Power and sensing

Selection guide 2022

www.infineon.com

Adam White,
Division President of
Power and Sensor Systems
电源与传感系统事业部总裁

Dear customer,

Thank you for downloading the Power and Sensing Selection Guide 2022 edition. This guide was created to eliminate choice overload by arranging our broad, cutting-edge portfolio and game-changing solutions around applications and technologies in a synthesized and easy-to-digest format.

The intelligent world we are living in brings new challenges and exciting opportunities for all of us in decarbonization and digitalization. The fusion of present and emerging technologies promises a digital, connected, and sustainable future. At Infineon, we not only want to be a part of this future, but we want to shape it - TOGETHER with you.

We continuously push technology limits to enable the advanced solutions of tomorrow. For your benefit, we bring products to systems maximizing your value. Our leading competencies in power, sensors, security, connectivity, and computing supported by our software expertise, application understanding, and outstanding quality leadership are part of our commitment to you.

Thanks to you and your trust in our company, we are the global leader in the power semiconductor market with our discrete and integrated silicon and wide-bandgap devices.

But we don't stop there! Following our long-term manufacturing strategy, we opened a state-of-the-art 300 mm wafer fab in Villach, Austria, and have started further expanding our frontend capacity in Kulim, Malaysia. With an additional €2 billion expenditure, we aim to add significant manufacturing capacities in wide bandgap (SiC and GaN) semiconductors. All these investments we make to enhance our supply security, increase our manufacturing flexibility and enable faster time to market for our customers.

As we grow, our responsibility grows - not only for the customers and employees, but also for the planet. Through our solutions, we make green energy happen within the entire power chain. This, in combination with our goal to achieve CO_2 neutrality by 2030, will have a significant impact on the world's CO_2 balance.

Sustainability and innovation are in our DNA, and our customers are at the heart of everything we do.

尊敬的客户，

感谢您下载《2022电源与传感选型手册》(以下简称“手册”)！本手册的目的是通过以综合且易于理解的方式，根据具体应用和技术来优化推荐更广泛、更领先的产品组合以及能够改变游戏规则的解决方案，从而帮助您减轻方案选择过程中的许多负担。

我们生活在一个智能世界，这其中许多人都会在减少碳排放和数字化方面面临新的巨大挑战和激动人心的机遇。现有技术和新兴技术的融合预示着未来将更加注重数字化、互联和可持续性，而对于英飞凌，我们不仅要参与这个美好未来的建设，而且还要与您一起来塑造更美好的未来！

为了能够提供面向未来的先进解决方案，我们正在不断突破技术极限。出于对客户的考虑，我们在为具体应用提供产品时将为您实现更大的价值。英飞凌拥有在电源、传感器、安全、连接和计算等方面的领先竞争力，深入的软件专业知识、应用理解和卓越的质量保证，这是我们对客户的一贯承诺。

正是您的大力支持和对英飞凌的长期信任，我们才得以凭借广泛和先进的分立与集成硅器件，以及宽带隙器件成为功率半导体市场的全球领导厂商。

但我们不会就此止步。根据我们的长期制造战略，英飞凌已经在奥地利菲拉赫(Villach, Austria)开设了先进的 300 毫米晶圆厂，并进一步扩大了我们在马来西亚居林(Kulim, Malaysia)的前端产能。通过额外的20 亿欧元投资，我们的目标是大幅提高宽带隙(SiC 和 GaN)半导体的制造能力。所有这些投资都是为了增强我们的供货安全保证，提高我们的制造灵活性，并帮助客户加快上市速度。

伴随我们业务的不断增长，我们也在承担更多的责任。在对客户和员工提供更多支持和关爱的同时，我们也更加关注自然环境。英飞凌解决方案已经在整个功率链路完全实现绿色能源目标，这与到 2030 年实现二氧化碳中和的目标相结合，将对全球二氧化碳的平衡产生重大影响。

可持续发展和创新刻在我们的 DNA中，而客户则是我们所有关注的核心。

Adam White,
Division President of Power and Sensor Systems
电源与传感系统事业部总裁

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Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Solutions

SMPS, battery management systems, motor control, UPS, contactless power and sensing

- SMPS - server power supply
- SMPS - telecom power supply
- SMPS - industrial SMPS
- SMPS - PC power supply
- SMPS - TV power supply
- Power over Ethernet (PoE)
- Fast/wireless EV charging
- Wireless charging for consumer/industrial
- USB-C chargers and adapters
- SMPS - battery chargers
- Battery protection
- Battery monitoring
- Relay replacement
- Low-voltage low-power motor drive and control
- High-power low-voltage motor drive
- Uninterruptible power supply
- Contactless power and sensing

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Feedback

Server SMPS

Highly efficient server power supply

The trend in the field of data center and enterprise servers is to deliver more power per rack. Meanwhile, the rising cost of energy and environmental concerns make SMPS efficiency optimization a key requirement across the entire load range for server and data center designs. This challenging task is combined with the requirement for higher power, higher power density, and cost effectiveness.

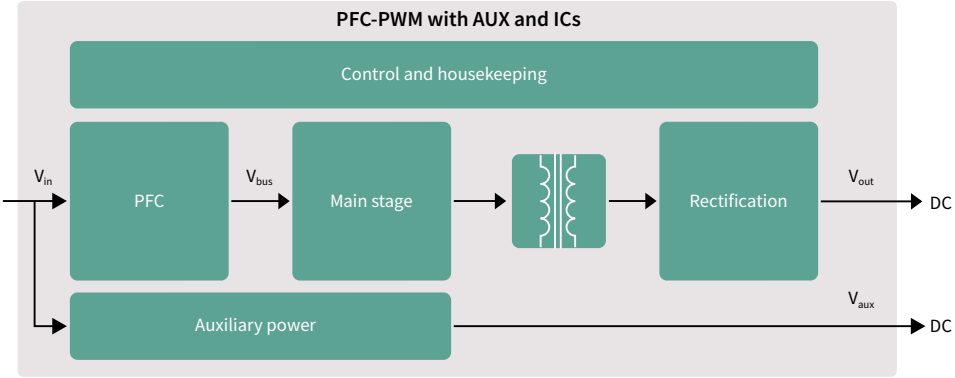
In the PFC stage and generally in hard-switching topologies used in server applications, Infineon recommends its 600 V CoolMOS™ C7 and G7 families offering the lowest FOM $R_{DS(on)}$*Q_G and $R_{DS(on)}$*E_{oss}. These MOSFET series provide the lowest switching losses, which is necessary in fast-switching-frequency operations in high-end server SMPS. With Infineon's C7 and G7 series, the efficiency is optimized already from a very light-load operation. Available in compact SMD packages such as ThinPAK, DDPAK, and TOLL, these SJ MOSFETs offer benefits in space usage and power density. The 600 V CoolMOS™ C7 and G7 products are best used with Infineon's industry-benchmark, the non-isolated EiceDRIVER™ 2EDN752x and the isolated EiceDRIVER™ Compact 1ED AF gate driver families.

Complementary to the 600 V CoolMOS™ C7 in high efficiency PFC are the CoolSiC™ Schottky diodes. The 600 V CoolMOS™ P7 family offers a good compromise between price and performance. This is valuable in both PFC and HV DC-DC stages where low Q_G and turn-off losses are important benefits, especially in case of high-switching-frequency operations and high light-load efficiency requirements.

As high power (2-6 kW and above) requires ultrahigh efficiency (96-98 percent peak) and high power density, Infineon's CoolGaN™ GIT HEMT 600 V family with totem-pole PFC controls deliver the highest efficiency and power density in the world. Using the 600 V CoolMOS™ S7 devices with active bridge circuit fulfills the Titanium® requirement at the lowest cost. Operating expenses (OPEX) and capital expenditures (CAPEX) are both reduced through simplified topologies and the power density in the server PSU is doubled.

In applications with low output voltage and high output current, further efficiency improvements are enabled by the continuous reduction of on-resistance. This can be achieved by using Infineon's low-voltage OptiMOS™ MOSFET series in the synchronous rectification stage. Infineon's low-voltage products are complemented by StrongIRFET™ devices that are optimized for lower switching frequencies and highest system robustness. Infineon's EiceDRIVER™ gate-driver IC family perfectly matches the CoolGaN™ and CoolSiC™ wide-bandgap products, and CoolMOS™ and OptiMOS™ MOSFET products.

In addition, ISOFACE™ digital isolators, based on the Infineon's coreless transformer (CT) technology, provide robust galvanic isolation for safety requirements.



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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended products

Functional block	Product category	Topology	Product family	Benefits
PFC	High-voltage MOSFETs	CCM/interleaved PFC; TTF	600 V/650 V CoolMOS™ C7 650 V CoolMOS™ G7 600 V CoolMOS™ S7	› Best FOM $R_{DS(on)}$*Q_G and $R_{DS(on)}$*E_{oss} › Lowest $R_{DS(on)}$ per package › Low dependency of switching losses form $R_{g,ext}$
	High-voltage GaN	Totem-pole PFC	CoolGaN™ GIT HEMT 600 V	› Enable the highest efficiency and highest power density
	High-voltage SiC MOSFET	Totem-pole PFC	CoolSiC™ 650 V	› Highest power handling capability › Highest temperature handling
	SiC diodes	CCM/interleaved PFC	CoolSiC™ Schottky diode 650 V G5	› Low FOM V_F*Q_G
	Control ICs	CCM PFC ICs	ICE3PCS0xG	› Ease of use
	GaN gate driver ICs	Totem-pole PFC	EiceDRIVER™ 1EDF5673F and 1EDF5673K	› Negative V_{GS} voltage to avoid false triggering › Differential output for GIT technology based GaN driving
	SiC MOSFET gate driver ICs	Totem-pole PFC	EiceDRIVER™ 2EDF9275F/1EDB9275F*	› 37 ns/45 ns typical propagation delay time › Functional isolation 1.5 kV
	Gate driver ICs	Interleaved PFC	EiceDRIVER™ 2EDN852x / 1EDN8511B EiceDRIVER™ 1EDN8550B for Kelvin-source CoolMOS™	› Source and sink driver capability: - 5 A for 2EDN - 4 A/8 A for 1EDN › 17 ns (45 ns for 1EDN8550B) propagation delay precision for fast MOSFET and GaN switching › (-)10 V input robustness (1EDN8550B has true differential inputs for ground-shift robustness CMR up to ±150 V)
			EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side driver in DSO8 with power-pad › Integrated UVLO protection and enable (EN) function › High frequency, high power operation with BOM savings
		Totem-pole PFC	EiceDRIVER™ level-shift: 2ED2181S06F, 2ED21814S06J	› 650 V half-bridge SOI driver with integrated bootstrap diode › Superior –VS transient voltage immunity › High frequency switching (500 kHz)
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
			EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
		Boost PFC	EiceDRIVER™ low side: 1ED44173N01B	› Single-channel with fast, accurate (± 5%), integrated overcurrent protection (OCP)
Main stage	High-voltage MOSFETs	ITTF	600 V CoolMOS™ C7/P6	› Fast switching speed for improved efficiency and thermals › Low gate charge for enhanced light-load efficiency and low power consumption at no-load condition › Optimized V_{GS} threshold for lower turn-off losses › Rugged body diode which prevents device failure during hard commutation
		LLC, half-bridge below 1 kW	600 V CoolMOS™ P7, CFD7	› Low turn-off losses › Low Q_{oss} › Low Q_G
		LLC, phase-shift full-bridge below 1 kW	600 V CoolMOS™ CFD7, 650 V CoolMOS™ CFD2	› Fast and rugged body diode › Optimized low Q_G and soft commutation behavior to reach highest effciency › Highest reliability for 650 V_{DS}
		ZVS PS FB, LLC, TTF	650 V TRENCHSTOP™ IGBT F5	› Improved ruggedness and high efficiency in low inductance designs
	Control ICs	HB LLC ICs	ICE1HS01G-1 ICE2HS01G	› High efficiency and low EMI
	Gate driver ICs	LLC, ZVS phase-shift full-bridge, TTF	EiceDRIVER™ 2EDS8165H, 2EDS8265H	› 37 ns typical propagation delay time › Reinforced (safe) isolation 6 kV, CMTI > 150 V/ns
			EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
			EiceDRIVER™ 2EDN8524F with pulse transformer	› 5 A source and sink driver capability › 17 ns propagation delay precision for fast MOSFET and GaN switching
			EiceDRIVER™ low side: 2ED24427N01F with pulse transformer	› Dual-channel, 10 A low-side driver in DSO8 with power-pad › Integrated UVLO protection and enable (EN) function › High frequency, high power operation with BOM savings
			EiceDRIVER™ level-shift: 2ED2181S06F, 2ED21814S06J	› 650 V half-bridge SOI driver with integrated bootstrap diode › Superior –VS transient voltage immunity › High frequency switching (500 kHz)
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
Sychronous rectification	Low-voltage MOSFETs	HB LLC and center tap	OptiMOS™ 40 V	› High efficiency over whole load range, layout tolerance
		ITTF	OptiMOS™ 60 V	› High efficiency, low thermals, low V_{DS} overshoot
		ZVS PS FB and center tap	OptiMOS™ 80 V	› High efficiency over whole load range, low V_{DS} overshoot and oscillations
	Gate driver ICs	Synchronous rectification	EiceDRIVER™ 2EDF7275K/2EDF7235K 2EDL811x/2EDL801x for bridge rectifier	› EiceDRIVER™ 2EDF72x5K › Functional isolation up to 650 V_{DC} channel-to-channel isolation › Compact solution available in LGA-13 5x5 mm package › EiceDRIVER™ 2EDL8x1x › Level-shift half-bridge gate driver up to 120 V isolation
			Low side: EiceDRIVER™ 2EDN75xx / 2EDN85xx, 1EDN751x / 1EDN8511B	› 5 A source and sink driver capability for 2EDN (4A/8A for 1EDN) › 17/19 ns propagation delay precision for fast MOSFET and GaN switching › (-)10 V input robustness
			EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side driver in DSO8 with power-pad › Integrated UVLO protection and enable (EN) function › High frequency, high power operation with BOM savings
			EiceDRIVER™ level-shift: 2ED2181S06F, 2ED21814S06J	› 650 V half-bridge SOI driver with integrated bootstrap diode › Superior –VS transient voltage immunity › high frequency switching (500 kHz)
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
			EiceDRIVER™ 1EDNx550B	› True differential inputs for ground shift robustness CMR up to ±150 V
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	700 V - ICE5xR0070xx 800 V - ICE5xR0080AG 800 V - ICE5QRxx80BG	› Low standby power, high efficiency and robustness › An integrated 700 V/800 V superjunction power MOSFET with avalanche capability › Burst mode entry/exit to optimize standby power at different low load conditions
Isolation	Digital isolator	-	2DIB040F*	› 2+0 digital isolator with TTL input threshold and fail-safe default low output state › 3 kVrms isolation voltage (UL 1577) in DSO8 package › High common mode transient immunity > 100 kV/us
Housekeeping	Microcontrollers	-	XMC1xxx	› Flexibility, HR PWM, digital communication › Arm®-based standard MCU family and wide family
Conversion	Microcontrollers	-	XMC4xxx	› Flexibility, HR PWM and digital communication

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* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Telecom

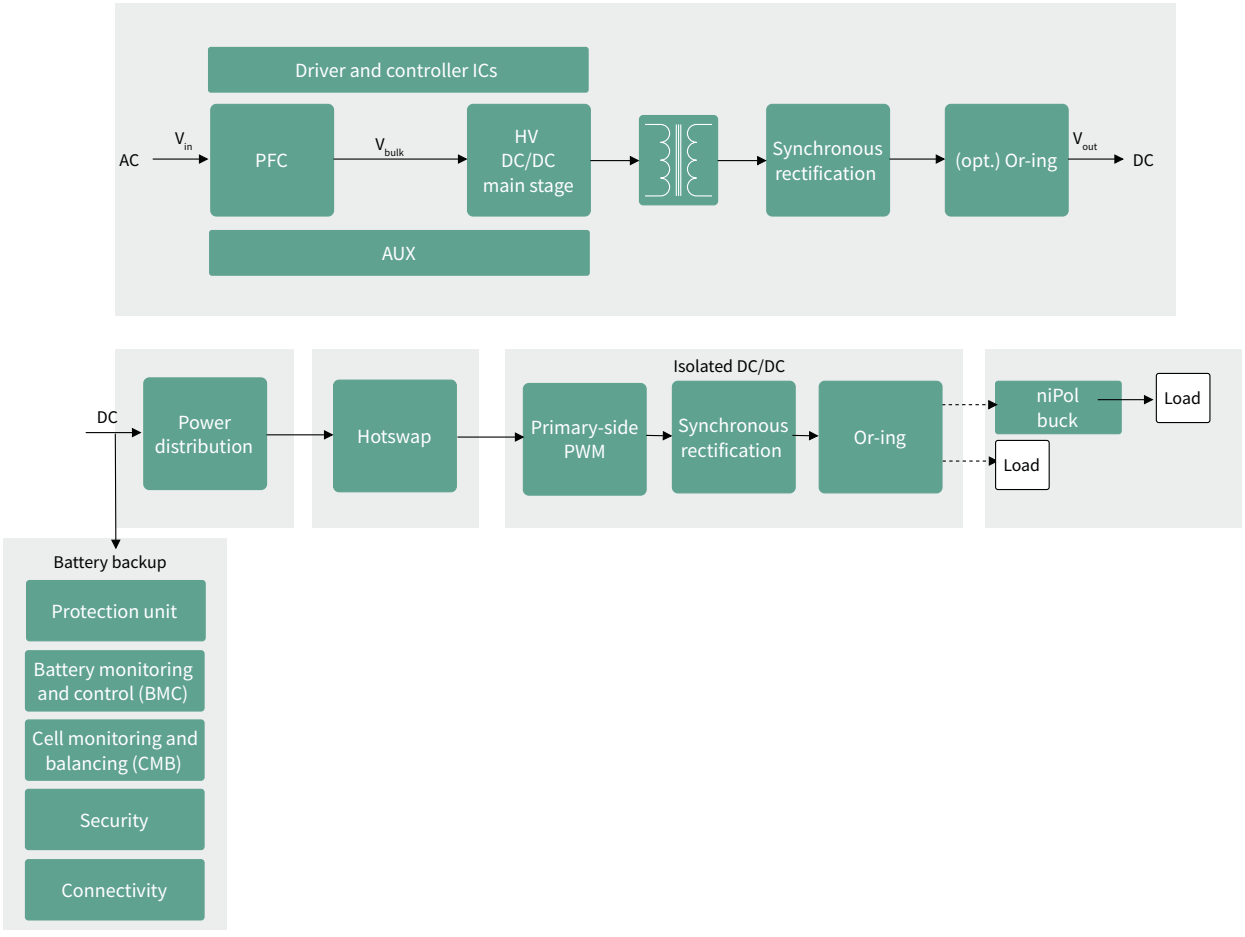
SMPS

Full system solution for telecom power supply

The ever increasing data consumption, coupled with new levels of virtualization and complexity of the 5G telecom infrastructure, is bringing its demanding requirements into the telecom power arena. The outstanding improvements made in telecom SMPS performance in the past decade have been primarily brought by the dramatic reduction of the on resistance achieved in high voltage MOSFETs, using the revolutionary superjunction principle. This principle was introduced by Infineon at the end of the nineties with the CoolMOS™ series.

To achieve the current demanding, flat energy efficiency targets, it has been increasingly popular to employ synchronous rectification utilizing the unique performance of medium-voltage OptiMOS™ power MOSFETs. The OptiMOS™ power MOSFET family, which has gained terrific popularity in DC-DC brick solutions, coupled with gate-driver ICs and microcontrollers efficiently powers the BBUs, RRUs and AAUs of the macro and the small cells.

Infineon's wide bandgap technologies, such as the CoolGaN 600 V GIT HEMT (gallium-nitride-based) and the CoolSiC™ 650 V (silicon-carbide-based) for primary side and the upcoming CoolGaN™ 100 V/200 V* for synchronous rectification, complement the wide portfolio of silicon-based switches, enabling highest electrical conversion efficiency and robustness at attractive system costs. Infineon's EiceDRIVER™ gate driver IC family perfectly matches the CoolGaN™ and CoolSiC™ wide bandgap products, and CoolMOS™ and OptiMOS™ MOSFET products.



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* in development

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended products

Functional block	Product category	Topology	Product family	Benefits
PFC	High-voltage MOSFETs	Classic CCM/interleaved PFC Dual-boost PFC	600 V/650 V CoolMOS™ C7	› Best FOM $R_{DS(on)}$*Q_G and $R_{DS(on)}$*E_{oss} › Lowest $R_{DS(on)}$ per package › Low dependency of switching losses form $R_{g,ext}$
			600 V CoolMOS™ P7	› Low turn-off losses › Low Q_{oss} › Low Q_G
			600 V CoolMOS™ S7	› The lowest $R_{DS(on)}$ MOSFET for line frequency rectification
	High-voltage GaN	CCM totem-pole PFC	CoolGaN™ 600 V	› Switching at high frequencies (> Si) › Enables high power density
	High-voltage SiC MOSFET	CCM totem-pole PFC	CoolSiC™ 650 V	› Enable very high efficiency with ease of use
	SiC diodes	Classic CCM/interleaved PFC Dual-boost PFC	CoolSiC™ Schottky diode 650 V G6	› Low FOM V_F*Q_C
	Control ICs	CCM PFC ICs	ICE3PCS0xG	› High PFC and low THD
	GaN gate-driver ICs	Totem-pole PFC	EiceDRIVER™ 2EDF9275F/1EDB9275F	› Negative V_{GS} voltage to avoid false triggering › Differential output for GIT technology based GaN driving › CMTI > 200 V/ns
	SiC MOSFET gate-driver ICs	Totem-pole PFC	EiceDRIVER™ 2EDF9275F/1EDB9275F	› 37 ns/45 ns typical propagation delay time › Functional isolation 1.5 kV › CMTI > 150 V/ns
	Gate-driver ICs	Totem-pole PFC	EiceDRIVER™ 2EDFx275F/1EDBx275F	› 37 ns/45 ns typical propagation delay time › Functional isolation 1.5 kV › CMTI > 150 V/ns
			EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
			EiceDRIVER™ level-shift: 2ED2304S06F, 2EDL23N06PJ, 2ED2182S06F	› Integrated bootstrap diode using Infineon SOI technology, low level-shift loss › Excellent ruggedness against negative transient voltages on VS pin
		Interleaved dual-boost PFC	EiceDRIVER™ 2EDN852x/1EDN851x	› 5 A source and sink driver capability for 2EDN › 8 A sink and 4 A source driver capability for 1EDN › 17 ns propagation delay precision for fast MOSFET and GaN switching
			EiceDRIVER™ 1EDN8550B for Kelvin-source CoolMOS™	› 8 A sink and 4 A source driver capability › 45 ns for propagation delay precision for fast MOSFET and GaN switching › True differential inputs for ground shift robustness (CMR up to ±150 V)
			EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side gate driver in PG-DSO8 package with power-pad › UVLO and enable (EN), high frequency, high power operation with BOM savings
DC-DC main stage	High-voltage MOSFETs	TTF, ITTF	600 V CoolMOS™ C7/P7	› Fast-switching speed for improved efficiency and thermals › Low gate charge for enhanced light load efficiency › Optimized V_{GS} threshold for lower turn-off losses › Rugged body diode which prevents device failure during hard commutation
		HB/FB LLC	600 V CoolMOS™ P7	› Low turn-off losses › Low Q_{oss} › Low Q_G
		HB/FB LLC, ZVS PSFB	600 V CoolMOS™ CFD7	› Best-in-class Q_{rr} and t_{rr} level › Significantly reduced Q_G › Improved efficiency over previous CoolMOS™ fast-body-diode series
	Gate-driver ICs	HB LLC, ZVS phase-shift full-bridge	EiceDRIVER™ 2EDS8x65H	› 37 ns typical propagation delay time › Reinforced isolation 8 kVpk › CMTI > 150 V/ns
			EiceDRIVER™ 2EDN8524F with pulse transformer	› 5 A source and sink driver capability › 17 ns propagation delay precision for fast MOSFET and GaN switching › (-)10 V input robustness
			EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
			EiceDRIVER™ level-shift: 2ED2304S06F, 2EDL23N06PJ, 2ED2182S06F	› Integrated bootstrap diode using Infineon SOI technology, low level-shift loss › Excellent ruggedness against negative transient voltages on VS pin
	Control ICs	HB LLC	ICE1HS01G-1, ICE2HS01G	› High efficiency and low EMI
	GaN gate-driver ICs	LLC, ZVS phase-shift full-bridge	EiceDRIVER™ 1EDS5663H	› Negative V_{GS} voltage to avoid false triggering › Differential output for GIT technology based GaN driving › CMTI > 200 V/ns
	High-voltage GaN	LLC, ZVS phase-shift full-bridge	CoolGaN™ 600 V	› Enables the highest efficiency and highest power density
Synchronous rectification	Low-voltage MOSFETs	Synchronous rectification MOSFET	OptiMOS™ 80-200 V	› Industry's lowest FOM ($R_{DS(on)}$*Q_G) leading to high efficiency at good price/performance › Low voltage overshoots enabling easy design-in › Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density › Outstanding quality and reliability › Reduces the need for a snubber circuit
	Gate-driver ICs	Synchronous rectification	EiceDRIVER™ 2EDF7275K	› Functional isolation up to 650 V_{DC} channel-to-channel isolation › Compact solution available in LGA-13 5x5 mm package
			EiceDRIVER™ 2EDL811x/ 2EDL801x	› Level-shift half-bridge gate driver up to 120 V isolation
			Low side: EiceDRIVER™ 2EDN75xx/ 2EDN85xx, 1EDN751x/ 1EDN851x	› 5 A source and sink driver capability for 2EDN › 8 A sink and 4 A source driver capability for 1EDN › 17/19 ns propagation delay precision for fast MOSFET and GaN switching › (-)10 V input robustness
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
			EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side gate driver in PG-DSO8 package with power-pad › UVLO and enable (EN), high frequency, high power operation with BOM savings
Auxiliary power supply	Control ICs	5th generation QR/FF flyback CoolSET™	QR 800 V - ICE5QRxx80BG FF 800 V - ICE5xRxx80AG	› Quasi-resonant-switching operation for high efficiency and low EMI signature › Fixed-frequency-switching operation for ease of design – 100 KHz and 125 KHz › Fast and robust start-up with cascode configuration › Robust protection with adjustable line input overvoltage protection, V_{CC} and CS pin short-to-ground protection › Optimized light-load efficiency with selectable burst mode entry/exit profile › Frequency reduction for mid- and light-load condition to reduce switching losses and increase efficiency › Direct feedback and regulation with integrated error amplifier for non-isolated output › High power delivery of up to 42 W with 800 V CoolSET™ in heatsink-free SMD package
Housekeeping	Microcontrollers	-	XMC1xxx	› Flexibility, HR PWM, digital communication › Arm®-based standard MCU family and wide family
Power conversion	Microcontrollers	-	XMC1xxx, XMC4xxx	› Flexibility, HR PWM, digital communication › Arm®-based standard MCU family and wide family
Isolated DC-DC	Microcontrollers	-	XDPP1100	› Optimized for 48 V telecom isolated conversion › Highly flexible digital core › State-of-the-art dedicated AFE › State-machine based fast loop control › Pre-programmed peripherals in ROM › Negligible internal power consumption › Industry smallest digital power controller

The list of recommended products continues on the next page.

Recommended products

Functional block	Product category	Topology	Product family	Benefits
Or-ing	Low-voltage MOSFETs	Or-ing MOSFET	OptiMOS™ 60-200 V	› Industry's lowest FOM ($R_{DS(on)}$*Q_G) leading to high efficiency at good price/performance › Low-voltage overshoots enabling easy design-in
Battery management and protection	Low- and medium-voltage MOSFETs	Back-to-back disconnect	OptiMOS™ 80-200 V StrongIRFET™ 80-200 V	› Industry's lowest Low $R_{DS(on)}$ › Wide SOA › Perfect match of robust and excellent price/performance
	Microcontroller	-	PSoC™ 4	› 32-bit MCU Subsystem › 48-MHz Arm® Cortex®-M0+ CPU › Flash: Up to 256 kB flash › RAM: 32 kB SRAM › Up to 2 CAN › USB/ Up to 4 serial channels
	Current sensing	Coulomb count	TLI4971	› Ultralow-power loss due to minimal resistance of the current rail › Reliable current measurement over the lifetime (no re-calibration) › Functional isolation for high-voltage application › Easy and compact package allows high power density design
	Battery management IC	Cell monitoring	TLE9012	› Robust communication without the need of transformers or common-mode chokes › Best in class voltage measurement accuracy even after soldering thanks to stress sensor technology › Integrated diagnosis easing functional safety design › Integrated UART communication for systems with a microcontroller on local ground
	Small signal N/P channel MOSFET	Cell balancing	OptiMOS™ 20-30 V StrongIRFET™ 20-30 V	› Wide range of packages › Suitable for space constraints › Suitable equalizing current between 0.5 A to 2.5 A › Compact solution with smaller PCB footprint
	Communication	-	Lin CAN	› Low quiescent current › ISO11898 compliant › Excellent EMI performance › Standby / sleep mode › Wake and failure detection › High ESD robustness
	Security	-	OPTIGA™ Trust M	› High-end CC EAL6+ (high) certified security controller: ECC, RSA®, AES, SHA, TLS, HKDF › Full turnkey solution › Host code with an abstraction layer › Customer-specific certificate provided for zero-touch provisioning
Isolated DC-DC	Microcontrollers		XDP™	› Optimized for 48 V telecom isolated conversion › Highly flexible digital core › State-of-the-art dedicated AFE › State-machine based fast loop control › Pre-programmed peripherals in ROM › Negligible internal power consumption › Industry smallest digital power controller
	Low-voltage MOSFETs	Primary-side PWM MOSFETs	OptiMOS™ 80-200 V StrongIRFET™ 80-200 Small-signal MOSFETs 60-200 V	› Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density › Outstanding quality and reliability › Reduces the need for a snubber circuit
		Synchronous-rectification MOSFET	OptiMOS™ 40-100 V StrongIRFET™ 40-100	
		Or-ing MOSFET	OptiMOS™ 25-30 V StrongIRFET™ 25-30 V	
		Active snubber	OptiMOS™ power MOSFET 60 V/100 V/150 V	
	Gate-driver ICs	Primary side	EiceDRIVER™ 2EDF7275K	› Functional isolation up to 650 VDC channel-to-channel isolation › Compact solution available in LGA-13 5x5 mm package
			EiceDRIVER™ 2EDL811x/ 2EDL801x	› Functional isolation up to 650 VDC channel-to-channel isolation › Compact solution available in LGA-13 5x5 mm package
		Synchronous rectification	EiceDRIVER™ 2EDF7275K	› Functional isolation up to 650 VDC channel-to-channel isolation › Compact solution available in LGA-13 5x5 mm package
			EiceDRIVER™ 2EDL811x/2EDL801x	› Level-shift half-bridge gate driver up to 120 V isolation
			Low side: EiceDRIVER™ 2EDN75xx/ 2EDN85xx, 1EDN751x/1EDN851x	› 5 A Source and Sink driver capability for 2EDN › 8 A sink and 4 A source driver capability for 1EDN › 17/19 ns propagation delay precision for fast MOSFET and GaN switching › (-)10 V input robustness
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
			EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side gate driver in PG-DSO8 package with power-pad › UVLO and Enable (EN), high frequency, high power operation with BOM savings

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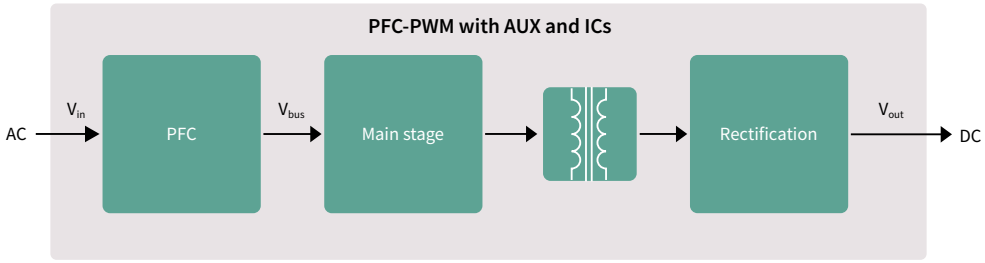
Industrial SMPS

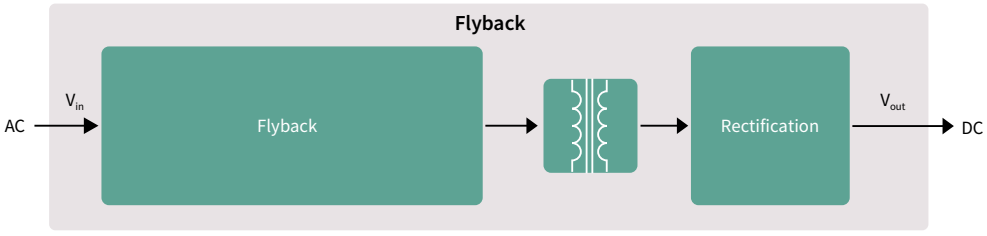
Reliable and robust

Industrial SMPS powers a wide range of devices from industrial automation robots to medical equipment and vending machines. With the expansion of the Internet of Things (IoT) and the adoption of Industry 4.0, the demand for industrial SMPS is on the rise. Industrial switch-mode power supplies (SMPS) are mostly operated in outdoor environments without air conditioning or systems without fans. Such operating conditions make reliability and robustness the key requirements for the industrial SMPS, especially when it comes to high-temperature operations, outdoor use, line surges, load jumps, short circuit, and so on. In addition to quality, reliable supply and long-term product availability are also some of the key customer concerns. Industrial SMPS life cycle goes beyond 10 years and it takes 3 to 5 years to ramp. Hence, not only do customers need high-quality products, but also stable and reliable supply over the industrial SMPS life cycle (10 to 20 years).

Infineon meets all of these requirements with its CoolMOS™, OptiMOS™, StrongIRFET™ and EiceDRIVER™ gate-driver product families. Infineon's products offer the best price/performance ratio along with the highest efficiency and reliability. For new designs, we recommend our CoolMOS™ P7 600 V/800 V/950 V parts, as well as the latest generation of OptiMOS™ 30 V/40 V/60 V/80 V/ 100 V/150 V and 250 V products. For high-power designs with convection cooling and high power supplies, our CoolMOS™ S7 in acitve bridge configuration will reduce the power losses to enable fanless operation. In addition, the ISOFACE™ digital isolators, based on the Infineon's coreless transformer (CT) technology, provide robust galvanic isolation for safety requirements.

Application diagrams





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Product portfolio

Functional block	Product category	Topology	Technology	Benefits
PFC/Main stage	High-voltage MOSFETs	CrCM/DCM PFC	600 V/800 V/950 V CoolMOS™ P7	› Best thermal performance › Rugged body diode › ESD enhancement for production line › Wide $R_{DS(on)}$ portfolio including both THD and SMD packages
			600 V CoolMOS™ P6	› Fast-switching speed for improved efficiency and thermals › Low gate charge for enhanced light-load efficiency and low power consumption at no load condition › Optimized V_{GS} threshold for low turn-off losses
			600 V CoolMOS™ S7	› PFC efficiency boost ~1% › Lowest $R_{DS(on)}$ in SMD packages
	High-voltage SiC MOSFET	Totem-pole PFC	CoolSiC™ 650 V	› Highest power handling › Best thermal capability
	Boost diodes	DCM PFC	650 V Rapid 1	› Low conduction losses
		CCM PFC	650 V Rapid 2	› Low reverse recovery losses and PFC switch turn-on losses
	Control ICs	CCM PFC ICs	ICE3PCS0xG	› High PFC and low THD
Main stage	Control ICs	HB LLC ICs	650 V – ICE1HS01G-1/ICE2HS01G	› High efficiency and low EMI
Synchronous rectification	Medium-voltage diodes	HB LLC + center-tap	OptiMOS™ 30 V/40 V/60 V/80 V/150 V/250 V	› Optimized cost/performance and low thermals
PFC/Main stage/ Synchronous rectification	Gate driver ICs	Boost PFC	EiceDRIVER™ low side: 1ED44173N01B	› Single-channel with fast, accurate (± 5%), integrated over-current protection (OCP)
		Totem-pole PFC/ HB LLC	EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
			EiceDRIVER™ level-shift: 2ED2181S06F, 2ED21814S06J	› 650 V half-bridge SOI driver with integrated bootstrap diode › Superior –VS transient voltage immunity › High-frequency switching (500 kHz)
			EiceDRIVER™ level-shift: IRS2186S, IRS21864S	› 4 A/4 A high- and low-side gate driver
		Interleaved PFC/ HB LLC	EiceDRIVER™ low side: 2ED24427N01F	› Dual-channel, 10 A low-side driver in DSO8 with power-pad › Integrated UVLO protection and enable (EN) function › High frequency, high power operation with BOM savings
Flyback	Control ICs	QR flyback	ICE5QSBG	› High efficiency and low standby power
	High-voltage MOSFET	Flyback	700 V/800 V CoolMOS™ P7	› Best price-competitive CoolMOS™ family › Lower switching losses versus standard MOSFET › Controlled dV/dt and di/dt for better EMI
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	700 V/800 V ICE5QRxx70/80A(Z)(G)	› Low standby power, high efficiency and robustness
Isolation	Digital isolator		2DIB0410F*	› 2+0 digital isolator with TTL input threshold and fail-safe default low output state › 3 kV_{rms} isolation voltage (UL 1577) in DSO8 package › High common mode transient immunity > 100 kV/µs

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*Coming soon

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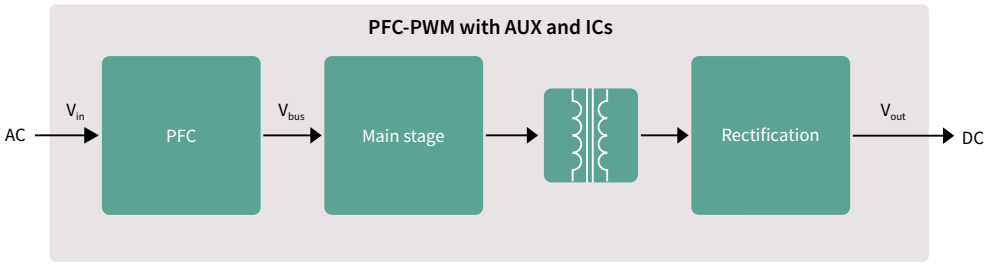
SMPS

More efficient PC power supply

The PC power market is divided into high-end gaming PC and better cost-performance sectors to achieve a better price/performance for desktop SMPS. The PC OEMs are implementing the desktop SMPS by removing the AUX power block to save the cost of having a flyback circuit.

Due to the new structure of the CPU and GPU, higher and higher peak power is needed (1.5 to 2 times higher than normal power). In addition to the needed CCM PFC, Infineon 600 V CoolMOS™ P7 and OptiMOS™ 40 V / 60 V offer the best price/performance and reliability to meet the design requirements, as well as to achieve the highest efficiency enabled by semiconductors available in the market.

For that CPU and GPU power-hungry gaming PCs, the ICE3PCS0xG CCM PFC IC provides high efficiency over the whole load range and low count of external components, besides that, the ICE3PCS0xG CCM PFC IC offers fast output dynamic response during load jump. In addition to PGFC IC, Infineon's LLC ICs ICE1HS01G/ICE2HS01G support customers to minimize the external component count.



Recommended products

Functional block	Product category	Topology	Technology	Benefits
PFC/main stage	High voltage MOSFETs	CrCM/DCM PFC	600 V CoolMOS™ P7	› Best thermal performance › Rugged body diode › ESD enhancement for production line › Wide $R_{DS(on)}$ portfolio including both THD and SMD packages
			600 V CoolMOS™ P6	› Fast switching speed for improved efficiency and thermals › Low gate charge for enhanced light-load efficiency and low power consumption at no load condition › Optimized V_{GS} threshold for low turn-off losses
			500 V CoolMOS™ CE	› Optimized cost/performance › Lower transition losses versus standard MOSFET
	Boost diodes	DCM PFC	650 V Rapid 1	› Low conduction losses
		CCM/interleaved PFC	CoolSiC™ Schottky diode 650 V G6	› Low FOM V_F*Q_G
	Control ICs	CCM PFC ICs	ICE3PCS0xG	› High PFC and low THD
Main stage	Control ICs	HB LLC ICs	650 V – ICE1HS01G-1/ ICE2HS01G	› High efficiency and low EMI
Synchronous rectification	Medium voltage diodes	HB LLC + center-tap	OptiMOS™ 40 V	› Optimized cost/performance and low thermals
			OptiMOS™ 60 V	› Layout tolerance and low thermals

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SMPS

Diversify TV power supply with cost, performance, and ease of use

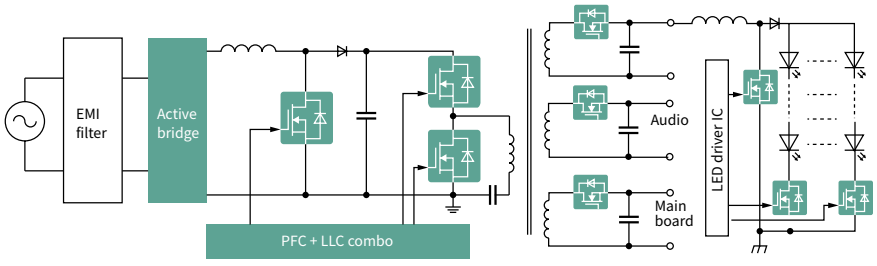
In addition to their outstanding image quality, new generation TVs gain attention for their user interface, low power consumption, and slim design. This requires the power supply unit (PSU) either to keep a low profile to maintain the slim appearance of a TV and a low thermal dissipation image or to have an external adapter. In addition, a growing number of TV manufacturers use external adapters to deliver DC power to the TV. Infineon products based on digital power technology have been designed to meet the challenges of efficiency and standby power requirements for the IoT-enabled TVs (both embedded PSU and adapter).

Thanks to digital power, our customers can reduce the number of TV power supplies by easily and flexibly adapting the digital IC parameters to different TV and screen models. Infineon's digital-based flyback controllers are ideal for low-power adapters for TVs and monitors. With digital soft switching, the adapter power density can significantly be improved.

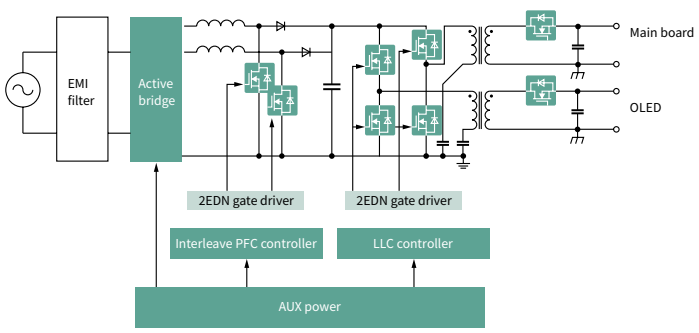
The 600 V CoolMOS™ P7 series has been developed to cover a broad spectrum of different applications where excellent performance and perfect ease of use are required. The rugged body diode enables the use of hard-switching topologies, such as power factor correction (PFC), boost, and two-transistor forward (TTF) and resonant topologies such as LLC, where the technologies lead to high efficiency in both hard-switching and resonant circuits.

For higher on-state resistance ($R_{DS(on)}$) classes, a new feature of an integrated ESD diode helps to improve the quality in manufacturing. At the same time, the low $R_{DS(on)}$ and gate charge (Q_G) enable high efficiency in the various topologies. The 600 V CoolMOS™ P7 with a wide variety of $R_{DS(on)}$ and packages on consumer-grade for TV power. Infineon developed a family of packages specifically for TV power supplies, characterized by short lead, SOT-223 mold stopper, and wide creepage distance, which enable low-cost and reliable manufacturing for our customers.

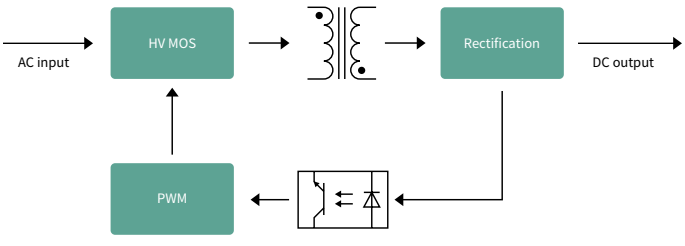
Non-AUX digital solution for large screen size



High-power solution for larger screen size



Flyback solution for small screen size



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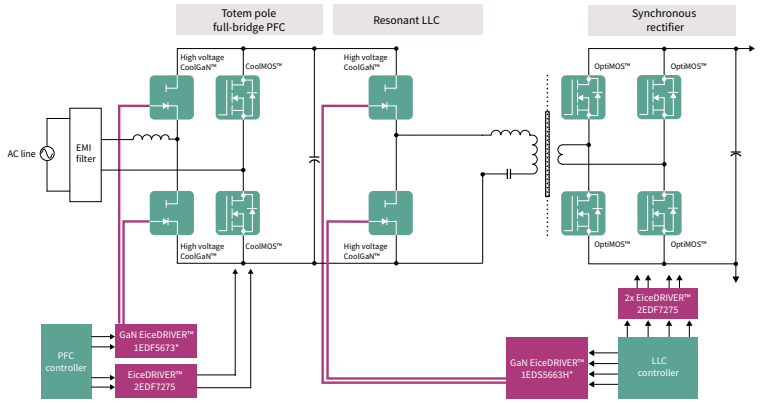
High-power solution for larger screen size



Recommended products

Functional block	Product category	Topology	Product family	Benefits
Main stage/PFC combo non-AUX	High-voltage MOSFETs	Active bridge	600 V CoolMOS™ S7	› Body diode robustness at AC line commutation › Improved thermal resistance › Absolute lowest $R_{DS(on)}$ in the market › Enables top-side cooling with DDPAK and QDPAK › Ideal fit for solid-state and hybrid relays and circuit breakers
		Active bridge DCM PFC HB LLC	600 V CoolMOS™ P7	› Fast-switching speed for improved efficiency › Low gate charge for enhanced light-load efficiency and low power consumption at no-load condition › Optimized V_{GS} threshold for lower turn-off losses › Rugged body diode for HB LLC application
		DCM PFC, HB LLC	600 V CoolMOS™ PFD7	› Robustness and reliability with integrated robust, fast body diode and up to 2 kV ESD protection in gate › Reduced gate charge for enhanced light-load efficiency, and lower hysteresis loss
	Gate-driver IC	HB LLC	EiceDRIVER™ level-shift: 2ED2181S06F, 2ED21814S06J	› 650 V half-bridge SOI driver with integrated bootstrap diode › High-frequency switching (500 kHz)
	Control ICs	IDP2308	PFC-LLC non-AUX digital IC for TV embedded PSU	› Low BOM count/system cost due to high integration › Low standby power › High system reliability › Shorter development cycles and higher design and production flexibility
		IDP2303A	PFC-LLC non-AUX digital IC for TV adapter	› Low BOM count/system cost due to high integration › Low standby power › Small form factor designs › High system reliability
Synchronous rectification	Low-voltage MOSFETs	Synchronous rectification	OptiMOS™ 5 100-150 V StrongIRFET™ 2 100 V	› Low conduction losses, reduced overshoot › FullPAK package available
PFC	Boost diodes	DCM PFC	650 V Rapid diode	› Low conduction losses
	Control ICs	CCM PFC ICs	ICE3PCS0xG	› High PFC and low THD
	WBG	PFC	CoolGaN™ 600 V e-mode HEMTs	› Highest efficiency contribution via less parasitic parameter › Space saving with SMD smaller package
	Gate-driver IC	PFC	1ED44173N01B	› Single-channel with fast, accurate (± 5%), integrated over-current protection (OCP)
High voltage MOSFETs	Active bridge DCM PFC HB LLC		600 V CoolMOS™	› Fast switching speed for improved efficiency › Low gate charge for enhanced light load efficiency and low power consumption at no-load condition › Optimized V_{GS} threshold for lower turn-off losses › Rugged body diode for HB LLC application
Main stage	Control ICs	HB LLC ICs	ICE1HS01G-1/ICE2HS01G	› High efficiency and low EMI
	WBG	HB LLC	CoolGaN™ 600 V Integrated Power Stage	› Highest efficiency, highest power density › High reliability › Isolated gate driver integrated
	High-voltage MOSFETs	HB LLC	600 V CoolMOS™ P7	› Fast-switching speed for improved efficiency › Low gate charge for enhanced light-load efficiency and low power consumption at no-load condition › Optimized V_{GS} threshold for lower turn-off losses › Rugged body diode for HB LLC application
Auxiliary power supply	Control ICs	QR/FF flyback CoolSET™	QR CoolSET™ - ICE5QRxx80BG FF CoolSET™ - ICE5xRxxxxXX	› Low standby power, high efficiency and robustness
Flyback	Control ICs	QR flyback	ICE2QS03G	› Forced resonant ZVS control reduces the switching loss › Multilevel protection enables the robust design › Flexible firmware provides more differentiation for OEMs
	High-voltage MOSFETs	Flyback	700 V CoolMOS™ P7	› Optimized for flyback topologies › Best price competitive CoolMOS™ SJ MOSFET family › Lower switching losses versus standard MOSFET › Controlled dV/dt and di/dt for better EMI

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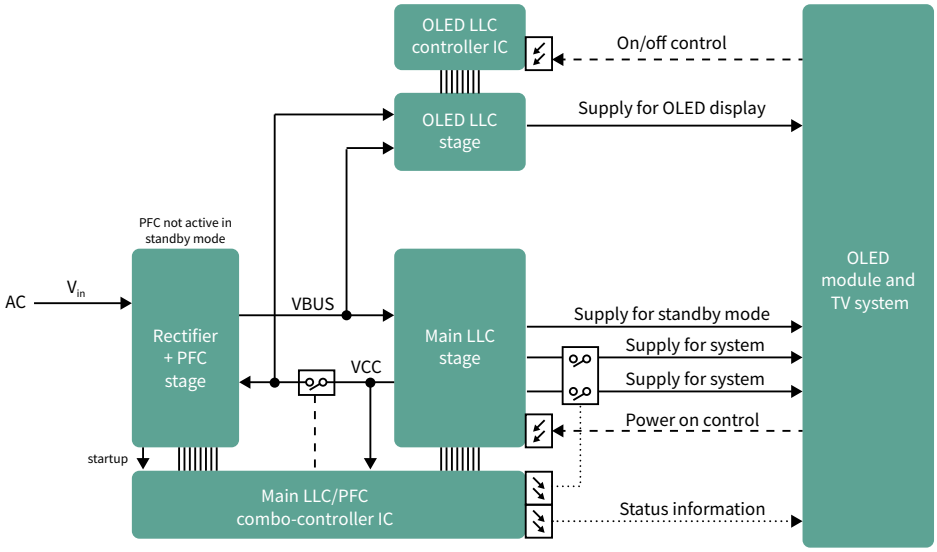
OLED TV power block diagram



OLED TVs improve user experience as they can be thinner, lighter, more flexible, and consume less power than LCD/ LED TVs.

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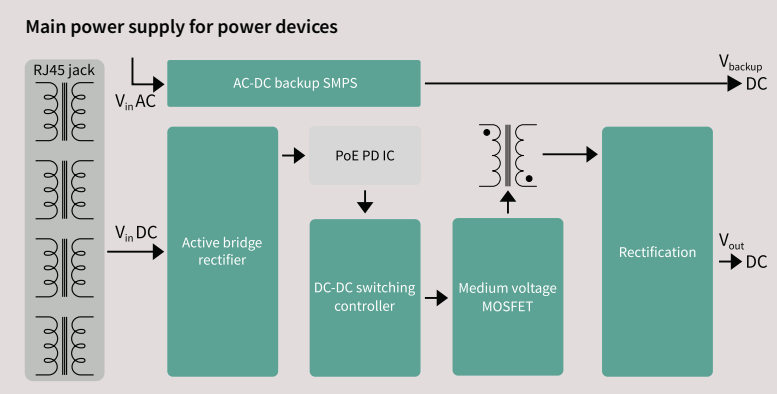
Power over Ethernet (PoE)

Designing reliable and power-efficient PoE power supplies

The latest IEEE 802.3bt standard for Power over Ethernet (PoE) not only increased the available power via PoE but also changed requirements for its power supply. Power sourcing equipment (PSE) now provides up to 100 W per port via a twisted pair of Ethernet cabling, whereas powered devices (PD) will have up to 71 W available. The adoption of this new PoE standard also largely depends on the capability to increase the power density on the PSE side while maintaining the same form factor as wide load conditions and higher power budgets change requirements. Infineon has long-standing expertise in switched-mode power supply (SMPS) designs and offers a highly reliable, rugged and efficient high-quality MOSFET portfolio for your PoE PSE and PD designs.

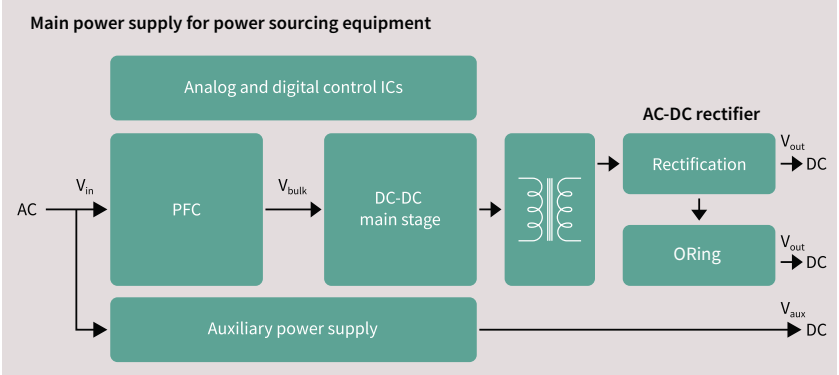
Powered devices

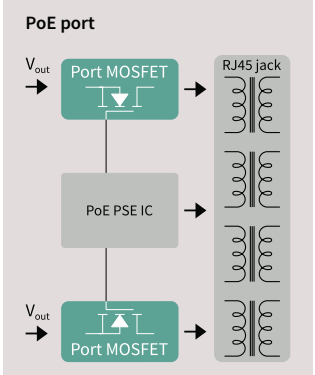
Powered devices (PD) include devices powered by PoE such as wireless access points, 5G small-cell radio units, IP cameras, conference systems, thin clients or public address systems. DC-DC SMPS designs need to be power efficient to maximize the available power for the PD itself with the simultaneous increase of power density. Moreover, PDs need to function reliably in the field even under potentially rough conditions for a long time.



Power sourcing equipment

Power sourcing equipment (PSE) is any equipment that is able to provide and source power on the twisted pair Ethernet cable, such as PoE switches, PoE extenders and PoE injectors. PSE needs to be highly reliable to prevent device failure and ensure uninterruptible operations of connected power devices. With IEEE 802.3bt PoE, the power demand for PoE switches significantly increases with highest efficiency over wide load conditions. For example, to fully enable a switch with twenty-four 802.3bt compliant PoE ports, up to 2.4 kW of available PoE power budget is required. This makes modifications in AC-DC SMPS designs necessary to fulfill these requirements.





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Recommended product portfolio for power sourcing equipment

Functional block	Product category	Topology	Product family	Benefits
PFC	High-voltage MOSFETs	DCM, CrCM, CCM,	600 V/650 V CoolMOS™ C7 600 V CoolMOS™ P7	› Best FOM $R_{DS(on)}$ x Q_G and $R_{DS(on)}$ x E_{oss} › Lowest $R_{DS(on)}$ per package › Lowest dependency of switching losses from $R_{g,ext}$ › Low turn-off losses, low Q_{oss}, and low Q_G
	Control ICs	DCM, CrCM, CCM	ICE3PCS0xG	› Simple external circuitry › High PFC and low THD
	High-voltage GaN	CCM totem-pole	CoolGaN™ 600 V	› Highest efficiency and highest power density
	GaN driver ICs	CCM totem-pole	EiceDRIVER™ 1EDF5673Fx/1EDS5663H	› Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) › Input-output propagation delay accuracy: ± 5 ns › Functional and reinforced isolation available
	SiC Schottky diode	DCM, CrCM, CCM	CoolSiC™ Schottky diode 650 V G5/G6	› Low FOM V_F x Q_C
	Silicon power diode	DCM, CrCM, CCM	650 V Rapid 1/2 diodes	› Low conduction losses
DC-DC main stage	High-voltage MOSFETs	Flyback (ACF), HB LLC, FB LLC, ITTF, ZVS	600 V CoolMOS™ P7/C7/CFD7 650 V TRENCHSTOP™ F5	› Best FOM $R_{DS(on)}$ x Q_G and $R_{DS(on)}$ x E_{oss} › Lowest $R_{DS(on)}$ per package › Lowest dependency of switching losses from $R_{g,ext}$ › Low turn-off losses, low Q_{oss}, and low Q_G
	Low- and medium-voltage MOSFETs	Isolated DC-DC primary-side PWM	OptiMOS™ 60 V-200 V StrongIRFET™ 60 V-200 V Small-signal MOSFETs 60 V-200 V	› Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density › Outstanding quality and reliability › Reduces the need for a snubber circuit
	Gate-driver ICs	-	EiceDRIVER™ 1EDNx/1EDi/2EDN7x/ 2EDLx/ 2EDFx/2EDSx	› Broadest portfolio in terms of isolation, channels, and protection
	Control ICs	HB LLC PWM-QF PWM-FF	ICE2HS01G ICE2QS03G/ICE5QSBG ICE5ASAG/ICE5GSAG	› High efficiency and low EMI
	High-voltage GaN	Flyback (ACF), HB LLC, FB LLC, ZVS	CoolGaN™ 600 V	› Highest efficiency and highest power density
	GaN driver ICs	-	EiceDRIVER™ 1EDF5673Fx/1EDS5663H	› Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink) › Input-output propagation delay accuracy: ± 5 ns › Functional and reinforced isolation available
PFC-main stage combo	High-voltage MOSFETs	HB LLC	600 V CoolMOS™ P7	› Low turn-off losses, low Q_{oss}, and low Q_G › Fast-switching speed for improved efficiency and thermals
Synchronous rectification	Low- and medium-voltage MOSFETs	Synchronous rectification	OptiMOS™ 100 V-150 V OptiMOS™ 40 V-120 V StrongIRFET™ 40 V-100 V	› Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density › Outstanding quality and reliability › Reduces the need for a snubber circuit
	Gate-driver ICs	-	EiceDRIVER™ 1EDNx/1EDi/2EDN7x/ 2EDLx/2EDFx/2EDSx	› Broadest portfolio in terms of isolation, channels, and protection
ORing	Low- and medium-voltage MOSFETs	ORing MOSFETs	OptiMOS™ 25 V-200 V	› Industry's lowest FOM ($R_{DS(on)}$ x Q_G) › Highest system efficiency and power density
Auxiliary power supply	AC-DC integrated power stage	Fixed-frequency (FF) Quasi resonant (QR)	CoolSET™ ICE5xRxx80AG CoolSET™ ICE5QRxx80BG	› Quasi-resonant switching operation for high efficiency and low EMI signature › Fixed-frequency switching operation for ease of design
Analog and digital control IC	32-bit XMC™ industrial microcontroller based on Arm® Cortex®-M	-	32-bit XMC1000 32-bit XMC4000	› Flexibility, HR PWM, digital communication › Arm® based standard MCU family and wide family
Port MOSFET	Medium-voltage MOSFETs	-	OptiMOS™ 100 V StrongIRFET™ 100 V	› Widest SOA quality and outstanding reliability › Lowest $R_{DS(on)}$

Recommended product portfolio for powered devices

Functional block	Product category	Topology	Product family	Benefits
Active bridge rectifier	Medium-voltage MOSFETs	Active bridge rectifier	OptiMOS™ 100 V-150 V StrongIRFET™ 100 V	› Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density
Synchronous rectification	Low- and medium-voltage MOSFETs	Synchronous rectification	OptiMOS™ 25 V-100 V OptiMOS™ 40 V IR MOSFET™ 20 V-100 V	› Industry's lowest $R_{DS(on)}$ › Highest system efficiency and power density › Outstanding quality and reliability
DC-DC switching stage	Medium-voltage MOSFETs	Flyback (ACF)	OptiMOS™ 100 V-150 V	› Low conduction losses, reduced overshoot › Logic level switching
AC-DC backup SMPS	High-voltage MOSFETs	Flyback (ACF)	600 V to 950 V CoolMOS™ P7	› Fast-switching speed for improved efficiency and thermals › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
	AC-DC integrated power stage	Fixed-frequency (FF) Quasi resonant (QR)	CoolSET™ 800 V ICE5GRxx80AG, 800 V ICE5ARxx80BZS, 700 V ICE5ARxx70AG, 700 V ICE5ARxx70BZS CoolSET™ 700 V ICE5QRxx70A(Z) (G), 800 V ICE5QRxx80A(Z)(G), 800 V ICE5QRxx80BG	› Quasi-resonant switching operation for high efficiency and low EMI signature › Fixed-frequency switching operation for ease of design

www.infineon.com/poe

For more details on the product, click on the part number, visit infineon.com or contact our product support.

EV charger

Fast/wireless EV charging

Advanced solutions for DC EV charging

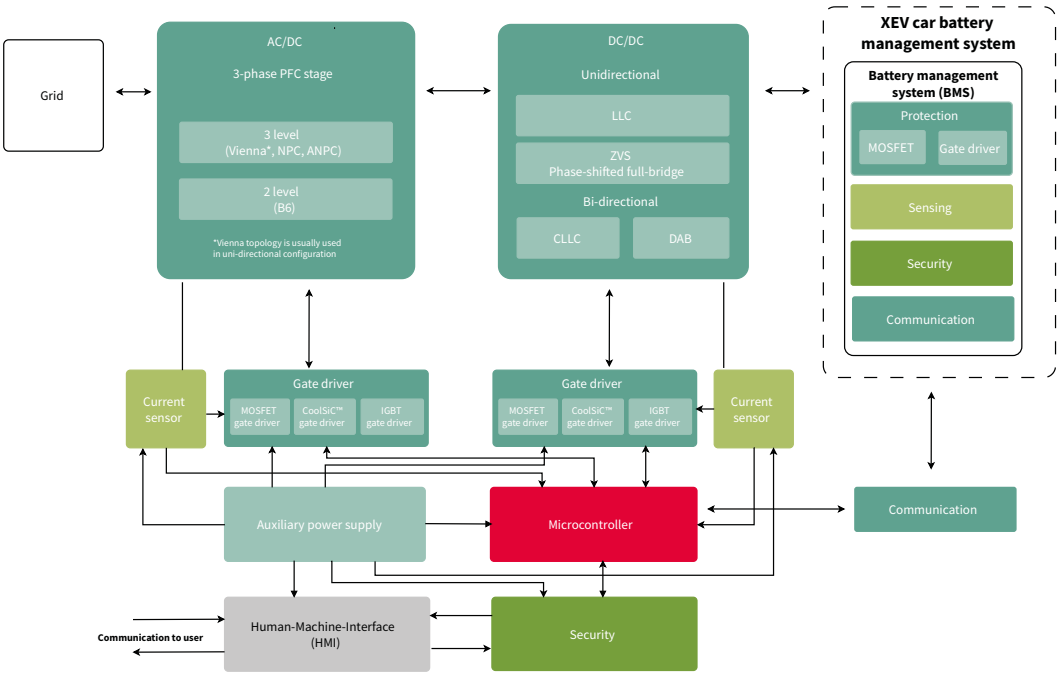
As e-mobility increasingly becomes part of daily life, there is a growing need for more efficient charging solutions. Fast electric vehicle (EV) charging stations equipped with powerful DC chargers are the answer. DC EV chargers are an attractive choice because they allow much faster charging than the standard AC EV ones that many EV owners have at home. Today, a DC charger with 150 kW can put a 200 km charge on an EV in around 15 minutes. As fast charging and battery technologies continue to evolve and improve in the near future, experts anticipate the charging time to drop even further.

As a market leader and the global front-runner in power electronics, Infineon enables you to bring energy-efficient DC EV charger designs to life, with our highly efficient components and in-depth technical support. We cover power ranges from kilowatts to megawatts in our broad portfolio of high-quality power semiconductors, microcontrollers, gate drivers, security, safety, and authentication solutions. Our CoolMOS™ and CoolSiC™ MOSFETs, together with EiceDRIVER™ gate drivers, for example, are ideal in a wide range of DC EV charging designs. Their matchless advantages include high-frequency operation, high power density and reduced switching losses, allowing you to reach high efficiency levels in any battery charging system.

Infineon offering and customer benefits

Infineon offering	Customer benefits
› CoolMOS™ and CoolSiC™ discrete and power module semiconductor solutions	› Highly efficient power conversion for reducing system size by up to 50 percent and reduced cooling efforts › Scalability across various platforms for upgrading system power charger levels on demand
› EiceDRIVER™ gate driver and XMC™ microcontroller	› Safe drive, advanced protection and ease of control
› XENSIV™ magnetic current sensor	› Bidirectional high precision current sensing
› OPTIGA™	› Identity protection against fake devices and protection against the manipulation of the data
› Power supply ICs (LDO, DC-DC) › Communication (CAN transceiver)	› Robust quality and easy to use implementation shorten time to market › and guarantee long operation

Application diagram



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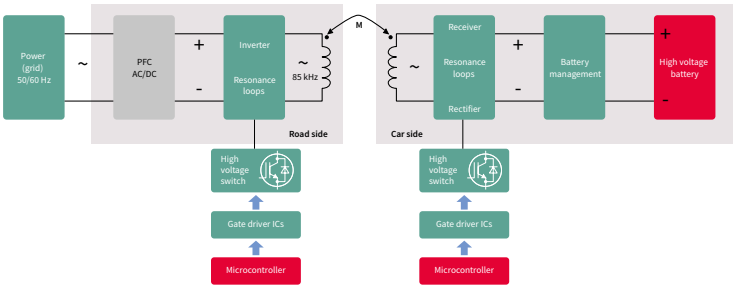
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Wireless charging

Wireless methods for power transfer to charge the batteries of electric vehicles are gaining attention. Several concepts for wireless power transfer systems have been proposed, which in general seek to compensate the significant stray inductances on primary and secondary sides of the magnetic couplers by adaptive resonant methods. At the end of 2013, SAE announced a new standard for inductive charging which defined three power levels at 85 kHz. Infineon's CoolMOS ™ CFD7, C7, and P7 series along with TRENCHSTOP™ 5 IGBTs, CoolSiC™ diodes, and EiceDRIVER™ gate-driver ICs are perfectly suited for driving inductive power transfer systems on the road side which operate inside the 80 to 90 kHz band.



Infineon's solution recommendation for DC EV charging system blocks

Our solutions have been designed for harsh environmental conditions and long lifetime thanks to Infineon's deep understanding of quality requirements. Take the next step by exploring our product portfolio for DC EV charging systems.

PFC stage (3-phase input)

Product category	Product family	Product	Additional information
High-voltage MOSFET/ SiC MOSFET/IGBT	650 V CoolMOS™ C7	IPW65R019C7	650 V, 19 mΩ, TO-247
	600 V CoolMOS™ C7	IPW60R017C7	600 V, 17 mΩ, TO-247
	600 V CoolMOS™ P7	IPW60R024P7	600 V, 24 mΩ, TO-247
		IPW60R037P7	600 V, 37 mΩ, TO-247
	CoolSiC™ MOSFET 650 V	IMW65R027M1H	650 V, 27 mΩ, TO-247-3
		IMZ65R027M1H	650 V, 27 mΩ, TO-247-4
		IMWA65R027M1H	650 V, 48 mΩ, TO-247-3
		IMZA65R027M1H	650 V, 48 mΩ, TO-247-4
	650 V TRENCHSTOP™ 5 H5	IKW50N65EH5/IKZ50N65EH5	650 V, 50 A, TO-247-3/4
		IKW75N65EH5/IKZ75N65EH5	650 V, 75 A, TO-247-3/4
	650 V HighSpeed H3 Easy hybrid module	FS3L50R07W2H3F_B11	650 V, 50 A, Easy 2B, three-level
	650 V TRENCHSTOP™ 5 H5 Easy hybrid module	FS3L40R07W2H5F_B11	650 V, 40 A, Easy 2B, three-level
		FS3L40R07W2H5F_B67	650 V, 40 A, Easy 2B, three-level
	650 V TRENCHSTOP™ 5 S5 Easy hybrid module	F3L200R07W2S5FP_B55	650 V, 200 A, Easy 2B, three-level
		F3L200R07W2S5FP_B56	650 V, 200 A, Easy 2B, three-level
		F3L200R07W2S5F_B11	650 V, 200 A, Easy 2B, three-level
	650 V TRENCHSTOP™ 5 S5 Easy module	F3L200R07W2S5_B11	650 V, 200 A, Easy 2B, three-level
	CoolSiC™ MOSFET 1200 V	IMW120R045M1/IMZ120R045M1	1200 V, 45 mΩ, TO-247-3/4
		MW120R030M1H/IMZ120R030M1H	1200 V, 30 mΩ, TO-247-3/4
	CoolSiC™ Easy modules 1200 V	F3L11MR12W2M1_B74	1200 V, 11 mΩ, Easy 2B, ANPC
		FF6MR12W2M1(P)_B11*	1200 V, 6 mΩ, Easy 2B, half-bridge
		FF8MR12W2M1(P)_B11*	1200 V, 8 mΩ, Easy 2B, half-bridge
		FF11MR12W1M1(P)_B11*	1200 V, 11 mΩ, Easy 1B, half-bridge
		FF23MR12W1M1(P)_B11*	1200 V, 23 mΩ, Easy 1B, half-bridge
		FS45MR12W1M1_B11	1200 V, 45 mΩ, Easy 1B, six-pack
SiC diodes	CoolSiC™ Schottky diodes 1200 V G5	IDW15G120C5B/IDWD15G120C5	1200 V, 15 A, TO-247-3/2
		IDW20G120C5B/IDWD20G120C5	1200 V, 20 A, TO-247-3/2
		IDW30G120C5B/IDWD30G120C5	1200 V, 30 A, TO-247-3/2

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

HV DC-DC main stage

Product category	Product family	Product	Additional information
High-voltage MOSFET/ SiC MOSFET	600 V CoolMOS™ CFD7/CSFD	IPW60R018CFD7	600 V, 18 mΩ, TO-247
		IPW60R024CFD7	600 V, 24 mΩ, TO-247
		IPW60R037CSFD	600 V, 37 mΩ, TO-247
		IPW60R040CFD7	600 V, 40 mΩ, TO-247
	600 V CoolMOS™ C7	IPW60R040C7	600 V, 40 mΩ, TO-247
	650 V CoolMOS™ CFD7	IPW65R018CFD7*/IPZA65R018CFD7	650 V, 29 mΩ, TO-247-3/4
		IPW65R029CFD7/IPZA65R029CFD7	650 V, 29 mΩ, TO-247-3/4
		IPW65R041CFD7	650 V, 41 mΩ, TO-247
	CoolSiC™ SiC MOSFET 650 V	IMW65R027M1H/IMZA65R027M1H	650 V, 27 mΩ, TO-247-3/4
		IMW65R048M1H/IMZA65R048M1H	650 V, 48 mΩ, TO-247-3/4
	CoolSiC™ SiC MOSFET 1200 V	IMW120R045M1/IMZ120R045M1	1200 V, 45 mΩ, TO-247-3/4
		IMW120R030M1H/IMZ120R030M1H	1200 V, 30 mΩ, TO-247-3/4
	CoolSiC™ Easy module 1200 V	FF6MR12W2M1(P)_B11*	1200 V, 6 mΩ, Easy 2B, half-bridge
		FF8MR12W2M1(P)_B11*	1200 V, 8 mΩ, Easy 2B, half-bridge
		FF11MR12W1M1(P)_B11*	1200 V, 11 mΩ, Easy 1B, half-bridge
		FF23MR12W1M1(P)_B11*	1200 V, 23 mΩ, Easy 1B, half-bridge
		FF45MR12W1M1(P)_B11*	1200 V, 45 mΩ, Easy 1B, half-bridge
		F4-45MR12W1M1(P)_B76*	1200 V, 45 mΩ, Easy 1B, four-pack
		F4-23MR12W1M1(P)_B76*	1200 V, 23 mΩ, Easy 1B, four-pack
		F4-15MR12W2M1(P)_B76*	1200 V, 15 mΩ, Easy 2B, four-pack
		F4-11MR12W2M1(P)_B76*	1200 V, 11 mΩ, Easy 2B, four-pack
		FS45MR12W1M1_B11	1200 V, 45 mΩ, Easy 1B, sixpack
SiC diodes output rectification diodes	CoolSiC™ Schottky diode 1200 V G5	IDW15G120C5B/IDWD15G120C5	1200 V, 15 A, TO-247-3/2
		IDW20G120C5B/IDWD20G120C5	1200 V, 20 A, TO-247-3/2
		IDW30G120C5B/IDWD30G120C5	1200 V, 30 A, TO-247-3/2
	CoolSiC™ Schottky diode 1200 V G5 rectifier bridge modules	DDB2U20N12W1RF(P)_B11*	1200 V, 20 A, Easy 1B, rectifier bridge
		DDB2U40N12W1RF(P)_B11*	1200 V, 40 A, Easy 1B, rectifier bridge
		DDB2U60N12W1RF(P)_B11*	1200 V, 60 A, Easy 1B, rectifier bridge
	CoolSiC™ Schottky diode 650 V G5	IDW12G65C5	650 V, 12 A, TO-247
		IDW16G65C5	650 V, 16 A, TO-247
		IDW20G65C5	650 V, 20 A, TO-247
		IDW20G65C5B	650 V, 10 A, TO-247
		IDW24G65C5B	650 V, 24 A, TO-247
		IDW30G65C5	650 V, 30 A, TO-247
		IDW32G65C5B	650 V, 32 A, TO-247
		IDW40G65C5	650 V, 40 A, TO-247
		IDW40G65C5B	650 V, 40 A, TO-247
	CoolSiC™ Schottky diode 650 V G6	IDH20G65C6	650 V, 20 A, TO-220
		IDH16G65C6	650 V, 16 A, TO-220 real 2-pin
		IDH12G65C6	650 V, 12 A, TO-220 real 2-pin
		IDH10G65C6	650 V, 10 A, TO-220 real 2-pin
		IDH08G65C6	650 V, 8 A, TO-220 real 2-pin
		IDH06G65C6	650 V, 6 A, TO-220 real 2-pin
		IDH04G65C6	650 V, 4 A, TO-220 real 2-pin
		IDDD20G65C6	650 V, 20 A, DDPAK
		IDDD16G65C6	650 V, 16 A, DDPAK
		IDDD12G65C6*	650 V, 12 A, DDPAK
		IDDD10G65C6	650 V, 10 A, DDPAK
		IDDD08G65C6	650 V, 8 A, DDPAK
		IDDD06G65C6	650 V, 6 A, DDPAK
		IDDD04G65C6	650 V, 4 A, DDPAK

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* For more information on the product, contact our product support
(P): Module with pre-applied thermal interface material (TIM)

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Gate driver and galvanic isolation

Product category	Product family	Product	Additional information
Gate-driver ICs	EiceDRIVER™ (non-isolated)	1EDN family, 2EDN family	› Single-channel/dual-channel, non-isolated low-side gate driver ICs
		1ED4417xN01B	› Single-channel with fast, accurate (± 5%), integrated overcurrent protection (OCP)
		2ED24427N01F	› Dual-channel, 10 A low-side gate driver in DSO8 package with power-pad › Integrated UVLO and enable (EN) function › Suitable for high frequency, high power operation w/BOM savings
	EiceDRIVER™ level-shift gate driver	2ED2184S06F 2ED2110S06M	› 650 V half-bridge gate driver for IGBTs and MOSFETs with SOI technology › Integrated bootstrap diode › High-frequency switching (500 kHz) and superior – VS transient voltage immunity
		IRS2186S, IRS21864S	› 600 V, 4 A high- and low-side gate driver
		IR2114SS, IR2214SS	› 600 V/1200 V half-bridge gate driver with DESAT, 2L SRC, soft-SD
		IR2213S	› 1200 V high- and low-side gate driver
	EiceDRIVER™ 2EDF/S isolated gate driver	2EDF7175F, 2EDF7275F	› Dual-channel functional isolated (1,5 kV)
		2EDS8265H, 2EDS8165H	› Dual-channel reinforced (safe) isolated (6 kV)
	EiceDRIVER™ compact isolated gate driver	1EDI20I12MF, 1EDI20N12AF, 1EDI60N12AF, 1EDI60I12AF	› 1200 V single-channel, cost-effective functional isolated driver with Miller clamp/separate output
		1ED3122MU12H, 1ED3124MU12H, 1ED3125MU12F, 1ED3124MU12F	› 5.7 kV / 3 kV single-channel isolated driver with Miller clamp or separate output, UL 1577 certification
	EiceDRIVER™ enhanced isolated gate driver	1ED3491MU12M, 1ED3890MU12M	› 5.7 kV single-channel isolated driver with analog/digital configurability, DESAT, Miller clamp, and Soft-off, UL 1577 certification
		1ED3321MC12N	› 1200 V, single-/dual-channel, functional isolated driver with DESAT and Miller clamp

Current sensor

Product category	Product family	Product	Additional information
Magnetic current sensor	XENSIV™	TLI4971-A120T5-E0001	–
		TLI4971-A120T5-U-E0001	UL certified

Microcontroller

Product category	Product family	Product	Additional information
Microcontroller	XMC™	XMC1400 family (PFC stage)	Arm® Cortex® M0 based microcontroller
		XMC4500/XMC4700 (HV DC-DC/PWM stage)	Arm® Cortex® M4F based microcontroller
	AURIX™	TC26X/TC27X TC36X/TC37X	TriCore™ AURIX™ 32-bit microcontroller HSM (hardware secure module) full EVITA compliance

Internal power supply

Product category	Product family	Product	Additional information
AC/DC power conversion	CoolSET™ 5 QR/FF flyback	ICE5QR0680BG	800 V, 42 W, 710 mΩ, PG-DSO-12
		ICE5AR0680AG	800 V, 42 W, 710 mΩ, PG-DSO-12
	5th generation PWM controllers and CoolMOS™ P7	ICE5QSBG and IPP80R360P7	800 V, 360 mΩ, TO-220
		ICE5QSBG and IPA95R450P7	950 V, 450 mΩ , TO-220 FP
	CoolMOS™ HV SJ MOSFETs	IPN95R1K2P7	950 V, 450 mΩ, SOT-223
		IPN80R1K4P7	800 V, 1.4 Ω, SOT-223
DC-DC power conversion	Low power LDOs	TLS805/TLS810/TLS820	50 mA/100 mA/200 mA ultralow quiescent current linear voltage regulator with a wide input voltage range
		TLS202	150 mA LDO in a small-footprint package
		TLS203/TLS205	300/500 mA low noise LDO
		TLS850	500 mA wide input voltage LDO
	Buck converter	TLE8366E	1.9 A DC-DC buck converter
	Safety PMIC for AURIX™ MCU	TLF35584/TLF35585	Multichannel power supply IC, optimized for AURIX™ MCU, up to ASIL-D rated

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Authentication and encryption

As embedded systems are increasingly becoming targets of attackers, Infineon offers OPTIGA™ - a turnkey security solution.

Product category	Product family	Product	Additional information
Security	OPTIGA™ Trust B	SLE952500000XTSA1	Asymmetric ECC authentication with individual certificate key pair and an extended temperature range of -40 to 110°C
	OPTIGA™ Trust TPM	SLB9670XQ2.0	Fully TCG TPM 2.0 standard compliant module with the SPI interface
	SLC37	SLC37ESA2M0, SLI97CSIFX1M00PE	New class of performance and security cryptocontroller adhering to CC EAL6+ high targeted and EMVCo targeted certifications for payment and eSIM applications

Communication

Product category	Product family	Product	Additional information
CAN transceiver	Automotive CAN transceiver	TLE9350, TLE9351, TLE9252	High-speed automotive CAN transceiver with 5 Mbps

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

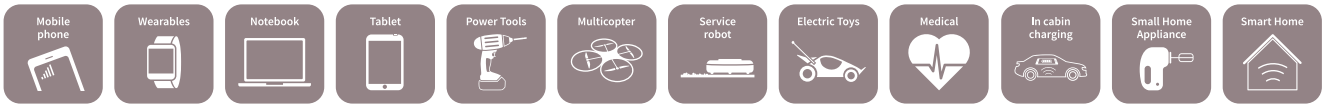
Wireless charging for consumer/industrial

Cost-effective and secure system solutions for consumer and industrial applications

Over the last years, wireless charging has gained more and more traction in the market and is expected to heavily influence our daily lives. Infineon offers a broad portfolio of efficient, high-quality products and solutions to serve the key requirements of the dominant market standards: inductive (Qi (WLC)) and resonant (AirFuel). Whether a smartphone (e.g., at home or in the car), a handful of wearables, a power tool, a laptop, kitchen appliance or a service robot is being charged, Infineon's components and solutions help overcome a wide range of common wireless power transfer challenges for consumer and industrial wireless charging designs. Wireless charging is a complex subject that requires in-depth system knowledge and expertise. Designers have to understand antennas and their interactions with surrounding structures. To successfully transfer power wirelessly, the power delivery has to be precisely controlled. We can help customers master all design challenges, including:

- Compatibility issues
- Safety issues
- Smart heat management
- Increasing efficiency and reducing charging times
- Preventing device and battery damage

Applications that benefit from wireless charging



Infineon's key enabling products for consumer and industrial solutions

- Power MOSFETs – OptiMOS™, StrongIRFET™ and CoolMOS™
- Gate-driver ICs – EiceDRIVER™: MOTIX™ three-phase gate-driver IC
- P-channel and N-channel small signal power MOSFETs
- XMC™, XMC™-SC (including software IP), AURIX ™, PSoC™
- Wireless charging ICs (including software IP)
- 32-bit microcontrollers – XMC™, AURIX™, PSoC™
- USB-C and Power Delivery (PD)
- Authentication - OPTIGA™ Trust Charge
- PSoC™ 4 MCU with AIROC™ Bluetooth LE
- AIROC™ Bluetooth® LE and Bluetooth®
- PWM/flyback controllers and integrated power stage ICs – CoolSET™
- GaN GIT HEMT - CoolGaN™
- Voltage and buck regulators for component and bridge supply
- Reverse Conducting IGBTs R5/R6 - 650 V

www.infineon.com/wirelesscharging

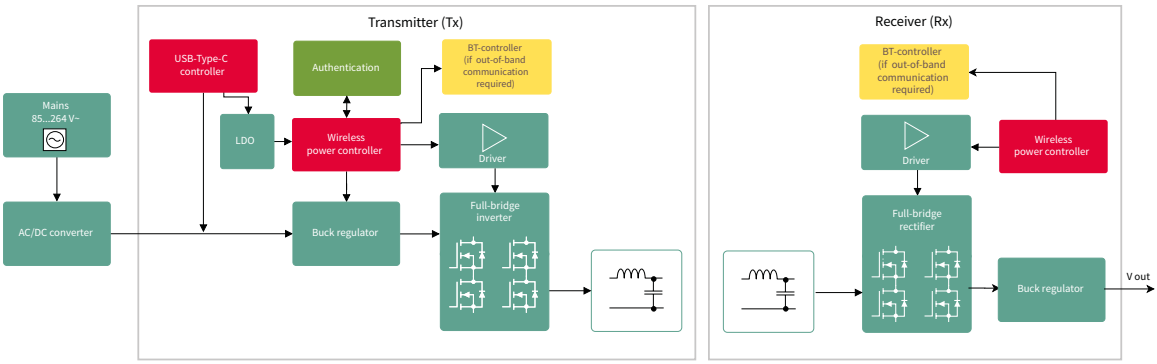
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Key benefits when choosing Infineon

Faster time-to-market	Collaboration with partners	In-depth system expertise	Inductive and resonant	Quality
Powerful and cost-effective system solutions that ensure smart, secure and high-performance wireless charging for a range of applications	Ready-to-go system solutions including software supported by our partners (plural)	We draw on our in-depth knowledge and expertise to help to solve wireless power challenges	Addressing both standards (inductive and resonant) with components or system solutions	We help you master your design challenges with leading silicon technology and upcoming new technologies

Inductive wireless charging for consumer and industrial

Example: >30 W inductive system solution



Key components for inductive designs for consumer and industrial

Wireless charging product portfolio for inductive

Sub-application	Products	
MOSFETs*	30 V	BSC0996NS, BSC0993ND, BSZ0909NS, BSZ0909ND, BSZ0910ND, IRFHS8342
	40 V	BSZ097N04LS, BSZ063N4LS6, BSC035N04LSG, BSC072N04LD
	60 V	BSZ099N06LS5, BSZ065N06LS5, BSZ040N06LS5
	80 V	IRL80HS120
	100 V	IRL100HS121, BSZ146N10LS5, BSZ096N10LS5
Driver IC	WCDSC006, PX3519, IRS2301S, 1EDN7512B, 1ED44173N01B, 1EDI60N12AF, 2EDN7524G, IRS2007M, 2ED2182S06F, 6EDL7141	
Wireless Charging IC	WLC1115-68LQXQ transmitter IC (incl. software IP)	
Microcontroller	XMC™, AURIX™ XMC™-SC (including software IP), PSoC™ family 4	
Voltage regulators	TLE4296G V33, TLF50211EL, TLE8366EV	
MCU + BLE Controller	PSoC™ 4 Bluetooth® Low Energy (Bluetooth® Smart): CY8C4248LQI-BL573 (QFN)	
AIROC™ Bluetooth® LE and Bluetooth®	CYW20719B2 / CYW20721B2	
USB-C and power delivery (PD)	PAG1: Power Adapter Generation 1, EZ-PD™ CCG3PA, EZ-PD™ CCG3, EZ-PD™ PMG1, EZ-PD™ Barrel Connector Replacement (BCR)	
Small-signal MOSFETs	See the portfolio on our webpage small-signal MOSFETs	
Authentication	SLS32AIA020Ux – OPTIGA™ Trust Charge (USON10 3 x 3 package)	
Reverse conducting IGBTs R5/R6 - 650 V	Package TO-247 IHW30N65RS (30 A), IHW40N65R5 (40 A), IHW50N65R5 (50 A)	
Reference designs and kits	REF_WLC_TX15W_C1 - 15 W Qi power transmitter solution (on demand)	

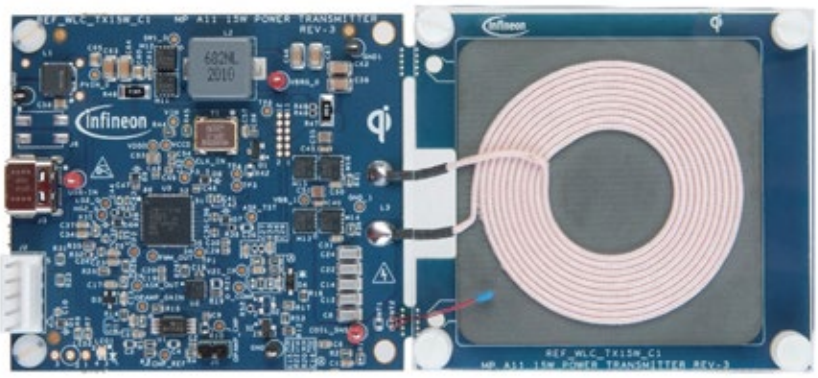
www.infineon.com/wirelesscharging

* Explore more MOSFET offerings at our webpage.

For more details on the product, click on the part number, visit infineon.com or contact our product support.

15W Qi transmitter solution with Infineon's Wireless Charging IC WLC1115

The REF_WLC_TX15W_C1 MP A11 Power Transmitter solution board, is highly integrated, Qi v1.3 compliant Extended Power Profile (EPP) transmitter design. This reference board is powered using USB PD 3.0-compliant USB-C power adapter and can support DC connector input of 9V-20V through firmware option. Combined with the OptiMOS™ power MOSFETs and OPTIGA™ Trust Charge, this solution offers a highly efficient and secure wireless charging platform.
The solution board supports firmware upgrades using USB-C or I²C interface along with the included dongle and the Wireless Charging Configuration Graphical User Interface (GUI). There are additional options provided for firmware updates using Serial Wire Debug (SWD) while using the ModusToolBox™ and Programmer.



Key components

- Wireless charging IC – WLC1115-68LQXQ
- OptiMOS™ MOSFETs – BSZ0910LS
- OPTIGA™ Trust Charge – SLS32AIA020Ux
- Small Signal MOSFETs

Features and benefits

Key features	Key benefits
Qi v1.3 compliant transmitter	Compliant Qi stack with library support
UDB-PD/legacy protocol input >9 V_{DC}	Programmable solution for evolving Qi standard
Peak system efficiency >83%	Zero voltage switching for high efficiency
Typical active charging area ±10 mm	Configurable gate drivers for EMC
Serial communication ports: I²C, UART	Configurable thresholds for FOD, protection
Programming, EXT clock option	
Foreign object detection with LEDs	
Configurable using wireless charging GUI	

Complimentary

- PAG1S Adaptor Reference Designs

Explore more details:

www.infineon.com/REF_WLC_TX15W_C1

www.infineon.com/wirelesscharging

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Key components for resonant designs for consumer and industrial

Wireless charging product portfolio for resonant	Sub-application	Products	
	MOSFETs**	30 V	IRLHS6376PBF, BSZ0909ND, BSZ0910ND, IRLML0030PBF
		40 V	IRLML0040
		60 V	IRLML0060
		80 V	IRL80HS120
		100 V	IRL100HS121
		150 V	BSZ900N15NS3, BSZ520N15NS3
		200 V	BSZ900N20NS3, BSZ22DN20NS3, BSZ12DN20NS3
		250 V	BSZ42DN25NS3
	Driver ICs	EiceDRIVER™ 2EDL71*, 1EDN7512, 2EDN7524, 2ED2182S06F, 2ED24427N01F, 1EDI60N12AF, 1ED44173N01B	
		EiceDRIVER™ for CoolGaN™ GIT HEMTs 1EDS5663H, 1EDF5673F, 1EDF5673K	
	GaN e-mode HEMTs	CoolGaN™ GIT HEMT 600 V IGT60R190D1S (HDSOF-8-3)	
	Microcontroller	XMC™, AURIX™ MCU and wireless power controller XMC™-SC (including software IP), PSoC™ family 4	
	MCU + BLE Controller	PSoC™ 4 Bluetooth® Low Energy (Bluetooth® Smart): CY8C4248LQI-BL573 (QFN)	
	AIROC™ Bluetooth® LE & Bluetooth®	CYW20719B2 / CYW20721B2	
	USB-C and power delivery (PD)	PAG1: Power Adapter Generation 1, EZ-PD™ CCG3PA, EZ-PD™ CCG3, EZ-PD™ PMG1, EZ-PD™ Barrel Connector Replacement (BCR)	
	Voltage regulators	TLE4296G V33, TLE4296G V50, TLE4296-2G V33, TLE4296-2G V50, TLF50211EL, TLE8366EV, TLE8366EV33, TLE8366EV50	
	Small signal MOSFETs	See the portfolio on our webpage small-signal MOSFETs	

MOSFETs, driver IC, µCs are on the website: www.infineon.com/wirelesscharging

Are you searching for a turnkey solution for your application?

Wireless power becomes an important part of our connected lifestyles. Infineon puts an emphasis on the development of the next-generation technologies and standards that allow easy charging without the limitation of wires. What started out with phones will quickly evolve - applications such as tablets, laptops, robots, drones, power tools, handheld gaming devices, medical devices, infrastructure, and applications around Industry 4.0 will have wireless charging included. For more information, please get in contact with us via www.infineon.com/support to get your customized system solution.

www.infineon.com/wirelesscharging

*coming soon
** Explore more MOSFET offerings at our webpage.

For more details on the product, click on the part number, visit infineon.com or contact our product support.

USB-C chargers and adapters

Outstanding solution offering for mobile chargers and laptop adapters

USB-C Power Delivery (USB-PD) has emerged as the standard for unified and fast charging and as power supplies for all kind of mobile devices such as smartphones, tablets, laptops, smart speakers, TVs and others.

USB-C simplifies the end user experience and together with the introduction of GaN HEMTs and increasing switching frequencies it enables compact and light-weight chargers and adapters.

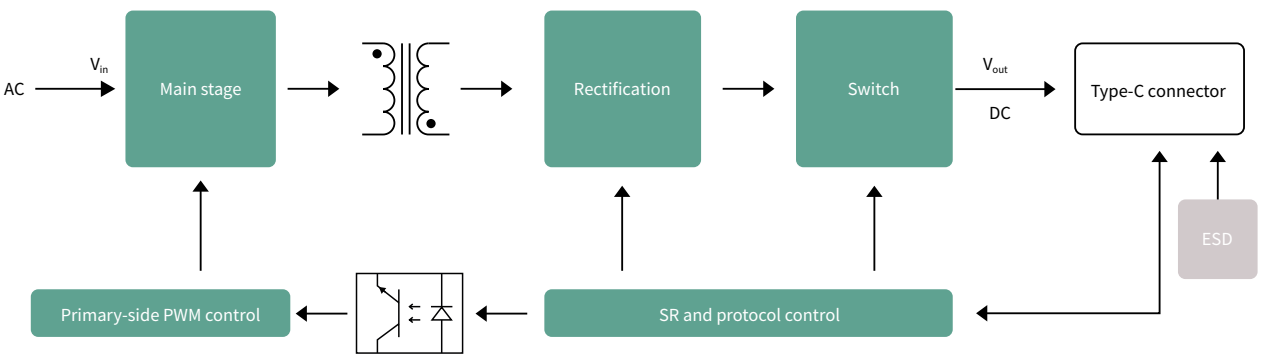
Infineon offers a leading portfolio of power controllers, flexible and programmable USB Type-C controllers, high-voltage CoolMOS™ superjunction MOSFETs, OptiMOS™ medium- and low-voltage MOSFETs as well as CoolGaN™ discretes and integrated power stages.

Our offering of USB-C reference and demo designs is based on quasi-resonant (QR), ZVS and hybrid flyback operation, for different power levels and power density requirements and for single and dual-output chargers.

Features and benefits

Key features	Key benefits
› Ready-to-use reference designs › Comprehensive offering of power and protocol controllers, high- and low-voltage switches and TVS diodes allow customers to source all components from a single supplier › Highly integrated solutions	› Ease-of-use and reduced complexity
› Smallest form factor, low $R_{DS(on)}$ and low parasitic capacitances, Kelvin-source engaged ThinPAK and PQFN packages › Digital controllers enabling high-efficiency designs	› High-efficiency designs
› Fully programmable USB-C PD port controllers › Configurability and upgradability	› Differentiation and short time to market
› Infineon has the largest installed in-house power semiconductor capacity with 12” wafer production for discretes for maximum supply security › Dedicated supply chain programs to secure capacity and enable flexibility to demand fluctuations	› Secured supply chain

Application diagram



www.infineon.com/USB-PD

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended products

Functional block	Product category	Topology	Product family	Benefits
Flyback converter	High-voltage MOSFETs and HEMTs	Quasi-resonant flyback (QR)	600 V/700 V/800 V CoolMOS™ P7	› Fast switching speed for improved efficiency and thermals › Reduced gate charge for enhanced light-load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
			600 V/650 V CoolMOS™ C7	› High switching performance enabling highest efficiency › Ease of use level high › Optimized devices for highest efficiency switched-mode power supplies
		Active-clamp flyback (ACF) Hybrid flyback (HFB)	600 V CoolMOS™ PFD7	› Robustness and reliability with integrated robust fast body diode and up to 2 kV ESD protection › Reduced gate charge for enhanced light-load efficiency › Lower hysteresis loss
		Flyback (QR, ZVS, ACF, HFB)	CoolGaN™ GIT HEMTs 600 V	› Highest efficiency › Highest power density
	Controller	ZVS flyback controller	XDPS21081	› Optimization of low line AC input with forced quasi-resonant › Suitable for high power density design
		Hybrid flyback controller	XDPS2201	› Asymmetrical half-bridge ZVS control to maximize efficiency › Supports a wide range of configurable parameters › Supports ultra-high power density (20 W/in3) design
		QR flyback controller	EZ-PD™ PAG1P/S	› Secondary-side-controlled flyback solution › Dual-chip flyback solution with integrated SR+PD controller
	Gate-driver IC	Active-clamp flyback (ACF)	IRS25752L	› High-side gate driver enables active clamp mode of operation › Cost-effective, 600 V, single-channel driver in SOT23 package
			IRS21271S	› High-side gate driver enables active clamp mode of operation › 600 V, single-channel driver with over-current protection (OCP)
PFC DC-DC	High-voltage MOSFETs, GIT HEMTs, and diodes	DCM PFC	600 V CoolMOS™ P7	› Fast switching speed for improved efficiency › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (VGS) threshold for lower turn-off losses
		DCM/CCM PFC	CoolGaN™ GIT HEMTs 600 V	› Highest efficiency contribution via less parasitic parameter › Space saving with SMD smaller package
	Boost diode	DCM/PFC	650 V Rapid 1 diodes	› Low conduction losses
	Controller	PFC/LLC Combo	IDP2308	› Digital multimode PFC and LLC combined controller with a floating high side driver and a startup cell › Comprehensive and configurable protection features › Wide set of configurable parameters
	High-voltage MOSFETs and GIT HEMTs	HB LLC	600 V CoolMOS™ P7	› Fast switching speed for improved efficiency and thermals › Reduced gate charge for enhanced light load efficiency › Optimized gate-to-source voltage (V_{GS}) threshold for lower turn-off losses
			CoolGaN™ IPS 600 V	› Highest efficiency and highest power density › Isolated gate driver integrated
	Gate-driver IC	HB LLC	EiceDRIVER™ Compact: 1EDI60N12AF, 1ED3124MU12F	› Isolated gate driver, up to 14 A, 100 ns propagation delay
Synchronous rectification	Low-voltage MOSFETs	Synchronous rectification	OptiMOS™ PD 60-150 V	› Low conduction losses, reduced overshoot › Adapter-oriented synchronous rectification MOSFETs
	Control ICs	Synchronous rectification	EZ-PD™ PAG1S	› Integration of synchronous rectification and PD controller › Configurable protection, like OTP, OCP, OVP, UVP, short circuit, etc.
Protocol control	USB-C ICs	Protocol controller	EZ-PD™ PAG1S	› Supports USB PD 2.0, PD 3.0 with PPS, QC4+, QC 4.0, QC 3.0,QC 2.0, Samsung AFC, Apple charging, and BC v1.2 charging protocols
		Protocol controller	EZ-PD™ CCG3PA-NFET	› Supports USB PD 3.0 with Programmable Power Supply (PPS) › Independent constant current (CC) and constant voltage (CV) modes › Configurable OVP, OCP, and OTP › Integrates NFET gate driver to drive the load switch › 64 kB Flash Memory
			EZ-PD™ CCG3PA	› Supports USB PD 3.0 with PPS, QC4, Apple 2.4 A charging, AFC, BC1.2 etc. › Supports 1C and 1A port › 64 kB flash memory
		Multi-port controller	EZ-PD™ CCG7DDC multi-port controller	› Integrates 2 USB-C PD controllers + 2 DC-DC controllers in one single chip › Supports latest USB-C PD v3.0 with PPS, QC4+, QC4.0, Samsung AFC, Apple 2.4A, BCv1.2 › Configurable switching frequency of 150 kHZ- 600 kHZ › Arm® Cortex®-M0 with flash allows users to implement custom features
Connector	ESD	ESD protection	Multi-purpose diodes for ESD protection	› Small packaging to support minimum board space consumption › High linearity - reducing harmonic generation/enabling suppression EMC problems › Exceptional quality and reliability

www.infineon.com/USB-PD

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SMPS

Battery chargers for mobile appliances

Infineon offers AC/DC battery charger reference designs targeted for charging Li-Ion batteries for mobile appliances such as power and gardening tools, cordless home appliances, e-bikes, and e-scooters.

The reference designs are based on Infineon's leading portfolio of high-voltage (CoolMOS™) and low-and medium-voltage (OptiMOS™) switches as well as power controllers, designed to meet customers' requirements and needs for battery chargers.

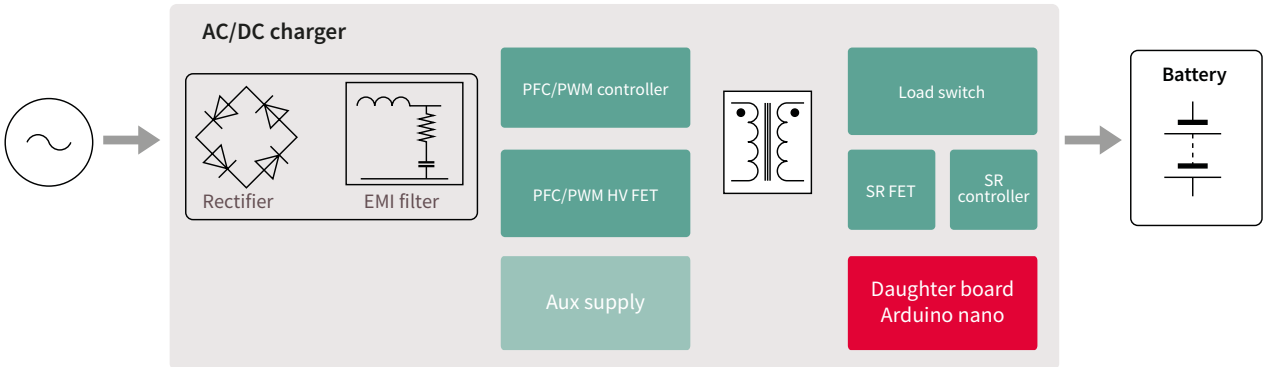
The flyback-based reference design* is scalable from 65 W to >100 W and aimed for 18 V/36 V Li-Ion battery packs. It is based on the quasi-resonant flyback controller ICC80QSG and the 700 V CoolMOS™ P7 series in the small-footprint and wave-solderable SOT-223 package. The controller burst mode enables a low standby power of <100 mW. The demo board includes a secondary-side auxiliary supply for battery switch and supply of a MCU. The measured efficiency is >90 % at 230 V_{AC} input voltage, providing excellent performance versus BOM cost ratio for chargers for consumer appliances.

The 170 W reference design* is aimed for e-bike battery charging and is based on the the digital hybrid flyback controller XDP™ digital power XDPS2201 and the well-established 600 V CoolMOS™ P7S series in the TO-220-FP package. The measured efficiency is >94 % at 230 V_{AC} input voltage, enabling fanless, very compact and fast e-bike chargers for outdoor use cases.

Features and benefits

Key features	Key benefits
› Wide output voltage range	› Scalable to support a wide range of battery cells
› High efficiency (>90 % for flyback, >94 % for hybrid flyback)	› Fewer heatsinks, fanless and varnished operation for outdoor use
› Low power consumption during standby	› Meet DoE level VI regulation
› Inrush current, reverse polarity protection	› Robustness
› CC/CV operation	› Allows for optimization of charging process via microcontroller
› Isolated aux voltage supply	› Supply for microcontroller

Application diagram



www.infineon.com/charging

*Reference designs available by Q4 2022

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Product portfolio

Application	Topology	Product type	Product/product family	Package
Battery charger for mobile appliances	QR flyback	QR flyback controller	ICC80QSG	PG-DSO-8
		High-voltage MOSFETs	700 V CoolMOS™ P7	SOT-223
	Hybrid flyback	Digital hybrid flyback controller	XDP™ digital power XDPS2201	DSO-14
		High-voltage MOSFETs	600 V CoolMOS™ P7	TO-220-FP
		Medium-voltage MOSFETs	60 V/80 V/100 V OptiMOS™	Multiple
		Medium-voltage MOSFETs	150 V StrongIRFET™	TO-220
		AC/DC integrated power stage	CoolSET™ Gen 5	DIP-7
	Aux supply		CoolSET™	-

www.infineon.com/charging

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Battery protection

Solutions that allow easy design-in ensuring safe charging/discharging

The high-power density of lithium-ion batteries has made them very popular. However, the unstable behavior of lithium-ion cells under critical conditions requires them to be handled with care. That means a battery management system (BMS) is needed to monitor the battery state and ensure safe operation. BMS is typically equipped with an electronic switch that disconnects the battery from the charge or load under critical conditions that can lead to dangerous reactions. A battery protection unit (BPU) prevents possible damages to the battery cells and the failure of the battery.

Such critical conditions include:

- Over-charge that occurs when the battery is charged over the allowed maximum capacity.
- High and low temperature when the internal temperature of the battery cells exceeds their safe operational temperature range.
- Over-discharge when the battery is discharged under the allowed minimum capacity.
- Overcurrent when the battery is exposed to a short circuit condition or a high inrush turn-on current.
- Reverse polarity when the battery terminals are wrongly plugged into the device.

Failing to disconnect the battery during such conditions can lead to the following problems:

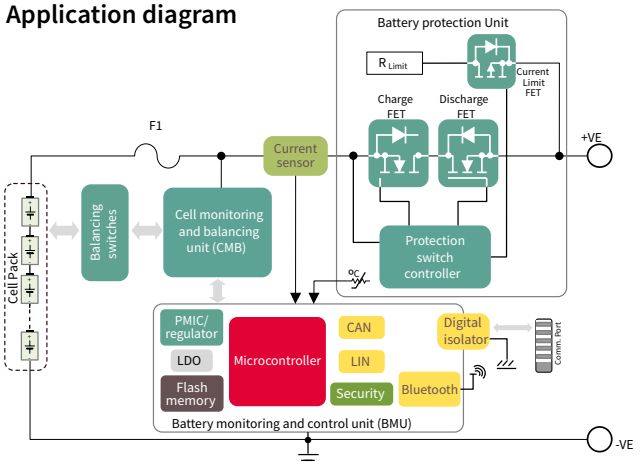
- Thermal runaway often due to over-charging or over-heating of the battery. The over-heating event can be due to a rise in the ambient temperature or due to charging/discharging the batteries with high current rates. Thermal runaway damages the battery cells and can lead to fires.
- Death of the cell often due to the discharge of batteries below its specified thresholds.
- Damage of load device often due to either improper inrush current management or reverse polarity.

In order to prevent these failures, Infineon offers a wide range of battery protection solutions that increase the lifetime and efficiency of lithium-ion batteries under stressful conditions.

Features and benefits

Key features	Key benefits
› $R_{DS(on)}$ and safe operating area (SOA)	› Higher performance with lower $R_{DS(on)}$ and wider safe operating area (SOA)
› Compact bill of material (BOM)	› Cheaper solutions with a more compact bill of material and more effective parallelization solutions
› Short circuit protection	› Short circuit protection with higher peak current rates to withstand higher current values
› Turn-on and turn-off capabilities	› Turn-on and turn-off solutions tailored to applications needs
› All voltage class solutions	› Up to 600 V MOSFET protection solutions (including single- and multi-module)

Application diagram



www.infineon.com/battery-protection

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Product portfolio

Battery voltage	MOSFET voltage class	Package	Technology	$R_{DS(on)}$	R_{thJC}	Part number
12 V	20 V	SuperSO8	StrongIRFET™	≤ 0.95 mΩ	≤ 0.8 °C/W	IRFH6200
		DirectFET		≤ 2.7 mΩ	≤ 1.4 °C/W	IRF6620
		TO-220		≤ 1.5 mΩ	≤ 0.5 °C/W	IRF1324
	25 V	SuperSO8	OptiMOS™	≤ 0.45 mΩ	≤ 0.8 °C/W	BSC004NE2LS5
		PQFN 3.3x3.3 SD	OptiMOS™	≤ 0.65 mΩ	≤ 1.4 °C/W	IQE006NE2LM5
		DirectFET	StrongIRFET™	≤ 0.8 mΩ	≤ 1.4 °C/W	BSB008NE2LX
		PQFN 3.3x3.3	OptiMOS™	≤ 0.9 mΩ	≤ 1.8 °C/W	BSZ009NE2LS5
18 V	30 V	TOLL	OptiMOS™	≤ 0.4 mΩ	≤ 0.5 °C/W	IPT004N03L
		SuperSO8		≤ 0.55 mΩ	≤ 0.8 °C/W	BSC005N03LS5
		PQFN 3.3x3.3		≤ 1.5 mΩ	≤ 1.8 °C/W	BSZ0500NSI
		DirectFET	StrongIRFET™	≤ 1.7 mΩ	≤ 1.4 °C/W	IRF6726M
		D²PAK		≤ 1.95 mΩ	≤ 0.64 °C/W	IRLS3813
		TO-220		≤ 1.95 mΩ	≤ 0.64 °C/W	IRLB3813
	34 V	SuperSO8	OptiMOS™	≤ 7.9 mΩ	≤ 4.1 °C/W	BSC079N03LSC G
24 V	40 V	DirectFET	StrongIRFET™	≤ 0.45 mΩ	≤ 0.44 °C/W	IRL7472L1
		sTOLL	OptiMOS™	≤ 0.6 mΩ	≤ 0.6 °C/W	IST006N04NM6
		D²PAK7P	StrongIRFET™	≤ 0.65 mΩ	≤ 0.36 °C/W	IRL40SC228
		SuperSO8	OptiMOS™	≤ 0.7 mΩ	≤ 0.8 °C/W	BSC007N04LS6
		TOLL	StrongIRFET™	≤ 0.72 mΩ	≤ 0.3 °C/W	IRL40T209
		D²PAK		≤ 1.2 mΩ	≤ 0.4 °C/W	IRFS7430
		TO-220		≤ 1.25 mΩ	≤ 0.4 °C/W	IRL40B209
		PQFN 3.3x3.3	OptiMOS™	≤ 1.8 mΩ	≤ 1.8 °C/W	BSZ018N04LS6
24-36 V	55 V	D²PAK7P	StrongIRFET™	≤ 2.6 mΩ	≤ 0.5 °C/W	IRF3805S-7P
36 V	60 V	D²PAK		≤ 3.3 mΩ	≤ 0.5 °C/W	IRF3805S
		TO-220		≤ 3.3 mΩ	≤ 0.45 °C/W	IRF3805
		TOLL	OptiMOS™	≤ 0.75 mΩ	≤ 0.4 °C/W	IPT007N06N
		D²PAK7P	StrongIRFET™	≤ 1.3 mΩ	≤ 0.36 °C/W	IRF60SC241
		SuperSO8	OptiMOS™	≤ 1.45 mΩ	≤ 0.8 °C/W	BSC014N06NS
		DirectFET	StrongIRFET™	≤ 1.5 mΩ	≤ 0.44 °C/W	IRF7749L1
		TO-220		≤ 1.9 mΩ	≤ 0.4 °C/W	IRL60B216
		D²PAK		≤ 1.95 mΩ	≤ 0.4 °C/W	IRL60S216
		PQFN 3.3x3.3	OptiMOS™	≤ 3.7 mΩ	≤ 1.8 °C/W	BSZ037N06LS5
		TOLG	OptiMOS™	≤ 3.7 mΩ	≤ 0.4 °C/W	IPTG007N06NM5
48 V	80 V	TOLG	OptiMOS™	≤ 1.1 mΩ	≤ 0.4 °C/W	IPTG011N08NM5
		TO-220		≤ 2 mΩ	≤ 0.4 °C/W	IPP020N08N5
		TOLT		≤ 1.2 mΩ	≤ 0.4 °C/W	IPTC012N08NM5
		SuperSO8		≤ 2.5 mΩ	≤ 0.8 °C/W	BSC025N08LS5
		DirectFET	StrongIRFET™	≤ 4.4 mΩ	≤ 1 °C/W	BSB044N08NN3 G
		PQFN 3.3x3.3	OptiMOS™	≤ 7 mΩ	≤ 1.8 °C/W	BSZ070N08LS5
72 V	100 V	TOLL	OptiMOS™	≤ 1.5 mΩ	≤ 0.4 °C/W	IPT015N10N5
		D²PAK	OptiMOS™ Linear FET	≤ 1.7 mΩ	≤ 0.4 °C/W	IPB017N10N5LF
		TO-220	OptiMOS™	≤ 2.3 mΩ	≤ 0.4 °C/W	IPP023N10N5
		SuperSO8		≤ 2.2 mΩ	≤ 0.6 °C/W	ISC022N10NM6
		TOLT	OptiMOS	≤ 1.5 mΩ	≤ 0.4 °C/W	IPTC015N10NM5
		DirectFET	StrongIRFET™	≤ 3.5 mΩ	≤ 1.2 °C/W	IRF7769L1
		D²PAK7P		≤ 3.9 mΩ	≤ 0.4 °C/W	IRLS4030-7P
		D²PAK		≤ 4.2 mΩ	≤ 0.34 °C/W	IRF100S201
		TOLG		≤ 1.4 mΩ	≤ 0.4 °C/W	IPTG014N10NM5
		PQFN 3.3x3.3	OptiMOS™	≤ 8 mΩ	≤ 1.5 °C/W	ISZ080N10NM6
	120 V	TO-220	OptiMOS™	≤ 4.1 mΩ	≤ 0.5 °C/W	IPP041N12N3 G
		SuperSO8		≤ 7.7 mΩ	≤ 0.9 °C/W	BSC077N12NS3 G
		PG-HSOF-8		≤ 3 mΩ	≤ 0.4 °C/W	IPT030N12N3 G
		D²PAK		≤ 3.6 mΩ	≤ 0.5 °C/W	IPB036N12N3 G
		PQFN 3.3x3.3		≤ 24 mΩ	≤ 1.9 °C/W	BSZ240N12NS3 G
	135 V	D²PAK7P	StrongIRFET™	≤ 5.9 mΩ	≤ 0.3 °C/W	IRF135SA204
		D²PAK		≤ 8.4 mΩ	≤ 0.34 °C/W	IRF135S203
		TO-220		≤ 8.4 mΩ	≤ 0.34 °C/W	IRF135B203
96 V	150 V	D²PAK	OptiMOS™ Linear FET	≤ 4.8 mΩ	≤ 0.4 °C/W	IPB048N15N5LF
		TO-220	OptiMOS™	≤ 5.1 mΩ	≤ 0.5 °C/W	IPP051N15N5
		TOLL		≤ 3.9 mΩ	≤ 0.47 °C/W	IPT039N15N5
		SuperSO8		≤ 7.4 mΩ	≤ 0.7 °C/W	BSC074N15NS5
		DirectFET	StrongIRFET™	≤ 11 mΩ	≤ 1.2 °C/W	IRF7779L2
		D²PAK7P		≤ 9.3 mΩ	≤ 0.4 °C/W	BSC093N15NS5
		D²PAK		≤ 12.1 mΩ	≤ 0.4 °C/W	IRFS4115
		PQFN 3.3x3.3	OptiMOS™	≤ 30 mΩ	≤ 2 °C/W	BSZ300N15NS5
150 V	200 V	TO-220	OptiMOS™	≤ 11 mΩ	≤ 0.5 °C/W	IPP110N20N3 G
		D²PAK	OptiMOS™ Linear FET	≤ 11 mΩ	≤ 0.5 °C/W	IPB110N20N3LF
		TOLL	OptiMOS™	≤ 11.1 mΩ	≤ 0.4 °C/W	IPT111N20NFD
		D²PAK	StrongIRFET™	≤ 16.9 mΩ	≤ 0.36 °C/W	IRF200S234
		SuperSO8	OptiMOS™	≤ 32 mΩ	≤ 1 °C/W	BSC320N20NS3 G
		DirectFET	StrongIRFET™	≤ 22 mΩ	≤ 1.4 °C/W	BSC220N20NSFD
		PQFN 3.3x3.3	OptiMOS™	≤ 90 mΩ	≤ 2.5 °C/WW	BSZ900N20NS3 G
300 V	250 V	TO-220	OptiMOS™	≤ 20 mΩ	≤ 0.5 °C/W	IPP200N25N3 G
		TOLL		≤ 21 mΩ	≤ 0.4 °C/W	IPT210N25NFD
		D²PAK	StrongIRFET™	≤ 48 mΩ	≤ 0.45 °C/W	IRFS4229
		SuperSO8	OptiMOS™	≤ 60 mΩ	≤ 1 °C/W	BSC600N25NS3 G
		PQFN 3.3x3.3		≤ 165 mΩ	≤ 2 °C/W	BSZ16DN25NS3 G
	300 V	TO-220		≤ 41 mΩ	≤ 0.5 °C/W	IPP410N30N
		SuperSO8		≤ 130 mΩ	≤ 1 °C/W	BSC13DN30NSFD
	600 V	TO-220	CoolMOS™ S7	≤ 22 mΩ	≤ 0.32 °C/W	IPP60R022S7
		TOLL		≤ 22 mΩ	≤ 0.32 °C/W	IPT60R022S7

www.infineon.com/battery-protection

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Battery monitoring

Optimize system performance by cell balancing and monitoring key battery parameters

Dedicated cell monitoring controllers are being used to keep lithium-ion cells within their allowed operational ranges regarding voltages, currents, and temperatures. They monitor the state of each cell according to pre-adjusted voltages and temperatures using high-precision ADCs. Synchronizing the distributed measurements across all cells inside a battery is key to achieving the best possible insights into the battery's dis-/charging state (SOD/SOC) and overall battery health (SOH). The critical battery state assessment becomes less precise if these measurements are spread across wider time windows and if the measurement accuracy for each parameter is not high enough. A robust high-speed communication link across multiple daisy-chained monitoring devices supports complex cell topologies for a battery. For additional robustness, the daisy-chaining realizes a redundant ring, which keeps communication up between all connected ICs in case of a broken link. CRC protected data frames complement communication robustness. To achieve extreme low-power dedicated housekeeping functions such as periodically scheduled cell measurements and state analysis required for functional safety, the cell controller can perform independently from the master controller of the BMS. Safety features for signaling over-/undervoltage, thermal stress, etc., including emergency alarms, are triggered autonomously. When the number of cells increases, a reliable transfer of information from the cell balancing IC to the BMS controller becomes very important. Digital isolators can be used to ensure that the right data is transferred reliably by isolating the low voltage side (BMS controller) from the high voltage battery side.

TLE9012DQU

Li-ion battery monitoring and balancing IC

AEC Qualified · RoHS · ISO 26262 compliant

Features

- Voltage monitoring of up to 12 battery cells connected in series
- Hot plugging support
- Dedicated 16-bit delta-sigma ADC for each cell with selectable measurement mode
- High accuracy measurement for SOC and SOH calculation
- Integrated stress sensor with digital compensation algorithm and temperature-compensated measurements
- Secondary ADC with same averaging filter characteristics as advanced end to end safety mechanism
- Five temperature measurement channels for external NTCs
- Internal temperature sensors
- Integrated balancing switch allows up to 200 mA balancing current
- Differential robust serial 2 Mbit/s communication interface
- Additional four GPIO pins to e.g., connect an external EEPROM
- Internal round robin cycle routine triggers majority of diagnostics mechanisms
  - Automatic balancing over- and undercurrent detection scheme
  - Automatic open load and open wire detection scheme
  - Automatic NTC measurement unit monitoring scheme
- End to end CRC secured iso UART/UART communication
- Emergency mode for communication
- ISO 26262 safety element out of context for safety requirements up to Automotive safety integrity level D
- Green product (RoHS compliant)

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TLE9015QU

BMS transceiver IC - UART to iso UART

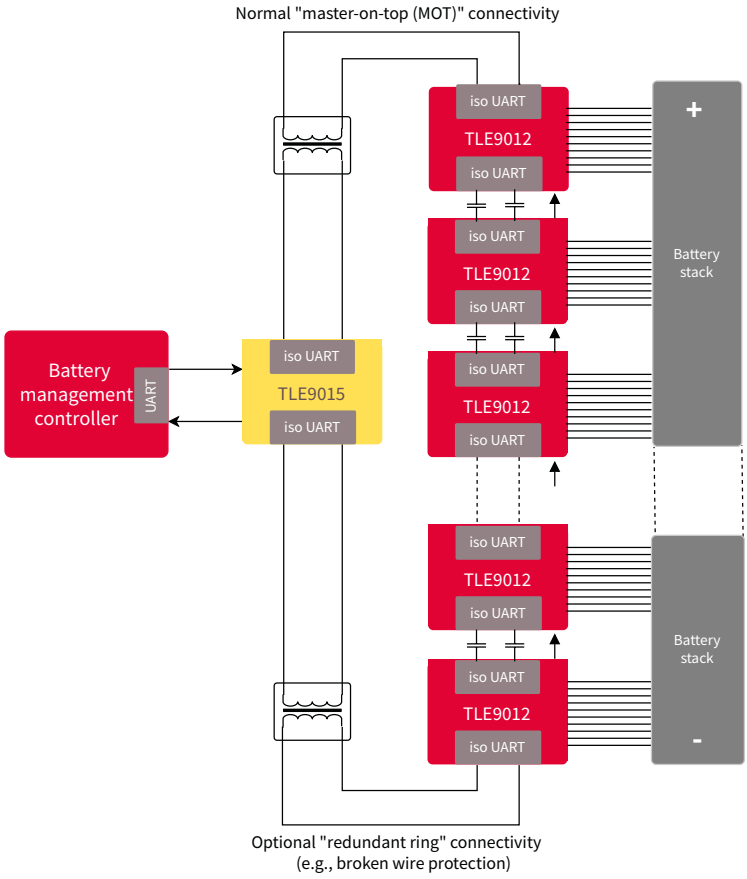
AEC Qualified

RoHS

Features

- General
  - Two UART ports for serial communication to host microcontroller
  - Two iso UART interfaces for communication to other BMS ICs
  - 2 Mbit/s data rate for fast communication
  - Fully transparent communication scheme from UART to iso UART
  - Ring mode topology compatible
- Communication ports
  - Integrated internal logic to minimize pin count on the UART side
  - Differential current edge triggered iso UART communication interface
  - High robustness against external noise
- General purpose error pin
  - Two external fault inputs (EMM and ERRQ_ext)
  - Latching error output pin to trigger external microcontroller
- Supporting diagnosis features
  - Internal supply monitoring
  - Green product (RoHS compliant)

Application diagram



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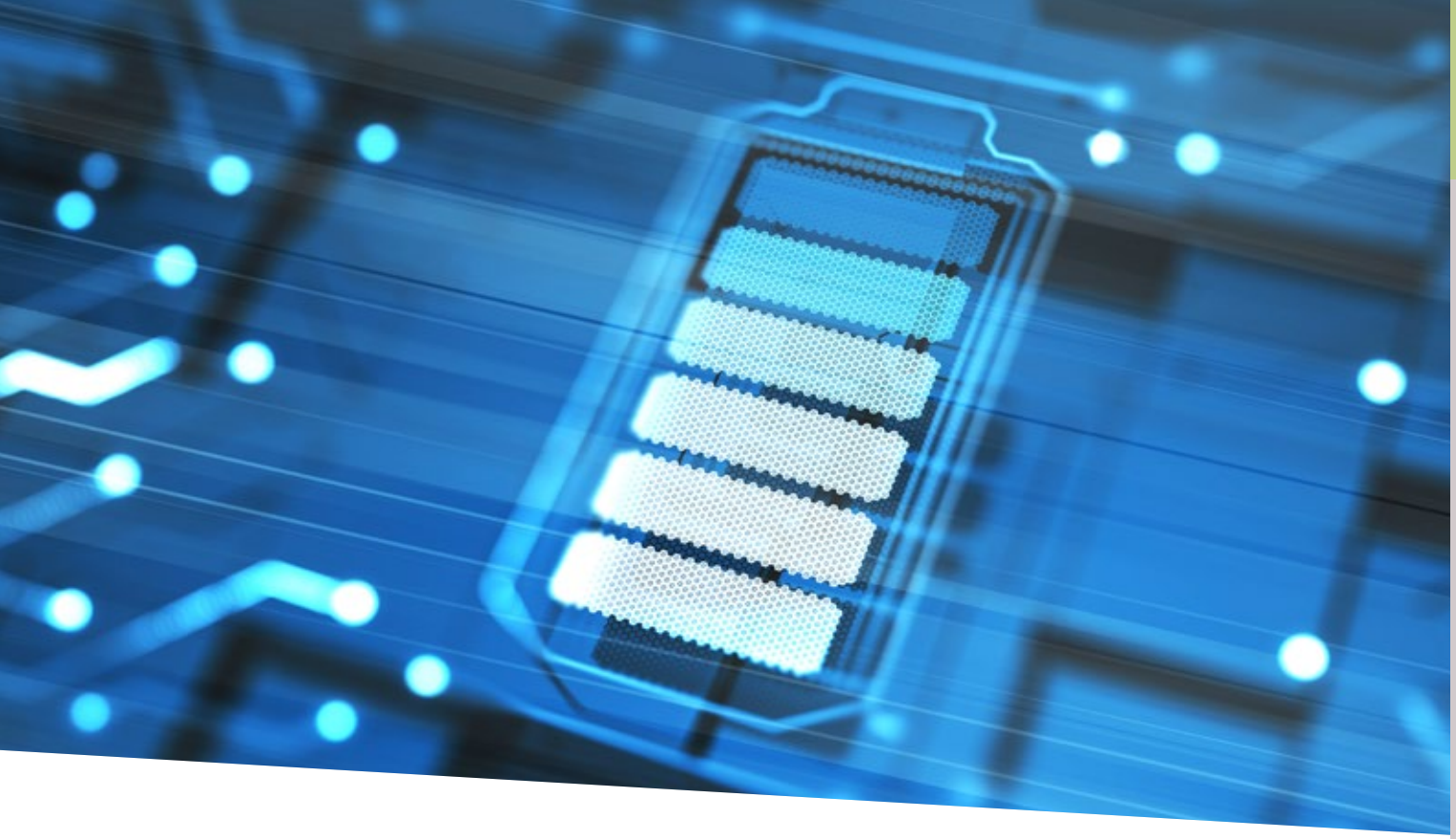

Digital isolators for battery monitoring

Part number	Isolation ring	Safety certifications	Channel configuration [1]	Input thresholds	Default output state	Package
2DIB0400F*	V_{ISO}=3000 VRMS (UL1577 Ed. 5)	UL1577 (Ed. 5) VDE 0884-11 VDE 0844-17 IEC 62368-1 IEC 60601-1 IEC 61010-1 GB4943.1	2 forward 0 reverse (2+0)	Variable (CMOS)	Low	› PG-DSO8 › 5 x 4 mm
2DIB0401F*					High	
2DIB1400F*			1 forward 1 reverse (1+1)		Low	
2DIB1401F*					High	
2DIB0410F*			2 forward 0 reverse (2+0)	Fixed (TTL)	Low	
2DIB0411F*					High	
2DIB1410F*			1 forward 1 reverse (1+1)		Low	
2DIB1411F*					High	

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*Coming soon
1)Certifications planned

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Super solid state solutions

FET-based high-voltage solid-state relays

Best-in-class $R_{DS(on)}$ x A enables unprecedented low losses in combination with advanced control and protection features

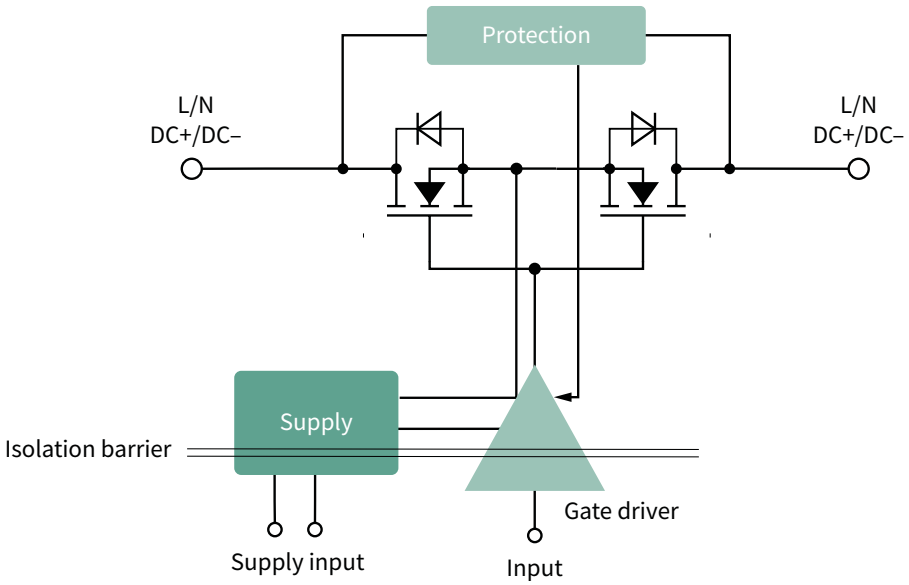
Electromechanical relays are a mature and well-established technology. However, they suffer from some inherent weaknesses. The mechanical movement of metal contacts causes noise. The high voltages can arc before the contacts are completely opened or closed, which leads to contact degradation. An increase of the contact resistance over the lifetime causes the behavior to become less predictable. Triacs (or silicon-controlled rectifiers, SCRs) are widely used as solid-state relays in AC applications. However, their controllability is limited and they suffer from high power dissipation in the range of 1 W/A.

FET-based solid-state solutions offer many benefits in relay applications. This includes significantly faster switching while eliminating arcing and the noise associated with electromechanical devices. Inherently, this results in higher reliability and more stable performance. When considering the maintenance, repair and operations (MRO) cost, a strong argument can be made for using solid-state relays. Compared to triacs, a FET-based solution offers advanced control and protection methods. The significantly lower power dissipation minimizes the cooling effort in the application. The latest CoolMOS™ S7(A) technology is a perfect match for solid-state relay applications. It offers an unprecedentedly low $R_{DS(on)}$ x A figure of merit that will meet the needs of customers and their end markets.

Features and benefits

Key features	Key benefits
› Operational lifetime: tens of millions of operations	› Maintenance free (no degradation of contacts), MRO cost savings
› No mechanical parts	› Arcing-free operation, no contact bounce, clicking noise is eliminated
› Significantly faster switching	› Advanced control and protection methods
› No increasing resistance vs. lifetime	› Stable performance, predictable behavior
› Lowest $R_{DS(on)}$ x A in class	› Highest power density, minimized cooling effort, parallelization and scalability

Application diagram



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Product portfolio

Product	Product family	Voltage class [V_{DS} max]	$R_{DS(on)}$	Package	Part number
MOSFETs	CoolMOS™ S7 industrial	600 V	22 mΩ to 65 mΩ	TO-220	IPP60R022S7, IPP60R040S7, IPP60R065S7
			22 mΩ to 65 mΩ	TOLL	IPT60R022S7, IPT60R040S7, IPT60R065S7
			10 mΩ to 65 mΩ	QDPAK top-side cooled	IPDQ60R010S7, IPDQ60R022S7, IPDQ60R040S7, IPDQ60R065S7
	CoolMOS™ S7A automotive	600 V	10 mΩ	QDPAK top-side cooled	IPDQ60R010S7A

Product	Product family	Output voltage	Output current [typ.]	Isolation type	Part number
Gate drivers	EiceDRIVER™	20 V	5 A/9 A	functional/basic isolation	1EDB6275F, 1EDB8275F, 1EDB9275F
			5 A/9 A	non-isolated	1EDN6550B, 1EDN8550B, 1EDN9550B
			5 A/9 A	non-isolated	1EDN8511B
		20 V	±2 A to ±6 A	functional isolation	1EDI10I12MF, 1EDI20I12MF, 1EDI30I12MF
		25 V	±2.6 A	non-isolated	1ED44173N01B
		40 V	±3 A to ±6 A	functional isolation	1ED3431MU12M, 1ED3461MU12M
			±3 A to ±6 A	reinforced isolation	1ED3431MC12H, 1ED3461MC12H

Product	Product family	Load voltage	Output/load current	Isolation voltage	Part number
Integrated solid-state relays	Photovoltaic isolators (PVI)	-	2 x 5 µA	3.75 kV	PVI5033R
		-	2 x 5 µA	2.5 kV	PVI1050N
	Photovoltaic relays (PVR)	60 V	2 A	4 kV	PVG612A
		400 V	1 A	3.75 kV	PVX6012

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Motor Control

Low-voltage motor drive and control

Low-power battery applications

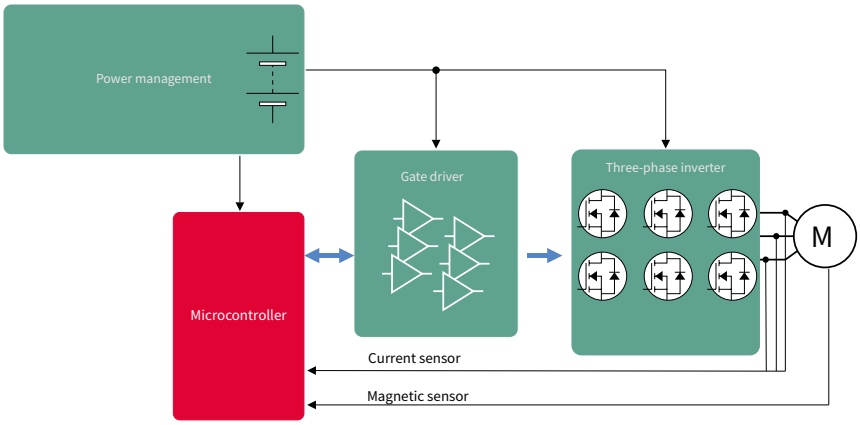
When it comes to increased efficiency and durability, brushless DC (BLDC) motors offer the ideal solution for power electric motor applications. Compared to traditional brushed motors, brushless DC motors are quieter, lighter, and offer an overall smaller design footprint while providing increased reliability. Theseimprovements, however, come with an increased need for monitoring and control, requiring significantly more complex electronics and supporting algorithms. This move toward BLDC motors occurs in concert with a continuous push towards higher energy efficiency, resulting in trade-offs between power delivery and battery lifetime. This, in turn, puts a significant burden on semiconductor technologies to deliver high performance in motor control applications. In parallel, shortening life cycles and increased product diversity put an additional burden on suppliers to provide that same high performance, cost-efficient solutions across an increasing variety of use cases.

With industry-leading technology and reliability, Infineon's extensive portfolio of discrete and integrated circuits offers the breadth and depth of solutions necessary to meet the demands across a wide spectrum of motor control needs.

Features and benefits

Key features	Key benefits
› A complete eco-system of simulations, documentation and demonstration boards v	› Fast time to market
› Comprehensive portfolio of products and solutions	› Broad portfolio allows for right product fit to meet application needs
› Best in class MOTIX™ gate drivers for OptiMOS™ and StrongIRFET™ MOSFETs offering high efficiency and protection	› Extended battery life and product life span
› World-class broad and deep portfolio of LV FETs with SMD packaging improves capability and reliability while reducing assembly cost	› Reduction overall system size and cost
› Components featuring small form factor and compact design offering highest power density and BOM savings thanks to lowest $R_{DS(on)}$	
› High reliability of Infineon components results in prolonged product life spans	

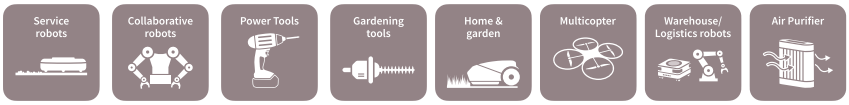
Application diagram



Key enabling products

- Power MOSFETs – OptiMOS™, StrongIRFET™
- MOTIX™ low-voltage motor control solutions
- XMC1000 microcontrollers
- XMC4000 microcontrollers
- PSoC™ 4100 microcontrollers
- PSoC™ 62 microcontrollers
- XENSIV™angle sensor
- XENSIV™ magnetic sensor
- XENSIV™ current sensor
- XENSIV™ Hall switch

Target end applications



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Product portfolio

Product category	Product family	Package options	Battery voltage support [V]	Voltage class [V_{DS} max.]	Representative part numbers
Inverter/MOSFETs	StrongIRFET™ OptiMOS™	SuperSO8 SuperSO8 SC PQFN 3x3 DirectFET™ S/M/L-Can TOLL TOLG TOLT TO-220 TO-247 DPAK D^2PAK D^2PAK 7-pin	12-16	25-30	BSC005N03, IQE006NE2, IPT004N, IPP055N
			18	40	IRL40DM2, BSC010N04, IST011N06, BSZ097N04, IRF40SC, IPB011N04, IRL40B215
			36-48	60	IST011N06NM, BSC012N06N, BSZ100N06N, IPT007N06N, IRFS7534, BSC014N06N
			48-60	75-80	BSC021N08N, BSC030N08N, IPT010N08N, IPTG011N08N, IPP040N08N, IPB049N08N
			60-72	100-120	BSC035N10N, ISZ080N10N, IPT015N10N, IPTC030N12N, IPB036N12N, IPP050N10N
			72-96	150	BSC074N15N, BSC110N15N, IPT059N15, IPB072N15
			96-144	200	BSC220N20N, IRF200S234, IPTG111N20NM, IPT111N20

Product category	Voltage class [V]	Configuration	Part number	Current source/sink	Comment
Gate drivers	25	Low-side	1ED44173	2.6 A/2.6 A	Integrated fast over-current protection, fault re-porting and enable functionality, SOT-23 package
	60	Three-phase	6EDL7141 NEW	1.5 A/1.5 A	Configurable smart gate driver, integrated power management and current sense amplifiers, VQFN-48 package
	160	Three-phase	6ED2742 NEW	1 A/2 A	SOI, integrated BSD, trickle charge pumps, power management and current sense amplifiers, RFE, QFN32 package
	160	High- and low-side	2ED2732 NEW	1 A/2 A	SOI, integrated BSD, separate VSS/COM, thermal pad, DFN10 package
	160	Half-bridge	2ED2748	4 A/8 A	SOI, integrated BSD, separate VSS/COM, thermal pad, DFN10 package
	200	Three-phase	6EDL04N02	0.165 A/0.375 A	SOI, Integrated BSD, OCP, enable, fault reporting, TSSOP-28 package
	200	High- and low-side	IRS2005S	0.29 A/0.6 A	V_{CC} and V_{BS} UVLO, matched propagation delay, DSO8 package
	200	Half-bridge	IRS2007S	0.29 A/0.6 A	V_{CC} and V_{BS} UVLO, matched propagation delay, DSO8 package
	200	Low- or high-side	1EDN7550	4 A/8 A	Low propagation delay, differential input, high common-mode input, UVLO, SOT23-6 and TSNP-6 package options
	600	Half-bridge	IRS21867S	4 A/4 A	High current level-shift gate driver with low VCC operation, DSO8 package
	600	Three-phase	6EDL04N06PT	0.165 A/0.375 A	SOI, integrated BSD, tolerant to $-V_S$ up to 100 V, OCP, enable, fault reporting, DSO-28W package
	650	Half-bridge	2ED2304S06F	0.36 A/0.7 A	SOI, integrated BSD, tolerant to –Vs up to 100 V, DSO8 package

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Product category	Product family	Representative part number	Description
Integrated devices	MOTIX™	IFX9201SG	Integrated brushed DC motor driver
		IMD701A NEW	Integrated BLDC controller with gate driver
Microcontrollers	XMC™	XMC1300 XMC1400	ARM™ Cortex® -M0 core. 32/48MHz core, math coprocessor, peripherals up to 96 MHz peripherals, CCU4/CCU8 PWM timers, 2x serial channels, Hall and encoder interface, analog comparators, 12 bit ADC, up to 200 kB Flash/16 kB RAM 16-64 pins
		XMC4400	ARM™ Cortex® -M4F core, up to 144 MHz, up to 512 kB Flash/80 kB RAM, 4xCCU4/2xCCU8/2xPOSIF timers, serial channels, up to 4x 12-bit ADC / 2x DAC, 4xΔΣ demodulator, 64-100 pins
	PSoC™	PSoC™ 4100	ARM™ Cortex® -M0/M0+ CPU with DMA controller, up to 384 kB Flash / 32 kB SRAM, cryptographic coprocessor, 12-bit ADC / 13-bit DAC, configurable amplifiers, 16-bit PWM timers, configurable serial communication blocks, up to 84 GPIO, 28-100 pin packages
		PSoC™ 62	Dual-core 150MHz ARM™ Cortex® -M4 and 100 MHz M0/M0+, ultra-low power and low-power operation modes, up to 2 MB Flash, 1 MB SRAM with DMA, 24x16-bit and 8x32-bit timer blocks, USB 2.0, up to 104 GPIOs
Sensors	Hall switches	XENSIV™ TLI4963	3-5.5V operation, active error compensation, high stability magnetic thresholds, low jitter
	Angle sensor	XENSIV™ TLI5012	Integrated angle calculation, incremental interface, SPI with 8 Mbit/s, ≤ 1.9o angle error over-temperature/life, integrated giant magnetoresistance based angle sensor, 15-bit representation of angle value with 0.01o resolution, bi-directional SSC interface
	3D magnetic sensor	XENSIV™ TLI493D	± 50 mT to ± 160 mT ranges, up to 30.8 LSB12/MT sensitivity, low-power mode, low offset and match drift, wake up function
	Magnetic coreless current sensor	XENSIV™ TLI4971	25 A to 120 A measurement range, 240 kHz bandwidth, low sensitivity error over temperature, galvanic functional isolation up to 1150 V, differential sensing, two independent over current detection outputs

Evaluation platforms

Category	Product name	Description
Application	DEMO-PTOOL-300W-M	This design kit for cordless power tools uses the DirectFET™ ME/MF and firmware developed using the XMC1300 family.
	KIT_MOTOR_DC_250W_24V	Three-phase DC motor control power card (V_{DC} 24 V, 250 W motor drive power card for XMC1000 and XMC4000)
	Stepper motor control shield with IFX9201 and XMC1300	The stepper motor control shield based on Infineon's H-bridge IFX9201 and XMC1300 microcontroller can drive the two coils in a stepper motor featuring a dual-H-bridge configuration. This current stepper motor control board is compatible with Arduino microcontroller boards and Infineon's XMC™ microcontroller kits using the Arduino form factor.
	KIT_XMC1X_AK_MOTOR_001	XMC1000 motor control application kit
Product	CY8CKIT-037	The CY8CKIT-037 is used for PSoC™ 4 solution evaluation for motor control application. The kit supports BLDC motors, PMSM (permanent magnetic synchronous motors), and stepper motors. We provide example projects including single-shunt and sensorless FOC (field oriented control), sensored BLDC control, sensorless BLDC control, and stepper motor control example projects.
	EVAL_6EDL7141_TRAP_1SH	The EVAL_6EDL7141_TRAP_1SH features fully configurable operating parameters with an on-board debugger ready for direct USB connection to PC. The BLDC motor drive board uses trapezoidal commutation based on the MOTIX™ 6EDL7141 smart three-phase driver.
	S2GO_CUR-SENSE_TLI4971	For evaluation purposes of the latest XENSIV™ current sensor TLI4971, we rely on our proven evaluation concept of Shield2Go and 2GO Kits – therefore the TLI4971 evaluation environment is also offered in those two configurations: › TLI4971 MS2GO: 2GO Kit version › TLI4971 S2GO: Shield2Go version

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Drives

High-power low-voltage motor drive

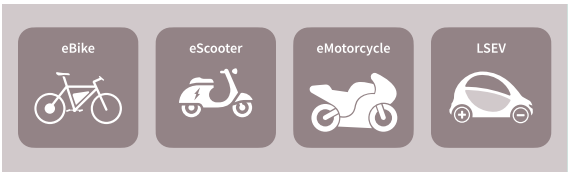
Powering light e-mobility and material handling

High-power low-voltage motor drives power both personal light e-mobility vehicles such as e-bikes, e-scooters, e-motorcycles, microEVs, as well as material handlers such as e-forklifts, delivery vehicles (xDVs), autonomous mobile robots (AMR), automated guided vehicles (AGV), and commercial, construction and agricultural vehicles (CAV). These applications can be collectively referred to as light electric vehicles (LEVs). LEVs have an ever-growing need for highly efficient, intelligent, and powerful motor-drive systems to address requirements such as high speed, high peak, and continuous torque, safety, reliability, and most of all, long battery lifetime. Infineon offers a comprehensive, end-to-end solution for every segment and variation of this diverse market with power levels ranging from 200 W to 50 kW. The OptiMOS™ and StrongIRFET2™ MOSFET families form a powerful yet efficient muscle of the system, while the EiceDRIVER™ gate driver family offers a broad range of both isolated and non-isolated gate drivers. An array of motor control MCUs such as iMOTION™, XMC™ and AURIX™ along with their software/tools ecosystem, enable quick, easy, and tailor-made implementations of advanced motor control algorithms with necessary safety requirements. The XENSIV™ current and angle/position sensors enable accurate closed-loop control. Along with an extensive product portfolio, Infineon simplifies and accelerates the design process by offering demonstration, evaluation, and reference boards, simulation models, application notes, comprehensive technical support, and a vibrant developer community.

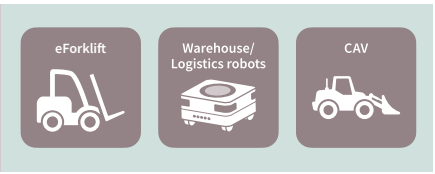
Features and benefits

Key features	Key benefits
› MOSFETs with best FOMs for drives with low $R_{DS(on)}$; low Q_{RR}; low ΔV_{GSth}	› Extended range/increase in battery life
› Broad and deep microcontroller portfolio enabling varied design approaches (plug n play, optimized custom design), S/W tool libraries, hall and encoder I/F MATH Co-processor, ΔΣ demodulator, functional safety	› Precise motor control
› Gate drivers with robust isolation, TDI, high/programmable output current, active miller clamp	› Enable compact motor drive design
› Current sensors having high current range, coreless sensing, high resolution, noise immunity and programmability	› Quick and easy system-design enabling fast time-to-market
› Hall switches, angle/position sensors and 3D angle sensors with high accuracy, low jitter and low power consumption	› Rugged, reliable and safe motor drives
	› Proven Infineon quality ensuring durability and long life of the system

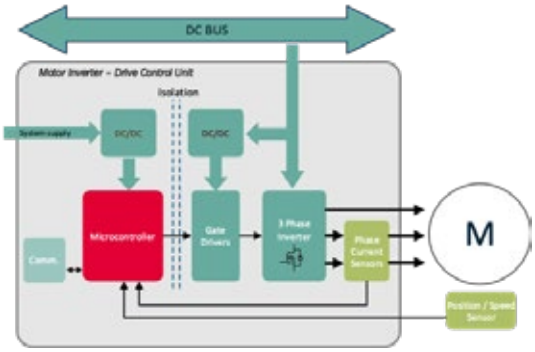
Personal e-mobility



Material handling



Application diagram



Product	Product family
3-phase inverter (MOSFETs)	OptiMOS™, StrongIRFET™
Microcontroller	iMOTION™ IMC 300, XMC™ 1300, 1400, XMC™4100, 4400, 4700
Gate driver	EiceDRIVER™
Position/speed sensor	XENSIV™ angle sensors and Hall switches
Current sensor	XENSIV™ current sensor

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Typical power level of the inverter system: 200 W-4 kW

Component	Product family	Package options	Battery voltage support (V)	Voltage class [V_{DS} max]	Representative part numbers	Features
Inverter/ MOSFETs	StrongIRFET™ OptiMOS™	TOLL TOLG TOLT D^2PAK 7-pin D^2PAK TO-220 TO-247 SuperSO8	24-36	60	IPT007N06N, IPTG007N06NM5, BSC012N06NS, ISC010N06NM5, IRFS7534, IPB026N06N, IPB010N06N, IRF60SC241, IRFS7537	Low $R_{DS(on)}$ and low conduction losses, tight V_{GSth} spread for efficient paralleling, low Q_{rr}, soft body diode, innovative packages
			36-48	80	IPTG011N08NM5, IPTC012N08NM5, IPT012N08NM5, IPT010N08NM5, IPT012N08NF2S*, IPB015N08N5, IPB017N08N5, BSC019N08NS5, IPP024N08NF2S, IPB024N08NF2S, IPP016N08NF2S, IPP040N08NF2S, BSC037N08NS5, IPB049N08N5	

Component	Voltage class (V)	Configuration	Part number	Source/sink	Package	Features
Gate drivers	60	Three-phase	6EDL7141 NEW	1.5A/1.5A	VQFN-48	Configurable smart gate driver, integrated power management, and current sense amplifiers
	160	Three-phase	6ED2742S01Q*	1A/2A	QFN32	SOI, integrated BSD, trickle charge pumps, power management and current sense amplifiers, RFE
	160	High- and low-side	2ED2742S01G*	1A/2A	DFN10	SOI, integrated BSD, UVLO, separate VSS/COM, thermal pad
	160	Half-bridge	2ED2748	4A/8A	DFN10	SOI, integrated BSD, separate VSS/COM, thermal pad
	200	Three-phase	6EDL04N02PR	0.165A/0.375A	TSSOP-28	SOI, integrated BSD, OCP, enable, fault reporting, UVLO enable
	200	High- and low-side	IRS2005S	0.29A/0.6A	DSO8	V_{CC} and V_{bs} UVLO, matched propagation delay
	200	High- and low-side	IRS2011S	1/1 A	DSO8	UVLO, $MT_{ON/OFF, max}$=20 ns, 3.3 V-5 V input
	600	High- and low-side	2EDL05N06PF	0.36/0.7 A	DSO8	SOI, UVLO, MTON/OFF,max=60 ns, 3.3-15 V input, BSD
	600	Single high-side	IRS21271S	0.2/0.42 A	DSO8	UVLO, OCP, 3-15 V input, fault reporting
	600	Three-phase	6EDL04N06PT	0.165A/0.375A	DSO-28	SOI, integrated BSD, OCP, enable, fault reporting, UVLO enable

Typical power level of the inverter system: 4 kW-11 kW

Component	Product family	Package options	Battery voltage support (V)	Voltage class [V_{DS} max]	Representative part numbers	Features
MOSFETs	StrongIRFET™ OptiMOS™	TOLL, TOLG TOLT D^2PAK 7-pin D^2PAK TO-220 TO-247 SuperSO8	48-72	100-120	IPTG014N10NM5, IPTC015N10NM5, IPT015N10N5, IPT015N10NF2S*, IPB020N10N5, ISC022N10NM6, IPB017N10N5, IPTC030N12N3 G, IPB036N12N3 G, IPP039N10N5, IPB042N10NF2S*, IPP050N10NF2S	Low $R_{DS(on)}$ and low conduction losses, tight V_{GSth} spread for efficient paralleling, low Q_{rr}, soft body diode, innovative packages
			72-96	135-150	IRF150P220, IPT039N15N5, IPTG039N15NM5*, IPTC039N15NM5*, IPB044N15N5, IPT044N15N5, IPB048N15N5, IPT054N15N5, BSC093N15NS5, IRFP4568, IPT063N15N5, IPB073N15N5, IRF7779L2, IPP076N15N5, IRFS4115	

Component	Voltage class (V)	Configuration	Part number	Source/sink	Package	Features
Gate drivers	160 V	High- and low-side	2ED2738S01G*	4/8 A	DFN10 3x3mm	SOI, integrated BSD, UVLO, separate VSS/COM, thermal pad
	200 V	1-ch non-isolated	1EDN8550B	4/8 A	SOT23-6	True differential inputs, with ± 80 V static and ± 150 V dynamic ground-shift robustness, separate SRC/SNK output pins
	500 V	High- and low-side	IRS2110S	2/2 A	DSO-16W	$MT_{ON/OFF}$, max=10 ns, separate power and logic ground, SD pin, 3-20 V input
	600 V	High- and low-side	2EDL23N06PJ	2.3/2.8 A	DSO-14	3.3 V-15 V input, -100 V transient, PGND, SOI, integrated BSD, OCP, UVLO, enable, fault reporting
	600 V	High- and low-side	IRS21867S	4/4 A	DSO8	High current level shift gate driver with low V_{CC} operation
	650 V	High- and low-side	2ED2181S06 F/J	2.5/2.5 A	DSO8 (F) DSO-14 (J)	SOI, integrated BSD, 3.3-15 V input, $MT_{ON/OFF, max}$=35 ns, -100 V transient, separate logic and power ground (only J version)

Note: The MOSFET parts listed under various power-levels in the above tables is only for guidance purposes; higher power levels can be achieved even with lower voltage class MOSFETs through paralleling.

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* Coming soon

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Typical power level of the inverter system: >11 kW

Component	Product family	Package options	Battery voltage support (V)	Voltage class [V_{DS} max]	Representative part numbers	Features
Inverter/ MOSFETs	StrongIRFET™ OptiMOS™	TOLL TOLG TOLT D^2PAK 7-pin D^2PAK TO-220 TO-247	96-144	200	IRF200P222, IPB107N20N3G, IPTG111N20NMM3FD, IRFP4668, IRF200S234, IRFS4127	Low $R_{DS(on)}$ and low conduction losses, tight V_{GSth} spread for efficient paralleling, Low Qrr, soft body diode, innovative packages
			144-200	250-300	IRF250P224, IRF300P226, IPT210N25NFD, IPTG210N25NM3FD, IPB407N30N, IPB600N25N3 G, IRFP4868, IRFB4229, IRFS4229	

Component	Voltage class (V)	Configuration	Part number	Source/sink	Package	Features
Gate drivers	1200 V	1-ch isolated	1EDB8275F NEW	5.4/9.8 A	DSO8	3 kV basic isolation with CT technology, (UL1577), separate SRC/SNK output, UVLO (4 types), CMTI > 300 V/ns
	1200 V	1-ch isolated	1EDI60N12AF	10/9.4 A	DSO8	Short circuit clamping, active shut-down, UVLO, separate SRC/SNK output, 3.3-15 V input
	1200 V	2-ch isolated	2EDB8259F*	5.4/9.8 A	DSO-16	3 kV basic isolation w. CT technology, (UL1577), UVLO (4 types), DIS, STP/DTC, CMTI > 300 V/ns
	1200 V	2-ch isolated	2EDF7275F	4/8 A	DSO-16	1.5 kV functional isolation, high CMTI, UVLO, SLDO, DIS, DTC

Microcontrollers and sensors for precision control and accurate sensing (power-level agnostic)

Component	Product family	Core/ MaxClock speed	Representative parts	Package	Features
Microcontroller	iMOTION™	Arm® Cortex® M0, 48 MHz	IMC301A-F048, IMC301A-F064	LQFP-48, LQFP-64	UART, SPI, I^2C, LIN, MATH, 2x ACMP, CCU4
	XMC™	Arm® Cortex® M0, 32 MHz	XMC13xx	TSSOP-16/28/38, VQFN-24/40,	UART, SPI, I^2C, I^2S, POSIF, MATH, 3x ACMP, CCU8
		Arm® Cortex® M0, 48 MHz	XMC14xx	TSSOP-38, VQFN-40/48,LQFP-64	UART, SPI, I^2C, I^2S, CAN, POSIF, MATH, 4x ACMP, 2x CCU8
		Arm® Cortex® M4F, 80 MHz	XMC41xx	VQFN-48,TQFP-64	UART, SPI, I^2C, I^2S, CAN, POSIF, HRPWM, CCU8
		Arm® Cortex® M4F, 80 MHz	XMC42xx	VQFN-48,TQFP-64	UART, SPI, I^2C, I^2S, CAN, POSIF, HRPWM CCU8
		Arm® Cortex® M4F, 120 MHz	XMC44xx	TQFP-64/100	Ethernet, USB, UART, SPI, I^2C, I^2S, CAN, POSIF, HRPWM, CCU8
		Arm® Cortex® M4F, 144 MHz	XMC47xx	TQFP-100/144, LFBGA-196	Ethernet, USB, UART, SPI, I^2C, I^2S, CAN, POSIF, SD/MMC, CCU8

Component	Product family	Representative parts	Features
Angle/position sensors	XENSIV™ Hall switches (end of shaft /out of shaft)	XENSIV™ TLx4961/68	3-32 V operation, active error compensation, high stability magnetic thresholds, low jitter
	XENSIV™ angle sensor (end of shaft)	XENSIV™ TLI5012	Integrated angle calculation, incremental interface, SPI with 8 Mbit/s, ≤ 1.9° angle error over temperature/life, integrated giant magneto resistance-based angle sensor, 15-bit representation of angle value with 0.01° resolution, bi-directional SSC interface
		XENSIV™ angle sensor	Sin/cos output via analog interface, precise rotation sensing (typ. angle error of 1 deg), very-low current consumption (~2mA), extended magnetic field range up to 100 mT, ISO-26262 (functional safety) compliant option
	XENSIV™ 3D magnetic sensor (end of shaft/out of shaft)	XENSIV™ TLI493D	Enables out-of-shaft angular sensing, ±50 mT to ±160 mT ranges, up to 30.8 LSB12/MT sensitivity, low power mode, low offset and match drift, wake up function
Current sensor	XENSIV™ magnetic coreless current sensor	XENSIV™ TLI4971	±25 A, ±50 A, ±75 A and±120 A measurement range, 240 kHz bandwidth, low sensitivity error over temperature, galvanic functional isolation up to 1150 V, differential sensing, two independent over current detection outputs, user programmable parameters
		XENSIV™ TLE4972	Analog output, up to ±1000 A measurement range, 210 kHz bandwidth, fast overcurrent detection output with programmable threshold, differential sensing, galvanic isolation between current rail and sensor, user programmable parameters

Design resources

Low-voltage drives scalable power demoboard platform
XMC™ demonstration and eval boards
XENSIV™ TLE-5501 evaluation kit
XENSIV™ current sensors evaluation boards

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* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

eBike | Warehouse/ Logistics robots

System specification exemplar

V_{bat} = 24 V, 500 W PMSM motor

Component	Features
MOSFETs	BSC012N06NS
Microcontroller	IMC301A-F048/XMC1302-T038X-0032
Gate driver	6ED2742S01Q*
Position/speed sensor	TLI49611MXTMA1
Current sensor	TLI4971-A120T5-U-E0001

eScooter

System specification exemplar

V_{bat} = 48 V, 3 kW PMSM motor

Component	Features
MOSFETs	IPTC012N08NM5
Microcontroller	IMC301A-F064/XMC1403-Q048X0200 AA
Gate driver	2ED2738S01G*
Position/speed sensor	TLE5012B E1000
Current sensor	TLI4971-A120T5-U-E0001

eScooter

System specification exemplar

V_{bat} = 96 V, 6 kW PMSM motor

Component	Features
MOSFETs	IPT039N15N5
Microcontroller	XMC1404-F064X0200 AA
Gate driver	2EDB8259F*
Position/speed sensor	TLE5501 E0002
Current sensor	TLE4972-AE35S5

eMotorcycle | LSEV | eForklift

System specification exemplar

V_{bat} = 48 V, 20 kW PMSM motor

Component	Features
MOSFETs	IPTG014N10NM5
Microcontroller	XMC4700-F100K1536 AA
Gate driver	2EDB8259F*
Position/speed sensor	TLE5501 E0002
Current sensor	TLE4972-AE35S5

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* Coming soon

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Uninterruptible power supply (UPS)

Attractive solutions for highest efficiency and power density

Today's uninterruptible power supply systems introduce a wide range of challenges. Overcoming them requires an increase in output power, energy efficiency and power density. We offer complete system-level solutions and high quality products for diverse uninterruptible power supply applications. Equipped with our semiconductors, UPS applications can achieve best-possible power-conversion efficiency and cutting-edge power density. The benefits are cost reduction and fewer passive components – regardless of the topology used.

Our solutions and products for UPS applications fulfill the latest market requirements. This includes the trend of modularization of UPS brick units due to scalable power demand from data centers, as well as the topology shift from two-level to three-level to achieve higher efficiency. Our products are suitable for any kind of uninterruptible power supplies in telecom, data center, server or industrial automation environments.

	Offline UPS	Online UPS
MOSFETs	OptiMOS™ and StrongIRFET™ 20-300 V	
	CoolMOS™ SJ MOSFETs 500-950 V	
SiC diodes		CoolSiC™ Schottky diode
IGBTs		TRENCHSTOP™ IGBT7 TRENCHSTOP™ 5
Power module and stack		EasyPACK™
Driver ICs	EiceDRIVER™ 1EDi EiceDRIVER™ 2EDi	EiceDRIVER™ X3 Compact
Auxiliary power supply		CoolSET™ 650-800 V
Microcontrollers	XMC1300 series	

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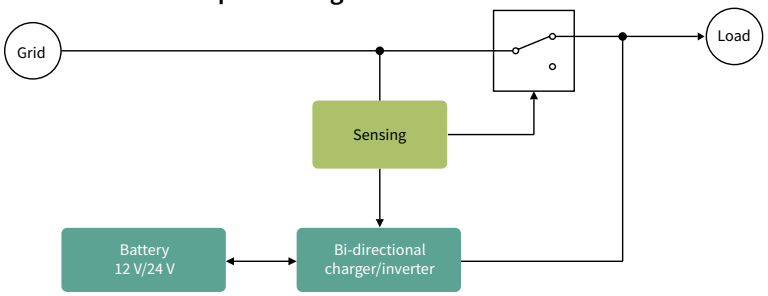
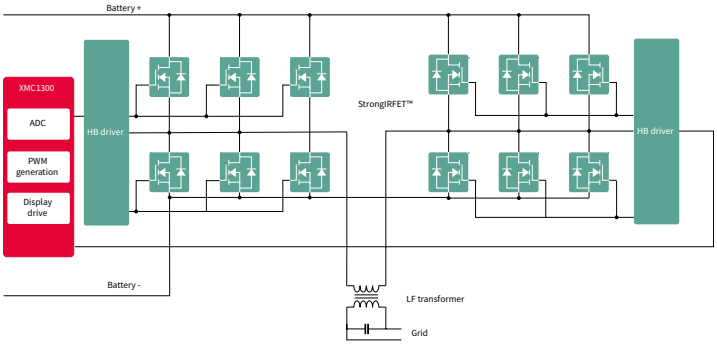
Offline UPS

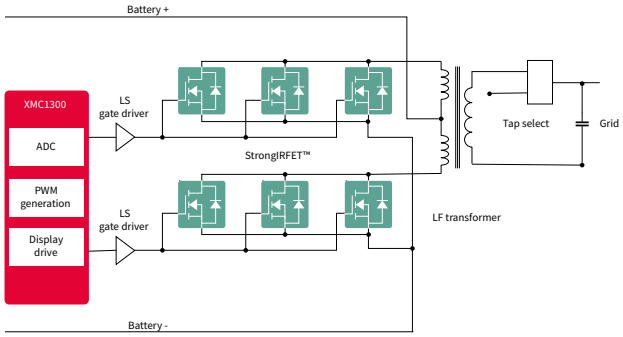
Bi-directional UPS power stage



Full-bridge bi-directional power stage



Push-pull bi-directional power stage



	Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	D²PAK and D²PAK-7	Gate drivers
Inverter/charger MOSFETs	**12 V**	**Push-pull**	60 V	IRFB7530 IRFB7534 IRFB7540 IRFB7545	IRFP3006 IRFP7530 IRFP7537	IRFS7530 IRFS7530-7P	IRS44273 IRS4427 1EDN751x 2EDN851x*
		Full-bridge	30 V 40 V	IRLB3813 IRLB8314 IRLB8743 IRFB7430 (40 V)	IRFP7430	IRFS7430 (40 V) IRFS7430-7P (40 V)	IRS211X* IRS2186 2EDL811X 1EDN7550B
	24 V	**Push-pull**	75 V 100 V	IRFB3077 IRFB3207 IRFB7730 IRFB7734	IRFP7718	IRFS7430 IRFS7734 IRF3610S (100 V) IRFS4010 (100 V)	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	40 V 60 V	IRFB7430 IRFB7434 IRFB7545 (60 V) IRF60B217 (60 V)	IRFP7530 IRFP3006 IRFP7537	IRFS7430 IRFS7430-7P IRF7430* IRFS7530-7P	IRS211X* IRS2186 2EDL811X 1EDN7550B
	48 V	**Push-pull**	150 V	IRFB4115 IRFB4321 IPP046N15N5* IRFB4228 IRFB4019	IRFP4568 IRFP4321 IRF150P220 IRF150P221	IRFS4321 IRFS4115 IRB048N15N5* IRFS4615	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	100 V	IPP030N10N IRFB4110 IPP086N10N3G IRFB4510 IPP180N10N3G	IRFP4468 IRFP4110 IRF100P218 IRF100P219	IRFS3610* IRF3710S IRF8010S IRFS4510 IRFS4010	IRS211X* IRS2186 2EDL811X 1EDN8550B
	72 V	**Push-pull**	200 V	IPP110N20N3 IRFB4127 IRFB4227 IPP320N20N3 IRFB4320*	IRF200P222 IRFP4668 IRF200P223 IRFP4127 IRFP4227	IPB110N20N3LF IRFS4127 IRFS4227 IRFB117N20NFD* IRF200S234	IRS44273 IRS4427 1EDN851X 2EDN852X
		Full-bridge	150 V	IRFB4321 IPP046N15N5*	IRFP4568 IRF150P220	IRFS4321 IRB048N15N5*	IRS211X* IRS2186 2EDL811X
		Full-bridge	200 V	IPP110N20N3 IRFB4227	IRF200P222 IRFP4668	IPB110N20N3LF IRFS4127	IRS211X* IRS2186 2EDL811X
Microcontrollers	**12-72 V**	**XMC1300 series**					

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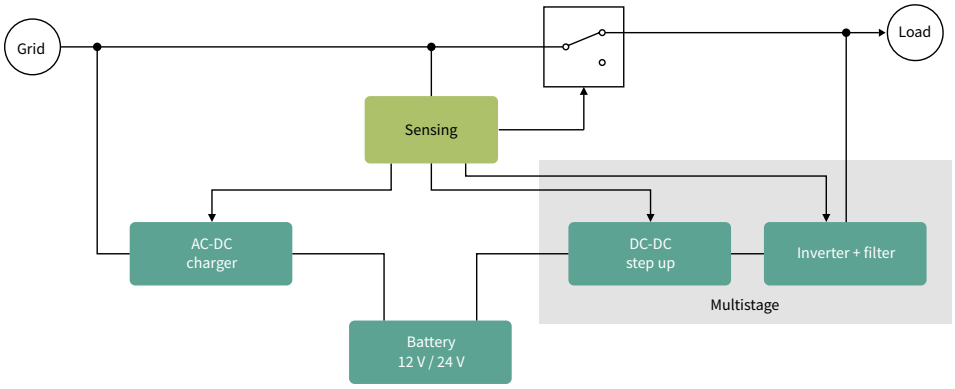
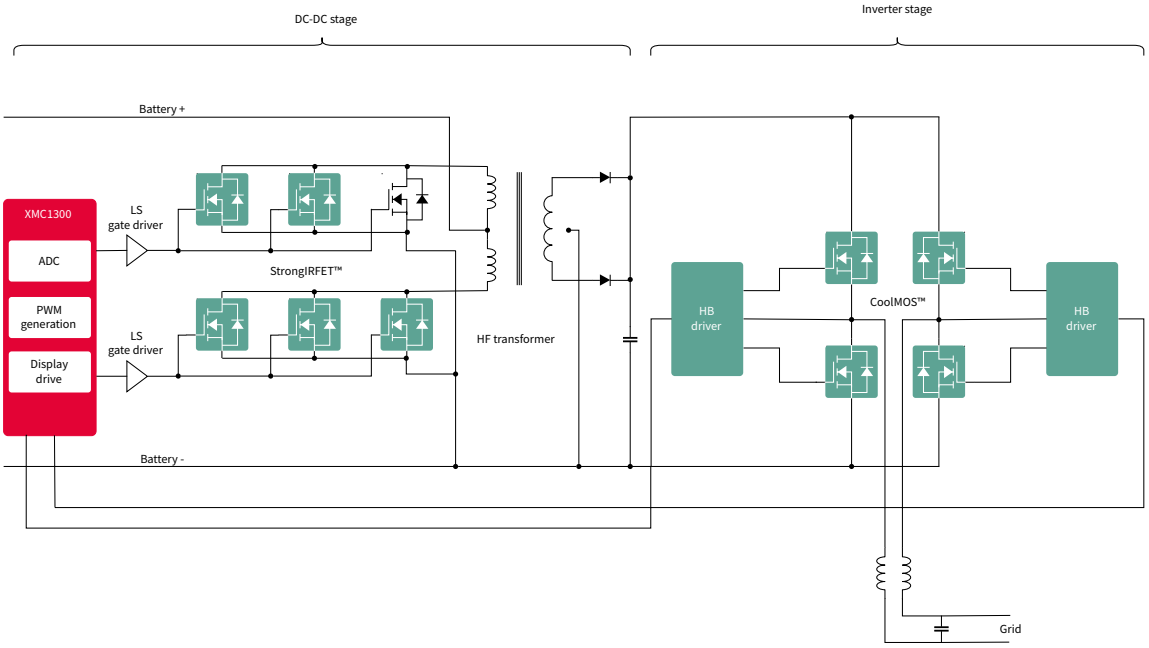
Unidirectional



Unidirectional power stage (output stage)



Unidirectional DC-DC stage

Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	D²PAK and D²PAK-7	Gate drivers
12 V	**Push-pull**	40 V	IRFB7430 IRFB7434	IRFP7718	IRFS7430 IRFS7430-7P IRF7430*	IRS44273 IRS4427 1EDN851X 2EDN852X
		60 V	IRFB7540 IRFB7545 IRF60B217		IRFS7530-7P	
		75 V		IRFP7718		
24 V	**Push-pull**	75 V	IRFB3077 IRFB3207 IRFB7730 IRFB7734	IRFP7718	IRFS7730 IRFS7734	
		100 V		IRF100P218 IRFP4468	IRFS4010 IRF3610S	
		150 V	IRFB4115 IRFB4321 IPP046N15N5* IRFB4228 IRFB4019	IRF150P220	IRFS4321 IRFS4115 IRB048N15N5* IRFS4615	
Microcontrollers		XMC1300 series				

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Unidirectional inverter stage

Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	Gate drivers
200 V	**Full-bridge inverter 120 V_{AC}**	300 V	IPP410N30N IRFB4137	IRF300P226 IRF300P227 IRFP4868 IRFP4137	IRS211X* IRS2186
400 V	**Full-bridge inverter 220 V_{AC}**	500 V	IPP50R280CE IPP50R380CE IPP50R190CE	IPW50R190CE	IRS211X* IRS2186
Microcontrollers		XMC1300 series			

Unidirectional charger

Battery voltage	Topology	MOSFET breakdown voltage	TO-220	TO-247	PG-DIP-7
12-72 V	**Flyback**	650 V	CoolSET™		ICE3RBR1765JZ ICE3RBR0665JZ
12-72 V	**Flyback**	800 V	CoolMOS™ P7	IPP80R750P7 IPP80R600P7 IPP80R450P7 IPP80R360P7 IPP80R280P7	
Microcontrollers		Integrated, ICE3AS03LJG, ICE3BS03LJG			

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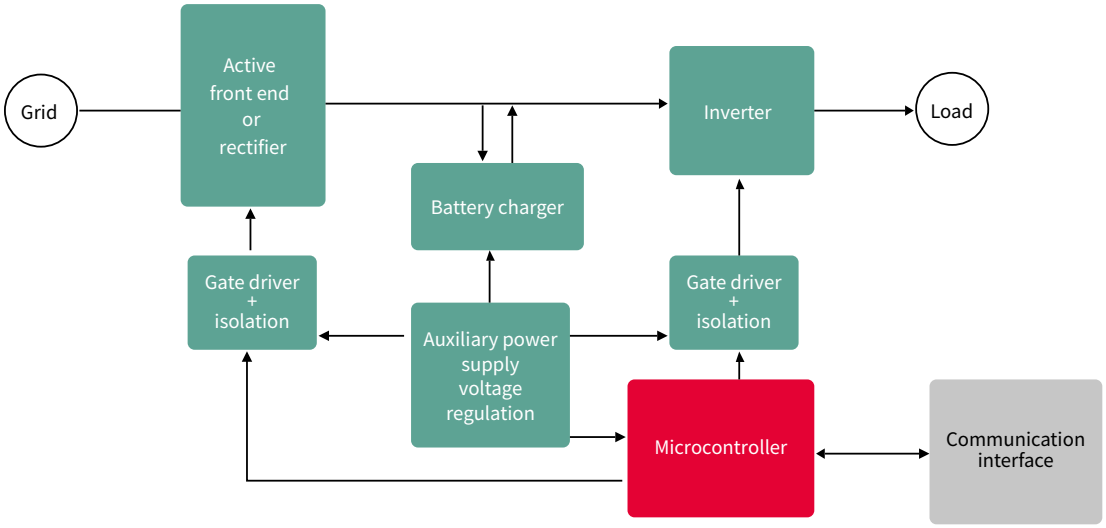
Online UPS

Online UPS power stage



Stage	Topology	Voltage class	Technology	Part number
Rectifier	Three-phase	800 V/1600 V	EasyBRIDGE, EconoBRIDGE™	
PFC	Boost PFC / Vienna "T-type"	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
	Boost PFC / Vienna rectifier	1200 V	CoolSiC™ MOSFET	F3L15MR12W2M1_B69
	Boost PFC / Vienna "T-type"	650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5
	Boost PFC	600 V/1200 V	EasyPACK™	
	Boost PFC	1200 V	CoolSiC ™ Schottky diode	
	PFC	600 V	CoolMOS™ P7	IPP60R060P7 IPB60R060P7
	PFC	600 V	CoolMOS™ C7	IPP60R040C7 IPB60R040C7
Inverter	NPC 1	650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5 IKZ50N65EH5 IKZ75N65EH5
	NPC 1	650 V	TRENCHSTOP™ 5 S5	IKW50N65ES5 IKW75N65ES5
	NPC 1	650 V	TRENCHSTOP™ HighSpeed3 IGBT Rapid diode	FS3L50R07W2H3F_B11
	NPC 2	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
	NPC 2	1200 V	CoolSiC ™ Schottky diode	
	NPC 2	1200 V	TRENCHSTOP™ HighSpeed3 IGBT Rapid diode	FS3L25R12W2H3_B11 F3L200R12W2H3_B11 F3L200R12W2H3_B47*
	NPC 2	650 V	TRENCHSTOP™ 5 S5	IKW50N65ES5 IKW75N65ES5
	Two-level	1200 V	EconoPACK™, EasyPACK™	FS75R12W2T4_B11 FS200R12KT4R_B11
	Two-level	1200 V	EconoDUAL™	FF600R12ME4_B11
	Three-level NPC1	600 V/1200 V	EconoPACK™	F3L300R07PE4
Battery charger	Half-bridge	1200 V	TRENCHSTOP™ IGBT6	IKW40N120CS6 IKQ75N120CS6
		1200 V	CoolSiC™ MOSFET	FF6MR12W2M1_B11
		650 V	TRENCHSTOP™ 5 H5	IKW50N65EH5 IKW75N65EH5
Gate driver ICs	Single-channel	2300 V	EiceDRIVER™ X3 Compact	1ED3122MC12H 1ED3124MC12H
AUX	-	650-800 V	CoolSET™	

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Smart devices with NFC interface

NFC-based configuration, actuation and sensing applications

Near-field communication (NFC) is a mature technology for contactless exchange of data over short distances. Besides the data exchange, NFC technology itself can also transfer power from the polling device to the receiver devices. Due to the working principle of resonant coupling, power transmission via NFC is efficient and user-friendly because it is less sensitive to antenna/coil alignment. The combination of data exchange and energy transfer in one interface and the availability in billions of smartphones make NFC exciting enabler for the following novel use cases:

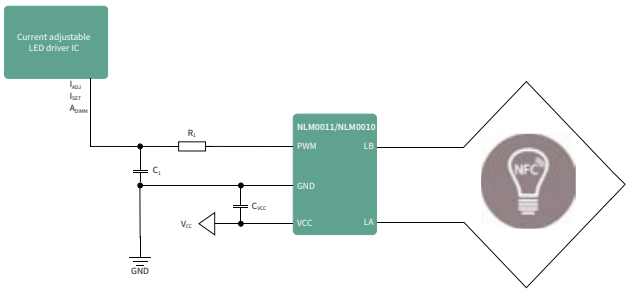
Passive device parameter configuration: Programming or configuring product operation parameters is sometimes complicated because of access problems or equipment requirements. Using an NFC interface, contactless or even passive operation can be performed anywhere. Modern LED power supplies are already equipped with the NFC interface to enable output current configuration in production, sales channel, and the field. Infineon's NLM product series supports customers to enable NFC configuration functions effectively.

Smart actuator and sensing devices: In the IoT age, smart devices help people make their life easier and more sustainable. NFC technology provides an option to develop battery-less smart devices that operate when the NFC reader device, like a mobile phone, is present. As a complement to mainstream active IoT technology, passive NFC technology is suitable for use cases like a passive smart lock, passive sensor inlay, medical care patch, etc.

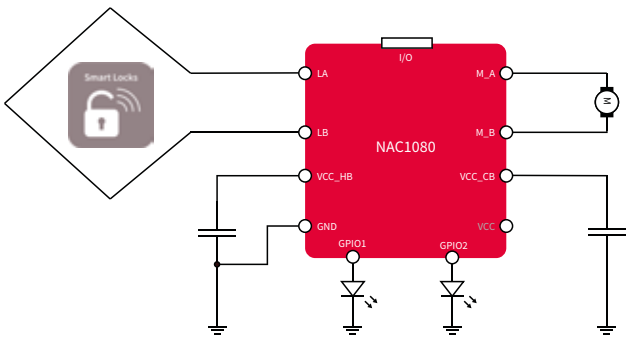
With Infineon's new NFC tag-side controller family a single-chip solution is available to develop cost-effective, miniaturized, actuation or sensing applications operating in either passive or active mode. The NAC1080, with integrated H-bridge and energy harvesting modules, enables cost-effective development of passive smart actuators like passive locks.

The NGC1081 is a low-power controller with ADC/DAC unit, integrated temperature sensor, and sophisticated analog and digital I/Os. It is the ideal solution for contactless sensing applications like temperature logger, gas detector, sensor inlay, medical patch, etc. Furthermore, both sensing and actuation control capability make the NGC1081 a unique product in the market, ideally suited for applications that require these functions – for example, radiator thermostats.

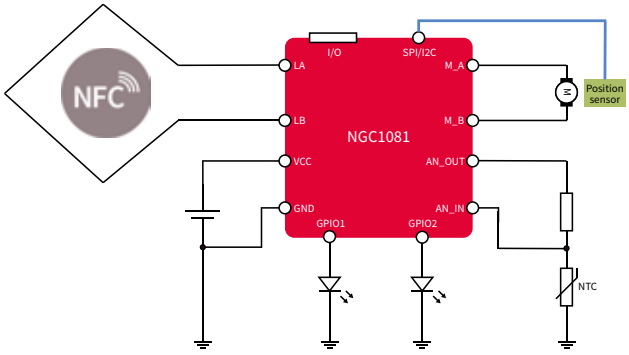
Example: NFC LED power supply



Example: NFC passive lock



Example: Smart radiator thermostat



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NFC configuration – NLM series

Type	Description	Package	Ordering code
NLM0011	Dual-mode NFC configuration IC with PWM output and CLO function	SOT23-5	NLM0011XTSA1
NLM0010	Dual-mode NFC configuration IC with PWM output, without CLO function	SOT23-5	NLM0010XTSA1

See LED lighting chapter for more information.

NFC actuation and sensing – NAC1080 and NGC1081

Highly integrated single-chip solution

The low-power Arm® Cortex®-M0 based microcontroller with integrated NFC frontend, sensing unit, motor driver, and energy harvesting function enables customers to develop smart actuation and sensing devices with minimum system BOM requirement.

Full flexible software-defined functions

The flexible IC architecture and the smart partitioning between hardware and software enable customers to maximize the utilization of software-defined functions.

Build-in security functions to meet the application requirements

These ICs include hardware security functions such as secure area in Flash, 128 bit AES accelerator and true random generator. A separate secure element can be connected via the digital interface on demand.

Type	NFC	Processor	RAM	NVM	ADC	DAC	I2V	H-Bridge	I²C	SPI	UART	GPIO	Analog-in	Package
NAC1080	ISO14443A	32-bit Arm® Cortex®-M0	16 kB	60 kB	no	no	no	yes	no	yes	yes	7x	no	PG-DSO-16
NGC1081*	ISO14443A	32-bit Arm® Cortex®-M0	16 kB	60 kB	12 bit	10 bit	yes	yes	yes	yes	yes	16x	X4	PG-VQFN-32

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Applications

Appliances and consumer electronics, ITC infrastructure, renewables, robotics, e-mobility

- Major home appliances
- Home appliances
- Power and gardening tools
- Wrist-worn devices
- Class D audio amplifiers
- Smart speaker
- Surveillance camera
- LED lighting
- Plug & LEDs play solutions
- Smart lighting solutions
- ITC solutions
- Solar
- Energy storage systems
- Robotics
- Onboard chargers for xEV appliactions
- Light electric vehicles and forklift

Dear users!

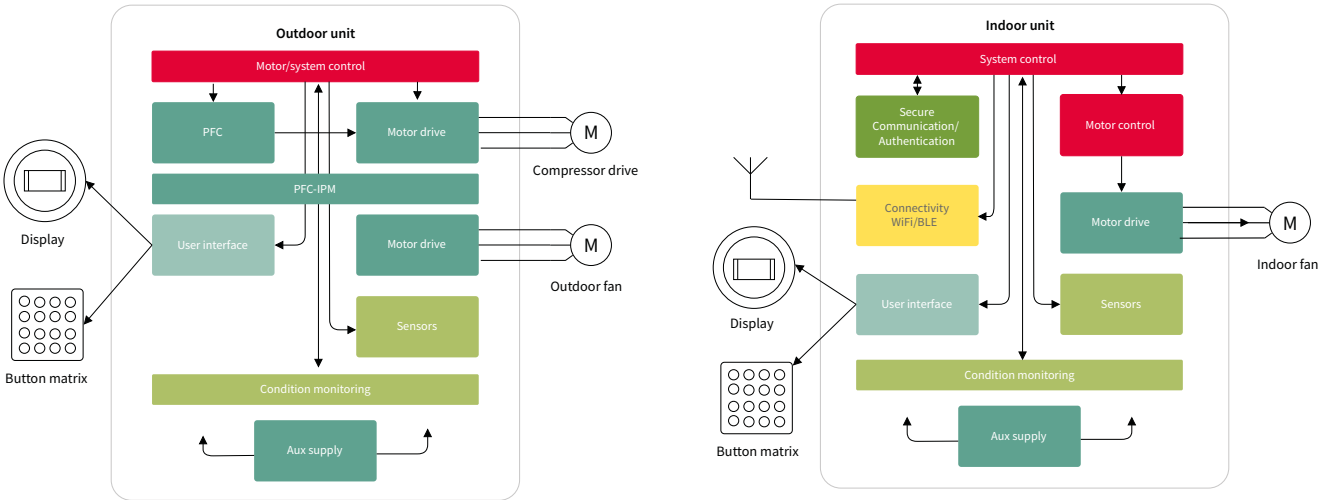
Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Major home appliances

Innovative approach for air conditioning

Product designers are facing the daunting challenge of developing smaller, smarter, more powerful, and more energy-efficient appliances. Based on industry-leading technology and manufacturing expertise, Infineon's line of innovative components for household appliances meets and exceeds even the most rigorous requirements for reliability and quality. The block diagram of an air conditioning system shown below, together with the product selection table, provides an effective recommendation for engineers to select the right component for each power management stage inside major home appliances.



In addition to efficiency gain through power solutions, Infineon's XENSIV™ sensor portfolio also enhances major home appliances' operation through advanced sensor-enabled use cases such as condition monitoring and predictive maintenance to detect potential device failures before they occur. Furthermore, integration of voice control or presence detection in those appliances increases user convenience and results in even more efficient devices.

Product category	Product family	Selection/benefits
Sensors	Pressure sensor	Airflow monitoring
	MEMS microphone	Noise monitoring
	Magnetic current sensor	Current sensing
	3D magnetic sensor	Vibration and position monitoring
	Linear Hall sensor	Linear vibration monitoring
	Hall sensors and switches	Opened and closed lid detection
	Double Hall sensor	Speed and direction measurement
	32-bit XMC4000 industrial microcontroller Arm® Cortex®-M4	Data processing, sensor system management, cloud connection management and ethernet connectivity
	OPTIGA™ embedded security solutions	Data and cloud security

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended products

Functional block	Topology	Voltage class	Technology/product family	Selection/benefit
Outdoor unit (ODU) PFC	iMOTION™ controller	-	IMC302A-F064	Motor/PFC controller incl. software
	Non-isolated EiceDRIVER™	25 V	1ED44175N01B	Integrated over-current protection
	Non-isolated EiceDRIVER™	25 V	1ED44171N01B	Cost/performance
	TRENCHSTOP™ IGBT WR5/WR6	650 V	IKW30N65WR5, IKWH30N65WR6	Recommended
	TRENCHSTOP™ 5 IGBT advanced isolation	650 V	IKFW40N65DH5	Easy to use
	TRENCHSTOP™ IGBT7	650 V	IKW30N65ET7	Recommended
	Rapid 1 Diodes	650 V	IDW60C65D1	Recommended
	CIPOS™ Mini	600 V	CIPOS™ Mini PFC interleaved IPM series IFCM20T60GD / IFCM20U60GD / IFCM30T60GD / IFCM30U60GD CIPOS™ Mini PFC integrated IPM series IFCM10P60GD / IFCM10S60GD / IFCM15P60GD / IFCM15S60GD IM564-X6D	Easy to use/system size saving
	CoolMOS™ SJ MOSFETs	600 V	IPP60R120P7	Recommended
ODU motor drive (compressor)	iMOTION™ controller	-	IMC302T-F064	Motor/PFC controller incl. software
	CIPOS™ IPM	600 V	CIPOS™ Tiny IM323 series	Easy to use/system size saving
		-	CIPOS™ Mini	
	Level-shift EiceDRIVER™	600 V	6EDL04I06PT	Recommended
	TRENCHSTOP™ IGBTs	600 V	IKD15N60RC2	Recommended
ODU motor drive (outdoor fan)	iMOTION™ controller	-	IMC101T-T038	Motor/PFC controller incl. software
	CIPOS™ IPM	600 V	CIPOS™ Micro IM241 series	Easy to use/system size saving
	Reverse Conducting Drive 2	600 V	IKD06N60RC2	Recommended
	CoolMOS™ SJ MOSFETs	600 V	IPD60R1K0PFD7S	Recommended
Condition monitoring and predictive maintenance	XENSIV™ Hall switches	-	TLI4963-2M	Recommended
	XENSIV™ pressure sensor	-	DPS368	Recommended
	XENSIV™ MEMS microphone	-	IM69D130	Recommended
	XENSIV™ Hall sensors	-	TLE4961, TLE4964, TLE4913, TLI4966G	Recommended
	XENSIV™ 3D magnetic sensor	-	TLI493D-W2BW	Vibration and position monitoring
	XMC4000 microcontroller	-	XMC4700	Recommended
Indoor unit (IDU)	XMC™ microcontroller	-	XMC1400; XMC4100	Recommended
	iMOTION™ controller	-	IMC302A-F064	Motor/PFC controller incl. software
	PSoC™ 6	-	CY8C62x4/5	Recommended
IDU motor control	XMC™ Microcontroller	-	XMC1300, XMC1400	Recommended
	iMOTION™ controller	-	IMC101T-T038	Motor/PFC controller incl. software
	CIPOS™ IPM	600 V	CIPOS™ Nano	Easy to use/system size saving
IDU motor drive	iMOTION™ IPM	-	IMM101T-015M	Motor/PFC controller incl. software
	Level-shift EiceDRIVER™	-	6EDL04I06PT	Recommended
	Reverse Conducting Drive 2	600 V	IKN03N60RC2, IKD04N60RC2	Recommended
	CoolMOS™ SJ MOSFETs	600 V	IPN60R1K5PFD7S	Recommended
Security	OPTIGA™ Trust family	-	OPTIGA TRUST M SLS32AIA	Recommended
Connectivity Wi-Fi/BLE	AIROC™	-	CYW43439	Recommended
User interface	PSoC™ 6	-	CY8C62x4/5	Recommended
Sensors	XENSIV™ radar	-	BGT60LTR11AIP	Recommended
	XENSIV™ PAS CO2	-	PASCO2V01	Recommended
	XENSIV™ MEMS microphone	-	IM69D130	Recommended
	XENSIV™ Hall switches	-	TLI4963-2M	Recommended
Auxiliary supply	CoolMOS™ SJ MOSFETs	800 V	IPN80R4K5P7	Recommended
	CoolSET™	700 V	ICE5AR4770BZS	Flyback with error amplifier
UV-C LED for health	LED driver ICs	42 V	BCR43x	Recommended

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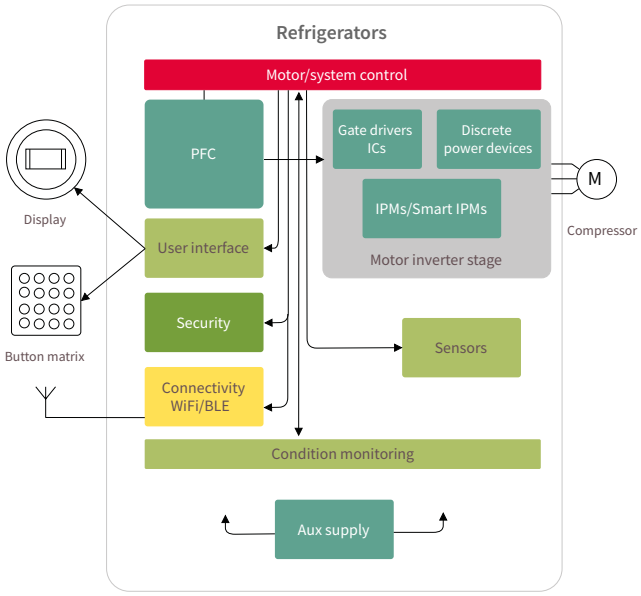
Refrigerators

Higher efficiency at lower cost

Today, consumers are not only looking at energy consumption and noise levels. Compact design coupled with maximum storage space is also playing an increasingly important role. In addition, there is a desire for intelligent appliances that can be easily integrated into the home network. From the manufacturer's point of view, the challenge is to meet the stricter regulations on energy efficiency while at the same time ensuring the form factor and a reduction in costs. Thus, intelligent, compact, energy- and cost-efficient drive solutions for refrigerators and freezers meet the high customer requirements.



Infineon offers a comprehensive portfolio for refrigerator compressors. Whether you choose the highest level of integration with our intelligent power modules (IPM) or aim for the best price/performance ratio with discrete components, our IGBTs, MOSFETs, gate drivers, and microcontrollers are designed to work together seamlessly. CIPOS™ family of IPMs is the optimal solution for highly integrated compressor drives whilst discrete solutions like the 600 V RC-D2 IGBT or the CoolMOS™ PFD7 SJ MOSFET are the best choice whenever layout flexibility and thermal performance optimization are the key design targets. If full-load operation and EMI performance are key for the design, the 600 V RC-D2 is the best choice. The diode is monolithically integrated and its current rating has been optimized for price and performance. The RC-D2 is the first IGBT family to introduce the SOT-223 package to further improve the price with a smaller package that is pin-to-pin compatible and substitutable with the DPAK package. They can all be combined with iMOTION™ products for dedicated motor control. For the auxiliary power supply, the CoolSET™ family rounds up our power portfolio by offering increased robustness and performance.

Our PSoC™ microcontroller family, AIROC™ Wi-Fi & Combos connectivity products and XENSIV™ sensors complete the portfolio needed for a truly smart refrigerator. The energy-efficient CIPOS™ modules integrate various power and control components to increase reliability, optimize board size and reduce system costs. This simplifies power supply design and shortens time-to-market. Infineon offers the OPTIGA™ Trust hardware security solution and enables secure access to all major cloud providers.

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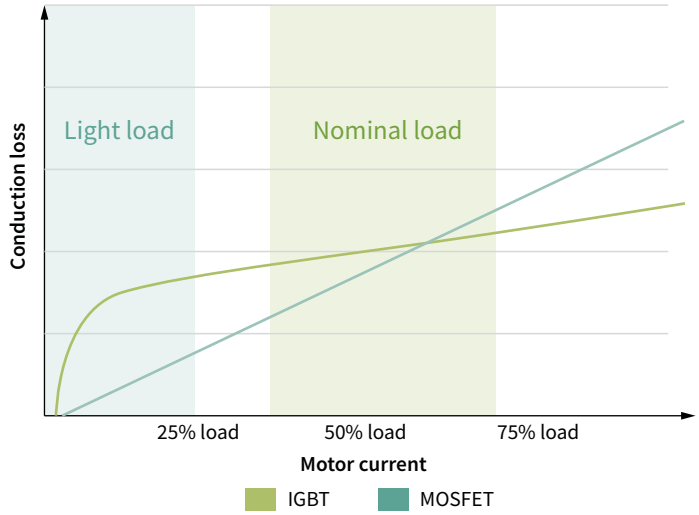
CoolMOS™ PFD7 for next-level energy saving

Although both MOSFETs and IGBTs can be used in refrigerator compressor drives, as most of the time, the refrigerator operates under light load, the MOSFET is highly recommended due to its lower conduction loss, thus reducing overall power loss at this condition.

The 600 V CoolMOS™ PFD7 high-voltage MOSFET series, shaped by Infineon's experience of more than twenty years in pioneering in superjunction SJ technology innovation, sets a new benchmark in 600 V SJ technologies. This product family combines best-in-class performance with state-of-the-art ease of use, features an integrated fast body diode ensuring a robust device and allowing for reduced BOM for the customer.



Smart, connected and secured – system solutions for the new home appliance era

Modern refrigerators can sense their environment by being smart and connected. They provide data to their users as well as to the manufacturer (who can remotely analyze the performance data and suggest preventive maintenance). In this data exchange, secure communication systems play a crucial role.

Components and system solutions from Infineon enable you to build smart home appliances while providing secure data acquisition, control, and device connectivity. Furthermore, they enable the highest device efficiency, smallest form factors, and improved carbon footprint with smart power supply designs. Benefit from one of the most comprehensive, out-of-the-box product and design portfolios on the market to best meet your unique application needs.

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Recommended products

Functional block	Topology	Voltage class	Technology/product family	Selection/benefit
System/motor control	XMC™ microcontroller	-	XMC1400; XMC4100	Recommended
PFC	iMOTION™ driver	-	IMD112T-6F040	Motor/PFC controller incl. software
	Non-isolated EiceDRIVER™	25 V	1ED44171N01B	Integrated over-current protection
		25 V	1ED44175N01B	Cost/performance
	CoolMOS™ SJ MOSFETs	600 V	IPP60R120P7	Recommended
	CoolSiC™ Diodes	650 V	IDW30G65C5	Recommended
Inverter	Level-shift EiceDRIVER™	600 V 650 V	6EDL04N06PT 2ED2304S06F	Recommended
	XMC™ microcontroller	-	XMC1400; XMC1300	Recommended
	iMOTION™ controller	-	IMC102T-F048	Motor/PFC controller incl. software
	iMOTION™ driver	-	IMD111T-6F040	Motor/PFC controller incl. software
	iMOTION™ IPM	-	IMM101T-046M	Motor/PFC controller incl. software
	CIPOS™ IPM	-	CIPOS™ Mini IGCM04G60GA CIPOS™ Micro IM241 series	Easy to use/system size saving
	Reverse Conducting Drive 2	600 V	IKN04N60RC2 IKD06N60RC2	Recommended
	CoolMOS™ SJ MOSFETs	600 V	IPN60R1K5PFD7S IPN60R600PFD7S	Recommended
User interface	PSoC™ 6	-	CY8C62x4/5	Recommended
Connectivity Wi-Fi/BLE	AIROC™	-	CYW43439	Recommended
Auxiliary supply	CoolMOS™ SJ MOSFETs	800 V	IPN80R4K5P7	Recommended
	CoolSET™	700 V	ICE5AR4770BZS	Flyback with error amplifier
Security	OPTIGA™ Trust family	-	OPTIGA TRUST M SLS32AIA	Recommended
Sensors	XENSIV™ radar sensor	-	BGT60LTR11AIP	Recommended
	XENSIV™ pressure sensor	-	DPS368	Recommended
	XENSIV™ MEMS microphones	-	IM69D130	Recommended
	XENSIV™ PAS CO2 sensor	-	PAS CO2	Recommended
	XENSIV™ magnetic position sensors	-	TLV493D-A1B6	Recommended

XENSIV™ sensor solutions for smart refrigerators

Product category	Product family	Benefits
Sensors	XENSIV™ MEMS microphones IM69D130	High-performance microphone with low self-noise (high SNR) and low distortions enables noise monitoring for advanced predictive maintenance analytics
	XENSIV™ digital barometric pressure sensors DPSxxx	Advanced predictive maintenance analytics are enabled based on highest precision and relative accuracy over a wide temperature range to detect anomalies in airflow
	XENSIV™ TLV493D-A1B6 3D magnetic sensor	Accurate three-dimensional sensing with extremely low power consumption in a small 6-pin package to enable vibration and position monitoring of the compressor
	XENSIV™ TLI4970 current sensor	Fully digital solution featuring high precision and ease of use, significantly reduces overall implementation efforts as well as PCB space to enable cost fan and compressor current measurement
	XENSIV™ 60 GHz radar sensor	Accurate presence detection and vibration detection based on ability to track sub-millimeter motion at high speed and accuracy, in both stand-alone chip as well as system solution available

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Ceiling Fan

Ceiling fan

Energy-efficient and cost-effective with high integration for system size-reduction

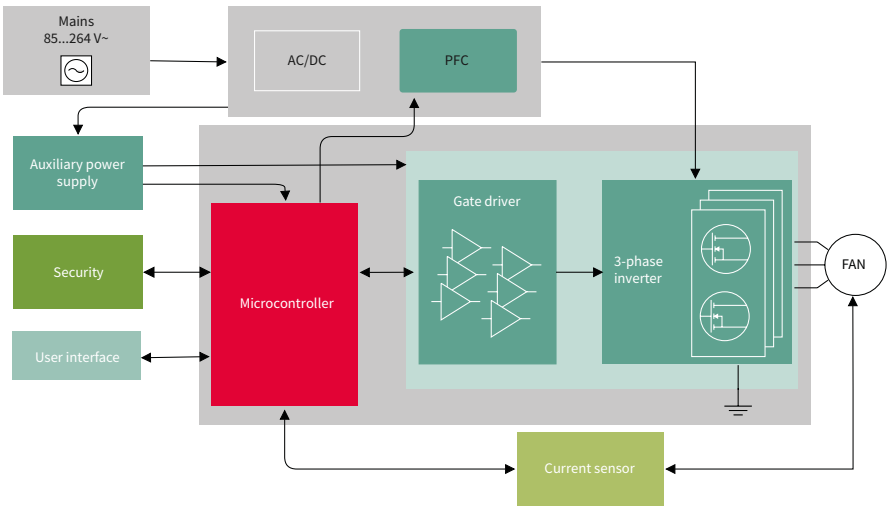
Ceiling fan manufacturers currently face more stringent regulations of the appliance's form factor and are under constant pressure to reduce costs. Infineon is here to provide compact, energy-efficient, cost-effective motor drive solutions. Infineon proposes a competitive solution with an extensive portfolio, high integration for system size reduction, and low cost.

Infineon is your ideal partner for all ceiling fan designs. In our portfolio, you'll find a wide range of solutions for inverterized fan motor control – whether your priority is achieving the highest level of integration using our IPMs or showcasing ultimate flexibility with the right price-performance ratio using our discrete IGBTs or MOSFETs. No matter your target, our power semiconductors, drivers, IPMs, and iMOTION™ motor controllers are designed to work together seamlessly. This means you can effortlessly realize smoother-running, quieter systems with low energy consumption and a smaller form factor.

Features and benefits

Key features	Key benefits
› Reference design for ready-to-copy PCB	› Compact and cost-effective system solution
› Turnkey PFC and motor control with MCE	› Eliminate the need for motor control software development
› Integrated infrared remote control	› Easy evaluation and system verification
› Suitable for single-sided PCB assembly process	› Reduce design-in effort and speed up time to market
› Compatible with low- and high-voltage motors	› Achieve maximum system performance per costs
› MCU design option for higher flexibility	› Higher reliability from system perspectives
› IEC61000-4-5 4 kVs surge compliant and EN55032 class B EMI compliant	› One-stop-shop

Application diagram



By selecting components from Infineon, you get parts engineered for best-in-class performance that upholds the highest quality standards for long-term reliability. Moreover, our excellent supply chain allows you to both build the most cost-effective, energy-efficient inverterized ceiling fan and meet the changing supply demands of the fluctuating consumer market. Explore our selection of semiconductor solutions now to find the best-fit components for your designs.

www.infineon.com/ceiling-fan

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Induction cooking

Enabled by Infineon's high-efficient power switches, secured connectivity, and touch sensor technology for best cooking experience

The huge global market for induction cooking appliances, such as induction ranges, microwave ovens, and rice cookers, is characterized by great competition and price pressure. Along with this, manufacturers must meet rising consumer expectations and produce more reliable, energy-efficient appliances that offer more and more functions. Benefits such as faster cooking, advanced functionalities, easy cleaning, and safety features play a crucial role.

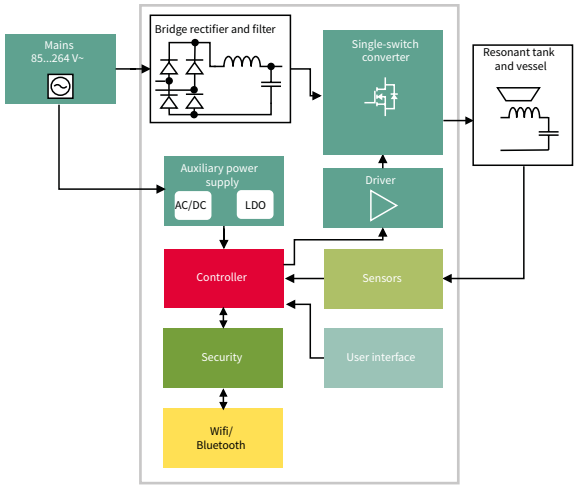
At Infineon, we are well equipped to help you overcome all the challenges common to induction cooking appliances. Our solutions target the increased consumer expectations regarding modern home appliances: Appliances must be energy-efficient and fully integrable, ensuring a high level of safety and reliability. An intelligent, user-friendly, and secure user interface is essential. We support you in creating intuitive devices with an intelligent touch interface.

Features and benefits

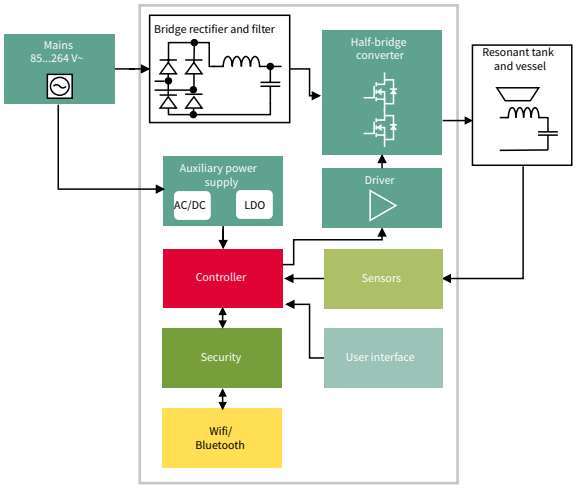
Key features
› Complete system solution offerings for inverter, system control, auxiliary power, HMI, connectivity, sensor, security blocks
› Highly reliable and market-proven Infineon products
› Evaluation and reference boards
› Innovative reverse conducting IGBT technology
› Cutting-edge touch sensing technologies

Key benefits
› Faster time-to-market and saving system design efforts
› One-stop-shop
› Extend system lifetime and product life spans
› Fast prototyping and system verification
› Higher efficiency and better reliability
› "Just work" and deliver the robustness and intelligence

Induction heating inverter (voltage resonance)
Single-switch



Induction heating inverter (current resonance)
Half-bridge



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Product portfolio

Functional block	Product	Product family	Specification	Benefits
Inverter (half-bridge/ quasi-resonant)	IGBT discretes	Reverse conducting R6	650 V up to 75 kHz	High performance and low losses
		Reverse conducting R5	650 V/1200 V/1350 V/1600 V up to 60 kHz	High performance and low losses
		Reverse conducting E1	1200 V up to 40 kHz	Price versus performance leader
	Gate driver	EiceDRIVER™ 1ED44173N01B 1ED44175N01B,	Low-side gate driver/25 V	1ED integrated with overcurrent-protection fault and enable functions
		EiceDRIVER™ 1ED44171N01B		Cost-effective
		EiceDRIVER™ 2ED2304S06F, 2ED2182S06F, 2EDL23I06PJ	Half-bridge gate driver/650 V/600 V	SOI with integrated bootstrap diode
		EiceDRIVER™ 1EDI20I12AF, 1EDI20I12MF, 2ED020I12-F2	Isolated gate driver/1200 V	Galvanic isolation, separate sink/source output, DESAT, Miller clamp
System control	Microcontroller	XMC™ 1000 series	32-bit Arm® Cortex®-M0	#1 choice to bring traditional 8-bit designs to the next level
		XMC™ 4000 series	32-bit Arm® Cortex®-M4	Successor to traditional DSP/DSC and 32-bit MCU solutions.
		PSoC™ 4 series	32-bit Arm® Cortex®-M0	Tackled some of the complex portions of embedded system design making it easier
		PSoC™ 6 series	32-bit Arm® Cortex®-M4	Dual-core Arm® Cortex®-M4 and Cortex-M0+ architecture
Connectivity	Wireless connectivity	AIROC™ Wi-Fi + Bluetooth® combo	IEEE 802.11a/b/g/n/ac/ax Wi-Fi and Bluetooth® 5.2 in a single-chip	Technical support through our global network of IoT partners
Aux power	CoolSET™	ICE5AR4770BZS	Up to 15 W flyback controller with integrated 700 V MOSFET	Higher switching frequency to take advantage of smaller magnetics
HMI (Human machine interface)	Microcontroller	PSoC™ 4 series	CAPSENSE™ technology	Most flexible and scalable low-power mixed-signal architecture
Security	OPTIGA™ TRUST	OPTIGA™ TRUST M SLS32AIA	High-end security solution for connected consumer devices	The OPTIGA™ Trust M is a high-end security solution that provides an anchor of trust for connecting IoT devices to the cloud

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Product portfolio

Functional block	Product	Product family	Specification	Benefits
Inverter including PFC control and user interface	Controller	iMOTION™ IMC100 series	Integrated motion control engine, PFC control and scripting engine	› Fast time-to-market
		XMC™1000 series	32-bit Arm® Cortex®-M0	› First choice to bring traditional 8-bit designs to the next level
	Controller + gate driver	iMOTION™ IMD110 series	Integrated gate driver in addition to iMOTION™ IMC100 functionalities	› Compatible with low- and high-voltage motors
	Fully integrated IPM	iMOTION™ IMM100 series	All-in-one for complete HW and SW integration	› Compact design and fast time-to-market
		iMOTION™ IMI110 series	All-in-one for complete HW and SW integration	› Compact design and fast time-to-market with competitive cost
	IPM	CIPOS™ Nano IPMs	Highly integrated IPM with various voltage options (40 V to 600 V)	› Compact design and broad coverage in same footprint
	IGBT discretes	600 V Reverse Conducting Drive 2	600 V/1 A to 6 A in SOT-223 600 V/4 A to 15 A in DPAK	› Competitive in terms of price and performance
		TRENCHSTOP™ 5	650 V/8 A in TO-220FP	› Excellent efficiency for the boost PFC stage switch
	Gate driver	EiceDRIVER™ 1ED44173N01B and 1ED44175N01B for PFC control	25 V single-channel low-side MOSFET gate driver	› Integrated fast over-current protection (OCP), fault reporting
		EiceDRIVER™ 1ED44171N01B		› Cost-effective
		EiceDRIVER™ 6EDL04I06PT for motor control	600 V three-phase in silicon-on-insulator technology	› Excellent ruggedness and noise immunity with integrated bootstrap diode for reduced BOM cost
		EiceDRIVER™ 2ED2304S06F for motor control	650 V half-bridge in silicon-on-insulator technology	
	MOSFET	N-channel MOSFETs IRLML00x0 series	40 V/60 V/SOT-23	› Fast switching and cost-competitive
Auxiliary power supply	Single stage flyback controller	ICL8810	Single-stage PFC-flyback LED controller for constant voltage output	› High-power factor supply combines optimum efficiency and low EMI, additional output voltages e.g. for MCU or LED lighting via aux winding
	MOSFET	800 V CoolMOS™ CE series	800 V superjunction MOSFET	› High efficiency and power density with outstanding price/performance

www.infineon.com/ceiling-fan

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Power and gardening tools

Battery-powered home and professional applications

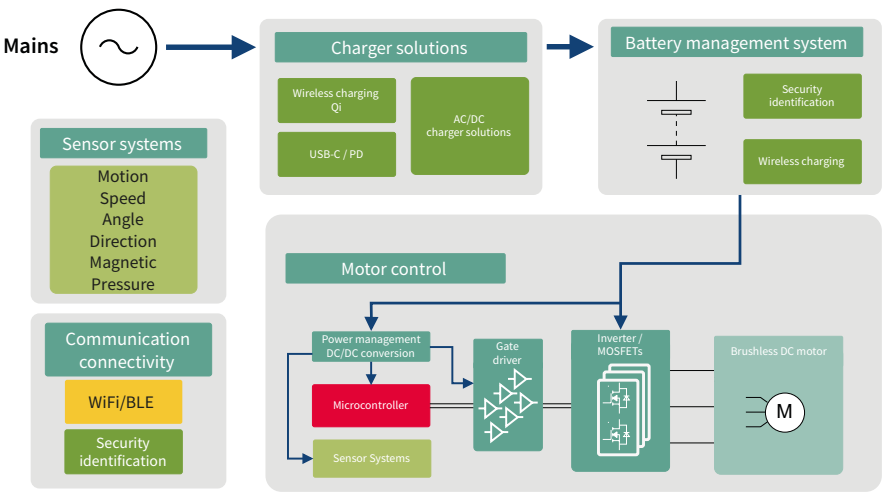
Infineon is bringing reliability and safety to consumer projects. Millions of households worldwide rely on power tools to complete daily tasks or creative projects around the home. Consumers want robust, reliable and portable power tools that are easy-to-use with low price and long battery life as key selection options. Battery-powered tools must also be equipped with diagnostic and safety features to ensure confidence with high quality.

Infineon's broad portfolio offers best-fit, innovative solutions for all power tools applications. We help you meet each consumer need and reduce your overall costs. Also, our wireless-charging reference designs deliver high performance and are easily optimized in our DAVE™ development platform. Configure your BOM and exceed expectations with Infineon components in your cordless power tool designs.

Features and benefits

Key features	Key benefits
› Comprehensive portfolio of products and solutions, easy to tailor to design specification	› Convenient selection of the right fit products thanks to broad portfolio and complete solutions
› Infineon offers complete solutions for power supplies, chargers and motor drives	› Extended battery lifetime and product life span
› Best-in-class EiceDRIVER™ level-shift driver for OptiMOS™ and StrongIRFET™, offering high efficiency and protection	› Productive capability
› High reliability of Infineon components	› Overall system size and cost reduction
› Offering LV FETs with SMD packaging improves the productive capability by automatic production, improves reliability and reduces assembly cost	› Security, quality, and safety
› Components featuring small form factor and compact design offering highest power density and BOM savings thanks to lowest $R_{DS(on)}$	› Authentication
› Trustworthy hardware-based security	› Short time to market
› Highest quality standards and a safety-certified development process	
› Proven track record and outstanding partner network for embedded security	
› OPTIGA™ Trust enables authentication of components connected to the system (e.g., battery pack recognition to avoid second-party batteries etc.)	
› Evaluation and demonstration boards for fast prototyping	
› Available simulations, documentation, and system support to reduce development time and cost	

Application block diagram example: cordless power tools



www.infineon.com/powertools

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Application block diagram example: cordless power tools

Functional block	Topology	Product category	Product family	Part number
Motor control	12 V, 15 V, 18 V, 22 V	MOSFET	OptiMOS™ 5/6 StrongIRFET™	BSC005N03, IQE006NE2, IPT004N, IPP055N
				IRL40DM2, BSC010N04, IST011N06, BSZ097N04, IRF40SC, IPB011N04, IRL40B215
		Gate drivers	MOTIX™	6EDL7141, IDM 700A
			EiceDRIVER™	1ED44173N01B
		Microcontroller	XMC™ series	XMC1400. XMC1400, XMC4400
			PSoC™	PSoC™ 4100, PSoC™62
		Sensor systems	Hall switches	TLV4963
			Angle	TLI5012
			3D magnetic	TLV493D
			Magentic coreless current	TLI4971
	36 V	MOSFET	OptiMOS™ 5/StrongIRFET™	IRL40DM2, BSC010N04, IST011N06, BSZ097N04, IRF40SC, IPB011N04, IRL40B215
		Gate drivers	MOTIX™	6EDL7141, IDM 700A
			EiceDRIVER™	1ED44173N01B
		Microcontroller	XMC™ series	XMC1400. XMC1400, XMC4400
			PSoC™	PSoC™ 4500S
				PSoC™ 6
		Sensor systems	Hall switches	TLV4963
			Angle	TLI5012
			3D magnetic	TLV493D
			Magentic coreless current	TLI4971
	48 V, 56 V, 72 V	MOSFET	OptiMOS™ 3/5/6 StrongIRFET™	BSC021N08N, BSC030N08N, IPT010N08N, IPTG011N08N, IPP040N08N, IPB049N08N
				BSC035N10N, ISZ080N10N, IPT015N10N, IPTC030N12N, IPB036N12N, IPP050N10N
		Gate drivers	MOTIX™	TLE9140EQW, 1EDN755X, 6ED2742, 2ED2732, 2ED2734, 2ED2748
		Microcontroller	XMC™ series	XMC1400. XMC1400, XMC4400
			PSoC™	PSoC™ 4500S
				PSoC™ 6
		Sensor systems	Hall switches	TLV4963
			Angle	TLI5012
			3D magnetic	TLV493D
			Magentic coreless current	TLI4971
Charging		MOSFET	CoolMOS™	IPD60R210PFD7S, IPD60R360PFD7S,IPT60R035CFD7, IPP60R360CFD7, IPT60R145CFD7
			CoolSiC™	IMZA65R027M1H, IMZA65R048M1H, IMW65R048M1H, IMW65R027M1H
		HEMTs	CoolGaN™	IGI60F0010A1L, IGI60F0014A1L, IGI60F0020A1L, IGI60F0027A1L
		Gate drivers	EiceDRIVER™	2EDL05N06PF, 2ED2304S06F, 6EDL04N06PT, 2EDF9275F, 1EDB9275F, 2EDS9265H
		USB PD	EZ-PD™	CCG3PA, CCG7D dual
				PAG 1S
		Microcontroller	XMC™	XMC4400
		Battery charging controller IC	-	ICL5102, ICC80QSG*, XDPS2201
BMS	12 V	Protection MOSFET	OptiMOS™/StrongIRFET™	BSC004NE2LS5, IQE006NE2LM5, BSB008NE2LX, BSZ009NE2LS5, IRFH6200, IRF6200, IRF1324
	18 V			IPT004N03L, BSC005N03LS5, BSZ0500NSI, IRF6726M, IRLS3813, IRLB3813, BSC079N03LSCG
	24 V			IRL7472L1, IRL40SC228, BSC007N04LS6, IRL40T209, IRFS7430, IRL40B209, BSZ018N04LS6
	36 V			IPT007N06N, IRF60SC241, BSC014N06NS,IRF7749L1, IRL60B216, IRL60S216
	48 V			IPT012N08N5, IPP020N08N5, BSC025N08LS5, BSB044N08NN3G, BSZ070N08LS5, BSZ096N10LS5,
	72 V			IPP041N12N3G, BSC077N12NS3G, BSZ240N12NS3G, IRF135SA204, IRF135S203, IRF135B203
		Monitoring balancing IC	-	TLE9012
		Cell balancing MOSFETs	StrongIRFET™	IRLML9303, IRFTS9342, IRLML9301
		Microcontrollers	XMC™, PSoC™	XMC1100, XMC1200, XMC1400, XMC1400, XMC4100,
				CY8C41x4/5/65, CY8C41x6/75, CY8C4147-S5
Communication and HMI		Authentication/security	OPTIGA™ Trust	SLE 95250, SLS 32AIA010MH
		Bluetooth®	AIROC™	CYBT-213043-02, CYW20736,CYW20706, CYW20704
		Wi-Fi	AIROC™	CYW43907, CYW43439, CYW954907
		Pressure sensor	XENSIV™	DPS368

www.infineon.com/powertools

* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Smartwatches, sports watches, fitness bands and medical wrist-worn devices

Next level of wrist-worn devices with Infineon's excellent RF, sensing, connectivity, power, memory and security solutions

With its broad product portfolio, Infineon helps wearable manufacturers to overcome the following design challenges across all device categories:

- the need for reliable device and data security to protect personal and sensitive information,
- accurate sensor readings for precise location tracking and recognition between everyday movements and a fall event,
- longer battery lifetimes and small form factors for elegant, unobtrusive designs.

Infineon's widely-deployed AIROC™ Wi-Fi and Bluetooth® Combo ICs portfolio offers the industry's best interoperability and RF performance. Infineon also helps customers to differentiate their offerings with highly efficient, secured and innovative solutions supporting the integration of additional use cases such as smart payment and ticketing, notifications and voice calls, Bluetooth® audio streaming, smart access or different ways of charging (wireless, NFC, USB).

A smartwatch provides a two-way connection via Bluetooth®, cellular baseband or Wi-Fi to a smartphone. It receives electronic communications like texts or voice calls, must display the time and have a glance-able display. These lifestyle devices monitor health and make communication (text, calls) more convenient.

A sports watch is a highly functional, robust and usually water-resistant device. Leisure or professional athletes mainly monitor their health conditions, fitness and sleep activities. Sports watches have fewer features compared to a smart watch as its main focus is on sports tracking.

A wristband or fitness band offers limited functionalities. Compared to a smartwatch, it just covers a selected amount of use cases (e.g. step counting, sleep monitoring, location tracking, access control, etc.).

A medical wrist-worn device measures and analyzes physical activity and body functions of the wearer. These wristbands are used for elderly care, safety, connected health and much more.

Key enabling products

- XENSIV™ 3D magnetic sensor
- XENSIV™ 60 GHz radar sensor
- XENSIV™ pressure sensor
- XENSIV™ MEMS microphones
- XENSIV™ Multigas sensor
- Wireless charging
- AIROC™ Wi-Fi and Combos
- AIROC™ Wi-Fi
- AIROC™ Bluetooth® LE and Bluetooth®
- AIROC™ Bluetooth® 5.0 SOC for Audio
- Wi-Fi MCUs
- Secora™ Connect
- PSoC™ 6 Microcontrollers
- PSoC™ 4 Microcontrollers
- PSoC™ 4 Bluetooth® Low Energy (Bluetooth® Smart)
- PSoC™ including CAPSENSE™ technology
- RF switches
- OPTIGA™ Connect Consumer eSIM solution
- OPTIGA™ Authenticate S
- NOR Flash / F-RAM
- GPS LNA
- ESD protection
- Antenna tuners
- 4G / 5G LTE LNAs

www.infineon.com/wearables

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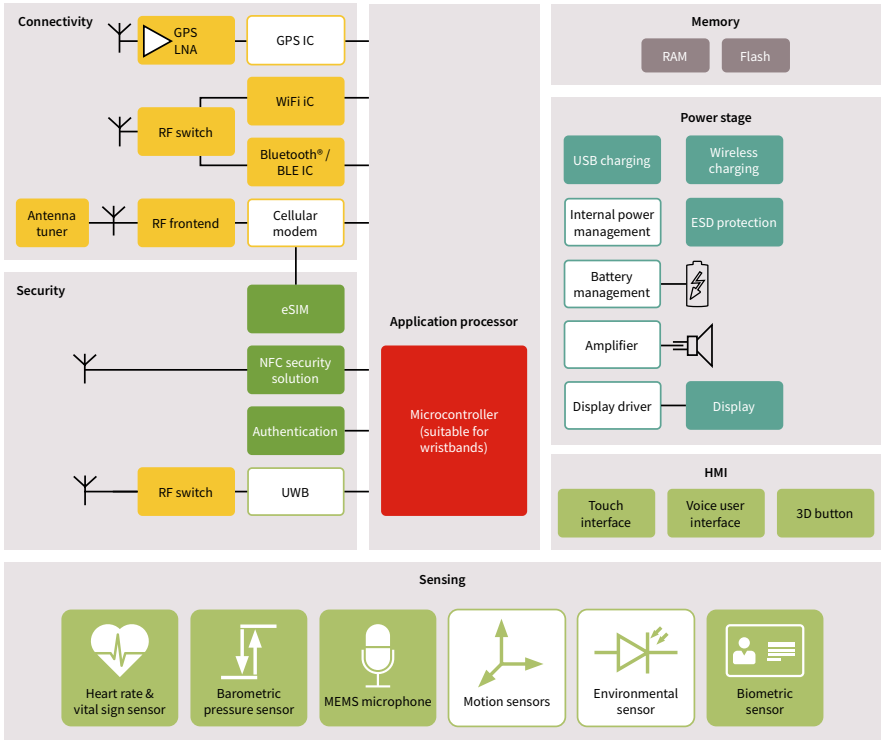
Block diagram for smartwatch, sports watch and wristband

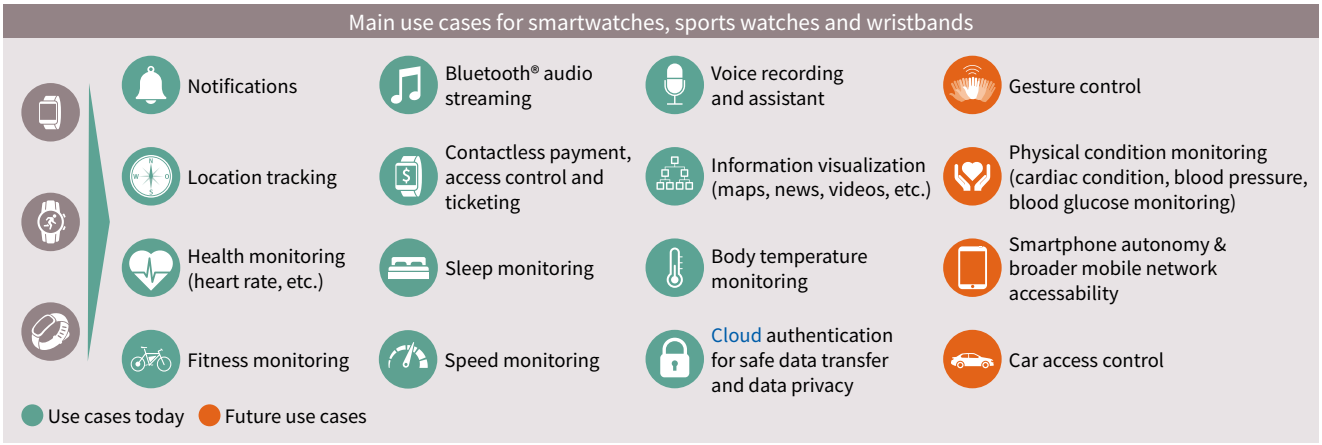


Functional block	Product family	Functional block	Recommended parts and families
Security	› OPTIGA™ Authenticate S (e.g., SLE95401) › OPTIGA™ Connect Consumer eSIM solution (OC1120) › SECORA™ Connect (boosted SiP or MCP, passive NFC) › RF switch (e.g., BGS12WN6, BGS14WMA9)	**Power stage**	› USB type-C controller (e.g., EZ-PD™ CCG2) › ESD protection (e.g., ESD119-B1, ESD131-B1, ESD307-U1) › Wireless charging
Human-machine interface	› XENSIV™ 3D magnetic sensor (e.g., TLI493-W2BWAO) › XENSIV™ MEMS microphones (e.g., IM69D120/D130) › PSoC™ 6 MCU + BLE (e.g., CY8C68237FM-BLE)	**Memory**	› SEMPER™ Nano NOR Flash / F-RAM
Sensing	› XENSIV™ pressure sensor (e.g., DPS368/DPS310) › XENSIV™ MEMS microphones (e.g., IM69D120/D130) › XENSIV™ MEMS packaging partners	**Connectivity**	› 4G / 5G LTE LNAs (e.g., BGA5x1BN6 family) › GPS LNA (e.g., BGA123L4, BGA524N6) › AIROC™ Wi-Fi (e.g., CYW43362, CYW43364) › AIROC™ Wi-Fi and combos (e.g., CYW43439, CYW43012) › AIROC™ Bluetooth® 5.0 SoC for audio(e.g., CYW20719/21) › Antenna tuners (e.g., BGSA12UGL8, BGSA14GN10) › RF switches (e.g., BGS12WN6, BGS14WMA9)

www.infineon.com/wearables

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Main use cases for wrist-worn devices



Infineon the right partner to solve your design challenges

Highest accuracy and fast signal pick-up for location tracking and altitude measurement

Secure cellular network connection

Products with smallest form factors enable high functional integration

Integrated lowest power compute, BLE connectivity and most robust capacitive touch

Bluetooth® audio streaming with BT / BLE Combo SoC

Precise detection of single steps, body motions or fall events

Best performance for voice call and voice assistant with MEMS microphones

Reliable and low-power code and data storage in a tiny footprint

Easy, convenient and secure data transmission by NFC

Device protection to enable high user experience

High reliability and data throughput with Wi-Fi / BT connectivity

Low power consumption to increase battery lifetime

www.infineon.com/wearables

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Class D audio amplifiers

No compromise on quality – products for exceptional audio performance

At Infineon, we manufacture power-efficient class D audio amplifier solutions that maintain best-in-class audio quality, without heating up the surroundings. We believe smaller and lighter is better, and that the amplifier embedded in your product should be heard, but not seen. Our amplifier solutions help you design robust, flexible products that meet the needs of your customers and the market. Choose from our high-performance class D audio amplifier solutions for all power ranges and application requirements, from the smallest fully integrated single-chip solutions to highly scalable driver and power MOSFET combinations (for a full portfolio, see Audio amplifier ICs).

Design with Infineon's solutions to benefit from:

- Exceptional audio performance
- Maximized power efficiency
- Maximized output power
- Design freedom
- Fast time to market

Portable/battery powered audio applications

Battery powered speakers:
- On-the-go Bluetooth® speakers
- Docking speakers
- Boom boxes
- Wearable speakers

Home audio applications

- Multiroom systems
- Audio hub
- TVs
- Sound bars
- Home theater systems
- Smart speakers

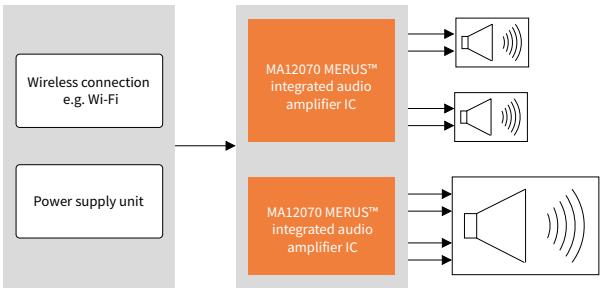
Professional audio applications

- Power-over-ethernet (PoE) audio systems
- Touring amplifiers
- Active speakers
- Public announcement 70-100 V systems
- Music instrument amplifiers

Home audio

Modern home audio products vary in shapes, sizes and configurations, but common requirement is great sound in combination with outstanding industrial and acoustic design. In addition to producing exceptional sound quality, MERUS™ amplifiers from Infineon can completely eliminate the need for bulky and expensive LC output filters and heatsinks. This allows the design of new innovative and great-sounding home audio products in form factors and shapes that were previously unthinkable.

Solution example: 2.1 configuration (2xBTL + 1xPBTL)



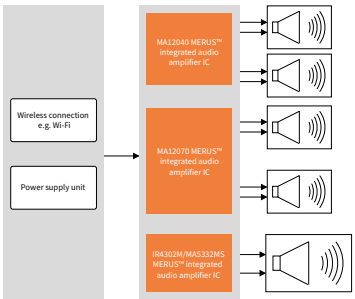
Solution specification

Number of audio channels: 2 bridge-tied load (BTL) and 1 parallel BTL channels

Peak power output: 2x80 W @ 4 Ω, 10% THD and 160 W @ 2 Ω, 10% THD

Featured audio ICs: 2x MA12070

4.1 configuration (4xBTL + 1xPBTL)



Solution specification

Number of audio channels: 5 bridge-tied load (BTL)

Peak power output:

2x40 W @ 4 Ω, 10% THD; 2x80 W @ 4 Ω, 10% THD; 200 W @ 3 Ω (IR4302M)/400 W @ 8 Ω (MA5332MS), 10% THD

Featured audio ICs: MA12040, MA12070, IR4302M, MA5332MS

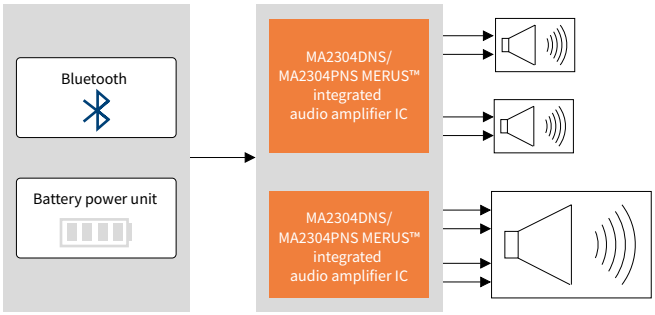
www.infineon.com/merus
www.infineon.com/audio

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Portable audio

When designing portable/battery-powered audio devices, it is essential to maximize battery playback time, and at the same time, maintain excellent audio performance. Infineon's MERUS™ amplifiers provide up to twice as long battery playback time in combination with the best-in-class audio performance and unsurpassed sound quality.

Solution example: 2.1 configuration (2xBTL + 1xPBTL)



Solution specification

Number of audio channels: 2 bridge-tied load (BTL) and 1 parallel BTL channels

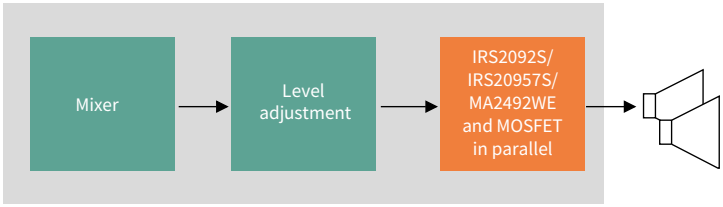
Peak power output: 2x37 W @ 4 Ω, 10% THD and 74 W @ 2 Ω, 10% THD

Featured audio ICs: Ultra low idle power MA2304DNS* (integrated DSP) and MA2304PNS* (digital volume control and limiter)

Professional audio

Professional audio equipment is all about maximizing output power and power density. With the conception of Infineon's MERUS™ multilevel class D technology and GaN-based CoolGaN™ GIT HEMTs, it is now possible to conceive both amplifiers and power supply units with great audio performance and high efficiency in a very compact design. For engineers developing amplifiers, Infineon offers both monolithic and chip-set solutions with versatile MOSFET combinations for the scaling of output power.

Solution example: active speakers



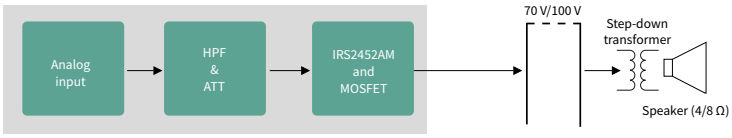
Solution specification

Number of audio channels: 2 half-bridge channels

Peak power output: 500 W @ 4 Ω, 1% THD

Featured audio ICs: IRS2092S, IRS20957S, MA2492WE*

Solution example: public announcement 70-100 V system



Solution specification

Number of channels: 2 half bridge channels

Peak power output: 500 W, 70 V_{rms}/100 V_{rms}, 1% THD

Featured audio IC: IRS2452AM

www.infineon.com/audiosolutions

*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Smart speaker

Speakers for an intuitive and outstanding user experience

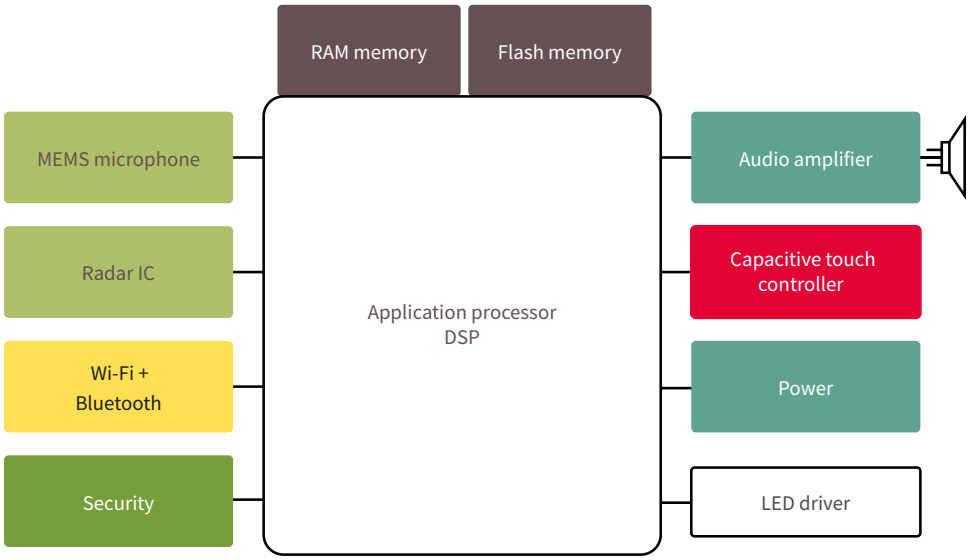
Once a novelty in households, smart speakers are more and more becoming increasingly commonplace. Rising user expectations accompany this rapid adoption. However, frustration with devices that do not understand or hear commands leads to lower user adoption. Consequently, growth rates for smart speakers are failing to reach their full potential. Components such as MEMS microphones, touch controllers, and new technologies such as radar are vital in improving the user experience in the smart speaker segment.

Infineon has long-standing expertise in sensor, connectivity and power solutions that fulfill the consumer market requirements in terms of outstanding performance, reliability and energy efficiency.

Features and benefits

Key features	Key benefits
› High sensitivity, low self-noise (high SNR) and distortion, wide dynamic range, and high acoustic overload-point with XENSIV™ MEMS microphones	› Improved audio input and thus voice command recognition, especially in extended use cases such as whispering or longer distances to the speaker for better user experience
› Multilevel switching technology at fully rated power in a wide range of MERUS™ class D amplifiers	› Best-in-class audio quality and lowest power consumption enables the class D audio amplifier to be used in filterless configurations
› Ultralow-power AIROC™ Wi-Fi and Bluetooth® combo in a single-chip solution enables small-form-factor IoT designs	› Connectivity for highest interoperability and performance without dropouts anywhere in the home, extended battery playback time, or the reduction of battery size without compromising on battery playback time to save cost
› Reliable, elegant and durable CAPSENSE™ touch controller with advanced capacitive touch sensors	› Noise immunity, water-resistance, and sleek, futuristic user interfaces and gesture recognition
› XENSIV™ 60 GHz radar sensor brings innovative, intuitive sensing capabilities	› Precise presence detection for more contextual awareness to ease interaction, sub-millimeter motion tracking to capture movement at high speed accurately, vital sensing for monitoring health status such as respiratory and heart rate
› Highly efficient and power-dense SMPS solutions	› Highly efficient charger in small form factor
› Highly-integrated EZ-PD™ USB-C controller supports all USB-PD profiles	› USB-IF certified with market-proven USB-PD stack, ensuring specification compliance and interoperability, requiring no firmware development
› IoT security controller OPTIGA™ Trust M maintains the unique identity and integrity of the speaker	› Easy and secure cloud provisioning services

Application diagram



www.infineon.com/smart-speaker

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended products

Functional block	Product family		Product	Benefits
Audio input	Microphones		XENSIV™ MEMS microphones	› High performance microphone with low self-noise (high SNR) and low distortions, setting a new performance benchmark for a superior user experience
Audio output	Class D amplifier		MERUS™ class D audio amplifiers MA120xx	› Cooler, smaller and lighter amplifiers designed to maximize power efficiency and dynamic range while providing best-in-class audio performance in product form factors for great sounding audio products › Extended battery playback time or the reduction of battery size without compromising on battery playback time to save cost
Connectivity	Wi-Fi + Bluetooth® combos		AIROC® Wi-Fi + Bluetooth combos	› Best-in-class interoperability to the widest deployed wireless IP › Whole Home Range with high throughput for multi-channel audio and RSDB (Real Simultaneous Dual Band) for speaker sub-networks › Ultralow-power technology designed with battery operation in mind
Sensing	Capacitive sensing touch controller		CAPSENSE™ capacitive touch sensing controller	› State-of-the-art noise immunity (SNR > 100:1) & water rejection have made CAPSENSE™ the industry leader › Advanced inductive touch sensors make possible sleek, futuristic user interfaces with metallic overlay
	Radar sensor		XENSIV™ 60 GHz radar sensor	› Accurate presence detection and vibration detection based on ability to track sub-millimeter motion at high speed and accuracy, › both stand-alone chip as well as system solution available
	CO_2 sensor		XENSIV™ PAS CO2 sensor	› Superior accuracy, providing a direct readout of the real CO_2 level, not simply a correlation › Size and cost advantages
Security	IoT security controller		OPTIGA™ Trust M	› Easy & secure provisioning services with OPTIGA™ Trust M for maintaining speaker's unique identity & integrity › Unify different products under unified PKI architecture
Power	USB-C PD controller		EZ-PD™ USB-C controller	› USB-IF certified with market-proven USB-PD stack, ensuring spec compliance and interoperability › Supports all USB-PD profiles commonly used in USB-C power adapters and requires no firmware development › A highly-integrated solution that minimizes incremental BOM costs
	ESD protection		ESD111, ESD245	› Outstanding low capacitance devices for best signal integrity › High protection performance by ultralow clamping voltage
	Wireless charging		15 W inductive wireless power transmitter	› Powerful and cost-effective wireless charging solutions for high performance, smart and secure charging solutions supported by Infineon's unique wireless power controllers
	High-voltage MOSFETs	Flyback	700 V CoolMOS™ P7 (standard grade)	› Best price-competitive CoolMOS™ SJ MOSFET family › Lower switching losses than a standard MOSFET
		ACF, FMCI	600 V CoolMOS™ PFD7	› Lower Q_{rr}, lower hysteresis loss, low $R_{DS(on)}$
	SMPS Flyback converter Control ICs	QR flyback ICs	ICE5QSAG	› High efficiency and low standby power
		FFR flyback IC	XDPS21071	› High power density and ideal for USB-PD
	SMPS synchronous rectification	Low-voltage MOSFETs	OptiMOS™ PD	› Low conduction losses and reduced overshoot › Logic level switching / S308 / PQFN 3.3x3.3 packages available
		Control ICs	IR1161LTRPBF	› High efficiency › simple external circuitry
	SMPS load switch	Low voltage MOSFETs	OptiMOS™ 30 V	› Low conduction losses › S308 / PQFN 3.3x3.3 packages available

www.infineon.com/smart-speaker

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Surveillance camera

Make your surveillance camera IoT-ready

Advancements in video surveillance technology take indoor and outdoor security solutions to the next level. They help you protecting your building against undesired intruders and detecting unusual behaviors. Smart cameras that are connected to management systems and cloud platforms detect intruders more easily and alarm you in case of danger. By equipping surveillance and IP cameras with reliable and accurate sensors and connectivity solutions, safety-enhancing IoT features can be implemented, significantly improving detection of intrusion and other unusual behavior. Of course, cutting-edge camera technology needs to run reliably and efficiently to guarantee image capturing at all times while also reducing operating costs and needed bandwidth. Connected IP cameras often demand low-power with advanced thermal features.

Infineon offers a broad range of products to make surveillance cameras smart and connected. The connectivity solutions portfolio for Wi-Fi, Bluetooth® and USB offers stable connection to cloud and management systems. Sensors such as Infineon's XENSIV™ BGT60LTR11AIP radar sensors can help overcome bandwidth limitations, for example, by the waking-up function when motion near the camera is detected. Furthermore, XENSIV™ MEMS microphone (or an additional low-power MCU) enables sound/voice triggered recording and notification. At the same time, Infineon's embedded security solutions make connected surveillance cameras more robust against cyberattacks, while the highly efficient power MOSFETs allow for low power consumption and efficient operations.

Matter – the new smart home standard from the Connectivity Standards Alliance (CSA) – promises interoperable, secure connectivity for the future of the smart home and surveillance camera. Infineon's unique combination of software support for Matter, ModusToolbox™ software and tools, broad family of AIROC™ connectivity chips (Thread 802.15.4, Wi-Fi, Bluetooth®) and PSoC™ 6 MCUs, and its involvement in Matter open-source development puts it in a strong position to help companies quickly bring Matter products to the market.

Features and benefits

Key features	Key benefits
› Best-in class figures of merit	› Lower system power consumption and energy savings and enablement of deep sleep modes
› Reliable connectivity and power solutions	› Less failure and increased up-time with stable connectivity of surveillance camera to cloud and management platforms
› Co-processor in connectivity solutions	› Keep-alive feature in connectivity solutions
› Small footprints of components	› Sleeker designs and space savings
› Turnkey embedded security solutions	› More robust designs against cyberattacks in connected eco-systems
› Highly accurate set of sensors with low power consumption	› Accurate data collection for IoT use cases, e.g. wake-up functions with radar sensors

www.infineon.com/surveillance

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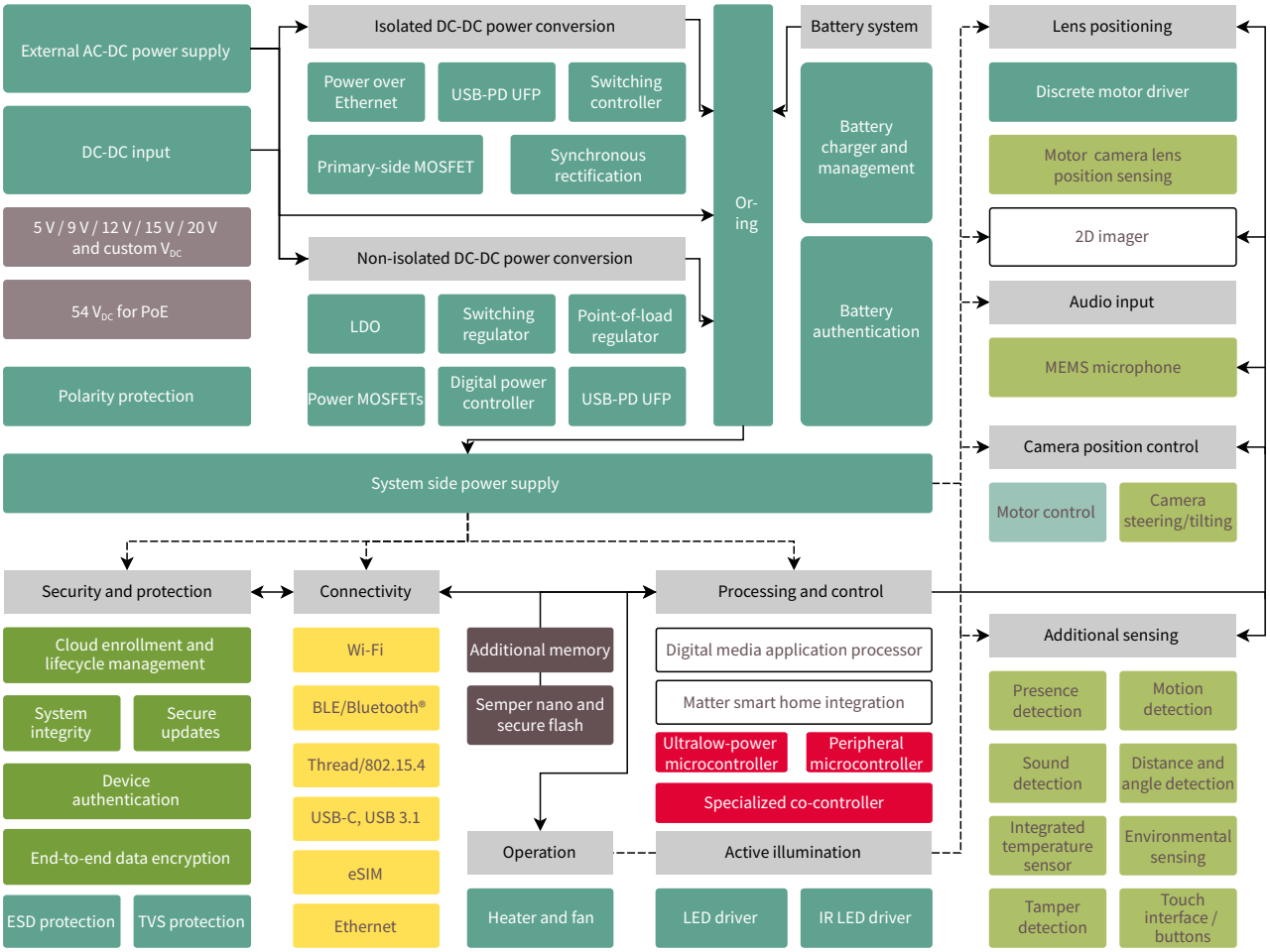
Application diagram



www.infineon.com/surveillance

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LED lighting

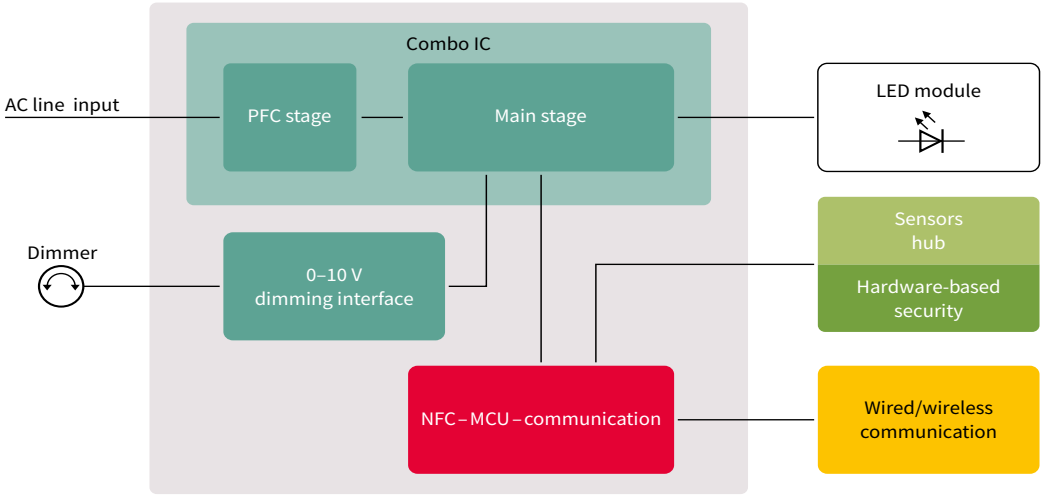
Solutions for cost-sensitive applications as well as for smart lighting

Infineon supplies tailored products for LED drivers, LED strips, horticultural, and smart lighting. Our broad portfolio of tailored products and solutions for LED lighting comprises LED driver ICs, MOSFETs, and microcontrollers suited for LED drivers as well as sensors and dedicated ICs for secure communication. In addition to offering products of proven quality, a competent global lighting team supports our lighting customers in designing LED lighting products and systems in collaboration with our channel partners.

Key trends and challenges in LED lighting and our offering:

- Human-centric lighting (HCL)
  - The lowest cost implementation of tunable white with single-stage flyback constant voltage and smart linear regulators with advanced headroom control ensuring high efficiency – BCR601
- Configuration of output current and some further parameters
  - Our NFC controller allows the configuration of the output current without the need for an additional microcontroller
  - Our XDPL lighting IC family allows, besides output current, also adjustment of other features like protection, dimming curves, etc.
- Cost reduction combined with efficiency increase
  - Integration of resonance inductor for PFC + resonant topology enables highest efficiency at low cost
  - Integration is enabled by the coreless transformer technology that enables high switching frequencies

LED drivers



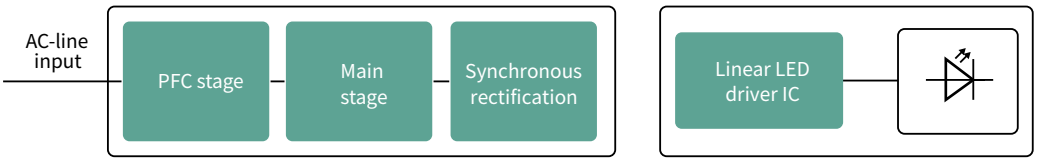
www.infineon.com/lighting

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Recommended LED driver products

Functional block	Product type	Product family	MOSFET technology	Voltage class
PFC stage	PFC	IRS2505	CoolMOS™ P7	600 V/700 V/800 V/950 V[1]
Main stage	PFC + LCC (constant current) PFC + LLC (constant current)	ICL5102[2]	CoolMOS™ P7 (up to 600 mΩ) CoolMOS™ PFD7	600 V/600V
			CoolMOS™ CE (above 600 mΩ)	600 V
		ICL5102HV[3]	CoolMOS™ PFD7	950 V
	PFC + flyback (dual-stage)	XDPL8221[2]	CoolMOS™ P7	800 V/950 V
	PFC/flyback (single-stage constant current)	XDPL8105	CoolMOS™ P7	800 V/950 V
	PFC/flyback (single-stage constant voltage)	XDPL8219	CoolMOS™ P7	800 V/950 V
	PFC/flyback (single-stage constant voltage)	ICL8800/ICL8810/ ICL8820	CoolMOS™ P7	800 V/950 V
	PFC, flyback low-side gate driver	1EDN7550B	any CoolMOS™ SJ MOSFETs	-
		2EDN8524F	any CoolMOS™ SJ MOSFETs	-
	Half-bridge LLC gate driver	2ED2101S06F	any CoolMOS™ SJ MOSFETs	650 V (SOI)
		1EDI20N12AF	any CoolMOS™ SJ MOSFETs	1200 V (coreless transformer/CT)
		2EDF7275F	any CoolMOS™ SJ MOSFETs	650 V (coreless transformer/CT)
Buck/linear solutions	Secondary buck (single-channel) Secondary buck (multichannel)	ILD8150	integrated	80 V
	High-side buck gate driver	1EDB8275F	any CoolMOS™ SJ MOSFETs	650 V
	Low-side buck gate driver	1EDN8511B	any CoolMOS™ SJ MOSFETs	-
	Secondary linear controller with feedback	BCR601	small-signal MOSFETs	75 V/100 V
	Tunable white with linear LED driver	BCR601, BCR602	small-signal MOSFETs	75 V/100 V
Dimming	0-10 V dimming interface IC	CDM10 V	-	-
		CDM10 VD	-	-
NFC	NFC configuration IC	NLM0010/NLM0011[4]	-	-
Microcontroller	XMC™ microcontroller	XMC1100	-	-

LED driver with constant voltage output and linear/switch mode LED driver ICs



Linear LED driver IC product portfolio

Functional block	Topology	IC product family	MOSFET technology
Lowest cost LED driver IC	Linear	BCR400W series	Integrated
Low voltage drop LED driver IC		BCR430/BCR431	
Robust LED driver IC		BCR40xU/BCR42xU	

For additional portfolio, take a look at Lighting ICs.

www.infineon.com/lighting

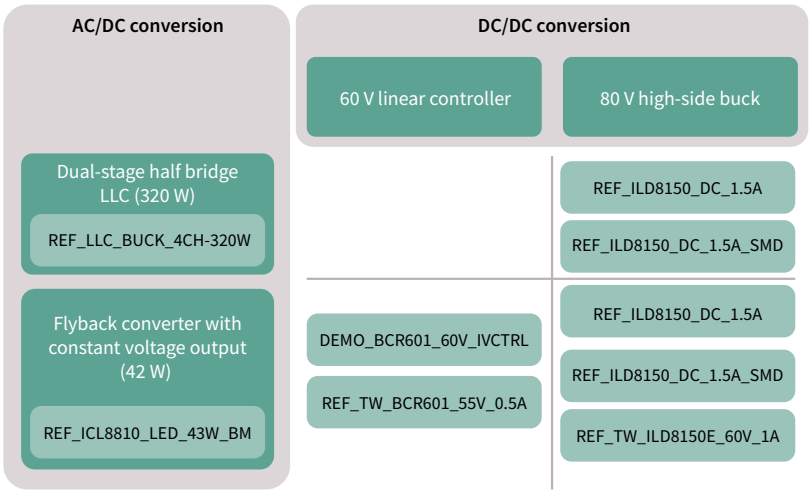
For more details on the product, click on the part number, visit infineon.com or contact our product support.

1) 700 V, 800 V and 950 V CoolMOS™ P7 are optimized for PFC and flyback topologies. 600 V CoolMOS™ P7 is suitable for hard as well as so switching topologies (flyback, PFC and LLC)
2) PFC and resonant combo controllers
3) Higher input voltage
4) In addition to current configuration also constant lumen output (CLO) feature is included.

Plug & LEDs play solutions

Modular LED lighting reference designs for LLC, buck and PFC flyback topologies

LED lighting has become a mature technology with stringent requirements on light quality. In order to achieve high light quality, there is a strong trend towards two-stage topologies. These two-stage topologies ensure that the light flicker or, also called light ripple, remains at low levels according to the IEEE 1789 standard and other new upcoming regulations. Primary constant voltage output, followed by a DC-DC buck, enables dimming, efficiency, cost, and scalability benefits. Infineon has solutions for both the primary AC-DC stage as well as for the secondary DC-DC buck stage. These solutions can be combined in a plug & play concept. In other words, depending on the requirements, the suitable AC-DC stage and the best fitting DC-DC stage can be selected and tested.



Our solutions include but are not limited to:

Low to medium power platform promising tunable white at low cost

REF_ICL8810_LED_43W_BM

REF_TW_BCR601_55V_0.5A

320 W DCM PFC cost-effective and scalable platform design with up to 4 DC-DC channels

REF_LLC_BUCK_4CH_320W

REF_ILD8150_DC_1.5A

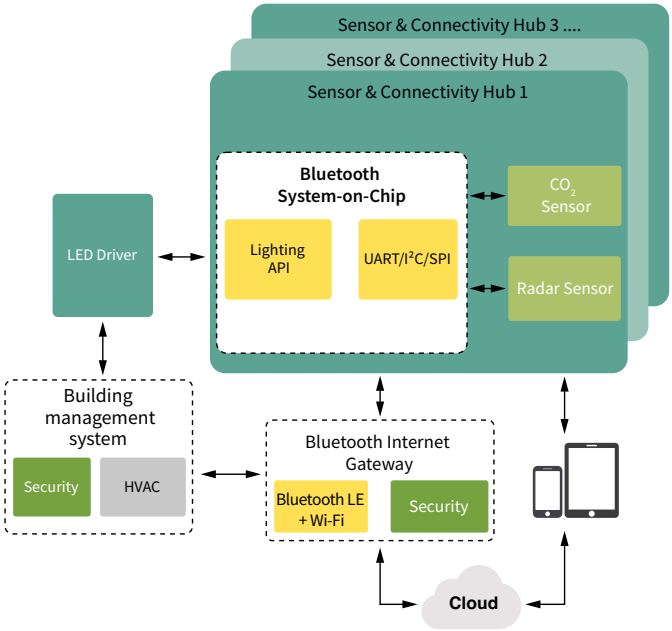
Discover more solutions on
www.infineon.com/leddriver-reference-solutions

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Smart lighting solutions

Connectivity and sensor solutions for connected and smart lighting to facilitate everyday life

In the last few years, connected and smart lighting has gained high momentum in the lighting industry. In this application field, sensing and connectivity play an essential role. Besides helping to realize energy savings, they also enable new use cases that go beyond lighting controls.

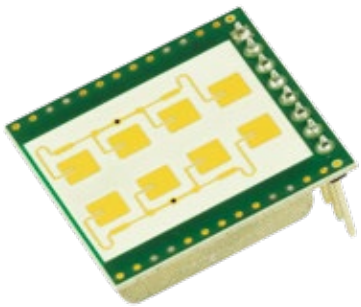


Radar sensor solutions

For energy saving, passive infrared (PIR) sensors are used. Novel sensors like radar can overcome weaknesses of PIR sensors like poor design, limited detection of micro-movements, and limited area coverage, to name a few. Radar sensors can be seamlessly integrated into the luminaires enabling nice design as well as platform design of luminaires since there is no need for drilling holes as in the case of PIR sensors. Advanced use cases like people counting and people tracking can also be ensured with radar technology. In order to add more intelligence into the entire system, connectivity is a key element.

Our partners:
Our system design house partners deliver both standard products and customized solutions to fit specific lighting applications from movement detection through automatic light activation to person counting. In addition, they offer all levels of support to get your intelligent lighting system up and running as quickly and efficiently as possible. See below a list of some of our partner solutions and check our Lighting brochure for more.

Functional block	Topology	IC product family
RF Beam	K-LD2	Presence detection including slight movements
	K-LD7	
InnoSent	INS-313x	Motion detection range up to 5m
	INS-333x	Motion detection range up to 10m
Novelic	RIOT100 – NRM302	Turnkey motion and presence sensor solution up to 15m



Additionally, Infineon provides numerous radar solutions.
Please find out more about them in Radar sensor ICs chapter.

www.infineon.com/smart-lighting
www.infineon.com/makeradar

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Bluetooth® Mesh devices and modules for connected and smart lighting applications

Embedding Bluetooth® Mesh networking in lighting systems, including luminaires, fixtures, and wall switches, opens a range of system applications to manage lighting brightness or color, efficiency based on occupancy movements, and correlation of lighting ecosystem components. The range and coverage of Bluetooth® Mesh devices allow for low latency, whole building coverage of automation and occupancy interaction via smartphone and tablet applications, as well as cloud applications for building management. Infineon provides a range of Bluetooth® Mesh MCUs and certified modules that enable lighting control functionality, safety and occupancy sensor management and robust, secure, reliable networked managed solutions.

Bluetooth® Mesh SoCs and certified modules: solutions and benefits

Bluetooth® Mesh system-on-a-chip (SoCs) and certified modules offer a range of efficient and future-proof upgradeable solutions:

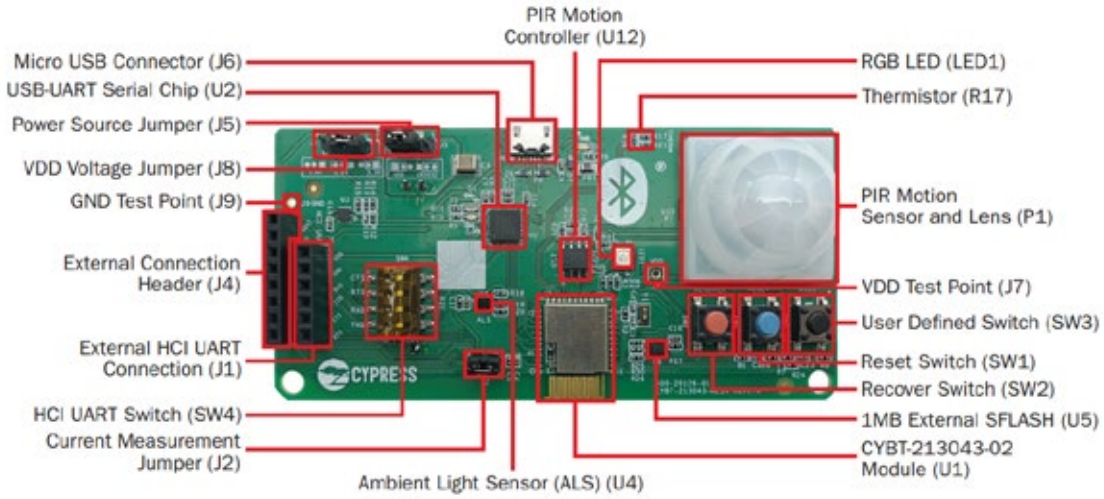
Solutions	Benefits
› Module diversity with integrated components ranging from the basic battery-powered sensor to the most sophisticated detection and safety devices	› Accommodating different needs now and in future
› Fully-integrated modules	› Accelerate time-to-market › Reducing development and manufacturing costs
› Ultra-high-transmit power designs with integrated antennas	› Enabling long range and unfailing node-node connections
› Integrated CPU, memory (flash and RAM) and I/O	› Suiting all foreseeable applications hosting

Bluetooth® Mesh evaluation kit CYBT-213043-MESH

The Bluetooth® Mesh evaluation kit (CYBT-213043-MESH) enables you to evaluate SIG Mesh functionality and features using the CYBT-213043-02 module. The CYBT-213043-02 module is an integrated, fully certified, 12.0 mm x 16.61 mm x 1.70 mm, programmable Bluetooth® Smart Ready module designed to reduce your time-to-market.

Utilized device: CYW20819

Kit contents:
4x mesh evaluation boards
4x USB A to micro-B cables
1x quick-start guide (this document)



Info

Bluetooth® Mesh Networking - An Introduction for Developers
Bluetooth®-Mesh-Paving-the-Way-for-Smart-Lighting
Bluetooth®-Mesh specifications:
www.bluetooth.com/specifications/mesh-specifications

Getting Started with Bluetooth® Mesh (AppNote AN227069)

www.infineon.com/smart-lighting
www.infineon.com/makeradar

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Mesh-enabled, silicon, dual-mode Bluetooth® 5.0 AIROC™ MCUs

	CYW20706	CYW20735	CYW20819	CYW20820	CYW20719
Product features					
TBA Processor	CM3	CM4 w/ FPU	CM4	CM4	CM4 w/ FPU
TBA Radio	–	ULP RF	ULP RF	ULP RF	ULP RF
Operating temperature	105 C	85 C	125 C planned	125 C planned	85 C
Transmit power	10 dBm Tx	10 dBm Tx	4 dBm Tx	10 dBm Tx	4 dBm Tx
Memory	–	–	256 kB Flash	256 kB Flash	1 MB Flash

Features/Integration

Interested in more? We offer a broad silicon portfolio to support your Bluetooth® Mesh design. Explore here.

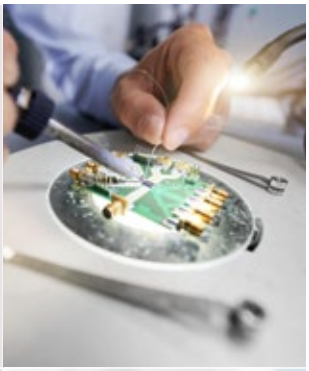
Fully-certified Bluetooth® modules (FCC, ISED, MIC, CE)

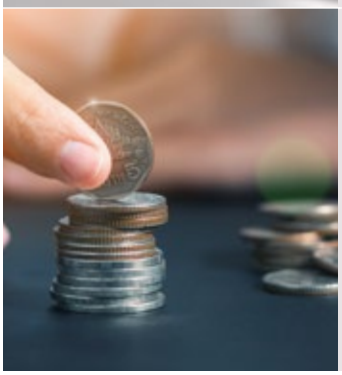
Load range
Up to 20 dBm transmit power

CYBT-483056-02

Size and simplicity
Ez Serial support enables fast time to market and 9x9 size for small form factor application

CYBT-353027-02





Value
Balance of features for cost sensitive applications

CYBT-343052-02

Integration
Fully integrated SoC with lowest power and extended range

CYBT-273063-02

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Wi-Fi enterprise networking and internet connectivity

Wi-Fi networking is the back-bone of enterprise, retail, and home internet connectivity. Wi-Fi is the bridging medium for Bluetooth® Mesh networks to enterprise networks and cloud applications capturing messaging from across the lighting installation for secure enterprise building management applications. Wi-Fi can also be used to connect sensors and fixtures directly to enterprise or home access points for long range solutions or integrated solutions including security lighting and cameras. Infineon offers a range of secure, high performance enterprise ready Wi-Fi solutions that can be added to switches, panels, and lighting bays. These solutions can be stand-alone network nodes or offer Bluetooth® Mesh Gateway services bridging Mesh-networked devices to cloud applications.

IoT Wi-Fi portfolio

Technology	Wi-Fi	Wi-Fi + MCU	Wi-Fi + Bluetooth® combos
Wi-Fi 4 (802.11n)	CYW43364 SB 1x1 11n | SDIO		CYW43439* SB 1x1 11n + BT5.2 SDIO/SPI
		CYW43903 SB 1x1 11n + 160-MHz R4	CYW43012 ULP DB 1x1 11n + BT5.1 SDIO/SPI WLBGA/WLCSP
		CYW43907 1x1 DB 11n + 320-MHz R4	
Wi-Fi 5 (802.11ac)		CYW54907 1x1ac DB + 320-MHz R4	CYW54590** DB 2x2 11ac + BT 5.1 PCIe/SDIO
			CYW4373/89373 DB 1x1 11ac + BT5.0 USB/SDIO/PCIe
			CYW54591 DB 2x2 11ac, RSDB, BT5.1 PCIe/SDIO

Infineon's Wi-Fi portfolio provides high-performance, flexible connectivity for Linux, Android, and RTOS.
Many of the Wi-Fi + Bluetooth® combos are supported on Infineon's WICED Wi-Fi and ModusToolbox™ Software Development Kits (SDK) which provide code examples, tools and development support.

Infineon's Wi-Fi and Bluetooth® combos use production-ready, fully-certified Wi-Fi + Bluetooth® combo modules based on both Linux and RTOS based platforms. Many of the Wi-Fi + Bluetooth® combos are supported on Infineon's WICED Wi-Fi and ModusToolbox™ Software Development Kits (SDK) which provide code examples, tools and development support for **easier and faster development.**

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*Coming soon
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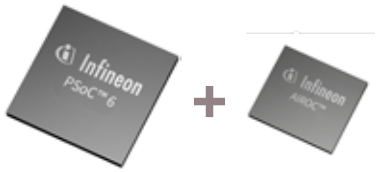
Wi-Fi enterprise networking and internet connectivity

		
CYW43907: MCU + Wi-Fi	PSoC™ or 3rd-party MCU: PSoC™ or 3rd-party MCU running RTOS 3rd-party SoC running Linux OS	P/N: CY8CKIT-06S2-43012 PSoC™ 6: Ultralow-power dual-core MCU
CYW20719: Dedicated Bluetooth® 5.1 MCU	CYW43439*: 1x1n Wi-Fi + Bluetooth® combo SoC	CYW43012 (Murata Type 1LV): Dedicated low-power Wi-Fi + Bluetooth® 5 combo SoC

We offer a broad platform portfolio to support your Bluetooth® Mesh gateway. Explore more here.

IoT Wi-Fi portfolio

A global Wi-Fi module partner ecosystem enables support and development for your IoT application.

Design, build and sell RF Modules with limited software and hardware certification support

Module makers

muRata INNOVATOR IN ELECTRONICS

AzureWave

USI

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*Coming soon

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DC-DC power solution for data center, edge, enterprise, telecom and datacom

Digital multiphase and point-of-load DC-DC solution

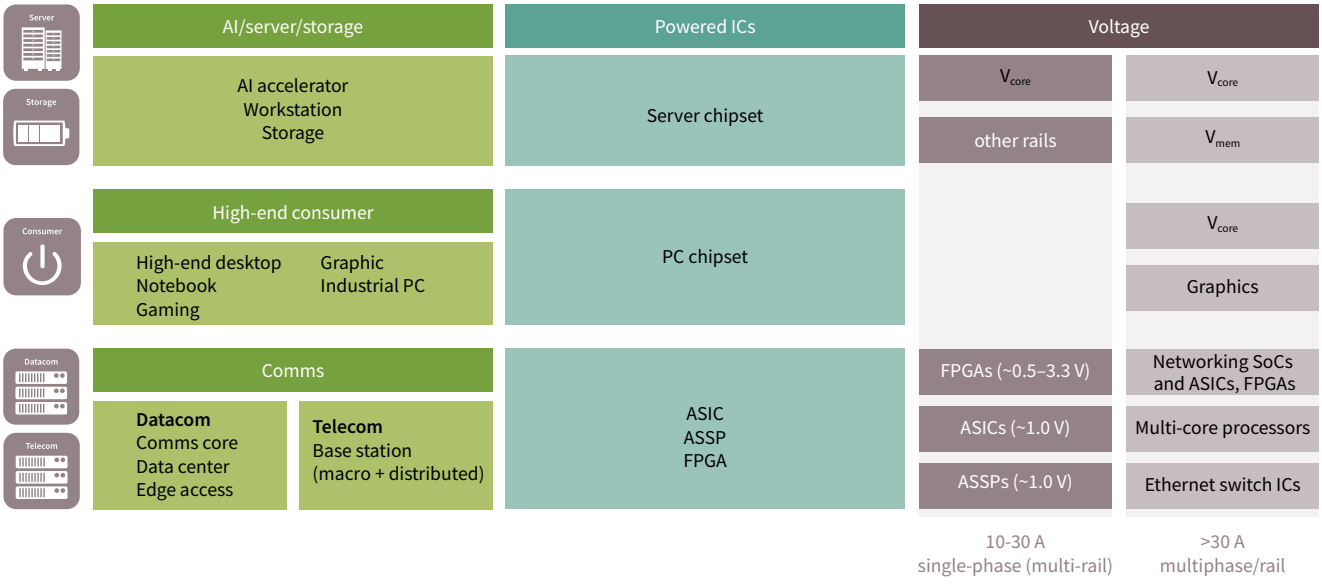
As an industry leader in digital power management, Infineon delivers solutions for the next-generation data center, edge, enterprise, server and telecom applications, storage and client computing applications. Infineon offers a complete portfolio including digital multiphase controllers, integrated power stages, integrated point-of-load (POL) voltage regulators and discrete MOSFETs. These proven technologies offer full flexibility to our customers to optimize a complete system solution for space, performance, ease of design and cost to meet critical design goals. In addition, our latest software tools help simplify design, shorten design cycles, and improve time-to-market.

Features and benefits

Key features
› Best-in-class efficiency
› Multi-protocol support
› Complete system solution
› Digital controller flexibility
› Ease of design
› Smallest solution size

Key benefits
› Digital multiphase controller and power stage provide industry's highest efficiency of more than 95 percent
› Intel SVID, AMD SVI2/3, NVIDIA PWM VID, parallel VID (up to 8 bits) , PMBus Rev1.3, AVS Bus (PMBus Rev1.3)
› A broad portfolio of fully integrated point-of-load, integrated power stage and digital controller solutions in addition to discrete drivers and MOSFETs offers full flexibility to optimize complete system solutions ranging from 1 A to 1000+ A
› Industry's benchmark for feature richness and low-quiescent power
› Intuitive GUI enables faster optimization, thereby reduces design cycle time
› Best-in-class OptiMOS™ MOSFETs combined with advanced packaging technologies enable high power density at high efficiency, and superior control engine with digital multiphase controllers help minimize output capacitance significantly

Multiphase DC-DC system solution

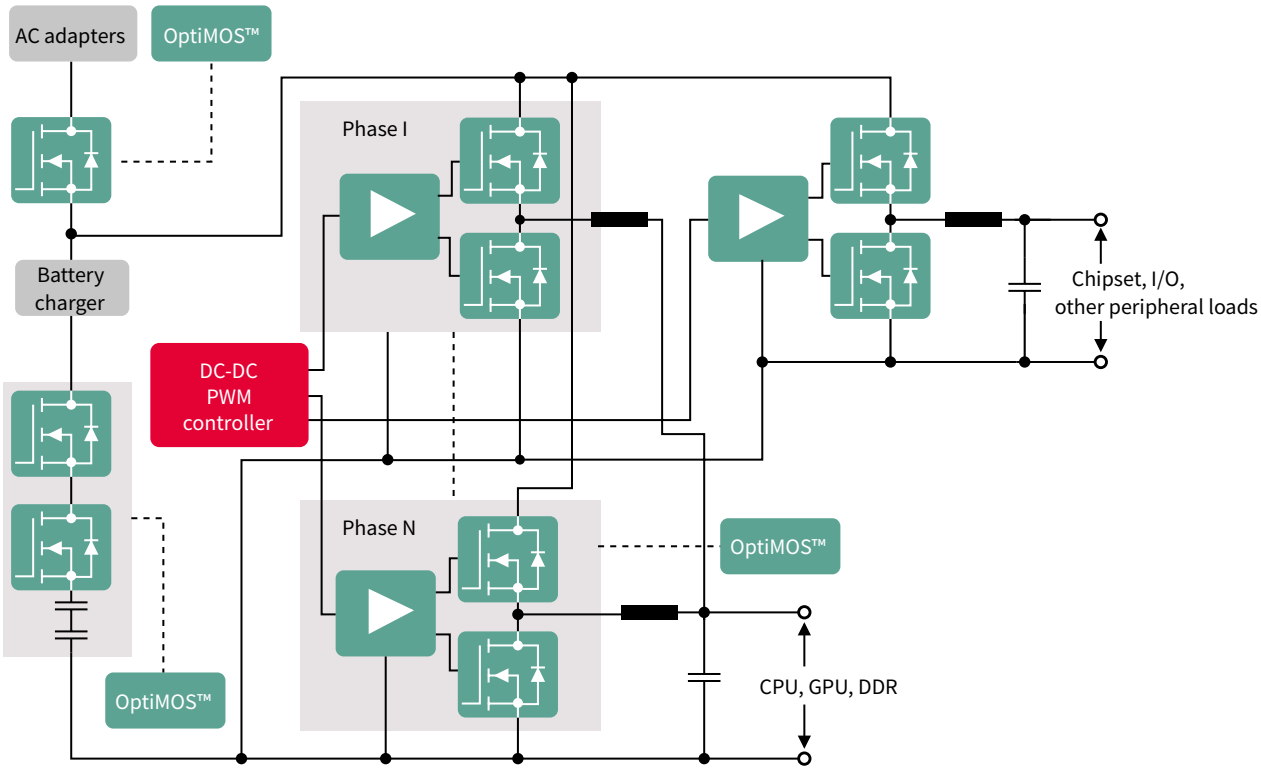


Click here for more information on server SMPS and telecom SMPS solutions.

www.infineon.com/dataprocessing

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Multiphase DC-DC system solution



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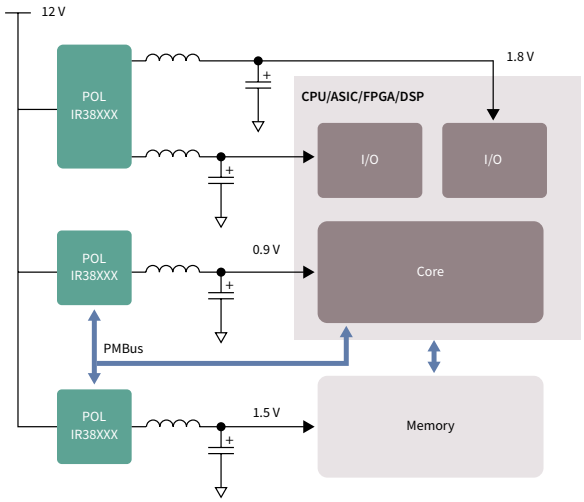
DC-DC enterprise power solution for data processing applications

Integrated point-of-load (IPOL) converters

Infineon's IPOL converters integrate a PWM controller, a driver, and MOSFETs into a small PQFN package for ease of use. The patented PWM modulation scheme allows greater than 1 MHz switching frequencies to deliver ultracompact layouts and the smallest bill of materials (BOM). A PMBus interface is available for monitoring and control in systems that use advanced CPUs, ASICs and FPGAs.

Block diagram



Key features

- Input voltage range 4.5-21 V
- Output current 1-40 A
- Operating temperature range of -40 to 125°C

Key benefits

- Integrated controller, driver, MOSFETs for small footprint
- High-efficiency MOSFETs and thermally enhanced packages for operation without heat sinks

Di-PoL

DC-DC IPOL portfolio

Digital interface IPOL

I²C PMBus, telemetry, margin, faults, SVID PVID Digital control/configuration, telemetry and diagnostic					
Part number	Max. current [A]	Package size [mm]	Max. V_{in}	Max. f_{sw}	Distinctive features
IR38064MTRPBF	35	5 x 7	21 V	1500 KHz	PMBus
IR38063M	25	5 x 7	21 V	1500 KHz	
IR38062M	15	5 x 7	21 V	1500 KHz	
IR38060M	6	5x6	16 V	1500 KHz	
IR38163M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus
IR38165M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38363M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus
IR38365M	15	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID
IR38263M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID + PMBus
IR38265M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, PVID
IR38164M	30	5 x 7	16 V	1500 KHz	OptiMOS™ 5, SVID + PMBus, enhanced Imon
IRPS5401M	4+4+2 +2+0.5	7 x 7	14 V	1500 KHz	5 output PMIC, PMBus

Analog IPOL

„Performance" voltage-mode PWM Ultralow jitter and noise, high accuracy and low ripple					
Part number	Max. current [A]	Package size [mm]	Max. V_{in}	Max. f_{sw}	Distinctive features
IR3883MTRPBF	3	3 x 3	14 V	800 KHz	Constant-on-time (COT)
IR3823AMTRPBF	3	3.5 x 3.5	17 V	2000 KHz	
IR3899AMTRPBF	9	4 x 5	17 V	2000 KHz	
TDA38820	20	4 x 5	17 V	2000 KHz	
IR3888MTRPBF	25	5x6	17 V	2000 KHz	
IR3447AMTRPBF	25	5x6	17 V	600 KHz	
IR3887MTRPBF	30	4 x 5	17 V	2000 KHz	
IR3889MTRPBF	30	5x6	17 V	2000 KHz	
TDA38840	40	5x6	17 V	2000 KHz	
IR3846AMTRPBF	40	5 x 7	17 V	600 KHz	

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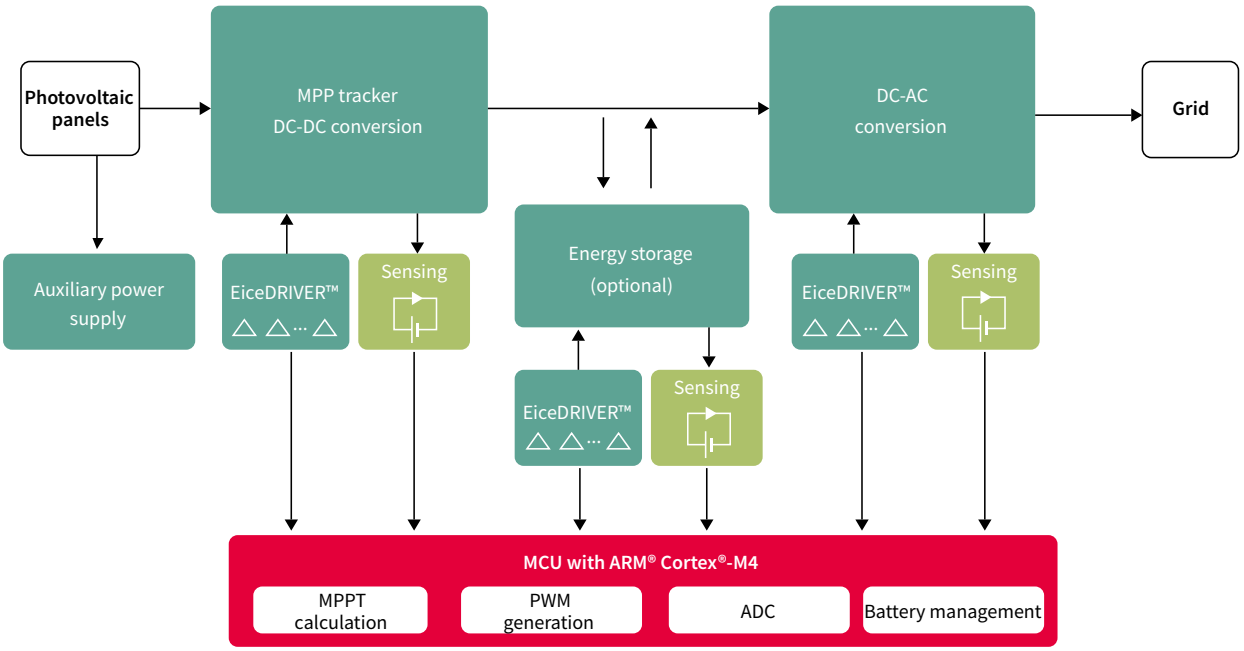
Solar

High efficiency designs for solar power systems

Infineon provides a comprehensive portfolio to deliver the best efficiency and reliability for solar applications. Cutting-edge technologies such as CoolMOS™ SJ MOSFETs, HighSpeed 3 IGBT and TRENCHSTOP™ 5, CoolSiC™ Schottky diodes, CoolSiC™ MOSFETs, coreless transformers, drivers and many more combined with the rich experience and highest quality ensure Infineon's unique supplier position for solar applications. The newly added Arm® Cortex®-M4 based MCU enables easy and high-efficiency design.

	Optimizer 250 W-750 W	Single and multiple panel micro inverter 250 W-1500 W	String inverter 1 kW-200 kW	Central inverter 500 kW-5000 kW
MOSFETs	OptiMOS™ SuperSO8/DirectFET™ | 60 V-150 V	OptiMOS™ SuperSO8 | DirectFET™ 60 V-200 V	OptiMOS™ 150 V-300 V	
		CoolMOS™ TOLL/D²PAK | 600 V-800 V	CoolMOS™ TO-247-3/TO-247-4 |D²PAK/TOLL/QDPAK | 600/650 V	
SiC MOSFETs			CoolSiC™ MOSFET TO-247-3/TO-247-4/D²PAK-7 | 650V/1200 V	
IGBTs			650 V TRENCHSTOP™ 5 / 1200 V HighSpeed 3 TO-247-3/TO-247-4/TO-247PLUS | 600 V/650 V/1200 V	
			Easy 1B/2B	PrimePACK™ / EconoDUAL™ 3 / 62 mm
Gate driver ICs	EiceDRIVER™ 2EDi / 1ED Compact (1ED-AF) / 650 V SOI / 1EDB / IRS2011	EiceDRIVER™ 2EDi / 1EDB / 1ED Compact(1ED-AF) / 650 V SOI / 1EDB	EiceDRIVER™ 2EDi/650 V SOI/ X3 Compact(1ED31xx) / X3 Analog(1ED34xx) / 1ED-F3 / 1EDB / IRS2011	EiceDRIVER™ X3 Compact(1ED31xx) / X3 Analog(1ED34xx) / 1ED-F3 / 1EDB 2ED24427N01F / 650 V SOI
SiC diodes		CoolSiC™ Schottky diodes DPAK | 600 V/1200 V D²PAK | 650 V	CoolSiC™ Schottky diodes TO-220/TO-247/TO-247-2/DPAK/D²PAK| 650 V/1200 V	
			BAT165 Schottky diode	
Auxiliary power supply			CoolSET™ 800 V	
Microcontrollers	XMC1xxx Arm® Cortex®-M0	XMC1xxx Arm® Cortex®-M0	XMC1xxx Arm® Cortex®-M0	XMC1xxx Arm® Cortex®-M0
	XMC45xx Arm® Cortex®-M4	XMC45xx Arm® Cortex®-M4	XMC45xx Arm® Cortex®-M4	XMC45xx Arm® Cortex®-M4

Infineon's products for complete solar system



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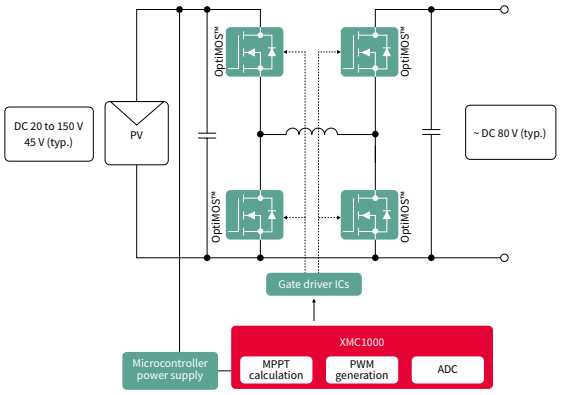
Optimizer

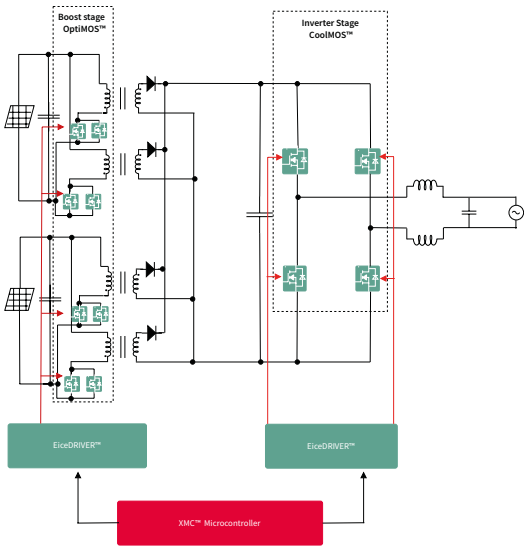


Functional block	Product family	Input voltage	Voltage class [V_{DS} max]	Package*	Part number*	$R_{DS(on)}$
Buck boost MPPT	OptiMOS™	≤ 48 V	60 V	SuperSO8	BSC012N06NS	1.2 mΩ
				SuperSO8 SC	BSC01406NSSC	1.4 mΩ
				DirectFET™	BSB028N06NN3 G	2.8 mΩ
				SuperSO8 SC	BSC028N06NSSC	2.8 mΩ
		≤ 64 V	80 V	SuperSO8	BSC021N08NS5	2.1 mΩ
				DirectFET™	BSB044N08NN3 G	4.4 mΩ
		≤ 80 V	100 V	SuperSO8	BSC027N10NS5	2.7 mΩ
				SuperSO8 SC	BSC040N10NS5SC	4.0 mΩ
				DirectFET™	BSB056N10NN3 G	5.6 mΩ
		≤ 125 V	200 V	SuperSO8	BSC220N20NSFD	9.3 mΩ
	Gate-driver ICs	Single channel		PG-SOT23-6	1EDN8550	
				DSO8	1EDI60N12AF [10 A]	
		Dual channel		VDSON	2EDL81xx	
				DSO8	IRS2011 [1 A]	
				DSO8	2ED2181S06F [2.5 A] IRS2186ST [4 A]	
	Microcontroller	XMC4000 and PSoC™6				

Microinverter

Microinverter can either be used per

- single (~300 W) PV panel or
- multiple PV panels (600 – 1500 W)



Functional block	Product family	Voltage class [V_{DS} max]	Package	Part number	$R_{DS(on)}$
MPPT – Boost stage	OptiMOS™	60 V	SuperSO8 SC	BSC01406NSSC	1.4 mΩ
				BSC028N06NSSC	2.8 mΩ
		100 V		BSC040N10NS5SC	4.0 mΩ
		60 V	SuperSO8	BSC028N06NS	2.8 mΩ
		80 V		BSC026N08NS5	2.6 mΩ
		120 V		BSC190N12NS3	19.0 mΩ
		150 V		BSC093N15NS5	9.3 mΩ
				BSC160N15NS5	16.0 mΩ
	CoolSiC™ Schottky diode	1200 V	DPAK	IDM02G120C5	2.0 A
				IDM05G120C5	5.0 A
				IDM08G120C5	8.0 A
	Gate driver: EiceDRIVER™		VDSON-8	2EDL81xx	
			PG-DSO8-60/PG-TSSOP-8-1	2EDN7524F	
			DFN-10 (3 x 3 mm)	2ED2742/44/48S01G*, 2ED2732/34/38S01G*	
			DSO8 with power-pad	2ED24427N01F	
			DSO8	IRS2011S, IRS2005S, IRS2007S, IRS2008S	
			DSO8	1EDI60N12AF, 1ED3124MU12F	
Inverter stage	CoolMOS™	600 V	TO-Leadless	IPT60R102G7	102.0 mΩ
			D²PAK	IPB60R145CDF7*	145.0 mΩ
			TO-247	IPW60R145CFD7	145.0 mΩ
		650 V	D²PAK	IPB65R125CFD7	125.0 mΩ
			TO-247	IPB65R125CFD7	125.0 mΩ
	Gate driver: EiceDRIVER™		PG-DSO-16	2EDS8165H	
				2EDS8265H	
			PG-DSO8/PG-DSO-14	2ED2181S06F, 2ED21814S06F	
			DSO8	1EDI60N12AF, 1ED3124MU12F	
Microcontroller				XMC4000 and PSoC™6	

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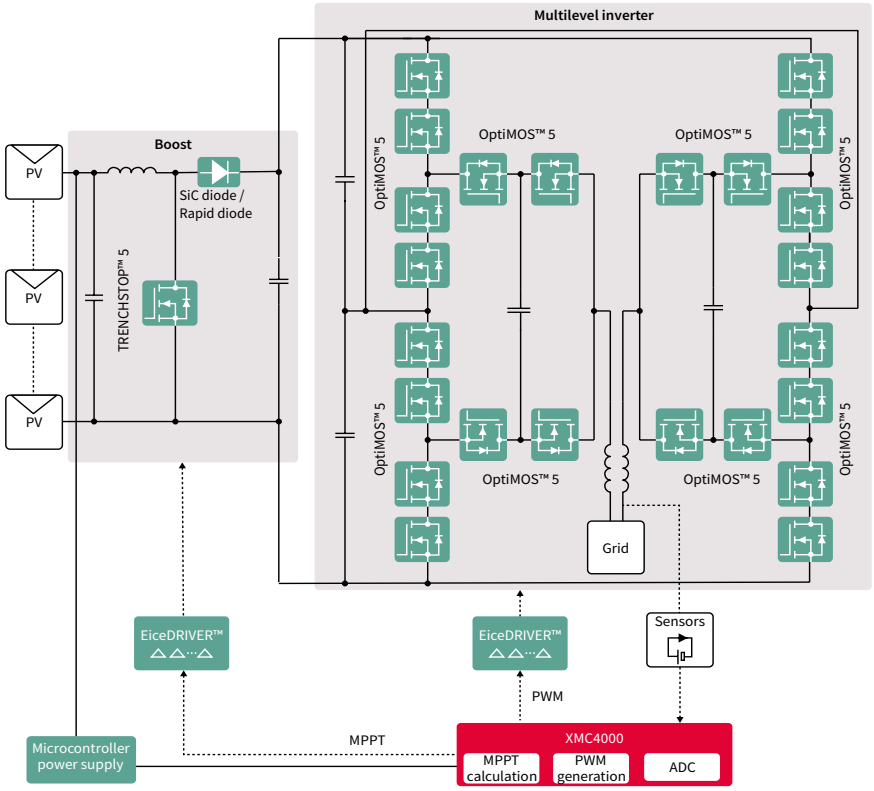
Single-phase string inverter – multilevel topology



In a multilevel inverter, four high-voltage MOSFETs/IGBTs in an H-bridge topology are replaced with a higher number of lower-voltage MOSFETs. Compared to a conventional H-bridge inverter, a multilevel inverter, composed of lower voltage MOSFETs, offers several advantages:

- With much lower $R_{DS(on)}$ and switching loss parameters, it significantly reduces conduction and switching losses
- Higher effective output frequency (smaller magnetics) is possible with lower switching losses
- Improved EMC due to reduced switching voltages
- Significant reduction in the cooling system, size and weight

Discrete power devices for multilevel string inverter

Functional block	Product family	Voltage class [V_{DS} max]	Package	Part number	$R_{DS(on)}$
Boost	CoolMOS™	600 V	TO-247	IPW60R017C7	17 mΩ
			TO-247	IPW60R024P7	24 mΩ
			D²PAK	IPB60R045P7	45 mΩ
	IGBT TRENCHSTOP™ 5	650 V	TO-247	IKW40N65EH5, IKW40N65ES5	40 A
			D²PAK	IKB40N65EH5, IKB40N65ES5	40 A
	CoolSiC™ Schottky diode	650 V	TO-247	IDW20G65C5	20 A
	EiceDRIVER™ 1EDN		PG-SOT23-6	1EDN8511B	4 A/8 A
Flying-capacitor-based active neutral-point-clamp (NPC)	OptiMOS™	150 V	SuperSO8	BSC093N15NS5	9.3 mΩ
			SuperSO8	BSC110N15NS5	11 mΩ
			DirectFET™	IRF150DM115*	11.3 mΩ
			D²PAK	IPB044N15N5	4.4 mΩ
			D²PAK	IPB048N15N5	4.8 mΩ
Gate-driver ICs	EiceDRIVER™ 2EDi		NB-DSO16	2EDF7275F	4 A/8 A
	EiceDRIVER™ SOI	650 V	DSO8, DSO-14	2ED2181S06F / 2ED21814S06J	2.5 A
	EiceDRIVER™ Compact	1200 V/2300 V	DSO8	1EDI60N12AF, 1ED3124MU12F	10 A, 14 A
Microcontroller	XMC4000 and PSoC™6				

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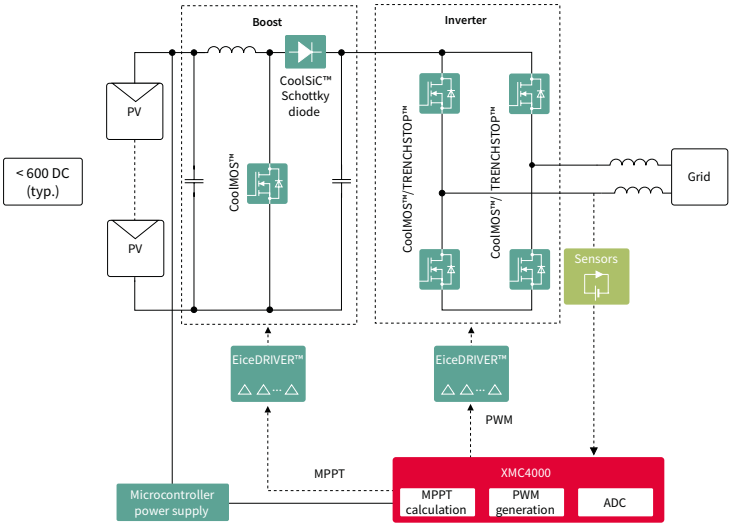
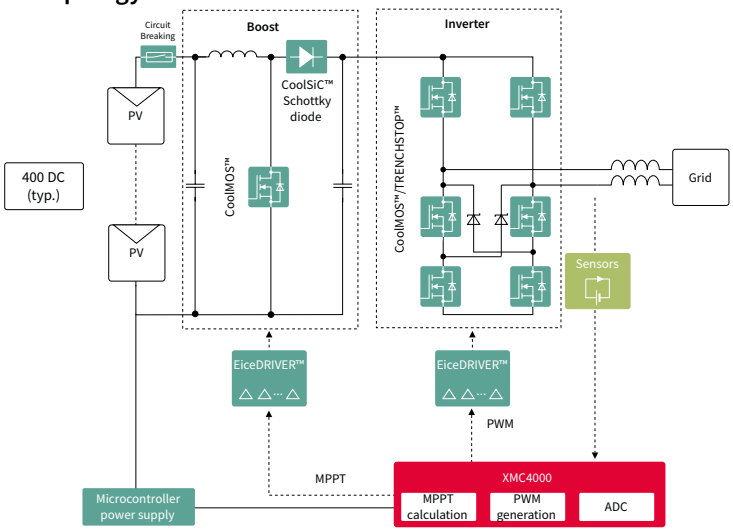
Single-phase string inverter

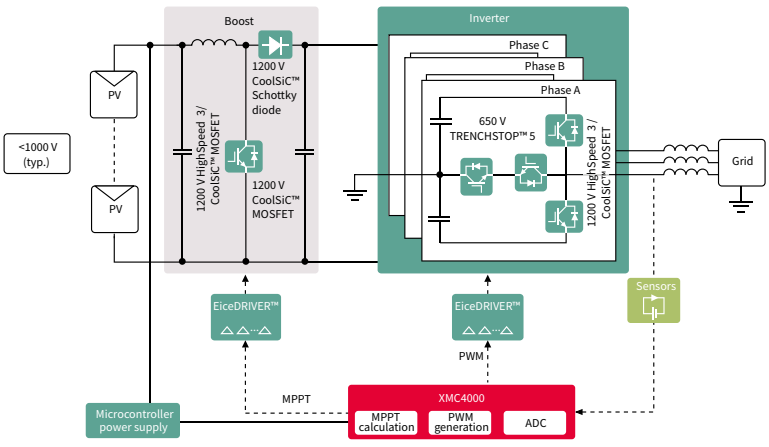
H4 topology



H6 topology



Three-phase string inverter



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Discrete power devices for string inverter

Inverter type	Functional block	Product category	Product technology	Voltage	Package	Part number	$R_{DS(on)}$	Ampere
Single phase	MPPT – Boost stage	Si MOSFET	CoolMOS™ P7	600 V	TO-247-3	IPW60R037P7	37 mΩ	-
					TO-247-4	IPZA60R037P7	37 mΩ	-
		SiC MOSFET	CoolSiC™ MOSFET	650 V	TO-247-4	IMZA65R027M1H	27 mΩ	-
					TO-247-3	IMW65R048M1H	48 mΩ	-
				1200 V	TO-247-3	IMW120R045M1	45 mΩ	-
		IGBT	TRENCHSTOP™ 5 S5/H5	650 V	TO-247-3	IKW40N65ES5, IKW40N65EH5	-	40 A
					TO-247-4	IKZ50N65ES5, IKZ50N65EH5	-	50 A
		Diode	CoolSiC™ diode	650 V	TO-247	IDW20G65C5	-	20 A
	Inverter	Si MOSFET	CoolMOS™ C7	650 V	TO-247-3	IPW65R065C7	65 mΩ	-
			CoolMOS™ S7	600 V	TO-Leadless	IPT60R022S7	22 mΩ	-
						IPT60R040S7	40 mΩ	-
			CoolMOS™ CFD7	600 V	TO-247-3	IPW60R018CFD7	18 mΩ	-
				600 V	TO-247-3	IPW60R031CFD7	31 mΩ	-
		SiC MOSFET	CoolSiC™ MOSFET	650 V	TO-247-4	IMZA65R027M1H	27 mΩ	-
					TO-247-3	IMW65R048M1H	48 mΩ	-
				1200 V	TO-247-3	IMW120R045M1	45 mΩ	-
		IGBT	TRENCHSTOP™ 5 S5/H5	650 V	TO-247-4	IKZ50N65ES5, IKZ50N65EH5	-	50 A
					TO-247-3	IKW40N65ES5, IKW40N65EH5	-	40 A
Three phase	MPPT – Boost stage	IGBT	HighSpeed 3	1200 V	TO-247-3	IKW40N120H3	-	40 A
					TO-247PLUS-3	IKQ75N120CH3	-	75 A
		SiC MOSFET	CoolSiC™ MOSFET	1200 V	TO-247-3/-4	IMW120R030M1H, IMZ120R030M1H	30 mΩ	-
						IMW120R045M1, IMZ120R045M1	45 mΩ	-
						IMW120R060M1H, IMZ120R060M1H	60 mΩ	-
	Inverter	IGBT	HighSpeed 3	1200 V	TO-247-3	IKW40N120H3	-	40 A
					TO-247PLUS-3	IKQ750N120CH3	-	75 A
		SiC MOSFET	CoolSiC™ MOSFET	1200 V	TO-247-3/-4	IMW120R030M1H, IMZ120R030M1H	30 mΩ	-
						IMW120R045M1, IMZ120R045M1	45 mΩ	-
						IMW120R060M1H, IMZ120R060M1H	60 mΩ	-
		Silicon carbide MOSFET module	CIPOS™ Maxi	1200 V	DIP 36x23D	IM828-XCC	55 mΩ	-
Gate-driver ICs			EiceDRIVER™ low side	25 V	SOT23-6	1ED44175/3N01B	2.6 A	
				24 V	DSO8	2ED24427N01F	10 A	
			EiceDRIVER™	650 V	DSO-16	2EDS7165H	8 A	
			EiceDRIVER™ SOI	650 V	DSO8	2ED2181S06F	2.5 A	
			EiceDRIVER™	1200 V	SSOP-23, DSO-16	IR2214SS, IR2213S	2.5 A	
			EiceDRIVER™ Compact	1200 V	DSO8	1EDI60I12AF, 1EDI30I12MF	10 A, 6 A	
				2300 V	DSO8	1ED3124MU12H, 1ED3122MU12H	14 A, 10 A	
			EiceDRIVER™ Enhanced	2300 V	DSO-16/36	1ED3322MC12N, 2ED020I12-F2	8.5 A	
				2300 V	DSO-16	1ED3491MU12M, 1ED3890MU12M	9 A	
			EiceDRIVER™ 2EDN family, EiceDRIVER™ 1EDB					
Microcontroller			XMC4000 and PSoC™6					

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Battery

Energy storage systems

Make energy storage systems the backbone of the new energy era with our semiconductor system solutions

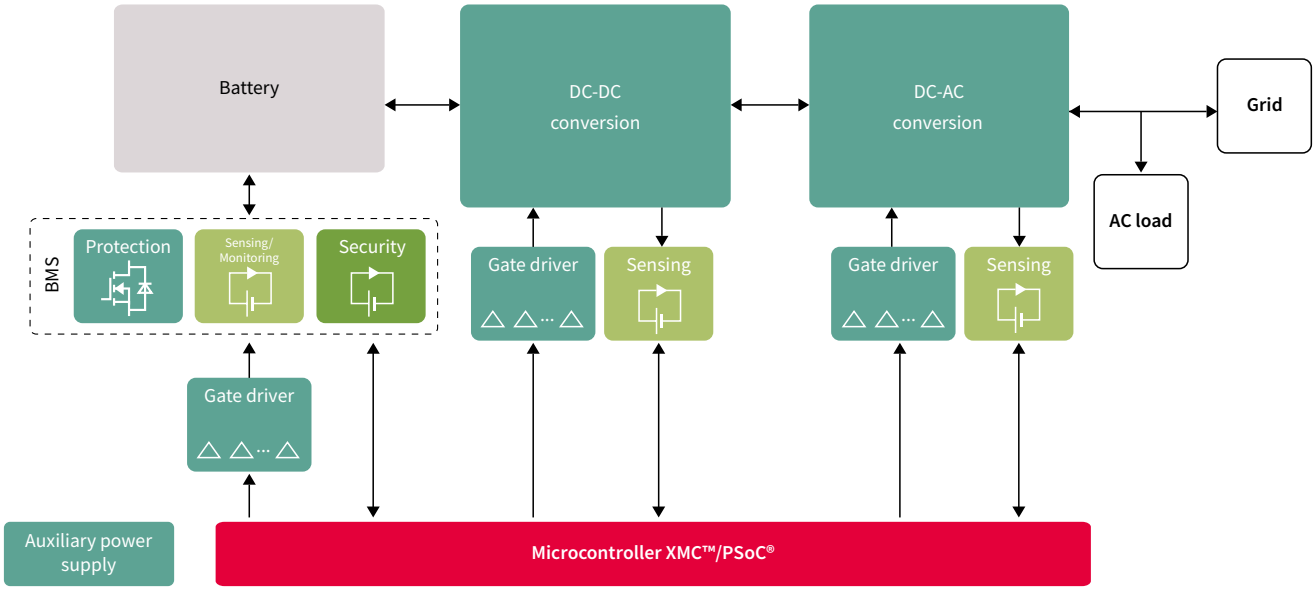
Facing diminishing fossil reserves, the world nonetheless needs to manage the rising demand for electrical energy while meeting the growing call for urgent climate action. The transition to renewable energies has become inevitable.

Energy storage systems play a vital role in managing this transition successfully. Our system solutions help to make energy storage the backbone of the new energy era. Our unique application expertise and comprehensive offering make us the natural choice to advance energy storage solutions in efficiency, performance, optimal cost, and innovation.

Features and benefits

Key features	Key benefits
› Efficient power conversion in DC-DC and AC-DC stage	› Improvement of system performance with industry leading semiconductor offering such as OptiMOS™, CoolMOS™, CoolSiC™ MOSFETs but also best-in-class modules and matching EiceDRIVER™ gate drivers
› Power dense design	› Reduction of design efforts and faster time to market
› Bi-directional power flow	› Trust in a true partnership during the whole system lifetime
› Safe operation of Li-ion battery	› Full system provider form power conversion stage (PCS) to the battery management system (BMS)
› Long battery lifetime	

Application diagram



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Highlight/recommended product portfolio

Functional block	Power/battery voltage	Voltage class [V_{DS} max]	Product family	Package	Benefits
Power conversion systems (PCS)	< 10 kW	150 V	BSC074N15NS5, IPT059N15N3	SuperSO8, TOLL	› High power density and system cost reduction
		600 V/650 V	CoolMOS™ CFD7/S7	TO-220/247, ThinPAK 8x8, TOLL	› Highest efficiency, enabling increased power density / more compact and easier design
		600 V	CoolSiC™ Schottky diode G6	TO-220	› Improved system efficiency and extremely fast switching
		650 V	CoolSiC™ MOSFET	TO-247	› Combination of high performance, high reliability and ease of use
	10-100 kW	150 V	OptiMOS™	TO-263	› High power density and system cost reduction
		600 V	CoolMOS™ C7/P7	TO-247	› Ease of use and fast design-in
		650 V	CoolSiC™ MOSFET	TO-247	› Combination of high performance, high reliability and ease of use
		650 V	TRENCHSTOP™ 5 H5	TO-247	› Benefit increase at high current conditions
		650 V	CoolSiC™ Schottky diode C6	TO-220	› Higher frequency and increased power density
		1200 V	CoolSiC™ MOSFET	TO-247	› Highest efficiency and increased power density
		1200 V	TRENCHSTOP™ 5/6 or S6	TO-247	› High device reliability and lifetime expectancy
	101-250 kW	150 V	IPB048N15N5	D^2PAK	› Enables and simplifies the setup of 2nd life batteries › Lower switching voltage enables higher inverter efficiency
		200 V	IPB107N20N3 G	D^2PAK	› Enables and simplifies the setup of 2nd life batteries › Lower switching voltage enables higher inverter efficiency
		1200 V	EasyPACK™ 2B	Modules	› Highest efficiency for reduced cooling effort
		1700 V	PrimePACK™/EconoDUAL™	Modules	› High power density › Easy and most reliable assembly
	> 0.25 MW	1200 V	PrimePACK™/EconoDUAL™	Modules	
		1700 V	PrimePACK™/EconoDUAL™	Modules	
	Gate driver	20 V	EiceDRIVER™ 1EDN	PG-SOT23-6	› Single-channel non-isolated
		25 V	1ED44175N01B/1ED44173N01	PG-SOT23-6	› Single-channel with fast, accurate (± 5%), integrated over-current protection (OCP)
		24 V	2ED24427N01F	PG-DSO8 with power-pad	› Dual-channel, 10 A low-side gate driver › Integrated undervoltage lockout (UVLO) protection and enable (EN) function › High frequency, high power operation with BOM savings
		650 V	EiceDRIVER™ 2EDS	PG-DSO-16-NB	› Dual-channel reinforced (safe) isolated
		650 V	EiceDRIVER™ 2EDF	PG-DSO-16-NB	› Dual-channel functional isolated
		650 V	2ED2181S06F 2ED21814S06J	DSO8 DSO-14	› Integrated bootstrap diode › Superior $-V_S$ transient voltage immunity › High-frequency switching (500 kHz)
		600 V	IRS2186S/IRS21864S	DSO8 / DSO-14	› 4 A/4 A high- and low-side gate driver
		600 V/1200 V	IR2114SS/IR2214SS	SSOP-24	› Half-bridge gate driver with DESAT, 2L SRC, soft-SD
		1200 V	IR2213S	DSO-28	› High- and low-side gate driver
		2300 V	EiceDRIVER™ Compact 1ED3124MC12H/1ED3122MC12H	DSO8	› Single-channel isolated driver with Miller clamp/sep-out
		1200 V/2300 V	EiceDRIVER™ Enhanced 1ED3322MC12N	DSO-16	› Single-channel isolated driver with DESAT and Miller clamp
BMS – battery protection	40-60 V	100 V	IPT007N06N,IRF40SC240/ IPB010N06N	TOLL, D^2PAK	› Highest system efficiency › Minimize parallelization of MOSFETs › Market-leading MOSFETs with lowest $R_{DS(on)}$ enabling low conduction losses › Widest SOA area with LinearFET™
	60-100 V	150 V	IPT010N08N5/IPT015N10N5 IPB017N08N5/IPB020N10N5LF	TOLL, D^2PAK	
	100-150 V	200-300 V	IPB020N10N5LF/IPB048N15N5LF	D^2PAK	
	150-400 V	600 V	CoolMOS™ S7	TO-247	› Lowest $R_{DS(on)}$ MOSFET
BMS Monitoring and balancing	IC		Battery management IC (TLE9012DQU)	PG-TQFP-48	› ASIL-D compliant › Cell balancing with integrated switches with up to 150 mA using external resistors to reduce chip power consumption › 12x delta-sigma ADCs ensure that the voltage of all cells is measured synchronously › ISO UART includes an 8-bit CRC to ensure data integrity until microcontroller register
BMS Transceiver	IC		Battery management IC (TLE9015QU)	PG-TQFP-48	› UART to ISO UART communication › General purpose error pin › Support diagnosis feature
BMS Digital isolator	IC		ISOFACE™ digital isolators*	PG-DSO8	› Isolated CAN/UART communication
BMS Microcontroller	MCU		PSoC™		Main features of PSoC™ 4: › 32-bit MCU subsystem › 48-MHz Arm® Cortex®-M0+ CPU › Up to 256 kB flash › 32 kB SRAM › Up to 2 CAN › USB/up to 4 serial channels

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*Coming soon

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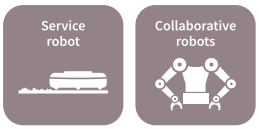


Robotics

Superior solutions for industrial and service robotics

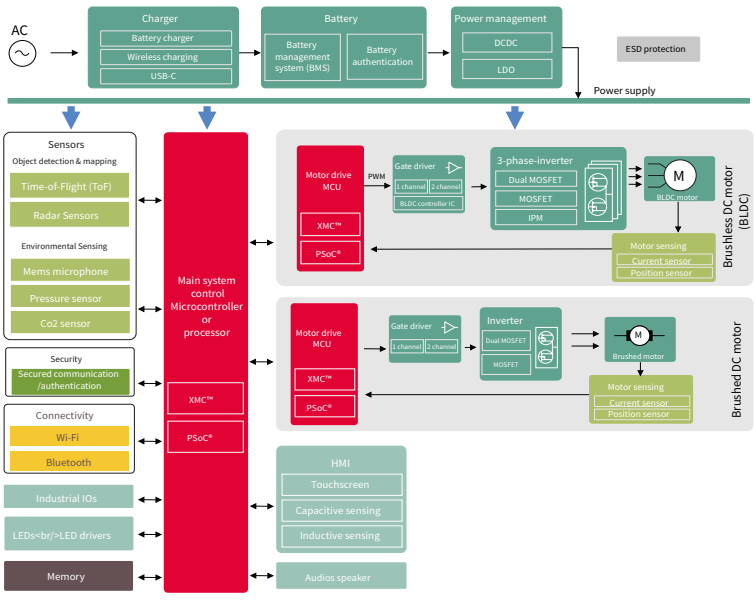
Disruptive technologies have significantly changed our lifestyle in the past few decades. Now a new era is on the horizon – the age of robots. Robots are joining the ranks of innovative and disruptive technologies by revolutionizing traditional habits and processes. Today's robots can identify and navigate through surroundings, work alongside and even interact with humans. Moreover, they teach themselves the skills required to complete a new task.
All this would not be possible without semiconductor solutions. Whether in an industrial robot, a collaborative robot (cobot), a mobile robot (AGV, AMR) for warehouses or last-mile delivery and personal care purposes (or a domestic robot in form of vacuum or lawn mower robots) intelligent semiconductors are the key enablers for all major robotic functions. Drawing on our insight into all facets of the robotics field and with a comprehensive portfolio of power products and sensors on offer, Infineon provides reliable system solutions that address the latest trends in robotics. Whether it is artificial intelligence, Internet of Things, smart home, cloud-based services, human-machine interface or any robotics-related field, Infineon has value to add to nearly all robot designs.

Features and benefits

Key features	Key benefits
› Fast time to market	› A complete eco-system of simulations, documentation, and demonstration boards enable a faster time to market
› Complete solutions – broad portfolio from power to connectivity (Wi-Fi & Bluetooth®) and sensors	› Whatever design specification, Infineon has the answer thanks to its comprehensive portfolio of products and solutions which you can easily tailor to your needs
› Extended battery lifetime and product life spans	› High reliability of Infineon components results in prolonged product life spans
› Overall system size and cost reduction	› Reduction of overall system size and cost thanks to small form factor and compact design of components, both of which are required for highest power density
› Security, quality, and safety	› BOM savings thanks to lowest $R_{DS(on)}$
› Authentication	› Trustworthy hardware-based security
	› As a security market leader with a proven track record and outstanding partner network for embedded security, Infineon provides highest quality standards and a safety-certified development process
	› OPTIGA™ Trust enables authentication of components connected to the system (e.g., battery pack recognition to avoid second-party batteries)

Domestic robots - simplifying everyday life and work

Structural system overview: domestic robots



The latest generation of domestic robots has ushered in a new level of assistance and simplicity in homes and professional environments. They directly interact with humans, which introduces unique challenges from a design perspective, especially in domestic environments. Energy efficiency, long battery life as well as security aspects and sensing capabilities are key to user-friendly and safe designs. By choosing Infineon, you get a one-stop semiconductor shop for all your robot design needs.

www.infineon.com/robotics

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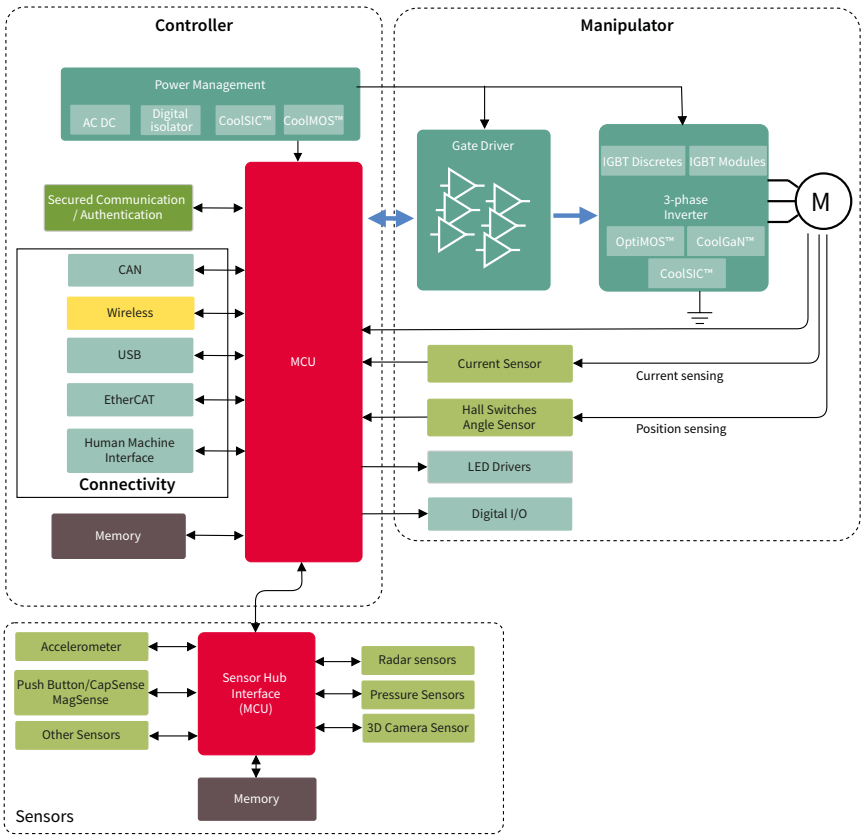
Industrial robots and cobots – advance through collaboration

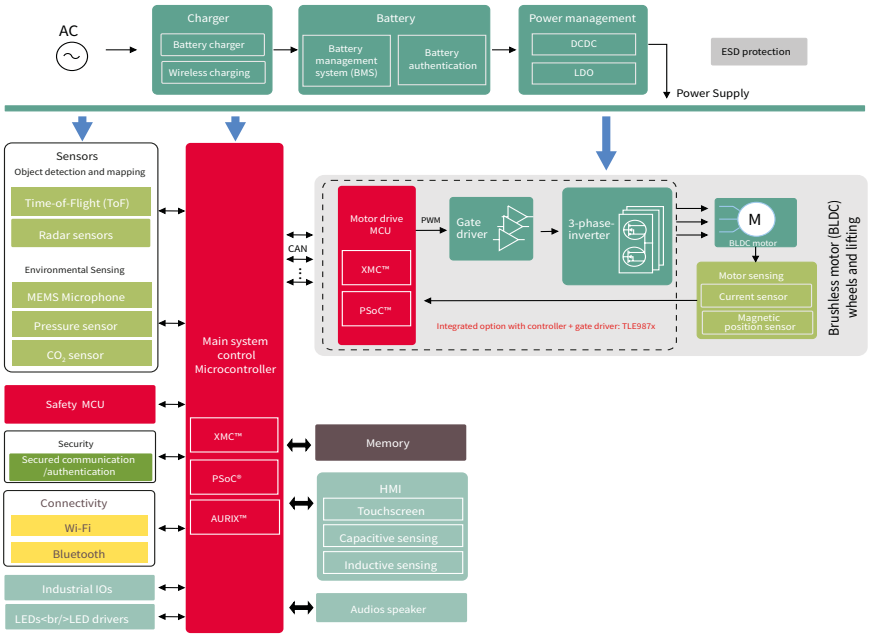
Structural system overview: industrial robots and cobots



Serving Industrial robot manufacturers with the best system solutions for years, Infineon is also well set to provide the right fit products for the upcoming category of collaborative robotsCobots, as they are shortly called work outside the limitation of a safety cell, directly interacting with real people. This setup requires a precise set of design features, especially for the sake of workplace safety. With Infineon's semiconductors for cobot systems, you benefit from the expertise of an experienced and reliable partner. Our radar and sensor solutions, for example, provide the tools to uphold even the highest safety standards and allow the robots to leave their formerly fenced working environment.

Mobile robots – driving production and automatization forward

Structural system overview: Mobile robots (AGV, AMR)



Autonomous mobile robots (AMRs) are a self-driving force behind automated processes and offer the highest degree of flexibility within working environments due to battery-powered systems. Covering the entire product portfolio for robotics applications – from the power supply to motor drives and sensors for navigation and environment scanning – Infineon is equipped to ensure mobile robots can find their way through nearly all environments.

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Recommended products

		Industrial robots		Cobots	Mobile robots (AMR, AGV)	Domestic robots
Common system power		> 5 KW	< 5 KW	100 – 1000 W	200- 500 W	10 – 100 W
Common operating/battery voltage		3 V ~ 400V_{AC}	1 v~ 110 V-220 V_{AC}	1 V~ 110 V-220 V_{AC} / 48 V_{DC} Bus	24 V – 48 V_{DC}	12 V - 36 V_{DC}
Power supply and charger	**Power switch**	650 V and 1200 V CoolSiC™ MOSFET 600 V/650 V IGBT HighSpeed 5 650 V IGBT TRENCHSTOP™ 5 and IGBT 7 T7 650 V and 1200 V EasyPACK™ Module		600 V/650 V CoolMOS™ 650 V CoolSiC™ 20 V - 200 V OptiMOS™ and StrongIRFET™	600 V/650 V CoolMOS™ 650 V CoolSiC™ 20 V - 200 V OptiMOS™ and StrongIRFET™	600 V/650 V CoolMOS™ 650 V CoolSiC™ 20 V - 200 V OptiMOS™ and StrongIRFET™
	PFC power diodes	650 V CoolSiC™ Schottky diode				
	Gate driver EiceDRIVER™ family	low-side single-channel: 1EDN7550B, 1EDN8550B, 1ED44175N01B, 1ED44173N01B low-side dual-channel: 2ED24427N01F, 2EDN7523G				
		1200 V single-channel isolated: 1ED3124MU12F, 1EDI60N12AF	650 V half-bridge: 2EDF9275F, 2EDF7175F, 2ED2304S06F, 2ED2182S06F, 2ED2110S06M 650 V high-side: 1EDB9275F, 1EDB6275F, 1EDB8275F			
	Digital Isolator ISOFACE™ family	ISO1I813T ISO1H816G 2DIB0410F				
	Microcontroller (MCU)	Arm® Cortex®-M0: XMC1100 or XMC1300 Arm® Cortex®-M4: XMC4200				
Motor control and drive	**Power Switch**	1200 V IGBT 7 S7 1200 V CoolSiC™ MOSFET 1200 V CoolSiC™ Easy1B Module	650 V and 1200 V CoolSiC™ CoolGaN™ 600 V 600 V/650 V/1200 V TRENCHSTOP™ 600 V EasyPIM™ and EasyPACK™ 600 V CIPOS™ (full integration)	60 – 100 V OptiMOS™ and StrongIRFET™ Recommended packages: PQFN 3 x 3 (space savings) Super SO8 (price/performance) TOLL (high current)	60 – 150 V OptiMOS™ and StrongIRFET™ Recommended packages: PQFN 3 x 3 (space savings) Super SO8 (price/performance) TOLL (high current)	25 – 60 V OptiMOS™ and StrongIRFET™ Single- and dual-channel MOSFETs Recommended packages: PQFN 3 x 3 (space savings) Super SO8 (price/performance) TOLL (high current)
	Gate driver EicEDRIVER™ family	1200V single-channel isolated Compact: 1ED31xx and 1ED-MF 1200 V single-channel isolated Enhanced: 1ED34xx and 1ED-F2 1200 V half-bridge IR2214SS 1200 V three-phase: 6ED2230S12T	650 V half-bridge: 2EDF9275F, 2EDF7275F, 2EDF7175F, 2ED2304S06F, 2ED2182S06F, 650 V high-side: 1EDB8275F, 1EDB9275F, 1EDB6275F 650 V three-phase: 6EDL04N06PT	600 V half-bridge: IRS21867S, IRS2186S 200 V half-bridge: IRS2005S, IRS2007S, IRS2008S, 2EDF7275K 200 V three-phase: 6EDL04N02 160 V three-phase: 6ED2742S01 200 V high-side: 1EDN7550B & 1EDB8550B 160 V half-bridge: 2ED2748S01G, 2ED2738S01G 120 V half- bridge: 2EDL8124G 60 V three-phase programmable: 6EDL7141 25 V low-side: 1ED44173N01B, IRS44273L		
	Microcontroller (MCU)	PSoC™: Arm® Cortex® M4F+M0 → CY8C61x8 XMC™: Arm® Cortex® M4F → XMC4800 TRAVEO II™: Arm® Cortex® M7 Dual Core + Arm® Cortex® M0+ → CYT4BF8CD AURIX™: TriCore → TC337				
	Digital isolator ISOFACE™ family	ISO1I813T ISO1H816G 2DIB0410F				
	Hall switch	XENSIV™ TLx496x				
	Current sensor	XENSIV™ TLI4971				
	Angle sensor	XENSIV™ TLE/TLI5012B, TLE5014SP				
Battery management system (BMS)	**Microcontroller (MCU)**			XMC™: XMC4x00 (Arm® Cortex® - M4F) PSoC™: PSoC™ 4 (Arm® Cortex®M4F+M0)		
	Protection switches			100 V – 150 V OptiMOS™ or StrongIRFET™ IPT015N10N5, IRFS4115	30 V – 80 V OptiMOS™ or StrongIRFET™ BSC007N04LS6, IRL40T209, IRFS7430	
	Balancing switches (small signal)			20 V or 30 V N/P MOSFETS in SOT23, TSOP6 or SOT363 dual-channel		
	Monitoring and balancing IC			TLE9012AQU (sensing IC) TLE9015QU (transceiver IC)		
	Battery authentication			OPTIGA™ Trust Charge OPTIGA™ Authenticate IDoT		
Sensing (e.g., room mapping, HMI, collision avoidance, air quality)	**Radar**	XENSIV™ 60 GHz: BGT60LTR11AIP XENSIV™ 24 GHz Radar: BGT24LTR11 or BGT24MTR11				
	ToF (Time-of-Flight) 3D image sensors	XENSIV™ REAL3™ 3D image sensor: IRS1125A, IRS2877AS (functional safety ISO26262) XENSIV™ VCSEL Driver: IRS9100C, IRS9102C				XENSIV™ REAL3™ 3D image sensor: IRS2381C, IRS2875C, IRS2877C XENSIV™ VCSEL Driver: IRS9100C, IRS9102C
	MEMS Microphones	XENSIV™ MEMS microphones, digital I/F: IM69D130 or IM69D120				
	Other sensors	Pressure sensor: XENSIV™ DPS368 (e.g., airflow control) CO_2 Sensor - XENSIV™ PAS CO2				
Connectivity and human-machine interface (HMI)	**Wi-Fi**	CYW4373 (1x1 dual-band Wi-Fi 5) CYW43439 (1x1 2.4GHz Wi-Fi 4)				
	HMI	PSoC™ 4000 - entry-level PSoC™ 4100 - more touch buttons PSoC™ 4700 - inductive sensing				
Security	**Authentication and protection**	OPTIGA™ Trust B OPTIGA™ Trust M				
Memory	**NOR Flash**	S25FL-L serial NOR Flash memories Densities 64 MB to 256 MB				
Others	**Voltage regulator**	DC-DC voltage regulator 12 V/5 V or 3.3 V, watchdog, error monitoring, safe state control, BIST etc.				
	LED Driver	Driving currents from 10 mA to 250 mA – linear driver ICs: BCR3xx, BCR4xx Support currents from 150 mA to 3 A – DC-DC switch-mode: ILD4xxx, ILD6xxx				

For more details on the product, click on the part number or contact our product support.

eMobility

Onboard chargers for xEV appliactions

Best solutions for electrified powertrain in XEV applications: on-board chargers and HV/LV DC-DC converter

The electrification of the powertrain enables local emission-free mobility and driving pleasure. The needed energy is stored and delivered from a battery. Infineon's semiconductor solutions do not only enable core functionalities in the electrification but also extend the driving range, reduce charging times and energy transfer between the high voltage systems with the traditional 12 V domain.

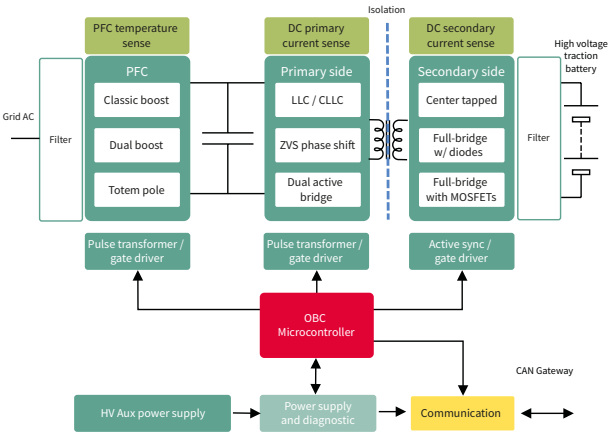
On-board chargers

Every plug-in hybrid electric vehicles (PHEV) and pure electric cars are equipped with at least one on-board charger, allowing battery recharge from any standard AC power outlet. Available power depends on regional regulations and installation base, typically providing up to 7.4 kW for PHEVs and up to 22 kW maximum power. System designers face the challenge of supporting the varied voltage and current levels while increasing the power density. When it comes to on-board charging, the key success factors involve efficiency and a high power density for a small form factor. The long-term trend is moving towards bidirectional charging, where the charger also feeds power from the car to the smart grid.

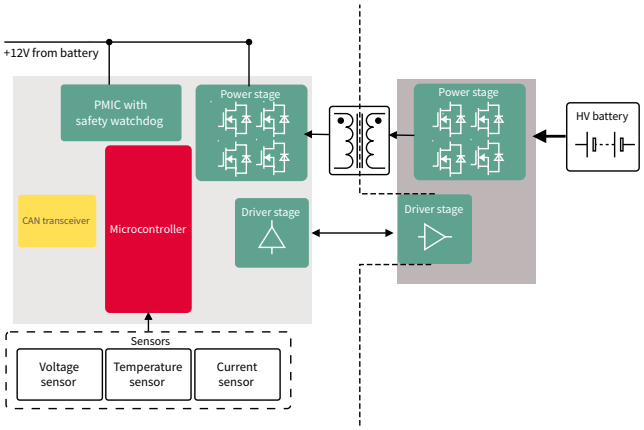
High-voltage DC-DC converter

The architecture of electric vehicles comprises at least one low-voltage sub-network with low-voltage energy storage and multiple electrical loads and one high-voltage sub-network with high-voltage energy storage. The auxiliary HV/LV DC-DC converter's function is to enable the bidirectional energy flow between these two electrical subnets. Typical design challenges are achieving the greatest possible efficiency and keeping the overall system costs under control. The space required for the DC-DC converter should also be kept to an absolute minimum. Infineon's portfolio is specially designed to help easily overcome these barriers.

On-board chargers: functional blocks



HV/LV DC-DC converter: functional blocks



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Product portfolio for on-board charger and HV/LV DC-DC applications

Infineon's comprehensive portfolio of semiconductors (sensors, microcontrollers, power semiconductors, etc.) lends itself perfectly to designing compact units for on-board, off-board, and wireless charging. Infineon products in this sector support high-switching frequencies at lowest possible on-state resistance ($R_{DS(on)}$) to enable compact and efficient designs. The power offering includes MOSFETs such as CoolMOS™, IGBTs such as TRENCHSTOP™ 5 , SiC Schottky diodes such as the CoolSiC™ diode 650 V, the CoolSiC™ Hybrid discrete (integrated IGBT and SiC diode), and easy module solutions. In addition, integrated MOSFET and IGBT drivers, controller ICs for active CCM PFC high-performance microcontroller solutions, and highly accurate current sensors complete the product portfolio. For more information about off-board chargers, refer to the Fast/wireless EV charging chapter.

Automotive products for on-board charger units

Part number	Product family	Description
CoolMOS™ 650 V	IPx65RxxxCFD7A	650 V MOSFETs with integrated fast body diode
TRENCHSTOP™ 5 AUTO IGBT	AIKW50N, AIKW40N, AIGW40	IGBT discrete dedicated to automotive applications
CoolSiC™ 1200 V	AIMW120Rx	Automotive 1200 V discrete SiC MOSFET
Level shifter	AUIRS2191S, AUIRS2113S	Automotive high and low side driver
Automotive EiceDRIVER™	2ED020I12FA	Dual-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
AURIX™ microcontroller	TC23xL, TC26xD , TX36x*, TC37X*	32-bit lockstep microcontroller
OPTIREG™ PMIC	TLF35584, TLF35585	ISO 26262 – system-supply optimized for AURIX™
CAN FD transceiver	TLE9350, TLE9351, TLE9252	High-speed automotive CAN transceiver with 5 Mbps
OPTIREG™ SBC	TLE9461, TLE9471	High integrated solution for microcontroller supply and communication
OPTIREG™ Linear	TLS810, TLS850, TLS105, TLS820	Automotive linear voltage regulators
XENSIV™ current sensor	TLI4971	Coreless magnetic current sensors

Easy modules for on-board charger units

Part number	Product family	Description
CoolMOS™ Easy module 650 V	F4-35MR07W1D7S8_B11/A*	650 V MOSFET in H-bridge configuration with integrated capacitor in Easy 1B package
CoolMOS™ Easy module 650 V	F4-35MR07W2D7S8_B13/A*	650 V MOSFET in H-bridge configuration with IGBT H5, rapid diode & integrated capacitor in Easy 2B package
CoolMOS™ Easy module 650 V	F4-xxMR07WxD7_Bxx/A	650 V MOSFET in H-bridge configuration in Easy package
CoolMOS™ Easy module 650 V	FSxxMR07WxD7_Bxx/A	650 V MOSFET in SixPACK configuration in Easy package
CoolMOS™ Easy module 650 V	FFxxMR07WxD7_Bxx/A	650 V MOSFET in half-bridge configuration in Easy package
CoolSiC™ Easy module 1200 V	F4-xxMR12WxM1H_Bxx/A	1200 V SiC MOSFET in H-bridge configuration in Easy package
CoolSiC™ Easy module 1200 V	FSxxMR12WxM1H_Bxx/A	1200 V SiC MOSFET in SixPACK configuration in Easy package
CoolSiC™ Easy module 1200 V	FFxxMR12WxM1H_Bxx/A	1200 V SiC MOSFET in half-bridge configuration in Easy package

For more information about off-board chargers, refer to the Fast/wireless EV charging chapter.

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* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Automotive products for the car side**

Product family	Part number	Description
Automotive EiceDRIVER™	1ED020I12FA2	Single-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
Automotive EiceDRIVER™	1ED020I12FTA	Single-channel isolated driver, two-level turn-off for 650 V/1200 V IGBTs
Automotive EiceDRIVER™	2ED020I12FA	Dual-channel isolated driver for 650 V/1200 V IGBTs and MOSFETs
CoolMOS™	IPx65RxxxCFD7A	650 V MOSFET with integrated fast body diode
AURIX™	TC23xL, TC26xD, TX36x*, TC37X*	32-bit lockstep microcontroller
OPTIREG™ PMIC	TLF35584 , TLF35585	ISO 26262 – system-supply optimized for AURIX™
CAN FD transceiver	TLE9350, TLE9351, TLE9252	High-speed automotive CAN transceiver with 5 Mbps
OPTIREG™ SBC	TLE9461, TLE9471	High integrated solution for microcontroller supply and communication
OPTIREG™ Linear	TLS810, TLS850, TLS105, TLS820	Automotive linear voltage regulators

Industrial products for the road side**

Product family	Part number	Description
CoolMOS™ CFD7 SJ MOSFET	IPW60R031CFD7	600 V MOSFET, 31 mΩ, TO-247
CoolMOS™ C7 SJ MOSFET	IPW60R040C7	600 V MOSFET, 40 mΩ, TO-247
CoolMOS™ P7 SJ MOSFET	IPW60R037P7	600 V MOSFET, 37 mΩ, TO-247
TRENCHSTOP™ 5 IGBTs	IKW40N65F5	Fast IGBT with Rapid 1 diode, 40 A, TO-247
TRENCHSTOP™ 5 IGBTs	IGW40N65F5	Fast IGBT, single, 40 A, TO-247
CoolSiC™ diode	IDW40G65C5	650 V SiC Schottky diode generation 5, 40 A, TO-247
XMC™ microcontroller	XMC4000	32-bit Arm® Cortex® -M4F microcontrollers, up to 125 °C ambient temperature
Linear voltage regulators	TLS805, TLS820, TLS850	Scalable Linear regulator family from 50mA to 500mA with robust design and feature sets
Current sensor	TLI4970	600 V functional isolation, ± 50 A
EiceDRIVER™ SOI gate driver	2ED21xxS06F	650 V half-bridge gate driver for IGBTs and MOSFETs
EiceDRIVER™ 1ED Compact gate-driver IC	1EDxxxI12AF/MF, 1ED31xxMU12H	1200 V, single-channel, isolated driver with Miller clamp or separate output

Industrial products for the road side

Part number	Product family	Description
CoolSiC™ Easy module 1200 V	F3L11MR12W2M1_B74	1200 V SiC MOSFET in three-level configuration in Easy 2B package
CoolSiC™ Easy module 1200 V	FF45MR12W1M1(P)_B11*	1200 V SiC MOSFET in half-bridge configuration in Easy 1B package
CoolSiC™ Easy module 1200 V	FF23MR12W1M1(P)_B11	1200 V SiC MOSFET in half-bridge configuration in Easy 1B package
CoolSiC™ Easy module 1200 V	FF11MR12W1M1(P)_B11	1200 V SiC MOSFET in half-bridge configuration in Easy 1B package
CoolSiC™ Easy module 1200 V	FF8MR12W2M1(P)_B11	1200 V SiC MOSFET in half-bridge configuration in Easy 2B package
CoolSiC™ Easy module 1200 V	FF6MR12W2M1(P)_B11	1200 V SiC MOSFET in half-bridge configuration in Easy 2B package
CoolSiC™ Easy module 1200 V	F4-45MR12W1M1(P)_B76*	1200 V SiC MOSFET in H-bridge configuration in Easy 1B package
CoolSiC™ Easy module 1200 V	F4-23MR12W1M1(P)_B76*	1200 V SiC MOSFET in H-bridge configuration in Easy 1B package
CoolSiC™ Easy module 1200 V	F4-15MR12W2M1(P)_B76*	1200 V SiC MOSFET in H-bridge configuration in Easy 2B package
CoolSiC™ Easy module 1200 V	F4-11MR12W2M1(P)_B76*	1200 V SiC MOSFET in H-bridge configuration in Easy 2B package
CoolSiC™ Easy rectifier bridge module 1200 V	DDB2U20N12W1RF(P)_B11	1200 V SiC diode in rectifier bridge configuration in Easy 1B package
CoolSiC™ Easy rectifier bridge module 1200 V	DDB2U40N12W1RF(P)_B11	1200 V SiC diode in rectifier bridge configuration in Easy 1B package
CoolSiC™ Easy rectifier bridge module 1200 V	DDB2U60N12W1RF(P)_B11	1200 V SiC diode in rectifier bridge configuration in Easy 1B package

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* For more information on the product, contact our product support
** Available in different current ratings

For more details on the product, click on the part number, visit infineon.com or contact our product support.

LEV

Light electric vehicles and forklift

e-bike, e-scooter, e-motorcycle, e-rickshaw, LSEV, e-forklift

As a leader in power semiconductors, Infineon strives to provide the most efficient, reliable, and smart solutions in the market. Keeping up with the latest market trends worldwide, Infineon prepares for the introduction of the following vehicle types, including but not limited to light electric vehicles:

- Micromobility - e-bike, kick e-scooter
- Electric powered 2/3 wheelers (ePTW) - e-moped, e-scooter, e-rickshaw, e-motorcycle
- Low-speed electric vehicles (microEV), neighborhood EV (NEV), e-quadricycle
- Other electric transporters (e.g., e-forklift, e-golf cart) with less than 200 V batteries

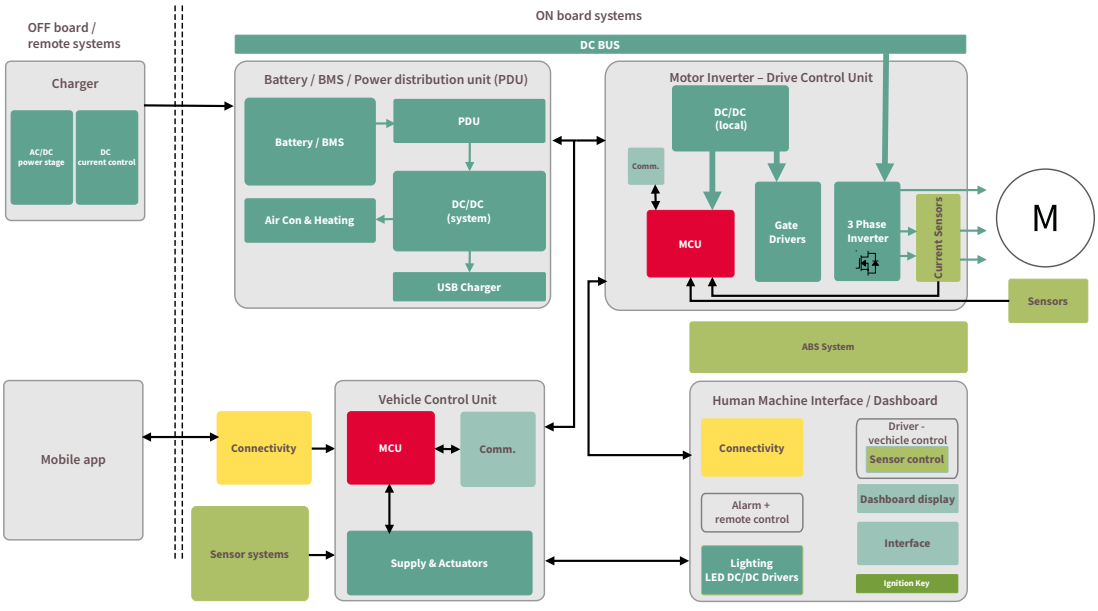
In contrast to automotive requirements, these applications (though also on-road) require different sets of safety and qualification standards that place more responsibility on the operator than the vehicle itself to mitigate risks. Many of Infineon's non-automotive and automotive offerings target these applications.

Different from the traditional vehicles with internal combustion engines, these type of vehicles are battery-powered with a bus voltage ranging from 28 V to 168 V. The commonalities among the electric light vehicles are motor drives/inverters, battery management systems, battery chargers/stations, as well as the increasingly popular smart features and electronics made possible due to their larger size batteries.

Key features and benefits

Key features	Key benefits
Leading power MOSFET technology	Highest power density and increased battery operating time
Track record of reliability and quality	Prolonged lifetime and low failure rate
Complete portfolio for driver, microntroller, and sensors	One-stop shop for designers
Broad connectivity products compliant to various standards	Enabling smart features
Complete design support with simulations, documentation and demonstration boards for high-end solutions	Shortened development cycle

Application diagram



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6 kW motor drive with 96 V bus voltage

Functional block	Topology	Product category	Product family	Part number
Motor drive	3-phase half bridge (B6)	LV MOSFETs	OptiMOS™ 5	IPT039N15N5
		Microcontrollers	XMC1400 series	XMC1404-F064X0200 AA
		Gate driver	EiceDRIVER™	2EDB8259F, IRS21867S
		Position/speed sensor	XENSIV™	TLE5501 E0002
		Current sensor	XENSIV™	TLE4972-AE35S5

For additional configurations, please refer to High power low voltage drives.

Swappable 48 V 1.2 kWh battery

Functional block	Topology	Product category	Product family	Part number
BMS	Back-to-back with pre-charge	LV MOSFETs (charge)	OptiMOS™	IPTG014N10NM5
		LV MOSFETs (discharge)	OptiMOS™	IPTG014N10NM5
		LV MOSFETs (pre-charge)	HEXFET™	IRLR3110Z
		Microcontrollers	XMC™	XMC1200
		Gate driver	EiceDRIVER™	2ED4820
		Memory (RAM)	NOR Flash	S25FL256LAGMFB001
		Bluetooth®	AIROC™	CYW20719B1KUMLG
		Security	OPTIGA™ Authenticate IDoT	SLE95401TSNP6XTSA1

For additonal configurations, please refer to Battery management systems.

3 kW AC-DC rectifiers in swapping battery stations

Functional block	Topology	Product category	Product family	Part number
Battery charging	Dual-boost PFC	PFC switch	CoolMOS™ P7	IPW60R037P7
		PFC diode	CoolSiC™ G6	IDH20G65C6
		Gate driver	EiceDRIVER™	2EDN7524F
		PFC controller	ICE3x family	ICE3PCS01C
	HB LLC	LLC switch (primary side)	CoolMOS™ CFD7	IPW60R040CFD7
		Gate driver	EiceDRIVER™ dual-channel functional isolated MOSFET gate drivers	2EDF7275F
		Sec SR MOSFET	OptiMOS™ 5	BSC093N15NS5
		Gate driver SR	EiceDRIVER™ non-isolated driver IC	2EDN7524
		MCU	XMC™ industrial microcontroller family	XMC4200-F64k256BA
	QR flyback	Aux power controller	CoolSET™	ICE5QR2280AZ

For additional configurations, please refer to Battery chargers.

250 W AC-DC offline charger

Functional block	Topology	Product category	Product family	Part number
Battery charging	PFC	Controller	Resonant combo PFC/LCC controller	ICL5102
		PFC switch	CoolMOS™ P7	IPA60R099P7
	LLC HV DC-DC	HB switch	CoolMOS™ P7	IPA60R280P7
		SR switch	StrongIRFET™	IRFB4615PbF
		Safety switch	OptiMOS™	IPD050N10N5
	QR flyback controller	Aux power IC	CoolSET™	ICE5QR2280AZ

For additional configurations, please refer to Battery chargers.

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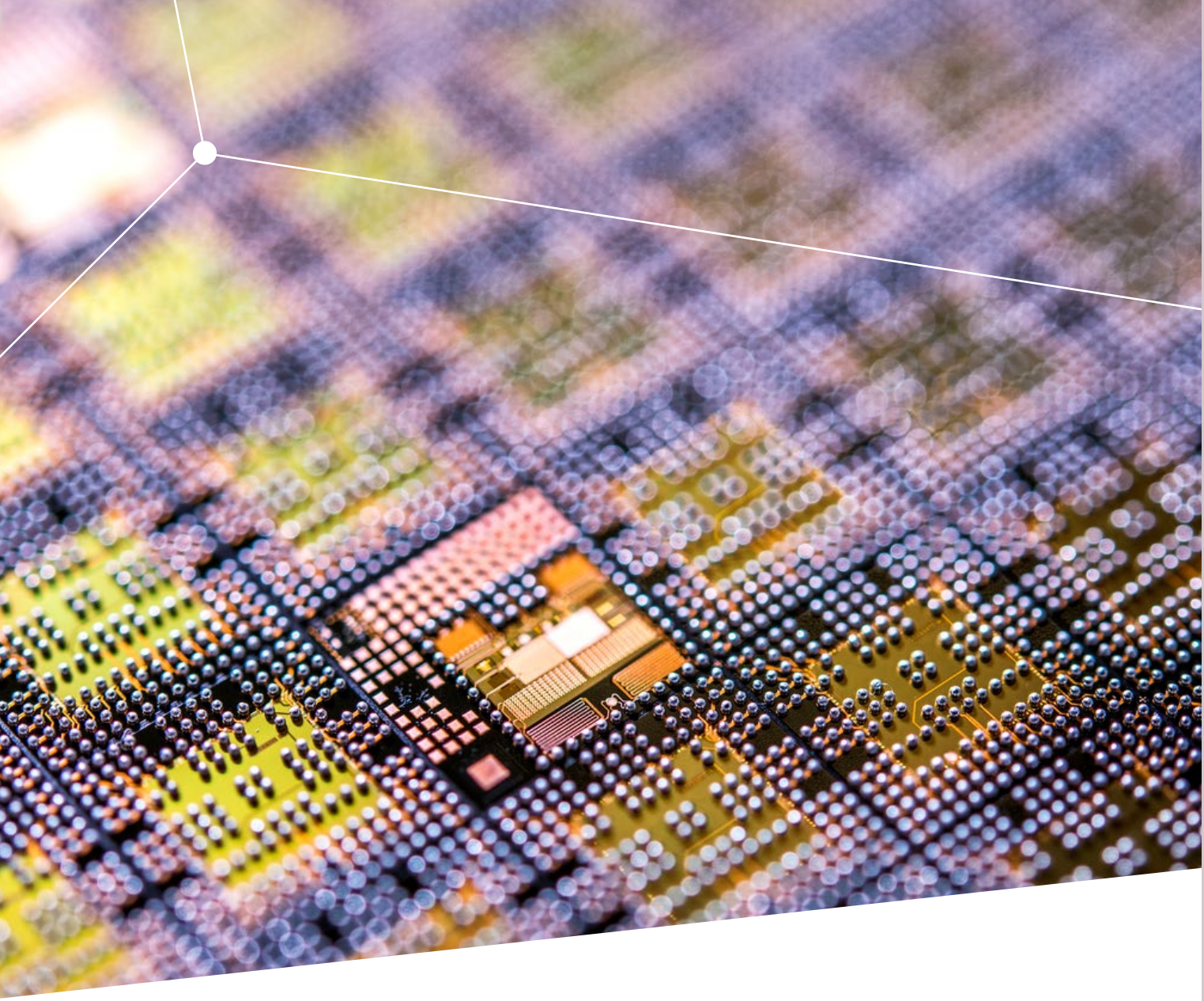
For more details on the product, click on the part number, visit infineon.com or contact our product support.



Products

- 20-300 V MOSFETs
- 500-950 V MOSFETs
- Gate-driver ICs
- Discrete IGBTs and silicon power diodes
- Intelligent power switches and modules
- Microcontrollers
- Power management ICs
- Wide bandgap semiconductors
- XENSIV™ sensor technologies for automotive, industrial and consumer applications
- Packages

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

20-300 V MOSFETs

- 20-300 V MOSFETs N-channel power MOSFETs - Technology development and product family positioning
- Guidance for applications and voltage classes
- Space-saving and high-performance packages
- Discrete packages
- Small-signal/small power MOSFETs -250 to 600 V
- OptiMOS™ Source-Down power MOSFETs 25-150 V
- StrongIRFET™ 2 MOSFETs 40 V/60 V/80 V/100 V
- TOLx family
- Product portfolio
- Nomenclature

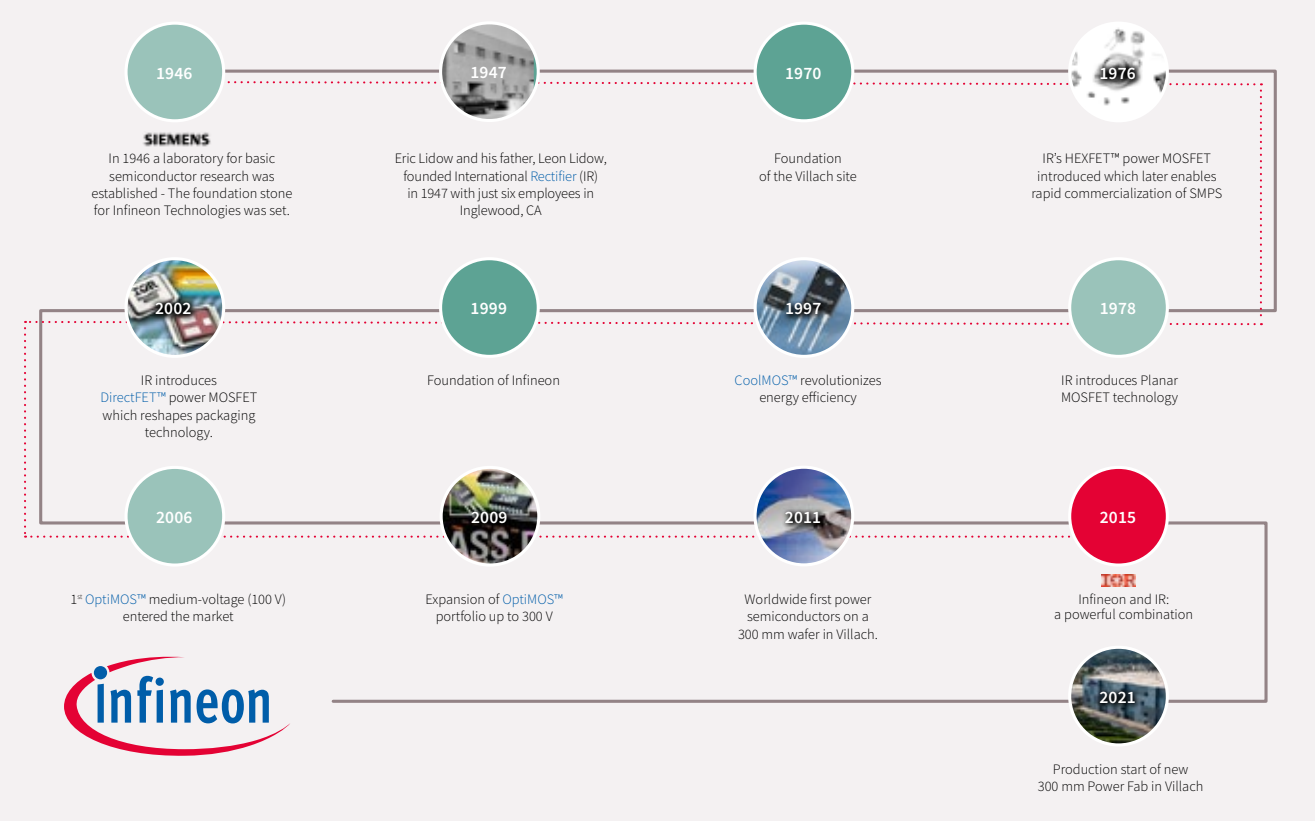
Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Infineon shapes power for growth through MOSFET innovation

With more than 40 years of experience in power MOSFET innovation, Infineon has led the way in solving the challenges design engineers face on a daily basis while enabling them achieve their targets. Although these targets may have changed over the years, the innovative spirit behind Infineon's product offering has persisted – from device design, technology, package and product development through manufacturing. Looking at the evolution of MOSFETs in the industry, numerous advancements in MOSFET technology have enabled the applications and trends that have become an indispensable part of our lives. Infineon power MOSFET innovation has proven that optimization at the component level brings significant system-level performance advantages and contributes to an easier, safer and greener future.



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OptiMOS™ and StrongIRFET™

20-300 V N-channel power MOSFETs

Infineon's semiconductors are designed to bring greater efficiency, power density and cost-effectiveness. The full range of OptiMOS™ and StrongIRFET™ power MOSFETs enables innovation and performance in applications such as switch mode power supplies (SMPS), battery powered applications, motor control, drives, inverters, and computing.

Infineon's highly innovative OptiMOS™ and StrongIRFET™ families consistently meet the highest quality and performance demands in key specifications for power system designs such as on-state resistance ($R_{DS(on)}$) and figure of merit (FOM).

OptiMOS™ power MOSFETs provide best-in-class performance. Features include ultra low $R_{DS(on)}$, as well as low charge for high switching frequency applications. StrongIRFET™ power MOSFETs are designed for drives applications and are ideal for designs with a low switching frequency, as well as those that require a high current carrying capability.

Technology development and product family positioning

StrongIRFET™	OptiMOS™
Robust and excellent price/performance ratio › Optimized for switching frequency < 100 kHz › Designed for industrial applications › High current carrying capability › Rugged silicon	**Best-in-class technology** › Optimized for broad switching frequency › Designed for high performance applications › Industry's best figure of merit › High efficiency and power density

StrongIRFET™ and IR MOSFET™
for switching frequency <100 kHz

› Low $R_{DS(on)}$
› Rugged silicon and broad portfolio selection

OptiMOS™
for broad switching frequency

› Industry's best Figure of Merit (FOM)
› High efficiency and power density

Active (price/performance optimized)	Active and preferred (high-performance optimized)	Active (price/performance optimized)	Active and preferred (high-performance optimized)
StrongIRFET™ 80-100 V	StrongIRFET™ 2 60 V / 80 V / 100 V	OptiMOS™ 25-60 V	OptiMOS™ 5: 25 V / 30 V; 40 V / 60 V; 80 V / 100 V; 150 V OptiMOS™ 6: 40 V; 100 V OptiMOS™ 3: 25 V / 120 V; 200-300 V
IR MOSFET™ 20-250 V	StrongIRFET™ 20-300 V	OptiMOS™ 80 V / 100 V / 150 V	

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With more than 40 years of experience in power MOSFET innovation, Infineon offers a broad portfolio of products. The product portfolio is divided into “active and preferred”, referring to the latest technology available offering best-in-class performance, and “active”, consisting of well-established technologies which complete this broad portfolio.

StrongIRFET™ 2 power MOSFETs are the latest generation to be added to the family. Currently available in 80 and 100 V options with additional voltages to be released later this year, this family offers broad availability and excellent price/performance ratio and are suitable for a broad range of applications.

OptiMOS™ 6 power MOSFETs 40 V/100 V are the newest addition to the OptiMOS™ product family. They are the perfect solution when best-in-class (BiC) products and high efficiency over a wide range of output power are required. For other voltage classes, from 25 V up to 150 V, OptiMOS™ 5 represents the latest generation in the market, offering low conduction losses and high switching performance.

For high and low frequency applications OptiMOS™ 3 power MOSFETs is our largest OptiMOS™ family and complements our existing product portfolio as well as providing additional options when best-in-class is not required. StrongIRFET™ is recommended for 20-300 V applications when the high performance is not essential and the cost is a more significant consideration.

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Guidance for applications and voltage classes

OptiMOS™ and StrongIRFET™ portfolio, covering from 20 up to 300 V MOSFETs, can address a broad range of needs from low to high switching frequencies. The tables below provide a guidance on the recommended OptiMOS™ or StrongIRFET™ products for each major sub-application and voltage class.

Recommended voltage			20 V to 30 V	40 V	60 V	75 V to 80 V	100 V	120 V to 150 V	200 V	250 V	300 V
Battery powered	Low power Power tools, Multicopter, Battery, Industrial Drives	OptiMOS™	✓	✓	✓	✓					
		StrongIRFET™	✓	✓	✓	✓					
	High power (LEV, LSEV)	OptiMOS™			✓	✓	✓	✓	✓		
		StrongIRFET™			✓	✓	✓	✓	✓		
Inverters	Solar	OptiMOS™			✓	✓	✓	✓			
		StrongIRFET™			✓	✓	✓				
	Online UPS	slow switching									
		OptiMOS™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		StrongIRFET™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		fast switching									
		OptiMOS™	✓	✓	✓	✓	✓	✓	✓	✓	✓
		StrongIRFET™	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Offline UPS	OptiMOS™		✓	✓						
		StrongIRFET™		✓	✓						
SMPS	Adapter / Charger	OptiMOS™		✓	✓	✓	✓				
		StrongIRFET™		✓	✓	✓	✓				
	PC Power	OptiMOS™		✓	✓						
		StrongIRFET™		✓	✓						
	LCD TV	OptiMOS™			✓	✓	✓				
		StrongIRFET™			✓	✓	✓				
	Server	OptiMOS™		✓	✓	✓					
		StrongIRFET™		✓	✓	✓					
	AC-DC	OptiMOS™				✓	✓	✓	✓		
		StrongIRFET™				✓	✓				
	Telecom	OptiMOS™	✓	✓	✓	✓	✓	✓			
		StrongIRFET™	✓	✓	✓	✓	✓				

StrongIRFET™ recommended
StrongIRFET™ available

OptiMOS™ recommended
OptiMOS™ available

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Space-saving and high-performance packages

	TO-247	TO-220	TO-220 FullPAK	D²PAK	D²PAK 7-pin	TO-Leadless	TOLT (Top-side cooling)	TOLG (Gullwing leads)
	Optimized for high power applications and high current capability							
Special features	–						Optimized for top-side cooling	Optimized for TCoB[1] robustness
Height [mm]	5.0	4.4	4.5	4.4	4.4	2.3	2.3	2.3
Outline [mm]	40.15 x 15.9	29.5 x 10.0	29.5 x 10.0	15.0 x 10.0	15.0 x 10.0	11.7 x 9.9	15.0 x 9.9	11.7 x 9.9
Thermal resistance R_{thJC} [K/W]	2.0	0.5	2.5	0.5	0.5	0.4	0.4	0.4

	sTOLL	SuperSO8	SuperSO8 super cool	Power Block	PQFN 3.3x3.3 Source-Down	PQFN 3.3x3.3	PQFN 2x2	DirectFET™
	Optimized for high power in small form factor	For highest efficiency and power management	Optimized for dual side cooling	Significant design shrink	Highest power density per area	High efficiency in small form factor	Enables significant space saving	Best performing dual-side cooling package
Height [mm]	2.3	1.0	0.75	1.0	1.0	1.0	0.9	Small: 0.65 Medium: 0.65 Large: 0.71
Outline [mm]	8.0 x 7.0	5.15x6.15	5.0 x 6.0	5.0 x 6.0	3.3 x 3.3	3.3 x 3.3	2.0 x 2.0	Small: 4.8 x 3.8 Medium: 6.3 x 4.9 Large: 9.1 x 6.98
Thermal resistance R_{thJC} [K/W]	0.6	0.8	0.5	1.5	1.4	3.2	11.1	0.5

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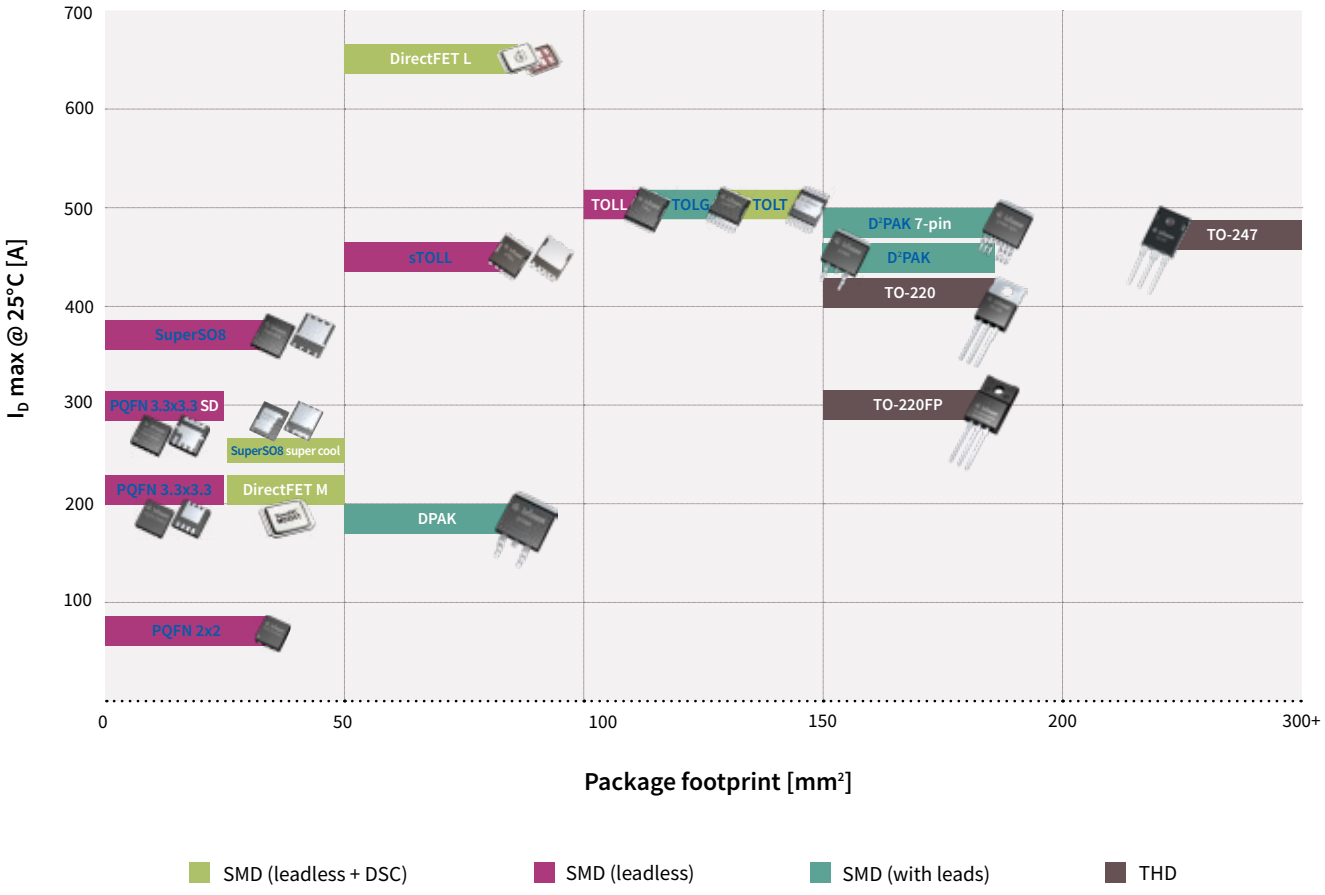
1) Temperature cycling on board

Discrete packages

Infineon has been making an impact in the MOSFET industry with innovation in MOSFET manufacturing techniques and processes as well as pioneering new packages to meet the changing demands of cutting-edge designs in various applications. OptiMOS™ and StrongIRFET™ technologies are available in different packages to address demands for high current carrying capability and significant space saving. The broad portfolio enables footprint reduction, boosted current rating and optimized thermal performance. While the surface mount leadless devices are enabled for footprint reduction, through-hole packages are characterized by a high-power rating.

Infineon offers innovative packages such as DirectFET™ and TO-Leadless (TOLL). DirectFET™ is designed for high frequency applications by offering the lowest parasitic resistance. This package is available in three different can sizes: small, medium and large. TO-Leadless is optimized to dissipate power up to 375 W, increasing power density with a substantial reduction in footprint.

New package innovations include the SuperSO8 Source-Down package offering high power density and performance; the TOLG (Gullwing leads) optimized for TCoB (Thermal cycling on board) robustness; TOLT (top-side cooling) optimized for superior thermal performance; sTOLL optimized for high power in small form factor; and the SuperSO8 super cool optimized for dual-side cooling in a standard 5x6 mm² footprint.



www.infineon.com/powermosfet-12V-300V

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Small-signal/small-power MOSFETs -250 to 600 V

Combining latest high-performance silicon technology with small and innovative packaging

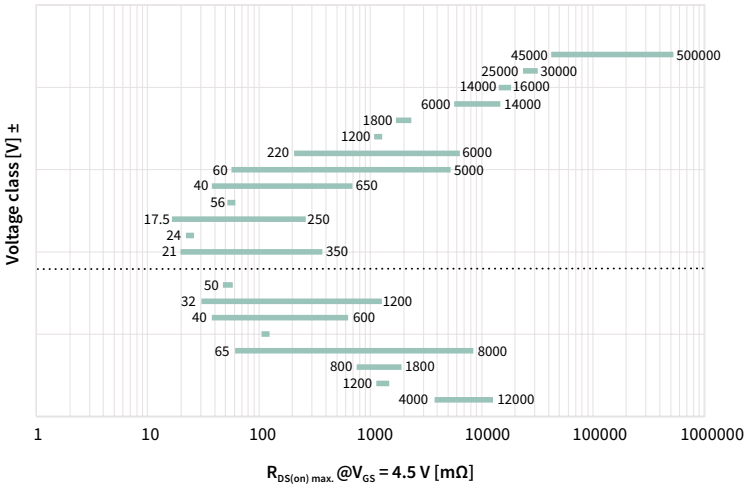
Small-signal/small power products are ideally suited for space-constrained automotive and non-automotive applications. With an optimal price/performance ratio and small footprint packages, Infineon's small-signal and small-power MOSFETs are the best fit for a wide range of applications and circuits. These include low-voltage drives, linear battery charger, battery protection, load switches, DC-DC converters, reverse polarity protection and many more.

The entire family includes different packages:
SOT-223, SOT-23, SOT-323, SOT-363, SOT-89, TSOP-6 and SC59

The product portfolio covers N-channel and P-channel enhancement mode MOSFETs as well as N-channel depletion mode products:

- -250 V to -12 V P-channel enhancement mode (available in single and dual configurations)
- 20 V to 600 V N-channel enhancement mode (available in single and dual configurations)
- -20/+20 V and -30/+30 V complementary (P + N channel) enhancement mode
- 60 V to 600 V N-channel depletion mode

Key features	Key benefits
Products qualified to Automotive and Industrial standards	Suitable for automotive and high quality demanding applications
Four $V_{GS(th)}$ classes available for 1.8 V, 2.5 V, 4.5 V, and 10 V gate drives	Easy interface to MCU
ESD protected P-channel parts	Reduction of design complexity
V_{DS} range from -250 V to 600 V	Wide selection of products available
RoHS compliant and halogen free	Environmentally friendly



Small-signal/small-power MOSFETs are available in seven industry-standard package types ranging from the largest SOT-223 to the smallest SOT-323.

Products are offered in single, dual and complementary configurations and are suitable for a wide range of applications, including battery protection, LED lighting, low-voltage drives and DC-DC converters.

SOT-363	SOT-323	SOT-23	TSOP-6	SC59	SOT-89	SOT-223

www.infineon.com/smallsignal
www.infineon.com/smallpower

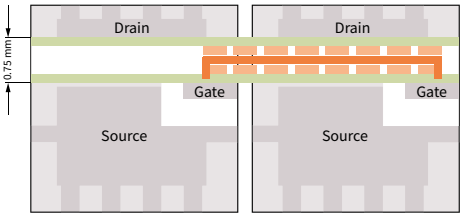
For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ Source-Down power MOSFETs 25-150 V

An innovative PQFN 3.3 mm x 3.3 mm product family

Once again, Infineon is setting a new standard in MOSFET performance with the new Source-Down package to support the requirement for high power density and optimized system-level efficiency. In comparison with a normal Drain-Down device, in the Source-Down technology, the source potential is connected to the thermal pad. Optional Center-Gate footprint is also available. Here the gate pin is moved to the center supporting easy parallel configuration of multiple MOSFETs. With the larger drain-to-source creepage distance, it is possible to connect the gates of multiple devices on a single PCB layer.

	Standard Drain-Down	New Source-Down	
	PQFN 3.3x3.3 standard Drain-Down footprint	PQFN 3.3x3.3 Standard-Gate Source-Down footprint	PQFN 3.3x3.3 Center-Gate Source-Down footprint
R_{thJC} [C/W]	1.8	1.4	1.4



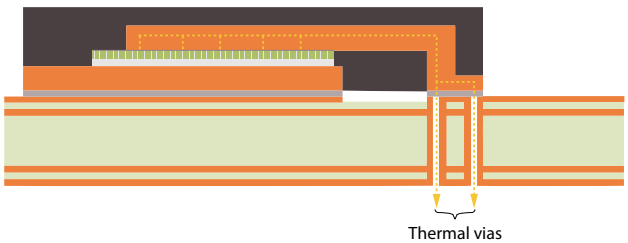
Features and benefits

Key features	Key benefits
› Major reduction in $R_{DS(ON)}$, up to 30% due to larger silicon die in same package outline	› Enabling highest power density and performance
› Improved R_{thJC} overcurrent PQFN package technology	› Superior thermal performance
› High power density	› Form factor reduction
› Standard-Gate and Center-Gate footprint options	› Optimized layout posibilities › Simplifying parallel configuration of multiple MOSFETs with Center-Gate footprints

Optimized thermal management

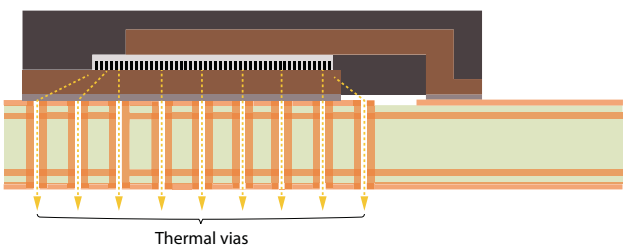
Drain-Down

PQFN 3.3x3.3



Source-Down

PQFN 3.3x3.3



In the Source-Down package technology, the heat is dissipated directly into the PCB through a thermal pad instead of over the bond wire or the copper clip.
The package significantly improves the thermal resistance (R_{thJC}) of this product family. In most cases, thermal vias cannot be used on the thermal pad if it is connected to the noisy switch node potential. With Source-Down, the thermal pad of the low-side MOSFET is now on the ground potential enabling the use of thermal vias right underneath the device. This considerably improves the thermal performance and the power density in the end application.

www.infineon.com/PQFN-3-source-down

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ 6 power MOSFETs 100 V

Next generation of cutting-edge MOSFETs

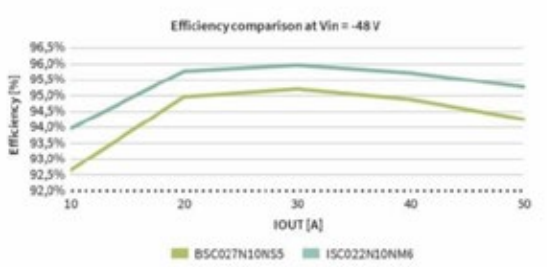
OptiMOS™ 6 100 V devices are setting a new technology standard in the field of discrete MOSFET devices. Compared to alternative products, Infineon's leading thin wafer technology enables significant performance benefits compared to OptiMOS™ 5:

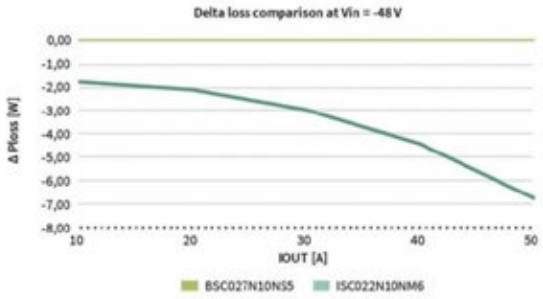
- $R_{DS(on)}$ reduced by 22%
- Improved FOM Q_g x $R_{DS(on)}$ by 37%
- Improved FOM Q_{gd} x $R_{DS(on)}$ by 38%

Infineon's OptiMOS™ 6 power MOSFET 100 V family offers an optimized solution for synchronous rectification in switched mode power supplies (SMPS) in servers, desktop PCs, wireless and quick chargers. The improved performance in on-state resistance ($R_{DS(on)}$) and figure of merits (FOM - $R_{DS(on)}$ x Q_g and Q_{gd} x $R_{DS(on)}$) yields an efficiency improvement, allowing easier thermal design and less paralleling, leading to system cost reduction. In addition, the best-in-class $R_{DS(on)}$ and high switching performance makes these devices suitable for Telecom applications.

Infineon's market-leading OptiMOS™ 6 power MOSFETs 100 V are available in two different packages:

- SuperSO8 – 5x6 mm² with $R_{DS(on)}$ ranging from 23 mΩ down to 2.2 mΩ
- PQFN 3x3 – 3.3 x 3.3 mm² with $R_{DS(on)}$ ranging from 23 mΩ down to 8 mΩ





Target applications include a ZVS inverting buck-boost -(36...60) V to 12 V DC-DC converter. In this topology, an active clamp circuit recovers, in a lossless way, Q_{rr} from the SR switch towards the output, while achieving zero-voltage switching for the control switch.

Best-in-class products in the newly released OptiMOS™ 6 technology (ISC022N10NM6) are compared to OptiMOS™ 5 (BSC027N10NS5) in SuperSO8 (PQFN 5x6) package in this application. The result is stunning: OptiMOS™ 6 in 2.2 mΩ achieves roughly 1% better efficiency across all the line and load conditions, compared to the 2.7 mΩ product in OptiMOS™ 5.

The improvement in efficiency is explainable as the joint contribution of the lower driving losses (thanks to approximatively 20% lower (typ) Q_g) lower turn-off losses (due the lower Q_{gd} – an improvement just shy of 40%) and lower conduction losses with a 18% lower $R_{DS(on)}$. The improvement in efficiency lowers the total losses by 7 W, a remarkable improvement allowing easier thermal management and increased power density. ISC022N10NM6 represents the lowest $R_{DS(on)}$ available in the market for SuperSO8 (PQFN 5x6) package in 100 V.

www.infineon.com/optimos-6-100v

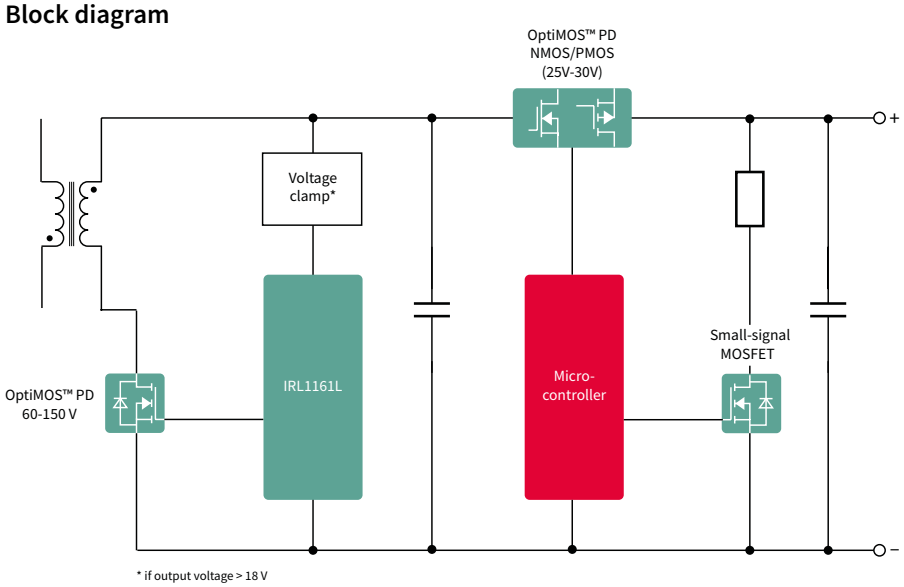
For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ PD

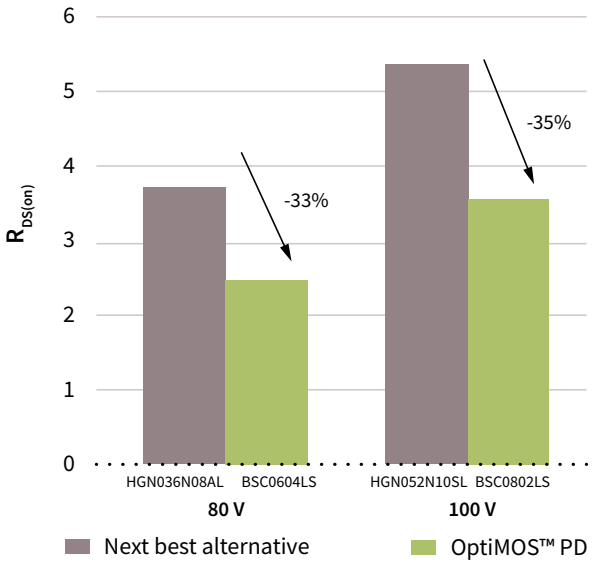
The best fit for USB-PD and fast charger designs

OptiMOS™ PD is Infineon's new MOSFET portfolio representing the best fit for USB-PD and fast charger designs and is available in 2 small standard packages: PQFN 3.3x3.3 and SuperSO8. Logic level availability enables parts to be fully driven from 4.5 V or directly from microcontrollers resulting in a lower part count in the application. The portfolio ranges from 25 V up to 150 V MOSFETs where 25 V and 30 V products represent the fit as load switch and 60-150 V parts are the optimal choice to function as synchronous rectification FETs in charger and adapter designs.

Block diagram

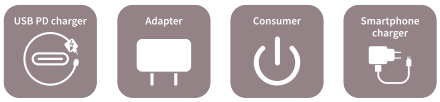


OptiMOS™ PD comparison of $R_{DS(on)}$ in 80 V and 100 V



The OptiMOS™ PD family features MOSFETs offering a low on-state resistance ($R_{DS(on)}$), less switching losses as well as low gate-, output- and reverse-recovery charges. The reduction in overall losses results in an excellent price/performance ratio leading to a decrease in total system BOM cost.

www.infineon.com/optimos-pd

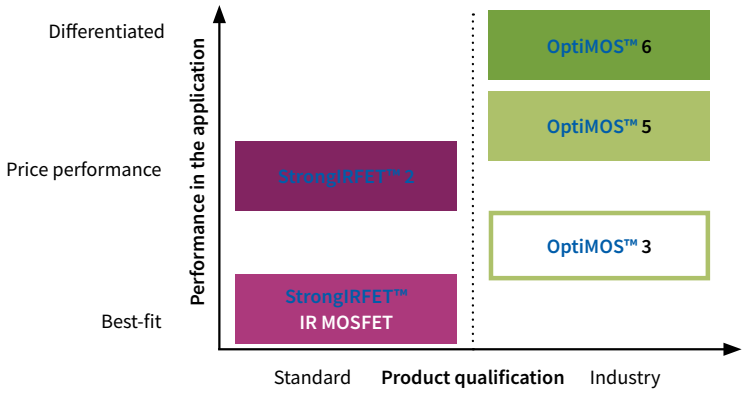


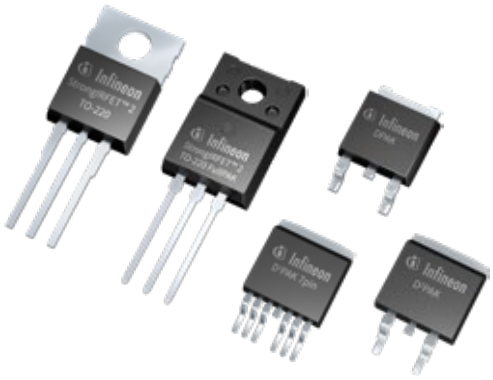
For more details on the product, click on the part number, visit infineon.com or contact our product support.

StrongIRFET™ 2 MOSFETs – 40 V/60 V/80 V/100 V

Right-fit products for a broad range of applications

The new StrongIRFET™ 2 power MOSFETs are the latest generation of MOSFET technology addressing a wide range of applications such as adapters, motor drives, e-scooters, battery management systems, light electric vehicles, robotics, power and gardening tools. Featuring broad availability and excellent price/performance ratio, this new technology offers right-fit products with an easy choice for designers interested in convenient selection and purchasing. Optimized for both low- and high-switching frequencies, the family supports a broad range of applications enabling flexibility in design.

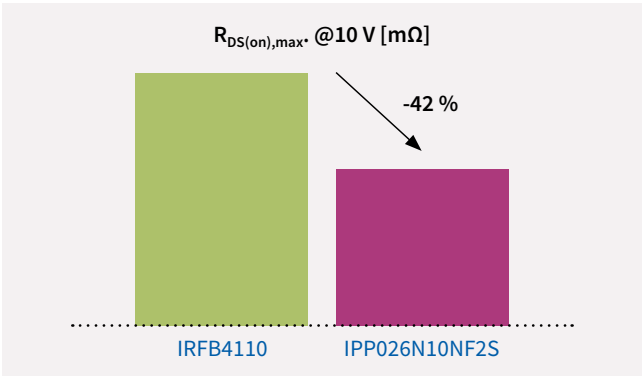


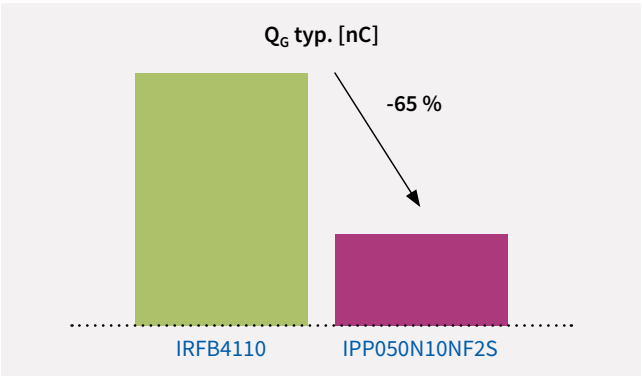


Features and benefits

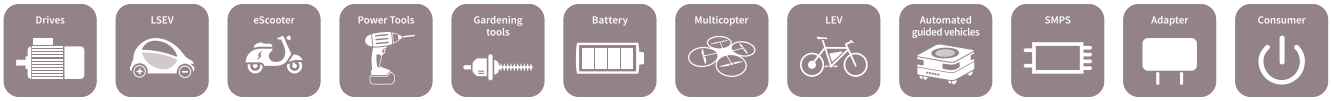
Key features	Key benefits
› Broad availability from distribution partners	› Increased security of supply
› Excellent price/performance ratio	› Right-fit products
› Ideal for high and low switching frequency	› Supports wide variety of applications
› Industry standard footprint	› Standard pin out allows for drop-in replacement
› High current rating	› Increased product ruggedness

StrongIRFET™ 2 vs. previous generation 100 V performance comparison





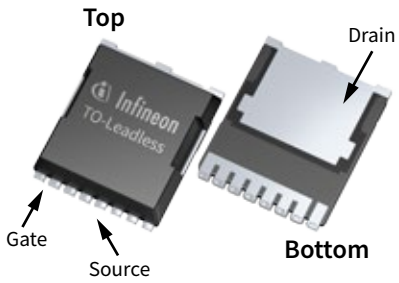
Compared to the previous StrongIRFET™ generation in 100 V TO-220 package, StrongIRFET™ 2 shows significant improvements such as ~40% lower $R_{DS(on)}$ and ~65% reduced Q_g. This results in better efficiency and longer life time.



www.infineon.com/strongirfet2

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TOLx family

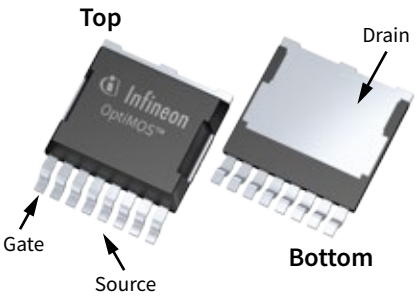


Optimized for high power applications

TO-Leadless (TOLL)

TO-Leadless is optimized to handle currents up to 500 A, increasing power density with a substantial reduction in footprint. A footprint reduction of 30% compared to D²PAK, together with a height reduction of 50%, results in an overall space saving of 60% enabling much more compact designs.

Key features	Key benefits
› Best-in-class technology	› High performance capability
› High current rating > 500 A	› High system reliability
› 60% space reduction compared to D²PAK 7-pin	› Optimized board utilization

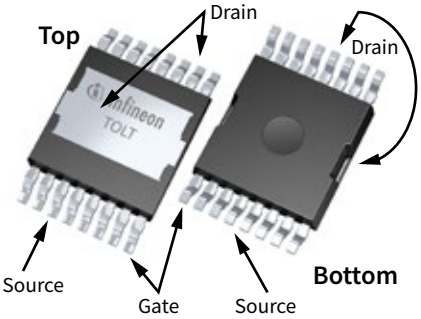


Optimized for better TCoB robustness

TOLG (Gullwing leads)

TOLG package offers a compatible footprint to the TO-Leadless with the additional feature of Gullwing leads resulting in two times higher TCoB performances compared to TO-Leadless. This package is excellent on aluminum insulated metal substrate boards (Al-IMS).

Key features	Key benefits
› Best-in-class technology	› High performance capability
› High current rating > 450 A	› High system reliability
› Low ringing and voltage overshoot	› High efficiency and lower EMI
› 60% space reduction compared to D²PAK 7-pin	› Optimized board utilization
› Gullwing leads	› High thermal cycling on board performance



Optimized for superior thermal performance

TOLT (Top-side cooling)

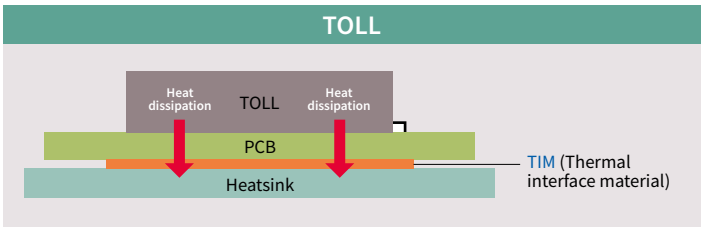
TOLT is the new top-side cooling package within the TOLx family. With top-side cooling, the drain is exposed at the surface of the package allowing for 95 percent of the heat to be dissipated directly to the heatsink, achieving 20 percent better R_{thJA} and 50 percent improved R_{thJC} compared to the TOLL package. With bottom-side cooling packages, like the TOLL or the D²PAK, the heat is dissipated via the PCB to the heatsink resulting in high power losses.

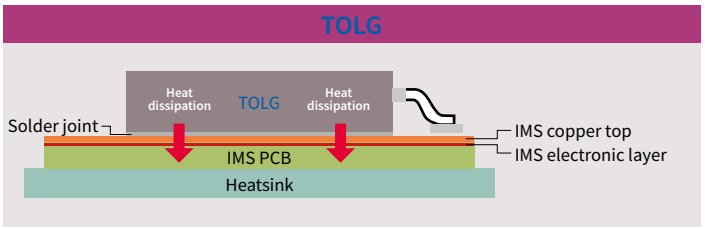
Key features	Key benefits
› Low $R_{DS(on)}$	› Reduction in conduction losses
› High current rating	› Increased product ruggedness
› Top-side cooling	› Superior thermal performance
› Negative standoff	› Minimize thermal resistance to heatsink

www.infineon.com/toll
www.infineon.com/tolg
www.infinon.com/tolt

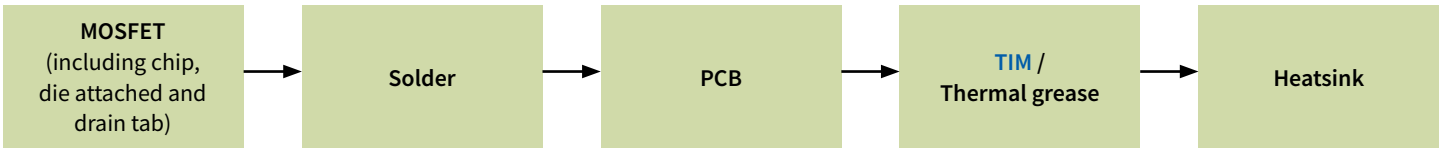
For more details on the product, click on the part number, visit infineon.com or contact our product support.

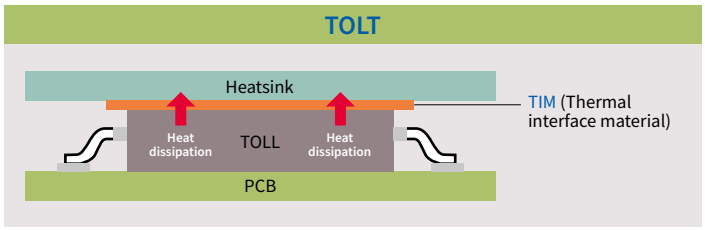
TOLx family – Cooling concept



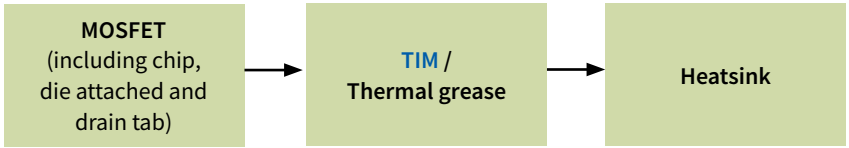


With TOLL / TOLG, board mounting, the heat is dissipated through the PCB to the heatsink.
Due to the PCB thermal resistance, power losses occur.

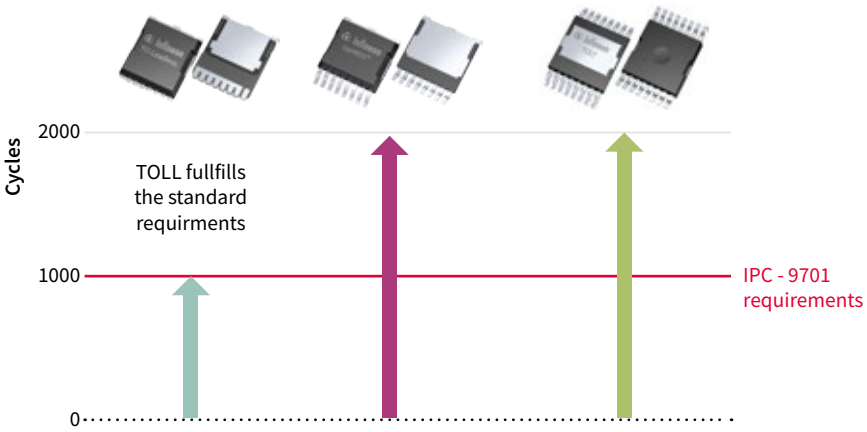




With top-side cooling setup, the drain pad is exposed on the top of the package allowing the majority of the heat to be dissipated into the top-mounted heatsink. This pulls heat away from the PCB resulting in at least 20 percent better R_{thJA} compared to standard over-molded TOLL.



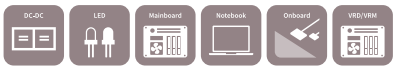
Thermal cycling on IMS board (TCoB) performance



www.infineon.com/optimos-tolg
www.infineon.com/optimos-tolt

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ and StrongIRFET™ 20 V (super) logic level



$R_{DS(on),max}$ @ V_{GS}=4.5 V [mΩ]	TO-252 (DPAK)	PQFN 2x2	PQFN 3.3x3.3	SuperSO8
< 1				IRFH6200TRPBF [1] $R_{DS(on)}$=0.99 mΩ
2-4			IRLHM620TRPBF** [1] $R_{DS(on)}$=2.5 mΩ	
	IRLR6225TRPBF [1] $R_{DS(on)}$=4.0 mΩ			
4-10				IRLH6224TRPBF [1] $R_{DS(on)}$=3.0 mΩ
> 10		IRLHS6242TRPBF $R_{DS(on)}$=11.7 mΩ		
		IRLHS6276TRPBF $R_{DS(on)}$=45 mΩ		

OptiMOS™ and StrongIRFET™ 25 V logic level

$R_{DS(on),max}$ @ V_{GS}=10 V [mΩ]	DirectFET™	PQFN 2x2	PQFN 3.3x3.3	SuperSO8	Source-Down PQFN 3.3x3.3
< 1				BSC004NE2LS5 $R_{DS(on)}$=0.9 mΩ	IQE006NE2LM5 $R_{DS(on)}$=0.6 mΩ
				BSC009NE2LS5 $R_{DS(on)}$=0.9 mΩ	IQE006NE2LM5CG $R_{DS(on)}$=0.6 mΩ
	IRF6717MTRPBF $R_{DS(on)}$=0.95 mΩ			BSC009NE2LS $R_{DS(on)}$ = 0.9 mΩ	
			BSZ009NE2LS5 $R_{DS(on)}$=0.9 mΩ	BSC009NE2LS5I* $R_{DS(on)}$=0.95 mΩ	
1-2			BSZ010NE2LS5 $R_{DS(on)}$=1.0 mΩ	BSC010NE2LS $R_{DS(on)}$=1.0 mΩ	
			BSZ011NE2LS5I $R_{DS(on)}$=1.1 mΩ	BSC010NE2LSI* $R_{DS(on)}$=1.05 mΩ	
				BSC014NE2LSI* $R_{DS(on)}$=1.4 mΩ	
			BSZ013NE2LS5I* $R_{DS(on)}$=1.3 mΩ	IRFH5250D** $R_{DS(on)}$=1.4 mΩ	
			BSZ014NE2LS5IF** $R_{DS(on)}$=1.45 mΩ	BSC015NE2LS5I* $R_{DS(on)}$=1.5 mΩ	
			BSZ017NE2LS5I* $R_{DS(on)}$=1.7 mΩ	BSC018NE2LS $R_{DS(on)}$=1.8 mΩ	
	IRF6797MTRPBF* $R_{DS(on)}$=1.1 mΩ		BSZ018NE2LS $R_{DS(on)}$=1.8 mΩ	BSC018NE2LSI* $R_{DS(on)}$=1.8 mΩ	
	IRF6715MTRPBF $R_{DS(on)}$=1.3 mΩ		BSZ018NE2LSI* $R_{DS(on)}$=1.8 mΩ		
	IRF6795MTRPBF* $R_{DS(on)}$=1.4 mΩ				
	IRF6714MTRPBF $R_{DS(on)}$=1.6 mΩ				
2-4		ISK024NE2LM5 $R_{DS(on)}$=2.4 mΩ	BSZ031NE2LS5 $R_{DS(on)}$=3.1 mΩ	BSC024NE2LS $R_{DS(on)}$=2.4 mΩ	
			BSZ033NE2LS5 $R_{DS(on)}$=3.3 mΩ	BSC026NE2LS5 $R_{DS(on)}$=2.6 mΩ	
			BSZ036NE2LS $R_{DS(on)}$=3.6 mΩ	BSC032NE2LS $R_{DS(on)}$=3.2 mΩ	
	IRF6712STRPBF $R_{DS(on)}$=3.8 mΩ				
4-10			BSZ060NE2LS $R_{DS(on)}$=6.0 mΩ	BSC050NE2LS $R_{DS(on)}$=5.0 mΩ	
> 10		IRFHS8242 $R_{DS(on)}$=13 mΩ			

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* Optimized for resonant applications (e.g. LLC converter)
** Monolithically-integrated Schottky-like diode
*** $R_{DS(on),max}$ @ V_{GS}=4.5 V

1) 2.5 V_{GS} capable

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ and StrongIRFET™ 25 V in Power Block 5x6

Part number	Package	Monolithically-integrated Schottky-like diode	BV_{DSS} [V]	$R_{DS(on),max.}$ [mΩ] @ V_{GS}=4.5 V max.		Q_g [nC] @ V_{GS}=4.5 V typ.	
				High-side	Low-side	High-side	Low-side
BSG0810NDI	SuperSO8	✓	25	4.0	1.2	5.6	16.0
BSG0811ND	SuperSO8	–	25	4.0	1.1	5.6	20.0
BSG0813NDI	SuperSO8	✓	25	4.0	1.7	5.6	12.0

OptiMOS™ 25/30 V symmetrical and asymmetrical dual N-Channel MOSFETs in 5x6 and 3x3 PQFN

Integrates the low-side and high-side MOSFET of a synchronous DC-DC converter into a single package.
The small outline and the interconnection of the two MOSFETs within the package minimize the loop inductance which boosts efficiency.

Part number	Package	Monolithically-integrated Schottky-like diode	BV_{DSS} [V]	$R_{DS(on),max.}$ [mΩ] @ V_{GS}=4.5 V max.		Q_g [nC] @ V_{GS}=4.5 V typ.	
				High-side	Low-side	High-side	Low-side
BSC0910NDI*	asymmetrical dual 5x6	✓	25	5.9	1.6	7.7	25
BSC0911ND*	asymmetrical dual 5x6	–	25	4.8	1.7	7.7	25
BSC0921NDI*	asymmetrical dual 5x6	✓	30	7	2.1	5.8	21
BSC0923NDI*	asymmetrical dual 5x6	✓	30	7	3.7	5.2	12.2
BSC0924NDI*	asymmetrical dual 5x6	✓	30	7	5.2	5.2	8.6
BSC0925ND*	symmetrical dual 5x6	–	30	6.4	6.4	5.2	6.7
BSC0993ND*	symmetrical dual 5x6	–	30	7	7	5.4	6.7

OptiMOS™ / StrongIRFET ™ 30 V - 100 V dual N-Channel MOSFETs

Integrates two independent N-channel MOSFETs into a single package for high power density and compact design.
Ideal for DC motors with power rating < 200 W

Part number	Package	Monolithically integrated Schottky like diode	BV_{DSS} [V]	$R_{DS(on),max.}$ [mΩ] @ V_{GS}=10 V max.		Q_g [nC] @ V_{GS}=10 V typ.	
				High-side	Low-side	High-side	Low-side
IRL6297SDTRPBF*	symmetrical dual DirectFET™	–	20	3.8**	3.8**	54	54
IRLHS6276*	symmetrical dual PQFN 2x2	–	20	45**	45**	3.1**	3.1**
IRF7907*	asymmetrical dual SO8	–	30	16.4	11.8	6.7**	14**
IRF7905TRPBF*	asymmetrical dual SO8	–	30	21.8	17.1	4.6**	6.9**
IRLHS6376TRPBF*	symmetrical dual PQFN 2x2	–	30	63**	63**	2.8**	2.8**
IRF40H233	symmetrical dual 5x6	–	40	6.2	6.2	45	45
BSC072N04LD*	symmetrical dual 5x6	–	40	7.2	7.2	39	39
BSC076N04ND	symmetrical dual 5x6	–	40	7.6	7.6	28	28
BSC112N06LD*	symmetrical dual 5x6	–	60	11.2	11.2	41	41
BSC155N06ND	symmetrical dual 5x6	–	60	15.5	15.5	21	21
IRF7351	symmetrical dual SO8	–	60	17.8	17.8	24	24
BSO615NG	symmetrical dual SO8	–	60	150	150	14	14
IRFHM792	symmetrical dual PQFN 3 x 3	–	100	195	195	4.2	4.2

Dual N-channel audio MOSFETs

Digital audio MOSFET half-bridges are specifically designed for class D audio amplifier applications. They consist of two power MOSFET switches connected in half-bridge configuration.

Part number	Package	Monolithically-integrated Schottky like diode	BV_{DSS} [V]	$R_{DS(on),max.}$ [mΩ] @ V_{GS}=4.5 V max.		Q_g [nC] @ V_{GS}=4.5 V typ.	
				High-side	Low-side	High-side	Low-side
IRFI4212H-117P	half-bridge in TO220FP	–	100	72.5	72.5	12	12
IRFI4019H-117P	half-bridge in TO220FP	–	150	95	95	13	13
IRFI4020H-117P	half-bridge in TO220FP	–	200	100	100	19	19

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* Logic level (capable of 4.5 V gate drive)
** $R_{DS(on)}$ at V_{GS}=4.5V

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ and StrongIRFET™ 30 V logic level

$R_{DS(on),\ max.}$ @ V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-220
1-2		IRLB3813PBF $R_{DS(on)}$=1.95 mΩ
2-4	IRFR8314TRPBF $R_{DS(on)}$=2.2 mΩ	IRLB8314PBF $R_{DS(on)}$=2.4 mΩ
	IRLR8743TRPBF $R_{DS(on)}$=3.1 mΩ	
		IRLB8743PBF $R_{DS(on)}$=3.2 mΩ
4-10	IRLR8726TRPBF $R_{DS(on)}$=5.8 mΩ	IRLB8748PBF $R_{DS(on)}$=4.8 mΩ
	IRLR8729TRPBF $R_{DS(on)}$=8.9 mΩ	IRLB8721PBF $R_{DS(on)}$=8.7 mΩ

OptiMOS™ and StrongIRFET™ 30 V logic level

$R_{DS(on),\ max.}$ @ V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3 x 3.3 Source-Down	PQFN 3.3 x 3.3	SuperSO8
< 1		IQE008N03LM5 $R_{DS(on)}$=0.85 mΩ		BSC005N03LS5 $R_{DS(on)}$=0.5 mΩ
		IQE008N03LM5CG $R_{DS(on)}$=0.85 mΩ		BSC005N03LS5I* $R_{DS(on)}$=0.5 mΩ
1-2				ISC011N03L5S $R_{DS(on)}$=1.1 mΩ
				IRFH8303TRPBF $R_{DS(on)}$=1.1 mΩ
				BSC011N03LS $R_{DS(on)}$=1.1 mΩ
				BSC011N03LSI* $R_{DS(on)}$=1.1 mΩ
	IRF8301MTRPBF $R_{DS(on)}$=1.3 mΩ			IRFH8307TRPBF $R_{DS(on)}$=1.3 mΩ
	IRF6726MTRPBF $R_{DS(on)}$=1.3 mΩ		BSZ0500NSI* $R_{DS(on)}$=1.5 mΩ	BSC0500NSI* $R_{DS(on)}$=1.3 mΩ
	IRF6727MTRPBF $R_{DS(on)}$=1.22 mΩ		BSZ019N03LS $R_{DS(on)}$=1.9 mΩ	
	IRF8302MTRPBF* $R_{DS(on)}$=1.4 mΩ		ISZ019N03L5S $R_{DS(on)}$=1.9 mΩ	IRFH5301TRPBF $R_{DS(on)}$=1.85 mΩ
			BSZ0901NS $R_{DS(on)}$=2.0 mΩ	ISC019N03L5S $R_{DS(on)}$=1.9 mΩ
			BSZ0501NSI* $R_{DS(on)}$=2.0 mΩ	BSC0901NS $R_{DS(on)}$=1.9 mΩ
				BSC0501NSI** $R_{DS(on)}$=1.9 mΩ
				BSC0901NSI** $R_{DS(on)}$=2.0 mΩ
2-4				ISC026N03L5S $R_{DS(on)}$=2.6 mΩ
				ISC037N03L5IS $R_{DS(on)}$=3.7 mΩ
			ISZ040N03L5IS $R_{DS(on)}$=4.0 mΩ	ISC045N03L5S $R_{DS(on)}$=4.5 mΩ
4-10			ISZ065N03L5S $R_{DS(on)}$=6.5 mΩ	

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*Monolithically-integrated Schottky-like diode
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OptiMOS™ and StrongIRFET™ 30 V logic level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3x3.3	SuperSO8	SO8	PQFN 2x2
2-4	IRF8304MTRPBF $R_{DS(on)}$=1.7 mΩ	BSZ0901NSI** $R_{DS(on)}$=2.1 mΩ	IRFH8311TRPBF $R_{DS(on)}$=2.1 mΩ		ISK036N03LM5 $R_{DS(on)}$=3.6 mΩ
			IRFH5302TRPBF $R_{DS(on)}$=2.1 mΩ		
	IRF6724MTRPBF $R_{DS(on)}$=1.9 mΩ		BSC0502NSI* $R_{DS(on)}$=2.4 mΩ		
		BSZ0902NS $R_{DS(on)}$=2.6 mΩ			
			BSC0902NS $R_{DS(on)}$=2.6 mΩ		
		BSZ0902NSI* $R_{DS(on)}$=2.8 mΩ	BSC0902NSI* $R_{DS(on)}$=2.8 mΩ	IRF8788TRPBF $R_{DS(on)}$=2.8 mΩ	
		BSZ0502NSI* $R_{DS(on)}$=2.8 mΩ			
		BSZ0503NSI* $R_{DS(on)}$=3.4 mΩ	IRFH8318TRPBF $R_{DS(on)}$=3.1 mΩ		
		IRLHM630** $R_{DS(on)}$= 3.5 mΩ	BSC0503NSI* $R_{DS(on)}$=3.2 mΩ	IRF7862TRPBF $R_{DS(on)}$=3.3 mΩ	
		IRFHM830 $R_{DS(on)}$= 3.8 mΩ	BSC0504NSI* $R_{DS(on)}$=3.7 mΩ		
		BSZ0904NSI** $R_{DS(on)}$=4.0 mΩ	BSC0904NSI* $R_{DS(on)}$=3.7 mΩ		
4-10	IRF6722MTRPBF $R_{DS(on)}$= 7.7 mΩ		IRFH8324TRPBF $R_{DS(on)}$=4.1 mΩ		
		BSZ0506NS $R_{DS(on)}$=4.4 mΩ			
		BSZ0589NS $R_{DS(on)}$=4.4 mΩ	BSC0906NS $R_{DS(on)}$=4.5 mΩ		
			IRFH5304TRPBF $R_{DS(on)}$=4.5 mΩ		
			IRFH8325TRPBF $R_{DS(on)}$=5.0 mΩ		
			BSC052N03LS $R_{DS(on)}$=5.2 mΩ		
		BSZ065N03LS $R_{DS(on)}$=6.5 mΩ			
			IRFH8330TRPBF $R_{DS(on)}$=6.6 mΩ		
		BSZ0994NS $R_{DS(on)}$= 7.0 mΩ			
			IRFH8334TRPBF $R_{DS(on)}$=9.0 mΩ		
					IRFHS8342 $R_{DS(on)}$= 16 mΩ

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** Monolithically-integrated Schottky-like diode
*** $R_{DS(on)}$, max. @V_{GS}=4.5 V
****For more information on the product, contact our product support

1) 2.5 V_{GS} capable

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ and StrongIRFET™ 40 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	TO-247	DirectFET™	sTOLL	SuperSO8	TO-220 FullPAK
<1			IRF40SC240 $R_{DS(on)}$=0.65 mΩ				IST006N04NM6 $R_{DS(on)}$=0.6 mΩ	ISC007N04NM6 $R_{DS(on)}$=0.7 mΩ	
			IRFS7430TRL7PP $R_{DS(on)}$ =0.75 mΩ				IST007N04NM6 $R_{DS(on)}$=0.7 mΩ	ISC010N04NM6 $R_{DS(on)}$=1.0 mΩ	
1-2		IRFS7430TRLPBF $R_{DS(on)}$ =1.3 mΩ	IRFS7434TRL7PP $R_{DS(on)}$ =1.0 mΩ	IRFB7430PBF $R_{DS(on)}$ =1.3 mΩ	IRFP7430PBF $R_{DS(on)}$ =1.3 mΩ			ISC012N04NM6 $R_{DS(on)}$ =1.2 mΩ	
						IRF7739L1TRPBF $R_{DS(on)}$ =1.0 mΩ		IRFH7084TRPBF $R_{DS(on)}$ =1.25 mΩ	
		IRFS3004TRLPBF $R_{DS(on)}$ =1.75 mΩ	IRFS3004-7P $R_{DS(on)}$ =1.25 mΩ	IRFB7434PBF $R_{DS(on)}$ =1.6 mΩ		IRF7480MTRPBF $R_{DS(on)}$ =1.2 mΩ		IRFH7004TRPBF $R_{DS(on)}$ =1.4 mΩ	
		IRFS7434TRLPBF $R_{DS(on)}$ =1.6 mΩ	IRFS7437TRL7PP $R_{DS(on)}$ =1.4 mΩ	IRFB3004PBF $R_{DS(on)}$ =1.75 mΩ		IRF7946TRPBF $R_{DS(on)}$ =1.4 mΩ		ISC015N04NM5 $R_{DS(on)}$=1.5 mΩ	
		IRFS7437TRLPBF $R_{DS(on)}$ =1.8 mΩ		IRFB7437PBF $R_{DS(on)}$ =2.0 mΩ				ISC017N04NM5 $R_{DS(on)}$=1.7 mΩ	
						IRF40DM229 $R_{DS(on)}$=1.85 mΩ		IRF40H210 $R_{DS(on)}$ =1.7 mΩ	
								ISC019N04NM5 $R_{DS(on)}$=1.9 mΩ	
2-4	IRFR7440TRPBF $R_{DS(on)}$ =2.4 mΩ	IRFS7440TRLPBF $R_{DS(on)}$ =2.5 mΩ				IRF7483MTRPBF $R_{DS(on)}$ =2.3 mΩ		IRFH7440TRPBF $R_{DS(on)}$ =2.4 mΩ	IPA028N04NM3S $R_{DS(on)}$ =2.8 mΩ
	IRFR7446TRPBF $R_{DS(on)}$ =3.9 mΩ	IRF1404S $R_{DS(on)}$ =4.0 mΩ		IRFB7440PBF $R_{DS(on)}$ =2.5 mΩ				IRFH5004TRPBF $R_{DS(on)}$=2.6 mΩ	
				IRFB7446PBF $R_{DS(on)}$ =3.3 mΩ				ISC028N04NM5 $R_{DS(on)}$=2.8 mΩ	
								IRFH7446TRPBF $R_{DS(on)}$ =3.3 mΩ	
								ISC036N04NM5 $R_{DS(on)}$=3.6 mΩ	
4-10								ISC046N04NM5 $R_{DS(on)}$=4.6 mΩ	
	IRF40R207 $R_{DS(on)}$ =5.1 mΩ			IRF40B207 $R_{DS(on)}$ =4.5 mΩ				ISC058N04NM5 $R_{DS(on)}$=5.8 mΩ	

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OptiMOS™ and StrongIRFET™ 40 V logic level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	TO-247	DirectFET™	PQFN 3.3x3.3	SuperSO8
<1			IRL40SC228 $R_{DS(on)}$ =0.65 mΩ			IRL7472L1TRPBF $R_{DS(on)}$ =0.45 mΩ		BSC007N04LS6 $R_{DS(on)}$=0.7 mΩ
			IRL40SC209 $R_{DS(on)}$ =0.8 mΩ			IRL40DM247 $R_{DS(on)}$ =1.0 mΩ		
1-2				IRL40B209 $R_{DS(on)}$ =1.25 mΩ				BSC010N04LS $R_{DS(on)}$ =1.0 mΩ
		IRLS3034TRLPBF $R_{DS(on)}$ =1.7 mΩ	IRLS3034TRL7P $R_{DS(on)}$ =1.4 mΩ	IRLB3034PBF $R_{DS(on)}$ =1.7 mΩ	IRLP3034PBF $R_{DS(on)}$ =1.7 mΩ	IRL7486MTRPBF $R_{DS(on)}$ =1.4 mΩ		BSC010N04LS6 $R_{DS(on)}$ =1.0 mΩ
		IRL40S212 $R_{DS(on)}$ =1.9 mΩ		IRL40B212 $R_{DS(on)}$ =1.9 mΩ				BSC010N04LST $R_{DS(on)}$=1.0 mΩ
								BSC010N04LSI $R_{DS(on)}$ =1.05 mΩ
								BSC010N04LSC* $R_{DS(on)}$= 1.05 mΩ
								ISC012N04LM6 $R_{DS(on)}$ =1.2 mΩ
								BSC014N04LST $R_{DS(on)}$ =1.4 mΩ
								BSC014N04LST $R_{DS(on)}$ =1.4 mΩ
								BSC014N04LS $R_{DS(on)}$ =1.4 mΩ
							BSZ018N04LS6 $R_{DS(on)}$=1.8 mΩ	BSC014N04LSI $R_{DS(on)}$ =1.45 mΩ
								BSC019N04LS $R_{DS(on)}$ =1.9 mΩ
								BSC019N04LST $R_{DS(on)}$ =1.9 mΩ
2-4				IRL40B215 $R_{DS(on)}$ =2.7 mΩ		IRF6613TRPBF $R_{DS(on)}$=3.4 mΩ	BSZ021N04LS6 $R_{DS(on)}$ =2.1 mΩ	BSC022N04LS $R_{DS(on)}$ =2.2 mΩ
							BSZ024N04LS6 $R_{DS(on)}$ =2.4 mΩ	BSC022N04LS6 $R_{DS(on)}$ =2.2 mΩ
								IRLH5034TRPBF $R_{DS(on)}$=2.4 mΩ
							BSZ025N04LS $R_{DS(on)}$ =2.5 mΩ	BSC026N04LS $R_{DS(on)}$ =2.6 mΩ
							BSZ028N04LS $R_{DS(on)}$ =2.8 mΩ	
							BSZ034N04LS $R_{DS(on)}$ =3.4 mΩ	BSC032N04LS $R_{DS(on)}$ =3.2 mΩ
	IPD036N04L G $R_{DS(on)}$=3.6 mΩ							
4-10	IRLR3114ZTRPBF $R_{DS(on)}$ =4.5 mΩ					IRF6616TRPBF $R_{DS(on)}$ =5.0 mΩ		
						IRF6614TRPBF $R_{DS(on)}$=8.3 mΩ	BSZ063N04LS6 $R_{DS(on)}$ =6.3 mΩ	
								BSC059N04LS6 $R_{DS(on)}$ =5.9 mΩ

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* Increased creepage distance

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OptiMOS™ and StrongIRFET™ 60 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-262 (I^2PAK)	TO-220	TO-220 FullPAK	TO-247	SuperSO8 super cool
1-2			IPB010N06N [1] $R_{DS(on)}$ =1.0 mΩ					
			IRF60C241 $R_{DS(on)}$=1.3 mΩ					
			IRFS7530TRL7PP $R_{DS(on)}$ =1.4 mΩ		IPP014N06NF2S $R_{DS(on)}$=1.4 mΩ			BSC014N06NSSC $R_{DS(on)}$ = 1.4 mΩ
			IPB014N06N [1] $R_{DS(on)}$ =1.4 mΩ		IPP016N06NF2S $R_{DS(on)}$=1.6 mΩ			BSC016N06NSSC $R_{DS(on)}$ = 1.6 mΩ
			IRFS7534TRL7PP [1] $R_{DS(on)}$ =1.95 mΩ		IPP019N06NF2S $R_{DS(on)}$=1.9 mΩ			
					IRFB7530PBF $R_{DS(on)}$ =2.0 mΩ			
		IRFS7530TRLPBF $R_{DS(on)}$ =2.0 mΩ			IPP020N06N [1] $R_{DS(on)}$ =2.0 mΩ		IRFP7530PBF $R_{DS(on)}$ =2.0 mΩ	
2-4	IPD025N06N [1] $R_{DS(on)}$ =2.5 mΩ	IRFS7534TRLPBF $R_{DS(on)}$ =2.4 mΩ	IRFS3006TRL7PP $R_{DS(on)}$ =2.1 mΩ		IRFB7534PBF $R_{DS(on)}$ =2.4 mΩ			BSC028N06NSSC $R_{DS(on)}$ = 2.8 mΩ
		IRFS3006 $R_{DS(on)}$ =2.5 mΩ			IRFB3006PBF $R_{DS(on)}$ =2.5 mΩ			
		IPB026N06N [1] $R_{DS(on)}$ =2.6 mΩ			IPP029N06N [1] $R_{DS(on)}$ =2.9 mΩ		IRFP3006PBF $R_{DS(on)}$ =2.5 mΩ	
				IPI029N06N [1] $R_{DS(on)}$ =2.9 mΩ	IRFB3206BF $R_{DS(on)}$ =3.0 mΩ	IPA029N06N [1] $R_{DS(on)}$ =2.9 mΩ	IRFP3206PBF $R_{DS(on)}$ =3.0 mΩ	
					IPP030N06NF2S $R_{DS(on)}$=3.05 mΩ	IPA029N06NM5S $R_{DS(on)}$ =2.9 mΩ		
	IPD033N06N [1] $R_{DS(on)}$=3.3 mΩ	IRFS3206 $R_{DS(on)}$=3.0 mΩ			IRFB7537PBF $R_{DS(on)}$ =3.3 mΩ			
		IRFS7537TRLPBF $R_{DS(on)}$ =3.3 mΩ			IPP040N06NF2S $R_{DS(on)}$=4.00 mΩ		IRFP7537PBF $R_{DS(on)}$ =3.3 mΩ	
						IPA040N06N [1] $R_{DS(on)}$ =4.0 mΩ		
4-10		IRFS3306 $R_{DS(on)}$ =4.2 mΩ			IPP040N06N [1] $R_{DS(on)}$ =4.0 mΩ	IPA040N06N M5S $R_{DS(on)}$ =4.0 mΩ		
					IRFB3306PBF $R_{DS(on)}$ =4.2 mΩ		IRFP3306PBF $R_{DS(on)}$ =4.2 mΩ	
	IRFR7540TRPBF $R_{DS(on)}$ =4.8 mΩ	IRFS7540TRLPBF $R_{DS(on)}$ =5.1 mΩ			IRFB7540PBF $R_{DS(on)}$ =5.1 mΩ			
	IPD053N06N [1] $R_{DS(on)}$ =5.3 mΩ							
		IPB057N06N [1] $R_{DS(on)}$ =5.7 mΩ			IRFB7545PBF $R_{DS(on)}$ =5.9 mΩ			
	IRFR7546TRPBF $R_{DS(on)}$ =7.9 mΩ	IRF1018ES $R_{DS(on)}$=8.4 mΩ			IPP060N06N [1] $R_{DS(on)}$ =6.0 mΩ	IPA060N06N [1] $R_{DS(on)}$ =6.0 mΩ		
	IRFR1018E $R_{DS(on)}$=8.4 mΩ				IRFB7546PBF $R_{DS(on)}$ =7.3 mΩ			
					IRF1018EPBF $R_{DS(on)}$ =8.4 mΩ	IPA060N06NM5S $R_{DS(on)}$ =6.0 mΩ		
					IRF60B217 $R_{DS(on)}$ =9.0 mΩ			
	IRF60R217 $R_{DS(on)}$ =9.9 mΩ							
>10	IRFR3806 $R_{DS(on)}$ =15.8 mΩ	IRFS3806 $R_{DS(on)}$ =15.8 mΩ			IRFB3806PBF $R_{DS(on)}$ =15.8 mΩ			

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2) 6 V rated ($R_{DS(on)}$ also specified @ V_{GS}=6 V)

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OptiMOS™ and StrongIRFET™ 60 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3x3.3	SO8	SuperSO8	TO-Leadless	sTOLL	TOLG (TO-Leaded Gullwing)
< 1					IPT007N06N [1] $R_{DS(on)}$ =0.7 mΩ	IST011N06NM5 $R_{DS(on)}$ = 1.1 mΩ	IPTG007N06NM5 $R_{DS(on)}$ = 0.75 mΩ
1-2				ISC010N06NM5 $R_{DS(on)}$ =1.05 mΩ		IST015N06NM5 $R_{DS(on)}$ = 1.5 mΩ	
	IRF7749L1TRPBF $R_{DS(on)}$ =1.5 mΩ			BSC012N06NS $R_{DS(on)}$ =1.2 mΩ	IPT012N06N [1] $R_{DS(on)}$ =1.2 mΩ		
				BSC014N06NS [1] $R_{DS(on)}$ =1.4 mΩ	IPT008N06NM5LF $R_{DS(on)}$ = 0.8 mΩ		
				BSC014N06NST [1] $R_{DS(on)}$ =1.45 mΩ			
				BSC016N06NST [1] $R_{DS(on)}$ =1.6 mΩ			
				BSC016N06NS [1] $R_{DS(on)}$ =1.6 mΩ			
				BSC019N06NS [1] $R_{DS(on)}$ =1.9 mΩ			
2-4	IRF7748L1TRPBF $R_{DS(on)}$ =2.2 mΩ	BSZ039N06NS $R_{DS(on)}$=3.9 mΩ		BSC028N06NS [1] $R_{DS(on)}$ =2.8 mΩ			
				BSC028N06NST[1] $R_{DS(on)}$ =2.8 mΩ			
	IRF60DM206 $R_{DS(on)}$ =2.9 mΩ			IRFH7085TRPBF $R_{DS(on)}$ =3.2 mΩ			
				BSC034N06NS [1] $R_{DS(on)}$ =3.4 mΩ			
				BSC039N06NS [1] $R_{DS(on)}$ =3.9 mΩ			
				IRFH5006TRPBF $R_{DS(on)}$ =4.1 mΩ			
	IRF6648 $R_{DS(on)}$ =7.0 mΩ	BSZ042N06NS [1] $R_{DS(on)}$ =4.2 mΩ	IRF7855TRPBF $R_{DS(on)}$=9.4 mΩ	IRFH7545TRPBF $R_{DS(on)}$ =5.2 mΩ			
	IRF6674 $R_{DS(on)}$ =11.0 mΩ			BSC066N06NS [1] $R_{DS(on)}$ =6.6 mΩ			
		BSZ068N06NS [1] $R_{DS(on)}$ =6.8 mΩ		BSC097N06NS [1] $R_{DS(on)}$ =9.7 mΩ			
		BSZ100N06NS [1] $R_{DS(on)}$ =10.0 mΩ		BSC097N06NST [1] $R_{DS(on)}$=9.7 mΩ			
> 10				IRFH5406TRPBF $R_{DS(on)}$=14.4 mΩ			

OptiMOS™ and StrongIRFET™ 60 V logic level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-262 (I^2PAK)	TO-220	PQFN 2x2	PQFN 3.3x3.3	SuperSO8
1-2			IRL60SC216 $R_{DS(on)}$ =1.5 mΩ					ISC009N06LM5 $R_{DS(on)}$ = 0.9 mΩ
								ISC011N06LM5 $R_{DS(on)}$ = 1.1 mΩ
		IRL60S216 $R_{DS(on)}$ =1.95 mΩ	IRLS3036TRL7PP $R_{DS(on)}$ =1.9 mΩ	IRL60SL216 $R_{DS(on)}$ =1.95 mΩ	IRL60B216 $R_{DS(on)}$ =1.9 mΩ		ISZ034N06LM5 $R_{DS(on)}$ = 3.4 mΩ	
2-4		IRLS3036TRLPBF $R_{DS(on)}$ =2.4 mΩ			IRLB3036PBF $R_{DS(on)}$ =2.4 mΩ		BSZ037N06LS5 $R_{DS(on)}$ =3.7 mΩ	BSC027N06LS5 $R_{DS(on)}$ =2.7 mΩ
4-10							BSZ040N06LS5 $R_{DS(on)}$ =4.0 mΩ	BSC065N06LS5 $R_{DS(on)}$=6.5 mΩ
	IRLR3636TRPBF $R_{DS(on)}$ =6.8 mΩ						BSZ065N06LS5 $R_{DS(on)}$ =6.5 mΩ	BSC094N06LS5 $R_{DS(on)}$ =9.4 mΩ
							BSZ099N06LS5 $R_{DS(on)}$ =9.9 mΩ	
>10						IRL60HS118 $R_{DS(on)}$=17.0 mΩ		

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1) 6 V rated ($R_{DS(on)}$ also specified @ V_{GS} = 6 V)

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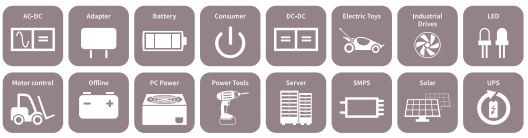

OptiMOS™ and StrongIRFET™ 75 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	TO-247	DirectFET™	SuperSO8
1-2			IRFS7730TRL7PP $R_{DS(on)}$ =2.0 mΩ		IRFP7718PBF $R_{DS(on)}$ =1.8 mΩ		
					IRFP4368PBF $R_{DS(on)}$ =1.85 mΩ		
2-4		IRFS7730TRLPBF $R_{DS(on)}$ =2.6 mΩ	IRFS3107TRL7PP $R_{DS(on)}$ =2.6 mΩ		IRFP3077PBF $R_{DS(on)}$ =3.3 mΩ	IRF7759L2TRPBF $R_{DS(on)}$ =2.3 mΩ	
		IRFS3107TRLPBF $R_{DS(on)}$ =3.0 mΩ		IRFB7730PBF $R_{DS(on)}$ =2.6 mΩ			
			IRFS7734TRL7PP $R_{DS(on)}$ =3.05 mΩ	IRFB3077PBF $R_{DS(on)}$ =3.3 mΩ			
		IRFS7734TRLPBF $R_{DS(on)}$ =3.5 mΩ					
				IRFB7734PBF $R_{DS(on)}$ =3.5 mΩ			
4-10		IRFS3207ZTRLPBF $R_{DS(on)}$ =4.1 mΩ		IRFB3207ZPBF $R_{DS(on)}$ =4.5 mΩ			
		IRFS3307ZTRLPBF $R_{DS(on)}$ =5.8 mΩ		IRFB3307ZPBF $R_{DS(on)}$ =5.8 mΩ			
						IRF7780MTRPBF $R_{DS(on)}$ =5.7 mΩ	IRFH5007TRPBF $R_{DS(on)}$ =5.9 mΩ
	IRFR7740TRPBF $R_{DS(on)}$ =7.2 mΩ			IRFB7740PBF $R_{DS(on)}$ =7.3 mΩ			
		IRFS7787TRLPBF $R_{DS(on)}$ =8.4 mΩ		IRFB7787PBF $R_{DS(on)}$ =8.4 mΩ			IRFH7787TRPBF $R_{DS(on)}$ =8.0 mΩ
	IRFR3607PBF $R_{DS(on)}$ =9.0 mΩ	IRFS3607TRLPBF $R_{DS(on)}$=9.0 mΩ		IRFB3607PBF $R_{DS(on)}$ =9.0 mΩ			
>10	IRFR7746TRPBF $R_{DS(on)}$ =11.2 mΩ			IRFB7746PBF $R_{DS(on)}$ =10.6 mΩ			

OptiMOS™ and StrongIRFET™ 80 V normal level / logic level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	TO-220 FullPAK	DirectFET™	PQFN 2x2	PQFN 3.3x3.3	SuperSO8	TO-Leadless
1-2		IPB017N08N5 $R_{DS(on)}$ =1.7 mΩ	IPB015N08N5 $R_{DS(on)}$ =1.5 mΩ	IPP016N08NF2S $R_{DS(on)}$=1.6 mΩ					BSC019N08NS5 $R_{DS(on)}$=1.9 mΩ	IPT010N08NM5 $R_{DS(on)}$=1.0 mΩ
				IPP019N08NF2S $R_{DS(on)}$=1.9 mΩ						
		IPB020N08N5 $R_{DS(on)}$ =2.0 mΩ	IPB019N08N5 $R_{DS(on)}$ =1.95 mΩ	IPP020N08N5 $R_{DS(on)}$ =2.0 mΩ						IPT012N08N5 $R_{DS(on)}$ =1.2 mΩ
2-4				IPP024N08NF2S $R_{DS(on)}$=2.4 mΩ					BSC021N08NS5 $R_{DS(on)}$ =2.1 mΩ	IPT013N08NM5LF $R_{DS(on)}$ = 1.3 mΩ
		IPB024N08N5 $R_{DS(on)}$ =2.4 mΩ		IPP023N08N5 $R_{DS(on)}$ =2.3 mΩ					BSC025N08LS5 $R_{DS(on)}$ =2.5 mΩ	IPT014N08NM5 $R_{DS(on)}$=1.4 mΩ
				IPP027N08N5 $R_{DS(on)}$ =2.7 mΩ					BSC026N08NS5 $R_{DS(on)}$ =2.6 mΩ	IPT019N08N5 $R_{DS(on)}$ =1.9 mΩ
									BSC030N08NS5 $R_{DS(on)}$ =3.0 mΩ	IPT029N08N5 $R_{DS(on)}$ =2.9 mΩ
		IPB031N08N5 $R_{DS(on)}$ =3.1 mΩ		IPP034N08N5 $R_{DS(on)}$ =3.4 mΩ					BSC037N08NS5 $R_{DS(on)}$ =3.7 mΩ	
									BSC037N08NS5T $R_{DS(on)}$= 3.7 mΩ	
4-10				IPP040N08NF2S $R_{DS(on)}$=4.0 mΩ					BSC040N08NS5 $R_{DS(on)}$ =4.0 mΩ	
	IPD046N08N5 $R_{DS(on)}$=4.6 mΩ	IPB049N08N5 $R_{DS(on)}$ =4.9 mΩ		IPP052N08N5 $R_{DS(on)}$ =5.2 mΩ	IPA040N08NM5S $R_{DS(on)}$ =4.0 mΩ					
					IPA052N08NM5S $R_{DS(on)}$ =5.2 mΩ				BSC052N08NS5 $R_{DS(on)}$ =5.2 mΩ	
				IPP055N08NF2S $R_{DS(on)}$=5.5 mΩ				BSZ070N08LS5 $R_{DS(on)}$ =7.0 mΩ		
						IRF6646TRPBF $R_{DS(on)}$ =9.5 mΩ		BSZ075N08NS5 $R_{DS(on)}$ =7.5 mΩ	BSC061N08NS5 $R_{DS(on)}$ =6.1 mΩ	
						IRF7854TRPBF $R_{DS(on)}$ =9.5 mΩ		BSZ084N08NS5 $R_{DS(on)}$ =8.4 mΩ	BSC072N08NS5 $R_{DS(on)}$ =7.2 mΩ	
>10							IRL80HS120 $R_{DS(on)}$=32.0 mΩ	BSZ110N08NS5 $R_{DS(on)}$ =11.0 mΩ	BSC117N08NS5 $R_{DS(on)}$ =11.7 mΩ	

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1) DirectFET™ S

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OptiMOS™ and StrongIRFET™ 80 V normal level / logic level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	TOLG (TO-Leaded Gullwing)	TOLT (TO-Leaded top-side cooling)	sTOLL
1-2	IPTG011N08NM5 $R_{DS(on)}$ = 1.1 mΩ	IPTC012N08NM5 $R_{DS(on)}$= 1.2 mΩ	IST019N08NM5 $R_{DS(on)}$ = 1.9mΩ
	IPTG018N08NM5 $R_{DS(on)}$= 1.8 mΩ	IPTC014N08NM5 $R_{DS(on)}$ = 1.4 mΩ	
	IPTG025N08NM5 $R_{DS(on)}$= 2.5 mΩ		

OptiMOS™ and StrongIRFET™ 100 V normal level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	TO-220 FullPAK	TO-247
1-2		IPB020N10N5 $R_{DS(on)}$ =2.0 mΩ	IPB017N10N5 $R_{DS(on)}$ =1.7 mΩ			IRF100P218 $R_{DS(on)}$=1.1 mΩ
		IPB020N10N5LF $R_{DS(on)}$=2.0 mΩ	IPB017N10N5LF $R_{DS(on)}$=1.7 mΩ			IRF100P219 $R_{DS(on)}$=2.1 mΩ
2-4			IPB024N10N5 $R_{DS(on)}$ =2.4 mΩ	IPP023N10N5 $R_{DS(on)}$ =2.3 mΩ	IPA030N10NF2S $R_{DS(on)}$=3.0 mΩ	IRFP4468PBF $R_{DS(on)}$ =2.6 mΩ
		IPB027N10N5 $R_{DS(on)}$ =2.7 mΩ		IPP026N10NF2S $R_{DS(on)}$=2.6 mΩ		
		IPB033N10N5LF $R_{DS(on)}$ =3.3 mΩ	IPB032N10N5 $R_{DS(on)}$ =3.2 mΩ	IPP030N10N5 $R_{DS(on)}$=3.0 mΩ		
				IPP039N10N5 $R_{DS(on)}$=3.9 mΩ		
4-10	IPD050N10N5 $R_{DS(on)}$=5.0 mΩ		IRFS4010TRL7PP $R_{DS(on)}$ =4.0 mΩ	IRF100B201 $R_{DS(on)}$ =4.2 mΩ		IRFP4110PBF $R_{DS(on)}$ =4.5 mΩ
		IRF100S201 $R_{DS(on)}$ =4.2 mΩ		IRFB4110PBF $R_{DS(on)}$ =4.5 mΩ	IPA050N10NM5S $R_{DS(on)}$ =5.0 mΩ	IRFP4310ZPBF $R_{DS(on)}$ =6.0 mΩ
		IRFS4010TRLPBF $R_{DS(on)}$ =4.7 mΩ		IPP050N10NF2S $R_{DS(on)}$=5.0 mΩ		
				IRFB4310ZPBF $R_{DS(on)}$ =6.0 mΩ	IPA082N10NF2S $R_{DS(on)}$=8.2 mΩ	
		IRFS4310ZTRLPBF $R_{DS(on)}$ =7.0 mΩ		IPP082N10NF2S $R_{DS(on)}$=8.2 mΩ	IPA083N10N5 $R_{DS(on)}$ =8.3 mΩ	
				IPP083N10N5 $R_{DS(on)}$ =8.3 mΩ	IPA083N10NM5S $R_{DS(on)}$ =8.3 mΩ	
				IRF100B202 $R_{DS(on)}$ =8.6 mΩ		
		IRFS4410ZTRLPBF $R_{DS(on)}$ =9.0 mΩ				
				IRFB4410ZPBF $R_{DS(on)}$ =9.0 mΩ		
10-25				IPP129N10NF2S $R_{DS(on)}$=12.9 mΩ		
	IRFR4510TRPBF $R_{DS(on)}$ =13.9 mΩ	IRFS4510TRLPBF $R_{DS(on)}$ =13.9 mΩ		IRFB4510PBF $R_{DS(on)}$ =13.5 mΩ	IPA126N10NM3S $R_{DS(on)}$ =12.6 mΩ	
>25	IPD78CN10N G $R_{DS(on)}$ =78.0 mΩ					

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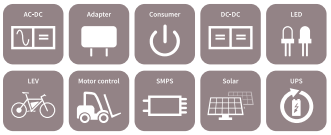
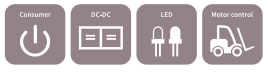


OptiMOS™ and StrongIRFET™ 100 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3x3.3	SuperSO8	SuperSO8 super cool	SO8	TO-Leadless	TOLT (TO-Leaded top-side cooling)	TOLG (TO-Leaded Gullwing)	sTOLL
1-2		ISZ080N10NM6 $R_{DS(on)}$= 8.0 mΩ	ISC022N10NM6 $R_{DS(on)}$= 2.2 mΩ			IPT015N10N5 $R_{DS(on)}$ =1.5 mΩ	IPTC015N10NM5 $R_{DS(on)}$ = 1.5 mΩ	IPTG014N10NM5 $R_{DS(on)}$ = 1.4 mΩ	
			ISC027N10NM6 $R_{DS(on)}$= 2.7 mΩ					IPTG018N10NM5 $R_{DS(on)}$ = 1.8 mΩ	
			ISC030N10NM6 $R_{DS(on)}$= 3.0 mΩ				IPTC019N10NM5 $R_{DS(on)}$ = 1.9 mΩ		
2-4			BSC027N10NS5 $R_{DS(on)}$= 2.7 mΩ					IPTG025N10NM5 $R_{DS(on)}$ = 2.5 mΩ	
						IPT020N10N5 $R_{DS(on)}$ =2.0 mΩ			
	IRF7769L1TRPBF $R_{DS(on)}$ =3.5 mΩ		BSC035N10NS5 $R_{DS(on)}$ =3.5 mΩ	BSC040N10NS5SC $R_{DS(on)}$ =4.0 mΩ		IPT026N10N5 $R_{DS(on)}$ =2.6 mΩ			IST026N10NM5 $R_{DS(on)}$ = 2.6 mΩ
			BSC040N10NS5 $R_{DS(on)}$ =4.0 mΩ						
4-10			BSC050N10N5 $R_{DS(on)}$ =5.0 mΩ						
			ISC060N10NM6 $R_{DS(on)}$= 6.0 mΩ						
			BSC070N10NS5 $R_{DS(on)}$ =7.0 mΩ	BSC070N10NS5SC $R_{DS(on)}$ =7.0 mΩ					
			ISC080N10NM6 $R_{DS(on)}$= 8.0 mΩ						
			IRFH5010TRPBF $R_{DS(on)}$ =9.0 mΩ						
		BSZ097N10NS5 $R_{DS(on)}$ =9.7 mΩ	BSC098N10NS5 $R_{DS(on)}$ =9.8 mΩ						
10-25	IRF6644TRPBF $R_{DS(on)}$ =13.0 mΩ	ISZ230N10NM6 $R_{DS(on)}$= 23 mΩ							
			IRFH5110TRPBF $R_{DS(on)}$ =12.4 mΩ						
			IRFH5210TRPBF $R_{DS(on)}$ =14.9 mΩ						
	IRF6662TRPBF $R_{DS(on)}$ =22.0 mΩ		ISC230N10NM6 $R_{DS(on)}$ =23 mΩ		IRF7853TRPBF $R_{DS(on)}$ =18.0 mΩ				
>25	IRF6645TRPBF $R_{DS(on)}$ =35.0 mΩ								
	IRF6665TRPBF $R_{DS(on)}$ =63.0 mΩ	IRFHM3911TRPBF $R_{DS(on)}$ = 115 mΩ							



OptiMOS™ and StrongIRFET™ 100 V logic level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-220	PQFN 2x2	PQFN 3.3x3.3	SuperSO8
2-4			IRLS4030TRL7PP $R_{DS(on)}$ =3.9 mΩ				BSC034N10LS5 $R_{DS(on)}$ =3.4 mΩ
4-10		IRLS4030TRLPBF $R_{DS(on)}$ =4.3 mΩ		IRLB4030PBF $R_{DS(on)}$ =4.3 mΩ		BSZ096N10LS5 $R_{DS(on)}$ =9.6 mΩ	BSC070N10LS5 $R_{DS(on)}$=7.0 mΩ
							IRLH5030TRPBF $R_{DS(on)}$=9.0 mΩ
							BSC096N10LS5 $R_{DS(on)}$=9.6 mΩ
10-25						BSZ146N10LS5 $R_{DS(on)}$ =14.6 mΩ	
	IRLR3110ZTRPBF $R_{DS(on)}$ =14.0 mΩ						BSC146N10LS5 $R_{DS(on)}$ =14.6 mΩ
>25					IRL100HS121 $R_{DS(on)}$=42.0 mΩ		

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OptiMOS™ and StrongIRFET™ 120 V normal level / logic level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-262 (I^2PAK)	TO-220	PQFN 3.3x3.3	SuperSO8	TO-Leadless (TOLL)
2-4		IPB038N12N3 G $R_{DS(on)}$=3.8 mΩ	IPB036N12N3 G $R_{DS(on)}$=3.6 mΩ					IPT030N12N3 G $R_{DS(on)}$=3.0 mΩ
4-10				IPI041N12N3 G $R_{DS(on)}$=4.1 mΩ	IPP041N12N3 G $R_{DS(on)}$=4.1 mΩ		BSC077N12NS3 G $R_{DS(on)}$=7.7 mΩ	
					IPP048N12N3 G $R_{DS(on)}$=4.8 mΩ		BSC080N12LS G* $R_{DS(on)}$=8.0 mΩ	
				IPI076N12N3 G $R_{DS(on)}$=7.6 mΩ	IPP076N12N3 G $R_{DS(on)}$=7.6 mΩ			
10-25	IPD110N12N3 G $R_{DS(on)}$=11.0 mΩ				IPP114N12N3 G $R_{DS(on)}$=11.4 mΩ		BSC120N12LS G* $R_{DS(on)}$=12.0 mΩ	
		IPB144N12N3 G $R_{DS(on)}$=14.4 mΩ			IPP147N12N3 G $R_{DS(on)}$=14.7 mΩ	BSZ240N12NS3 G $R_{DS(on)}$=24.0 mΩ	BSC190N12NS3 G $R_{DS(on)}$=19.0 mΩ	

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* logic level devices

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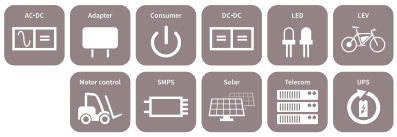
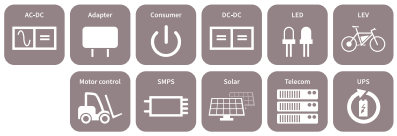


OptiMOS™ and StrongIRFET™ 135-150 V normal level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3x3.3	SuperSO8	TO-Leadless
4-10			BSC074N15NS5 [2] $R_{DS(on)}$ =7.4 mΩ	IPT039N15N5 $R_{DS(on)}$ = 3.9 mΩ
			BSC093N15NS5 $R_{DS(on)}$ =9.3 mΩ	IPT044N15N5 $R_{DS(on)}$ = 4.4 mΩ
				IPT054N15N5 $R_{DS(on)}$ = 5.4 mΩ
				IPT063N15N5 $R_{DS(on)}$ = 6.3 mΩ
10-25	IRF7779L2TRPBF [2] $R_{DS(on)}$ =11.0 mΩ		BSC110N15NS5 $R_{DS(on)}$ =11.0 mΩ	
			BSC160N15NS5 $R_{DS(on)}$ =16.0 mΩ	
>25		BSZ300N15NS5 $R_{DS(on)}$ =30.0 mΩ	IRFH5015TRPBF $R_{DS(on)}$ =31.0 mΩ	
	IRF6643TRPBF $R_{DS(on)}$ =34.5 mΩ		IRFH5215TRPBF $R_{DS(on)}$ =58.0 mΩ	
	IRF6775MTRPBF $R_{DS(on)}$ =56.0 mΩ			



OptiMOS™ and StrongIRFET™ 135-150 V normal level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TO-263 (D^2PAK 7-pin)	TO-262 (I^2PAK)	TO-220	TO-247
4-10		IPB048N15N5 $R_{DS(on)}$=4.8 mΩ	IPB044N15N5 $R_{DS(on)}$=4.4 mΩ	IPI051N15N5 $R_{DS(on)}$=5.1 mΩ	IPP051N15N5 [2] $R_{DS(on)}$=5.1 mΩ	IRF150P220 $R_{DS(on)}$=2.5 mΩ
		IPB048N15N5LF $R_{DS(on)}$=4.8 mΩ	IRF135SA204 [2] $R_{DS(on)}$ =5.9 mΩ			IRF150P221 $R_{DS(on)}$=4.8 mΩ
			IPB060N15N5 $R_{DS(on)}$=6.0 mΩ			IRFP4568PBF $R_{DS(on)}$ =5.9 mΩ
		IPB073N15N5 $R_{DS(on)}$=7.3 mΩ		IPI076N15N5 $R_{DS(on)}$=7.6 mΩ	IPP076N15N5 $R_{DS(on)}$=7.6 mΩ	
		IPB083N15N5LF $R_{DS(on)}$=8.3 mΩ				
		IRF135S203 [2] $R_{DS(on)}$ =8.4 mΩ			IRF135B203 [2] $R_{DS(on)}$ =8.4 mΩ	
					IRFB4115PBF $R_{DS(on)}$ =11.0 mΩ	
10-25			IRFS4115TRL7PP $R_{DS(on)}$ =11.8 mΩ			
		IRFS4321 $R_{DS(on)}$ =15.0 mΩ			IRFB4321PBF $R_{DS(on)}$ =15.0 mΩ	IRFP4321PBF $R_{DS(on)}$ =15.5 mΩ
		IRFS4115TRLPBF $R_{DS(on)}$ =12.1 mΩ			IRFB4228PBF $R_{DS(on)}$ =15.0 mΩ	
>25		IRFS4615PBF $R_{DS(on)}$ =42.0 mΩ			IRFB4615PBF $R_{DS(on)}$ =39.0 mΩ	
	IRFR4615 $R_{DS(on)}$ =42.0 mΩ				IRFB5615PBF $R_{DS(on)}$ =39.0 mΩ	
					IRFB4019PBF $R_{DS(on)}$ =95.0 mΩ	

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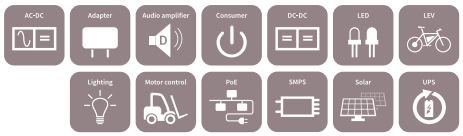
1) 8 V rated ($R_{DS(on)}$ also specified @ V_{GS} = 8 V)
2) 135 V

For more details on the product, click on the part number, visit infineon.com or contact our product support.



OptiMOS™ and StrongIRFET™ 200 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D²PAK)	TO-220	TO-220 FullPAK	TO-247
4-10					IRF200P222 $R_{DS(on)}$=6.6 mΩ
					IRFP4668PBF $R_{DS(on)}$ =9.7 mΩ
10-25		IPB107N20N3 G $R_{DS(on)}$ =10.7 mΩ	IPP110N20N3 G $R_{DS(on)}$ =11.0 mΩ		IRF200P223 $R_{DS(on)}$=11.5 mΩ
		IPB110N20N3LF $R_{DS(on)}$=11.0 mΩ			
		IPB117N20NFD $R_{DS(on)}$ =11.7 mΩ	IPP120N20NFD $R_{DS(on)}$ =12.0 mΩ		IRFP4127PBF $R_{DS(on)}$ =21.0 mΩ
		IPB156N22NFD [1] $R_{DS(on)}$ =15.6 mΩ	IRFB4127PBF $R_{DS(on)}$ =20.0 mΩ		IRFP4227PBF $R_{DS(on)}$ =25.0 mΩ
		IRFS4127TRLPBF $R_{DS(on)}$ =22.0 mΩ			
>25		IRFS4227TRLPBF $R_{DS(on)}$ =26.0 mΩ	IRFB4227PBF $R_{DS(on)}$ =26.0 mΩ	IPA320N20NM3S $R_{DS(on)}$ =32.0 mΩ	
	IPD320N20N3 G $R_{DS(on)}$ =32.0 mΩ	IPB320N20N3 G $R_{DS(on)}$ =32.0 mΩ	IPP320N20N3 G $R_{DS(on)}$ =32.0 mΩ		
			IRFB4620PBF $R_{DS(on)}$ =72.5 mΩ		
	IRFR4620TRLPBF $R_{DS(on)}$ =78.0 mΩ	IRFS4620TRLPBF $R_{DS(on)}$ =78.0 mΩ	IRFB5620PBF $R_{DS(on)}$ =72.5 mΩ		
		IRFS4020TRLPBF $R_{DS(on)}$ =105.0 mΩ	IRFB4020PBF $R_{DS(on)}$ =100.0 mΩ		
			IRF200B211 $R_{DS(on)}$ =170.0 mΩ		

OptiMOS™ and StrongIRFET™ 200 V normal level

$R_{DS(on),\ max.}$ @V_{GS}=10 V [mΩ]	DirectFET™	PQFN 3.3x3.3	SuperSO8	SO8	TO-Leadless	TOLG (TO-Leaded Gullwing)
10-25			BSC220N20NSFD $R_{DS(on)}$=22.0 mΩ		IPT111N20NFD $R_{DS(on)}$=11.1 mΩ	IPTG111N20NM3FD $R_{DS(on)}$ = 11.1 mΩ
>25			BSC320N20NS3 G $R_{DS(on)}$ =32.0 mΩ			
			BSC350N20NSFD $R_{DS(on)}$=35.0 mΩ			
			BSC500N20NS3G $R_{DS(on)}$ =50.0 mΩ			
	IRF6641TRPBF $R_{DS(on)}$ =59.9 mΩ		IRFH5020 $R_{DS(on)}$ =55.0 mΩ			
		BSZ900N20NS3 G $R_{DS(on)}$ =90.0 mΩ	BSC900N20NS3 G $R_{DS(on)}$ =90.0 mΩ	IRF7820TRPBF $R_{DS(on)}$ =78.0 mΩ		
	IRF6785TRPBF $R_{DS(on)}$ =100.0 mΩ	BSZ12DN20NS3 G $R_{DS(on)}$ =125.0 mΩ	BSC12DN20NS3 G $R_{DS(on)}$ =125.0 mΩ			
		BSZ22DN20NS3 G $R_{DS(on)}$ =225.0 mΩ	BSC22DN20NS3 G $R_{DS(on)}$ =225.0 mΩ			

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1) 220 V rated

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ and StrongIRFET™ 250 V normal level

$R_{DS(on),max.}$ @V_{GS}=10 V [mΩ]	TO-252 (DPAK)	TO-263 (D^2PAK)	TOLG (TO-Leaded Gullwing)	TO-220	TO-220 FullPAK	TO-247	PQFN 3.3x3.3	SuperSO8	TO-Leadless
10-25		IPB200N25N3 G $R_{DS(on)}$ =20.0 mΩ	IPTG210N25NM3FD $R_{DS(on)}$ = 21 mΩ	IPP200N25N3 G $R_{DS(on)}$ =20.0 mΩ		IRF250P224 $R_{DS(on)}$=12.0 mΩ			
				IPP220N25NFD $R_{DS(on)}$ =22.0 mΩ		IRFP4768PBF $R_{DS(on)}$ =17.5 mΩ			IPT210N25NFD $R_{DS(on)}$=21.0 mΩ
						IRF250P225 $R_{DS(on)}$=22.0 mΩ			
>25								BSC430N25NSFD $R_{DS(on)}$=43.0 mΩ	
		IRFS4229TRLPBF $R_{DS(on)}$ =48.0 mΩ		IRFB4332PBF $R_{DS(on)}$ =33.0 mΩ		IRFP4332PBF $R_{DS(on)}$ =33.0 mΩ		BSC600N25NS3 G $R_{DS(on)}$ =60.0 mΩ	
	IPD600N25N3 G $R_{DS(on)}$ =60.0 mΩ	IPB600N25N3 G $R_{DS(on)}$ =60.0 mΩ		IRFB4229PBF $R_{DS(on)}$ =46.0 mΩ				BSC670N25NSFD $R_{DS(on)}$=67.0 mΩ	
				IPP600N25N3 G $R_{DS(on)}$ =60.0 mΩ	IPA600N25NM3S $R_{DS(on)}$=60.0 mΩ	IRFP4229PBF $R_{DS(on)}$ =46.0 mΩ	BSZ16DN25NS3 G $R_{DS(on)}$ =165.0 mΩ	IRFH5025 $R_{DS(on)}$ =100.0 mΩ	
							BSZ42DN25NS3 G $R_{DS(on)}$ =425.0 mΩ	BSC16DN25NS3 G $R_{DS(on)}$ =165.0 mΩ	

OptiMOS™ and StrongIRFET™ 300 V normal level

$R_{DS(on),max.}$ @ V_{GS}=10 V [mΩ]	TO-263 (D^2PAK)	TO-220	TO-247	SuperSO8
0-25			IRF300P226 $R_{DS(on)}$=19.0 mΩ	
>25	IPB407N30N $R_{DS(on)}$ =40.7 mΩ	IPP410N30N $R_{DS(on)}$ =41.0 mΩ	IRFP4868PBF $R_{DS(on)}$ =32.0 mΩ	
			IRF300P227 $R_{DS(on)}$ = 40 mΩ	
		IRFB4137PBF $R_{DS(on)}$ =69.0 mΩ	IRFP4137PBF $R_{DS(on)}$ =69.0 mΩ	BSC13DN30NSFD $R_{DS(on)}$=130.0 mΩ

Power MOSFETs complementary

Voltage [V]			PQFN 3.3x3.3	SO8
Complementary	-20/20	>50 mΩ	BSZ15DC02KD H*/** N: 55 mΩ, 5.1 A P: 150 mΩ, -3.2 A	
			BSZ215C H*/** N: 55 mΩ, 5.1 A P: 150 mΩ, -3.2 A	
	-30/30	27-64 mΩ		IRF9389 N: 27 mΩ, 6.8 A P: 64 mΩ, -4.6 A
	-60/60	11-30 Ω		BSO612CV G* N: 0.12 Ω, 3.0 A P: 0.30 Ω, -2.0 A
				BSO615C G* N: 0.11 Ω, 3.1 A P: 0.30 Ω, -2.0 A

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*Products are qualified to Automotive AEC Q101
**$R_{DS(on)}$ specified at 4.5 V

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Power P-channel MOSFETs

Voltage [V]	TO-252 (DPAK)	TO-263 (D²PAK)	TO-220	PQFN 3.3x3.3	SuperSO8	SO8	PQFN 2x2
P-channel MOSFETs -20						BSO201SP H $R_{DS(on)}$ =7.0 mΩ	
							IRLHS2242TRPBF** $R_{DS(on)}$ =31.0 mΩ
-30					BSC030P03NS3 G $R_{DS(on)}$ =3.0 mΩ	IRF9310 $R_{DS(on)}$=4.6 mΩ	
	IPD042P03L3 G $R_{DS(on)}$ =4.2 mΩ				BSC060P03NS3E G $R_{DS(on)}$ =6.0 mΩ; ESD	IRF9317 $R_{DS(on)}$=6.6 mΩ	
				BSZ086P03NS3 G $R_{DS(on)}$ =8.6 mΩ	IRFH9310 $R_{DS(on)}$ =4.6 mΩ	IRF9321 $R_{DS(on)}$=7.2 mΩ	
	SPD50P03L G [1]* $R_{DS(on)}$ =7.0 mΩ			BSZ086P03NS3E G $R_{DS(on)}$ =8.6 mΩ			
					BSC084P03NS3 G $R_{DS(on)}$ =8.4 mΩ		
						BSO080P03S H $R_{DS(on)}$ =8.0 mΩ	
				BSZ120P03NS3 G $R_{DS(on)}$ =12.0 mΩ		BSO301SP H $R_{DS(on)}$ =8.0 mΩ	
						IRF9328 $R_{DS(on)}$=11.9 mΩ	
						IRF9388TRPBF $R_{DS(on)}$=11.9 mΩ	
						IRF9358 $R_{DS(on)}$=16 mΩ; dual	
				BSZ180P03NS3 G $R_{DS(on)}$ =18.0 mΩ		IRF9333 $R_{DS(on)}$=19.4 mΩ	
				BSZ180P03NS3E G $R_{DS(on)}$ =18.0 mΩ; ESD			
							IRFHS9301TRPBF $R_{DS(on)}$ =37.0 mΩ
						IRF9362 $R_{DS(on)}$=21 mΩ; dual	IRFHS9351TRPBF $R_{DS(on)}$ =170.0 mΩ; dual
						IRF9335 $R_{DS(on)}$=59 mΩ	
-60	IPD380P06NM $R_{DS(on)}$= 38 mΩ	IPB110P06LM $R_{DS(on)}$= 11 mΩ	SPP80P06P H* $R_{DS(on)}$ =23.0 mΩ				
	IPD650P06NM $R_{DS(on)}$= 65 mΩ	SPB80P06P G* $R_{DS(on)}$ =23.0 mΩ					
	SPD30P06P G* $R_{DS(on)}$ =75.0 mΩ						
	IPD900P06NM $R_{DS(on)}$ = 90 mΩ						
	SPD18P06P G* $R_{DS(on)}$ =130.0 mΩ	SPB18P06P G* $R_{DS(on)}$ =130.0 mΩ	SPP18P06P H* $R_{DS(on)}$ =130.0 mΩ			BSO613SPV G* $R_{DS(on)}$ =130.0 mΩ	
	SPD09P06PL G* $R_{DS(on)}$ =250.0 mΩ						
	IPD25DP06LM $R_{DS(on)}$ = 250 mΩ						
	IPD25DP06NM $R_{DS(on)}$ = 250 mΩ						
	SPD08P06P G* $R_{DS(on)}$ =300.0 mΩ						
	IPD40DP06NM $R_{DS(on)}$ = 400 mΩ						
-100	SPD15P10PL G* $R_{DS(on)}$ =200.0 mΩ	IPB320P10LM $R_{DS(on)}$ = 32 mΩ	SPP15P10PL H* $R_{DS(on)}$ =200.0 mΩ				
	SPD15P10P G* $R_{DS(on)}$ =240.0 mΩ	IPB330P10NM $R_{DS(on)}$ = 33 mΩ	IPP330P10NM $R_{DS(on)}$ =33 mΩ				
	SPD04P10PL G* $R_{DS(on)}$ =850.0 mΩ	IPB19DP10NM $R_{DS(on)}$ = 185 mΩ					
	SPD04P10P G* $R_{DS(on)}$ =1000.0 mΩ						
	IPD11DP10NM $R_{DS(on)}$ =111 mΩ						
	IPD18DP10LM $R_{DS(on)}$ = 178 mΩ						
	IPD19DP10NM $R_{DS(on)}$ = 186 mΩ						
-150	IPD42DP15LM $R_{DS(on)}$ = 420 mΩ	IPB720P15LM $R_{DS(on)}$ = 72 mΩ					

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* Products are qualified to Automotive AEC Q101
** $R_{DS(on)}$ specified at 4.5 V
1) 5-leg

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Small-signal/small-power N-channel

	Voltage [V]	SOT-223	TSOP-6	SOT-89	SC59	SOT-23	SOT-323	SOT-363
N-channel	20 V		BSL202SN [4] 36 mΩ, 7.5 A, SLL		BSR802N [5] 32 mΩ, 3.7 A, ULL	IRLML2402 [1] [3] 250 mΩ, 1.2 A, SLL	BSS816NW [5] 240 mΩ, 1.4 A, ULL	BSD214SN [4] 250 mΩ, 1.5 A, SLL
			IRLMS2002 [1] [4] 45 mΩ, 6.5 A, SLL		BSR202N [4] 33 mΩ, 3.8 A, SLL	IRLML6244 [1] [4] 27 mΩ, 6.3 A, SLL	BSS214NW [4] 250 mΩ, 1.5 A, SLL	BSD840N [5] 560 mΩ, 0.88 A, ULL, dual
			BSL806N [5] 82 mΩ, 2.3 A, ULL, dual			IRLML6246 [1] [4] 66 mΩ, 4.1 A, SLL		BSD235N [4] 600 mΩ, 0.95 A, SLL, dual
			IRLMS1902 [1] [3] 100mΩ, 3.2 A, SLL			IRLML2502 [1] [4] 80 mΩ, 4.2 A, SLL		
						BSS806N [5] 82 mΩ, 2.3 A, ULL		
						BSS806NE [5] 82 mΩ, 2.3 A, ULL, ESD		
						BSS205N [4] 85 mΩ, 2.5 A, SLL		
						BSS214N [4] 250 mΩ, 1.5 A, SLL		
	25 V					IRFML8244 [1] [3] 41 mΩ, 5.8 A, LL		
	30 V		IRLTS6342 [1] [4] 22 mΩ, 8.3 A, SLL			IRLML6344 [1] [4] 37 mΩ, 5.0 A, SLL		BSD316SN [3] 280 mΩ, 1.4 A, LL
			IRFTS8342 [1] [3] 29 mΩ, 8.2 A, LL			IRLML0030 [1] [3] 40 mΩ, 5.3 A, LL		
			IRLMS1503 [1] [3] 200mΩ, 3.2A, LL			IRLML6346 [1] [4] 80 mΩ, 3.4 A, SLL		
						BSS306N [3] 93 mΩ, 2.3 A, LL		
						IRLML2030 [1] [3] 154 mΩ, 2.7 A, LL		
						BSS316N [3] 280 mΩ, 1.4 A, LL		
						IRLML2803 [3] 400 mΩ, 1.2 A, LL		
	40 V					IRLML0040 [1] [3] 78 mΩ, 3.6 A, LL		
	55 V	IRFL024Z [1] [2] 57.5 mΩ, 5.1 A, NL				BSS670S2L [3] 825 mΩ, 0.54 A, LL		
		IRLL2705 [1] [3] 65 mΩ, 3.8 A, LL						
		IRFL4105 [1] [2] 45 mΩ, 3.7 A, NL						
		IRLL024N [1] [3] 100 mΩ, 3.5 A, LL						
		IRLL014N [1] [3] 280 mΩ, 2.0 A, LL						
		IRFL014N [1] [2] 160 mΩ, 1.9 A, NL						
	60 V	BSP320S [2] 120 mΩ, 2.9 A, NL	BSL606SN [3] 95 mΩ, 4.5 A, LL	BSS606N [3] 90 mΩ, 3.2 A, LL		IRLML0060 [1] [3] 116 mΩ, 2.7 A, LL	BSS138W [3] 4 Ω, 0.28 A, LL	2N7002DW [3] 4 Ω, 0.3 A, LL, dual
		BSP318S [3] 150 mΩ, 2.6 A, LL				IRLML2060 [1] [3] 640 mΩ, 1.2 A, LL	SN7002W [3] 7.5 Ω, 0.23 A, LL	
		BSP295 [3] 500 mΩ, 1.8 A, LL				2N7002 [1] [3] 4 Ω, 0.3 A, LL		
						BSS138I [1] [3] 4 Ω, 0.23 A, LL		
						BSS138N [3] 4 Ω, 0.23 A, LL		
						SN7002I [1] [3] 7.5 Ω, 0.2 A, LL		
						SN7002N [3] 7.5 Ω, 0.2 A, LL		
						BSS7728N [3] 7.5 Ω, 0.2 A, LL		
						BSS159N [6] 8 Ω, 0.13 A, depletion		
	100 V	BSP373N [2] 240 mΩ, 1.8 A, NL				IRLML0100 235 mΩ, 1.6 A, LL		
		BSP372N [3] 270 mΩ, 1.8 A, LL				BSS119N [3] 10 Ω, 0.19 A, LL		
		BSP296N [3] 800 mΩ, 1.2 A, LL				BSS123I [1] [3] 10 Ω 0.19 A, LL		
						BSS123N [3] 10 Ω 0.19 A, LL		
						BSS169I [1] [6] 12 Ω, 0.09 A, depletion		
						BSS169 [6] 12 Ω, 0.09 A, depletion		
	150 V	IRFL4315 [1] [2] 185 mΩ, 2.6 A, NL	IRF5802 [1] [2] 1.2 Ω, 0.9 A, NL					
	200 V	BSP297 [3] 3 Ω, 0.66 A, LL	IRF5801 [1] [2] 2.2Ω, 0.6 A, NL					
		BSP149 [6] 3.5 Ω, 0.14 A, LL, depletion						
	240 V	BSP88 [3] 7.5 Ω, 0.35 A, LL		BSS87 [3] 7.5 Ω, 0.26 A, LL		BSS131 [3] 20 Ω, 0.11 A, LL		
		BSP89 [3] 7.5 Ω, 0.35 A, LL						
		BSP129 [6] 20 Ω, 0.05 A, LL, depletion						
	250 V					BSS139I [6] 30 Ω, 0.10 A, LL, depletion		
						BSS139 [6] 30 Ω, 0.10 A, LL, depletion		
	400 V	BSP324 [3] 22 Ω, 0.17 A, LL						
	600 V	BSP125 [3] 60 Ω, 0.12 A, LL		BSS225 [3] 45 Ω, 0.09 A, LL		BSS127I [1] [3] 600 Ω, 0.021 A, LL		
		BSP135I [1] [6] 60 Ω, 0.02 A, LL, depletion				BSS127 [3] 600 Ω, 0.021 A, LL		
		BSP135 [6] 60 Ω, 0.02 A, LL, depletion				BSS126I [1] [6] 700 Ω, 0.021 A, LL, depletion		
						BSS126 [6] 700 Ω, 0.021 A, LL, depletion		

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1) not qualified to Automotive AEC-Q101
2) $R_{DS(on)}$ specified at 10 V
3) $R_{DS(on)}$ specified at 4.5 V
4) $R_{DS(on)}$ specified at 2.5 V
5) $R_{DS(on)}$ specified at 1.8 V
6) $R_{DS(on)}$ specified at 0 V

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Small-signal/small-power P-channel

Voltage [V]		SOT-223	TSOP-6	SOT-89	SC59	SOT-23	SOT-323	SOT-363
P-channel MOSFETs	-250 V	BSP317P [3] 5 Ω, -0.43 A, LL		BSS192P [3] 15 Ω, -0.19 A, LL	BSR92P [3] 13 Ω, -0.14 A, LL			
		BSP92P [3] 15 Ω, -0.26 A, LL						
	-150 V	ISP14EP15LM [1] [3] 1.4 Ω, -1.29 A, LL						
	-100 V	BSP321P [2] 0.9 Ω, -0.98 A, NL			BSR316P [3] 2.2 Ω, -0.36 A, LL			
		BSP322P [3] 1 Ω, -1.0 A, LL						
		BSP316P [3] 2.3 Ω, -0.68 A, LL						
		ISP16DP10LM [1] [3] 190 mΩ, -3.9 A, LL						
		ISP98DP10LM [1] [3] 1.05 Ω, -1.55 A, LL						
		ISP20EP10LM [1] [3] 2.2 Ω, -0.99 A, LL						
	-60 V	ISP650P06NM [1] [2] 65 mΩ, -3.7 A, NL			BSR315P [3] 1.3 Ω, -0.62 A, LL	ISS17EP06LM [1] [3] 2.2 Ω, -0.3 A, LL	BSS84PW [3] 12 Ω, -0.15 A, LL	
		ISP12DP06NM [1] [2] 125 mΩ, -2.8 A, NL						
		ISP13DP06NMS [1] [2] 125 mΩ, -2.8 A, NL				BSS83P [3] 3 Ω, -0.33 A, LL		
		BSP613P [2] 130 mΩ, -2.9 A, NL				ISS55EP06LM [1] [3] 7 Ω, -0.18 A, LL		
		ISP25DP06NM [1] [2] 250 mΩ, -1.9 A, NL				BSS84P [3] 12 Ω, -0.17 A, LL		
		ISP26DP06NMS [1] [2] 260 mΩ, -1.9 A, NL						
		BSP170P [2] 300 mΩ, -1.9 A, NL						
		ISP25DP06LM [1] [3] 310 mΩ, -1.9 A, LL						
		ISP25DP06LMS [1] [3] 310 mΩ, -1.9 A, LL						
		BSP171P [3] 450 mΩ, -1.9 A, LL						
		ISP75DP06LM [1] [3] 1 Ω, -1.1 A, LL						
		BSP315P [3] 1.4 Ω, -1.17 A, LL						
	-40 V		IRF5803 [1] [2] 112 mΩ, -3.4 A, NL					
	-30 V		IRFTS9342 [1] [2] 40 mΩ, -5.8 A, NL			IRLML9301 [1] [3] 103 mΩ, -1.3 A, LL		BSD314SPE [3] 230 mΩ, -1.5 A, LL, ESD
			BSL307SP [3] 74 mΩ, -5.5 A, LL			BSS308PE [3] 130 mΩ, -2.1 A, LL, ESD		
			BSL308PE [3] 130 mΩ, -2.1 A, LL, dual, ESD			IRLML5203 [1] [3] 165 mΩ, -3.0 A, LL		
						BSS314PE [3] 230 mΩ, -1.5 A, LL, ESD		
						BSS315P [3] 270 mΩ, -1.5 A, LL		
						IRLML9303 [1] [4] 270 mΩ, -2.3 A, LL		
						IRLML5103 [1] [3] 1000mΩ, -0.76A, LL		
	-20 V		BSL207SP [4] 41 mΩ, -6.0 A, SLL			IRLML2244 [1] [4] 95 mΩ, -4.3 A, SLL	BSS209PW [4] 900 mΩ, -0.58 A, SLL	BSV236SP [4] 285 mΩ, -1.5 A, SLL
			IRLTS2242 [1] [4] 55 mΩ, -6.9 A, SLL			IRLML6402 [1] [4] 135 mΩ, -3.7 A, SLL	BSS223PW [4] 2.1 Ω, -0.39 A, SLL	BSD223P [4] 2.1 Ω, -0.39 A, SLL, dual
			IRLMS6802 [1] [4] 100 mΩ, -5.6 A, SLL			IRLML2246 [1] [4] 236 mΩ, -2.6 A, SLL		
			BSL211SP [4] 110 mΩ, -4.7 A, SLL			BSS215P [4] 280 mΩ, -1.5 A, SLL		
			IRLMS6702 [1] [3] 200 mΩ, -2.4 A, SLL			IRLML6302 [1] [3] 600 mΩ, -0.78 A, SLL		
	-12 V					IRLML6401 [4] 125 mΩ, -4.3 A, ULL		

Small-signal/small-power complementary

Voltage [V]		TSOP-6	SOT-363
Complementary	-20/20	BSL215C [4] N: 250 mΩ, 1.5 A, SLL P: 280 mΩ, -1.5 A, SLL	BSD235C [4] N: 600 mΩ, 0.95 A, SLL P: 2.1 Ω, -0.53 A, SLL
	-30/30	BSL308C [3] N: 93 mΩ, 2.3 A, LL P: 130 mΩ, -2.0 A, LL	
		BSL316C [3] N: 280 mΩ, 1.4 A, LL P: 270 mΩ, -1.5 A, LL	

www.infineon.com/smallsignal

www.infineon.com/small power

1) not qualified to Automotive AEC-Q101
2) $R_{DS(on)}$ specified at 10 V
3) $R_{DS(on)}$ specified at 4.5 V
4) $R_{DS(on)}$ specified at 2.5 V
5) $R_{DS(on)}$ specified at 1.8 V
6) $R_{DS(on)}$ specified at 0 V

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Nomenclature

OptiMOS™

Package type
BSB = DirectFET™ (M Can)
BSC = SuperSO8
BSF = DirectFET™ (S Can)
BSK = PQFN 2x2
BSO = SO-8
BSZ = PQFN 3.3x3.3
IPA = FullPAK
SPB/IPB = D²PAK
IPC = Chip product
SPD/IPD = DPAK
IPI = I²PAK
SPP/IPP = TO-220
IPS = IPAK Short Leads
IPT = TO-Leadless

$R_{DS(on)}$ [mΩ]
Divide by 10 to get $R_{DS(on)}$ value e.g. 014 = 1.4 mΩ

However, if the sixth character is a C, the fourth and the fifth character indicate the $R_{DS(on)}$
e.g. 12C = 12 mΩ
For chip products chip area in mm² multiplied by 10

N = N-channel
P = P-channel
C = Complementary

Breakdown voltage [V]
Multiply by 10 to get voltage class e.g. 03 = 30 V
E = Extended, +5 V, e.g. E2 = 25 V

RoHS compliant

Features
F = Fast switching
R = Integrated gate resistor
E = ESD protection
A = Qualified according to Automotive AEC Q101

3 = Technology generation
I = Monolithically-integrated Schottky-like diode
FD = Fast diode
LF = Linear mode capability

Package options
SO-8/SuperSO8/PQFN 3.3x3.3/PQFN 2x2
S = Single chip
D = Dual chip

DirectFET™
X = MX footprint
N = MN footprint
Z = MZ footprint
Q = SQ footprint
T = ST footprint
H = SH footprint
J = SJ footprint

Level		to be used from V_{GS}
N = Normal level	(NL)	10.0
M = Logic level 5 V opt.	(LL)	4.5
L = Logic level	(ELL)	4.5
K = Super logic level	(SLL)	2.5
J = Ultra logic level	(ULL)	1.8

OptiMOS™ 30 V

Package type

Consecutive number
without any correlation to product specification

Channels
N = N-channel
P = P-channel

I = Monolithically-integrated Schottky-like diode

D = Dual
E = ESD
S = Single

Small signal

"X" indicates the package
D = SOT-363
P = SOT-223
R = SC59
S = SOT-89, SOT-23, SOT-323
L = TSOP-6

3 digits product identifier
meaning dependent on
product generation

Only present in following case
S = Single (only for packages which
are also used for multichip products)

Additional features
E = ESD-protected MOSFET

Only present in following case
W= to distinguish SOT-323 from SOT-23

Polarity
N = N-channel
P = P-channel
C = Complementary
(N-ch + P-ch)

StrongIRFET™ (from May 2015 to 2019)

3 sequential digits
3 digits issued sequentially

Drive voltage
F = 4.5 V_{GS} capable for BV ≤ 30 V
L = 2.5 V_{GS} capable for BV ≤ 30 V, 4.5 V_{GS} capable for BV ≥ 40 V

2 to 3 digit voltage
For example:
25 = 25 V
135 = 135 V

Package
1 or 2 letters
B = TO-220
BA = Super220
C = Bare die or wafer
DL = DirectFET™ 1.5 Large Can
DM = DirectFET™ 1.5 Medium Can
Can DS = DirectFET™ 1.5 Small Can
Can FF = TO-220 FullPAK
H = PQFN 5x6
HB = Power Block 5x6
HM = PQFN 3.0x3.0 or 3.3x3.3
HS = PQFN 2x2
I = TO-220 FullPAK
K = SO-8
L = SOT-223
ML = SOT-23
P = TO-247
PS = Super247
R = DPAK
S = D^2PAK
SL = TO-262
SA = D2 7-pin with pin 2 void
SN = D2 7-pin with pins void
SC = D2 7-pin with pin 4 void
T = TollFET
TS = TSOP-6
U = IPAK

New nomenclature for OptiMOS™ and StrongIRFET™ MOSFETs (2019 onward)

I	SC	010	N	25	L	I

Infineon

Package type
SC = SuperSO8
SD = SOT-363
SL = TSOP-6
SK = PQFN 2x2
SA = SO8
SP = SOT-223
SQ = CE2
SR = SC59
SS = SOT-89, SOT-23, SOT-323
ST = sTOLL
SZ = PQFN 3.3x3.3
PA = TO-220 FullPAK
PB = D²PAK
PC = Chip Product
PD = DPAK
IPF = D²PAK-7-pin
PI = I²PAK
PP = TO-220
PS = IPAK Short Leads
PT = TO-Leadless
PW = TO-247
QA = PQFN 5x6
QB = PQFN 3x2
QC = PQFN 3x5
QD = PQFN 5x6 Source-Down
QE = PQFN 3.3x3.3 Source-Down
WS = DirectFET™ (S)
WM = DirectFET™ (M)
WL = DirectFET™ (L)
QF = PQFN 8x6

$R_{DS(on)}$ [mΩ]
Divide by 10 to get $R_{DS(on)}$ value
e.g. 012 = 1.2 mΩ

However, if the sixth character is D or E the fourth and the fifth characters indicate the $R_{DS(on)}$ e.g.
12D = 120 mΩ
12E = 1200 mΩ
For chip products chip area in mm² multiplied by 10

Version
N = N-channel
P = P-channel
C = Complementary
G = GaN

M|F = Product brand – family
(M = OptiMOS™, F = StrongIRFET™)

Features
D = Dual
H = Half-bridge
3 = Marketing generation with branding strategy
CG = Center gate
E = ESD protection
F = Fast switching
FD = Fast diode
SC = Super cool
I = Monolithically-integrated Schottky-like diode
LF = Linear mode
R = Integrated gate resistor

Last letter – requirement category:
A = Qualified according to AECQ 101
S = Standard
None = Industrial

Level to be used for V_{GS}

N = Normal level	(NL)	10.0 V
L = Logic level	(LL)	4.5 V
M = Logic level 5 V opt.	(ELL)	4.5 V
K = Super logic level	(SLL)	2.5 V
J = Ultra logic level	(ULL)	1.8 V

Breakdown voltage [V]
Divide by 10
e.g. E2 = 25 V
10 = 100 V
25 = 250 V

Infineon support for low voltage MOSFETs

Useful links and helpful information

Further information, data sheets and documents
www.infineon.com/powermosfet-12V-300V
www.infineon.com/smallsignal
www.infineon.com/pchannel
www.infineon.com/depletion
www.infineon.com/complementary

MOSFET Cross Reference
www.infineon.com/cms/en/product/search/cross-reference

Evaluation boards and simulation models
www.infineon.com/powermosfet-simulationmodels

Die support
www.infineon.com/baredie

MOSFET Community
community.infineon.com/t5/Power-MOSFET/bd-p/MOSFET

For more information regarding StrongIRFET™ and OptiMOS™ power MOSFET bare die products, please contact the Infineon Service Center or your local sales counterpart.

500-950 V MOSFETs

- CoolMOS™ SJ MOSFETs
- 950 V CoolMOS™ P7 SJ MOSFETs
- 800 V CoolMOS™ P7 SJ MOSFETs
- 700 V CoolMOS™ P7 SJ MOSFETs
- 600 V CoolMOS™ P7 SJ MOSFETs
- 600 V CoolMOS™ PFD7 SJ MOSFETs
- 600 V and 650 V CoolMOS™ C7 and 600 V C7 Gold (G7) SJ MOSFETs
- 600 V CoolMOS™ S7 SJ MOSFETs
- 650 V CoolMOS™ CFD7 SJ MOSFETs
- CoolMOS™ CE SJ MOSFETs
- CoolMOS™ SJ MOSFETs for automotive
- CoolMOS™ SJ MOSFET package innovations
- 500-950 V MOSFETs product portfolio
- 500-950 V MOSFETs nomenclature

Dear users!

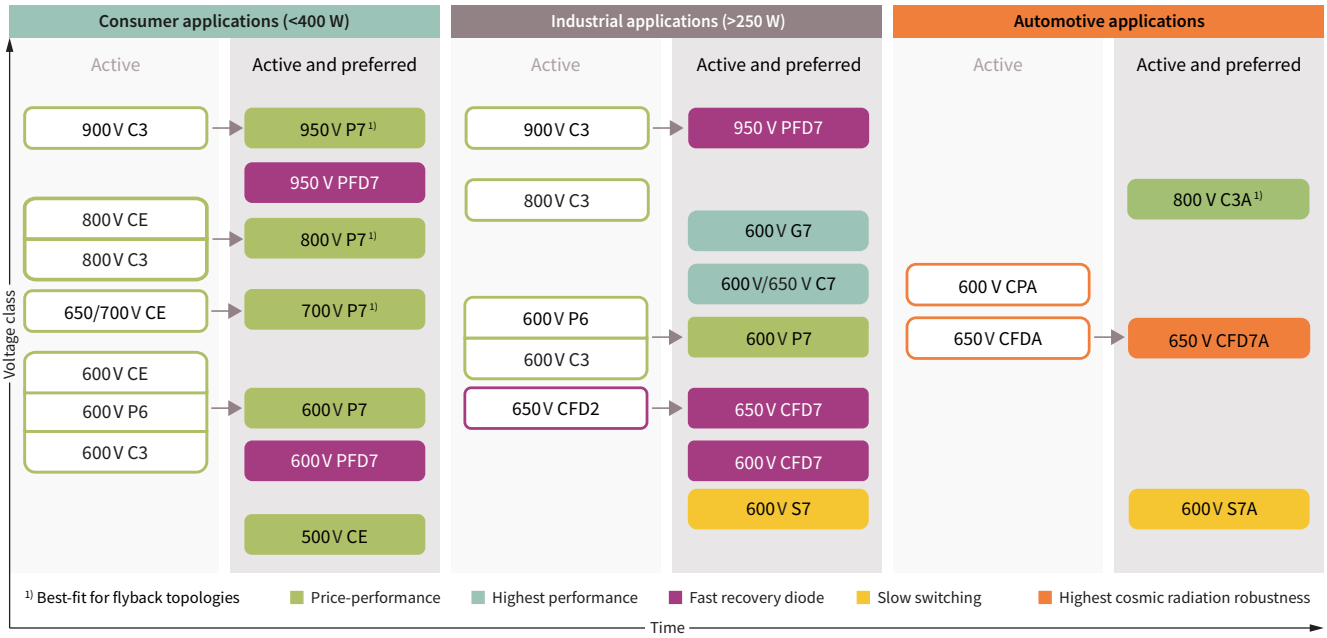
Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

CoolMOS™ SJ MOSFETs

Trusted leader in high-voltage MOSFETs

Infineon's CoolMOS™ products offer a significant reduction of conduction, switching and driving losses, and enable high power density as well as efficiency for superior power conversion systems.



CoolMOS™ low power package innovations
Click to learn more

CoolMOS™ high power package innovations
Click to learn more

High-voltage superjunction MOSFETs address consumer applications, such as home appliance drives, smartphone/tablet chargers, notebook adapters, LED lighting, PC power, as well as audio and TV power supplies. Customers are increasingly replacing standard MOSFETs with superjunction MOSFETs to benefit from higher efficiency and lower power consumption for end users. CoolMOS™ P7 sets a benchmark by offering high performance and competitive price all at once. The CoolMOS™ PFD7 series is a state-of-the-art solution for high density chargers/adapters as well as home appliance drives (e.g., refrigerator compressors).

Also for industrial applications such as server, telecom, PC power, solar, UPS, EV-charging and others, Infineon's latest CoolMOS™ 7 superjunction MOSFETs with the C7, G7, CFD7, P7 and S7 product families offer what you need - from highest efficiency to best price performance. Complementary to the silicon CoolMOS™ portfolio, Infineon offers a broad wide bandgap (WBG) portfolio of CoolGaN™ HEMTs and CoolSiC™ MOSFETs to further optimize efficiency and system cost (see Wide bandgap semiconductors).

Infineon's industrial- and consumer-qualified CoolMOS™ superjunction MOSFET offering is complemented by the automotive qualified series 600 V CPA, 650 V CFDA, 800 V C3A and the latest 650 V CFD7A as well as 600 V S7A. Infineon's excellent-performing automotive series address on-board chargers, DC-DC converters, active pre-charge and discharge function, insulation monitor, HV eFuse, and HV eDisconnect with proven outstanding quality standards going well beyond the AEC-Q101, supporting customers to gain momentum in the rapidly growing xEV market.

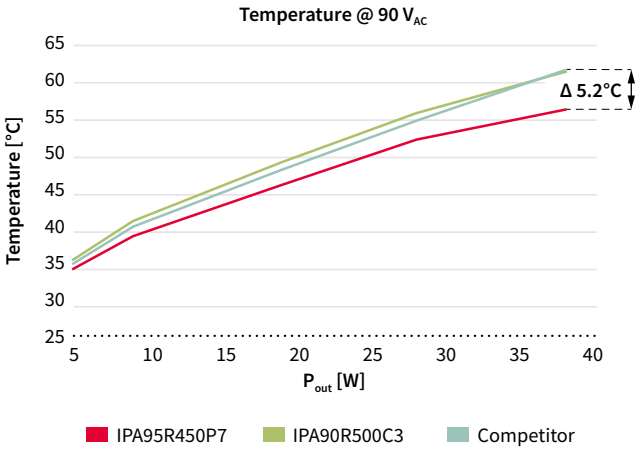
www.infineon.com/coolmos

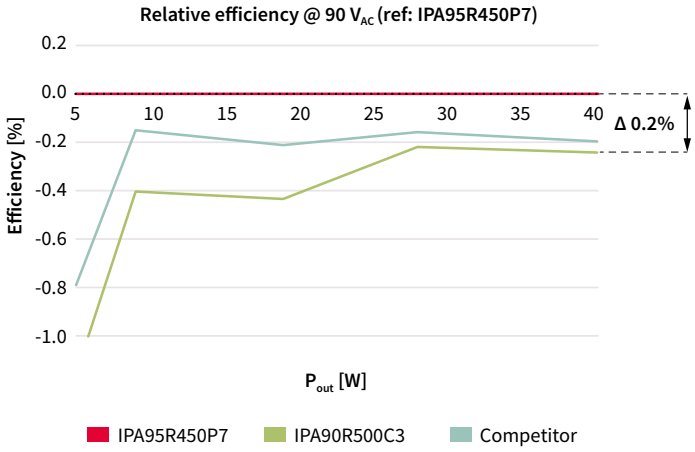
For more details on the product, click on the part number, visit infineon.com or contact our product support.

950 V CoolMOS™ P7 SJ MOSFETs

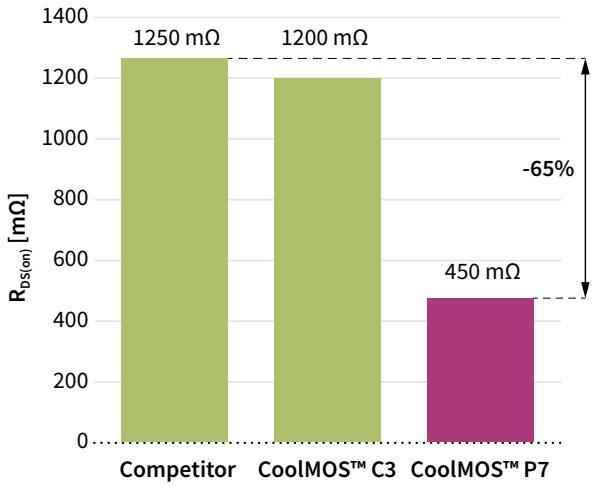
Perfect fit for PFC and flyback topologies

Designed to meet the growing consumer needs in the high-voltage MOSFETs arena, the 950 V CoolMOS™ P7 technology focuses on the low-power SMPS market. The P7 family addresses applications ranging from lighting, smart meter, mobile phone charger, notebook adapter, to AUX power supply and industrial SMPS. Offering 50 V more blocking voltage than its predecessor 900 V CoolMOS™ C3, the 950 V CoolMOS™ P7 series delivers outstanding performance in terms of efficiency, thermal behavior, and ease of use. As all other P7 family members, the 950 V CoolMOS™ P7 series comes with an integrated Zener diode ESD protection. The integrated diode considerably improves ESD robustness, thus reducing ESD-related yield loss and reaching exceptional ease-of-use levels. CoolMOS™ P7 is developed with a best-in-class threshold voltage ($V_{GS(th)}$) of 3 V and a narrow tolerance of only ± 0.5 V, which makes it easy to drive and design-in.





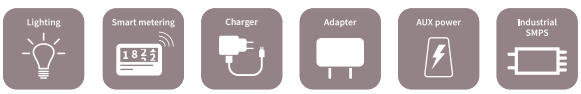
Compared to competition, the 950 V CoolMOS™ P7 delivers best-in-class efficiency and thermal performance. Plug-and-play at 90 V_{AC} in a 40 W adapter reference design, featuring the snubberless concept, demonstrates excellent efficiency gains of up to 0.2 percent and lower MOSFET temperature of up to 5.2°C compared to similar competitor technology. With over 20 years of experience in superjunction technology, Infineon introduces 950 V CoolMOS™ P7 with best-in-class DPAK on-resistance ($R_{DS(on)}$). This SMD device comes with the $R_{DS(on)}$ of 450 mΩ - more than 60 percent lower $R_{DS(on)}$ compared to the nearest competitor. Such low $R_{DS(on)}$ value enables higher density designs while decreasing BOM and assembly cost.



Best-in-class DPAK $R_{DS(on)}$

Customer benefits:

- Possible change from leaded to SMD packages
- High power density
- Lower BOM cost
- Lower production cost



www.infineon.com/950v-p7

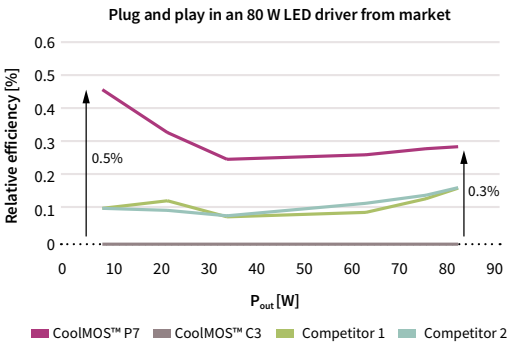
For more details on the product, click on the part number, visit infineon.com or contact our product support.

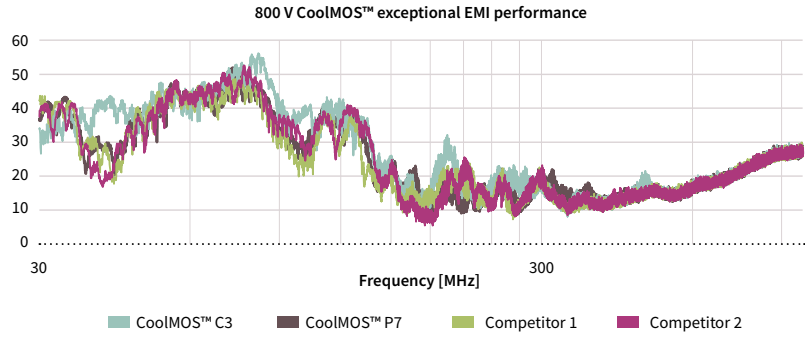
800 V CoolMOS™ P7 SJ MOSFETs

A benchmark in efficiency and thermal performance

With the 800 V CoolMOS™ P7 series, Infineon sets a benchmark in 800 V superjunction technologies and combines best-in-class performance with the remarkable ease of use. This product family is a perfect fit for flyback-based consumer and industrial SMPS applications. In addition, it is also suitable for PFC stages within consumer, as well as solar applications, fully covering the market needs in terms of its price/performance ratio.

The technology offers fully optimized key parameters to deliver best-in-class efficiency as well as thermal performance. As demonstrated on an 80 W LED driver, bought on the market, the >45 percent reduction in switching losses (E_{oss}) and output capacitance (C_{oss}) as well as the significant improvement in input capacitance (C_{iss}) and gate charge (Q_G), compared to competitor technologies, lead to 0.5 percent higher efficiency at light load which helps to reduce standby power in the end application. At full load, the observed improvement is up to 0.3 percent higher efficiency and 6°C lower device temperature.

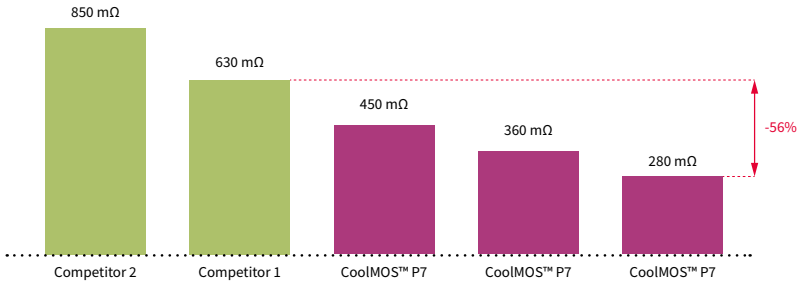




EMI is a system level topic, and the optimization needs to be done on the system level only. Nevertheless, a pure plug-and-play measurement on Infineon's 45 W adapter reveals that 800 V CoolMOS™ P7 shows similar EMI performance to Infineon's previous technologies as well as to competitors' technologies.

Compared to competition, the 800 V CoolMOS™ P7 technology allows to integrate much lower $R_{DS(on)}$ values into small packages, such as a DPAK. This finally enables high power density designs at highly competitive price levels.

Overview of lowest DPAK $R_{DS(on)}$ for 800 V superjunction MOSFET



CoolMOS™ P7 sets a new benchmark in best-in-class DPAK $R_{DS(on)}$

Customer benefits:

- High power density
- Lower BOM cost
- Lower production cost

The complete P7 platform has been developed with an integrated Zener diode that is used as an electrostatic discharge (ESD) protection mechanism, which increases the overall device ruggedness up to human body model (HBM) class 2 level.

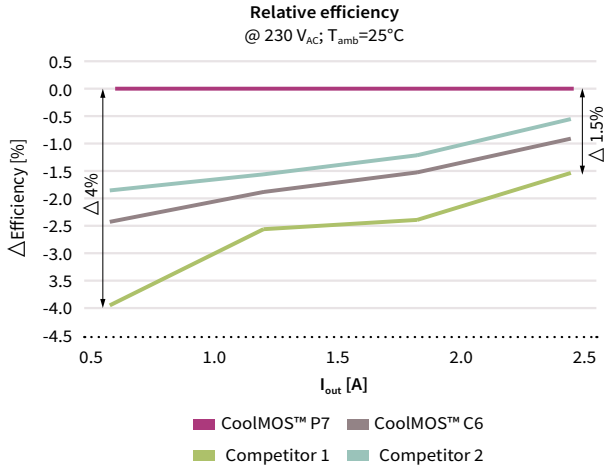
www.infineon.com/800V-p7

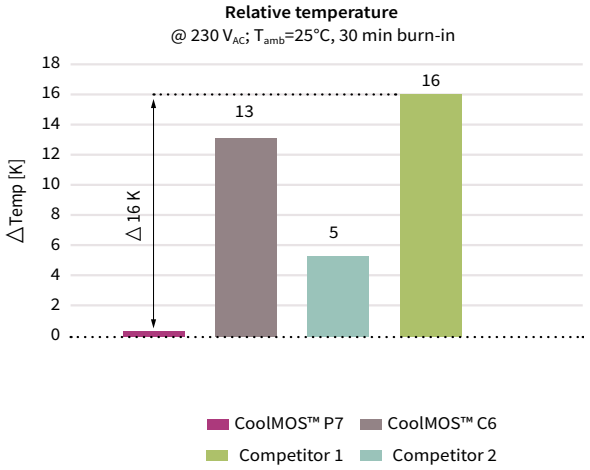
For more details on the product, click on the part number, visit infineon.com or contact our product support.

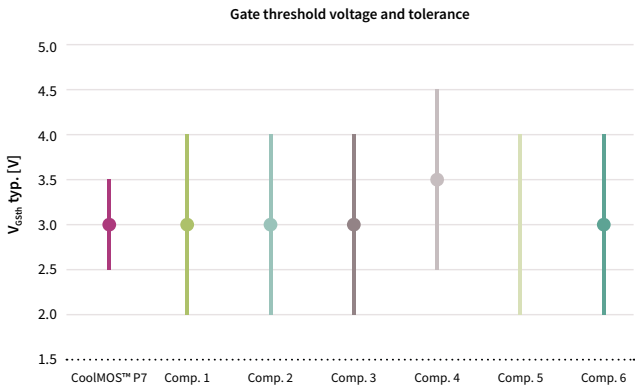
700 V CoolMOS™ P7 SJ MOSFETs

Infineon's solution for flyback topologies

The 700 V CoolMOS™ P7 family has been developed to serve today's and, especially, tomorrow's trends in flyback topologies. The products address the low-power SMPS market, mainly focusing on mobile phone chargers and notebook adapters, but are also suitable for power supplies, used within lighting applications, home entertainment (TV, game consoles or audio), and auxiliary power supplies. 700 V CoolMOS™ P7 achieves outstanding efficiency gains of up to 4 percent and a decrease in device temperature of up to 16 K compared to the competition. In contrast with the previous 650 V CoolMOS™ C6 technology, 700 V CoolMOS™ P7 offers 2.4 percent gain in efficiency and 12 K lower device temperature, measured at a flyback-based charger application, operated at 140 kHz switching speed.



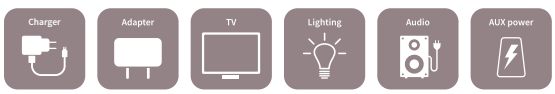




Keeping the ease of use in mind, Infineon has developed the technology with a low threshold voltage ($V_{GS(th)}$) of 3 V and a very narrow tolerance of ±0.5 V. This makes the CoolMOS™ P7 easy to design-in and enables the usage of lower gate source voltage, which facilitates its driving and leads to lower idle losses. To increase the ESD ruggedness up to HBM class 2 level, 700 V CoolMOS™ P7 has an integrated Zener diode. This helps to support increased assembly yield, leads to reduction of production related failures and, finally, manufacturing cost savings on customer side.

Features and benefits

Key features	Key benefits
› Highly performant technology - Low switching losses (E_{oss}) - Highly efficient - Excellent thermal behavior	› Cost-competitive technology
› Allowing high-speed switching	› Further efficiency gain at higher switching speed
› Integrated protection Zener diode	› Supporting less magnetic size with lower BOM costs
› Optimized $V_{GS(th)}$ of 3 V with very narrow tolerance of ±0.5 V	› High ESD ruggedness up to HBM class 2 level
› Finely graduated portfolio	› Easy to drive and design-in
	› Enabler for smaller form factors and high power density designs
	› Excellent choice in selecting the best-fitting product



www.infineon.com/700V-p7

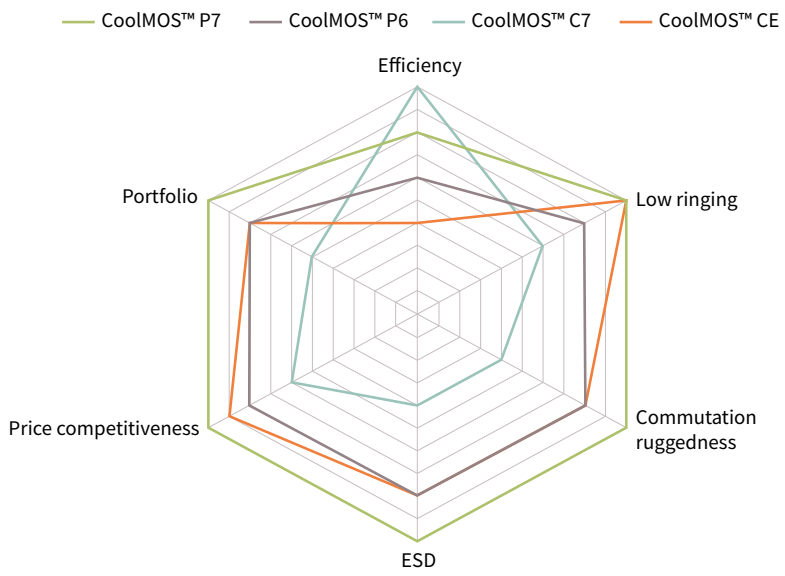
For more details on the product, click on the part number, visit infineon.com or contact our product support.

600 V CoolMOS™ P7 SJ MOSFETs

Perfect combination of high efficiency and ease of use

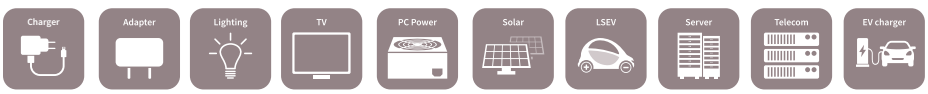
The 600 V CoolMOS™ P7 is a general purpose series, targeting a broad variety of applications, ranging from low-power SMPS up to the highest power levels. In the low-power arena, it is the successor of the 600 V CoolMOS™ CE, and for high-power SPMS applications, it is the replacement for the 600 V CoolMOS™ P6, which makes it the perfect choice for applications such as chargers, adapters, lighting, TV and PC power supplies, solar, small light electric vehicles, server and telecom power supplies, and electric vehicle (EV) charging.

The 600 V CoolMOS™ P7 is Infineon's most well-balanced CoolMOS™ technology in terms of combining ease of use and excellent efficiency performance. Compared to its predecessors, it offers higher efficiency and improved power density due to the significantly reduced gate charge (Q_G) and switching losses (E_{OSS}) levels, as well as optimized on-state resistance ($R_{DS(on)}$). The carefully selected integrated gate resistors enable very low ringing tendency and, thanks to its outstanding robustness of body diode against hard commutation, it is suitable for hard as well as soft-switching topologies, such as LLC. In addition, an excellent ESD capability helps to improve the quality in manufacturing. The 600 V CoolMOS™ P7 family offers a wide range of on-resistance ($R_{DS(on)}$)/package combinations, including THD, as well as SMD devices, at an $R_{DS(on)}$ granularity from 24 to 600 mΩ and comes along with the most competitive price/performance ratio of all 600 V CoolMOS™ offerings.



Features and benefits

Key features	Key benefits
› Suitable for hard and soft switching (PFC and LLC) due to an outstanding commutation ruggedness	› Ease of use and fast design-in through low ringing tendency and usage across PFC and PWM stages
› Optimized balance between efficiency and ease of use	› Improved efficiency and simplified thermal management due to low switching and conduction losses
› Significant reduction of switching and conduction losses leading to low MOSFET temperature	› Higher manufacturing quality due to >2 kV ESD protection
› Excellent ESD robustness >2 kV (HBM) for all products	› Increased power density solutions enabled by using products with smaller footprint
› Better $R_{DS(on)}$/package products compared to competition	› Suitable for a wide variety of applications and power ranges
› Large portfolio with granular $R_{DS(on)}$ selection qualified for a variety of industrial and consumer applications	



www.infineon.com/600V-p7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

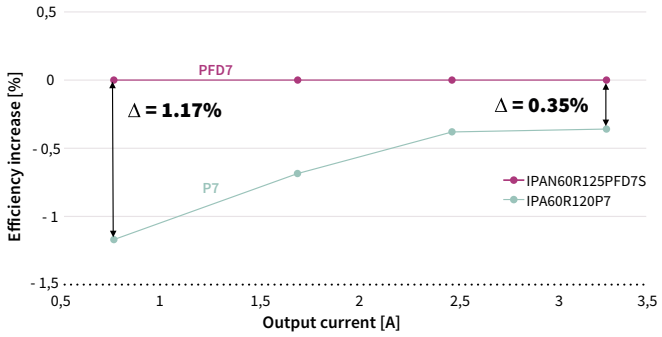
600 V CoolMOS™ PFD7 SJ MOSFETs

The next level for ultrahigh power density designs and energy-efficient home appliance drives

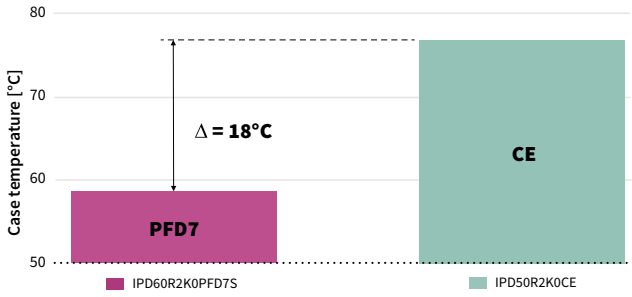
The 600 V CoolMOS™ PFD7 MOSFET series sets a new benchmark in 600 V superjunction (SJ) technologies, shaped by Infineon's experience of more than 20 years in pioneering in superjunction technology innovation. The series combines best-in-class performance with state-of-the-art ease of use and features an integrated fast body diode ensuring a robust device and in turn reduced BOM for the customer. This product family offers up to 1.17 percent efficiency increase compared to the CoolMOS™ P7 technologies, which leads to a power density increase of 1.8 W/in^3. CoolMOS™ PFD7 pushes the SJ MOSFET technology to new limits leading to outstanding improvement of lower conduction and charge/discharge losses as well as a reduced turn-off and gate-driving losses.

A broad range of $R_{DS(on)}$ values in combination with a variety of packages helps in selecting the right part to optimize designs. Furthermore, an integrated ESD protection of up to 2 kV eliminates ESD-related yield loss. Infineon's industry-leading SMD package offering contributes to bill-of-material and PCB space savings and simplifies manufacturing. This unique set of product features and their resulting benefits, position the CoolMOS™ PFD7 superjunction MOSFET family exceptionally well for ultrahigh density applications like chargers and adapters, USB power delivery but also for home appliance drives (e.g. refrigerator compressors) and specific lighting SMPS applications.

65 W delta efficiency @ 90 V_{AC} input voltage
with IPAN60R125PFD7S as reference



Low-side MOSFET temperature
100 W motor drive at high line 230 V_{AC}



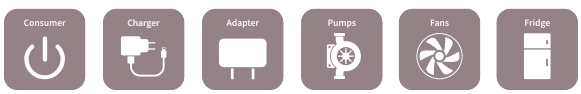
600 V CoolMOS™ PFD7 increases efficiency in light- and full-load conditions. This results in a power density increase of 1.8 W/in^3 for ultrahigh power chargers and adapters.

600 V CoolMOS™ PFD7 provides up to 2 percent higher efficiency at 100 W, which results in an 18°C thermal improvement. Its excellent commutation ruggedness makes it the perfect fit for low-power drives.

Features and benefits

Key features
› Very low FOM $R_{DS(on)}$ x E_{oss}
› Integrated robust fast body diode
› Ultra-low Q_{rr} and industry's fastest recovery time (T_{rr})
› Up to 2 kV ESD protection (HBM class 2)
› Wide range of $R_{DS(on)}$ values and broad package portfolio
› Excellent commutation ruggedness

Key benefits
› Minimized switching losses
› Power density improvement compared to latest CoolMOS™ charger technology
› Increased efficiency (especially at light-load operation) and improved thermal behavior compared to CoolMOS™ CE technology for home appliance motor drives
› BOM cost reduction and easy manufacturing
› Robustness and reliability
› Easy to select right parts for design fine-tuning



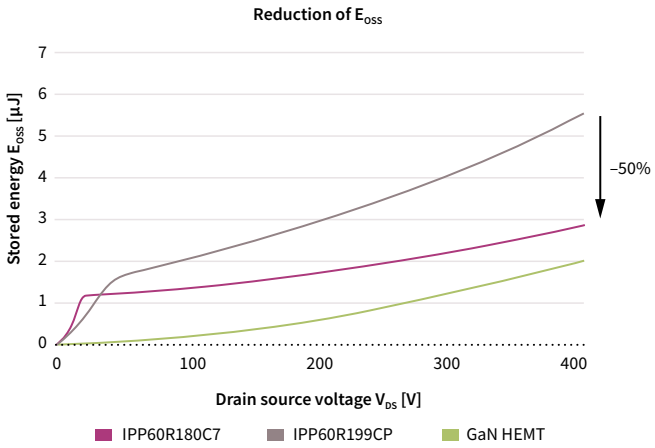
www.infineon.com/600V-PFD7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

600 V and 650 V CoolMOS™ C7 and 600 V C7 Gold (G7) SJ MOSFETs

Infineon's superjunction MOSFET series for highest efficiency

The 600 V and 650 V CoolMOS™ C7 and and 600 V C7 Gold (G7) superjunction MOSFET series are designed to achieve record level efficiency performance – they offer substantial efficiency benefits over the whole load range in hard-switching applications compared to previous series and competition. This is achieved by minimizing switching losses via ultralow levels of switching losses (E_{OSS}) (approximately 50 percent reduction compared to the CoolMOS™ CP), reduced gate charge (Q_G) and a careful balance of other relevant product key parameters. The low E_{oss} and Q_G also enable operation at higher switching frequency and related size reduction of the circuit magnetics.



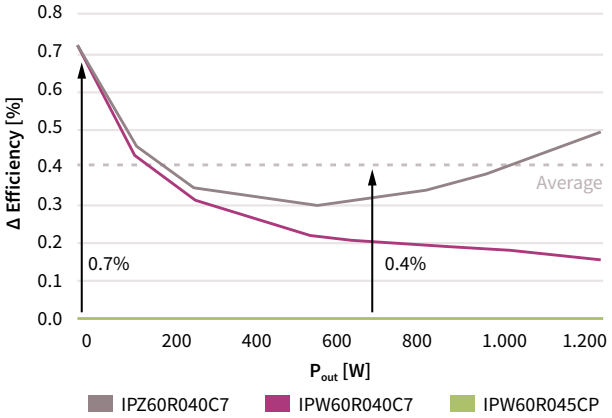
The outstanding figures of merit (FOM) and the best-in-class on-state resistance ($R_{DS(on)}$) offerings make the CoolMOS™ C7 and C7 Gold series key enablers for highest efficiency and power density. While the 650 V CoolMOS™ C7 and 600 V C7 Gold (G7) superjunction MOSFETs are solely designed for hard-switching applications such as PFC, the 600 V version is also well suited for high-end LLC stages due to its rugged body diode that withstands slew rates up to 20 V/ns. The product portfolio contains TO-247 4-pin, ThinPAK 8x8, TO-Leadless and top-side cooled Double DPAK (DDPAK) packages which come with additional Kelvin source contacts enabling further efficiency advantages over the classical 3-pin approach.

Features and benefits

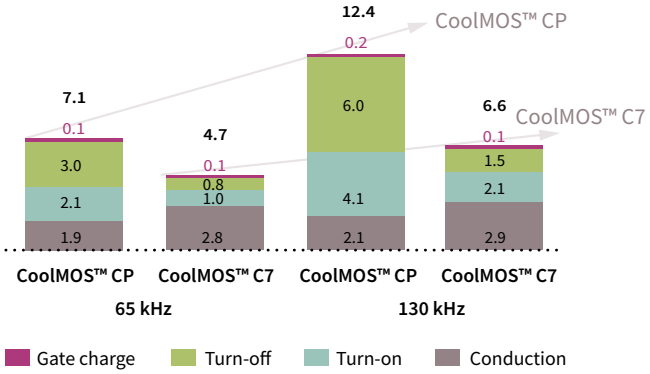
Key features
› Reduced switching loss parameters such as Q_G and C_{oss}, enabling higher switching frequency
› 50 percent E_{oss} reduction compared to older CoolMOS™ CP
› Suitable for hard-switching topologies (650 V and 600 V)
› Suitable for high-end resonant (600 V only) topologies

Key benefits
› Increased efficiency in hard-switching topologies such as PFC and TTF
› Reduced size and cost of magnetic components by increased switching frequency (e.g. 65 -130 kHz)
› Increased power density by smaller packages for the same $R_{DS(on)}$

PFC CCM 1200 W efficiency difference for 90 V_{AC} (PFC CCM, 1.150 W @ 65 kHz)



MOSFET losses [W]
IPW60R045CP vs. IPZ60R060C7, highline 2.5 kW



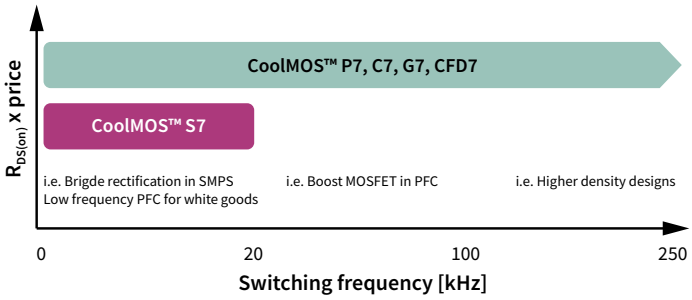
www.infineon.com/c7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

600 V CoolMOS™ S7 SJ MOSFETs

The best price/performance SJ MOSFET for low frequency switching applications

The 600 V CoolMOS™ S7 superjunction MOSFET is the perfect fit for applications where MOSFETs are switched at low frequency, such as active bridge rectification, inverter stages, in-rush relays, PLCs, power solid state relays and solid state circuit breakers. The new MOSFET design with the best conduction performance allows the CoolMOS™ S7 to offer cost-optimized distinctively low on-resistance ($R_{DS(on)}$) values, ideally suited for applications looking to minimize conduction losses at the best price.



The CoolMOS™ S7 leads the way for power density, uniquely fitting a 22 mΩ $R_{DS(on)}$ chip into an innovative small TO-Leadless (TOLL) SMD package.

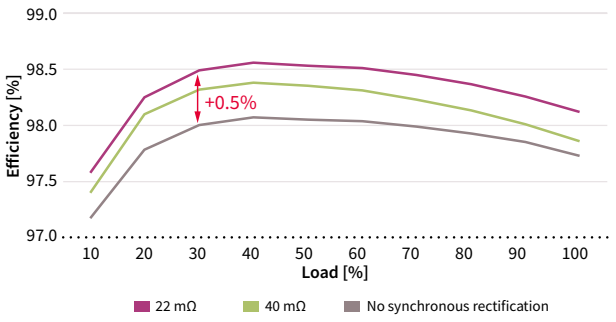
Use cases

Typically, CoolMOS™ S7 is used in active rectification bridges, where diodes are replaced or paralleled with MOSFETs, obtaining an increase in efficiency without the need for extensive system redesign. In this application, the TO-leadless (TOLL) package in low $R_{DS(on)}$ allows the most efficient and compact modular design based on daughter cards.
The CoolMOS™ S7 delivers also tremendous value to solid state relay (SSR) and solid state circuit breaker (SSCB) designs, by bringing the superjunction MOSFET advantages to a system level cost comparable to other silicon alternatives. In addition, any socket or topology switching at low frequency can greatly benefit from the leading low $R_{DS(on)}$ x price.

Features and benefits

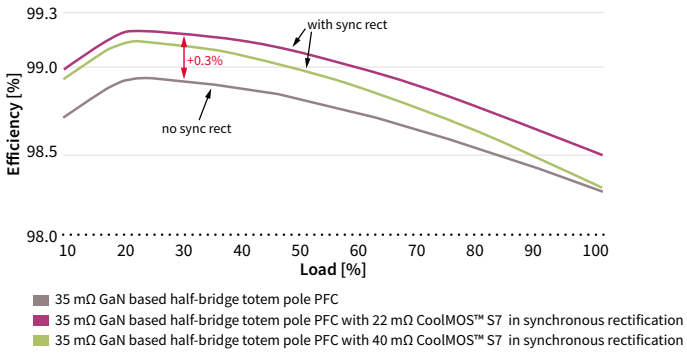
Key features	Key benefits
Best-in-class $R_{DS(on)}$ in SMD packages	Minimizes conduction losses
Optimized for conduction performance, reaching the lowest $R_{DS(on)}$ values	An easy step into Titanium level SMPS
High pulse current capability	Modular, more compact and easier designs
Improved thermal resistance	Eliminates or reduces heat sink in solid state relays and circuit breakers
	Lower TCO cost or BOM cost

Efficiency in 2400 W PFC at V_{in} = 230 V_{AC}
Difference between using or not using the active-bridge rectification



CoolMOS™ S7 brings more efficiency to power supplies when used in an active rectification bridge.

3 kW GaN-based totem pole PFC efficiency calculation with and without synchronous rectification when V_{in} = 230 V_{AC}, V_{out} = 400 V, f_{sw} = 65 kHz



CoolMOS™ S7 is the perfect complement for CoolSiC™ MOSFETs and CoolGaN™ GIT HEMTs in totem pole PFC topologies.

www.infineon.com/s7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

600 V CoolMOS™ CFD7 SJ MOSFETs

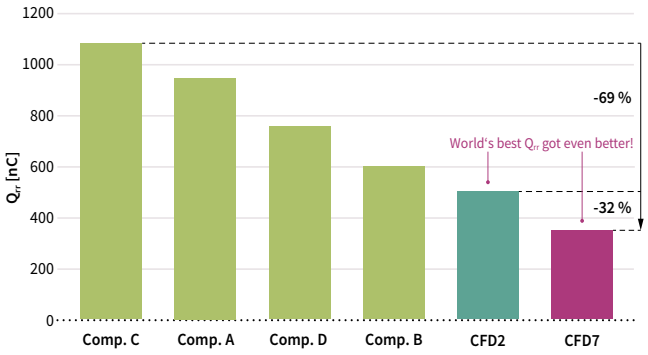
Infineon's solution for resonant switching high-power applications

The 600 V CoolMOS™ CFD7 is one of Infineon's high-voltage superjunction MOSFET series with an integrated fast body diode. It is the ideal choice for resonant topologies, such as LLC and ZVS PSFB, and targets the high SMPS market.

As a result of significantly reduced gate charge (Q_G), improved turn-off behavior, a reverse recovery charge (Q_{rr}) of up to 69 percent lower compared to the competition, as well as the lowest reverse recovery time (t_{rr}) in the market, it combines the highest efficiency and best-in-class reliability in soft-switching applications, without sacrificing the easy implementation in the design-in process.

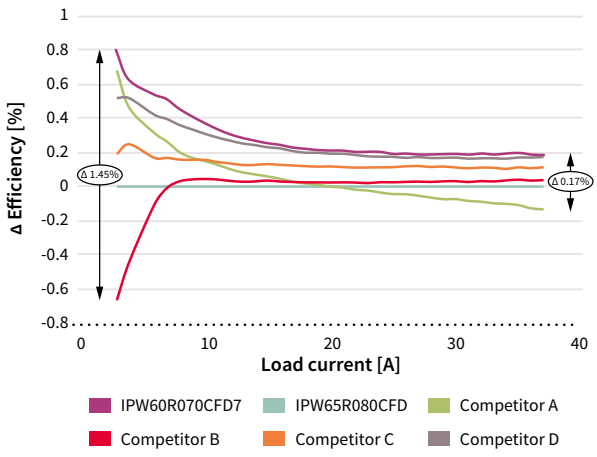
In addition, the 600 V CoolMOS™ CFD7 enables higher power density solutions by offering the best-in-class on-state resistance ($R_{DS(on)}$) package combinations in through-hole devices, as well as in surface mount devices. In ThinPAK 8x8 and TO-220 with CoolMOS™ CFD7, a $R_{DS(on)}$ of around 30 percent below the next best competitor offering can be achieved. All this together makes CoolMOS™ CFD7 the perfect fit for server and telecom applications, and it is also suitable for EV-charging stations.

Q_{rr} comparison of 170 mΩ CFD vs. 190 mΩ range competition*



*Comparison based on datasheet values

Efficiency comparison of CFD7 vs. CFD2 and competition in 2 kW ZVS



Features and benefits

Key features	Key benefits
› Ultrafast body diode	› Best-in-class hard commutation ruggedness
› Best-in-class reverse recovery charge (Q_{rr})	› Highest reliability for resonant topologies
› Improved reverse diode dv/dt and dif/dt ruggedness	› Highest efficiency with outstanding ease of use/performance trade-off
› Lowest figure of merit ($R_{DS(on)}$ x Q_G x E_{oss})	› Enabling increased power density solutions
› Best-in-class $R_{DS(on)}$/package combinations	

Solar SMPS Server Telecom EV charger

www.infineon.com/cfd7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

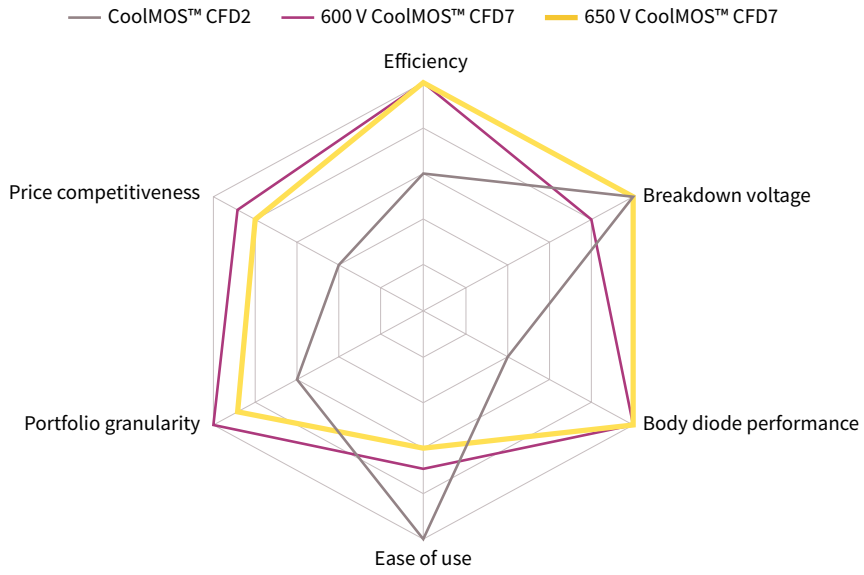
650 V CoolMOS™ CFD7 SJ MOSFETs

Tailored to win in resonant topologies

The need for improved efficiency and higher power density in industrial SMPS applications is driven by the megatrends of the 21st century such as big data, digitalization and e-mobility. Furthermore, over the last few years, due to the higher nominal input voltages in the US, a trend towards 450 V bus voltage, and the need for worldwide applicable designs, the demand for 650 V breakdown voltage has increased significantly - also for resonant topologies.

The 650 V device family is the voltage-range extension of Infineon's renowned CoolMOS™ CFD7 family, the successor to the well-established CoolMOS™ CFD2. It comes along with an additional 50 V breakdown voltage, integrated fast body diode, improved switching performance (compared to previous generations), and excellent thermal behavior. Thanks to these features, the 650 V CoolMOS™ CFD7 allows for the highest efficiency and power density levels in soft-switching applications such as LLC and ZVS phase-shift-full-bridge.

The best-in-class $R_{DS(on)}$ in TO-247, TO-220, and D²PAK enables customers to increase the power density level of their designs primarily addressing telecom, server, solar, and (off-board) EV-charging applications.



Features and benefits

Key features	Key benefits
› 650 V blocking voltage	› 50 V extra margin for increased bus voltage
› Ultrafast body diode	› Excellent hard commutation ruggedness
› Reduced switching losses	› Outstanding light load efficiency
› Low $R_{DS(on)}$ dependency over temperature	› High full load efficiency

www.infineon.com/650v-cfd7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

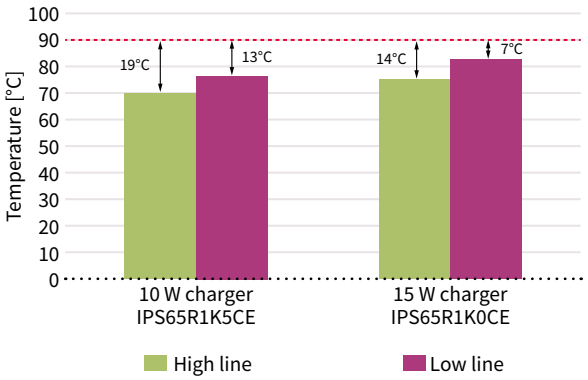
CoolMOS™ CE SJ MOSFETs

High-voltage superjunction MOSFETs for consumer applications

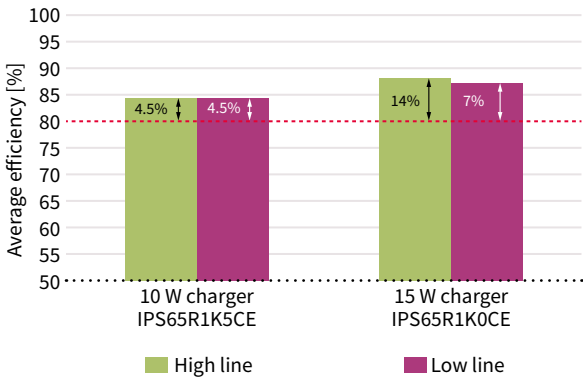
Infineon's CoolMOS™ CE is a product family that addresses consumer and lighting applications. It offers benefits in efficiency and thermal behavior versus standard MOSFETs and is optimized for ease of use and cost-competitiveness, while delivering the right-fit performance and excellent Infineon quality.

Application example: 10 W and 15 W smartphone charger

CoolMOS™ CE meets typical MOSFET case temperature requirements in charger applications



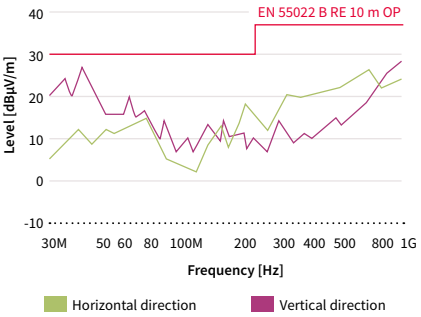
CoolMOS™ CE meets the standard efficiency requirements in charger application



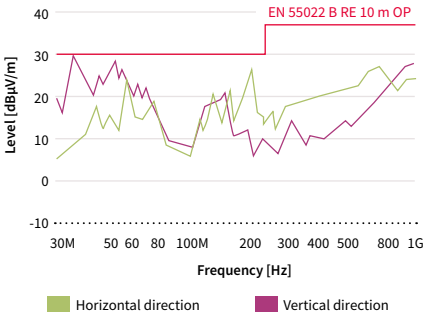
CoolMOS™ CE case temperature:
The maximum MOSFET case temperature is required to be below 90°C. CoolMOS™ CE meets this requirement and offers enough margin required for design-in flexibility.

CoolMOS™ CE efficiency performance:
CoolMOS™ CE meets the 80 percent standard efficiency requirement and offers enough margin required for design-in flexibility.

10 W design: IPS65R1K5CE
EN 55022 B radiated HF-field
30 MHz – 1 GHz position



15 W design: IPS65R1K0CE
EN 55022 B radiated HF-field
30 MHz – 1 GHz position



The performance of CoolMOS™ CE in the 10 W and 15 W design demonstrates that the series meets common EMI requirements for charger applications and thus, is also offering design-in flexibility.

CoolMOS™ CE customer benefits	
Product portfolio	Broad portfolio covering five voltage classes in both through-hole and SMD packages
Quality	Field failure rates are as low as 0.1 DPM
Design-in support	Large field application engineering team to provide professional and flexible support for your design

www.infineon.com/ce

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolMOS™ SJ MOSFETs for automotive

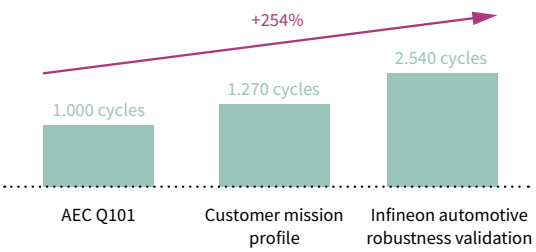
600 V CoolMOS™ CPA, 650 V CoolMOS™ CFDA, 800 V CoolMOS™ C3A, 650 V CoolMOS™ CFD7A – on the fast lane in automotive applications

The highest system performance in a size and weight constrained environment, outstanding and proven product quality and reliability, as well as 100 percent reliable delivery, are key requirements for manufacturers in the automotive market. With the high-voltage automotive MOSFET series 600 V CoolMOS™ CPA and 650 V CoolMOS™ CFDA, 800 V CoolMOS™ C3A and 650 V CoolMOS™ CFD7A, Infineon is perfectly prepared to take the challenges in the strongly growing automotive market.

Product series	Key features	Applications	Quality
600 V CoolMOS™ CPA	**Best choice for demanding hard-switching applications** › Lowest $R_{DS(on)}$ per package › Lowest gate charge value Q_G	› Hard-switching topologies (with SiC diode) › PFC boost stages in on-board charger	**Quality level well beyond the formal requirements of the AEC Q101 standard through** › Special screening measures in front end, back end › Mission-profile based qualification procedures
650 V CoolMOS™ CFDA	**Easy implementation of layout and design** › Integrated fast body diode › Limited voltage overshoot during hard commutation – self-limiting dI/dt and dV/dt › Low Q_{rr} at repetitive commutation on body diode and low Q_{oss}	› Resonant-switching topologies › DC-DC stage of OBC › LLC or full-bridge phase shift (ZVS) in DC-DC converter › HID lamp › Active DC link discharge › Pre-charge	
800 V CoolMOS™ C3A	› Outstanding performance in terms of efficiency, thermal behavior and ease-of-use › High blocking voltage	› Flyback low-power auxiliaries › On-board charger › HV-LV DC-DC converter › Battery disconnect unit › Traction inverter auxiliaries › DC-link pre-charge › DC-link active discharge › Isolation monitoring	
650 V CoolMOS™ CFD7A	› Improved 650 V CoolMOS™ CFDA › Higher application voltage possible (at the same proven reliability level) › New D²PAK 7-pin with increased creepage distance and Kelvin source › Considerable improvement in key parameters (higher efficiency)	› On-board charger – Hard-switching topologies (with SiC diode) – PFC boost stages – DC-DC stage of OBC › HV-LV DC-DC converter – LLC or full-bridge phase shift (ZVS) › Auxiliary power supplies	

CoolMOS™ SJ MOSFET automotive – benchmark in quality and reliability

Robustness validation – example for thermal cycling test



Focus on top-notch quality and reliability without any compromise – that is the principle Infineon applies during development and qualification of all CoolMOS™ superjunction technologies. For our automotive grade derivatives, the great quality levels of the industrial-based technologies are further boosted by special screening measures in front- and back-end, as well as by extended qualification procedures. The Infineon robustness validation approach with extended stress-test procedures, doubling the real application requirements, is one of our key measures to ensure a quality level well beyond the formal requirements of the AEC Q101 standard. Aside from extended stress times on standard qualification tests, it comprises test procedures, specially developed by Infineon to ensure highest quality of e.g., the power metallization of our devices. Usage of robust package technologies, 100 percent gate oxide screening, and top-notch production monitoring, including yield screening measures, part average testing (PAT), statistical bin alarm (SBA), and pattern recognition procedures, complete our package to guarantee highest automotive quality. This holistic approach results in an unrivalled quality position of Infineon's CoolMOS™ SJ MOSFETs for automotive..

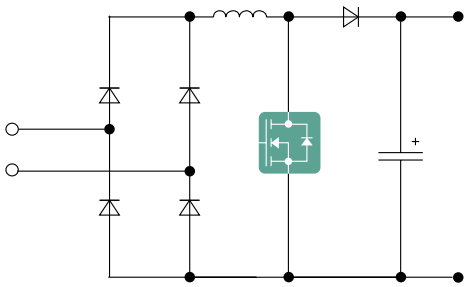
www.infineon.com/cfd7a
www.infineon.com/coolmos-automotive

For more details on the product, click on the part number, visit infineon.com or contact our product support.

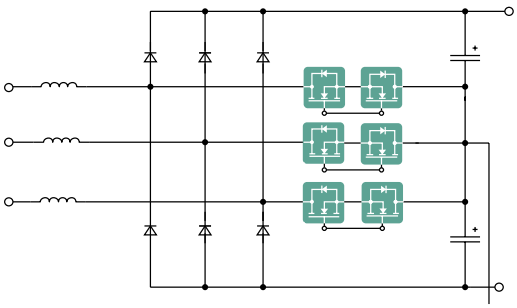
CoolMOS™ SJ MOSFET automotive – ready to support future application trends

Driven by the carbon dioxide (CO_2) reduction initiatives, the market of plug-in hybrid PHEV and pure EV is strongly growing. Higher ranges of the electric vehicles are realized by increasing the battery capacity and the energy efficiency of the used electric components. The used battery voltage classes tend to become standardized at approximately 450 V with a trend towards the higher voltages, as this supports faster charging times and enables lighter cabling within the vehicle. Discrete high-voltage components are widely used for on-board charger (OBC) and DC-DC converter (LDC) applications, as price pressure increasingly displaces module-based solutions. The trend towards fast charging impacts on the power range demanded from OBC topologies. Presently, as well as in the past, a vast majority of OBC topologies have been found in the range up to 7.2 kW, whereas the future tends to stir the trend towards 11 kW or even up to 22 kW. This development, paired with a demand for high efficiency and power density at low system cost, is a strong driver for the usage of three-phase solutions.

Classic PFC stage for OBC



OBC Vienna rectifier for three-phase PFC in OBC



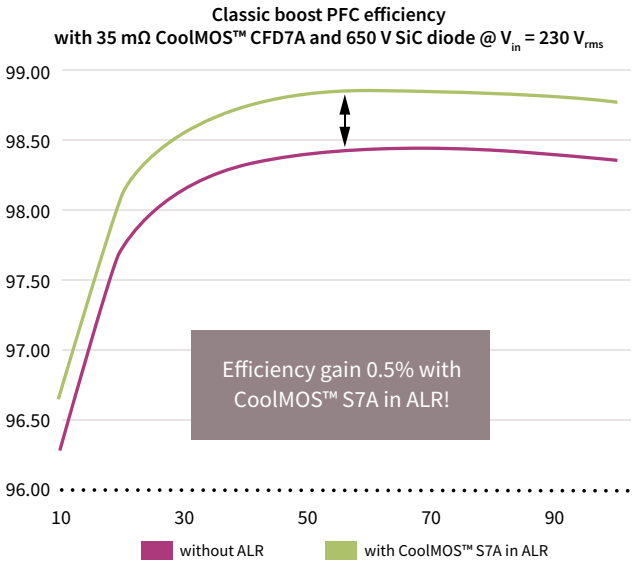
While for the lower power OBC solutions classic PFC approaches are the well-established approaches in the market, the Vienna rectifier is the optimal solution for the higher power levels. As a true three-phase topology, it delivers full power if attached to a three-phase input but is flexible enough to run on a single-phase if required. The three-level topology minimizes the filter effort compared to other solutions. By using the doubled frequency on the magnetic components, it also helps to significantly reduce the size of the passives. As a three-level topology, the Vienna rectifier, followed by two paralleled DC-DC stages, furthermore leads to a relaxed voltage stress level on the power MOSFETs. This way, it enables to handle upcoming higher battery voltage levels. The $R_{DS(on)}$, required to yield a desired efficiency level in a Vienna Rectifier, is a function of applied switching frequency and demanded power level. With our 600 V CoolMOS™ CPA and 650 V CoolMOS™ CFDA portfolio, covering an $R_{DS(on)}$ range from 45 to 660 mΩ, we are well-prepared to support your next-generation three-phase Vienna rectifier design. With CoolMOS™ you are ready to seize your share in the emerging high-power on-board charger markets.

www.infineon.com/coolmos-automotive

600 V CoolMOS™ S7A

Best-in-class $R_{DS(on)}$ x A SJ MOSFET for slow-switching automotive applications

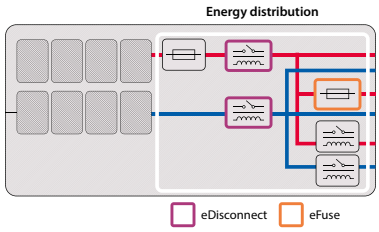
The automotive-grade 600 V CoolMOS™ S7A superjunction MOSFET addresses xEV applications where MOSFETs are switched at low frequency, such as HV eFuse, HV eDisconnect, and on-board charger in the slow-switching leg of the PFC stage. The more stringent requirements for increased power density, safety, and reliability in these applications are met by combining the superior robustness and performance of the S7A MOSFET with the innovative package concept offered by the QDPAK TSC. The new MOSFET design offers a cost-optimized, distinctively low on-resistance $R_{DS(on)}$ of 10 mΩ, enabling increased power density and minimized conduction losses. The top-side cooled QDPAK package offers increased efficiency and controllability thanks to its intrinsic Kelvin source, high power dissipation capability, and innovative cooling concept.



CoolMOS™ S7A is the ideal device for the ALR active line rectification in a classic boost PFC topology, which offers a power loss reduction up to 30 percent and an overall PLC efficiency improvement of 0.5 percent.

CoolMOS™ S7A is the semiconductor solution for HV eDisconnect and HV eFuse. It answers e-mobility needs with respect to reliability (maintenance-free), flexible and cost-optimized system integration, scalability, and minimized failure propagation.

HV power distribution unit



Features and benefits

Key features	Key benefits
› Best-in-class $R_{DS(on)}$: 10 mΩ	› Minimized conduction losses
› Smallest $R_{DS(on)}$ in SMD packages	› Increased energy efficiency
› Optimized for conduction performance	› More compact and easier designs
› Industry's leading heat-sinking capability	› Increased power density
› High pulse current capability	› Lower TCO cost or BOM cost
› Body diode robustness at AC line commutation	› Flexible system integration
› Kelvin-source concept	› Variable cooling strategy

www.infineon.com/s7a

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolMOS™ SJ MOSFET high-power package innovations

Space-saving and high performance packages

An SMD package for high efficiency and controllability in automotive applications

TO-263-7 (D²PAK-7-pin)

The TO-263-7-pin package is a SMD package addressing automotive-specific requirements including high efficiency and controllability. The Kelvin source pin leads to reduced switching losses. Furthermore, the new 7-pin design increases the creepage distance at the PCB and therefore helps to improve the manufacturability.

Innovative top-side cooled SMD solution for high-power applications

Top-side cooled Double & Quadruple DPAK (DDPAK + QDPAK)

These top-side cooled surface mount device (SMD) packages address high-power SMPS applications such as PC power, solar, server and telecom as well as automotive applications like HV eDisconnect, HV eFuse and on-board charger. SMD-based SMPS designs support fast switching and help to reduce the parasitic inductance associated with long leaded packages such as the common TO-220 and TO-247 package. In today's SMD-based designs, the output power is restricted by the thermal limit of the PCB material because the heat must be dissipated through the board. Thanks to the top-side cooling concept of DDPAK and QDPAK, the thermal decoupling of board and semiconductor is possible, enabling higher power density or improved system lifetime.

For highest efficiency and controllability in high-power SMPS markets

TO-247 4-pin with asymmetric leads

The TO-247 4-pin package with asymmetric leads is an optimized version of the standard TO-247 4-pin and enables highest efficiency and controllability in the high-power SMPS market. The fourth pin acts as a Kelvin source. The main current of the switch is placed outside of the gate loop and the feedback is eliminated. This leads to less switching losses, especially at high currents. Secondly, the EMI will be reduced due to cleaner waveforms. In addition, the asymmetric leads further improve the ease of use in the design-in process. Compared to the standard TO-247 4-pin the distance between the critical pins has been increased to enable simplified wave soldering and reduced board yield loss.

Enabling significant space savings

ThinPAK 8x8

With a very small footprint of only 64 mm² (vs. 150 mm² for the D²PAK) and a very low profile with only 1 mm height (vs. 4.4 mm for the D²PAK) the ThinPAK 8x8 leadless SMD package for high-voltage MOSFETs is a first choice to decrease system size in power-density driven designs. Low parasitic inductance and a separate 4-pin Kelvin source connection offer best efficiency and ease of use. The package is RoHS compliant with halogen-free mold compound.

Optimized for high-power applications

TO-Leadless

Combined with the CoolMOS™ C7 Gold (G7) technology, the TO-Leadless (TOLL) package is Infineon's flagship SMD package for high power/high current SMD solutions. Compared to D²PAK 7-pin, TO-Leadless shows a 30 percent reduction in footprint, yet offers improved thermal performance. This, and the 50 percent height reduction result in a significant advantage whenever highest power density is demanded. Equipped with 4-pin Kelvin source connection and low parasitic inductances the package offers best efficiency and ease of use. The package is MSL1 compliant and reflow solderable.

www.infineon.com/coolmos-latest-packages

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CoolMOS™ SJ MOSFET low-power package innovations

Addressing today's consumer needs

Cost-effective drop-in replacement for DPAK

SOT-223

The SOT-223 package without middle pin is a cost-effective alternative to DPAK, addressing the need for cost reductions in price-sensitive applications. It offers a smaller footprint, while still being pin-to-pin compatible with DPAK, thus, allowing a drop-in replacement for DPAK and second sourcing. Moreover, SOT-223 achieves comparable thermal performance to DPAK and enables customers to achieve improved form factors or space savings in designs with low power dissipation.

Solution for slim and small adapters and chargers

ThinPAK 5x6

ThinPAK 5x6 reduces the PCB area by 52 percent and height by 54 percent when compared to the DPAK package which is widely used in chargers and adapters. ThinPAK 5x6 is the right device to replace DPAK and meet the market demands of slimmer and smaller designs. Also, ThinPAK 5x6 enables a reduced charger and adapter case hot spot temperature by increasing the space between the MOSFET and the charger and adapter case.

Solution for height reduction in adapters and chargers

TO-220 FullPAK Narrow Lead

Infineon's TO-220 FullPAK Narrow Lead addresses customer needs with regards to height reduction requirements in adapter and charger applications. By offering an optimized standoff width and height and improved creepage distance, the package can be fully inserted into the PCB without any production concerns and, therefore, is especially suitable for slim and semi-slim adapter solutions.

Improved creepage distance for open frame power supplies

TO-220 FullPAK Wide Creepage

This package solution has an increased creepage distance between the pins to 4.25 mm compared to 2.54 mm of a TO-220 FullPAK package. It targets open frame power supplies such as TV sets and PC power, where dust can enter the case through air vents. Dust particles can reduce the effective creepage between pins over time, which may lead to high voltage arcing. The package meets the requirements of open frame power supplies without any additional measures. Thus, it reduces system cost by offering an alternative to frequently used approaches to increase creepage distance.

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950V CoolMOS PFD7

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO247	TO252 DPAK
60		IPW95R60PFD7*	
130	IPA95R130PFD7*	IPW95R130PFD7*	
310	IPA95R310PFD7*	IPW95R310PFD7*	
450	IPA95R450PFD7*		IPD95R450PFD7*

950 V CoolMOS™ P7

$R_{DS(on)}$ [mΩ]	TO-220	TO-220 FullPAK	SOT-223	TO-251 Long lead	TO-252 (DPAK)
450		IPA95R450P7		IPU95R450P7	IPD95R450P7
750		IPA95R750P7		IPU95R750P7	IPD95R750P7
1200		IPA95R1K2P7	IPN95R1K2P7	IPU95R1K2P7	IPD95R1K2P7
2000			IPN95R2K0P7	IPU95R2K0P7	IPD95R2K0P7
3700			IPN95R3K7P7	IPU95R3K7P7	

900 V CoolMOS™ C3

$R_{DS(on)}$ [mΩ]	TO-220	TO-262 (I^2PAK)	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)
120					IPW90R120C3	
340	IPP90R340C3	IPI90R340C3	IPB90R340C3	IPA90R340C3	IPW90R340C3	
500		IPI90R500C3		IPA90R500C3	IPW90R500C3	
800	IPP90R800C3			IPA90R800C3		
1200	IPP90R1K2C3	IPI90R1K2C3		IPA90R1K2C3		IPD90R1K2C3

800 V CoolMOS™ P7

$R_{DS(on)}$ [mΩ]	TO -220	TO-220 FullPAK	TO-247	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK narrow lead	ThinPAK 5x6
280	IPP80R280P7	IPA80R280P7	IPW80R280P7	IPD80R280P7				IPAN80R280P7	
360	IPP80R360P7	IPA80R360P7	IPW80R360P7	IPD80R360P7				IPAN80R360P7	
450	IPP80R450P7	IPA80R450P7		IPD80R450P7				IPAN80R450P7	
600	IPP80R600P7	IPA80R600P7		IPD80R600P7	IPU80R600P7	IPS80R600P7	IPN80R600P7		IPLK80R600P7
750	IPP80R750P7	IPA80R750P7		IPD80R750P7	IPU80R750P7	IPS80R750P7	IPN80R750P7		IPLK80R750P7
900	IPP80R900P7	IPA80R900P7		IPD80R900P7	IPU80R900P7	IPS80R900P7	IPN80R900P7		IPLK80R900P7
1200	IPP80R1K2P7	IPA80R1K2P7		IPD80R1K2P7	IPU80R1K2P7	IPS80R1K2P7	IPN80R1K2P7		IPLK80R1K2P7
1400	IPP80R1K4P7	IPA80R1K4P7		IPD80R1K4P7	IPU80R1K4P7	IPS80R1K4P7	IPN80R1K4P7		IPLK80R1K4P7
2000				IPD80R2K0P7	IPU80R2K0P7	IPS80R2K0P7	IPN80R2K0P7		IPLK80R2K0P7
2400				IPD80R2K4P7	IPU80R2K4P7	IPS80R2K4P7	IPN80R2K4P7		
3300				IPD80R3K3P7	IPU80R3K3P7		IPN80R3K3P7		
4500				IPD80R4K5P7	IPU80R4K5P7		IPN80R4K5P7		

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* Coming soon

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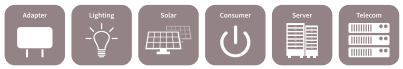
800 V CoolMOS™ CE

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-252 (DPAK)	TO-251 (IPAK)
310	IPA80R310CE		
460	IPA80R460CE		
650	IPA80R650CE		
1000	IPA80R1K0CE	IPD80R1K0CE	IPU80R1K0CE
1400	IPA80R1K4CE	IPD80R1K4CE	
2800		IPD80R2K8CE	

800 V CoolMOS™ C3



$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)
85				SPW55N80C3	
290	SPP17N80C3	SPB17N80C3	SPA17N80C3	SPW17N80C3	
450	SPP11N80C3		SPA11N80C3	SPW11N80C3	
650	SPP08N80C3		SPA08N80C3		
900	SPP06N80C3		SPA06N80C3		SPD06N80C3
1300	SPP04N80C3		SPA04N80C3		SPD04N80C3
2700			SPA02N80C3		SPD02N80C3

700 V CoolMOS™ P7

$R_{DS(on)}$ [mΩ]	TO-251 (IPAK Short Lead)	TO-220 FullPAK	TO-252 (DPAK)	TO-220 FullPAK narrow lead	TO-251 (IPAK Short Lead w/ ISO Standoff)	SOT-223	ThinPAK 5x6
360	IPS70R360P7S	IPA70R360P7S	IPD70R360P7S	IPAN70R360P7S	IPSA70R360P7S	IPN70R360P7S	
450		IPA70R450P7S		IPAN70R450P7S	IPSA70R450P7S	IPN70R450P7S	
600	IPS70R600P7S	IPA70R600P7S	IPD70R600P7S	IPAN70R600P7S	IPSA70R600P7S	IPN70R600P7S	IPLK70R600P7
750		IPA70R750P7S		IPAN70R750P7S	IPSA70R750P7S	IPN70R750P7S	IPLK70R750P7
900	IPS70R900P7S	IPA70R900P7S	IPD70R900P7S	IPAN70R900P7S	IPSA70R900P7S	IPN70R900P7S	IPLK70R900P7
1200					IPSA70R1K2P7S	IPN70R1K2P7S	IPLK70R1K2P7
1400	IPS70R1K4P7S		IPD70R1K4P7S		IPSA70R1K4P7S	IPN70R1K4P7S	IPLK70R1K4P7
2000					IPSA70R2K0P7S	IPN70R2K0P7S	IPLK70R2K0P7

700 V CoolMOS™ CE

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK Wide Creepage	TO-262 (I^2PAK)	TO-251 (IPAK Short Lead with ISO Standoff)	TO-252 (DPAK)	TO-251 (IPAK Short Lead)	SOT-223
600	IPAW70R600CE		IPSA70R600CE	IPD70R600CE		
950	IPAW70R950CE	IPI70R950CE	IPSA70R950CE	IPD70R950CE	IPS70R950CE	
1000						IPN70R1K0CE
1400			IPSA70R1K4CE	IPD70R1K4CE	IPS70R1K4CE	
1500						IPN70R1K5CE
2000			IPSA70R2K0CE	IPD70R2K0CE	IPS70R2K0CE	
2100						IPN70R2K1CE

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650 V CoolMOS™ C7

$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 8x8
19				IPW65R019C7	IPZ65R019C7		
45	IPP65R045C7	IPB65R045C7	IPA65R045C7	IPW65R045C7	IPZ65R045C7		
65	IPP65R065C7	IPB65R065C7	IPA65R065C7	IPW65R065C7	IPZ65R065C7		
70							IPL65R070C7
95	IPP65R095C7	IPB65R095C7	IPA65R095C7	IPW65R095C7	IPZ65R095C7		
99							IPL65R099C7
125	IPP65R125C7	IPB65R125C7	IPA65R125C7	IPW65R125C7			
130							IPL65R130C7
190	IPP65R190C7	IPB65R190C7	IPA65R190C7	IPW65R190C7		IPD65R190C7	
195							IPL65R195C7
225	IPP65R225C7	IPB65R225C7	IPA65R225C7			IPD65R225C7	
230							IPL65R230C7

650 V CoolMOS™ CE

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-252 (DPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK Narrow Lead
400	IPA65R400CE	IPD65R400CE	IPS65R400CE		
650	IPA65R650CE	IPD65R650CE	IPS65R650CE		IPAN65R650CE
1000	IPA65R1K0CE	IPD65R1K0CE	IPS65R1K0CE		
1500	IPA65R1K5CE	IPD65R1K5CE		IPN65R1K5CE	

650 V CoolMOS™ CFD2

$R_{DS(on)}$ [mΩ]	TO-220	TO-262 (I^2PAK)	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)	ThinPAK 8x8
41					IPW65R041CFD		
80					IPW65R080CFD		
110	IPP65R110CFD		IPB65R110CFD	IPA65R110CFD	IPW65R110CFD		
150	IPP65R150CFD		IPB65R150CFD	IPA65R150CFD	IPW65R150CFD		
165							IPL65R165CFD
190	IPP65R190CFD	IPI65R190CFD	IPB65R190CFD	IPA65R190CFD	IPW65R190CFD		
210							IPL65R210CFD
310	IPP65R310CFD		IPB65R310CFD	IPA65R310CFD			
340							IPL65R340CFD
420	IPP65R420CFD			IPA65R420CFD	IPW65R420CFD	IPD65R420CFD	
660				IPA65R660CFD		IPD65R660CFD	
950						IPD65R950CFD	
1400						IPD65R1K4CFD	

650 V CoolMOS™ CFD7

$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D^2PAK)	TO-247	TO-247 4-pin	TO-Leadless (TOLL)	ThinPAK 8x8	QDPAK BSC	QDPAK TSC
17							IPQC65R017CFD7*	IPDQ65R017CFD7*
18			IPW65R018CFD7	IPZA65R018CFD7				
29			IPW65R029CFD7	IPZA65R029CFD7			IPQC65R029CFD7*	IPDQ65R029CFD7*
40					IPT65R040CFD7*		IPQC65R040CFD7*	IPDQ65R040CFD7*
41	IPP65R041CFD7	IPB65R041CFD7	IPW65R041CFD7					
60	IPP65R060CFD7		IPW65R060CFD7		IPT65R060CFD7*		IPQC65R060CFD7*	IPDQ65R060CFD7*
65						IPL65R065CFD7		
80					IPT65R080CFD7*			IPDQ65R080CFD7*
90	IPP65R090CFD7	IPB65R090CFD7	IPW65R090CFD7					
95						IPL65R095CFD7		
99					IPT65R099CFD7*			IPDQ65R099CFD7*
110	IPP65R110CFD7	IPB65R110CFD7	IPW65R110CFD7					
115						IPL65R115CFD7		
125		IPB65R125CFD7	IPW65R125CFD7		IPT65R125CFD7*			IPDQ65R125CFD7*
130						IPL65R130CFD7		
155	IPP65R155CFD7	IPB65R155CFD7	IPW65R155CFD7		IPT65R155CFD7*			
160						IPL65R160CFD7		
190	IPP65R190CFD7				IPT65R190CFD7*			
200						IPL65R200CFD7		

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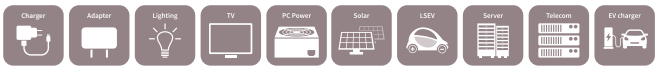
600 V CoolMOS™ PFD7

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK Narrow Leads	TO-251 (IPAK Short Lead)	TO-252 (DPAK)	SOT-223	ThinPAK 5x6
125	IPAN60R125PFD7S				
210	IPAN60R210PFD7S	IPS60R210PFD7S	IPD60R210PFD7S		
280	IPAN60R280PFD7S	IPS60R280PFD7S	IPD60R280PFD7S		
360	IPAN60R360PFD7S	IPS60R360PFD7S	IPD60R360PFD7S	IPN60R360PFD7S	IPLK60R360PFD7
600		IPS60R600PFD7S	IPD60R600PFD7S	IPN60R600PFD7S	IPLK60R600PFD7
1000		IPS60R1K0PFD7S	IPD60R1K0PFD7S	IPN60R1K0PFD7S	IPLK60R1K0PFD7
1500			IPD60R1K5PFD7S	IPN60R1K5PFD7S	IPLK60R1K5PFD7
2000			IPD60R2K0PFD7S	IPN60R2K0PFD7S	

600 V CoolMOS™ P7
Industrial grade

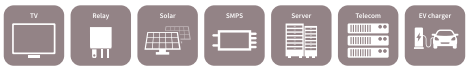


$R_{DS(on)}$ [mΩ]	TO -220	TO-220 FullPAK	TO-247	TO-247 4-pin asymmetric leads	TO-252 (DPAK)	ThinPAK 8x8	D^2PAK
24			IPW60R024P7	IPZA60R024P7			
37			IPW60R037P7	IPZA60R037P7			
45			IPW60R045P7	IPZA60R045P7			IPB60R045P7
60	IPP60R060P7	IPA60R060P7	IPW60R060P7	IPZA60R060P7			IPB60R060P7
65						IPL60R065P7	
80	IPP60R080P7	IPA60R080P7	IPW60R080P7	IPZA60R080P7		IPL60R085P7	IPB60R080P7
99	IPP60R099P7	IPA60R099P7	IPW60R099P7	IPZA60R099P7			IPB60R099P7
105						IPL60R105P7	
120	IPP60R120P7	IPA60R120P7	IPW60R120P7	IPZA60R120P7			IPB60R120P7
125						IPL60R125P7	
160	IPP60R160P7	IPA60R160P7					
180	IPP60R180P7	IPA60R180P7	IPW60R180P7	IPZA60R180P7	IPD60R180P7		IPB60R180P7
185						IPL60R185P7	
280	IPP60R280P7	IPA60R280P7			IPD60R280P7		IPB60R280P7
285						IPL60R285P7	
360	IPP60R360P7	IPA60R360P7			IPD60R360P7		IPB60R360P7
365						IPL60R365P7	
600	IPP60R600P7	IPA60R600P7			IPD60R600P7		

600 V CoolMOS™ P7
Standard grade

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-220 FullPAK Narrow lead	TO-252 (DPAK)	TO-220 FullPAK Wide Creepage	SOT-223
180	IPA60R180P7S	IPAN60R180P7S	IPD60R180P7S	IPAW60R180P7S	
280	IPA60R280P7S	IPAN60R280P7S	IPD60R280P7S	IPAW60R280P7S	
360	IPA60R360P7S	IPAN60R360P7S	IPD60R360P7S	IPAW60R360P7S	IPN60R360P7S
600	IPA60R600P7S	IPAN60R600P7S	IPD60R600P7S	IPAW60R600P7S	IPN60R600P7S

600 V CoolMOS™ CFD7



$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-252 (DPAK)	ThinPAK 8x8	DDPAK	TO-Leadless (TOLL)	QDPAK
15									IPDQ60R015CFD7*
18				IPW60R018CFD7					
20									IPDQ60R020CFD7*
24				IPW60R024CFD7					
25									IPDQ60R025CFD7*
31/35				IPW60R031CFD7				IPT60R035CFD7	IPDQ60R035CFD7*
40/45		IPB60R040CFD7		IPW60R040CFD7			IPDD60R045CFD7	IPT60R045CFD7	IPDQ60R045CFD7*
55		IPB60R055CFD7		IPW60R055CFD7			IPDD60R055CFD7	IPT60R055CFD7	IPDQ60R055CFD7
60						IPL60R060CFD7			
70	IPP60R070CFD7	IPB60R070CFD7		IPW60R070CFD7					
75						IPL60R075CFD7	IPDD60R075CFD7	IPT60R075CFD7	IPDQ60R075CFD7*
90/95	IPP60R090CFD7	IPB60R090CFD7		IPW60R090CFD7		IPL60R095CFD7	IPDD60R090CFD7	IPT60R090CFD7	
105/115	IPP60R105CFD7	IPB60R105CFD7		IPW60R105CFD7		IPL60R115CFD7	IPDD60R105CFD7	IPT60R105CFD7	
125/140	IPP60R125CFD7	IPB60R125CFD7	IPA60R125CFD7	IPW60R125CFD7		IPL60R140CFD7	IPDD60R125CFD7	IPT60R125CFD7	
145/160	IPP60R145CFD7	IPB60R145CFD7	IPA60R145CFD7	IPW60R145CFD7	IPD60R145CFD7	IPL60R160CFD7	IPDD60R145CFD7	IPT60R145CFD7	
170	IPP60R170CFD7	IPB60R170CFD7	IPA60R170CFD7	IPW60R170CFD7	IPD60R170CFD7		IPDD60R170CFD7		
185						IPL60R185CFD7			
210/225	IPP60R210CFD7	IPB60R210CFD7	IPA60R210CFD7		IPD60R210CFD7	IPL60R225CFD7			
280	IPP60R280CFD7	IPB60R280CFD7	IPA60R280CFD7		IPD60R280CFD7				
360	IPP60R360CFD7	IPB60R360CFD7	IPA60R360CFD7		IPD60R360CFD7				

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600 V CoolMOS™ S7

$R_{DS(on)}$ [mΩ]	TO -220	TO-Leadless (TOLL)	TO247-3	QDPAK TSC	QDPAK BSC
10			IPW60R010S7*	IPDQ60R010S7	IPQC60R010S7*
17			IPW60R017S7*	IPDQ60R017S7*	IPQC60R017S7*
22	IPP60R022S7	IPT60R022S7	IPW60R022S7*	IPDQ60R022S7	IPQC60R022S7*
40	IPP60R040S7	IPT60R040S7	IPW60R040S7*	IPDQ60R040S7	IPQC60R040S7*
65	IPP60R065S7	IPT60R065S7	IPW60R065S7*	IPDQ60R065S7	

600 V CoolMOS™ C7 Gold (G-series)

$R_{DS(on)}$ [mΩ]	TO-Leadless (TOLL)	TO-252 (Double DPAK)
28	IPT60R028G7	
50	IPT60R050G7	IPDD60R050G7
80	IPT60R080G7	IPDD60R080G7
102	IPT60R102G7	IPDD60R102G7
125	IPT60R125G7	IPDD60R125G7
150	IPT60R150G7	IPDD60R150G7
190		IPDD60R190G7

600 V CoolMOS™ C7

$R_{DS(on)}$ [mΩ]	TO-220	TO-263 (D^2PAK)	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 8x8
17				IPW60R017C7	IPZ60R017C7		
40	IPP60R040C7	IPB60R040C7		IPW60R040C7	IPZ60R040C7		
60	IPP60R060C7	IPB60R060C7	IPA60R060C7	IPW60R060C7	IPZ60R060C7		
65							IPL60R065C7
99	IPP60R099C7	IPB60R099C7	IPA60R099C7	IPW60R099C7	IPZ60R099C7		
104							IPL60R104C7
120	IPP60R120C7	IPB60R120C7	IPA60R120C7	IPW60R120C7			
125							IPL60R125C7
180	IPP60R180C7	IPB60R180C7	IPA60R180C7	IPW60R180C7		IPD60R180C7	
185							IPL60R185C7

600 V CoolMOS™ P6

$R_{DS(on)}$ [mΩ]	TO-220	TO-220 FullPAK	TO-263 (D^2PAK)	TO-247	TO-247 4-pin	TO-252 (DPAK)	ThinPAK 5x6	ThinPAK 8x8
41				IPW60R041P6				
70				IPW60R070P6	IPZ60R070P6			
99	IPP60R099P6	IPA60R099P6		IPW60R099P6	IPZ60R099P6			
125	IPP60R125P6	IPA60R125P6		IPW60R125P6				
160	IPP60R160P6	IPA60R160P6	IPB60R160P6	IPW60R160P6				
180								IPL60R180P6
190	IPP60R190P6	IPA60R190P6		IPW60R190P6				
210								IPL60R210P6
230		IPA60R230P6						
255								
280	IPP60R280P6	IPA60R280P6	IPB60R280P6	IPW60R280P6				
330/360							IPL60R360P6S	
380		IPA60R380P6				IPD60R380P6		
600		IPA60R600P6				IPD60R600P6		
650							IPL60R650P6S	

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600 V CoolMOS™ CE

$R_{DS(on)}$ [mΩ]	TO-220 FullPAK	TO-220 FullPAK Wide Creepage	TO-252 (DPAK)	TO-251 (IPAK)	TO-251 (IPAK Short Lead)	SOT-223	TO-220 FullPAK Narrow Lead
190		IPAW60R190CE					
280		IPAW60R280CE					
380		IPAW60R380CE					
400	IPA60R400CE		IPD60R400CE		IPS60R400CE		
460	IPA60R460CE		IPD60R460CE				
600		IPAW60R600CE					
650	IPA60R650CE		IPD60R650CE		IPS60R650CE		IPAN60R650CE
800			IPD60R800CE		IPS60R800CE		IPAN60R800CE
1000	IPA60R1K0CE		IPD60R1K0CE	IPU60R1K0CE	IPS60R1K0CE	IPN60R1K0CE	
1500	IPA60R1K5CE		IPD60R1K5CE	IPU60R1K5CE	IPS60R1K5CE	IPN60R1K5CE	
2100			IPD60R2K1CE	IPU60R2K1CE	IPS60R2K1CE	IPN60R2K1CE	
3400			IPD60R3K4CE		IPS60R3K4CE	IPN60R3K4CE	

500 V CoolMOS™ CE

$R_{DS(on)}$ [mΩ]	TO-220	TO-220 FullPAK	TO-252 (DPAK)	SOT-223	TO-220 FullPAK Narrow Lead
190	IPP50R190CE	IPA50R190CE			
280	IPP50R280CE	IPA50R280CE	IPD50R280CE		
380	IPP50R380CE	IPA50R380CE	IPD50R380CE		
500		IPA50R500CE	IPD50R500CE		IPAN50R500CE
650			IPD50R650CE	IPN50R650CE	
800		IPA50R800CE	IPD50R800CE	IPN50R800CE	
950		IPA50R950CE	IPD50R950CE	IPN50R950CE	
1400			IPD50R1K4CE	IPN50R1K4CE	
2000			IPD50R2K0CE	IPN50R2K0CE	
3000			IPD50R3K0CE	IPN50R3K0CE	

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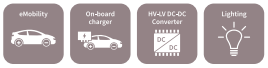
CoolMOS™ SJ MOSFET automotive

800 V CoolMOS™ C3A

$R_{DS(on)}$ @ T_J = 25°C V_{GS} = 10 V [mΩ]	TO-247	TO-252	TO-263
290	IPW80R290C3A		IPB80R290C3A
2700		IPD80R2K7C3A	

650 V CoolMOS™ CFDA



$R_{DS(on)}$ @ T_J = 25°C V_{GS} = 10 V [mΩ]	TO-220	TO-247	TO-252	TO-263
48		IPW65R048CFDA		
80		IPW65R080CFDA		
110	IPP65R110CFDA	IPW65R110CFDA		IPB65R110CFDA
150	IPP65R150CFDA	IPW65R150CFDA		IPB65R150CFDA
190				IPB65R190CFDA
310				IPB65R310CFDA
420			IPD65R420CFDA	
660			IPD65R660CFDA	IPB65R660CFDA

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650 V CoolMOS™ CFD7A

$R_{DS(on)}$ @ T_J = 25°C V_{GS} = 10 V [mΩ]	TO-220	TO-247	TO-247 Short leads	TO-263-3 D^2PAK 3-pin	TO-263-7 D^2PAK 7-pin	QDPAK BSC	QDPAK TSC
17						IPQC65R017CFD7A*	IPDQ65R017CFD7A*
22		IPW65R022CFD7A	IPWS65R022CFD7A				
29						IPQC65R029CFD7A*	IPDQ65R029CFD7A*
35		IPW65R035CFD7A	IPWS65R035CFD7A				
40						IPQC65R040CFD7A*	IPDQ65R040CFD7A*
50	IPP65R050CFD7A	IPW65R050CFD7A	IPWS65R050CFD7A	IPB65R050CFD7A	IPBE65R050CFD7A		
60						IPQC65R060CFD7A*	IPDQ65R060CFD7A*
75	IPP65R075CFD7A	IPW65R075CFD7A	IPWS65R075CFD7A	IPB65R075CFD7A	IPBE65R075CFD7A		
80						IPQC65R080CFD7A*	IPDQ65R080CFD7A*
99	IPP65R099CFD7A	IPW65R099CFD7A		IPB65R099CFD7A	IPBE65R099CFD7A	IPQC65R099CFD7A*	IPDQ65R099CFD7A*
115	IPP65R115CFD7A	IPW65R115CFD7A		IPB65R115CFD7A	IPBE65R115CFD7A		
125						IPQC65R125CFD7A*	IPDQ65R125CFD7A*
145	IPP65R145CFD7A	IPW65R145CFD7A		IPB65R145CFD7A	IPBE65R145CFD7A		
190	IPP65R190CFD7A	IPW65R190CFD7A		IPB65R190CFD7A	IPBE65R190CFD7A		
230				IPB65R230CFD7A	IPBE65R230CFD7A		

600 V CoolMOS™ CPA

$R_{DS(on)}$ @ T_J = 25°C V_{GS} = 10 V [mΩ]	TO-220	TO-247	TO-262	TO-263
45		IPW60R045CPA		
75		IPW60R075CPA		
99	IPP60R099CPA	IPW60R099CPA	IPI60R099CPA	IPB60R099CPA
199				IPB60R199CPA
299				IPB60R299CPA

600 V CoolMOS™ S7A

$R_{DS(on)}$ @ T_J = 25°C V_{GS} = 10 V [mΩ]	QDPAK TSC	QDPAK BSC	TO-247-3
40	IPDQ60R040S7A*	IPQC60R040S7A*	IPW60R040S7A*
22	IPDQ60R022S7A*	IPQC60R022S7A*	IPW60R022S7A*
17	IPDQ60R017S7A*	IPQC60R017S7A*	IPW60R017S7A*
10	IPDQ60R010S7A	IPQC60R010S7A*	IPW60R010S7A*

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CoolMOS™ SJ MOSFETs – packages

SOT-223

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE								650/800	950/1400	2000/3000
600	P7						360	600			
	CE									1000/1500	2100/3400
	PFD7						360	600		1000/1500	2000
650	CE									1500	
700	P7						360	450/600	750	900/1200/1400	2000
	CE									1000/1500	2100
800	P7								600/750	900/1200/1400	2000/2400/ 3300/4500
950	P7									1200	2000/3700

TO-247

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7	24/37/45	60/80	99/120	180						
	C7	17/40	60	99/120	180						
	P6	41	70	99/125	160/190	280					
	CFD7	18/24/31/40/55	70	90/105/125/145	170						
	CPA	45	75	99							
650	CFD7	18/29/41	60	90/110/125	155						
	C7	19/45	65	95/125	190						
	CFD2	41	80	110	150/190			420			
	CFDA	48	80	110	150/190						
	CFD7A	22/35/50	75	99/115/145	190	230					
800	P7					280	360				
	C3		85			290		450			
900	C3			120			340	500			
950	PFD7		60*	130*			310*				

TO-247 short leads

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
650	CFD7A	22/35/50	75								

TO-247 4-pin

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	C7	17/40	60	99							
	P6		70	99							
650	C7	19/45	65	95							

TO-247 4-pin asymmetric leads

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7	24/37/45	60/80	99/120	180						
650	CFD7	18/29									

IPAK

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CE									1000/1500	2100
800	P7							600	750	900/1200/1400	2000/2400 3300/4500
	CE									1000	
950	P7							450	750	1200	2000/3700

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IPAK Short Lead

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CE						400		650/800	1000/1500	2100/3400
	PFD7					210/280	360	600		1000	
650	CE						400		650	1000	
700	P7						360/600			900/1400	
	CE									950/1400	2000
800	P7							600	750	900/1200/1400	2000/2400

IPAK Short Lead with ISO Standoff

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
700	P7						360	450/600	750	900/1200/1400	2000
	CE							600		950/1400	2000

I²PAK

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CPA			99							
650	CFD2				190						
700	CE									950	
900	C3						340	500		1200	

DPAK

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE					280	380	500	650/800	950/1400	2000/3000
600	P7				180	280	360	600			
	C7				180						
	CE						400	460	650/800	1000/1500	2100/3400
	P6						380	600			
	CFD7			145	170	210/280	360				
	PFD7					210/280	360	600		1000/1500	2000
650	C7				190	225					
	CE						400		650	1000/1500	
	CFD2							420	660	950/1400	
	CFDA							420	660		
700	P7						360	600		900/1400	
	CE							600		950/1400	2000
800	P7					280	360	450/600	750	900/1200/1400	2000/2400 3300/4500
	C3									900/1300	2700
	C3A										2700
	CE									1000/1400	2800
900	C3									1200	
950	P7							450	750	1200	2000
	PFD7							450*			

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D²PAK

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	C7	40	60	99/120	180						
	P7	45	60/80	99/120	180	280	360				
	CPA			99		299					
	CFD7	40 55	70	90/105 125/145	170	210 280	360				
650	CFD7	41		90/110/125	155						
	C7	45	65	95/125	190	225					
	CFD2			110	150/190		310				
	CFDA			110	150/190		310		660		
	CFD7A	50	75	99 /115/145	190	230					
800	C3					290					
900	C3						340				

D²PAK 7-pin

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
650	CFD7A	50	75	99 /115	145/190	230					

Double DPAK (DDPAK)

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CFD7	45/55	75	90/105/ 125/145	170						
	G7	50	80	102/125	150/190						

QDPAK TSC

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	S7	10/17*/22/40	65								
	S7A	10*/17*/22*/40*									
650	CFD7	17*/29*/40*	60*/80*	99*/125*							
	CFD7A	17*/29*/40*	60*/80*	99*/125*							

QDPAK BSC

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	S7	10/17*/22*/40*									
	S7A	10/17*/22*/40*									
650	CFD7	17*/29*/40*	60*								
	CFD7A	17*/29*/40*	60*/80*	99*/125*							

TO-220 FullPAK

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE				190	280	380	500	800	950	
600	P7		60/80	99/120	160/180	280	360	600			
	C7		60	99/120	180						
	CE						400	460	650	1000/1500	
	CFD7			125	170	280	360				
	P6			99/125	160/190	230/280	380	600			
650	C7	45	65	95/125	190	225					
	CE						400		650	1000/1500	
	CFD2			110	150/190		310	420	660		
700	P7						360	450/600	750	900	
800	P7					280	360	450/600	750	900/1200/1400	
	C3					290		450	650	900/1300	2700
	CE						310	460	650	1000/1400	
900	C3						340	500	800	1000/1200	
950	P7							450	750	1200	
	PFD7			130*			310*	450*			

TO-220 FullPAK Narrow Lead

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE							500			
600	CE								650/800		
	P7				180	280	360	600			
	PFD7			125		210/280	360				
650	CE								650		
700	P7						360	450/600	750	900	
800	P7					280	360	450			

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TO-Leadless

		$R_{DS(on)}$ group [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	CFD7	35/45/55	75	90/105/ 125/145							
	G7	28/50	80	102/125	150						
	S7	22/40	65								
650	CFD7	40*	60*/80*	99*/125*	155*/190*						

TO-220

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
500	CE				190	280	380				
600	P7		60/80	99/120	160/180	280	360	600			
	C7	40	60	99/120	180						
	P6			99/125	160/190	280					
	CFD7		70	90/105/ 125/145	170	280	360				
	CPA			99							
	S7	22									
650	CFD7	41	60	90/110	155	190					
	C7	45	65	95/125	190	225					
	CFD2			110	150/190		310	420			
	CFDA	50		99/110/115	150/190		310		660		
	CFD7A	50/75*		99 /115 /145*	190						
800	P7					280	360	450/600	750	900/1200/1400	
	C3					290		450	650	900/1300	

TO-220 FullPAK Wide Creepage

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7				180	280	360	600			
	CE				190	280	380	600			
700	CE							600		950	

ThinPAK 5x6

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	PFD7						360	600		1000/1500	
700	P7							600	750	900/1200/1400	2000
800								600	750	900/1200/1400	2000

ThinPAK 8x8

		$R_{DS(on)}$ [mΩ]									
Voltage [V]	Series	0-59	60-89	90-149	150-199	200-299	300-400	401-600	601-899	900-1500	>1500
600	P7		65/85	105/125	185	285	365				
	C7		65	104/125	185						
	CFD7		60/75	95/115/140	160/185	225					
	P6				180	210					
650	CFD7		65	95/115/130	160	200					
	C7		70	99/130	195	230					
	CFD2				165	210	340				

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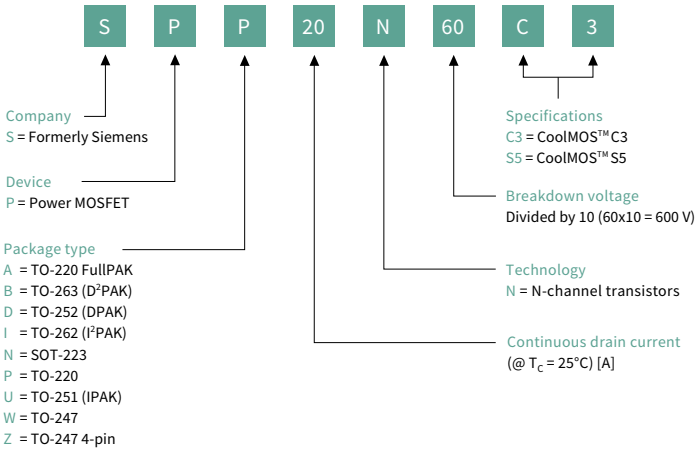
ACTIVE & PREFERRED

*Coming soon

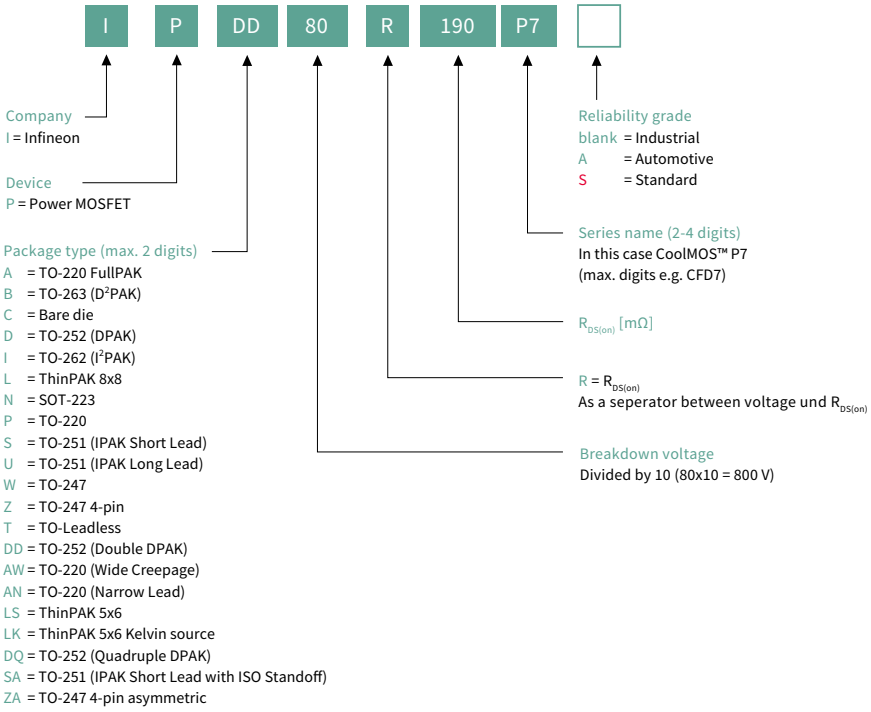
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Nomenclature

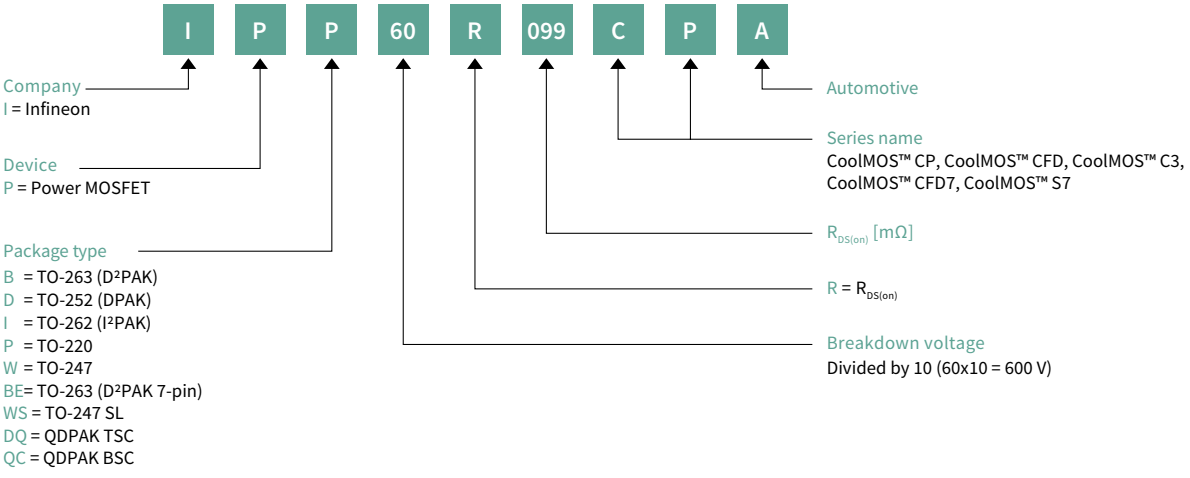
Power MOSFETs (until 2005)



Power MOSFETs (from October 2015 onwards)



Automotive MOSFETs



Infineon support for high-voltage MOSFETs

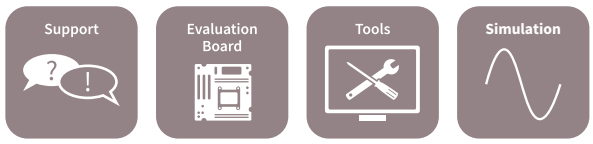
Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/coolmos
www.infineon.com/coolmos-latest-packages
www.infineon.com/coolmos-automotive
www.infineon.com/gan

Evaluationboards and simulation models

www.infineon.com/coolmos-boards
www.infineon.com/powermosfet-simulationmodels



Gate-driver ICs

- Infineon gate-driver IC technologies
- Infineon gate-driver IC applications
- How to choose a gate driver
- Silicon carbide MOSFET gate-driver ICs
- Driver configuration overview
- Gate-driver ICs portfolio
- Infineon gate driver IC package options
- EiceDRIVER™ non-isolated low-side gate drivers
- 2EDN EiceDRIVER™ family
- EiceDRIVER ™ 1EDN71x6G/U family
- EiceDRIVER™ 2EDL8x2x family
- MOTIX™ 6EDL7141 high performance motor control
- MOTIX™ 160 V SOI gate-driver family
- EiceDRIVER™ 650 V level-shift SOI gate driver family
- EiceDRIVER™ 1200 V level-shift SOI gate driver family
- 2EDi EiceDRIVER™ family
- EiceDRIVER™ X3 Compact and 2L-SRC Compact
- EiceDRIVER™ Enhanced 1ED-F3 and X3 Analog
- EiceDRIVER™ Enhanced X3 Digital
- EiceDRIVER™ APD 2ED4820-EM
- EiceDRIVER™ 1EDI302xAS/1EDI303xAS
- Gate driver nomenclature

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

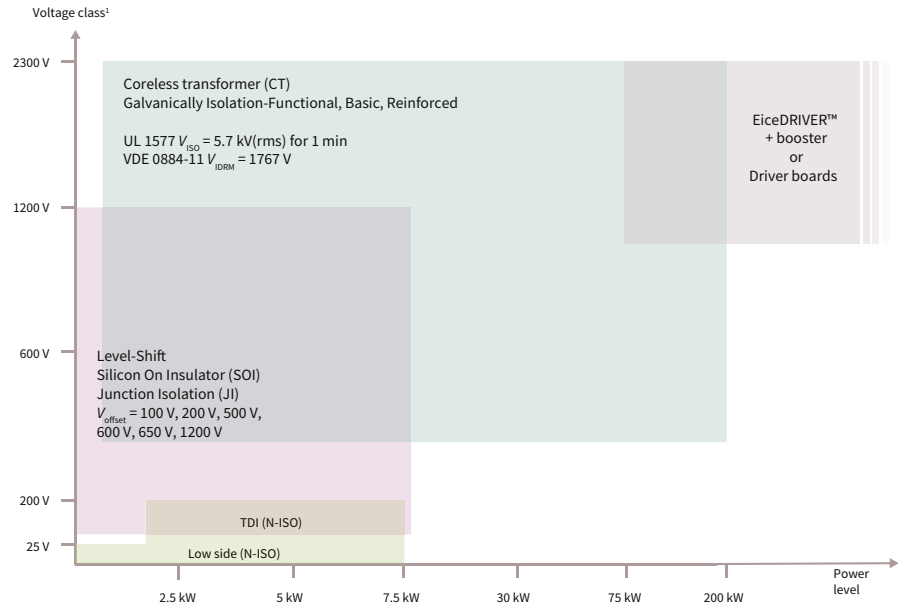
Feedback

EiceDRIVER™ and MOTIX™ gate-driver IC

Gate-driver ICs serve as the interface between control signals (digital or analog controllers) and power switches (IGBTs, MOSFETs, SiC MOSFETs, and GaN HEMTs). The integrated gate driver solutions reduce design complexity, development time, bill of materials (BOM), and board space while improving reliability over discretely-implemented gate-drive solutions.

Every switch needs a driver, the right driver makes a difference. Infineon offers a comprehensive portfolio of EiceDRIVER™ gate-driver ICs with a variety of configurations, voltage classes, isolation levels, protection features, and package options. EiceDRIVER™ gate-driver ICs are complementary to Infineon IGBT discretes and modules, silicon (CoolMOS™, OptiMOS™ and StrongIRFET™) and silicon carbide MOSFETs (CoolSiC™), gallium nitride HEMTs (CoolGaN™), or as part of integrated power modules (CIPOS™ IPM and iMOTION™ smart IPM).

In addition, MOTIX™ gate driver is part of the MOTIX™ scalable product portfolio for low-voltage motor control solutions including MOTIX™ Driver, MOTIX™ Bridge, MOTIX™ SBC, and MOTIX™ MCU.



Gate driver configuration			25 V	25 - 105 V	200 V	500 V	600 V	650 V	1200 V	2300 V
Gate drivers	1-Channel	Isolated							●	●
		High-side		● ●	● ●	●	●			
		Low-side	●							
	2-Channel	Isolated			●			●	●	
		High-side		●						
		Low-side	●							
		High-side + Low side			● ●	●	● ●	●	●	
		Half-bridge		●	● ●		● ●	●	●	
	4-Channel	Half-bridge		●			●			
	6-Channel	Three-phase			●		● ●		● ●	

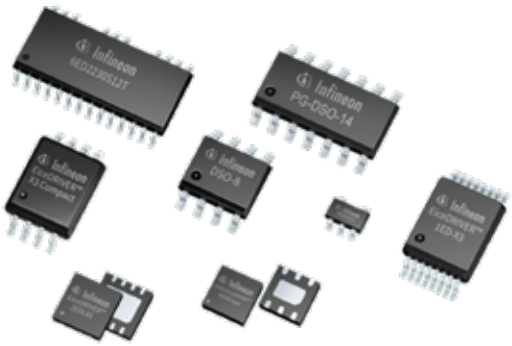
● Non-isolated (N-ISO) ● Junction isolation (JI) ● Silicon on insulator (SOI) ● Coreless transformer (CT)

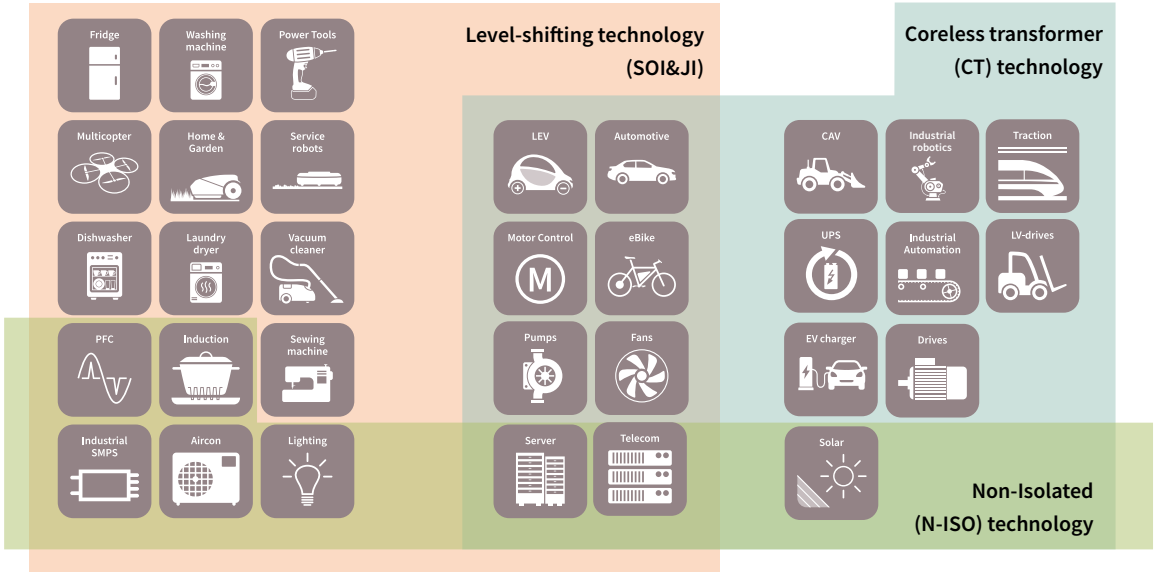
Note 1 Voltage class on the top row is defined base on different driver configurations for the maximum Voltage class.
1. For single high-side, high-side and low-side, half bridge and three phase gate drivers, voltage class is defined as switch break down voltage in applications.
2. For low side drivers (N-ISO), voltage class is defined as maximum operating range supply voltage.
3. For special cases as 1EDNx550 (1EDN-TDI, N-ISO), voltage class is defined as maximum bus voltage (highest floating voltage it can manage).

www.infineon.com/gatedriver

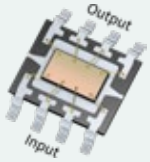
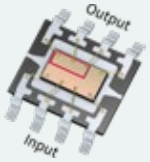
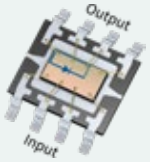
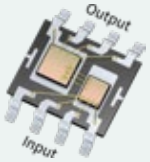
Infineon gate-driver IC applications

Leveraging the application expertise and advanced technologies of Infineon and International Rectifier, EiceDRIVER™ gate-driver ICs are well-suited for many applications such as industrial motor drives, home appliances, solar inverters, automotive applications, EV charging, UPS, switch-mode power supplies (SMPS), high-voltage lighting, battery-powered applications, and so on.





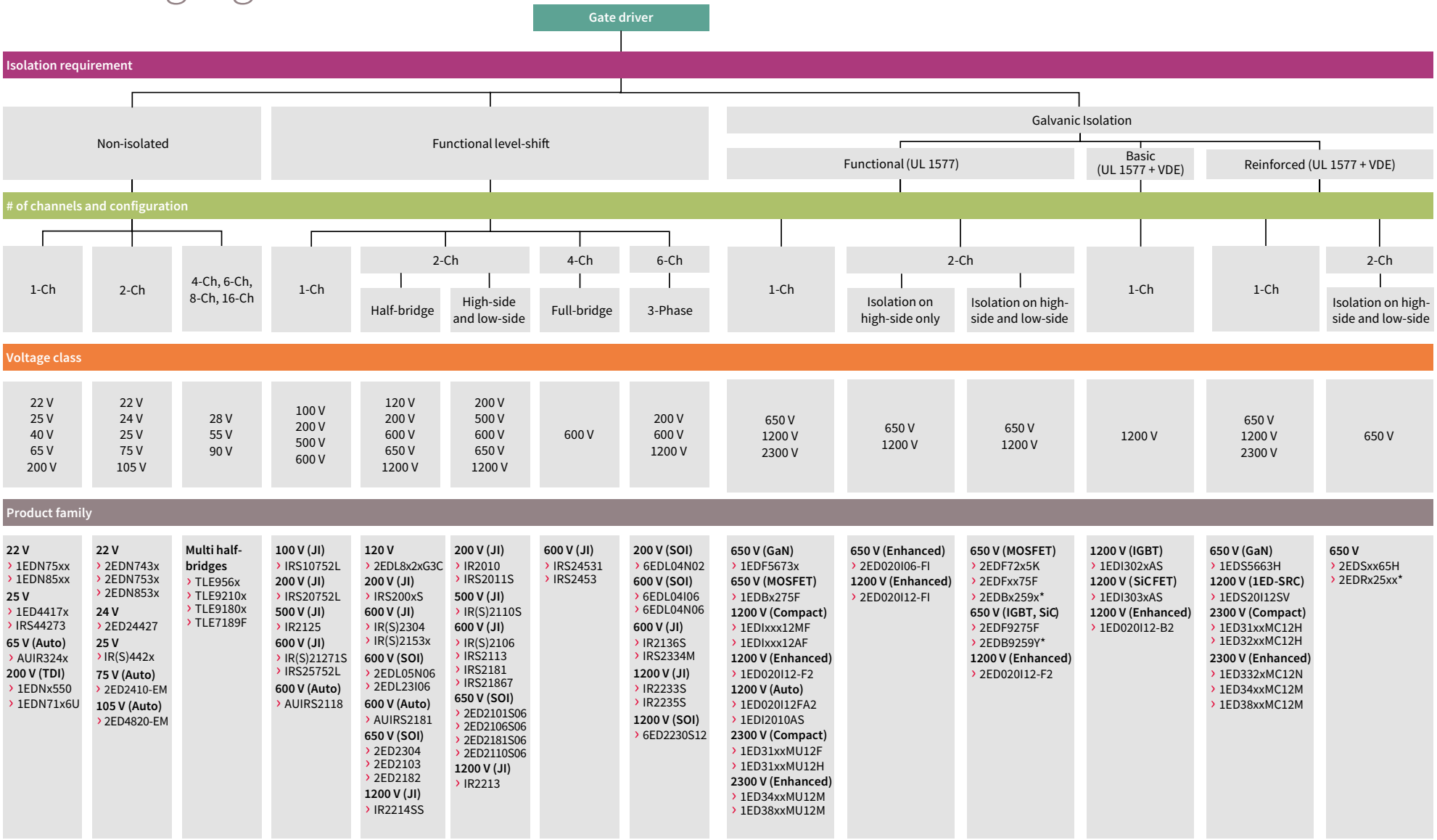
Infineon gate-driver IC technologies

Non-isolated GD	Level-shift GD		Isolated GD
Non-isolated (N-ISO)	Junction isolation (JI)	Silicon on insulator (SOI)	Coreless transformer (CT)
			
› **Monolithic construction** of ground-reference gate drivers for 20 V to 35 V supply voltage applications › **Comprehensive families** of single- and dual-low-side drivers with flexible options for output current, logic configurations and UVLOs (plus non-isolated TDI) › Uses **rugged and high-performance technologies** of HVIC process or **state-of-the-art 130 nm** process	› Monolithic construction of one to six gate drive channels up to 1200 V rating › Industrial pioneering high-voltage IC **(HVIC) technology** used in all high-voltage gate drive applications › **Gen 2** technology (**IR** prefix): Industrial pioneering HVIC process › **Gen 5** technology (IRS prefix): Cost-effective pin-to-pin versions of Gen 2	› Monolithic construction of 2 to 6 gate drive channels up to 1200 V rating › Built-in **PN-based bootstrap diode** (36 Ω typ.) for simplified bootstrap operation & reduced PCB area › **Negative transient immunity** to prevent latch-up: -100 V for 300 ns › **>50 percent lower level-shift losses** for higher efficiency, higher frequency operation, smaller heat sinks, and higher reliability	› Two separate chips solution with **magnetic coupling** providing **galvanically isolated** single- and dual channel gate drivers › **VDE 0884-11 isolation technology** providing **isolation** up to **8 kVpk** V_{IOTM} and up to **±2300 V functional isolation** › **CMTI** of **more than 300 V/ns** › **Strongest gate-drive output currents** (up to ±18 A) reducing need for external booster

www.infineon.com/gatedriver

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Choosing a gate-driver IC



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* Coming soon

Silicon carbide MOSFET gate-driver ICs

Ultra-fast switching 650 V to 2000 V power transistors such as CoolSiC™ SiC MOSFETs can be more easily handled by isolated gate driver solutions. Therefore, the following EiceDRIVER™ isolated gate drivers based on Infineon coreless transformer technology are recommended as most suitable. For a larger selection of isolated gate drivers, refer to the product portfolio overview section of this selection guide.

The following EiceDRIVER™ isolated gate drivers incorporate the most important key features for driving SiC MOSFET such as tight propagation delay matching, precise input filters, wide output supply voltage range, negative gate voltage capability, extended CMTI capability, Miller clamp, and DESAT protection.

Product family	Part number	Typ. current	V_{CC2} -V_{EE2}	UVLO	Prop. delay (accuracy)	CMTI	Other key features	Package
Achieve high efficiency and power density: take advantage of low propagation delay and high CMTI								
EiceDRIVER™ 1EDB 1-channel family	1EDB9275F 1EDB6275F	5 / 9 A	20 V	14.9 / 14.4 V 12.2 / 11.5 V	45 ns (+6 / -4 ns)	300 V/ns	Separate source/sink outputs, fast start-up times and fast recovery, basic isolation, UL 1577	DSO8, 150 mil
EiceDRIVER™ 2EDi 2-channel family	2EDR9259X* 2EDR9258X* 2EDR6258X*	5 / 9 A	20 V	14.9 / 15.4 V 14.9 / 15.4 V 12.5 / 11.5 V	38 ns (+9 / -5 ns)	150 V/ns	2EDi Gen 2, dead-time control, disable/enable, reinforced isolation, UL 1577, VDE-11, IEC 62368-1, GB4943.1	DSO-14, 300mil
	2EDB9259Y*			14.9 / 15.4 V			2EDi Gen 2, dead-time control, basic isolation, UL 1577, GB4943.1	DSO-14, 150 mil
EiceDRIVER™ 1EDN-TDI 1-channel family	1EDN6550B 1EDN9550B	4 / 8 A	20 V	12.2 / 11.5 V 14.9 / 14.4 V	45 ns (+10 / -7 ns)	N/A	Separate source/sink outputs	SOT23-6
Avoid parasitic turn-on: take advantage of Miller clamp options								
EiceDRIVER™ 1ED Compact 1-channel family	1EDI20I12MF	4 A	20 V	12.7 / 10.5 V	300 ns	100 V/ns	Miller clamp, functional isolation	DSO8, 150 mil
	1EDI60N12AF	10 A	35 V	10 / 8 V	125 ns	100 V/ns	Separate source/sink outputs, functional isolation	
EiceDRIVER™ X3 Compact 1-channel family	1ED3124MC12H 1ED31xxMU12F	5.5 / 10 / 14 A	35 V	12.5 / 10.5 V 14.2 / 12 V	90 ns (+/- 7 ns)	200 V/ns	Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO8, 300 mil DSO8, 150 mil
EiceDRIVER™ 2L-SRC Compact 1-channel family	1ED32xxMC12H	10 / 18 A	35 V	12.5 / 10.4 V	110 ns (+/- 15 ns)	200 V/ns	Two-level slew-rate control, Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO8, 300 mil
Short-circuit protect your CoolSiC™: take advantage of the fast and accurate DESAT protection								
EiceDRIVER™ X3 Analog 1-channel family	1ED34x1MC12M	3 / 6 / 9 A	35 V	12.6 / 10.4 V	244 ns (+/- 30 ns)	200 V/ns	Analog configurable, fast and accurate short circuit protection and soft turn-off Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ X3 Digital 1-channel family	1ED38x0MC12M	3 / 6 / 9 A	35 V	12.6 / 10.4 V default, but adjustable	244 ns (+/- 30 ns)	200 V/ns	Digital configurable (I²C), fast and accurate short circuit protection, rich monitoring functionality (predictive maintenance) Miller clamp, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ 1ED-F3 1-channel family	1ED332xMC12N	3 / 6 A	35 V	"12.6 / 10.4 V 13.6 / 12.6 V“	85 ns	300 V/ns	Miller clamp, short circuit protection, soft-off, reinforced isolation, UL 1577 and VDE-11	DSO-16, 300 mil
EiceDRIVER™ 2ED-F2 2-channel family	2ED020I12-F2	2 A	28 V	12.6 / 10.4 V	170 ns	50 V/ns	Miller clamp, short circuit protection	DSO-36, 300mil

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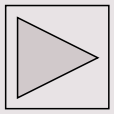
* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Driver configuration overview

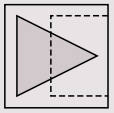
1-channel low-side driver

Allows low offset of the voltage between input and output



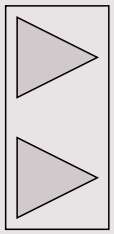
1-channel high-side driver

Allows high voltage offset between input and output



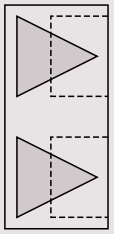
2-channel low-side driver

Both channels allow individual low voltage offsets, no interlock



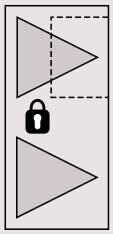
2-channel high-side driver

Both channels allow individual high voltage offsets, no interlock



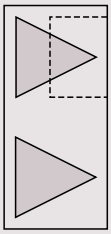
Half-bridge driver

Two interlocked channels for shoot through protection where one of the channels allows a high voltage offset.



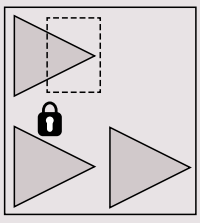
High- and low-side driver

Two non-interlocked channels, one for high voltage, one for low voltage offsets. The industry may also refer this as half-bridge.



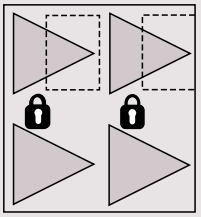
Half-bridge plus single low-side driver

Half-bridge with one additional low-side driver.



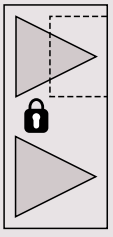
Full-bridge driver

Four channels in a package with two independent half bridges.



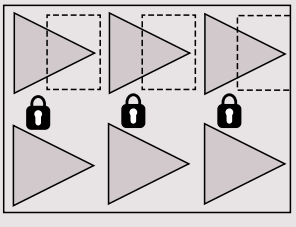
Synchronous-buck drivers

High speed drivers for dual high side and low side MOSFETs in synchronous rectified buck converters.



Three-phase bridge

Six channels in a package with three independent half bridges



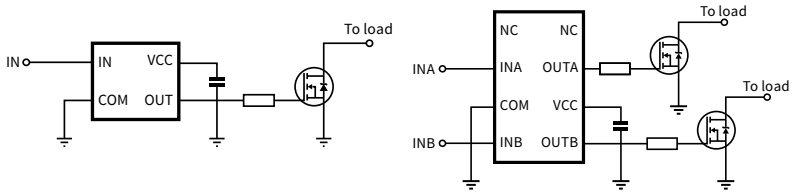
www.infineon.com/gatedriver

Product overview

Infineon's gate-driver IC solutions are the expert's choice. With more than 400 reliable and efficient gate driver solutions, we provide a comprehensive portfolio for virtually any application. To ease the selection process, this overview is structured along the configurations of the gate-driver ICs, as opposed to application topology.

Non-isolated low side gate-driver IC

Typical connection



Configuration	Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN		Technology	Features					Package							
								Enable	Fault reporting	Over-current protection	Programmable fault clear time	Separate sink/source outputs	DSO8	DSO8 (with power-pad)	DIP-8	SOT23-5	SOT23-6	WSON-6	WSON-8	TSSOP-8
1-channel		2.6/2.6	8.0/7.3	34/34	1ED44173N01B	NEW	N-ISO	✓	✓	✓							✓			
		2.6/2.6	11.9/11.0	50/50	1ED44175N01B	NEW	N-ISO	✓	✓	✓							✓			
	25	0.8/1.75	11.9/11.4	50/50	1ED44176N01F	NEW	N-ISO	✓	✓	✓	✓		✓							
		2.6/2.6	11.9/11.0	50/50	1ED44171N01B[1]		N-ISO	✓	✓							✓				
		1.5/1.5	10.2/9.2	50/50	IRS44273L		N-ISO									✓				
	22	4/8	4.2/3.9	19/19	1EDN7511B		N-ISO					✓					✓			
		4/8	4.2/3.9	19/19	1EDN7512B		N-ISO									✓				
		4/8	4.2/3.9	19/19	1EDN7512G		N-ISO											✓		
		4/8	8.0/7.0	19/19	1EDN8511B		N-ISO					✓					✓			
	5	1.6/3.3	8.9/8	200/150	IR2121		N-ISO		✓	✓					✓					
2-channel		2.3/3.3	10.2/9.2	50/50	IRS44262S		N-ISO						✓							
		2.3/3.3	N.A.	50/50	IRS4426S		N-ISO						✓							
		2.3/3.3	N.A.	50/50	IRS4427S		N-ISO						✓							
	25	2.3/3.3	N.A.	65/85	IR25600S		N-ISO						✓							
		2.3/3.3	N.A.	65/85	IR4426S		N-ISO						✓							
		2.3/3.3	N.A.	65/85	IR4427S		N-ISO						✓							
	24	10/10	11.5/10.0	40/55	2ED24427N01F	NEW	N-ISO	✓						✓						
	22	5/5	4.2/3.9	19/19	2EDN7523F		N-ISO	✓					✓							
		5/5	4.2/3.9	19/19	2EDN7523G		N-ISO	✓											✓	
		5/5	4.2/3.9	19/19	2EDN7523R		N-ISO	✓												✓
		5/5	4.2/3.9	19/19	2EDN7524F		N-ISO	✓					✓							
		5/5	4.2/3.9	19/19	2EDN7524G		N-ISO	✓											✓	
		5/5	4.2/3.9	19/19	2EDN7524R		N-ISO	✓												✓
		5/5	8.0/7.0	19/19	2EDN8523F		N-ISO	✓					✓							
		5/5	8.0/7.0	19/19	2EDN8523R		N-ISO	✓												✓
		5/5	8.0/7.0	19/19	2EDN8524F		N-ISO	✓					✓							
		5/5	8.0/7.0	19/19	2EDN8524R		N-ISO	✓												✓
		4/4	4.2/3.9	19/19	2EDN7424F		N-ISO	✓					✓							
		4/4	4.2/3.9	19/19	2EDN7424R		N-ISO	✓												✓
		4/4	4.2/3.9	19/19	2EDN7434F	NEW	N-ISO	✓					✓							
		4/4	4.2/3.9	19/19	2EDN7434R	NEW	N-ISO	✓												✓
		5/5	4.2/3.9	19/19	2EDN7533B	NEW	N-ISO										✓			
		5/5	4.2/3.9	19/19	2EDN7533F	NEW	N-ISO	✓					✓							
		5/5	4.2/3.9	19/19	2EDN7533R	NEW	N-ISO	✓												✓
		5/5	4.2/3.9	19/19	2EDN7534B	NEW	N-ISO										✓			
		5/5	4.2/3.9	19/19	2EDN7534F	NEW	N-ISO	✓					✓							
		5/5	4.2/3.9	19/19	2EDN7534R	NEW	N-ISO	✓												✓
		5/5	4.2/3.9	19/19	2EDN7534G	NEW	N-ISO	✓											✓	
		5/5	8.0/7.0	19/19	2EDN8533F	NEW	N-ISO	✓					✓							
		5/5	8.0/7.0	19/19	2EDN8533R	NEW	N-ISO	✓												✓
		5/5	8.0/7.0	19/19	2EDN8534F	NEW	N-ISO	✓					✓							
		5/5	8.0/7.0	19/19	2EDN8534R	NEW	N-ISO	✓												✓

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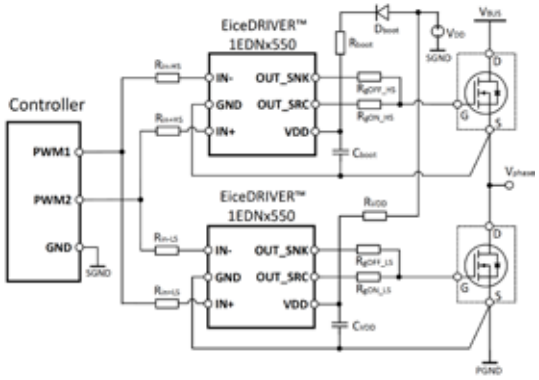
Non-isolated TDI gate-driver IC

Typical connection



Configuration	Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN		Technology	Features: Adustable Negative charge pump	Features: Active Miller clamp	Features: Separate sink/source outputs	Features: Truly differential inputs	Package: SOT23-6	Package: TSNP-6	Package: TSNP-7	Package: VSON-10
1-channel	200	4/8	4.2/3.9	45/45	1EDN7550U		N-ISO			✓	✓		✓		
		4/8	4.2/3.9	45/45	1EDN7550B		N-ISO			✓	✓	✓			
		4/8	8.0/7.0	45/45	1EDN8550B		N-ISO			✓	✓	✓			
		4/8	12.2/11.5	45/45	1EDN6550B	NEW	N-ISO			✓	✓	✓			
		4/8	14.9/14.4	45/45	1EDN9550B	NEW	N-ISO			✓	✓	✓			
		2/2	3.85/3.75	55/55	1EDN7116G	NEW	N-ISO	✓	✓		✓				✓
		2/2	3.85/3.75	55/55	1EDN7116U [1]		N-ISO		✓		✓			✓	
		1.5/1.5	3.85/3.75	75/75	1EDN7126G	NEW	N-ISO	✓	✓		✓				✓
		1.5/1.5	3.85/3.75	75/75	1EDN7126U [1]		N-ISO		✓		✓			✓	
		1/1	3.85/3.75	105/105	1EDN7136G	NEW	N-ISO	✓	✓		✓				✓
		1/1	3.85/3.75	105/105	1EDN7136U [1]		N-ISO		✓		✓			✓	
		0.5/0.5	3.85/3.75	125/125	1EDN7146G	NEW	N-ISO	✓	✓		✓				✓
		0.5/0.5	3.85/3.75	125/125	1EDN7146U [1]		N-ISO		✓		✓			✓	

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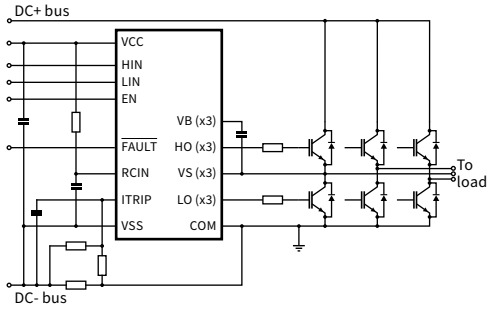
Three-phase gate-driver ICs

Typical connection



Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features																Package									
						Brake chopper	Desaturation protection	Enable	Fault reporting	Integrated bootstrap diode	Operaltional amplifier	Over-current protection	Power Management Unit	Programmable dead time	Programmable Fault Clear / Reset	Programmable OCP Reference Threshold	Programmable Op-amp Voltage Gain	Trickle Charge Pumps (100% duty cycle)	Separate pin for logic ground	Shoot-through protection	Shutdown	Two stage turn on	DSO-20 WB	DSO-24	DSO-28 WB	LCC-32	MQFP-64	TSSOP-28	VQFN-28	VQFN-32	VQFN-34	VQFN-48	CHIP
1200	0.35/0.65	11.4/10.4	600/600	6ED2230S12T	SOI			✓	✓	✓		✓			✓				✓	✓				✓								✓
	0.25/0.5	8.6/8.2	700/750	IR2233S	JI				✓		✓	✓							✓	✓	✓				✓								
	0.25/0.5	8.6/8.2	700/750	IR2233J	JI				✓		✓	✓							✓	✓	✓					✓							
	0.25/0.5	10.4/9.4	700/750	IR2235S	JI				✓		✓	✓							✓	✓	✓				✓								
	0.25/0.5	10.4/9.4	700/750	IR2235J	JI				✓		✓	✓							✓	✓	✓					✓							
	0.35/0.54	11.2/10.2	550/550	IR2238Q	JI	✓	✓		✓			✓		✓					✓		✓	✓						✓					
600	0.165/0.375	11.7/9.8	490/530	6ED003L06-F2	SOI			✓	✓			✓							✓						✓								✓
	0.165/0.375	11.7/9.8	490/530	6EDL04I06NT	SOI			✓	✓	✓		✓							✓						✓								✓
	0.165/0.375	11.7/9.8	490/530	6EDL04I06PT	SOI			✓	✓	✓		✓							✓						✓								✓
	0.165/0.375	9/8.1	530/530	6EDL04N06PT	SOI			✓	✓	✓		✓							✓						✓								✓
	0.2/0.35	8.9/8.2	400/425	IR2136S	JI			✓	✓			✓							✓						✓	✓							✓
	0.2/0.35	11.1/10.9	400/425	IR21363S	JI			✓	✓			✓							✓						✓								✓
	0.2/0.35	11.1/10.9	400/425	IR21363J	JI			✓	✓			✓							✓							✓							✓
	0.2/0.35	10.4/9.4	530/500	IR21364S	JI			✓	✓			✓							✓						✓								✓
	0.2/0.35	11.1/10.9	530/530	IRS2334M	JI																						✓					
	0.2/0.35	11.1/10.9	530/530	IRS2334S	JI																	✓										
	0.2/0.35	8.9/8.2	530/530	IRS2336S	JI			✓	✓			✓							✓						✓								
	0.2/0.35	8.9/8.2	530/530	IRS2336DJ	JI			✓	✓	✓		✓							✓							✓							✓
	0.2/0.35	8.9/8.2	530/530	IRS2336DM	JI			✓	✓	✓		✓							✓											✓		✓
	0.2/0.35	8.9/8.2	530/530	IRS2336DS	JI			✓	✓	✓		✓							✓						✓								✓
	0.2/0.35	8.9/8.2	530/530	IRS23364DJ	JI			✓	✓	✓		✓							✓							✓							✓
	0.2/0.35	8.9/8.2	530/530	IRS23364DS	JI			✓	✓	✓		✓							✓						✓								✓
	0.2/0.35	8.9/8.2	530/530	IRS23365DM	JI			✓	✓	✓		✓							✓											✓		
	0.25/0.5	9/8.7	425/675	IR2130S	JI				✓		✓	✓							✓						✓								✓
	0.25/0.5	9/8.7	425/675	IR2130J	JI				✓		✓	✓							✓							✓							✓
	0.25/0.5	9/8.7	425/675	IR2132S	JI				✓		✓	✓							✓						✓								✓
	0.25/0.5	9/8.7	425/675	IR2132J	JI				✓		✓	✓							✓							✓							✓
	0.25/0.5	8.6/8.2	700/750	IR2133S	JI				✓		✓	✓							✓		✓				✓								
	0.25/0.5	8.6/8.2	700/750	IR2133J	JI				✓		✓	✓							✓		✓					✓							
	0.25/0.5	10.4/9.4	700/750	IR2135S	JI				✓		✓	✓							✓		✓				✓								✓
	0.25/0.5	10.4/9.4	700/750	IR2135J	JI				✓		✓	✓							✓		✓					✓							✓
200	0.165/0.375	11.7/9.8	490/530	6ED003L02-F2	SOI			✓	✓			✓							✓								✓						
	0.165/0.375	9/8.1	530/530	6EDL04N02PR	SOI			✓	✓	✓		✓							✓	✓							✓						
160	1/2	7.5/6.8	100/100	6ED2742S01Q[1]	SOI			✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓										✓			
60	1.5/1.5	5.8/4.5	140/140	6EDL7141[1]	SOI																										✓	

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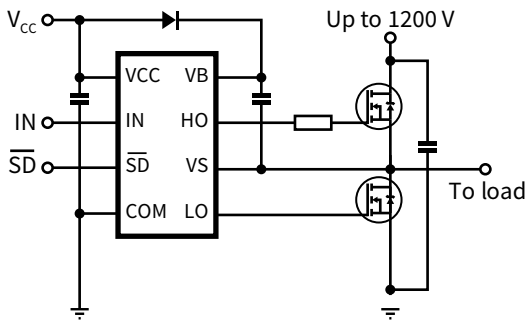
Half-bridge and high- and low-side gate-driver IC

Typical connection



Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Comparator	Operational amplifier	Desaturation protection	Enable	Fault reporting	Integrated bootstrap diode	Over-current protection	Programmable dead time	Programmable Fault Clear / Reset	Programmable shutdown	Self-oscillating	Separate pin for logic ground	Shoot-through protection	Shutdown	Soft over-current shutdown	Two stage turn-on	DSO8	DSO-14	DSO-16	DSO-16 WB	DSO-18	DSO-20 WB (36 fine pitch leads)	SSOP-24	VDSON-8	VSON-10	VQFN-14	CHIP
						Features																Package										
1200	1.5/2.5	12.2/11.2	85/85	2ED020I12-FI	CT	✓	✓											✓	✓							✓						
	2/2.5	10.2/9.3	225/280	IR2213S	JI												✓		✓						✓							✓
	2/3	10.2/9.3	440/440	IR2214SS	JI			✓		✓				✓			✓	✓	✓	✓	✓							✓				✓
	2.3/2.3	12.2/11.3	500/500	2ED1324S12P[1]	SOI				✓	✓	✓	✓		✓			✓	✓										✓				
	2.3/2.3	12.2/11.3	350/350	2ED1323S12P[1]	SOI				✓	✓	✓	✓		✓			✓								✓							
	2.3/4.6	12.2/11.3	500/500	2ED1322S12J[1]	SOI				✓	✓	✓	✓		✓			✓	✓									✓					
	2.3/4.6	12.2/11.3	350/350	2ED1321S12J[1]	SOI				✓	✓	✓	✓		✓			✓								✓							
650	0.29/0.7	8.9/8.0	90/90	2ED2101S06F NEW	SOI						✓											✓										
	0.29/0.7	8.9/8.0	90/90	2ED2103S06F NEW	SOI						✓							✓				✓										
	0.29/0.7	8.9/8.0	90/90	2ED2104S06F NEW	SOI						✓							✓	✓			✓										
	0.29/0.7	9.1/8.2	200/200	2ED2106S06F	SOI						✓											✓										✓
	0.29/0.7	9.1/8.2	200/200	2ED21064S06J	SOI						✓												✓									✓
	0.29/0.7	9.1/8.2	200/200	2ED2108S06F	SOI						✓							✓				✓										✓
	0.29/0.7	9.1/8.2	200/200	2ED21084S06J	SOI						✓		✓				✓	✓					✓									✓
	0.29/0.7	9.1/8.2	200/200	2ED2109S06F	SOI						✓							✓	✓			✓										✓
	0.29/0.7	9.1/8.2	200/200	2ED21094S06J	SOI						✓		✓				✓	✓	✓				✓									✓
	0.29/0.7	9.1/8.2	200/200	2ED21091S0F	SOI						✓		✓					✓	✓			✓										✓
	0.36/0.7	9.1 / 8.3	300 / 310	2ED2304S06F	SOI						✓							✓				✓										✓
	2.5/2.5	9.1/8.2	200/200	2ED2181S06F	SOI						✓											✓										✓
	2.5/2.5	9.1/8.2	200/200	2ED21814S06J	SOI						✓												✓									✓
	2.5/2.5	9.1/8.2	200/200	2ED2182S06F	SOI						✓							✓				✓										✓
	2.5/2.5	9.1/8.2	200/200	2ED21824S06J	SOI						✓		✓				✓	✓					✓									✓
	2.5/2.5	9.1/8.2	200/200	2ED2183S06F	SOI						✓							✓				✓										✓
	2.5/2.5	9.1/8.2	200/200	2ED21834S06J	SOI						✓		✓				✓	✓					✓									✓
	2.5/2.5	9.1/8.2	200/200	2ED2184S06F	SOI						✓							✓	✓			✓										✓
	2.5/2.5	9.1/8.2	200/200	2ED21844S06J	SOI						✓		✓				✓	✓	✓				✓									✓
	2.5/2.5	8.9/8.1	90/90	2ED2110S06J NEW	SOI						✓						✓	✓	✓						✓							
	1.5/2.5	12.2/11.2	85/85	2ED020I06-FI	CT	✓	✓											✓	✓								✓					
600	0.078/0.169	8.9/8.2	220/220	IR2304S	JI													✓				✓										
	0.078/0.169	8.9/8.2	220/220	IR25601S	JI													✓				✓										
	0.18/0.26	9/8	N.A.	IR21531S	JI									✓	✓			✓	✓			✓										✓
	0.18/0.26	9/8	N.A.	IR25603S	JI									✓	✓			✓	✓			✓										
	0.18/0.26	11/9	N.A.	IRS2153DS	JI						✓			✓	✓			✓	✓			✓										✓
	0.18/0.26	11/9	N.A.	IRS21531DS	JI						✓			✓	✓			✓	✓			✓										✓
	0.2/0.35	8.9/8.2	200/220	IR2106S	JI																	✓										
	0.2/0.35	8.9/8.2	200/220	IR21064S	JI												✓						✓									
	0.2/0.35	8.9/8.2	200/220	IR2108S	JI													✓				✓										
	0.2/0.35	8.9/8.2	200/220	IR21084S	JI								✓				✓	✓					✓									
	0.2/0.35	8.9/8.2	200/750	IR2109S	JI													✓	✓			✓										
	0.2/0.35	8.9/8.2	200/750	IR21091S	JI								✓					✓	✓			✓										
	0.2/0.35	8.9/8.2	200/750	IR21094S	JI								✓				✓	✓	✓				✓									
	0.2/0.35	8.9/8.2	200/220	IR2308S	JI													✓				✓										
	0.2/0.35	8.9/8.2	200/220	IR25606S	JI													✓				✓										
	0.2/0.35	8.9/8.2	200/220	IR25604S	JI																	✓										
	0.2/0.35	4.1/3.8	200/220	IR2301S	JI																	✓										
	0.2/0.35	4.1/3.8	200/220	IRS2301S	JI																	✓										
	0.2/0.35	4.1/3.8	200/750	IR2302S	JI													✓	✓			✓										
	0.21/0.36	8.9/8.2	150/160	IR2101S	JI																	✓										✓
	0.21/0.36	8.9/8.2	150/160	IRS2101S	JI																	✓										✓
	0.21/0.36	8.9/8.2	150/160	IR2102S	JI																	✓										
	0.21/0.36	8.9/8.2	150/680	IR2103S	JI													✓				✓										
	0.21/0.36	8.9/8.2	150/680	IR2104S	JI													✓	✓			✓										
	0.21/0.36	8.9/8.2	150/680	IR25602S	JI													✓	✓			✓										
	0.21/0.36	8.9/8.2	200/220	IRS2106S	JI																	✓										✓
	0.21/0.36	8.9/8.2	200/220	IRS21064S	JI												✓						✓									
	0.22/0.48	8.9/7.7	500/500	IRS2890DS	JI					✓	✓	✓						✓					✓										
	0.25/0.5	8.6/8.2	150/750	IR2111S	JI													✓				✓										
	0.25/0.5	8.6/8.2	105/125	IR2112S	JI														✓						✓							
	0.25/0.5	8.6/8.2	130/135	IRS2112S	JI												✓		✓						✓							✓
	0.29/0.6	8.9/8.2	150/680	IRS2103S	JI													✓				✓										✓
	0.29/0.6	8.9/8.2	150/680	IRS2104S	JI													✓	✓			✓										✓
	0.29/0.6	8.9/8.2	200/220	IRS2108S	JI													✓				✓										✓
	0.29/0.6	8.9/8.2	200/220	IRS21084S	JI								✓				✓	✓					✓									
	0.29/0.6	8.9/8.2	200/750	IRS2109S	JI													✓	✓			✓										✓
	0.29/0.6	8.9/8.2	200/750	IRS21091S	JI								✓					✓				✓										
	0.29/0.6	8.9/8.2	200/750	IRS21094S	JI								✓				✓	✓	✓				✓									
	0.29/0.6	8.6/8.2	150/750	IRS2111S	JI													✓				✓										✓
	0.29/0.6	8.9/8.2	150/150	IRS2304S	JI													✓				✓										✓
	0.29/0.6	8.9/8.2	200/220	IRS2308S	JI													✓				✓										✓
	0.36/0.7	9.1/8.3	300/310	2EDL05N06PF	SOI						✓							✓				✓										
	0.36/0.7	9.1/8.3	300/310	2EDL05N06PJ	SOI						✓							✓					✓									
	0.36/0.7	12.5/11.6	400/420	2EDL05I06PF	SOI						✓							✓				✓										
	0.36/0.7	12.5/11.6	400/420	2EDL05I06PJ	SOI						✓							✓					✓									
	0.36/0.7	12.5/11.6	400/420	2EDL05I06BF	SOI						✓											✓										
	1.9/2.3	8.9/8.2	220/180	IRS2181S	JI																	✓										✓
	1.9/2.3	8.9/8.2	220/180	IR2181S	JI																	✓										
	1.9/2.3	8.9/8.2	220/180	IR21814S	JI												✓						✓									
	1.9/2.3	8.9/8.2	220/180	IRS21814S	JI												✓						✓									
	1.9/2.3	8.9/8.2	220/180	IRS21814M	JI												✓														✓	
	1.9/2.3	8.9/8.2	220/180	IRS2183S	JI													✓				✓										✓
	1.9/2.3	8.9/8.2	220/180	IR2183S	JI													✓				✓										
	1.9/2.3	8.9/8.2	220/180	IR21834S	JI								✓				✓	✓					✓									
	1.9/2.3	8.9/8.2	220/180	IRS21834S	JI								✓				✓	✓					✓									
	1.9/2.3	8.9/8.2	270/680	IRS2184S	JI													✓	✓			✓										✓
	1.9/2.3	8.9/8.2	270/680	IR2184S	JI													✓	✓			✓										
	1.9/2.3	8.9/8.2	270/680	IR21844S	JI								✓				✓	✓	✓				✓									
	1.9/2.3	8.9/8.2	270/680	IRS21844S	JI								✓				✓	✓	✓				✓									
	1.9/2.3	8.9/8.2	270/680	IRS21844M	JI								✓				✓	✓	✓												✓	
	2.5/2.5	8.6/8.2	94/120	IR2113S	JI												✓		✓						✓							✓
	2.5/2.5	8.6/8.2	94/120	IR25607S	JI												✓		✓						✓							
	2.5/2.5	8.5/8.2	120/130	IRS2113S	JI												✓		✓						✓							✓
	2.5/2.5	8.5/8.2	120/130	IRS2113M	JI												✓		✓												✓	✓
	2/3	10.2/9.3	440/440	IR2114SS	JI			✓		✓							✓	✓		✓								✓				
	2.3/2.8	9.1/8.3	300/310	2EDL23N06PJ	SOI				✓	✓	✓	✓					✓	✓					✓									
	2.3/2.8	12.5/11.6	400/420	2EDL23I06PJ	SOI				✓	✓	✓	✓					✓	✓					✓									
	4/4	8.9/8.2	170/170	IRS2186S	JI																	✓										✓
	4/4	8.9/8.2	170/170	IRS21864S	JI												✓						✓									
	4/4	6/5.5	170/170	IRS21867S	JI																	✓										
500	2.5/2.5	8.6/8.2	94/120	IR2110S	JI												✓		✓						✓							
	2.5/2.5	8.5/8.2	120/130	IRS2110S	JI												✓		✓						✓							✓
200	0.29/0.6	8.9/8.2	150/160	IRS2005S	JI																	✓										
	0.29/0.6	8.9/8.2	150/160	IRS2005M	JI																										✓	
	0.29/0.6	8.9/8.2	150/160	IRS2007S	JI													✓				✓										
	0.29/0.6	8.9/8.2	150/160	IRS2007M	JI													✓													✓	
	0.29/0.6	8.9/8.2	150/680	IRS2008S	JI													✓	✓			✓										
	0.29/0.6	8.9/8.2	150/680	IRS2008M	JI													✓	✓												✓	
	1/1	9/8.2	75/80	IR2011S	JI																	✓										
	1/1	9/8.2	60/60	IRS2011S	JI																	✓										✓
	3/3	8.6/8.2	65/95	IR2010S	JI												✓		✓						✓							
160	1/2	5/4.5	50/50	2ED2732S01G[1]	SOI						✓						✓													✓		
	1/2	5/4.5	50/50	2ED2742S01G[1]	SOI						✓						✓	✓												✓		
	2/4	5/4.5	50/50	2ED2734S01G[1]	SOI						✓						✓													✓		
	2/4	5/4.5	50/50	2ED2744S01G[1]	SOI						✓						✓	✓												✓		
	4/8	5/4.5	50/50	2ED2738S01G[1]	SOI						✓						✓													✓		
	4/8	5/4.5	50/50	2ED2748S01G[1]	SOI						✓						✓	✓												✓		
120	2/6	7/6.5	47/47	2EDL8012G NEW	JI						✓																	✓				
	2/6	7/6.5	47/47	2EDL8112G NEW	JI						✓							✓										✓				
	3/6	7/6.5	47/47	2EDL8023G NEW	JI						✓																	✓				
	3/6	7/6.5	47/47	2EDL8123G NEW	JI						✓							✓										✓				
	4/6	7/6.5	47/47	2EDL8024G NEW	JI						✓																	✓				
	4/6	7/6.5	47/47	2EDL8124G NEW	JI						✓							✓										✓				
	3/6	7/6.5	47/47	2EDL8023G3C[1]	JI						✓																			✓		
	3/6	7/6.5	47/47	2EDL8123G3C[1]	JI						✓							✓												✓		
	4/6	7/6.5	47/47	2EDL8024G3C[1]	JI						✓																			✓		
	4/6	7/6.5	47/47	2EDL8124G3C[1]	JI						✓							✓												✓		

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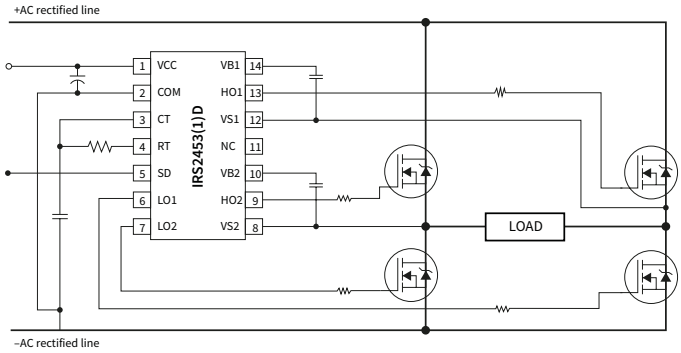
1) Coming soon

For more details on the product, click on the part number or contact our product support.

Full-bridge gate-driver ICs

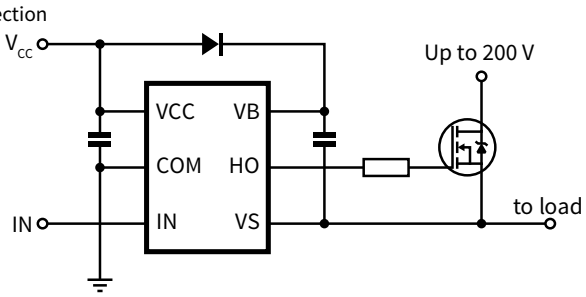
Typical connection



Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features: Integrated bootstrap diode	Features: Shoot-through protection	Features: Shutdown	Package: DSO-14
600	0.18/0.26	11/9	N.A.	IRS2453DS	JI	✓	✓	✓	✓
				IRS24531DS	JI	✓	✓	✓	✓

Single high-side gate-driver ICs

Typical connection



Voltage class [V]	I_{O+}/I_{O-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN	Technology	Features: Fault reporting	Features: Over-current protection	Package: DSO8	Package: DSO-16 WB	Package: SOT23-6
600	0.16/0.24	9/8	215/140	IRS25752L	JI					✓
	0.25/0.5	8.6/8.2	105/125	IR2117S	JI			✓		
	0.25/0.5	8.6/8.2	105/125	IR2118S	JI			✓		
	0.25/0.5	10.3/9	150/200	IR2127S	JI	✓	✓	✓		
	0.25/0.5	10.3/9	150/200	IR2128S	JI	✓	✓	✓		
	0.25/0.5	7.2/6.8	150/200	IR21271S	JI	✓	✓	✓		
	0.29/0.6	8.6/8.2	105/125	IRS2117S	JI			✓		
	0.29/0.6	8.6/8.2	105/125	IRS2118S	JI			✓		
	0.29/0.6	10.3/9	150/150	IRS2127S	JI	✓	✓	✓		
	0.29/0.6	7.2/6.8	150/150	IRS21271S	JI	✓	✓	✓		
500	1.6/3.3	9.2/8.3	200/170	IR2125S	JI	✓	✓		✓	
200	0.16/0.24	9/8	215/140	IRS20752L	JI					✓
100	0.16/0.24	9/8	215/140	IRS10752L	JI					✓

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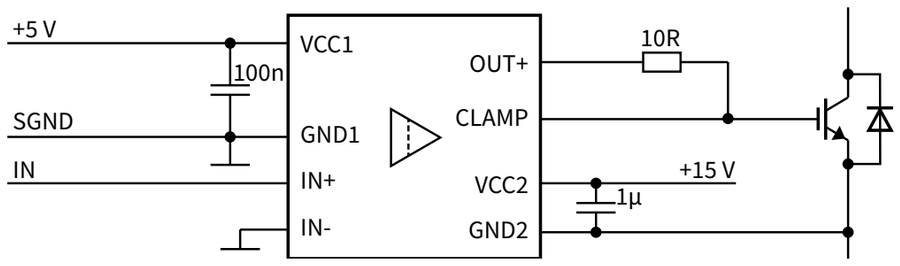
SRC=Turn on slew rate control

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Galvanic isolated gate driver ICs



Configuration	Voltage class [V]	Isolation type	Isolation rating	I_{o+}/I_{o-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN		Technology	Features: Active Miller clamp	Analog configurability (Desat, soft-off)	Comparator	Deadtime control	Desaturation protection	Digital I²C configurability	Disable	Enable	Fast output clamping for supply below UVLO	Fault reporting	Fault reset	Operational amplifier (OPAMP)	Over-current protection	Separate pin for logic ground	Separate sink / source outputs	Shoot-through protection	Shutdown	Soft off	Two-level turn-off	Two-level Slew rate control	UL 1577	VDE 0884-10/11	Package: DSO8 150mil	DSO8 300mil	DSO-14 150mil	DSO-14 300mil	DSO-16 150mil	DSO-16 fine pitch 300 mil	DSO-16 300 mil	DSO-18	DSO-36	TFLGA-13 (4x4)	TFLGA-13 (5x5)
1-channel	2300	Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	5.5/5.5	10/8	90/90	1ED3120MC12H	NEW	CT														✓	✓					✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	5.5/5.5	10/8	90/90	1ED3120MU12H	NEW	CT														✓	✓					✓			✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	5.5/5.5	12.5/10.5	90/90	1ED3121MC12H	NEW	CT														✓	✓					✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	5.5/5.5	12.5/10.5	90/90	1ED3121MU12H	NEW	CT														✓	✓					✓			✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	5.5/5.5	12.5/10.5	280/280	1ED3131MC12H	NEW	CT														✓	✓					✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	5.5/5.5	12.5/10.5	280/280	1ED3131MU12H	NEW	CT														✓	✓					✓			✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	10/9	10/8	90/90	1ED3122MC12H	NEW	CT	✓													✓						✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	10/9	10/8	90/90	1ED3122MU12H	NEW	CT	✓													✓						✓			✓									
		Functional	V_{ISO} = 3 kV(rms)	10/9	12.5/10.5	90/90	1ED3125MU12F	NEW	CT	✓													✓						✓		✓										
		Functional	V_{ISO} = 3 kV(rms)	14.2/12	12.5/10.5	90/90	1ED3127MU12F[1]		CT	✓													✓						✓		✓										
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	13.5/14	10/8	90/90	1ED3123MC12H	NEW	CT														✓	✓					✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	13.5/14	10/8	90/90	1ED3123MU12H	NEW	CT														✓	✓					✓			✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	13.5/14	12.5/10.5	90/90	1ED3124MC12H	NEW	CT														✓	✓					✓	✓		✓									
		Functional	V_{ISO} = 5.7 kV(rms)	13.5/14	12.5/10.5	90/90	1ED3124MU12H	NEW	CT														✓	✓					✓			✓									
		Functional	V_{ISO} = 3 kV(rms)	13.5/14	12.5/10.5	90/90	1ED3124MU12F	NEW	CT														✓	✓					✓		✓										
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	10/10	12.5/10.4	110/110	1ED3240MC12H	NEW	CT														✓					✓	✓	✓		✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	10/10	12.5/10.4	110/110	1ED3250MC12H	NEW	CT														✓					✓	✓	✓		✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	18/18	12.5/10.4	110/110	1ED3251MC12H	NEW	CT	✓													✓					✓	✓	✓		✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	18/18	12.5/10.4	110/110	1ED3241MC12H	NEW	CT	✓													✓					✓	✓	✓		✓									
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	3.3/6	12.6/10.4	86/80	1ED3320MC12N	NEW	CT	✓				✓									✓			✓			✓	✓											
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	6/8.5	12.6/10.4	86/80	1ED3321MC12N	NEW	CT	✓				✓									✓			✓			✓	✓											
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	6/8.5	14.2/11.9	86/80	1ED3322MC12N	NEW	CT	✓				✓									✓						✓	✓											
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	6/8.5	12.6/10.4	86/80	1ED3323MC12N	NEW	CT	✓				✓									✓						✓	✓											
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	3.8/2.5	12.6/10.4	236/244	1ED3431MC12M	NEW	CT	✓	✓			✓									✓			✓			✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	3.8/2.5	12.6/10.4	236/244	1ED3431MU12M	NEW	CT	✓	✓			✓									✓			✓			✓							✓				
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	3.8/2.5	Adjustable	236/244	1ED3830MC12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	3.8/2.5	Adjustable	236/244	1ED3830MU12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓							✓				
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	7.5/5	12.6/10.4	236/244	1ED3461MC12M	NEW	CT	✓	✓			✓									✓			✓			✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	7.5/5	12.6/10.4	236/244	1ED3461MU12M	NEW	CT	✓	✓			✓									✓			✓			✓							✓				
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	7.5/5	Adjustable	236/244	1ED3860MC12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	7.5/5	Adjustable	236/244	1ED3860MU12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓							✓				
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	11/7.5	12.6/10.4	236/244	1ED3491MC12M	NEW	CT	✓	✓			✓									✓			✓			✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	11/7.5	12.6/10.4	236/244	1ED3491MU12M	NEW	CT	✓	✓			✓									✓			✓			✓							✓				
		Reinforced	V_{IORM} = 1.7 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	11/7.5	Adjustable	236/244	1ED3890MC12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓	✓							✓				
		Functional	V_{ISO} = 5.7 kV(rms)	11/7.5	Adjustable	236/244	1ED3890MU12M	NEW	CT	✓				✓	✓								✓			✓	✓		✓							✓				
		Basic	V_{IORM} = 1.4 kV; V_{IOTM}=6 kV; V_{ISO} = 3.7 kV(rms)	2/2	12/11	165/170	1ED020I12-B2		CT	✓				✓									✓						✓	✓									✓		
		Basic	V_{IORM} = 1.4 kV; V_{IOTM}=6 kV; V_{ISO} = 3.7 kV(rms)	2/2	12/11	1750/1750	1ED020I12-BT		CT	✓				✓									✓					✓		✓	✓								✓		
		Functional	V_{ISO} = ± 1.2 kV	2/2	12/11	165/170	1ED020I12-F2		CT	✓				✓									✓						✓										✓		
		Functional	V_{ISO} = ± 1.2 kV	2/2	12/11	1750/1750	1ED020I12-FT		CT	✓				✓									✓					✓											✓		
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	4/8	5.0/4.5	37/37	1EDS5663H		CT							✓							✓				✓		✓	✓									✓		
		Functional	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 3 kV(rms)	5.4/9.8	12.2/11.5	45/45	1EDB6275F		CT							✓		✓					✓						✓		✓										
		Functional	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 3 kV(rms)	5.4/9.8	4.2/3.9	45/45	1EDB7275F		CT							✓		✓					✓						✓		✓										
		Functional	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 3 kV(rms)	5.4/9.8	8/7	45/45	1EDB8275F		CT							✓		✓					✓						✓		✓										
		Functional	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 3 kV(rms)	5.4/9.8	14.9/14.4	45/45	1EDB9275F		CT							✓		✓					✓						✓		✓										
		Functional	V_{IOWM} = 510 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	5/4.5	37/37	1EDF5673F		CT							✓							✓					✓						✓						
		Functional	V_{IOWM} = 460 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	5/4.5	37/37	1EDF5673K		CT							✓							✓					✓												✓
		Functional	V_{ISO} = ± 1.2 kV	1.3/0.9	12/11.1	300/300	1EDI05I12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	1.3/0.9	12/11.1	300/300	1EDI05I12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	1.3/0.9	12/11.1	300/300	1EDC05I12AH		CT														✓	✓					✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	2.2/2.3	12/11.1	300/300	1EDI10I12MF		CT	✓													✓								✓									
		Functional	V_{ISO} = ± 1.2 kV	2.2/2.3	12/11.1	300/300	1EDI10I12MH		CT	✓													✓									✓								
		Functional	V_{ISO} = 2.5 kV(rms)	2.2/2.3	12/11.1	300/300	1EDC10I12MH		CT	✓													✓						✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	4/3.5	9.1/8.5	120/115	1EDI20N12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	4/3.5	12/11.1	125/120	1EDI20H12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	4/3.5	12/11.1	125/120	1EDC20H12AH		CT														✓	✓					✓			✓								
	1200	Functional	V_{ISO} = ± 1.2 kV	4/3.5	12/11.1	300/300	1EDI20I12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	4/3.5	12/11.1	300/300	1EDI20I12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	4/3.5	12/11.1	300/300	1EDC20I12AH		CT														✓	✓					✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	4.4/4.1	12/11.1	300/300	1EDI20I12MF		CT	✓													✓								✓									
		Functional	V_{ISO} = ± 1.2 kV	4.4/4.1	12/11.1	300/300	1EDI20I12MH		CT	✓													✓									✓								
		Functional	V_{ISO} = 2.5 kV(rms)	4.4/4.1	12/11.1	300/300	1EDC20I12MH		CT	✓													✓						✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	5.9/6.2	12/11.1	300/300	1EDI30I12MF		CT	✓													✓								✓									
		Functional	V_{ISO} = ± 1.2 kV	5.9/6.2	12/11.1	300/300	1EDI30I12MH		CT	✓													✓									✓								
		Functional	V_{ISO} = 2.5 kV(rms)	5.9/6.2	12/11.1	300/300	1EDC30I12MH		CT	✓													✓						✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	7.5/6.8	12/11.1	300/300	1EDI40I12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	7.5/6.8	12/11.1	300/300	1EDI40I12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	7.5/6.8	12/11.1	300/300	1EDC40I12AH		CT														✓	✓					✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	10/9.4	9.1/8.5	120/115	1EDI60N12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	10/9.4	12/11.1	125/120	1EDI60H12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	10/9.4	12/11.1	125/120	1EDC60H12AH		CT														✓	✓					✓			✓								
		Functional	V_{ISO} = ± 1.2 kV	10/9.4	12/11.1	300/300	1EDI60I12AF		CT														✓	✓							✓									
		Functional	V_{ISO} = ± 1.2 kV	10/9.4	12/11.1	300/300	1EDI60I12AH		CT														✓	✓								✓								
		Functional	V_{ISO} = 2.5 kV(rms)	10/9.4	12/11.1	300/300	1EDC60I12AH		CT														✓	✓					✓			✓								
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5 kV(rms)	SRC/2	11.9/11	460/460	1EDS20I12SV		CT				✓		✓		✓	✓		✓	✓			✓	✓		✓	✓											✓	
		Functional	V_{ISO} = 5 kV(rms)	SRC/2	11.9/11	460/460	1EDU20I12SV		CT				✓		✓		✓	✓		✓	✓			✓	✓		✓											✓	
		Functional	V_{ISO} = ± 1.2 kV	SRC/2	11.9/11	460/460	1EDI20I12SV		CT				✓		✓		✓	✓		✓	✓			✓	✓													✓	
		Functional	V_{ISO} = ± 1.2 kV	2/2	12/11	165/170	2ED020I12-F2		CT	✓			✓				✓	✓			✓																	✓	
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	1/2	4.2/3.9	37/37	2EDS7165H		CT							✓		✓											✓	✓								✓		
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	1/2	8/7	37/37	2EDS8165H		CT							✓		✓											✓	✓								✓		
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	4/8	8/7	37/37	2EDS8265H		CT							✓		✓											✓	✓								✓		
		Reinforced	V_{IORM} = 1.4 kV(rms); V_{IOTM}=8 kV; V_{ISO} = 5.7 kV(rms)	4/8	14.9/14.4	37/37	2EDS9265H		CT							✓		✓											✓	✓								✓		
		Reinforced	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 5.7 kV(rms)	5 / 9	4.2/3.9	38 / 36	2EDR7259X[1]		CT				✓			✓								✓					✓	✓				✓						
		Reinforced	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 5.7 kV(rms)	5 / 9	8/7	38 / 36	2EDR8259H[1]		CT				✓			✓								✓					✓	✓								✓		
		Reinforced	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 5.7 kV(rms)	5 / 9	8/7	38 / 36	2EDR8259X[1]		CT				✓			✓								✓					✓	✓				✓						
		Reinforced	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 5.7 kV(rms)	5 / 9	12.2/11.5	38 / 36	2EDR6258X[1]		CT				✓			✓								✓					✓	✓				✓						
		Reinforced	V_{IOTM} = 4.2 kV(peak); V_{ISO} = 5.7 kV(rms)	5 / 9	14.9/14.4	38 / 36	2EDR9258X[1]		CT				✓			✓								✓					✓	✓				✓						
		Basic	V_{IORM} = 800 V(rms); V_{IOTM}=3.5 kV; V_{ISO} = 2.5 kV(rms)	5 / 9	4.2/3.9	38 / 36	2EDB7259K[1]		CT				✓			✓								✓						✓										✓
		Basic	V_{IORM} = 800 V(rms); V_{IOTM}=3.5 kV; V_{ISO} = 2.5 kV(rms)	5 / 9	8/7	38 / 36	2EDB8259K[1]		CT				✓			✓								✓						✓										✓
		Basic	V_{IORM} = 1 kV(rms); V_{IOTM}=4.2 kV; V_{ISO} = 3 kV(rms)	5 / 9	8/7	38 / 36	2EDB8259F[1]		CT				✓			✓																		✓						
		Basic	V_{IORM} = 1 kV(rms); V_{IOTM}=4.2 kV; V_{ISO} = 3 kV(rms)	5 / 9	4.2/3.9	38 / 36	2EDB7259Y[1]		CT				✓			✓																			✓					
		Basic	V_{IORM} = 1 kV(rms); V_{IOTM}=4.2 kV; V_{ISO} = 3 kV(rms)	5 / 9	8/7	38 / 36	2EDB8259Y[1]		CT				✓																						✓					
		Basic	V_{IORM} = 1 kV(rms); V_{IOTM}=4.2 kV; V_{ISO} = 3 kV(rms)	5 / 9	14.9/14.4	38 / 36	2EDB9259Y[1]		CT				✓																						✓					
		Functional	V_{IOWM} = 510 V(rms); V_{ISO} = 1.5 kV(rms)	1/2	4.2/3.9	37/37	2EDF7175F		CT							✓		✓																	✓					
		Functional	V_{IOWM} = 510 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	4.2/3.9	37/37	2EDF7275F		CT							✓		✓																	✓					
		Functional	V_{IOWM} = 460 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	4.2/3.9	37/37	2EDF7275K		CT							✓		✓																						✓
		Functional	V_{IOWM} = 460 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	4.2/3.9	37/37	2EDF7235K		CT				✓			✓																								✓
		Functional	V_{IOWM} = 510 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	8/7	37/37	2EDF8275F		CT							✓		✓																	✓					
		Functional	V_{IOWM} = 510 V(rms); V_{ISO} = 1.5 kV(rms)	4/8	14.9/14.4	37/37	2EDF9275F		CT							✓		✓																	✓					
	650**	Basic	V_{IORM} = 500 V(rms); V_{IOTM}=3.2 kV; V_{ISO} = 2.3 kV(rms)	5 / 9	4.2/3.9	38 / 36	2EDB7259A[1]		CT				✓			✓								✓						✓										✓
		Basic	V_{IORM} = 500 V(rms); V_{IOTM}=3.2 kV; V_{ISO} = 2.3 kV(rms)	5 / 9	8/7	38 / 36	2EDB8259A[1]		CT				✓			✓								✓						✓										✓
2-channel (Isolation on high-side only)	1200	Functional on high side	V_{ISO} = ± 1.2 kV	1.5/2.5	12.2/11.2	85/85	2ED020I12-FI		CT			✓							✓				✓	✓													✓		
	650	Functional on high side	V_{ISO} = ± 650 V	1.5/2.5	12.2/11.2	85/85	2ED020I06-FI		CT										✓				✓	✓													✓		
	250	Functional on high side	V_{ISO} = ±250 V (high-side to low-side)	5.2/9.2	7/6.4	37/37	2EDF5215F[1]		CT									✓												✓										

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1) Coming soon
2) Isolation between primary and secondary. If the driver is used in half-bridge configuration, the channel-to-channel will limit the working voltage
SRC = Turn on slew rate control

For more details on the product, click on the part number or contact our product support.

Automotive gate-driver ICs

Configuration	Voltage class [V]	I_{o+}/I_{o-} typ. [mA]	UVLO on/off typ. [V]	Prop delay off/on typ. [ns]	Base PN		Technology	Features																				Package								
								Buffer	Desaturation protection	Enable	Fault reporting	Operational amplifier	Over-current protection	Programmable frequency	Programmable dead time	Self-oscillating (Oscillator)	Separate pin for logic ground	Shoot-through protection	Shutdown	SPI Interface	Synchronous rectification	Two-level turn-off	UL 1577	VDE 0884-11	ISO 26262 ready	ISO 26262 compliant	DSO8	DSO-14	DSO-16 NB	DSO-16 WB	DSO-20 (sine pitch)	DSO-28	DSO-36	TSDSO-24
1-channel isolated	1200	12/12	12.6/11.8	60/60	1EDI3020AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		12/12	12.6/11.8	60/60	1EDI3021AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		12/12	12.6/11.8	60/60	1EDI3023AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		12/12	12.6/11.8	60/60	1EDI3030AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		12/12	12.6/11.8	60/60	1EDI3031AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		12/12	12.6/11.8	60/60	1EDI3033AS		CT	✓	✓	✓	✓		✓					✓				✓	✓	✓		✓					✓			
		2.1/2.1	12/11	165/170	1ED020I12FA2		CT		✓		✓												✓	✓							✓			
		2/2	12/11	1900/1750	1ED020I12FTA		CT		✓		✓											✓	✓	✓							✓			✓
		2/2	12.5/11.7	215/215	1EDI2004AS		CT		✓	✓	✓		✓				✓					✓	✓	✓		✓							✓	
		2/2	12.5/11.7	215/215	1EDI2002AS		CT		✓	✓	✓		✓				✓					✓	✓	✓	✓									✓	
		2/2	12.5/11.7	215/215	1EDI2010AS		CT		✓	✓	✓		✓				✓					✓	✓	✓										✓	
2-channel isolated	1200	2/2	12/11	165/170	2ED020I12FA		CT		✓		✓							✓					✓	✓										✓	
Half-bridge	100	1/1	7.3/6.8	N.A.	AUIR2085S		JI			✓			✓	✓	✓	✓											✓								
High-side and low-side	600	1.9/2.3	8.9/8.2	135/135	AUIRS21811S		JI																				✓								
		1.9/2.3	8.9/8.2	200/160	AUIRS21814S		JI										✓											✓							
		1.9/2.3	8.9/8.2	200/160	AUIRS2181S		JI																				✓								
		3.5/3.5	8.9/8.2	90/90	AUIRS2191S		JI										✓												✓						
		0.2/0.35	4.1/3.8	200/220	AUIRS2301S		JI																				✓								
Single high-side	600	0.5/0.5	8.6/8	140/140	AUIRS2123S		JI																				✓								
		0.5/0.5	8.6/8	140/140	AUIRS2124S		JI																				✓								
		0.29/0.6	8.6/8.2	140/140	AUIRS2117S		JI																				✓								
		0.29/0.6	7.2/6.8	150/150	AUIRS21271S		JI				✓		✓														✓								
		0.29/0.6	8.6/8.2	140/140	AUIRS2118S		JI																				✓								
	65	0.3/0.3	10/6.5	2500/2500	AUIR3241STR		N-ISO			✓	✓																✓								
	65	0.3/0.3	10/6.5	2500/2500	AUIR3242STR		N-ISO			✓	✓																✓								
Dual high-side	75	0.3/1.4	12.5/10.0	4000/7000	2ED2410-EM	NEW	N-ISO			✓	✓		✓												✓										✓
	105	0.3/1.0	7.0/6.6	3000/3000	2ED4820-EM	NEW	N-ISO			✓	✓		✓							✓					✓										✓
Single low-side	200	3/6	10.2/9.3	60/90	AUIRS1170S		N-ISO														✓						✓								

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Features

Addressing various application requirements, Infineon delivers solutions with an assortment of features intended to optimize performance, minimize size and reduce cost. Below is a table of additional gate-driver IC features available in the current portfolio.

Features	Abbreviation	Benefits
Active Miller clamp	M-CLAMP	Protection against inadvertent dynamic turn-on because of parasitic Miller effects
Active shutdown	SD-ACT	Ensures a safe IGBT off-state in case the output chip is not connected to the power supply or an undervoltage lockout is in effect
Brake chopper	BRAKE	Integrated brake IGBT driver with protection
Comparator	CMP	General purpose comparator included
Desaturation protection	DESAT	Protects the IGBT at short circuit
Enable	EN	Dedicated pin terminates all outputs
Fault reporting	FAULT-RPT	Indicates an overcurrent or under-voltage shutdown has occurred
Fault reset	FAULT-RST	Dedicated pin resets the DESAT-FAULT-state of the chip
High-voltage start-up	HVSTART	Provides easy and fast circuit start-up while enabling low circuit standby losses
Integrated bootstrap diode	BSD	Integrated bootstrap reduces BOM
Operational amplifier	OPAMP	An independent op-amp for current measurement or overcurrent detection
Oscillator	OSC	Integrated front end oscillator
Over-current protection (ITRIP)	OCP	Ensures safe application operation in case of overcurrent
Programmable dead time	DT-PROG	Dead time is programmable with external resistor for flexible design
Programmable fault clear time	FLTC	The length of the fault clear time period (t_{FLTC}) is programmed by external capacitor which connected between FLTC and VSS (C_{FLTC}).
Programmable shutdown	SD-PROG	A shutdown feature has been designed into a pin
Separate pin for logic ground	SEP-GND	Dedicated pin or logic ground for improved noise immunity
Separate sink/source outputs	SEP-OUT	Simplifies gate resistor selection, reduces BOM, and improves dV/dt control
Shoot-through protection	STP	Additional shoot-through protection logic such as interlock
Short-circuit clamping	SC-CLAMP	During short circuit the IGBT's gate voltage tends to rise because of the feedback via the Miller capacitance. An additional protection circuit connected to OUT+ limits this voltage to a value slightly higher than the supply voltage.
Shutdown	SD	Dedicated pin disables the IC outputs
Soft overcurrent shutdown	SD-SOFT	Dedicated pin turns off the desaturated transistor, preventing overvoltages
Truly Differential Inputs	TDI	#FEHLER!
Two-level turn-off	TLTO	Lowers VCE overshoots at turn-off during short circuits or overcurrent events
UL 1577	UL	Double galvanic isolation certification
Undervoltage lockout	UVLO	Ensures safe application operation by avoiding unexpected driver behavior at low voltages
VDE 0884-10 or VDE 0884-11	VDE	Reinforced galvanic isolation certifications for non-optical couplers

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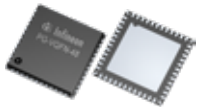
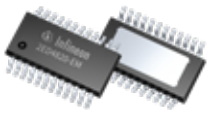
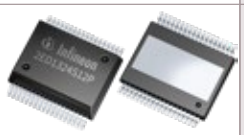
Infineon gate-driver IC package options

DSO8 (SOIC-8N)		DSO-28 (SOIC-28WB)		TSSOP-8	
DSO8 with power pad		DSO-36		TSSOP-28	
DSO8 300-mil (SOIC-8WB)		LCC-32 (PLCC-44)		VDSON-8	
DSO-14 (SOIC-14N)		LQFP-64		VQFN-14 (MLPQ 4X4 14L)	
DSO-16		MQFP-64		VQFN-28 (MLPQ 5X5 28L)	
DSO-16 300-mil (SOIC-16WB)		SOT23-5		VQFN-32	
DSO-16 (fine pitch)		SOT23-6		VQFN-34 (MLPQ 7X7 48L)	
DSO-18		SSOP-24		VQFN-48	
DSO-19		TFLGA-13		VSON-10	
DSO-20 (SOIC-20WB)		TQFN-48		WSON-6	
DSO-20 (fine pitch)		TSDSO-24		WSON-8	
DSO-20 WB		TSNP-6		CHIP	
DSO-24 (DSO-28 without 4 pins)		TSNP-7			

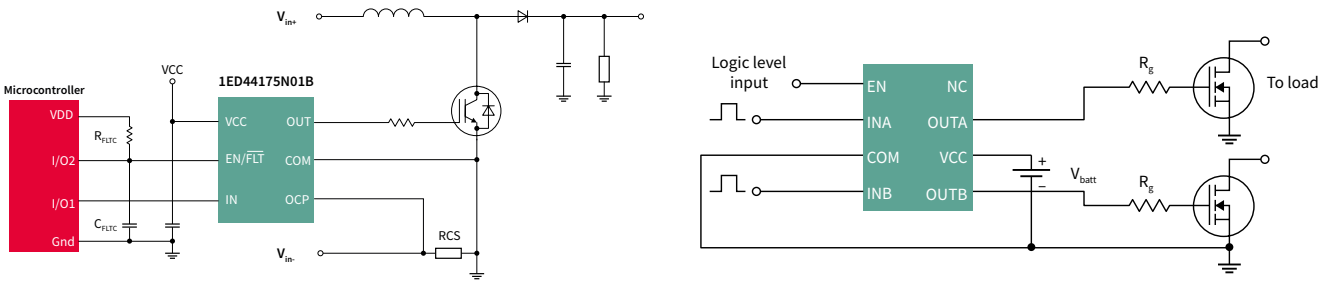
EiceDRIVER™ non-isolated low-side gate drivers

1ED4417x, 1-ch, low-side drivers with OCP, Enable, and Fault
2ED24427N01F, 10 A, 2-ch, low-side driver with Enable in DSO8 with thermal pad

EiceDRIVER™ 1ED4417x family are 1-channel low-voltage, non-inverting, low-side gate drivers designed for ground-referenced applications such as digitally controlled power-factor correction (PFC) circuits. This family provides an under voltage lockout protection (UVLO) and integrates fault output reporting to the controller and driver enable functionality in one pin. In addition, EiceDRIVER™ 1ED44173/5/6 integrate the overcurrent protection (OCP) comparator, realizing up to 20% cost and 50% space savings. The comparator features a fast and accurate current-sensing threshold tolerance of ±5%. 1ED44176N01F has separate logic and power ground pins for operational robustness.

EiceDRIVER™ 2ED24427N01F is a high-current 10 A, 2-channel low-voltage, non-inverting, low-side gate driver in a DSO8 package with thermally efficient, exposed power pad. Propagation delays between two channels are matched. In half-bridge LLC or full-bridge ZVS topologies, 2ED24427N01F can easily drive low $R_{DS(on)}$ high-voltage MOSFETs at high switching frequencies. In synchronous rectification, more than two MOSFETs can be paralleled and driven from a single channel of the driver. One 2ED24427N01F device can efficiently drive both synchronous rectification legs. When higher current is needed, 2ED24427N01F can boost the current from a regular gate driver and drive high-current IGBTs and MOSFETs.

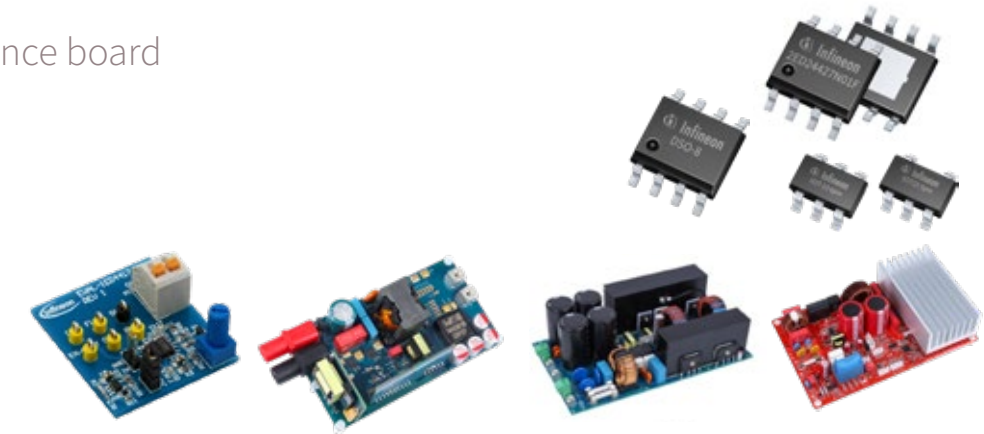
Simplified application diagram



Part Number	Package	$I_{O\pm}$ [A]	UVLO [V]	V_{OCTH} [mV]	$T_{on/off}$ [ns]	Ground pins	Feature
1ED44171N01B*	SOT23-5	2.6/2.6 A	11.9/11.4 V	N/A	50/50 ns	COM	Enable, Fault
1ED44173N01B	SOT23-6	2.6/2.6 A	8/7 V	-250 mV	34/34 ns	COM	OCP (negative current sensing), Enable, Fault
1ED44175N01B	SOT23-6	2.6/2.6 A	11.9/11.4 V	-250 mV	50/50 ns	COM	
1ED44176N01F	DSO8	0.8/1.75 A	11.9/11.4 V	500 mV	50/50 ns	VSS / COM	OCP (positive current sensing), Enable, Fault, Programmable fault clear time
2ED24427N01F	DSO8 with Power Pad	10/10 A	11.5/10 V	N/A	40/55 ns	COM	Enable

Evaluation and reference board

- EVAL-1ED44176N01F
- EVAL-1ED44175N01B
- EVAL-1ED44173N01B
- EVAL-PFC5KIKWWR5SYS
- EVAL-2ED2101-HB-LLC
- REF-AIRCON-C302A-IM564



www.Infineon.com/1ED44173
www.Infineon.com/1ED44175
www.Infineon.com/1ED44176
www.Infineon.com/2ED24427

*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

2EDN EiceDRIVER™ family

Rugged, fast, dual-channel low-side 4 A/5 A gate-driver ICs

EiceDRIVER™ 2EDN family overview

Dual-channel driver ICs are the crucial link between control ICs and powerful MOSFET, wide band gap (WBG) switching devices. Driver ICs enable high system level efficiencies, excellent power density and consistent system robustness.

EiceDRIVER™ 2EDN family: Fast, precise and compatible

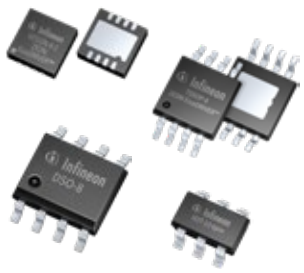
- Highly efficient SMPS enabled by 19 ns propagation delay and 2 ns channel-to-channel mismatch precision for fast MOSFET, WBG switches
- Diversified applications driven by strong output current 4 A/5 A per channel
- Unique designs are supported by the availability of numerous packages

EiceDRIVER™ 2EDN family: The new reference in ruggedness and low power dissipation

- 4 V and 8 V UVLO (undervoltage lock out) options for instant FETs protection under abnormal conditions, further improved with active output voltage clamping
- -10 V robustness of control and enable inputs provides crucial safety margin when driving pulse transformers or driving FETs in various packages
- 5 A reverse output current robustness eliminates the need for Schottky switching diodes and reduces bill-of-material
- Cool driver ICs from true rail-to-rail low impedance output stages

Applications

- Server
- Telecom
- DC-DC Converters
- Power tools
- Industrial SMPS
- Low speed electrical vehicles
- Solar power inverter
- LED lighting



Key features	Product benefits	System benefits
5 A source/sink current 2 ns channel-to-channel mismatch 10 ns minimum input pulse width	Fast Miller plateau transition Precise timing	High power efficiency - in hard switching PFC with SiC diode - in half-bridges and synchronous rectifications
True rail-to-rail low impedance output stages	Low power dissipation in driver IC	Cooler driver IC operation Higher FETs drive capability
4 V and 8 V UVLO options, with active output voltage clamping 19 ns propagation delay for both control and enable	Fast and reliable FETs turn-off, independent of control IC	Instant FETs protection under abnormal operation
-10 V robustness of control and enable inputs	Increased GND-bounce robustness	Crucial safety margin to drive pulse transformer
5 A reverse output current robustness	Saves switching diodes	Increases power density BOM savings
2 independent channels	Option to increase drive current by truly concurrent switching of 2 channels	One IC covering many applications
Industry standard pinout and packages	Straight forward design upgrades	Short time to market

www.infineon.com/2EDN

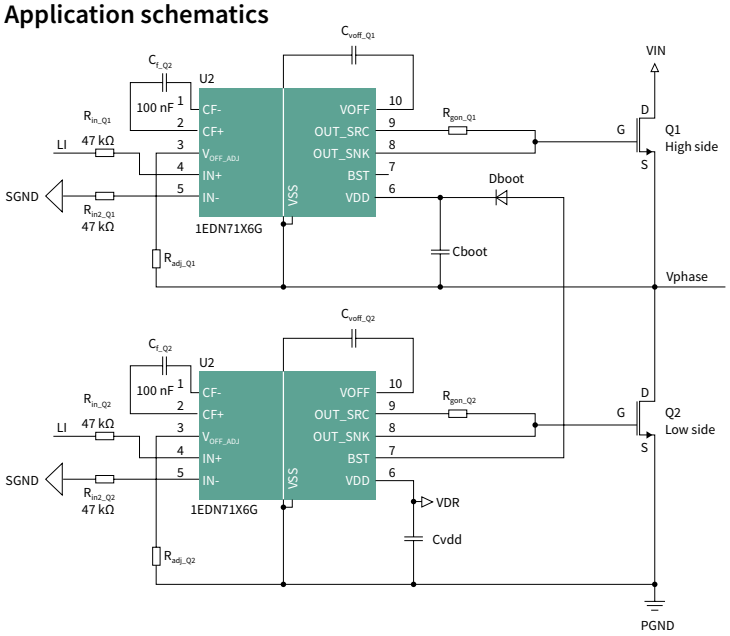
For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER ™ 1EDN71x6G/U family

200 V 1-ch gate drivers with truly differential input (TDI)

The 1EDN71x6G/U is a 1-channel gate driver family optimized for Infineon CoolGaN™ Schottky-gate (SG) HEMTs, and also compatible with other GaN SG HEMTs and silicon MOSFETs. The TDI feature eliminates the risk of false triggering due to ground bounce in low-side applications and enable 1EDN71x6G/U to address even high-side applications. The TDI feature works by controlling the gate driver output state exclusively by the voltage difference between the two inputs, completely independent of the driver's reference (ground) potential as long as the common-mode voltage is below 150 V (static) and 200 V (dynamic).

Application schematics



Features and benefits

Product features	Product benefits
› Truly differential logic input (TDI)	› High-side driving and low-side ground bounce immunity
› Four driving strengths	› Optimize switching speed without external gate resistors
› Active Miller clamp	› Prevent induced turn-on
› Optional negative charge pump	› Additional induced turn-on immunity
› Active bootstrap capacitor	› No overcharging the bootstrap capacitor during deadtime

Product family

Product	Ourput current	Source/sink resistance	Input pulse blanking time	Package
1EDN7116G	2 A	0.8 Ω	20 ns	VSON-10
1EDN7126G	1.5 A	1.0 Ω	40 ns	vVSON-10
1EDN7136G	1 A	1.5 Ω	60 ns	VSON-10
1EDN7146G	0.5 A	3.0 Ω	80 ns	VSON-10
1EDN7116U*	2 A	0.8 Ω	20 ns	TSNP-7
1EDN7126U*	1.5 A	1.0 Ω	40 ns	TSNP-7
1EDN7136U*	1 A	1.5 Ω	60 ns	TSNP-7
1EDN7146U*	0.5 A	3.0 Ω	80 ns	TSNP-7

DC-DC | Server | Telecom | Artifical intelligence | Collaborative robots | Multicopter | Audio

www.infineon.com/1edn

* Coming soon

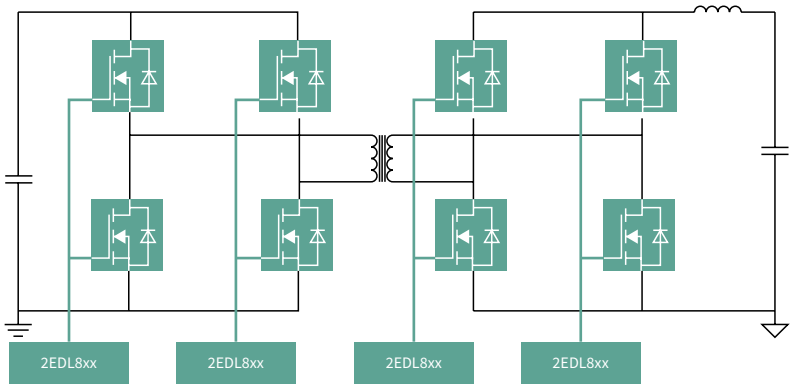
For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER™ 2EDL8x2x family

120 V, 3/4 A, junction-isolated high- and low-side gate drivers

The 2EDL8x2x is a family of high- and low-side gate driver designed for advanced switching DC-DC converters. The 2EDL802x takes in independent inputs while 2EDL812x takes in differential inputs with both having built-in hysteresis for enhanced noise immunity. The gate-driver family comes in two packages: VDSON-8 4x4 mm and VSON-10 3x3 mm.

Application schematics



Features and benefits

Product features	Product benefits
› 120 V integrated boot-strap diode with 10 ns reverse recovery time	› Drive strength for fast Miller plateau transition
› 2 A to 4 A output source currents	› Fast and robust
› 6 A output sink currents	› Immunity against false triggering from ground bounce
› -8 V / + 15 V differential input robustness	› No need for Schottky clamping diodes
› 5 A reverse current output robustness	
› ±1 ns (typ.) channel-to-channel delay matching	

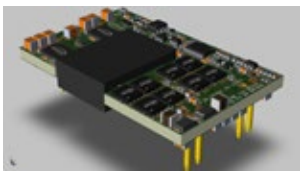
Product family

Part nu	Input	Source current	Sink current	Min. input pulse width	Propagation delay (typ.)	Matching delay (typ)	ESD	Package
2EDL8123G	Differential	3 A	6 A	40 ns	45 ns	2 ns	2 kV	VDSON-8 4x4 mm
2EDL8124G		4 A						
2EDL8023G	Independent	3 A						
2EDL8024G		4 A						
2EDL8123G3C*	Differential	3 A						VSON-10 3x3 mm
2EDL8124G3C*		4 A						
2EDL8023G3C*	Independent	3 A						
2EDL8024G3C*		4 A						

Evaluation board:

EVAL_HB_2EDL8x2xG*

REF_600W_FBFB_QB*



DC-DC | Battery formation | Server | Solar | Telecom

www.infineon.com/2edl8

* Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

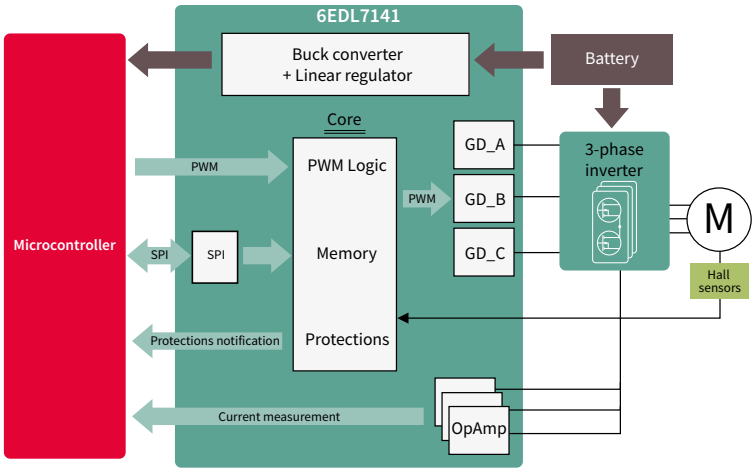
MOTIX™ 6EDL7141 high performance motor control

Next-generation fully programmable three-phase gate driver

6EDL7141, Infineon's latest three-phase motor control gate-driver IC allows our customers to develop their next generation of high performance battery operated products using BLDC or PMSM motors. Ideal applications include cordless power tools, gardening products, and automated guided vehicles. With over 50 fully programmable parameters using built-in digital SPI interface, 6EDL7141 is fully configurable to drive a wide range of MOSFET's to yield the best possible system efficiency. The integrated buck regulator provides the power for both the microcontroller and the Hall sensors in the motor, further reducing peripheral components and required PCB area. In addition, with a full suite of system protection features such as OCP, UVLO, over-temperature, and locked rotor detection, this dedicated motor controller will increase reliability and robustness in severe operating fault conditions.

Block diagram

Three-phase BLDC battery-powered motor control



Features and benefits

Key features	Key benefits
› Integrated power supply	› Reduced external components and PCB area
› Programmable slew rate	› Optimized efficiency and EMI
› Programmable gate drive supply	› Maximum flexibility to use different inverter FETs
› 3x current shunt amplifier	› Highly accurate current sense while saving external components
› ADC ref. of 5 V	› Higher dynamic range to increase signal resolution
› Complete dedicated motor control protection suite	› Improve reliability and fault detection

EVAL_6EDL7141_TRAP_1SH

BC 1 shunt evaluation board
Parallel 40 V OptiMOS™5 PQFN
XMC1404 MCU
On-board programming dongle
Featured module IC: 6EDL7141

www.infineon.com/6edl7141

For more details on the product, click on the part number, visit infineon.com or contact our product support.

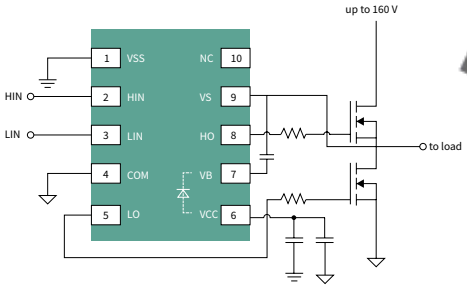
MOTIX™ 160 V SOI gate-driver family

2ED27xxS01G half-bridge and high- and low-side gate-driver family with integrated bootstrap diode
6ED2742S01Q three-phase driver with charge pump, current sense amplifier, OCP and bootstrap diode

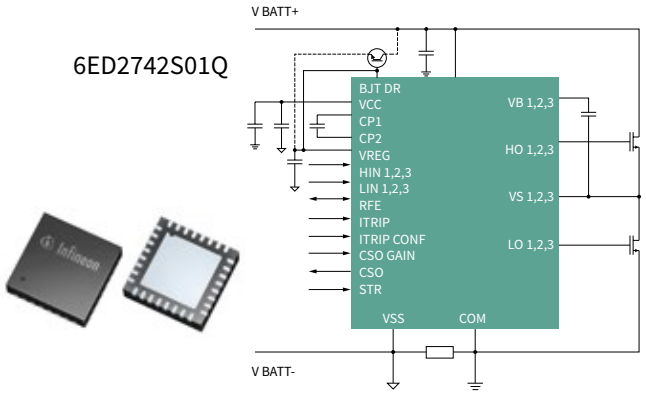
MOTIX™ 160 V SOI gate driver family is designed for the BLDC motor drive applications. The SOI technology enables integrated bootstrap diodes, which can be used to supply the external high-side bootstrap capacitor. The output drivers feature a high-pulse current buffer stage designed for minimum driver cross-conduction. MOTIX™ 2ED27xxS01G family consists of three half-bridge and three high- and low-side 160 V SOI gate drivers. The UVLO protection is on both V_{cc} and V_B pins. Fast propagation delays (50 ns) are suitable for motor drive and power conversion applications in VSON-10 (3x3 mm) package with exposed ground pad. MOTIX™ 6ED2742S01Q is a 160 V three-phase SOI gate driver, which supports 100% duty cycle operation by a trickle charge pump. Protection features include UVLO, OCP with configurable threshold, fault and automatic fault clear. A current sense operational amplifier (CSA) with selectable gain is integrated between the V_{SS} and COM.

Simplified application diagram

2ED27xxS01G



6ED2742S01Q



Product	Package	Output current	Configuration	Deadtime	Propagation delay
2ED2732S01G*	VSON-10 3x3 mm	1/2 A	High- and low-side (HS+LS)	None	50 ns
2ED2734S01G*		2/4 A			
2ED2738S01G*		4/8 A			
2ED2742S01G*		1/2 A	Half-bridge	50 ns	
2ED2744S01G*		2/4 A			
2ED2748S01G*		4/8 A			
6ED2742S01Q*	VQFN-32 5x5 mm	1/2 A	Three-phase	100 ns	100 ns

Applications for MOTIX™ 160 V SOI gate driver family

- Servo/stepper drives in robotics and factory automation
- General purpose low-voltage drives
- Battery-operated small home appliances (SHA)
- Professional and consumer service robotics
- Logistics vehicles (e-forklifts, autonomous warehouse robotics)
- Commercial and agricultural drones
- Hand-held battery-operated power tools
- Garden or outdoor power equipment (OPE) tools
- e-scooters, e-bikes, and other e-vehicles that do not require automotive qualification (LSEV)

www.infineon.com/SOI

6ED2742S01Q key features

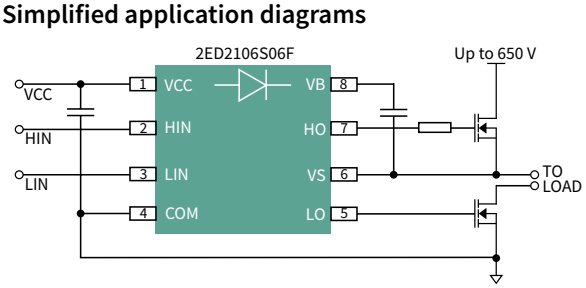
- Integrated power management with charge pump and pre-regulator supports wide input voltage range of 6 V to 140 V
- Integrated over-current protection comparator for single-shunt low side operation with programmable +/-5% reference threshold
- Integrated current sense amplifier with programmable voltage gain and ability to read output voltage offset during zero phase current
- Always positive output voltage offset to reduce need for +/- V_{REF} for downstream ADC in microcontroller.
- Integrated, per phase, high-side trickle charge pumps to enable 100% duty cycle operation
- Integrated, multi-function RFE pin combines FAULT, FAULT Clear, and Enable functionality

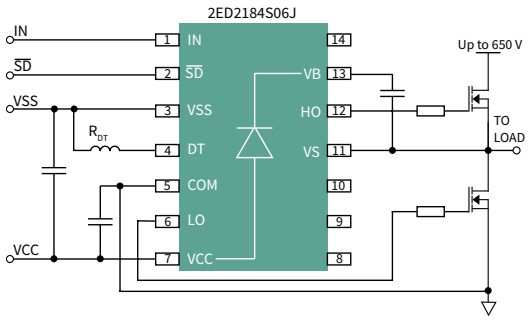
EiceDRIVER™ 650 V level-shift SOI gate driver family

2ED2101/3/4 and 2ED2110: EiceDRIVER™ fast level-shift SOI family with 90 ns prop delay
2ED2106/8/9 and 2ED2181/2/3/4: EiceDRIVER™ general purpose SOI family

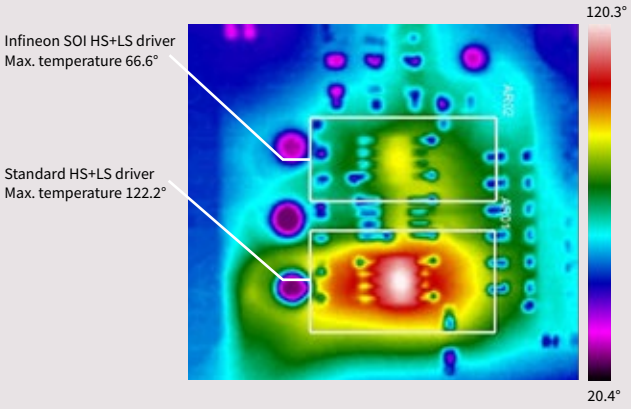
EiceDRIVER™ 650 V SOI is a family of high-voltage, high-speed MOSFET and IGBT gate drivers. Based on Infineon's SOI technology, this family features an integrated, ultra-fast, low $R_{DS(on)}$ bootstrap diode and offers excellent ruggedness and noise immunity with tolerance to negative transient voltages of up to -100 V. The absence of parasitic thyristor structures ensures superior latch up immunity. The level-shift loss is significantly reduced on the EiceDRIVER™ SOI gate drivers compared to other technologies.

Simplified application diagrams





Power dissipation of Infineon SOI



DC = 300 V; CoolMOS™ P7 in DPAK; 300 kHz switching frequency

Evaluation board

EVAL-M1-2ED2106S

EVAL-2ED2101 HB-LLC

Product family	Part number	Output current	Prop. delay	Input logic	Configuration	Package
EiceDRIVER™ fast level-shift SOI	2ED2101S06F	0.29/0.7 A	90 ns	HIN, LIN	High- and low-side	DSO8
	2ED2103S06F			HIN, $\overline{\text{LIN}}$	Half-bridge	
	2ED2104S06F			IN, $\overline{\text{SD}}$	Half-bridge	
	2ED2110S06M	2.5/2.5 A		HIN, LIN	High- and low-side	DSO-16 WB
EiceDRIVER™ general purpose SOI	2ED2106S06F	0.29/0.7 A	200/200 ns	HIN, LIN	High- and low-side	DSO8
	2ED21064S06J			HIN, LIN		DSO-14
	2ED2108S06F			HIN, /LIN	Half-bridge	DSO8
	2ED21084S06J			HIN, /LIN		DSO-14
	2ED2109S06F		740/200 ns	IN, /SD		DSO8
	2ED21094S06J			IN, /SD		DSO-14
	2ED21091S06F			IN, DT/SD		DSO8
	2ED2181S06F	2.5/2.5 A	200/200 ns	HIN, LIN	High- and low-side	DSO8
	2ED21814S06J			HIN, LIN		DSO-14
	2ED2182S06F			HIN, LIN	Half-bridge	DSO8
	2ED21824S06J			HIN, LIN		DSO-14
	2ED2183S06F			HIN, /LIN		DSO8
	2ED21834S06J			HIN, /LIN		DSO-14
	2ED2184S06F		600/200 ns	IN, /SD		DSO8
	2ED21844S06J			IN, /SD		DSO-14

www.infineon.com/SOI

For more details on the product, click on the part number, visit infineon.com or contact our product support.

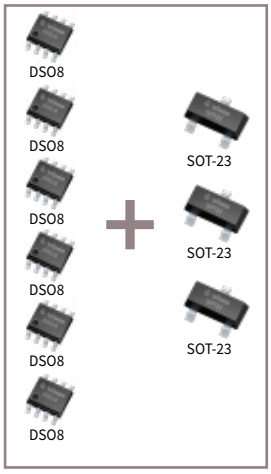
EiceDRIVER™ 1200 V level-shift SOI gate driver family

6ED223x: 1200 V three-phase SOI driver with OCP, bootstrap diode
2ED132x: 1200 V half-bridge and high- and low-side SOI driver with OCP, Miller clamp and bootstrap diode

The 6ED2231S12T is a 1200-V three-phase SOI gate driver, with 0.35 A / 0.65 A current in DSO-24 package (DSO-28 with 4 pins removed). The 2ED132x family consists of four 1200 V SOI gate drivers, in half-bridge or high- and low-side configurations. 2ED132x family offers 2.3 A output current in high creepage (5 mm)/clearance DSO-20 wide body package or higher sink option (4.6 A) in DSO-16 wide body package. Both 6ED2231S12T and the 2ED132x family integrates ultra-fast over-current protection (OCP) with ± 5% accuracy, and bootstrap diode. In addition, the 2ED132x family also integrates active Miller clamp.

Current solutions

6 x opto-isolated drivers +
3 x 1200 V bootstrap diodes



- Space savings
- Cost savings
- Easy to design
- Higher reliability
- Faster time to market

New 6ED2231S12T Integrates

6x gate-driver functionality and
3x boot-strap diodes
Over-current protection
IGBT/SiC MOSFET UVLOs

6ED2231S12T easily fits within EasyPIM™ 1B module footprint

EVAL-M1-6ED2231-B1

Features and benefits

Key features	Key benefits	Customer value
› Leading negative VS immunity	› Increased robustness and reliability resulting in reduced manufacturing and field failures	› Increased profitability from lower lifecycle costs
› > 50% lower level-shift switching losses	› Reduced power dissipation, lower temperature	› Faster time to market for higher share capture
› Integrated bootstrap diode	› Faster frequency switching	› Enables new applications
› 1200 V breakdown voltage	› Smaller PCB footprints	› Increased flexibility
› Integrated input filters	› Reduced BOM costs	› Increased reliability
	› Improved noise sensitivity	
	› Latch-up immunity	

Product Name	Configuration	Package	Output current	Key features	Deadtime	T_{ON} / T_{OFF}
6ED2231S12T*	Three-phase	DSO-24	0.35 / 0.65 A	OCP, RFE	460 ns	700 / 650 ns
2ED1324S12P*	Half-Bridge	DSO–20	2.3 / 2.3 A	OCP, SOFF, AMC, RFE	380 ns	500 ns
2ED1323S12P*	HS+LS	DSO–20	2.3 / 2.3 A	OCP, SOFF, AMC, RFE	None	350 ns
2ED1322S12M*	Half-Bridge	DSO–16	2.3 / 4.6 A	OCP, SOFF, RFE	400 ns	500 ns
2ED1321S12M*	HS+LS	DSO–16	2.3 / 4.6 A	OCP, SOFF, RFE	None	350 ns

www.infineon.com/SOI www.infineon.com/1200VHVIC www.infineon.com/6ED2230

*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

2EDi EiceDRIVER™ family

Fast, robust, dual-channel galvanic isolated gate-river ICs

Galvanic isolated EiceDRIVER™ family overview

The 2EDi is a family of dual-channel isolated gate driver ICs designed to drive Si MOSFETS, SiC MOSFETs and GaN power switches. Isolation is achieved by means of Infineon's coreless transformer (CT) technology which guarantees robust operation and industry benchmark common-mode rejection (CMTI). The high propagation delay accuracy and low channel-to-channel mismatch makes the product ideal for use in fast-switching power system. In addition, high CMTI, high reverse current capability and fast clamping of the output below UVLO guarantees reliable operation in the application.

2EDi Gen 2: What is new?

- DSO-14 packages with increased channel-to-channel creepage to easier the layout or enable the use with higher working voltages or worst pollution layout
- New LGA 4 mm x 4 mm package enabling 70 percent space saving
- Fulfills the latest component standard for magnetic couplers (IEC 60747-17)
- Programmable dead-time and shoot-through functionality

Applications

- Server
- Telecom
- DC-DC converters
- Power tools
- Industrial SMPS
- Low speed electrical vehicles
- Solar power inverter
- LED lighting

Features and benefits

Key features	Key benefits	Customer value
Fast power switching with accurate timing › 5 A/ 9 A source/sink currents › Propagation delay typ. 38 ns with 6 ns channel-to-channel precision	**Efficiency gain and lower losses** › › Strong driving enables reduced switching losses › Accurate timing enables deadtime optimization or synchronized driving in case of parallel MOSFETs	**Enabling higher system efficiency and higher power density designs**
Optimized for area and system BOM › < 1 Ω source and sink output resistance › Output stages with 5 A reverse current capability	**Improved thermal behavior at smaller form factor** › Most of the driving power is dissipated externally with reduced thermal stress on the driver › Eliminates two costly protection diodes on the gate driver outputs	**Improving long term competitive cost position, integration and mass manufacturability**
Robust › CMTI >150 V/ns › Under voltage lockout function for switch protection › Deadtime control and shoot through protection	**Protection and safe operation** › Reliable driver operation against fast switching transients › MOSFET is protected from thermal stress in abnormal conditions › Protection against noise and spurious pulses	**Extending end-product lifetime** by improving safe operation of power switches in normal and abnormal field (grid) conditions
Output-to-output channel isolation › Functional level galvanic isolation	**Flexible configurations** › High-side + low-side, high-side + high-side, low-side + low-side	**Lower EMI by ground isolation**
Input-to-output channel isolation › Functional, basic and reinforced galvanic isolation	**Regulatory safety** › Functional for level-shifting and ground bounce immunity › Reinforced for control of primary-side MOSFETs from secondary-side controller	**Simplified safety approval** through component standards (UL1577, IEC60747-17) and system standards (IEC62368) certificates

www.infineon.com/2edi

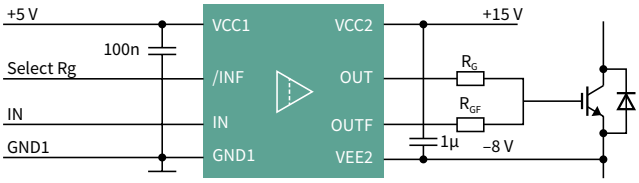
EiceDRIVER™ X3 Compact and 2L-SRC Compact

5.7 kV, 18 A, 1-ch, isolated drivers with Miller clamp and two-level slew rate control

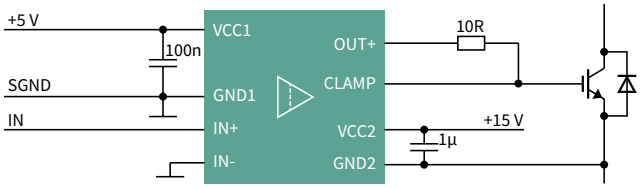
The EiceDRIVER™ X3 Compact family (1ED31xx) provides Miller clamp or separate output options with up to 14 A current, in DSO8 150 mil and 300 mil package. The EiceDRIVER™ 2L-SRC Compact family (1ED32xx) provides Miller clamp or 2-level slew rate control options with up to 18 A current, in DSO8 300 mil package. The Miller clamp function is highly recommended for SiC MOSFET 0 V turn off and IGBT7 against parasitic turn on. The two-level slew rate control function allows customers to change the output current on the fly. It is highly recommend for industrial drives application, where customer suffer from the EMI and switching loss optimization. Both EiceDRIVER™ X3 Compact and 2L-SRC Compact families are rated up to 2300 V functional isolation and 200 kV/µs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC MOSFETs in applications like solar inverter, EV charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc.

Simplified application diagram

Two-level slew rate control (1ED3241MC12H)



Active Miller clamp (1ED3122MC12H)



Evaluation board

EVAL-1ED3121MX12H
EVAL-1ED3122MX12H
EVAL-1ED3124MX12H
EVAL-1ED3241MC12H
EVAL-1ED3251MC12H
REF-22K-GPD-INV-EASY3B

Family	Part number	Typ. output current	Feature	Prop. delay	Input filter	UVLO	Prop.delay matching	Package	Isolation rating
EiceDRIVER™ X3 Compact	1ED3127MU12F*	10 A	Miller clamp	90 ns	30 ns	12 V	7 ns	DSO8 150mil	UL 1577: VISO = 3 kV_{rms}
	1ED3125MU12F	10 A				10.5 V			
	1ED3124MU12F	14 A	Separate output			10.5 V			
	1ED3131MC12H	5.5 A		270 ns	180 ns	10.5 V		DSO8 300mil	UL 1577: V_{ISO} = 5.7 kV_{rms} VDE 0884-11: V_{IORM} = 1767 V (reinforced)
	1ED3120MC12H	5.5 A		90 ns	30 ns	8 V			
	1ED3121MC12H	5.5 A				10.5 V			
	1ED3122MC12H	10 A	Miller clamp			8 V			
	1ED3123MC12H	14 A	Separate output			8 V			
	1ED3124MC12H	14 A				10.5 V			
EiceDRIVER™ 2L-SRC Compact	1ED3240MC12H	10 A	Turn-on and turn-off slew rate control	110 ns	30 ns	10.5 V	15 ns		
	1ED3241MC12H	18 A				10.5 V			
	1ED3250MC12H	10 A	Turn-on slew rate control and Miller clamp			10.5 V			
	1ED3251MC12H	18 A				10.5 V			

www.infineon.com/gdcompact
www.infineon.com/src

* Coming soon

Server | SMPS | +SiC | Telecom | Drives | EV charger | CAV | Industrial robotics | Solar | UPS

For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER™ Enhanced 1ED-F3 and X3 Analog

5.7 kV, 9 A, 1-ch, isolated drivers with DESAT, Miller clamp and soft-off

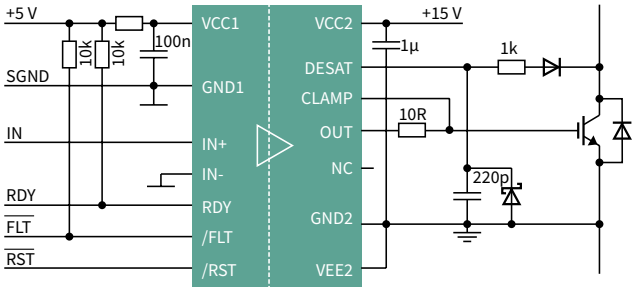
The EiceDRIVER™ Enhanced 1ED-F3 family (1ED332x) provides DESAT, Miller clamp and soft-off features with up to 6 A current, in DSO-16 300 mil package. The EiceDRIVER™ Enhanced X3 Analog family (1ED34xx) provides Miller clamp, resistor configurable DESAT and soft-off function with up to 9 A current, in DSO-16 300 mil fine pitch package.

The 1ED-F3 family (1ED332x) is pin-to-pin with our previous generation 1ED020I12-F2 (1ED-F2), with higher current, shorter propagation delay, higher isolation ratings and additional soft-off function. The X3 Analog family (1ED34xx) offers best-in-class DESAT protection accuracy with the resistor configurability on DESAT filter and leading edge blanking time and soft-off current.

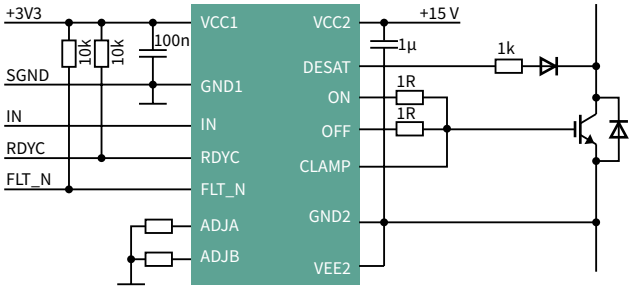
Both EiceDRIVER™ Enhanced 1ED-F3 and X3 Analog families are rated up to 2300 V functional isolation and 200 kV/µs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC MOSFETs in applications like solar inverter, EV charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc.

Simplified application diagram

1ED-F3 (1ED332x)



X3 Analog (1ED34xx)



Evaluation board

EVAL-1ED3321MC12N
EVAL-1ED3491MX12M

Family	Part number	Typ. output current	Feature	Prop. delay	Input filter	UVLO	Prop.delay matching	Package	Isolation rating
EiceDRIVER™ Enhanced 1ED-F3	1ED3320MC12N	3/6 A	Miller clamp, DESAT, soft-off	80 ns	35 ns	10.5 V	15 ns	DSO-16 300mil	UL 1577: V_{ISO} = 5.7 kV_{rms} VDE 0884-11: V_{IORM} = 1767 V (reinforced)
	1ED3321MC12N	6/8.5 A				10.5 V			
	1ED3322MC12N	6/8.5 A	Miller clamp, DESAT			12 V			
	1ED3323MC12N	6/8.5 A				10.5 V			
EiceDRIVER™ Enhanced X3 Analog	1ED3431MC12M	3 A	Miller clamp, resistor adjustable DESAT and soft-off	236 ns	100 ns	10.5 V	30 ns	DSO-16 300mil fine pitch	
	1ED3461MC12M	6 A	Clamp driver, resistor adjustable DESAT and soft-off			10.5 V			
	1ED3491MC12M	9 A				10.5 V			

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER™ Enhanced X3 Digital

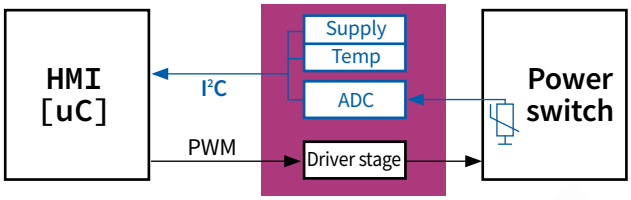
5.7 kV, 9 A, 1-ch, isolated drivers with I²C configurability for DESAT, Miller clamp, soft-off and many more

The EiceDRIVER™ Enhanced X3 Digital family (1ED38xx) provides I²C configurability for DESAT, soft-off, UVLO, Miller clamp, two-level turn off (TLTO), and fault function to simplify the design of highly reliable systems. All adjustments are done from the input side via the I²C interface (pin SDA and SCL). The 1ED38xx offers up to 9 A current, in DSO-16 300 mil fine-pitch package.

The EiceDRIVER™ Enhanced X3 Digital family is rated up to 2300 V functional isolation and 200 kV/µs CMTI. They are ideal for IGBTs, Si MOSFETs, and SiC MOSFETs especially due to the configurability of DESAT and UVLO. This family is recommended in applications like solar inverter, EV charging, industrial drives, CAC, industrial induction cooking, CAV, UPS, server and telecom SMPS, etc. Two noticeable advantages of the digitally configurable approach for customers are predictive maintenance in sophisticated industrial systems and rapid prototyping for fast solution development.

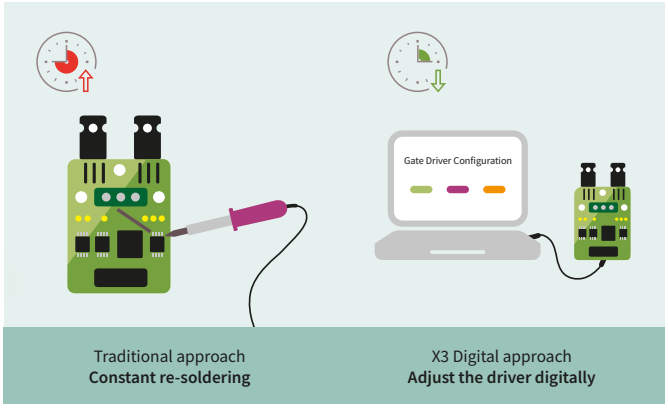
Predictive maintenance

Using the I²C interface, the 1ED38xx is able to register the counts of UVLO spikes, monitor the supply voltage and temperature increase. With the long-term analysis of the collected data, customers are able to decide when is the best time to schedule a maintenance cycle before the system fails.



Rapid prototyping

The I²C interface enables rapid prototyping without hardware changes. Using a traditional gate driver, customers have to first design an initial PCB board, and then adjust and replace the components on the board during evaluation. However, with the 1ED38xx I²C interface, customers can configure up to 27 parameters to optimize the board without replacing the components. This feature extremely shortens the development flow.

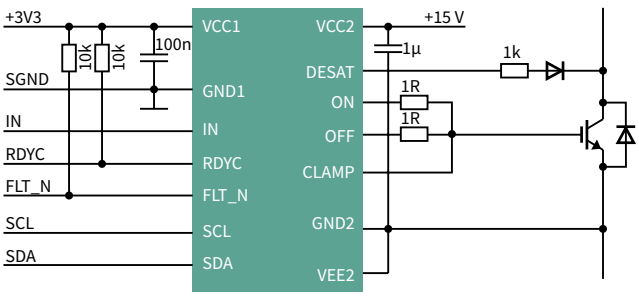


Evaluation board

EVAL-1ED3890Mx12M
EVAL-1ED38x0DCT

Simplified application diagram

X3 Digital (1ED38xx)



Family	Part Number	Typ. output current	Feature	Isolation rating
EiceDRIVER™ Enhanced X3 Digital	1ED3830MC12M	3 A	I²C configurability, Miller clamp, DESAT, soft-off, two-level turn-off, integrated ADC	UL 1577: V_{ISO} = 5.7 kVrms VDE 0884-11: V_{IORM} = 1767 V (reinforced)
	1ED3860MC12M	6 A		
	1ED3890MC12M	9 A		

Predictive maintenance · +SiC · Industrial robotics · CAV · EV charger · Drives · Solar · UPS

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER™ APD 2ED4820-EM

48 V smart high-side MOSFET gate driver with SPI for automotive applications

The EiceDRIVER™ 2ED4820-EM is a smart high side N-channel MOSFET gate driver with two outputs controlled via SPI. The integrated powerful charge pump allows external MOSFETs to stay continuously on. Thanks to the enhanced turn-on and turn-off ability of the driver, the number of MOSFETs could be easily scaled up to manage large currents in the order of several hundred amps, while ensuring fast switch on and off. The MOSFETs could be controlled in a back to back configuration either common mode or common source. The integrated current sense amplifier supports high-side and even load-side current measurement with a dedicated monitoring output. The 2ED4820-EM comes along with several latching failure detections, to implement protections for the external MOSFETs, the load and the power source. Parameters can be adjusted by SPI; monitoring data, configuration, warning and failure detection registers can be read.

Summary of features

- Extended supply voltage range: 20 - 70 V
- Two independent high-side gate driver outputs with 1 A pull down, 0.3 A pull up for fast switch off/on
- Low supply current in sleep mode IBAT_Q < 5 µA
- Device control, configuration and diagnostic via SPI
- Configurable overcurrent/short circuit protection
- Configurable Drain-Source overvoltage protection
- Gate undervoltage lockout (V_{GS})
- Ground loss detection
- AEC-Q100 qualification

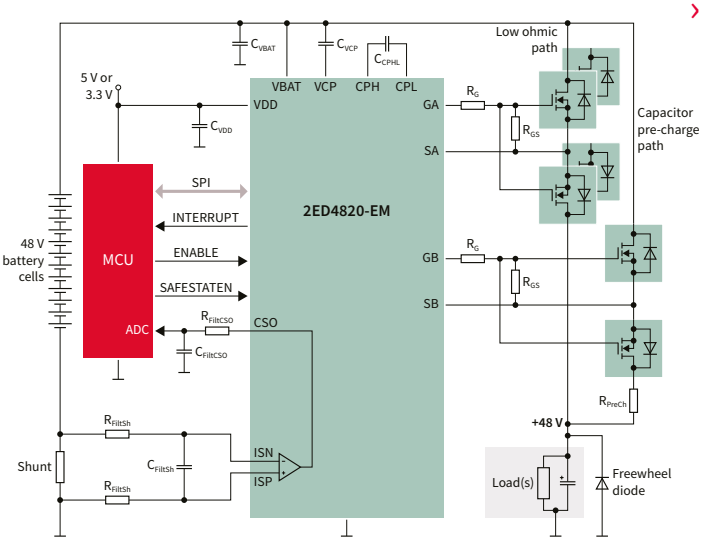
Lead-free Halogen-Free RoHS

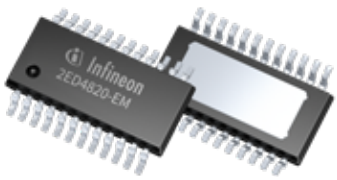
Benefits

- Supports back-to-back MOSFET topologies (common drain or common source)
- SAFESTATEN input to trigger safe state mode in case of µC failure
- One bidirectional high or low side analog current sense interface with configurable gain to optimize power losses
- Robust against V_{bat} voltages up to 105 V and V_{source} voltages versus V_{bat} of -90 V

Potential applications

- Battery protection switch
- Input protection switch
- Static load and supply switch for high currents





Products and evaluation boards

Product	Description	Ordering code	Package
2ED4820-EM	48 V smart high-side MOSFET gate driver with SPI	SP005629911	PG-TSDSO-24
2ED4820 EB2 2HSV48	2ED4820 dual high-side switch – 48 V evaluation board	SP005353778	BOARD
R 48V BATT Switch10	48 V battery disconnect switch - reference design	SP005595834	BOARD

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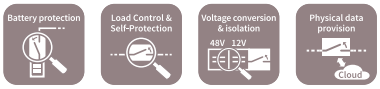


For more details on the product, click on the part number, visit infineon.com or contact our product support.

EiceDRIVER™ 1EDI302xAS/1EDI303xAS

1200 V galvanically isolated automotive gate-driver IC family

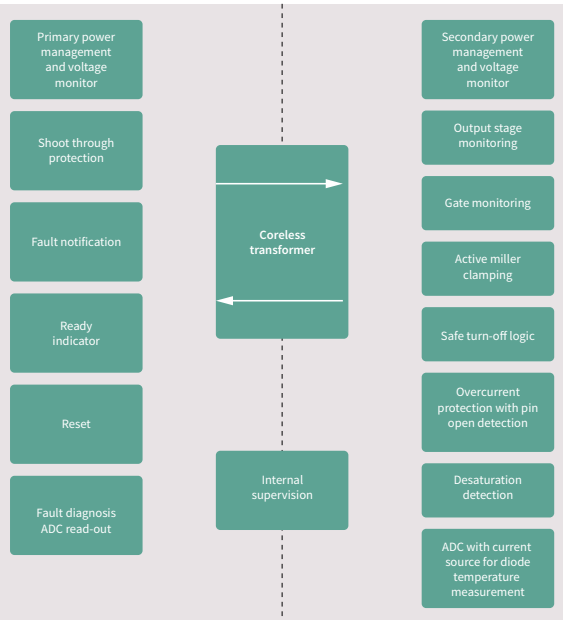
The EiceDRIVER™ 1EDI302xAS/1EDI303xAS is a family of automotive qualified single-channel high-voltage gate drivers optimized for IGBT and SiC technologies. The robust Infineon coreless transformer (CT) technology is used to provide bi-directional signal transfer across the galvanic isolation barrier. Comprehensive safety features and ISO26262 compliance enable ASIL D classification on the system level. Accompanying safety documents ease and speed-up FMEDA analysis in the application. The compact package design and the high level of feature integration save valuable PCB space and system cost, while the pre-configured settings reduce design efforts. Pin-compatible product variants make it easy to switch between variants and swiftly adjust ECUs to different application needs (i.e., SiC MOSFET vs IGBT).

Product features

- Single-channel isolated IGBT driver
- For IGBTs up to 1200 V
- High CMTI up to 150 V/ns
- 8 kV basic insulation according to DIN VDE V 0884-11:2017-01
- Basic insulation according to UL 1577
- Min. 12 A peak current rail-to-rail output
- Propagation delay 60 ns typical
- Typ. 10 A integrated active Miller clamp supports unipolar switching
- Integrated, accurate 12 bit ADC for temperature measurements
- Integrated safety features to support ASIL B(D):
  - DESAT and differential OCP protection
  - Gate and output stage monitoring
  - Shoot-through protection
  - Primary/secondary supply monitoring
  - Internal supervision
- Advanced driver diagnosis with duty cycle coded DATA pin
- AEC-Q100 qualified
- Compact DSO-20 fine pitch package

RoHS

Simplified block diagram



Potential applications

- Traction inverters for HEV and EV
- Auxiliary inverters for HEV and EV
- High-power DC-DC converters

Evaluation board

1EDI30XXAS EVALBOARD
1EDI303XAS EVALBOARD*
1EDI302XAS EVALBOARD*

Product family overview

Product variant	Driver support	Additional functionality
1EDI3020AS	IGBT	ADC for temperature Diode
1EDI3021AS	IGBT	Active short circuit
1EDI3023AS	IGBT	ADC for NTC and DC-link
1EDI3030AS	SiC	ADC for temperature diode
1EDI3031AS	SiC	Active short circuit
1EDI3033AS	SiC	ADC for NTC and DC-link

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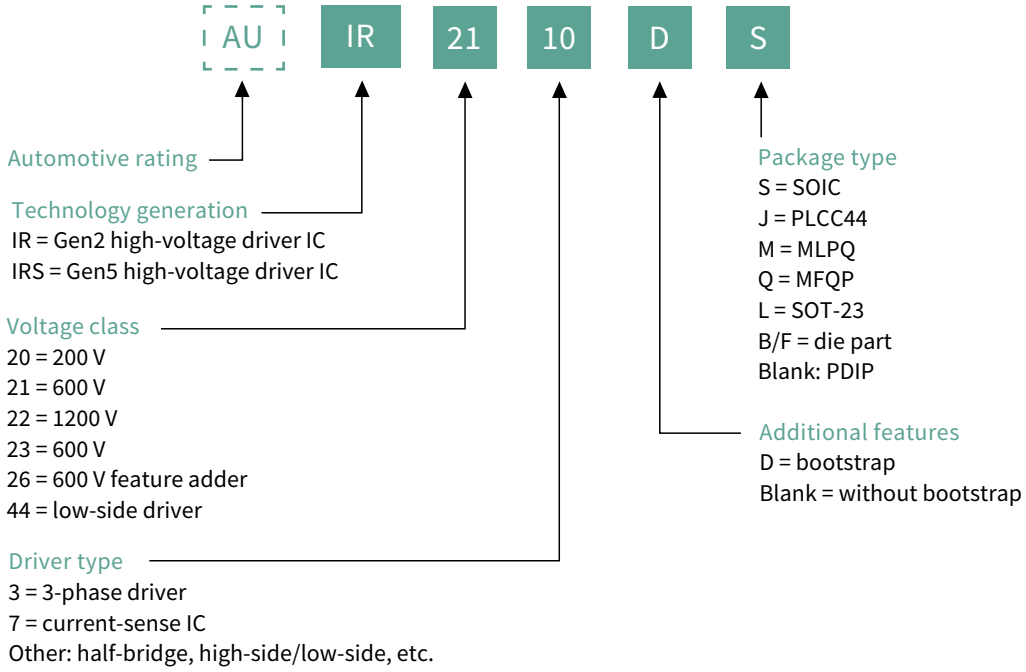
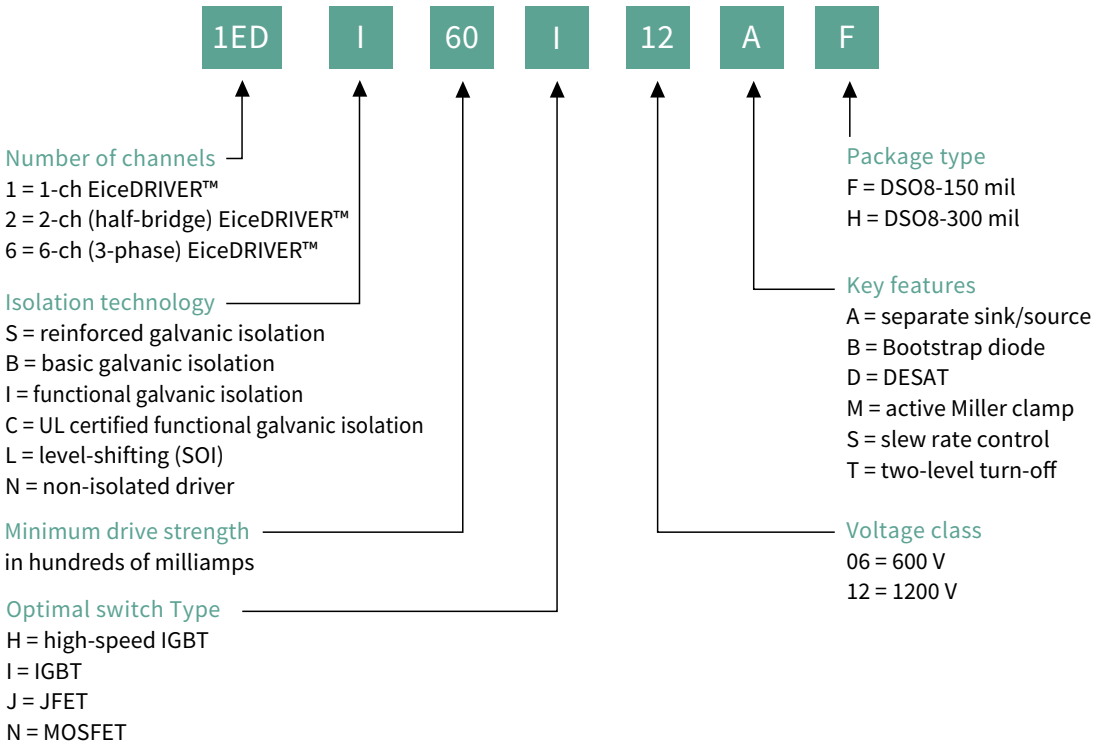
*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

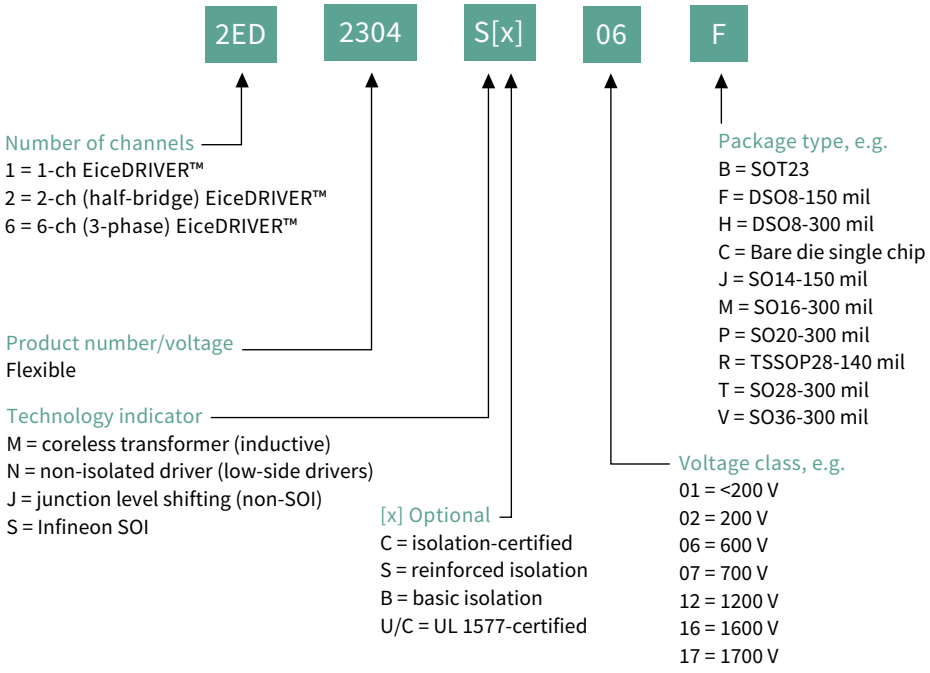
Nomenclature

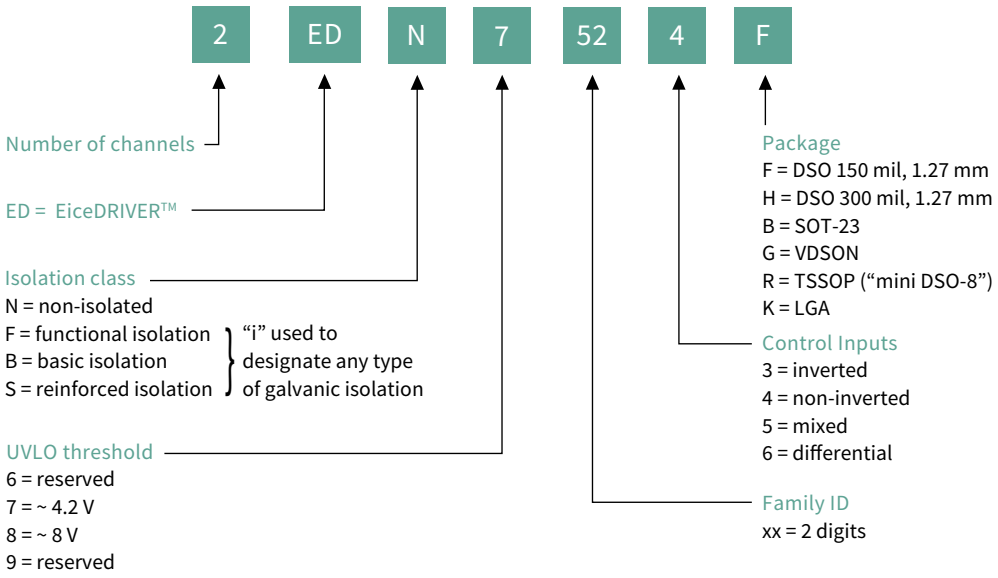
Naming convention for existing families of gate-driver ICs



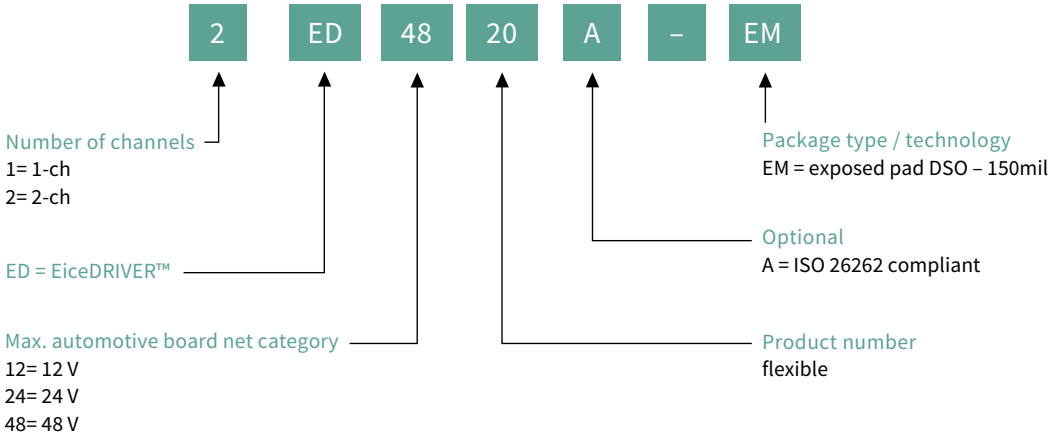


Naming convention for existing and upcoming families of gate-driver ICs





Naming convention for existing and upcoming families of gate-driver ICs



Infineon support for gate-driver ICs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/200vhvic
www.infineon.com/700vhvic
www.infineon.com/1200vhvic
www.infineon.com/gdsic
www.infineon.com/gdsic-cn (CN)
www.infineon.com/gdcompact
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www.infineon.com/1EDN
www.infineon.com/2EDN
www.infineon.com/TDI
www.infineon.com/2EDL8
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Gate driver IC community FAQs
www.infineon.com/gdforum

Gate driver selection tools
www.infineon.com/gdfinder

Gate driver simulation (SPICE) models
www.infineon.com/gdmodel

Cross reference tool
www.infineon.com/crs

Digital isolators

- ISOFACE™ digital isolators

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

ISOFACE™ digital isolators

Robust digital isolators with precise timing and low power consumption

ISOFACE™ digital isolators are based on Infineon's coreless transformer (CT) technology and provide robust isolation for high voltage applications. They are the preferred choice for isolated gate signal transfer in high-density power designs and isolated communication such as UART or CAN.

The 2DIBx4xxF family features

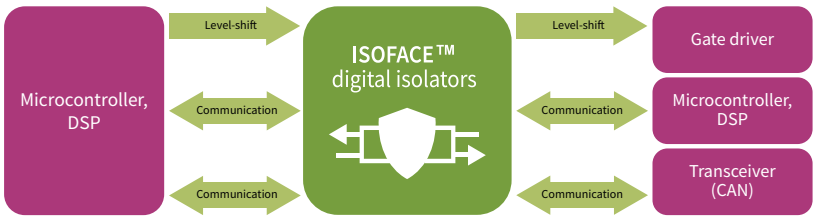
- Dual-channel digital isolators with eight variants and data rates up to 40 Mbits/s
- 3 kV_{RMS} isolation voltage
- CMOS/TTL input thresholds
- High common-mode transient immunity (CMTI)
- Accurate timing performance
- Wide operating supply voltage from 2.7 V to 6.5 V

Product variants

Part number	Isolation rating	Channel configuration	Input thresholds	Default output state	Package
2DIB0400F	V_{ISO} = 3000 V_{RMS} (UL1577 Ed. 5)	2 forward 0 reverse (2+0)	Variable (CMOS)	Low	PG-DSO8 5 x 4 mm
2DIB0401F				High	
2DIB1400F		1 forward 1 reverse (1+1)		Low	
2DIB1401F				High	
2DIB0410F		2 forward 0 reverse (2+0)	Fixed (TTL)	Low	
2DIB0411F				High	
2DIB1410F		1 forward 1 reverse (1+1)		Low	
2DIB1411F				High	

Features and benefits

Key features	Key benefits
High CMTI > 100 V/ns	High immunity against system noise or high dv/dt
Wide supply voltage range 2.7 V ~ 6.5 V (abs. max. 7.5 V)	Reliable performance in SMPS with switching noise on IC power supply
TTL or CMOS input threshold	Optimized noise margin for different applications
Typical propagation delay 26 ns with -4/+6 ns spread	For high system power efficiency
Both high and low fail-safe default output state	Reliable high or low default output state in case of failures
Both component and system level certification	Simplified system certification process
Pin-to-pin compatibility	For easy device replacement and alternative sourcing



Infineon ISOFACE™ dual-channel digital isolators are used to transfer gate driving and communication signals like CAN and UART over the isolation barrier. With high robustness and accurate switching characteristics, they are suitable for high power density designs and isolated communication systems.

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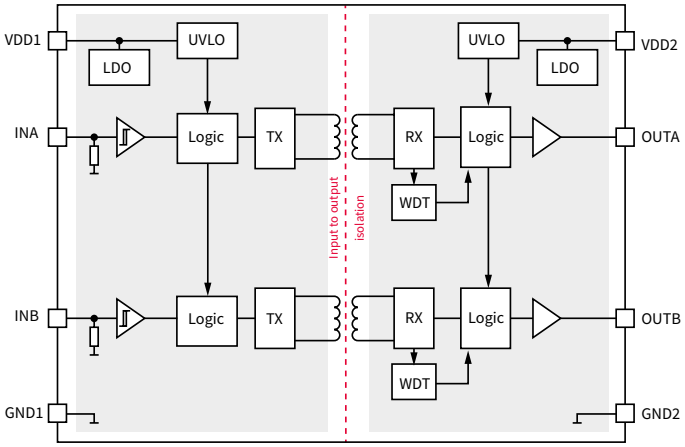
ISOFACE™ digital isolators

Dual-channel digital isolator 2DIB0410F in SOIC-8 narrow body package

Infineon ISOFACE™ dual-channel digital isolator 2DIB0410F (with 2 forward channels) provides robust isolation for high voltage applications. With a wide supply voltage range, TTL input thresholds and default output state low, it is the perfect fit for high-power density DC-DC brick applications.

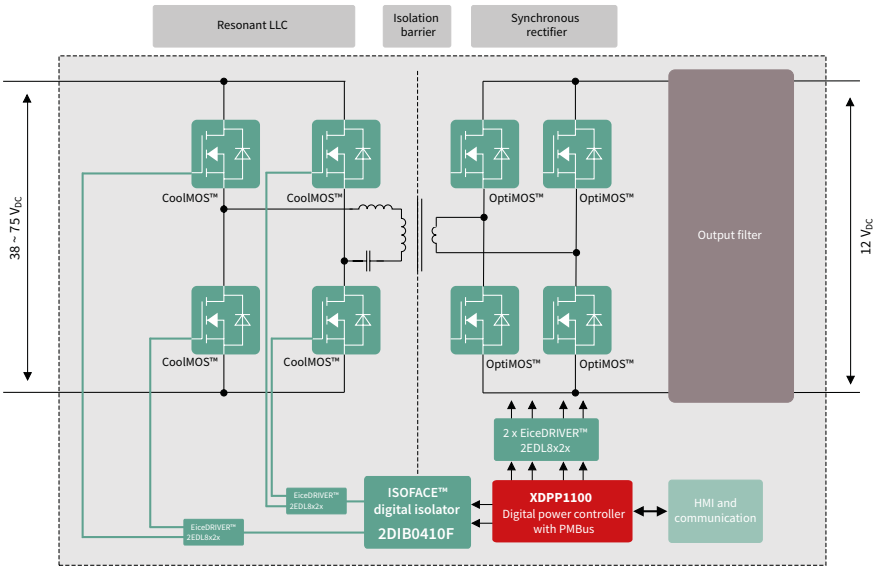
Block diagram of 2DIB041xF with two forward data channels



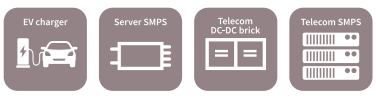
Features and benefits

Key features	Key benefits
› High CMTI > 100 V/ns	› High immunity against system noise
› Wide operating supply voltage range 2.7 V ~ 6.5 V (abs. max. 7.5 V)	› Reliable performance in SMPS with switching noise on IC power supply
› TTL input threshold	› Optimized noise margin for SMPS applications
› Integrated glitch filter	› Effective noise suppression in SMPS applications
› Default low fail-safe output state	› Reliable low output state in case of failures
› Both component and system-level certification	› Simplified system certification process

2DIB0410F used in isolated DC-DC brick application



Infineon ISOFACE™ dual-channel digital isolator 2DIB0410F is a perfect fit for isolated DC-DC brick applications to transfer half- or full-bridge gate driving signals. The two-channel configuration allows transfer of low- and high-side gate-signals over the isolation barrier.



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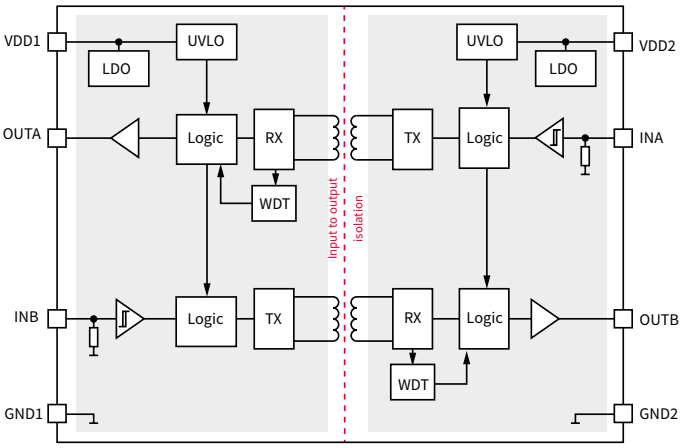
ISOFACE™ digital isolators

Dual-channel digital isolator 2DIB1410F in SOIC-8 narrow body package

Infineon ISOFACE™ dual-channel digital isolator 2DIB1410F (with one forward and one reverse channel) provides robust isolation for high voltage applications. With high common-mode transient immunity (>100 V/ns), TTL input threshold, and default low output state, it is the perfect match for GaN-IPS with high dv/dt in high-density power designs (GaN with integrated non-isolated gate driver).

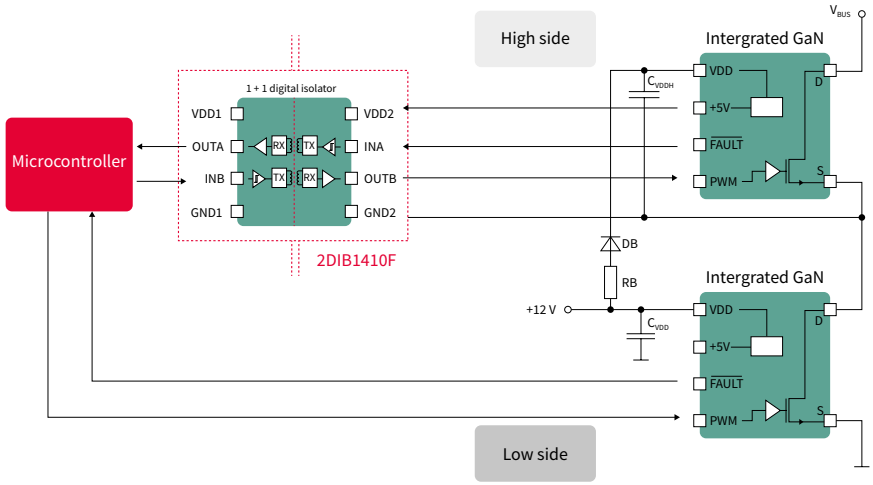
Block diagram of 2DIB14xxF with one forward and one reverse data channel



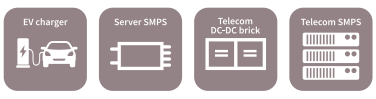
Features and benefits

Key features	Key benefits
› High CMTI > 100 V/ns	› For GaN with integrated non-isolated gate driver with high dv/dt
› Wide supply voltage range 2.7 ~ 6.5 V (abs. max. 7.5 V)	› Reliable performance in SMPS with switching noises on IC power supply
› TTL input threshold	› Optimized noise margin for SMPS applications
› Integrated glitch filter	› Effective noise suppression in SMPS applications
› Default low fail-safe output state	› Reliable low output state in case of failures
› Both component and system-level certification	› Simplified system certification process

2DIB1410F used in totem-pole PFC with GaN IPS



Infineon ISOFACE™ dual-channel digital isolator 2DIB1410F can be used together with GaN IPS for high-side floating drive. One forward channel is used to transfer the gate signal. The reverse channel can be used for protection signal.



www.infineon.com/digitalisolators

Infineon support for digital isolators

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/digitalisolators

Support

Evaluation Board

Tools

Discrete IGBTs and silicon power diodes

- Discrete IGBTs
- 650 V TRENCHSTOP™ 5 IGBT
- 1200 V IGBT families
- Lower power drive IGBT portfolio
- 650 V Reverse Conducting R6 IGBT
- TRENCHSTOP™ advanced isolation
- TRENCHSTOP™ 5 selection tree
- IGBT selection tree
- Discrete IGBTs product portfolio
- Silicon power diodes
- IGBT nomenclature
- Silicon power diodes nomenclature

Discrete IGBTs

Market leadership through groundbreaking innovation and application focus

Resolute to achieve the highest standards in performance and quality, Infineon offers a comprehensive portfolio of application-specific discrete IGBTs. From 600 V up to 1600 V, we offer a wide range of IGBT voltage classes to meet different voltage requirements in each application.

kHz f_{sw} [kHz] (typical used up to) µs Short circuit withstand time [µs]

www.infineon.com/igbtdiscretes
www.infineon.com/gatedriver

High-power drive IGBT portfolio

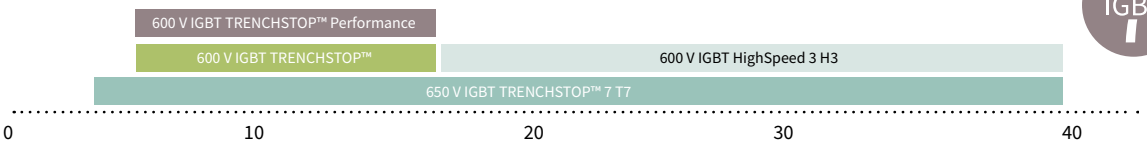
Did you know that you could potentially save 20% of energy or 17 million tons of CO_2 if only half of all industrial drives had an electric speed control? Infineon has designed the 7th generation of TRENCHSTOP™ IGBTs, especially for variable speed drives. Based on the new micro-pattern trench technology, which offers a high level of controllability. These features bring significant loss reduction in the application, especially for industrial drives, which usually operate at moderate switching frequency.

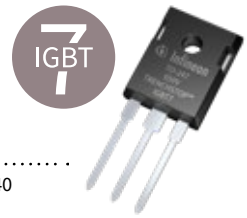
650 V TRENCHSTOP™ 7 T7

If you still use old technology, like the short-circuit IGBT 3 or the non short-circuit TRENCHSTOP™ 5, then it is about time to change that.

Why? Because:

- The flexible family IGBT7 T7 is a benchmark in performance with state-of-the-art quality and best price/performance ratio.
- IGBT7 T7 is the best-in-class device for industrial motor drives, namely uninterruptable power supplies for photovoltaic and air conditioning PFC topologies



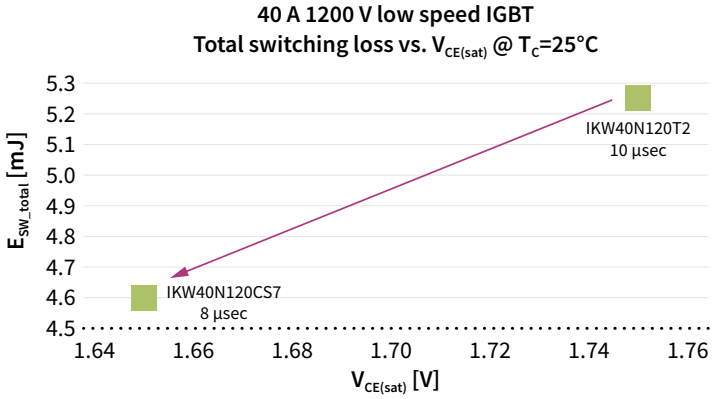


1200 V TRENCHSTOP™ 7 S7

The new 1200 V IGBT generation TRENCHSTOP™ IGBT7 is designed to meet requirements of high efficiency, lowest conduction and switching losses in hard switching and resonant topologies operating at switching frequencies up to 20 kHz. Very soft, fast recovery anti-parallel emitter controlled diode is optimized for fast recovery while still maintaining a high level of softness complementing to an excellent EMI behavior.

Target applications:

- Industrial drives
- Solar
- UPS



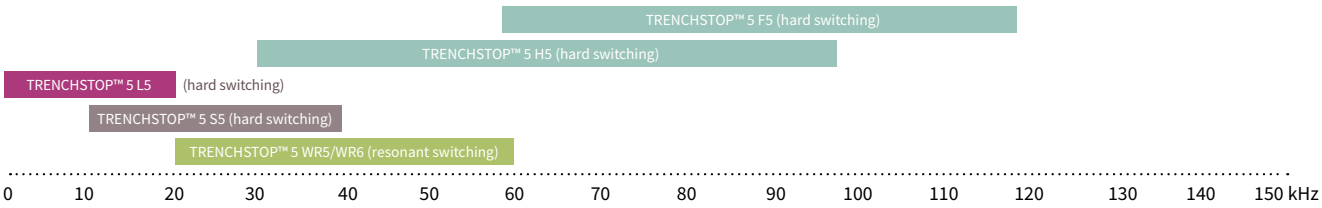
The best-in-class MPT technology of the TRENCHSTOP™ IGBT7 S7 allows reduction of both $V_{CE(sat)}$ by ~ 10% and total switching losses of > 10% compared to the TRENCHSTOP™ 2 family.

www.infineon.com/discreteIGBT7
www.infineon.com/igbtdiscretes
www.infineon.com/gatedriver

For more details on the product, click on the part number, visit infineon.com or contact our product support.

650 V TRENCHSTOP™ 5 IGBT

In terms of switching and conduction losses, there is no other IGBT in the market that can match the performance of the TRENCHSTOP™ 5. Wafer thickness has been reduced by more than 25 percent, which enables a dramatic improvement in both switching and conduction losses while providing an increased breakthrough voltage of 650 V. Based on TRENCHSTOP™ 5 IGBT technology, Infineon has developed six different product families optimized for specific applications, allowing designers to optimize for high efficiency, system cost or reliability demands of the market. The quantum leap of efficiency improvement provided by the TRENCHSTOP™ 5 IGBT families opens up new opportunities for designers to explore. EiceDRIVER™ isolated gate driver such as the 1ED compact family 650 V IGBT in solar and UPS applications. EiceDRIVER™ low side gate driver with overcurrent protection is widely used in induction cooking application and PFC stage.



TRENCHSTOP™ 5 L5	**Best-in-class IGBT low $V_{CE(sat)}$ IGBT** $V_{CE(sat)}$ IGBT – 1.05 V Best trade-off $V_{CE(sat)}$ V_{ss} E_{ts} for frequencies below 20 kHz	**Solar, UPS, welding** › Ultra-low frequency converters › Three-level inverter type I NPC 1 and NPC 2 › Modified HERIC inverter › AC output (aluminum/magnesium welding)
TRENCHSTOP™ 5 S5	**Best-in-class ease-of-use IGBT** Elimination of: › Collector-emitter snubber capacitor and gate capacitor in low inductance designs (<100 nH) › Softer switching than TRENCHSTOP™ 5 H5	**UPS, battery charger, solar, welding** › Medium frequency converters › Multilevel inverter stages › Output stages › PFC
TRENCHSTOP™ 5 H5/F5	**Best-in-class high frequency IGBT** › Bridge to SJ MOSFET performance › Highest efficiency, especially under light load conditions	**UPS, solar, welding** › High frequency converters › Multilevel inverter stages › Output stages › PFC
TRENCHSTOP™ 5 WR5	**Price optimized reverse conducting TRENCHSTOP™ 5 with an optimized monolithically integrated diode tailored for specific hard switching applications** › Monolithic diode optimized for PFC and welding applications › Excellent R_G controllability › Perfect fit to mainstream design for 20 kHz < fsw < 60 kHz	**Air conditioning, welding** › RAC/CAC PFC outdoor compressor › Compact/portable welding › Light-medium industrial welding
TRENCHSTOP™ 5 WR6	**Outstanding price/performance ratio with the latest 650 V reverse-conducting IGBT in the new high creepage TO-247-3 package** › Very low $V_{CE(sat)}$ of 1.45 V @25°C › High creepage and clearance TO-247 package › Optimized for full-rated hard switching turn-off	**Air conditioning, welding** › RAC/CAC PFC outdoor compressor › Compact/portable welding › Light-medium industrial welding

www.infineon.com/trenchstop5
www.infineon.com/gatedriver

For more details on the product, click on the part number, visit infineon.com or contact our product support.

1200 V IGBT families

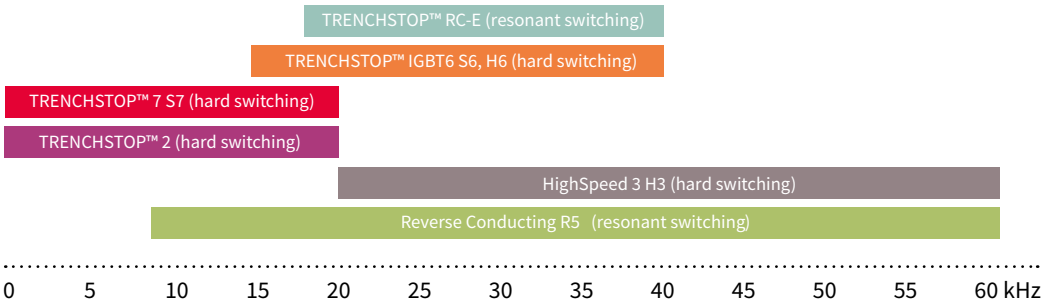
The 1200 V TRENCHSTOP™ 2 IGBT is optimized for low conduction losses with the lowest saturation voltage $V_{CE(sat)}$ of 1.75 V. A soft fast recovery emitter controlled diode further minimizes the turn-on losses.

The 1200 V HighSpeed 3 discrete IGBTs provides the lowest losses and the highest reliability for switching above 20 kHz. Transition to fast switching high-speed devices allows reduction in the size of the active components (25-70 kHz).

The new 1200 V IGBT generation, TRENCHSTOP™ IGBT7 S7, is designed to meet requirements of high efficiency, lowest conduction and switching losses in hard switching and resonant topologies, operating at switching frequencies up to 20 kHz. The IGBT7 S7 devices can be used as direct replacement for the TRENCHSTOP™ T2 and alternative to HighSpeed 3 H3 series.

The Reverse Conducting R5 is the latest generation in the RC-H series of reverse conducting IGBT. With a monolithically integrated diode, they offer optimized performance for resonant switching applications such as induction cooking. R5 devices are also available in 1350 V and 1600 V blocking voltage.

EiceDRIVER™ isolated gate driver like 1ED Compact family and EiceDRIVER™ 1200 V level shift gate driver family are perfect match for the 1200 V IGBT in motor control, general purpose inverter, solar, and UPS applications. EiceDRIVER™ low-side gate driver with over current protection is widely used in induction cooking application.



Reverse Conducting R5	**World-class Reverse Conducting RC-H products** High performance and low losses	**Induction cooking** **Resonant switching** Medium to high frequency converters
Reverse Conducting E1	**Competitive Reverse Conduction RC-E** Price versus performance leader	**Induction cooking** **Resonant switching** Low to medium power cookers
TRENCHSTOP™ 2	**Best-in-class 1200 V IGBT** › Outstanding efficiency › Lowest conduction and switching losses › Market proven and recognized quality leader	**Motor control, general purpose inverter, solar, UPS** Low frequency converters
HighSpeed 3 H3	**High speed/high power IGBT** › First tailless/low loss IGBT on market › Market proven and recognized quality leader	**Solar, UPS, welding** Medium frequency converters
TRENCHSTOP™ IGBT6	**New low switching losses and high power IGBTs** › Optimized for operation at 15 – 40 kHz › Best combination of low $V_{CE(sat)}$ of 1.85 V and low switching losses	**UPS, solar, welding** Medium frequency converters
TRENCHSTOP™ IGBT7 S7	**New low switching losses and high power IGBTs** › Optimized for operation up to 20kHz › Best-in-class $V_{CE(sat)}$ and low switching losses	**Industrial Drives, solar, HVAC** Low/medium frequency converters

www.infineon.com/rch5
www.infineon.com/rc-e
www.infineon.com/discreteigbt7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

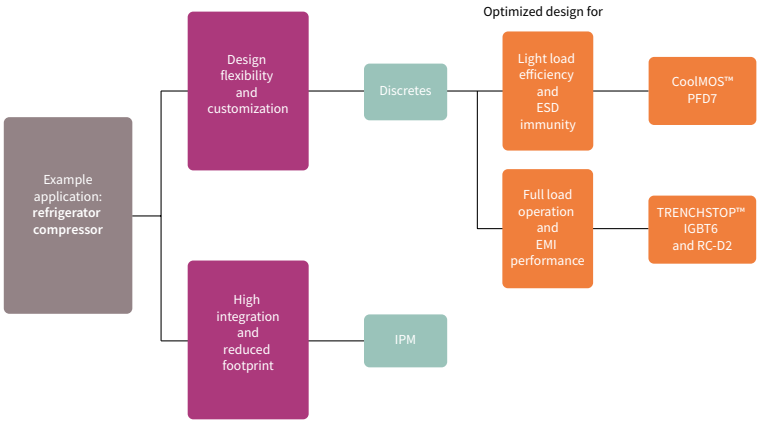
Lower power drive IGBT portfolio

650 V TRENCHSTOP™ IGBT6 and 600 V RC-D2

Motor drives up to 1 kW are used in a wide variety of applications, from home appliance fans and compressors to pumps. The market for these products demands design flexibility, EMI performance, and easy controllability. Therefore, these compact motors require power electronics with the lowest losses and best thermal performance. The TRENCHSTOP™ IGBT6 family of discrete devices has been designed for the lowest switching losses, which is particularly important in systems with higher switching frequencies (up to 30 kHz). Additionally, the IGBTs are co-packed with the soft, fast-recovery Rapid 1 anti-parallel diodes for the lowest total losses. With a higher blocking voltage at 650 V, and short-circuit rating, TRENCHSTOP™ IGBT6 is a key contributor to robust motor designs.

The new RC-D2 family of discrete devices has been cost-optimized in surface-mounted packages. The device contains a monolithically integrated diode and has HV-H3TRB ruggedness capability. With a blocking voltage at 600 V, and 3 µs short-circuit rating , the RC-D2 is a key contributor to cost-effective motor designs.

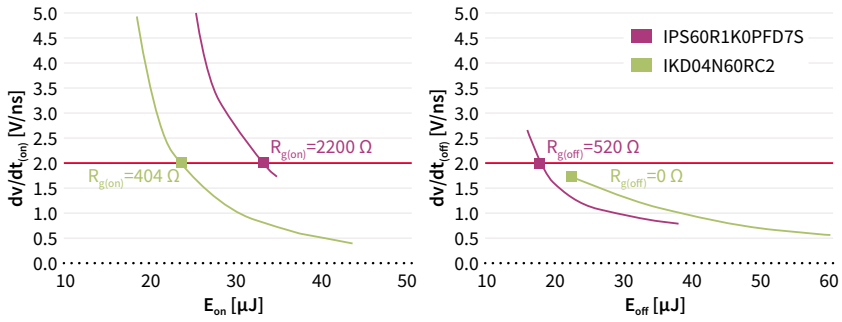
Switch selection for low power drives < 300 W



Features and benefits

Key features	Key benefits
› Available in surface-mounted packages	› Enable space limited application
› IGBT6 co-packed with and without diodes (DPAK, TO-220FP)	› Performance improvement
› RC-D2 monolithically integrated diode (DPAK, SOT-223)	› Cost-optimized solution
› SC rating up to 3 µs	› SC protection
› Low EMI due to easy controllability	› No need for additional components on PCB

EMI performance



- $R_{g(on)}$ and $R_{g(off)}$ are selected to meet dv/dt of 2 V/ns at 500 mA and T_j of 100°C
- IGBTs (IKD04N60RC2) are easily controllable by optimizing R_g values
- CoolMOS™ (IPS60R1K0PFD7S) EMI performance can be enhanced with additional passive components

www.infineon.com/IGBT6
www.infineon.com/rcd2
www.infineon.com/gatedriver

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Reverse Conducting for soft-switching applications

650 V Reverse Conducting R6 IGBT in TO-247 package

The 650 V R6 IGBT offers the lowest $V_{CE(sat)}$ and optimized E_{off} for best efficiency, minimized power losses and cooling effort. The good EMI behavior simplifies filtering design, reduces system costs and effort for the designers.
Thanks to the best system performances and high compatibility with the existing gate driver solution, 650 V R6 IGBT represents the optimal choice for soft switching topologies.

Features and benefits

Key features	Key benefits
› Very low $V_{CE(sat)}$ and low E_{off}	› Lowest losses on IGBT, high system efficiency for higher power output
› High ruggedness and stable temperature behavior	› Fast and easy replacement of predecessor R5 portfolio
› Maximum operating T_J of 175 °C	› High device reliability
	› Good EMI behavior

Package innovations

Discrete IGBT package overview

Infineon discrete IGBT package portfolio contains SMD (surface mount device) packages, for example, D²PAK, DPAK, SOT-223, and through-hole packages, for example, TO-220, TO-220 FP, TO-247, TO-247-3-HCC, TO-247-4, TO-247PLUS, TO-247PLUS-4, and TO-247 advanced isolation packages. It provides discrete IGBTs solutions with and without anti-parallel diode, which is an excellent fit to use in industrial, home appliance, and automotive applications.

	SOT-223 SMD	TO-252 (DPAK)	TO-263 (D²PAK)	TO-220	TO-220 FullPAK	TO-247	TO-247 4-pin	TO-247PLUS	TO-247PLUS 4-pin	TRENCHSTOP™ advanced isolation TO-247	TO-247-3-HCC
Package options											
Voltage class	600 V, 650 V, 1100 V, 1200 V, 1350 V, 1600 V									600 V, 650 V	650 V
Configuration	DuoPack (with diode), single IGBTs									DuoPack IGBTs (with diode) and single diodes	
Continuous collector current T_C = 100°C	3-120 A									40-90 A	20 -70 A

www.infineon.com/rch6
www.infineon.com/latest-discrete-packages

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TRENCHSTOP™ advanced isolation

Fully isolated TO-247 package with industry leading IGBTs

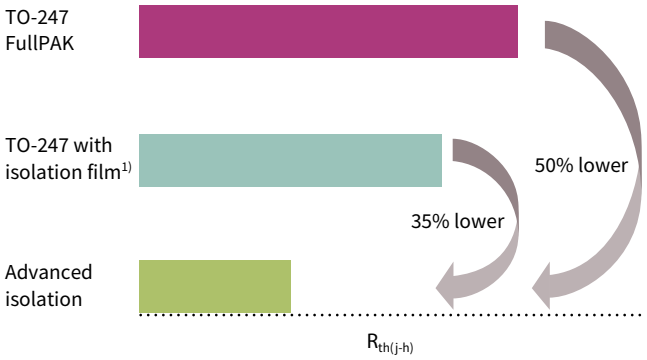
TRENCHSTOP™ advanced isolation solution breaks the limits reached by traditional packaging and isolation techniques. This new isolated package enables the highest power density, the best performance and the lowest cooling effort thanks to an effective and reliable thermal path from the IGBT die to the heatsink.

In addition to providing 100 percent electrical isolation, TRENCHSTOP™ advanced isolation also eliminates the need for thermal grease or thermal interface sheets. The new package delivers at least 35 percent lower thermal resistivity, helping designers to increase power density, as well as lower system complexity and assembling costs.
This new package solution allows industrial and home appliance designs to fully utilize the high performance of TRENCHSTOP™ IGBTs without compromises for isolation and cooling.

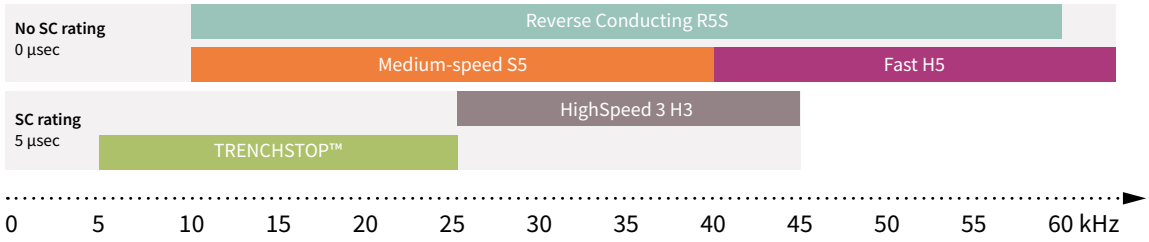
Features and benefits

Key features	Key benefits
› 2500 V_{RMS} electrical isolation, 50/60 Hz, t = 1 min	› Up to 35 percent reduction in assembly time reduces manufacturing cost
› 100 percent tested isolated mounting surface	› Increased power density
› Lowest $R_{th(j-h)}$	› Improved reliability from higher yield and no isolation film misalignment
› Low coupling capacitance, 38 pF	› Less EMI filter design effort
› No need for isolation film or thermal interface material	› Decreased heatsink size

Thermal resistivity of package and isolation types

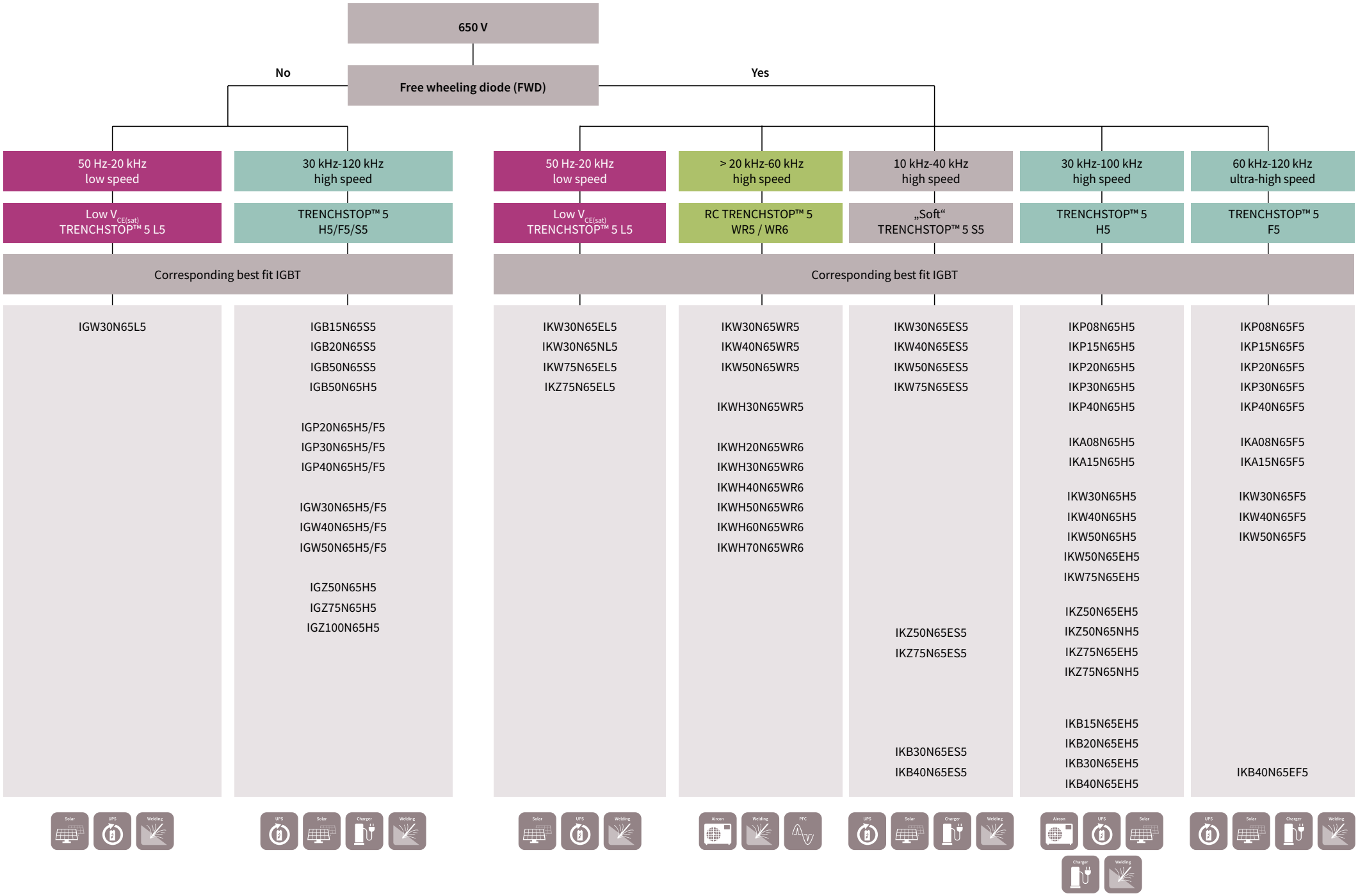


1) Isolation material: standard polyimide based reinforced carrier insulator film with 152 µm thickness, 1.3 W/mK thermal conductivity



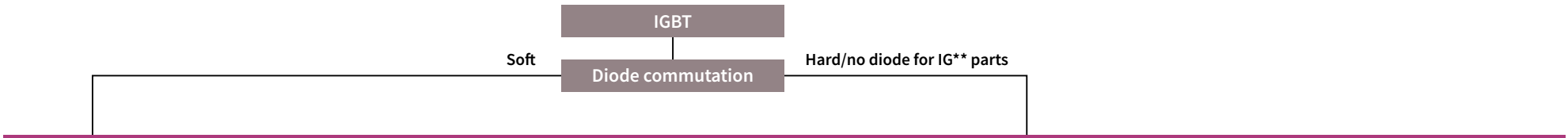
www.infineon.com/advanced-isolation
www.infineon.com/gatedriver

TRENCHSTOP™ 5 selection tree



www.infineon.com/trenchstop5
www.infineon.com/gatedriver

IGBT selection tree



Frequency range									
8-75 kHz RC series (monolithic)	2-40 kHz				10-40 kHz medium speed	> 18-60 kHz high speed	10-100 kHz high speed	> 18-60 kHz high speed	50 Hz-20 kHz low speed
	RC-drives (monolithic)	TRENCHSTOP™ 7	TRENCHSTOP™, TRENCHSTOP™ 2, TRENCHSTOP™ Performance	TRENCHSTOP™ IGBT6	Soft turn-off TRENCHSTOP™ 5 S5	HighSpeed 3 H3	TRENCHSTOP™ 5 H5/F5	TRENCHSTOP™ 5 WR5/WR6	Low $V_{CE(sat)}$ TRENCHSTOP™ 5 L5
Voltage range									
650 V, 1100 V, 1200 V, 1350 V, 1600 V	600 V	650 V, 1200 V	600 V	650 V, 1200 V	650 V	600 V, 1200 V	650 V	650 V	650 V
Part number									
IHpccNvvvR3 IHpccNvvvR5 IHpccN65R6 IHpccN120E1 IHFW40N65R5S	IKpccN60R IKpccN60RC2 IKpccN60RF	IKpccN65ET7 IKpccN120CS7 IKpccN60DTP	IKpccN60T IKpccN60DTP IKpccT120 IKpccN120dT2 IGpccN60T IGpccN60TP IGpccT120 IGpccN120T2	IKpccN65ET6 IGpccN65T6 IKpccN120dS6 IKpccN120dH6	IKpccN65dS5	IKpccN60H3 IKpccN120H3 IGpccN60H3 IGpccN120H3	IKpccN65H5 IKpccN65F5 IGpccN65H5 IGpccN65F5	IKpccN65WR5 IKppccN65WR6	IKpccN65dL5 IGpccN65L5
Applications									
Induction cooking **Microwave** **Multifunction printers** **Half-bridge resonant (Voltage resonance < 650 V)** **Single switch (Voltage resonance > 650 V)**	Conduction loss optimized **Solar inverter** **Asymmetrical bridge** Symmetrical full-bridge Three-level type I or three-level type II converter **Motor control** Three-phase inverter Full-bridge inverter Single-phase inverter **Uninterruptable power supply** UPS bridge Three-level type II converter **Major and small home appliances** Symmetrical full-bridge Single-phase inverter				**UPS** **Energy storage** **Battery charger** **Welding** **Solar inverter**	**PFC** **Battery charger** **Welding** **UPS** **Solar** **Energy storage** **SMPS** **Air conditioning** **HVDC (telecom/data centers)** **Totem pole PFC**	**PFC** **RAC/CAC PFC outdoor compressor** **Welding inverter** Full-brigde Half-bridge Two transistor forward	**UPS** Three-level NPC1 and NPC2 topology, inner switches **Solar** Three-level NPC1 and NPC2 topology, inner switches **Welding** AC output (Al/Mag welding)

www.infineon.com/igbtdiscretes
www.infineon.com/gatedriver

TRENCHSTOP™ and RC-drives

600 V/650 V product family together with 650 V SOI gate driver family

	Continuous collector current @ T_c=100°C [A]	TO-251 (IPAK) Halogen-Free	TO-252 (DPAK) Halogen-Free	TO-263 (D^2PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247PLUS/ Super 247 (TO-247AA) Halogen-Free	SOT-223 Halogen-Free
Single IGBT	4	IGU04N60T								
	6		IGD06N60T IGD06N65T6		IGP06N60T					
	10		IGD10N65T6	IGB10N60T	IGP10N60T					
	15		IGD15N65T6	IGB15N60T	IGP15N60T					
	30			IGB30N60T				IGW30N60T IGW30N60TP		
	40							IGW40N60TP		
	50			IGB50N60T	IGP50N60T			IGW50N60T IGW50N60TP		
	75							IGW75N60T		
IGBT and diode	1									IKN01N60RC2
	3		IKD03N60RF							IKN03N60RC2
	4		IKD04N60RC2 IKD04N60RF IKD04N60R		IKP04N60T					IKN04N60RC2
	6		IKD06N60RC2 IKD06N60RF IKD06N60R IKD06N65ET6	IKB06N60T	IKP06N60T		IKA06N60T			IKN06N60RC2
	8		IKD08N65ET6							
	10		IKD10N60RC2 IKD10N60RF IKD10N60R	IKB10N60T	IKP10N60T		IKA10N60T			
	15		IKD15N60RC2 IKD15N60RF IKD15N60R	IKB15N60T	IKP15N60T		IKA15N60T			
	20			IKB20N60T	IKP20N60T			IKW20N60T		
	30							IKW30N60T IKW30N60DTP		
	40							IKW40N60DTP		
	50					IKFW50N60ET		IKW50N60T IKW50N60DTP		
	75					IKFW75N60ET		IKW75N60T		
	100								IKQ100N60T	
	120								IKQ120N60T	

www.infineon.com/600V-1200V-trenchstop

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TRENCHSTOP™ IGBT6

650 V product family together with 650 V SOI gate driver family

Continuous collector current @ Tc=100°C [A]	TO-252 (DPAK) Halogen-Free	TO-220 FullPAK Halogen-Free
6	IKD06N65ET6 IGD06N65T6	
8	IKD08N65ET6	IKA08N65ET6
10	IGD10N65T6	IKA10N65ET6
15	IGD15N65T6	IKA15N65ET6

TRENCHSTOP™ IGBT6

1200 V fast speed IGBT product family together with isolated gate driver family

	Continuous collector current @ T_c=100°C [A]	TO-247	TO-247PLUS 3-pin Halogen-Free	TO-247PLUS 4-pin Halogen-Free
DuoPack	15	IKW15N120BH6		
	40	IKW40N120CS6		IKY40N120CS6
	75		IKQ75N120CS6	IKY75N120CS6

TRENCHSTOP™

1200 V product family together with isolated driver and 1200 V level shift driver family

	Continuous collector current @ T_c=100°C [A]	TO-247 Halogen-Free			TO-247PLUS 3-pin Halogen-Free		TO-247 4-pin Halogen-Free
		TRENCHSTOP™	TRENCHSTOP™ 2	TRENCHSTOP™ 7 S7	TRENCHSTOP™ 2	TRENCHSTOP™ 7 S7	TRENCHSTOP™ 7 S7
Single IGBT	8	IGW08T120					
	15	IGW15T120					
	25	IGW25T120					
	40	IGW40T120					IKZA40N120CS7
	60	IGW60T120					
DuoPack	8	IKW08T120		IKW08N120CS7			
	15	IKW15T120	IKW15N120T2	IKW15N120CS7			
	25	IKW25T120	IKW25N120T2	IKW25N120CS7			
	40	IKW40T120	IKW40N120T2	IKW40N120CS7	IKQ40N120CT2	IKQ75N120CS7	
	50			IKW50N120CS7	IKQ50N120CT2	IKQ100N120CS7	
	75				IKQ75N120CT2	IKQ120N120CS7	

TRENCHSTOP™ 7 T7

Together with isolated driver, 650 V SOI driver, and low side driver family

	Continuous collector current @ Tc=100°C [A]	TO-220 FullPAK Halogen-Free
DuoPack	20	IKW20N65ET7
	30	IKW30N65ET7
	40	IKW40N65ET7
	50	IKW50N65ET7
	75	IKW75N65ET7

www.infineon.com/igbt6

www.infineon.com/discreteigbt7

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Induction heating series

650 V, 1100 V, 1200 V, 1350 V and 1600 V product families together with isolated driver and low side driver family

Continuous collector current @ T_c=100°C [A]		TO-247 advanced isolation Halogen-Free	TO-247 Halogen-Free				
			650 V	1100 V	1200 V	1350 V	1600 V
	15				IHW15N120E1		
	20						
					IHW20N120R5	IHW20N135R5	
	25				IHW25N120E1		
	30		IHW30N65R6 IHW30N65R5	IHW30N110R3 IHW30N110R5	IHW30N120R5	IHW30N135R5	IHW30N160R5
	40	IHFW40N65R5S	IHW40N65R6 IHW40N65R5		IHW40N120R5	IHW40N135R5	
	50		IHW50N65R6 IHW50N65R5				

HighSpeed 3

Together with isolated driver, 650 V SOI driver, and low side driver family

Continuous collector current @ T_c=100°C [A]		TO-263 (D^2PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-247 Halogen-Free
IGBT	20	IGB20N60H3	IGP20N60H3		IGW20N60H3
	30	IGB30N60H3	IGP30N60H3		IGW30N60H3
	40				IGW40N60H3
	50				IGW50N60H3
	60				IGW60N60H3
	75				IGW75N60H3
	100				IGW100N60H3
DuoPack	20	IKB20N60H3	IKP20N60H3		IKW20N60H3
	30				IKW30N60H3
	40			IKFW40N60DH3E	IKW40N60H3
	50			IKFW50N60DH3E IKFW50N60DH3	IKW50N60H3
	60			IKFW60N60DH3E IKFW60N60EH3	IKW60N60H3
	75				IKW75N60H3
	90			IKFW90N60EH3	

HighSpeed 3

1200 V product family together with isolated driver, and 1200 V level shift driver family

Continuous collector current @ T_c=100°C [A]		TO-247 Halogen-Free	TO-247PLUS 3-pin Halogen-Free	TO-247PLUS 4-pin Halogen-Free
IGBT	15	IGW15N120H3		
	25	IGW25N120H3		
	40	IGW40N120H3		
DuoPack	15	IKW15N120H3		
	25	IKW25N120H3		
	40	IKW40N120H3	IKQ40N120CH3	IKY40N120CH3
	50		IKQ50N120CH3	IKY50N120CH3
	75		IKQ75N120CH3	IKY75N120CH3

www.infineon.com/rch5
www.infineon.com/rch6
www.infineon.com/rc-e
www.infineon.com/advanced-isolation

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TRENCHSTOP™ 5 F5, H5 and S5

Together with isolated driver, 650 V SOI driver, and low side driver family

	Continuous collector current @ T_c=100°C [A]	TO-263 (D^2PAK) Halogen-Free	TO-220 Halogen-Free	TO-247 advanced isolation Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 4-pin Halogen-Free
IGBT	20	IGB20N65S5	IGP20N65F5/IGP20N65H5				
	30	IGB30N65S5	IGP30N65F5/IGP30N65H5				
	40		IGP40N65F5/IGP40N65H5			IGW40N65F5/IGW40N65H5	
	50	IGB50N60H5				IGW50N65F5/IGW50N65H5	IGZ50N65H5
		IGB50N60S5					
	75					IGW75N65H5	IGZ75N65H5
	100						IGZ100N65H5
DuoPack	8		IKP08N65F5/IKP08N65H5		IKA08N65F5/IKA08N65H5		
	15	IKB15N65EH5	IKP15N65F5/IKP15N65H5		IKA15N65F5/IKA15N65H5		
	20	IKB20N65EH5	IKP20N65H5/IKP20N65F5				
	28		IKP28N65ES5				
	30	IKB30N65EH5	IKP30N65H5/IKP30N65F5			IKW30N65H5	
		IKB30N65ES5				IKW30N65ES5	
	39		IKP39N65ES5				
	40	IKB40N65ES5	IKP40N65F5/IKP40N65H5	IKFW40N65DH5		IKW40N65F5/IKW40N65H5	
		IKB40N65EH5				IKW40N65ES5	
		IKB40N65EF5					
	50			IKFW50N65ES5		IKW50N65F5/IKW50N65H5	IKZ50N65EH5
				IKFW50N65DH5 IKFW50N65EH5		IKW50N65EH5 IKW50N65ES5	IKZ50N65ES5
	60			IKFW60N65ES5			
	75			IKFW75N65ES5		IKW75N65EH5	IKZ75N65EH5
				IKFW75N65EH5		IKW75N65ES5	
	90			IKFW90N65ES5			

TRENCHSTOP™ 5 L5 low $V_{CE(sat)}$

650 V product family together with low side driver family

	Continuous collector current @ T_c=100°C [A]	TO-251 (IPAK)	TO-252 (DPAK) Halogen-Free	TO-263 (D^2PAK) Halogen-Free	TO-220 Halogen-Free	TO-262 (I^2PAK) Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 4-pin Halogen-Free
IGBT	30							IGW30N65L5	
DuoPack	30							IKW30N65EL5	
	75							IKW75N65EL5	IKZ75N75EL5

TRENCHSTOP™ 5 WR5/WR6

650 V product family together with low side driver family

	Continuous collector current @ T_c=100°C [A]	TO-247 Halogen-Free	TO-247 HCC Halogen-Free
DuoPack	20		IKWH20N65WR6
	30	IKW30N65WR5	IKWH30N65WR5/IKWH30N65WR6
	40	IKW40N65WR5	IKWH40N65WR6
	50	IKW50N65WR5	IKWH50N65WR6
	60		IKWH60N65WR6
	70		IKWH70N65WR6

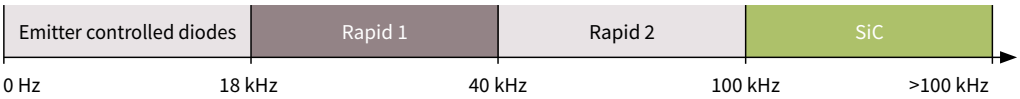
www.infineon.com/trenchstop5

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Silicon power diodes

Filling the gap between SiC diodes and emitter controlled diodes

The Rapid diode family complements Infineon's existing high-power 600 V/650 V diode portfolio by filling the gap between SiC diodes and previously released emitter controlled diodes. They offer a perfect cost/performance balance and target high-efficiency applications switching between 18 and 100 kHz. Rapid 1 and Rapid 2 diodes are optimized to have excellent compatibility with CoolMOS™ and high speed IGBTs (insulated gate bipolar transistor) such as the TRENCHSTOP™ IGBT7 and TRENCHSTOP™ 5.



The Rapid 1 diode family

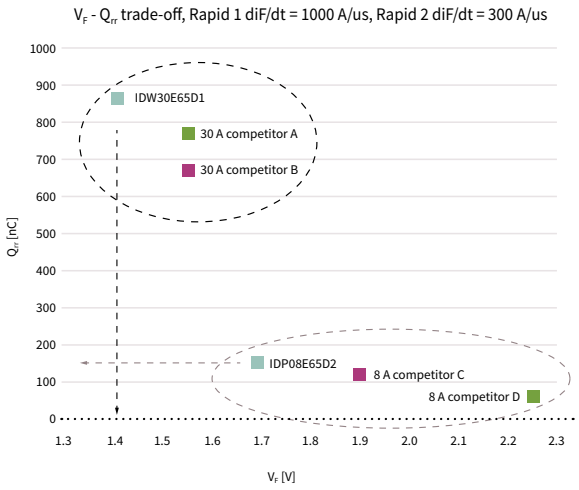
Rapid 1 is forward voltage drop (V_F) optimized to address low switching frequency applications between 18 kHz and 40 kHz, for example, air conditioner and welder PFC stages.

- 1.35 V temperature-stable forward voltage (V_F)
- Lowest peak reverse recovery current (I_{rrm})
- Reverse recovery time (t_{rr}) < 100 ns
- High softness factor

The Rapid 2 diode family

Rapid 2 is Q_{rr}/t_{rr} optimized hyperfast diode to address high-speed switching applications between 40 kHz and 100 kHz, typically found in PFCs in high efficiency switch mode power supplies (SMPS) and welding machines.

- Lowest reverse recovery charge (Q_{rr}): V_F ratio for best-in-class performance
- Lowest peak reverse recovery current (I_{rrm})
- Reverse recovery t_{rr} < 50 ns
- High softness factor



www.infineon.com/rapiddiodes
www.infineon.com/ultrasoftdiodes

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Rapid 1 diodes
650 V product family

Continuous current I_F @T_C=100°C [A]	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-247 Halogen-Free	TO-247 common cathode Halogen-Free	TO-247 advanced isolation Halogen-Free
8	IDP08E65D1				
15	IDP15E65D1				
20		IDV20E65D1			
30	IDP30E65D1		IDW30E65D1	IDW30C65D1	
40			IDW40E65D1		IDFW40E65D1E
60				IDW60C65D1	IDFW60C65D1
75				IDW75D65D1	
80				IDW80C65D1	IDFW80C65D1

Rapid 2 diodes
650 V product family

Continuous current I_F @T_C=100°C [A]	TO-220 Halogen-Free	TO-220 FullPAK Halogen-Free	TO-220 common cathode Halogen-Free	TO-247 Halogen-Free	TO-247 common cathode Halogen-Free
8	IDP08E65D2	IDV08E65D2			
15	IDP15E65D2	IDV15E65D2		IDW15E65D2	
20	IDP20E65D2		IDP20C65D2		IDW20C65D2
30	IDP30E65D2	IDV30E65D2	IDP30C65D2		IDW30C65D2
40	IDP40E65D2			IDW40E65D2	
80					IDW80C65D2

Emitter controlled diodes
600 V and 1200 V product families

	Continuous current I_F @T_C=100°C [A]	TO-263 (D^2PAK) Halogen-Free	TO-220 Real 2-pin Halogen-Free	TO-247 Halogen-Free
600 V	30			IDW30E60
	50			IDW50E60
	75			IDW75E60
	100			IDW100E60
1200 V	12		IDP12E120	
	18		IDP18E120	
	30	IDB30E120	IDP30E120	

www.infineon.com/rapiddiodes
www.infineon.com/ultrasoftdiodes

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Nomenclature

IGBT (after 03/2013)

Company
I = Infineon
S = Formerly Siemens

Device
E = Enhanced
G = Single IGBT
H = Reverse conducting
K = DuoPack

Package type
A = TO-220-3 FullPAK
B = TO-263-3 (D^2PAK)
CP2 = EDT2™ series
D = TO-252-3 (DPAK)
P = TO-220-3
N = SOT-223
Q = TO-247PLUS
QB = TO-247PLUS 3-pin SMD
U = TO-251-3 (IPAK)
W= TO-247-3
Y = TO-247PLUS 4-pin
Z = TO-247-4
FW = TO-247-3 advanced isolation
WH =TO-247-3 high creepage
WS = TO-247 6-pin
ZA = TO-247 4-pin asymmetric

Nominal current
[A] @ 100°C

Technology
N = N-channel
P = P-channel

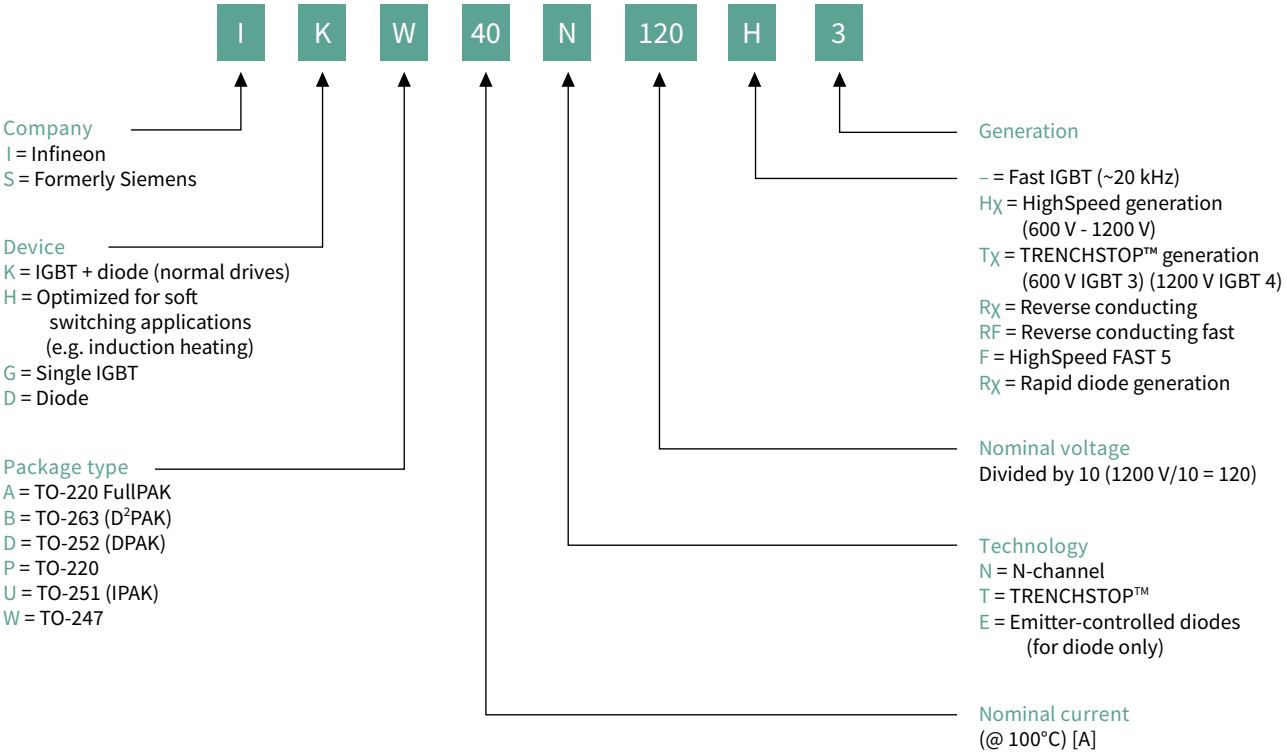
Nominal voltage
Divided by 10 (650 V/10 = 65)

Diode (for DuoPack only)
B = Emitter controlled 1200 V half rated diode
C = Emitter controlled 1200 V full rated diode
D = Rapid 1 650 V half rated diode
E = Rapid 1 650 V full rated diode
R = CoolSiC™ 650 V half rated diode
S = CoolSiC™ 650 V full rated diode

L5
E1 = Reverse conducting E-series
F5 = TRENCHSTOP™ 5 ultra fast
H3 = HighSpeed 3
H5 = TRENCHSTOP™5 fast
H6 = 1200 V TRENCHSTOP™ IGBT6
IPD = Integrated Power Device Protect
L5 = TRENCHSTOP™ 5 low $V_{CE(sat)}$
R = Reverse conducting Drives (RC-D)
R3 = Reverse conducting R3 series
R5 = Reverse conducting R5 series
R6 = Reverse conducting R6 series
RC2 = Reverse conducting Drives Gen2
RF = Reverse conducting Drives Fast
S5 = TRENCHSTOP™ 5 medium speed
S6 = 1200 V TRENCHSTOP™ IGBT6
S7 = 1200 V TRENCHSTOP™ IGBT7
T = TRENCHSTOP™
T2 = TRENCHSTOP™ 2
T6 = 650 V TRENCHSTOP™ IGBT6
T7 = TRENCHSTOP™ IGBT7
TP = TRENCHSTOP™ Performance
WR5 = TRENCHSTOP™ 5 WR5
WR6 = TRENCHSTOP™ 5 WR6

www.infineon.com/igbtdiscretes

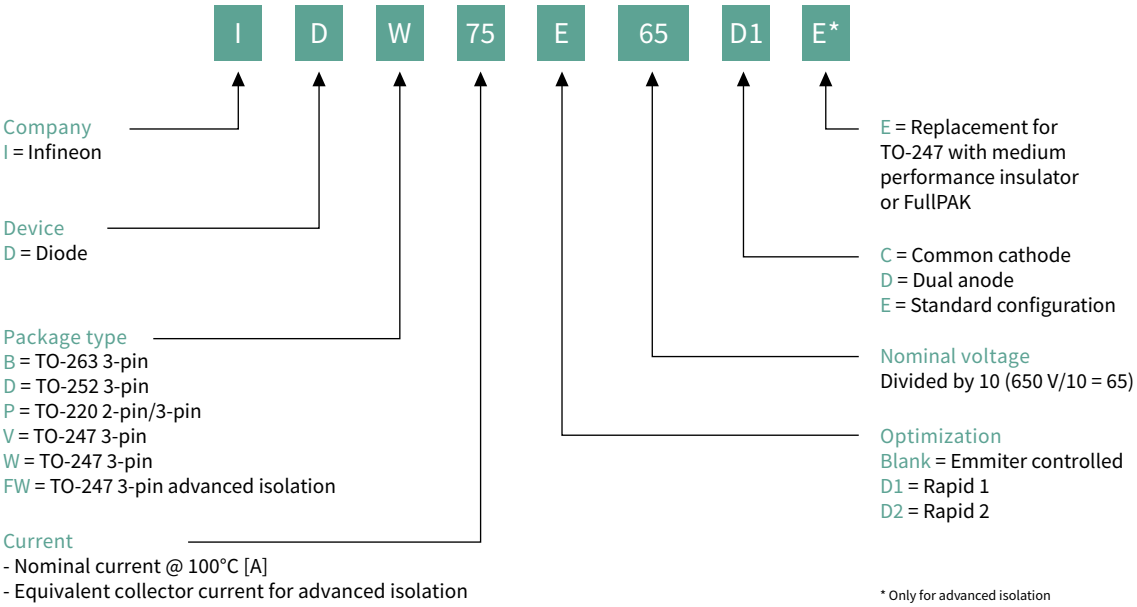
IGBT (before 03/2013)



www.infineon.com/igbtdiscretes

Nomenclature

Silicon power diodes



www.infineon.com/rapiddiodes

Infineon support for discrete IGBTs and silicon power diodes

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/igbt
www.infineon.com/igbtdiscretes
www.infineon.com/rapiddiodes
www.infineon.com/discreteIGBT7
www.infineon.com/ultrasoftdiodes
www.infineon.com/discrete-automotive-igbt
www.infineon.com/latest-discrete-packages

Evaluationboards and simulation models

www.infineon.com/eval-TO-247-4pin
www.infineon.com/igbtdiscrete-simulationmodels

Support | Evaluation Board | Tools | Simulation

Intelligent power switches and modules

- CIPOS™ IPM family
- iMOTION™ IPM
- ISOFACE™ isolated industrial interface
- Industrial PROFET™
- HITFET™
- CIPOS™, iMOTION™, ISOFACE™, industrial PROFET™ and HITFET™ product portfolio

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

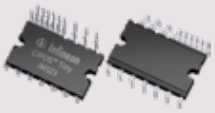
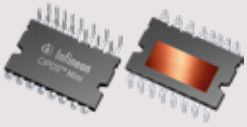
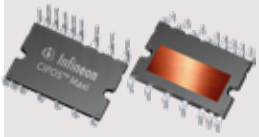
CIPOS™ IPM family

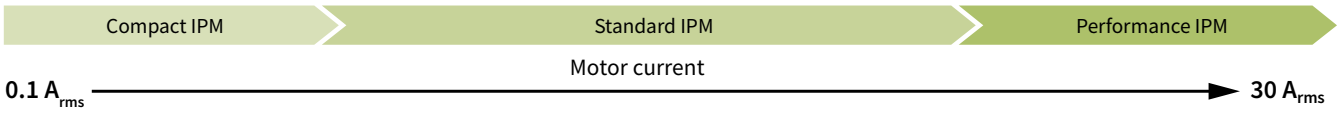
CIPOS™ intelligent power modules in different packages, voltage and current classes

Infineon has a broad portfolio of intelligent power modules (IPMs) with different semiconductors combined in various packages in varying voltage and current classes. These IPMs are separated into Compact, Standard and Performance families.

Part of the IPMs is divided into CIPOS™ Nano, CIPOS ™ Micro, CIPOS™ Tiny, CIPOS ™ Mini and CIPOS™ Maxi families. CIPOS™ IPMs are families of highly integrated, compact power modules designed to drive motors in applications ranging from home appliances, fans, pumps, HVAC to industrial drives. These energy-efficient intelligent power modules integrate the latest power semiconductor and ICs technologies from Infineon.

CIPOS™ product overview

CIPOS™ Nano	CIPOS™ Micro	CIPOS™ Tiny	CIPOS™ Mini	CIPOS™ Maxi
MOSFET 40/100/250/500/600 V	IGBT: 600 V, 2/4/6 A	IGBT: 600 V, 15 A	IGBT: 600 V, 4-30 A MOSFET: 600 V	IGBT: 1200 V, 5/10/15 A CoolSiC™ MOSFET: 1200 V, 20 A
				
7 x 8 x 0.9 mm 8 x 9 x 0.9mm 12 x 10 x 0.9 mm 12 x 12 x 0.9 mm	29 x 12 x 2.9 mm	33 x 19 x 3.6 mm	36 x 21 x 3.1 mm	36 x 23 x 3.1 mm



Key benefits

- Fast time-to-market
- Increased reliability
- Reduced system design complexity
- Improved manufacturability

www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ Nano

Ultra compact three-phase or half-bridge MOSFET IPMs

The ultra-compact CIPOS™ Nano is a family of highly integrated power modules for high-efficiency consumer and light industrial applications. With half-bridge and three-phase configurations, CIPOS™ Nano is designed for the rectifier, converter, and inverter stage in power management circuits and motor drives for applications like fans, hair dryers, air purifiers, and circulation pumps. By implementing an innovative Power QFN package, which utilizes PCB copper traces to dissipate heat from the module, CIPOS™ Nano family delivers a new benchmark in device size, offering up to a 60 percent smaller footprint than existing three-phase motor control power IPMs.

The family is comprised of a series of fully integrated three-phase, half-bridge and H-bridge surface-mount motor control circuit solutions. The new alternative approach utilizes PCB copper traces to dissipate heat from the module, providing cost savings through a smaller package design and even eliminating the need for an external heat sink.

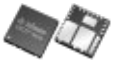
Features and benefits

Key benefits	Key advantages
› Various switch technologies such as HEXFETs, Trench FREDFETs, Trench MOSFETs, CoolMOS™ and OptiMOS™ apply to motor drivers	› Smallest modules in the market
› Multiple package platforms with various topologies to suitable for a variety of application scenarios	› Cost savings from smaller footprint and reduced PCB space
› Integrated bootstrap functionality and gate drivers	› Easy implementation of 2 or 3-phase motor drives
› Realize a variety of protection (overcurrent protection, under-voltage lockout, over-temperature protection, fault reporting and etc.)	› Half bridge configuration enables more flexible board design w/better thermal performance
› Accessible for heat sink-less operation	› Same PCB footprint to address multiple application markets (100 VAC – 230 VAC)

Key applications

- Hair dryer
- Fan motor
- Pump
- Air conditioner Indoor Unit
- Air purifiers
- Small kitchen appliances
- CPAP machine

Package overview

QFN 7x8 7 x 8 x 0.9 mm	QFN 8x9 8 x 9 x 0.9 mm	QFN 12x10 12 x 10 x 0.9 mm	QFN 12x12 12 x 12 x 0.9 mm
			

www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ Micro

Solution for low power motor drive applications

CIPOS™ Micro is a family of compact, three-phase IPMs (intelligent power modules) for low-power (i.e., up to 500 Watts with heatsink) motor drive applications, including ventilation fans, circulation pumps, air purifiers, dish washer and refrigerator compressor drives. CIPOS™ Micro has several protection features, including precise overcurrent protection and a UL-certified temperature sensor. Available in both surface mount and through-hole configurations, the family features rugged and efficient high voltage IGBTs specially optimized for variable frequency drives with a 600 V rating. Also, these IPMs utilize high-voltage gate drivers tuned to achieve an optimal balance between EMI and switching losses.

Features and benefits

Key features	Key benefits
› Wide range of product coverage	› Save system space and cost through the enhanced power capability
› Optimized dv/dt for loss and EMI trade offs	› Offer application-optimized solution for both fast switching and low EMI version
› HV H3TRB qualified	› Improve system ruggedness thru enhanced protection features & isolation voltage
› Compatible with mass-market TO-2xx heat sinks and clips	
› Power capability up to 500 W at isolation 2000 VRMS, 1 min	

Key applications

- RAC outdoor fan
- Dish washer
- Fan motor and pump
- Washing machine
- Refrigerator
- General purpose drive

Package overview

DIP 29x12 29 x 12 x 3.1 mm	SOP 29x12 29 x 12 x 3.1 mm

www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ Tiny IM323 series

Best optimized solution for RAC compressor up to 1.5 HP

CIPOS™ Tiny IM323 is a series of high efficient intelligent power modules that has enhanced package robustness based on the proven package technology as well as the latest gate driver and RCD2 switch technology from Infineon. It integrates best-optimized performance for 600 V IPM and the best efficiency for motor drives in major home appliances.

The family of the products is applicable to wide applications to control variable speed drives, and such as room air conditioners, fans, pumps, washing machines, compressors, and drives up to 1.5 HP.

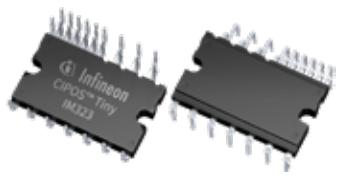
Features and benefits

Key features	Key benefits
› Latest TRENCHSTOP™ Reverse Conducting (RC) technology	› Fast time to market with pin-compatibility
› IGBT's maximum junction temperature 175 °C	› Robust and reliable solution
› Rugged new SOI gate driver technology	› Reliable in-house supply chain
› Proven & enhanced package robustness	
› Compatible pin out design	

Key applications

- Room air conditioning
- Washing machine
- HVAC outdoor fan
- Fans and pumps
- General purpose drives

Package overview

DIP 33x19 32.8 x 18.8 mm


www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ Mini

Broad range of configurations from PFC to inverter

CIPOS™ Mini is a family of highly efficient intelligent power modules that has the highest power density with 4 A to 30 A rated products built into a single package platform. It integrates various power and control components to increase reliability, and optimize PCB size and system costs. Utilizing multiple configurations, CIPOS™ Mini IPMs apply to a wide range of applications to control variable speed drives, such as air conditioners, washing machines, refrigerators, vacuum cleaners, compressors, and industrial drives up to 3 kW.

The configurations offered within the CIPOS™ Mini family are 2-phase MOSFET, 3-phase MOSFET, and IGBT, integrated PFC, and 2-phase and 3-phase interleaved PFC. All options include an integrated gate driver and a built-in temperature sensor. CIPOS™ Mini provides optimized performance for power applications, which need good thermal conduction and electrical isolation, but also EMI-safe control, innovative FAULT indication, and overload protection.

Infineon's TRENCHSTOP™ IGBTs, reverse-conducting IGBTs, or CoolMOS™ power MOSFETs are combined with newly optimized Infineon SOI gate driver IC for excellent electrical performance. Also, CIPOS™ Mini family offers IPMs with DCB substrates, improving heat dissipation to provide higher power capability.

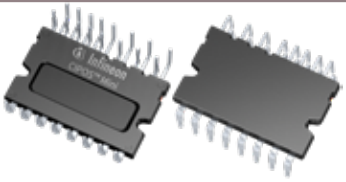
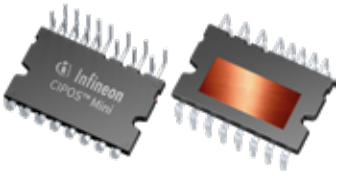
Features and benefits

Key features	Key benefits
› Wide range of current rating: 4 A to 30 A	› Lower PCB size and system cost
› High integration (bootstrap circuit, thermistor, single boost PFC)	› Easy power extension from 300 W to 3 kW
› Optimized for target application requirements (separate version for washing machine and air conditioner)	› Optimized performance for each application
	› UL certified package and temp sensor

Key applications

- Refrigerator
- Washing machine
- Room air conditioning
- Fans and pumps
- HVAC outdoor fan
- General purpose drives

Package overview

DIP 36x21 36 x 21 x 3.1 mm	DIP 36x21D 36 x 21 x 3.1 mm
	

www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ Maxi

Smallest package in 1200 V IPM class while still offering high power density and best performance

The high-performance CIPOS™ Maxi intelligent power modules (IPMs) integrate various switching devices and control components to increase reliability, optimize PCB size and system costs. CIPOS™ Maxi IPMs are designed to control three-phase AC motors and permanent magnet motors in variable speed drive applications such as low-power industrial motor drives, pumps, fan drives, and active filters for HVAC (heating, ventilation, and air conditioning). The product concept is specially adapted to power applications, which need excellent thermal performance and electrical isolation as well as meeting EMI requirements and overload protection.

The existing IGBT-based portfolio IM818 series offers 5 A and 15 A in 1200 V class up to 3.0 kW power rating, while the newly released IM828 series offers superior efficiency up to 99% and optimal reliability up to 4.8 kW power rating through the 6 revolutionary CoolSiC™ MOSFETs with an optimized 1200 V 6-channel SOI gate driver. IM828 series provides the exceptional power density with a wide switching speed range up to 80 kHz to adapt to fast-switching applications with superior lower power losses.

Features and benefits

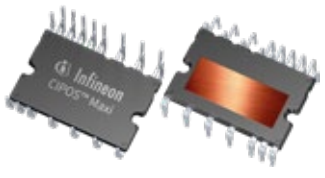
Key benefits
› Fully isolated dual in-line molded module with DCB
› 1200 V TRENCHSTOP™ IGBT 4
› 1200 V CoolSiC™ MOSFET
› Rugged 1200 V SOI gate driver technology
› Integrated booststrap functionality
› Overcurrent shutdown
› Under-voltage lockout at all channels
› All of six switches turn-off during protection
› Cross-conduction prevention
› Independent NTC for temperature monitoring
› Allowable negative VS potential up to -11 V for signal transmission at V_{BS} of 15 V
› Low side emitter pins accessible for all phase current monitoring (open emitter)
› Programmable fault clear timing
› Enable input

Key advantages
› The smallest package size in 1200 V IPM class with high power density and best performance
› Enhanced robustness of gate driver technology for excellent protection
› High efficiency
› Adapted to high switching application with lower power loss
› Simplified design and manufacturing
› Time-to-market

Key applications

- Fan and pump
- HVAC outdoor fan
- Low-power general purpose drives (GPI, servo drive)
- Active filter (active power factor correction) for HVAC

Package overview

DIP36x23D 36 x 22.7 x 3.1 mm


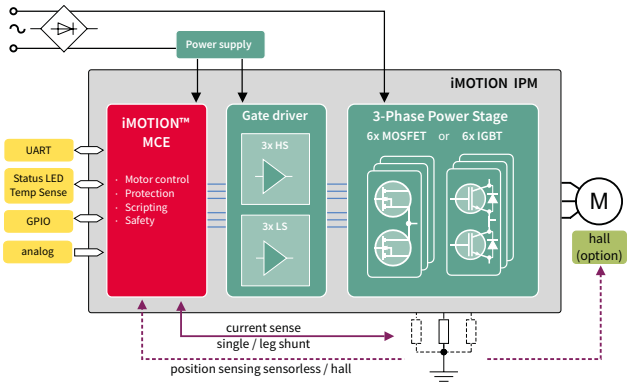
www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

iMOTION™ IPM

Fully integrated iMOTION™ IPM for BLDC motor control

iMOTION™ IPM is a family of fully integrated modules for the control of three-phase motors, optimized for low-power devices. Within the iMOTION™ IPM family, there are two different series: The IMM100 and IMI110, which combine the motor controller IC and a three-phase inverter stage in a single package, minimizing external components count and PCB area. The three-phase inverter stage is based either on six MOSFETs or six IGBTs. These iMOTION™ IPMs offer the highest integration level by making use of the field-proven iMOTION™ Motion Control Engine (MCE) in combination with providing all required hardware functions: From single shunt current sensing to bootstrap capability, signal filtering and several hardware protections like dead-time insertion and shoot through prevention. An iMOTION™ IPM does not require a heatsink and addresses motor drives with a rated output power between 30 W and 80W with 600 V maximum DC blocking voltage, depending on the chosen product variant. All IMM100 and IMI110 devices support the functional safety requirements according to the IEC/UL 60730-1 (“class B”).



Features and benefits

Key benefits	Key advantages
› Completely self-sustaining Motion Control Engine with identical feature set as the IMC100 series	› Fastest time to market with easy parametrization and tuning of motor and PFC control
› Up to 80 W without heatsink	› Applicable for fans and small pumps
› Support for IEC 60335-1 (‘Class B’)	› Support for functional safety integrated
› Controller, gate driver and power stage in one package	› Minimizing BOM count and PCB area
› IMI in DSO-22 package with single layer layout option	› Reducing PCB and production costs

EVAL-IMM101T-046 is a Starter Kit for iMOTION™ IMM101T-046M IPMs. Together with the iMOTION™ Solution Designer the board can be used for an easy system configuration, controlling, tuning and monitoring. EVAL-IMM101T-046 enables rapid prototyping of various inverterized motor control systems, for example fans, pumps and compressors.

Product portfolio

Product	Function	Integration	Description	Package
IMI111T-026H	Motor inverter	MCE incl Scripting, gate driver, IGBT based inverter	Output rating: 600V / 2 A, single shunt sensorless operation	PG-DSO-22-1
IMI111T-046H	Motor inverter	MCE incl Scripting, gate driver, IGBT based inverter	Output rating: 600V / 4 A, single shunt sensorless operation	PG-DSO-22-1
IMM101T-046M	Motor inverter	MCE incl Scripting, gate driver, MOSFET based inverter	Output rating: 600 V / 1.4 Ω $R_{DS(on)}$, single/leg shunt, sensorless/hall	PG-IQFN-38-1
IMM101T-056M	Motor inverter	MCE incl Scripting, gate driver, MOSFET based inverter	Output rating: 600 V / 0.95 Ω $R_{DS(on)}$, single/leg shunt, sensorless/hall	PG-IQFN-38-2
IMM102T-056M	Motor inverter + PFC control	MCE incl Scripting, gate driver, MOSFET based inverter	Output rating: 500 V / 6 Ω $R_{DS(on)}$, single/leg shunt, sensorless/hall	PG-IQFN-38-3
IMM102T-046M	Motor inverter + PFC control	MCE incl Scripting, gate driver, MOSFET based inverter	Output rating: 600 V / 1.4 Ω $R_{DS(on)}$, single/leg shunt, sensorless/hall	PG-IQFN-38-4
IMM102T-056M	Motor inverter + PFC control	MCE incl Scripting, gate driver, MOSFET based inverter	Output rating: 600 V / 0.95 Ω $R_{DS(on)}$, single/leg shunt, sensorless/hall	PG-IQFN-38-5

www.infineon.com/IMM100

www.infineon.com/IMI110

For more details on the product, click on the part number, visit infineon.com or contact our product support.

ISOFACE™ isolated industrial interface

Output switches and digital input ICs offering unmatched system uptime, reliability and shortened product launch time by 50%

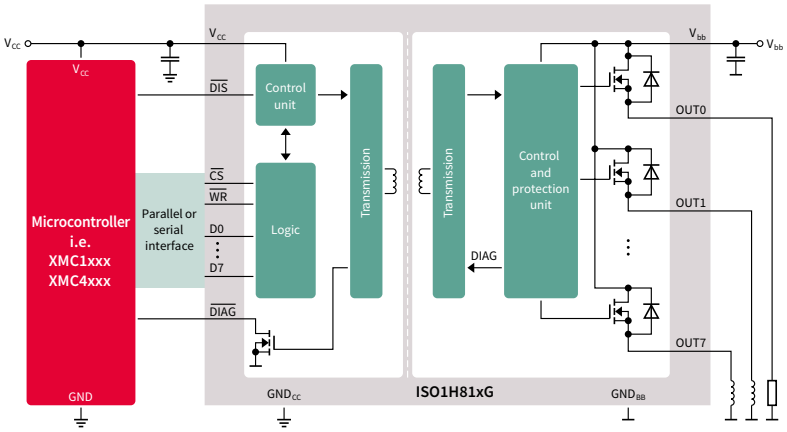
The ISOFACE™ product family provides robust and intelligent galvanic isolation for industrial control applications such as programmable logic controllers, sensor input modules, control panels and general control equipment. The output switches are compact in design, enabling robust and reliable operation at a low system cost. Ideal for high-speed applications, digital input ICs are equally robust, reliable and compact – also offering superior EMI robustness and setting a new standard in diagnostics.

ISOFACE™ galvanic-isolated 8-channel output switches

The ISO1H81xG product family integrates:

- Robust galvanic isolation (UL508 and C22.2 NO14 certified) to protect the 3.3 V/5 V control domain of an industrial control system from the harsh 24 V process side
- 8-channel high-side power-switching capabilities of up to 1.2 A per channel
- Active current limitation and over-temperature protection
- Common diagnostic feedback for overtemperature and for V_{bb} undervoltage

Isolated output switch block diagram



Isolated output switches

Features and benefits

Key features	Key benefits
Integrated galvanic isolation (500 V_{AC})	Robust and reliable
Eight channels (0.6 or 1.2 A, each)	Compact system solution
Inductive load switching	Lower system cost
Diagnostic feedback (overtemperature, overload)	System status feedback
Serial and parallel MCU interface	Directly interfacing with all MPUs and MCUs

www.infineon.com/isoface

For more details on the product, click on the part number, visit infineon.com or contact our product support.

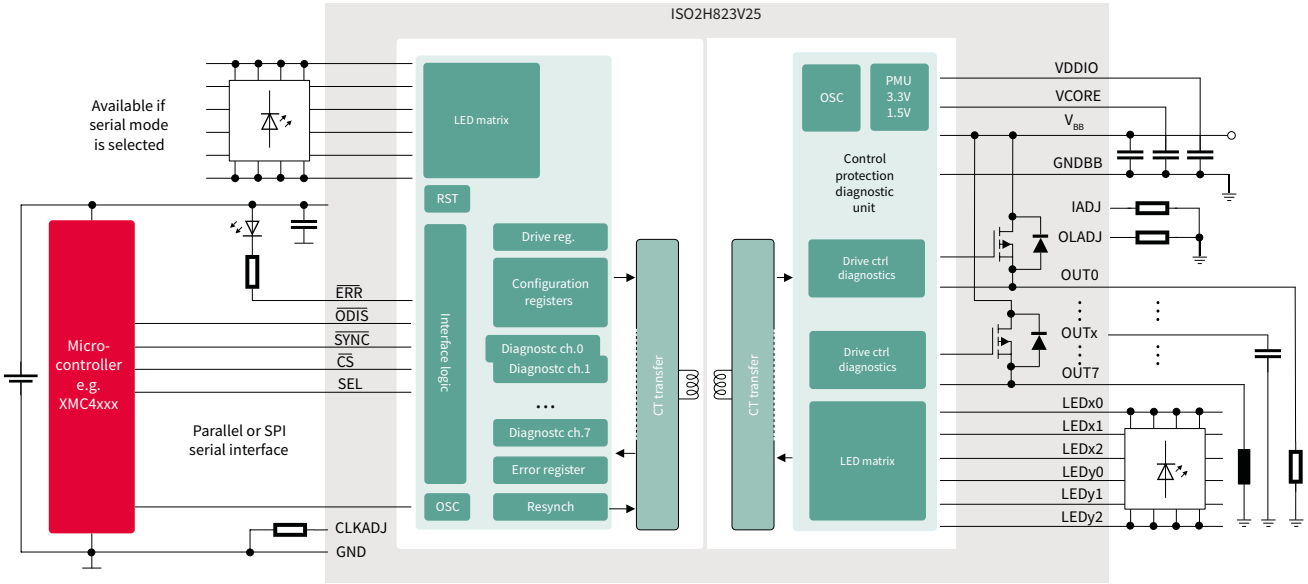
ISOFACE™ galvanic-isolated 8-channel high-side switch with 10-fold diagnostics

The ISO2H823V establishes a new standard in diagnostics for industrial control applications. For example, in industrial plants with capital-intensive single-tool equipment at work or with time-critical chemical processes running, obtaining in real-time differentiated feedback from the factory floor enables both, preventive maintenance and drastic reduction of the time to fix a problem. This is why the ISO2H823V is a highly desirable system solution. System designers benefit from the ISO2H823V through short time to market, reduced PCB area and uncompromised product reliability.

The ISO2H823V integrates:

- Robust 2.5 kV AC galvanic isolation:
  - UL508 and CSA C22.2 No.14 certified
  - Protecting the 3.3 V control domain of an industrial control system from the harsh 24 V process side
  - Exceeding the IEC 61131-2 requirements for reinforced isolation
- 8-channel high-side power-switching capabilities of up to 0.6 A per channel with active current limitation and overtemperature protection
- 10-fold diagnostic feedback
  - 5 types of feedback which are available individually for each of the eight outputs
  - 5 types of IC-level feedback
- Common diagnostic feedback for overtemperature and for V_{bb} undervoltage

Typical application



Features and benefits

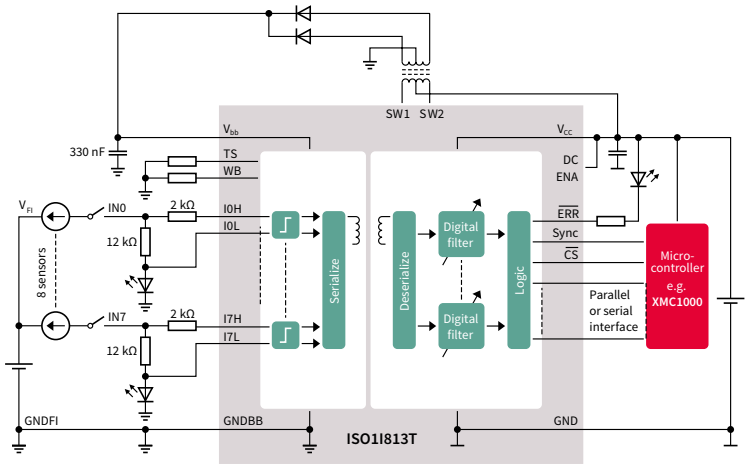
Key features	Key benefits
› Robust 2.5 kV AC galvanic isolation	› Reliable and UL certified
› Eight channels (up to 0.6 A per channel)	› Small form factor solution
› 10-fold diagnostic feedback (over-temperature, overload)	› Preventive maintenance and short down-times

www.infineon.com/isoface

ISOFACE™ galvanic-isolated digital input ICs

The UL1577 certified ISO1I81xT digital input IC family is an intelligent system solution offering robust galvanic isolation between the microcontroller on the “control side” and the 24 V factory floor environment, frequently referred to as the “process side”.

Digital input switch block diagram



Galvanic-isolated digital input ICs

Features and benefits

Key features	Key benefits
› Integrated galvanic isolation (500 VAC)	› Robust and reliable
› Eight channels (IEC type 1/2/3)	› Compact system solution
› Up to 500 kHz sampling speed	› High-speed applications
› Programmable input filters	› Superior EMI robustness
› Channel-specific diagnostics (wire-break, undervoltage)	› System status feedback
	› Valuable maintenance support

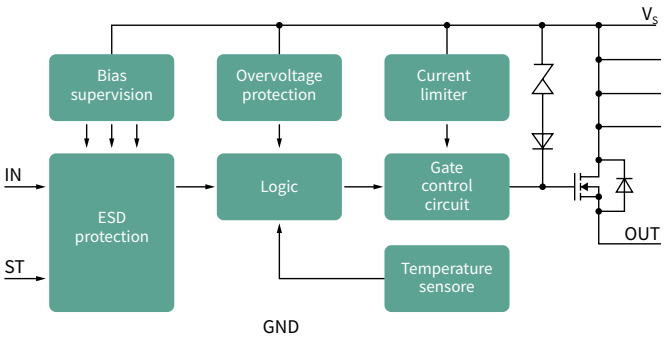
www.infineon.com/isoface

Industrial PROFET™

Protected high-side switches

Infineon's market-proven high-side switch Industrial PROFET™ products have been designed to target various industrial applications that drive all types of resistive, inductive and capacitive loads. Due to their outstanding energy robustness, they are perfectly suitable for switching challenging inductive loads and driving relays. Their main application areas include high-voltage and (V_{supply} up to 60 V) and PWM applications up to 1 kHz. Industrial PROFET™ can be applied to drive any kind of sensor units, indicators, displays, LEDs, relays, valves and magnetic actuators or replace electromechanical relays, fuses and discrete circuitry. Industrial PROFET™ products are also perfect for applications with long wiring or any other kind of inductive loads or applications with space constraints. Failsafe systems do make use of them as well.

PROFET™ typical block diagram



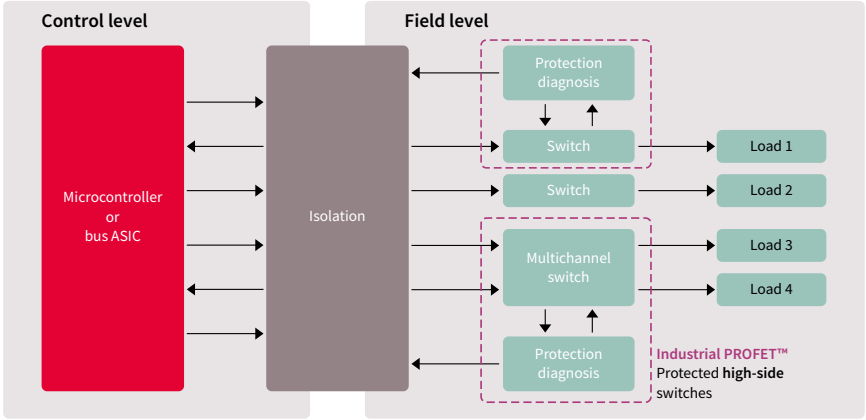
Key applications

- Industrial automation
- Programmable logic controller (PLC)
- Digital DCS and PC I/O modules
- Robotics
- Building and home automation
- Solar applications
- Wind energy systems
- Failsafe systems
- Smart grid
- Motor control and drives
- Power supplies

Features and benefits

Key features	Key benefits
Right fit for digital output modules, motor or robot control, protected switching of decentralized loads like sensors or auxiliary supply	Small system form factor
Outstanding robustness and reliability as required by industrial mission profiles	No/little downtime of system in operation
Thermally optimized products with low $R_{DS(on)}$ to deal with the high ambient temperatures in applications with limited or even no cooling	Low heating up of a system
Diagnosis and protection for safe system operation	System cost saving by built-in protection and tailored featureset
Small and compact design for higher integration and applications with space constraints	Reduced system maintenance efforts by providing optimized diagnostics

PLC – programmable logic controller digital output modules



PROFET™ as actuators typically address I/O modules supplying nominal currents of 2 A or 0.5 A. However, PROFET™ portfolio also provides devices for lower and higher currents. PROFET™ parts are suitable for switching resistive, capacitive and, by featuring high EAS, inductive loads.

Corresponding PROFET™ evaluation boards are available on request.

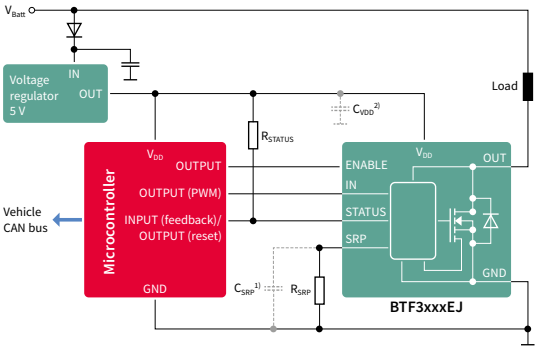
www.infineon.com/industrial-profet

HITFET™

Low-side smart protected switches

HITFET™ stands for highly-integrated temperature-protected MOSFET. These well-established low-side switches offer a compelling feature set with protection against overtemperature, short circuit and overload conditions as well as ESD robustness. The HITFET™ + family is the new generation based on new technology, enabling a significant shrink compared to the existing Classic HITFET™ portfolio (up to 50 percent shrink). This novel generation consists of standard and fully-featured protected low-side switches (11 to 125 mΩ) in the TO-252-3 DPAK/TO-252-5 DPAK and TDSO8 packages. Classic HITFET™ and HITFET™ + devices address a wide range of applications, including resistive, inductive and capacitive loads.

Application diagramm example for HITFET™ +



1) C_{SRP}-GND < 100 pF – maximum permittet parasitic capacitance at the SRP-pin
2) Filter capacitor on supply, recommended 100 nF

Key applications

- Industrial automation*
- Programmable logic controller (PLC)**
- Digital I/O modules
- Building and home management
- All kind of solenoid or valve driving
- Power modules
- Solar power inverters

Features and benefits

Key features	Key benefits
Low-side switches with integrated protection features	High design flexibility with scalable $R_{DS(on)}$ and package
Scalable in $R_{DS(on)}$ ranges from 800 mΩ down to 11 mΩ	Driving applications with high switching speed requirements up to 25 kHz (e.g. valve, solenoid)
Adjustable slew rate control (BTFxxx and BTT30xxEJ)	Easy to design-in
Thermal shutdown with auto restart or latch behavior	Choice of packages to match individual application needs
Status feedback via › Increased input current (HITFET™ 2nd gen.) › Digital readout via SRP (BTF3050TE) › Via status pin (BTF3xxxEJ)	

Low-side switch shield with BTF3050TE for Arduino

Featured products: Three BTF3050TE low-side switches of the HITFET™ + family
Combatible with: Microcontroller boards using the Arduino form factor and the corresponding Infineon's kits with Arm® powered XMC™ microcontroller
Orderable part number: SHIELDBTF3050TETOBO1

Evaluation board based on BTT3050EJ

Featured products: One single-channel low-side switch of BTT3050EJ
Combatible with: Can be used as single stand and is also pin-compatible with microcontroller boards using the Arduino form factor (e.g. XMC1100 Boot Kit, Arduino Uno)
Orderable part number: BTT3050EJDEMOBOARDTOBO1

www.infineon.com/hitfet
www.infineon.com/shields-for-arduino

*See block diagram on page 278
** See block diagram on page 279

For more details on the product, click on the part number, visit infineon.com or contact our product support.

ISOFACE™ product portfolio

ISOFACE™ output switches

Product overview		ISO1H801G	ISO1H811G	ISO1H812G	ISO1H815G	ISO1H816G	ISO2H823V
Switch	V_{bb} operational range: 11 V to 35 V	✓	✓	✓	✓	✓	✓
	Max. continuous load current per channel	0.6 A	0.6 A	0.6 A	1.2 A	1.2 A	0.6 A
	Load current increase by using outputs in parallel	✓	✓	✓	✓	✓	✓
	Inductive clamping energy per channel: 1 Joule	✓	✓	✓	✓	✓	150 mJ
Microcontroller interface	Type	Parallel	Parallel	Serial	Parallel	Serial	Serial/ Parallel
	Nominal voltages	5 V	3.3 V/5 V	3.3 V/5 V	3.3 V/5 V	3.3 V/5 V	3.3 V
Safety features	Isolation voltage: V_{ISO} = 500 VAC UL508 and EN 61131-2 certified	✓	✓	✓	✓	✓	2.5 kV AC
	Active current limitation	✓	✓	✓	✓	✓	✓
	Thermal shutdown	✓	✓	✓	✓	✓	✓
	Common output disable pin	✓	✓	✓	✓	✓	✓
Diagnostics feedback	Overtemperature		✓	✓	✓	✓	✓
	V_{bb} undervoltage		✓	✓	✓	✓	✓
Package DSO-36 (16x14 mm)		✓	✓	✓	✓	✓	VQFN-70
Ordering code		ISO1H801GAUMA1	ISO1H811GAUMA1	ISO1H812GAUMA1	ISO1H815GAUMA1	ISO1H816GAUMA1	ISO2H823V25XUMA1

ISOFACE™ digital input IC

Product overview		ISO1I811T	ISO1I813T
Input characteristics	IEC type: I, II, III	✓	✓
	Input status LED	✓	✓
	Max. sampling frequency	125 kHz	500 kHz
	Deglitching filter setting	Hard wired	Software, individual per channel
	Synchronous data acquisition	–	✓
µC interface	3.3 V/5 V	✓	✓
	Serial and parallel	✓	✓
Safety features	500 VAC isolation voltage	✓	✓
Diagnostic feedback	Wire break, channel-specific	–	✓
	V_{bb} undervoltage	✓	✓
Support for external V_{bb} supply		–	✓
Package TSSOP-48 (8x12.5 mm)		✓	✓
Ordering code		ISO1I811TXUMA1	ISO1I813TXUMA1

www.infineon.com/isoface

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Industrial PROFET™ product portfolio

Load current Typical, per channel	1-channel	2-channel	4-channel	8-channel
7 A	ITS428L2 ● 7 A, 60 mΩ, TO-252-5			
3 A	ITS4060S-SJ-N, ISP772T 3.1 A, 60 mΩ DSO8			
2 A … 3 A	ITS4100S-SJ-N, ISP762T 2.4 A, 100 mΩ, DSO8			
1 A … 2 A	ITS4200S-ME-P, ITS4142N 1.4 A, 200 mΩ, SOT223	ITS4040D-EP-D ● 2.6 A, 40 mΩ, TSDSO14	ITS4075Q-EP-D ● 2.6 A, 75 mΩ, TSDSO14	
	ISP752T 1.3 A, 200 mΩ, DSO8	ITS5215L ● 2 A, 90 mΩ, DSO-12	ITS724G ● 2 A, 90 mΩ, DSO-20	
	ITS4200S-SJ-D, ISP752R ● 1.2 A, 200 mΩ, DSO8		ITS716G ● 1 A, 140 mΩ, DSO-20	
			ITS711L1 ● 1 A, 200 mΩ, DSO-20	
0.5 A … 1 A	ITS4200S-ME-N, ISP452 0.7 A, 200 mΩ, SOT223		ITS4090Q-EP-D ● 0.7 A, 90 mΩ, TSDSO14	ITS42008-SB-D, ITS4880R ● 0.6 A, 200 mΩ, DSO-36
	ITS4200S-ME-O, ITS4141N 0.7 A, 200 mΩ, SOT223		ITS4130Q-EP-D ● 0.65 A, 130 mΩ, TSDSO14	
< 0.5 A	ITS4300S-SJ-D, ISP742RI ● 0.4 A, 300 mΩ, DSO8	ITS42K5D-LD-F ● 0.25 A, 2.5Ω, TSON-10		
	ITS41k0S-ME-N, ITS4140N 0.2 A, 1Ω, SOT223			

● = With diagnosis

Product	Number of channels	$R_{DS(on)}$ (typ) [mΩ]	Nominal load current [A]	E_{AS} [mJ]	Recommended operating voltage range [V]	$I_{L(SC)}$ (typ) [A]	Diagnosis	Package
ITS4060S-SJ-N	1	50	3.10	900 @ 1.50 A	5.00 … 34.00	17.0	n/a	DSO8
ISP772T	1	50	2.60	900 @ 1.50 A	5.00 … 34.00	17.0	n/a	DSO8
ITS428L2	1	60	7.00	190 @ 7.00 A	4.75 … 41.00	22.0	Digital	TO252-5
ITS4100S-SJ-N	1	70	2.40	870 @ 1.00 A	5.00 … 34.00	10.0	n/a	PG-DSO8
ISP762T	1	70	2.00	870 @ 1.00 A	5.00 … 34.00	10.0	n/a	DSO8
ITS4200S-ME-O	1	150	1.10	700 @ 0.50 A	11.00 … 45.00	1.4	n/a	SOT-223-4
ITS4141N	1	150	1.10	700 @ 0.50 A	12.00 … 45.00	1.4	n/a	SOT-223-4
ITS4200S-ME-P	1	150	2.20	160 @ 1.00 A	11.00 … 45.00	3.0	n/a	SOT-223-4
ITS4142N	1	150	2.20	160 @ 1.00 A	12.00 … 45.00	3.0	n/a	SOT-223-4
ITS4200S-ME-N	1	160	1.20	500 @ 0.50 A	5.00 … 34.00	1.5	n/a	DSO8
ISP452	1	160	1.20	500 @ 0.50 A	5.00 … 34.00	1.5	n/a	SOT-223-4
ITS4200S-SJ-D	1	150	1.70	125 @ 1.00 A	6.00 … 52.00	6.5	Digital	DSO8
ISP752R	1	200	1.70	125 @ 1.00 A	6.00 … 52.00	6.5	Digital	DSO8
ISP752T	1	200	1.70	125 @ 1.00 A	6.00 … 52.00	6.5	n/a	DSO8
ITS4300S-SJ-D	1	250	0.80	800 @ 0.30 A	5.00 … 34.00	1.2	Digital	DSO8
ISP742RI	1	350	0.80	800 @ 0.30 A	5.00 … 34.00	1.2	Digital, inverted	DSO8
ITS41K0S-ME-N	1	1000	0.55	1000 @ 0.15 A	4.90 … 60.00	0.9	n/a	SOT-223-4
ITS4140N	1	1000	0.55	1000 @ 0.15 A	4.90 … 60.00	0.9	n/a	SOT-223-4
ITS4040D-EP-D	2	40	2 x 2.00	185 @ 2 A	5.00 … 45.00	4.1	Digital	TSDSO-14
ITS5215L	2	90	2 x 2.00	178 @ 3.50 A	5.50 … 40.00	15.0	Digital	DSO-12
ITS42K5D-LD-F	2	2500	2 x 0.25	Freewheeling	4.50 … 45.00	0.6	Digital	TSON-10
ITS4075Q-EP-D	4	75	4 x 2.00	60 @ 2 A	5.00 … 45.00	4.1	Digital	TSDSO-14
ITS4090Q-EP-D	4	90	4 x 0.50	410 @ 0.5 A	5.00 … 45.00	1.5	Digital	TSDSO-14
ITS724G	4	90	4 x 2.00	120 @ 3.30 A	5.50 … 40.00	15.0	Digital	DSO-20
ITS4130Q-EP-D	4	130	4 x 0.50	380 @ 0.5 A	5.00 … 45.00	1.25	Digital	TSDSO-14
ITS716G	4	140	4 x 1.00	76 @ 2.30 A	5.50 … 40.00	9.0	Digital	DSO-20
ITS711L1	4	200	4 x 1.00	150 @ 1.90 A	5.00 … 35.00	7.5	Digital	DSO-20
ITS42008-SB-D	8	200	8 x 0.60	10,000 @ 625 mA	11.00 … 45.00	3.0	Digital	DSO-36
ITS4880R	8	200	8 x 0.60	10,000 @ 625 mA	11.00 … 45.00	3.0	Digital	DSO-36

Evaluation board

- ITS4040
- ITS4075
- ITS4090
- ITS4130

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* Per one channel

For more details on the product, click on the part number, visit infineon.com or contact our product support.

HITFET™ product portfolio

Product type	Product family	Channels	$R_{DS(on)}$ @ 25°C [mW]	Nominal load current [A]	EAS [mJ]	Operating voltage range [V]	$I_{L(lim)}$ (typ) [A]	$I_{L(lim)_TRIGGER}$ (typ) [A]	Diagnosis	Package
BTS3011TE	HITFET™ +	1	10.7	10	300 @ 5 A	up to 28	35	70	Status pin	TO-252-5 (DPAK 5-leg)
BTT3018EJ	HITFET™ +	1	16	7.0	150	up to 36	45	–	Status pin	TDSO8
BTS3035EJ	HITFET™ +	1	28	5.00	105 @ 5 A	up to 31	20.00	–	Status pin	TDSO8
BTS3035TF	HITFET™ +	1	30	5.00	106 @ 5 A	up to 31	20.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3035EJ	HITFET™ +	1	28	5.00	95 @ 5 A	up to 32	14.00	41.00	Status pin	TDSO8
BTF3050TE	HITFET™ +	1	40	3.00	120 @ 3 A	up to 28	8.00	30.00	Through SRP pin	TO-252-5 (DPAK 5-leg)
BTS3050EJ	HITFET™ +	1	40	4.00	62 @ 3 A	up to 31	15.00	–	Status pin	TDSO8
BTS3050TF	HITFET™ +	1	44	4.00	64 @ 4 A	up to 31	15.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3050EJ	HITFET™ +	1	40	4.00	62 @ 4 A	up to 32	10.00	29.00	Status pin	TDSO8
BTS3060TF	HITFET™ +	1	50	3.00	55 @ 3 A	up to 35	10.50	–	–	TO-252-3 (DPAK 3-leg)
BTS3080EJ	HITFET™ +	1	64	3.00	35 @ 3 A	up to 31	10.00	–	Status pin	TDSO8
BTS3080TF	HITFET™ +	1	69	3.00	38 @ 3 A	up to 31	10.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3080EJ	HITFET™ +	1	64	3.00	33 @ 3 A	up to 32	7.00	18.00	Status pin	TDSO8
BTS3125EJ	HITFET™ +	1	100	2.00	30 @ 2 A	up to 31	7.00	–	Status pin	TDSO8
BTS3125TF	HITFET™ +	1	108	2.00	24 @ 2 A	up to 31	7.00	–	–	TO-252-3 (DPAK 3-leg)
BTF3125EJ	HITFET™ +	1	100	2.00	23 @ 2 A	up to 32	5.00	12.00	Status pin	TDSO8
BTS3018TC	Classic HITFET™	1	14	6.00	1900	up to 36	30.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS141TC	Classic HITFET™	1	25	5.10	4000	up to 36	25.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3028SDL	Classic HITFET™	1	28	5.00	350	up to 36	18.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3028SDR	Classic HITFET™	1	28	5.00	350	up to 36	18.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS133TC	Classic HITFET™	1	40	3.80	2000	up to 36	21.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3046SDL	Classic HITFET™	1	46	3.60	140	up to 36	10.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3046SDR	Classic HITFET™	1	46	3.60	140	up to 36	10.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS117TC	Classic HITFET™	1	80	3.50	1000	up to 36	7.00	–	Through input pin	TO-263-3-2 (TO-220-3 (SMD))
BTS3104SDL	Classic HITFET™	1	104	2.00	50	up to 36	6.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3104SDR	Classic HITFET™	1	104	2.00	50	up to 36	6.00	–	Through input pin	TO-252-3 (DPAK 3-leg)
BTS3408G	Classic HITFET™	2	480	0.55	800	up to 36	1.00	–	Through input pin	DSO8
BSP75N	Classic HITFET™	1	490	0.70	550	up to 36	1.00	–	Through input pin	SOT-223

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

CIPOS™ IPM product portfolio

MOSFET based CIPOS™ IPMs					
Product family	Voltage [V]	Configuration	$R_{DS(on),max}$, [Ω]	Package	Product name
CIPOS™ Nano	40	Half-bridge	0.005	QFN 7x8	IRSM005-800MH
	100	Half-bridge	0.021	QFN 7x8	IRSM005-301MH
	250	H-bridge	0.063	QFN 12x10	IM111-X3Q1B
		Half-bridge	0.15	QFN 8x9	IRSM808-204MH
		3-phase inverter	0.45 ~ 2.40	QFN 12x12	IRSM836-024MA/IRSM836-044MA IRSM836-084MA
	500	Half-bridge	0.80/1.70	QFN 8x9	IRSM808-105MH / IRSM807-045MH
		3-phase inverter	1.70 ~ 6.00	QFN 12x12	IRSM836-015MA/IRSM836-025MA/IRSM836-035MA IRSM836-045MA
	600	H-bridge	0.28	QFN 12X10	IM111-X6Q1B
CIPOS™ Mini	600	2/3-phase inverter	0.33	DIP 36x21	IM512-L6A/IM513-L6A
CIPOS™ Maxi	1200	3-phase inverter	0.055	DIP 36x23D	IM828-XCC

IGBT based CIPOS™ IPMs					
Product family	Voltage [V]	Configuration	Rated current [A]	Package	Product name
CIPOS™ Micro	600	3-phase inverter	2.0/4.0/6.0	DIP 29x12	IM241-S6T2B*/IM241-M6T2B*/IM241-L6T2B* IM241-S6T2J*/IM241-M6T2J*
			2.0/4.0/6.0	SOP 29x12	IM241-S6S1B*/IM241-M6S1B*/ IM241-L6S1B IM241-S6S1J*/IM241-M6S1J*
CIPOS™ Tiny	600	3-phase inverter	6.0/10.0/15.0	DIP 33x19	IM323-L6G*/IM323-L6G2*
CIPOS™ Mini	600	PFC integrated	10.0~20.0	DIP 36x21D	IFCM10S60GD/IFCM10P60GD IFCM15S60GD/IFCM15P60GD IM564-X6D
		3-phase inverter	4.0 ~ 30.0	DIP 36x21	IGCM04F60GA/IGCM04G60GA/IGCM06F60GA/IGCM06G60GA IGCM10F60GA/IKCM10H60GA/IKCM10L60GA IGCM15F60GA/ICM15L60GA/IKCM15F60GA/IKCM15H60GA IGCM20F60GA/IKCM20L60GA IKCM30F60GA IM523-S6A/IM523-M6A/IM523-L6A/IM523-X6A
			15.0 ~ 30.0	DIP 36x21D	IKCM15L60GD/IKCM20L60GD/IKCM30F60GD IM535-U6D
		Single boost PFC + inverter	10.0~20.0	DIP 36x21D	IKCM15L60GD/IKCM20L60GD/IKCM30F60GD M535-U6D
	650	3-phase interleaved PFC	20.0/30.0	DIP 36x21D	IFCM20T65GD/IFCM30T65GD
		2-phase interleaved PFC	30.0	DIP 36x21D	IFCM30T65GD/IFCM30U65GD
CIPOS™ Maxi	1200	3-phase inverter	5.0 ~ 15.0	DIP 36x23D	IM818-SCC/IM818-MCC/IM818-LCC

* Coming soon

www.infineon.com/ipm

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Infineon support for intelligent switches and modules

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/isoface
www.infineon.com/hitfet
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www.infineon.com/shields-for-arduino

Support | Evaluation Board | Tools

Microcontrollers

- XMC™ microcontrollers
- XMC™ ecosystem, enablement and partners
- XMC™ digital power explorer kit
- XMC™ starter kits
- XMC™ peripherals
- AURIX™ - 32-bit microcontrollers
- AURIX™ TC2xx family system architecture
- AURIX™ TC3xx family system architecture
- AURIX™ starter and application kits
- Application example: Industrial robotics
- Microcontroller PDH partner
- TRAVEO™ II portfolio
- MOTIX™ Embedded Power ICs
- BLDC Motor Control Shield for Arduino
- CAN-FD transceivers

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

XMC™

One microcontroller platform – countless solutions

Infineon's XMC™ 32-bit industrial microcontroller portfolio is designed for efficiency and demanding industrial applications.

XMC™ MCU portfolio

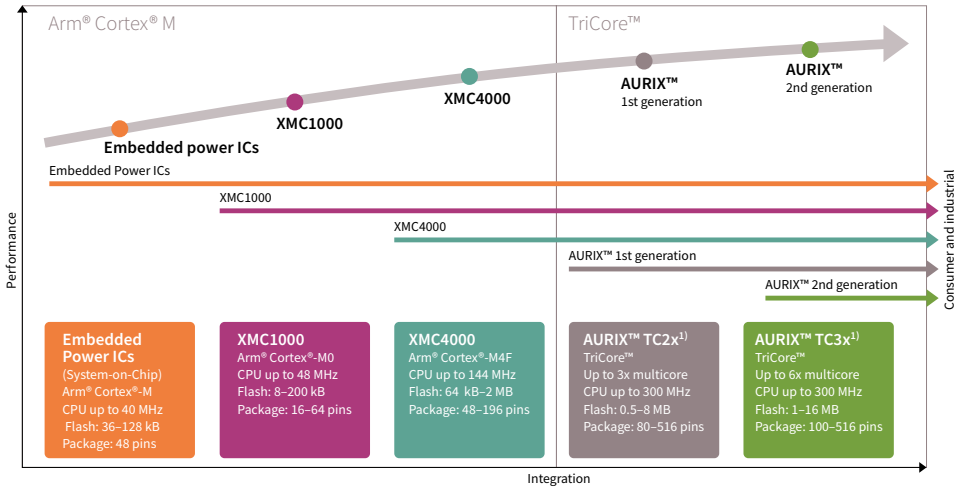
- RAM: 8 kB up to 352 kB
- Flash: 16 kB up to 2 MB
- Accurate analog mixed-signal peripherals
- Fast timer/PWM peripherals
- Rich communication interfaces
- 16-pin to 196-pin count packages

XMC1000 family

- Arm® Cortex®-M0 up to 48 MHz
- Peripherals up to 96 MHz
- One-time event request unit (ERU)
- V_{DD}: 1.8 to 5.5 V
- $T_{Ambient}$: -40°C to 105°C

XMC4000 family

- Arm® Cortex®-M4 up to 144 MHz
- Built-in DSP, SFPU
- Peripherals up to 144 MHz
- Event request unit (ERU)
- $T_{Ambient}$: -40°C to 125°C



1) AURIX™ devices add safety and CAN FD

XMC™ entry	LED lighting	Digital power	Motor control	Industrial I/O
XMC4000 Arm® Cortex®-M4F up to 144 MHz core 64 kB-2 MB Flash up to 125°C			**XMC4700/4800** Industrial drives, Hall and encoder I/F, ΔΣ demodulator, LQFP-100/144 LFBGA-196	**XMC4800, XMC4300** EtherCAT, +drives MultiCAN - 6 nodes LQFP-100/144 LFGBGA-196
XMC4100 Basic control and connectivity VQFN-48 LQFP-64		**XMC4200** Server power 150 ps HRPWM LQFP-64/100	**XMC4100/XMC4400** Industrial drives, Hall and encoder I/F, ΔΣ demodulator, LQFP-64/100/144 LFBGA-144	**XMC4500** MultiCAN - 3 nodes, Ethernet, +drives ext. memory, SD/MMC LQFP-100/144 LFBGA-144
XMC1000 Arm® Cortex®-M0 up to 48 MHz core/ 96 MHz peripheral 8-200 KB flash up to 105°C 1.8-5.5 V	**XMC1400** Flicker-free, 4-Ch LED, SMPS, connectivity VQFN-40/64 LQFP-64	**XMC1400** SMPS control, connectivity VQFN-40/64 LQFP-64	**XMC1400** Hall and encoder I/F, MATH co-processor, CAN VQFN-40/64 LQFP-64	**XMC1400** Multi CAN - 2 nodes VQFN-48/64 LQFP-64
XMC1100 Basic control and connectivity TSSOP-16/38 VQFN-24/40	**XMC1200, XMC1300** Flicker-free, 4-Ch LED, SMPS, connectivity TSSOP-16/28/38 VQFN-24, -40	**XMC1300** SMPS control, connectivity, TSSOP-16/38 VQFN-24/40	**XMC1300** Hall and encoder I/F, MATH co-processor, TSSOP-16/38 VQFN-24/40	

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XMC™ ecosystem, enablement and partners

A comprehensive set of tools, products, components, and services are available for fast and efficient design with XMC™ microcontrollers.

Infineon enablement for XMC™ MCUs

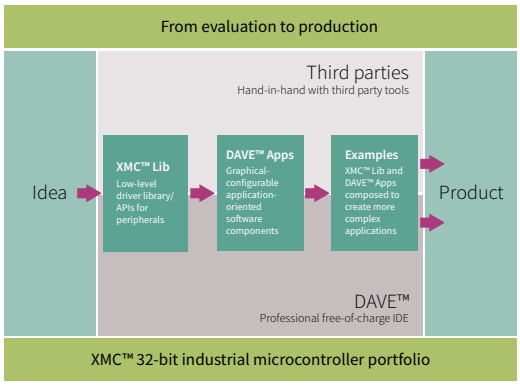
DAVE™ – www.infineon.com/dave
Professional and free-of-charge development platform

XMC™ library for Embedded Coder® – www.infineon.com/matlab
Model-based design from MATLAB® and Simulink® environment, download free of charge

IEC60730 class B library for XMC™ – www.infineon.com/iec60730
Available for XMC™ industrial microcontrollers free of charge

Microcontroller/Probe™ XMC™ – www.infineon.com/ucprobexmc
Free-of-charge version of microcontroller/Probe™ for XMC™ MCUs to build user interfaces for visualizing, observing, and control of the internals of XMC™ MCUs

XMC™ link – www.infineon.com/xmclink
Functional isolated debug probe, based on SEGGER J-Link technology



In addition to a rich third party ecosystem and enablement landscape, which support the entire development cycle from evaluation to production.
For more www.infineon.com/xmc-ecosystem

Infineon's XMC™ 32-bit industrial microcontroller portfolio is designed for system cost and efficiency for demanding industrial applications. It comes with the most advanced peripheral set in the industry. Fast and largely autonomous peripherals can be configured to support individual needs.

Highlights include analog mixed-signal, timer/PWM and communication peripherals powered by either an Arm® Cortex®-M0 core (XMC1000 family) or an Arm® Cortex®-M4 core with a floating point unit (XMC4000 family).

		Clocks		Memory		Analog			Timer/PWM				Connectivity		Package
Arm® Cortex®-M0	Co-processor	Frequency	Peripherals			ADC1 2-bit/S&H	Number of channels	Analog comparators	CCU4 (4 ch)	CCU8 (4 ch)	POS IF	BCCU	US IC	CAN 2.0B	
XMC11x	-	32	64	Flash	8-64 kB	1/1	Up to 12	-	1x	-	-	-	2x	-	VQFN 24/40 TSSOP 16/38
				RAM	16 kB										
XMC12x	-	32	64	Flash	16-200 kB	1/2	Up to 12	Up to 3	1x	-	-	✓	2x	-	VQFN 24/40 TSSOP 16/28/38
				RAM	16 kB										
XMC13x	✓	32	64	Flash	8-200 kB	1/2	Up to 12	Up to 3	1x	1x	✓	✓	2x	-	VQFN 24/40 TSSOP 16/38
				RAM	16 kB										
XMC14x	✓	48	96	Flash	32-200 kB	1/2	Up to 12	Up to 4	2x	2x	✓	✓	4x	✓	VQFN 40/48/64 LQFP 64
				RAM	16 kB										
Supply voltage range 1.8-5.5 V															
Temperature range -40°C … 85°C/105°C															

		Memory		Analog			Timer/PWM					Connectivity							Package
Arm® Cortex®-M0	Frequency [MHz]			ADC1 2-bit/S&H	Number of channels	DAC1 2-bit	CCU4 (4 ch)	CCU8 (4 ch)	HRPWM (150 ps)	POSIF	∑ Demodulator	US IC	CAN 2.0B	USB	Ethernet	EtherCAT®	SDIO/SD/MMC	External BUS Unit (EBU)	
XMC41x	80	Flash	64-128 kB	2/2	Up to 9	2 ch	2x	1x	✓	✓	-	4x	Up to 2	✓	-	-	-	-	VQFN 48 TQFP 64
		RAM	20 kB																
XMC42x	80	Flash	256 kB	2/2	Up to 9	2 ch	2x	1x	✓	✓	-	4x	2x	✓	-	-	-	-	VQFN 48 TQFP 64
		RAM	40 kB																
XMC43x	144	Flash	256 kB	2/2	14	2 ch	2x	1x	-	-	-	4x	2x	✓	✓	✓	✓	-	LQFP 100
		RAM	128 kB																
XMC44x	120	Flash	256-512 kB	4/4	Up to 18	2 ch	4x	2x	✓	2x	4 ch	4x	2x	✓	✓	-	-	-	TQFP 64 LQFP 100
		RAM	80 kB																
XMC45x	120	Flash	512 kB-1 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	4x	Up to 3	✓	✓	-	✓	✓	LQFP 100/144 LFBGA 144
		RAM	128-160 kB																
XMC47x	144	Flash	1.5-2 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	6x	6x	✓	✓	-	✓	✓	LQFP 100/144 LFBGA 196
		RAM	276-352 kB																
XMC48x	144	Flash	1-2 MB	4/4	Up to 26	2 ch	4x	2x	-	2x	4 ch	6x	6x	✓	✓	✓	✓	✓	LQFP 100/144 LFBGA 196
		RAM	276-352 kB																
Supply voltage range 3.1-3.6 V																			
Temperature range -40°C … 85°C/125°C																			

www.infineon.com/xmc
www.infineon.com/dave

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XMC™ digital power explorer kit

The new digital power explorer kit is designed with the particular goal of making it easy for engineers to take the first steps into digital power control with XMC™ microcontrollers. It showcases both XMC™ families Arm® Cortex-M microcontrollers: XMC4000 and XMC1000, 30 V dual n-channel OptiMOS™ MOSFETs and IRS2011S gate drivers. The kit includes two different control card options, XMC1300 control card (Arm® Cortex®-M0) and XMC4200 control card (Arm® Cortex®-M4F), which allow designers to evaluate both XMC™ microcontroller families and make the right price/performance choice for their application.

Features and benefits

Key features
› Synchronous buck converter evaluation kit controlled with XMC4200 or XMC1300 Arm® Cortex®-M MCUs
› Onboard resistive load banks
› Featuring BSC0924NDI dual n-channel OptiMOS™ MOSFET and IRS2011S high- and low-side gate driver
Different control schemes possible › Voltage mode control › Peak current mode control (with slope compensation)

Key benefits
› Easy entry in digital power control applications
› Understand the details of voltage/peak current control and how to extract the maximum of XMC™ devices
› DAVE™ v4 APPs for buck converter and many more example

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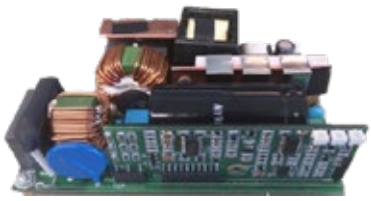
For more details on the product, click on the part number, visit infineon.com or contact our product support.

High power density 800 W 130 kHz platinum server design with XMC1300

The 800 W PFC CCM evaluation board demonstrates design and practical results of an 800 W 130 kHz platinum server PFC evaluation board based on Infineon devices, in terms of power semiconductors, non-isolated gate drivers, analog and digital controllers for the PFC converter, as well as flyback controller for the auxiliary supply. This evaluation board verifies the performance of the latest 600 V CoolMOS™ C7 superjunction MOSFET technology working at 130 kHz in a PFC CCM boost converter along with EiceDRIVER™ ICs and CoolSiC™ Schottky diode 650 V G5 using digital control.

Features and benefits

Key features	Customer benefits
› Classic PFC boost stage digitally controlled with XMC1302 including voltage and current loops	› High efficient PFC stage with a complete systemsolution from Infineon
› Protections, including cycle-by-cycle current protection	› HW and SW available
› Run time debug with isolated UART to PC interface and PC software	› Higher switching frequency permits higher power density

800 W PFC CCM with XMC1300	Specification		Infineon components	
	V_{in}	90-265 V_{AC}	**MCU**	XMC1302 (TSSOP38)
	V_{out_nom}	380 V_{DC}	**MOSFET**	600 V CoolMOS™ C7
	I_{out}	2 A	**MOSFET driver**	EiceDRIVER™ 2EDN7524F non-isolated
	PWM frequency	130 kHz	**Diode**	CoolSiC™ Schottky diode 650 V G5
	THD	<10%	**Auxiliary PSU**	ICE2QR4780Z
	Power factor	>0.9 from 20% load		
	Efficiency	97% (peak)		

600 W half-bridge LLC evaluation board with 600 V CoolMOS™ C7 SJ MOSFET with digital control

The 600 W LLC digital control evaluation board shows how to design the half-bridge LLC stage of a server SMPS with the target to meet 80+ Titanium standard efficiency requirements. For this purpose, the latest CoolMOS™ technologies, 600 V CoolMOS™ C7 or P6 superjunction MOSFETs have been used on the primary side, and OptiMOS™ low-voltage power MOSFET in SuperSO8, BSC010N04LS, in the synchronous rectification secondary stage in combination with QR CoolSET™ ICE2QR2280Z, high- and low-side driver 2EDL05N06PF, low-side gate driver 2EDN7524F and a XMC4200 microcontroller.

Features and benefits

Key features	Customer benefits
600 W LLC half-bridge stage with synchronous rectification (SR)	Learn LLC topology with a complete system solution from Infineon › HW and- SW available
All controlled with XMC4200 including: › Start up (PWM to PFM) and burst-mode algorithms › Adaptive dead time and capacitive-mode detection › No hard commutation at any condition	Close to customer solution › High efficiency → 97.8% › Reliability and power density

600 W LLC digital control	Specification		Infineon components	
	V_{in}	350-410 V_{DC}	**MCU**	XMC4200 (VQFN48)
	V_{out_nom}	12 V_{DC}	**MOSFET SR**	BSC010N04LS
	I_{out}	50 A	**HB driver**	2EDL05N06PF
	P_{out}	600 W	**LLC HB MOSFET**	CoolMOS™ IPP60R190P6
	f_{res}	157 kHz	**Auxiliary PSU**	ICE2QR2280Z

www.infineon.com/xmc www.infineon.com/800w-pfc-eval www.infineon.com/600w-llc-eval

For more details on the product, click on the part number, visit infineon.com or contact our product support.

3 kW dual-phase LLC converter using XMC4400

The 3 kW dual-phase LLC demonstration board is an example of a high efficiency isolated DC-DC converter using the state-of-the-art Infineon components, both power devices and controller/driver ICs. The use of an advanced digital control using the XMC4400 microcontroller, together with the latest generation of CoolMOS™ and OptiMOS™ devices, allows achieving a very flat efficiency curve in the entire load range. The demonstration board is targeting the high voltage DC-DC stage of high-end telecom rectifiers.

Features and benefits

Key features	Customer benefits
› Full digital control by XMC4400 on the secondary side	› Full digital control by XMC4400 on the secondary side
› Digital current sharing with phase shedding	› Efficiency peak 98.5% and more than 97.2% in the entire load range
› Accurate algorithm able to prevent hard commutation and capacitive load mode in LLC operation	› Easy monitoring and parameter setting via a graphic user interface

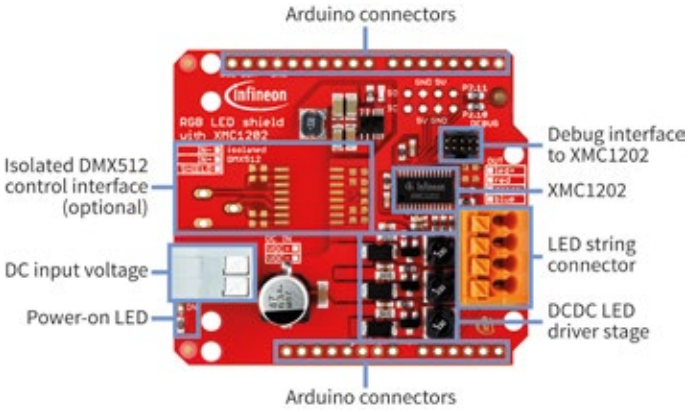
3 kW dual-phase LLC converter using XMC4400	Specification		Infineon components	
	V_{in}	350-410 V_{DC}	**MCU**	XMC4400 (LQFP64)
	V_{out_nom}	54.3 V_{DC}	**SR MOSFET**	OptiMOS™ BSC093N15NS5
	I_{out_max}	55 A	**Drivers**	1EDI60N12AF 2EDN7524R
	P_{out}	3000 W	**LLC Half-bridge MOSFET**	CoolMOS™ P6 IPW60R041P6
	f_{range}	90-200 kHz	**Auxiliary PSU**	ICE2QR2280Z
	Peak efficiency	>98.4%		

RGB LED lighting shield with XMC1202 for Arduino

The RGB LED lighting shield with XMC1202 for Arduino uses a DC-DC buck topology and is able to drive up to three LED channels with constant current. The shield itself is powered by a programmable XMC™ 32-bit Arm® MCU with embedded brightness color control unit (BCCU, XMC1200 MCU series), for flicker-free LED dimming and color control.

Features

- Compatible with Arduino Uno R3 and XMC1100 boot kit from Infineon
- Easily configurable for various light engines and any input voltage (within operating conditions)
- Wide DC input voltage range
- Simple I^2C interface



Operating conditions

- Nominal: 12-48 V input voltage (max. 6-60 V)
- Average LED current up to 700 mA (max. peak current 1 A)

The Infineon shields mentioned above are hardware compatible with Arduino and Infineon's XMC™ boot and relax kits.

www.infineon.com/shields-for-arduino

For more details on the product, click on the part number, visit infineon.com or contact our product support.

3 kW dual-phase LLC converter

XMC4800 automation board V2 – explore XMC4800 microcontroller based on Arm® Cortex®-M4

The XMC4800 automation board V2 uses Infineon's industry leading XMC™ Arm® Cortex®-M4 microcontroller in combination with Infineon's supply, interface, communication and safety products. The XMC4800 automation board V2 is designed to evaluate the capabilities of the XMC4800 microcontroller especially in EtherCAT® slave applications and can be used with a wide range of development tools including Infineon's free-of-charge Eclipse based IDE, DAVE™.

Features and benefits

Key features
› XMC4800-E196 MCU based on Arm® Cortex®-M4 at 144 MHz
› EtherCAT® slave controller, 2 MB flash and 352 kB RAM
› OPTIGA™ Trust E embedded security solution (CC EAL6+)
› Real time clock crystal
› SPI FRAM (64 kB non-volatile memory)
› EtherCAT® slave node (2 EtherCAT® PHY and RJ45 Jacks)
› 24 V ISOFACE™ 8-channel inputs and 8-channel outputs CAN transceiver
› CAN transceiver

Customer benefits
› Complete automation kit gateway
› Combined MCU with EtherCAT slave application
› Isolated interfaces with diagnose
› Ethernet connectivity with software examples available
› 24 V supply
› CAN connectivity
› Full software DAVE™ examples

XMC4800 automation board V2	Type	Description	OPN
	KIT_XMC48_AUT_BASE_V2	The XMC4800 automation board V2 utilizes Infineon's industry leading XMC™ Arm® Cortex®-M4 microcontroller in combination with Infineon's supply, interface/communication and safety products	KITXMC48AUTBASEV2TOBO1
	XMC4800-E196K2048	Arm® Cortex®-M4 microcontroller	XMC4800E196K2048AAXQMA1
	ISO2H823V2.5	24 V 8-channel isolated output	ISO2H823V25XUMA1
	ISO1I813T	24 V 8-channel isolated input	ISO1I813TXUMA1
	SLS 32AIA020A4 USON10	OPTIGA™ Trust E – embedded security solution	SLS32AIA020A4USON10XTMA2
	TLE6250GV33	Infineon CAN transceiver	TLE6250GV33XUMA1
	IFX54441LDV	Infineon voltage regulator	IFX54441LDVXUMA1

www.infineon.com/automationkit

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XMC™ wireless power controller – enabling wireless charging transmitter applications

Infineon's XMC™ wireless power controller, based on the Arm® Cortex®-M0 core, provides a powerful and cost-effective platform for high performance, smart and safe wireless charging applications. The XMC™ wireless power controller helps the next-generation wireless charging systems to meet strict safety, environmental and regulatory requirements, while still enabling industry-leading charging performance and efficiency. This controller works seamlessly with Infineon's power devices in a scalable architecture to provide a complete charging solution for everything from a fast-charge smartphone, to a 20 W robot, or a 60 W drone and beyond.

Features and benefits

Key features	Customer benefits
› Supports inductive and resonant charging methods	› Supports 15 W charging and existing standards, including fast charging of smartphones
› Power levels up to 60 W	› Full power 15 W without exotic thermal management
› Multiple industry standard and custom charging profiles using the same hardware architecture	› Achieves charging rates equivalent to wired charging
› Single- and multi-coil transmitters	› Supports custom-charging profiles and industry standards on the same hardware
› Half- and full-bridge support	› Foreign object detection (FOD) with improved accuracy quality-factor monitoring
› Variable and fixed-frequency transmitter types	› Foreign object detection capability can be extended beyond existing standards to improve detection
› Buck and boost topologies	› Supports custom coils, and greater than three coils
› Integrated flash for parameter storage	
› Voltage supply 1.8-5.5 V	
› Space saving VQFN-40 package	

For a detailed overview of Infineon's wireless charging solutions, check the Wireless charging chapter.

www.infineon.com/wirelesscharging

XMC™ starter kits

Kits and evaluation boards

Xtreme2Go

Order number: KIT_XMC_2GO_XTR_ XMC1400

- XMC1400 family kit with ADAFRUIT, MikroE and Shields2Go connectivity. Extension for IoT and other cloud applications.
- The XMC1400 series devices are optimized for motor control, power conversion and LED Lighting applications and Human-Machine Interface (HMI)

For more information on this product, please contact our product support.

Platform2Go XMC4400

Order number: KIT_XMC_PLT_2GO_XMC4400

- Equipped with an Arm® Cortex®-M4 based XMC™ microcontroller, the XMC4400 Platform2Go is designed to evaluate the capabilities of Infineon's XMC4400 microcontroller. It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE DAVE™
- This kit has the XMC4400 device with debugger plus Ethernet, CAN, Arduino, MikroBUS and Shields2Go form factor.

Click on the following to find/purchase the kit:
www.infineon.com/XMC4400patform2go

XMC1400 Arduino

Order number: KIT_XMC1400_ARDUINO

- This kit utilizes Infineon's industry leading Arm® Cortex® M0 microcontroller in combination with Arduino form factor.
- It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE, DAVE™ and much more.

Click on the following to find/purchase the kit:
www.infineon.com/xmc1400_ARDUINO

Platform2Go XMC4200

Order number: KIT_XMC_PLT 2GO_XMC 4200

- Equipped with an Arm® Cortex®-M4 based XMC™ microcontroller from Infineon Technologies AG, the XMC4200 Platform2Go is designed to evaluate the capabilities of Infineon's XMC4200 microcontroller.
- It can be used with a wide range of development tools including Infineon's free of charge Eclipse based IDE DAVE™
- This kit has the XMC4200 device with debugger plus CAN, Arduino, MikroBUS and Shields2Go form factor.

Click on the following to find/purchase the kit:
www.infineon.com/XMC4200patform2go

RGB LED Lighting Shield

Order number: KIT_XMC_LED_DALI_20_RGB

- One of the first intelligent evaluation boards compatible with Arduino as well as Infineon's XMC1100 BOOT KIT.
- Designed to be easily configurable and combinable for different LED light engines and lamps, for fast prototyping and in-expensive evaluation of LED lighting applications.
- The RGB LED lighting shield with XMC1302 uses a DC-DC buck topology.

Click on the following to find/purchase the kit:
www.infineon.com/cms/en/product/evaluation-boards/kit_xmc_led_dali_20_rgb/

XMC™ peripherals

IEC60730 class B library for XMC™

Supporting the XMC1xxx and XMC4xxx families

In collaboration with the consultancy Hitex, Infineon developed the IEC60730 – class B software library for XMC™ industrial microcontrollers for household electrical appliances. This is a dedicated software library for XMC™ MCUs with routines for internal supervisory functions and for self-diagnostics.

Extended documentation and pre-certified software libraries to XMC™ Cortex® Arm® based controllers are free of charge. For more information, please check: www.hitex.com/classb

Documentation	Consultancy
› Safety application note › Failure mode report › FMEDA tool by Infineon, revised in workshops by TÜV Süd	hitex EMBEDDED TOOLS & SOLUTIONS Implementation support by Hitex

Embedded security for XMC™ MCUs

Infineon and its partners provide solutions which support with data protection, allowing authentication and encryption and securing firmware file updates to prevent cloning and downtimes.

Security solutions		
Software	**Hardware**	
Secure bootloader by Infineon, XMC1000	**OPTIGA™ family by Infineon** Hardware-based security solutions	
CodeMeter µEmbedded by WIBU, XMC4000 exclusive	**OPTIGA™ Trust family**	**OPTIGA™ TPM family**
KMS/CycurKEYS by ESCRYPT, XMC4000		
emSecure by SEGGER	Turnkey and programmable security solutions	Standardized certified turnkey solution

www.infineon.com/xmc

For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ – 32-bit microcontrollers

32-bit multicore TriCore™ – safety joins performance

AURIX™ is Infineon's family of microcontrollers serving the needs of industrial applications in terms of performance and safety. Its innovative multicore architecture, based on up to six independent 32-bit TriCore™ CPUs at 300 MHz, has been designed to meet the highest safety standards while increasing the performance at the same time. Using the AURIX™ scalable platform, developers will be able to implement applications such as motor control and drives, PLC or any other automation application. Developments using AURIX™ require less effort to achieve the SIL/ IEC61508 standard based on its innovative safety concept and multiple HW safety features. Furthermore, AURIX™ has enhanced communication capabilities to support communication between CAN, LIN, FlexRay and Ethernet buses.

Features and benefits

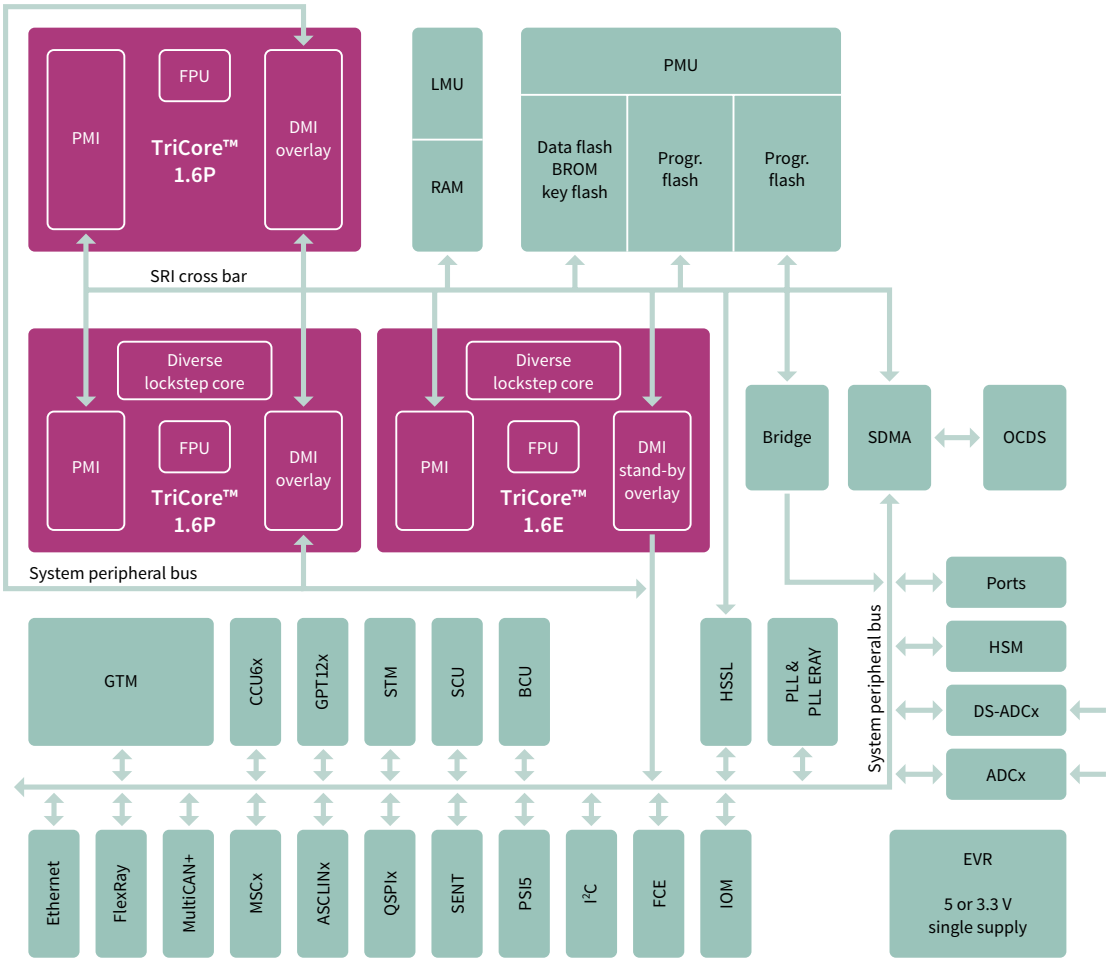
Key features	Customer benefits
› TriCore™ with DSP functionality	› High scalability gives the best cost-performance fit
› Best-in-class real-time performance: up to six TriCore™ with up to 300 MHz per core	› High integration leads to significant cost savings
› Supporting floating point and fix point with all cores	› High integration leads to reduced complexity
› Up to 6.9 MB of internal RAM, up to 16 MB of flash	› Innovative supply concept leads to best-in-class power consumption
› Innovative single supply 5 V or 3.3 V	
› IEC61508 conformance to support safety requirements up to SIL 3	
› Embedded EEPROM	
› Advanced communication peripherals: CAN FD, LIN, SPI, FlexRay, Ethernet	

www.infineon.com/aurix

For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ TC2xx family system architecture

Powerful 1st generation AURIX™ TC2xx system architecture



AURIX™ TC2xx family package scalability

	TQFP-80	TQFP-100	LQFP-144 TQFP-144	LQFP-176	LFBGA-292	BGA-416	LFBGA-516
9x series up to 8 MB					TC297 300 MHz	TC298 300 MHz	TC299 300 MHz
7x series up to 4 MB				TC275 200 MHz	TC277 200 MHz		
6x series up to 2.5 MB			TC264 200 MHz	TC265 200 MHz	TC267 200 MHz		
3x series up to 2 MB		TC233 200 MHz	TC234 200 MHz		TC237 200 MHz		
2x series up to 1 MB	TC222 133 MHz	TC223 133 MHz	TC224 133 MHz				
1x series up to 512 KB	TC212 133 MHz	TC213 133 MHz	TC214 133 MHz				

Flash / Package

↕ Upgrade/downgrade with pin-compatible packages

www.infineon.com/aurix

AURIX™ TC2xx portfolio

Product type	Max. clock frequency [MHz]	Program memory [kB]	SRAM (incl. cache) [kB]	Co-processor[1]	Cores/lockstep	Timed I/O	Number of ADC channels	External bus interface	CAN nodes	Communication interfaces[2]	Temperature ranges[3]	Packages	Additional features/remarks[4]
TC299TX	300	8000	2728	FPU	3/1	263	84/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-516	EVR, STBU, HSM
TC299TP	300	8000	728	FPU	3/1	263	84/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-516	EVR, STBU, HSM
TC298TP	300	8000	728	FPU	3/1	232	60/10 DS	yes	6	4xASCLIN, 6xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LBGA-416	EVR, STBU, HSM
TC297TA	300	8000	2728	FPU, FFT, CIF	3/1	169	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC297TX	300	8000	2728	FPU	3/1	263	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC297TP	300	8000	728	FPU	3/1	169	60/10 DS	no	6	4xASCLIN, 4xQSPI, 3xMSC, 2xI2C, 15xSENT, HSSL, 5xPSI5, 2xFlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU, HSM
TC277TP	200	4000	472	FPU	3/2	169	60/6 DS	no	4	4xASCLIN, 4xQSPI, 2xMSC, HSSL, 2xI2C, 10xSENT, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, WUT, HSM
TC275TP	200	4000	472	FPU	3/2	112	60/6 DS	no	4	4xASCLIN, 4xQSPI, 2xMSC, HSSL, 2xI2C, 10xSENT, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-176	EVR, WUT, HSM
TC267D	200	2500	240	FPU	2/1	169	50/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, 3xPSI5, HSSL, FlexRay, Ethernet, CAN FD	K	LFBGA-292	EVR, STBU
TC265D	200	2500	240	FPU	2/1	112	50/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-176	EVR, STBU
TC264DA	200	2500	752	FPU, FFT, CIF	2/1	88	40/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-144	EVR, STBU
TC264D	200	2500	240	FPU	2/1	88	40/3 DS	no	5	4xASCLIN, 4xQSPI, 2xMSC, 2xI2C, 10xSENT, HSSL, 3xPSI5, FlexRay, Ethernet, CAN FD	K	LQFP-144	EVR, STBU
TC237LP	200	2000	192	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	LFBGA-292	EVR, WUT, HSM
TC234LA	200	2000	704	FPU, FFT	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, Ethernet	K	TQFP-144	EVR, WUT, HSM
TC234LX	200	2000	704	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, Ethernet	K	TQFP-144	EVR, WUT, HSM
TC234LP	200	2000	192	FPU	1/1	120	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	TQFP-144	EVR, WUT, HSM
TC233LP	200	2000	192	FPU	1/1	78	24	no	6	2xASCLIN, 4xQSPI, 4xSENT, FlexRay, CAN FD	K	TQFP-100	EVR, WUT, HSM
TC224L	133	1000	96	FPU	1/1	120	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-144	EVR, WUT
TC223L	133	1000	96	FPU	1/1	78	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-100	EVR, WUT
TC222L	133	1000	96	FPU	1/1	59	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-80	EVR, WUT
TC214L	133	500	96	FPU	1/1	120	14	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-144	EVR, WUT
TC213L	133	500	96	FPU	1/1	78	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-100	EVR, WUT
TC212L	133	500	96	FPU	1/1	59	24	no	3	2xASCLIN, 4xQSPI, 4xSENT, CAN FD	K	TQFP-80	EVR, WUT

[1] CIF = camera and external ADC Interface, FFT = fast fourier transform accelerator, FPU = floating point unit, PCP = peripheral control processor
[2] ASC = asynchronous serial channel, ASCLIN = asyn/synchronous local interconnect network, HSSL= high-speed serial link, I²C = inter-integrated circuit, LIN = local interconnect network, MLI = micro link interface, MSC = micro second channel, PSI5 = peripheral sensor interface 5, QSPI = queued serial peripheral interface, SENT = single edge nibble transmission, SSC = synchronous serial channel, CAN FD ISO11898-1:2015
[3] Ambient temperature range: A = -40°C ... 140°C, B = 0°C ... 70°C, F = -40°C ... 85°C, H = -40°C ... 110°C, K = -40°C ... 125°C, L = -40°C ... 150°C, X = -40°C ... 105°C
[4] EVR = embedded voltage regulator, HSM = hardware security module, STBU = stand-by control unit, WUT = wake-up timer

Evolution from TC2xx to TC3xx - Easy migration with focus on reuse

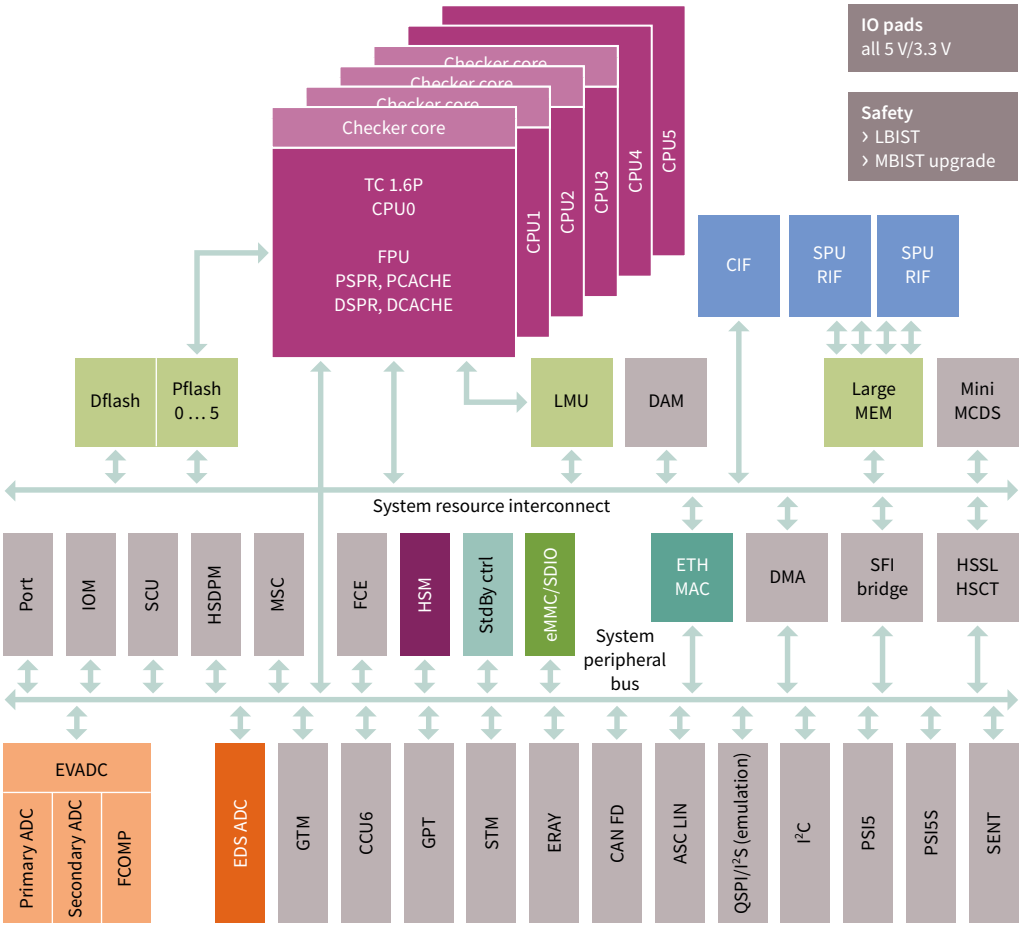
- Fast conversion of existing AURIX™ TC2xx designs
  - Backwards compatibility
  - High AURIX™ TC3xx compatibility to pinout of existing QFP100/144/176 and BGA packages
- Flexibility - scalability within the AURIX™ TC3xx family
  - Up-/Downgrade paths for devices in identical packages
  - Compatible pin-out of QFP/BGA package options enabling combination designs
- Pin-to-pin compatibility between the devices of AURIX™ TC2xx/TC3xx and from generation to generation
- A high scalability with a very large portfolio for both AURIX™ TC2xx and TC3xx

www.infineon.com/aurix

For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ TC3xx family system architecture

AURIX™ TC3xx – scalable family - from low-cost to high-performance applications



Performance
› New TriCore™ 162 generation
› New instructions
› Up to 6 CPUs at 300 MHz
› New direct flash access path

HSM: Full EVITA compliance
› New accelerators ECC256/SHA256
› Available on all devices

ADAS
› LVDS IF
› Signal processing unit

ADC
› Improvement of existing ADC
› Reduction of capacitive load

Delta-sigma
› Enhanced concept

Memories
› Larger SRAM
› SRAM/flash ratio increased
› Enhanced MPU
› A/B swap support

Stand-by control unit
› Low-power modes

Ethernet
› 1 Gbit/s ETH
› QoS services
› Remote DMA

eMMC/SDIO
› External NAND flash IF

AURIX™ TC3xx provides an upgrade on key parameters with focus on SW and HW reuse

Performance increase and reduction of power	Increased from 3 to 6 cores Developed in 40 nm for power consumption reduction
Scalable & backwards compatible to TC2xx	Fully compatible devices with focus on HW & SW reuse
Functional safety	IEC61508 compliant enabling SiL-3 level
Enhanced security	Upgraded to Full EVITA support
Improved networking	Richer peripheral set
SOTA	Full support of SOTA A/B swap

www.infineon.com/aurix

AURIX™ TC3xx package scalability

		TQFP-80	TQFP-100	T/LQFP-144	BGA-180	LQFP-176	BGA-233	LFBGA-292	LFBGA-516
6x 300 MHz	9x A series 16 MB							TC397XA 300 MHz	
6x 300 MHz	9x series 16 MB							TC397x 300 MHz	TC399x 300 MHz
4x 300 MHz	Ex series 12 MB							TC387Qx 300 MHz	
4x 300 MHz	8x series 10 MB							TC387Q 300 MHz	TC389Q 300 MHz
3x 300 MHz	7x X series 6 MB							TC377TX 300 MHz	
3x 300 MHz	7x series 6 MB					TC375T 300 MHz		TC377T 300 MHz	
2x 300 MHz	6x series 4 MB			TC364D 300 MHz	TC366D 300 MHz	TC365D 300 MHz		TC367D 300 MHz	
4x 300 MHz	Ax series 4 MB						TC3A8Q 300 MHz	TC3A7Q 300 MHz	
3x 300 MHz	5x A series 4 MB				TC356TA 300 MHz			TC357TA 300 MHz	
2x 300 MHz	3x A series 2 MB				TC336DA[1] 200 MHz			TC337DA[1] 200 MHz	
1x 300 MHz	3x series 2 MB	TC332L[1] 200 MHz	TC333L[1] 200 MHz	TC334L[1] 200 MHz	TC336L[1] 200 MHz			TC337L[1] 200 MHz	
1x 300 MHz	2x series 1 MB	TC322L 160 MHz	TC323L 160 MHz	TC324L 160 MHz				TC327L 160 MHz	

Flash / Package

L – Single lockstep core D – Dual core T – Triple core Q – Quadruple core X – Sextuple core

Control and actuate | Sense and compute

1) An option of 300 MHz is also available

- Advanced package technologies deliver the best price/performance ratio
- Customers can choose between different devices in the same pin-compatible package

MCU scalability
- Performance and flash
- Pin compatibility
- Binary-compatible cores

Safety/security concept
- ISO 26262 compliance
- IEC61508 compliant

AURIX™ TC3xx

Power consumption
- On-chip SC DC-DC high-efficiency power supply
- Integrated standby controller

Connectivity
- Ethernet: up to 2x1 GB
- CAN FD: up to 12 channels
- eMMC IF

www.infineon.com/aurix

For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ TC3xx portfolio

Product type	Cores/lockstep	Max clock frequency [MHz]	Program memory [kB]	SRAM (incl. cache) [kB]	Radar accelerator/ radar interface [1]	CAN/CAN FD nodes	Ethernet 100/1000 Mbit	External bus interface [2]	Communication interfaces	HSM	Temperature ranges	Packages	Additional features/ remarks [3]
AURIX™ TC3xx family													
TC399XX	6/4	300	16000	6912	no	12	1	EBU, eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSI5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC399XP	6/4	300	16000	2816	no	12	1	EBU, eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSI5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC397XX	6/4	300	16000	6912	no	12	1	eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSI5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC397XP	6/4	300	16000	2816	no	12	1	eMMC, 2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSI5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC397XA	6/4	300	16000	6912	2x SPU/ 8x 400 Mbit/s LVDS	12	1	2x HSSL	6x SPI, 2x FlexRay, 12x LIN, 25x SENT, 4x PSI5, 2x I2C, 4x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC389QP	4/2	300	10000	1568	no	12	1	HSSL	5x SPI, 2x FlexRay, 24x LIN, 25x SENT, 4x PSI5, 2x I2C, 3x MSC	EVITA full	K, L	LFBGA-516	5 V/3.3 V EVR, 8-bit SCR
TC387QP	4/2	300	10000	1568	no	12	1	HSSL	5x SPI, 2x FlexRay, 24x LIN, 25x SENT, 4x PSI5, 2x I2C, 3x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC377TX	3/3	300	6000	4208	no	12	2	eMMC, HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSI5, 1x I2C, 2x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC377TP	3/2	300	6000	1136	no	8	1	HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSI5, 1x I2C, 2x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC375TP	3/2	300	6000	1136	no	8	1	HSSL	5x SPI, 1x FlexRay, 12x LIN, 15x SENT, 2x PSI5, 1x I2C, 2x MSC	EVITA full	K, L	LQFP-176	5 V/3.3 V EVR, 8-bit SCR
TC367DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSI5, 1x I2C, 1x MSC	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC366DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSI5, 1x I2C, 1x MSC	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC365DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSI5, 1x I2C, 1x MSC	EVITA full	K, L	LQFP-176	5 V/3.3 V EVR, 8-bit SCR
TC364DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSI5, 1x I2C, 1x MSC	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC364DP	2/2	300	4000	672	no	8	1	HSSL	4x SPI, 1x FlexRay, 12x LIN, 10x SENT, 2x PSI5, 1x I2C, 1x MSC	EVITA full	K, L	LQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC357TA	3/2	300	4000	3664	2x SPU/ 8x 400 Mbit/s LVDS	8	1	no	4x SPI, 1x FlexRay, 4x LIN	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC356TA	3/2	300	4000	3664	2x SPU/ 8x 400 Mbit/s LVDS	8	1	no	4x SPI, 1x FlexRay, 4x LIN	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC337DA	2/1	200	2000	1568	1x SPU/ 4x 400 Mbit/s LVDS	8	1	eMMC	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC336DA	2/1	200	2000	1568	1x SPU/ 4x 400 Mbit/s LVDS	8	1	eMMC	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC337LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC336LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	LFBGA-196	5 V/3.3 V EVR, 8-bit SCR
TC334LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC333LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-100	5 V/3.3 V EVR, 8-bit SCR
TC332LP	1/1	200	2000	248	no	8	no	no	4x SPI, 1x FlexRay, 12x LIN, 6x SENT	EVITA full	K, L	TQFP-80	5 V/3.3 V EVR, 8-bit SCR
TC327LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	LFBGA-292	5 V/3.3 V EVR, 8-bit SCR
TC324LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-144	5 V/3.3 V EVR, 8-bit SCR
TC323LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-100	5 V/3.3 V EVR, 8-bit SCR
TC322LP	1/1	160	1000	96	no	8	no	no	4x SPI, 6x SENT, 6x LIN	EVITA full	K, L	TQFP-80	5 V/3.3 V EVR, 8-bit SCR

1) SPU – Signal processing unit
2) HSSL – High-speed serial link
3) 8-bit SCR – Standby controller for low power modes
4) EVR – Embedded voltage regulator

www.infineon.com/aurix

For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ starter and application kits

Infineon starter kits – 32-bit microcontrollers

AURIX™ Triboards Kits

- Full evaluation board for development to write and debug your 1st programs
- Includes getting started advice, free TriCore™ entry tool chain, technical documentation, compiler and debugger
- TriBoard available for all productive silicon

www.infineon.com/aurix-kits

AURIX™ TFT Kits

- Low cost board for early evaluation with limited access to signals
- Additional touchscreen display for convenient handling
- TFT board available for every silicon

Click on the following to find/purchase the kit:
www.infineon.com/aurix-kits

Arduino AURIX™ TC275 ShieldBuddy Kit

- The Hitex TC275/TC375 ShieldBuddy follows the Arduino standard
- Compatible with 100's of Arduino application shields
- Evaluation licenses available
- Ideal for getting started on a high-end real time embedded industrial or automotive application as well as students and hobbyists

www.infineon.com/aurixlowcostarduinokits

Arduino AURIX™ TC375 ShieldBuddy Kit

Order number: KIT_A2G_TC375_ARD_SB

- Compatible with 100's of Arduino application shields
- Evaluation licenses available
- Ethernet
- Ideal for getting started on a high-end real time embedded industrial or automotive application as well as students and hobbyists

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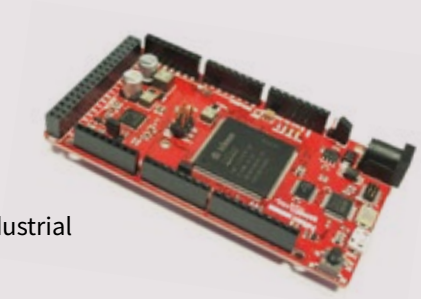

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

AURIX™ TC275 Lite kit

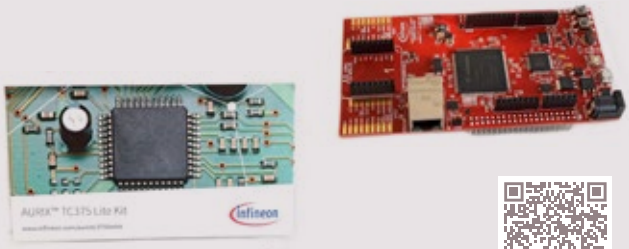
- AURIX™ TC275 device in LQFP-176 package
- FTDI based debugger with micro USB
- Use of Arduino Uno/compatible platform

www.infineon.com/aurixlowcostarduinokits

AURIX™ TC375 Lite kit

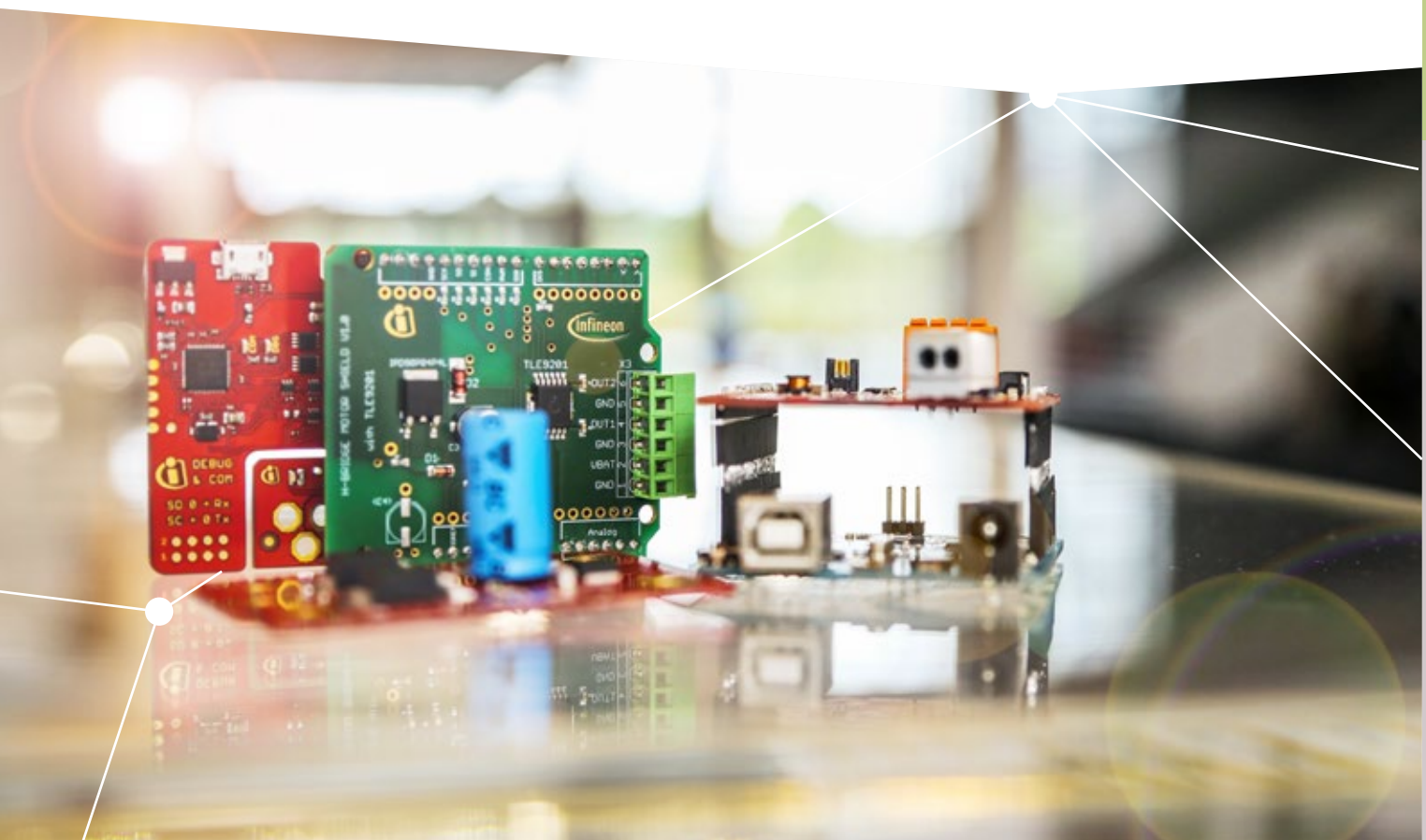
- AURIX™ TC375 device in LQFP-176 package
- Ethernet PHY
- FTDI based debugger with micro USB
- Use of Arduino Uno/compatible platform

www.infineon.com/aurixlowcostarduinokits



Discover our AURIX™ kits platform for more starter and application kits

www.infineon.com/aurixkits



Infineon application kits – 32-bit microcontrollers

24 GHZ Radar

Based on the Infineon AURIX™ and MMIC BGT24A families

- BGT24A transceiver MMIC family, e.g. BGTA24ATR12,
- 2-bit radar microcontroller family, e.g. SAK-TC264DA- 40F200
- FFT acceleration engine and extended memory for radar image storage
- Ethernet as measurement interface

www.infineon.com/aurixapplicationkits

60 GHZ Radar

XENSIV™ BGT60ATR24C
+ AURIX™ TC356TA
+ OPTIREG™ TLS4120D0EPV33/TLS715B0EJV50

- Modular architecture
- Automotive qualified components
- Virtual array processing (TDM MIMO)
- Ultra-wideband operation of 4 GHz
- Optimized performance versus power with SPU

www.infineon.com/aurixapplicationkits

Motor control

Order number: KIT_AURIX_TC234_MOTORCTR

- TC234 application kit with TFT display incl. safety supply TLF35584
- Driving of a 3-phase PMSM/BLCD (12 V/max. 50 W)
- BLDC motor from Nanotec integrated
- Software available with flexible configuration

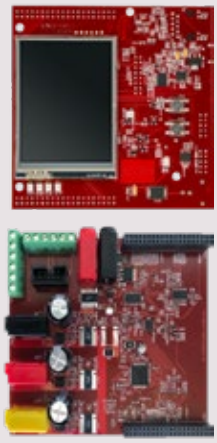
www.infineon.com/aurixapplicationkits

Motor control board AURIX™ TC387

Order number: KIT_AURIX_TC234_MOTORCTR

- TC387 Application Kit with TFT Display incl. safety supply TLF35584
- eMotor Power board: 3-phase motor control power board with TLE9180D-31QK 3-phase gate driver IC, MOSFET power stage, and auxiliary components
- Commands and monitoring via TFT touch screen
- Field oriented control (FOC) algorithm using 3-phase current sensing (EVADC) encoder as position sensor (GPT12) and AURIX™ GTM as PWM generator

www.infineon.com/aurixapplicationkits



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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Infineon application kits – 32-bit microcontrollers

Wireless charging: the beast 1.0

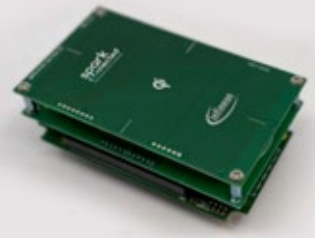
- WPC Qi v1.2.4 certified
- Support fast charging enabled devices (7.5W and 9W)
- AUTOSAR support
- Improved accuracy Foreign Object Detection (FOD)

www.infineon.com/aurixapplicationkits

Wireless charging: the beast 2.0

- Beast 2.0 is powered by the high-performance Infineon AURIX™ or Traveo™ II
- Latest WPC Qi functionality
- Supports 15W charging for Qi-certified devices
- Improved accuracy Foreign Object Detection (FOD)
- Supports future products and standards with field-upgradeable Pantheon™ software

www.infineon.com/aurixapplicationkits



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Industrial robotics

Application example

Application features

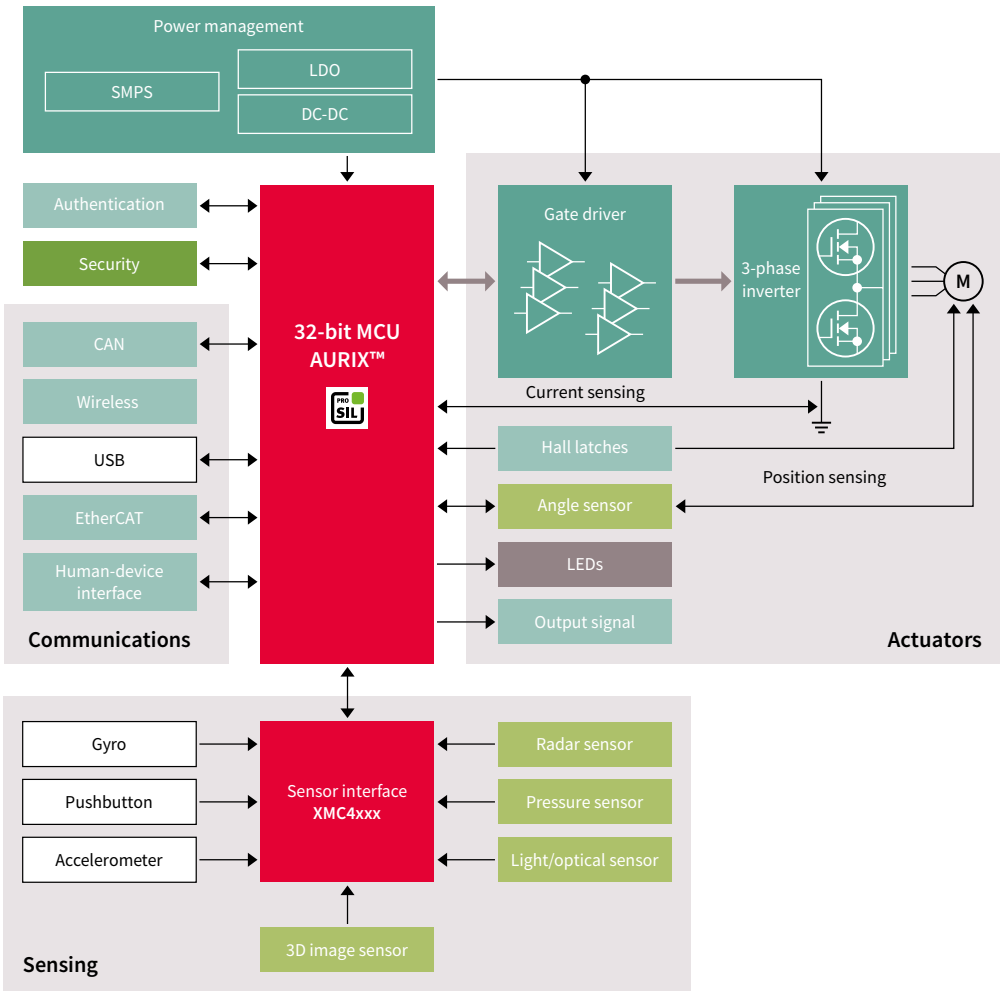
- High computing performances
- High level of accuracy, integration and efficiency
- Safety management in line with current norms
- Various topologies for axis, joints and motors
- Security features that protect intellectual property from counterfeiting

System benefits

- High computing performance: up to 6x 300 MHz
- High flexibility thanks to tailored peripherals
- Integrated safety support (EN ISO 10218 and ISO/TS15066)
- Integrated security with hardware security module
- Robust 3 V-, 5 V-, LVDS – PortPins
- Large portfolio with long-term availability

Suggested products

- TC23x
- TC33x
- TC36x
- TC37x
- TC38x
- TC39x
- XMC4xxx



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For more details on the product, click on the part number, visit infineon.com or contact our product support.

Microcontroller PDH partner

Preferred Design Houses (PDH) and software resellers – AURIX™ Traveo and PSoC, AURIX™ tools and software

AURIX™ Tools and Software

To enable customers to achieve optimal performance when using the powerful AURIX™ architecture, Infineon has built up a network of strong partnerships with companies highly specialized in multicore software development. Infineon's multicore partners can offer the best multicore expertise and tools on the market for each stage of the software design process, covering everything from the initial multicore knowledge acquisition phase right up to final optimization of the multicore software.

AURIX™ Embedded Software

- AURIX™ Applications software
- Autosar
- Non-Autosar OS/RTOS
- Middleware
- Communication and connectivity
- Bootloader/OTA
- Safety

AURIX™ Tools

- AURIX™ Free Tools
- Calibration/Measurement/Prototyping
- Compilers
- Debugger, Test Tools
- Flash Tools
- Simulation/Modelling
- SW Automation/Autocoding

Discover our new AURIX™ Tools and Software ecosystems where you can find everything you need within easy reach www.infineon.com/aurixtools and www.infineon.com/aurixsoftware

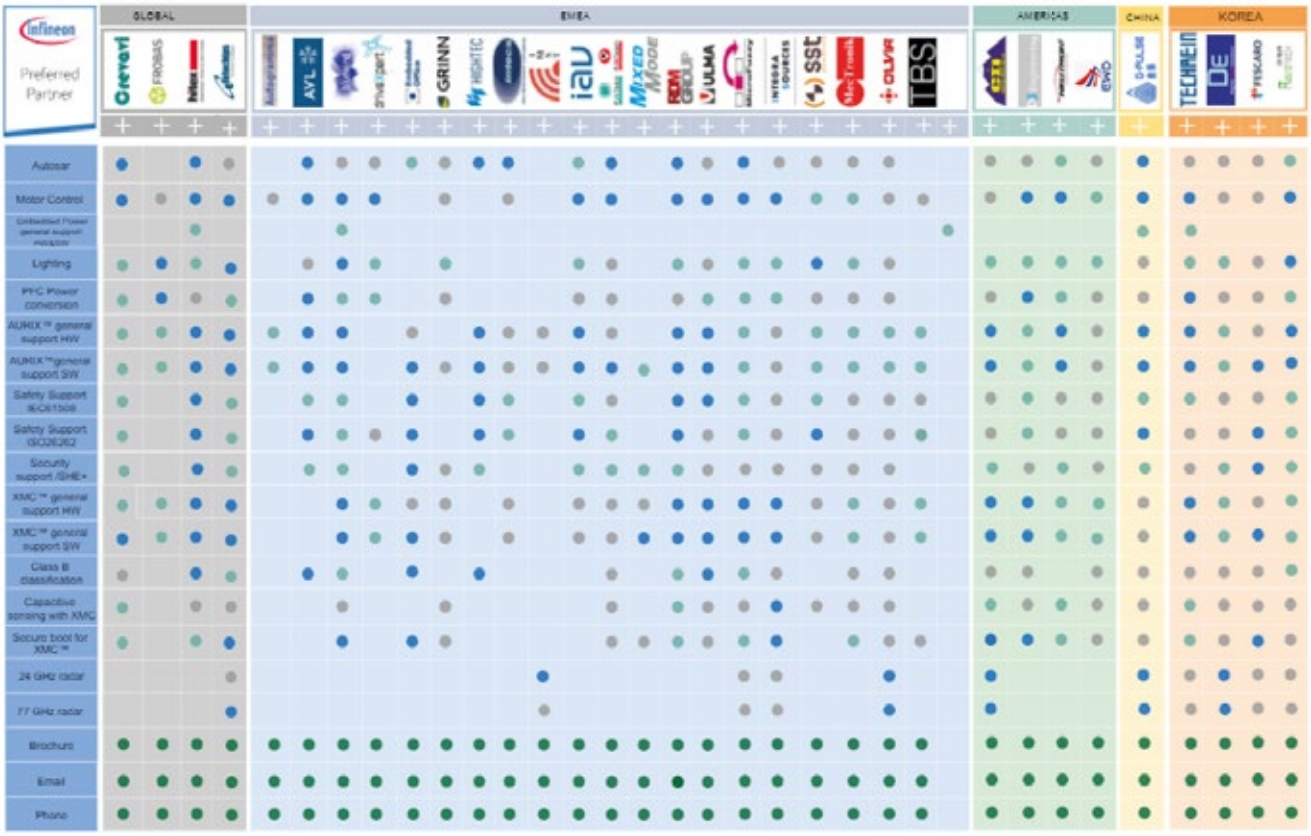
www.infineon.com/aurix

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Classic (Free of charge)	› 1st level customer support covering Infineon products/solutions › Technical interface and support to the customer	› Driving design at customer › Basic training for design teams at customer › 24 h response time to the customer
Premium (Consultancy mode) To be agreed between customers and PDH	› Project management and project-specific application support › Specification of general software architecture, defining required layers, control and data flow structure etc. › Specification and implementation of custom device drivers › Optimization of software components with regard to speed/code size	› Software testing › Support for project-specific functional safety engineering › Project-specific support for security solution › Safety support › Security support › Multicore support

Preferred Design Houses (PDH)

The preferred design house extends the support force by specifying and customizing the know-how. Furthermore, it brings an additional value for customer service. The preferred design house supports the set up for systems using AURIX™ and XMC™, including software and other Infineon products. Our partners are trained to use AURIX™ and XMC™.



Basic ●
Essential principles and elementary know-how to support a customer; provision of basic training for design teams

Advanced ●
High-level project-specific application support/consulting

Expert ●
Extensive knowledge and ability to fully support development

www.infineon.com/aurix

TRAVEO™ II portfolio

Thanks to its special features the Traveo™ II family is the perfect match for industrial applications. With processing power and network connectivity built into a single Arm® Cortex®- M4F and dual Cortex®- M7F, the Traveo™ II family comes up with an enhanced performance up to 1500 DMIPS and a high-performance CPU operating up to 350 MHz.

Product type	Supply Voltage [V]	Main Core frequency [MHz]	Flash (Code + Work) [kB]	SRAM [kB]	GPIO	ADC Channels	CAN/CAN FD Channels	Ethernet 100/1000 Mbit	SCB Channel	CXPI Channel	SMIF (SPI/HyperBus)	LIN Channel	I²S Channel	eMMC Channels	HSM	Temperature ranges	Packages	SIL Level
TRAVEO™ T2G CYT2B7 series																		
CYT2B75CADQ0AZEGS	2,7 to 5,5	160	1088 + 96	128	78	39	6	no	8	0	-	7	-	0	Yes	E	100-LQFP	ASIL-B
CYT2B78CADQ0AZEGS	2,7 to 5,5	160	1088 + 96	128	152	64	6	no	8	0	-	8	-	0	Yes	E	176-LQFP	ASIL-B
TRAVEO™ T2G CYT2B9 series																		
CYT2B95CACQ0AZEGS	2,7 to 5,5	160	2112 + 128	256	78	39	8	no	8	4	-	9	-	0	Yes	E	100-LQFP	ASIL-B
CYT2B98CACQ0AZEGS	2,7 to 5,5	160	2112 + 128	256	152	64	8	no	8	4	-	12	-	0	Yes	E	176-LQFP	ASIL-B
TRAVEO™ T2G CYT4BF series																		
CYT3BB8CEBQ0AESGS	2,7 to 5,5	250	4160 + 256	768	148	64	8	1	10	0	1	16	TX 3ch, RX 3ch (3 instances)	1	Yes	S	176-TEQFP	ASIL-B
CYT3BBBCEBQ0BZEGS	2,7 to 5,5	250	4160 + 256	768	220	72	8	1	11	0	1	16	TX 3ch, RX 3ch (3 instances)	1	Yes	E	272-BGA	ASIL-B
TRAVEO™ T2G CYT4BF series																		
CYT4BF8CEDQ0AEEGS	2,7 to 5,5	350	8384 + 256	1024	148	81	10	1	10	0	1	17	TX 3ch, RX 2ch (3 instances)	1	Yes	E	176-TEQFP	ASIL-B
CYT4BFCCJDQ0BZEGS	2,7 to 5,5	350	8384 + 256	1024	240	86	10	2	11	0	1	20	TX 3ch, RX 2ch (3 instances)	1	Yes	E	320-BGA	ASIL-B

www.infineon.com/traveo

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TRAVEO™ II kits

CYTVII-B-E-BB

- The CYTVII-B-E-BB is a generic base board that can be connected to compatible Traveo™ II entry or high-end evaluation boards so as to extend its functionality
- Connects to most CYTVII-B-E-xxx and CYTVII-B-H-xxx evaluation boards

www.infineon.com/cms/en/product/evaluation-boards/cytvii-b-e-bb

CYTVII-B-E-176-SO

- The CYTVII-B-E-176-SO evaluation board is based on the Traveo™ II entry family of devices.
- Traveo™ II is CYT2B78CADES

www.infineon.com/cms/en/product/evaluation-boards/cytvii-b-e-176-so

CYTVII-B-E-1M-SK

- The CYTVII-B-E-1M-SK is a low-cost easy to use evaluation board based on the Traveo™ II entry family of devices.
- Traveo™ II CYT2B75CADES MCU
- Designed in an Arduino form factor so that users can connect many off-the-shelf Arduino shields to it, to expand its functionality

www.infineon.com/cms/en/product/evaluation-boards/cytvii-b-e-1m-sk

CYTVII-B-H-8M-320-CPU

- The CYTVII-B-H-8M-320-CPU evaluation board is based on the Traveo™ II high-end family of devices.
- Traveo™ II CYT4BFCCHCES MCU
- Audio, Ethernet, SD Card, SMIF

www.infineon.com/cms/en/product/evaluation-boards/cytvii-b-h-8m-320-cpu

MOTIX™ MCU – Embedded Power ICs

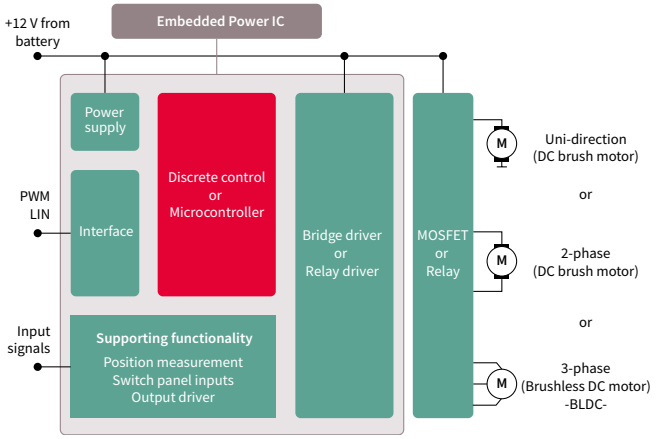
System-on-chip solution for motor control applications

Infineon's MOTIX™ Embedded Power ICs include a 32-bit Arm® Cortex®-M microcontroller, a voltage regulator, the communication interfaces, along with the driving stages for motor control applications. These system-on-chip solutions offer an unmatched level of integration of all functions required to sense, control and actuate a motor. They save space and energy, improve the overall system reliability through advanced diagnosis features and reduce the overall cost due to a minimum number of external components. They perfectly fit with a range of motor control applications where a small package form factor and a minimum number of external components are essential.

Criteria	TLE984x	TLE9845	TLE9850/1	TLE985x	TLE986x	TLE987x
Controller	Arm® Cortex®-M0				Arm® Cortex®-M3	
Core frequency	25-40 MHz	40 MHz			24-40 MHz	
Flash size	36 KB – 64 KB	48 KB	48/64 KB	48 KB – 96 KB	36 KB – 256 KB	
Driver stage	Relay	Half-bridge		H-bridge		B6-bridge
	Relay	PN FET half-bridge	NN FET half-bridge	N FET H-bridge		N FET B6-bridge
HV monitor inputs	4-5	5	4		0-1	
Junction temperature levels	150°C	150°C	150°C and 175°C	150°C and 175°C	150°C and 175°C	
Packages	VQFN-48-31		VQFN-48-31 VQFN-48-29	VQFN-48-31 VQFN-48-29	VQFN-48-29 and VQFN-48-31 TQFP-48-10	

Features and benefits

Key features	Customer benefits
› Extensive diagnostics and protections embedded within the system-on-chip	› High levels of system reliability
› Minimum number of external components needed	› Reduced cost
› Platform based approach with compatible software between the product families	› Support multiple and flexible designs with minimal effort
› Data processing, actuation and sensing integrated into the product with 32-bit Arm® Cortex®-M	› Space saving
› Compact package with 7x7 mm footprint (VQFN-48/TQFP-48)	› Energy saving
› Intelligent power saving modes including stop and sleep mode and energy management for external sensors (on demand)	



- MOTIX™ Embedded Power ICs enable mechatronic motor control solutions for either relay, half-bridge or full-bridge DC and BLDC motor applications
- They are supported by a complete development tool chain provided by Infineon and third party vendors. The tool chain includes compilers, debuggers, evaluation boards, LIN low level drivers and configuration tools as well as variety of example software code.

www.infineon.com/embeddedpower

For more details on the product, click on the part number, visit infineon.com or contact our product support.

BLDC Motor Control Shield for Arduino

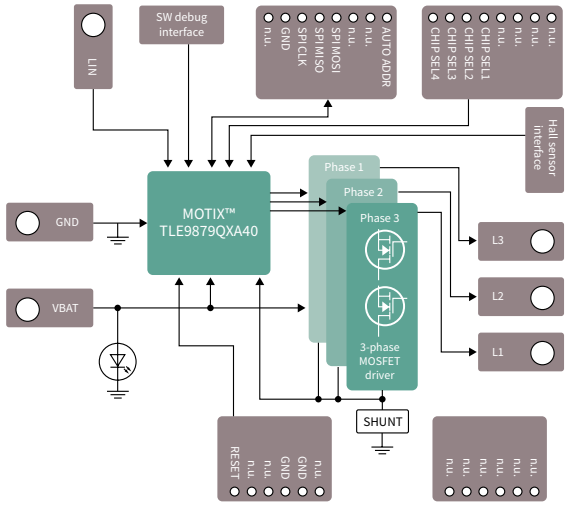
3-phase motor control shield with MOTIX™ TLE9879QXA40

The BLDC Shield for Arduino uses TLE9879QXA40, which is a part of the MOTIX™ TLE987x family of the Infineon MOTIX™ MCU portfolio. It enables the shield to drive 3-phase BLDC motors with a variety of different features. One Arduino base board can control up to four BLDC shields via SPI. The BLDC Shield firmware provides an auto-addressing functionality. Every shield in the stack can be controlled independently and run completely different motor control algorithms if desired.

The shield implements three different advanced motor control algorithms:

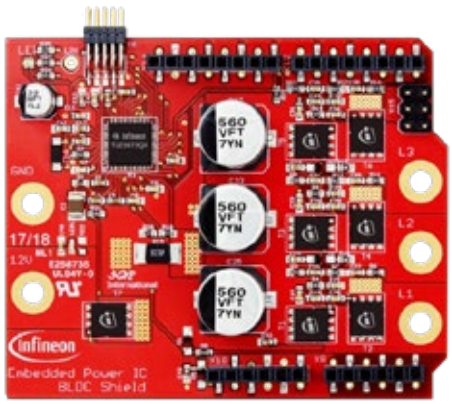
- Sensorless field-oriented control (FOC),
- Block commutation with back EMF (BEMF)
- Hall based block commutation (HALL)

The firmware can be changed using the SWD Interface Additional connectors for voltage supply, motor-phases and hall sensors speed up the evaluation.



Features and benefits

Key features	Customer benefits
Implemented motor control algorithms (FOC, BEMF, Hall)	Easy to use API, allowing the user to quickly setup an application
Controlled over Arduino via SPI	
Compatible with the Arduino Uno or the Infineon XMC™ baseboard	
Up to four shields can be used simultaneously	High performance BLDC motor control in form of the TLE987x chip
Each shield can be controlled independently	
Motor parameters can be set for each shield individually	



Our BLDC Shield for Arduino comes with a library which includes a collection of code that makes it easy for you to run your project. The Arduino library offers an intuitive API to quickly setup and configure an application.

www.infineon.com/bldcmotorshield
www.infineon.com/shields-for-arduino

Motor Control | Pumps | Fans | Multicopter | Power Tools | Vacuum cleaner

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CAN-FD transceivers

High- and low-speed CAN-FD Transceivers for automotive and many other applications

Recently the automotive industry newly established the CAN-FD (Flexible Data-rate) protocol for faster CAN communication up to 5Mbit/s and CAN PN (Partial Networking) for improved energy efficiency.

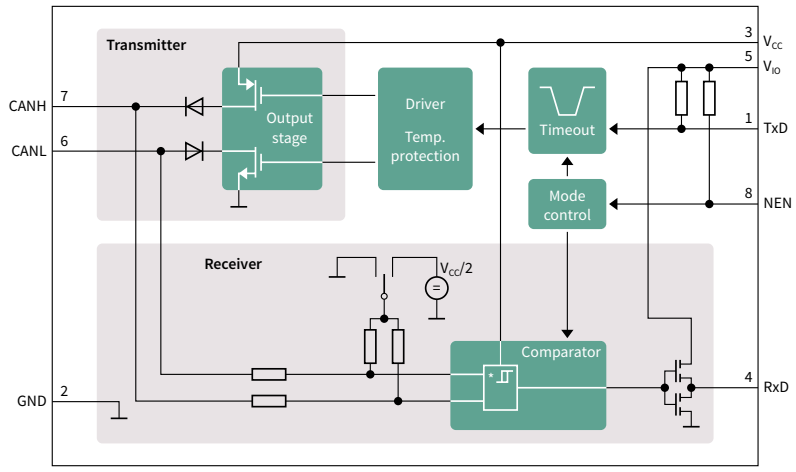
Dependent on the respective network architecture and the related ECU supply path, different transceiver types are used. Infineon transceivers ensure reliable communication and help minimizing the current consumption.
The products provide the best value by its high performance, ruggedness and reliability.

Features and benefits

Key features
› Transmission rates up to 5 Mbit/s ISO11898 compliant
› Low-power modes
› Receive-only mode
› Standby/sleep mode
› Bus wake up
› Thermal protection
› CAN FD compliance

Key benefits
› Low current consumption
› Excellent EMI performance & robustness
› Pin-to-pin replacements for industry-standard parts

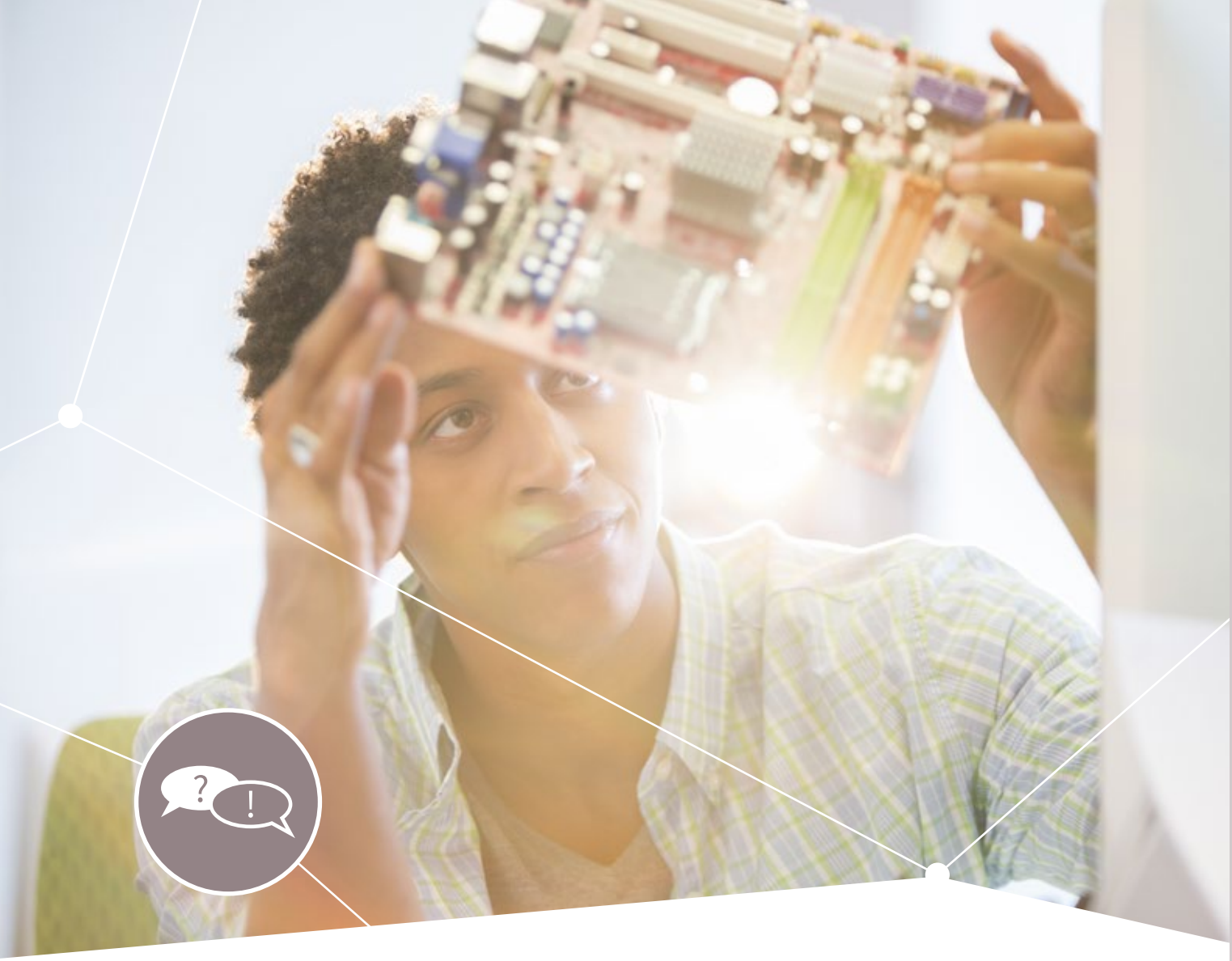
Block diagram TLE9250V



PG-DSO8-65	PG-TSON-8-1
TLE9250SJ_GRN	TLE9250LE_GRN
TLE9250VSJ_GRN	TLE9250VLE_GRN
TLE9250XSJ_GRN	TLE9250XLE_GRN
TLE9251SJ_GRN	TLE9251LE_GRN
TLE9251VSJ_GRN	TLE9251VLE_GRN
	TLE9251VLE

www.infineon.com/can-transceivers

For more details on the product, click on the part number, visit infineon.com or contact our product support.



Infineon support for industrial microcontrollers

One platform, countless solutions

Further information, datasheets and documents

www.infineon.com/xmc
www.infineon.com/xmc1000
www.infineon.com/xmc4000
www.infineon.com/aurix
www.infineon.com/makers

XMC SC Wireless power controller:

www.infineon.com/xmcscwirelesspowercontrollers

XMC™ MCUs ecosystem and enablement – kits, board, tools and software

Boards and kits:
www.infineon.com/xmc-dev
www.infineon.com/connectivitykit
www.infineon.com/ethercat

Ecosystem and tools:

www.infineon.com/xmc-ecosystem

DAVE™ IDE:

www.infineon.com/dave

Power management ICs

- XDP™ SMPS controllers
- DC-DC digital multiphase controllers
- AC-DC power management ICs
- PFC controllers
- PWM controllers and climate saver systems
- Resonant LLC half-bridge controller ICs
- NCF tag-side controllers
- OptiMOS™ integrated power stages
- Switching regulators
- Voltage regulators
- Digital power controller
- 3-phase smart gate drive controller IC
- Audio amplifier ICs
- AC-DC LED driver ICs
- DC-DC LED driver ICs
- iMOTION™ integrated motor control solutions
- MOTIX™ motor control ICs

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

XDP™ SMPS

IDP2308 and IDP2303A – digital multimode PFC+LLC combo controller

The IDP2308 and IDP2303A are high-performance digital combo controllers with integrated drivers and a 600 V depletion cell designed for boost PFC and half-bridge LLC targeting switched mode power supplies (SMPS) from 75 W to 300 W.

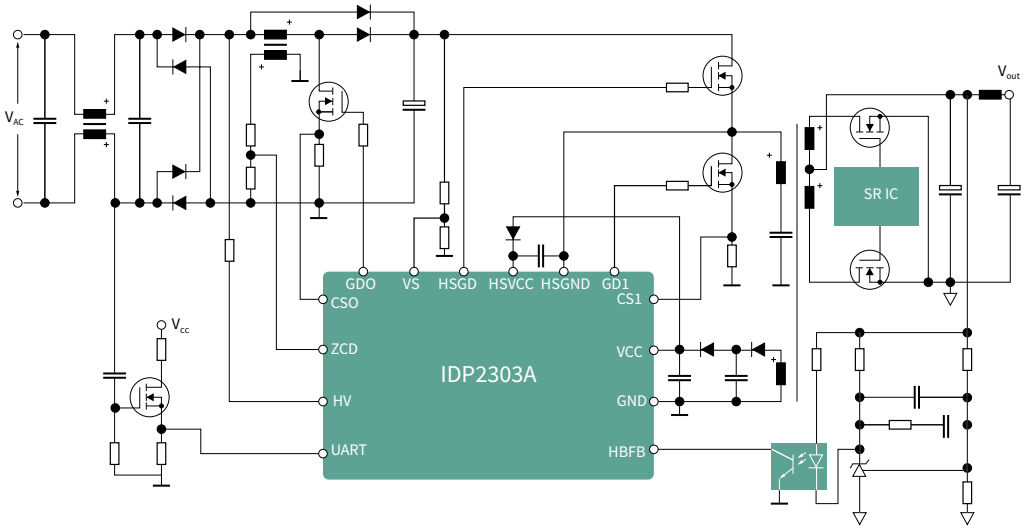
- Support non-AUX operation with the lowest standby performance and start-up cell
- Support multimode PFC operation for optimized efficiency curve
- Configurable frequency setting for LLC soft-start and normal operation
- Synchronous PFC and LLC burst mode control with soft-start to prevent acoustic noise
- Excellent dynamic response by adaptive LLC burst mode
- Configurable and comprehensive protections for PFC/LLC/IC temperature
- IEC62368-1 certified active X-cap discharge function
- Flexible IC parameter setting with digital UART interface supports PSU platform approach

Key benefits

- Low BOM count due to high integration of digital control
- No auxiliary power supply needed
- Easy design of system schematic and PCB layout
- Small form factor design
- Higher system reliability
- Shorter development cycles and higher design and production flexibility

Product	Target application	Major difference	Package
IDP2308	TV embedded PSU	2nd redundant PFC output overvoltage protection	DSO-14 (with enhanced HV creepage distance)
IDP2303A	Adapter, general SMPS	Constant output voltage	DSO-16

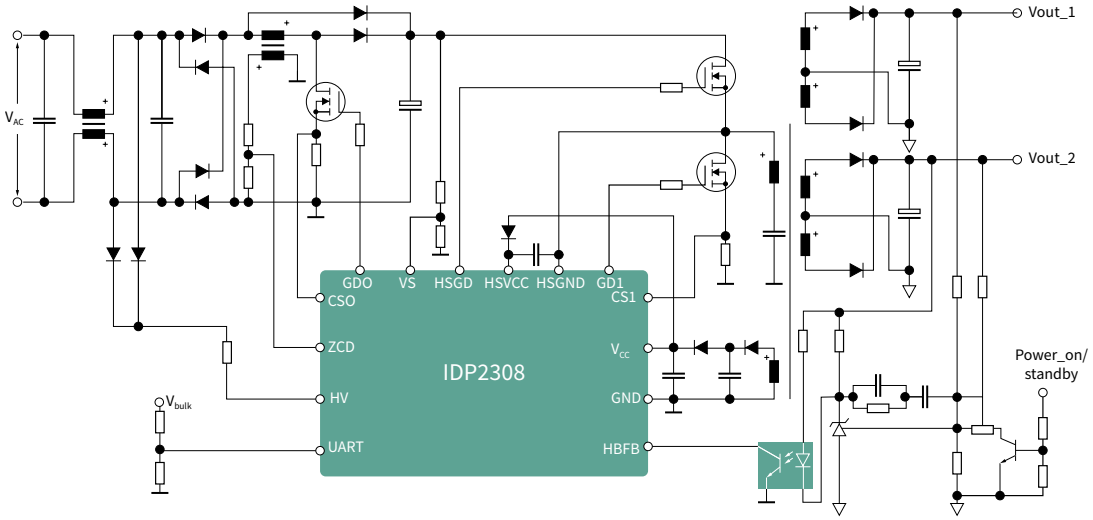
IDP2303A – power adapter



www.infineon.com/xdp-smps

For more details on the product, click on the part number, visit infineon.com or contact our product support.

IDP2308 – embedded PSU



Target applications

- LCD TV power supply
- General SMPS
- Power adapter

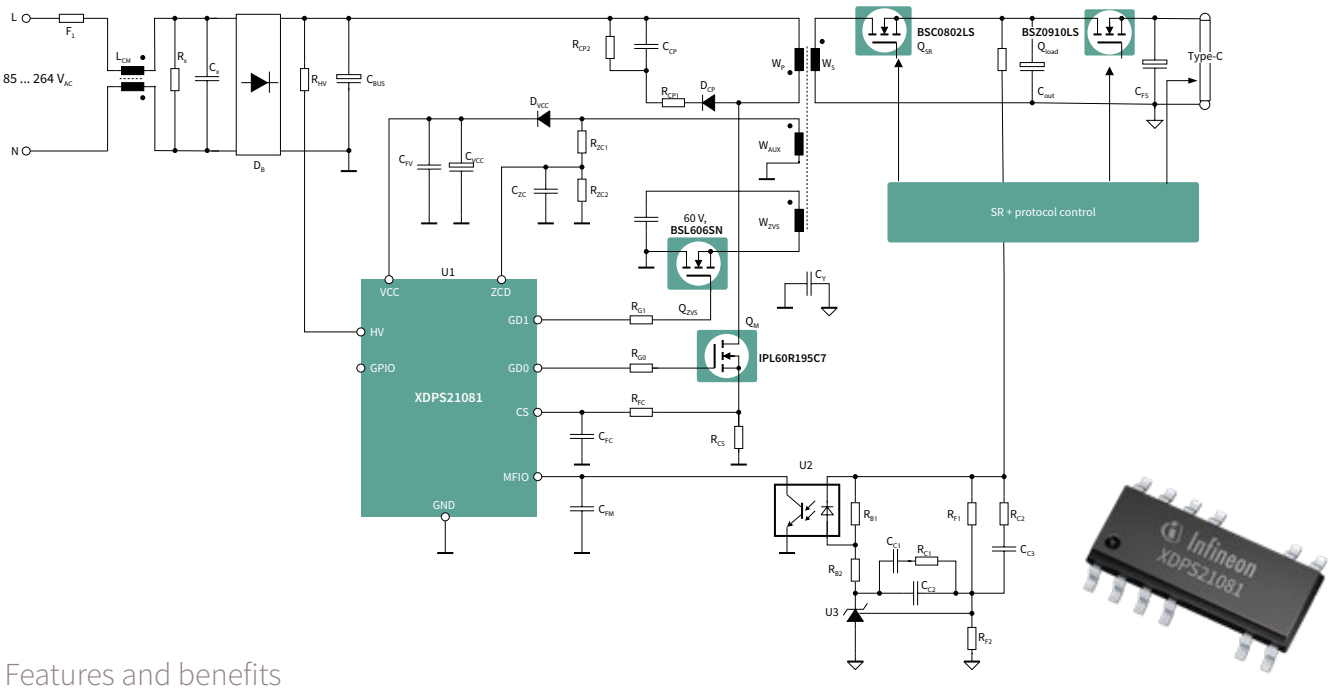
www.infineon.com/xdp-smps

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDP™ SMPS

XDPS21081 – digital FQR flyback controller

XDPS21081 is a flyback controller with zero voltage switching (ZVS) on the primary side to achieve high efficiency with simplified circuitry and economical switches. By driving an external low-voltage switch to induce a negative current to discharge the main high-voltage MOSFET, switching losses can be reduced further than the traditional valley by switching the type of switching scheme. To achieve high efficiency with synchronous rectification, the XDPS21081 multimode digital forced quasi-resonant (FQR) flyback controller IC ensures discontinued conduction mode (DCM) operation via valley detection for a safe and robust operation.



Features and benefits

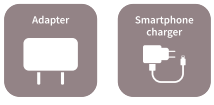
Key features	Key benefits
› Zero voltage switching	› Reduce switching loss and achieve high efficiency
› Frequency law optimization	› Optimize efficiency across various line/load conditions
› Active burst mode operation with multi-entry/exit threshold	› Optimize light and no-load efficiency
› Integrated dual MOSFET gate driver	› Save BOM count and cost with no messy external driver
› Easy ZVS implementation with an external 60 V MOSFET	› Easy to drive, low cost and widely available off the shelf 60 V MOSFET
› Multiple peak current threshold offset for different output	› Fail-safe mechanism to limit output power in the event of PD controller failure
› CrCM operation with valley detection	› Avoid CCM operation and no potential of shoot-through with SR MOSFET

REF_XDPS21081_65W1

65 W USB-PD Type-C reference design in a small form factor based on XDPS21081.

- Up to 65 W output power with 25 W/in³ power density
- Universal input range 90~264 V_{AC}
- Supported output: 5 V/3 A, 9 V/3 A, 12 V/3 A, 15 V/3 A and 20 V/3.25 A
- Peak efficiency > 93 percent
- Low no-load standby input power < 65 mW

Ordering code: REFXDPS2108165W1TOBO1



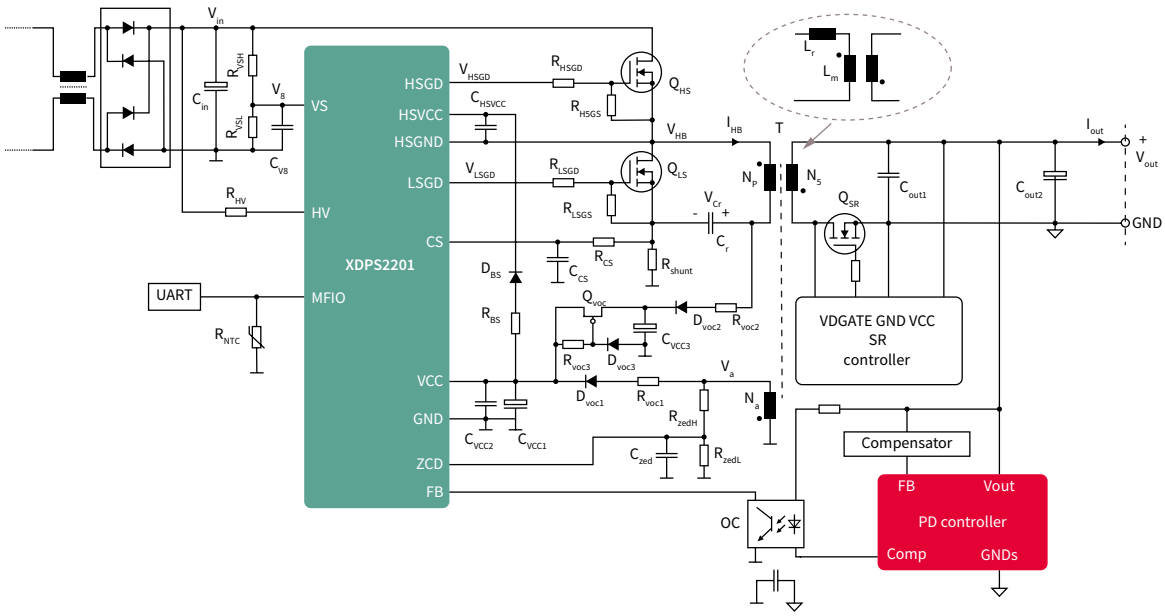
www.infineon/xdps21081

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDP™ SMPS

XDPS2201 – digital hybrid flyback controller

XDPS2201 is a multimode, digital configurable hybrid flyback controller that combines the simplicity of a traditional flyback topology with the performance of a resonant converter. By utilizing two high-voltage MOSFETs, such as CoolMOS™, the controller can drive both high- and low-side MOSFETs in an asymmetric half-bridge flyback topology. Both zero voltage and current switching are achieved through means of regulating the polarity of the magnetizing current to increase efficiency. Also, transformer leakage energy is recycled, thereby further increasing efficiency



Features and benefits

Key features	Key benefits
› Zero voltage and current switching across all line and load conditions	› Reduce switching loss and achieve high efficiency
› Multimode operation (active burst mode, DCM, ZV-RCS and CRM)	› Optimize efficiency across various line/load conditions
› Integrated high-side driver and 600 V start-up cell	› Optimize light and no-load efficiency
› Single auxiliary transformer winding and resonant cap to supply power to IC	› Save BOM count and cost with no messy external driver
› Comprehensive suite of protection feature sets	› Easy to drive, low cost and widely available off the shelf 60 V MOSFET
› Digital platform with configurable parameters	› Fail-safe mechanism to limit output power in the event of PD controller failure
	› Avoid CCM operation and no potential of shoot-through with SR MOSFET

DEMO_XDPS2201_65W1

65 W USB-PD PPS Type-C demo board in a miniature form factor based on XDPS2201.

- Up to 65 W output power with 31 W/in³ power density
- Universal input range 90~264 V_{AC}
- Supported output: 5 V/3 A, 9 V/3 A, 12 V/3 A, 15 V/3 A and 20 V/3.25 A, 5~20 V/3 A
- Peak efficiency > 93.8 percentage
- Low no-load standby input power < 75 mW

Ordering code: DEMOXDPS220165W1TOBO1

www.infineon/xdps2201

For more details on the product, click on the part number, visit infineon.com or contact our product support.

DC-DC digital multiphase controllers

Point-of-load power management

Infineon's digital multiphase and multi-rail controllers provide power for today's medium- and high-current POL applications used in telecom/datacom, server, and storage environments. Infineon's digital controller family enables OEMs and ODMs to improve efficiency and total cost of ownership while increasing power density and optimizing the total system footprint of the voltage regulator. The products highlighted in the table below represent our fifth-generation digital controller family and support up to two rails with 1-6 phases on individual rails. The I2C/PMBus interface connects the digital controllers to the application system and provides real-time telemetry information, monitoring, and control capabilities. The digital controllers are fully configurable through our PowerCode and PowerClient graphical user interfaces that allow for easy-to-use and simplified design optimization.

Multiphase configurations are supported for best power optimization

Feature		Controller family							
Configurable output rails		Dual rail	Dual rail	Dual/single rail	Dual/single rail	Dual rail	Dual/single rail	Dual/single rail	Dual rail
Part number	PMBus	PXE1610C*	IR35212	XDPE10280B*	XDPE10281B*	IR35204MTRPBF	IR35201MTRPBF	IR35223*	XDPE132G5C*
Phase configuration	Main	7 ph	7 ph	8 ph	8 ph	4 ph	8 ph	10 ph	16 ph
	Subconfigurations	6+1	6+1	8+0, 6+2, 4+4	8+0, 6+2, 4+4	3+1	8+0, 7+1, 6+2	10+0, 5+5	8+8
V_{out_max}		2.5 V	3.3 V	3.04 V	3.04 V	3.3 V	3.3 V	3.3 V	3.3 V
Switching frequency		Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz
Operating temperature range		- 5°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 85°C	- 40°C to 120°C
VQFN package		48-lead (6x6) 0.4 mm pitch	48-lead (6x6) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	40-lead (5x5) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch	48-lead (6x6) 0.4 mm pitch	56-lead (7x7) 0.4 mm pitch
Typical application		Intel server, high-end desktop	Intel server, workstation, high-end desktop	Intel server, workstation, high-end desktop	AMD server, workstation, high-end desktop	AMD server, memory and SOC	AMD server, CPU	Phase redundant based server systems	AMD server, GPU, ASIC, networking ASSP

Advantages of a digital controller

The protection features include a set of sophisticated overvoltage, undervoltage, overtemperature, and overcurrent protection. Each of the controllers in the table above also detects and protects against an open circuit on the remote sensing inputs. These attributes provide a complete and advanced protection feature set for microprocessor, DSP, FPGA, or ASIC power systems. Accurate current sense telemetry achieved through internal calibration that measures and corrects current sense offset error sources upon start-up. Programmable temperature compensation provides accurate current sense information even when using DCR current sense.

www.infineon.com/digital-controller

*For more information on the product, contact our product support

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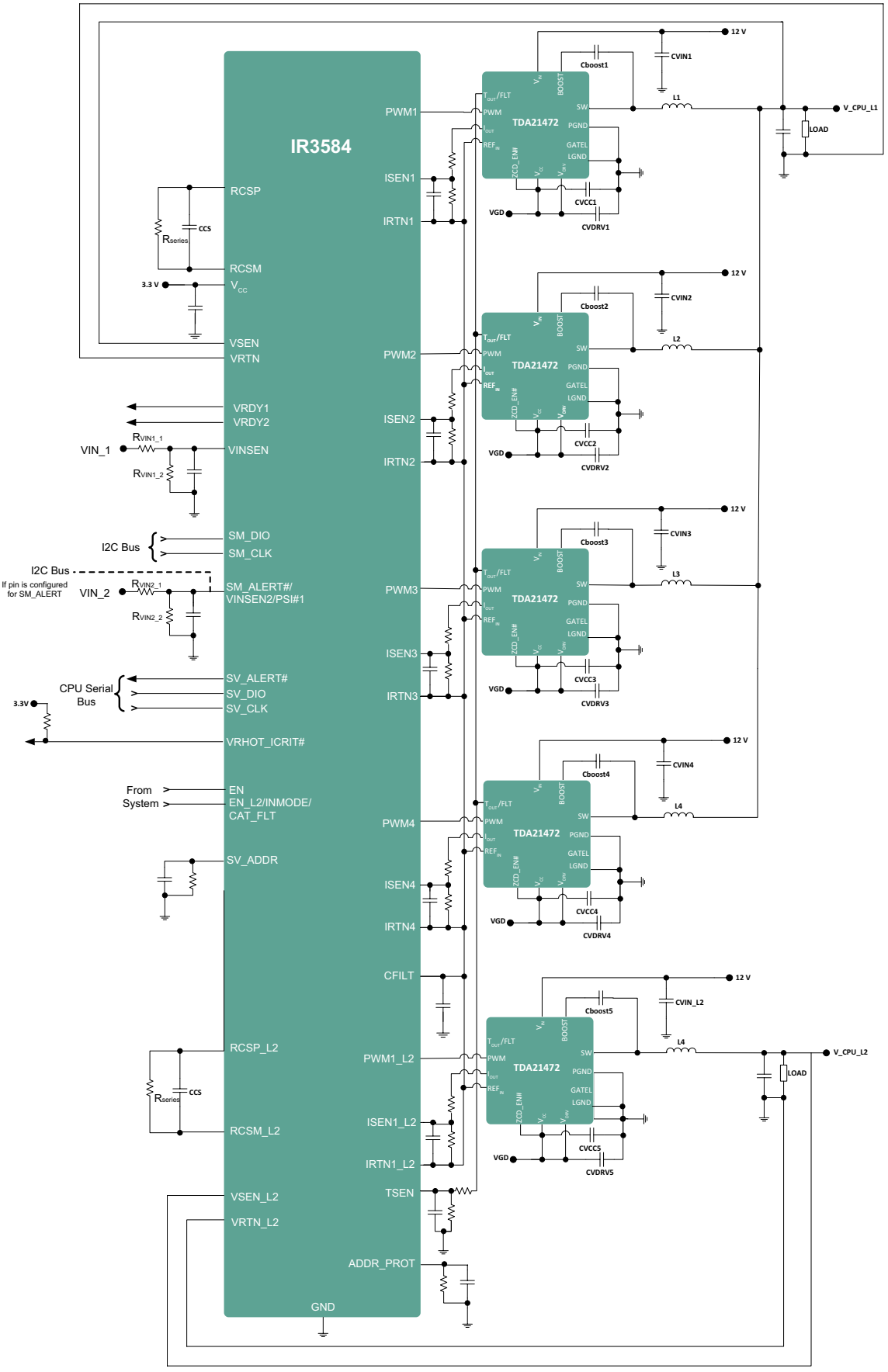
Typical multiphase application circuit



AC-DC power management ICs

Technology leadership in power supply

By offering a wide variety of highly efficient control ICs we enable our customer to meet new demands like PFC regulations and ultralow standby power requirements in a very cost-effective way. A comprehensive array of safety features helps to minimize the number of external components, reduces design in time and improves the reliability of the SMPS.

AC-DC power management ICs

PFC controller

Continuous conduction mode (CCM) PFC

Fixed-frequency
ICE2PCS02G (65 kHz)
ICE2PCS03G (100 kHz)

Adjustable frequency
ICE2PCS01G (50-250 kHz)
ICE2PCS05G (20-250 kHz)
ICE3PCS01G (OVP+brown-out)
ICE3PCS02G (OVP)
ICE3PCS03G (Brown-out)

Critical conduction mode (CrCM) PFC

IRS2505L

PWM controller

Stand-alone PWM

Fixed-frequency
ICE5GSAG (125 kHz)
ICE5ASAG (100 kHz)
ICE3AS03LJG (100 kHz)
ICE3BS03LJG (65 kHz)

Quasi-resonant
ICE5QSBG
ICE2QS02G
ICE2QS03G
XDPS21081

Half-bridge and LLC resonant
ICE1HS01G-1
ICE2HS01G
XDPS2201

Fixed-frequency (FF) CoolSET™

650 V F3/F3R CoolSET™
ICE3Axx65ELJ
ICE3RBRxx65JZ
ICE3RBRxx65JG

700 V Gen5 CoolSET™
ICE5AR4770AG
ICE5AR4770BZS

800 V CoolSET™
ICE5A/GRxx80AG
ICE5xRxx80xZ
ICE3A/BRxx80JZ
ICE3ARxx80CJZ
ICE3ARxx80VJZ
ICE3ARxx80JG

950 V CoolSET™
ICE5xR3995xZ

Combi (PFC+PWM)

CrCM + LLC
XDP™ SMPS IDP2308 (DSO-14)
XDP™ SMPS IDP2303A (DSO-16)

Quasi-resonant (QR) CoolSET™

650 V CoolSET™
ICE2QRxx65(Z)/(G)

800 V CoolSET™
ICE2QRxx80Z/G
ICE5QRxx80BG

www.infineon.com/acdc

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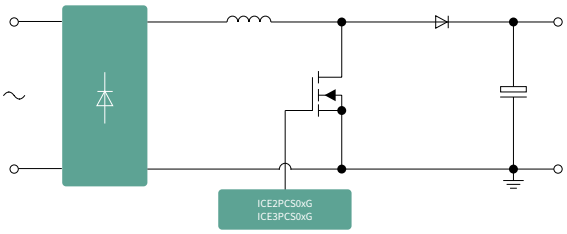
Continuous conduction mode (CCM) PFC ICs

High efficiency and very low system cost

Compared to the first generation of ICE1PCS01/02, the second generation of CCM PFC controller ICs, ICE2PCS01/02, have lower internal reference trimmed at 3 V. They also have other advantages such as wider V_{CC} operating range, an improved internal oscillator and additional direct bulk capacitor overvoltage protection. Compared to the first and second generation of ICE1PCS0x and ICE2PCS0x, the third generation of CCM PFC has the lowest internal reference trimmed at 2.5 V and integrated digital control voltage loop. The third generation also features low peak current limit at 0.2 V, an adjustable gate switching frequency range from 21 kHz to 100 KHz and is able to synchronize with an external frequency range from 50 kHz to 100 kHz. The third generation is now able to now able to achieve 95 percent efficiency at full load for the entire input voltage range.

Application diagram



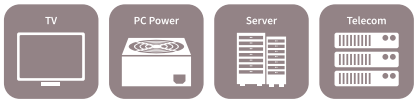
2nd generation continuous conduction mode PFC IC features

- Fulfills class D requirements of IEC 61000-3-2
- Lowest count of external components
- Adjustable and fixed switching frequencies
- Frequency range from 20 to 250 kHz
- Versions with brown-out protection available
- Wide input range supported
- Enhanced dynamic response during load jumps
- Cycle-by-cycle peak current limiting
- Integrated protections OVP, OCP
- DIP-8 and DSO8
- Lead-free, RoHS compliant

3rd generation continuous conduction mode PFC IC features

- Fulfills class D requirements of IEC 61000-3-2
- Integrated digital voltage loop compensation
- Boost follower function
- Bulk voltage monitoring signals, brown-out
- Multi protections such as double OVP
- Fast output dynamic response during load jump
- External synchronization
- Extra-low peak current limitation threshold
- SO8 and SO-14
- Lead-free, RoHS compliant

	ICE2PCS01G ICE2PCS05G	ICE2PCS02G ICE2PCS03G	ICE3PCS03G	ICE3PCS02G	ICE3PCS01G
Digital control voltage loop	–		✓	✓	✓
Variable frequency	✓	–	✓	✓	✓
Synchronous frequency	–		✓	✓	✓
Open loop protection	✓	✓	✓	✓	✓
Low peak current limit	-1 V	-1 V	-0.4 V	-0.4 V	-0.2 V
Brown-out protection	–	✓	✓	–	✓
Overvoltage protection	✓	✓	✓	✓	✓
Second overvoltage protection	–			✓	✓
PFC enable function	–				✓
Boost follower mode	–				✓
5 V regulator	–				✓



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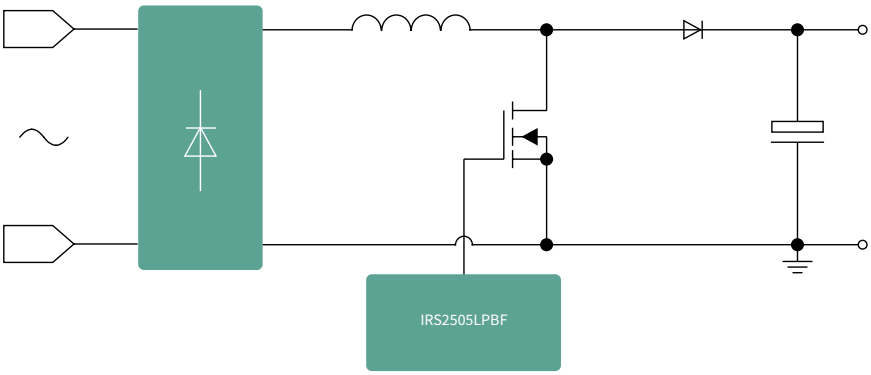
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Critical conduction mode (CrCM) PFC

Easy design and lowest system cost

Fully compatible with the world standard, these devices are optimized to offer extremely compact and cost-effective PFC solutions for electronic ballast and off-line SMPS.

Application diagram



IRS2505LPBF

- Critical conduction mode PFC control
- High power factor and ultralow THD
- Wide load and line range
- Regulated and programmable DC bus voltage
- No secondary winding required
- MOSFET cycle-by-cycle overcurrent protection
- DC bus overvoltage protection
- Low EMI gate drive
- Ultralow start-up current
- 20.8 V internal Zener clamp on V_{CC}
- Excellent ESD and latch immunity
- RoHS compliant
- 5-pin SOT-23 package

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PFC controller portfolio

Critical conduction mode (CrCM) PFC IC portfolio

Product	V_{CC} min.	V_{CC} max.	Package
IRS2505L	9 V	20.8 V	SOT-23

Continuous conduction mode PFC ICs

2nd generation continuous conduction mode PFC IC product portfolio

Product	Frequency – f_{SW}	Current drives	Package
ICE2PCS01G	50-250 kHz	2.0 A	DSO8
ICE2PCS02G	65 kHz	2.0 A	
ICE2PCS03G	100 kHz	2.0 A	
ICE2PCS05G	20-250 kHz	2.0 A	

3rd generation continuous conduction mode PFC IC product portfolio

Product	Frequency – f_{SW}	Current drives	Features	Package
ICE3PCS01G	Adjustable	0.75 A	OVP+brown-out	SO-14
ICE3PCS02G		0.75 A	OVP	SO8
ICE3PCS03G		0.75 A	Brown-out	SO8

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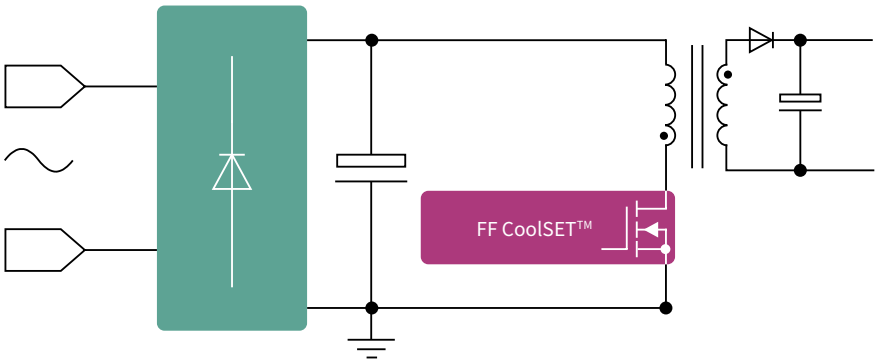
5th generation fixed-frequency PWM IC and CoolSET™



- Integrated CoolMOS™ in 700 V, 800 V and 950 V MOSFETs
- Cascode configuration for brown-in protection, fast and robust start-up
- Available in 65 kHz, 100 kHz and 125 kHz fixed switching frequency
- Frequency reduction in tandem with load reduction to increase efficiency
- Selectable active burst mode entry/exit profile to optimize standby power and ability to disable
- Supports CCM flyback operation with built-in slope compensation
- Integrated error amplifier for direct feedback non-isolated flyback and buck
- Adjustable line input overvoltage protection (only ICE5xRxxxxAG and ICE5xRxxxxCZ)
- V_{CC} pin short-to-ground protection
- Auto restart protection mode to minimize interruption of operation
- DSO8 package (stand-alone controller), DIP-7 and DSO-12 package for CoolSET™

Halogen-Free RoHS

5th generation fixed-frequency CoolSET™

Output power[1] 85 V_{AC}~300 V_{AC} T_a=50°C		15 W	17 W	23 W	27 W	40 W
$R_{DS(on),max.}$		5.18 Ω	4.05 Ω	2.35 Ω	1.75 Ω	0.80 Ω
700 V	DIP-7	ICE5AR4770BZS				
	DSO-12	ICE5AR4770AG				
800 V	DIP-7	ICE5AR4780BZS ICE5BR4780BZ		ICE5AR2280CZ ICE5BR2280BZ		ICE5AR0680BZS
	DSO-12	ICE5GR4780AG		ICE5GR2280AG	ICE5GR1680AG	ICE5AR0680AG
950 V	DIP-7		ICE5AR3995BZ ICE5BR3995BZ ICE5BR3995CZ			

3rd generation fixed-frequency CoolSET™

Output power[1] 85 V_{AC}~300 V_{AC} T_a=50°C		10~15 W	19~21 W	23~26 W	30~34 W	37~41 W
$R_{DS(on),max.}$		11.1~5.44 Ω	3.42~2.62 Ω	1.96~1.71 Ω	1.11~1.05 Ω	0.75~0.71 Ω
650 V	DIP-7	ICE3RBR4765JZ		ICE3RBR1765JZ		ICE3RBR0665JZ
	DIP-8	ICE3BR4765J	ICE3A1065ELJ	ICE3BR1765J	ICE3A2065ELJ	ICE3BR0665J
	DSO-12	ICE3RBR4765JG		ICE3RBR1765JG		ICE3RBR0665JG
800 V	DIP-7	ICE3AR4780JZ	ICE3AR2280JZ	ICE3AR1580VJZ	ICE3AR1080VJZ	ICE3AR0680JZ
		ICE3AR4780VJZ	ICE3BR2280JZ			ICE3BR0680JZ
		ICE3AR4780CJZ	ICE3AR2280VJZ			ICE3AR0680VJZ
		ICE3AR10080CJZ	ICE3AR2280CJZ			
	DSO-12	ICE3AR4780JG	ICE3AR2280JG		ICE3AR1080JG	

www.infineon.com/coolset

1) Calculated DCM maximum output power in an open-frame design based on T_a=50° C and T_j=125°C without copper area as heatsink

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Fixed-frequency PWM IC

	Gen5		Gen3	
FF PWM IC	ICE5ASAG	ICE5GSAG	ICE3AS03LJG	ICE3BS03LJG
Package	DSO–8		DSO–8	
Switching frequency	100 kHz	125 kHz	100 kHz	65 kHz
Operating temperature	-40°C~129°C		-25°C~130°C	
Start-up cell	Cascode		✓	
V_{CC} on/off threshold	16 V/10 V		18 V/10.5 V	
Soft-start time	12 ms		10 ms	20 ms
Frequency jittering	✓		✓	
Modulated gate drive	✓		✓	
Active burst mode	✓ (3-level selectable)		✓	
Slope compensation for CCM	✓		–	
Frequency reduction	✓		–	
Integrated error amplifier for direct feedback	✓		–	
Adjustable line input overvoltage protection	✓ with auto restart		–	
Adjustable brown-in protection	✓ with auto restart		–	
V_{CC} pin short-to-ground protection	✓ (no start–up)		–	
V_{CC} undervoltage protection	✓ with auto restart		✓ with auto restart	
V_{CC} overvoltage protection	✓ with auto restart		✓ with latch–up	
Overload/open loop protection	✓ with auto restart		✓ with auto restart	
Overtemperature protection	✓ with auto restart and hysteresis		✓ with latch–up	
External blanking time extension	–		✓ with auto restart	
External protection enable pin	–		✓ with latch–up	

www.infineon.com/coolset

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Fixed-frequency CoolSET™

	700 V CoolSET™	650 V CoolSET™		
	Gen5 ICE5ARxx70AG(BZS)	Gen3 ICE3Axx65ELJ	Gen3R ICE3BRxx65J	Gen3R ICE3RBRxx65JZ(G)
Package	DIP-7, DSO-12	DIP-8		DIP-7, DSO-12
Output power range	15 W	19 W~34 W	15 W~41 W	14 W~39 W
Operating temperature range	-40°C~129°C	-25°C~130°C		-40°C~130°C
Switching frequency	100 kHz	100 kHz	65 kHz	65 kHz
Frequency reduction	✓	–		
Integrated error amplifier	✓	–		
Slope compensation for CCM mode	✓	–		
V_{CC} on/off threshold	16 V/10 V	18 V/10.5 V		
Soft-start time	12 ms	20 ms		
Active burst mode selection	3 level	1 level		
V_{CC} pin short-to-ground protection	No start-up	–		
V_{CC} overvoltage protection	Auto restart	Latch	Auto restart	
Overtemperature protection	Auto restart with hysteresis	Latch	Auto restart	
External protection enable pin	-	Latch	Auto restart	
Adjustable brown-in/-out protection	Brown-in only	–		
Adjustable line input overvoltage protection	Only ICE5ARxx70AG	–		
Fast AC reset	–			
Product available	ICE5AR4770AG ICE5AR4770BZS	ICE3A1065ELJ ICE3A2065ELJ	ICE3BR4765J ICE3BR1765J ICE3BR0665J	ICE3RBR4765JZ ICE3RBR1765JZ ICE3RBR0665JZ ICE3RBR4765JG ICE3RBR1765JG ICE3RBR0665JG

	800 V CoolSET™							950 V CoolSET™	
	Gen3R ICE3A(B)Rxx80JZ	Gen3R ICE3ARxx80CJZ	Gen3R ICE3ARxx80JG	Gen3R ICE3ARxx80VJZ	Gen5 ICE5BRxx80BZ	Gen5 ICE5ARxx80AG(BZS)	Gen5 ICE5GRxx80AG	Gen5 ICE5BRxx95xZ	Gen5 ICE5ARxx95xZ
Package	DIP–7		DSO–12	DIP–7	DIP-7	DIP–7, DSO–12	DSO–12	DIP-7	
Output power range	10 W~40 W	11 W~23 W	14 W~30 W	15 W~39 W	15 W~22 W	15 W~40 W	15 W~27 W	17 W	
Non-isolated buck output current range					450 mA~700 mA			550 mA	-
Operating temperature range	–25°C~130°C		–40°C~130°C		–40°C~129°C			-40°C~129°C	
Switching frequency	100 kHz/65 kHz	100 kHz	100 kHz		65 kHz	100 kHz	125 kHz	65 kHz	100 kHz
Frequency reduction	–				✓			✓	
Integrated error amplifier	–				✓	✓ (except ICE5ARxx80CZ)		Only ICE5BRxx95BZ	✓
Slope compensation for CCM mode	–	✓	–		✓			✓	
V_{CC} on/off threshold	17 V/10.5 V				16 V/10 V			16 V/10 V	
Soft-start time	10 ms				12 ms			12 ms	
Active burst mode selection	4-level	3-level	4-level		3-level			3-level	
V_{CC} pin short-to-ground protection	–				No start–up			No start-up	
V_{CC} overvoltage protection	Auto restart							Auto restart	
Overtemperature protection	Auto restart with hysteresis							Auto restart with hysteresis	
External protection enable pin	Auto restart	Latch	Auto restart	–				-	
Adjustable brown-in/-out protection	Auto restart			–	Brown-in only			Brown-in	
Adjustable line input overvoltage protection	–			Auto restart		Yes (except ICE5ARxx80BZS)	Auto restart	Only ICE5BRxx95CZ	-
Fast AC reset	–	✓	–					-	
Product available	ICE3AR10080JZ ICE3AR4780JZ ICE3AR2280JZ ICE3AR0680JZ ICE3BR2280JZ ICE3BR0680JZ	ICE3AR10080CJZ ICE3AR4780CJZ ICE3AR2280CJZ	ICE3AR4780JG ICE3AR2280JG ICE3AR1080JG	ICE3AR4780VJZ ICE3AR2280VJZ ICE3AR1580VJZ ICE3AR1080VJZ ICE3AR0680VJZ	ICE5BR4780BZ ICE5BR2280BZ	ICE5AR0680AG ICE5AR4780BZS ICE5AR2280CZ ICE5AR0680BZS	ICE5GR4780AG ICE5GR2280AG ICE5GR1680AG	ICE5BR3995BZ ICE5BR3995CZ	ICE5AR3995BZ

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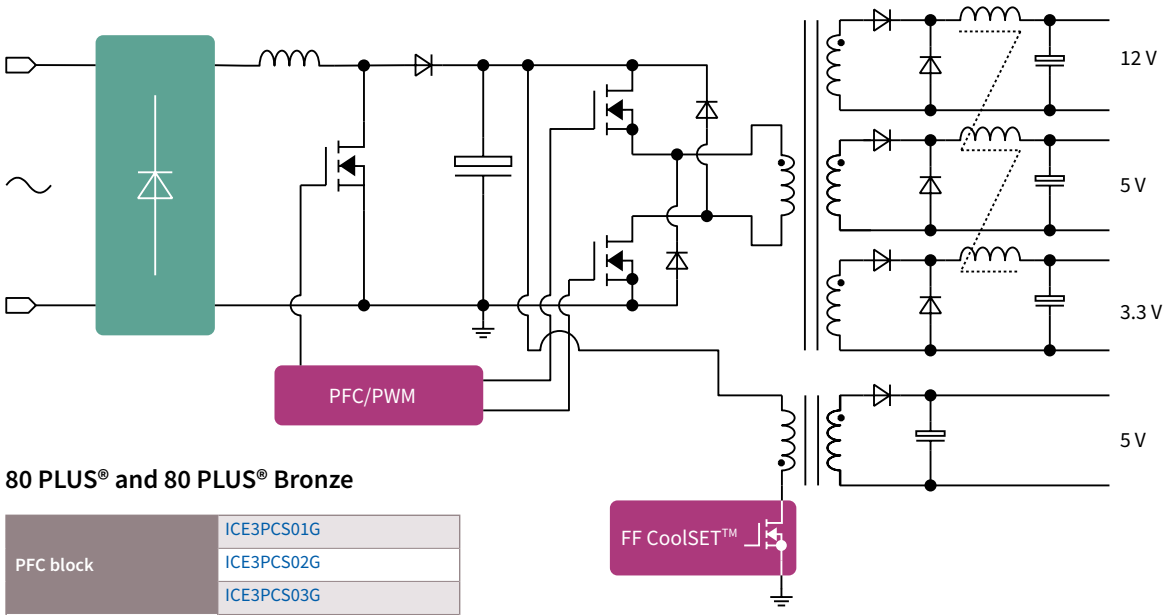
Climate saver systems

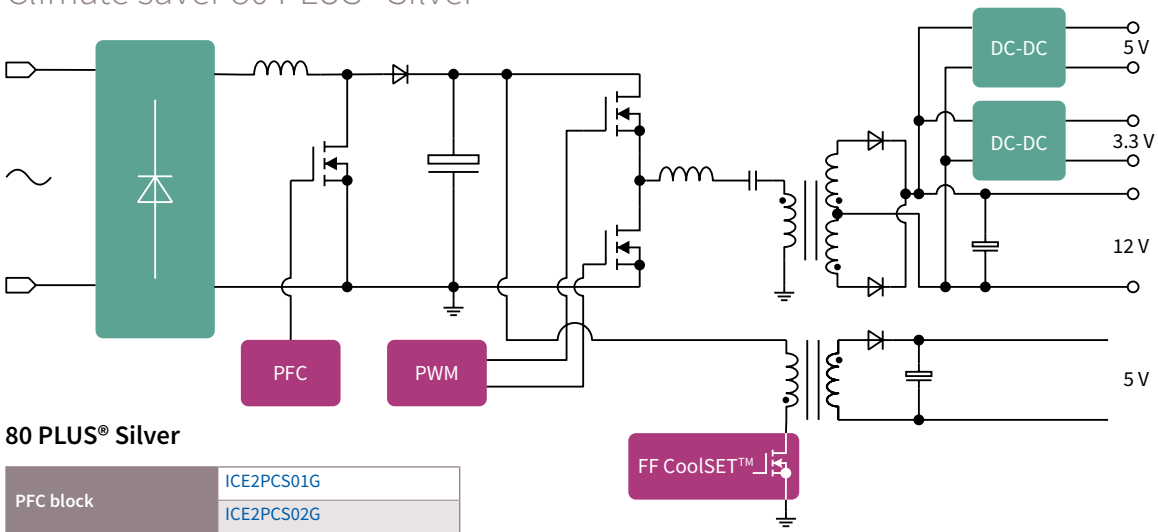
Climate saver 80 PLUS® and 80 PLUS® Bronze



80 PLUS® and 80 PLUS® Bronze

PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
Standby block FF CoolSET™	ICE5GR4780AG
	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

Climate saver 80 PLUS® Silver



80 PLUS® Silver

PFC block	ICE2PCS01G
	ICE2PCS02G
PWM block	ICE1HS01G-1
Standby block FF CoolSET™	ICE5GR4780AG
	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

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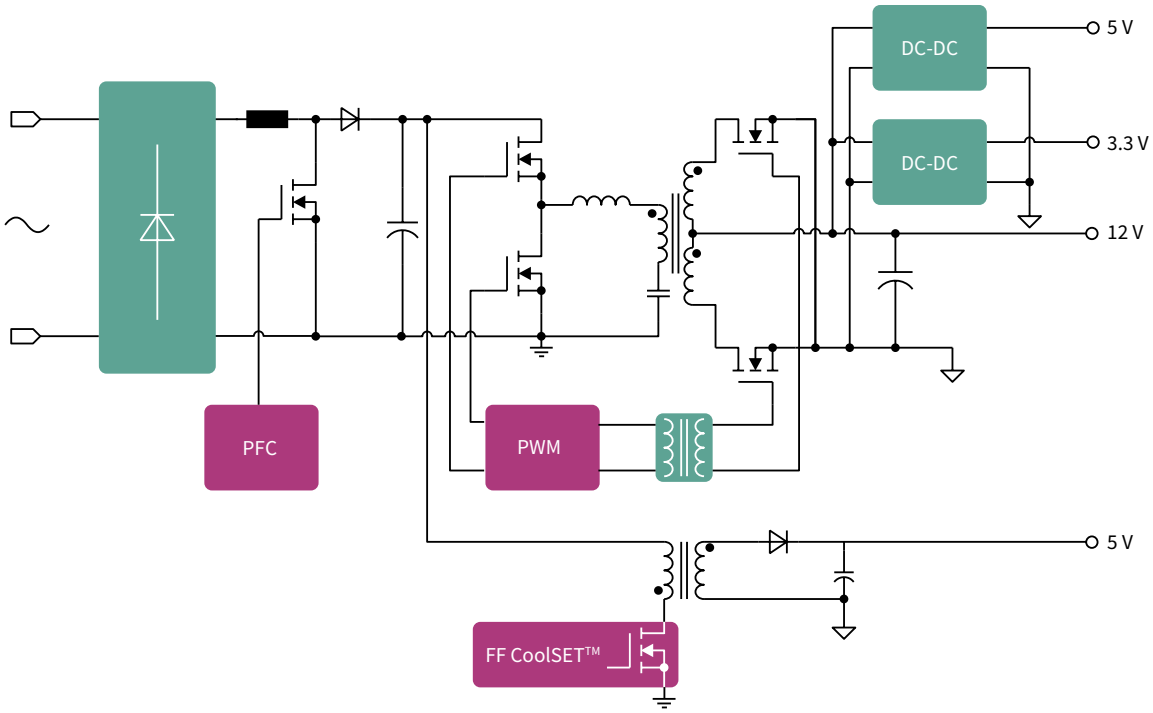
Climate saver 80 PLUS® Gold

Climate saver 80 PLUS® Platinum

Certification for Infineon's PC power reference design



80 PLUS® Gold

PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
Standby block FF CoolSET™	ICE5GR4780AG
	ICE5GR2280AG
	ICE5GR1680AG
	ICE3AR1080JG
	ICE5AR0680AG

80 PLUS® Platinum

Certification for Infineon's PC power reference design

PFC block	ICE3PCS01G
	ICE3PCS02G
	ICE3PCS03G
PWM block	ICE2HS01G
Standby block QR CoolSET™	ICE5QR4780BG
	ICE5QR2280BG
	ICE5QR1680BG
	ICE2QR1080G
	ICE5QR0680BG

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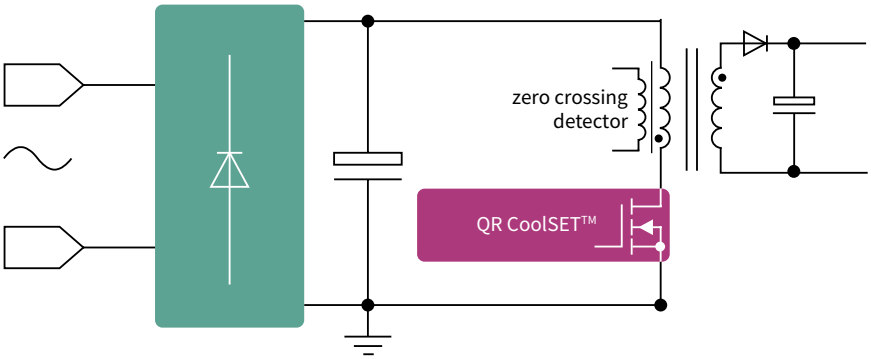
5th generation quasi-resonant PWM IC and CoolSET™



- Integrated CoolMOS™ in 800 V MOSFET with cascode configuration
- Digital frequency reduction with reduced load
- Novel quasi-resonant to minimize the spread of switching frequency between low and high line AC input
- Selectable active burst mode entry/exit profile
- Auto restart mode for line overvoltage protection
- Auto restart mode for brown-out protection
- Auto restart mode for V_{CC} under-/overvoltage protection
- Auto restart mode for open loop and output overload protection
- Auto restart mode for overtemperature protection with hysteresis
- Auto restart mode for output overvoltage
- Limited charging current during V_{CC} pin short-to-ground protection
- Peak power limitation with input voltage compensation
- Minimum switching frequency limitation (no audible noise on power units on/off)
- DSO package (controller) and DSO-12 (CoolSET™)

Halogen-Free RoHS

5th generation quasi-resonant CoolSET™

Output power[1] 85 V_{AC}~300 V_{AC} T_a=50°C		15 W	22 W	27 W	41 W~42 W
$R_{DS(on),max.}$		5.18 Ω	2.35 Ω	1.75 Ω	0.80 Ω
800 V	DSO-12	ICE5QR4780BG	ICE5QR2280BG	ICE5QR1680BG	ICE5QR0680BG

2nd generation quasi-resonant CoolSET™

Output power[1] 85 V_{AC}~300 V_{AC} T_a=50°C		14 W~15 W	20 W~21 W	23 W~26 W	31 W	38 W~42 W
$R_{DS(on),max.}$		5.44 Ω~5.18 Ω	2.62 Ω	1.96 Ω	1.11 Ω	0.75 Ω~0.71 Ω
650 V	DIP-7	ICE2QR4765Z		ICE2QR1765Z		ICE2QR0665Z
	DIP-8	ICE2QR4765		ICE2QR1765		ICE2QR0665
	DSO-12	ICE2QR4765G		ICE2QR1765G		ICE2QR0665G
800 V	DIP-7		ICE2QR2280Z			ICE2QR0680Z
	DSO-12	ICE2QR4780G	ICE2QR2280G ICE2QR2280G-1		ICE2QR1080G	

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[1] Calculated maximum output power in an open-frame design at T_a=50°C, T_j=125°C and without copper area as heat sink

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Quasi-resonant PWM IC

Feature	ICE5QSBG	ICE2QS02G	ICE2QS03G
Package	DSO8	DSO8	DSO8
Switching scheme	Novel QR with 10 zero crossing counters	QR with 7 zero crossing counters	QR with 7 zero crossing counters
Operating temperature	-40°C~129°C	-25°C~130°C	-25°C~130°C
Start-up cell	Cascode	–	✓
V_{CC} on/off	16 V/10 V	12 V/11 V	18 V/10.5 V
Power saving during standby	✓ active burst mode in QR switching 2-level selectable burst mode entry/exit level	–	✓ active burst mode 52 kHz
Digital frequency reduction for high average efficiency	✓	✓	✓
OLP blanking time	Fixed	Adjustable	Fixed
Auto restart timer	Through V_{CC} charging/discharging	Setting with external components	Through V_{CC} charging/discharging
Maximum input power limitation	V_{in} pin voltage dependent	Adjustable through ZC resistor	Adjustable through ZC resistor
V_{CC} undervoltage protection	✓ with auto restart	✓ with latch	✓ with auto restart
Adjustable output overvoltage protection	✓ with auto restart	✓ with latch	✓ with latch
Adjustable line input overvoltage protection	✓	–	–
Brown-out feature	✓	✓	–
V_{cc} pin short-to-ground protection	✓	–	–
Target application	Home appliances, set-top-box, AUX SMPS	AUX power supply to V_{CC} eg., LCD TV multi/main, audio main, PDP TV multi/address	Self-power supply to V_{CC} eg., smart meter, industrial applications

Quasi-resonant CoolSET™

Feature	2nd generation ICE2QRxxxxZ/G	2nd generation ICE2QRxx80G-1	5th generation ICE5QRxx80BG
Switching scheme	QR with 7 zero crossing counters		Novel QR with 10 zero crossing counters
Integrated MOSFET	650 V and 800 V	800 V	800 V
High-voltage start-up cell	✓		Cascode
Power saving during standby	Active burst mode f_{SW} at 52 kHz		2 level selectable active burst mode quasi-resonant
V_{CC} on/off threshold (typ.)	18 V/10.5 V	18 V/9.85 V	16 V/10 V
Adjustable output overvoltage protection	✓ with latch		✓ with auto restart
V_{CC} over/undervoltage protection	✓ with auto restart		✓ with auto restart
Overload/open loop protection	✓ with auto restart		✓ with auto restart
Overtemperature protection	✓ with auto restart		✓ (Auto restart with hysteresis)
Adjustable line input overvoltage protection	–		✓ with auto restart
Brown-out	–		✓ with auto restart
V_{CC} pin short to ground	–		✓ (No start-up)
Package	DIP-7 DIP-8 DSO-12	DIP-7 DSO-12	DSO-12

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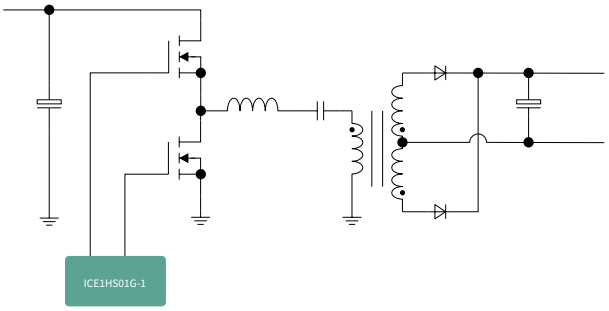
Resonant LLC half-bridge controller ICs

Best-in-class converters and controllers to support LLC HB resonant mode topology

Resonant mode power supplies are a variation over SMPS circuits where the switching losses are significantly reduced by adapting zero-voltage or zero-current switching techniques, also known as soft-switching techniques. In non-resonant mode SMPS circuits, the switches are subjected to hard switching. LLC HB resonant operates in ZVS mode, whereby switching loss is reduced to operate the converter at a higher switching frequency. In addition, the converter can be further optimized at a high input voltage. This topology allows to eliminate the secondary filter inductor, adopt better rectifier diodes and reduce secondary conduction loss. The converter utilizes the leakage and magnetizing inductance of a transformer. With the magnetic integration concept, all the magnetic components can be built in one magnetic core.

LLC resonant (no SR)

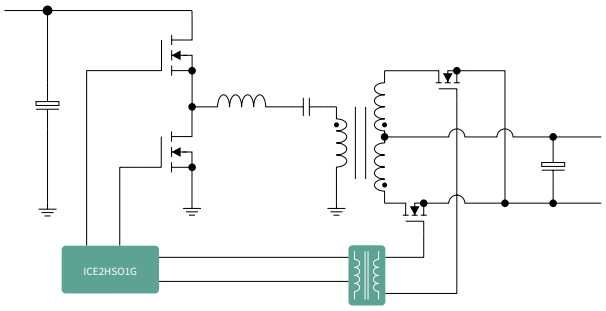
Application diagram – LLC resonant (no SR)



- Novel and simple design (12 components + HB driver)
- Minimum operating frequency is adjustable externally
- Burst mode operation for output voltage regulation during no load and/or bus overvoltage
- Multiple protections in case of fault
- Input voltage sense for brown-out protection
- Open loop/overload fault detection by FB pin with auto restart and adjustable blanking/restart time
- Frequency shift for overcurrent protection
- Lead-free, RoHS compliant package
- DSO8 package

Resonant LLC half-bridge controller IC with integrated synchronized rectifier control

LLC resonant + SR



- Novel LLC/SR operation mode and controlled by primary-side controller controller
- Multiple protections for SR operation
- Tight tolerance control
- Accurate setting of switching frequency and dead time
- Simple system design
- Optimized system efficiency
- Multiple converter protections: OTP, OLP, OCP, latch-off enable
- External disable for either SR switching or HB switching
- Lead-free, RoHS compliant package
- DSO-20 package

Audio amplifier | Notebook | Projector | TV | PC Power | Server | Telecom

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LLC half-bridge controller IC	ICE1HS01G-1	ICE2HS01G
Package	DSO8	DSO-20
Switching frequency range	up to 600 kHz	up to 1 MHz
LLC soft-start	✓	✓
LLC burst mode	✓	✓
Adjustable minimum frequency	✓	✓
Overload/open loop protection	✓	✓
Mains undervoltage protection with hysteresis	✓	✓
Overcurrent protection	2-level	3-level
Drive signal for synchronous rectification	–	✓
Adjustable dead time	–	✓
External latch-off and OTP	–	✓
Target application	LCD-TV, audio, etc.	Server, PC, LCD-TV, etc.

Product		Frequency – f_{sw}	Dead time	Current drives	Package
ICE1HS01G-1	LLC resonant (no SR)	30 kHz~600 kHz	380 ns	1.5 A	DSO8
ICE2HS01G	Resonant LLC half-bridge controller IC with integrated synchronized rectifier control (LLC resonant + SR)	30 kHz~1 MHz	100 ns~1000 ns	0.3 A	DSO-20

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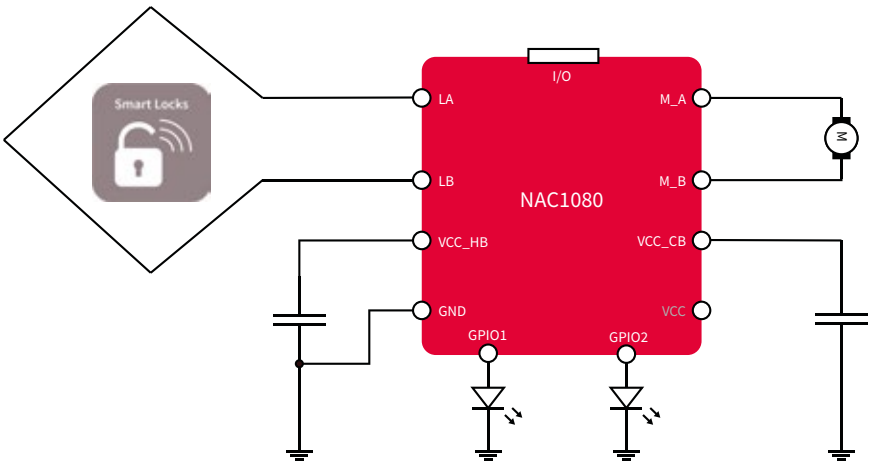
NAC1080 – NFC smart actuation controller

The NAC1080* is an NFC actuation controller with integrated half-bridge and energy harvesting modules, enabling cost effective development of passive smart actuators like passive locks. The low-power Arm® Cortex®-M0 based microcontroller with integrated NFC frontend, motor driver, and energy harvesting function enables customers to develop smart actuation devices with minimum system BOM requirement.

The flexible IC architecture and the smart partitioning between hardware and software enable customers to maximize software-defined functions. Furthermore, the NAC1080 includes hardware security functions such as a secure area in flash, a 128 bit AES accelerator, and a true random generator. A separate secure element can be connected via the digital interface on demand.

Users can program this NAC1080 with the industry-wide standard solutions for Cortex®-M0 processors. Especially for the smart lock application, SDK packages for firmware and mobile application development in both Android and iOS systems are available to support a fast development cycle.



Applications

- Passive/active NFC lock
- Emergency power source for battery devices
- NFC configuration of electronic devices

Features and benefits

Key features	Key benefits
NFC interface compliant to ISO 14443 type A	A single-chip solution to build batteryless NFC actuators, like passive lock
Arm® 32 bit Cortex®-M0 microcontroller core	Batteryless IoT devices without battery exchange efforts and costs
Dual-operation mode: passive or battery mode	Intuitive connection via smartphone to enable cloud-based business models
60 kB NVM, 16 kB RAM, 16 kB boot ROM	Minimum system BOM for easy and cost effective implementation
Integrated H-bridge	
Energy harvesting output	
128-bit AES accelerator, true random number generator	

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*Coming soon

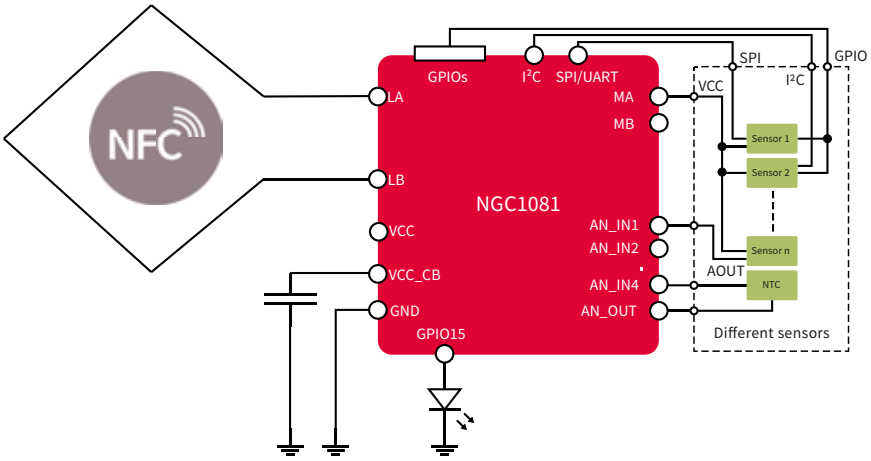
For more details on the product, click on the part number, visit infineon.com or contact our product support.

NGC1081 – NFC smart sensing controller

The NGC1081* is an NFC sensing controller with an integrated temperature sensor and ADC/DAC sensing unit in addition to the features provided by NAC1080. The low-power Arm® Cortex®-M0 based microcontroller with integrated NFC connectivity, sensing unit, and energy harvesting function in one device enables customers to develop miniaturized smart edge computing/sensing devices with minimum system BOM requirement.

NGC1081 works in both passive mode and battery mode. In passive mode, it can communicate with a mobile phone wirelessly while at the same time harvesting energy from the NFC field to power the whole sensing system including the IC and its connected sensors. Working in battery mode, it simplifies the implementation of many sensing applications like temperature, humidity, and vibration tracking devices. With the smartphone as the human interaction interface, the system functions are widely extended to cloud functionalities, such as uploading data and data analysis on the cloud.

NGC1081 has a 12-bit SAR ADC and a 10-bit DAC. It provides one analog output (DAC) and four analog inputs (ADC). The ADC has three sample and hold stages, which allow parallel signal sampling. A temperature sensor is integrated as well. Users can program the NGC1081 with the industry-wide standard solutions for Cortex®-M0 processors.



Applications

- Passive sensor device, inlay
- Medical, healthcare sensor patch
- Data logger, temperature logger
- Radiator thermostat
- Galvanic isolated sensor front end

Features and benefits

Key features
NFC interface compliant to ISO 14443 type A
Arm® 32-bit Cortex®-M0 microcontroller core
Dual-operation mode: passive or battery mode
60 kB NVM, 16 kB RAM, 16kB boot ROM
12-bit SAR ADC, 10-bit DAC
Integrated temperature sensor
Integrated H-bridge
Energy harvesting output
128-bit AES accelerator, true random number generator

Key benefits
A single-chip solution to build a batteryless smart sensor for miniaturized design with low BOM cost
Multiple power supply options for sensors: GPIO for low current or energy harvesting output for high current
Natural galvanic isolated sensing interface for applications with direct human body contact
Intuitive connection via smartphone to enable cloud-based business models

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*Coming soon

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DC-DC converters

Highest density end-to-end power management solutions

As the innovation leader for power semiconductor and energy efficiency technologies, we are continually developing and working on the best solutions for your applications. Our DC-DC converter portfolio includes integrated power stages, switching regulators, integrated POL converters and integrated POL voltage regulators, as well as digital multiphase controllers and digital power controllers (see XDPP1100 digital power controller family).

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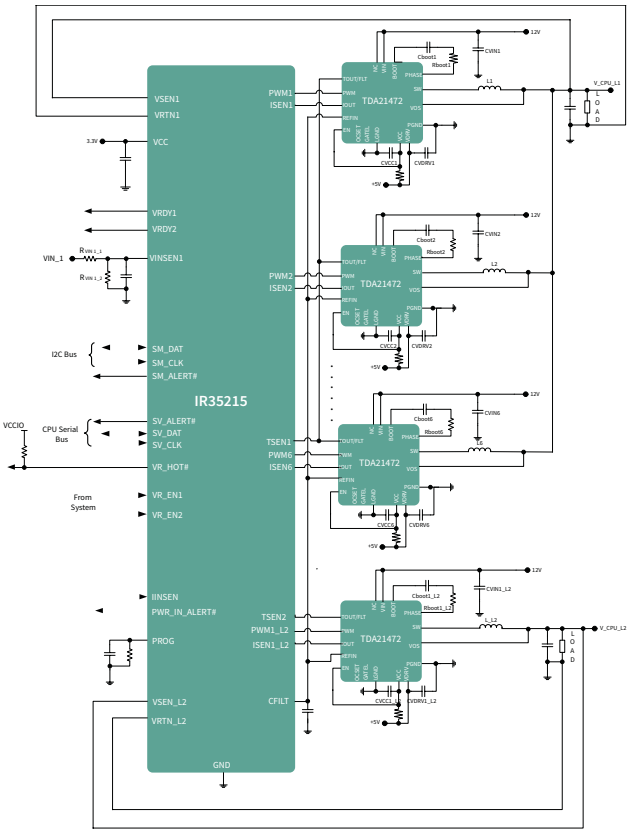
OptiMOS™ powerstage

60 A and 70 A integrated power stages with integrated current and temperature telemetry

Infineon's integrated OptiMOS™ power stage family contains a synchronous buck gate driver IC which is co-packed with control and synchronous MOSFETs and a Schottky diode to further improve efficiency. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The paired gate driver and MOSFET combination enables higher efficiency at lower output voltages required by cutting-edge CPU, GPU, ASIC, and DDR memory designs. The TDA21472 integrated power stages internal MOSFET current sense algorithm, with integrated temperature compensation, achieves superior current sense accuracy versus best-in-class controller-based inductor DCR sense methods. Up to 1.0 MHz switching frequency enables high performance transient response, allowing miniaturization of output inductors, as well as input and output capacitors while maintaining industry-leading efficiency. The TDA21472 is optimized for CPU core power delivery in server applications. The ability to meet the stringent requirements of the server market also makes the TDA21472 ideally suited for powering GPU, ASIC, DDR memory, and other high current designs.



Features

- Integrated driver, Schottky diode, control MOSFET and synchronous MOSFET
- 5 mV/A on-chip MOSFET current sensing with temperature compensated reporting
- Input voltage (V_{in}) range of 4.5 to 15 V
- V_{CC} and V_{DR} V supply of 4.5 to 7 V
- Output voltage range from 0.25 up to 5.5 V
- Output current capability of 70 A
- Operation up to 1.0 MHz
- V_{CC} undervoltage lockout (UVLO)
- 8 mV/°C temperature analog output and thermal flag pull-up to 3.3 V
- Overtemperature protection (OTP)
- Cycle-by-cycle self-preservation overcurrent protection (OCP)
- MOSFET phase fault detection and flag
- Preliminary overvoltage protection (pre-OVP)
- Compatible with 3.3 V tri-state PWM input
- Body-Braking™ load transient support through PWM tri-state
- Diode emulation mode (DEM) for improved light-load efficiency
- Efficient dual-sided cooling
- Small 5.0 x 6.0 x 0.9 mm PQFN package

Applications

- High-frequency, high-current, low-profile DC-DC converters
- Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
TDA21472	5x6 x 0.9 mm PQFN	70	4.5 to 15	0.25 to 5.5	1.0
TDA21462*	5x6 x 0.9 mm PQFN	60	4.5 to 15	0.25 to 5.5	1.0

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*For more information on the product, contact our product support

Voltage regulators

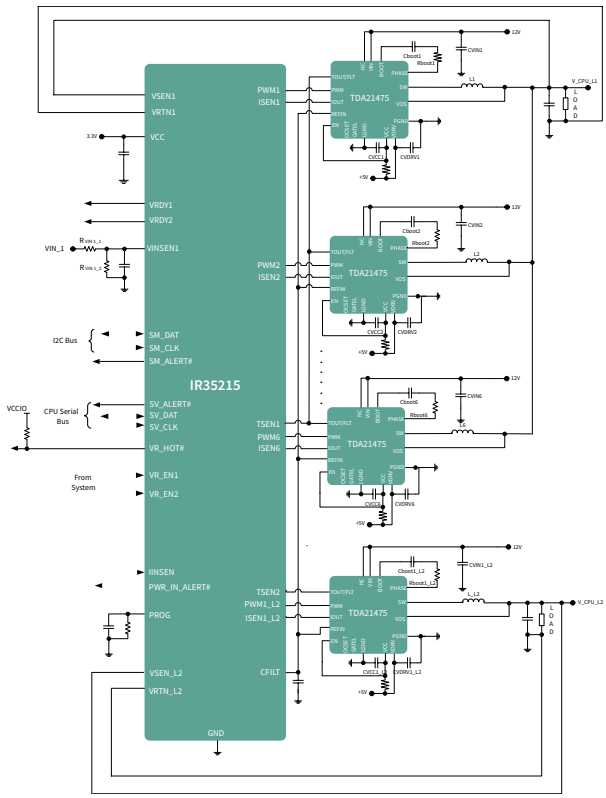
DC/DC Converter

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ power stage

70 A power stage with exposed top for improved thermal performance

Infineon's TDA21475 exposed-top power stage contains a low quiescent-current synchronous buck gate driver IC co-packaged with high-side and low-side MOSFETs. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The gate driver and MOSFET combination enables higher efficiency at the lower output voltages required by cutting-edge CPU, GPU, and DDR memory designs. The TDA21475 internal MOSFET current sense algorithm with temperature compensation achieves superior current sense accuracy versus best-in-class controller-based inductor DCR sense methods. Protection includes cycle-by-cycle overcurrent protection with programmable threshold, V_{CC}/V_{DRV} UVLO protection, bootstrap capacitor undervoltage protection, phase fault detection, IC temperature reporting, and thermal shutdown. The TDA21475 also features auto replenishment of the bootstrap capacitor to prevent over-discharge. The TDA21475 features a deep-sleep power-saving mode, which greatly reduces the power consumption when the multiphase system enters PS3/PS4 mode. Operation at switching frequency as high as 1.5 MHz enables high performance transient response, allowing reduction of output inductance and output capacitance while maintaining industry-leading efficiency. The TDA21475 is optimized for CPU core power delivery in server applications. The ability to meet the stringent requirements of the server market also makes the TDA21475 ideally suited for powering GPU and DDR memory designs.



Features

- Co-packaged driver, high-side and low-side MOSFETs
- 5 mV/A on-chip MOSFET current sensing with temperature compensated reporting input voltage (V_{IN}) range of 4.25 to 16 V
- V_{CC} and V_{DRV} supply of 4.25 to 5.5 V
- Output voltage range from 0.25 up to 5.5 V output current capability of 70 A operation up to 1.5 MHz
- V_{CC}/V_{DRV} undervoltage lockout (UVLO) bootstrap capacitor undervoltage protection 8 mV/°C temperature analog output
- Thermal shutdown and fault flag
- Cycle-by-cycle overcurrent protection with programmable threshold and fault flag MOSFET phase fault detection and flag
- Auto replenishment of bootstrap capacitor
- Deep-sleep mode for power saving
- Compatible with 3.3 V tri-state PWM input Body-Braking™ load transient support Small 5x6 x 0.65 mm PQFN package
- Lead-free RoHS compliant package
- Integrated driver, Schottky diode, control MOSFET and synchronous MOSFET

Applications

- High-frequency, high-current, low-profile DC-DC converters
- Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
TDA21475	5x6 x 0.9 mm PQFN	70	4.25 to 16	0.25 to 5.5	1.5

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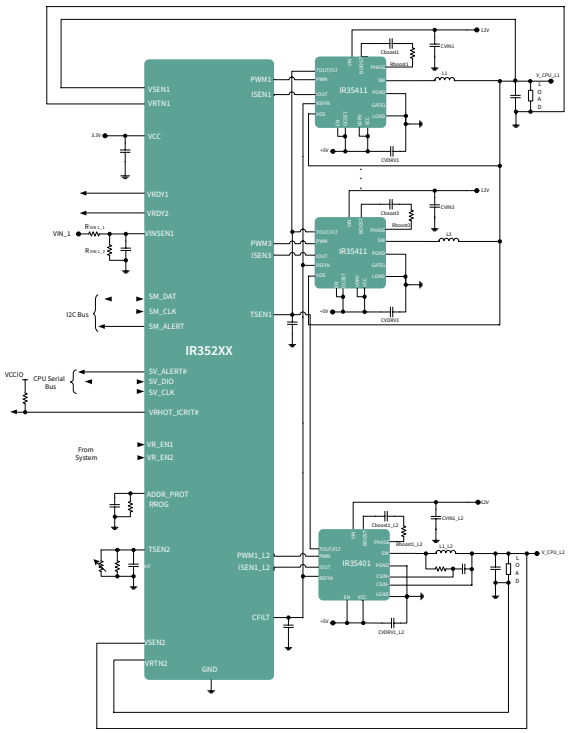
OptiMOS™ power stage

20 A power stage with integrated current sense

Infineon's IR35401 integrated power stage contains a synchronous buck gate driver IC, which is co-packaged with control and synchronous MOSFETs and a Schottky diode to further improve efficiency. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The paired gate driver and MOSFET combination enables higher efficiency at lower output voltages required by cutting-edge CPU, GPU and DDR memory designs. The IR35401 power stage features an integrated current sense amplifier to achieve superior current sense accuracy against best-in-class controller-based inductor DCR sense methods while delivering the clean and accurate current report information. The protection features inside IR35401 include V_{CC} UVLO and thermal flag. IR35401 also features an auto replenishment of the bootstrap capacitor to prevent the bootstrap capacitor from overdischarging. The IR35401 supports deep-sleep mode and consumes <100 µA V_{CC} bias current when the EN pin is pulled low. Up to 1.5 MHz switching frequency enables high-performance transient response, allowing miniaturization of output inductors, as well as input and output capacitors while maintaining industry-leading efficiency. When combined with Infineon's digital controllers, the IR35401 incorporates the Body-Braking™ feature through PWM tri-state which enables reduction of output capacitors. The IR35401 is optimized for low current CPU rails in server applications. The ability to meet the stringent requirements of the server market also makes the IR35401 ideally suited for powering GPU and DDR memory rails.



Applications

- General purpose POL DC-DC converters
- Voltage regulators for CPUs, GPUs, ASICs, and DDR memory arrays

Features

- Integrated driver, control MOSFET and synchronous MOSFET
- Integrated bootstrap synchronous PFET
- Inductor DCR current sensing with temperature compensation
- Input voltage (V_{IN}) range from 4.25 to 16 V
- V_{CC} supply of 4.25 to 5.5 V
- Output voltage range from 0.5 to 3 V or up to 5.5 V if the internal current sense amplifier is not used
- Local lossless inductor current sensing with improved noise immunity and accuracy
- Single reference based current reporting output
- Output current capability of 20 A
- Operation up to 1.5 MHz
- V_{CC} undervoltage lockout
- Overtemperature and V_{CC} UVLO fault communication to controller via TOUT pin
- Compatible with 3.3 V tri-state PWM input
- Body-Braking™ load transient support through PWM tri-state
- Auto replenishment on BOOST pin
- Low operating quiescent current and <100 µA when disabled
- Small 4 x 5 x 0.9 mm PQFN package
- Lead-free RoHS compliant package

Part type	Package	I_{out} [A]	V_{in} [V]	V_{out} [V]	Switching frequency [MHz]
IR35401	4 x 5 x 0.9 mm PQFN	20	4.25 to 16	0.5 to 5.5	1.5

www.infineon.com/integrated-powerstages

Voltage regulators

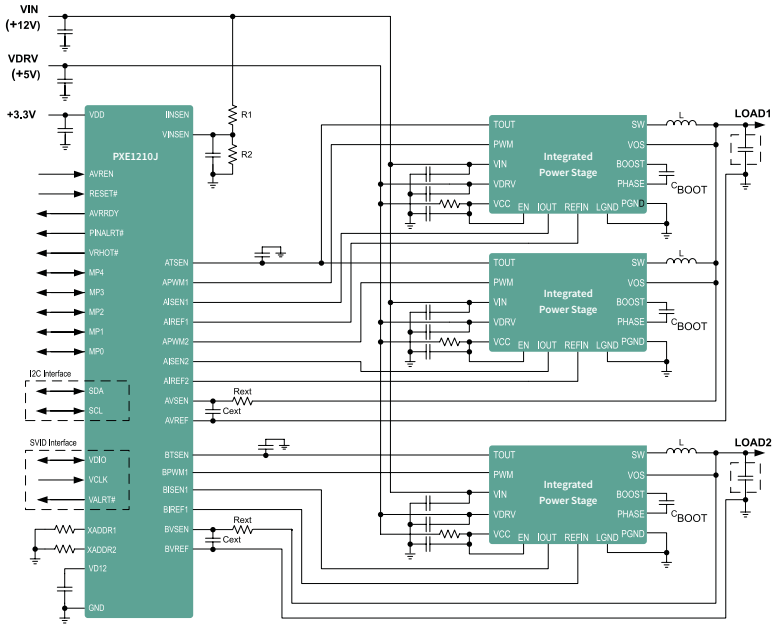
DC/DC Converter

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ power stage

25 A, 35 A, 40 A integrated power stages with highest efficiency on smallest form factor

Infineon's TDA21240 power stage is a multi-chip module that incorporates Infineon's premier MOSFET technology for a single high-side and a single low-side MOSFET coupled with a robust, high-performance, high switching frequency gate driver in a single PG-IQFN-30-2 package. The optimized gate timing allows for significant light-load efficiency improvements over discrete solutions. When combined with Infineon's family of digital multiphase controllers, the TDA21240 forms a complete core voltage regulator solution for advanced micro and graphics processors as well as point-of-load applications.



Features

- For synchronous buck converter step down voltage applications
- Maximum average current of 40 A
- Input voltage range +4.5 V to +16 V
- Power MOSFETs rated 25 V
- Fast switching technology for improved performance at high switching frequencies (> 500 kHz)
- Remote driver disable function
- Includes bootstrap diode
- Undervoltage lockout
- Shoot through protection
- +5 V high-side and low-side MOSFETs driving voltage
- Compatible to standard +3.3 V PWM controller integrated circuits
- Tri-state PWM input functionality
- Small package: PG-IQFN-30-2 (4 x 4 x 1 mm)
- RoHS compliant
- Thermal warning

Applications

- Desktop and server VR buck converter
- Single-phase and multiphase POL
- CPU/GPU regulation in notebook, desktop graphics cards, DDR memory, graphic memory
- High power density voltage regulator modules (VRM)
- Qualified for DC-DC industrial applications based on JEDEC (JESD47, JESD22, J-STD20)
- General purpose POL DC-DC converters

Part type	Package	I_{out} [A]	V_{in} [V]	Switching frequency [MHz]
TDA21242	4 x 4 x 1 mm PQFN	25	4.5 to 16	1.0
TDA21241	4 x 4 x 1 mm PQFN	35	4.5 to 16	1.0
TDA21240	4 x 4 x 1 mm PQFN	40	4.5 to 16	1.0

www.infineon.com/integrated-powerstages

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Integrated POL voltage regulators

Highest density high efficiency integrated POL (IPOL) for smart enterprise systems

Infineon's integrated POL switching converters deliver benchmark efficiency and dramatically reduce system size. Solutions up to 35 A are available in compact PQFN packages. Target applications include server, storage, routers and switches, telecom base stations, digital home media, mobile computing and embedded data processing. Solutions with and without PMBus digital communication are available in single output and multi-rail format.

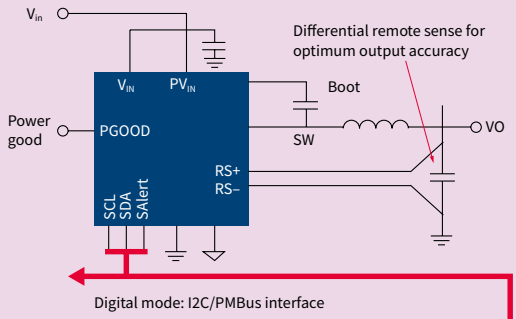
Point-of-load products – how to choose

DC-DC products
1 to 35 A

PMBus digital IPOL

IPOL with digital interface

- Telemetry
- Margining
- Intel SVID support
- Parallel VID
- IR3806x: 6-35 A with PMBus
- IR3816x: 15 A, 30 A with PMBus and Intel SVID
- IR38263: 30 A with PVID and PMBus

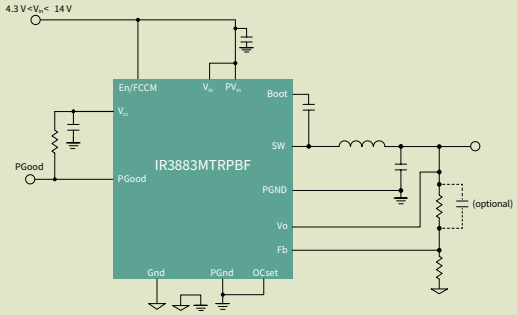


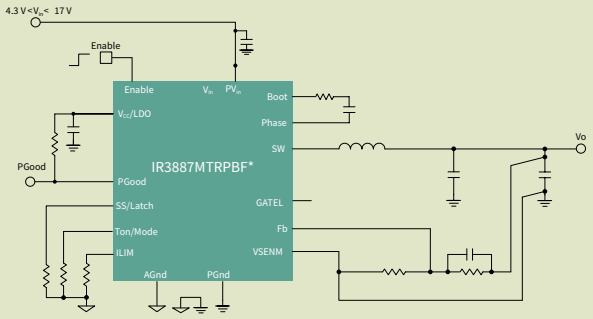
PMBus IC capabilities

Inventory	Device ID
Configuration	On/off configuration fault/warnings
Control	Sequencing delay/ramp fault response
Telemetry	V_{out}, I_{out}, power temperature, peak values
Status	Comms, data, temps

Constant on-time IPOL

Easy/light-load efficiency
IR3883MTRPBF (3 A), IR3888MTRPBF (25 A),
IR3889MTRPBF (30 A), IR3887MTRPBF* (30 A)





Ready-to-go reference designs and the on-line PowerDesk simulator simplify the task of designing regulated voltage rails. Different control topologies are available to meet an application's specific requirements.

www.infineon.com/ipol
www.infineon.com/analog-ipol

*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Integrated point-of-load converters IR3806x series (6 A/15 A/25 A/35 A)

Digital interface IPOL voltage regulators

The digital interface IPOL devices are easy-to-use, fully integrated and highly efficient DC-DC regulator offering I2C/PMBus, parallel VID, Intel SVID. The on-board PWM controller and MOSFETs make the family a space-efficient solution, providing accurate power delivery for low output voltage and high current applications.

The IR3806x family of PMBus enabled IR MOSFET™ IPOL based IR MOSFET™ IPOL voltage regulators offers:

- Compactness of integrated controller, driver and MOSFETs
- High-performance analog voltage mode engine
- Flexibility of a rich PMBus interface

The IR381(2/3)6x family features OptiMOS™ 5 for the highest efficiency and adds Intel SVID support (IR381(/3)6x) for Intel based systems or parallel VID (IR3826x) for voltage scaling or 8 programmable output voltages booting options to avoid programming at start up. Pin compatible options with and without PMBus are available to allow the flexibility of using PMBus only during evaluation or easily upgrade a system to PMBus without re-layout.

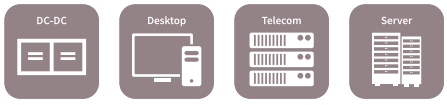
Features and benefits

Key features
PMBus revision 1.2 compliant
≥ 66 PMBus commands
Wide input voltage range and single 5 V – 16 V input operations
Differential remote sense
Ultralow jitter voltage mode engine
Operation temp: -40° to 125° C

Key benefits
Only single-chip solution with extensive PMBus, parallel VID, Intel SVID support allows 50 percent space saving versus external power competition
Intel SVID support for Intel-based systems
Parallel VID or PMBus for voltage setting and margining
Telemetry status via digital bus
Remote monitoring and update
Parameter changes by register
Flexible sequencing
High accuracy low ripple
Integrated sequencing, margin, current and voltage monitoring

Digital interface IPOL

Part number	Max. current [A]	Package size [mm]	Max. V_{in}	Max. f_{sw}	Distinctive features
IR38064MTRPBF	35	5 x 7	21 V	1500 kHz	PMBus
IR38063M	25	5 x 7	21 V	1500 kHz	
IR38062M	15	5 x 7	21 V	1500 kHz	
IR38060M	6	5x6	16 V	1500 kHz	
IR38163M	30	5 x 7	16 V	1500 kHz	OptiMOS™ 5, SVID + PMBus
IR38165M	30	5 x 7	16 V	1500 kHz	OptiMOS™ 5, SVID
IR38363M	15	5 x 7	16 V	1500 kHz	OptiMOS™ 5, SVID + PMBus
IR38365M	15	5 x 7	16 V	1500 kHz	OptiMOS™ 5, SVID
IR38263M	30	5 x 7	16 V	1500 kHz	OptiMOS™ 5, PVID + PMBus
IR38265M	30	5 x 7	16 V	1500 kHz	OptiMOS™ 5, PVID
IR38164M	30	5 x 7	16 V	1500 kHz	OptiMOS™ 5, SVID + PMBus, enhanced Imon
IRPS5401M	4+4+2+2+0.5	7 x 7	14 V	1500 kHz	5 output PMIC, PMBus



www.infineon.com/ipol

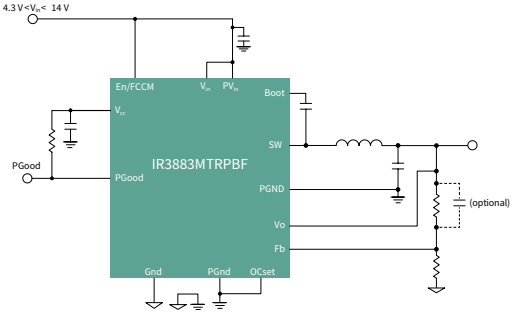
For more details on the product, click on the part number, visit infineon.com or contact our product support.

OptiMOS™ IPOL voltage regulators with COT

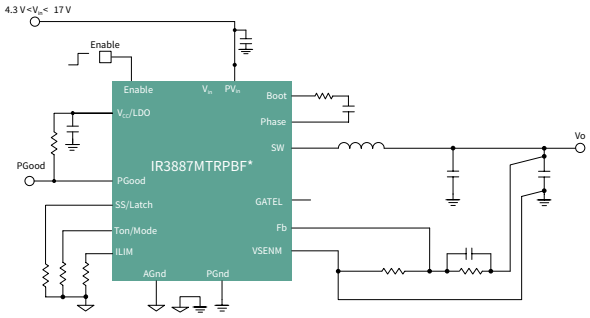
Easy-to-use with no external compensation and smallest BOM

OptiMOS™ IR3883MTRPBF, IR3887MTRPBF*, IR3889MTRPBF, and IR3888MTRPBF integrated point-of-load DC-DC devices are easy-to-use, fully integrated and highly efficient DC-DC regulators that operate from a wide input voltage range and provide up to 30 A continuous current. The devices increase efficiency and power density and simplify design for POL applications in server, enterprise storage, netcom router and switches, datacom and telecom base stations.

Block diagram IR3883M



Block diagram IR3887M (30 A)



Main benefits

Main benefits
› Compensation free and stable with all ceramic caps
› Scalable solution from 3 A up to 40 A
› For designs requiring high density, low cost and easy design, the family includes a 3 A device with enhanced stability constant-on-time (COT) engine that does not require external compensation enabling easy designs and fast time to market.
› Quiescent current down to 5 µA
› Overload, overtemperature, short circuit and reverse-polarity protection
› Low current consumption
› Extended temperature range -40°C ... +125°C

Analog interface IPOL

Part number	Max. current [A]	Package size [mm]	Max. V_{in}	Max. f_{sw}	Distinctive features
IR3883MTRPBF	3	3 x 3	14 V	800 kHz	Constant-on-time (COT)
IR3823AMTRPBF	3	3.5 x 3.5	17 V	2000 kHz	
IR3899AMTRPBF	9	4 x 5	17 V	2000 kHz	
TDA38820	20	4 x 5	17 V	2000 kHz	
IR3888MTRPBF	25	5x6	17 V	2000 kHz	
IR3447AMTRPBF	25	5x6	17 V	600 kHz	
IR3887MTRPBF	30	4 x 5	17 V	2000 kHz	
IR3889MTRPBF	30	5x6	17 V	2000 kHz	
TDA38840	40	5x6	17 V	2000 kHz	
IR3846AMTRPBF	40	5 x 7	17 V	600 kHz	

www.infineon.com/ipol

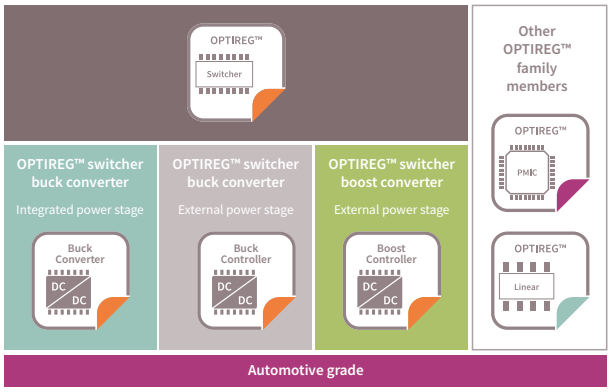
*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

OPTIREG™ switcher power supply ICs

High-efficiency solutions for harsh environments

Infineon offers optimized DC-DC converters that are designed specifically for harsh automotive environments. Wide input voltage range, optimized feature set, and extended qualification make our DC-DC converters perfectly suitable for multiple applications. Our DC-DC portfolio contains various products that operate in step-down (buck), step-up (boost), or a combination of those(buck-boost/sepic). High integration, efficiency, and flexibility are the main benefits of our products.



Features and benefits

Key features	Key benefits
› Input voltage up to 60 V	› High-efficiency regulation
› Output currents going from 500 mA up to 10 A	› Only a few external components needed for stable regulation
› Switching frequencies ranging from 100 kHz to 2.2 MHz	› Perfectly suited for regulation in pre-/post-regulation power supply architectures
› Shutdown quiescent current down to below 2 µA	
› Current limitation and overtemperature protection	
› Enable feature	

OPTIREG™ switcher

Product name	Input voltage $V_{S(OP)}$ [V]	Output current [mA]	Quiescent current (EN = ON) [mA]	Output voltage V_Q [V]	Synchronous topology	Accuracy [%]	Switching frequency PWM f_{sw} [kHz]	Enable	PFM operation	Reset	Watchdog	Early warning	Package
Buck converter (integrated MOSFET)													
TLE6365	8.00 … 40.00	400	1500	5.00		2	100			●			DSO-8
TLE8366	4.75 … 45.00	1800	7000	Adj., 3.30, 5.00		2(4)	200 … 530	●					DSO-8 EP
TLS4120D0	3.70 … 36.00	2000	0.032	Adj., 3.30, 5.00	●	2	380 … 2800	●	●	●			TSDSO-14 EP
TLS4125D0	3.70 … 36.00	2500	0.032	Adj., 3.30, 5.00	●	2	380 … 2800	●	●	●			TSDSO-14 EP
TLF50281	4.75 … 45.00	500	0.045	5.00		2	800 … 2200	●	●	●	●		SSOP-14 EP
TLF50251	4.75 … 45.00	500	0.045	5.00		2	800 … 2200	●	●	●			SSOP-14 EP
TLF50241	4.75 … 45.00	500	0.045	5.00		2	800 … 2200		●	●			SSOP-14 EP
TLF50211	4.75 … 45.00	500	0.045	5.00		2	800 … 2200	●	●				SSOP-14 EP
TLF50201	4.75 … 45.00	500	0.045	5.00		2	800 … 2200		●				SSOP-14 EP
Buck controller (external MOSFET)													
TLE6389-2GV	5.00 … 60.00	2300	0.120	Adj.		3	250 … 530	●	●	●		●	DSO-14
TLE6389-2GV50	5.00 … 60.00	2300	0.120	5.00		3	250 … 530	●	●	●		●	DSO-14
TLE6389-3GV50	5.00 … 60.00	2300	0.120	5.00		3	250 … 530	●	●	●[1]		●	DSO-14
TLF51801	4.75 … 45.00	Adj. max. 10,000	< 2.000 µA	1.20–$D_{max.}$*V_S	●	2	100 … 700	●					SSOP-14 EP
Boost controller													
TLE8386-2[2]	4.75 ... 45.00	dep.on V_Q	7000	Adj. (max. 9-times of V_S)		4	100 … 500	●					SSOP-14 EP

www.infineon.com/optireg-switcher

1) Different voltage reset hysteresis
2) LS-sense-booster

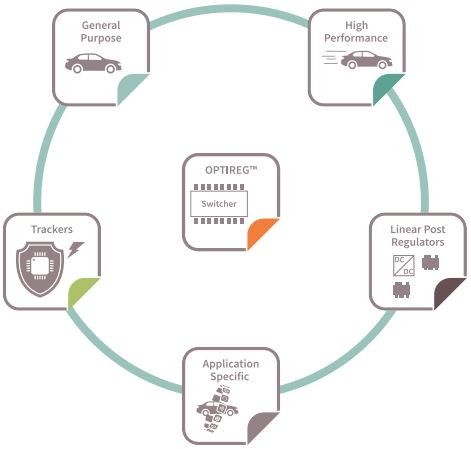
For more details on the product, click on the part number, visit infineon.com or contact our product support.

OPTIREG™ linear voltage regulators

Energy-efficient voltage regulators and trackers

Our linear voltage regulators and trackers help to reduce energy consumption, extending operating time and minimizing operating costs across all kinds of systems. The wide supply voltage range, low quiescent current, rich protective feature set and choice of packages make our devices the perfect fit across a broad application spectrum, apart from automation systems as well for heath care, traffic, power tools, lighting and many other multi-market systems. Our trackers are ideal as additional supplies for off-board loads to increase system reliability

OPTIREG™ linear voltage regulators (selection tree)



General purpose

Best suited for supplying	
› Microcontrollers › Transceivers (CAN, LIN,...) › Sensors (on-board) › Actuator ICs › Standby supply › Low load LEDs › Microphones	TLE42xxx TLE44xxx TLE46xxx TLE7xxx TLF4949 TLS71x

High performance

	Best suited for supplying
TLS8xx TLF80511	› Microcontrollers › Transceivers (CAN, LIN,...) › Sensors (on-board) › Actuator ICs › Standby supply

Trackers

Best suited for supplying	
› Sensors › Microphones › Satellite ECUs (off-board) › Small lamps (LED) › Protected loads	TLS1xx TLT1xx TLE425x

Post regulators

	Best suited for supplying
TLS2xx TLF1963	› Radar (MMIC) › Flash Memory › RAM Memory › Camera › SoC core supply › I/O supply › Ethernet PHY › Cluster supply › Low noise supply

Application specific

	Best suited for supplying
TLF4277x TLT807 TLE447xx	› Radar (MMIC) › Flash Memory › RAM Memory › Camera › SoC core supply › I/O supply › Ethernet PHY › Cluster supply › Low noise supply

Features and benefits

Key features	Key benefits
› Input voltage up to 60 V	› Pin-to-pin compatibility with industry-standard parts
› Output current up to 1.5 A	› Very low dropout voltage trackers for optimized heat distribution and external protection
› Output voltage adjustable or fixed to specific values	› Trackers for maximum system cost reduction
› Quiescent current down to 5 µA	› Small robust packages
› Overload, overtemperature, short circuit and reverse-polarity protection	
› Low current consumption	
› Extended temperature range -40°C ... +125°C	

Infineon's microcontroller families and industrial voltage regulators

Microcontroller family	Input voltage [V]	Input current (max.) [mA]	Voltage regulator
XMC1000 family	1.8 to 5.5	<100	TLS810B1EJ, TLS810A1LD, TLE4266-2G, TLS820D3EL
XMC4000 family	3.3	<500/300	TLF80511x, TLE42764D, TLS835D2EL, TLS850FxTA
XC8xx	3.3 to 5.0	200	TLS810A1LD, TLS810B1EJ, TLE42764D, TLE4296-2G
XE166/XC2000	1.5 and 3.3 or 5.0	100	TLS810A1LD, TLS810B1EJ, TLE42764D, TLE4296-2G
TriCore™	1.5 to 3.3	>400	TLF80511TF/ EJ / TC, TLE42764D, TLS850FxTA

www.infineon.com/optireg-linear

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDPP1100

The smallest digital power controller with PMBus interface

The XDPP1100 is Infineon's highly integrated and programmable digital power supply controller. This device offers advanced power control solution for 48 V DC-DC power applications with isolated topologies. The XDPP1100 device features many optimized power-processing blocks and pre-programmed peripherals to enhance the performance of isolated DC-DC converters, reduce external components and minimize firmware development effort. The controller also provides an accurate telementry and power management bus (PMBus 1.3) interface for system communication, advance power conversion and monitoring. Integrated current sensing capability and compact chip size (24-pin 4 mm^2) can greatly reduce the solution size by eliminating various external components. A combination of high-performance AFE, state machine based digital control loop and an Arm® Cortex® M0 integrated in a single chip makes the XDPP1100 a highly integrated, fully programmable and fastest time-to-market technology for modern high-end power systems, employed in telecom infrastructure, 48 V server motherboards, datacenter and industrial 4.0 applications.

The XDPP1100 device can be configured to support different DCDC topologies including:

- Hard-switched full-bridge and half-bridge
- Phase shifted full-bridge
- Active clamp forward
- Interleaved FB, HB and ACF
- Current-doubler
- Pre-buck or post-buck configuration

Infineon offers support tools such as a complementary graphical user interface (GUI) that allows customers to configure and monitor key parameters. In addition, developers have full control of their application and FW development process with commonly used Arm® based compilers.

Typical applications

- Isolated DC-DC brick modules
- Telecom radio power
- 48 V point of loads
- Non-isolated buck boost converters
- 48 V server motherboard

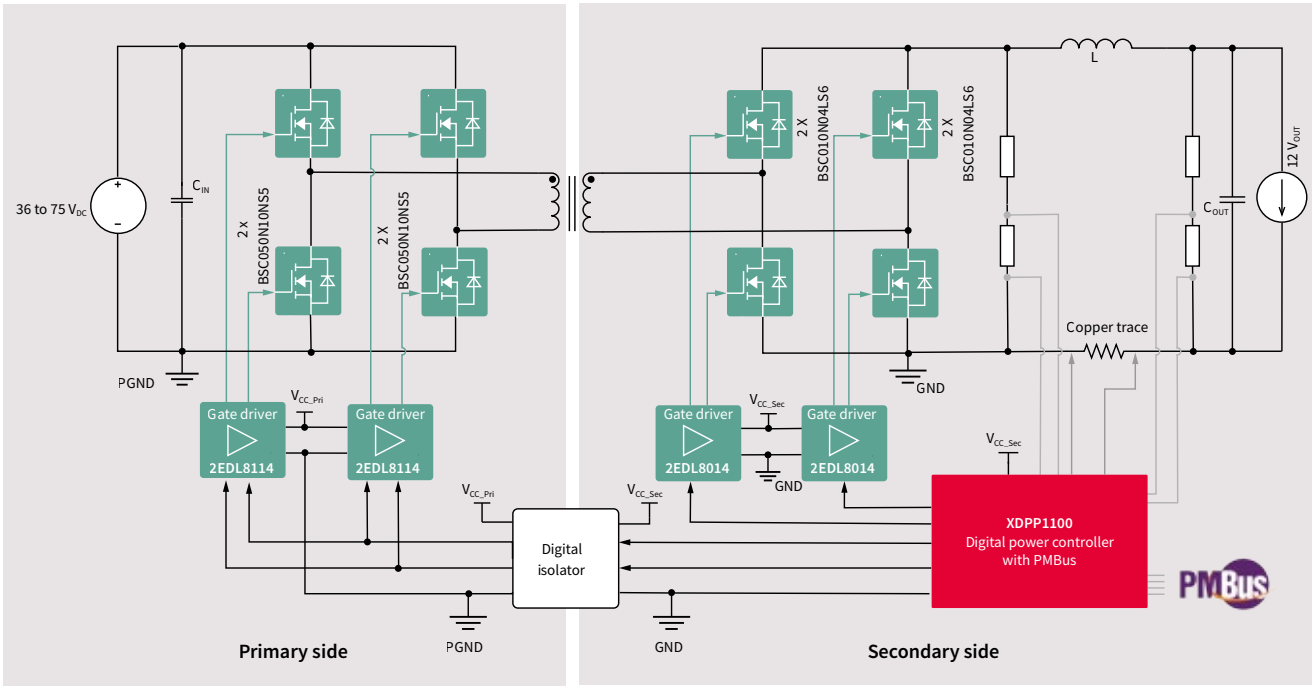
Features and benefits

Key features	Key benefits
State machine based digital control for up to 2 independent voltage loops	Ease of use thanks to firmware-based system configuration with GUI support
Configurable feedback control	User-specific customization and software-based design changes
Arm® Cortex®-M0 processor	Enhanced control and excellent dynamic transient performance
Up to 16 configurable GPIOs	Sophisticated system level fault handling
Up to 12 high resolution digital modulated PWM outputs	System housekeeping i.e., fan control, LED control, sequencing, with configurable GPIOs
Input voltage feed-forward control scheme	High efficiency at light-load management
3 high-speed voltage sense ADCs: 50 MHz 11-bit ADC with set point accuracy within ±1% overtemperature range	
2 current sense ADCs: 25 MHz, 9-bit with 100 µV and 1.45 mV LSB	
Communication: 1 MHz I^2C/PMBus,	
Operating temperature from -40 °C to 125 °C	

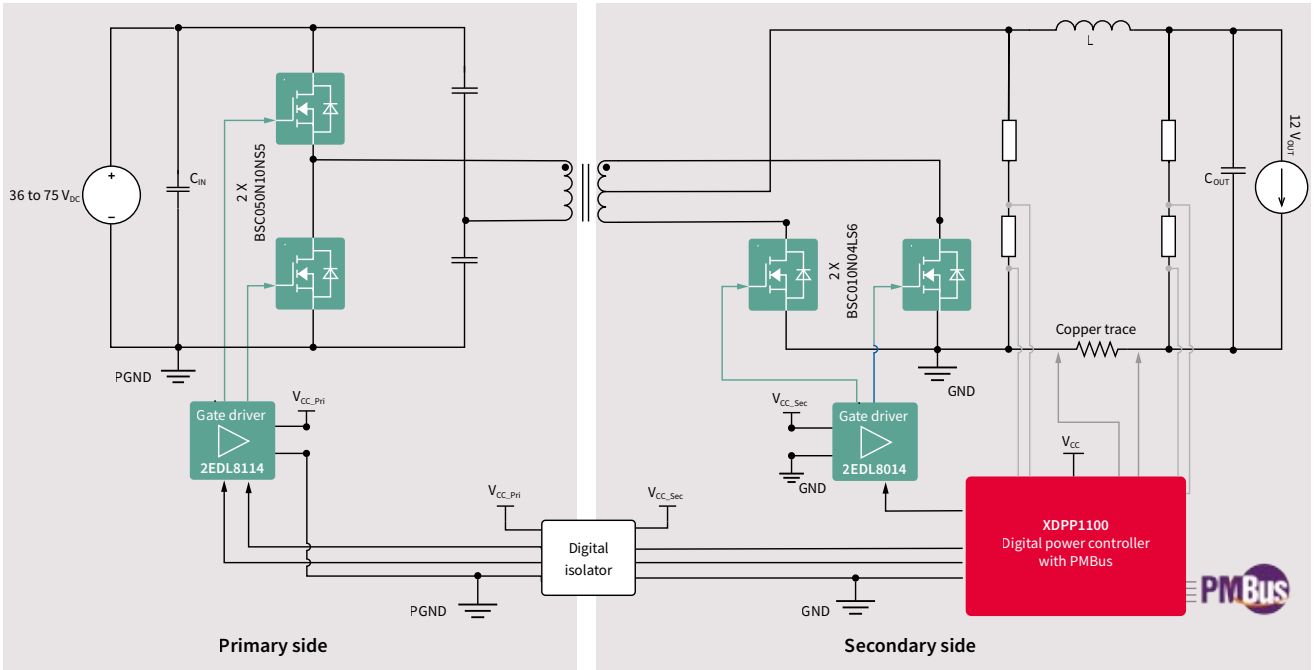
www.infineon.com/xdpp1100

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDPP1100 implementation in 48 V to 12 V full-bridge isolated DC-DC converter



XDPP1100 implementation in 48 V to 12 V full-bridge isolated DC-DC converter



The XDPP1100 device is offered in two packages

VQFN 24-pin	VQFN 40-pin
4 x 4 mm	6 x 6 mm
6 PWM	12 PWM
Single loop	Dual loop

www.infineon.com/xdpp1100

For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ 6EDL7141

Three-phase smart gate drive controller IC

The MOTIX™ 6EDL7141 is Infineon's latest three-phase motor control gate driver IC that enables development of high-performance-battery-operated products using BLDC or PMSM motors. Ideal applications include cordless power tools, gardening products, and automated guided vehicles. With over 50 programmable parameters using built-in digital SPI interface, the MOTIX™ 6EDL7141 is fully configurable to drive a wide range of MOSFET's to yield the best possible system efficiency. The MOTIX™ 6EDL7141 is also designed for maximum flexibility. With an operating voltage from 5.5-70 V and configurable gate drive sink and source current up to 1.5 A, it has the ability to drive a wide range of MOSFETs effectively to best fit the application. It has an adjustable gate driver supply voltage setting between 7 V, 10 V, 12 V and 15 V even at low battery voltage thanks to built-in dual charge pumps. The MOTIX™ 6EDL7141 also has adjustable gate driver parameters to enable control of the slew rate to minimize system EMI. All of the MOTIX™ 6EDL7141 settings can be quickly changed with the available easy-to-use GUI. The integrated buck regulator requires only an external capacitor and inductor to provide power for both the microcontroller and the Hall sensors in the motor, further reducing fault conditions.

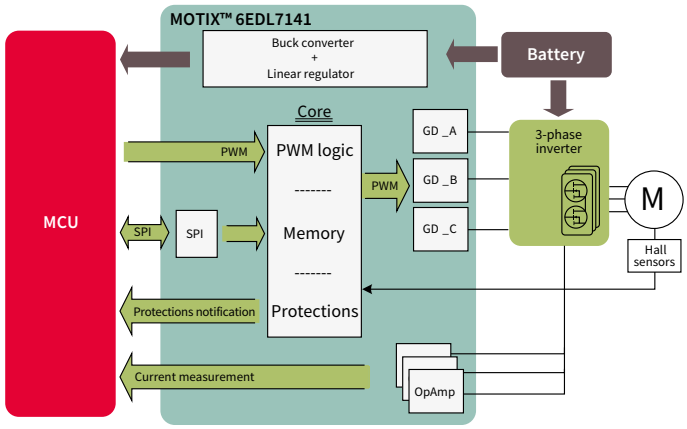
EVAL_6EDL7141_TRAP_1SH

- Single shunt evaluation board for trapezoidal commutation of BLDC motors with 40 V OptiMOS™ 5 PQFN and XMC1404 MCU
- On-board programming dongle
- Featured IC: MOTIX™ 6EDL7141

Features and benefits

Key features	Key benefits
Integrated power supplies	Reduced external components and PCB area
Adjustable slew rate	Optimized efficiency and EMI
Programmable gate drive parameters	Maximum flexibility to use diff erent inverter FETs
3x current shunt amplifier	Highly accurate current sense while saving external components
Complete dedicated motor control protection suite	Higher dynamic range to increase signal resolution
	Improve reliability and fault detection

Block diagram



Product portfolio

Part number	Package	Voltage [V]	$R_{DS(on),max}$ [mΩ]
6EDL7141	PG-VQFN-48-78	5.5 – 70 V	2.2

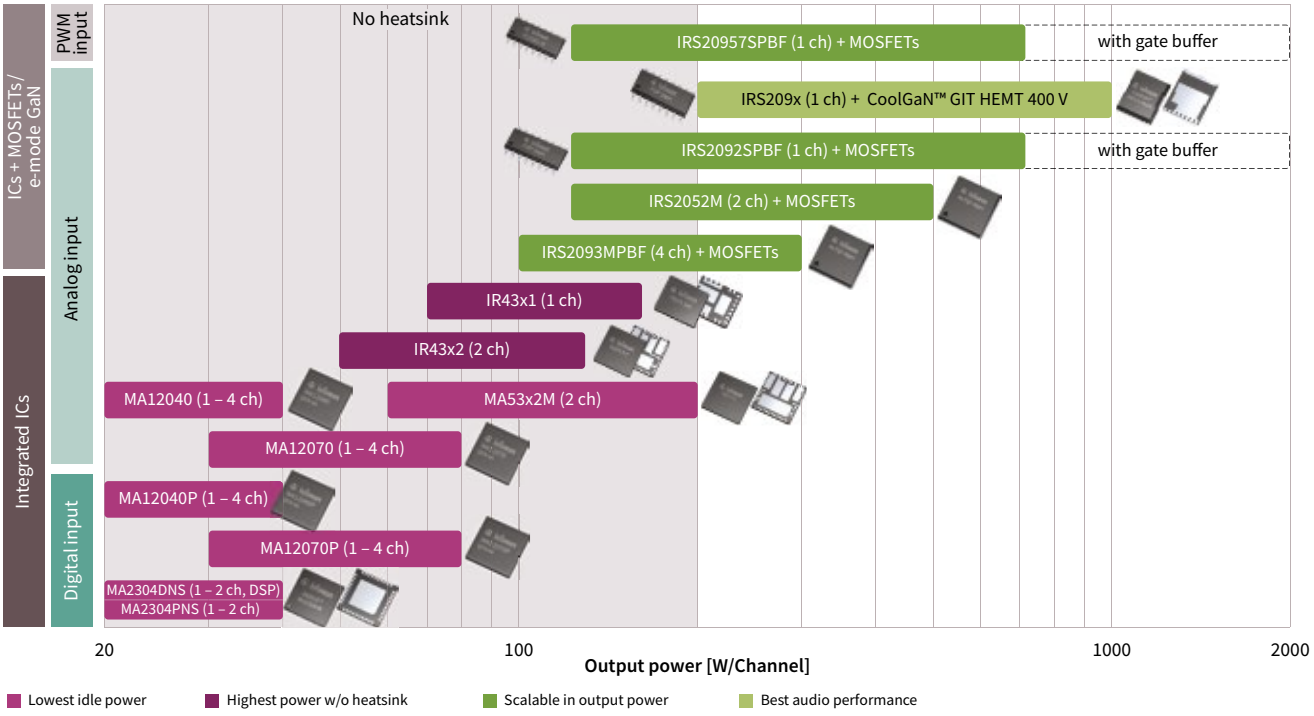
www.infineon.com/6edl7141

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Integrated class D audio amplifier ICs

Cooler, smaller and lighter class D audio amplifiers for great sounding products

Infineon's MERUS™ audio solutions enable audio designers to improve the performance of their products, while increasing efficiency and reducing solution size. Advances in semiconductor processes in combination with new innovative architectures are behind a portfolio of class D technologies that allow professional, commercial/home and portable audio applications to benefit from unparalleled performance, power density and reliability. The broad portfolio covers power ranges from 20 W to 2 kW per channel from the smallest single-chip devices and multi-chip module (MCMs) to highly scalable discrete audio amplifier solutions consisting of powerful MOSFET/CoolGaN™ GIT HEMT and driver ICs combinations.



By combining our core principles, competencies, and leadership in groundbreaking power semiconductors with revolutionary audio amplifier technologies, such as MERUS™, we provide solutions that are smaller, lighter, more robust and flexible, running with less heat dissipation. In addition to outstanding quality and reliability, Infineon's amplifier solutions are designed to maximize power efficiency and dynamic range while providing best-in-class performance in product form factors that make them an optimal fit for any high-end application. These include portable/battery-powered applications, voice controlled active speakers, television sets, stereo HiFi, soundbars, monitors, power over ethernet (PoE) and multichannel systems.

Design with Infineon's solutions to benefit from:

- Exceptional audio performance
- Maximized power efficiency
- Maximized output power
- Design freedom
- Fast time to market

www.infineon.com/merus

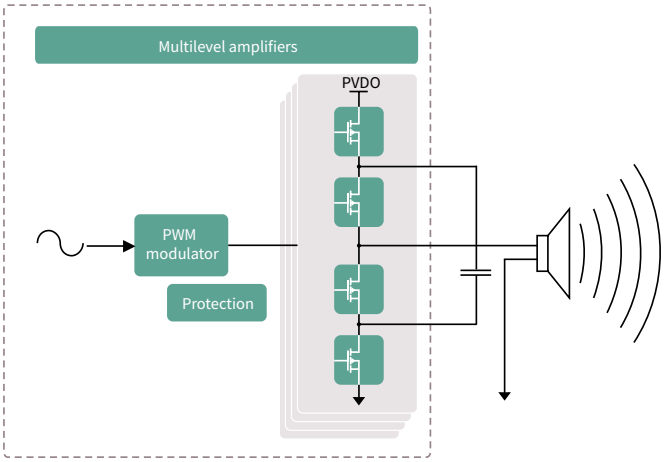
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Integrated MERUS™ multilevel amplifier ICs for class D audio solutions

High power efficiency and density in small packages

With its revolutionary MERUS™ integrated multilevel class D audio amplifier ICs, Infineon is leading in efficiency and power density. Compared to traditional class D amplifier ICs, which produce only two voltage output levels, multilevel amplifier ICs use additional on-chip MOSFETs and capacitors to produce outputs with a higher signal ranularity, i.e., higher switching frequencies and/or multiple output signal levels – typically up to five voltage levels

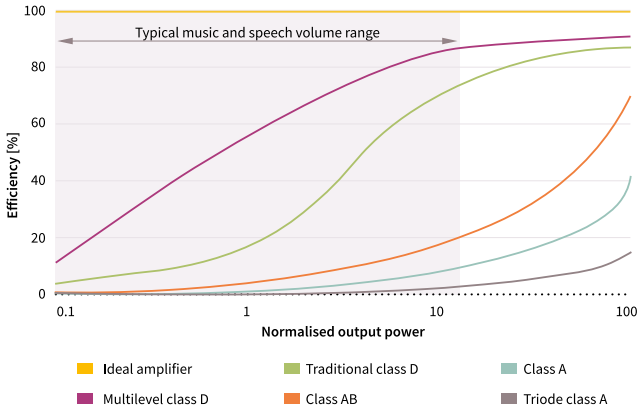
Filterless topology with “flying capacitor” of an integrated class D IC



Features and benefits

Key features	Key benefits
› Multilevel switching technology	› Highest efficiency and power density
› Scalable signal “granularity”	› Potential LC filter removal
› Proprietary circuits architecture	› Low THD+N
	› Cooler operation
	› Low power loss
	› Virtually no switching loss measurable in idle mode

Efficiency where it matters for audio reproduction



For MERUS™ integrated multilevel audio amplifier ICs, amplifier efficiency at average output power is key. As the graph on the left shows, MERUS™ multilevel amplifier is much more effective than the traditional class D amplifier, which translates into less power consumption in AC input and in battery-powered audio applications.

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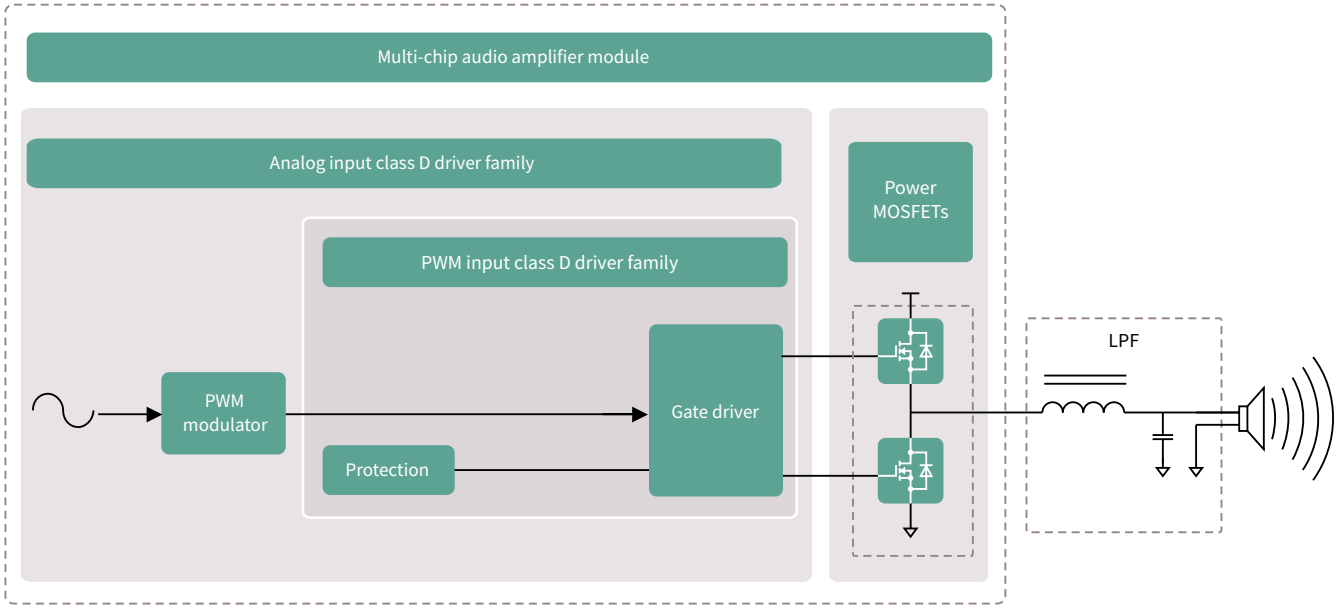
For more details on the product, click on the part number, visit infineon.com or contact our product support.

MERUS™ integrated audio amplifier multi-chip modules (MCM)

Integrated components for scalable output power and superb audio performance

Multi-chip modules integrate PWM controller and power MOSFETs in a single package to offer a highly efficient, compact solution that reduces component count, shrinks PCB size up to 70 percent, and simplifies class D amplifier design.

Multi-chip audio amplifier module



Features and benefits

Key features
› Single package with integrated PWM controller and audio-performance-optimized power MOSFET
› Overcurrent protection
› Thermal shutdown
› Floating differential input
› Clip detection
› Best-in-class power efficiency and audio performance
› Lower component count, leading to design simplification
› Compatible with single supply or split rail configuration
› Click noise reduction

Key benefits
› Extended battery playback time
› Unrivaled audio performance
› Smaller solution size (BOM reduction, system level cost savings)
› Eliminated need for heatsink
› High noise immunity
› Reliable operation
› Thermal efficiency

Audio amplifier | Wireless audio | Audio | PoE | Audio

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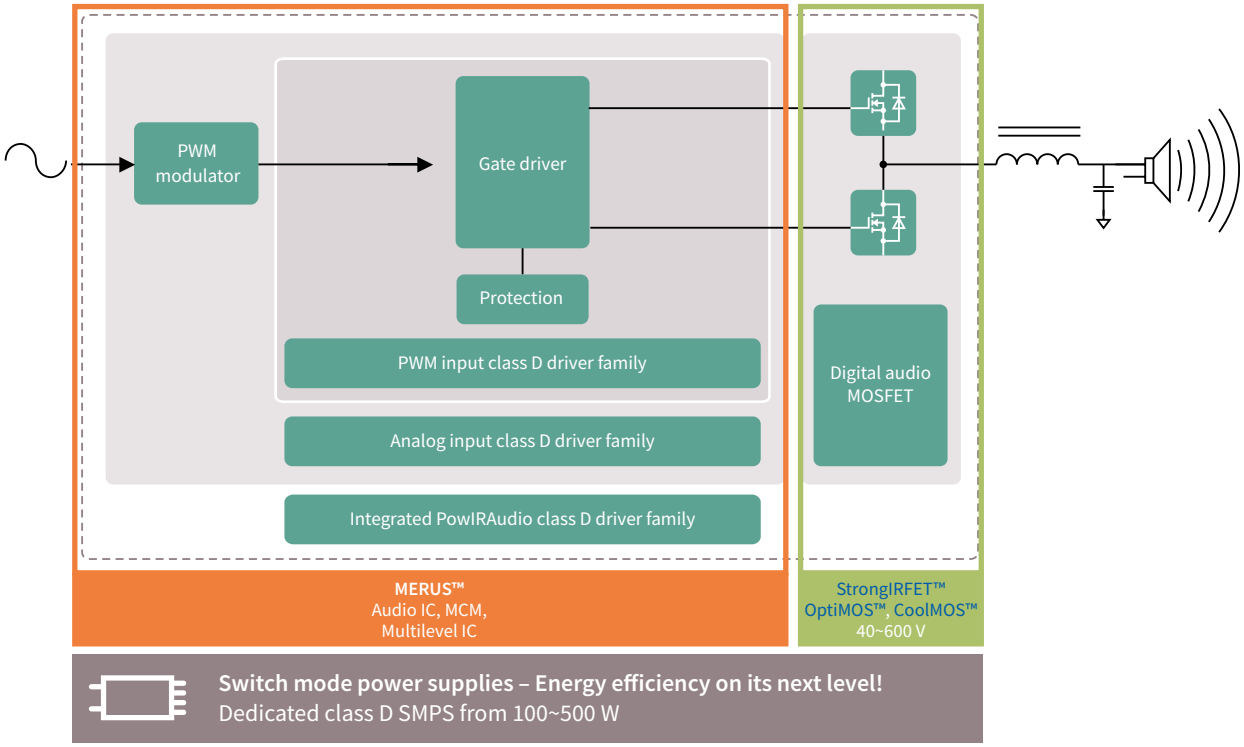
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Discrete MERUS™ audio amplifier driver ICs with MOSFET and gallium nitride CoolGaN™ GIT HEMT 400 V

Scalable output power with a unified design platform

Infineon's discrete audio solutions are scalable to various output power levels, simply by replacing the external MOSFETs or CoolGaN™ GIT HEMTs of the driver-transistor combinations. Key parameters for the transistors used in discrete class D audio applications include on-state resistance ($R_{DS(on)}$), gate charge (Q_G), and reverse recovery charge (Q_{rr}). Our products are specifically suitable for class D audio applications and optimized for these parameters to achieve maximized efficiency, THD and EMI amplifier performance. The CoolGaN™ GIT HEMT 400 V portfolio is specifically built for class D audio requirements, with high-performing SMD packages to fully utilize the benefits of gallium nitride.

Audio solution overview



Features and benefits

Key benefits	Key advantages
› Unified design platform	› Superior audio performance
› Scalable output power up to over 2 kW per channel	› Increased reliability
› Simple yet effective - exchange of external MOSFET triggers alteration in output power level	› Unique audio experience
› Best-in-class power efficiency	

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Integrated class D audio amplifier IC portfolio

MERUS™ Gen2 integrated multilevel audio amplifier IC product portfolio

		MA2304DNS	MA2304PNS
Specifications	Number of audio channels	2xBTL	
	Max. peak power at 4 Ω 10% THD	2x37 W	
	Supply voltage	10-20 V	
	3-level and 5-level modulation	√	√
	Selectable power mode profiles:	Low power consumption (LPC) or high audio performance (HAP)	
	Audio input	Digital	
	HiRes audio compliant	I2S/TDM	
	Integrated DSP	√	
	Volume and dynamic range control	√	√
	Idle power dissipation Max. output and all channels switching	52 mW (LPC mode)	
	Audio performance (PMP2)	106 dB DNR 52 µVrms output noise <0.03% THD+N	
Features	Sample rates	32, 44.1, 48, 88.2, 96, 176.4, 192 kHz	
	Comprehensive protection scheme*	√	√
	Configurable for SE or PBTL operation	√	√
	I²C communication	√	√
	Filterless implementation	√	√
	Package type	40-pin QFN package with exposed thermal pad	
	Evaluation boards	EVAL_AUDIO_MA2304DNS	EVAL_AUDIO_MA2304PNS

*All ICs carry a full protection scheme comprising undervoltage lockout, overtemperature warning/error, short circuit/overload protection, power stage pin-to-pin short circuit, error reporting through serial interface (I²C), and DC protection

MERUS™ integrated audio amplifier multi-chip modules (MCMs)

		IR4301M	IR4321M	IR4311M	IR4302M	IR4322M	IR4312M	MA5332MS
Specifications	Number of audio channels	1	1	1	2	2	2	2
	Max. power per channel	160 W	90 W	45 W	130 W	100 W	40 W	200 W
	Supply voltage	~ ± 31 V or 62 V	~ ± 25 V or 50 V	~ ± 15 V or 30 V	~ ± 31 V or 62 V	~ ± 25 V or 50 V	~ ± 16 V or 32 V	~±40 V or 80 V
	Max. PWM frequency	500 kHz	500 kHz	500 kHz	500 kHz	500 kHz	500 kHz	500 kHz
Features	Differential audio input	✓	✓	✓	✓	✓	✓	✓
	Overcurrent protection	✓	✓	✓	✓	✓	✓	✓
	Integrated power MOSFET	✓	✓	✓	✓	✓	✓	✓
	Voltage	80 V	60 V	40 V	80 V	60 V	40 V	100 V
	PWM controller	✓	✓	✓	✓	✓	✓	✓
	Thermal shutdown	✓	✓	✓	✓	✓	✓	✓
	Click noise reduction	✓	✓	✓	✓	✓	✓	✓
	Clip detection				✓	✓	✓	✓
	Package type	5x6 mm QFN	5x6 mm QFN	5x6 mm QFN	7 x 7 mm QFN	7 x 7 mm QFN	7 x 7 mm QFN	7 x 7 mm QFN
	Evaluation boards	IRAUDAMP12 IRAUDAMP19	IRAUDAMP21	IRAUDAMP15	IRAUDAMP16 IRAUDAMP17	IRAUDAMP22	IRAUDAMP18	EVAL_AUDAMP25 REF_MA5332BTLSPS

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

MERUS™ discrete audio amplifier driver IC product portfolio

	Number of audio channels	IRS20965S	IRS20957SPBF	IRS2092SPBF	IRS2052M	IRS2093MPBF	IRS2452AM
Specifications	Max. power per channel	500 W	500 W	500 W	300 W	300 W	500 W
	Supply voltage	± 100 V	± 100 V	± 100 V	± 100 V	± 100 V	± 200 V
	Gate sink/source current	2.0/2.0 A	1.2/1.0 A	1.2/1.0 A	0.6/0.5 A	0.6/0.5 A	0.6/0.5 A
Features	Overcurrent protection	✓	✓	✓	✓	✓	✓
	Overcurrent flag	✓					
	PWM input	✓	✓				
	Floating input	✓	✓	✓	✓	✓	✓
	Dead time		✓	✓	✓	✓	✓
	Protection control logic	✓	✓	✓	✓	✓	✓
	PWM controller			✓	✓	✓	✓
	Clip detection				✓		
	Click noise reduction			✓	✓	✓	✓
	Temperature sensor input				✓		✓
	Thermal shutdown				✓		
	Clock input				✓		✓
	Package type	16-pin SOIC narrow	16-pin SOIC narrow	16-pin SOIC narrow	MLPQ48	MLPQ48	MLPQ32
	Evaluation boards		IRAUDAMP4A IRAUDAMP6	IRAUDAMP5 IRAUDAMP7S IRAUDAMP7D IRAUDAMP9	IRAUDAMP10	IRAUDAMP8	IRAUDAMP23

Recommended MOSFET (through-hole) product portfolio

Output power	Recommended discrete audio driver IC	Speaker resistance		
		2 Ω	4 Ω	8 Ω
150 W	IRS2093MPBF	IRFB4019	IRFB4019	IRFI4020H-117P
200 W	IRS2052M	IRFB5615	IRFB4019	IRFI4020H-117P
300 W	IRS2092SPBF	IRFB4228PBF	IRFB4227	IRFB4229
500 W	IRS20957SPBF	IRFB4228PBF	IRFB4227	IRFB4229
750 W		IRFB4227	IRFB4229	
1000 W		IRFP4668	IRFB4229 x 2	

IRS2093MPBF works up to 150 W and IRS2052M works up to 300 W.
IRS2092SPBF and IRS20957SPBF work with all power levels listed above.

Recommended MOSFET (DirectFET™) product portfolio

Output power	Recommended discrete audio driver IC	Speaker resistance		
		2 Ω	4 Ω	8 Ω
150 W	IRS2093MPBF	IRF6645	IRF6665	IRF6775M
200 W	IRS2052M	IRF6646	IRF6775M	IRF6775M
300 W	IRS2092SPBF	IRF6644	IRF6775M	IRF6785
500 W	IRS20957SPBF	IRF6643	IRF6641	

Recommended CoolGaN™ GIT HEMT 400 V product portfolio

	CoolGaN™ GIT HEMT 400 V	Recommended discrete audio amplifier driver IC
Package	HSOF-8-3 (TO-Leadless)	IRS20957SPBF
$P_{max.}$	Up to 200 W	
$R_{DS(on),max.}$	70 mΩ	
OPN	IGT40R070D1 E8220	

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Recommended audio evaluation boards

Enabling fast time to market and device performance evaluation

MERUS™ integrated multilevel audio amplifier IC evaluation boards

EVAL_AUDIO_MA2304DNS*

The demonstration board EVAL_AUDIO_MA2304DNS is an evaluation and demonstration board for MERUS™ audio MA2304DNS. It contains a digital input and a variety of output and setup/selection features. It also contains an on-board power supply generator (selectable 1.8 or 3.3 V buck-converted) so only one external power supply (PVDD) is necessary. It can be controlled and programmed with its software GUI.

The board can be used for evaluating or demonstrating key features/advantages of the MERUS™ technology:

- Energy efficiency: power losses at typical audio listening levels/ultralow idle power consumption
- Adaptive power management system
- Minimum output filter components: significant cost and size reduction
- THD performance and audio quality
- Integrated MERUS™ DSP

EVAL_AUDIO_MA2304PNS*

The demonstration board EVAL_AUDIO_MA2304PNS is an evaluation and demonstration board for MERUS™ audio MA2304PNS. It contains a digital input and a variety of output and setup/selection features. It also contains an on-board power supply generator (selectable 1.8 or 3.3 V buck-converted) so only one external power supply (PVDD) is necessary. It can be controlled and programmed with its software GUI.

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- Energy efficiency: power losses at typical audio listening levels/ultralow idle power consumption
- Adaptive power management system
- Minimum output filter components: significant cost and size reduction
- THD performance and audio quality
- Integrated volume and limiter processors

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*Coming soon

For more details on the product, click on the part number, visit infineon.com or contact our product support.

KIT_40W_AMPHAT_ZW

Kit board - MERUS™ audio amplifier HAT ZW class D audio amplifier 40 W for Raspberry Pi Zero W featuring MA12070P

Summary of features

- Equipped with MERUS™ MA12070P proprietary multilevel amplifier
- Compatible with Raspberry Pi Zero and Raspberry Pi Zero wireless
- Power input: 5 V/2.5 A - sourced from the same single supply as the Raspberry Pi
- No need for external or extra power supplies
- Up to 40 W instantaneous peak output power with the Raspberry Pi official 5 V/2.5 A supply

Benefits

- Compatibility with major streaming applications for Raspberry Pi (Volumio, JustBoom Player, Max2Play)
- Up to 48 kHz of sample rate and 24-bit of music playback
- Full hardware control, customization, and error monitoring trough Linux Alsamixer

Potential Applications

- DIY on the go wireless speakers
- DIY intelligent home audio systems

KIT_ARDMKR_AMP_40W

Kit board MA12070P audio amplifier - compatible with Arduino MKR boards

Summary of features

- Equipped with MERUS™ MA12070P proprietary multilevel amplifier
- Power input: 5 V/2.5 A - sourced from the same single USB-C power supply or battery pack
- No need for external or extra power supplies
- Up to 40 W instantaneous peak output power with a USB-C power supply or battery pack

Benefits

- Compatible with Arduino MKRZERO and MKR1000 WIFI
- Full hardware control and customization
- Error monitoring through Arduino programming framework

DEMO_BASSAMP_60W_MA12070

Reference design demoboard MERUS™ MA12070 as musical instrument bass amplifier

Summary of features

- 1 x 60 W at 4 Ω speaker output
- Powered by off-the-shelf regulated wall adapter
- 12AU7 vacuum-tube preamplifier
- Stereo 3.5 mm AUX input
- XLR D.I. output with ground lift switch
- Bright switch for slap-bass sound
- Low idle power consumption

Benefits

- Superior sound quality
- Modelled after classic bass amplifier topology
- Genuine vacuum-tube preamplifier
- Small size and scalable platform
- Excellent efficiency

EVAL_AUDAMP25

Number of audio channels: 2
Output power per channel [RMS]: 200 W
Featured class D IC: MA5332MS
Input: analog
OPN: EVALAUDAMP25TOBO1

REF_MA5332BTLSPS

Number of audio channels: 1
Output power per channel [RMS]: 200 W
Featured class D IC: MA5332MS
Input: analog
OPN: REFMA5332BTLSPSTOBO1

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

MERUS™ integrated audio amplifier multi-chip module (MCM) evaluation boards

IRAUDAMP12
Number of audio channels: 2
Output power per channel [RMS]: 130 W
Featured class D IC: IR4301M
Input: Analog
OPN: IRAUDAMP12

IRAUDAMP17
Number of audio channels: 2
Output power per channel [RMS]: 100 W
Featured class D IC: IR4302M
Input: Analog
OPN: IRAUDAMP17

IRAUDAMP19
Number of audio channels: 2
Output power per channel [RMS]: 100 W
Featured class D IC: IR4301M
Input: Analog
OPN: IRAUDAMP19

IRAUDAMP21
Number of audio channels: 2
Output power per channel [RMS]: 135 W
Featured class D IC: IR4321M
Input: Analog
OPN: IRAUDAMP21

IRAUDAMP22
Number of audio channels: 2
Output power per channel [RMS]: 100 W
Featured class D IC: IR4322M
Input: Analog
OPN: IRAUDAMP22

Discrete MERUS™ audio amplifier driver IC and MOSFET evaluation boards

IRAUDAMP4A
Number of audio channels: 2
Output power per channel [RMS]: 120 W
Featured driver IC: IRS20957S
Featured MOSFET: IRF6645TRPbF
OPN: IRAUDAMP4A

IRAUDAMP5
Number of audio channels: 2
Output power per channel [RMS]: 120 W
Featured driver IC: IRS2092S
Featured MOSFET: IRF6645TRPbF
OPN: IRAUDAMP5

IRAUDAMP6
Number of audio channels: 2
Output power per channel [RMS]: 250 W
Featured driver IC: IRS20957S
Featured MOSFET: IRF6785MTRPbF
OPN: IRAUDAMP6

IRAUDAMP7S
Number of audio channels: 2
Output power per channel [RMS]: 500 W
Featured driver IC: IR-S2452AM
Featured MOSFET: IRFI4019H-117P
OPN: IRAUDAMP7S

IRAUDAMP9
Number of audio channels: 1
Output power per channel [RMS]: 1700 W
Featured driver IC: IRS2092S
Featured MOSFET: IRFB4227PbF
OPN: IRAUDAMP9

IRAUDAMP10
Number of audio channels: 2
Output power per channel [RMS]: 370 W
Featured driver IC: IRS2052M
Featured MOSFET: IRF6775MTRPbF
OPN: IRAUDAMP10

IRAUDAMP23
Number of audio channels: 2
Output power per channel [RMS]: 500 W
Featured driver IC: IRS2452AM
Featured MOSFET: IPP60R180C7
OPN: IRAUDAMP23

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Discrete audio amplifier driver IC and CoolGaN™ GIT HEMT 400 V evaluation board

EVAL_AUDAMP24
Number of audio channels: 2
Output power per channel [RMS]: 300 W at 1%
Featured driver IC: IRS20957S
Featured HEMT: IGOT40R070D1
IGT40R070D1
OPN: EVAL_AUDAMP24

Power supply units for audio evaluation boards

IRAUDPS1
Input voltage: 12 V_{DC}
Output voltage: ± 35 V
Output power per channel [RMS]: 100 W
Featured driver IC: IR2085
Description: 250-1000 W scalable audio power supply
OPN: IRAUDPS1

IRAUDPS3
Input voltage: 110/220 V_{AC}
Output voltage: ± 30 V
Output power per channel [RMS]: 200 W
Featured driver IC: IRS27952S
Description: Power supply for class D audio amplifier
OPN: IRAUDPS3

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AC-DC LED driver ICs

Digital and mixed-signal, single- and dual-stage high-voltage control ICs for LED drivers

XDP™ digital power – digital single- and dual-stage flyback combo controllers

The XDP™ portfolio of high-performance digital power control ICs addresses today's challenges such as smart or connected lighting, meeting demanding LED driver requirements with a unique set of features.

Mixed-signal control ICs for solid-state lighting luminaires

Infineon's mixed-signal control ICs for LED drivers deliver excellent power quality and high efficiency for LED lighting applications supporting dimming levels down to 1 percent. The integration of advanced functions saves external components and minimizes system cost. The wide variety of features and functions gives the option to choose the best fitting part for the application.

www.infineon.com/offline-led-driver

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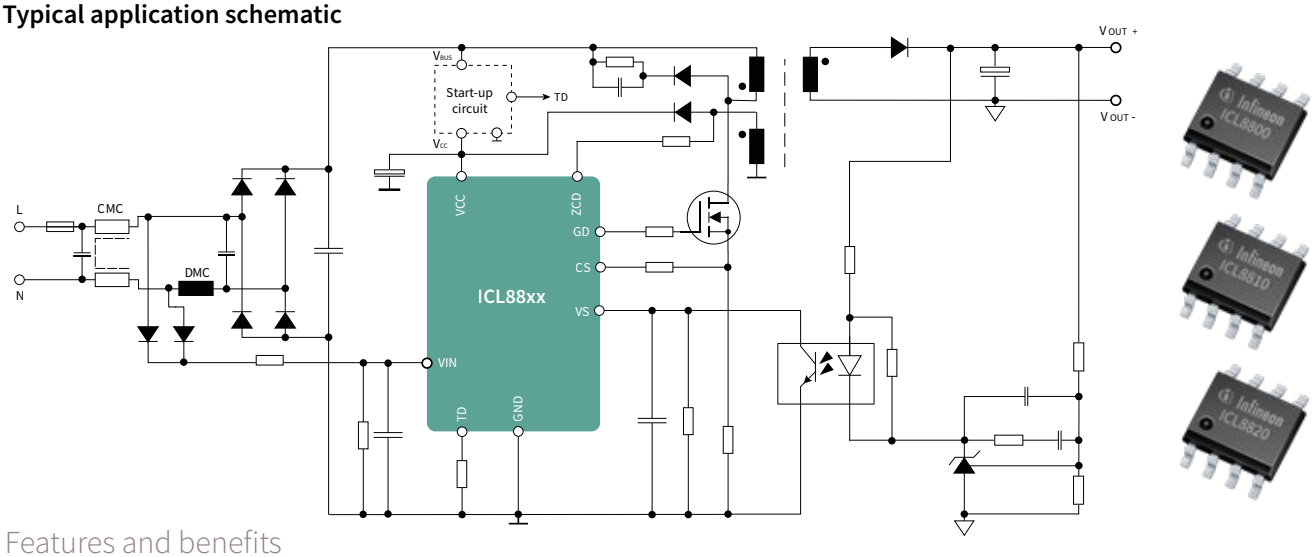
ICL8800/ICL8810/ICL8820

Single-stage flyback LED controllers for constant voltage output

The ICL88xx family of single-stage flyback controllers for constant voltage output is tailored for LED lighting applications to meet the required performance cost-effectively. All three ICs offer benchmarking performance for power factor correction and total harmonic distortion at full-load as well as at low-load conditions. With their comprehensive set of protection features (compare table below) and bottom-up design, they are easy to design-in and require a minimum number of external components. The controllers are optimized as secondary-side regulated (SSR) constant voltage (CV) output flyback controllers and are also well suited for primary-side regulation (PSR).

Additionally, the controllers' low standby power due to the integrated BM (in ICL8810, ICL8820) is ideally suited for smart lighting systems' requirements. The jitter function (in ICL8820) eases the design of emergency lighting LED drivers without additional circuitry. It fulfills EMI requirements in DC operation and improves the EMI performance.

Typical application schematic



Features and benefits

Key benefits
› Optimized for SSR CV output flyback operation, additionally suited for PSR
› PF > 0.9 and THD < 10% across a wide load range (AC input up to 277 V_{rms})
› CCM and QRM with smart valley hopping
› ICL8810 also contains burst mode (BM) to ensure low standby power (< 100 mW)
› ICL8820 also contains built-in jitter function

Key advantages
› Low BOM for wide range of applications with PFC functionality where dual-stage topologies are required
› Enables platform design and window drivers
› Optimum efficiency and low EMI at low BOM without compromising light quality
› ICL8810 **enables in addition:** smart lighting in connection with microcontrollers (standby power < 500mW, i.e., more power budget for additional components)
› ICL8820 **enables in addition:** Fulfillment complying with EMI regulations in DC operation at low cost and effort

Order information for ICL88xx

Board name	Description	Ordering code
ICL8800	Single-stage flyback controller for constant voltage output	ICL8800XUMA1
REF_ICL8800_LED_43W*	Demoboard with ICL8800	REFICL8800LED43W
ICL8810	Single-stage flyback controller for constant voltage output with low standby power	ICL8810XUMA1
REF_ICL8810_LED_43W_BM*	Demoboard with ICL8810 with burst mode	REFICL8810LED43WBM
REF_ICL8810_LED_42W_PSR	Demoboard with ICL8810 for primary side regulation	REFICL8810LED42WPSR
ICL8820	Single-stage flyback controller for constant voltage output with low standby power and jitter function	ICL8820XUMA1
REF_ICL8820_LED_43W_JT*	Demoboard with ICL8820 with jitter function	REFICL8820LED43WJT

Plug & LEDs play | LED | Lighting

www.infineon.com/offline-led-driver

*See Plug & LEDs play, ideally to be combined with secondary-side boards

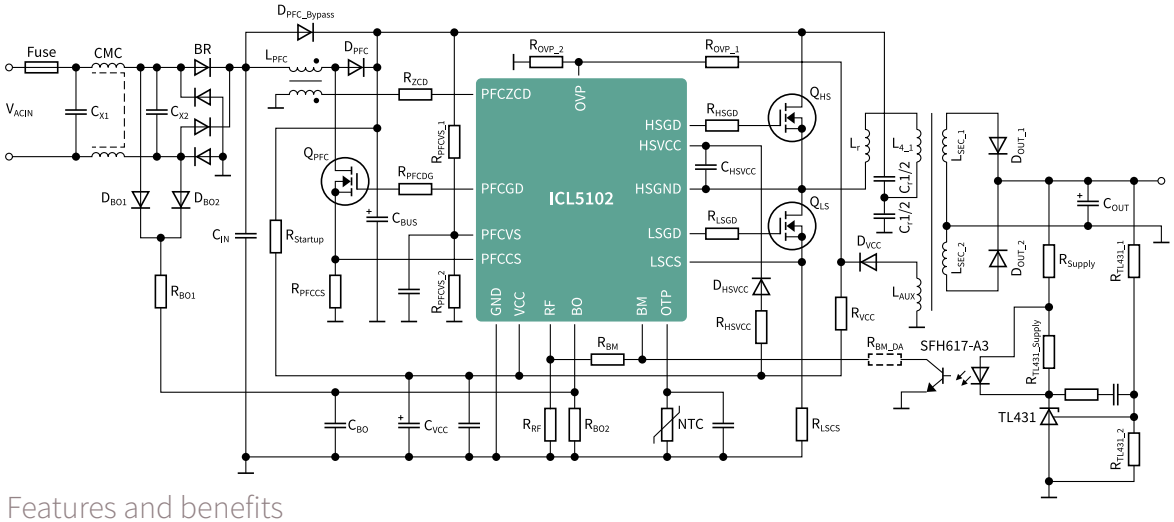
For more details on the product, click on the part number, visit infineon.com or contact our product support.

ICL5102

High-performance PFC + resonant controller for LCC and LLC

With ICL5102 Infineon offers a highly integrated combo controller IC with a universal input of 70 V to 325 V, which allows manufacturers to realize global designs, keeping cost for product variety and stock low. Highest efficiency of up to 94 percent by resonant topology, a THD factor less than 3.5 percent and a high power factor of more than 0.95 allow for more lumen output and less thermal load, enabling cost-effective designs and keeping cost for LEDs and heat sink low. Thanks to the high integration, there is no need for additional expensive components in PFC and LLC stage, reducing the overall BOM cost. In addition, integrated protection features complement the ICL5102 features.

Typical application schematic



Features and benefits

Key features and benefits
› **Small form factor LED driver and low BOM** The high level of integration assures a low count of external components, enabling small form factor designs and making them ideal for compact and slimline power supplies for lighting, such as LED driver for indoor and outdoor applications
› **High performance, digital PFC and advanced HB driver** The high-performance digital PFC stage achieves power factor of 99 percent, through operation in CrCM and DCM mode, in a frequency range of 22 to 500 kHz. This supports stable operation even at low-load conditions down to 0.1 percent of the nominal power without audible noise
› **Fast time-to-light and low standby** With a start-up current of less than 100 µA the controller provides very fast time-to-light within less than 300 ms, while in standby the controller changes into active burst mode which reduces power consumption to less than 300 mW
› **Safety first** The controller has a comprehensive set of protection features built in to increase the system safety. In run mode it monitors the complete system regarding bus over- and undervoltage, open loop, overcurrent of PFC and/or inverter, output overvoltage, overtemperature and capacitive load operation

Order information for ICL5102

Type	Description	Ordering code
ICL5102	PFC and resonant controller for LCC and LLC	ICL5102XUMA2
REF-ICL5102-U130W-CC	PFC/LLC-CC constant current evaluation board 130 W LED driver	REFICL5102U130WCCTOBO1
REF-ICL5102-U52W-CC	Low-cost PFC/LCC reference design 52 W LED driver, non-dimmable	REFICL5102U52WCCTOBO1
REF_ICL5102_U100W_LCC	Low-cost PFC/LCC reference design 100 W, dimmable	REFICL5102U100WLCC
REF_LLC_BUCK_4CH_320W*	Scalable 320 W multichannel high-power LED driver (using ICL5102 board and ILD8150E board)	REFLLCBUCK4CH320WTOBO1

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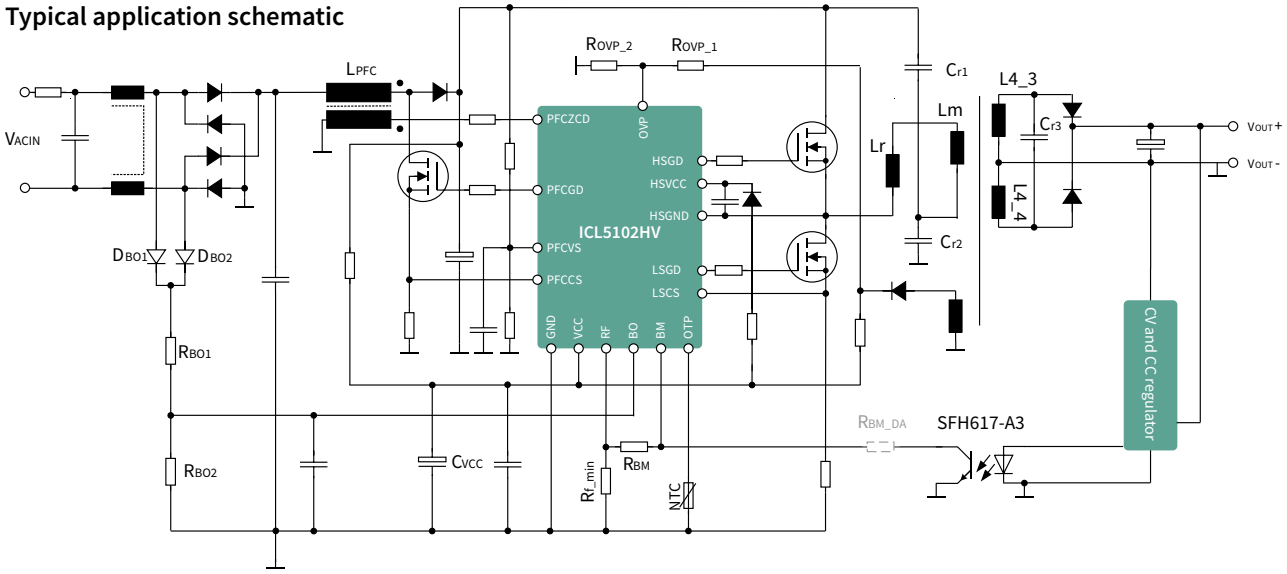
ICL5102HV

High-performance PFC + resonant controller for LCC and LLC, supporting 980 V high side

ICL5102HV control IC for LED drivers offers a unique one-package solution for lighting applications up to 350 W, supporting LLC/LCC topology. It is particularly designed to deliver best performance of total harmonic distortions (THD) and power factor (PF). Compared to level-shifter technology, the integrated coreless transformer not only further reduces the loss at high operation frequency, but also enhances the capability of handling a huge negative voltage (-600 V on HSGND). Reduce the number of external components to optimize the form factor and reduce the bill of materials (BOM) with the integrated two-stage combination controller (PFC + LLC/LCC) for lighting applications. Simplify your design and shorten time-to-market.

Typical application schematic



Features and benefits

Key features and benefits
› **Small form factor LED driver and low BOM** The high level of integration assures a low count of external components, enabling small form factor designs and making them ideal for compact and slimline power supplies for lighting, such as LED driver for indoor and outdoor applications
› **High performance, digital PFC and advanced HB driver** The high-performance digital PFC stage achieves power factor of 99 percent, through operation in CrCM and DCM mode, in a frequency range of 22 to 500 kHz. This supports stable operation even at low-load conditions down to 0.1 percent of the nominal power without audible noise
› **Fast time-to-light and low standby** With a start-up current of less than 100 µA the controller provides very fast time-to-light within less than 300 ms, while in standby the controller changes into active burst mode which reduces power consumption to less than 300 mW
› **Safety first** The controller has a comprehensive set of protection features built in to increase the system safety. In run mode it monitors the complete system regarding bus over- and undervoltage, open loop, overcurrent of PFC and/or inverter, output overvoltage, overtemperature and capacitive load operation

Order information for ICL5102HV

Type	Description	Ordering code
ICL5102HV	PFC and resonant controller for LCC and LLC	ICL5102HVXUMA1
REF-ICL5102HV-U150W	PFC/LCC evaluation board 150 W, CC LED driver	REFICL5102HVU150WTOBO1

Lighting

www.infineon.com/icl5102hv

For more details on the product, click on the part number, visit infineon.com or contact our product support.

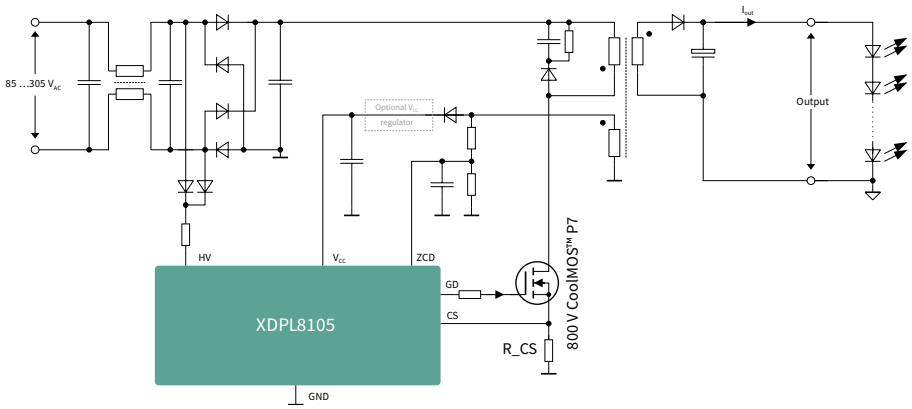
XDP™ LED

The IC family XDP™ is the first all-in-one package solution combining a digital controller with key power peripherals. Such integration provides exceptional flexibility and performance. The XDP™ family addresses essential features for advanced LED driver.

XDPL8105 – digital flyback controller IC for LED driver

The XDPL8105 is a digital, single-stage flyback controller with high power factor for constant current LED driver.
The device offers versatile functions for different indoor and outdoor lighting applications. The IC is available in a DSO8 package and it provides a wide feature set, requiring a minimum of external components. The advanced control algorithms in the digital core of the XDPL8105 provide multimode operation for high efficiency. Configurable parameters allow last minute changes, shorten the product development time and reduce hardware variants. The extensive set of configurable standard and sophisticated protection mechanisms ensure a safe, reliable and robust LED driver device for diverse use cases.

Typical application schematic



Features and benefits

Key features and benefits
› Constant current with primary-side regulation
› Supports AC and DC input
› Nominal input voltage range 90-305 V_{AC} or 120-350 V_{DC}
› Integrated 600 V start-up cell
› Power factor > 0.9 and THD < 15 percent over wide load range
› Highly accurate primary-side control output current typ. ± 3 percent
› Reference board efficiency > 90 percent
› Internal temperature guard with adaptive thermal management
Multimode operation › QRM (quasi-resonant mode) › DCM (discontinuous conduction mode) › ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected › Undervoltage › Overvoltage › Open load › Output shorted

Order information for XDPL8105

Type	Description	Ordering code
XDPL8105	Digital flyback constant current controller IC	XDPL8105XUMA1
REF-XDPL8105-CDM10V	40 W reference design with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8105CDM10VTOBO1

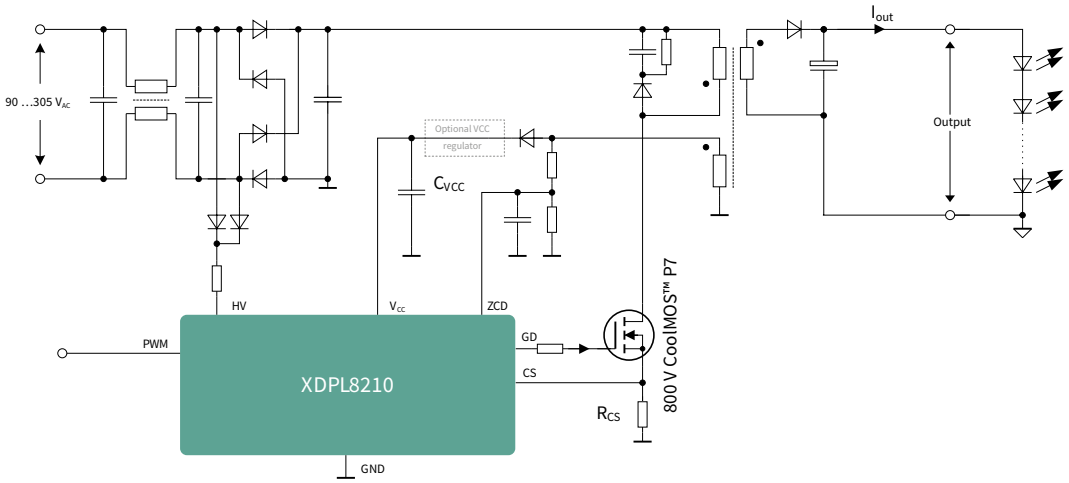
www.infineon.com/xdpl8105

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDPL8210 – digital flyback constant current controller IC for LED driver with 1 percent dimming

The XDPL8210 is a digital, single-stage, quasi-resonant flyback controller with high power factor and high precision primary-side controlled constant current output. The IC is available in a DSO8 package and it provides a wide feature set, which requires only a small number of external components. Sophisticated algorithms provide flicker-free dimming below one percent. The driver fully supports IEC61000-3-2 class C designs. The limited power mode improves functional safety, while configurable parameters allow last minute changes, shorten the product development time and reduce hardware variants. The extensive set of configurable standard and sophisticated protection mechanisms ensure a safe, reliable and robust LED driver for a large set of use cases.

Typical application schematic



Features and benefits

Key features and benefits
› Constant current with primary-side regulation
› Supports AC and DC input
› Nominal input voltage range 90-305 V_{AC} or 90-430 V_{DC}
› Reference board efficiency > 90 percent
› Power factor > 0.9 and THD < 15 percent over wide load range
› Standby power < 100 mW
› Internal temperature guard with adaptive thermal management
Multimode operation › QRM (quasi-resonant mode) › DCM (discontinuous conduction mode) › ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected › Undervoltage › Overvoltage › Open load › Output shorted

Order information for XDPL8210

Type	Description	Ordering code
XDPL8210	Digital flyback constant current controller IC	XDPL8210XUMA1
REF-XDPL8210-U35W	35 W reference design with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8210U35WTOBO1

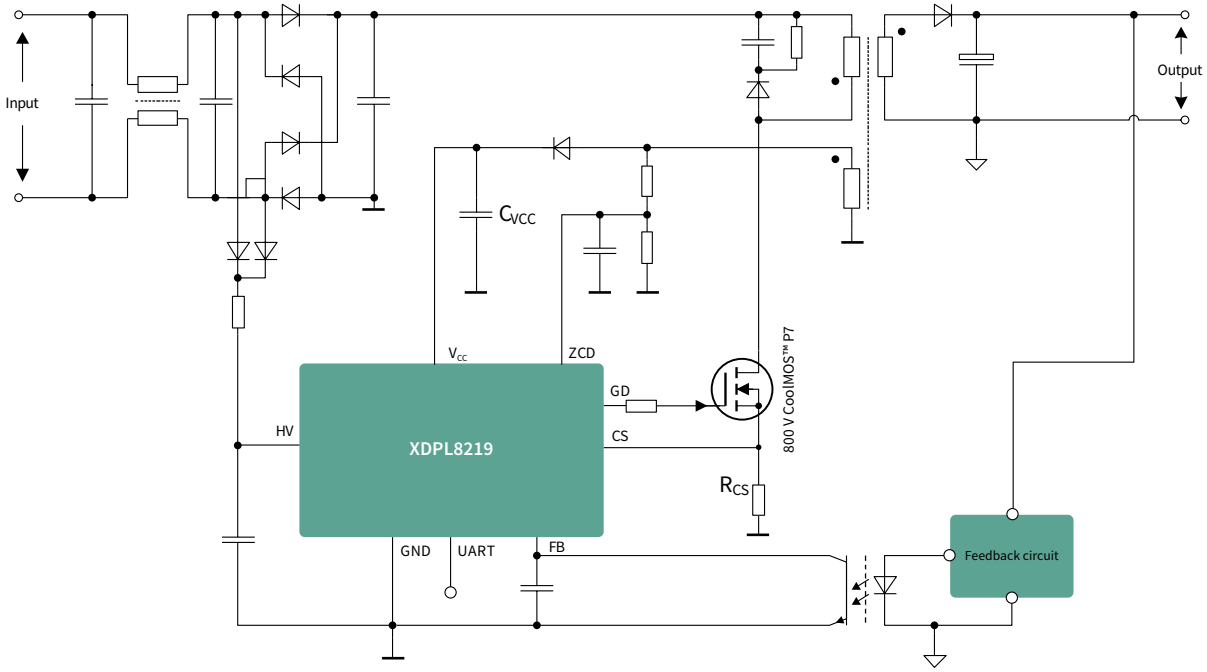
www.infineon.com/xdpl8210

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XDPL8219 – PFC/flyback controller with enhanced total harmonic distortion

The XDPL8219 is a digital high-performance secondary-side regulated flyback controller with constant voltage output. With its high power factor the controller is the perfect fit for cost-effective, dual-stage LED drivers and enables for instance smart lighting applications. The device operates in quasi-resonant mode (QRM) to maximize the efficiency and minimize the electromagnetic interference (EMI) over a wide load range. It enters active burst mode (ABM) at light load to prevent audible noise from being heard, while achieving no-load standby power as low as <100mW. The XDPL8219 is available is available in a DSO8 package.

Typical application schematic



Features and benefits

Key benefits
› Secondary-side-regulated (SSR) constant voltage (CV) output
› Flyback controller with power factor correction
› Depending on load condition, either quasi-resonant, discontinuous conduction mode or active burst mode (ABM)
› Integrated 600 V start-up cell

Key benefits
› Supporting wide load range and fast and stable reaction to dynamic load changes
› PF > 0.9 and THD < 10% across a wide load range (AC input up to 277 V_{rms})
› Optimal efficiency, power factor and THD can be achieved by best-suited mode. In addition, DCM eases compliance with EMI at low-load condition
› Very low standby power < 100 mW can be achieved
› Integrated start-up cell enables very high efficiency

Order information for XDPL8218

Type	Description	Ordering code
XDPL8219	Digital flyback CV output controller IC	XDPL8219XUMA1
REF-XDPL8219-U40W*	Efficient 40 W reference circuit design for XDPL8219 with high power factor and low THD. It is built for universal input voltage 120–277 V AC or 127–432 V DC	REFXDPL8219U40WTOBO1

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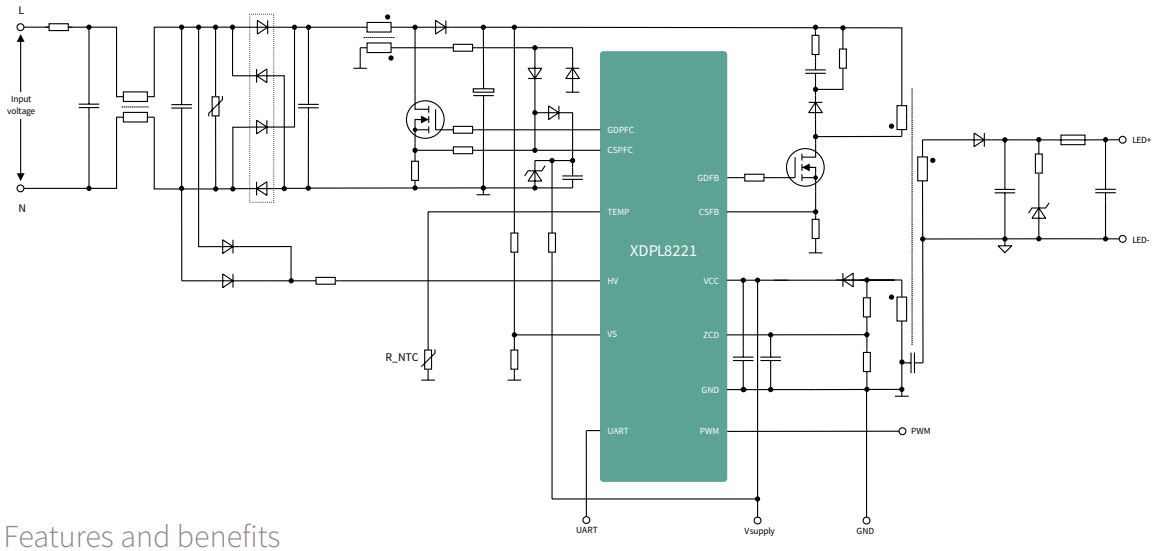
XDPL8221 - digital dual-stage multimode flyback controller for CC, CV, LP with 1 percent dimming and serial interface

The XDPL8221 is a digital, highly integrated, future-proof device combining a quasi-resonant PFC with a quasi-resonant flyback controller with primary-side regulation. A serial communication interface supports direct communication with an external microcontroller unit (MCU). The XDPL8221 is especially designed for advanced LED driver in smart lighting or IoT applications, featuring flicker-free dimming down to 1 percent of the nominal current. The device enables customizable LED driver and simplifies the generation and maintenance of different variants without increasing the number of stock keeping units. The IC is available in a DSO-16 package.

Typical application schematic



Features and benefits

Key features and benefits
› Nominal input voltage range 100-305 V_{AC} or 90-430 V_{DC}
› Reference board efficiency > 90 percent
› Power factor > 0.9 and THD < 15 percent over wide load range
› UART interface for control and real-time monitoring
› Constant current, constant voltage, limited power with primary-side regulation
› 1 percent dimming
› Dim-to-off with low standby power < 100 mW
› Internal temperature guard with adaptive thermal management
› The UART interface and the command set enable to control the function of the XDPL8221 or inquire status information
Multimode operation › QRM (quasi-resonant mode) › DCM (discontinuous conduction mode) › ABM (active burst mode)
Digital parameters
Relevant error conditions are monitored and protected › Undervoltage › Overvoltage › Open load › Output shorted

Order information for XDPL8221

Type	Description	Ordering code
XDPL8221	Digital dual-stage multimode flyback controller for CC, CV, LP with 1 percent dimming	XDPL8221XUMA1
REF-XDPL8221-U50W	50 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8221U50WTOBO1
REF-XDPL8221-U100W	100 W reference board with CDM10V isolated 0 V-10 V dimming interface	REFXDPL8221U100WTOBO1

www.infineon.com/xdpl8221

Lighting

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DC-DC LED driver ICs

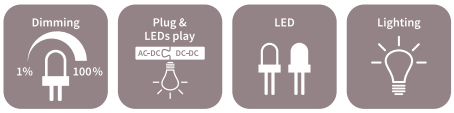
DC-DC switch mode LED driver ICs with efficiencies up to 98 percent, dimming level down to 0.5 percent

Infineon offers highly integrated DC-DC LED driver ICs that support currents up to 1.5 A, making these drivers the ideal choice for high- and ultrahigh-power LEDs. These highly integrated DC to DC driver ICs achieve efficiency levels as high as 98 percent across a wide range of operation conditions. Integrated smart thermal protection, along with overvoltage and overcurrent protection contribute to a longer LED lifetime.

Go for quality with Infineon's cost-efficient linear LED driver ICs

Infineon's BCR linear driver ICs are the best choice for driving LED strings supplied by a DC voltage source. The BCR regulators are suitable for driving currents from 10 mA to 250 mA. That is why they are the best solution for low- and mid-power LEDs. For high-power LEDs instead, the linear controller ICs in combination with an external power stage allow for the greatest design flexibility.

www.infineon.com/cms/en/product/power/lighting-ics/dc-dc-led-driver-ic
www.infineon.com/cms/en/product/power/lighting-ics/linear-led-driver-ic

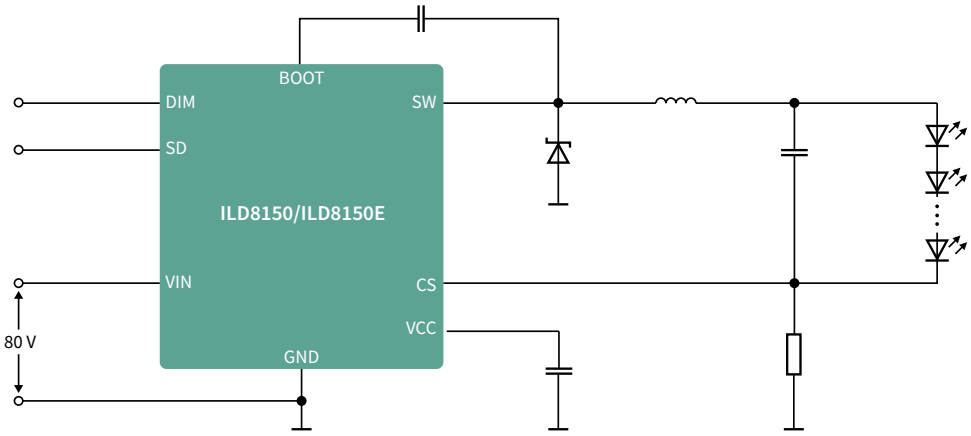


ILD8150/ILD8150E – 80 V DC-DC buck LED driver IC for high-power LEDs and high-performance hybrid dimming

The ILD8150 is 80 V DC-DC converter IC, designed to be used in LED applications to drive high-power LEDs. For applications operating close to safe extra low voltage (SELV) limits, it provides a high safety voltage margin. The buck LED driver IC is tailored for LEDs in general lighting applications with average currents up to 1.5 A using a high-side integrated switch. Several performance and protection features provide the right fit for professional LED lighting.

The hysteretic current control provides an extremely fast regulation and stable LED current combined with good EMI performance. The efficiency of the LED driver IC is remarkably high, reaching more than 95 percent efficiency over a wide range. A PWM input signal between 250 Hz and 20 kHz controls dimming of the LEDs current in analog mode from 100 to 12.5 percent and 12.5 to 0.5 percent in PWM mode with flicker-free modulation frequency of 3.4 kHz.

Digital PWM dimming detection with high resolution makes ILD8150/E the perfect LED driver IC for use together with microcontrollers. Precise output current accuracy from device to device under all loads and input voltage conditions makes it perfect for tunable white and flat panel designs where the current must be identical string to string.



Features and benefits

Key benefits
› Wide input voltage ranging from 8–80 V_{DC}
› Up to 1.5 A average output current, adjustable via shunt resistor
› Efficiency > 95 percent
› Up to 2 MHz switching frequency
› Soft-start
› PWM dimming input, with 250 Hz to 20 kHz PWM dimming frequency

Key advantages
Hybrid dimming for flicker-free light down to 0.5 percent › Analog dimming 100 percent – 12.5 percent › PWM dimming 12.5 percent – 0.5 percent with 3.4 kHz flicker-free modulation, dim-to-off
› Typical 3 percent output current accuracy
› Overtemperature protection
› Pull-down transistor to avoid LED glowing in dim-to-off
› DSO8 package to enable wave soldering
› DSO8 with exposed pad for higher thermal performance (ILD8150E)

Type	Description	Package	Ordering code
ILD8150	80 V DC-DC buck LED driver IC	DSO8	ILD8150XUMA1
ILD8150E	80 V DC-DC buck LED driver IC	DSO8 exposed pad	ILD8150EXUMA1
REF_ILD8150_DC_1.5A*	Reference design board 1.5 A with through hole inductor	Board with ILD8150E	REFILD8150DC15ATOBO1
REF_ILD8150_DC_1.5A*	Reference design board 1.5 A	Board with ILD8150E	REFILD8150DC15ATOBO1
REF_TW_ILD8150E_60V_1A*	Reference board for professional tunable white and multichannel applications	Board with 2x ILD8150E	REFTWILD8150E60V1ATOBO1
REF_ILD8150_DC_1.5A_SMD*	Reference design board 1 A with SMD inductor	Board with 2x ILD8150E	REFILD8150DC15ASMDTOBO1

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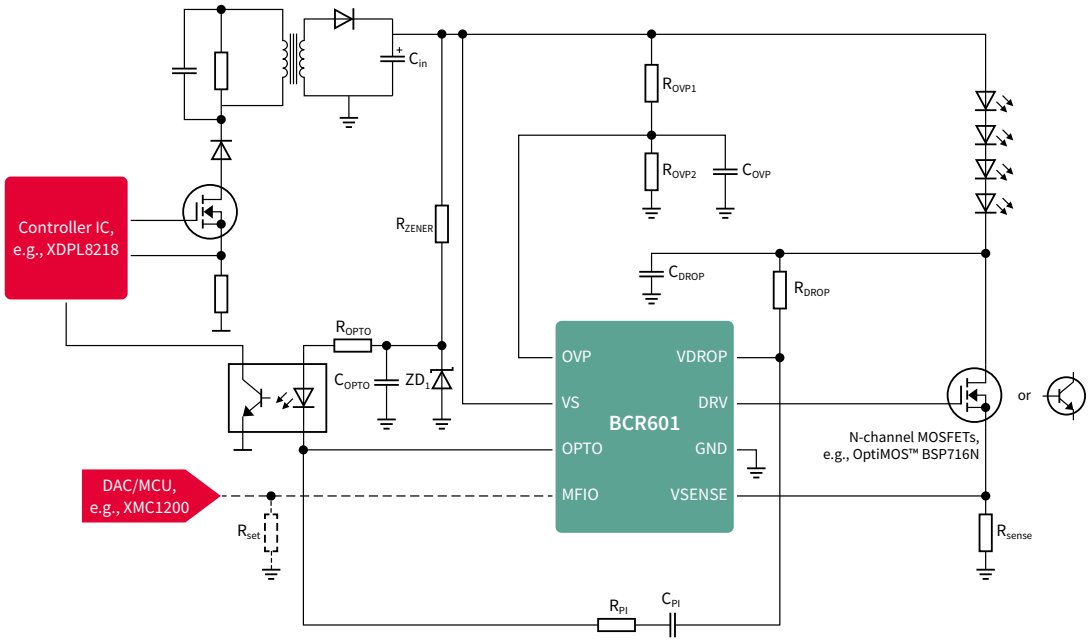
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Linear current regulators

60 V linear LED controller IC with active headroom control for power- and cost-efficient linear regulation on DC-DC side

A unique feature of BCR601 is to provide feedback to the primary side via an optocoupler to control the output voltage of the primary-side converter, e.g., XDPL8219 or ICL88xx. The integrated control loop minimizes the voltage overhead and power dissipation of the external driver transistor. This capability, coupled with the adjustment of voltage overhead by external configuration according to application needs, leads to power- and cost-efficient LED systems. AC line ripple suppression, analog dimming option and various protection features round up this device for LED drivers allowing for flicker-free light and longevity of LEDs.

Typical application schematic



Features and benefits

Key features and benefits
› Active headroom control (supports an optocoupler feedback loop to primary side minimizing power losses)
› Dimming in pure analog mode down to 3%
› Suppresses the voltage ripple of the power supply driving a constant LED current for high light quality
› The embedded hot-plug protection allows plug in and plug out of any LED load during operation without damaging the LEDs
› Supports wide current range depending on external driver transistor
› Supply voltage range up to 60 V
› Gate driver current 10 mA
› LED current can be adjusted by R_{set} functionality
› Overtemperature protection and adjustable overvoltage protection

Order information for BCR601

Type	Description	Ordering code
BCR601	60 V linear LED controller IC with voltage feedback to primary side	BCR601XUMA1
DEMO_BCR601_60V_IVCTRL*	Demonstration board BCR601 current and voltage control, 700 mA	DEMOBCR60160VIVCTRLTOBO1
REF_TW_BCR601_55V_0.5A*	Demoboard for design evaluation of tunable white applications with cost-effective linear LED controllers, 500 mA	REFTWBCR60155V05ATOBO1

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Lighting

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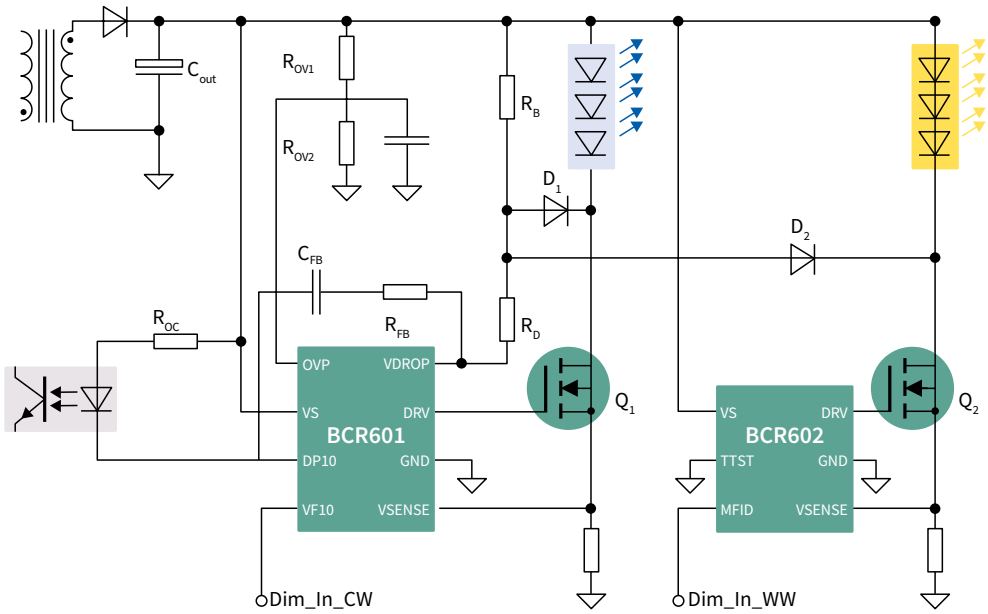
BCR601/BCR602 – 60 V linear LED controller ICs for tunable white plus active headroom control and flexible dimming

BCR601 is a linear controller that enables high efficiency at low cost as a second-stage LED controller to replace DC-DC buck converters especially in low- to mid-power LED drivers. The cost-effectiveness especially in multichannel designs can be further enhanced by using BCR602 in a tiny SOT-23-6 package regulating the LED current for flicker-free deep dimming performance.



Features and benefits

Key benefits
› BCR601 as the master controller controls voltage overhead of both channels and current of one channel
› BCR602 as slave controller regulates current of second channel
› Input voltage up to 60 V
› Can be operated with either BJT or N-channel MOSFET
› Analog dimming down to 3%, PWM dimming down to 1% (BCR602)
› Current precision ±3%
› OTP, OVP, hot-plug protection

Key advantages
› Linear regulators give considerable cost advantage over buck topology
› Cost advantage increases with additional channels
› Efficiency can be on par with buck (depends on output ripple of first stage)
› Highest light quality, zero ripple
› Deep, full analog dimming
› Easy to extend to additional outputs (e.g., RGBW)

Order information

Type	Description	Ordering code
REF_TW_BCR601_55V_0.5A*	Demoboard for design evaluation of tunable white applications with cost-effective linear LED controllers BCR601/BCR602, 500 mA	REFTWBCR60155V05ATOBO1
BCR601	60 V linear LED controller IC with voltage feedback to primary side	BCR601XUMA1
DEMO_BCR601_60V_IVCTRL*	Demonstration board BCR601 current and voltage control, 700 mA	DEMOBCR60160VIVCTRLTOBO1
BCR602	60 V linear LED controller IC	BCR602XTSA1
DEMO_BCR602_60V_ICTRL*	Demoboard for design evaluation of cost-efficient, highly reliable, dimmable LED engines/modules, 60 V, 200 mA	DEMOBCR60260VICTRLTOBO1

www.infineon.com/cms/en/product/evaluation-boards/ref_tw_bcr601_55v_0.5a
www.infineon.com/cms/en/product/power/lighting-ics/linear-led-driver-ic/bcr601
www.infineon.com/bcr602

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Lighting

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BCR43x linear LED driver ICs for low-power LEDs

The BCR3x family is the smallest size and lowest cost series of LED drivers. These products are perfectly suited for driving low-power LEDs in general lighting applications.

The advantage over resistor biasing is:

- Long lifetime of LEDs due to constant current in each LED string
- Homogenous LED light output independent of LED forward voltage binning, temperature increase and supply voltage variations

The advantage versus discrete semiconductors is:

- Reduced part count and assembly effort
- Pretested output current
- Defined negative temperature co-efficient protection

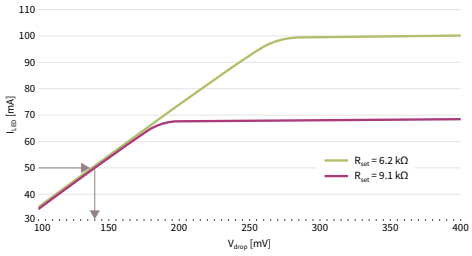
Needing more details on replacing resistors?

Download now the application note
"Driving low power LEDs from 10 to 65 mA LED driver ICs"

Features and benefits

Key features and benefits
Output current from 8 to 100 mA (adjustable by external resistor)
Supply voltage up to 40 V (BCR430U, BCR431U*)
Reduction of output current at high temperature, contributing to long lifetime LED systems
Extra low voltage drop for more voltage headroom and flexibility in designs (BCR430U, BCR431U)
Excellent ESD performance on device and system level for BCR43xU
Very small form factor packages with up to 600 mW max. power handling capability

LED current versus voltage drop (V_S = 24 V)



The voltage drop at the integrated LED driver stage can go down to 135 mV at 50 mA and less improving the overall system efficiency and providing extra voltage headroom to compensate for tolerances of LED forward voltage or supply voltage. With the BCR430U and BCR431U, additional LEDs can be added to lighting designs or longer LED strips can be created without changing the supply voltage.

Low-power LED driver ICs (5-100 mA)

Type	Group	Topology	V_s (min.) [V]	V_s (max.) [V]	I_{out} (typ.) [mA]	I_{out} (max.) [mA]	Dimming	Package	P_{tot} (max.) [mW]	Ordering code
BCR430U*	LED drivers for low-power LEDs	Linear	6	42	Defined by R_{set}	100	PWM by external transistor	SOT-23	600	BCR430UXTSA2
BCR431U**	LED drivers for low-power LEDs	Linear	6	42	Defined by R_{set}	42		SOT-23	600	BCR431UXTSA1

Type	Description	Ordering code
BCR430U LED BOARD	Low-power demoboard with 8 LEDs, 50 mA	BCR430ULEDBOARDTOBO11
DEMO_BCR431U_LVDROP	Low-power demoboard with 8 LEDs, 15 mA	DEMOBCR431ULVDROPTOBO1

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* Ultralow voltage drop version BCR430U with only 135 mV at 50 mA
** Ultralow voltage drop version BCR431U with only 115 mV at 15 mA

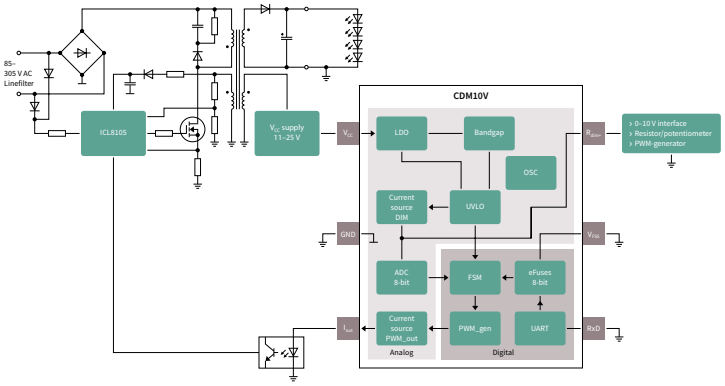
For more details on the product, click on the part number, visit infineon.com or contact our product support.

CDM10V and CDM10VD – most flexible dimming interface ICs for 0-10 V input

Infineon's fully integrated dimming solutions

Infineon's CDM10V and CDM10VD are the industry's first single-chip lighting interface ICs. They are capable of transforming an analog 0–10 V input into a PWM or dimming input signal, required by a lighting controller IC. CDM10V and CDM10VD devices are dedicated for commercial and industrial LED lighting applications. The compact and highly integrated devices allow designers to replace up to 25 discrete components, used in conventional 0–10 V dimming schemes, with a single device. Supplied in an ultra-miniature 6-pin SOT package, the CDM10Vx and CDM10VDx perfectly match small PCBs with high component densities.

Typical application schematic using CDM10V



Features and benefits

Key benefits
› Active dimming (0–10 V) and passive dimming (resistor)
› Embedded digital signal processing which maintains minimum variations from device to device
› PWM input
› One-time configurable device: CDM10V and preconfigured devices with various feature sets

Key advantages
› Single-device solution leading to low BOM and PCB savings
› Dimming ICs in small SOT-23 package for high power density designs
› Granular portfolio for highest flexibility and easy design-in
› Wide input V_{CC} range 11–25 V, extended range down to 6 V for CDM10V
› Attractive pricing and faster time to market

Product type	I_{out} [mA]	Min. duty cycle [%]	PWM output frequency [kHz]	Dimmer/resistor bias current [µA]	Dimm-to-off	Ordering code
CDM10V	5	1/2/**5**/10	0.2/0.5/**1**/2	50/100/**200**/500	**Disabled**/enabled	CDM10VXTSA1
CDM10V-2	5	n.a.	1	200	Enabled	CDM10V2XTSA1
CDM10V-3	5	1	1	200	Disabled	CDM10V3XTSA1
CDM10V-4	5	n.a.	2	100	Enabled	CDM10V4XTSA1
CDM10VD	5	5	1	120	Enabled	CDM10VDXTSA1
CDM10VD-2	5	10	1	120	Enabled	CDM10V2DXTSA1
CDM10VD-3	1	5	1	120	Enabled	CDM10V3DXTSA1
CDM10VD-4	1	10	1	120	Enabled	CDM10V4DXTSA1

Board name	Description	Ordering code
REF-XDPL8105-CDM10V	40 W single-stage PFC FB digital power reference design with CDM10V	REFXDPL8105CDM10VTOBO1

www.infineon.com/cdm10V

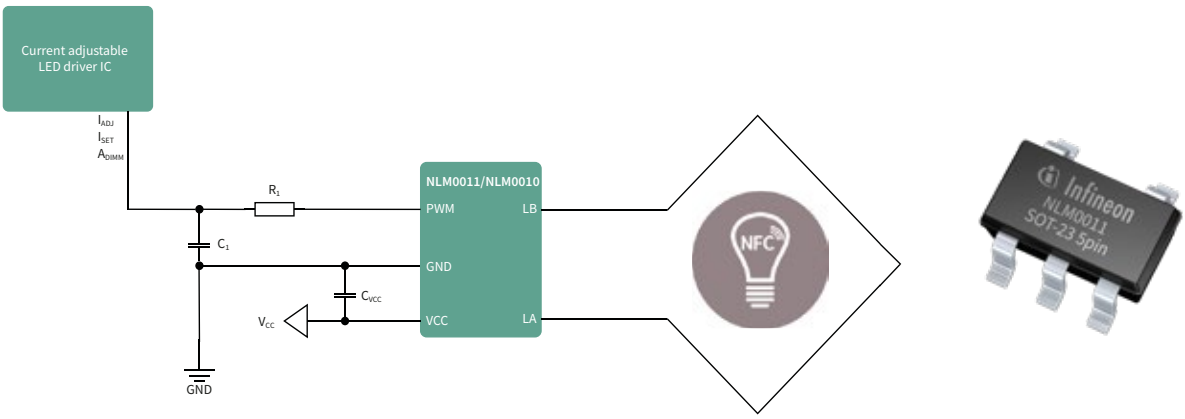
For more details on the product, click on the part number, visit infineon.com or contact our product support.

NFC-PWM configuration ICs

Dual-mode NFC wireless configuration ICs with CLO function and pulse width modulation (PWM) output for lighting applications

The NLM0011 is a dual-mode NFC wireless configuration IC with PWM output. It is compatible with existing analog LED driver designs and with the NFC-programming specification from the module-driver interface special interest group (MD-SIG). This device is primarily designed for LED applications to enable NFC programming. In addition, advanced features such as the constant lumen output (CLO) as well as the on/off counting are integrated, and there is no need for an additional microcontroller. Since the NLM0011 is designed to work together with mainstream analog driver ICs, there are no firmware development efforts needed. It can be easily adapted into existing designs to replace the "plug-in resistor" current configuration concept. The NLM0010 is a light version without CLO function.

Typical example of NFC lighting application



Features and benefits

Key benefits
› Configurable pulse width modulation (PWM) output
› NFC contactless interface compliant to ISO/IEC 18000-3 mode 1 (ISO/IEC 15963)
› Constant light output (CLO) with 8 configurable points
› Integrated operation-time counter (OTC) and on/off counter
› Non-volatile memory (NVM) including UID and 20 bytes free memory for user data

Key advantages
› Fast and cost-effective implementation of NFC programming and CLO without the need of an additional microcontroller
› Compatible with most analog LED driver designs using the „plug-in resistor" method
› Stable PWM output with fixed 2.8 V amplitude and ±0.1% duty cycle accuracy
› Internal voltage regulator (LDO) to avoid influence of instable external supply voltage

EVAL_NLM0011_DC – evaluation board demo kit

This evaluation board not only enables fast demonstration of NFC-PWM configuration ICs with NLM0011 through the NFC-PWM mobile app, but also accelerates the development of the NFC-reader software. EVAL_NLM0011_DC does not require a full system, but allows NFC configuration for existing LED driver boards.

Ordering code: EVALNLM0011DCTOBO1

Type	Description	Package	Ordering code
NLM0011	Dual-mode NFC configuration IC with PWM output and CLO function	SOT-23-5	NLM0011XTSA1
NLM0010	Dual-mode NFC configuration IC with PWM output, without CLO function	SOT-23-5	NLM0010XTSA1

Smart city lighting

Lighting

www.infineon.com/NFC-PWM

For more details on the product, click on the part number, visit infineon.com or contact our product support.

iMOTION™ integrated motor control solutions

A family of highly integrated products for the control of a variable speed drive

iMOTION™ products are offered in several integration levels including hardware as well as software. The hardware integration comprises stand-alone motor controllers, motor controllers with integrated gate drivers (iMOTION™ driver) and fully integrated inverters-in-a-package (iMOTION™ IPM). In terms of software, Infineon offers full turnkey solutions as well as freely programmable modules.

Infineon's field-proven motion control engine (MCE) eliminates software coding from the motor control development process reducing the effort to the configuration for the respective motor and power stage.

The MCE implements highly efficient control of the motor and an optional power factor correction (PFC) and integrates all necessary protections and a flexible scripting engine. Assisted by powerful tools like the solution designer it is possible to have the motor up and running in less than an hour. Integrated support for functional safety for home appliances paves the way to meet regulations in the global market

Infineon provides complete solutions for motor control with its combined offering of iMOTION™ together with EiceDRIVER™ gate drivers, TRENCHSTOP™ IGBTs, CoolMOS™ MOSFETs and CIPOS™ IPMs.

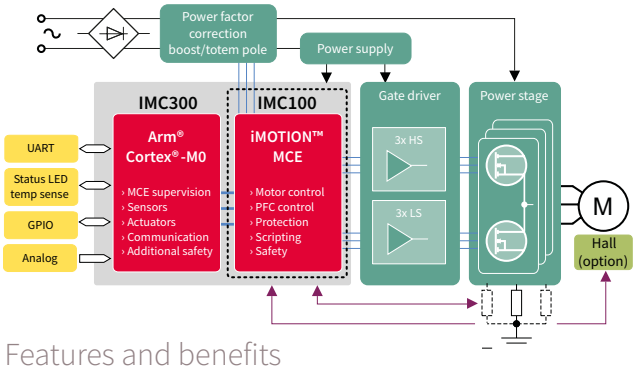
www.infineon.com/motor-control-ics

iMOTION™ controller

Motor/PFC controller plus optional MCU for maximum flexibility

The iMOTION™ controller consists of two different families: iMOTION™ IMC100 is a series of highly integrated ICs for the control of variable speed drives. By integrating both the required hardware and algorithm to perform control of a three-phase motor they provide the shortest time to market for any motor system at the lowest system and development cost. By combining the iMOTION™ IMC100 with an additional microcontroller based on the Arm® Cortex®-M0 core iMOTION™ IMC300 series is the perfect fit for applications requiring application flexibility beyond pure motor and PFC control.

Infineon's field-proven motion control engine (MCE) implements field-oriented control (FOC) using single or leg shunt current feedback and uses space vector PWM with sinusoidal signals to achieve highest energy efficiency. The MCE can run sensorless as well as using Hall sensors for low speed operation. It also integrates multiple protection features like over- and undervoltage, overcurrent, rotor lock etc. The integrated scripting engine grants flexibility for a wide range of applications. The IMC100/300 series are offered in several device variants. All devices can be used in applications requiring functional safety acc. to IEC 60730-1 ('Class B'). With this wide application scope the iMOTION™ controller is the perfect choice for any highly efficient variable speed drive - from low to high voltage.



Features and benefits

Key features	Key benefits
› Completely self-sustaining motion control engine	› Easy motor parametrization and tuning
› Option for boost or totem pole PFC	› Low BOM cost for active PFC applications
› Integrated protection features	› Safeguard power stage and motor
› Scripting engine for application flexibility	› Maximum flexibility for customer functions
› Additional independent microcontroller	› Full flexibility for custom functions or communication
› Support for IEC 60335-1 ('Class B')	› Support for functional safety integrated

The REF-VACUUM_C101_2ED is a reference design kit featuring IMC101T iMOTION™ controller, 2ED2304 SOI half-bridge gate driver and BSC030N04NS OptiMOS™. It demonstrates our thin-film-SOI and advanced MCE technologies for low-voltage, permanent-magnet motors drive up to 120 KRPM speed, and inverter section rating of 30 V and 25 A. It is optimized for major low-voltage home appliances like vacuums, fans, pumps and compressors.

www.infineon.com/iMOTION

For more details on the product, click on the part number, visit infineon.com or contact our product support.

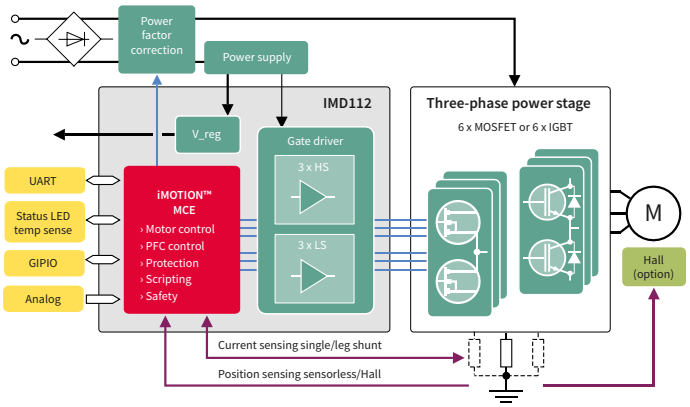
iMOTION™ driver

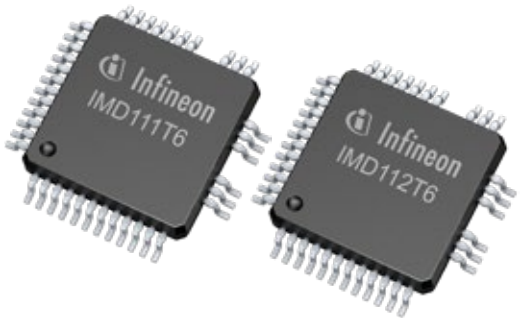
Motor/PFC controller with gate driver and voltage regulator

The iMOTION™ IMD110 is a series of highly integrated ICs for the control of three-phase motors. The IMD110 drivers are an optimal combination of a ready-to-use motor and (optional) PFC controller with a high-voltage three-phase SOI gate driver and a voltage regulator. They can be combined with almost any low- to high-voltage MOSFET or IGBT to create a very compact yet still highly flexible drive solution. The full set of protections, improved clearance and creepage makes the IMD110 a highly robust and reliable driver family.

The family implements the identical field-proven Motion Control Engine (MCE) as the iMOTION™ controller family. The scripting engine that executes customer scripts with access to the MCE, a high number of GPIOs, analog inputs and a configurable UART grants flexibility for a wide range of applications. Based on Infineon's latest SOI technology the three-phase gate driver exhibits market-leading robustness and lowest failure rates. The very low level-shift losses reduce thermal stress and allow high-frequency operation while the built-in bootstrap diodes help to reduce PCB space and cost. Protections like over- and undervoltage lockout lockout and cross conduction prevention safeguard the power stage during erroneous conditions. All IMD110 devices support the functional safety requirements according to the IEC/UL 60730-1 ('Class B').

Block diagram





Features and benefits

Key features	Key benefits
› Completely self-sustaining motion control engine with identical feature set as the IMC100 series	› Fastest time to market with easy parametrization and tuning of motor and PFC control
› Option for boost or totem pole PFC	› Low BOM cost for active PFC applications
› High-voltage three-phase gate driver and built-in bootstrap diodes	› Reducing BOM and PCB space
› Single layer design possible	› Reducing PCB and production costs
› Support for IEC 60335-1 ('Class B')	› Support for functional safety integrated

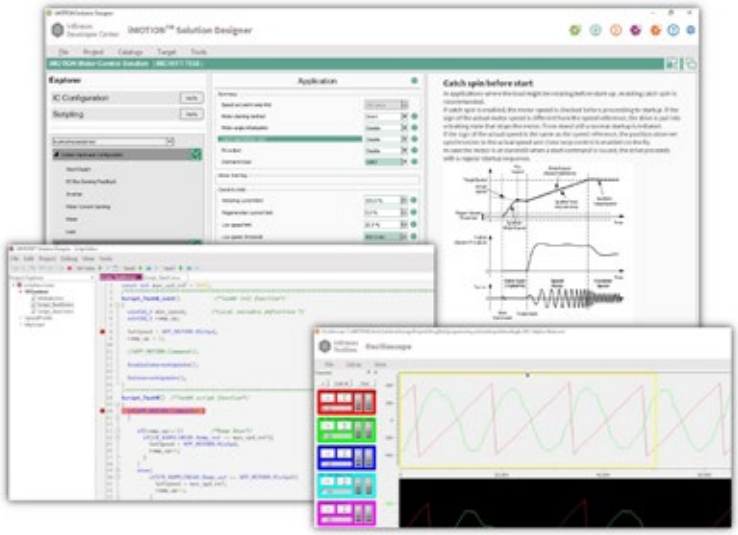
The REF_FRIDGE_D111T_MOS board is a ready-to-use three-phase inverter designed for refrigerator compressors featuring the iMOTION™ driver. The 600 V CoolMOS™ PFD7 super junction MOSFET demonstrates market-leading light-load efficiency. The board provides a single-phase AC-connector, rectifier, and three-phase output for the motor. Targeting low-cost applications, the motor is run with sensorless field-oriented control (FOC) using single shunt current sensing. The direct sensing of all voltages and currents does not require any OpAamp.

www.infineon.com/IMD110

For more details on the product, click on the part number, visit infineon.com or contact our product support.

iMOTION™ tools and development support

The easy way to get started with motor control



The iMOTION™ solution designer is the new all-in-one PC tool supporting the iMOTION™ products in all stages of a motor control project. A new project can either be started by choosing one of the preconfigured applications or via selecting an evaluation board or a specific device. Solution designer offers individual views for all design steps from configuration up to the final tuning of the control loop.

Drive configuration is assisted by the integrated help describing all parameters in detail. After downloading the parameter sets into the iMOTION™ device customer configurable dashboards help with starting and running the motor and tuning the control loop parameters to the desired behavior. All relevant parameters like voltages, currents, torque, speed can be visualized in real time on the 8-channel oscilloscope. Going one step beyond the configuration of the motor and PFC the integrated editor, compiler and debugger help with the development of scripts for the iMOTION™ script engine.

Features and benefits

Key features	Key benefits
› Integrated PC tool for all devices in all project phases	› One common tool and consistent workflow for all iMOTION™ products
› Configuration wizard for motor and PFC parameter sets	› Easy handling of parameter sets with fully integrated help system
› Dashboards for typical design steps, customer configurable	› Fully configurable for individual testing and tuning stages
› Oscilloscope with 8 channels	› Real-time insight into all motor and PFC parameters
› Full IDE for editing, compiling and debugging or for scripting	› Assisted creation of scripts and live debugging including breakpoints
› Programmer for firmware, parameter sets and scripts	› Unified data handling from project to device
› Catalogs for devices, boards, loads and projects	› Project centric work and ease of creating derived projects

iMOTION2Go

Getting familiar with iMOTION™ firmware, features and tools

The iMOTION2go kit contains a complete motor control system on a small form factor board and is powered via USB. It is particularly useful for a first evaluation of the iMOTION™ firmware and tools like the iMOTION™ solution designer. This combination of the IMC101 motor control IC with the solution designer supports all project stages from drive configuration up to optimization and tuning using dashboards and oscilloscope. Scripting can be practiced by downloading and debugging via the IDE integrated in the solution designer.

www.infineon.com/iMOTION-software
www.infineon.com/iMOTION2go

iMOTION™ modular application design kit

Get a motor running in less than 1 hour!

The iMOTION™ modular application design kit (MADK) is an evaluation platform targeting variable speed-drive applications up to 10 kW. The platform offers a modular and scalable system solution with different control board options and a wide range of power boards. Using the iMOTION™ MADK standardized platform interfaces, different control and power boards can be combined into a system that perfectly meets the requirements of the final application. This modular approach allows developers the maximum flexibility and scalability during the evaluation and development phase at affordable costs.

While the M1 platform provides control of a permanent magnet synchronous motor (PMSM), the M3 platform additionally includes an active power factor correction (PFC) implemented as a CCM boost PFC.
The M7 platform is based on the iMOTION™ driver series IMD110. The gate driver is contained on the control board and the power boards use different types of discrete power devices thus covering a wide voltage range from 20 V to 600 V with either MOSFETs or IGBTs. Boards with M7 connector are available with and without active PFC.

iMOTION™ Link

Isolated debug interface for final application boards

iMOTION™ Link is an isolated debug probe for all iMOTION™ motor control products. It connects to the user's target board (final application board) or any other evaluation or reference board via a galvanically isolated interface. iMOTION™ solution designer is then used for configuring, parameterizing and tuning of the respective iMOTION™ device. In addition to the serial interface iMOTION™ Link also provides a standard Arm® SWD debug connection for programming the MCU core in devices like the IMC300 series.

www.infineon.com/MADK
www.infineon.com/iMOTION-link

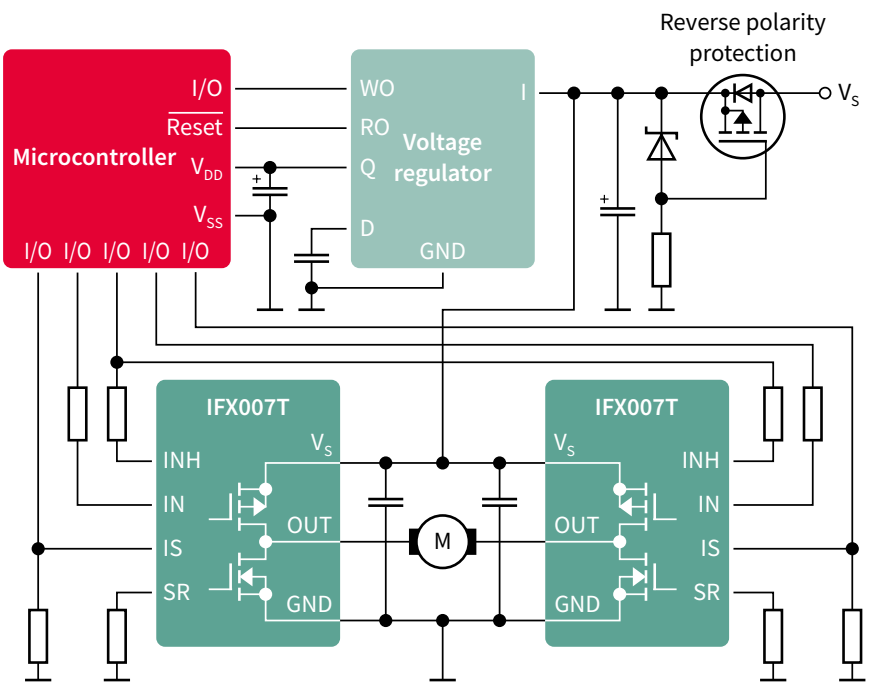
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Single half-bridge IC

Protected high-current half-bridge for industrial applications

The NovalithIC™ provides a complete, low-ohmic protected half-bridge in a single package (typ. path resistance at 25°C down to 10 mΩ). It can also be combined with an additional NovalithIC™ to create a H-bridge or three-phase bridge. The NovalithIC™ family has the capability to switch high-frequency PWM while providing overcurrent, overvoltage and overtemperature protection. The NovalithIC™ family offers cost-optimized, scalable solutions for protected high-current PWM motor drives with very restrictive board space. Due to the P-channel high-side switch the need for a charge pump is eliminated thus minimizing EMI. The latest addition to the NovalithIC™ family is the IFX007T, which is optimized for industrial applications.

Application example for high-current PWM motor drives



High-current H-bridge

Features

Basic features
› Low quiescent current
› Capable for high PWM frequency
› Logic level input
› Adjustable slew rate
› Cross-current protection

Protection features
› Overtemperature shutdown
› Overvoltage shutdown
› Undervoltage
› Overcurrent

Diagnostic features
› Overtemperature
› Overvoltage
› Current sense and status

Product number	Operating range [V]	$R_{DS(on)}$ path (typ.) [mΩ]	$I_{D(lim)}$ (typ.) [A]	I_q (typ.) [µA]	Switch time (typ.) [µs]	Diagnosis	Protection	Package	Qualification
IFX007T	5.5 ... 40.0	10.0	70	7	0.25	OT, OC, CS	UV, OT, OC	PG-TO-263-7	JESD471

www.infineon.com/novalithic

CS = Current sense OC = Overcurrent OT = Overtemperature UV = Undervoltage

For more details on the product, click on the part number, visit infineon.com or contact our product support.

BLDC motor control shield with IFX007T for Arduino

The BLDC motor control shield is a high-current motor control board compatible with Arduino and Infineon's XMC4700 boot kit. It is equipped with three smart IFX007T half-bridges. The BLDC motor control shield is capable to drive one BLDC motor. Alternatively, it can be used to drive one or two bidirectional DC motors (H-bridge configuration, cascaded to support second motor) or up to three unidirectional DC motors (half-bridge configuration). The implemented integrated NovalithIC™ IFX007T half-bridges can be controlled by a PWM via the IN-pin.

Features

Key features
Capable of high-frequency PWM, e.g., 30 kHz
Adjustable slew rates for optimized EMI by changing external resistor
Driver circuit with logic level inputs
Diagnosis with current sense

Target applications

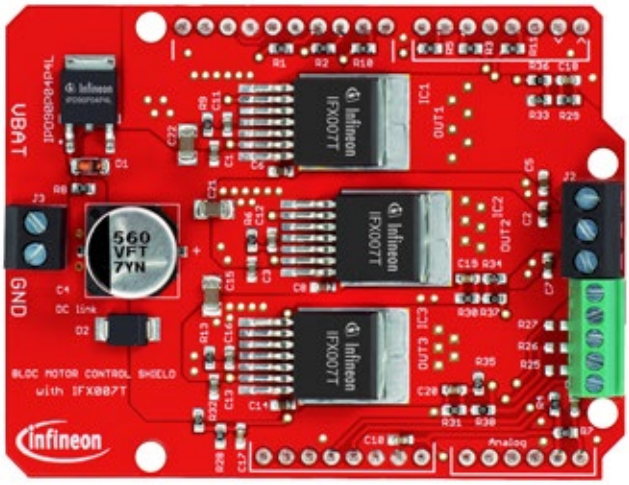
- Brushed DC motor control up to 250 W continuous load
- 24 V nominal input voltage (max. 6 V–40 V)
- Average motor current 30 A restricted due to PCB (IFX007T current limitation at 55 A min.)

BLDC-SHIELD_IFX007T

BLDC motor control with half-bridge IFX007T

Infineon's shields for Arduino are compatible with microcontroller boards using the Arduino-compatible form factor, e.g., Infineon's XMC™ microcontroller kits.

Ordering code: BLDCSHIELDIFX007TTOBO1



www.infineon.com/bldc-shield-ifx007t
www.infineon.com/shields-for-arduino

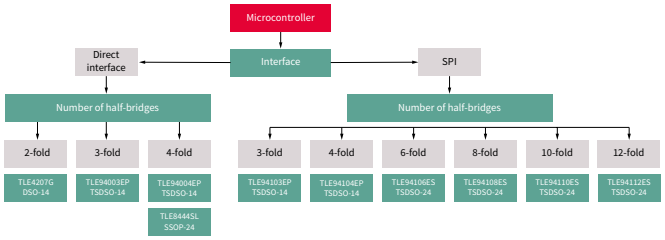
For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ multi half-bridge ICs

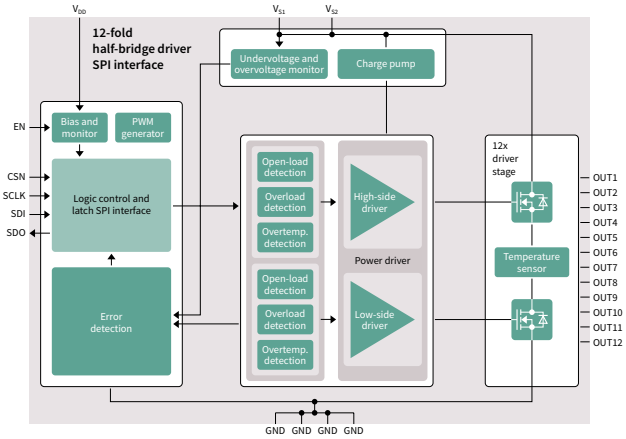
Extensive offering ranging from two-fold half-bridge ICs to twelve-fold half-bridge ICs

The MOTIX™ TLE94xyz products are protected half-bridge drivers designed for 12 V motion control applications such as small DC motors for heating, ventilation and air conditioning (HVAC), as well as automotive mirror adjustment and fold. The family offers two-, three-, four-, six-, eight-, ten-, and twelve-fold integrated half-bridge driver. All devices can drive DC motor loads up to 0.9 A per output or the outputs can be used stand-alone or combined to increase driving capability up to 3.6 A. They provide diagnosis of short circuit, open load, power supply failure and overtemperature for each half-bridge to ensure safe operation in HVAC or other systems. The TLE94xyz offers enhanced EMC performance, which in combination with the low quiescent current and a small package makes the product attractive for a wide range of 12 V automotive and industrial applications. In addition to TLE94xyz, Infineon's multi half-bridge offerings include a dual-half-bridge driver, TLE4207G.

Infineon's portfolio of MOTIX™ multi half-bridge ICs



Block diagram MOTIX™ TLE94112ES



Features and benefits

Key features and benefits
› Three-, four-, six-, eight-, ten-, and twelve-fold half-bridges with integrated output stages and PWM
› 16-bit SPI or direct inputs for control and diagnosis
› Voltage supply range: 5.5– 20 V
› Variable driving schemes for up to 11 motors

Key applications

- 12 V automotive and industrial applications
- Flap motors in HVAC systems
- Mirror adjustment and fold
- Small DC motors (≤ 0.9 A/output)
- Bistable relays
- Bipolar stepper motors in full-step and half-step mode

Product name	Config.	$I_{L(NOM)}$ [A]	$I_{L(lim)}$ [A]	I_q [µA]	$V_{S(OP)}$ [V]	Protection	Diagnostic interface	Highlights	$V_{CE(sat)}$/ $R_{DS(on)}$ [mΩ]	Package
TLE94003EP	3 x half-bridge	3 x 0.30	3 x 0.90	0.6	5.5 to 20	OC, OT, VS, UV/OV	Error flag	TLE94xyz family concept + small package	850/switch	TSDSO-14-
TLE94103EP	3 x half-bridge	3 x 0.30	3 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + small package		TSDSO-14-
TLE94004EP	4 x half-bridge	4 x 0.30	4 x 0.90	0.6	5.5 to 20	OC, OT, VS, UV/OV	Error flag	TLE94xyz family concept + small package		TSDSO-14-
TLE94104EP	4 x half-bridge	4 x 0.30	4 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + small package		TSDSO-14-
TLE94106ES	6 x half-bridge	6 x 0.30	6 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + backwards compatible to TLE84106EL		TSDSO-24
TLE94108ES	8 x half-bridge	8 x 0.30	8 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept		TDSO-24
TLE94110ES	10 x half-bridge	10 x 0.30	10 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + backwards compatible to TLE84110		TDSO-24
TLE94112ES	12 x half-bridge	12 x 0.30	12 x 0.90	0.6	5.5 to 20	OC, OT, OL, VS, UV/OV	16-bit SPI	TLE94xyz family concept + 12 outputs in one package		TDSO-24
TLE4207G	2 x half-bridge	2 x 0.80	2 x 1.50	20	8 to 18	OC, OT, VS, UV/OV	Status flag	Error detection		DSO-14

www.infineon.com/multi-half-bridge-ics

For more details on the product, click on the part number, visit infineon.com or contact our product support.

DC motor control HAT with MOTIX™ TLE94112ES

Complies with Raspberry Pi HAT specification

The Infineon motor control HAT with MOTIX™ TLE94112ES complies with Raspberry Pi HAT specification and provides you with unique evaluation experience. It is equipped with 12-fold half-bridge driver TLE94112ES and comes with a ready-to-use software library. The HAT is also equipped with an Infineon TLS4125D0EP V50, a synchronous step-down converter which can power the Raspberry Pi.

Features and benefits

Key features
› Twelve half-bridge power outputs, 0.9 A each (combinable to up to 3.6 A)
› Wide input voltage range of 5.5 V to 20 V
› Powering of Raspberry Pi by TLS4125D0EP V50
› Reverse polarity protection
› Driver is protected against overtemperature, overcurrent, overvoltage, undervoltage and enables diagnosis of overcurrent, overvoltage, undervoltage
› SPI interface with zero clock diagnosis
› Enhanced EMC performance
› Integrated PWM generator with 3 different frequencies (80 Hz, 100 Hz, 200 Hz)

Benefits
› Compact design for multi-motor applications
› Quick and easy setup for evaluation and demo applications
› Wide range of applications

Target applications

- Automotive motor control: HVAC flap control
- Multi-motor applications
- DC motors and voltage controlled bipolar stepper motors
- Toys

Ordering code: TLE94112ESRPIHATTOBO1

www.infineon.com/raspTLE94112ES
www.infineon.com/makers

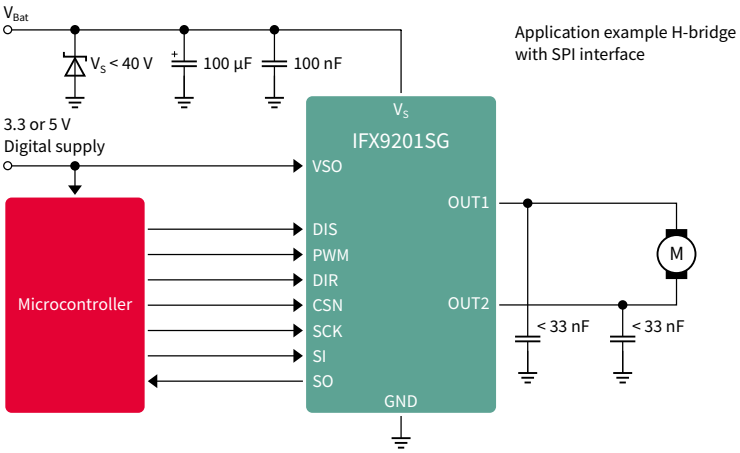
For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ full-bridge ICs

General purpose 6 A H-bridges

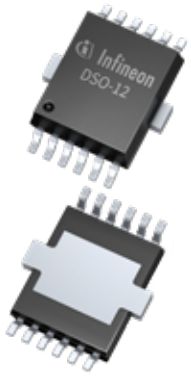
MOTIX™ IFX9201SG is a general purpose 6 A H-bridge for industrial applications, home appliance and building automation, power tools battery management and medical applications, designed to control small DC motors and inductive loads. The outputs can be pulse width modulated at frequencies up to 20 kHz, which enables operation above the human sonic range by means of PWM/DIR control. While the signal at the DIR input defines the direction of the DC motor, the PWM signal controls the duty cycle. For load currents above the current limitation threshold (8 A typically), the H-bridges switch into chopper current limitation mode.

Applications examples



Features

Key features
› Up to nominal 36 V supply voltage
› Short circuit, overtemperature protection and undervoltage shutdown
› Detailed SPI diagnosis or simple error flag
› Simple design with few external components
› Small and robust DSO-12-17 (IFX9201SG) and DSO-36-72 (IFX9202ED) packages



Product number	Operating voltage	Current limit (min.) [A]	Quiescent current (typ.) [µA]	Operating range [V]	$R_{DS(on)}$ (typ./switch) [mΩ]	Package	R_{thJC} (max.) [K/W]
IFX9201SG	4.5 to 36 V	6.0	19.0	5 to 36	100	PG-DSO-12 (power)	2.0

www.infineon.com/ifx9201sg

For more details on the product, click on the part number, visit infineon.com or contact our product support.

H-BRIDGE KIT 2GO with MOTIX™ IFX9201SG

Build your own DC motor control with the H-bridge Kit 2GO, a ready-to-use evaluation kit. It is fully populated with all electronic components equipped with the H-bridge MOTIX™ IFX9201 combined with XMC1100 microcontroller based on Arm® Cortex®-M0 CPU. It is designed for the control of DC motors or other inductive loads up to 6 A or up to 36 V of supply.

Target applications

- DC motor control for industrial applications
- Home and building automation
- Power tools battery management
- Industrial robotic applications
- Electric toys applications

Ordering code: HBRIDGEKIT2GOTOBO1

KIT_XMC1300_IFX9201

Stepper motor control shield with MOTIX™ IFX9201SG and XMC1300 for Arduino

The stepper motor control shield from Infineon is one of the first high-current stepper motor control boards being compatible to Arduino as well as to Infineon's XMC1100 boot kit. The stepper motor control shield is capable to drive the two coils in a stepper motor featuring dual-half-bridge configuration. The implemented integrated MOTIX™ IFX9201 half-bridges can be controlled by a STEP-signal via the STEP pin. Interfacing to a microcontroller is made easy by the integrated XMC1300 microcontroller that holds the peripherals to allow high-speed current control. Microstepping of the stepper motor can be achieved using the internal comparators, while operational amplifiers are installed to adapt the motor current sense signal to the microcontroller's input levels.

Features and benefits

Key features	Key benefits
Compatible with microcontroller boards using the Arduino form factor, e.g., Infineon's XMC™ microcontroller kits	Fast and inexpensive prototyping of stepper motor control
Capable of high-frequency PWM, e.g., 30 kHz	Simple testing of microstepping algorithms
Adjustable slew rates for optimized EMI by changing external resistor	Diagnose pin to allow hardware feedback during development
Driver circuit with logic level inputs	Overtemperature shutdown with latch behavior and undervoltage shutdown of the power section
Diagnosis with current sense	

Target applications

- Stepper motors up to 5 A phase current
- 24 V nominal input voltage for the power stage
- Average motor current 3 A without additional cooling effort, 5 A possible with proper cooling

Ordering code: KITXMC1300IFX9201TOBO1

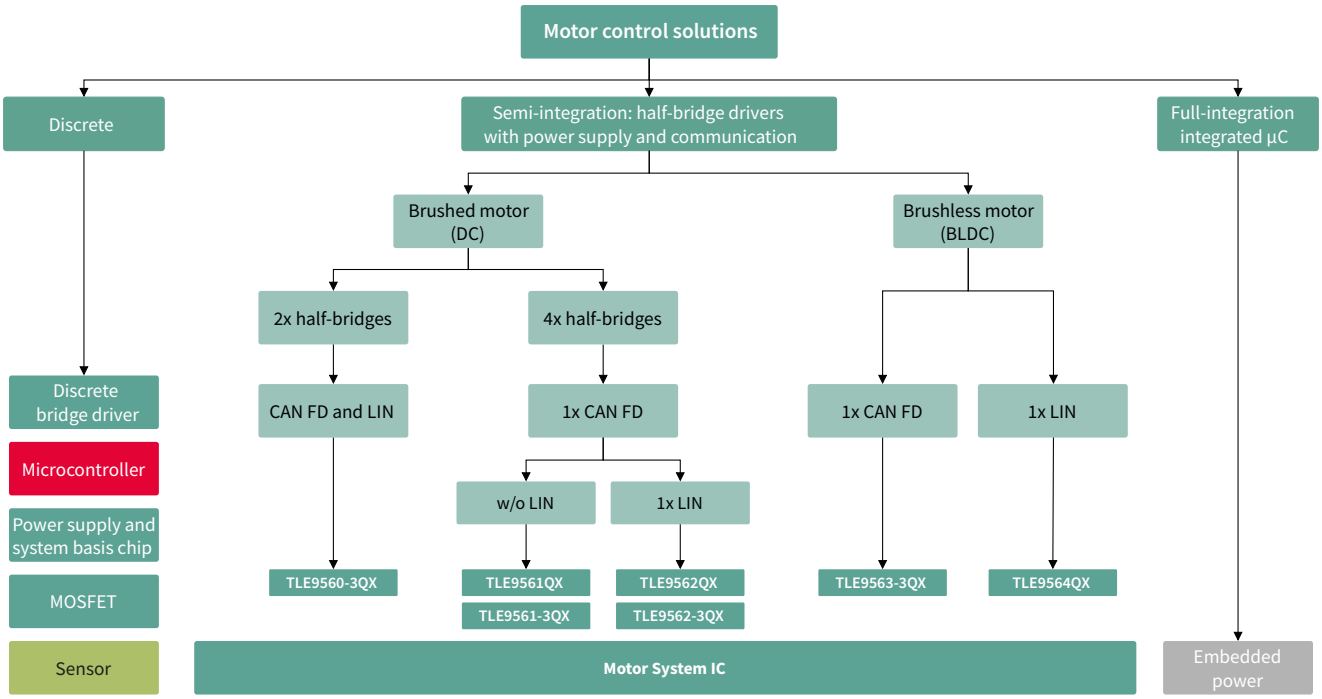
www.infineon.com/h-bridge-kit-2go
www.infineon.com/kit-xmc1300-ifx9201
www.infineon.com/makers

For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ SBC

(BL)DC motor system IC combines power supply, communication and multiple half-bridge MOSFET drivers

Infineon's MOTIX™ SBC family offers high integration and high performance with optimized system cost for DC and BLDC motor control applications. All devices of the motor system IC family feature a low-dropout voltage regulator with an output current of 250 mA/5 V. The communication interface incorporates a CAN FD transceiver up to 5 Mbit/s according to ISO 11898-2:2016 (including partial networking (PN) option) and/or a LIN transceiver.



Features

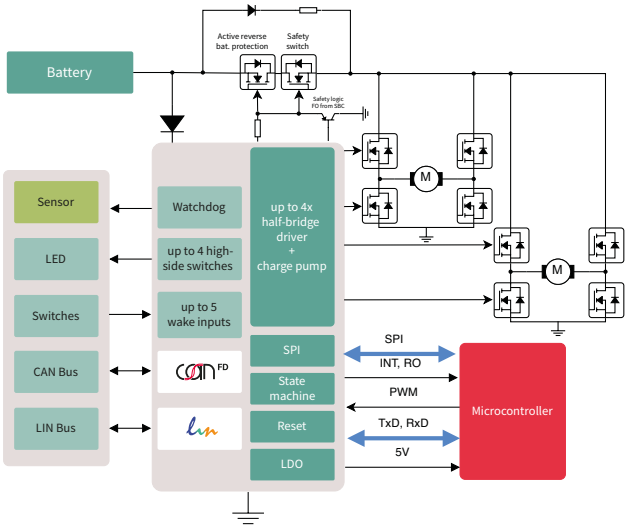
Features
› 5 V linear regulator up to 250 mA
› CAN FD up to 5 Mbps › CAN PN and FD tolerant ("-3" variants)
› LIN2.2B/J2602
› MOTIX™ TLE9560/1/2: up to 4 half-bridge gate drivers with adaptive MOSFET control up to 100 mA constant gate charge
› MOTIX™ TLE9563/4: three-phase gate driver with CSA and adaptive MOSFET control up to 150 mA constant gate charge
› Up to 4 high-side switches (with 7 on-resistance) › Up to 5 wake inputs
› Up to 6 PWM inputs

Benefits
› PCB savings up to 50 percent due to unique integration approach
› Lower switching losses and EMC optimization due to adaptive MOSFET control
› Automatic regulation of MOSFET pre-charge currents diminish need for production MOSFET calibration
› VS monitoring in sleep mode activates MOSFET to prevent from ECU damage when motor is in generator mode

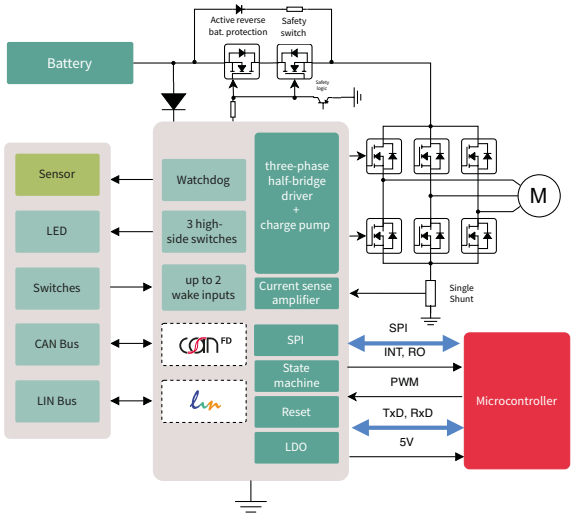
www.infineon.com/bldc-motor-system-ics
www.infineon.com/bdc-motor-system-ics

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Application diagram MOTIX™ TLE9560/1/2 for DC motor control

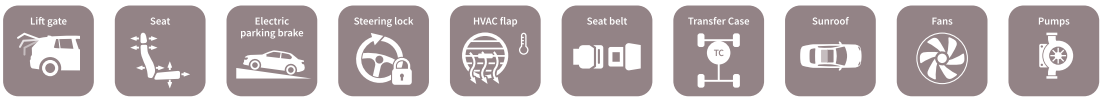


Application diagram MOTIX™ TLE9563/4 for BLDC motor control



Product table

Product variant	VCC1	CAN FD	CAN PN	LIN	HS switches	PWM input	Driver
TLE9560-3QX	5 V up to 250 mA	✓	✓	✓	4	1	2x half-bridges (100 mA const.)
TLE9561QX	5 V up to 250 mA	✓	–	–	4	4	4x half-bridges (100 mA const.)
TLE9561-3QX	5 V up to 250 mA	✓	✓	–	4	4	4x half-bridges (100 mA const.)
TLE9562QX	5 V up to 250 mA	✓	–	✓	4	2	4x half-bridges (100 mA const.)
TLE9562-3QX	5 V up to 250 mA	✓	✓	✓	4	2	4x half-bridges (100 mA const.)
TLE9563-3QX	5 V up to 250 mA	✓	✓	–	3	6	3x half-bridges (150 mA const.)
TLE9564QX	5 V up to 250 mA	–	–	✓	3	6	3x half-bridges (150 mA const.)

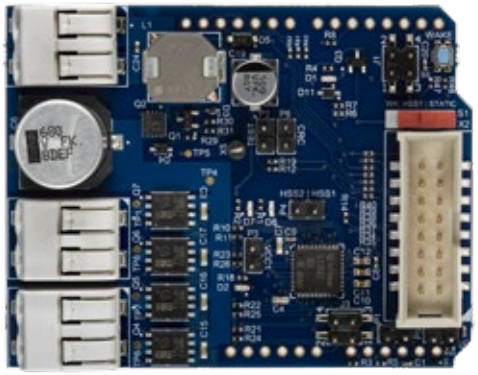


www.infineon.com/bldc-motor-system-ics
www.infineon.com/bdc-motor-system-ics

For more details on the product, click on the part number, visit infineon.com or contact our product support.

DC and BLDC motor control shields and evaluation boards with MOTIX™ TLE9562-3QX and with MOTIX™ TLE9563-3QX

The purpose of these boards is to provide a quick evaluation solution for lab assessments. The evaluation boards offer a unique two in one solution: they can be connected via a UIO stick with the computer to evaluate features via config wizard (a graphical user interface) which can be found in the Infineon Developer Center. In addition, the evaluation boards feature an Arduino shield interface for rapid prototyping.



Summary of features BLDC motor control shield with MOTIX™ TLE9563-3QX

- Operating voltage range 5.5-28 V with 5 V compatible logic input
- Integrated reverse polarity protection with on-board EMC filter
- Three integrated half-bridges MOSFET (2 in 1 MOSFET package)
- 5 mΩ low-side current sense
- High-power RGB LED driven by integrated high-side switches
- On-board back-EMF detection circuit and connector for Hall-sensor
- Arduino example codes available

Sales product name: BLDC SHIELD_TLE956X
Ordering code: BLDCSHIELDTLE956XTOBO1

Summary of features DC motor control shield with MOTIX™ TLE9562-3QX

- Operating voltage range 5.5-28 V with 5 V compatible logic input
- Integrated reverse polarity protection with on-board EMC filter
- Four integrated half-bridge MOSFETs (2 in 1 MOSFET package)
- Easy interfacing of CAN and LIN transceiver
- Miniaturization/shrink of the PCB area
- Arduino example codes available

Sales product name: DC SHIELD_TLE956X
Ordering code: DCSHIELDTLE956XTOBO1

Benefits of DC and BLDC motor control shields

- 2 in 1 board with GUI and Arduino interface for evaluation and rapid prototyping
- 50 percent reduced internal operating current consumption
- Simplified and cost efficient ground network
- Smaller package size for area savings
- Very low quiescent current in sleep-mode

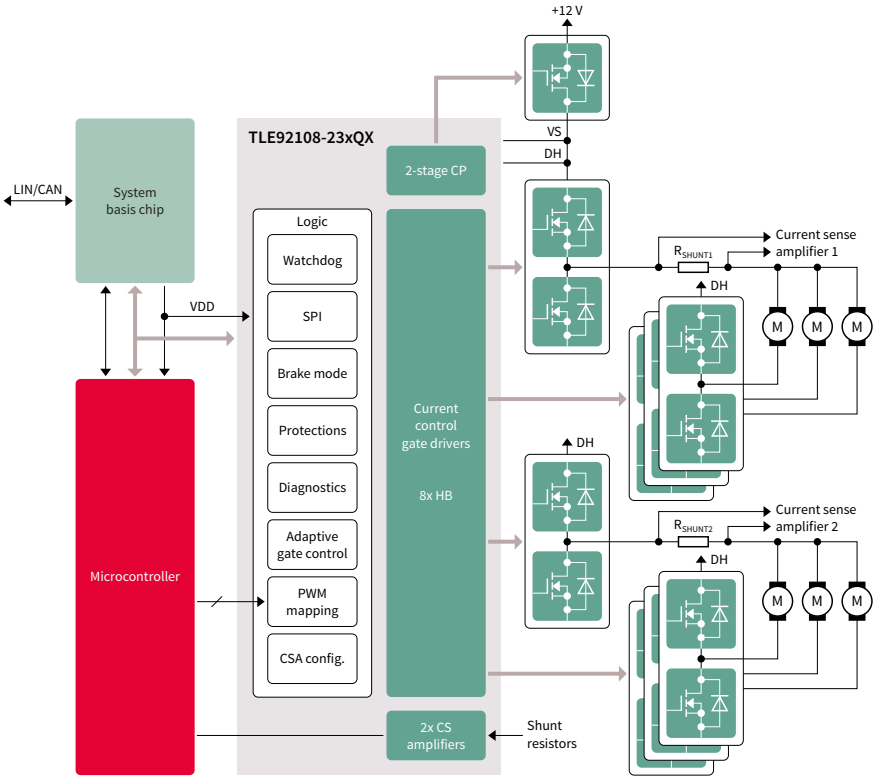
www.infineon.com/bldc-shield_tle956x
www.infineon.com/bdc-shield_tle956x

For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ multi-MOSFET driver

Multiple half-bridge drivers designed to control up to eight half-bridges

Infineon's MOTIX™ TLE9210x is a family of multi-MOSFET drivers, designed to control up to eight half-bridges (up to 16 N-channel MOSFETs) with one packaged device. Having only one device for several half-bridges enables further savings, such as less pick and place costs as well as less required PCB area compared to discrete solutions.
The MOTIX™ TLE92108 and MOTIX™ TLE92104 multiple MOSFET driver offer a reliable and cost-optimized solution with state-of-the-art diagnostic and protection. The devices of the MOTIX™ TLE9210x family are pin and software compatible. Furthermore, the product family allows motor cascading: with TLE92108 (8 half-bridges), up to 7 bidirectional DC motors motors can be driven.



Product table

Type	Description	Brake mode	Package	Ordering code
TLE92108-231QX	8-fold multi-MOSFET driver IC	No	PG-VQFN-48	TLE92108231QXXUMA1
TLE92108-232QX	8-fold multi-MOSFET driver IC	Yes	PG-VQFN-48	TLE92108232QXXUMA1
TLE92104-131QX	4-fold multi-MOSFET driver IC	No	PG-VQFN-48	TLE92104131QXXUMA1
TLE92104-232QX	4-fold multi-MOSFET driver IC	Yes	PG-VQFN-48	TLE92104232QXXUMA1

www.infineon.com/multi-mosfet-driver

For more details on the product, click on the part number, visit infineon.com or contact our product support.

MOTIX™ TLE92104-23QX APPKIT and MOTIX™ TLE92108-23QX APPKIT

Infineon's evaluation boards to measure and evaluate the hardware and software functionalities of the MOTIX™ multi-MOSFET driver family

The TLE92104-23QX APPKIT contains the multi-MOSFET driver IC TLE92104-232QX, and a typical application circuit, including 4 MOSFET half-bridges (OptiMOS™ 40 V MOSFETs in S3O8 package) to drive up to 3 bidirectional DC motors.

The TLE92108-23QX APPKIT contains the multi-MOSFET driver IC the TLE92108-232QX and a typical application circuit, including 8 MOSFET half-bridges (OptiMOS™ 40 V in S3O8 package) to drive up to 7 bidirectional DC motors.

The application boards can be connected via a UIO stick with the computer to evaluate their features via config wizard (a graphical user interface) which can be found in the Infineon Developer Center.

Ordering code: TLE9210423QXAPPKITTOBO1
Ordering code: TLE9210823QXAPPKITTOBO1

www.infineon.com/tle92104-23qx-appkit
www.infineon.com/tle92108-23qx-appkit

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Infineon support for power ICs

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/acdc
www.infineon.com/coolset
www.infineon.com/integrated-powerstages
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www.ifineon.com/optireg-switcher
www.infineon.com/motor-control-ics
www.infineon.com/imotion

Wide bandgap semiconductors

- CoolGaN™ e-mode HEMTs
- CoolGaN™ GIT HEMT 400 V
- CoolGaN™ GIT HEMT 600 V
- CoolGaN™ IPS half-bridge 600 V
- CoolGaN™ product portfolio
- Silicon carbide
- CoolSiC™ MOSFETs 650 V overview and portfolio
- CoolSiC™ MOSFETs 1200 V overview and portfolio
- CoolSiC™ MOSFETs 1700 V overview and portfolio
- CoolSiC™ Schottky diodes
- CoolSiC™ Schottky diodes 650 V
- CoolSiC™ Schottky diodes 1200 V
- CoolSiC™ diodes product portfolio
- CoolGaN™ and CoolSiC™ nomenclature

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Wide bandgap semiconductors

Gallium nitride (GaN) and silicon carbide (SiC)

The key to the next essential step towards an energy-efficient world is the use of new materials, such as wide bandgap semiconductors that allow for greater power efficiency, smaller size, lighter weight, lower overall cost – or all of these together. As the leading and trusted power supplier, Infineon offers the broadest product and technology portfolio of silicon (Si) and wide bandgap (WBG) solutions with more than 40 years of heritage in silicon, and several decades of heritage in wide bandgap technology development.

CoolGaN™ – ultimate efficiency and reliability

Compared to silicon (Si) MOSFETs, the breakdown field of Infineon's CoolGaN™ gate injection transistor (GIT) enhancement mode (e-mode) HEMTs is ten times higher, and the electron mobility is double. Both the output charge and gate charge are ten times lower than with Si and the reverse recovery charge is almost zero, which is key to high-frequency operations. GaN is the best-suited technology in hard-switching and resonant topologies, enabling new approaches in current modulation. Infineon's GaN solution is based on the most robust and performing concept in the market – the enhancement-mode concept - offering fast turn-on and turn-off speed. CoolGaN™ products focus on high performance and robustness, and add significant value to a wide variety of systems across many applications such as server, telecom, hyperscale data centers, wireless charging, adapter/charger, and audio. CoolGaN™ switches are easy to design-in with the matching EiceDRIVER™ gate driver ICs optimized for CoolGaN™ 600 V from Infineon.

CoolSiC™ - revolution to rely on

Silicon carbide (SiC) has a wide bandgap of 3 electronvolts (eV) and a much higher thermal conductivity compared to silicon. SiC-based MOSFETs are best-suited for high-breakdown, high-power applications that operate at higher frequencies compared to traditional IGBTs. CoolSiC™ MOSFETs come along with a fast internal freewheeling diode, thus making hard commutation without additional diode chips possible. Due to its unipolar character, the MOSFETs show very low temperature-independent switching and low conduction losses, especially under partial load conditions. Based on proven, high-quality volume manufacturing, Infineon's silicon carbide solutions combine revolutionary technology with benchmark reliability – for our customers' success today and tomorrow. The offering is completed by EiceDRIVER™ SiC MOSFET gate driver ICs based on Infineon's successful coreless transformer technology.

www.infineon.com/wbg

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolGaN™ GIT HEMTs

Tailor-made for the highest efficiency and power density in switch-mode power supplies

Compared to the next best silicon alternative, CoolGaN™ enables higher power density and the highest efficiency, especially in the partial load range, through novel topologies such as the CCM totem-pole PFC stage. GaN e-mode HEMT performance features a low reverse recovery charge and excellent dynamic performance in reverse conduction compared to silicon FET solutions. This characteristic enables more efficient operation at established frequencies and much higher frequency operation, improving power density by shrinking the size of passive components. CoolGaN™ enables doubled output power in a given energy storage slot size, freeing up space and realizing higher efficiency simultaneously. Infineon's CoolGaN™ comes with industry-leading reliability. During the quality management process, it is not only the device that is thoroughly tested but also its behavior in the application environment. The performance of CoolGaN™ goes beyond other GaN products in the market.

Features

- Low output charge and gate charge
- No reverse recovery charge

Design benefits

- High power density, small and light design
- High efficiency in resonant circuits
- New topologies and current modulation
- Fast and (near-)lossless switching

Advantages

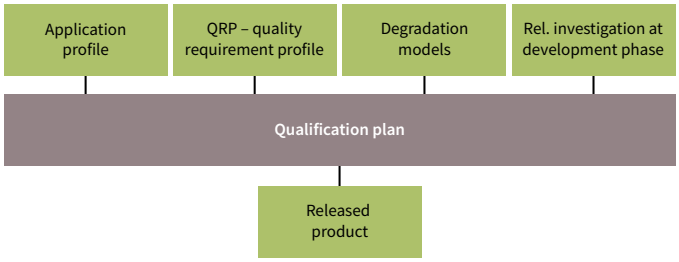
- Operational expenses (OPEX) and capital expenditure (CAPEX) reduction
- BOM and overall cost savings

Infineon's high- and low-voltage MOSFETs, gate-driver ICs and digital controllers complement the CoolGaN™ (discrete and integrated power stage) offering to fully exploit the benefits of GaN technology in systems.

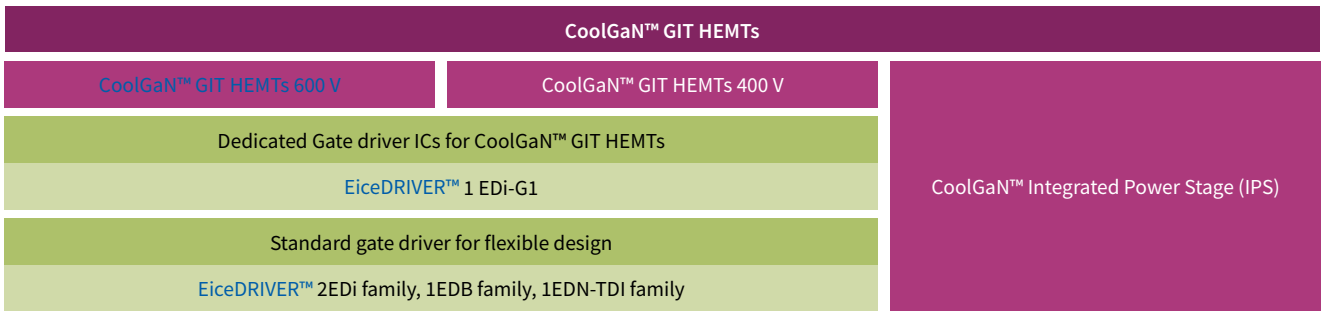
The highest quality

The qualification of GaN switches requires a dedicated approach, well above existing silicon standards

- Infineon qualifies GaN devices well beyond industry standards
- Application profiles are an integral part of the qualification process
- Failure models, based on accelerated test conditions, ensure target lifetime and quality are met
- Infineon sets the next level of wide bandgap quality



CoolGaN™ GIT HEMTs overview



www.infineon.com/gan

For more details on the product, click on the part number, visit infineon.com or contact our product support.

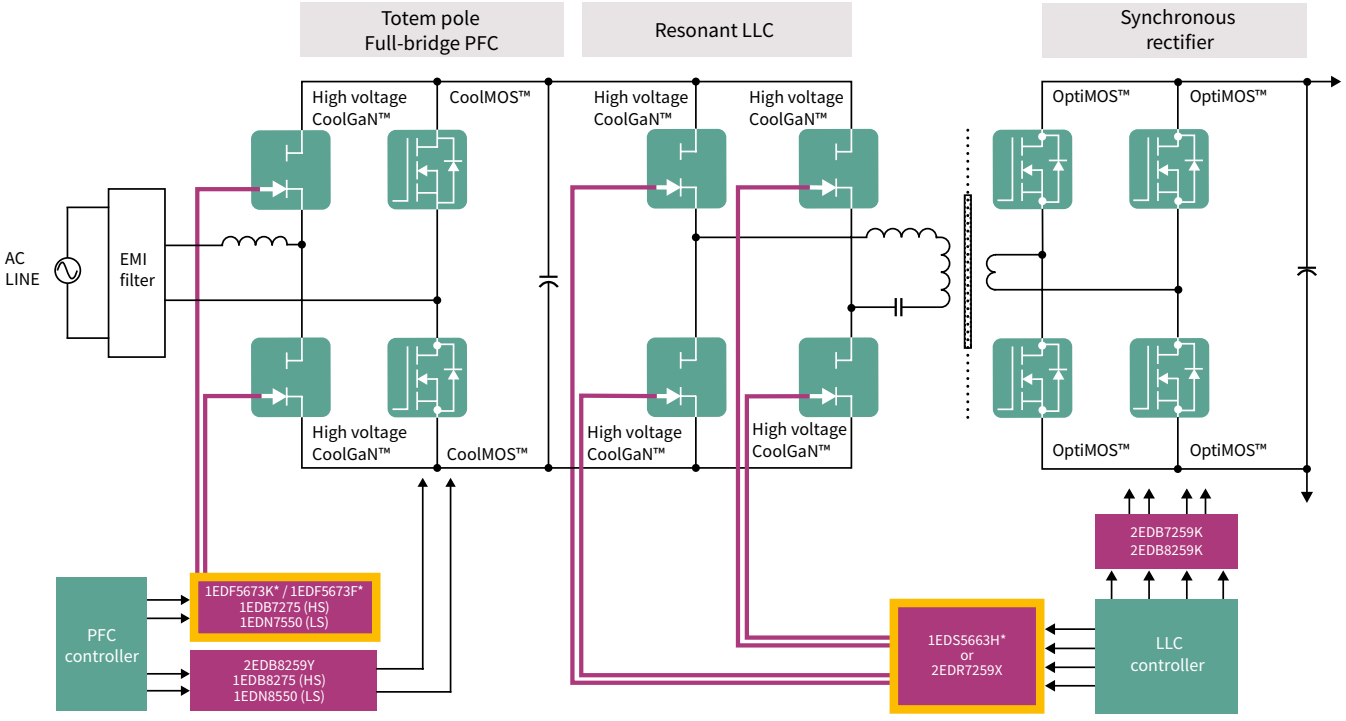
CoolGaN™ GIT HEMTs 400 V and 600 V – bringing GaN technology to the next level

Infineon's CoolGaN™ 400 V and 600 V GIT e-mode HEMTs enable more than 98 percent system efficiency and help customers make their end products smaller and lighter. Driving enhancement-mode devices requires additional features when choosing the correct gate driver IC. With the EiceDRIVER™ 1EDx56x3x family, Infineon offers dedicated single-channel galvanically isolated gate driver ICs, which are a perfect fit for e-mode GaN HEMTs with non-isolated gate (diode input characteristic) and low threshold voltage, such as CoolGaN™. However, CoolGaN™ technology does not require customized ICs, and in many applications, CoolGaN™ can be driven by standard gate drivers when coupled to an RC interface.

Complete support of all requirements specific to e-mode GaN HEMTs operation:

- Low driving impedance (on-resistance 0.85 Ω source, 0.35 Ω sink)
- Resistor programmable gate current for steady on-state (typically 10 mA)
- Programmable negative gate voltage to completely avoid spurious turn-on in half-bridges

Block diagram: high-efficiency GaN switched-mode power supply (SMPS)



*Single-channel EiceDRIVER™ ICs dedicated for CoolGaN™ GIT HEMTs

www.infineon.com/gan

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolGaN™ GIT HEMT 400 V

Class D output stage offering the best audio experience

Compared to silicon solutions, the CoolGaN™ GIT HEMT 400 V normally-off switch enables smoother switching and a more linear class D output stage by offering low/linear Coss and zero Q_{rr}. Ideal class D audio amplifiers offer 0 percent distortion and 100 percent efficiency. What impairs the linearity and power loss is highly dependent on the switching characteristics of the switching device. Infineon's CoolGaN™ GIT HEMT 400 V breaks through the technology barrier by introducing zero reverse recovery charge in the body diode and minimal, linear input and output capacitances.

In addition, the e-mode concept offers fast turn-on and turn-off speed. This feature also simplifies pairing CoolGaN™ GIT with the IRS20957SPBF class D controller and therefore enables faster go-to-market.

CoolGaN™ GIT for class D audio solutions

CoolGaN™ GIT HEMT 400 V is tailored for premium HiFi home audio, professional, and aftermarket car audio systems where end-users demand every detail of their high-resolution soundtracks. These have been conventionally addressed by bulky linear amplifiers or tube amplifiers. With CoolGaN™ GIT HEMT 400 V as the class D output stage, audio designers will be able to deliver the best audio experience to their prospective audio fans.

The IGT40R070D1, CoolGaN™ GIT HEMT 400 V device in HSOF-8-3 (TO-leadless) package has been tested in class D audio amplifier applications on 200 W + 200 W dual-channel system designs.

Features and benefits

Key features	Key benefits
› Ultralow and linear C_{oss} 400 V power devices	› Clean switching performance
› Zero Q_{rr}	› Narrow dead time for better THD
› E-mode transistor – normally-off switch	› Easy to use: compatible with the IRS20957SPBF class D audio control IC

The CoolGaN™ GIT HEMT 400 V device benefits from Infineon's engineering expertise in challenging applications, such as telecom rectifiers and SMPS servers, where CoolGaN™ technology proved to be highly reliable. It is the most robust and performing concept in the market. The CoolGaN™ GIT HEMT 400 V addresses class D audio requirements and comes in a high-performing SMD package to fully exploit the benefits of GaN technology.

www.infineon.com/hemt

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolGaN™ GIT HEMTs 600 V

The highest efficiency and power density with reduced system costs

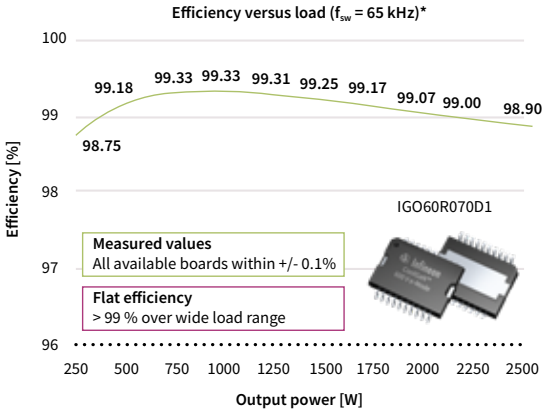
The e-mode concept offers fast turn-on and turn-off speed, as well as a better path towards integration. CoolGaN™ GIT HEMTs 600 V enable simpler and more cost-effective half-bridge topologies. As e-mode based products reach maturity, CoolGaN™ GIT HEMTs 600 V are gaining growing prominence thanks to their potential. Infineon manufactures their CoolGaN™ 600 V series according to a specific, GaN-tailored qualification process that goes far beyond the standard for silicon power devices. CoolGaN™ GIT HEMT 600 V is designed for datacom and server SMPS, telecom rectifiers, as well as mobile chargers and adapters, and can be used as a general switch in many other industrial and consumer applications. It is the most rugged and reliable solution in the market. The CoolGaN™ portfolio is built around high-performing SMD packages to fully exploit the benefits of GaN.

CoolGaN™ GIT for PFC

CoolGaN™ enables the adoption of simpler half-bridge topologies (including the elimination of the lossy input bridge rectifier). The result is record efficiency (>99%) with a potential for BOM savings.

CoolGaN™ GIT for resonant topologies

- In resonant applications, ten times lower Q_{OSS} and Q_G enables high-frequency operations (>1 MHz) at the highest efficiency levels
- Linear output capacitance leads to 8 to 10 times lower dead time
- Devices can be easily paralleled
- Power density can be pushed even further by optimizing the thermal performance
- CoolGaN™ enables to push the efficiency forward, thus enabling high power density e.g., in low-power chargers/adapters

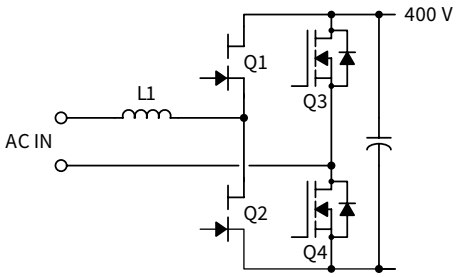


* No external power supplies – everything included.
V_{in} = 230 V_{AC}, V_{out} = 390 V_{DC}, $t_{ambient}$ = 25 °C

Applications

- Telecom
- Server
- Datacom
- Adapter and charger
- Wireless charging
- SMPS

Full-bridge totem pole



Demonstration board

2.5 kW totem-pole PFC board:
EVAL_2500W_PFC_GAN_A

- 2 x 70 mΩ CoolGaN™ GIT HEMT in DSO-20-85
- 2 x 33 mΩ CoolMOS™

www.infineon.com/hemt

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolGaN™ IPS half-bridge 600 V

Ease of use with integrated drivers for highest efficiency and power density

The CoolGaN™ IPS half-bridge 600V combines a half-bridge power stage consisting of two CoolGaN™ GIT HEMTs and a dedicated gate driver IC in one thermally enhanced 8 x 8 mm QFN-28 package. The CoolGaN™ IPS HB family is available in 2x 140/200/270/500 mΩ, $R_{DS(on)}$ typ. It is thus ideally suited to support the design of compact appliances in the low-to-medium power area. Infineon's CoolGaN™ and power switches provide a very robust gate structure. When driven by a continuous gate current of a few mA in the on-state, a minimum on-resistance $R_{DS(on)}$ is always guaranteed, independent of temperature and parameter variations.

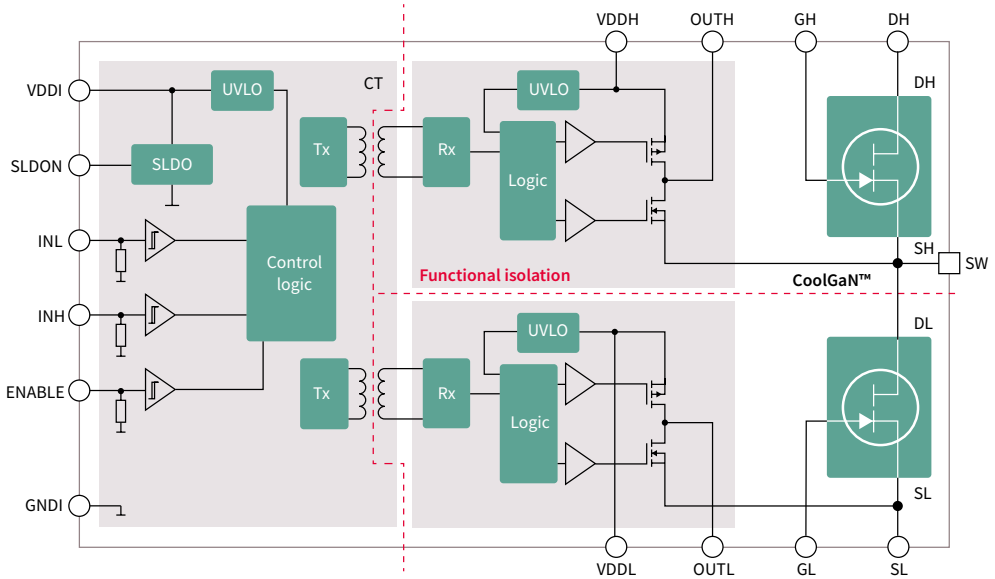
Due to the GaN-specific low threshold voltage and the fast switching transients, a negative-gate drive voltage is required in certain applications to avoid spurious turn-on effects. This can be achieved by the well-known RC interface between the driver and the switch. A few external SMD resistors and capacitors allow for easy adaptation to different applications (low/medium power, hard/soft switching).

The built-in driver utilizes an on-chip coreless transformer (CT) technology to achieve level-shifting to the high side. Besides, CT guarantees excellent robustness even for extremely fast switching transients above 150 V/ns.

The CoolGaN™ IPS 600V family today, is available in various configurations such as half-bridge and single-channel.

Features and benefits

Key features	Key benefits
› Digital-in, power-out building block	› Easy to drive with 2x digital PWM input
› Application configurable switching behavior	› Low system BOM
› Highly accurate and stable timing	› Configurability of gate path with low inductance loop on PCB
› Thermally enhanced 8 x 8 mm QFN-28 package	› Allows short dead-time setting in order to maximize system efficiency
	› Small package for compact system designs



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For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolGaN™ GIT HEMTs 400 V

Package	HSOF-8-3 (TO-Leadless)
$R_{DS(on),max.}$ \ P_{max}	up to 200 W
70 mΩ	IGT40R070D1

CoolGaN™ GIT HEMTs 600 V

Package $R_{DS(on),max.}$	DSO-20-85 Bottom-side cooling	DSO-20-87 Top-side cooling	HSOF-8-3 TO-Leadless	LSON-8-1 DFN 8x8	TSON-8-3 ThinPAK 5x6
42 mΩ	IGO60R042D1*	IGOT60R042D1 *	IGT60R042D1*		
70 mΩ	IGO60R070D1	IGOT60R070D1	IGT60R070D1	IGLD60R070D1	
190 mΩ			IGT60R190D1	IGLD60R190D1 IGLD60R190D1S	IGLR60R190D1
260 mΩ					IGLR60R260D1*
340 mΩ					IGLR60R340D1*

Unlock the full potential of GaN by driving CoolGaN™ HEMTs with dedicated single-channel isolated gate driver ICs from the EiceDRIVER™ family.

EiceDRIVER™ family optimized for CoolGaN™ GIT HEMTs 600 V

Product	Package	Input to output isolation				Propagation delay accuracy	Typ. high level (sourcing) output resistance	Typ. low level (sinking) output resitance	SP number
		Isolation class	Rating	Surge testing	Certification				
1EDF5673K	LGA, 13-pin, 5x5 mm	functional	V_{IO} = 1.5 kV_{DC}	n.a.	n.a.	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP002447622
1EDF5673F	DSO, 16-pin, 150 mil	functional	V_{IO} = 1.5 kV_{DC}	n.a.	n.a.	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP003194020
1EDS5663H	DSO, 16-pin, 300 mil	reinforced	V_{IOTM} = 8 kV_{pk} V_{ISO} = 5.7 kV_{rms}	V_{ISOM} > 10 kV_{pk}	EN 62368-1 UL1577	-6 ns/+7ns	0.85 Ω	0.35 Ω	SP002753980

EiceDRIVER™ standard gate drivers

Product	Package	Input to output isolation			Output UVLO[1]	Output peak source/sink current	CMTI (min.)	Propagation dealy (typ.)	Propagation delay accuracy
		Isolation class	Rating	Certification					
2EDR7259X	DSO, 14-pin, 300 mil	reinforced	V_{ISO} = 5.7 kV_{rms} V_{IOTM} = 8 kV_{pk}	UL1577, VDE 0884-11	4 V	5 A/9 A	150 V/ns	38 ns	-5 ns/+9 ns
2EDR8259X[2]					8 V				
2EDB7259Y	DSO, 14-pin, 150 mil	single protection	V_{ISO} = 3.0 kV_{rms}	UL1577	4 V				
2EDB8259Y					8 V				
1EDB7275F	DSO, 8-pin, 150 mil	single protection	V_{ISO} = 3.0 kV_{rms}	UL1577	4 V		300 V/ns	45 ns	-4 ns/+6 ns
1EDB8275F					8 V				
1EDN7550B	SOT23, 6-pin	non-isolated	n.a.	n.a.	4 V		n.a.	45 ns	-7 ns/+10 ns
1EDN8550B					8 V				

CoolGaN™ IPS 600 V half-bridge / single-channel

Package $R_{DS(on)\ typ.}$	8x8 mm QFN-28	8x8 mm QFN-21
100 mΩ		IGI60F100A1L*
140 mΩ	IGI60F1414A1L	IGI60F140A1L*
200 mΩ	IGI60F2020A1L*	IGI60F200A1L*
270 mΩ	IGI60F2727A1L*	IGI60F270A1L*
500 mΩ	IGI60F5050A1L*	

www.infineon.com/hemt www.infineon.com/gan-ips www.infineon.com/gan-eicedriver

* Coming soon
1) 8 V UVLO parts recommended for bipolar driving or for unipolar driving with V_{DD} ≥ 10V
2) 2EDR8258X with ENABLE function also available

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Silicon carbide

Revolution to rely on

Silicon carbide (SiC) devices belong to the so-called wide bandgap semiconductor group, which offers many attractive characteristics for high voltage power semiconductors remove compared to commonly used silicon (Si). In particular, the much higher breakdown field strength and thermal conductivity of silicon carbide allow developing devices which by far outperform the corresponding silicon-based ones, and enable efficiency levels unattainable otherwise. Infineon's portfolio of SiC devices covers 600 V to 1200 V Schottky diodes as well as the revolutionary CoolSiC™ MOSFETs 650 V, 750 V, 1200 V and 1700 V.

EiceDRIVER™ SiC MOSFET gate-driver ICs are well-suited to drive SiC MOSFETs, especially Infineon's ultra-fast switching CoolSiC™ SiC MOSFETs. These gate drivers incorporate the most important key features and parameters for driving SiC, such as tight propagation delay matching, precise input filters, wide output-side supply range, negative gate voltage capability, active Miller clamp, DESAT protection, and extended CMTI capability.

www.infineon.com/sic

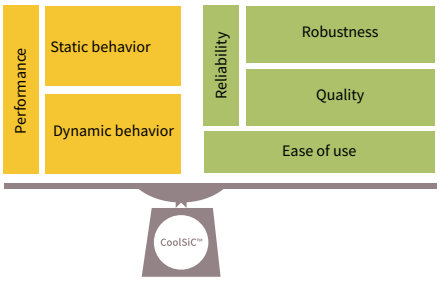
For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ silicon carbide MOSFETs 650 V

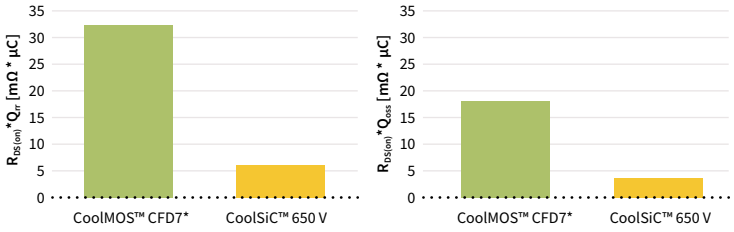
Delivering reliable and cost-effective top performance

Silicon carbide physical characteristics, from wide bandgap to electron mobility and thermal conductivity, provide the basis to engineer high-performance semiconductor technologies and products. The CoolSiC™ MOSFETs from Infineon maximize the advantages of silicon carbide, offering a high-performance product that also meets power electronics design requirements, like reliability and ease of use. As per performance, the CoolSiC™ MOSFETs show low $R_{DS(on)}$ dependency with temperature and low switching losses. The reliability is built on technological strengths and on flawless quality processes. Some aspects of Infineon's SiC technology, like superior gate oxide reliability, excellent thermal behavior, advanced avalanche ruggedness and short circuit capabilities, contribute to the robustness of the device. Infineon's benchmark quality was further improved for silicon carbide, with an application-focused qualification scope exceeding standards, complemented by SiC-specific screening measures. Additional unique features, like 0 V turn-off V_{GS}, wide V_{GS} range, and the use of silicon MOSFET drivers and driving schemas make CoolSiC™ MOSFETs 650 V easy to integrate and use.

Leveraging SiC's material properties



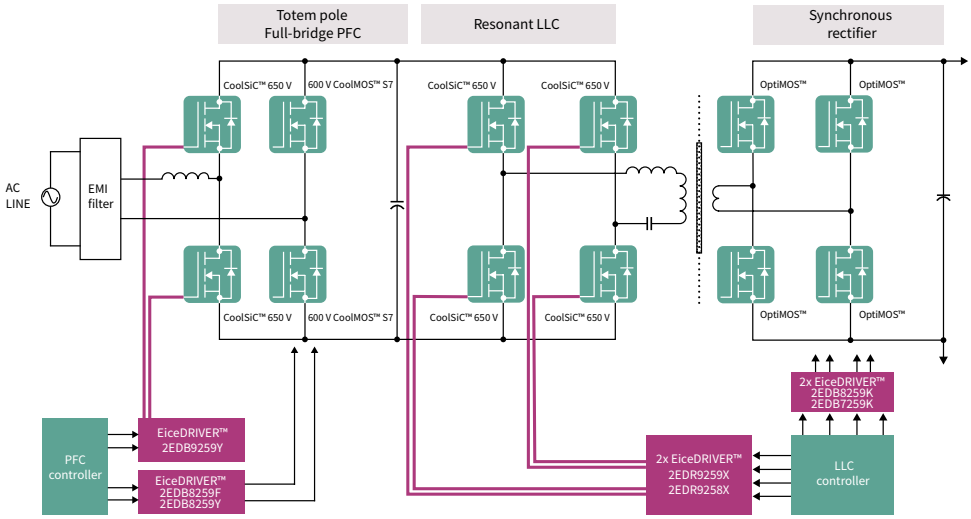
Robustness for continuous hard commutation topologies



* Best CoolMOS™ SJ MOSFET reference in the market

CoolSiC™ MOSFETs can enable streamlined and cost-optimized system designs with fewer components, weight and size, reaching high energy efficiency and power density. For instance, the CoolSiC™ MOSFETs boast a low level of Q_{rr}, roughly 80% less of the best CoolMOS™ reference in the market, the CoolMOS™ CFD7. This ensures the robustness of the body diode, making the CoolSiC™ MOSFETs suitable for topologies with continuous hard commutation, like the high-efficiency totem-pole PFC, a topology that enables > 99% of efficiency.

High-efficiency CoolSiC™ totem-pole PFC in server SMPS (switched-mode power supply)



www.infineon.com/coolsic-mosfet-discretes
www.infineon.com/SiCgd

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CoolSiC™ MOSFET 650 V ACTIVE & PREFERRED

$R_{DS(on),max}$. [mΩ]	$R_{DS(on)}$ typ. [mΩ]	TO-247 4-pin	TO-247	D^2PAK-7	TOLL
27	27	IMZA65R027M1H	IMW65R027M1H	IMBG65R027M1H	IMT65R027M1H*
42	30	IMZA65R030M1H	IMW65R030M1H	IMBG65R030M1H	IMT65R030M1H*
50	39	IMZA65R039M1H	IMW65R039M1H	IMBG65R039M1H	IMT65R039M1H*
64	48	IMZA65R048M1H	IMW65R048M1H	IMBG65R048M1H	IMT65R048M1H*
74	57	IMZA65R057M1H	IMW65R057M1H	IMBG65R057M1H	IMT65R057M1H*
94	72	IMZA65R072M1H	IMW65R072M1H	IMBG65R072M1H	IMT65R072M1H*
111	83	IMZA65R083M1H	IMW65R083M1H	IMBG65R083M1H	IMT65R083M1H*
141	107	IMZA65R107M1H	IMW65R0107M1H	IMBG65R107M1H	IMT65R107M1H*
217	163			IMBG65R163M1H	IMT65R163M1H*
346	260			IMBG65R260M1H	IMT65R260M1H*

CoolSiC™ MOSFET 750 V ACTIVE & PREFERRED

$R_{DS(on),max}$. [mΩ]	$R_{DS(on)}$ typ. [mΩ]	QDPAK TSC	TO263-7 (D^2PAK)
11	8	AIMDQ75R008M1H*	
23	17	AIMDQ75R017M1H*	AIMBG75R017M1H*
57	42	AIMDQ75R042M1H*	AIMBG75R042M1H*
197	146	AIMDQ75R146M1H*	AIMBG75R146M1H*

www.infineon.com/coolsic-mosfet-discretes

www.infineon.com/SiCgd

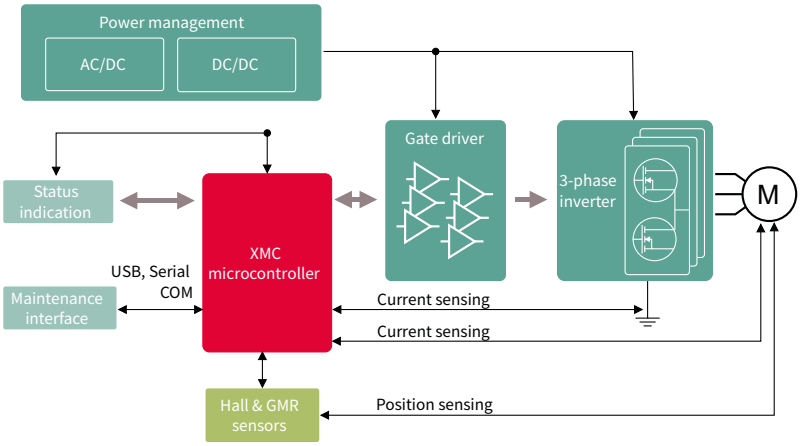
* Coming soon

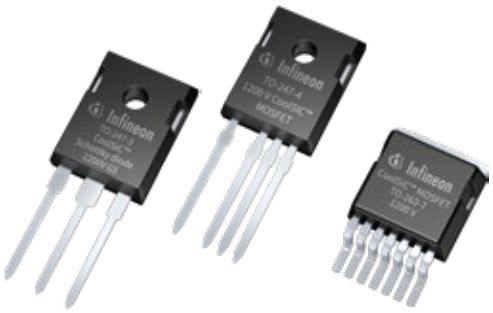
For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ silicon carbide MOSFETs 1200 V

Infineon's CoolSiC™ technology enables radically new product designs

Silicon carbide (SiC) opens up new degrees of freedom for designers to harness unseen levels of efficiency and system flexibility. Compared to traditional silicon-based switches like IGBTs and MOSFETs, SiC MOSFETs offer many advantages. These include the low switching losses with 1200 V and 650 V switches, very low reverse recovery losses of the internal commutation proof body diode, temperature-independent low switching losses, and threshold-free on-state characteristics. Based on volume experience and compatibility know-how, Infineon presents the revolutionary CoolSiC™ technology which enables radically new product designs with high performance and high reliability. CoolSiC™ MOSFET products are targeted for automotive, photovoltaic inverters, battery charging, EV charging, industrial drives, UPS, SMPS, and energy storage.





Features and benefits

Key features	Key benefits
› Very low switching losses	› Best-in-class system performance
› Superior gate-oxide reliability	› Efficiency improvement and reduced cooling effort
› Threshold-free on-state characteristic	› Longer lifetime and higher reliability
› Wide gate-source voltage range	› Enables higher frequency operation, allowing the increase in power density
› Benchmark gate threshold voltage, $V_{GS(th)}$ = 4.5 V	› Reduction in system cost
› Fully controllable dV/dt	› Ease of use
› Commutation robust body diode, ready for synchronous rectification	

TO-247 4-pin package contains an additional connection to the source (Kelvin connection) used as a reference potential for the gate driving voltage, thereby eliminating the effect of voltage drops over the source inductance. The result is even lower switching losses than for the TO-247 3-pin version, especially at higher currents and higher switching frequencies.

The gate-source pin of the TO-263 7-pin package, similar to the TO-247 4-pin, eliminates the effect of voltage drops over the source inductance, further reducing turn-on switching loss. TO-263 7-pin package minimizes the leakage inductance between drain and source, reducing the risk of high turn-off voltage overshoot.

www.infineon.com/coolsic-mosfet-discretes

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ MOSFET 1200 V ACTIVE & PREFERRED

Package / $R_{DS(on)}$	TO-247	TO-247-4	D²PAK 7-pin	Gate driver for CoolSiC™	
				EiceDRIVER™ Compact:	EiceDRIVER™ Enhanced:
7 mΩ	IMW120R007M1H	IMZA120R007M1H		1EDI20I12MF 1EDI60I12AF 1ED3124MU12F 1ED3125MU12F 1ED3122MC12H 1ED3124MC12H 1ED3241MC12H	1ED3322MC12N 1ED3491MC12M 1ED3890MC12M 2ED020I12-F2
14 mΩ	IMW120R014M1H	IMZA120R014M1H			
20 mΩ	IMW120R02M1H	IMZA120R020M1H			
30 mΩ	IMW120R030M1H	IMZ120R030M1H	IMBG120R030M1H		
40/45 mΩ	IMW120R040M1H	IMZA120R040M1H	IMBG120R045M1H		
60 mΩ	IMW120R060M1H	IMZ120R060M1H	IMBG120R060M1H		
90 mΩ	IMW120R090M1H	IMZ120R090M1H	IMBG120R090M1H		
140 mΩ	IMW120R140M1H	IMZ120R140M1H	IMBG120R140M1H		
220 mΩ	IMW120R220M1H	IMZ120R220M1H	IMBG120R220M1H		
350 mΩ	IMW120R350M1H	IMZ120R350M1H	IMBG120R350M1H		

CoolSiC™ silicon carbide MOSFETs 1700 V

CoolSiC™ MOSFET 1700 V SMD enables best efficiency and reduced complexity for high voltage auxiliary power supplies

The CoolSiC™ 1700 V MOSFET in a TO-263-7 high-creepage package is optimized for fly-back topologies to be used in auxiliary power supplies connected to DC-link voltages 600 V up to 1000 V in numerous power applications.

Features and benefits

Key features
› Optimized for flyback topologies
› Extremely low switching loss
› 12 V/0 V gate source voltage compatible with fly-back controllers
› Fully controllable dV/dt for EMI optimization
› SMD package with enhanced creepage and clearance distances, >7 mm

Key benefits
› The CoolSiC™ 1700 V MOSFET enables simple single-ended flyback topology at high efficiency level for use in auxiliary power supplies
› SMD package enables direct integration into PCB, with natural convection cooling without extra heatsink
› Reduced isolation efforts due to extended creepage and clearance distance of package
› Reduced system complexity
› High power density

CoolSiC™ MOSFET 1700 V ACTIVE & PREFERRED

Package / $R_{DS(on)}$	D²PAK 7-pin
450 mΩ	IMBF170R450M1
650 mΩ	IMBF170R650M1
1000 mΩ	IMBF170R1K0M1

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ Schottky diodes

The differences in material properties between silicon carbide and silicon limit the fabrication of practical silicon unipolar diodes (Schottky diodes) to a range up to 100-150 V, with a relatively high on-state resistance and leakage current. With SiC, Schottky diodes can reach a much higher breakdown voltage. With more than 20 years of field experience in SiC, Infineon is the world's first SiC discrete power supplier. Infineon offers products up to 1200 V in discrete packages and up to 1700 V in modules.

The long market presence and experience enable Infineon to deliver highly reliable, industry-leading SiC performance. With over ten years of pioneering experience in developing and manufacturing SiC diodes, Infineon's latest CoolSiC™ Schottky diode generation 6 family sets a benchmark in quality, efficiency and reliability.

Features

- No reverse recovery charge
- Purely capacitive switching
- High operating temperature ($T_{j, max}$ 175°C)

Advantages

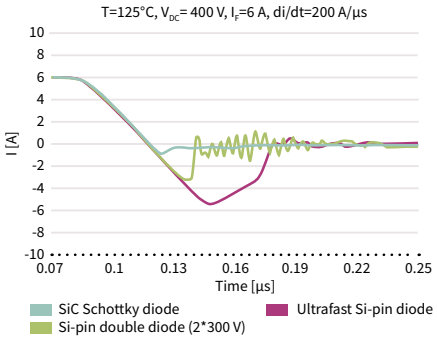
- Low turn-off losses
- Reduction of CoolMOS™ or IGBT turn-on loss
- Switching losses independent from load current, switching speed and temperature

Benefits

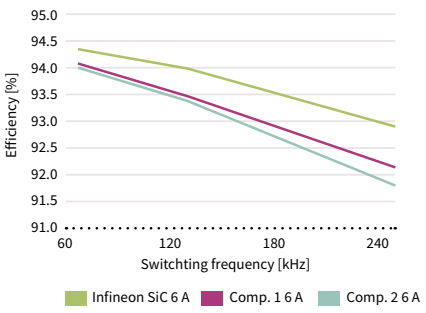
- System efficiency improvement compared to Si diodes
- Reduced cooling requirements
- Enabling higher frequency/increased power density
- Higher system reliability due to lower operating temperature
- Reduced EMI

Applications

- Server
- Telecom
- Solar
- UPS
- EV charging
- Energy storage
- PC power
- Motor drives
- Lighting
- CAV



Reverse-recovery charge of SiC Schottky diodes versus Si-pin diodes
The majority of carrier characteristics imply no reverse recovery charge and the only contribution to the switching losses comes from the tiny displacement charge of capacitive nature. In the same voltage range, silicon devices have a bipolar component resulting in much higher switching losses. The graph shows the comparison between various 600 V devices.



Improved system efficiency (PFC in CCM mode operation, full load, low line)
The fast switching characteristics of the SiC diodes provide clear efficiency improvements at a system level. The performance gap between SiC and high-end silicon devices increases with the operating frequency.

www.infineon.com/sic-diodes

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ Schottky diodes 650 V

CoolSiC™ Schottky diodes 650 V G6 and G5

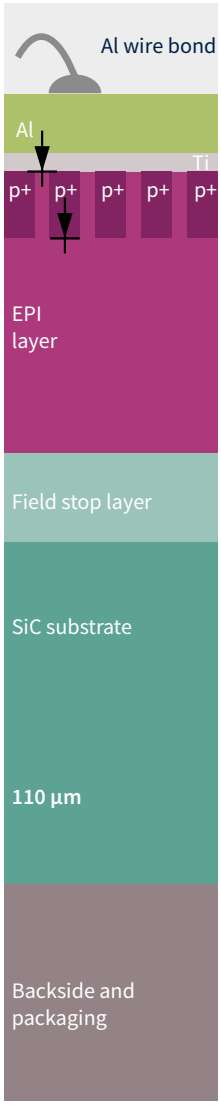
The CoolSiC™ Schottky diode 650 V G6 product family is built over the strong characteristics of the previous G5 generation, fully leveraging technology and process innovation to propose the best efficiency and zero price/performance products to date.

Foundation technology – CoolSiC™ Schottky diodes 650 V G5

The established CoolSiC™ Schottky diodes G5 product family has been optimized after all key aspects including junction structure, substrate and die attach. It represents a well-balanced product family which offers state-of-the-art performance and high surge current capability at a competitive cost level.

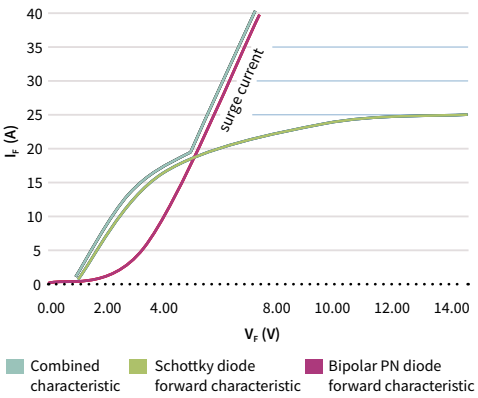
Innovation: optimized junction, substrate and die attach

Infineon's SiC Schottky diode generation 5 is optimized with regard to all key aspects relevant for high-power and high-efficiency SMPS applications.



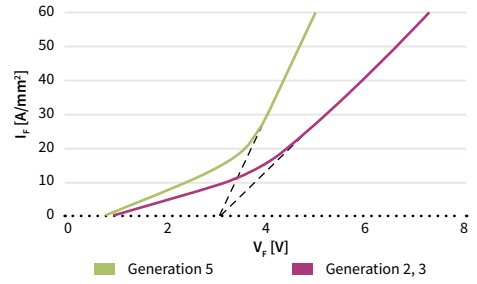
Junction: merged PN structure

On the junction level, it has an optimized merged PN structure. Compared to competitors, Infineon's SiC diode has an additional P-doped area, which, together with the N-doped EPI layer, forms a PN junction diode. Thus, it is a combination of Schottky diode and PN junction diode. Under normal conditions it works like a standard Schottky diode. Under abnormal conditions such as lighting, AC line drop-out, it works like a PN junction diode. At high current level, the PN junction diode has a significantly lower forward voltage (V_F) than the Schottky diode, which leads to less power dissipation, thus significantly improving the surge current capability.



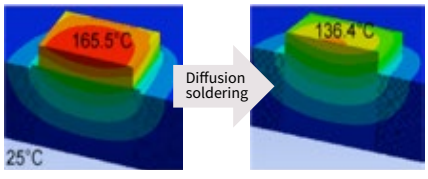
Substrate: thin wafer technology

On the substrate level, Infineon introduced the thin wafer technology. At the later stage of our SiC diode production, the thin wafer process is used to reduce the wafer thickness by about two-thirds, which significantly reduces the substrate resistance contribution, thus, improving both forward voltage (V_F) and thermal performance.



Die attach: diffusion soldering

On the backside, package level diffusion soldering is introduced, which significantly improves the thermal path between the lead frame and the diode, enhancing the thermal performance. With the same chip size and power dissipation, the junction temperature is reduced by 30°C.



R_{thJC}=2.0 K/W R_{thJC}=1.5 K/W

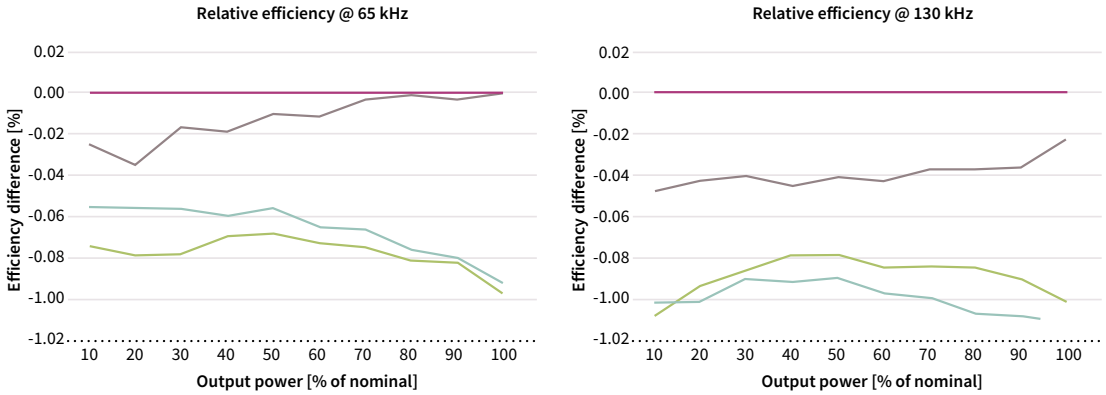
www.infineon.com/sic-diodes

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Latest development - CoolSiC™ Schottky diodes 650 V G6

The CoolSiC™ Schottky diodes G6 product family introduces a novel and proprietary Schottky metal system. This contributes to reducing the forward voltage (VF) to challenging levels, determining a measurable decrease of conduction losses. Infineon's CoolSiC™ Schottky diodes enable optimum efficiency and ruggedness. Lower forward voltage (V_F) means lower conduction loss, and lower capacitive charge (Q_c) means lower switching loss. Q_c x V_F is the figure of merit for efficiency, and comparison indicates that the latest generation 6 products have the lowest Q_c x V_F on the market. Infineon's CoolSiC™ Schottky diodes offer a surge current robustness far better than the one offered by the most efficient products. Thus, under abnormal conditions, this surge current capability offers excellent device robustness.

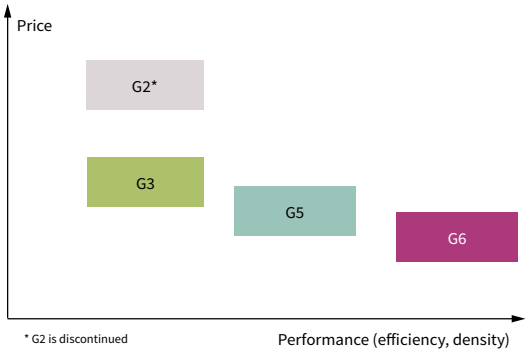
Efficiency comparison



In terms of efficiency, the 8 A G6 device has been tested in CCM PFC. The maximum output power is 3.5 kW. The left figure shows the relative efficiency at 65 kHz, while the figure on the right shows the relative efficiency at 130 kHz. This shows that Infineon's CoolSiC™ Schottky diode G6 delivers better efficiency over the full load range, keeping this advantage even at 130 kHz, therefore meeting the needs of designers who want to increase the switching frequencies in their designs to attain more power density.

The best price performance

CoolSiC™ Schottky diodes G6 are the outcome of Infineon's continuous technological and process improvements, which enable the design and development of SiC-based products, making them more price-competitive and increasing performance across generations. As a result, G6 is Infineon's best price/performance CoolSiC™ Schottky diode generation, offering the highest cost-efficiency. In addition, Infineon offers the reliability of collaborating with the industry leader. Customers can leverage Infineon's proven quality and supply chain reliability. They can benefit from "one-stop-shop" advantages and maximize system performance, combining CoolSiC™ Schottky diodes with the SJ MOSFETs of the CoolMOS™ 7 family, such as 600 V C7, 650 V C7, 600 V G7, 650 V G7 and 600 V P7.



A comprehensive portfolio

The combined G6 and G5 CoolSiC™ Schottky diode 650 V diode portfolio offers a wide choice of packages and ampere class granularity to allow the best fit to applications. G6 comes in double DPAK, the first top-side cooled surface mount package, which allows thermal decoupling of PCB to chip junction and enables higher power dissipation and improved system lifetime thanks to the reduced board temperature.

www.infineon.com/coolsic-g6

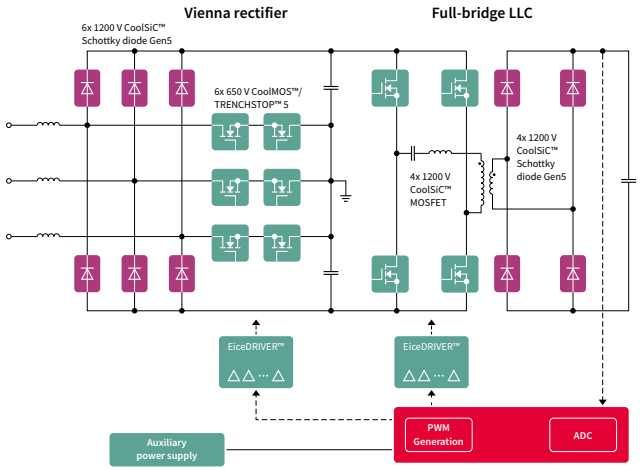
For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ Schottky diodes 1200 V

A new level of system efficiency and reliability

By using hybrid Si power switch/SiC diode sets, industrial application designers will gain flexibility for system optimization compared to purely silicon-based solutions. SiC diodes enable system improvements such as higher output power, greater efficiency or higher switching frequency. By implementing CoolSiC™ diodes generation 5, for example, in Vienna rectifier topology, in combination with Infineon's 650 V TRENCHSTOP™ IGBTs and 650 V CoolMOS™ MOSFETs, designers can achieve outstanding system-level performance and reliability.

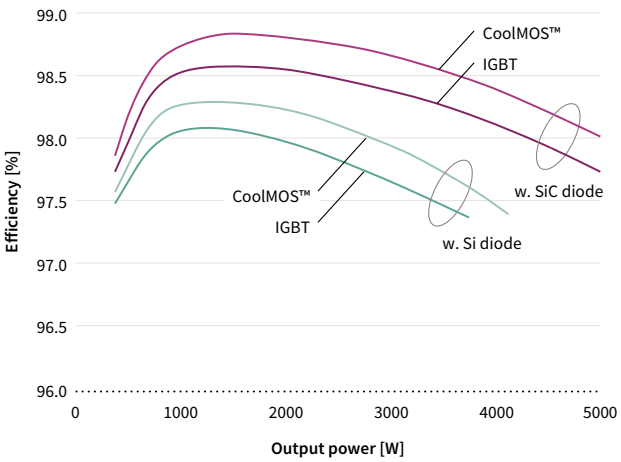
One of the most commonly used topologies for EV DC charging



Features and benefits

Key features	Key benefits
› Zero Q_{rr} leading to no reverse recovery losses	› System efficiency improvement over Si-based diodes
› High surge current capability up to fourteen times of the nominal current	› Enabling higher frequency/increased power density solutions
› Tight forward voltage distribution	› High system reliability by extended surge current
› Temperature-independent switching behavior	› Reduced cooling requirements through lower diode losses and lower case temperatures
› Low forward voltage (V_F = 1.4 V) even at high operating temperature	› System size/cost saving due to reduced heatsink requirements and smaller magnetics
› Available in both through-hole and SMD packages	
› Up to 40 A rated diode	

650 V Si IGBT/Si SJ MOSFET and 1200 V SiC diode/ultrafast Si diode in a Vienna rectifier topology, f_{sw}=48 kHz



650 V SJ MOSFET + 1200 V SiC diode (IPW65R045C7 + IDW15G120C5B)

650 V IGBT + 1200 V SiC diode (IKW50N65EH5 + IDW15G120C5B)

650 V SJ MOSFET + 1200 V Si diode (IPW65R045C7 + Vendor A)

650 V IGBT + 1200 V Si diode (IKW50N65EH5 + Vendor A)

SiC vs. Si diode

- +0.8% higher efficiency
- Increased output power is possible

EV-Charging SMPS Solar Drives

www.infineon.com/sicdiodes1200v

For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ Schottky diodes 650 V G6 ACTIVE & PREFERRED

I_F [A]	TO-220 R2L	Double DPAK
4	IDH04G65C6	IDDD04G65C6
6	IDH06G65C6	IDDD06G65C6
8	IDH08G65C6	IDDD08G65C6
10	IDH10G65C6	IDDD10G65C6
12	IDH12G65C6	IDDD12G65C6
16	IDH16G65C6	IDDD16G65C6
20	IDH20G65C6	IDDD20G65C6

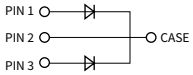
CoolSiC™ Schottky diodes 650 V G5 ACTIVE

I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247	D²PAK R2L	ThinPAK 8x8
2	IDH02G65C5			IDK02G65C5	IDL02G65C5
3	IDH03G65C5			IDK03G65C5	
4	IDH04G65C5			IDK04G65C5	IDL04G65C5
5	IDH05G65C5			IDK05G65C5	
6	IDH06G65C5			IDK06G65C5	IDL06G65C5
8	IDH08G65C5			IDK08G65C5	IDL08G65C5
9	IDH09G65C5			IDK09G65C5	
10	IDH10G65C5		IDW10G65C5	IDK10G65C5	IDL10G65C5
12	IDH12G65C5		IDW12G65C5	IDK12G65C5	IDL12G65C5
16	IDH16G65C5		IDW16G65C5		
20	IDH20G65C5	IDW20G65C5B	IDW20G65C5		
24		IDW24G65C5B			
30/32		IDW32G65C5B	IDW30G65C5		
40		IDW40G65C5B	IDW40G65C5		

www.infineon.com/coolsic-diodes

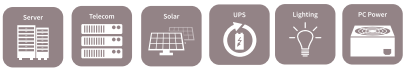
*For more information on the product, contact our product support

„B“ in product name refers to dual die with the common-cathode configuration.



For more details on the product, click on the part number, visit infineon.com or contact our product support.

CoolSiC™ Schottky diodes 600 V G3 ACTIVE



I_F [A]	TO-220 R2L	DPAK R2L
3	IDH03SG60C	IDD03SG60C
4	IDH04SG60C	IDD04SG60C
5	IDH05SG60C	IDD05SG60C
6	IDH06SG60C	IDD06SG60C
8	IDH08SG60C	IDD08SG60C
9	IDH09SG60C	IDD09SG60C
10	IDH10SG60C	IDD10SG60C
12	IDH12SG60C	

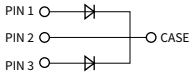
CoolSiC™ Schottky diodes 1200 V G5 ACTIVE & PREFERRED

I_F [A]	TO-220 R2L	TO-247 Dual Die	TO-247 R2L	DPAK R2L	D^2PAK R2L
2	IDH02G120C5			IDM02G120C5	IDK02G120C5
5	IDH05G120C5			IDM05G120C5	IDK05G120C5
8	IDH08G120C5			IDM08G120C5	IDK08G120C5
10	IDH10G120C5	IDW10G120C5B	IDWD10G120C5	IDM10G120C5	IDK10G120C5
15/16	IDH16G120C5	IDW15G120C5B	IDWD15G120C5		IDK16G120C5
20	IDH20G120C5	IDW20G120C5B	IDWD20G120C5		IDK20G120C5
30		IDW30G120C5B	IDWD30G120C5		
40		IDW40G120C5B	IDWD40G120C5		

www.infineon.com/coolsic-diodes

*For more information on the product, contact our product support

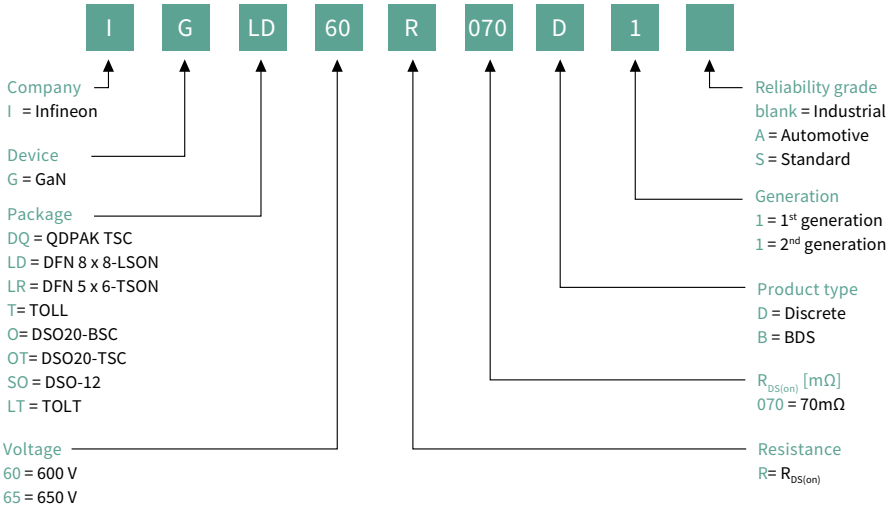
„B“ in product name refers to dual die with the common-cathode configuration.



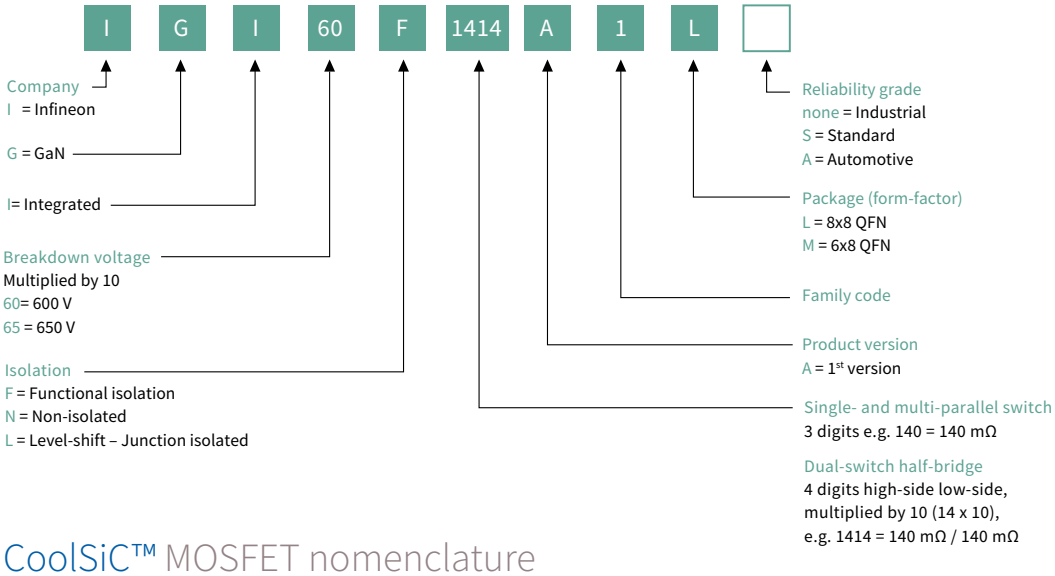
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Nomenclature

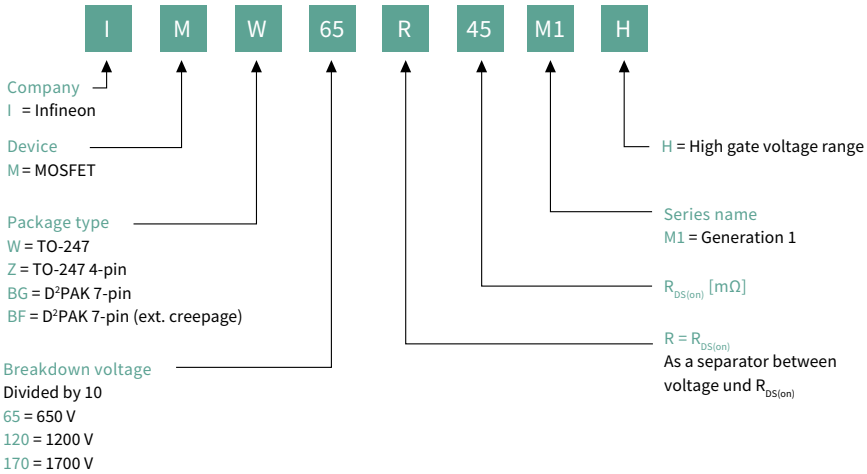
CoolGaN™ GIT HEMTs



CoolGaN™ IPS



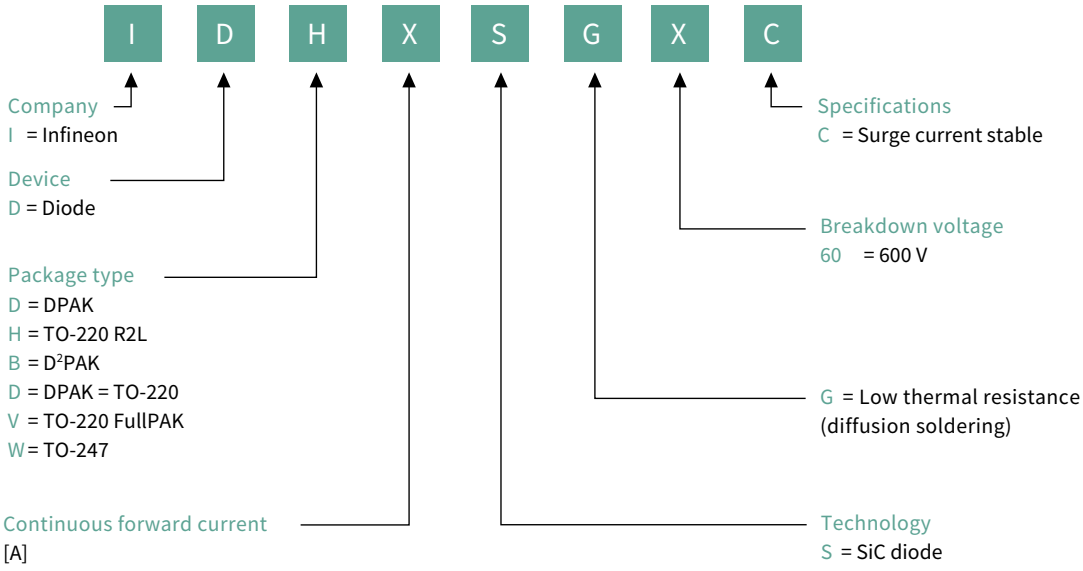
CoolSiC™ MOSFET nomenclature



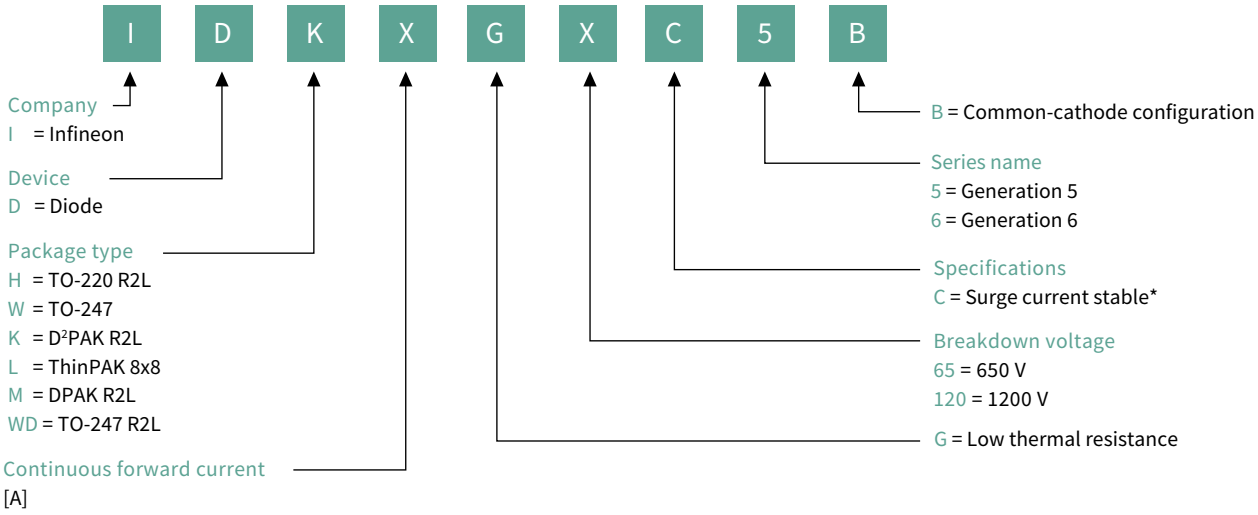
www.infineon.com/gan www.infineon.com/gan-ips www.infineon.com/sic

Nomenclature

CoolSiC™ Schottky diodes G2 and G3



CoolSiC™ Schottky diodes G5 and G6



www.infineon.com/coolsic-diodes

*Generation

Infineon support for wide bandgap semiconductors

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/wbg
www.infineon.com/gan
www.infineon.com/gan-ips
www.infineon.com/gan-eicedriver
www.infineon.com/sic
www.infineon.com/sic-diodes
www.infineon.com/SiCgd
community.infineon.com

Support | Evaluation Board | Tools | Simulation

XENSIV™ sensor technologies for automotive, industrial and consumer applications

- Barometric (BAP) and manifold (MAP) sensors
- Current sensors
- Magnetic position sensors
- Magnetic speed sensors
- MEMS microphones for automotive
- Intuitive sensing
- XENSIV™ MEMS microphone for consumer applications
- Pressure sensors for IoT
- PAS CO2 sensor
- 60 GHz radar sensor ICs
- 24 GHz radar sensor ICs
- Shield2Go
- Sensor 2GO kits

Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Infineon XENSIV™ – sensing the world

Infineon XENSIV™ sensors are exceptionally precise thanks to industry-leading technologies.

From a world leader in sensing technology, XENSIV™ sensors smartify lives by enabling things to “see”, “hear”, “feel”, and “smell” and therefore intuitively “understand” their environment. As a result of proven quality and outstanding reliability, customers can count on XENSIV™ for system stability, durability and integrity. Providing high accuracy and best-in-class measurement performance, XENSIV™ sensors add great value to customer applications. More than 40 years of experience in sensing solutions and a deep-rooted system understanding result in the broadest portfolio of ready-to-use sensor solutions on the market. Ecosystem partners and our customers partner with us for leading technologies, perfect-fit solutions and continuous innovation.

In the Internet of Things, sensors are omnipresent and mark the starting point of each and every IoT system. They collect all kinds of data on their surroundings, providing the entry point for all subsequent functions and features. Building on its well-founded systems expertise, Infineon’s broad portfolio in the XENSIV™ family contains ready-to-use solutions to enable a fast time-to-market and reliable functionality for applications in the area of smart home & smart building, smart things, smart factory or smart cars.

We inspire the next generation of smart environments, capable of understanding and responding to human communication. Infineon’s semiconductors are at the very heart of machine-to-machine (M2M), human-machine interface (HMI), mobile and wireless infrastructure technologies. As the technological boundary between humans and machines gradually disappears, these devices need even more advanced intelligence, enriched with voice assistance capabilities and the latest sensor fusion innovations, not to mention robust security technologies to protect personal data. Infineon’s sensors and microphones already deliver this intelligent functionality and inspiring the next step in mobile connectivity.

www.infineon.com/xensiv

Barometric (BAP) and manifold (MAP) sensors

Infineon's pressure sensors offer the highest quality and accuracy for safety-relevant automotive, industrial, or consumer lifestyle applications. Typical safety-related automotive pressure sensing applications such as side-impact and pedestrian protection call for the highest quality and accuracy standards with full ISO 26262 compliance. Our XENSIV™ family includes integrated pressure sensors that tick all these boxes with PSI5 peripheral sensor interfaces for a safety-critical use case. Discover our highlight product dedicated to 2-wheelers: KP212 enables lower CO_2 emissions, as well as lower fuel consumption, which makes it the right fit product worldwide to fulfill emission regulation requirements such as CN6 and Bharat 6. Of course, these sensors can also be used in industrial control, consumer applications, as well as medical applications.

KP21x/KP22x – Analog manifold air pressure sensor IC family (MAP + turbo MAP)

Features

- Manifold air pressure measurement – MAP and turbo MAP
- Excellent accuracy of up to 1.0 kPa over a large temperature range
- Ratiometric analog voltage output proportional to the applied pressure
- Output signal fully compensated over pressure and temperature
- Pressure range from 10 to 400 kPa
- Temperature range from -40 to +140°C
- Output clamping (optional)
- Complete product family available with multiple transfer function
- Reverse polarity protection
- Green SMD package

KP23x – Analog barometric air pressure (BAP) sensor IC family

Features

- Absolute air pressure measurement
- Excellent accuracy of 1.0 kPa over a large temperature range
- Ratiometric analog voltage output proportional to the applied pressure
- Output signal fully compensated across pressure and temperature range
- Pressure range from 40 to 165 kPa
- Temperature range from -40 to +125°C
- Serial service interface
- Open bond detection (OBD) for supply and GND
- Inverse polarity protection
- Green SMD package

KP25x/KP264 – Digital barometric air pressure (BAP) sensor IC family

ISO 26262 ready

Features

- Absolute air pressure measurement
- Excellent accuracy of 1.0 kPa over a large temperature range
- Real 10-bit pressure resolution
- Integrated temperature sensor
- Real 10-bit temperature resolution
- Power-down mode for reduced power consumption
- Self diagnosis features
- Output signal fully compensated across pressure and temperature range
- Pressure range from 40 to 165 kPa
- Temperature range from -40 to +125°C
- Green SMD package

www.infineon.com/pressure

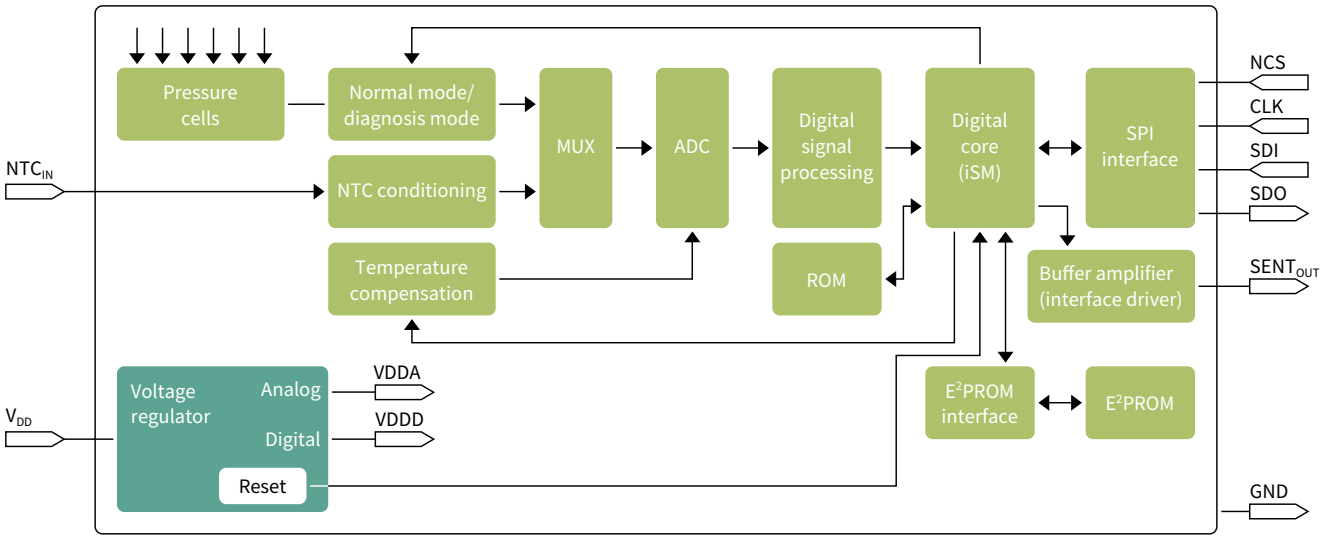
For more details on the product, click on the part number, visit infineon.com or contact our product support.

KP276
Media robust MAP sensor with digital interface

Features

- Media robustness for current automotive requirements
- Digital single edge nibble transmission (SENT) interface (282 clock ticks)
- Excellent accuracy of ±0.77 percent FSS
- Green SMD package
- Temperature range -40 to +170°C
- Integrated NTC temperature sensor functionality with fast start up time (typ. 10ms)

Block diagram



Integrated pressure sensor ICs for manifold and barometric air pressure

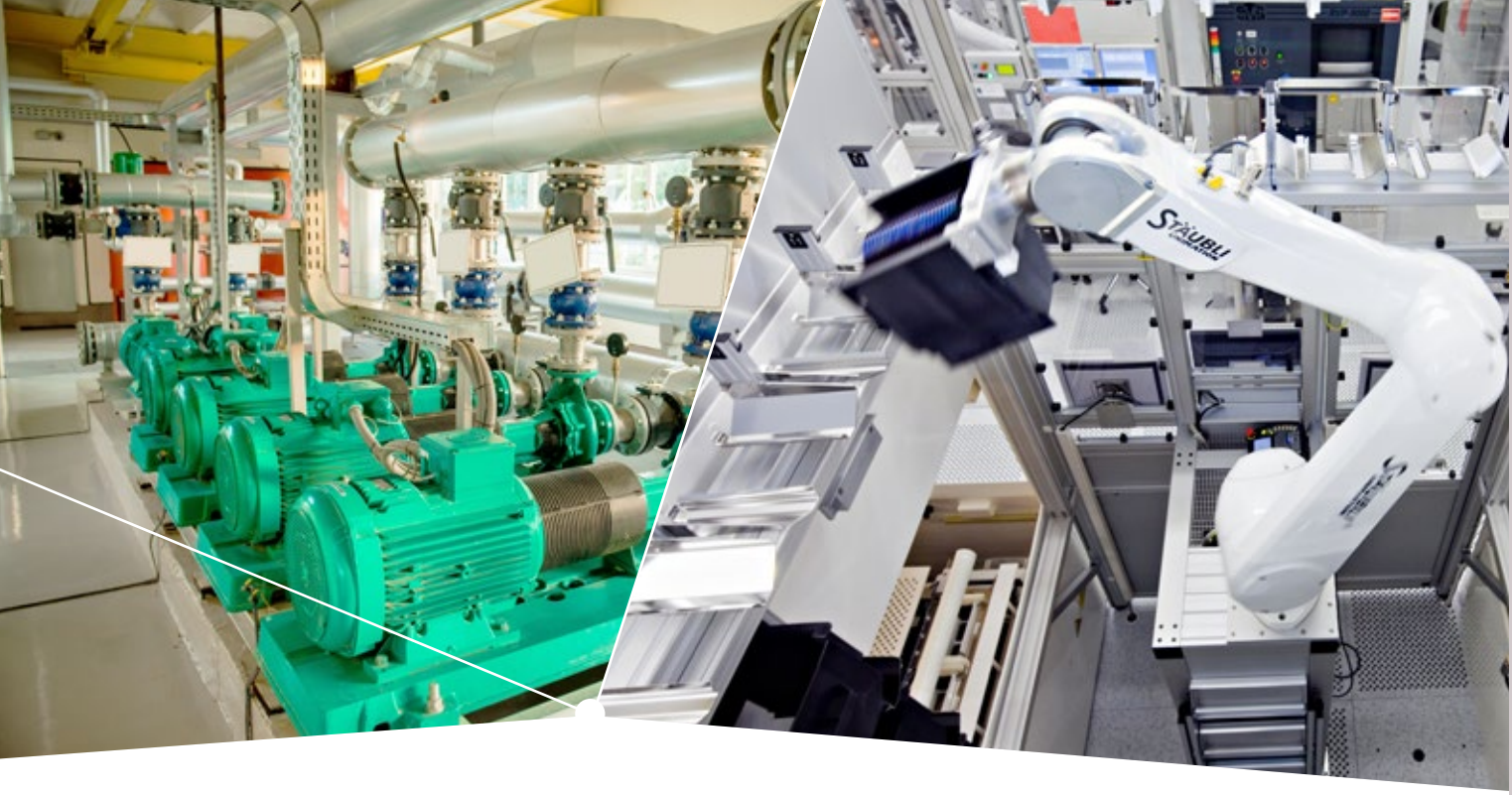
Product	Max. accuracy [kPa]	Max. operating temperature [°C]	Automotive	Industrial	ISO 26262	Pressure range [kPa]
KP21x*	1.0	140	✓	✓	–	10 ... 150
KP22x*	2.5	140	✓	✓	–	10 ... 400
KP23x*	1.0	125	✓	✓	–	15 ... 115
KP236N6165	1.0	125	✓	✓	–	60 ... 165
KP253	1.0	125	✓	✓	Ready	60 ... 165
KP254	1.5	125	✓	✓	Ready	40 ... 115
KP255*	1.4	140	✓	✓	Ready	10 ... 125
KP256	1.0	125	✓	✓	Ready	60 ... 165
KP264 [2)]	1.5	125	✓	✓	Ready	40...115
KP276*	3.0	170	✓	✓	Ready	10...400

ISO 26262 ready

www.infineon.com/pressure

*For more information on the product, contact our product support
2) Package with small 4-hole lid

For more details on the product, click on the part number, visit infineon.com or contact our product support.



XENSIV™ – high-precision coreless current sensors

Used to measure both AC and/or DC currents, Infineon's current sensors provide accurate and stable current measurement up to 120 A or 2000 A respectively. Our magnetic current sensors include integrated current rail for low currents, and external current rail for medium to high currents. The products are intended for use in 48 V, as well as high voltage applications such as traction inverters, industrial drives, photovoltaic inverters, or EV charging systems.

Infineon's XENSIV™ family of high-precision coreless open-loop current sensors are less bulky, and cost less compared to core-based current sensors. Based on Infineon's precise and stable Hall effect current sensor IC technology, the current sensor analog output signal is highly linear over temperature and lifetime. Due to lacking an iron core, the sensor signal shows neither hysteresis nor does it suffer from saturation.

The differential current sensor measurement with two Hall cells ensures high accuracy even in a noisy environment with crosstalk from adjacent current lines or magnetic stray fields. Designers can program the sensitivity of the sensor as well as the threshold levels of the two dedicated overcurrent signals and, therefore, adapt them to individual requirements without any external components. The contactless current sensor IC also provides a signal in case of an over- or under-voltage condition for the supply voltage.

Infineon's product portfolio includes current sensors for both industrial and automotive application needs. Our current sensors use a high accuracy Hall effect current sensor that enables current measurements from DC to AC with a bandwidth of 210 kHz without any impact. These non-invasive Hall effect current sensors provide safe and reliable solutions for power electronics since there is no additional power dissipation. Our selection of isolated, non-contact current sensors provides excellent electrical isolation and can be used for motor control applications, as well as for current monitoring.

www.infineon.com/current-sensors

TLI4971

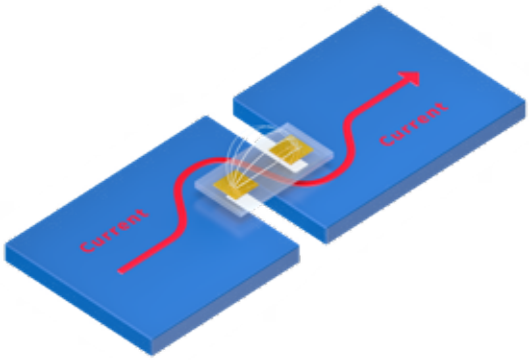
High-precision coreless sensors for industrial applications

Features

- Integrated current rail with typical 220 µΩ insertion resistance enables ultralow power loss
- Small form factor, 8x8 mm SMD, for easy integration and board area saving
- Highly accurate, scalable, DC and AC current sensing
- Bandwidth of 240 kHz enables wide range of applications
- Very low sensitivity error over temperature (< 2.5%)
- Excellent stability of offset over temperature and lifetime
- Galvanic functional isolation up to 1150 V peak V_{IORM}; partial discharge capability of 1200 V; 4 mm clearance and creepage
- Differential sensor principle ensures superior magnetic stray field suppression
- Two independent fast over-current detection (OCD) pins with configurable thresholds enable protection mechanisms for power circuitry (typical < 1 µs)
- Pre-calibrated sensor

Applications

- Electrical drives (up to 690 V)
- Photovoltaic inverter
- General purpose & GaN-based inverters
- Chargers
- Power supplies



Product	Max. Error[1]	Current range [A]	Bandwidth [kHz]	Sensitivity [mV/A]	Certification	Industrial	Supply [V]	Package
TLI4971-A025T5-U-E0001	3.45%	25	240 kHz typ.	48	UL	✓	3.3	TISON-8-5
TLI4971-A025T5-E0001	3.45%	25	240 kHz typ.	48	–	✓	3.3	TISON-8-5
TLI4971-A050T5-U-E0001	3.45%	50	240 kHz typ.	24	UL	✓	3.3	TISON-8-5
TLI4971-A050T5-E0001	3.45%	50	240 kHz typ.	24	–	✓	3.3	TISON-8-5
TLI4971-A075T5-UE0001	3.45%	75	240 kHz typ.	16	UL	✓	3.3	TISON-8-5
TLI4971-A075T5-E0001	3.45%	75	240 kHz typ.	16	–	✓	3.3	TISON-8-5
TLI4971-A120T5-U-E0001	3.45%	120	240 kHz typ.	10	UL	✓	3.3	TISON-8-5
TLI4971-A120T5-E0001	3.45%	120	240 kHz typ.	10	–	✓	3.3	TISON-8-5

www.infineon.com/current-sensors

1) Total error over lifetime and temperature

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLE4971

High-precision coreless current sensor for automotive applications

The Infineon TLE4971 is a high-precision current sensor for bi-directional AC and DC measurements. The device has an analog interface and two fast overcurrent detection outputs that support the power circuitry's protection. Galvanic isolation is provided due to magnetic sensing principle.

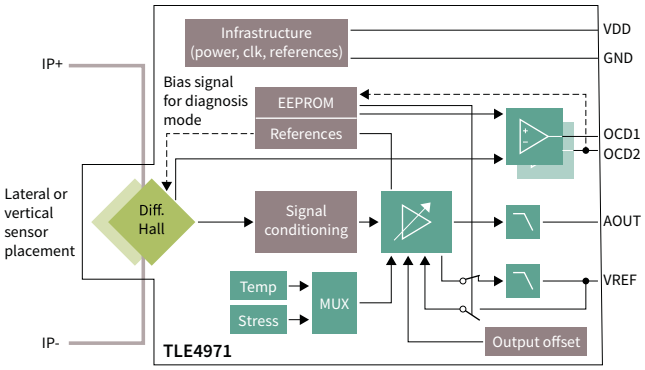
Infineon's well-established and robust monolithic Hall technology enables accurate and highly linear measurement of currents with a full scale up to 120 A. Negative effects, like saturation and hysteresis, commonly known from core-based sensor techniques, are not present in the Infineon open loop, coreless sensors principle. The smart current rail design (double U-shape) combined with a differential signal sensing makes the current sensor robust against stray fields.
The sensor is shipped as a fully calibrated product without requiring any customer end-of-line calibration. It comes in a small 8 mm x 8 mm TISON-8 leadless package, which allows standard SMD assembly. The sensor can be reprogrammed for many parameters enabling the customer to achieve maximal adaption for his application requirements.

Features and benefits

Key features
› Measurement up to 70 ARMS at 690 VRMS
› Typical error at 25°C < 2 percent
› Current rail resistance at 220 µΩ and inductance <1 nH specified typical
› Analog output signal (with typ. 210 kHz) bandwidth
› Fast (<0.7 µs) overcurrent detection up to 2 x IFSR
› AEC-Q100 Grade 1 qualified

Key benefits
› Ultra-low power loss due to minimal resistance of current rail
› Reliable current measurement over lifetime (no re-calibration)
› Functional isolation for high-voltage application
› Easy and compact package allows high-power density design
› Pre-programmed variants for 25 A, 50 A, 75 A and 120 A
› High accuracy, low noise analog output

Block diagram



The integrated primary conductor (current rail) with very low insertion resistance and inductance minimizes the power loss and enables miniaturization of the sensing circuit. The analog output (AOUT) can be configured in single-ended, semi-differential, and fully-differential mode together with the voltage reference pin (VREF) Two separate overcurrent pins (OCD1/OCD2) provide a fast output signal in case the current exceeds a pre-set threshold.

Product	Accuracy	Current range [A]	Bandwidth [kHz]	Sensitivity [mV/A]	Certification	Automotive	Industrial	Package
TLE4971-A025N5-U-E0001	3.45%	25	210 kHz typ.	48	UL	✓	✓	TISON-8-5
TLE4971-A025N5-E0001	3.45%	25	210 kHz typ.	48	–	✓	✓	TISON-8-5
TLE4971-A050N5-U-E0001	3.45%	50	210 kHz typ.	24	UL	✓	✓	TISON-8-5
TLE4971-A050N5-E0001	3.45%	50	210 kHz typ.	24	–	✓	✓	TISON-8-5
TLE4971-A075N5-U-E0001	3.45%	75	210 kHz typ.	16	UL	✓	✓	TISON-8-5
TLE4971-A075N5-E0001	3.45%	75	210 kHz typ.	16	–	✓	✓	TISON-8-5
TLE4971-A120N5-U-E0001	3.45%	120	210 kHz typ.	10	UL	✓	✓	TISON-8-5
TLE4971-A120N5-E0001	3.45%	120	210 kHz typ.	10	–	✓	✓	TISON-8-5

www.infineon.com/current-sensors

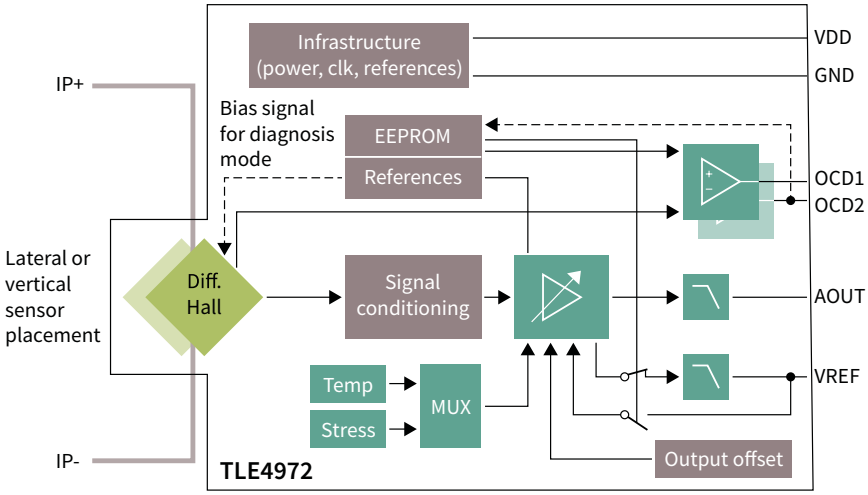
For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLE4972

Magnetic current sensor for automotive applications

The Infineon TLE4972 product family of core-less magnetic current sensors specifically addresses requirements for current sensing in automotive applications. The well-established and robust Hall technology enables accurate and highly linear current measurements of the magnetic field induced by the current. With its compact design and diagnosis modes, the TLE4972 is ideal for xEV applications like traction inverters used in hybrid and battery-driven vehicles, as well as for battery main switches.

Block diagram



Features and benefits

Key features
› Hall based core-less magnetic current sensor
› AC and DC sensing
› Two dedicated pins for overcurrent detection
› Scalable sensitivity
› ISO 26262 compliant
› ASIL B as SEooC
› Typical bandwidth of 210 kHz

Key benefits
› High accuracy up to 2 kA
› Very low error over temperature and lifetime
› Protection against overcurrent events for fast switching technologies, e.g. SiC
› No saturation or hysteresis effects
› Very low power losses through sensing structure
› Ideal for platform designs

Product	Description	Meas. range [mT]	Total drift over temperature & fetime Typical (±3σ) and Maximum values	Band-width typ. [kHz]	Diagnosis	Interface	ATV	IND	Supply [V]	Package (footprint) [mm]
TLE4972-AE35D5	High precision core-less current sensor with diagnosis capability. External current rail pa-ckages for high current measurement.	up to 31	Typ: ±1.4% ±3σ (25 – 125°C) Min/Max: ± 2% (25 – 125°C)	210	OCD 1, OCD 2, OV, UV, diagnosis mode	analog	✓	✓	3.3	TDSO-16 (5x6)
TLE4972-AE35S5			Typ: ±1.3% ±3σ (25 – 150°C) Min/Max: ± 2% (25 – 150°C)							VSON-6 (3.5x4.5)

www.infineon.com/currents-sensors

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Magnetic switches

The energy-saving option with excellent accuracy, robustness, and quality

TLE/TLI/TLV4961/64/6: Energy-efficient Hall switch family for up to 32 V

The TLE/TLI/TLV496x-xM/L family of Hall switches saves energy and enables designers to create precise, compact systems. With an operational current consumption of just 1.6 mA, TLE/TLI/TLV496x-xM/L products can cut energy consumption up to 50 percent when compared with similar competitor products. Thanks to its small magnetic hysteresis, the family paves the way for precise switching points in systems. The integrated temperature profile compensates magnetic drifts and enables stable performance over temperature and lifetime. TLE/TLI/TLV496x-xM products come in the small SOT23 package. The sensors also feature an integrated functionality test for better system control.

Features

- Current consumption of just 1.6 mA
- 3 to 32 V supply voltage range (over voltage up to 42 V)
- 7 kV ESD protection (HBM)
- Overtemperature and overcurrent protection
- Temperature compensation
- Smallest SOT23 package
- Dedicated products for industrial applications (TLI496x)
- AEC-Q100 qualified
- Electrical drives

Applications

- Window lift (index counting)
- Power closing (index counting)
- Gear stick (position detection)
- Seat belt (position detection)
- BLDC commutation
  (e.g. wiper seat belt pretentioner, pump, seating)
- Service robots
- Power tools
- White goods
- Electrical drives

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Consumer	Package
TLE4961-1M/L	Latch	2.0	-2.0	4.0	✓	✓	✓	SOT23/SSO-3-2
TLE4961-2M	Latch	5.0	-5.0	10.0	✓	✓	✓	SOT23
TLE4961-3M/L	Latch	7.5	-7.5	15.0	✓	✓	✓	SOT23/SSO-3-2
TLE4964-1M	Switch	18.0	12.5	5.5	✓	✓	✓	SOT23
TLE4964-2M	Switch	28.0	22.5	5.5	✓	✓	✓	SOT23
TLE4964-3M	Switch	12.5	9.5	3.0	✓	✓	✓	SOT23
TLE4964-5M	Switch	7.5	5.0	2.5	✓	✓	✓	SOT23
TLE4968-1M/L	Bipolar	1.0	-1.0	2.0	✓	✓	✓	SOT23/SSO-3-2
TLE4961-5M	Latch	15.0	-15.0	30.0	✓	✓	✓	SOT23
TLE4961-4M	Latch	10.0	-10.0	20.0	✓	✓	✓	SOT23
TLE4964-4M	Switch	10.0	8.5	1.5	✓	✓	✓	SOT23
TLE4964-6M	Switch	3.5	2.5	1.0	✓	✓	✓	SOT23
TLV4964-1M	Switch	18.0	12.5	5.5	–	–	✓	SOT23
TLV4964-2M	Switch	28.0	22.5	5.5	–	–	✓	SOT23
TLI4961-1M/L	Latch	2.0	-2.0	4.0	–	✓	✓	SOT23/SSO-3-2
TLV4961-3M	Latch	7.5	-7.0	15.0	–	–	✓	SOT23

www.infineon.com/Hall-switches

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLE/TLI4963/65-xM

5 V high-precision automotive/industrial Hall-effect sensors

By offering an excellent magnetic behavior Infineon's switches are ideally suited for:

- Index counting application with a pole wheel
- Rotor position detection (BLDC motors)
- Open/close detection

Features

- 3.0 to 5.5 V operating supply voltage
- Low current consumption 1.4 mA
- ESD protection 4 kV HBM
- Active error compensation (chopped)
- High stability of magnetic thresholds
- Low jitter (typ. 0.35 µs)
- Operating temperature range:
  - from -40 to +170°C (TLE496x-xM)
  - from -40 to +125°C (TLI496x-xM)
- Small SMD package SOT23
- TLE: AEC-Q100 qualified
- TLI: JESD47 qualified

Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Automotive	Industrial	Package
TLE4963-1M	Latch	2.0	-2.0	4.0	✓	✓	SOT23
TLE4963-2M	Latch	5.0	-5.0	10.0	✓	✓	SOT23
TLE4965-5M	Unipolar switch	7.5	5.0	2.5	✓	✓	SOT23
TLI4963-1M	Latch	2.0	-2.0	4.0	–	✓	SOT23
TLI4963-2M	Latch	5.0	-5.0	10.0	–	✓	SOT23
TLI4965-5M	Unipolar switch	7.5	5.0	2.5	–	✓	SOT23

TLV496x-xTA/B

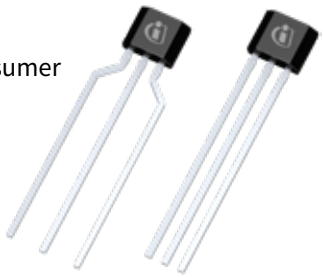
Precision Hall-effect sensor for consumer applications in leaded package

Features

- 3.0 to 26 V operating supply voltage
- Low current consumption 1.6 mA
- ESD protection 4 kV HBM
- Operating temperature range from -40 to +125 °C
- Leaded package TO92S

Applications

- BLDC motor commutation for consumer devices (e.g. e-bikes, fans, aircons)
- Position detection e.g. flaps and control buttons



Product	Type	Operating point B_{OP} [mT]	Release point B_{RP} [mT]	Hysteresis ΔB_{HY} [mT]	Consumer	Package
TLV4961-1TA	Latch	2.0	-2.0	4.0	✓	TO92S-3-1
TLV4961-1TB	Latch	2.0	-2.0	4.0	✓	TO92S-3-2
TLV4961-3TA	Latch	7.5	-7.5	15.0	✓	TO92S-3-1
TLV4961-3TB	Latch	7.5	-7.5	15.0	✓	TO92S-3-2
TLV4964-4TA	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-1
TLV4964-4TB	Unipolar switch	10.0	8.5	1.5	✓	TO92S-3-2
TLV4964-5TA	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-1
TLV4964-5TB	Unipolar switch	7.5	5.0	2.5	✓	TO92S-3-2
TLV4968-1TA	Latch	1.0	-1.0	2.0	✓	TO92S-3-1
TLV4968-1TB	Latch	1.0	-1.0	2.0	✓	TO92S-3-2

www.infineon.com/Hall-switches

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLx4966
Two-in-one double Hall sensor

Features
- Two Hall probes for information on speed and direction
- Excellent matching between the two Hall probes
- Hall plate distance of 1.45 mm
- High resistance to mechanical stress by Active Error Compensation
- TSOP6 package
- TLE: AEC-Q100 qualified
- TLI: JESD47 qualified

Applications
- Window lift
- Sunroof
- Automatic tailgate
- Automated doors
- Sun blinds
- Garage doors

Product	Production samples	Temperature range [°C]	Operating voltage [V]	Magnetic thresholds	Output	Comment	Package
TLI4966G	Available	-40 to +125	2.7–24	Bop: +7.5 mT Brp: -7.5 mT	Speed and direction	› Horizontal Hall plates › For industrial applications › SMD package	TSOP6-6
TLE4966G	Available	-40 to +150	2.7–24	Bop: +7.5 mT Brp: -7.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966-2G	Available	-40 to +150	2.7–24	Bop: +7.5 mT Brp: -7.5 mT	Speed and speed	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966-3G	Available	-40 to +150	2.7–24	Bop: +2.5 mT Brp: -2.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966V-1G	Available	-40 to +150	3.5–32	Bop: +2.5 mT Brp: -2.5 mT	Speed and direction	› Horizontal Hall plates › SMD package	TSOP6-6
TLE4966L	Available	-40 to +150	2.7–24	Bop: +7.5 mT Brp: -7.5 mT	Speed and direction	› Horizontal Hall plates › Leaded package	SSO-4-1

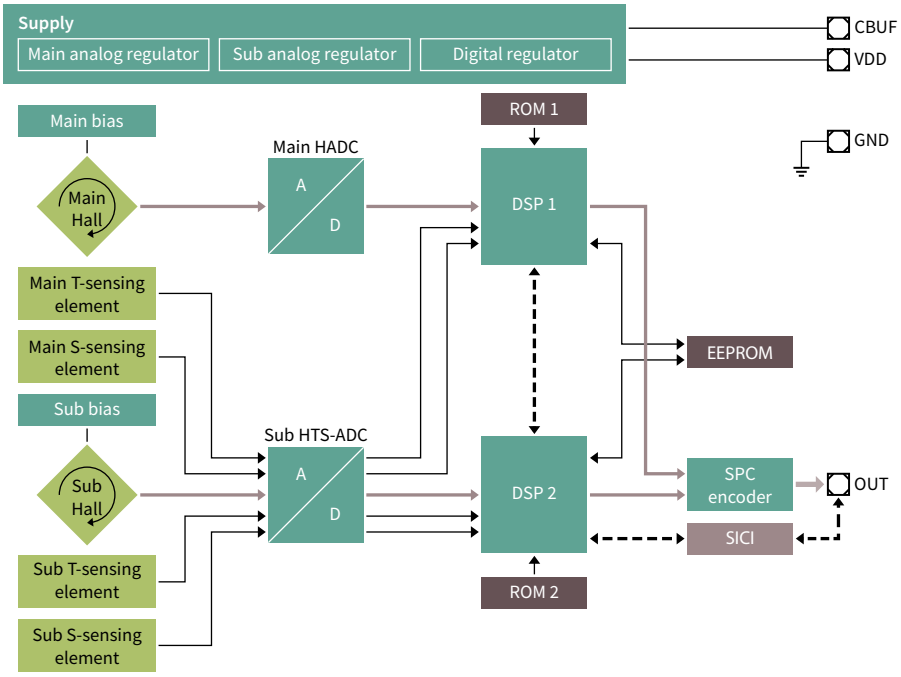
www.infineon.com/Hall-switches

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Linear sensors

Programmable dual channel linear Hall sensor with fast SPC interface for high precision applications

Infineon's TLE4999C8 is a programmable dual channel linear Hall sensor designed to meet the requirements of safety critical automotive and industrial applications. It is developed in full compliance with ISO 26262 by means of two sensor elements included within one monolithic silicon design. In order to fulfill the state-of-the-art safety requirements on system level and enable ASIL D system developments the sensor cells are designed in a complementary way. Their signals follow two independent analog paths. Each signal path has its own digital signal processing unit to ensure maximum independency - redundancy, respectively. The sensor offers a multi-point calibration with up to 9 selectable set points for enhanced linearization of the output signal. For an easy and flexible adaptation to non-linearity of magnetic circuit design, the chip provides 5 different calibration characteristics. TLE4999C features a digital Short-PWM-Code (SPC) interface, with a bus-capability for up to 4 sensor ICs on a single data output. The communication interface with min. 0.5 µs unit time guarantees a fast transmission of complete 2 channel data signal in less than 500 µs. The additionally implemented frame holder circuit enables the synchronicity of multiple sensors (e.g. in combinations of angle sensors) via a SPC bus. The chip offers a 12, 14 and 16 Bit resolution of the output signal, ensuring highest flexibility and superior noise performance. Highest accuracy over a wide temperature range and lifetime is achieved by an integrated digital temperature- and stress-compensation. The chip is available in a thin 8-pin SMD single sensor package.



www.infineon.com/linear-halls

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Features

- Fully ISO 262626 compliant, supports ASIL D systems
- < 2 % sensitivity drift, < 100 µT offset drift overtemperature and life time specification
- Integrated digital temperature- and stress-compensation
- Fast digital SPC interface with a unit time down to 0.5 µs
- Multi-point calibration with up to 9 linearization set points

Key benefits

- High diagnostic coverage, ISO 26262-compliancy and dual sensor cell integration enable development of fail operational systems
- Multi-point calibration for better fit into various magnetic circuit designs
- Easy system integration due to programmability of several sensor parameters

Applications

Automotive safety critical applications

- Electric power steering
- Linear movement position sensing
- Pedal position
- Electric throttle control
- Seat rail adjustment
- Headlight adjustment

Industrial applications

- Small home appliances
- Joystick applications

Sales name	Interface	Magnetic linear range [mT]	Sensitivity	Sensitivity drift [%] [1]	Gain	Magnetic offset drift [µT] [1]	ISO 26262	Ordering code	Package
TLE4997A8D	Analog ratiometric	50, 100, 200	±60 mV/mT default for 100 mT range, with gain 1.5	±3	±4	< ±400	Ready	SP000902760	TDSO8
TLE4998P8D	Digital interface PWM	50, 100, 200	±48 LSB_{12}/mT default for 100 mT range, with gain 1.5	±2	±4	< ±400	Ready	SP000902776	TDSO8
TLE4998S8D	Digital interface SENT	50, 100, 200	±48 LSB_{12}/mT default for 100 mT range, with gain 1.5	±2	±4	< ±400	Ready	SP000902784	TDSO8
TLE4998C8D	Digital interface SPC	50, 100, 200	±48 LSB_{12}/mT default for 100 mT range, with gain 1.5	±2	±4	< ±400	Ready	SP000902768	TDSO8
TLE4999I3	Digital interface PSI5	12.5, 25	±147.5 LSB_{13}/mT default for 25 mT range, with gain 1.5	±2	±5	< ±100/ < ±200 [2]	Compliant	SP001689862	SSO-3
TLE4999C8/4	Digital interface SPC	25, 50	±36.875 LSB_{12}/mT default for in 50 mT range, with gain 1.0	±2	±5	< ±100/ < ±200 [2]	Compliant	SP002662500	TDSO8 SSO-4

1) Maximum over drift overtemperature and life time
2) Main channel/sub channel

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ISO 26262 compliant

ISO 26262 ready

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLE499x family

Programmable analog/digital linear Hall sensor family

Infineon's family of TLE499x linear Hall ICs is tailored to the needs of highly accurate angular and linear position detection and current measurement applications. Each product measures the vertical component of a magnetic field and outputs a signal that is directly proportional to the magnetic field. These programmable linear Hall sensors come with different interface options: TLE4997 features ratiometric analog output, while TLE4998P comes with pulse width modulation (PWM), TLE4998S with single edge nibble transmission (SENT), and TLE4998C with short PWM codes (SPC). These high-precision 12-bit resolution linear Hall sensors feature EEPROM memory for flexible programming across a wide range of parameters. Thanks to digital signal processing based on a 20-bit DSP architecture plus digital temperature compensation, these sensors deliver outstanding temperature stability compared with similar compensation methods. TLE4998 also includes stress compensation to withstand stress effects from the package, such as moisture, thus ensuring best-in-class accuracy over the device's lifetime.

Features

- Best-in-class accuracy with low drift of output signal temperature range lifetime (including stress compensation in TLE4998)
- Programmable transfer function (gain, offset), clamping, bandwidth, and temperature characteristics
- AEC-Q100 qualified
- Available in various packages including SSO-3-9 with two integrated capacitors to improve ESD and ESC behavior
- Dual-die SMD package
- TLE4997, TLE4998 ISO 26262 ready
- TLE4999 fully ISO 26262 compliant for highest ASIL-levels

Applications

- Detecting linear and angular position
- Detecting pedal and throttle position
- Steering torque measurement
- Headlight leveling
- High-current sensing
- Seat position and occupant detection
- Suspension control
- Detecting gear stick/lever positions
- Detecting fuel tank levels
- Current sensing e.g. for battery management

Product	Program-mable	Number of pins	Sensitivity (programmable range)	Magnetic offset	Supply voltage (extended range)	Automotive	ISO 26262	Interface	Package
TLE4997	EEPROM	3/Single die SMD 8	±12.5 to ±300 mV/mT	< ±400 µT	5 V ±10% (7 V)	✓	–	Analog	SSO-3-10 TDSO8
TLE4998P	EEPROM	3/4/Single die SMD 8	±0.2 to ±6%/mT	< ±400 µT	5 V ±10% (16 V)	✓	Ready	PWM	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO- 8
TLE4998S	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB_{12}/mT	< ±400 µT	5 V ±10% (16 V)	✓	Ready	SENT	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO8
TLE4998C	EEPROM	3/4/Single die SMD 8	±8.2 to ±245 LSB_{12}/mT	< ±400 µT	5 V ±10% (16 V)	✓	Ready	SPC	SSO-3-10 SSO-4-1 SSO-3-9 (2 capacitors) TDSO8
TLE4999I3	EEPROM	3	±73.72 to ±147.44 LSB_{13}/mT[1)]	< ±300 µT	5.5–7 V ±10% (16 V)	✓	Compliant	PSI5	SSO-3-12
TLE4999C8/4	EEPROM	Single die SMD 8	±36.85 to ±73.7 LSB12/mT	< ±300 µT	5 V ±10% (16 V)	✓	Compliant	SPC	TDSO8

1) 147.44 LSB_{13} converts to 294.88 LSB_{12}

www.infineon.com/linear-halls

ISO 26262 compliant

ISO 26262 ready

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Dual linear sensors

Two sensors in one SMD package

The SMD package (TDSO) includes two independent sensors with separate power supplies and separate signal outputs. Due to special mounting technology, Infineon can keep dual-sensor package sizes very small to enable compact PCB layouts and small magnet sizes.

Infineon offers a wide range of Hall sensors in the TDSO package. The combination of two sensors in one package offers sensors redundancy, a feature that is especially interesting for new generation EPS steering systems with increased ISO 26262 requirements and other safety-critical applications. All sensors are automotive qualified.

Most products are also available as a single-sensor solution with only one sensor. The newest member of the TLE499x family, the TLE4999I3, is a fully ISO 26262-compliant linear Hall sensor that includes 2 sensor channels on one chip. The SSO-3 package allows PCB-less application flexibility and the PSI5 interface enables low EMI at high-speed communication with minimum wiring.

Features

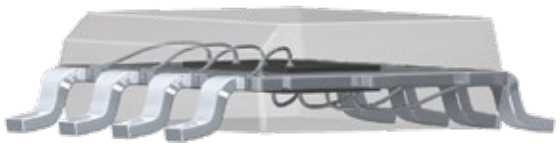
- Two sensors in one package
- Separate power supply and signal output
- AEC-Q100 qualified
- Temperature range from -40 to +125°C
- Outstanding quality
- Single-sensor versions available
- 16-pin and 8-pin versions available
- ISO 26262-ready
- TLE4999I3 ISO 26262-compliant

Automotive applications

- Steering torque systems
- Pedal position
- Any other safety-critical application

Product	Interface	Dual-/ single-sensor available	ISO 26262	Package
TLE4997A8D	Analog	yes/yes	Ready	TDSO8
TLE4998P8D	PWM	yes/yes	Ready	TDSO8
TLE4998S8D	SENT	yes/yes	Ready	TDSO8
TLE4998C8D	SPC	yes/yes	Ready	TDSO8
TLE4999I3	PSI5	monolithic [1)]	Compliant	SSO-3
TLE4999C8/4	SPC	monolithic [1)]	Compliant	TDSO8

1) 2 sensor channels on one chip



ISO 26262 compliant

ISO 26262 ready

www.infineon.com/linear-halls

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Angle sensors

Compact designs in small outline packages

Highest variety - low end to high end, standardized and specialized in all four magnetic technologies: Hall, GMR, AMR and TMR

Infineon's magnetic sensor products TLE5501, are fast analog TMR-based angle sensors dedicated to automotive applications. Their fields of use range from steering angle applications, with the highest functional safety requirements, to motors for wipers, pumps and actuators, and electric motors in general. They are also ready to be used in industrial and consumer applications like robotics or gimbal. Angle sensors detect the orientation of an applied magnetic field by measuring sine and cosine angle components with monolithically integrated magnetoresistive elements.

Infineon's iGMR sensors are ideal for applications with a wide-angle range, such as BLDC motors or steering sensors. They are pre-calibrated and ready to use. Different levels of signal processing integration enable designers to optimize system partitioning. The XENSIV™ iAMR sensors also perfectly fit applications with the highest accuracy requirements, as they offer the best performance over temperature, lifetime, and magnetic field range.

iGMR, iAMR and iTMR based angle sensors

Diverse redundant sensor with analog and digital interface

Product	Technology	Die configuration	ISO 26262	Sin/cos output	Angle output	Second interface	Accuracy	Package
TLE5009*	GMR	Single die	Ready	Analog sin/cos	–	–	0.9°	DSO8
TLE5009A16(D)*	GMR	Dual die	Ready	Analog sin/cos	–	–	1.0°	TDSO-16
TLE5011	GMR	Single die	Ready	SSC (SPI)	–	–	1.6°	DSO8
TLI5012B*	GMR	Single die	QM	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.9°	DSO8
TLE5012B(D)*	GMR	Single and dual die	Ready	SSC (SPI)	SSC (SPI)	PWM/IIF/SPC/HSM	1.0°	DSO8/ TDSO-16
TLE5014C16(D)	GMR	Single and dual die	Compliant	–	SPC	–	1.0°	TDSO-16
TLE5014P16(D)	GMR	Single and dual die	Compliant	–	PWM	–	1.0°	TDSO-16
TLE5014S16(D)	GMR	Single and dual die	Compliant	–	SENT	–	1.0°	TDSO-16
TLE5014SP16(D)*	GMR	Single and dual die	Compliant	–	SPI	–	1.0°	TDSO-16
TLE5109A16(D)*	AMR	Single and dual die	Ready	Analog sin/cos	–	–	0.5°	TDSO-16
TLE5309D*	AMR + GMR	Dual die	Ready	Analog sin/cos	SSC (SPI)	–	AMR 0.5°, GMR 1.0°	TDSO-16
TLE5501*	TMR	Single die	Compliant	Analog sin/cos	–	–	1.0°	DSO8

SPI = Serial peripheral interface
IIF = Incremental interface
PWM = Pulse width modulation
SENT = Single Edge Nibble Transmission
HSM = Hall Switch Mode

ISO 26262 compliant

ISO 26262 ready

www.infineon.com/angle-sensors

*For more information on the product, contact our product support

For more details on the product, click on the part number, visit infineon.com or contact our product support.

iTMR

iTMR based angle sensors

Tunneling Magneto Resisitive (iTMR) technology is offering high sensing sensitivity with a high output voltage, reducing the need for an internal amplifier. Thus, the sensor can be connected directly to the microcontroller without any further amplification. In addition, iTMR technology shows a very low temperature drift, reducing external calibration and compensation efforts. The iTMR technology is also well known for its low current consumption.

TLE5501

With the TLE5501 products, Infineon is currently launching the first angle sensor products based on iTMR technology. TLE5501 is available in two versions.

TLE5501 - product versions with different pinout:

- TLE5501 E0001: pin-compatible to TLE5009 automotive qualified acc. AEC-Q100
- TLE5001 E0002: decoupled bridges for redundant external angle calculation and highest diagnostic coverage, realizing ISO 26262-compliant development ASIL D

Features

- Large output signals of up to 0.37 V/V for direct microcontroller connection
- Discrete bridge with differential sine and cosine output
- Very low supply current: ~2 mA
- Magnetic field range (20-100 mT)
- Typ. angle error ~ 1.0 ° (over temperature and lifetime)
- DSO8 package
- AEC-Q100, grade 0: TA = -40°C to 150°C (ambient temperature)
- For TLE5501 E0002:
  - Reaching ASIL D with just one single sensor chip
  - ISO 26262-compliant development ASIL D

Applications

- Steering angle sensor
- BLDC motor commutation (e.g. wipers, pumps and actuators)
- Angular position sensing for e.g. robotics or gimbal
- Electric motors
- Industrial automation
- Safety applications

www.infineon.com/angle-sensors

For more details on the product, click on the part number, visit infineon.com or contact our product support.

iGMR based angle sensors

TLE5014(D)

Digital iGMR sensor with an easy-to-use plug-and-play concept for the highest functional safety applications

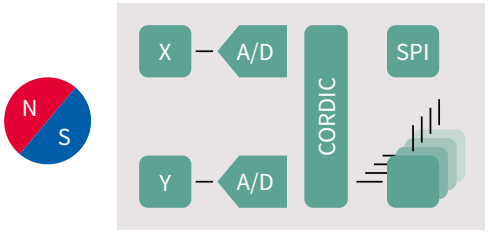
All XENSIV™ TLE5014 angle sensors are available as single and dual die products. The products come pre-configured and pre-calibrated as plug-and-play sensors and are easy to use. Customers can choose between the interfaces SENT, PWM, SPC, and SPI. On top of those protocol options, the sensors can be adapted to any kind of application setup via their programmable E²PROM interfaces. TLE5014 magnetic angle sensors meet ISO 26262 ASIL C for the single die and ISO 26262 ASIL D for the dual die versions. All products are ready for applications with the highest functional safety requirements. The sensors show an extremely small angle error of less than 1° across the entire temperature profile and lifetime. This is particularly helpful in applications with the need for very accurate position sensing such as steering angle sensing or motor commutation. Further application areas range from rotor position measurement, electric power steering (EPS), pedal position to any other kind of position measurement.

Features

- Easy-to-use, plug-and-play sensors, pre-configured and pre-calibrated
- Offering high flexibility:
  - Available as single and dual die products
  - 12 bit digital interface with protocol options PWM, SENT, SPC and SPI
  - E2 PROM and look-up table for customer configuration and calibration
- High angle accuracy: max. 1.0° over temperature and lifetime
- High voltage capability up to 26 V
- Development fully compliant with ISO 26262
  - Developed acc. ASIL D level
  - Dual die sensors reaching ASIL D, single die sensors ASIL C metrics
- Safety manual and safety analysis summary report available on request

Applications

- Steering angle sensing (SAS)
- Motor commutation
- Rotor position measurement
- Pedal position
- Safety applications
- Any other kind of high-accuracy position measurement



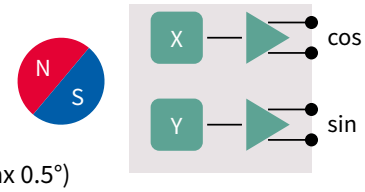
iAMR based angle sensors

TLE5109A16(D)

Analog iAMR sensor with temperature compensation

Features

- Features a differential or single-ended analog interface for sine and cosine values
- Internal temperature drift compensation for gain and offset
- Also available as a dual-sensor package
- ISO 26262-ready
- Typical 0.1° angle error over lifetime and temperature range after compensation (max 0.5°)
- Available as single and dual die product



www.infineon.com/angle-sensors

*Giant Magneto resistance

For more details on the product, click on the part number, visit infineon.com or contact our product support.

3D magnetic sensors for consumer industrial markets

The TLV493D-A1B6 sensor realizes accurate three-dimensional sensing with extremely low power consumption in a small 6-pin package. Capable of detecting the magnetic field in the x, y, and z-direction, the sensor is ideally suited for the measurement of linear, rotation, or 3-dimensional movements. Thanks to its small package and low power consumption, the 3D magnetic sensor can be used in new applications, replacing potentiometer and optical solutions. Featuring contactless position sensing and high-temperature stability of the magnetic threshold, the sensor allows systems to get smaller, more accurate, and more robust.

Rotation movement

3D movement

Linear movement

Features

- 3D magnetic sensing
- Integrated temperature sensing
- Low current consumption
  - 7 nA in power-down mode
  - 10 µA in ultralow power mode
- 2.8 to 3.5 V operating supply voltage
- Digital output via a 2-wire standard I²C interface
- B_x, B_y and B_z linear field measurement up to ±160 mT
- JESD47 qualified
- 12-bit data resolution for each measurement direction
- High sensitivity up to 30.8 LSB_{12}/mT.
- Operating temperature range from -40 to +125°C

Product	Temperature range	Qualification	Linear magnetic range	Sensitivity	I_{DD}	Update rate	Package	Ordering code
TLI493D-A2B6	-40…105°C	JESD47	±160 mT (min) ±100 mT (min)	7.7 or 15.4 LSB_{12}/mT	7 nA – 3.3 mA	10 Hz – 8.4 kHz	TSOP6	SP001689844
TLI493D-W2BW A0 TLI493D-W2BW A1 TLI493D-W2BW A2 TLI493D-W2BW A3	-40...125°C	JESD47	±50, ±100 or ±160 mT	7.7, 15.4 or 30.8 LSB_{12}/mT	7 nA – 3.4 mA	0,05 Hz – 8.4 kHz	WLB	SP005409964 SP005409966 SP005409968 SP005409970
TLV493D-A1B6	-40…125°C	JESD47	±130 mT (typ)	10.2 LSB_{12}/mT	7 nA – 3.7 mA	10 Hz – 3.3 kHz	TSOP6	SP001286056
TLV493D-A2BW	-20°C…85°C	JESD47	±50, ±100 or ±160 mT	7.7, 15.4 or 30.8 LSB_{12}/mT	7 nA – 3.4 mA	6 Hz – 11,6 kHz	WLB	SP005542151

1) Half range mode

While the TLV493D-A1B6 just supports a typical value for the linear magnetic range of ±130 mT, the TLI493D-A2B6 specification includes also a minimum value of ±160 mT.
With the TLI493D-A2B6, broader microcontroller compatibility, as well as an enhanced feature set, is included.

New features

- Sensor address read back
- Short mode range setting, focusing on the half of the magnetic range, ensuring higher accuracy
- Higher update frequency allows for an application field that requires faster update speed
- Angular mode (for x and y read-out only)

Applications

- Anti tempering protection in smart meters
- Joysticks e.g. for medical equipment, cranes,
- Game consoles
- Control elements e.g. white goods multifunction knobs
- Industrial joysticks
- Ergonomic push and control buttons on domestic appliances and power tools
- Position control in robotics

www.infineon.com/3d-magnetics

For more details on the product, click on the part number, visit infineon.com or contact our product support.

3D magnetic sensors for automotive low-power applications

Infineon's XENSIV™ TLE493D-x2B6 enables all kind of automotive control element applications within the passenger compartment or under the hood with a temperature range of -40 to +125°C, with linear magnetic range requirements up to ±160 mT.

Features

- 3D magnetic sensing
- Integrated temperature sensing
- 2.8 to 3.5 V operating supply voltage
- Low current consumption
  - 0.007 µA in power-down mode
  - 10 µA in ultralow power mode
  - Up to 10 power modes
- Digital output via a 2-wire standard I2C interface
- B_x, B_y and B_z linear field measurement ±160 mT
- AEC-Q100 qualified
- 12-bit data resolution for each measurement direction
- Various resolution options from 67 µT/LSB to 134 µT
- Operating temperature range from -40 to +125°C

Product	Temperature range	Qualification	Linear magnetic range	Sensitivity	I_{DD}	Update rate	Wake-up	Package	Ordering code
TLE493D-A2B6	-40 … 125°C	AEC-Q100	±160 mT (min)	7.7 or 15.4 LSB_{12}/mT	7 nA – 3.3 mA	10 Hz – 8.4 kHz	No	TSOP6	SP001689848
TLE493D-P2B6 A0 TLE493D-P2B6 A1 TLE493D-P2B6 A2 TLE493D-P2B6 A3	-40 … 125°C	AEC-Q100	±160 mT (min) ±100 mT (min)	7.7 or 15.4 LSB_{12}/mT	7 nA – 3.3 mA	0.05 Hz – 8.4 kHz	Yes	TSOP6	SP005557415 SP005557413 SP005557411 SP005557408
TLE493D-W2B6 A0 TLE493D-W2B6 A1 TLE493D-W2B6 A2 TLE493D-W2B6 A3	-40 … 125°C	AEC-Q100	±160 mT (min) ±100 mT (min)	7.7 or 15.4 LSB_{12}/mT	7 nA – 3.3 mA	0.05 Hz – 8.4 kHz	Yes	TSOP6	SP001655334 SP001655340 SP001655344 SP001655348

1) Half-range mode

The XENSIV™ sensor TLE493D-A2B6 features include a sensor address read-back feature for additional communication verification, a half range mode focusing to half of the magnetic range, ensuring higher accuracy, and an angular mode (for x and y readout only).

With the TLE493D-W2B6/ P2B6 A0-A3, a 3D sensor family with an enhanced dynamic wake-up feature was developed. Four pre-programmed address options (A0-A3) are available, enabling for a fast start-up initialization when used in I2C bus configurations. Our sensors include enhanced test options, and safety documentation is available to enable the usage of this sensor in the context of ASIL B systems.

Compared to the previous products of this family the new TLE493D-P2B6 A0-A3 family offers enhance precision in x-, y-, z- sensing direction, while otherwise featuring the same dynamic wake-up features, programmability, and test options like TLE493D-W2B6 A0-A3. We provide safety documentation on request for usage of the sensor in the context of ASIL B systems.

Applications

- Control elements for infotainment/navigation systems, air conditioners, multifunctional steering wheels, seat controls
- Top column modules e.g. direction indicator, wiper control
- Gear stick position sensing

www.infineon.com/3dmagnetics

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Magnetic speed sensors

Easy to use, robust and cost-effective sensors for speed measurement

Infineon's Hall and GMR-based magnetic speed sensors are designed to measure speed in safety and powertrain applications such as speedometers, ABS, camshafts, crankshafts, and automatic transmissions. They are also used in similar applications in the industrial sector. The sensors use a ferromagnetic gear tooth or encoder structure to measure linear or rotational speed and position. Hall sensor measuring rotational speed with a gear tooth and a magnetic encoder wheel. The majority of sensors also feature additional benefits such as integrated capacitorsfor high EMC robustness and the highest levels of ESD protection.

TLE4922

Highly robust, easy-to-use mono-Hall speed sensor with twist-independent mounting

This sensor is specially designed to provide an easy-to-use, robust and cost-effective solution for vehicle or industrial speed sensing applications. The TLE4922 can, therefore, be back-biased using a simple, low-cost bulk magnet, while providing a good air gap performance and switching accuracy. Its hidden adaptive hysteresis and calibration algorithm enable good accuracy over air gap jumps and immunity to vibration and run-out events.

Features

- Large operating air gap capability
- Flexible mounting (also known as Twist-independent mounting)
- Hidden adaptive hysteresis
- Low current consumption
- Reverse magnetic polarity capability
- Advanced protection technology
  - Reverse voltage protection at VS-pin
  - Short-circuit protection
  - Overtemperature protection
- Wide operating temperature ranges of -40°C ≤ Tj ≤ ±150°C
- High ESD robustness up to ±4 kV HBM
- 3-wire PWM voltage interface

Applications

- Industrial applications
- Two-wheeler and automotive vehicle speed

www.infineon.com/speed-sensors

For more details on the product, click on the part number, visit infineon.com or contact our product support.

TLE4929
Fully programmable crankshaft sensor

The TLE4929 is an active Hall sensor ideally suited for crankshaft applications and similar industrial applications, such as a speedometer or any speed sensor with high accuracy and low jitter capabilities.

Features

- Differential Hall speed sensor to measure speed and position of tooth/pole wheels
- Switching point in the middle of the tooth enables backward compatibility
- Robustness over magnetic stray-field due to the differential sensing principle
- Precise miss fire detection through excellent jitter performance
- Dedicated hybrid engine algorithm keeps combustion engine calibrated during an electric drive cycle
- Digital output signal with programmable output-protocol including diagnosis interface
- Direction detection and stop-start-algorithm
- High accuracy and low jitter
- High sensitivity enables large air gap
- End-of-line programmable to adapt engine parameters
- Can be used as a differential camshaft sensor
- Automotive operating temperature range

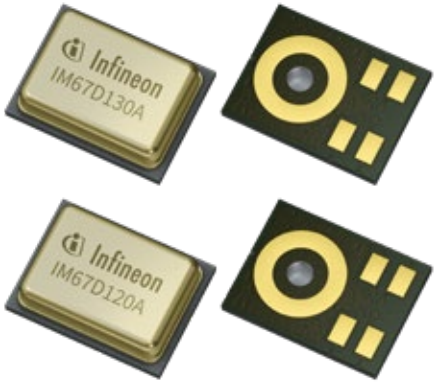
Product	Sensor technology	AEC-Q100 qualified	Automotive	Industrial	RoHS	HAL free
TLE4922	Mono-Hall	✓	✓	✓	✓	✓
TLE4929	Differential Hall	✓	✓	✓	✓	✓

www.infineon.com/speed-sensors

For more details on the product, click on the part number, visit infineon.com or contact our product support.

IM67D130A/IM67D120A
MEMS microphones for automotive applications

As part of our comprehensive XENSIV™ sensor family, we now also offer high-performance MEMS microphones, qualified according to the state-of-the-art automotive quality standard AEC-Q103-003. These microphones close the gap in the automotive industry, providing the best possible fit for automotive applications.
These automotive XENSIV™ MEMS microphones combine our proven expertise in the automotive industry with our technical leadership in high-end MEMS microphones. They are suited to all applications inside and outside the car, where the best audio performance in harsh automotive environments is required.



Speech: Hands free / e-call / ICC
Enabling distortion free audio capturing for all speech related application thanks to their high SNR and low distortions

Interior

Speech: Microphone arrays – beamforming voice command
Making it possible to operate infotainment systems with voice commands due to their narrow sensitivity matching for enhanced performance of beam-forming arrays

Interior

Active and road noise cancellation
Enabling a quite environment for comfortable travels, the microphones are a good fit for ANC applications thanks to their flat frequency and stable phase response

Interior

www.infineon.com/mems-automotive

For more details on the product, click on the part number, visit infineon.com or contact our product support.

In addition, they will enhance autonomous driving features … and even allow interaction from outside of the vehicle

– Event sound detection / sirens detection / contact detection
– Road condition detection
Contributing to road safety, by detedting sounds like sirens from emergency vehicles or even dangerous road conditions thanks their large dynamic range and acoustic overload point

exterior

Voice recognition / external interaction
Allowing external interaction e.g. for controlling certain functions via voice commands due to their good suitability for voice recognition use cases

exterior

Customer benefit

- Automotive qualification according to AEC-Q103, together with long term availability reduces design-in risk and effort
- Increased operating temperature range allows flexible usage in automotive environment up to +105°C
- Best in class audio performance (SNR, AOP, THD) for optimum speech quality and capture of distortion-free audio signals in loud environments such as inside a car
- Narrow sensitivity matching for enhanced performance of beam-forming (noise suppression) arrays
- Flat frequency and stable phase response for optimal fit in acoustic noise cancellation use cases

Parametrics	IM67D130A/IM67D120A
Acoustic overload point	130 dBSPL (IM67D130A) / 120.0 dBSPL (IM67D120A)
Current consumption	980 µA
Interfaces	PDM
Sensitivity	-36 dBFS
Signal to noise	> 67 dB(A)
Supply voltage	1.62–3.6 V
Ordering code	SP005582032 (IM67D130A)/SP005550431 (IM67D120A)

www.infineon.com/mems-automotive

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XENSIV™ sensors for consumer and IoT applications

Intuitive sensing: giving things human-like senses for a better contextual awareness

Imagine a world where technology is unobtrusive and seamlessly integrated into our lives. Where intentional and deliberate communication between people and devices is no longer necessary. In this world, there is no need to push buttons or issue commands in order to activate devices because technology is capable of interpreting implicit intentions and context. This enhances the user experience and makes it more natural – it would seem as if the devices around us intuitively understand what we want them to do. At Infineon, this future is already becoming reality. We develop sensor solutions that enable simple and effortless user interactions with all kinds of smart devices. Bridging the gap between the real and digital worlds, our technology is developed to make life easier, safer, greener and more efficient. Our intuitive sensing solutions are at the very core of this mission. Reflecting our belief that the essential value of sensor technology lies in making our lives more convenient through seamless, natural interactions between people and sensing devices, our aim is to leave you free to focus on what really matters in life.

Choose your type of sense

Thanks to industry-leading technologies Infineon, XENSIV™ sensors are exceptionally precise. They are the perfect fit for various customer applications in automotive, industrial and consumer markets.

Pressure sensors

Our digital barometric pressure sensors give designers the best choice when it comes to small form factors, highest precision and accuracy over a wide temperature range, fast read-out speeds and low power consumption.

Radar sensors

Radar supports existing applications while providing features that enable completely new use cases. It measures velocity, range and angle, both horizontal and vertical, for precise position mapping and 3D tracking.

MEMS microphones

MEMS microphones overcome existing audio chain limitations and are designed for applications where low self-noise (high SNR), wide dynamic range, low distortions and a high acoustic overload point are required.

PAS CO2 sensor

Leveraging photoacoustic spectroscopy (PAS), Infineon has developed an exceptionally small CO_2 sensor that overcomes existing size, cost and performance challenges.

Today, sensors already enable interactions between people and devices

This interaction often depends on the interpretation and merging of information from different sources. Machines cannot yet read our minds and do not always have the information necessary to correctly evaluate a given situation. So, we sometimes have to explicitly tell devices what we want them to do. This can be inconvenient and time-consuming. Inspired by human nature, Infineon intuitive sensing solutions are designed to take the complexity out of our interaction with devices.

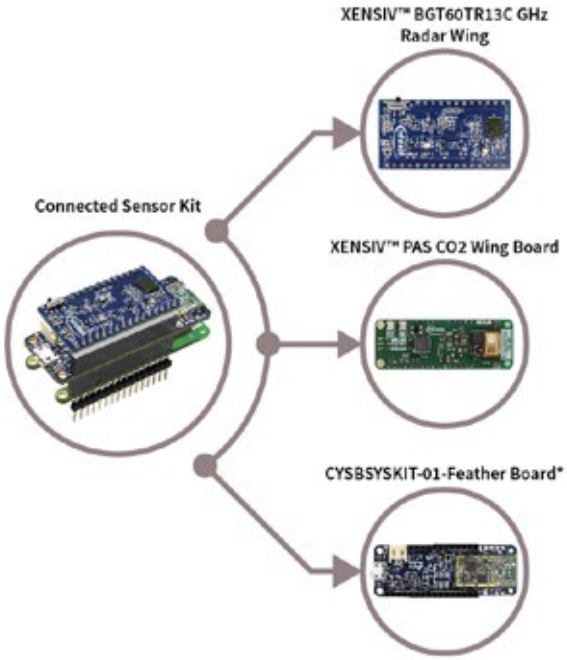
Reflecting a holistic approach, we combine different sensors with state-of-the-art software to create a comprehensive picture of the world around us. By fusing several smart sensors into one coherent intelligent system, our intuitive sensing solutions simplify complex technical processes and enable people to effortlessly interact with devices. These smart devices intuitively sense the world around them, determining what is expected and needed from them.

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XENSIV™ connected sensor kit

Rapid IoT prototyping experience enabled by XENSIV™ sensors

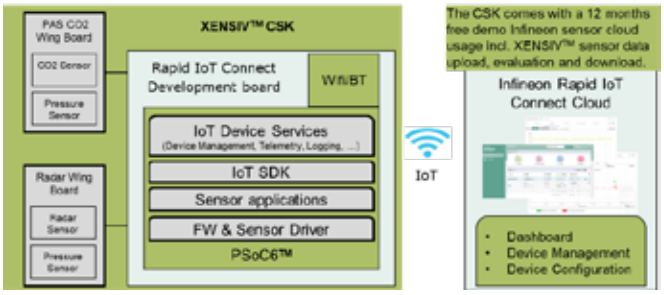
The XENSIV™ connected sensor kit enables rapid development of a custom solution built on Infineon products. The CSK supports customers in testing sensor-driven IoT products and use cases as well as in prototyping. It offers a real-time sensor evaluation with custom configurations and cloud-based sensor data visualization with sensor fusion. The development kit supports use cases based on XENSIV™ 60GHz radar and PAS CO2 with DPS368 pressure sensor (Sense), PSoC™ 6 microcontroller embedded processing (Compute), connectivity via Infineon AIROC™ CYW43012 Wi-Fi and Bluetooth® Combo (Connect) and hardware security with OPTIGA™ Trust M (Secure). Code examples and sensor libraries are available in the Infineon software ecosystem ModusToolbox™ to help customers create use case-specific application codes for new product offerings.



Features and benefits

Key features
› Small form-factor (22.5 mm x 63 mm x 30 mm) Adafruit feather compatible design
› Wi-Fi and Bluetooth 5.0-compliant combo radio module
› Power optimized design, deployable with battery
› Interchangeable sensor wings – 60GHz Radar, PAS CO2
› Seamless integration into ModusToolbox™
› FCC and CE certified

Key benefits
› Ideal for prototyping battery-powered IoT devices due to optimized power consumption. Suited for customer field trials.
› Rapid development and deployment via code examples in ModusToolbox™ for presence detection, entrance counter, air quality measurements. Enabler for Multi-sensor data fusion.
› Secure cloud device onboarding and management with OPTIGA™ Trust M. Secure kit provisioning (unique user ID).



The Infineon Rapid IoT Connect SOM platform deployed on the XENSIV™ CSK provides hardware, firmware, and cloud artifacts to enable rapid onboarding to the Internet of Things. Bidirectional XENSIV™ sensor to cloud data communication is securely enabled. The XENSIV™ CSK is a pre-implemented Infineon Prototyping Sensor System that makes it possible to provision, monitor and manage Infineon hardware remotely. Sensor2cloud kit set up takes 10 minutes with 12 months free user access to a dedicated cloud demo platform for sensor data collection and interpretation as well as sensor data download.

www.infineon.com/connectedsensorkit

For more details on the product, click on the part number, visit infineon.com or contact our product support.

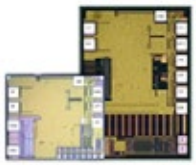
XENSIV™ MEMS microphones for consumer

High performance analog and digital MEMS microphones for consumer electronics

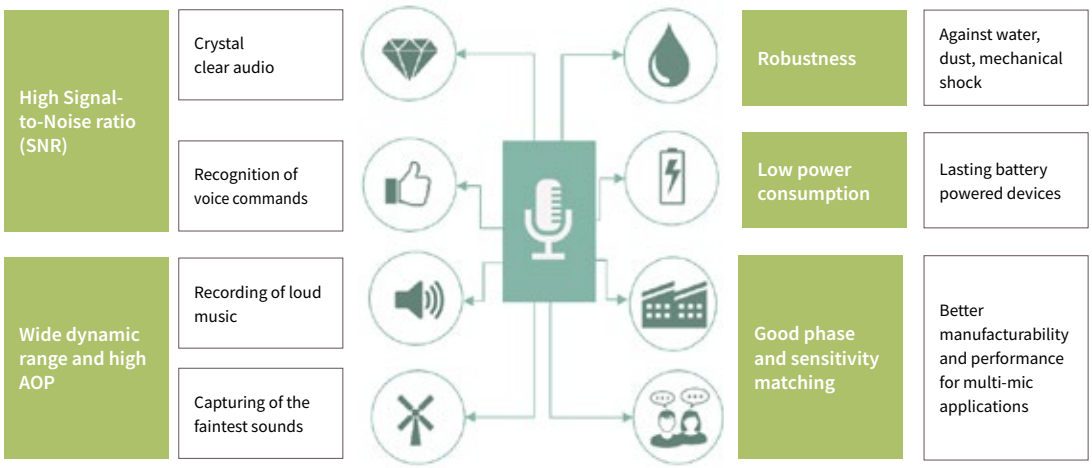
Infineon's XENSIV™ MEMS microphones are designed for capturing audio signals with unprecedented precision and quality. The microphones are comprised of Infineon's MEMS microphone chips and ASICs which are not without reason the world's best-selling microphone components.

Infineon microphone system

MEMS	ASIC	Package

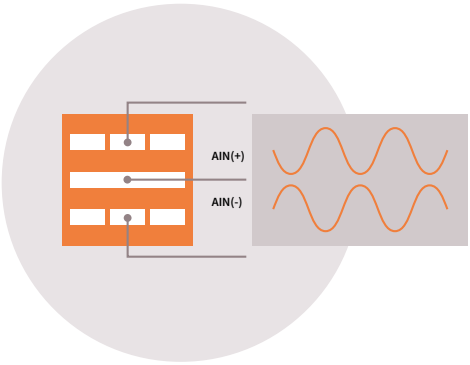


XENSIV™ MEMS microphones feature ultra-low self-noise (high SNR), extremely low distortions (THD) even at high sound pressure levels (SPL), very tight part-to-part phase, and sensitivity matching, a flat frequency response with a low LFRO (low frequency roll-off) and an ultra-low group delay. Combined with selectable power modes and their very small package size, Infineon XENSIV™ MEMS microphones are a perfect match for consumer electronics with excellent audio capturing functionalities and also for selected industrial applications such as predictive maintenance and security.



Infineon's Sealed Dual Membrane (SDM) MEMS technology

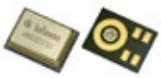
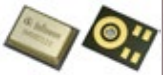
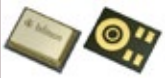
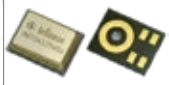
Infineon's latest Sealed Dual Membrane MEMS technology delivers high ingress protection (IP57) at a microphone level. The sealed MEMS design prevents water or dust from entering between membrane and backplate, preventing mechanical blockage or electric leakage issues commonly observed in MEMS microphones. Microphones built with the sealed dual membrane technology can be used to create IP68 devices, requiring only minimal mesh protection.



www.infineon.com/mems

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Product portfolio

		IM69D130	IM69D120	IM69D127 NEW	IM73A135 NEW	IM72D128 NEW	IM70A135 NEW
							
Environmental robustness				IP57	IP57	IP57	IP57
Sensitivity @ 1 kHz, 94 dBSPL(dBFS)		-36 ±1 dBFS	-26 ±1 dBFS	-34 ±1 dBFS	-38 ±1 dBV	-36 ±1 dBFS	-38 ±1 dBV
Signal-to-noise Ratio (SNR)		69 dB(A) @ 3.072 MHz 64 dB(A) @ 768 kHz	69 dB(A) @ 3.072 MHz 64 dB(A) @ 768 kHz	69 dB (A) @ 3.072 MHz 65 dB(A) @ 768 kHz	73 dB(A) @ 2.75 V 71 dB(A) @ 1.60 V	72 dB(A) @ 3.072 MHz 67 dB(A) @ 768 kHz	70 dB(A) @ 2.75 V 69 dB(A) @ 1.60 V
Acoustic overload point (1/10% THD)		128/130 dBSPL	118/120 dBSPL	123/127 dBSPL	132/135 dBSPL	126/128 dBSPL	130/135 dBSPL
Current consumption		980 µA @ 3.072 MHz 300 µA @ 768 kHz	980 µA @ 3.072 MHz 300 µA @ 768 kHz	980 µA @ 3.072 MHz 300 µA @ 768 kHz	170 µA @ 2.75 V 70 µA @ 1.60 V	980 µA @ 3.072 MHz 280 µA @ 768 kHz	170 µA @ 2.75 V 70 µA @ 1.60 V
Low frequency roll off (LFRO)		28 Hz	28 Hz	40 Hz	20 Hz	20 Hz	37 Hz
Group delay @ 1 kHz		6 µs	6 µs	9 µs	2 µs	7 µs	2 µs
Supply voltage		1.62 to 3.60 V	1.62 to 3.60 V	1.62 to 3.60 V	1.52 to 3.00 V	1.62 to 3.60 V	1.52 to 3.00 V
Interface		Digital PDM	Digital PDM	Digital PDM	Analog differential	Digital PDM	Analog differential
Port location		Bottom port	Bottom port	Bottom port	Bottom port	Bottom port	Bottom port
Package dimensions		4.00 x 3.00 x 1.20 mm³	4.00 x 3.00 x 1.20 mm³	3.60 x 2.50 x 1.00 mm³	4.00 x 3.00 x 1.20 mm³	4.00 x 3.00 x 1.20 mm³	3.50 x 2.65 x 1.00 mm³
Typical applications	TWS earbuds			✓			✓
	ANC headphones	✓		✓	✓	✓	✓
	Smart speakers	✓	✓		✓	✓	
	Conference systems	✓			✓	✓	
	Laptops / tablets		✓	✓		✓	
	Wearables			✓			✓

Features, applications and use cases

Features

- Ultra-low self-noise/ultra-high SNR
- Selectable power modes
- Sealed Dual Membrane (SDM) technology with ingress protection at microphone level
- Extremely low distortions (THD) even at high sound pressure levels
- High dynamic range and very high acoustic overload points (AOP)
- Very tight part-to-part phase and sensitivity matching
- Flat frequency response with a low LFRO (low frequency roll-off)
- Ultra-low group delay
- Very small package sizes

Typical application

- TWS earbuds
- ANC headphones
- Smart speakers
- Conference speakers
- Laptops/tablets
- Wearables
- AR/VR devices

Typical use cases

- Studio quality audio capturing for communication devices
- Low latency wide band audio signal capturing for Active Noise Cancellation (ANC) and transparent hearing functionality
- Battery and size constraint devices
- Multi-microphone (array) based beamforming and source separation for audio zoom features and multi user audio capturing
- High range, far field voice pickup for multi room applications
- Capturing of audio signals in loud environments
- Audio pattern detection for predictive maintenance and security

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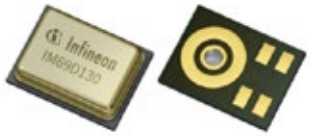
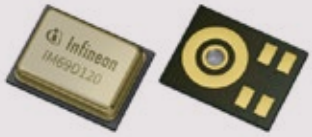
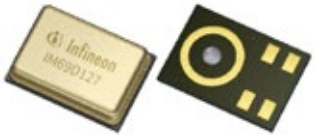
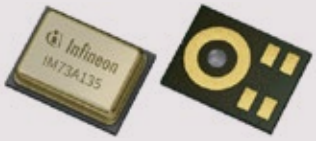
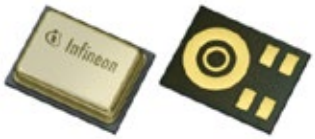
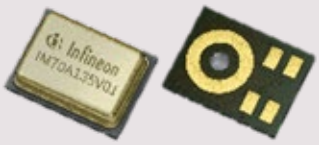
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Product	Description
IM69D130 	IM69D130 is a high-performance digital MEMS microphone making use of Infineon's Dual Backplate MEMS technology to deliver 105 dB dynamic range and high output linearity up to 130 dBSPL. The application benefits are crystal clear audio signals, extended pick-up distance and sensitivity to both soft and loud signals - from whispered speech to rock concerts.
IM69D120 	IM69D120 is a high-performance digital MEMS microphone making use of Infineon's Dual Backplate MEMS technology to deliver 95 dB dynamic range and high output linearity up to 120 dBSPL. If IM69D130 is used in a 16 bit audio signal chain, the full SNR performance would not be realized as the noise floor will be limited by the system dynamic range. IM69D120 has been specifically designed to preserve 69 dB(A) SNR in a 16 bit system. This is achieved by increasing the microphone sensitivity to -26 dBFS, and reducing the acoustic overload point to 120 dBSPL.
IM69D127 	IM69D127 is a digital high-performance MEMS microphone based on Infineon's new Sealed Dual Membrane MEMS technology which delivers high ingress protection (IP57) at a microphone level. Its small size of only 3.60 x 2.50 x 1.00 mm3 makes it a perfect match for compact audio devices, such as TWS earbuds.
IM73A135 	Infineon's XENSIV™ MEMS analog microphone IM73A135 sets a new performance benchmark in MEMS microphones. A best-in-class signal to noise ratio (SNR) of 73 dB and a high acoustic overload point of 135 dBSPL enable clear audio pick up of the quietest and the loudest sounds. This microphone is based on Infineon's new Sealed Dual Membrane MEMS technology which delivers high ingress protection (IP57) at a microphone level. The IM73A135 allows designers to reach a level of high audio performance that was previously only achievable by ECMs while at the same time reaping the benefits inherent in MEMS technology.
IM72D128 	The IM72D128V01 is an ultra-high-performance digital microphone designed for applications which require a very high SNR (low self-noise) and low distortions (high AOP). This microphone is based on Infineon's new Sealed Dual Membrane MEMS technology which delivers high ingress protection (IP57) at a microphone level. The flat frequency response (20Hz low-frequency roll-off) and tight manufacturing tolerance improve performance of multi-microphone (array) applications. The digital microphone ASIC contains an extremely low-noise preamplifier and a high-performance sigma-delta ADC. Different power modes can be selected in order to suit specific clock frequency and current consumption requirements. Each IM72D128V01 microphone is calibrated with an advanced Infineon calibration algorithm, resulting in very low sensitivity tolerances (± 1dB).
IM70A135 	Infineon's XENSIV™ MEMS analog microphone IM70A135 is a compact high performance microphone with a very high acoustic overload point of 135 dBSPL and a size of only 3.50 x 2.65 x 1.00 mm3. This microphone is based on Infineon's new Sealed Dual Membrane MEMS technology which delivers high ingress protection (IP57) at a microphone level. The small size makes this microphone especially suited for TWS earbud applications.

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

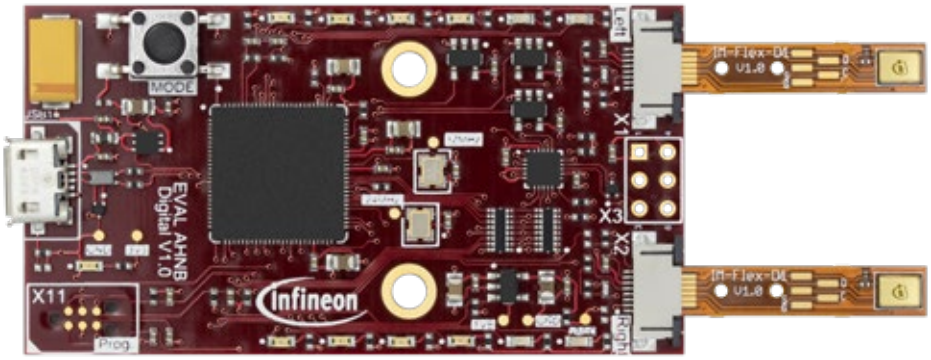
EVAL AHNB IM69D130V01

Enables the evaluation of Infineon digital XENSIV™ MEMS microphones

The Infineon Audiohub Nano enables the evaluation of Infineon digital PDM XENSIV™ MEMS microphones. The kit includes an Infineon Audiohub Nano and four IM69D130 digital microphones on flex board. Up to two Infineon digital XENSIV™ MEMS microphones can be connected to the evaluation board in mono or stereo output. The evaluation board provides a USB audio interface to stream audio data from the microphone with any audio recording and editing software.

Summary of Features

- Audio streaming over USB interface
- 48 kHz sampling rate
- 24-bit audio data (stereo)
- Mode switch for toggling between normal mode and low power mode with 4 pre-defined gain configurations
- LEDs indication for the configured gain level in normal mode and low power mode
- Volume unit meter display with on board LEDs
- Powered through Micro-USB



Product	SP No.	OPN No.
EVAL AHNB IM69D130V01	SP005285852	EVALAHNBIM69D130V01TOBO1

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For more details on the product, click on the part number, visit infineon.com or contact our product support.

XENSIV™ MEMS microphone partners

Building upon the superior XENSIV™ MEMS microphone performance, Infineon's extensive network of global partners offers customers a comprehensive portfolio of XENSIV™ MEMS microphone-based reference designs, as well as Infineon inside MEMS microphones that will propel audio performance to the next level even for the most demanding applications. Click on the buttons below to learn more about our partner solutions.

www.infineon.com/mems-partners

XENSIV™ digital barometric pressure sensor

for mobile and wearable devices

Infineon's digital barometric pressure sensor family is the best choice for mobile and wearable devices due to its small form factor, high precision, and low power consumption. Pressure sensing is based on capacitive technology, which guarantees ultra-high precision (±2 cm) and excellent relative accuracy (±0.06 hPa) over a wide temperature range. The sensor's internal signal processor converts the output from the pressure and temperature sensor elements to 24-bit results. Each pressure sensor has been calibrated individually and contains calibration coefficients. The coefficients are used in the application to convert the measurement results to true pressure and temperature values. All sensors have a FIFO that can store the last 32 measurements. Since the host processor can remain in a sleep mode for a longer period between readouts, a FIFO can reduce the system power consumption. Sensor measurements and calibration coefficients are available via the serial I2C/SPI interface.

DPS310

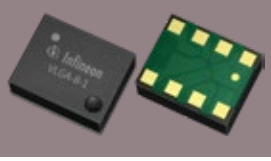
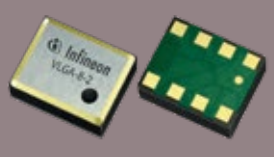
A barometric pressure sensor with very low power consumption is recommended for applications where power consumption is critical and the highest precision in pressure metering is required.

DPS368

DPS368 offers the best-in-class resolution (±2 cm), a very fast read-out speed, and low current consumption. The sensor can be used in harsh environments, as it is robust against water (IPx8 - 50 m underwater for 1 hour), dust and humidity. The small package size saves up to 80 percent of the space and makes the DPS368 ideal for mobile applications and wearable devices.

Typical applications

- Drones: altitude detection and height stability
- Health and fitness: accurate elevation gain and step counting (e.g. for smartwatches)
- Outdoor Navigation: GPS start-up time/accuracy improvement; dead reckoning (e.g. in tunnels)
- Indoor navigation: floor detection e.g. in shopping malls and parking garages
- Smart home: micro weather forecasting; room temperature control; intruder detection
- Airflow control: Smart filter replacement alarm (e.g. in home appliances); predictive maintenance
- Health care: fall detection; respiratory devices; smart inhalers

Key product features	DPS310	DPS368
		
Package size	2.0 x 2.5 x 1.0 mm	2.0 x 2.5 x 1.1 mm
Operating pressure range	300 … 1200 hPa	
Operating temperature range	-40 … 85°C	
Pressure level precision	± 0.002 hPa (or ±0.02 m)	
Relative accuracy	± 0.06 hPa (or ±0.5 m)	
Absolute accuracy	± 1 hPa (or ±8 m)	
Temperature accuracy	0.5°C	
Pressure temperature sensitivity	0.5 Pa/K	
Measurement time	3.6 ms (low precision); 27.6 ms (standard mode)	
Average current consumption @ 1 Hz sampling rate	1.7 µA pressure measurement, 1.5 µA temp. measurement, standby 0.5 µA	
Supply voltage	V_{DDIO}: 1.2 – 3.6 V; V_{DD}: 1.7 – 3.6 V	
Operating modes	Command (manual), background (automatic), standby	
Interface	I2C and SPI, both with optional interrupt	

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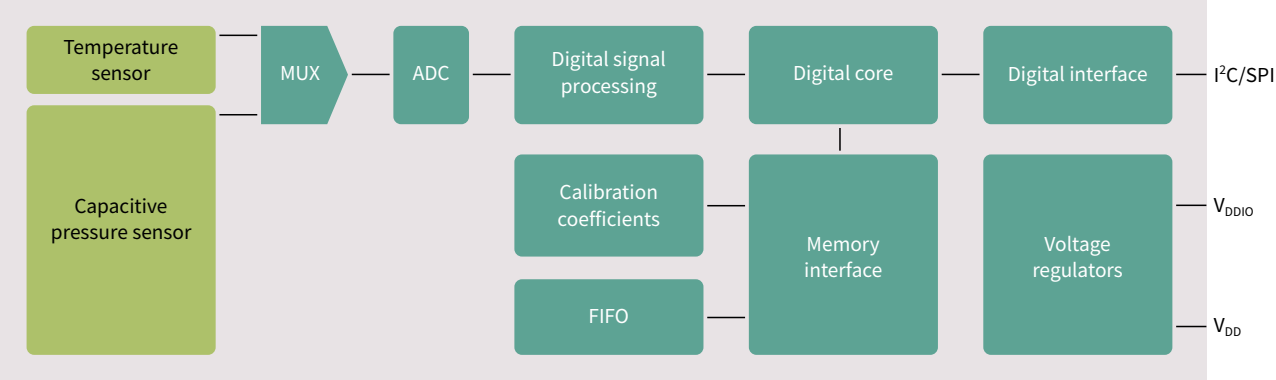
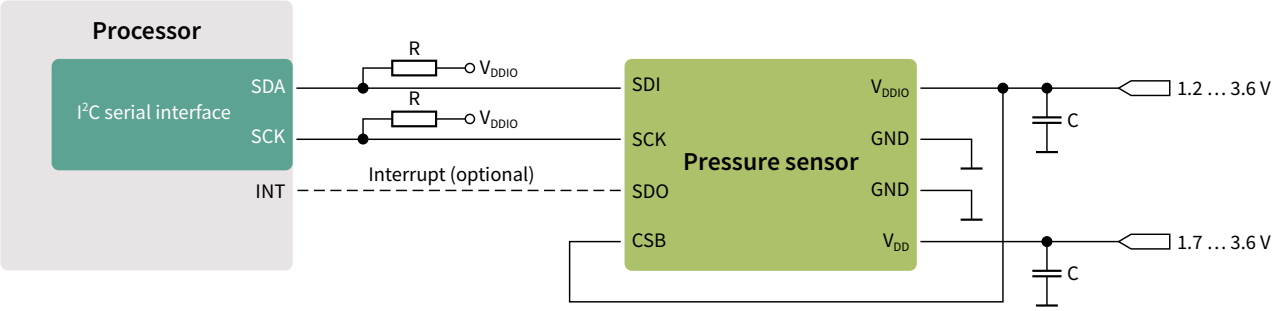
For more details on the product, click on the part number, visit infineon.com or contact our product support.

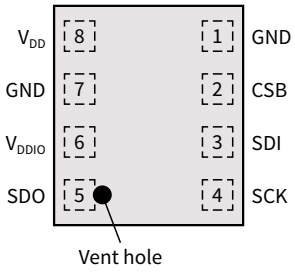
Functional block diagram



Application circuit example (in I²C configuration)



Pin configuration (top view)



Pin	Name	Function
1	GND	Ground
2	CSB	Chip select
3	SDI	Serial data in/out
4	SCK	Serial clock
5	SDO	Serial data out
6	V_{DDIO}	Digital interface supply
7	GND	Ground
8	V_{DD}	Analog supply

Infineon inside pressure sensor partners

Building upon its best-in-class technology, Infineon offers a full range of barometric pressure sensors as chipsets. Infineon's network of global partners offers customers a comprehensive portfolio of Infineon inside pressure sensors that will propel performance to the next level even for the most demanding applications.

Visit www.infineon.com/pressure-sensor-partners to learn more and purchase our partner solutions.

www.infineon.com/pressure-sensors-iot

XENSIV™ PAS CO2

High performance in a small size – Introducing a disruptive CO_2 sensor based on photoacoustic spectroscopy (PAS)

Infineon's XENSIV™ PAS CO2 breaks the boundaries of CO_2 sensing with its exceptionally small form factor and highest accuracy in its class.

Measure what matters with our XENSIV™ PAS CO2 sensor

CO_2 measurement contributes to improvements in health, comfort and productivity as well as energy efficiency. Even at moderate levels, CO_2 can have a negative impact on health and productivity, causing drowsiness and headaches. Fortunately, smart indoor air quality sensors can "smell" rising levels of CO_2 and either alert the user or trigger a system response. Awareness of indoor air quality is further increasing as a result of the COVID-19 pandemic, making accurate, affordable monitoring solutions like XENSIV™ PAS CO2 more important than ever. Given the correlation between CO_2 and aerosol concentration, CO_2 sensors can contribute to mitigating the transmission of not only COVID-19 but also other airborne illnesses such as the common cold and influenza. Furthermore, CO_2 sensors can facilitate demand-controlled ventilation, leading to improvements in energy efficiency and significant savings on energy bills.

Accurate, real-time CO_2 measurement thanks to superior MEMS technology

Widespread adoption of real CO_2 sensors has so far been hampered by size, performance and cost constraints. Infineon's XENSIV™ PAS CO2 sensor leverages photoacoustic spectroscopy (PAS) technology to provide an exceptionally small, real CO_2 sensor that is both highly accurate and cost-effective. Infineon's leading position in MEMS technology is the foundation for this unique and accurate CO_2 detection approach. Reliable CO_2 measurement enables smart monitoring of indoor air quality, facilitating improvements in health, productivity and overall well-being. These features make the XENSIV™ PAS CO2 sensor ideal for demand-controlled ventilation and air conditioning applications (HVAC) as well as for integration into consumer IoT devices such as air purifiers, thermostats, baby monitoring devices, wake-up alarms and smart speakers.

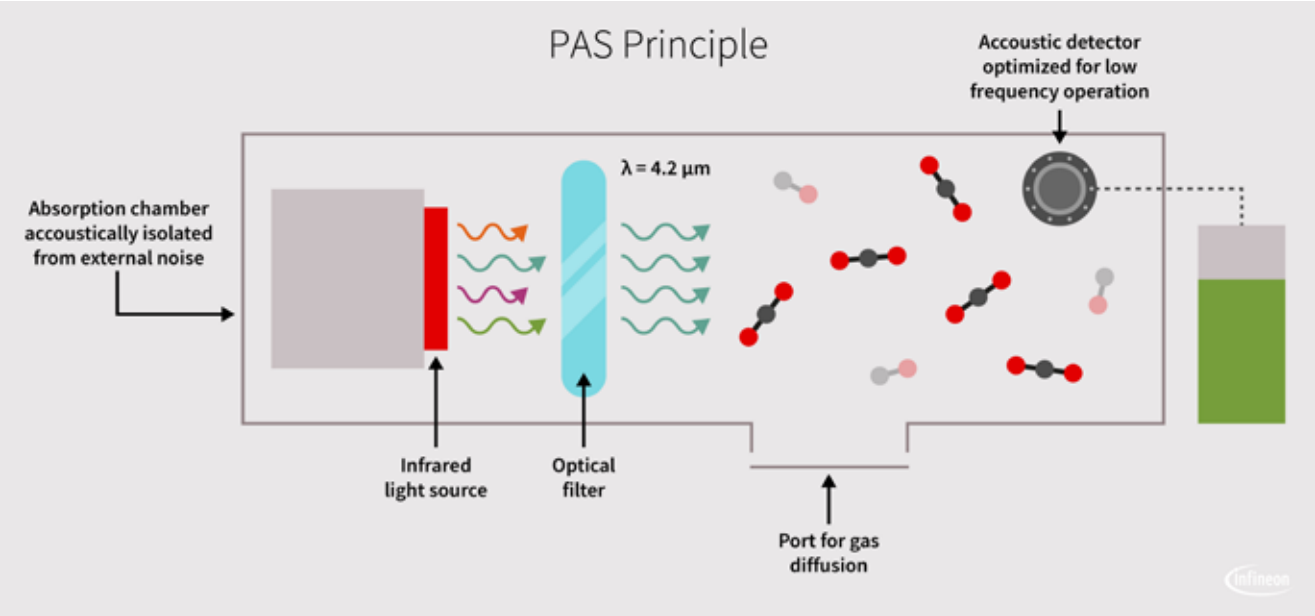
Disruptive environmental sensor technology from Infineon

XENSIV™ PAS CO2 integrates on the PCB a photoacoustic transducer, including an acoustic detector, infrared source and optical filter; a microcontroller for signal processing and a MOSFET chip to drive the infrared source. The exceptional sensitivity of the acoustic detector coupled with the integrated PCB design reduce space requirements by more than 75 percent compared to nowadays state-of-the-art NDIR CO_2 sensors.

www.infineon.com/CO2

The PAS (photoacoustic spectroscopy) principle

The sensor is characterized by a disruptive measurement principle called PAS (photoacoustic spectroscopy). It works as follows: pulses of infrared light pass through an optical filter tuned to the CO_2 absorption wavelength. The CO_2 molecules absorb the filtered light, causing them to shake and generate a pressure wave with each pulse. This is called the photoacoustic effect. The sound is then detected by an acoustic detector optimized for low frequency operation and converted to a CO_2 concentration reading by the microcontroller.



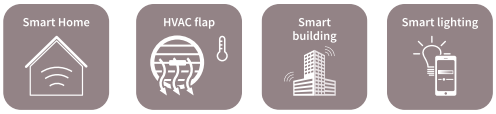
Features and benefits

Key features	Key benefits
› Exceptionally small form factor (14 x 13.8 x 7.5 mm³)	› Space savings in customers' end products
› High accuracy (±30 ppm ±3% of reading)	› High-quality data and compliance with smart building standards
› SMD package delivered in tape and reel	› Cost-effective high-volume assembly and easy system integration
› Advanced compensation and self-calibration algorithms	› Plug & play for fast design-to-market
› Various configuration options (e.g. sampling rate, baseline calibration) and interfaces (UART, I2C, PWM)	› Customer flexibility

Applications

- HVAC (Heating, Ventilation and Air Conditioning) systems
- Smart home appliances such as air purifiers, air conditioners and thermostats
- Consumer devices for air quality monitoring such as personal assistants and CO_2 traffic lights
- Smart indoor lighting

www.infineon.com/CO2



For more details on the product, click on the part number, visit infineon.com or contact our product support.

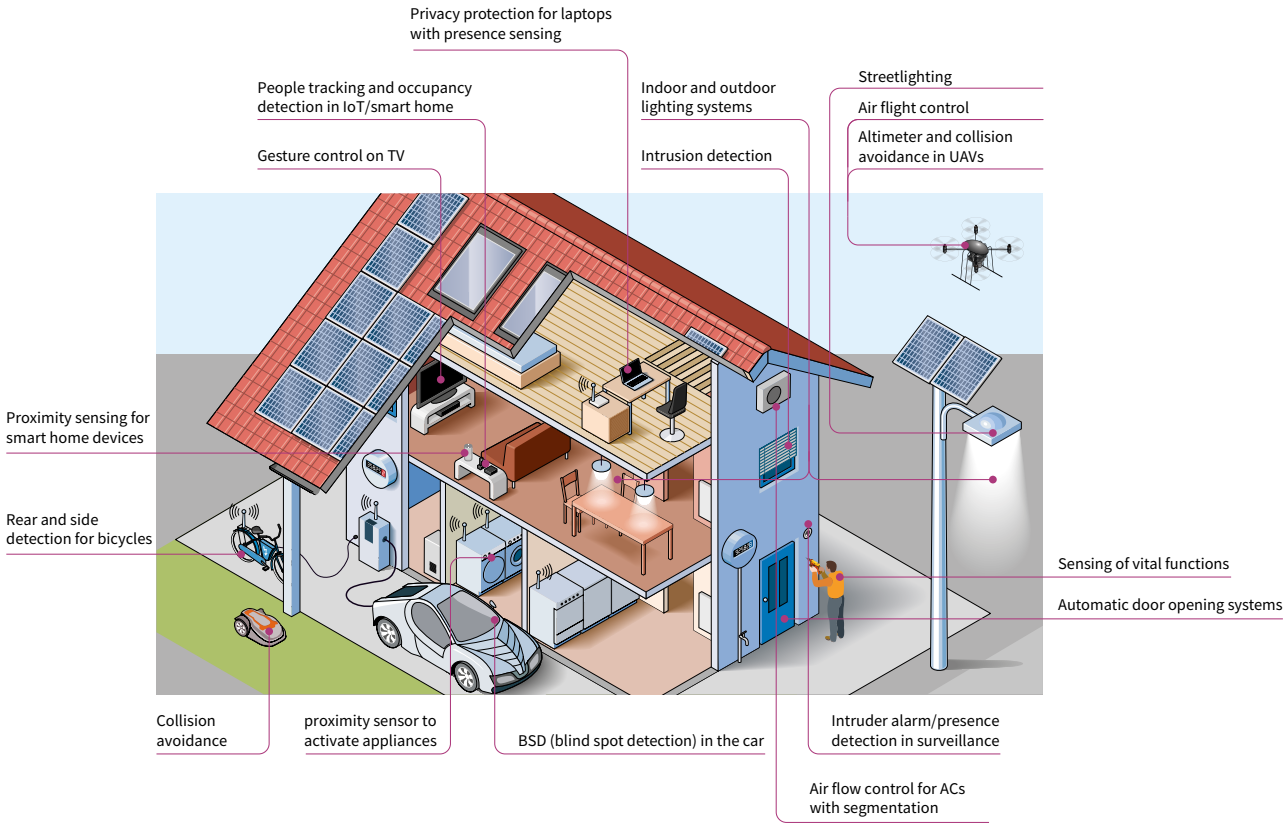
XENSIV™ radar sensors for consumer and IoT applications

As market leader in radar chips, we offer a wide portfolio of mmWave radar sensors as part of our XENSIV™ sensor family – including Doppler radar as well as FMCW radar systems. This portfolio includes the smallest 24 GHz MMIC in the market as well as the most integrated and largest 24 GHz radar transceiver family currently available. These radar chips are designed to support different industrial, smart home, and consumer applications. In addition, we also offer radar sensors in the 60 GHz range, which are used in consumer products such as the Google Pixel 4 smartphone.

Motion detection with radar offers significant advantages over PIR and other motion-sensing technologies

With our 24 and 60 GHz radar sensors, we cover a wide range of applications. Many of them are based on motion detection triggering systems like lighting solutions, automatic doors, camera and security systems, or smart home devices. In contrast to other motion detection technologies like PIR, radar technology offers significant advantages. These include smaller system sizes, greater accuracy, and more precise measurements of detected objects. In addition, radar can also determine the direction of a moving object, speed of an object, distance, and depending on the antenna configuration, even the position of a moving object.

Applications for Infineon's radar sensors



www.infineon.com/radar-for-iot

Key benefits of radar sensing

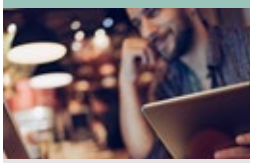
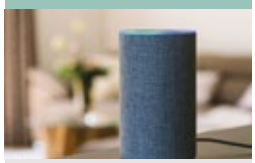
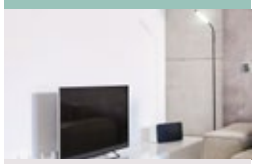
- Direction, proximity, and speed detection
- Segmentation and tracking functionalities
- Target positioning
- Detection through non-conductive materials
  - Product design flexibility
  - Anonymous sensing
- Maintains operation through harsh environmental conditions such as rain, snow, fog, dust, etc.
- Sensitive enough to capture breathing and heartbeat
  - Radar can feel presence & vital functions
- Radar performance parameters can be adjusted
  - Adaptable to different application requirements

Applications

New application or simple PIR replacement? Radar has it covered.

Radar, used in motion detection applications, increases accuracy when compared to passive infrared (PIR) technology, allowing more precise measurement of object detection, and providing new capabilities such as the detection of speed and the direction of moving objects. Radar is also superior to camera-based systems by allowing detection of the objects while keeping identities anonymous.

Example applications that can benefit from radar technology

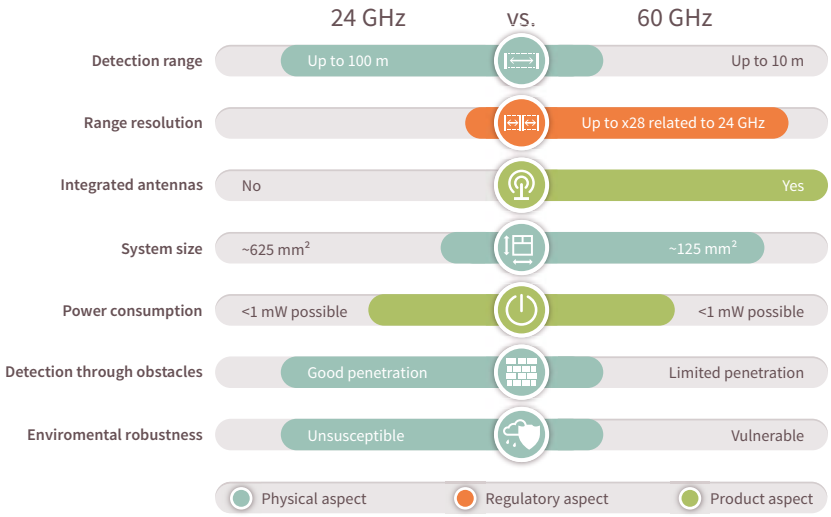
Smart Home	Door opening	Security	Lighting	Monitors and laptops
				
Robust, discreet, small	Direction of travel to remove false opening	Privacy protection, and increased accuracy	Indoor and outdoor Resistant to harsh weather	Small, hidden, sensitive
Home appliances	**Air conditioners**	**Smart speaker**	**TV**	**Gaming and VR**
				
Activate displays based on presence around	Track people to move the airflow away from them	Eliminate keyword based activation	Safe energy & OLED lifetime by turning off	Enhance gaming experience
Gesture control	**Material detection**	**Service robots**	**Robotics**	**Vital sensing**
Additional gesture package available	Object recognition and classification	Robust, small footprint, accurate	Safety, accuracy and efficiency	Breathing & heart rate measurement

www.infineon.com/radar-for-iot

When to use 24 GHz or 60 GHz radar technology

In the 24 GHz range, the bandwidth for FMCW radar operations covers 250 MHz within the regulated ISM band. In the 60 GHz regime, an unlicensed ultra-wideband of up to 7 GHz can be used for short-range applications. Consequently, 60 GHz FMCW radar systems can offer a better resolution and therefore allow additional use cases such as human tracking and segmentation. Even gesture control, material classification, or the monitoring of various vital functions (respiration, heartbeat, or even blood pressure) is possible with radar technology due to micromotion detection.

XENSIV™ radar sensors for industrial and consumer applications

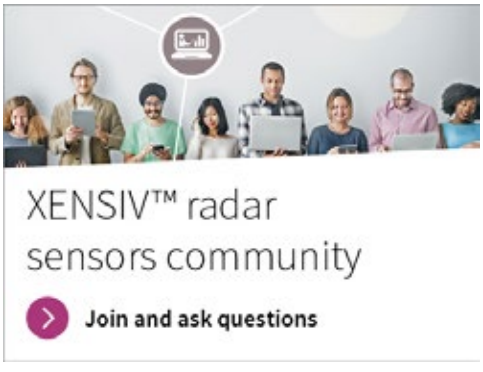


Partners

Click this link to view our network of partners who provide modules and design support for all 24GHz industrial applications:

Have questions?

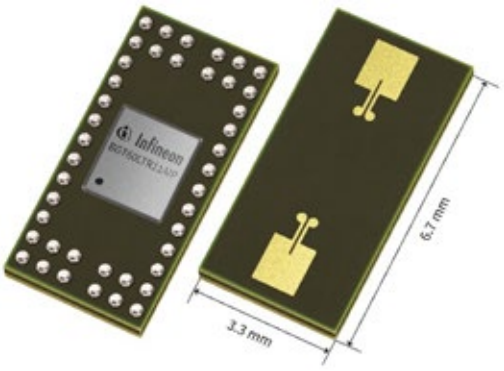
Visit our Community to inquire, share, and connect:



www.infineon.com/radar-for-iot

For more details on the product, click on the part number, visit infineon.com or contact our product support.

XENSIV™ 60 GHz radar sensor IC



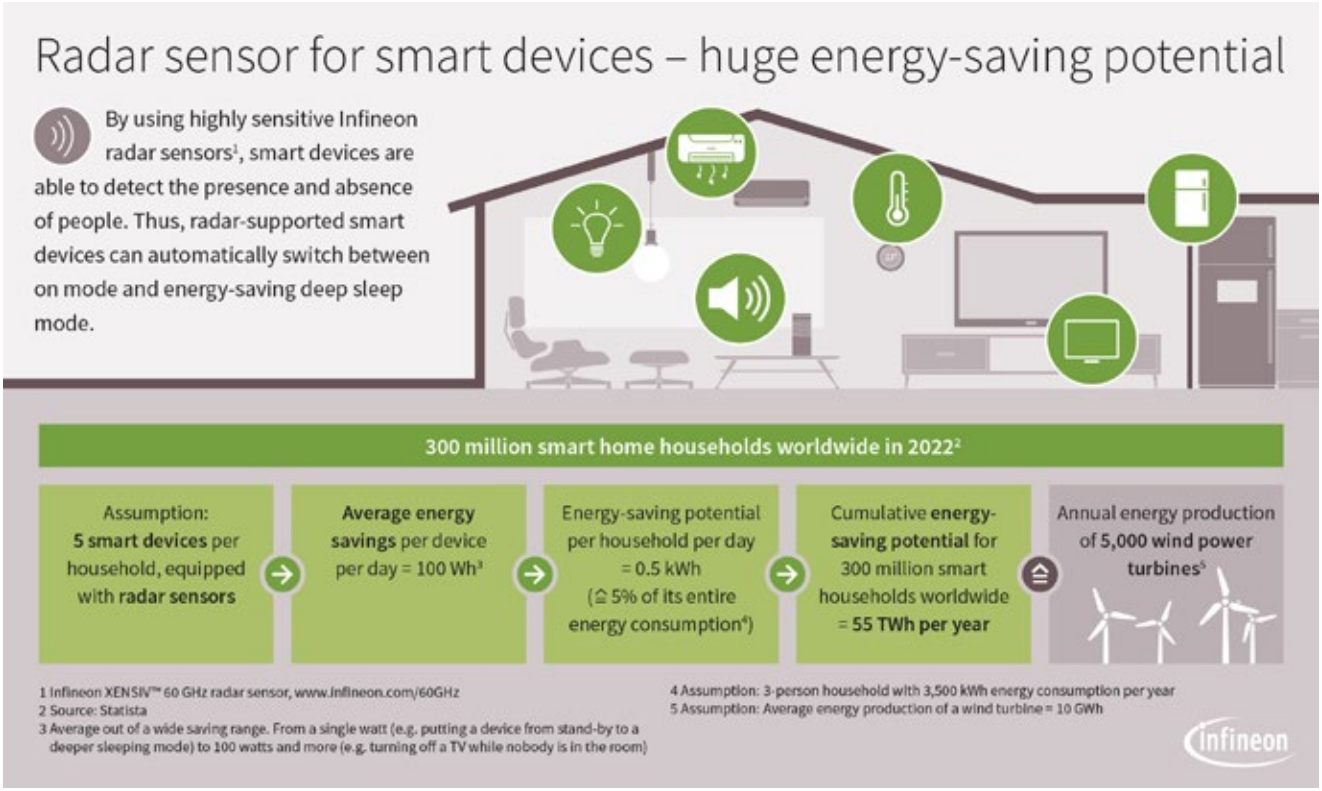
Infineon's innovative XENSIV™ 60 GHz radar chip enables things to see and revolutionizes the human-machine interface.

BGT60LTR11AIP for consumer and IoT applications

The BGT60LTR11AIP is a fully integrated microwave motion sensor including Antennas in Package (AIP) as well as built-in detectors for motion and direction of motion. A state machine enables operation of the device without any external microcontroller. In this autonomous mode, it detects a human target up to 7 m with a low power consumption of less than 2 mW. The BGT60LTR11AIP enables radar technology for everyone, since it does not require know-how in RF, antenna design, or radar signal processing. These features make the small-sized radar solution a compelling smart and cost-effective replacement for conventional PIR sensors in low power or battery-powered applications. Also, with its small form factor, Infineon's highly integrated radar sensor solutions bring innovative, intuitive sensing capabilities to many applications.

Radar has been demonstrated to be a powerful sensor for short-range motion detection. Through reliable presence and absence detection, smart devices equipped with radar sensors become more energy efficient and therefore smart and more sustainable. Users can also benefit from vacancy detection in applications such as televisions. For example BGT60LTR11AIP has been implemented in Samsung's Frame TV 2021, which puts the TV from art mode into sleep mode when there is no person nearby for a user-specified time. This function not only saves energy, but also displays lifetime. BGT60LTR11AIP has a high sensitivity and can detect if a person is present and if the device needs to be ready – similar to a screensaver that deactivates the PC monitor after a certain time without mouse or keyboard input and reactivates it as soon as new input is noticed.

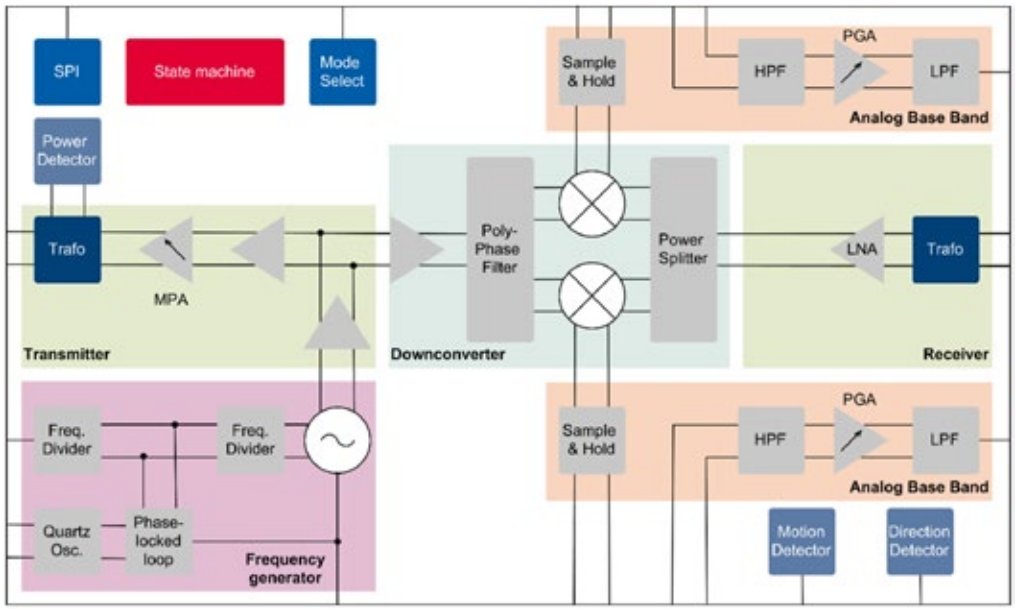
Through this reliable presence and absence detection, Infineon's 60 GHz radar powers the design of truly smart, energy-saving devices. Find out more at: www.infineon.com/green-energy



www.infineon.com/BGT60LTR11AIP

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Block diagram of the BGT60LTR11AIP



Key features

- 3.3 x 6.7 x 0.56 mm package size
- 1Tx 1Rx Antennas in Package (AIP) with 80 ° field of view
- Built-in motion detector
- Built-in direction of motion detector
- Multiple modes of operation including. a completely autonomous mode
- Adjustable performance parameters: detection sensitivity, hold time and frequency of operation
- FR4 material for PCB design is sufficient

Key benefits

- Autonomous mode:
  - Up to 7 m detection range
  - Less than 2 mW power consumption
  - Requires minimal external circuitry incl. crystal, LDO and some resistors capacitors

Adding a M0 MCU extends flexibility

- Up to 14 m detection range (SPI mode)
- Less than 2 mW power consumption possible

Target application

- Smart Building and Smart Home
- Home appliances
- Smart home security
- Room air conditioners
- Automated door openers
- Smart entrance counter solution
- Displays such as TVs, monitors, laptops or tablets
- Lighting systems and lighting control

www.infineon.com/BGT60LTR11AIP

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Product portfolio

Product	SP	OPN	Package	Description	Status
BGT 60LTR11AIP E6327	SP005537624	BGT60LTR11AIPE6327XUMA2	PG-UF2BGA-42-1	Chip samples	Available
DEMO BGT60LTR11AIP	SP005422969	DEMOBGT60LTR11AIPTOBO1		Demonstration Kit (Shield + 60 GHz baseboard)	Available
SHIELD_BGT60LTR11AIP	SP005422968	SHIELDBGT60LTR11AIPTOBO1		Shield fitting on 60 GHz baseboard	Available
SHIELD_AUTONOM_BGT60	SP005630363	SHIELDAUTONOMBGT60TOBO1		Shield for autonomous operation of BGT60LTR11AIP; directly fits on Arduino MKR board	Available
REF BGT60LTR11AIP	SP005636053	REFBGT60LTR11AIPTOBO1		Reference design	Upcoming
S2GO RADAR BGT60LTR11	SP005594890	S2GORADARBGT60LTR11TOBO1		Shield2Go version	Upcoming

DEMO BGT60LTR11AIP

For evaluation of the completely autonomous 60 GHz radar sensor MMIC for motion sensing

This demo features Infineon's first completely autonomous radar sensor – the BGT60LTR11AIP. The 60 GHz radar MMIC is a fully integrated microwave motion sensor including Antennas in Package (AIP) as well as integrated detectors for motion and direction of motion. A state machine enables operation of the device without any external microcontroller. In this autonomous mode, it detects a human target up to 7 m with a low-power consumption of less than 2 mW. These features make the small-sized radar solution a compelling, smart and cost-effective replacement for conventional PIR sensors in low-power or battery-powered applications.

For evaluation of the BGT60LTR11AIP MMIC, this demo includes the BGT60LTR11AIP shield as well as the Infineon Radar Baseboard MCU7.

The BGT60LTR11AIP shield can be attached to an Arduino MKR board or the included Infineon Radar Baseboard MCU7. Infineon's Toolbox supports this platform with a demonstration software and a Radar GUI to display and analyze acquired data in time and frequency domain. It further enables to change various performance parameters of the BGT60LTR11AIP in order to evaluate this radar sensor.

www.infineon.com/BGT60LTR11AIP

For more details on the product, click on the part number, visit infineon.com or contact our product support.

BGT60TR13C – XENSIV™ 60 GHz radar sensor for advance sensing

Enablement of horizontal and vertical angular measurement

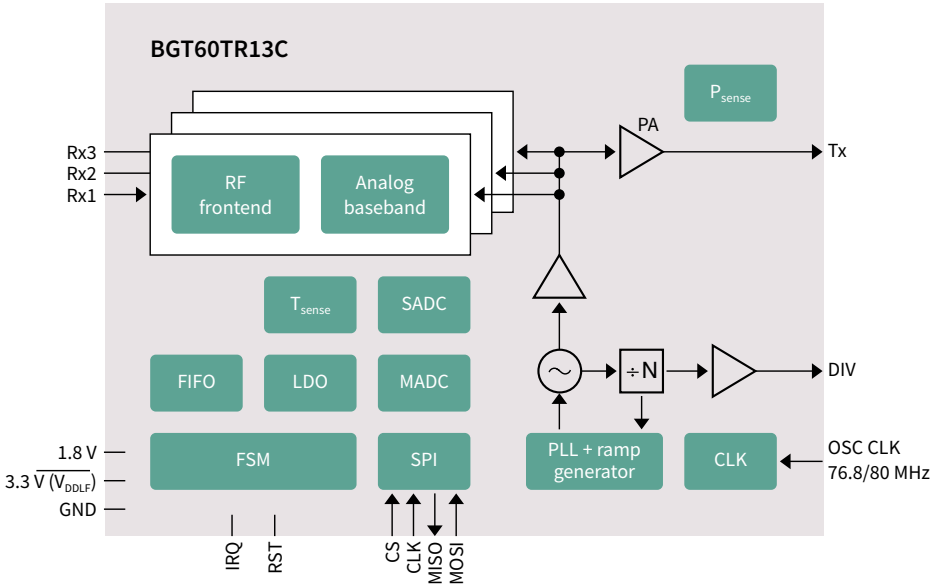
The BGT60TR13C MMIC is a 60 GHz radar sensor with integrated antennas and comes with one transmitting and three receiving antennas. Thanks to the Antennas in Package (AIP) concept, the antenna design complexity at the user end can be eliminated and the PCB designed with standard FR4 materials.

BGT60TR13C offers innovative and intuitive sensing capabilities

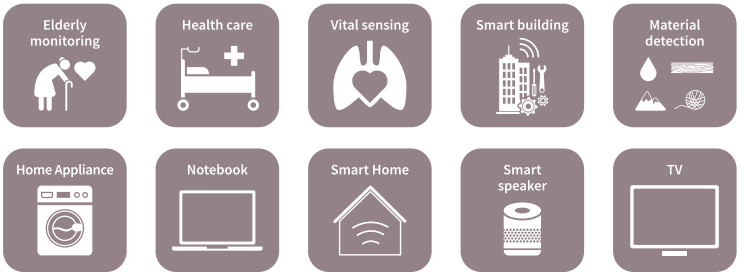
With its small form factor and low power consumption, BGT60TR13C MMIC brings innovative, intuitive sensing capabilities to many applications. Based on the developed algorithm the MMIC can serve established as well as new applications and use cases without intruding on privacy. Thanks to its feature-set, the MMIC can measure velocity, angle, horizontal as well as vertical.

BGT60TR13C has been demonstrated to be a powerful sensor for:

- Presence detection/segmentation/tracking: BGT60TR13C enables human presence detection, tracking, and segmentation while providing extremely high accuracy in detecting micro and macro motions
- Gesture Sensing: BGT60TR13C ensures detection of submillimeter motions
- Vital sensing: BGT60TR13C is able to track vital signs in consumer electronics, healthcare as well as industrial applications



Target applications



www.infineon.com/BGT60TR13C

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Features and benefits

Key features	Key benefits
› Integrated Finite-State-Machine (FSM)	› Allows semi-autonomous operation › Highly configurable modulation and power modes › MCU only needs to configure sensor and fetch data
› Very fast chirp speed: 400 MHz/µs	› High velocity resolution
› High Signal-To-Noise Ratio (SNR)	› People can be detected up to 15 m › High sensitivity allows submillimeter level motion detection
› Ultra-wide bandwidth >5 GHz	› Allows simultaneous measurement of target range and velocity
› FMCW operation	› High accuracy of range measurements › Reduced interference with other sensors
› Integrated L-shaped antennas + small package size (6.5 x 5.0 x 0.9 mm^3)	› L-shape enables horizontal and vertical angular measurements › Thanks to small package size, PCB area can be saved + design-in process simplified
› <5 mW (duty cycling according to released FCC waiver)	› Reduces average power consumption › Optimized power modes for low power consumption

Product portfolio

Product	SP No.	OPN No.
DEMO BGT60TR13C	SP005728718	DEMOBGT60TR13CTOBO1
BGT60TR13C	SP002262606	BGT60TR13CE6327XUMA1

DEMO BGT60TR13C

Getting started with the XENSIV™ 60GHz demo board for advanced sensing

BGT60TR13C offers innovative and intuitive sensing capabilities

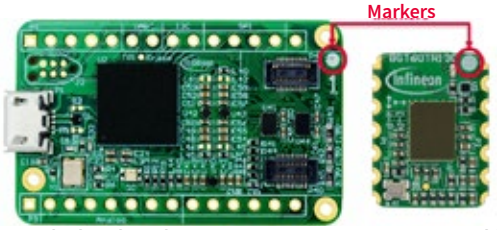
This demo board features Infineon's 60GHz XENSIV™ radar sensor BGT60TR13C and consists of a radar baseboard as well as a BGT60TR13C shield.

The radar baseboard is a 40.64 mm x 25.4 mm printed circuit board (PCB). Its main purpose is to provide a generic sensor interface for BGT60TR13C MMIC. The central microcontroller unit (MCU) can perform radar data processing or forward the sensor data to a USB interface or an Arduino MKR interface.

The BGT60TR13C shield presents a minimized form factor of 17 x 12.7 mm^2 and comes with an integrated BGT60TR13C Antenna-in-Package (AIP) radar chip of 6.5 x 5.0 x 0.85 mm^3. Moreover, the shield contains a digital interface for configuration and transfer of the acquired radar data to a microcontroller board. The shield is optimized for fast prototyping designs and system integrations as well as initial product feature evaluations. In addition, it offers developers the flexibility to choose their own platform depending on their preferred use cases.

Several benefits come along with the BGT60TR13C demoboard:

- Flexible platform selection
- Variable connector options, and option to solder onto other PCBs
- Highly flexible configuration on FMCW modulation
- Power consumption can be optimized according to use case



Radar baseboard BGT60TR13C shield

www.infineon.com/BGT60TR13C

For more details on the product, click on the part number, visit infineon.com or contact our product support.

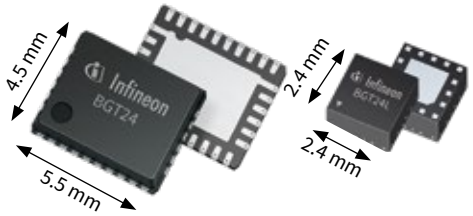
XENSIV™ 24 GHz radar sensor ICs

Infineon BGT24M/L family of MMIC chips

Infineon's range of 24 GHz industrial radar chips provides five configurations of transmit and receiver channels, ensuring that there is a chip to support your specific application. From basic applications such as motion detection in security systems, which only requires one transmit and one receive channel, to more complex applications like 3D positioning, which requires two or more receive channels, our range of radar chips supports all of your requirements.

Features	Infineon MMIC	Benefits

- 24 GHz ISM band operation for motion, speed, direction movement and distance measurements
- Five 24 GHz chips available
- Highly integrated MMICs

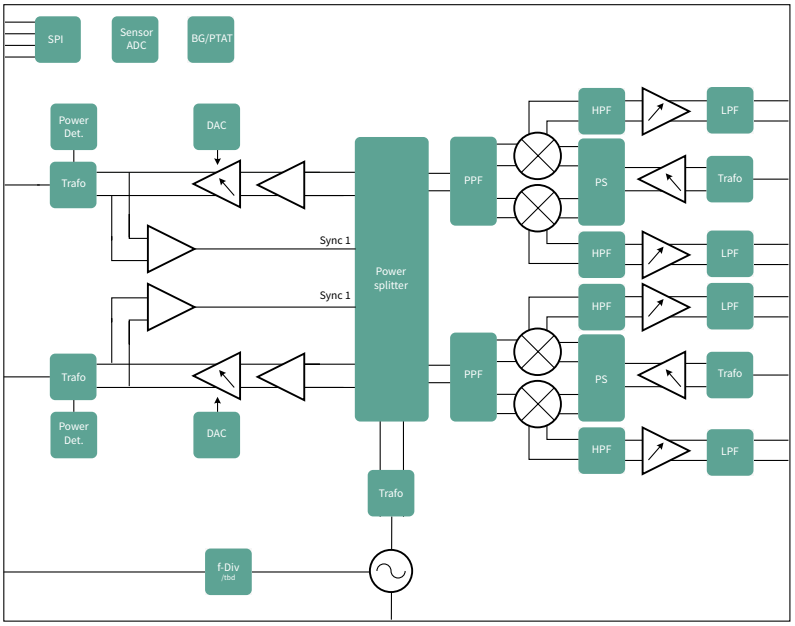


- Long-range distance detection of moving objects up to 50 m
- Wide range speed detection up to ±100 km/h
- Low BOM costs

Product	Configuration	Features
BGT24MTR11	1Tx + 1Rx	› Measures, not just motion, but also speed, direction, and distance › Small form factor › Resistance to moisture, dirt, and temperature › Increased area coverage › Discrete design › Low power MMICs for energy saving › Privacy protection › Adaptable to different application requirements › Highly integrated chips eliminating costly external components
BGT24MR2	2Rx	
BGT24MTR12	1Tx + 2Rx	
BGT24LTR11	1Tx + 1Rx	
BGT24LTR22	2Tx + 2Rx	

The BGT24LTR22 key features

- 24 GHz transceiver MMIC
- Fully integrated low phase noise VCO
- Integrated analog base band stage with programmable gain and filter settings
- Bi-directional pin for synchronization
- Built in temperature compensation circuit for VCO stabilization, no PLL needed
- Low power consumption
- Fully ESD protected device
- Single ended RF and IF terminals
- Single supply voltage 1.5 V



www.infineon.com/24GHz

For more details on the product, click on the part number, visit infineon.com or contact our product support.

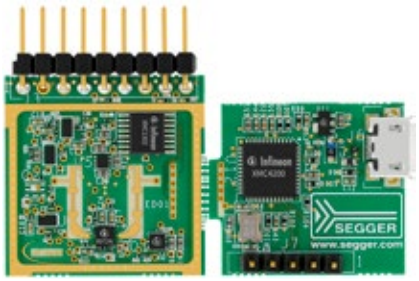
24 GHz evaluation and demonstration boards

In addition to the BGT24M/L family of MMIC chips, Infineon provides a continuously expanding range of evaluation and demonstration boards to support the testing and development of radar in multiple applications of our customers. All boards are provided with base-level software to support the ease of use and faster time-to-market integration.

Features

- Four system boards available
- All include 24 GHz radar chip and XMC™ microcontroller
- Kit contains user manual, GUI, MATLAB compiler and Gerber files
- Software available via Infineon Toolbox

Infineon development kit



Demonstrator with SW support

Benefits

- Capability to detect motion, speed and direction of movement (approaching or retreating) distance and angle of arrival based on hardware
- Fast prototyping with available software

Sense2GoL Pulse (BGT24LTR11 + XMC4700)	Distance2Go (BGT24MTR11 + XMC4200)	Distance2GoL (BGT24LTR11 + XMC4700)	Position2Go (BGT24MTR12 + XMC4700)
› Capability to detect motion, speed, and direction of movement (approaching or retreating) › Detection range of 18 m for a human target at a power consumption < 5 mW › High sensitivity of detection in comparison to PIR › Arduino compatible microcontroller board (Arduino standard connectors) › Modulation parameters can be changed to suit the application requirements › Multiple current sensors for current consumption monitoring and optimization › Integrated multiple-element patch antennas	› Capability to detect the distance of multiple targets › Capability to detect motion, speed, and direction of movement (approaching or retreating) › Operates in harsh environments and detects through non-metallic materials › BGT24MTR11 – 24 GHz highly integrated RF MMIC › XMC4200 Arm® Cortex®-M4 –32-bit industrial microcontroller › Debug over Cortex 10 pin debug connector › Integrated multiple-element patch antennas	› Capability to detect the distance of the closest human target › Capability to detect motion, speed, and direction of movement (approaching or retreating) › Very low power consumption due to duty cycling options › Operates in harsh environments and detects through non-metallic materials › BGT24LTR11 – 24 GHz highly integrated RF MMIC › XMC4700 Arm® Cortex®-M4 –32-bit industrial microcontroller › Debug over Cortex 10 pin debug connector › Microstrip patch antennas with › 10 dBi gain and 29°/80° field of view	› Capability to detect and track the position of multiple targets › Capability to detect the distance of multiple targets › Capability to detect motion, speed, and direction of movement (approaching or retreating) › Operates in harsh environments and detects through non-metallic materials › BGT24MTR12 – 24 GHz highly integrated RF MMIC › XMC4700 Arm® Cortex®-M4 –32-bit industrial microcontroller › Debug over Cortex 10 pin debug connector › Integrated multiple-element patch antennas
Main applications › Security › Indoor and outdoor lighting › Smart home › Automatic door opener › Intelligent switches › Speed measurement	**Main applications** › Drone: soft landing/obstacle avoidance › Smart toilets › Tank level sensing › Intelligent switches	**Main applications** › Smart Home devices › Indoor and outdoor lighting systems › Unmanned aerial vehicles (UAV) › Security systems from commercial surveillance to low-power IP cameras › HVAC products like smart air conditioners › Smart sanitary facilities (eg Smart Toilets)	**Main applications** › Drone/robots: obstacle avoidance › Security systems incl. surveillance cameras › People tracking (IoT, smart home) › Vital sensing
Board dimensions › Board 55 mm x 85 mm › Shield: 55 mm x 66 mm	**Board dimensions** › Board 36 mm x 45 mm	**Board dimensions** › Board 55 mm x 85 mm › Shield: 55 mm x 66 mm	**Board dimensions** › Board 50 mm x 45 mm
Kit contents › RF radar shield: SHIELD_BGT24LTR11 › Programmed controller board: RADAR BB XMC4700 › Micro USB cable › SW GUI to operate kit › Doppler FW and SW[1] › Schematic and bill-of-materials of module	**Kit contents** › User's manual › Demonstration board › SW GUI to operate kit › FMCW FW and SW[1] › Doppler FW and SW[1] › Schematic and bill-of-materials of module	**Kit contents** › RF radar shield: SHIELD_BGT24LTR11 › Programmed controller board: RADAR BB XMC4700 › Micro USB cable › SW GUI to operate kit › Doppler FW and SW[1]	**Kit contents** › User's manual › Demonstration board › Corner reflector › SW GUI to operate kit › FMCW FW and SW › Doppler FW and SW › Schematic and bill-of-materials of module

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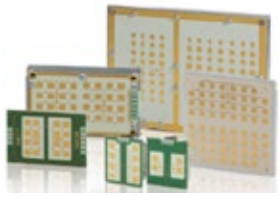
1) Usage of the FMCW and/or Doppler FW and SW requires agreeing to Infineon's user's agreement and licensing terms.

For more details on the product, click on the part number, visit infineon.com or contact our product support.

24 GHz modules

Partnering with the leading radar solution providers enables Infineon to connect our customers looking for turnkey solutions and design support for a complete range of applications. Utilizing our strong network of partners, the radar portfolio is extended to include a range of easy-to-integrate modules. Each of them contains Infineon's 24 GHz MMIC.

Features	Partner modules using Infineon chips	Benefits
› Complete module, including radar MMIC, antenna options, MCU signal processing options, and SW options (Doppler, FSK and FMCW versions available)	 Module (RF module; RF module + MCU including SW)	› Ease of design › Turnkey solution, no need for test and certification

By integrating Infineon's 24GHz MMIC chip into the partners easy-to-use and simple-to-integrate modules the complexity and time to market for a range of applications such as smart home automation, camera & security systems, air conditioners, UAVs, robotics, and smart lighting, are reduced.

Learn radar with Infineon on www.infineon.com/MakeRadar

For the first time, we bring radar to makers and developers. Here you can test, develop, and learn radar and its applications. At www.infineon.com/makeradar, you will see how simple it has become to work with ultrasmall radar sensors. The board and data will flow to your browser for testing, and this is not all, if you want to take the next step just take the available Arduino code examples and start your project.

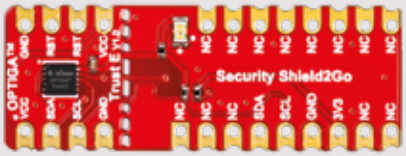
www.infineon.com/24GHz

For more details on the product, click on the part number, visit infineon.com or contact our product support.

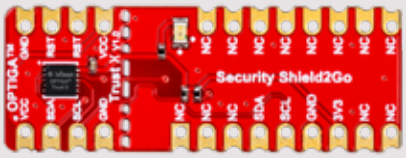
Shield2Go

Infineon's Shield2Go boards offer a unique customer and evaluation experience – the boards are equipped with one Infineon IC and come with a ready-to-use Arduino library. Customers can now develop their own system solutions by combining 2GO boards together with Infineon MyIoT adapters. MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry PI, which are popular IoT hardware platforms. All this enables the fastest evaluation and development of the IoT system.

Security



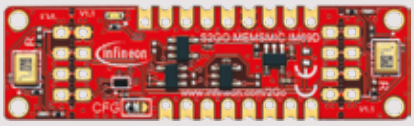
OPTIGA™ Trust E Security Shield2Go
Product name: S2GO_Security_OPTIGA_E
SP: SP001820138



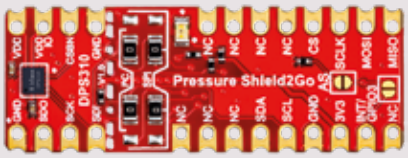
OPTIGA™ Trust X Security Shield2Go
Product name: S2GO SECURITY OPTIGA X
SP: SP002349576

Sensors

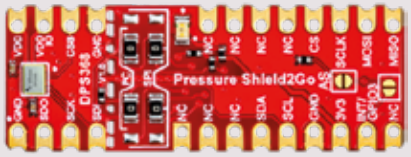
PASCO2V01 Shield2Go
Product name: SHIELD_PASCO2_SENSOR
SP: SP005569590



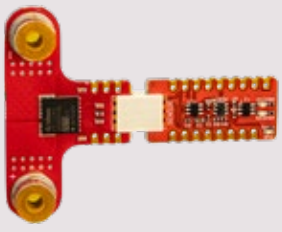
IM69D130 Microphone Shield2Go
Product name: S2GO MEMSMIC IM69D
SP: SP002851544



S2GO Pressure Sensor DPS310
Product name: S2GO_PRESSURE_DPS310
SP: SP001777630



S2GO Pressure Sensor DPS368
Product name: S2GO PRESSURE DPS368
Featured product: XENSIV™ pressure sensor DPS368
SP: SP005338022



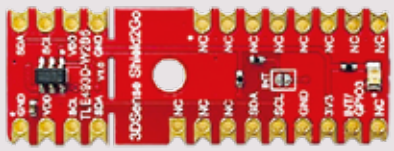
TLI4971 Current Sense Shield2Go
Product name: S2GO_CUR-SENSE_TLI4971
SP: SP005345472

www.infineon.com/sensors2go www.infineon.com/s2go-myiot

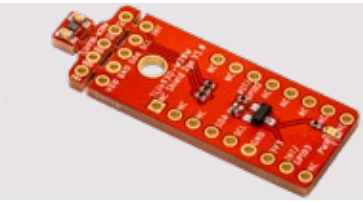
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Shield2Go

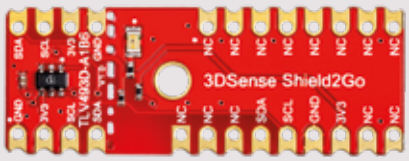
Sensors



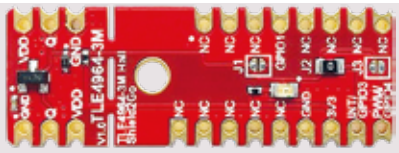
TLE493DW2B6 3DSense Shield2Go
Product name: S2GO_3D_TLE493DW2B6-A0
SP: SP004308594



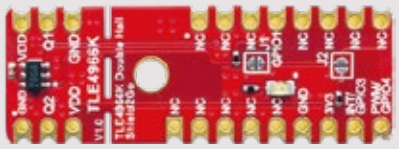
TLI493D 3DSense Shield2Go in small WLB-5 package (1.13 mm x 0.93 mm x 0.59 mm
Product name: S2GO_3D_TLI493DW2BW-A0
SP: SP005410385



TLV493D 3DSense Shield2Go
Product name: S2GO_3D-SENSE_TLV493D
SP: SP001823678

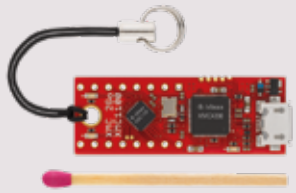


TLE4964-3M Hall Sense Shield2Go
Product name: S2GO_HALL_TLE4964-3M
SP: SP004308590



TLE4966K Double Hall Shield2Go
Product name: S2GO_2_HALL_TLE4966K
SP: SP004308598

Microcontroller



XMC 2Go Kit
Product name: KIT_XMC_2GO_XMC1100_V1
SP: SP001199544

MyIoT – Adapter

MyIoT Adapter
Sales name: MYIOTADAPTERTOBO1
SP: SP002434972

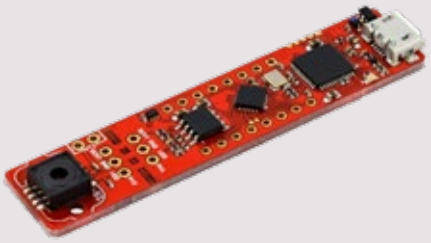
Infineon's 2Go boards offer a unique customer and evaluation experience – the boards are equipped with one Infineon IC and come with a ready-to-use Arduino library. Customers can now develop their own system solutions by combining 2Go boards together with Infineon MyIoT adapters.
MyIoT adapters are gateways to external hardware solutions like Arduino and Raspberry PI, which are popular IoT hardware platforms. All this enables the fastest evaluation and development of IoT system.

www.infineon.com/s2go-myiot

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Sensor 2GO kits

Infineon's XENSIV™ Sensor 2GO kits are budget-priced evaluation boards that are already equipped with a sensor combined with an Arm® Cortex®-M0 CPU. The Sensor 2GO kits provide a complete set of on-board devices, including an on-board debugger. Build your own application and gadget with the Sensor 2GO kits. Our 2GO kits are ready-to-use plug-and-play boards.



Automotive Pressure Sensor 2GO kit

Product name: KP215F1701-PS2GO-KIT/KP229E3518-PS2GO-KIT/ KP236-PS2GO-KIT/KP254-PS2GO-KIT/KP275-PS2GO-KIT

SP: SP002676652/SP002676656/ SP002676664/SP002676664/ SP002676648

Features

- We offer three different derivatives
  - KP215F1701 MAP: Analog Manifold Air Pressure Sensor
  - KP229E3518 TurboMAP: Analog Turbo Manifold Air Pressure Sensor
  - KP236 BAP: Analog Barometric Air Pressure
  - KP254 dBAP: Digital Barometric Air Pressure (SPI)
  - KP275 dMAP: Digital Manifold Air Pressure Sensor (SENT)
- Pressure and external temperature measurement - ONLY KP275dMAP
- CSV file can be generated for each derivative
- External NTC included KP275-PS2GO-KIT
- Configuration of different transfer functions possible, KP215F1701-PS2GO-KIT and KP229E3518-PS2GO-KIT
- A pressure connector consisting of a fast connector for 6mm tubes, pressure couple, and sealing is included
- GUI software for free download
- Power over USB (micro USB), ESD and reverse current protection
- GUI for free download

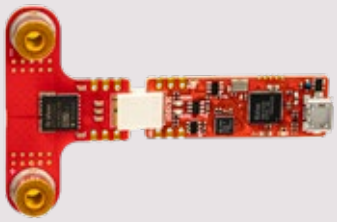
3D Magnetic Sensor 2GO kit

Product name: TLE493D-A2B6 MS2GO/TLE493D-W2B6 MS2GO/ TLV493D-A1B6 MS2GO

SP: SP001707582/SP001707578/ SP001707574

Features

- We offer three different derivatives
  - TLE493D-A2B6 (three dimensional magnetic sensor)
  - TLE493D-W2B6 (three dimensional magnetic sensor)
  - TLV493D-A1B6 (three dimensional magnetic sensor)
- XMC1100 (Arm® Cortex™-M0 based)
- On-board J-Link Lite Debugger (Realized with XMC4200 Microcontroller)
- Power over USB (Micro USB), ESD and reverse current protection
- GUI for free download



TLI4971 Current Sensor 2GO kit

Product name: TLI4971_MS2GO

SP: SP00534547

Features

- XENSIV™ magnetic current sensor TLI4971-A120T
- Sensor board for high current capability (≤20 A)
- Complete evaluation set including control and debug
- First measurements possible within minutes

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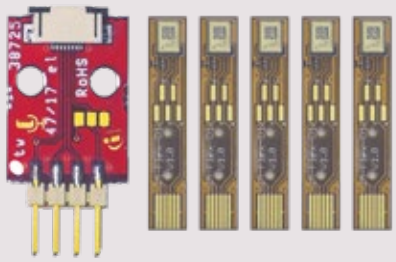
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Sensor 2GO kits

Speed Sensor 2GO kit
Product name: TLE4922 Speed-2-Go-Kit
SP: SP001624692
Features
- Budget-priced evaluation board for speed sensing
- Complete speed sensor incl. back-bias magnet, fixing and cable
- TLE4922 (active mono cell Hall sensor)
- XMC1100 (Arm® Cortex™-M0 based)
- On-board J-Link Lite Debugger (realized with XMC4200 microcontroller)
- Power over USB (Micro USB), ESD and reverse current protection
- GUI based tool for real in-application evaluation for free download

Angle Sensor 2GO kit
Product name: TLE5012B_E1000_MS2GO/TLI5012B_E1000_MS2GO/ TLE5012B_E5000_MS2GO/TLE5012B_E9000_MS2GO
SP: SP002133956/SP002133960/SP002133964/SP002133968
Features
- Budget-priced evaluation board for angle and position sensing
- We offer four derivatives:
  - TLE5012B E1000 version: automotive predefined variant with SSC and IIF communication protocols
  - TLE5012B E5000 version: automotive predefined variant with SSC and PWM communication protocols
  - TLE5012B E9000 version: automotive predefined variant with SSC and SPC communication protocols
  - TLI5012B E1000 version: industrial predefined variant with SSC and IIF communication protocols
- TLE5012B/TLI5012B GMR digital angle sensor
- XMC1100 (Arm® Cortex™-M0 based)
- On-board J-Link Lite Debugger (realized with XMC4200 microcontroller)
- The kit is compatible with the angle rotate knob for fast evaluation
- GUI based tool for real in-application evaluation for free download

For more details on the product, click on the part number, visit infineon.com or contact our product support.



Microphone flex evaluation kits

Product name:	SP:
EVAL_IM69D130_FLEXKIT	SP002153022
EVAL_IM69D120_FLEXKIT	SP002153026
EVAL_IM69D127_FLEXKIT	SP005403891
EVAL_IM73D135_FLEXKIT	SP005415695
EVAL_IM72D128_FLEXKIT	SP005429924
EVAL_IM70A135_FLEXKIT	SP005728204
EVAL_IM67D120_FLEXKIT	SP005560671
EVAL_IM67D130_FLEXKIT	SP005537489

The flex evaluation kits allow simple and easy evaluation of XENSIV™ MEMS microphones. One microphone of the respective type is mounted on each flex board. A flex board can be easily connected to an audio testing setup with the included adapter board via a 6-position ZIF connector. Each kit includes five flex boards and one adapter board. All digital flex kits can be connected to Infineon's EVAL AHNB IM69D130V01 evaluation board.

Features

- Quick and easy connection to evaluation system
- Small size: 25 mm x 4.5 mm
- Pre-soldered MEMS microphone
- Configurable select pin configuration for digital microphones

XENSIV™ - TLE4966 Hall switches 2GO kit

Product name:	SP:
TLE4966 MS2GO	SP005406992

The board features our 3D magnetic sensor, TLI493D-W2BW used as reference magnetic probe for corelating magnetic switching points with magnetic field strength. Mechanically, the board is compatible with the Out-of-Shaft mechanical Add on, which must be ordered separately.

Features

- TLE4966V-1G, double vertical Hall latch with direction detection
- TLE4966G, double lateral Hall latch with direction detection
- XMC1100 (Arm® Cortex™-M0 based)
- On-board J-Link Lite Debugger (Realized with XMC4200 Microcontroller)
- Power over USB (Micro USB), ESD and reverse current protection
- GUI for free download

Add ons for Sensor 2GO kits and Shield2Go

Joystick for all 3D Magnetic Sensor 2GO kits and Shield2Go

Product name: JOYSTICK FOR 3D 2 GO KIT

SP: SP001491834

Features

- Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- First magnetic joystick measurements within minute

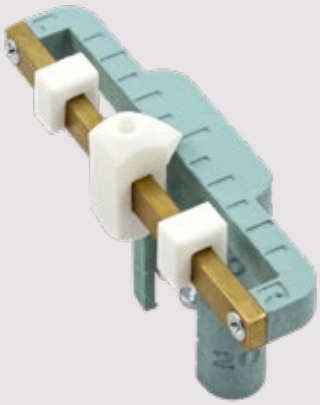
Rotate knob for all 3D Magnetic Sensor 2GO kits, angle sensor 2GO kits and 3D magnetic sensor Shield2Go

Product name: ROTATE KNOB 3D 2 GO KIT

SP: SP001504602

Features

- Easy mounting on all 3D magnetic and angle sensor 2GO kits as well as 3D magnetic sensor Shield2Go
- Rotate knob with magnet as used in control elements and push buttons
- Use cases 3D magnetic sensors: rotational and vertical movements of control elements and push buttons
- Use cases angle sensors: simulates rotational movements for angle measurements



Linear slider for all 3D Magnetic Sensor 2GO kits and Shield2Go

Product name: LINEAR-SLIDER 2GO

SP: SP002043034

Features

- Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- First magnetic linear evaluations within minutes
- Use case: linear movements
- Linear slider with magnet – flexible setup: adaptable air-gaps, two different magnetic strengths/materials and distance limiters

Out of shaft adapter for all 3D Magnetic Sensor 2GO kits and Shield2Go

Product name: OUT OF SHAFT FOR 3D 2 GO

SP: SP003475178

Features

- Easy mounting on all 3D magnetic sensor 2GO kits and Shield2Go
- Use case: angle measurement in out of shaft configuration with 3D Hall sensor
- Three different out of shaft configurations possible (x-z, y-z and x-y axis)
- Magnetic rotation bar with ring magnet included

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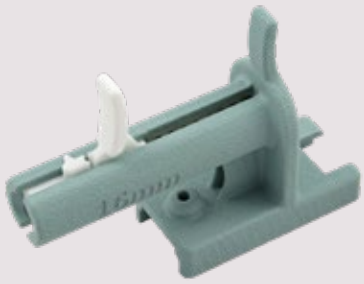
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Add ons for Sensor 2GO kits and Shield2Go



Linear control trigger for all 3D Magnetic Sensor 2GO Kits and Shield2Go

Product name: POWER_DRILL2GO

Features

- Easy mounting on all 3D magnetic sensor 2GO Kits and Shield2Go
- Use case: control trigger for e.g. power drill (linear position measurements with 3D Hall sensor)
- Magnetic slider with magnet included

Human Machine Interface (HMI) direction indicator for all 3D Magnetic Sensor 2GO Kits and Shield2Go

Product name: DIR_INDICATOR2GO

Features

- Easy mountig on all 3D magnetic sensor 2GO Kits and Shield2Go
- Use case: human-machine interface (3x3 position matrix) for e.g. automotive direction indicator
- Magnetic direction indicator with magnet included in handle bar

HMI mini control with 4 directions and 360° rotation for all 3D Magnetic Sensor 2GO Kits and Shield2Go

Product name: MINI_CONTROL2GO

Features

- Easy mounting on all 3D magnetic sensor 2GO Kits and Shield2Go
- Use case: left/right/forwad and backward including 360° rotation at all positions
- Control element includes magnet

OpenClose Adapter for Hall switch Shield2Go

Product name: OPENCLOSE2GOHSTOBO1

Features

- Open & Close detection with magnet for positions detection
- Presence and non-presence detection

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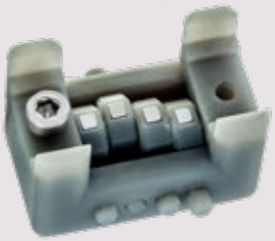
For more details on the product, click on the part number, visit infineon.com or contact our product support.

Play2Go for 3D magnetic sensor

Product name: PLAY2GO
Ordering code: SP005731811

The Infineon PLAY2GO is a very small joystick that can be actuated with your thumb. In terms of size it is a direct replacement to those potentiometer joysticks often used in gaming controllers and similar devices. The joystick itself comes with a pre-mounted magnet and is especially made to be combined with the TLI493D-W2BW 3D magnetic sensor Shield2Go in order to evaluate three dimensional movements of consumer or also industrial joysticks.

Features
- Easy mounting on TLI493D-W2BW Shield2Go
- First magnetic joystick measurements within minutes
- GUI for free download



Contactless switch array for all 3D magnetic sensor 2GO kits and Shield2Go

Product name: Contactless switch array
Ordering code: SP005731811

Features
- Contactless magnetic based „4-bit DIP Switch“ for configuration using a magnetic 3D sensor for detection
- Four movable tiny magnets are used to configure a four bit value

Complementary magnets
- TRU COMPONENTS 505944 Permanent Magnet Würfel

www.infineon.com/sensors2go

For more details on the product, click on the part number, visit infineon.com or contact our product support.

Infineon support for sensors

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/sensors
www.infineon.com/microphones
www.infineon.com/magnetic-sensors
www.infineon.com/current-sensor
www.infineon.com/hall-switches
www.infineon.com/angle-sensors
www.infineon.com/3dmagnetic
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www.infineon.com/24GHz
www.infineon.com/pressure
www.infineon.com/CO2

2GO evaluation kits

www.infineon.com/sensors2go

Online simulation tools

www.infineon.com/cms/en/product/sensor/#!simulation

Info | Document | Evaluation Board | Tools | Play

Packages

- Surface mount device (SMD) technology
- Through-hole device (THD) technology

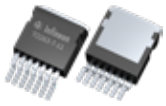
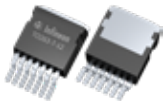
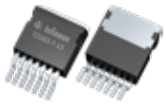
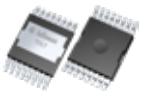
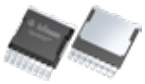
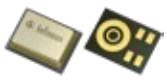
Dear users!

Our customers are at the heart of everything we do. Please give us feedback on how we can improve to meet your expectations with this document the best.

Feedback

Packages

Surface mount device (SMD) technology

DPAK (TO-252-2)		DPAK (TO-252)		DPAK 5-pin (TO-252)		HDSOP-10-1		QDPAK TSC		D²PAK (TO-263)	
2	9.9 x 6.5 x 2.3	3	9.9 x 6.5 x 2.3	5	9.9 x 6.5 x 2.3	10	20.96 x 6.5 x 2.3	22	20.96 x 15.0 x 2.3	3	15.0 x 10.0 x 4.4
D²PAK (TO-263-2)		TO263-7-11		TO263-7-12		TO263-7-13		D²PAK 7-pin (TO-263)		TO-Leadless (TOLL)	
2	15.0 x 10.0 x 4.4	7	15.0 x 10.0 x 4.4	7	15.0 x 10.0 x 4.4	7	15.0 x 10.0 x 4.4	7	15.0 x 10.0 x 4.4	8	11.7 x 9.9 x 2.3
											
TOLT (top-side cooling)		TOLG (Gullwing leads)		sTOLL		SC59		SOT-23		SOT-23-5	
16	15.0 x 9.9 x 2.3	8	11.7 x 9.9 x 2.3	5	8.0 x 7.0 x 2.3	3	3.0 x 2.8 x 1.1	3	2.9 x 2.4 x 1.0	5	2.9 x 1.6 x 1.3
											
SOT-23-6		SOT-89		SOT-223		SOT223-3-1		SOT-323		SOT-363	
6	2.9 x 1.6 x 1.3	3	4.5 x 4.0 x 1.5	4	6.5 x 7.0 x 1.6	3	7.0 x 6.5 x 1.6	3	2.0 x 2.1 x 0.9	6	2.0 x 2.1 x 0.9
TSOP6		PQFN 2x2		PQFN 2x2 dual		PQFN 3.3x3.3		SuperSO8		SuperSO8 dual	
6	2.9 x 2.5 x 1.1	6	2.0 x 2.0 x 0.9	6	2.0 x 2.0 x 0.9	8	3.3 x 3.3 x 1.0	8	5.15x6.15 x 1.0	8	5.15x6.15 x 1.0
SuperSO8 fused leads		SuperSO8 super cool		LSON-8-1		TDSON-8-47		TDSON-10-2		TDSON-10-7	
8	5.15x6.15 x 1.0	8	6.0 x 5.0 x 0.75	8	8.0 x 8.0 x 1.35 (max.)	8	5.15x6.15 x 1.0	10	3.0 x 3.0 x 0.9	10	3.0 x 3.0 x 0.9
TSDSON-8-25 fused leads		TISON-8		TISON-8-5/TISON-8-6		TISON-8 (power stage 5x6)		TISON-8-4 (Power Block)		TSON-8-1	
8	3.3 x 3.3 x 1.0	8	7.0 x 7.0 x 1.0	8	8.0 x 8.0 x 1.0	8	5.0 x 6.0 x 1.0	8	5.0 x 6.0 x 1.0	8	3.0 x 3.0 x 1.0
TSON-8-3		ThinPAK 5x6 (TSON-8)		LLGA-5-4		TSON-10		TDSO-16-30		TSNP-6-13	
8	5.0 x 6.0 x 1.0	8	6.15 x 5.33 x 1.0	5	4.0 x 3.0 x 1.2	10	3.3 x 3.3 x 1.0	16	5.0 x 6. x 1.2	6	1.5 x 1 x 0.375
											
ThinPAK 8x8 (VSON-4)		VDSON-8		DSOF-8-16		DSOF-8-164		DFN-8-1		DSOSP-14-82	
4	8.0 x 8.0 x 1.0	8	4.0 x 4.0 x 0.9	8	7.0 x 7.0 x 2.8	8	7.0 x 7.0 x 2.8	8	4.5 x 4.3 x 1.55	14	5.4 x 5.7 x 3.4
WSON-6-1		WSON-8-3		WSON-10		DirectFET™ Small Can		DirectFET™ Medium Can		DirectFET™ Large Can	
6	3 x 3 x 0.75	8	3 x 3 x 0.75	10	4.0 x 4.0 x 0.8	V	4.8 x 3.8 x 0.65	V	6.3 x 4.9 x 0.65	V	9.1 x 6.98 x 0.71

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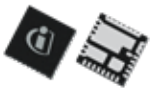
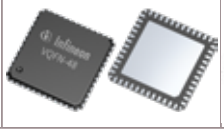
All products are RoHS Compliant.

HSOF-8-1 (TOLL)		IQFN-27-2		IQFN-30 (DrMOS 4x4)		IQFN-31 (DrMOS 5x5)		IQFN-36		IQFN-39	
8	10.375 x 9.9 x 2.3	27	3.3 x 6.0 x 0.9	30	4.0 x 4.0 x 1.0	31	5.0 x 5.0 x 0.8	36	7.5x6.0 x 0.9	39	5.0 x 6.0 x 0.9
											
IQFN-40		**TIQFN-21-1**		**TIQFN-28-1**		**SO8/SO8 dual**		**SO-16/12**		**SO-14**	
40	6.0 x 6.0 x 0.8	21	8.0 x 8.0 x 1.15	28	8.0 x 8.0 x 1.15	8	5.0 x 6.0 x 1.75	12	10.0 x 6.0 x 1.75	14	8.75x6.0 x 1.75
SO-16		**SO-18**		**DSO-12**		**DSO-16-30 (300 mil)**		**DSO-20-85**		**DSO-20-87**	
16	10.0 x 6.0 x 1.75	18	12.8 x 10.3 x 2.65	12	10.3 x 7.8 x 2.6 (max)	16	10.3 x 7.5 x 2.35	20	15.9 x 11.0 x 3.25	20	15.9 x 11.0 x 3.25
DSO-24		**SSOP-24**		**TDSO-16**		**SO-19**		**SO-20**		**DSO-28**	
24	10.5 x 15.6 x 2.65 (max)	24	6 x 8.65 x 1.75 (max)	16	5.0 x 6.0 x 1.2	19	12.8 x 10.3 x 2.65	20	12.8 x 10.3 x 2.65	28	18.1 x 10.3 x 2.65
SO-36		**TSSOP-28**		**TSSOP-48**		**LFBGA-516-5**		**LFBGA-292-6**		**BGA-416-26**	
36	15.9 x 11.0 x 3.5	28	9.7 x 6.4 x 1.2	48	12.5x6.1 x 1.1	516	25.3 x 25.3 x 2.8	292	17.3 x 17.3 x 2.35	416	27.3 x 27.3 x 3.2
TFLGA-13-1		**LQFP-176-22**		**LQFP-144-22**		**TQFP-144-27**		**TQFP-100-23**		**TQFP-80-7**	
13	5 x 5 x 0.96	176	26.7 x 26.7 x 2.1	144	22.4 x 22.4 x 2.2	144	18.7 x 18.7 x 1.6	100	14.5 x 14.5 x 1.5	80	12.6 x 12.6 x 1.5
VQFN-40-13		**VQFN-48-60**		**VQFN-48-78 (LTI)**		**VQFN-56-5/-6**		**Package (JEITA-code)**			
40	5 x 5 x 0.85	48	6 x 6 x 0.85	48	7 x 7 x 0.85	56	7 x 7 x 0.9	X	L x W x H		
								| pin-count V = Variable number of pins All dimensions in mm			

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All products are RoHS Compliant.

Through-hole device (THD) technology

IPAK (TO251)		IPAK SL (TO251 SL)		IPAK short lead with ISO standoff		I²PAK (TO262)		TO-220 real 2-pin		TO-220 2-pin	
3	16.5x6.5 x 2.3	3	10.5x6.5 x 2.3	3	9.5x6.6 x 2.3	3	23.3 x 10 x 4.4	2	29.15 x 10.0 x 4.4	2	29.1 x 9.9 x 4.4
TO-220 3-pin		**TO-220 FullPAK**		**TO-220 FullPAK Narrow Lead**		**TO-220 FullPAK Wide Creepage**		**TO-220-6-46**		**TO-220-6-47**	
3	28.8 x 10 x 4.4	3	29.2 x 10.3 x 4.7	3	29.6 x 10.5 x 4.7	3	28.85 x 11 x 4.7	6	21.7 x 9.9 x 4.4	6	26.1 x 9.9 x 4.4
TO-247		**TO-247-3-AI**		**TO-247 4-pin**		**DIP-7**		**DIP-8**		**DIP-14**	
3	41 x 16 x 5	3	41.3 x 10.9 x 5.18	4	40.15 x 15.9 x 5.0	7	9.52 x 8.9 x 4.37	8	9.52 x 8.9 x 4.37	14	19.5 x 8.9 x 4.37
DIP-20		**Super220**		**Super247**		**SSO-3-9**		**SSO-3-10**		**SSO-4-1**	
20	24.6 x 9.9 x 4.2	3	28.25 x 10.5 x 4.5	3	34.6 x 15.6 x 5	3	A: 3.71 x 5.34 x 1 B: 2.68 x 5.34 x 1.2	3	4.06 x 1.5 x 4.05	4	5.34 x 1.0 x 3.71
TO92S-3-1		**TO92S-3-2**		**Package (JEITA-code)**							
3	4.0 x 1.52 x 3.15	3	4.0 x 1.52 x 3.15	X	L x W x H						

|
pin-count
V = Variable number of pins

All dimensions in mm

All products are RoHS Compliant.

Infineon support for packages

Useful links and helpful information

Further information, datasheets and documents

www.infineon.com/packages

Infineon powerful support

Useful links and helpful information

General support

www.infineon.com/support
www.infineon.com/wheretobuy
www.infineon.com/quality
www.infineon.com/packages
www.infineon.com/green
www.infineon.com/opn

Tools, desks and more

www.infineon.com/solutionfinder
www.infineon.com/lightdesk
www.infineon.com/evaluationboards
www.infineon.com/webinars

Request reliability (FIT) data

http://infineon-community.com/FIT_1

Register for the Newsletter4Engineers

http://infineon-community.com/Newsletter4Engineers

Infineon Customized Solutions

Your specific needs, realized.

A customized solution (commonly known in the industry as an ASIC – Application Specific IC or CSP – Customer Specific Product) is one that is designed, planned, developed and used for a specific purpose, with the mission of being optimized, efficient, and having all the required functionalities and features to be used in a specific application for a single customer.

Working with Infineon from design through to delivery

Infineon as a market leader in customized solutions, believe innovation comes through collaboration and exploring new paths. Working closely with our customer's, understanding their needs, and combining with our cutting edge solutions, we know there is always a benefit for every customer and application. Whether the challenge is related to IP, BOM constraints, or simply required higher integration, an ASIC can be the solution.

More than just a product

A customized solution enabled by Infineon's extensive knowledge, experience and partner network, provides several more advantages, such as IP protection, trusted Infineon quality and supply guarantee.

www.infineon.com/asic

A process streamlined through efficiency, expertise and experience

The journey begins together with a focus on feasibility where we match early on your needs with our 40 years expertise in building world-class industry leading semiconductors, ensuring we can successfully implement your requirements

Technology advantage through to supply stability

Whether it's digital, analog, mixed signal devices an embedded processor or integrated sensors. We have the experience and product know-how. Being one of the largest semiconductor companies, we also have a vast array of IPs. We can integrate almost anything into your chip from the vast variety of our sensors, discrete devices, drivers and much more, including support for higher voltage levels. Our in-house fabrication facilities and design centers around the globe are known for highest quality standards. We also have well established partnerships with all major silicon foundries and assembly test fabs to complement our in-house technologies. At every step along the way, we take pride in the highest quality Infineon is known for.

Interested to learn more?

Visit our web page: www.infineon.com/asic where you can find further information about our customized solutions, videos, and if interested, use the "contact us" feature to connect with us.

A world leader in semiconductor solutions

Our vision

We are the link between the real and the digital world.

Our values

We commit
We partner
We innovate
We perform

Our mission

We make life easier, safer and greener.

Part of your life. Part of tomorrow.

The Infineon Partner Program

Together we win

Find solutions from our partners to accelerate your business of tomorrow. Infineon's global network of partners are experts in designing products, solutions or services leveraging Infineon components in 5 key areas: software, hardware, services, tools & end-applications.

The Infineon partner program is a global ecosystem of qualified companies, offering knowledge and experience to enable and implement Infineon products. Partners from the Infineon partner ecosystem help design your device and application based on our components. They have been selected by us on the basis of their competence and ability to design and deliver strong and trustworthy solutions, especially for new technologies and use cases. Their knowledge and experience spans areas as diverse as hardware, software, tools, services and target applications.

Hardware	Software	Tools	Services	End application
Partners manufacturing electronic components, demo boards and turnkey modules	Partners programming various types of software, algorithms and operating systems	Partners designing computer programs for the development of embedded systems	Partners providing cloud and engineering services, application support or trainings	Partners creating end products and related applications
... jointly we create and commercialize value added solutions, while reaching new buyers	... jointly we enhance our portfolio with complementary components and expand technology know how	... jointly we enable a complete and immersive development experience for customers	... jointly we build up engineering capabilities and offer it to a world class customer network	... jointly we provide customers with state of the art solutions and innovative use cases

Find out more information about the partner program and the latest news around our partners at Infineon Partner Ecosystem Website.

Looking for specific partner solution in your region? Our partner finder provides an overview of our partners and their offerings. Simply specify your search in the dropdown menu and browse through the texts, company logo, and partner signet to navigate directly to the respective website for further information.

Further information about Infineon partner solutions, you can also find under the "partner tab" on the product and application pages .

www.infineon.com/partners

Where to buy

Infineon distribution partners and sales offices:
www.infineon.com/wheretobuy

Service hotline

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

- Germany ..... 0800 951 951 951 (German/English)
- China, mainland ..... 4001 200 951 (Mandarin/English)
- India ..... 000 800 4402 951 (English)
- USA ..... 1-866 951 9519 (English/German)
- Other countries ..... 00* 800 951 951 951 (English/German)
- Direct access ..... +49 89 234-0 (interconnection fee, German/English)

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