PIC16F183XX and PIC16F188XX 8-bit Microcontrollers

Versatile Functionality via Peripheral Interconnectivity with Low Power

Summary

As the complexity of applications increase, many designers are facing challenges such as handling multiple functions and interfacing with a wide range of system inputs and communications. The PIC16F188XX products feature a number of Core Independent Peripherals (CIPs) that can be combined to perform a wide variety of functions with little or no core involvement. This integration allows interconnections that bring a new level of interaction between peripherals, enabling unsurpassed flexibility in creating functions for a wide range of applications including consumer electronics, Internet of Things (IoT), safety critical and wearable technology. These products also incorporate new power conserving functionality, including IDLE/DOZE operating modes and Peripheral Module Disable (PMD), in addition to eXtreme Low Power (XLP) technology.

Safety and Monitoring

Using the integrated Windowed Watchdog Timer (WWDT) and Cyclic Redundancy Check (CRC) peripherals simplies the implementation of safety and system management functionality. These Core Independent Peripherals automate the monitoring hardware-based events as well as verify the integrity of program memory, data EE and communications.

Signal Generation

The multiple 10-bit PWMs and Capture/Compare/PWMs (CCP) can be used to create pulse outputs for motor, LED, power supplies and other applications. Any of these peripherals can be combined with the Complementary Waveform Generator (CWG), which enables automated complementary output control with control of dead-band and auto-shutdown modes. Once configured, the complementary outputs run completely independent of the core, allowing the core to perform other tasks.

Integrated Analog

Interfacing with external signals, inputs and sensors can be handled with the integrated analog peripherals. This product family features the first MCU with an Analog-to-Digital Converter (ADC) with additional computation functionality, such as automated averaging, accumulation and low-pass filter calculations. The on-board 10-bit ADC, 5-bit Digital-to-Analog Converter (DAC), internal voltage references and comparators can be connected internally to create closed-loop feedback without requiring pins or PCB space, or they can be used for other functions within the applications. The versatile 10-bit ADC can be used to implement buttons or sliders using Microchip's mTouch® capacitive sensing solution.

Increased Low-Power Functionality

New IDLE and DOZE low-power modes allow applications to optimize device performance and power consumption. The Peripheral Module Disable (PMD) allows unused peripherals to be turned off individually, further reducing power consumption.

Flexible PCB Routing

The Peripheral Pin Select (PPS) functionality allows for I/O pin remapping of the digital peripherals for increased flexibility and ease of PCB layout. Hardware utilization is also improved by enabling access to multiple peripherals from the same I/O port.

Communication

These products include SPI, I^2C™ and EUSART peripherals, which enable a wide range communication protocols. Using external modules, these peripherals enable other wired and wireless communications such as Ethernet, WiFi®, Bluetooth® Low Energy and LoRa™. This allows for intelligent applications where communication with a server in the cloud or with a host/master device is required.

Product Family Highlights

- 10-bit ADC with computation
- IDLE, DOZE low-power operating modes
- Up to 56 KB of program memory
- Safety-critical functionality
- Peripheral pin select
- Bootloader capable

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Featured Products

Device	Program Flash Memory (words)	Program Flash Memory (KB)	EEPROM (bytes)	Data SRAM (bytes)	I/O Pins	10-bit ADC	5-bit DAC	Comparator	8-/16-bit Timer	SMT	Windowed Watchdog Timer	CRC + Memory Scan	CCP/10-bit PWM	Zero-Cross Detect	CWG	NCO	CLC	DSM	EUSART/ I²C™/SPI	Peripheral Pin Select
PIC16(L)F18313	2048	3.5	256	256	6	9	1	1	2/1	–	–	–	2/2	–	1	1	2	1	1/1	✓
PIC16(L)F18323	2048	3.5	256	256	12	15	1	2	2/1	–	–	–	2/2	–	1	1	2	1	1/1	✓
PIC16(L)F18324	4096	7	256	512	12	15	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/1	✓
PIC16(L)F18325	8192	14	256	1024	12	15	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/2	✓
PIC16(L)F18326	16384	28	256	2048	12	15	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/2	✓
PIC16(L)F18344	4096	7	256	512	18	21	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/2	✓
PIC16(L)F18345	8192	14	256	1024	18	21	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/2	✓
PIC16(L)F18346	16384	28	256	2048	18	21	1	2	4/3	–	–	–	4/2	–	2	1	4	1	1/2	✓
PIC16(L)F18854	4096	7	256	512	25	24	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18855	8192	14	256	1024	25	24	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18875	8192	14	256	1024	36	35	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18856	16384	28	256	2048	25	24	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18876	16384	28	256	2048	36	35	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18857	32768	56	256	4096	25	24	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓
PIC16(L)F18877	32768	56	256	4096	36	35	1	2	3/4	2	✓	✓	5/2	✓	3	1	4	1	1/2	✓

Development Made Easy

You can easily create projects using the MPLAB® X IDE environment, MPLAB XC8 compiler, MPLAB Code Configurator and Development boards. The MPLAB Code Configurator utilizes a graphical user interface to configure peripherals, along with drivers, to seamlessly generate code that can be inserted into your project. It is integrated into the MPLAB X IDE to provide a powerful and extremely easy-to-use platform that greatly reduces design time. The code generated is reliable and designed for efficient use of CPU and memory resources. For additional information, please visit www.microchip.com/mcc.

Development Tools from Microchip

- MPLAB X IDE
- MPLAB Code Configurator
- MPLAB XC8 Compiler
- PICkit™ 3 In-Circuit Debugger (PG164130)
- MPLAB ICD 3 In-Circuit Debugger (DV164035)
- Curiosity Development Board (DM164137)

Links

- Online Sampling: www.sample.microchip.com
- Core Independent Peripherals Information: www.microchip.com/cip
- Intelligent Analog Information: www.microchip.com/intelligentanalog

IoT Sensor Badge Demonstration

The 20-pin PIC16F18345-based IoT Sensor Badge demonstrates the capabilities of Core Independent Peripherals by interfacing with multiple sensors, sound buzzer, communication module and RGB LEDs to perform various application functions, including communication with a smartphone application via a Bluetooth LE module.

For more information, visit www.microchip.com/IoTSensorBadge.

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www.microchip.com/8bit

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