

In This Issue...

1. MAKE IT LAST
2. MICROCHIP LICENSES MIPS32® M14K™ CORES FOR NEXT-GENERATION 32-BIT PIC32 MICROCONTROLLERS
3. MICROCHIP AND POWERCAST DEBUT WORLD'S FIRST RF ENERGY HARVESTING KIT ENABLING BATTERY-FREE, PERPETUALLY POWERED WIRELESS APPLICATIONS
4. 16V OP AMPS FROM MICROCHIP FEATURE LOW QUIESCENT CURRENT (135 MICROAMPERES)
5. BATTERY POWER SENSING USING THE MCP6441, NANO-POWER OPERATIONAL AMPLIFIER
6. DESIGN GUIDELINES FOR ROBUST TOUCH SENSING SOLUTIONS
7. WHITE PAPER PREVIEW – 8-BIT MCUs: SOPHISTICATED SOLUTIONS FOR SIMPLE APPLICATIONS
8. REMOTE TEMPERATURE MONITORING VIA CANBUS
9. EMBEDDED DESIGNERS FORUM
10. JOIN MICROCHIP AT THESE WORLDWIDE EVENTS
11. FEATURED 3RD PARTY PARTNER: P.R. GLASSEL
12. FEATURED 3RD PARTY PARTNER: TRACE SYSTEMS
13. NEW MICROCHIP TRAINING INITIATIVES
14. WHAT'S NEW IN MICROCHIP LITERATURE
15. WHAT'S NEW AT MICROCHIPDIRECT?

Make:



Make It Last

BUILD SERIES

Brought to you by



Welcome to *Make It Last*, a project build series and contest at *Make: Online* [makezine.com], sponsored by Microchip and Energizer.

Over the course of this contest, we're going to cover a series of three project builds, demonstrating some of the finer points of low-power microcontroller design. These will be fun, informative projects and a good introduction to using "bare" microcontrollers while learning more about the relationship between microcontrollers and power management. Starting with basic components, we will build up each design and you can follow along in a series of *Make It Last* build newsletters. We will be awarding some really cool prizes at the end of each build, based on the quality of your submission, what you learned in the process, your documentation, etc.

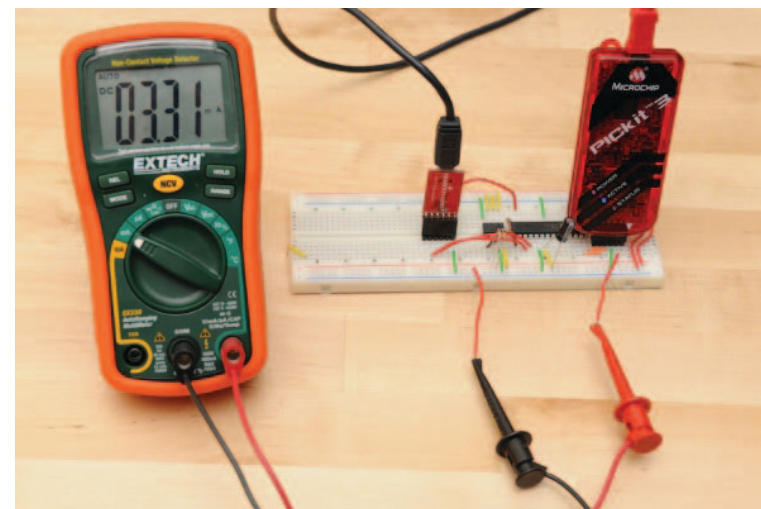
Project 1 - Data Logger

The first project in the build is a data logger. This is a battery powered device that can periodically sample the temperature and record it for later analysis. It's basically like a thermometer combined with a recording device – you could track the temperature of your home, refrigerator, personal volcano, or anything else over a long period of time, using a single set of batteries. To save battery power, the device will spend most of its time in a reduced-power "sleep" mode, only waking itself up every so often to measure a temperature probe before going back to sleep.

As a reminder, this contest is open to anyone who wants to learn about microcontrollers. Whether you're a seasoned programmer who wants to learn a bit more about hardware, or a beginner just starting to get your feet wet, don't be shy! We're looking forward to seeing how much we can all learn in the coming months.

Check out the contest landing page [makezine.com/makeitlast] to sign up for the "Make It Last" weekly newsletter, where you will receive build instructions and contest specifics.

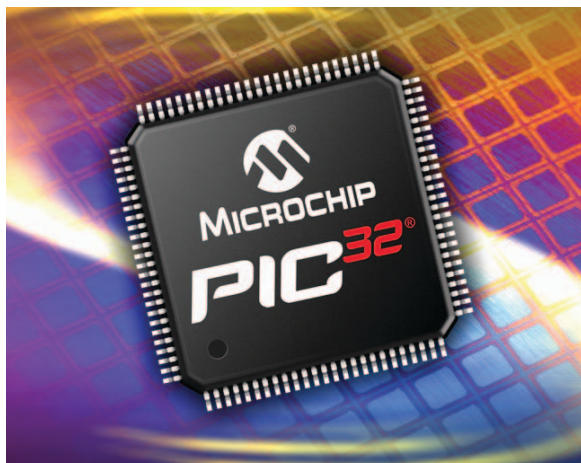
Check out the next microSOLUTIONS to learn about Project 2!



For more information, visit: <http://makezine.com/makeitlast/>
 Need product samples for your project? visit: <http://www.microchip.com/samples/>

Microchip Licenses MIPS32® M14K™ Cores for Next-Generation 32-bit PIC32 Microcontrollers

M14K Cores Deliver Smaller Code Size, Increased Performance and Lower Cost While Enabling 100% Code Compatibility With All PIC32 Microcontrollers



Microchip is building on its successful **32-bit PIC32 microcontroller family**, which is currently based on the MIPS32® M4K® core, by licensing the MIPS32 M14K™ family of cores from MIPS.

Watch a video interview between Microchip and MIPS [here](#)

The M14K cores will enable Microchip to further expand its presence in the competitive 32-bit microcontroller market by delivering uncompromised levels of performance and improved code density – critical factors in embedded applications. Additionally, the M14K cores provide cost and performance scalability, while maintaining 100% code compatibility with PIC32 MCUs based on the M4K core.

The higher code density in the M14K core family was achieved through MIPS Technologies' new microMIPS™ Instruction Set Architecture (ISA). Executing the microMIPS ISA results in at least a 30% code-size reduction with little or no compromise in performance. Additional features of the M14K cores that will be beneficial in the next generation of PIC32 microcontrollers include interrupt-latency improvements and low power consumption.

Since the successful launch of the rapidly expanding PIC32 family, Microchip has continued to strengthen its strategic partnership with MIPS Technologies. In fact, the microcontroller-specific enhancements to the new M14K core were heavily influenced by Microchip's extensive experience in the embedded market and with the M4K core.

"We were pleased to work closely with Microchip, our flagship MCU licensee, on the definition of our M14K product line, which includes features and enhancements specifically for MCUs. Because of its clear value proposition, the M14K core is rapidly gaining traction in the market, with more than 17 licenses in the short six months that it has been generally available. We are pleased that Microchip is reaffirming its commitment to the MIPS architecture, which offers superior performance, lower power and more advanced features for MCUs than the competition," said Art Swift, vice president of marketing and business development, MIPS Technologies.

About the M14K Core Family

The MIPS32 M14K core family provides high levels of system performance for extremely cost-sensitive embedded applications, such as 32-bit microcontrollers, home entertainment, personal entertainment and home networking. The MIPS32 M14K core and M14Kc™ core with integrated cache-controller are the first MIPS32-compatible cores that also execute the new microMIPS ISA, achieving high performance of 1.5 DMIPS/MHz with an advanced level of code compression. The microMIPS ISA maintains 98% of MIPS32 performance while reducing code size by at least 30%, translating to significant silicon cost savings. With smaller code size and efficient use of the instruction cache to lower the cost, the microMIPS ISA also helps to reduce system power consumption.



To learn more about Microchip and MIPS, visit:
<http://www.microchip.com/PIC32>

[RETURN TO FRONT PAGE](#)

Microchip and Powercast Debut World's First RF Energy Harvesting Kit Enabling Battery-Free, Perpetually Powered Wireless Applications

Combining Powercast's RF Energy Harvesting System and Microchip's eXtreme Low Power PIC® Microcontrollers Eliminates Batteries in a Wide Range of Applications

Microchip announced the **Lifetime Power® Energy Harvesting Development Kit for Wireless Sensors** featuring **PIC® microcontrollers with eXtreme Low Power (XLP) Technology**. Composed of a 3-watt Powercaster™ transmitter as the power source, two P2110 Powerharvester® receiver evaluation boards, two custom-designed wireless sensor boards, the XLP 16-bit development board pre-loaded with jointly developed application software, an **IEEE 802.15.4 transceiver** and other accessories, this kit makes it easy to demonstrate and develop smart-energy, wireless-sensor applications that are reliably and perpetually powered by radio waves – eliminating the need for a battery. The included transmitter can wirelessly power sensor devices from more than 40 feet away.

The main challenges for designers of wireless sensor applications fall into the categories of power, location and wireless communication. Combining Powercast's RF transmitter and receiver energy-harvesting system, which broadcasts and converts RF energy into DC power, with Microchip's XLP PIC microcontrollers, which provide the industry's lowest power consumption in active and sleep modes, solves all three of these design challenges.

Power

Powercast's RF energy harvesting system provides predictable and reliable power, using broadcasted RF energy for wire- and battery-free operation, or to wirelessly charge battery-based systems. In the Lifetime Power kit, the Powercaster transmitter broadcasts RF energy to the Powerharvester receiver, which can be embedded into an OEM's micro-power device. The receiver then converts the RF energy and presents it as a regulated power supply to Microchip's **PIC24F microcontroller**. The recently announced Powercast transmitter included in the kit is approved by the FCC (Part 15) and Industry Canada.

Location

Using broadcasted RF energy as the application's sole power source allows for untethered and battery-free operation in hazardous or inaccessible locations, which would otherwise require labor-intensive or potentially dangerous battery maintenance. Additionally, broadcasted RF energy is controllable (can be scheduled, continuous or on-demand) and works in locations where other potentially intermittent energy-harvesting sources (e.g., solar, vibration and heat) make them unreliable.

Wireless Communication

Microchip's configurable **MiWi™ and MiWi P2P stacks** are efficient and save power by enabling only the most essential wireless communication features. In addition to these proprietary Microchip protocols, the kit's included **MRF24J40 IEEE 802.15.4 transceiver** also supports Microchip's **ZigBee® stacks**. From a functional standpoint, Microchip's RF transceiver allows for continual readings of sensor data, portability and much easier installation than wired communication provides.

In addition to solving these three major challenges, the Lifetime Power kit provides modular development with Microchip's included **XLP 16-bit Development Board**. This flexible platform allows customization for developing applications, and enables faster evaluation, prototyping and time to market.

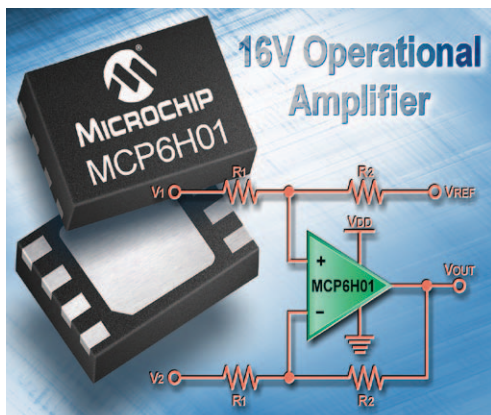


For more information about the RF Energy Harvesting Kit, visit:
www.microchip.com/rfenergyharvesting

[RETURN TO FRONT PAGE](#)

16V Op Amps from Microchip Feature Low Quiescent Current (135 microamperes)

Op Amps Extend Battery Life and Enable Improved Noise Performance for Medical, Automotive, Industrial, Battery-Powered and Other Applications



Microchip recently released the **MCP6H01** and **MCP6H02** (MCP6H01/2) general-purpose operational amplifiers (op amps) with a gain bandwidth of 1.2 MHz and supply voltage from 3.5V to 16V. These devices also feature low quiescent current of 135 microamperes (typical), offset voltage of 3.5 mV (maximum), Common Mode Rejection Ratio (CMRR) of 100 dB (typical), and Power-Supply Rejection Ratio (PSRR) of 102 dB (typical).

The MCP6H01/2 is targeted for applications that operate on voltages up to 16V, such as those in the **medical** (e.g. portable instrumentation, heart- and blood-pressure monitors), **automotive** (e.g. proximity, temperature or flow sensors), and **industrial** (e.g. high-side current sensing in power supplies) markets. These devices also offer high CMRR and PSRR for improved noise performance. Additionally, low current consumption combined with space-saving package offerings make the MCP6H01/2 ideal for portable applications.

Development Support

PCB footprints and schematic symbols are available today from **Microchip's web site**.

The downloads will be available in a neutral format that can be exported to the leading EDA CAD/CAE design tools using the Ultra Librarian Reader from Accelerated Designs Incorporated.



To learn more about these op amps and their various applications, visit:
<http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en547495>

AN1332

Current Sensing Circuit Concepts and Fundamentals

Author: Yang Zhou
Microchip Technology Inc.

INTRODUCTION
 Current sensing is a fundamental requirement in a wide range of electronic applications. Typical applications that benefit from current sensing include:

- Battery life indicators and chargers
- Overcurrent protection and supervising circuits
- Current and voltage regulators
- DC/DC converters
- Circuit fault detectors
- Linear and switch-mode power supplies
- Proportional speed control, linear or PWM
- Medical diagnostic equipment
- Handheld communications devices
- Automotive power electronics
- Motor speed controls and overload protection

This application note focuses on the concepts and fundamentals of current sensing circuits. It introduces current sensing resistors, current sensing techniques and describes three typical high-side current sensing implementations, with their advantages and disadvantages. The other current sensing implementations are beyond the scope of this application note and reserved for subsequent Microchip Technology Incorporated's application notes.

DESCRIPTION
 A current sensor is a device that detects and converts current to an easily measured output voltage, which is proportional to the current through the measured path. There are a wide variety of sensors, and each sensor is suitable for a specific current range and environmental condition. No one sensor is optimum for all applications.

Among these sensors, a current sensing resistor is the most commonly used. It can be considered a current-to-voltage converter, where inserting a resistor into the current path, the current is converted to voltage in a linear way of $V = I \times R$.

The main advantages and disadvantages of current sensing resistors include:

a) Advantages:

- Low cost
- High measurement accuracy
- Measurable current range from very low to medium
- Capability to measure DC or AC current

b) Disadvantages:

- Introduces additional resistance into the measured circuit path, which may increase source output resistance and result in undesirable loading effect
- Power loss since power dissipation $P = I^2 \times R$. Therefore, current sensing resistors are rarely used beyond the low and medium current sensing applications.

White Paper Preview: "Current Sensing Circuit Concepts and Fundamentals"

INTRODUCTION

Current sensing is a fundamental requirement in a wide range of electronic applications.

This application note focuses on the concepts and fundamentals of current sensing circuits. It introduces current sensing resistors, current sensing techniques and describes three typical high-side current sensing implementations, with their advantages and disadvantages.

A current sensor is a device that detects and converts current to an easily measured output voltage, which is proportional to the current through the measured path. There are a wide variety of sensors, and each sensor is suitable for a specific current range and environmental condition. No one sensor is optimum for all applications.

Among these sensors, a current sensing resistor is the most commonly used. It can be considered a current-to-voltage converter, where inserting a resistor into the current path, the current is converted to voltage in a linear way of $V = I \times R$.

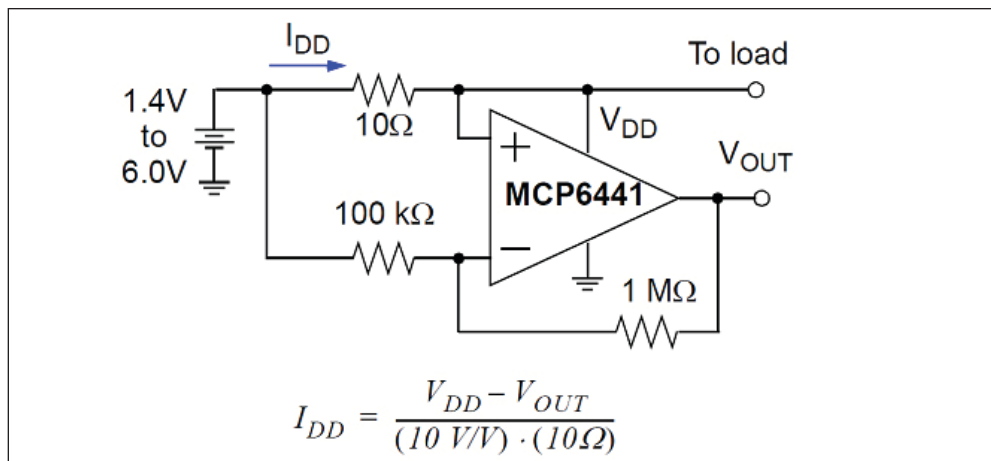
Continue Reading...

To read the full white paper, visit:
<http://ww1.microchip.com/downloads/en/AppNotes/01332A.pdf>

[RETURN TO FRONT PAGE](#)

Battery Power Sensing Using the MCP6441, Nano-power Operational Amplifier

With quiescent currents in the nano ampere range, supply voltage as low as 1.4V and space saving SC70 package, the **MCP6441** is ideally suited for a variety of battery powered and portable applications. One such application is battery power sensing.



The MCP6441 op amp's Common Mode Input Range, which goes 0.3V beyond both supply rails, supports their use in high-side and low-side battery current sensing applications. The low quiescent current (450 nA, typical) helps prolong battery life, and the rail-to-rail output supports detection of low currents. The figure above shows a high side battery current sensor circuit. The 10Ω resistor is sized to minimize power losses. The battery current (I_{DD}) through the 10Ω resistor causes its top terminal to be more negative than the bottom terminal. This keeps the Common Mode input voltage of the op amp below V_{DD} , which is within its allowed range. The output of the op amp will also be below V_{DD} , within its Maximum Output Voltage Swing specification.

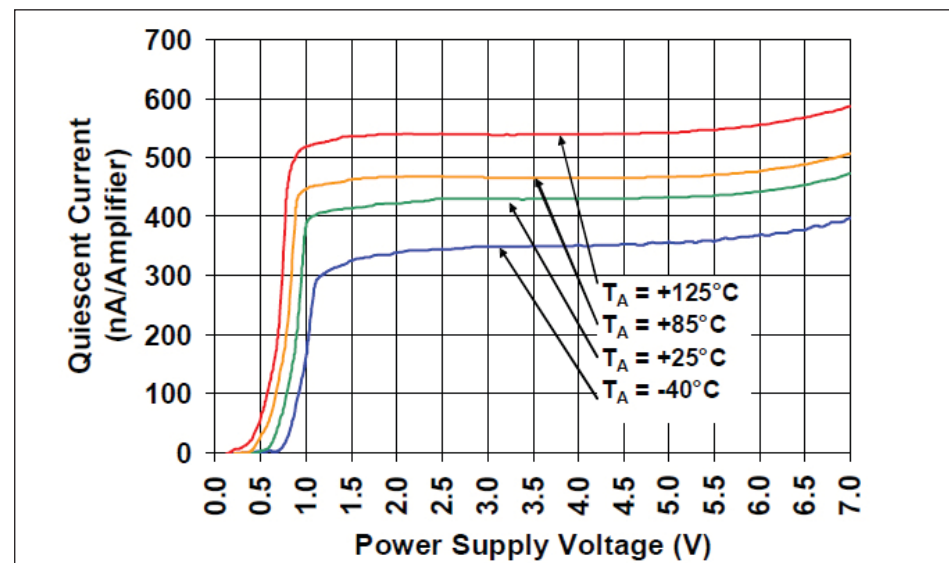


Click below to view the MCP6441 datasheet and product page:

<http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en551077>

MCP6441 Key Features:

- Quiescent current of 450 nA (typ.) at 9 kHz GBWP
- Operating voltage from 1.4V to 6.0V in the extended temperature range (-40°C to +125°C)
- Unity gain stable and Rail-to-Rail Input and Output operation
- Package options: MCP6441 in SOT-23 and SC70



Other target applications include:

- Portable Equipment and Battery Powered System
- Medical Instrumentation
- Data Acquisition Equipment
- Sensor Conditioning

These devices are available for sampling and high volume production.

[RETURN TO FRONT PAGE](#)

Design Guidelines for Robust Touch Sensing Solutions

Capacitive touch sensing solutions are susceptible to any environmental effects that can change the capacitance or voltage on a high-impedance sensor. Common mode noise coupled through the power supply lines, temperature changes, humidity shifts, and radiated emissions can all affect the quality of a system's readings.

Microchip is the only open-source solution available on the market which provides our customers with more control over their capacitive touch application than ever before. Designing an **mTouch™** application that can perform in extreme environments requires that the engineer follow hardware and software design guidelines to maximize the amount of shift seen on the sensor while minimizing parasitic effects such as noise and crosstalk.

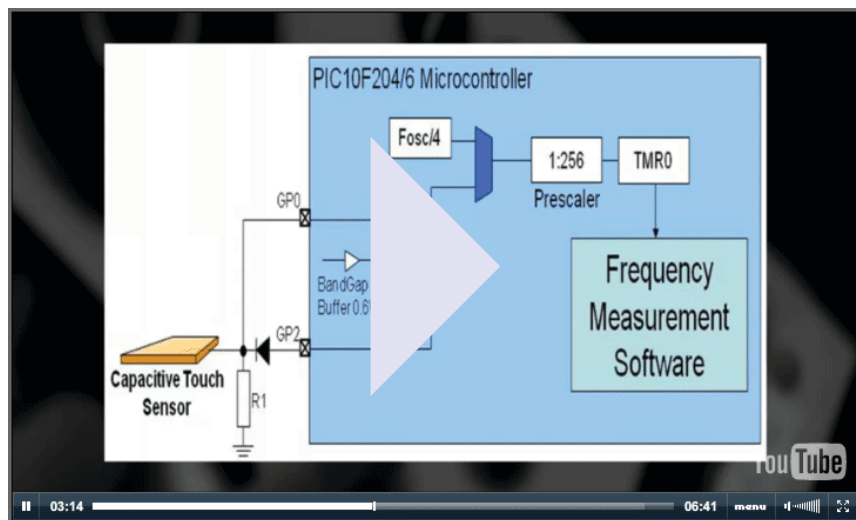
Making this easy has been our focus and we have developed a detailed set of guidelines to help make implementation a straight-forward process that can provide quick and solid results. The "Techniques for mTouch Touch Sensing Design" application note (**AN1334**) has been released. It provides developers with an understanding of capacitive touch noise and how it is injected on the system, hardware design guidelines to limit noise and increase sensitivity, software handling algorithms to perform quality scans, and filtering techniques to further clean the signal.

This application note covers:

- Information on designing the correct size sensor in order to maximize your starting sensitivity
- Many common layout concerns such as:
 - How far to separate multiple sensors to minimize crosstalk
 - Effectively using ground planes to enhance the system's natural noise immunity
 - Using series resistance to limit the ability of noise to affect the pin's internal circuitry and the sensor's signal-to-noise ratio
 - Software techniques including several filters and decoding algorithms are explained so that it completely covers the mTouch design process

Using these techniques, mTouch sensing solutions have passed industry standard tests for conducted and radiated noise immunity such as IEC 61000-4-6 and several more extensive, personalized tests created by our customers.

mTouch Video Resources



mTouch™ Sensing Solutions for Key, Slider & Proximity Sensing
Overview of the Different mTouch™ Capacitive Solutions



mTouch™ Solutions for Analog Resistive Touch Screen
Overview of AR1000 Series Resistive Touch Screen Controller

For more information about our mTouch development products and support, visit:
<http://www.microchip.com/mTouch>

[RETURN TO FRONT PAGE](#)

White Paper Preview – 8-Bit MCUs: Sophisticated Solutions for Simple Applications

Introduction

The 8-bit microcontroller has been around for close to 40 years. In this age of rapidly advancing technology, when electronic devices seem to become obsolete not long after they get to market, that boggles the mind. To what can we attribute such longevity? There are a variety of reasons.

For starters, today's **8-bit microcontrollers** are not the same as first appeared in the early 1970s. They are smaller, faster, cheaper, require less power, are easier to program and offer more features and peripherals. In the early days of 8-bit microcontrollers, 500,000 instructions per second was considered state-of-the-art. Of course, back then, typical clock rates were in the 1-2 MHz range; today's 8-bit units offer a wide range of performance options up to 64 MHz with 16 million instructions per second.

8-bit microcontrollers are optimized for low power and simple code. They will always be the easiest and most cost-effective solution for basic embedded control. The low-cost tools and fast time to market for developing with 8-bit MCUs make them an ideal choice when engineers need to quickly solve problems. The cost optimized 8-bit MCUs have smaller code, lower power and offer more robustness to environmental noise. The amount of integrated memory has also increased dramatically over the years. Microchip's 8-bit portfolio now ranges from 384 bytes of program memory for extremely low cost, simple applications to 128 KB Flash and up to 4 KB RAM for more sophisticated drivers, stacks and libraries. So, even with a low-cost 8-bit MCU, there is plenty of bandwidth to implement an internet radio or a wireless energy monitoring device.

Features and Peripherals

The fact of the matter is, today's 8-bit microcontrollers pack a lot of features into a small, cost-effective package. Take Microchip's **PIC10F2XX** family, for example, which comes in small 6-pin, 2x3 DFN, or SOT-23 packages. Despite being the smallest microcontrollers in the world, these MCUs are helpful for adding smarts to discrete or analog centric legacy designs where previously no electronics were needed.

Microchip's PIC® microcontrollers integrate a broad array of peripherals, which greatly increases the number of potential applications in which they can be used. Most embedded applications require some level of connectivity with other ICs or the outside world. Microchip offers 8-bit MCUs with standard integrated communication's peripherals such as SPI, USART (RS-232/RS-485), I²C™, **CAN** and **LIN**.



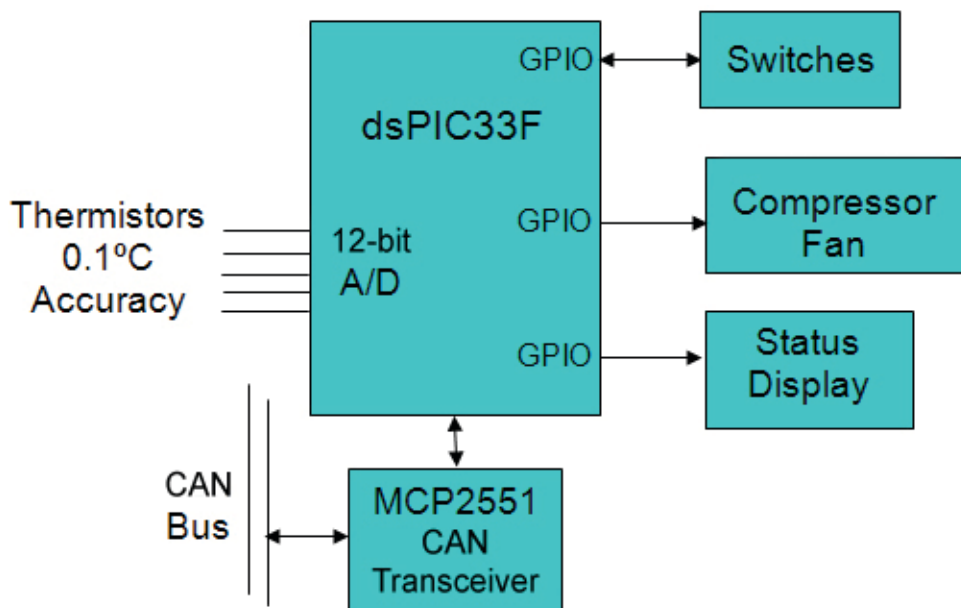
In addition, many PIC MCUs also integrate USB for data logging, remote field upgrades, RS-232 replacement and diagnostic equipment. Microchip's **USB MCUs** include full-speed USB 2.0 operation up to 12 Mbits/sec across 14 to 80 pins and from 8 to 128 KB Flash, from the **PIC18F14K50** family to the **PIC18F87J50** family. All of the USB MCUs are supported by Microchip's free USB drivers and stack. Or you can use the pre-programmed USB to UART bridge, **MCP2200**, to add a USB connection to any PIC MCU.

Many applications are also adding Ethernet connectivity to take advantage of the internet for remote monitoring or control of embedded applications. Designers can choose between Microchip's standalone Ethernet controllers (**ENC28J60** or **ENC624J600**) with on-board MAC and PHY, or their single-chip **PIC18F97J60** solution that integrates the 10 Base-T Ethernet MAC and PHY into the PIC MCU in a single package. Whether you choose the integrated solution or pair the Ethernet controller with a separate PIC MCU, it is easy to add Ethernet connectivity to your 8-bit design using Microchip's free TCP-IP stack and low cost tools. Other integrated peripherals are included to help designers implement stylish and low-cost user interfaces with buttons and displays. For buttons, keys and sliders, **Microchip's mTouch™ sensing solutions** provide a stylish alternative to mechanical buttons for lower cost or robustness to weather, with solutions that work with metal and plastic.

To continue reading this Microchip white paper, visit:
<http://www.eetimes.com>

[RETURN TO FRONT PAGE](#)

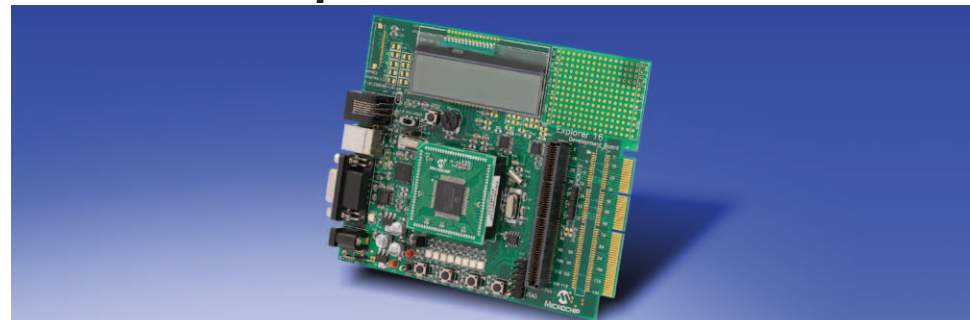
Remote Temperature Monitoring via CANbus



- **12-bit ADC Capability**
- **Integrated CANbus Controller**
- **High Performance MCU**
- **Multiple GPIO support**

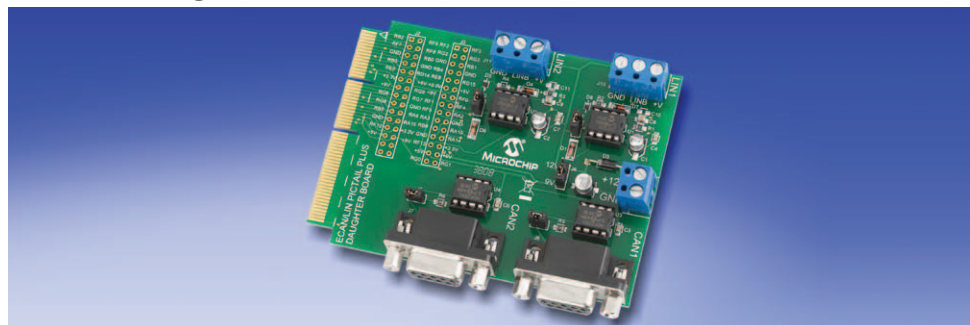
Remote monitoring of various processes is required in many industrial and automotive applications. Utilizing existing system buses makes system integration much easier. In this application the **dsPIC33FJ64GP706A** serves as the temperature monitoring controller for a refrigeration system in a delivery truck. The dsPIC® Digital Signal Controller monitors multiple channels via the integrated 12-bit analog-to-digital converter, monitors the various pressure switches of the refrigeration system, controls the compressor fan, displays current system status, and communicates with the vehicle cab console via the integrated Controller Area Network (CAN) connected to an **MCP2551** CAN Transceiver.

Related Development Boards



Explorer 16 Board

The Explorer 16 is a low cost, efficient development board to evaluate the features and performance of Microchip's new PIC24 Microcontroller, the dsPIC33 Digital Signal Controller (DSC) families, and the new 32-bit PIC32MX devices. Coupled with the MPLAB® ICD 3 In-Circuit Debugger or MPLAB REAL ICE™, real-time emulation and debug capabilities, this board speeds evaluation and prototyping of application circuitry. The Explorer 16 100-pin features two interchangeable Plug-In Modules (PIMs), one each for the PIC24FJ128GA010 and the dsPIC33FJ256GP710 DSC. The Explorer 16 44-pin features a Plug-In Module (PIM) for the PIC24FJ64GA004.



ECAN/LIN PICTail™ Plus Daughter Board

The ECAN/LIN PICTail™ Plus Daughter Board is used with the Explorer 16 Development Board to facilitate rapid implementation and evaluation of applications that use CAN and Local Interconnect Network (LIN) interfaces and are implemented on dsPIC33F Digital Signal Controllers and PIC24H 16-bit microcontrollers.

View the Entire dsPIC33F Family of DSCs here:

http://www.microchip.com/stellent/idcplg?idcService=SS_GET_PAGE&nodeId=2859&dDocName=en545107

[RETURN TO FRONT PAGE](#)

HOW DOES YOUR DESIGN FIT INTO SMART ENERGY?

Whether you're looking to monitor, measure, control, display, convert or use energy more efficiently, Microchip has the latest technologies and products to help you design products for the emerging Smart Energy market.

Microchip's Worldwide Embedded Designers Forum (EDF) is one-day seminar designed to give you the tools and knowledge needed to take your design to the next level and help you stay ahead in today's competitive environment.

Six of nine focused modules featuring the latest technologies in low power, human interface and connectivity will be presented in each seminar. Learn how to apply these technologies into Smart Energy through discussions and demonstrations led by Microchip's expert staff. Modules are packed with practical information and advice on how to achieve the lowest power consumption, add a more stylish user interface, run more complex software, add USB connectivity and save money on development and system BOM cost.

The EDF's in North America ran in October 2010 and a Virtual Conference was held live on November 2nd. The material is available on demand at www.microchip.com/VirtualEDF. The Virtual EDF features all nine modules (and more!). For additional details, please see the sidebar.

MODULES

- Adding USB to your Embedded Designs
- Connectivity Solutions for Embedded Designs
- Touch Screen Sensing and Graphical Displays
- Touch Sensing Solutions for Keys and Sliders
- Smart Energy Monitoring
- Smart Power Conversion
- Designing for Optimum Energy Usage
- Signal Conditioning for Embedded Applications
- Exploring MPLAB® Development Tools

EMBEDDED DESIGNERS FORUM

LIVE • ON DEMAND



THE VIRTUAL EDF

Now available to view online
www.microchip.com/VirtualEDF

Microchip & Digi-Key are pleased to bring an online component to support designers who are unable to attend one of our in-person seminars.

Attendees of the FREE Virtual Embedded Designers Forum learn from and interact directly with industry experts and technology providers via 12 presentations including keynote presentations featuring Energizer® and Google PowerMeter™, interactive chats, a virtual exhibit hall, and gain access to a comprehensive collection of educational material and resources supporting Microchip and the Smart Energy market.

All content from the live event has been archived and is available on-demand for 12 months.



DATES & LOCATIONS

For a complete list of worldwide locations, visit:
www.microchip.com/EDF

Space is still available in Europe and Asia, visit www.microchip.com/EDF for a complete list of locations and dates

- North America**
October 2010 - No Longer Available
- Europe**
November 2010 to March 2011
- Asia**
October 2010 to March 2011



Join the Community!



Facebook Fan Pages

(click on the name to view)

- [Microchip Technology Inc. Fan Site](#)
- [Microchip En Espanol](#)
- [PIC32](#)
- [Regional Training Centers](#)
- [Academic Support Fan Site](#)



- LinkedIn Groups
- [MASTERS](#)
- [Project Analog](#)



microSOLUTIONS is distributed monthly.

HAVE YOU SUBSCRIBED?

If you would like to be added to the mailing list, [CLICK HERE!](#)

Brought to you by:



www.microchip.com/EDF

11th Annual **China MASTERS**
November 8-10 Beijing
November 13-17 Shanghai
November 18-19 Chengdu
Technical Training Conference for Embedded Control Engineers

7th Annual **India MASTERS**
November 25-26 Bangalore
November 29-30 Mumbai
Technical Training Conference for Embedded Control Engineers

[RETURN TO FRONT PAGE](#)

Join Microchip At The Following Worldwide Events

Featuring Leading Edge Technologies & Solutions



**Embedded
Technology 2010**

**Embedded Technology Japan
Yokohama, Japan
Dec 1-Dec 3, 2010**

Join *Microchip* as we present "Designing Low-Voltage, Single-Cell Battery-Powered Applications"

This presentation will demonstrate how the MCP1623/24/40 family of single-cell Alkaline/NiMH input-voltage synchronous boost converters can be used to power PIC® microcontrollers (MCUs). The paper will present features unique to the MCP1623/24/40 converters that can extend battery life while providing a low output-voltage ripple and fast transient responses to sudden changes in line or load. In some options, a dual-mode PWM/PFM system is used to optimize converter efficiency over a wide load range, while in others PWM-only mode is used to minimize output ripple voltage and noise for wireless and audio applications. A unique operating mode enables the input quiescent current for the system to be reduced by an order of magnitude when combining the MCP1623/24/40 with the PIC MCU, by taking advantage of the boost converters' low IQ during shutdown as well as the proprietary, low operating power of the PIC MCU. External component trade-offs will be presented, which enables optimization of the system to meet size, cost and performance requirements.

Register online, today at: <http://www.embeddedtech.net/>

Featuring Leading Edge Technologies & Solutions



**Embedded
Technology 2010**

**Embedded Technology Japan
Yokohama, Japan
Dec 1-Dec 3, 2010**

Be sure to also join us for a presentation on "Developing Digital-Power Applications Using dsPIC® Digital Signal Controllers: A Step-by-Step Approach"

Developing digital-power applications using dsPIC® Digital Signal Controllers (DSCs) is made easy with Microchip Technology's hardware and software development tools, and reference designs. This presentation will take a step-by-step approach to help engineers and engineering managers understand different design methods for digital-power applications design. The presentation will provide a basic introduction to the different tools available from Microchip for digital-power applications. Additionally, the presentation will walk through the step-by-step development of digital-power applications, including interleaved Power Factor Correction, a quarter brick DC-to-DC converter and a grid-interactive micro-grid inverter.

Register online, today at: <http://www.embeddedtech.net/>

**Motor, Drive and
Automation Systems 2011**

Advancements in Motion Control and Power Electronic Technology
MARCH 1-2 • SAN ANTONIO, TEXAS

**Motor, Drive and Automation
Systems 2011
San Antonio, TX
March 1-2, 2011**

Join *Patrick Heath, Strategic Marketing Manager*, as he discusses "Techniques for Improved Stepper Motor Control"

Typical stepper motor control uses an open-loop, voltage-control method, where the faster the voltage ramps in the motor phase, the quicker the step is taken. While this method works well, it is not optimized for energy efficiency nor speed. Using a low-cost, motor-control digital signal controller with comparators, a closed-loop, current-control mode of operation can be implemented. This control method provides a significant step speed increase of up to 25 times faster. At the same time, by controlling the currents, stepper-motor energy consumption is optimized. Another significant advantage of this control technique is a marked reduction in the motor noise level.

Register online at:
<http://www.e-driveonline.com>

Register for one or more of these great events at the links above!

[RETURN TO FRONT PAGE](#)

FEATURED

**MICROCHIP
PREMIER
THIRD-PARTY
PARTNER**

P. R. Glassel

And Associates, Inc.

PRGA specializes in OEM product development for medical, commercial and wireless industries. Services include: concept feasibility, software and hardware engineering, product definition, prototype development and everything in between.

Our experience includes: analog design, digital design, driver development, embedded systems, firmware, FPGA, RF design, wireless systems and ZigBee® protocol development to name a few.

Our staff has considerable industry experience and many team members have dual degrees. Using our staff, enables clients to build relationships and enjoy years of service from the same engineer(s).

PRGA was formed to provide inventive and well-considered engineering solutions for our client's ideas. Since our inception, we have done just that and have enjoyed over 25 years working on extraordinary projects with exceptional clients.

For more information contact:

P.R. Glassel & Associates, Inc.
30255 Fir Trail
Stacy, MN 55079

952-595-PRGA (7742)

sales@prga.com

www.prga.com

P.R. Glassel: Winner of the PIC18 Starter Kit Demo Contest

As the winner of the MPLAB® Starter Kit for PIC18F MCU contest, P.R. Glassel's code will be featured in the next version of the demo software shipped with the MPLAB Starter Kit for PIC18F MCU (Part # DM180021).

The demo application uses the 2-axis accelerometer on the MPLAB Starter Kit for PIC18F MCU board to act as a real-time 2-axis level. The OLED display shows a bubble that “floats” as you tilt the board, simulating a traditional spirit level. Internally, the demo has examples of digital filtering using integer arithmetic, adding a device interface for the OLED display controller, and how to draw a circle on the display. There is also an analysis of expected performance of the level with rationale behind the digital filtering techniques used.

The MPLAB Starter Kit for PIC18F MCU provides an all-in-one solution for debugging and programming applications using Microchip's own MPLAB Integrated Development Environment (IDE). A USB connection to a host computer supplies communications and power to the board; no additional external power supply is needed.

The MPLAB Starter Kit for PIC18F MCU includes integrated debug and programmer circuitry that allows applications to be programmed onto the application side of the PIC18F MCU and then debugged, all using MPLAB IDE. The need for an additional programmer or hardware interface has been completely eliminated.

The application side of the starter kit contains a range of hardware components to demonstrate the utility and the processing power of Microchip's PIC18F46J50 family USB microcontrollers.

The MPLAB Starter Kit for PIC18F MCU also includes:

- On-board capacitive touch sense pads to demonstrate a USB mouse, joystick or mass storage device
- A MicroSD™ memory card, potentiometer, acceleration sensor and OLED display
- Microchip's FREE USB bootloader and software framework



For more details on the MPLAB Starter Kit for PIC18 MCU, please visit:
www.microchip.com/pic18starter

[RETURN TO FRONT PAGE](#)

FEATURED



**MICROCHIP
PREMIER
THIRD-PARTY
PARTNER**



Trace Systems Inc, based in the USA, is proud to be a Microchip Premier Third Party Partner.

They are dedicated to making great software tools to help developers communicate data between their devices and a PC, using USB or Ethernet.

Need something special? Windows® software to control your hardware? USB? Embedded web devices? Call them!

They can help!

For more information, contact:

Trace Systems, Inc.
359 Rudder Road
Shepherdstown, WV 25443

1-888-474-1041
drbob@tracesystemsinc.com

www.tracesystemsinc.com



Trace Systems Expands its Line of Powerful USB and Ethernet Connectivity Tools

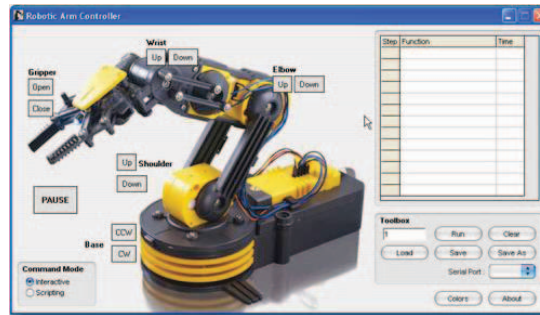
New Simple Upgrade Management SYSTEM aims to make field upgrades of your firmware “Push-Button Easy.”

Trace Systems Inc. has now included Simple Upgrade Management SYSTEM, or SUMS for short to its HIDmaker FS software tool for USB developers and TCPmaker software tool,

More than just a PIC® Microcontroller bootloader, SUMS is a seamlessly integrated, mechanized, expandable SYSTEM for managing and performing field upgrades across your whole product line. SUMS Upgrade Manager can send out your firmware in encrypted files that also contain your unique company ID (provided by Trace), a hardware model ID you make up, and a serial number for each product unit. Upgrade manager collects all the files together into a WinZip® archive, mail merges customer information into an email cover letter, and actually sends out the email with the zip file attachment to your customer. This can save companies a huge amount of time and effort.

When used in Developer Mode, each SUMS Bootloader offers the professional features that you need. Easily build up a manufacturing image hex file that contains SUMS bootloader code, your main app code, company ID and model ID. Program this information into all chips for an efficient manufacturing process, then use SUMS to burn in unique serial numbers as a last step. As your product line grows, just add more SUMS bootloaders for different processors and connectivity types. This system grows with your product line.

See what others have done with Trace Systems' tools. (YOU can, too!)



“**HIDmaker** is a valuable time saver, it writes USB code for host and peripherals without you needing to know USB code or protocols. Better than this is the technical support offered by Trace Systems.”

– John Iovine, Images Scientific Instruments



“**TCPmaker** really makes the Microchip Stack an easier piece of software to actually USE. I still am amazed by how quick and easy it is to revise the web pages and add content.”

– John Markland, CTI

[For more information about SUMS, please click here](#)

[RETURN TO FRONT PAGE](#)

New Online Microchip Training Initiatives

For any training program to be effective it needs to provide the right information at the right time in the right place to the right people. The more these conditions aren't met, the less effective the training becomes. To help our customers get the most from the technical training we offer, Microchip is rolling out two new training initiatives to supplement the courses given in our network of Regional Training Centers (RTC) and by third party trainers.

While classroom based training is a great opportunity to interact with a knowledgeable instructor, its effectiveness can be hampered by the need to travel to the classroom. If the knowledge you need is not available in a convenient location when you want it, the costs and time associated with travel may make attendance impractical. To help overcome this obstacle, Microchip is now offering several RTC courses via the internet using Microsoft Live Meeting. These are the same instructor led classes optimized for online delivery. You don't need to wait for a particular class to come to your town or travel to attend: take the class when you need it from the convenience of your office or home.

To see the schedule of live online classes, visit: www.microchip.com/rtc and select "Find classes > Search" in the "By Location" section of the search page.

Select the "Show Live Online Classes Only" radio button and click Search. After registering for a class, your access code and instructions will be sent in the confirmation email.

Microchip is currently in the process of creating self-paced instructional modules that can be taken "on demand" at your convenience. If all you really need is some specific information or instruction on how to perform a simple task; like how the UART operates or how to set a break point in MPLAB® IDE, we urge you to try these modules. The first of these will appear near the end of the year and will be focused on our new development platform MPLAB X.

These new programs continue Microchip's objective of giving our customers the freedom to innovate.



MICROCHIP

Regional Training Centers



For a complete list of classes and locations, visit www.microchip.com/RTC

[RETURN TO FRONT PAGE](#)

WHAT'S New IN MICROCHIP LITERATURE?

Visit our **Technical Documentation** page at www.microchip.com to view the documents.

Doc. Type	Doc. Title	DS No.
Application Note	Optimizing Battery Life Using the MCP1640	01337A
	A Complete Electronic Watch Based on MCP79410 I ² C™ RTCC	01355A
	Using the Alarm Feature on the MCP79410 RTCC to Implement a Delayed Alarm	01364A
	MCP79410 Best Practices/Recommended Usage Application Note	01365A
	Porting the Helix MP3 Decoder Onto Microchip's PIC32MX 32-bit MCUs	01367A
Data Sheet	TC1270A/70AN/71A Voltage Supervisor with Manual Reset Input Data Sheet	22035C
	MCP1801 Data Sheet	22051D
	MCP1802 Data Sheet	22053D
	TC1264 Data Sheet	21375D
	TC2117 Data Sheet	21665D
	TCN75A 2-Wire Serial Temp. Sensor Data Sheet	21935D
	12-bit, Quad Digital-to-Analog Converter with EEPROM Memory Data Sheet	22187E
	MCP79410 I ² C RTCC with EEPROM, SRAM Unique ID and Battery Switchover Data Sheet	22266A
	PIC18F/LF1XK50 Data Sheet	41350E
	dsPIC30F2011/2012/3012/3013 Data Sheet	70139G
	User's Guide	AAAA LCD Clock Demo User's Guide
16-bit Language Tools Libraries		51456G
MCP3901 ADC Evaluation Board for 16-bit MCUs User's Guide		51845B
Single Quadruple-A Battery Boost Converter Reference Design		51922A
Backlight LED Demo Board User's Guide		51930A
Technical Brief	MCP79410 Technical Brief	93065A
Product Brief	MCP9833 Product Brief	41445A
	SST Product Selection Guide - Fall 2010	01356A
	SST 25 Series - SPI Serial Flash Product Brief	01357A
	SST 26 Series - Serial Quad I/O™ (SQI™) Flash Memory Product Brief	01358A
	SST 38 Series - Advanced MPF+ Product Brief	01359A
	SST 39 Series - Multi-Purpose Flash™ (MPF™) & Multi-Purpose Flash Plus (MPF+) Product Brief	01360A
	SST 49 Series - LPC Firmware Flash/Firmware Hub Product Brief	01361A
	SST 89 Series - FlashFlex® Microcontrollers Product Brief	01362A

Doc. Type	Doc. Title	DS No.
Family Reference Manual	PIC24F Family Reference Manual, Section 50. Program Code Security	39738A
	PIC32MX Family Reference Manual, Section 31. DMA Controller	61117F
Errata	PIC18F97J60 Family Silicon Errata and Data Sheet Clarification	80433C
	dsPIC33FJ06GS101/X02 and dsPIC33FJ16GSX02/X04 Family Silicon Errata and Data Sheet Clarification	80439H
	PIC24HJ32GP302/304, PIC24HJ64GPX02/X04 and PIC24HJ128GPX02/X04 Family Silicon Errata and Data Sheet Clarification	80441F
	dsPIC33FJ32MC302/304, dsPIC33FJ64MCX02/X04 and dsPIC33FJ128MCX02/X04 Family Silicon Errata and Data Sheet Clarification	80442F
	dsPIC33FJ32GP302/304, dsPIC33FJ64GPX02/X04 and dsPIC33FJ128GPX02/X04 Family Silicon Errata and Data Sheet Clarification	80443F
	dsPIC30F2010 Family Silicon Errata and Data Sheet Clarification	80451E
	dsPIC30F5011/5013 Family Silicon Errata and Data Sheet Clarification	80453E
	dsPIC33FJ32GP202/204 and dsPIC33FJ16GP304 Family Silicon Errata and Data Sheet Clarification	80460D
	dsPIC33FJ12MC201/202 Family Silicon Errata and Data Sheet Clarification	80461E
	dsPIC33FJ12GP201/202 Family Silicon Errata and Data Sheet Clarification	80462E
	dsPIC33FJ32MC202/204 and dsPIC33FJ16MC304 Family Silicon Errata and Data Sheet Clarification	80463D
	dsPIC33FJ64MCX06A/X08A/X10A and dsPIC33FJ128MCX06A/X08A/X10A Family Silicon Errata and Data Sheet Clarification	80464D
	dsPIC33FJ64GPX06A/X08A/X10A and dsPIC33FJ128GPX06A/X08A/X10A Family Silicon Errata and Data Sheet Clarification	80465D
	PIC24HJ12GP201/202 Family Silicon Errata and Data Sheet Clarification	80466E
	PIC24HJ32GP202/204 and PIC24HJ16GP304 Family Silicon Errata and Data Sheet Clarification	80467D
	PIC24HJ64GPX06A/X08A/X10A and PIC24HJ128GPX06A/X08A/X10A Family Silicon Errata and Data Sheet Clarification	80468D
	PIC16F/LF1933 Errata	80490F
	PIC18F47J13 Family Silicon Errata and Data Sheet Clarification	80503B
	PIC18F47J53 Family Silicon Errata and Data Sheet Clarification	80506B
	Programming Specification	PIC18F2XXX/4XXX Family Flash MCU Programming Specifications
dsPIC33F/PIC24H Flash Programming Specification		70152H
dsPIC30F SMPS Flash Programming Specification		70284C

The Microchip name and logo, the Microchip logo, dsPIC, KeeLoq, KeeLoq logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rPIC and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MXDEV, MXLAB, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A. Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP.Mindi, MiWi, MPASM, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Octopus, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICKit, PICtail, REAL ICE, rLAB, Select Mode, Total Endurance, TSHARC, UniWinDriver, WiperLock and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. SQTP is a service mark of Microchip Technology Incorporated in the U.S.A. All other trademarks mentioned herein are property of their respective companies.

© 2010, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

[RETURN TO FRONT PAGE](#)

What's New @ **microchip** **DIRECT**

Are you having problems getting inventory? Buy Direct From Microchip Technology using **microchipDIRECT**

Microchip offers the most comprehensive on-line resource for pricing, ordering, inventory and support directly from Microchip Technology. **microchipDIRECT** offers...

- The largest inventory of Microchip products
- Secure ordering using SSL (Secure Socket Layer)
- Competitive pricing on all Microchip and third party products
- Apply for a Microchip business account and credit line
- High volume price quotes
- Assign PO and internal part numbers to your orders
- Schedule and change order delivery dates up to 12 months out
- Change/add multiple ship to locations to your account
- Check order history and delivery status on-line and much more...

www.microchipDIRECT.com

Would you also like secure programming directly from Microchip?

microchipDIRECT allows you, regardless of order size, to have your application code programmed into a PIC® microcontroller prior to delivery.

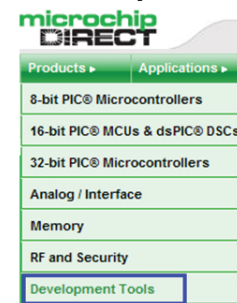
- Receive low-cost and secure microcontroller programming directly from the Microchip factory with ink dotting, labeling and tape and reel options
- Seamlessly integrated into your microchipDIRECT account
- Code verification service prior to production
- Cost-effective
- No unit minimum order requirements
- Quick-turn fulfillment (programmed orders typically ship within 48 hours)

www.microchipDIRECT.com/programming

microchipDIRECT Now Makes It Easier To Find 3rd Party and Academic-Friendly Development Tools!

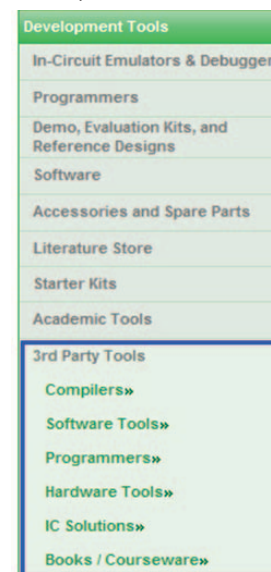
Two new categories have been added to www.microchipDIRECT.com making it easier to find 3rd Party Development tools that compliment Microchip's solutions and low-cost, academic-friendly tools for educators and students. How to access the new categories:

Select the products pull-down menu:



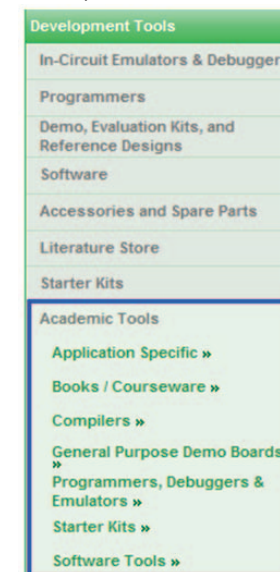
3rd Party Tools

Select 3rd Party Tools from the Development Tools Menu:



Academic Tools

Select Academic Tools from the Development Tools Menu:



[RETURN TO FRONT PAGE](#)