

Bourns® ESD Protection

Electrostatic Discharge (ESD) Brochure

ChipGuard® ESD Suppressors • Transient Voltage Suppressor (TVS) Diodes • TVS Diode Arrays • Steering Diode Arrays



BOURNS®

ESD Protection Requirements

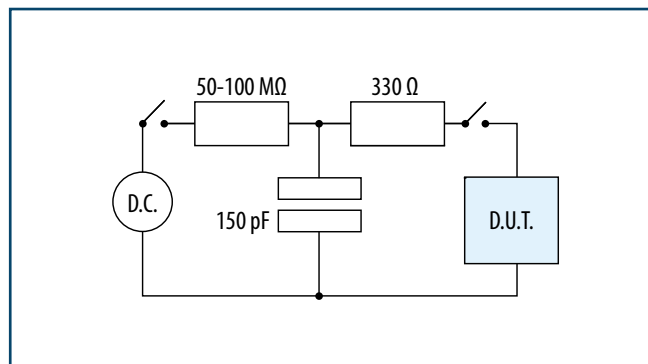
Integrated circuits usually have ESD ratings per the JEDEC (Joint Electron Device Engineering Council) JESD22-A114 standard. This standard was developed to provide a method for evaluating the ESD sensitivity of devices in the manufacturing environment. The test circuit discharges a 100 pF capacitor through a 1500 ohm resistor. In contrast, the more stringent IEC 61000-4-2 Standard is used to evaluate the sensitivity of a system to an ESD event. The test circuit, which is shown to the right, discharges a 150 pF capacitor through a 330 ohm resistor. The table below lists the peak currents and voltages for levels 1-4. In addition to these four levels, the standard allows a user defined level. A sketch of a typical ESD current waveform, per IEC 61000-4-2, is also shown. Note that the current amplitude after 30 seconds and 60 seconds is about 54 % and 25 % of the initial peak, respectively.

IEC 61000-4-2 Level	Contact Voltage (kV)	Air Discharge Voltage (kV)	Peak Contact Current (A)
Level 1	2	2	7.5
Level 2	4	4	15
Level 3	6	8	22.5
Level 4	8	15	30

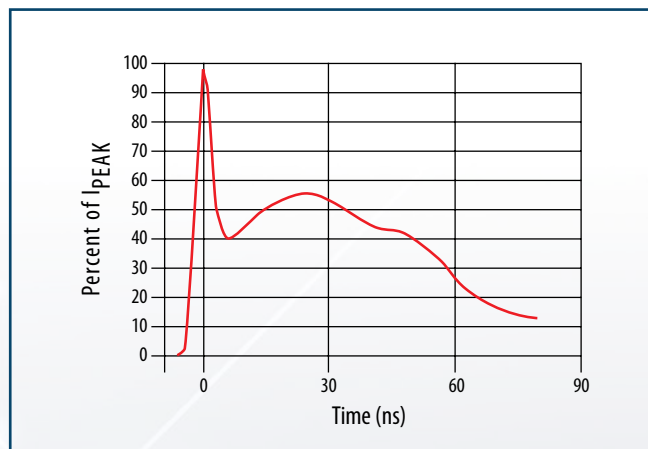
Bourns manufactures a wide range of components that provide system level ESD protection. From our ChipGuard® devices through our TVS diode arrays, Bourns has the right products to help your product meet its system level ESD requirements.

The following pages of this ESD brochure contain a selection flowchart, application examples and device selection tables that show key parameters of our devices. For additional assistance please contact your local Bourns field applications engineer or sales office. You can also visit our website at www.bourns.com. In the circuit protection category under products, you will find links to our ChipGuard® ESD Suppressors, TVS diode and TVS diode array devices.

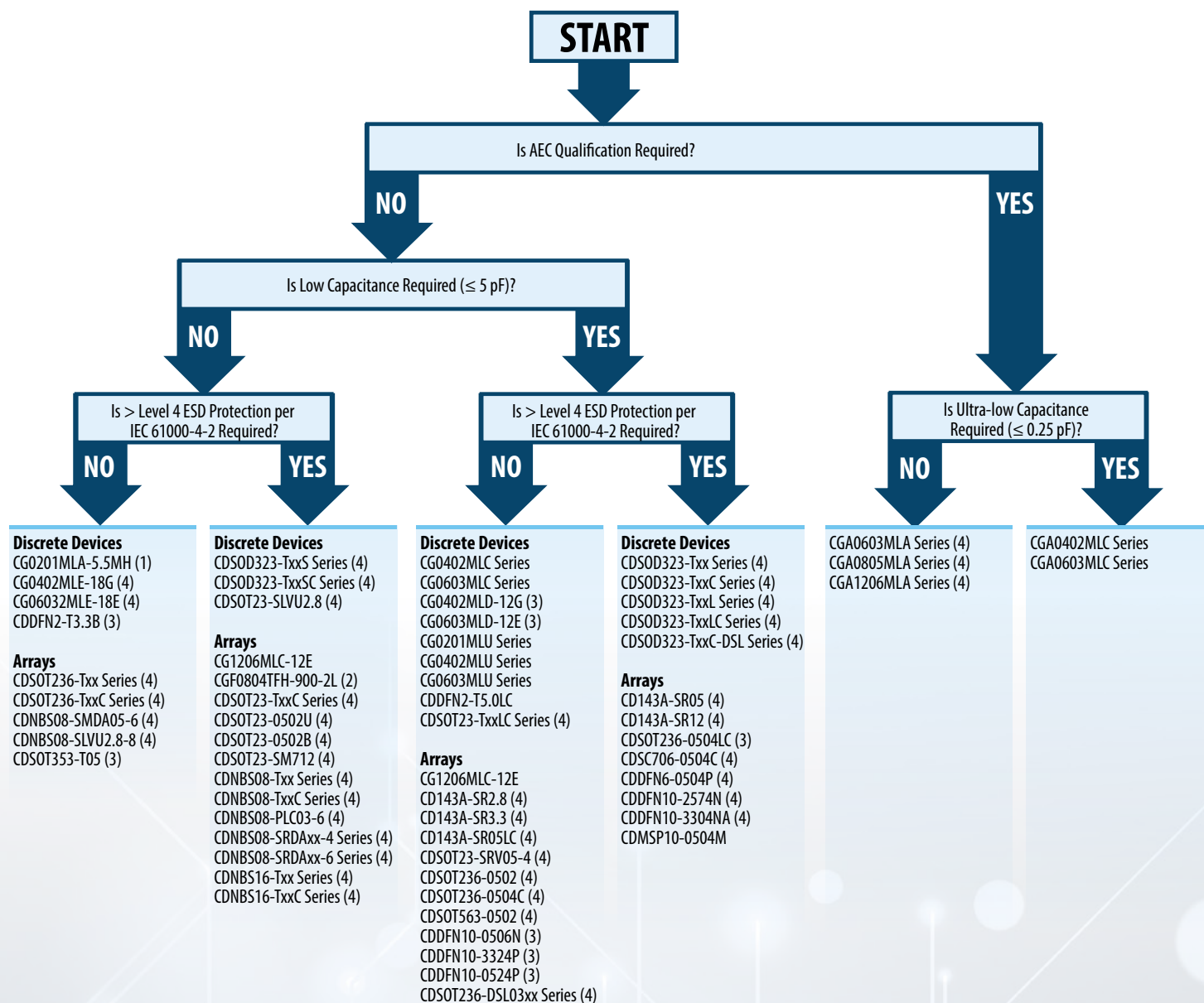
ESD Test Circuit



ESD Current Waveform, per IEC 61000-4-2



Device Selection Flowchart

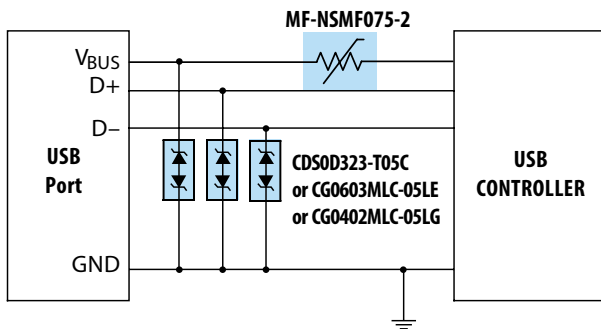


Notes:

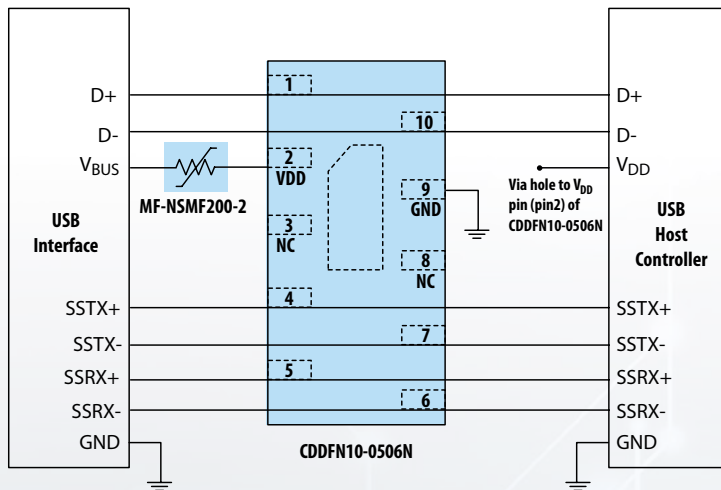
- (1) Provides Level 1 protection. All other devices are Level 4.
- (2) Includes EMI Filter.
- (3) Surge rated devices with 8/20 μ s current surge rating ≤ 5 A, per IEC 61000-4-5.
- (4) Surge rated devices with 8/20 μ s current surge rating ≥ 5 A, per IEC 61000-4-5, except the CGA0603MLA-16150E/17300E/3210E which are rated ≤ 5 A.

ESD Protection Product Applications

USB 2.0 Single Port Protection



USB 3.0 ESD & Overcurrent Protection



Other Recommendations for USB Port Protection

Device	Configuration	Pkg. Size (mm x mm)	Capacitance (pF)	Contact Discharge Rating (kV)
CDDFN2-T5.0LC	Discrete	1.0 x 0.6	0.5	8
CG0201MLU-06H	Discrete	0.6 x 0.3	0.05	8
CG0402MLU-05G	Discrete	1.0 x 0.5	0.05	8
CG0603MLU-05E	Discrete	1.6 x 0.8	0.05	8
CDS0D323-T05LC*	Discrete	2.6 x 1.3	1	30
CDS0T563-0502*	Array	1.6 x 1.6	2	15
CDS0T236-0502*	Array	2.95 x 2.8	2	15
CD143A-SR05LC*	Array	3.0 x 2.3	3	16

* 8/20 μ s I_{pp} rating > 6 A

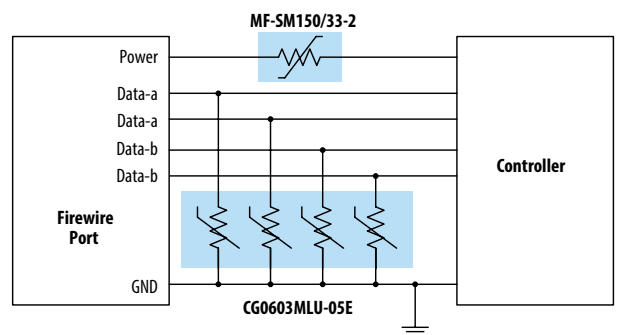
Features

- ESD Protection per IEC 61000-4-2
- RoHS Compliant*
- Surface Mount Packages
- Discrete and Array Configurations

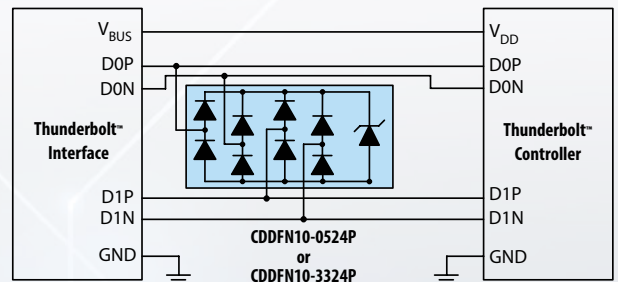
Applications

- HDMI
- USB
- Ethernet
- RS-232, RS-422, and RS-485

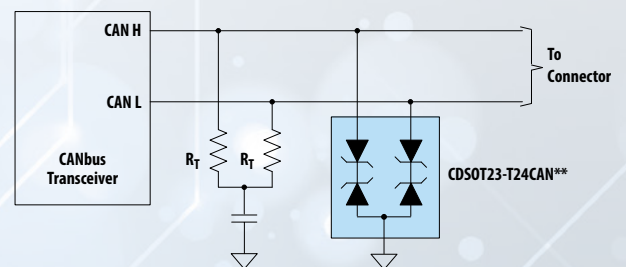
IEEE1394 (Firewire, i.Link) Protection



Thunderbolt™ Port ESD



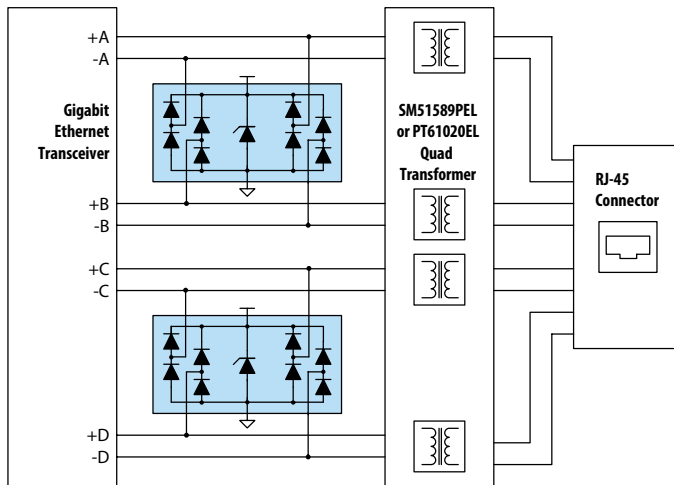
CANbus Protection



*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

***"Q" suffix for AEC-Q101 compliance.

Ethernet ESD Protection (10/100/1000 BASE-T)

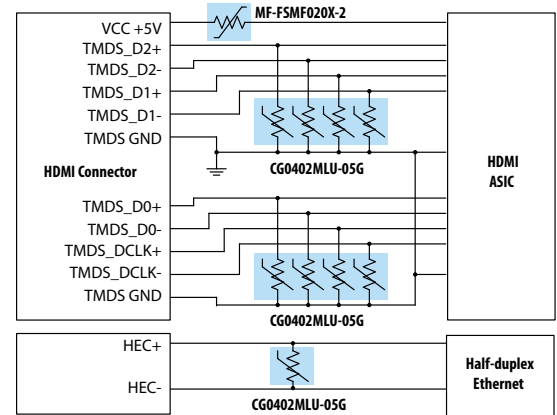


Recommendations for Ethernet Port ESD Protection

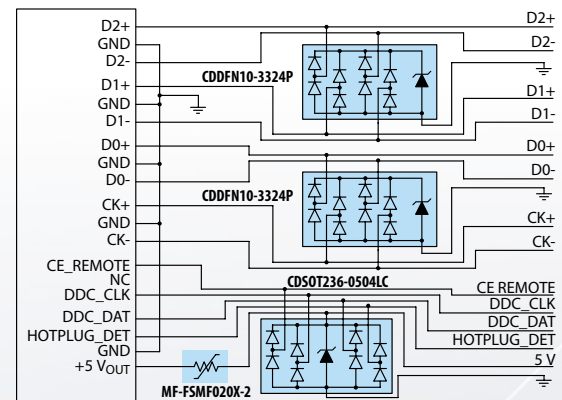
Device	V_{RWM} (V)	Capacitance (pF)	Pkg. size (mm x mm)	Contact Discharge Rating (kV)
CDDDFN10-2574N	2.5	1.7	3.0 x 2.0	30
CDDDFN10-3324P	3.3	0.45	2.5 x 1.0	12
CDDFN10-3304NA*	3.3	4	2.5 x 2.5	30
CDDFN10-0524P	5	0.5	2.5 x 1.0	10
CDDFN6-0504P	5	1.5	1.6 x 1.6	14
SDSC706-0504C	5	1.6	2.1 x 2.1	14
CDSOT236-0504LC	5	0.65	2.95 x 2.8	12
CDSOT236-0504C	5	1.2	2.95 x 2.8	8
CDSOT23-SRV05-4*	5	3.5	2.95 x 2.8	8

* 8/20 μ s I_{pp} rating > 20 A

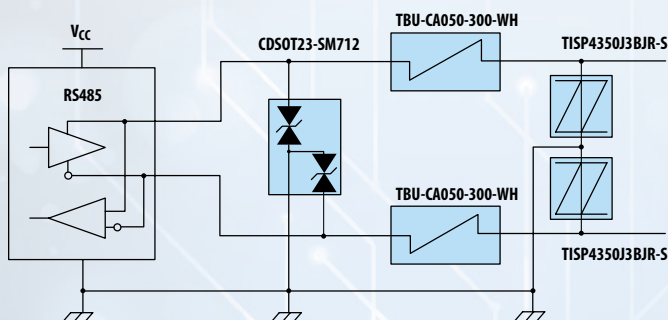
HDMI 1.3 ESD & Overcurrent Protection



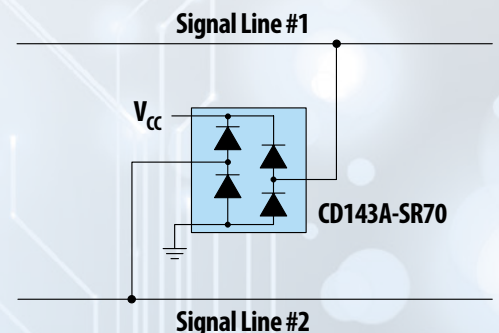
HDMI 2.0 ESD & Overcurrent Protection



RS485 Serial Port ESD/EFT/ Surge Protection



General Purpose Rail Clamp ESD and Surge Protection



AEC-Q200 Qualified Discrete ChipGuard® ESD Suppressors



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical characteristics (T _a = 25 °C)								
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 µs Current	V _C Typ. (V) @ I _{PP} = 1 A	I _R Max. (µA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 kHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)	V _T (V), (Note 1)	V _C (V) (Note 2)
CGA0402MLC-05G	0402	1.0 x 0.5	5	-	-	-	10 nA	0.2	8	300	30
CGA0402MLC-12G	0402	1.0 x 0.5	12	-	-	-	10 nA	0.2	8	300	30
CGA0402MLC-24G	0402	1.0 x 0.5	24	-	-	-	10 nA	0.2	8	300	30
CGA0603MLC-05E	0603	1.6 x 0.8	5	-	-	-	10 nA	0.2	8	300	30
CGA0603MLC-12E	0603	1.6 x 0.8	12	-	-	-	10 nA	0.2	8	300	30
CGA0603MLA-16150E	0603	1.6 x 0.8	16	23	5	70	10	15	8	-	-
CGA0603MLA-16121E	0603	1.6 x 0.8	16	22	30	46	10	120	8	-	-
CGA0603MLA-17300E	0603	1.6 x 0.8	17	21.6	2	70	10	30	8	-	-
CGA0603MLA-18101E	0603	1.6 x 0.8	18	19	30	44	10	100	8	-	-
CGA0603MLA-19161E	0603	1.6 x 0.8	19	8	20	64	10	160	8	-	-
CGA0603MLA-22500E	0603	1.6 x 0.8	22	25	10	54	10	50	8	-	-
CGA0603MLA-22750E	0603	1.6 x 0.8	22	24	30	54	10	75	8	-	-
CGA0603MLA-22101E	0603	1.6 x 0.8	22	24.3	30	50	10	100	8	-	-
CGA0603MLA-22161E	0603	1.6 x 0.8	22	24.3	30	50	10	160	8	-	-
CGA0603MLC-24E	0603	1.6 x 0.8	24	-	-	-	10 nA	0.2	8	-	-
CGA0603MLA-26800E	0603	1.6 x 0.8	26	30	30	67	10	80	8	-	-
CGA0603MLA-31900E	0603	1.6 x 0.8	31	35	30	71	10	90	8	-	-
CGA0603MLA-32120E	0603	1.6 x 0.8	32	51.9	5	124	10	12	8	-	-
CGA0805MLA-16401E	0805	2 x 1.25	16	22	120	46	10	400	8	-	-
CGA0805MLA-18351E	0805	2 x 1.25	18	19.8	120	44	10	350	8	-	-
CGA0805MLA-22101E	0805	2 x 1.25	22	25	30	54	10	100	8	-	-
CGA0805MLA-22401E	0805	2 x 1.25	22	24.3	120	50	10	400	8	-	-
CGA0805MLA-26221E	0805	2 x 1.25	26	29.7	80	56	10	220	8	-	-
CGA0805MLA-31251E	0805	2 x 1.25	31	35.1	80	71	10	250	8	-	-
CGA0805MLA-38201E	0805	2 x 1.25	38	42.3	80	81	10	200	8	-	-
CGA1206MLA-16701E	1206	3.2 x 1.6	16	19.8	200	42	10	700	8	-	-
CGA1206MLA-16801E	1206	3.2 x 1.6	16	22	200	44	10	800	8	-	-
CGA1206MLA-22651E	1206	3.2 x 1.6	22	24.3	200	48	10	650	8	-	-
CGA1206MLA-22841E	1206	3.2 x 1.6	22	24.3	100	50	10	840	8	-	-
CGA1206MLA-26601E	1206	3.2 x 1.6	26	29.7	200	58	10	600	8	-	-
CGA1206MLA-31551E	1206	3.2 x 1.6	31	35.1	200	69	10	550	8	-	-
CGA1206MLA-38501E	1206	3.2 x 1.6	38	42.3	200	81	10	500	8	-	-
CGA1206MLA-40181E	1206	3.2 x 1.6	56	63	200	110	10	180	8	-	-

Notes:

(1) V_T measured using TLP (Transmission Line Pulse) method.

(2) Peak voltage measured under ESD test conditions: IEC 61000-4-2, 8 kV contact discharge.

Discrete ChipGuard® ESD Suppressors

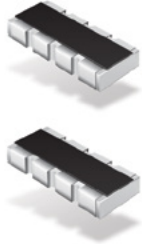


Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)								
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ. (V) @I _{PP} = 1 A	I _R Max. (nA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)	V _T (V) (Note 1)	V _C (V) (Note 2)
CG0201MLA-5.5MH	0201	0.6 x 0.3	5.5	8	1	28	-	32	-	250	25
CG0201MLU-06H	0201	0.6 x 0.3	6	-	-	-	10	0.05	8	300	-
CG0201MLU-12H	0201	0.6 x 0.3	12	-	-	-	10	0.05	8	300	-
CG0201MLU-15H	0201	0.6 x 0.3	15	-	-	-	10	0.05	8	300	-
CG0201MLU-24H	0201	0.6 x 0.3	24	-	-	-	10	0.05	8	300	-
CG0201MLU-30H	0201	0.6 x 0.3	30	-	-	-	10	0.05	8	300	-
CG0402MLU-3.3G	0402	1.0 x 0.5	3.3	-	-	-	5 nA	0.05	8	250	25
CG0402MLC-3.3LGA	0402	1.0 x 0.5	3.3	-	-	-	5 nA	0.5	8	250	25
CG0402MLC-3.3LG	0402	1.0 x 0.5	3.3	-	-	-	5 nA	0.5	8	250	25
CG0402MLU-05G	0402	1.0 x 0.5	5	-	-	-	5 nA	0.05	8	250	25
CG0402MLC-05LGA	0402	1.0 x 0.5	5	-	-	-	5 nA	0.5	8	-	-
CG0402MLC-05LG	0402	1.0 x 0.5	5	-	-	-	5 nA	0.5	8	-	-
CG0402MLA-5.5MG	0402	1.0 x 0.5	5.5	6.4	20	19	50	19	8	-	-
CG0402MLU-12G	0402	1.0 x 0.5	12	-	-	-	5 nA	0.05	8	-	-
CG0402MLC-12LG	0402	1.0 x 0.5	12	-	-	-	5 nA	0.5	8	-	-
CG0402MLC-12LGA	0402	1.0 x 0.5	12	-	-	-	5 nA	0.5	8	-	-
CG0402MLD-12G	0402	1.0 x 0.5	12	50 (Typical)	-	140	1	140	8	-	-
CG0402MLA-14LG	0402	1.0 x 0.5	14	15.3	20	30	50	30	8	-	-
CG0402MLA-14KG	0402	1.0 x 0.5	14	16.2	20	38	50	38	8	-	-
CG0402MLA-18KG	0402	1.0 x 0.5	18	19.8	20	45	50	45	8	-	-
CG0402MLE-18G	0402	1.0 x 0.5	18	-	15	100	10	100	8	-	-
CG0402MLU-24G	0402	1.0 x 0.5	24	-	-	-	5 nA	0.05	8	-	-
CG0402MLC-24LGA	0402	1.0 x 0.5	24	-	-	-	5 nA	0.5	8	-	-
CG0402MLC-24LG	0402	1.0 x 0.5	24	-	-	-	5 nA	0.5	8	-	-
CG0603MLU-3.3E	0603	1.6 x 0.8	3.3	-	-	-	5 nA	0.05	8	-	-
CG0603MLC-3.3LE	0603	1.6 x 0.8	3.3	-	-	-	5 nA	0.5	8	-	-
CG0603MLC-3.3LEA	0603	1.6 x 0.8	3.3	-	-	-	5 nA	0.5	8	-	-
CG0603MLU-05E	0603	1.6 x 0.8	5	-	-	-	5 nA	0.05	8	-	-
CG0603MLC-05LE	0603	1.6 x 0.8	5	-	-	-	5 nA	0.5	8	-	-
CG0603MLC-05LEA	0603	1.6 x 0.8	5	-	-	-	5 nA	0.5	8	-	-
CG0603MLA-5.5ME	0603	1.6 x 0.8	5.5	6.4	30	19	50	19	8	-	-
CG0603MLU-12E	0603	1.6 x 0.8	12	-	-	-	5 nA	0.05	8	-	-
CG0603MLC-12LE	0603	1.6 x 0.8	12	-	-	-	5 nA	0.5	8	-	-
CG0603MLC-12LEA	0603	1.6 x 0.8	12	-	-	-	5 nA	0.5	8	-	-
CG0603MLD-12E	0603	1.6 x 0.8	12	-	-	140	1	140	8	-	-
CG0603MLA-14KE	0603	1.6 x 0.8	14	16.2	30	35	50	35	8	-	-
CG0603MLA-18KE	0603	1.6 x 0.8	18	19.8	30	40	50	40	8	-	-
CG0603MLE-18E	0603	1.6 x 0.8	18	-	20	60	0	60	8	-	-
CG0603MLU-24E	0603	1.6 x 0.8	24	-	-	-	5 nA	0.05	8	-	-
CG0603MLC-24LE	0603	1.6 x 0.8	24	-	-	-	5 nA	0.5	8	-	-
CG0603MLC-24LEA	0603	1.6 x 0.8	24	-	-	-	5 nA	0.5	8	-	-
CG0603MLA-26KE	0603	1.6 x 0.8	26	27.9	30	58	50	58	8	-	-

Notes:

- (1) Typical trigger voltage for 8 kV contact discharge, per IEC 61000-4-2. Maximum response time is 1 ns.
- (2) Typical clamp voltage 30 ns after start of 8 kV contact discharge, per IEC 61000-4-2.

4 Channel ChipGuard® Arrays



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)								
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ. (V) @I _{PP} = 1 A	I _R Max. (nA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)	V _T (V) (Note 1)	V _C (V) (Note 2)
CG0805MLA-5.5ME	0805	2 x 1.25	5.5	9.6	10	28	10	33	8	-	-
CG0805MLA-18KE	0805	2 x 1.25	18	25.2	5	58	10	15	8	-	-
CG1206MLC-12E	1206	3.2 x 1.6	12	-	-	-	10 nA	0.5	8	150	30

ChipGuard® Devices with EMI Filter

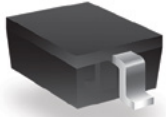


Part Number	Pkg.	Pkg. Size (mm x mm)	Max Ratings		Typical Electrical Characteristics (T _a = 25 °C)						
			Max. (V)	Current (mA)	Z _{CM} (Ω) @ 100 MHz	Cut-off Frequency (GHz)	Typical DC Resistance (Ω)	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)	V _C (V) (Note 3)	I _L (μA) @ 5 V
CGF0804TFH-900-2L	-	0.85 x 0.65	5	100	90	3	2.7	0.6	8	20	1

Symbols & Terms

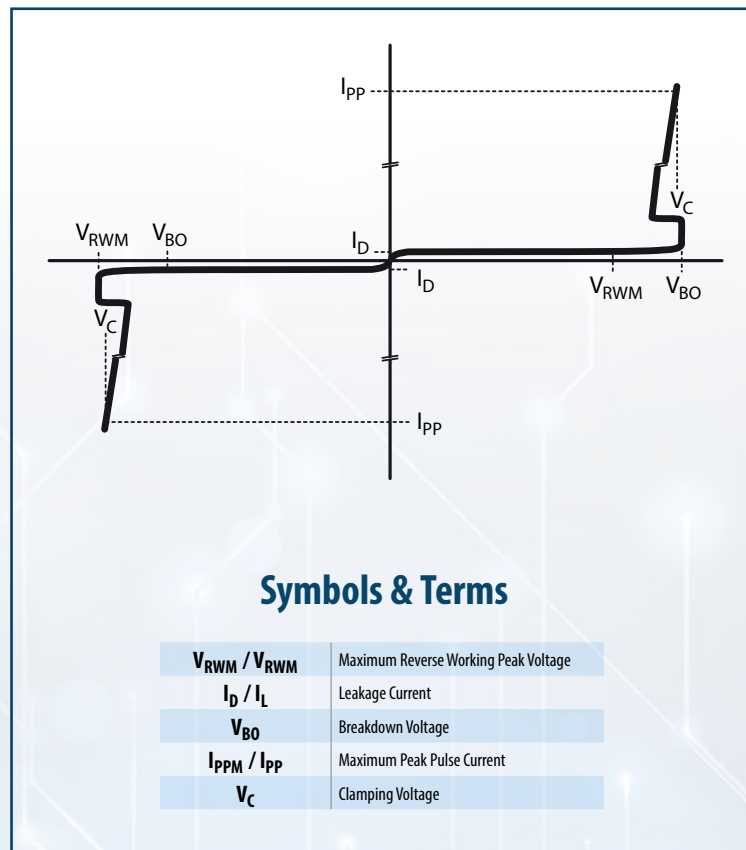
C_{typ}	Typical Diode Capacitance	V_{BR}	Breakdown Voltage
I_F	Forward Current	V_C	Clamping Voltage
I_{FRM}	Maximum Repetitive Forward Current	V_F	Forward Voltage
I_{FSM}	Maximum Forward Surge Current	V_{RRM}	Maximum Repetitive Reverse Current
I_L	Leakage Current	V_T	Trigger Voltage
I_{PPM}	Maximum Peak Pulse Current	V_{WM}	Maximum Working Voltage
I_R	Reverse Current	Z_{CM}	Common Mode Impedance

AEC-Q101 Discrete Transient Voltage Suppressor (TVS) Diodes



Part Number	Pkg.	Pkg. Size (mm x mm)	Max Ratings		Typical Electrical Characteristics (Ta = 25 °C)				
			Max. (V)	Current (mA)	Z_{CM} (Ω) @ 100 MHz	Cut-off Frequency (GHz)	Typical DC Resistance (Ω)	C_{typ} (pF) VR = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CDSOT23-T24CAN-Q	SOT23	2.9 x 2.3	24	26.2	8	40	100 nA	22	30
CDSOD323-T12X-DSL-Q	SOT23	2.55 x 1.3	12	13.3	11	28.3	1 nA	3	30

Typical TVS Diode V-I Characteristic (Bidirectional)



Discrete Transient Voltage Suppressor (TVS) Diodes

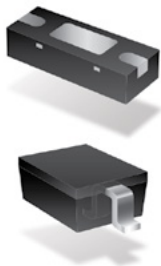


Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Max. (V) @I _{PPM} (Note 1)	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CD0201-T20C	0201	0.6 x 0.3	20	22.8	-	-	100 nA	6.5	20
CDDFN2-T3.3B	0402	1.0 x 0.6	3.3	4	5	8	1	13.5	15
CDDFN2-T5.0LC	0402	1.0 x 0.6	5	7	-	-	1	0.5	8
CDSOD323-T03	SOD323	2.55 x 1.3	3.3	4	20	19	5	3	30
CDSOD323-T03S	SOD323	2.55 x 1.3	3.3	4	43	10.9	125	500	30
CDSOD323-T05L	SOD323	2.55 x 1.3	5	6	15	18.3	5	1	30
CDSOD323-T05	SOD323	2.55 x 1.3	5	6	17	18.3	5	3	30
CDSOD323-T05S	SOD323	2.55 x 1.3	5	6	42	13.5	10	350	30
CDSOD323-T08L	SOD323	2.55 x 1.3	8	8.5	15	18.3	2	1	30
CDSOD323-T08	SOD323	2.55 x 1.3	8	8.5	17	18.5	2	3	30
CDSOD323-T08S	SOD323	2.55 x 1.3	8	8.5	34	16.9	10	250	30
CDSOD323-T12L	SOD323	2.55 x 1.3	12	13.3	11	28.6	1	1	30
CDSOD323-T12	SOD323	2.55 x 1.3	12	13.3	11	28.3	1	3	30
CDSOD323-T12C-DSL	SOD323	2.55 x 1.3	12	13.3	11	28.3	1 nA	3	30
CDSOD323-T12S	SOD323	2.55 x 1.3	12	13.3	21	25.9	1	150	30
CDSOD323-T15L	SOD323	2.55 x 1.3	15	16.7	10	31.8	1	1	30
CDSOD323-T15	SOD323	2.55 x 1.3	15	16.7	10	31.8	1	3	30
CDSOD323-T15S	SOD323	2.55 x 1.3	15	16.7	17	30	1	100	30
CDSOD323-T18L	SOD323	2.55 x 1.3	18	20	8	45	1	1	30
CDSOD323-T18	SOD323	2.55 x 1.3	18	20	8	45	1	3	30
CDSOD323-T18S	SOD323	2.55 x 1.3	18	20	9	40	1	90	30
CDSOD323-T24L	SOD323	2.55 x 1.3	24	26.7	6	56	1	1	30
CDSOD323-T24	SOD323	2.55 x 1.3	24	26.7	6	56	1	3	30
CDSOD323-T24C-DSL	SOD323	2.55 x 1.3	24	26.7	6	56	1 nA	3	30
CDSOD323-T24S	SOD323	2.55 x 1.3	24	26.7	12	49	1	88	30
CDSOD323-T36S	SOD323	2.55 x 1.3	36	40	5	75	1	75	30
CDSOD323-T03C	SOD323	2.55 x 1.3	3.3	4	20	19	5	3	30
CDSOD323-T03SC	SOD323	2.55 x 1.3	3.3	4	43	10.9	125	200	30
CDSOD323-T05LC	SOD323	2.55 x 1.3	5	6	15	18.3	5	1	30
CDSOD323-T05C	SOD323	2.55 x 1.3	5	6	17	18.3	5	3	30
CDSOD323-T05SC	SOD323	2.55 x 1.3	5	6	28	14.5	10	175	30
CDSOD323-T08LC	SOD323	2.55 x 1.3	8	8.5	15	18.3	2	1	30
CDSOD323-T08C	SOD323	2.55 x 1.3	8	8.5	17	18.5	2	3	30
CDSOD323-T08SC	SOD323	2.55 x 1.3	8	8.5	17	18.5	10	150	30
CDSOD323-T12LC	SOD323	2.55 x 1.3	12	13.3	11	28.6	1	1	30

Notes:

(1) CDSOD323-TxxSC clamp voltages are typical values.

Discrete Transient Voltage Suppressor (TVS) Diodes



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Max. (V) @I _{PPM} (Note 1)	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	
CDSOD323-T12C	SOD323	2.55 x 1.3	12	13.3	11	28.3	1	3	30
CDSOD323-T12SC	SOD323	2.55 x 1.3	12	13.3	14	29.5	1	50	30
CDSOD323-T15LC	SOD323	2.55 x 1.3	15	16.7	10	31.8	1	1	30
CDSOD323-T15C	SOD323	2.55 x 1.3	15	16.7	10	31.8	1	3	30
CDSOD323-T15SC	SOD323	2.55 x 1.3	15	16.7	12	33	1	40	30
CDSOD323-T18LC	SOD323	2.55 x 1.3	18	20	8	45	1	1	30
CDSOD323-T18C	SOD323	2.55 x 1.3	18	20	8	45	1	3	30
CDSOD323-T18SC	SOD323	2.55 x 1.3	18	20	9	40	1	40	30
CDSOD323-T24LC	SOD323	2.55 x 1.3	24	26.7	6	56	1	1	30
CDSOD323-T24C	SOD323	2.55 x 1.3	24	26.7	6	56	1	3	30
CDSOD323-T24SC	SOD323	2.55 x 1.3	24	26.7	9	46.2	1	40	30
CDSOD323-T36SC	SOD323	2.55 x 1.3	36	40	5	75	1	35	30
CDSOT23-T03	SOT23	2.9 x 2.3	3.3	4	43	10.9	125	500	30
CDSOT23-T05	SOT23	2.9 x 2.3	5	6	42	13.5	20	350	30
CDSOT23-T08	SOT23	2.9 x 2.3	8	8.5	34	16.9	10	250	30
CDSOT23-T12	SOT23	2.9 x 2.3	12	13.3	21	25.9	2	150	30
CDSOT23-T15	SOT23	2.9 x 2.3	15	16.7	17	30	1	100	30
CDSOT23-T24	SOT23	2.9 x 2.3	24	26.7	12	49	1	88	30
CDSOT23-T36	SOT23	2.9 x 2.3	36	40	9	76.8	1	80	30
CDSOT23-T03LC	SOT23	2.9 x 2.3	3.3	4	43	10.9	125	5	30
CDSOT23-T03C	SOT23	2.9 x 2.3	3.3	4	43	10.9	125	300	30
CDSOT23-T05LC	SOT23	2.9 x 2.3	5	6	42	13.5	20	5	30
CDSOT23-T05C	SOT23	2.9 x 2.3	5	6	42	13.5	20	210	30
CDSOT23-T08LC	SOT23	2.9 x 2.3	8	8.5	34	16.9	10	5	30
CDSOT23-T08C	SOT23	2.9 x 2.3	8	8.5	34	16.9	10	150	30
CDSOT23-T12LC	SOT23	2.9 x 2.3	12	13.3	27	25.9	2	5	30
CDSOT23-T12C	SOT23	2.9 x 2.3	12	13.3	21	25.9	2	90	30
CDSOT23-T15LC	SOT23	2.9 x 2.3	15	16.7	17	30	1	5	30
CDSOT23-T15C	SOT23	2.9 x 2.3	15	16.7	17	30	1	60	30
CDSOT23-T24LC	SOT23	2.9 x 2.3	24	26.7	12	49	1	5	30
CDSOT23-T24CAN	SOT23	2.9 x 2.3	24	26.2	6	36	100 nA	22	30
CDSOT23-T24C	SOT23	2.9 x 2.3	24	26.7	12	49	1	63	30
CDSOT23-T36LC	SOT23	2.9 x 2.3	36	40	9	76.8	1	5	30
CDSOT23-T36C	SOT23	2.9 x 2.3	36	40	9	76.8	1	60	30

Notes:

(1) CDSOD323-TxxSC clamp voltages are typical values.

Transient Voltage Suppressor (TVS) Diode Arrays



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ.(V) @I _{PPM}	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CDSOT236-T05	SOT23-6	2.95 x 2.8	5	6	17	21	20	150	8
CDSOT236-T12	SOT23-6	2.95 x 2.8	12	13.3	12	29.2	2	80	8
CDSOT236-T15	SOT23-6	2.95 x 2.8	15	16.7	10	34.6	1	50	8
CDSOT236-T24	SOT23-6	2.95 x 2.8	24	26.7	6	58.3	1	40	8
CDSOT236-T05C	SOT23-6	2.95 x 2.8	5	6	17	21	20	150	8
CDSOT236-T12C	SOT23-6	2.95 x 2.8	12	13.3	12	29.2	2	80	8
CDSOT236-T15C	SOT23-6	2.95 x 2.8	15	16.7	10	34.6	1	50	8
CDSOT236-T24C	SOT23-6	2.95 x 2.8	24	26.7	6	58.3	1	40	8
CDNBS08-T03	Narrow Body SO-8	4.9 x 6	3	3.3	43	10.9	125	450	30
CDNBS08-T05	Narrow Body SO-8	4.9 x 6	5	6	42	13.5	20	308	30
CDNBS08-T08	Narrow Body SO-8	4.9 x 6	8	8.5	34	16.9	10	300	30
CDNBS08-T12	Narrow Body SO-8	4.9 x 6	12	13.3	21	25.9	1	105	30
CDNBS08-T03C	Narrow Body SO-8	4.9 x 6	3	3.3	43	10.9	125	450	30
CDNBS08-T05C	Narrow Body SO-8	4.9 x 6	5	6	42	13.5	20	308	30
CDNBS08-T08C	Narrow Body SO-8	4.9 x 6	8	8.5	34	16.9	10	300	30
CDNBS08-T12C	Narrow Body SO-8	4.9 x 6	12	13.3	21	25.9	1	105	30
CDNBS08-T15	Narrow Body SO-8	4.9 x 6	15	16.7	17	30	1	80	30
CDNBS08-T24	Narrow Body SO-8	4.9 x 6	24	26.7	12	49	1	50	30
CDNBS08-T36	Narrow Body SO-8	4.9 x 6	36	40	9	76.8	1	45	30
CDNBS08-T15C	Narrow Body SO-8	4.9 x 6	15	16.7	17	30	1	80	30

Transient Voltage Suppressor (TVS) Diode Arrays



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ.(V) @I _{PPM}	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CDNBS08-T24C	Narrow Body SO-8	4.9 x 6	24	26.7	12	49	1	50	30
CDNBS08-T36C	Narrow Body SO-8	4.9 x 6	36	40	9	76.8	1	45	30
CDNBS16-T03	Narrow Body SO-16	9.9 x 6	3	4.5	43	23	125	15	15
CDNBS16-T05	Narrow Body SO-16	9.9 x 6	5	6	42	24	20	15	15
CDNBS16-T08	Narrow Body SO-16	9.9 x 6	8	8.5	30	26	10	15	15
CDNBS16-T12	Narrow Body SO-16	9.9 x 6	12	13.3	21	33	2	15	15
CDNBS16-T15	Narrow Body SO-16	9.9 x 6	15	16.7	15	39	2	15	15
CDNBS16-T24	Narrow Body SO-16	9.9 x 6	24	26.7	10	57	2	15	15
CDNBS16-T36	Narrow Body SO-16	9.9 x 6	36	40	7	72	2	15	15
CDNBS16-T03C	Narrow Body SO-16	9.9 x 6	3	4.5	43	23	125	15	15
CDNBS16-T05C	Narrow Body SO-16	9.9 x 6	5	6	42	24	20	15	15
CDNBS16-T08C	Narrow Body SO-16	9.9 x 6	8	8.5	30	26	10	15	15
CDNBS16-T12C	Narrow Body SO-16	9.9 x 6	12	13.3	21	33	2	15	15
CDNBS16-T15C	Narrow Body SO-16	9.9 x 6	15	16.7	15	39	2	15	15
CDNBS16-T24C	Narrow Body SO-16	9.9 x 6	24	26.7	10	57	2	15	15
CDNBS16-T36C	Narrow Body SO-16	9.9 x 6	36	40	7	72	2	15	15

Steering Diode Arrays with Transient Voltage Suppressor (TVS) Diode



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ. (V) @I _{PPM}	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CDDFN6-0504P	DFN-6	1.6 x 1.6	5	6	6.5	8.1	1	1.5	14
CDSOT563-0502	SOT563	1.6 x 1.6	5	6	6	8.5	1	2	15
CDSC706-0504C	SC70-6	2.1 x 2.1	5	6	6.5	9	1	1.6	14
CDSOT23-0502B	SOT23	2.9 x 2.3	5	6	8.5	8.5	2.5	15	15
CDSOT23-0502U	SOT23	2.9 x 2.3	5	6	16	9.5	2.5	65	20
CDSOT23-SLVU2.8	SOT23	2.9 x 2.3	2.8	3	30	21	1	20	25
CDSOT23-SM712	SOT23	2.9 x 2.3	7 / 12	7.5 / 13.3	17	14 / 26 Max	20	75	30
CDSOT236-0504LC	SOT23-6	2.95 x 2.8	5	6	4.7	8.1	1	0.65	12
CDSOT236-0504C	SOT23-6	2.95 x 2.8	5	6	5.5	10	1	1.2	8
CDSOT236-0502	SOT23-6	2.95 x 2.8	5	6	7	9	1	2	15
CDSOT23-SRV05-4	SOT23-6	2.95 x 2.8	5	6	30	15 @ 5 A	5	3.5	8
CDDFN10-3324P	DFN-10	2.5 x 1	3.3	4.5	4	7.5 Max	500 nA	0.45	12
CDDFN10-0524P	DFN-10	2.5 x 1	5	6	3.8	-	1.5	0.5	10
CDDFN10-2574N	DFN-10	3 x 2	2.5	3	45	-	1	1.7	30
CDDFN10-3304NA	DFN-10	2.5 x 2.5	3.3	3.9	25	18	25	4	20
CDDFN10-0516P	DFN-10	4.1 x 2	3.3	4.5	4	7.2	1	0.35 @ 1.65V	10
CDDFN10-0506N	DFN-10	4.1 x 2	5	6	3.5	-	1	0.25	8
CDMSP10-0504M	MSOP-10	3 x 4.9	5	6	-	-	1	0.55	12

Steering Diode Arrays with Transient Voltage Suppressor (TVS) Diode



Part Number	Pkg.	Pkg. Size (mm x mm)	Electrical Characteristics (T _a = 25 °C)						
			V _{WM} (V)	V _{BR} Min. (V) @1 mA	I _{PPM} (A) 8/20 μs Current	V _C Typ. (V) @ I _{PPM}	I _R Max. (μA) @V _R = V _{WM}	C _{typ} (pF) V _R = 0 V f = 1 MHz	ESD Rating per IEC 61000-4-2, Contact Discharge (kV)
CD143A-SR2.8	SOT-143	3 x 2.3	2.8	3	12	8.5 @ 5 A	1	4.5	8
CD143A-SR3.3	SOT-143	3 x 2.3	3.3	3.5	12	8.5 @ 5 A	1	4.5	8
CD143A-SR05LC	SOT-143	3 x 2.3	5	6.1	13	20	1	3	16
CD143A-SR05	SOT-143	3 x 2.3	5	6	30	20	1	10	25
CD143A-SR12	SOT-143	3 x 2.3	12	13.3	16	30	1	10	25
CD143A-SR70	SOT-143	3.0 x 2.3	70	85	24	-	1	10	8
CDNBS08-SMDA05-6	Narrow Body SO-8	4.9 x 6	5	6	17	18	20	120	8
CDNBS08-SLVU2.8-8	Narrow Body SO-8	4.9 x 6	2.8	3	30	17 Max	1	6	30
CDNBS08-SLVU2.8-4	Narrow Body SO-8	4.9 x 6	2.8	3	30	15	1	6	30
CDNBS08-PLC03-6	Narrow Body SO-8	4.9 x 6	6	6.8	95	20 @ 100 A	25	16	30
CDNBS08-SRDA3.3-4	Narrow Body SO-8	4.9 x 6	3.3	4	43	10.9	125	15	30
CDNBS08-SRDA05-4	Narrow Body SO-8	4.9 x 6	5	6	42	13.5	20	15	30
CDNBS08-SRDA12-4	Narrow Body SO-8	4.9 x 6	12	13.3	27	25.9	1	15	30
CDNBS08-SRDA15-4	Narrow Body SO-8	4.9 x 6	15	16.7	17	30	1	15	30

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