8-bit PIC® Microcontroller Peripheral Integration

Quick Reference Guide

					Peripheral Function Focus																																							
					Intelligent Analog								Waveform Control							Timing and Measurements[1]							Logic and Math			Safety and Monitoring			Communications					User Interface			Low Power and System Flexibility			
Product Family	Pin Count	Program Flash Memory (KB)	RAM (B)	Data EE (B)	ADC (# of bits)	Comp	HSComp	DAC (# of bits)	OPA	PRG	SlopeComp	ZCD	CCP/ECCP	10-bit PWM	16-bit PWM	COG	CWG	NCO	DSM	AngTMR	HLT (8-bit)	16-bit PWM (16-bit)	NCO (20-bit)	SMT (24-bit)	RTCC	TEMP/TS	CLC	MULT	MathACC	CRC/SCAN	HLT	WWDT	EUSART/AUSART	UART with Protocols	I²C/SPI	USB with ACT	LIN Capable	mTouch® Sensing	HCVD	LCD	PPS	IDLE/DOZE/PMD	DMA/VI	DIA/MAP
PIC10(L)F3XX	6	384–896	64	HEF	8									✓			✓	✓					✓			✓	✓											✓						
PIC12LF1552	8	3.5	256	HEF	10																					✓									✓			✓	✓					
PIC16LF155X/6X	14–20	7–14	1024	HEF	10[2]									✓												✓							✓		2		✓	✓	✓					
PIC16(L)F145X	14–20	14	1024	HEF	10	✓								✓			✓									✓							✓		✓	✓	✓	✓						
PIC1X(L)F157X	8–20	1.75–14	1024	HEF	10	✓		5							✓		✓					✓				✓							✓				✓	✓			✓			
PIC16(L)F153XX	8–48	3.5–28	2048	HEF	10	✓		5				✓	✓	4			✓	✓			✓		✓			✓	✓				✓	✓	2		2		✓	✓			✓	✓		✓
PIC1X(HV)F752/53	8–14	1.75–3.5	128	–	10		✓	5/9	✓		✓		✓			✓					✓										✓							✓						
PIC1X(L)F1612/3	8–14	3.5	256	HEF	10	✓		8				✓	✓				✓				✓			✓		✓				✓	✓	✓						✓						
PIC16(L)F161X	14–20	7–14	1024	HEF	10	✓		8				✓	✓	✓			✓			✓	✓			✓		✓	✓		✓	✓	✓	✓	✓		✓		✓	✓			✓			
PIC16(L)F170X	14–20	3.5–14	1024	HEF	10		✓	5/8	✓			✓	✓	✓		✓										✓	✓						✓		✓		✓	✓	✓		✓			
PIC16(L)F171X	28–40	7–28	2048	HEF	10		✓	5/8	✓			✓	✓	✓		✓		✓					✓			✓	✓						✓		✓		✓	✓	✓		✓			
PIC16(L)F176X/7X	14–40	7–28	2048	HEF	10		✓	5/10	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓				✓	✓				✓		✓		✓		✓	✓			✓			
PIC16(L)F183XX	8–20	3.5–14	2048	256	10	✓		5					✓	✓			✓	✓	✓				✓			✓	✓						✓		2		✓	✓			✓	✓		
PIC16(L)F184XX	14–28	7–28	2048	256	12[3]	✓		5				✓	✓	✓			✓	✓			✓		✓	✓		✓	✓					✓	✓		2			✓	✓		✓	✓		✓
PIC16(L)F188XX	28–40	7–56	4096	256	10[3]	✓		5				✓	✓	✓			✓	✓	✓		✓		✓	✓		✓	✓			✓	✓	✓	✓		2		✓	✓	✓		✓	✓		
PIC16(L)F191XX	28–64	14–56	4096	256	12[3]	✓		5				✓	✓	✓			✓				✓			✓	✓	✓	✓				✓	✓	✓		✓		✓	✓	✓	✓[5]	✓	✓		✓
PIC18(L)FXXK40	28–64	16–128	3728	256–1K	10[3]	✓		5				✓	✓	✓			✓		✓		✓					✓		✓		✓	✓	✓	5		2		✓	✓	✓		✓	✓		
PIC18(L)FXXK42	28–48	16–128	8192	256–1K	12[3]	✓		5				✓	✓	4			✓	✓	✓		✓		✓	✓		✓	✓	✓		✓	✓	✓	1	1	2		✓	✓	✓		✓	✓	✓	✓
PIC18(L)FXXJ94	64–100	32–128	4096	–	12	✓							✓												✓			✓					4		2	✓	✓	✓		✓[5]	✓	✓		
PIC18(L)FXXK83	28	32–64	4096	1K	12[3]	✓		5				✓	✓	✓			✓	✓	✓		✓		✓	✓		✓	✓	✓		✓	✓	✓		2	✓		✓	✓	✓		✓	✓	✓	✓
PIC18FXXQ10	28–40	128	3728	1024	10[3]	✓		5				✓	✓	✓			✓		✓		✓					✓	✓			✓	✓	✓	2		2			✓	✓		✓			

INTELLIGENT ANALOG: Sensor Interfacing and Signal Conditioning	
ADC: Analog-to-Digital Converter	General purpose 8-/10-/12-bit ADC
ADC²/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
HC I/O: High-Current I/O	Up to 50 mA or 100 mA current drive on select I/O pins
HSComp: 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	
AngTMR: Angular Timer	Phase angle timer for measurement and control of rotational and periodic events (ex. motor, AC mains, TRIAC, etc.)
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
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

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 K_p, K_i, K_d 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

FLEXIBLE INTELLIGENCE MADE EASY
8-BIT PIC® MICROCONTROLLERS

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