

8-bit PIC® Microcontroller Peripheral Integration

Quick Reference Guide

8-bit PIC® Microcontrollers																																								
Product Family	Pin Count	Program Flash Memory (KB)	RAM (KB)	Data EE (B)	Intelligent Analog							Waveform Control ⁽¹⁾								Logic and Math			Safety and Monitoring				Communications					User Interface				Low Power and System Flexibility				
					ADC (# of bits)	Comp	HSComp	DAC (# of bits)	OPA	SlopeComp / PRG	ZCD	CCP/ECCP/PWM	16-bit PWM	COG / CWG	NCO	DSM	HLT (8-bit)	Universal Timer	NCO (20-bit)	SMT (24-bit)	RTCC	TEMP/TS	CLC	MULT	MathACC	CRC/SCAN	HLT	WWDT	Functional Safety Ready	USART	UART with Protocols	I2C/SPI	USB with ACT	LIN Capable	CAN FD	mTouch® Sensing	HCVD	LCD w/ charge pump	PPS	IDLE/DOZE/PMD
PIC10(L)F3XX	6	384–896 B	0.064	HEF	8																																			
PIC16F152XX	8–40	3.5–28	0.5–2	–	10																							1												
PIC16F180XX	8-40	3.5–28	.256-2	128-256	10	✓		8 ⁽⁷⁾			✓	✓		✓					✓	✓						✓		✓			✓									
PIC16F171XX	8-40	7–28	0.5–2	128-256	12 ⁽³⁾	✓		8 ⁽⁷⁾	✓		✓	✓	4	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓			✓			✓			✓	✓		✓	
PIC16F181XX	8-40	7–28	0.5–2	128-256	12 ⁽³⁾	✓		8 ⁽⁷⁾			✓	✓	4	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓			✓			✓			✓	✓		✓	
PIC12/16 LF155X/6X	14–20	7–14	1.024	HEF	10 ⁽²⁾														✓								✓		✓		✓		✓	✓						
PIC1X(L)F157X	8–20	1.75–14	1.024	HEF	10	✓		5				3	✓				✓										✓				✓						✓			
PIC16(L)F153XX	8–48	3.5–28	2.048	HEF	10	✓		5			✓	✓		✓	✓		✓		✓	✓				✓	✓	✓	2		✓		✓		✓			✓	✓		✓	
PIC1X(HV) F752/53	8–14	1.75–3.5	0.128	–	10		✓	5/9	✓	SC		✓		✓			✓							✓									✓							
PIC18-Q40/41	14–20	16–32	1–4	512	12 ⁽³⁾	✓		8	✓ ⁽⁴⁾		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	2	1	✓		✓		✓	✓		✓	✓	✓	✓	
PIC16(L) F170X/71X	14–40	3.5–28	2.048	HEF	10		✓	5/8	✓		✓	✓			✓				✓	✓						✓		✓		✓		✓		✓			✓			
PIC16(L) F176X/7X	14–40	7–28	2.048	HEF	10		✓	5/10	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓			✓			✓			✓			✓			✓					
PIC16(L) F183XX/88XX	8–40	3.5–56	2-4	256	10 ⁽³⁾	✓		5			✓	✓		✓	✓	✓			✓	✓			✓	✓	✓	✓	✓		✓		✓			✓			✓	✓		
PIC18-Q10	28–40	16–128	1–3.6	256-1K	10 ⁽³⁾	✓		5			✓	✓		✓		✓	✓			✓	✓		✓	✓	✓	✓	2		✓		✓		✓	✓		✓	✓			
PIC18-Q71	28–48	16-64	1–4	256	12 ⁽⁶⁾		✓	8 ^{(7)/10}	2		✓	✓	✓	✓	✓		✓	✓					✓	✓	✓	✓														
PIC18-Q43	28–48	32–128	2–8	1024	12 ⁽³⁾	✓		8			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	4	1	✓		✓		✓	✓		✓	✓	✓	✓	
Speciality Families																																								
PIC16(L)F145X	14–20	14	1.024	HEF	10	✓								✓					✓							✓		✓	✓	✓	✓		✓							
PIC16(L)F191XX	28–64	14–56	4.096	256	12 ⁽³⁾	✓		5			✓	✓		✓			✓		✓	✓	✓	✓			✓	✓	✓		✓		✓		✓	✓	✓			✓		
PIC18-Q84 (6)	28–48	64–128	8–13	1024	12 ⁽⁶⁾	✓		8			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	3	2	✓		✓		✓		✓	✓	✓	✓	✓	

Notes: (1) In addition to standard 8-bit and 16-bit timers (2) Independent Dual ADC Modules (3) ADCC: Analog-to-Digital Converter with Computation (4) PIC18-Q41 has an OPAMP (5) CAN-FD & JTAG capable (6) Analog-to-Digital Converter with Computation and Context Switching (7) Two Digital-Analog-Converter

INTELLIGENT ANALOG: Sensor Interfacing and Signal Conditioning	
ADC: Analog-to-Digital Converter	General purpose 8-/10-/12-bit ADC
ADC2V/ADCC: Analog-to-Digital Converter with Computation	General purpose 10-/12-bit ADC with automated analog signal analysis (ex. oversampling, averaging, etc.)
Comp: Comparator	General purpose rail-to-rail comparator
DAC: Digital-to-Analog Converter	Programmable voltage reference with multiple internal and external connections
HSCmp: High-Speed Comparator	General purpose rail-to-rail comparator with < 50 ns response time
OPA: Operational Amplifier	General purpose op amp for internal and external signal source conditioning
PRG: Programmable Ramp Generator	Analog ramp generator (with slope compensation) for current/voltage mode power supplies
SlopeComp: Slope Compensation	Slope compensation for Peak Current Mode power supplies
VREF: Voltage Reference	Stable fixed voltage reference for use with integrated analog peripherals
ZCD: Zero Cross Detect	AC high-voltage zero-crossing detection for simplifying TRIAC control, synchronized switching control and timing
WAVEFORM CONTROL: PWM Drive and Waveform Generation	
CCP/ECCP: (Enhanced) Capture Compare PWM	1. CCP/ECCP: 10-bit PWM control with 16-bit capture and compare 2. ECCP: Addition of auto shutdown control
COG: Complementary Output Generator	Automated complementary output with control of key parameters such as programmable rising/falling edge events, polarity, phase, precision dead-band, blanking and auto shutdown
CWG: Complementary Waveform Generator	Automated complementary output with control of key parameters such as dead-band and auto shutdown
DSM: Data Signal Modulator	1. Modulates up to two carrier signals with digital data to create custom carrier synchronized output waveforms 2. LED dimming engine functionality via interconnection with 10-/16-bit PWM, DSM and op amp
NCO: Numerically Controlled Oscillator and 16-/20-bit Timer/Counter	1. Precision linear frequency generator (@ 50% duty cycle) with 0.0001% step size of source input clock frequency 2. General purpose 16-/20-bit timer/counter
PWM: Pulse Width Modulation	General purpose 10-bit PWM control
16-bit PWM: Standalone 16-bit PWM and 16-bit Timer/Counter	1. High-resolution 16-bit PWM with edge- and center-aligned modes 2. General purpose 16-bit timer/counter
TIMING AND MEASUREMENTS: Signal Measurement with Timing and Counter Control	
HLT: Hardware Limit Timer and 8- bit Timer/Counter	1. Hardware monitoring for missed periodic events and fault detection 2. General purpose 8-bit timer/counter with external reset capabilities
NCO: Numerically Controller Oscillator and 16-/20-bit Timer/Counter	1. Precision linear frequency generator (@ 50% duty cycle) with 0.0001% step size of source input clock frequency 2. General purpose 16-/20-bit timer/counter
RTCC: Real-Time Clock/Calendar	Maintains accurate clock and calendar timing with external 32.768 kHz crystal
SMT: 24-bit Signal Measurement Timer and 24-bit Timer/Counter	1. Accurate measurement of any digital signal including period, duty cycle, time of flight; instantaneous vs. average measurements 2. General purpose 24-bit timer/counter
TEMP: Temperature Indicator	Provides relative temperature measurements utilizing the ADC
TS: Temperature Sensor	Provides linear relative temperature measurements utilizing the ADC with two factory- calibrated reference values
8-/16-bit Timer	General purpose 8-/16-bit timer/counter
UTMR: Universal Timer	1. Timer modules with features of TMR0/TMR1/TMR2 (Gate, Hardware Limit) 2. Two 16-bit timers can be chained together to create a combined 32-bit timer



Learn more about 8-bit PIC Microcontrollers at microchip.com/8bit.

Learn more about Core Independent Peripherals (CIP) at microchip.com/CIP.

LOGIC AND MATH: Customizable Logic and Math Functions	
CLC: Configurable Logic Cell	1. Integrated combinational and sequential logic 2. Customer interconnection and re-routing of digital peripherals
MULT: Hardware Multiplier	MULTIPLY function of two 8-bit values with 16-bit result
MathACC: Math Accelerator	1. MULTIPLY, ADD, ACCUMULATE functions of 8-/16-bit values with 35-bit result 2. Calculates a 16-bit PID function based on configurable Kp, Ki, Kd constants with a 34-bit result
SAFETY AND MONITORING: Hardware Monitoring and Fault Detection	
CRC/SCAN: Cyclical Redundancy Check with Memory Scan	1. Automatically calculates CRC checksum of Program/DataEE memory for NVM integrity 2. General purpose 16-bit CRC for use with memory and communications data
HLT: Hardware Limit Timer and 8- bit Timer/Counter	1. Hardware monitoring for missed periodic events and fault detection of external hardware 2. General purpose 8-bit timer/counter with external reset capabilities
WWDT: Windowed Watch Dog Timer	System supervisory circuit that generates a reset when software timing anomalies are detected within a configurable critical window
COMMUNICATIONS: General, Industrial, Lighting and Automotive	
ACT: Active Clock Tuning for Crystal-Free USB	1. Auto-tuning of internal oscillator when connected to USB host (eliminates need for external crystal) 2. Tunes internal oscillator to match accuracy of external clock source
CAN: Controller Area Network	Industrial- and automotive-centric communication bus
LIN: Local Interconnect Network	1. Industrial- and automotive-centric communication bus 2. Support for LIN when using the EUSART
EUSART/AUSART: Enhanced/ Addressable Universal Asynchronous Receiver Transceiver	1. General purpose serial communications 2. Support for LIN when using the EUSART
I2C: Inter-Integrated Circuit	General purpose 2-wire serial communications
SPI: Serial Peripheral Interface	General purpose 4-wire serial communications
UART: Universal Asynchronous Receiver Transmitter	Supports LIN master and slave, DMX, DALI and device protocols
USB: Universal Serial Bus	Support for full-speed USB 2.0 device profiles
USER INTERFACE: Capacitive Touch Sensing and LCD Control	
HCVD: Hardware Capacitive Voltage Divider	Simplifies implementation and reduces overhead of mTouch sensing applications
LCD: Liquid Crystal Display	Highly integrated segmented LCD controller
mTouch: Microchip Proprietary Capacitive Touch Technology	1. Capacitive sensing for touch buttons and sliders 2. Capacitive sensing for system measurements and detection (ex. water level, intrusion detection, etc.)
LOW POWER AND SYSTEM FLEXIBILITY: XLP Low-Power Technology, Peripheral and Interconnects	
DIA: Device Information Area	Dedicated memory area for data storage of temp sensor factory calibration values, factory ID and FVR values for ADC and COMP
DMA: Direct Memory Access	Moves data between memories and peripherals without CPU overhead, improving overall system performance and efficiency
DOZE: Power Saving Mode	Ability to run the CPU core slower than the system clock used by the internal peripherals
HEF: High-Endurance Flash	128B Non-volatile data storage with high-endurance 100k E/W cycles
IDLE: Power Saving Mode	Ability to put the CPU core to sleep while the internal peripherals continue to operate from the system clock
MAP: Memory Access Partition	Customizable Flash partitioning with bootloader write protection option
PMD: Peripheral Module Disable	Peripheral power disable hardware to minimize power consumption of unused peripherals
PPS: Peripheral Pin Select	I/O pin remapping of digital peripherals for greater design flexibility and optimized board layout
VI: Vectored Interrupts	Offers faster and more predictable interrupt response times, with lower software overhead
XLP: eXtreme Low Power Technology	XLP technology devices with extreme low-power operation modes for battery/low-power applications