## 8-bit PIC® Microcontroller Peripheral Integration

### Quick Reference Guide

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**Note:**
1. In addition to standard 8-bit and 10-bit timers
2. Independent Dual ADC Modules
3. ADCC: Analog-to-Digital Converter with Computation
4. CAN capable
5. LCD with Charge Pump
Learn more about 8-bit PIC Microcontrollers at www.microchip.com/8bit.

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

INFOGRAPHIC: Microchip 8-bit PIC® MCUs

INTELLIGENT ANALOG: Sensor Interfacing and Signal Conditioning
ADC: Analog-to-Digital Converter General purpose 8-/10-12-bit ADC
ADC/ADCC: Analog-to-Digital Converter with Temp. and Voltage Monitor 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
H/C: 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
OPTA: 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 detect for simplifying TRIAC control, synchronized switching control and timing

WAVEFORM CONTROL: PWM Drive andWaveform Generation
CCP/ECCP: (Enhanced) Capture Compare PWM 1. CCP/ECCP: 10-bit PWM control with 16-bit capture and compare
2. ECP: 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, DSD 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.)
HIL: 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 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
RTC: 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
TB: Temperature Sensor Provides 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
CCL: Configurable Logic Cell 1. Integrated combinational and sequential logic
2. Customer interconnection and re-routing of digital peripherals
MULT: Hardware Multiplier MULTPLY function of two 8-bit values with 16-bit result
MathACC: Math Accelerator 1. MULTPLY, 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
CRO/SCAN: Cyclical Redundancy Check with Memory Scan 1. Automatically calculates CRC checksum of Program/Data/EE memory for NVM integrity
2. General purpose 16-bit CRC for use with memory and communications data
HIL: Hardware Limit Timer and 8-/16-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
ACP: 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
FC: 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
HCVR: 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: Ultra-Low-Power Technology, Peripherals 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 COMB
DMA: Direct Memory Access Moves data between memories and peripherals without CPU overhead, improving overall system performance and efficiency
DOZER: 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
PMOD: 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 flexbility and optimized board layout
V6: 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

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