MICROCHIP
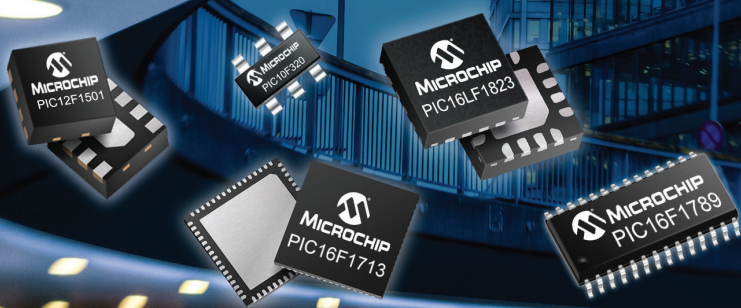
8-bit PIC® Microcontrollers

Command. Communicate. Control.

Flexible Intelligence for Embedded Applications

www.microchip.com/8bit

Overview

Get Ready to See a New World of 8-bit PIC® Microcontrollers

PIC microcontrollers are finding their way into new applications like solar battery chargers, advanced medical devices and solid state lighting. Microchip provides solutions for the entire performance range of 8-bit microcontrollers, with easy-to-use development tools, complete technical documentation, design-in and production support through a global sales and distribution network.

The Industry's Broadest MCU Offering

There are over 800 8-bit PIC microcontrollers ranging from 6 to 100 pins and up to 128 KB Flash that are pin and code compatible across the portfolio. PIC microcontrollers with XLP technology feature the world's lowest active and sleep power consumption with flexible power modes and wake-up sources. MPLAB® X Integrated Development Environment (IDE) supports all PIC microcontrollers with XC Compiler support and common development boards.

Peripherals, Performance, and Price Points for any Application

Peripheral integration is key with communication and control peripherals like SPI, I2C™, UART, PWM, ADC, DAC, op amps, as well as specialized peripherals for USB, LCD and Ethernet. In addition, Microchip offers the Core Independent Peripherals that provide even higher levels of flexibility and integration which has never been possible in the 8-bit microcontrollers. These new Core Independent Peripherals include Configurable Logic Cell (CLC), Complementary Output Generator (COG), Numerically Controlled Oscillator (NCO), Zero Cross Detect (ZCD) and Hardware CVD (Capacitive Voltage Divider). Customers have made PIC MCUs a worldwide standard, with over one million development systems shipped. PIC microcontrollers are quick and easy to design into a wide variety of applications with a long history of dependable product delivery.

Scalability & Migration

To provide customers a low-risk development environment, PIC microcontrollers offer seamless migration within the complete range of products. The 8-bit PIC microcontroller family is pin-compatible within a given pin count as well as code compatible between the architectures. Being able to migrate easily between various PIC MCUs allows flexibility to react to changing design requirements and feature enhancements. Maximize re-use for future developments and preserve the investment in hardware, software and tools by choosing Microchip.

Strength Through Design

In an effort to meet the needs of embedded system designers, silicon manufacturers continue to increase functionality and performance while decreasing the physical size and cost. This provides a significant benefit to both the embedded system designer and end consumer, but as the demand for sophisticated consumer and embedded products continues to expand, so does the challenge of properly designing such applications.

As semiconductor technology continues to evolve into "smaller, faster and cheaper", so does the challenge to provide key features and attributes necessary for embedded design. Microchip is committed to implementing technology advances that not only increase performance and reduce cost of the microcontroller, but do so without sacrificing key features such as:

- **5V:** As an 8-bit leader, we understand the need for 5V devices and will continue to support it.
- **EEPROM:** A key requirement for many embedded designs, cost effective implementation is critical.
- **Analog Integration:** Having a rich Analog offering available in a low cost MCU is a must have for many of today's embedded challenges.
- **High Voltage Variants:** Allows for connection to an application that has high voltage rails, without the need of an external regulator.
- **EMC:** Designed to minimize susceptibility to EMI/EMC, providing the most electrically durable solutions in the industry.

Global Support

Microchip provides 24/7 global technical support with on-line and phone support, hundreds of dedicated field application engineers, more than 50 sales offices and our authorized distributor network. Microchip also offers standard code libraries, reference designs, application notes and seminars on-line and at Microchip Regional Training Centers.

www.microchip.com/8bitresources

Trusted partner

While MCU core commonality is a trend, there are no "drop in" replacements. The reality of MCU selection is that you are entering into a partnership with your MCU supplier. To ensure success, technology leadership is critical, but it is equally important to work with a partner that is committed to strong business fundamentals such as:

- Financial security to weather any economic downturns
- Industry leading lead times
- Industry leading quality and reliability (ISO/TS-16949 qualified)
- Industry leading EOL policy
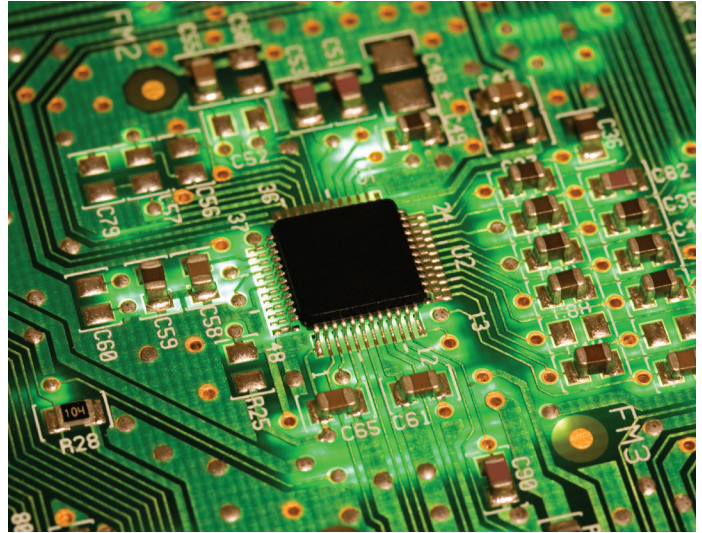
8-bit PIC Microcontroller Key Highlights

Core Independent Peripherals
- Configurable Logic Cell (CLC)
- Complementary Waveform/Output Generator (CWG/COG)
- Numerically Controlled Oscillator (NCO)
- Programmable Switch Mode Controller (PSMC)

eXtreme Low Power (XLP)
- Active current as low as < 30 µA/MHz
- Sleep current as low as < 10 nA
- Battery lifetime > 20 years

Intelligent Analog
- Rail-to-rail op amps
- Fast comparators
- 12b/10b/8b ADC
- 9b/8b/5b DAC
- Zero Cross Detect (ZCD)
- Voltage reference

Small Form Factors
- As small as 8-pin 2 × 3 UQFN and 28-pin 4 × 4 UQFN
- Many other package options available, e.g. 3 × 3 QFN, 5 × 5 UQFN

Essential Features
- 5V+ operation
- EEPROM
- LCD, mTouch™ Sensing Solutions
- USB, CAN, Ethernet
- Analog Integration

Faster Time-to-Market
- Free software
- Pin and code compatibility, easy migration
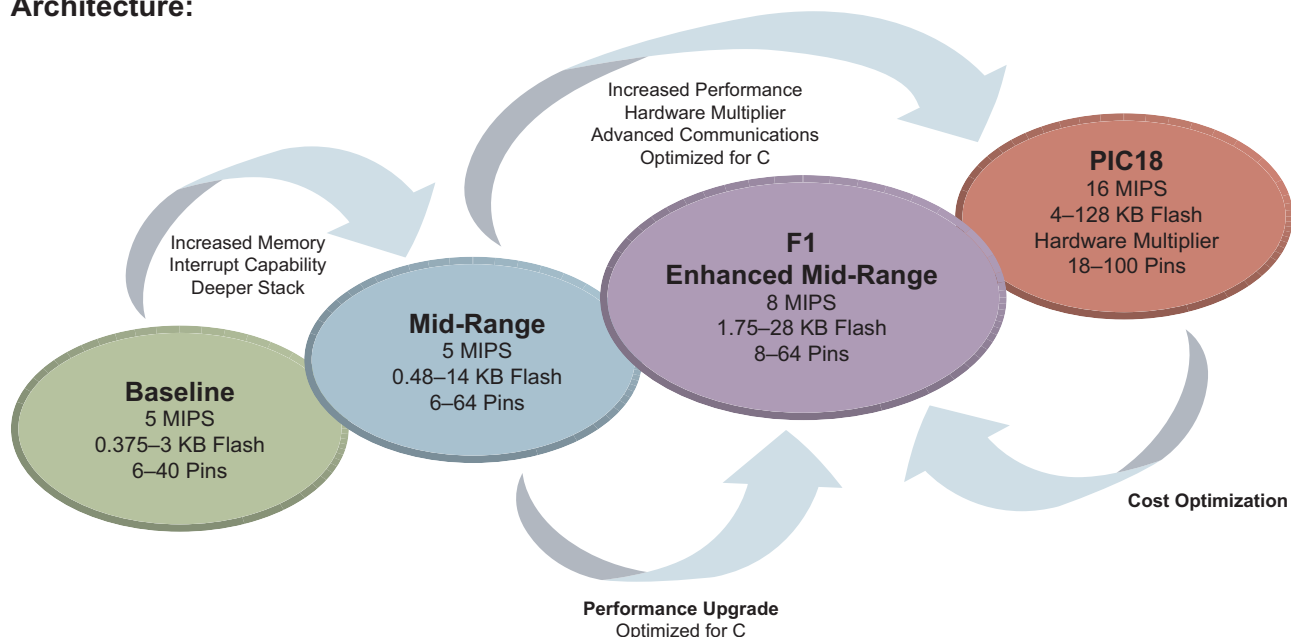- Pre-programmed parts via Quick Turn Programming (QTP)

Design Support
- Free MPLAB® X Integrated Development Environment
- Free C Compilers
- Comprehensive technical documentation
- World-class, 24/7 technical support and training

8-bit PIC MCU Architectures

Unified MPLAB Tool Suite/XC8 Compiler
Free IDE • Free C Compilers • Free Software Libraries

Architecture:

Increased Performance
Hardware Multiplier
Advanced Communications
Optimized for C

PIC18
16 MIPS
4–128 KB Flash
Hardware Multiplier
18–100 Pins

F1
Enhanced Mid-Range
8 MIPS
1.75–28 KB Flash
8–64 Pins

Increased Memory
Interrupt Capability
Deeper Stack

Mid-Range
5 MIPS
0.48–14 KB Flash
6–64 Pins

Baseline
5 MIPS
0.375–3 KB Flash
6–40 Pins

Cost Optimization

Performance Upgrade
Optimized for C

Family:

PIC10
6 Pin

PIC12
8 Pin

PIC16
14–64 Pins

PIC18
18–100 Pins

Continuous development across all architectures and families.

	Baseline Architecture	Mid-Range Architecture	F1 Enhanced Mid-Range Architecture	PIC18 Architecture
Families	PIC10, PIC12, PIC16	PIC10, PIC12, PIC16	PIC12F1, PIC16F1	PIC18
Pin Count	6-40	6-64	8-64	18-100
Interrupts	No	Single interrupt capability	Single interrupt capability with hardware context save	Multiple interrupt capability with hardware context save
Performance	5 MIPS	5 MIPS	8 MIPS	Up to 16 MIPS
Instructions	33, 12-bit	35, 14-bit	49, 14-bit	83, 16-bit
Program Memory	Up to 3 KB	Up to 14 KB	Up to 28 KB	Up to 128 KB
Data Memory	Up to 134B	Up to 368B	Up to 1.5 KB	Up to 4 KB
HardwareStack	2 level	8 level	16 level	32 level
Features	■ Comparator ■ 8-bit ADC ■ Data memory ■ Internal Oscillator ■ Op amp	In addition to Baseline: ■ SPI/I²C™ ■ UART ■ PWMs ■ LCD ■ 10-bit ADC ■ Op amp ■ Configurable logic cells ■ Numerically controlled oscillator ■ Complementary waveform generator ■ Hardware CVD ■ High speed comparators	In addition to Mid-Range: ■ Multiple communication peripherals ■ Linear programming space ■ PWMs with independent time base ■ Programmable switch mode controller ■ 12-bit ADC ■ USB ■ PPS	In addition to Enhanced Mid-Range: ■ 8 × 8 Hardware multiplier ■ CAN ■ CTMU ■ Ethernet

# Core Independent Peripherals

Summary

The following Core Independent Peripherals take 8-bit MCU performance to a new level, while requiring no processor overhead.

- **CLC (Configurable Logic Cell):** The CLC provides programmable combinational and sequential logic. It also enables on-chip interconnection of peripherals and I/O, thereby reducing external components, saving code space, and adding functionality.

- **NCO (Numerically Controlled Oscillator):** A programmable precision linear frequency generator, ranging from <1 Hz to 500 KHz+. The NCO offers a step up in performance, and a simplification in design, for applications requiring precise linear frequency control, such as: fluorescent ballasts, lighting control, radio tuning circuitry, Class D audio amplifiers, etc.

- **Hardware CVD (Capacitive Voltage Divider):** The Hardware CVD is a hardware implementation of our Capacitive Voltage Divider. It enables capacitive touch sensing and proximity detection while simplifying the design, reducing code size and decreasing CPU usage.

- **COG (Complementary Output Generator)/ CWG(Complementary Waveform Generator):** The CWG provides a complementary waveform with rising and falling edge dead band control, enabling high efficiency synchronous switching, with no processor overhead. The CWG also incorporates auto shutdown, auto restart, and can directly interface with other peripherals/external inputs. The COG takes the CWG and improves its performance with blanking and phase control.

- **PSMC (Programmable Switch Mode Controller:** The PSMC is a high performance 16-bit PWM with 6 configurable outputs that can operate in multiple modes. With a dedicated 64MHz clock and the flexibility to interface to external inputs as well as integrated peripherals/clock sources, the PSMC offers the highest level of advanced PWM control and accuracy in an 8-bit MCU. The PSMC can simplify the implementation of a wide array of applications such as: motor control, lighting, and power supplies.
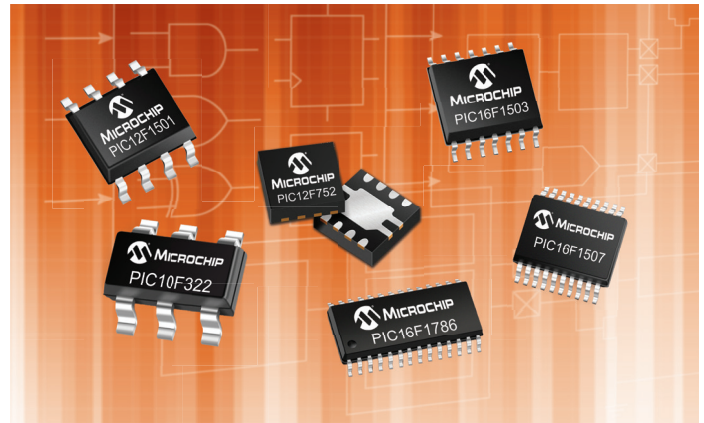
Development Tools

PICkit Low Pin Count Development Board (DM164130-9)
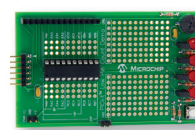
- Dev board for 8, 14, 20-pin 8-bit PIC® MCU
- Populated with PIC16F1829-I/P and ships with PIC18F14K22-I/P (20-pin) MCU
- This board package contains assembled board with area for prototyping circuits and bare board as well
- Software can be rewritten to accommodate new technologies

PIC10F32X Development Board (AC103011)

- Populated with the PIC10F322 6-pin MCU
- Factory programmed with CWG, NCO and CLC demo software
- Prototype area for development purposes
- User's guide and source code available

Featured Core Independent Peripherals Product Families

Family	Pins	Flash Memory SRAM (Bytes)	Capture Compare/ PWM	Analog	Core Independent Peripherals	Communications Serial I/O	Additional Features
PIC10(L)F32X	6	448–896 64	0 2	8-bit ADC (3)	CLC, NCO, CWG	–	–
PIC16(L)F150X	8/14/20	1.75K–14K 64–512	0 4	10-bit ADC (4-12), 5-bit DAC (0-1), Comparators (1-2)	CLC, NCO, CWG	UART, I2C™/SPI	Fixed Voltage Ref
PIC12LF1552	8	2K 256	0 0	10-bit ADC (5)	HCVD	I2C/SPI	Fixed Voltage Ref
PIC16(L)F151X	28	2K–4K 128–256	2 2	10-bit ADC(17)	HCVD	UART, I2C/SPI	Fixed Voltage Ref

www.microchip.com/cip

Intelligent Analog

Summary

With Microchip's Intelligent Analog solutions, engineers can reduce their component count, design smaller, more cost effective boards, and benefit from simplified, higher performance designs and easier procurement of components. In addition, designers benefit from increased flexibility like analog topology agility, utilizing the MCU's programmable analog interconnects and programmability.

To simplify your next design, Microchip has integrated the following Analog Peripherals.

Op Amps

A basic building block in electronic design. Integrating op amps into the Microcontroller offers increased flexibility and reliability while reducing BOM costs and board space.

High Speed Comparators

Comparators have be in the PIC Microcontroller lineup for many years. We are now offering feature rich High Speed (50 nS) variants to enable faster responding/more efficient closed loop feedback designs.

Fixed Voltage Refference

Fixed Voltage Ref provides an integrated stable voltage reference, independent of V_{DD}.

Analog to Digital Conversion

- 16, 12, 10 and 8-bit ADCs available in our 8-bit offering

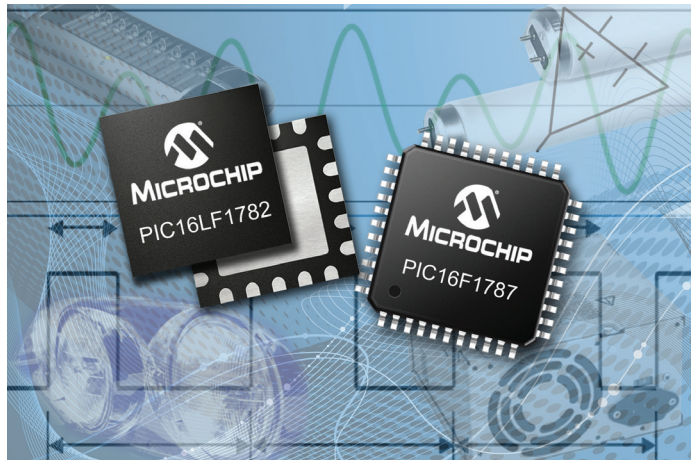### Digital to Analog Conversion

- 9,8, and 5-bit DAC options available in our 8-bit offering

High Current Sink/Source Pins

High Current Sink/Source pins with the ability to sink/source 50 mA the high currents pins enable direct MOSFET drive from the microcontroller.
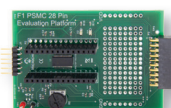
Zero Cross Detect

Enables the micro to be connected directly to the AC input via a current limiting resistor. The ZCD will flag the micro when the Zero Cross is approaching so any required switching can be synchronized to reduce power and eliminate any switching related artifacts/noise.

Development Tools

F1 PSMC 28-pin Evaluation Board (DM164130-10)

- PSMC development platform using the PIC16F1783
- Break-out headers for application development
- Connect to any F1 motor control add-on
- Prototyping area

PICDEM™ Lab Development Kit (DM163045)

- Development platform for 6 to 20-pin parts
- Work across different architectures
- Includes comprehensive user guide, labs, and application examples
- Support for PICkit™ 3 and Expansion Headers

Featured Intelligent Analog Product Families

Family	Pins	Flash Memory SRAM (Bytes)	Intelligent Analog	Core Independent Peripherals	Additional Features
PIC16F527/570	20/28	1.5K–3K 64–132	8-bit ADC (8), Comparator (2), Op amp (2)	-	
PIC16F75X	8/14	1.75 KB–3.5 KB 64–128	10-bit ADC (4), 5/9-bit DAC (1), Comparators (2), Op amp (1), High Current Pins (2)	CWG/COG	Internal Shunt: providing high voltage input capability
PIC16(L)F170X	14/20	3.5 KB–14 KB 256 B–1 KB	10-bit ADC (8-12), 8-bit DAC (1), Op amps (2), Comparators (2), Zero Cross Detect	CLC,COG	I2C™/SPI, UART
PIC16(L)F171X	28/40/44	7 KB–28 KB 512–2 KB	10-bit ADC (17–28), 5 & 8-bit DAC, Op amps (2), Comparators (2), Zero Cross Detect	CLC, NCO, COG	I2C/SPI, UART
PIC16(L)F178X	28/40/44	2K - 16K 256 - 2K	12-bit ADC (11–14), Comparators (3–4), Op amps (2–3), 8-bit DAC, 5-bit DAC (0–3)	PSMC	I2C/SPI, UART

www.microchip.com/intelligentanalog

PIC Microcontrollers with XLP Technology

eXtreme Low Power (XLP) Technology

- Sleep currents down to 9 nA
- Active Mode currents down to 30 µA/MHz
- Execution Efficiency with more than 80% PIC MCU single cycle instructions
- Execute code smarter, sleep longer, maximize battery life
- Wake-up sources including RTC, WDT, BOR, Interrupts, Reset or POR

Low Power Peripheral Integration

Many of today's low power products need advanced peripherals. Microchip offers low power devices with peripherals like USB, LCD and mTouch capacitive sensing. This eliminates the need for additional parts in the application, which saves cost, current and complexity.

Low Power Reliability

In addition to peripherals, products with XLP have system supervisory circuits specially designed for battery powered products.

- Watchdog Timer down to 200 nA, provides protection against system failure
- Real-Time Clock/Calendar down to 400 nA, provides precise timekeeping
- Brown-out Reset down to 45 nA, protects as batteries are depleted or changed

Battery Life Estimator

The XLP Battery Life Estimator is a free software utility to aid you in developing eXtreme Low Power applications with Microchip's PIC MCUs featuring XLP technology.

- Profile your application Run and Sleep time (duty cycle)
- Select operating temperature and operating voltage
- Pre-loaded with most common battery specifications www.microchip.com/BLE

Run from a Single Battery

The MCP1623/4 and MCP1640 Synchronous Boost Regulators enable single cell battery applications, ideal for small, portable and lightweight applications.

- Power any PIC MCU down to 0.35V
- Provides 2–5.5V fixed/stable output voltage

Development Tools

XLP 8-bit Development Board (DM240313)

- Supports PIC16 and PIC18 devices
- LCD display and buttons
- Flexible power options
- Expansion connector
- Current measurement points

Featured XLP Product Families

Device Family	Pins	Flash (KB)	Sleep (nA)	Active (µA/MHz)	Special Features
PIC16F727	20–44	3.5–14	20	55	–
PIC16F1509	20	7–14	25	30	CLC, CWG, NCO
PIC16F1829	8–20	3.5–14	20	50	–
PIC16F1947	28–64	7–28	60	55	LCD
PIC18F46K20	28–40	8–64	50	138	–
PIC18F87K22	20–80	8–128	20	190	–
PIC18F47J53	28–44	16–128	9	197	USB
PIC18F66K80	28–64	32–64	13	100	CAN
PIC18F87K90	64–80	32–128	20	180	LCD

All numbers are typical values, sleep numbers refer to the lowest power Sleep mode available on each family.

PIC Microcontrollers with mTouch™ Technology

Touch Sensing

Touch sensing has become an alternative to traditional push-buttons and switches providing:

- Lower cost of manufacturing and assembly
- Elegant and stylish designs
- Increased reliability; with fewer moving parts
- Proximity-sensitive human interfaces

Microchip's mTouch Sensing Solutions allow designers to integrate touch sensing with application code in a single microcontroller, reducing total system cost. Microchip offers a broad portfolio of low power, low cost and flexible solutions for keys/sliders and touch screen controllers. Get to market faster using our easy GUI-based tools, free source code and low-cost development tools.

TOUCH SENSING

Keys, Sliders, Wheels and Proximity Detection

- Industry's lowest power touch sense solutions
  - Capacitive sensing in less than 5 μA
  - Proximity sensing down to less than 1 μA
- No external component
- Works through plastic, glass and metal surfaces
- Water-proof designs for all weather conditions
- High noise robustness
- Integrated peripherals such as USB, segmented and graphical LCD modules for true human interface systemon-a-chip
- Free software library simplifi es implementation and source code puts you in control

Capacitive Voltage Divider (CVD)

CVD is a charge/voltage based technique to measure relative capacitance on a pin using only the ADC.

- Software implementation
- 8, 16, and 32-bit support
- Proximity support
- Low temperature dependence
- Low V_{DD} Dependence
- Minimal hardware requirements
- Low-frequence noise rejection
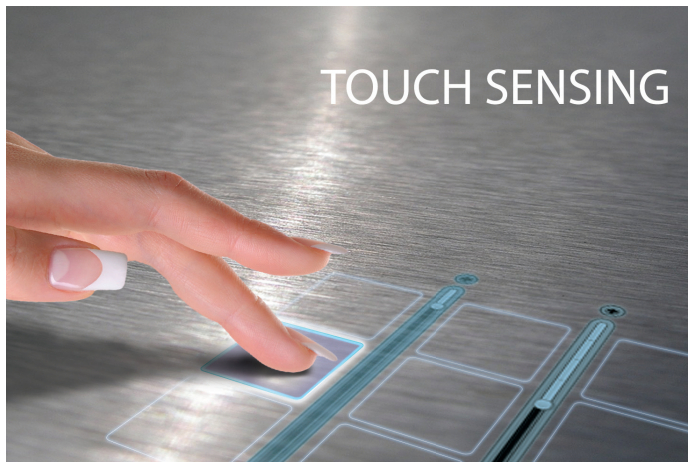- Metal over cap compatible

Hardware CVD

Hardware CVD has been implemented on some of our new devices providing automated capacitive touch sampling, thereby reducing code size and decreasing CPU usage.
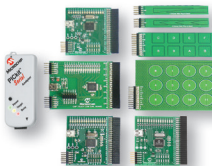
Development Tools

Enhanced mTouch Technology Capacitive Evaluation Kit (DM183026-2)

- Features PIC16F, PIC18F, PIC24F and PIC32F
- Includes 8 buttons, matrix and sliders daughter boards
- GUI for easy configuration and real time data monitoring

mTouch Projected Capacitive Development Kit (DM160211)

- PIC16F707 controller board with fully functional firmware
- Sensor board with 3.5" projected capacitive 12 × 9 touch screen
- Royalty-free source code supports sensors with up to 32 channels

Metal Over Cap Accessory Kit (AC183026)

- For use with the DM183026-2
- 1 daughter board featuring stainless steel cover
- 1 daughter board featuring a plastic cover

Featured HCVD Product Families

Device Family	Pins	Flash (KB)	HCVD	Voltage (V)	Additional Features
PIC16(L)F1513	28	2–4	✓	1.8–5.5	10-bit ADC × 17 channels, CCPWM, UART, I2C™, SPI
PIC12LF1552	8	2	✓	1.8–3.6	10-bit ADC × 5 channels I2C, SPI

Software CVD available on all PIC MCUs with ADC

www.microchip.com/mtouch

PIC Microcontrollers with LCD

Segemented Displays

Segmented displays are used in a wide variety of applications, ranging from meters to portable medical devices to thermostats to exercise equipment. PIC MCUs with integrated LCD drivers can directly drive segmented displays with letters, numbers, characters and icons. The main features of Microchip's LCD portfolio include:

- Flexible LCD segments
  - 28 pins: up to 72 segments
  - 44 pins: up to 116 segments
  - 64 pins: up to 184 segments
  - 80 pins: up to 192 segments
  - 100 pins: up to 480 segments
- Variable clock inputs
- Integrated voltage bias generation
- Direct drive for both 3V and 5V powered displays
- Software contrast control for boosting or dimming for different temperature or lighting conditions
- Drive LCD while conserving power in Sleep mode
- Integrated real time clock and calendar for displaying time and date information
- mTouch capacitive touch sensing capability
- Crystal-free USB 2.0 options

Direct Drive for Segmented Displays

The LCD PIC microcontrollers support direct LCD panel drive capability with no external components needed, lowering total system cost. They have integrated voltage bias generation which allows the MCU to generate the different voltage levels that are required to drive the LCD segment pins and provide good contrast for the display. The LCD MCUs support a range of fixed and variable bias options as well as variable clock inputs that enable the flexibility to work with many different glass vendors.

Contrast Control

Software contrast control is a key feature using firmware to either boost or dim the contrast of the display. Boost the contrast up to V_{DD} or beyond if you are using one of the MCUs with an integrated charge pump. Software contrast control allows the designer to vary the contrast on the LCD to account for different operating conditions such as temperature, lighting, and humidity. Also, software contrast control can be invaluable for portable applications. As the battery level starts to drop, the firmware can apply a boost to the contrast helping extend the battery life while still seeing a crisp image on the display.

Featured LCD Product Families

Development Tools

PICDEM™ LCD 2 Demo Board (DM163030)

- Illustrates and supports the main features of Microchip's 28-, 40-, 64- and 80-pin LCD PIC microcontrollers
- LCD glass with icons, numbers, alphanumeric and starburst display
- Separate Processor Plug-in Modules (PIMs) are available to evaluate all of the LCD products
- Booster capability for contrast control and dimming

LCD Explorer Development Board (DM240314)

- Supports PIC24 & PIC18 LCD PIC MCUs with XLP technology
- Current measurement terminals, mTouch sensing solutions & expansion connector
- Eight common LCD glass
- Support 1/3 biasing
- CTMU switch to showcase touch sensing
- Four switches implemented for software demonstration
- Power the board using 9V power supply, USB connector, two AAA batteries or Connector for V_{BAT} current measurement

PIC18F97J94 PIM Demo Board (MA180034)

- Features 100-pin PIC18F97J94 for evaluation of all 100-, 80- and 64-pin PIC18F97J94 LCD/USB/General Purpose MCUs
- Plugs into LCD Explorer Board (DM240314) for additional functionality
- Contains code examples

Device Family	Pins	Flash (KB)	Max Segments	Voltage (V)	Additional Features
PIC16LF1907	28–40	3.5–14	116	1.8–3.6	10-bit ADC, EUSART
PIC16(L)F1947	28–64	7–28	184	1.8–5.5	10-bit ADC, EEPROM, I2C™, SPI, Comparators
PIC18F87K90	64–80	32–128	192	1.8–5.5	10-bit ADC, EEPROM, I2C, SPI, RTCC, Comparators, ECCP
PIC18F97J94	64–100	32–128	480	2–3.6	Crystal-free USB, V_{BAT}, 12-bit ADC, ECCP, UART, I2C, SPI, Comparators

PIC Microcontrollers with Integrated USB

USB

USB communication is growing in popularity for remote upgrades, downloading data and other portable serial communication applications. Microchip's USB PIC MCUs bring the benefits of full-speed USB to a broad range of embedded designs that can operate in various environments and locations, enabling easy access to other USB devices such as printers, handheld devices or PCs.

Full-Speed USB 2.0 (Device)

Microchip offers USB solutions capable of full-speed USB operation with the PIC16 and PIC18 family of devices. If USB On-The-Go is a requirement we have solutions in our 16 and 32 bit families.

Crystal-Free USB

USB communication requires 48 MHz with 0.25% accuracy over temperature. This is typically done with an external crystal and an internal USB. We have recently implemented technologies that allow a crystal-free implementation with the following benefits:

- Lower BOM cost
- Tiny PCB footprint
- Simplified design
- More robust solution

Free USB Software

Microchip has USB software to support USB on 8, 16 and 32-bit MCUs. This software is royalty-free source code and also includes sample projects. The 8-bit family supports USB device mode with full speed operation. Additional software support includes full C and RTOS development environments. Included within this USB Framework Library is Microchip's USB Framework Configuration Tool.

- Generates configuration files with just a few clicks
- Royalty-free source code
- Firmware projects and USB drivers for the PC

Add USB to any PIC MCU with UART

The MCP2200 is a stand-alone USB to UART serial converter that enables full-speed USB connectivity in applications containing a UART interface. The MCP2200 has 256 bytes of EEPROM and 8 general purpose I/O. It offers a simple "plug-and-play" solution, allowing USB connectivity with very little design effort.

Full-speed Integrated USB 12 Mb/s

Development Tools

Low Pin Count USB Development Kit (DV164139/DM164127)

- Development platform for 14 and 20-pin USB MCUs
- For evaluation of PIC18F14K50/13K50 20-pin USB MCUs + 145X
- Contains hardware, software and code examples
- Self-directed course and lab materials

PICDEM Full-Speed USB Demo Kit (DM163025-1)

- Evaluation platform for PIC18F2X/4XK50 family of USB MCUs
- Full speed USB 2.0 device without the need for an external crystal
- Populated with the PIC18F45K50

PIC18F87J94 PIM Demo Board (MA180033)

- Features 80-pin PIC18F87J94 MCU for evaluation of all 80- and 64-pin PIC18F97J94 USB/LCD/General Purpose MCUs
- Can be used with PIC18 Explorer Board (DM183032) for additional functionality
- Contains code examples

Featured Crystal-Free Product Families

Device Family	Pins	Flash (KB)	Voltage (V)	Crystal-Free	Additional Features
PIC16(L)F1459	14–20	7–14	1.8–5.5	✓	CWG, 10-bit ADC, DAC, I2C™, SPI, UART
PIC18(L)F45K50	28–44	16–32	1.8–5.5	✓	10-bit ADC, Comparators, ECCP, UART, SPI, I2C
PIC18F97J94	64–100	32–128	2–3.6	✓	V$_{BAT}$, 12-bit ADC, LCD, ECCP, UART, I2C, SPI, Comparators

www.microchip.com/usb

PIC Microcontrollers with Ethernet

Embedded Ethernet

Microchip addresses the growing demand for embedded Ethernet products with the ENC624J600, ENC424J600 and ENC28J60 as standalone Ethernet controllers, and the PIC18F97J60 family, which are IEEE 802.3™ compliant and fully compatible with 10/100/1000 Base-T networks. Microchip's Ethernet solution also includes: Free and robust TCP/IP stack optimized for PIC microcontroller and dsPIC® digital signal controller families (www.microchip.com/tcpip).

Development Tools

PICDEM.net™ 2 Development Board (DM163024)

- Supports ENC28J60 and PIC18F97J60 devices
- Can be developed as web server

PICtail™ Ethernet Daughter Board (AC164121)

- Can be plugged to any of the PIC18 demonstration boards
- Populated with ENC28J60
- Interfaces to RJ-45 female connector

Featured Ethernet Product Families

Device Family	Pins	MCU + Ethernet	Integrated MAC + PHY	Interface	Hardware Security	Pre-programmed MAC	Additional Features
PIC18F97J90	64–100	✓	✓ (10 Base-T)	–	–	–	IEEE 802.3™ compliant, Auto-negotiation, Configurable buffer
ENC28J60	28	–	✓ (10 Base-T)	SPI	–	–	
ENC624J600	44–64	–	✓ (10/100 Base-T)	SPI/Parallel	✓	✓	

www.microchip.com/ethernet

PIC Microcontrollers with CAN & LIN

Controller Area Network (CAN)

Microchip offers a complete line of 8-, 16- and 32-bit MCUs to meet the needs of high-performance, embedded applications using the CAN bus. On-chip peripherals include A/D converters, comparators, motor control PWMs, USART (RS485, RS232, LIN) and Master I2C/SPI.

Microchip's Enhanced CAN Module

- Supports CAN 1.2, CAN 2.0A and CAN 2.0B protocols
- DeviceNet data bytes filter support
- Standard and extended data frames
- 0–8 bytes data length
- Three modes of operation:
  - Mode 0: Legacy mode
  - Mode 1: Enhanced Legacy mode with DeviceNet support
  - Mode 2: FIFO mode with DeviceNet support
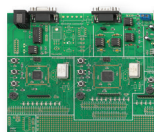- Six buffers programmable as Rx/Tx buffers

Local Interconnect Network (LIN)

Microchip offers a LIN compatible USART on a wide variety of microcontrollers. We have recently taken our LIN offering to a new level by offering microcontrollers with integrated LIN transceivers.

Development Tools

PICDEM CAN-LIN 3 Demonstration Board (DM163015)

- Demonstrates CAN module features
- Includes both firmware and PC software for simulating a CAN network
- In addition, the board employs a LIN sub-network

Featured CAN & LIN Product Families

Device Family	Pins	Flash (KB)	CAN Tx Buffers	CAN Rx Buffers	LIN Tx Rx	Voltage (V)	Additional Features
PIC18F4685	28–44	16–96	3	2	–	2–5.5	LIN USART
PIC18F66K80	28–64	32–64	3	2	–	1.8–5.5	LIN USART
PIC16F1829LIN	14	8K	–	–	Integrated	2.3–5.5	LIN USART

www.microchip.com/can
www.microchip.com/lin

Support

Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. In addition, the following service areas are available at www.microchip.com:

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