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## 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.

Please visit our web site at [www.microchip.com/EDF](http://www.microchip.com/EDF) to see which six modules will be presented live in your area. All nine modules (and more!) are available in the Virtual EDF (See side bar).

### 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

Brought to you by:



**THE VIRTUAL EDF**  
NOVEMBER 2, 2010  
7 AM - 3 PM PST

[www.microchip.com/VirtualEDF](http://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 is then archived and available on-demand for 12 months.



### DATES & LOCATIONS

For a complete list of worldwide locations, visit:

[www.microchip.com/EDF](http://www.microchip.com/EDF)

| City              | Date  | Location                           |
|-------------------|-------|------------------------------------|
| Atlanta, GA       | 10/21 | Hilton Garden Inn Sugarloaf        |
| Boston, MA        | 10/27 | Microchip Training Center          |
| Chicago, IL       | 10/20 | Microchip Training Center          |
| Dallas, TX        | 10/27 | Microchip Training Center          |
| Denver, CO        | 10/26 | Courtyard Boulder Louisville       |
| Detroit, MI       | 10/27 | Courtyard Detroit Farmington Hills |
| Indianapolis, IN  | 10/26 | Hilton Garden Inn Fishers          |
| Montreal, QC      | 10/21 | Holiday Inn Montreal Airport       |
| Orange County, CA | 10/26 | Microchip Training Center          |
| Orlando, FL       | 10/28 | Embassy Suites Airport             |
| Philadelphia, PA  | 10/29 | Marriott Philadelphia West         |
| Raleigh, NY       | 10/26 | Hilton Raleigh-Durham Airport      |
| Rochester, NY     | 10/28 | Holiday Inn Rochester Airport      |
| San Diego, CA     | 10/28 | Country Inn & Suites Mira Mesa     |
| San Jose, CA      | 10/21 | Microchip Training Center          |
| Tempe, AZ         | 10/19 | Microchip Training Center          |
| Toronto, ON       | 10/19 | Microchip Training Center          |



All attendees of the one-day, live seminar will receive a **Single Cell (AAAA Battery) Demo Board!**

**Low Power Real Time Clock with mTouch™ Sensing Technology**

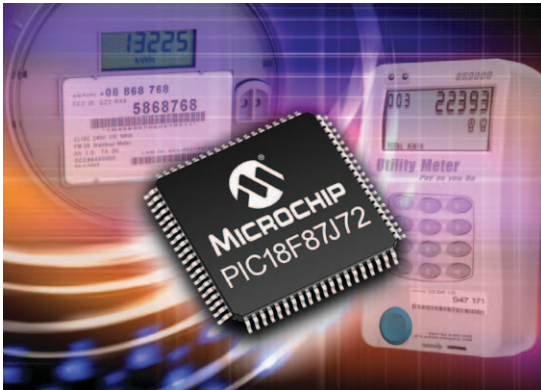


- MCP1624 Low Voltage Boost
- AAAA Energizer Battery
- PIC16LF1933
- MCP9701A Temperature Sensor
- Two mTouch Sensing Buttons

[www.microchip.com/EDF](http://www.microchip.com/EDF)

# Microchip Unveils PIC® Microcontrollers for Single-Phase, Multi-Function Smart-Metering and Energy-Monitoring Applications

*PIC18F87J72 Family Features High-Performance 16-/24-bit Analog Front End and 64–128 KB Flash Program Memory; Enables Meters Exceeding IEC Class 0.5 Performance*



Microchip has announced the 8-bit **PIC18F87J72** Microcontroller (MCU) family for single-phase, multi-function smart-metering and energy-monitoring applications. Featuring a dual-channel, high-performance 16-/24-bit Analog Front End (AFE), the new MCUs provide an accurate, reliable, easy-to-use and cost-effective solution for developing meters that exceed International Electrotechnical Commission (IEC) class 0.5 performance. The family includes 64 or 128 KB Flash program memory and 4 KB RAM, to enable time-of-use and multi-tariff functions; as well as a high level of peripheral integration, including a LCD driver, hardware Real-Time

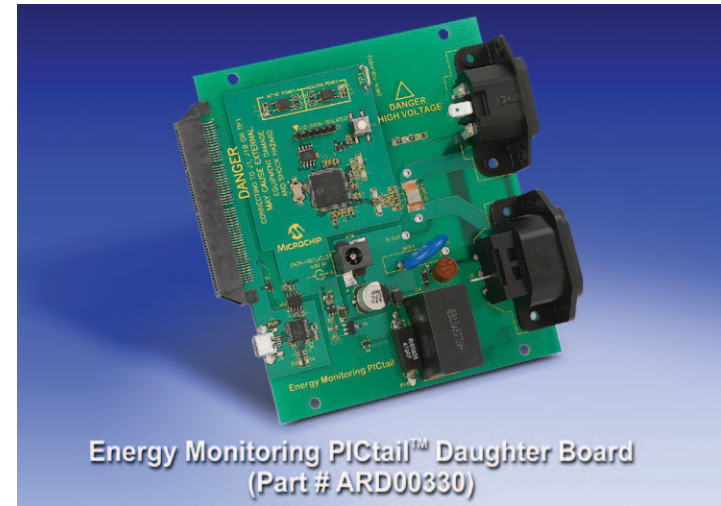
Clock/Calendar (RTCC) and a Charge-Time Measurement Unit (CTMU) that enables a capacitive-touch user interface. Energy-calculation firmware, a development board and a reference design are available, providing a complete solution that lowers costs and shortens time to market for a variety of smart-metering and energy-monitoring applications.

The PIC18F87J72 MCU family addresses market demands for an integrated smart energy metering and power-monitoring MCU. These new MCUs expand Microchip's existing energy-metering and power-monitoring portfolio. Customers now have the option of selecting the PIC18F87J72 MCU with AFE for small size, or a separate Microchip **MCP390X** AFE with a standard PIC® MCU for maximum flexibility.

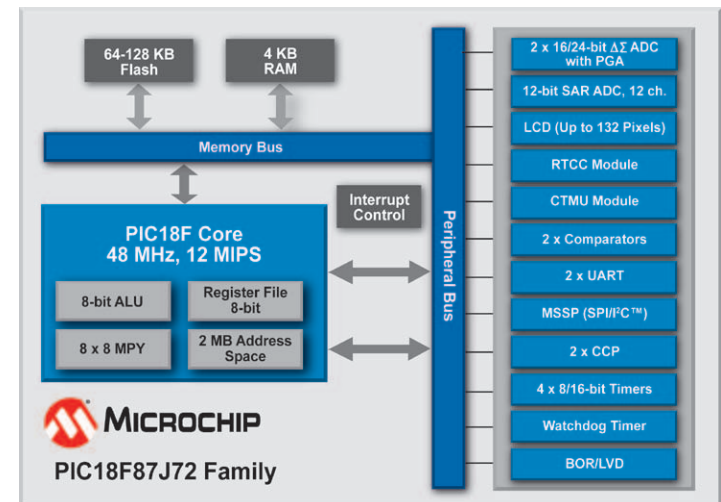
The PIC18F87J72 Single-Phase Energy-Meter Reference Design (Part # ARD00280) can be obtained through Microchip sales representatives for evaluation, today. Featuring a shunt-based single-phase meter with energy-calculation firmware and GUI-assisted software calibration, the reference design enables calculation of active/reactive energy, forward/reverse energy, active/reactive/apparent power and RMS current/Voltage.

Customers can reuse or customize the free firmware for their needs, which further shortens time to market and enables them to differentiate their products in the marketplace. The firmware, PC software and Gerbers are available for **download** today.

Additionally, the PIC18F87J72-based Energy Monitoring PICtail™ Daughter Board (part # ARD00330) can be plugged into Microchip's Explorer 16 Development Board (part # DM240001) for easy development of energy-measurement and monitoring devices. The PICtail board is expected to be available in November 2010.



Energy Monitoring PICtail™ Daughter Board  
(Part # ARD00330)



For more information, visit:

<http://www.microchip.com/wwwproducts/Devices.aspx?dDocName=en550260>

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## Microchip's DC/DC Converter Reference Designs Enable Greater Energy Efficiency Through Digital Power

Free Reference Designs Based on dsPIC33F 'GS' Family of Digital Signal Controllers Make it Easy to Lower Product Cost, Increase Power Output and Improve Efficiency

Microchip has announced two new digitally controlled DC/DC converter reference designs with advanced, high-efficiency topologies.

Complete documentation—including software, Gerber files, MATLAB® models, Webinars and application notes – can be downloaded for free today at Microchip's **Switch Mode Power Supply (SMPS) Design Center**, for the following reference designs:

- **Quarter Brick DC/DC Converter Reference Design**
- **DC/DC LLC Converter Reference Design**

DC/DC converter designers are faced with a number of challenges to optimize a set of contrasting requirements in the design process, including efficiency, power density (i.e., size of the converter) and cost. Microchip's two new reference designs provide advanced digital techniques that enable designers to optimize these requirements quickly and easily. Additionally, these reference designs are applicable to a diverse set of end products in both board-mounted and external DC/DC converters, for the server, telecom, industrial, medical and aerospace markets.

Both reference designs are implemented using Microchip's **dsPIC33F 'GS'** series of digital-power Digital Signal Controllers (DSCs), which provide full digital control of the power-conversion and system-management functions. As demonstrated in these reference designs, the dsPIC33F 'GS' DSCs allow designers to easily and cost effectively create products using advanced topologies, such as LLC resonant, which lower switching losses and boost efficiencies as high as 95%.

Microchip's new reference designs enable customers to develop the most advanced, fully digital DC/DC converters quickly and economically. By using the features in the dsPIC33F 'GS' series of DSCs, designers can improve efficiency, lower the cost of their DC/DC converter products, lower carbon footprints and ease the burden on the world's strained power grids.

Both reference designs support intelligent control of the power converter and serial system communication, enabling remote control and monitoring. The designs also include full fault protection, and can be easily configured for operating specifications and custom features, via the fully programmable dsPIC33F 'GS' DSC.

### Quarter Brick DC/DC Converter Reference Design:

- Quarter Brick Size
- Phase Shift Full Bridge (PSFB) Topology
- 200W Output Power
- Input Voltage 36-76 Vdc, Output Voltage 12V
- Greater than 93% Efficiency

### DC/DC LLC Converter Reference Design:

- LLC Resonant Topology
- 200W Output Power
- Input Voltage 350-420 Vdc, Output Voltage 12V
- Greater than 95% Efficiency



For more information, visit: <http://www.microchip.com/SMPS>

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## Microchip Celebrates Shipment of 1 Millionth Development Tool; Sold During 14th Annual MASTERS Technical Training Conference

Microchip sold its one millionth development tool during the 14th annual Worldwide MASTERS Conference – the premier technical training event for embedded-control engineers held in Phoenix, AZ. To celebrate this milestone, Microchip honored **Mike Nicholson**, Engineering Manager from Price Electronics in Winnipeg, Canada, as the recipient of its one millionth tool. “We’ve been using Microchip development tools and PIC® microcontrollers since 1999,” Nicholson said. “We fell in love with Microchip’s development tools and support, and a lot of their application notes have really helped us with our designs. We’ve learned a ton over the last three days at the MASTERS Conference. It’s great to have the 1 millionth development tool in hand, and we look forward to using it.”

Microchip development tools comprise software and hardware that is used to design applications with Microchip’s semiconductors. The announcement reinforces the industry’s continued acceptance of Microchip’s tools by embedded design engineers, who increasingly seek to simplify code development while reducing their tool investments. Microchip has a reputation for providing the industry’s best tools and support, and the shipment of the one millionth development tool demonstrates that embedded designers have found this reputation to be well founded.

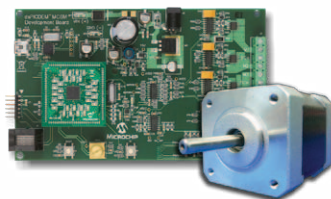
From evaluation kits, programmers and in-circuit debuggers to state-of-the-art in-circuit emulators that run full speed with tomorrow’s highest speed technologies, our **MPLAB®** tools offer simplicity, power and affordability. Microchip stands alone among semiconductor companies by offering a universal and truly integrated development environment that supports the entire line of 8-bit, 16-bit and 32-bit PIC microcontrollers, and dsPIC® digital signal controllers, ranging from 6-pin to over 100-pin devices.



Mike Nicholson

## Motor Control Tuning Guide Sweepstakes!

Enter to WIN a Motor Control Development Tool  
10 Chances to Win!



dsPICDEM™ MCSM Stepper Motor  
Development Board Kit  
part # **DM330021**  
(includes motor and power supply \$270 value)

Complete these 4 easy steps to enter the Motor Control Tuning Guide Sweepstakes and get your discount coupon for 20% off motor control development tools.

- 1) [Register](#) to receive a 20% off discount coupon for Microchip motor control development tools.
- 2) [Select and download](#) the Application Note and Tuning Guide for your motor control application.  
[New dsPIC® DSC Motor Control Tuning Guides!](#)
- 3) Use the Tuning Guide to adjust the software control parameters to your motor and application.
- 4) [Click here](#) to provide feedback on your tuning experience and be entered in a drawing to win a free tool!



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# CMOS vs. Bipolar Operational Amplifiers: Which is Best for My Application?

Today's system designer has many choices when it comes to selecting operational amplifiers (op amps). The three largest op amp manufacturers collectively have over sixteen hundred products to choose from, not including specialty amplifiers! How does one go about sorting through this overwhelming number of devices? A way to narrow the selection is to start by selecting the proper process technology. Most manufacturers clearly label an operational amplifier as CMOS, bipolar or even BiCMOS, but what does this mean in regard to the actual application?

## Power Consumption

CMOS is known for lower power, as the transistors only draw current when switching states. However, this power advantage is only true for slower amplifiers. As the bandwidth increases, a CMOS amplifier's current increases dramatically, and soon draws more current than a comparable bipolar amplifier. Because of the exponentially increasing current in order for CMOS to achieve high speeds, bipolars are typically better suited for high-bandwidth, high-slewing applications. For lower-bandwidth applications, CMOS amplifiers can still provide power advantages.

## Noise Performance

In terms of flicker or  $1/f$  noise, CMOS transistors have worse low-frequency noise than bipolar transistors. At low frequencies, this noise is dominated by irregularities in the conduction path and noise due to the bias currents within the transistors. In a bipolar transistor, the conduction path is buried down inside the silicon. On a CMOS transistor, the current flow is near the surface, making it susceptible to defects in the surface of the silicon, which increases the low-frequency noise. At higher frequencies,  $1/f$  noise is negligible as the white noise from other sources begins to dominate. CMOS transistors have a lower transconductance relative to similarly sized bipolar transistors, which results in higher broadband noise. In general, bipolar op amps hold an inherent advantage over CMOS when it comes to noise performance.

## Voltage Offset

An important amplifier specification is input offset voltage. This error voltage can vary from microvolts up to millivolts, and is highly dependent upon how well-matched input transistors are. Bipolar transistors offer better matching, resulting in lower offset voltages for a given architecture. Some manufacture's compensate for this inherent mismatch by using laser trimming, fuses or even EPROM. These techniques can improve an amplifier's performance significantly, regardless of the process technology. Better matching also results in less voltage-offset drift over temperature, which is an important consideration in many applications.

## Price/Packaging

Historically, CMOS is known as a more cost-effective technology. This is mainly due to traditionally lower wafer costs, driven by the high volume of CMOS logic chips. Despite the lower wafer costs, for a given current capability, CMOS transistors take up more silicon area than bipolar transistors, resulting in a larger silicon die. So even though the wafer costs may be lower, there are less die per wafer, thus negating the cost benefit. In the end, the cost structure of these two process technologies is very similar. A larger silicon solution also limits a manufacturer's packaging options. This can be a significant limitation, as system designers are constantly tasked with placing more performance and functionality into smaller and smaller form factors. Several packages such as those with Ball Grid Arrays and leadless packages are helping to address this situation.

## Input Bias Current

All amplifiers have a specification called input bias current. This is the amount of current flow into the inputs of an amplifier to bias the input transistors. This current can be thought of as leakage current, but is referred to as bias current when on the inputs of an amplifier. This bias current can range from peco amperes to hundreds of nano amperes. Amplifiers with a CMOS input stage generally have less bias current when compared to an amplifier with bipolar input transistors, typically around 1 pA, while bipolar transistors can be orders of magnitude higher. This bias current is converted into a voltage through the input resistance of the circuitry and will result in an error voltage at the output of the amplifier. The less bias current, the better, and in this regard CMOS has a distinct advantage.

## Which process is best for amplifiers?

Bipolar amplifiers are grounded in history, but CMOS amplifiers offer some inherent advantages. BiCMOS processes are the relative newcomers to the field, but this hybrid technology takes the best of both worlds and provides superior performance at a price point that is becoming more and more competitive. So in the end, the answer to the question of which process is better for amplifiers is "it depends," which is why this topic continues to be debated. System designers must evaluate the function of the amplifier in their system and determine which specifications are most critical. There is no universal amplifier or process technology that addresses all of the many applications in which op amps are found. This is why manufacturers will continue to provide a multitude of amplifiers on a variety of process technologies. It is up to the system designer to determine which one is best, for the given application.

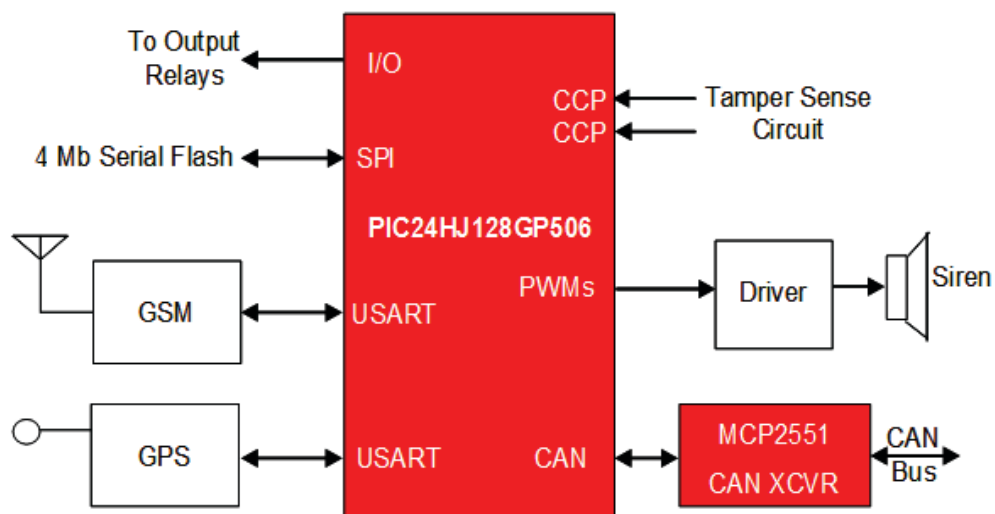
For more information, visit:

<http://www.microchip.com/ParamChartSearch/chart.aspx?mid=10&lang=en&branchID=11015>

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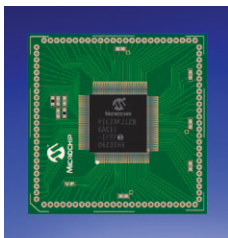
# GPS / GSM Auto Alarm



- **PIC24H with integrated CAN Controller**
- **40 MIPS of performance and 8 KB of on-chip SRAM**
- **Flexible peripheral mix**

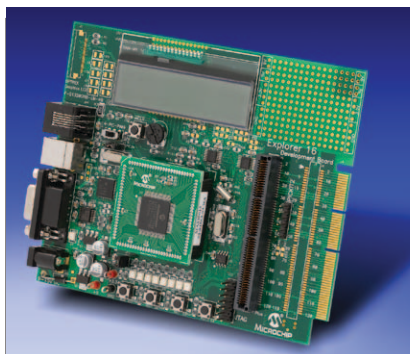
This auto alarm alerts a sensor trip via local audible notification and a GSM cellular call. The system can also be tracked via GPS. The **PIC24H** provides an easy to use integrated CAN 2.0B controller and is coupled with Microchip's **MCP2551** transceiver in this design to communicate alarm conditions to critical systems of the vehicle. The **PIC24HJ128GP506** includes 2 UARTS (used for GPS and GSM interface here), 2 SPI, 2 12c™, 8 Capture/Compare/PWMs and general purpose I/O to drive system relays.

View the Entire PIC24H Product Line [here](#).



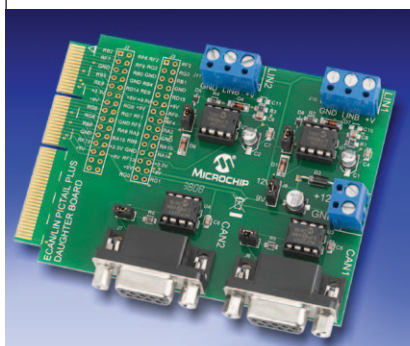
## PIC24H Plug-In Module

This Plug-In Module comes with a 100-pin **PIC24HJ256GP610** MCU sample. Use this PIM with the Explorer 16 Development Board (DM240001).



## Explorer16 Board

The Explorer 16 is an efficient low cost, 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. Speed evaluation and prototyping of application circuitry using the real-time emulation and debug capabilities of the MPLAB ICD 3 In-Circuit Debugger or MPLAB REAL ICE emulator.



## ECAN/LIN PICTail™ Plus

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 Controller Area Network (CAN) and Local Interconnect Network (LIN) interfaces and are implemented on dsPIC33F Digital Signal Controllers and PIC24H 16-bit microcontrollers.

## Visit The Automotive Design Center

Learn about  
Microchip's solutions  
for your Automotive  
design needs



[www.Microchip.com/Automotive](http://www.Microchip.com/Automotive)

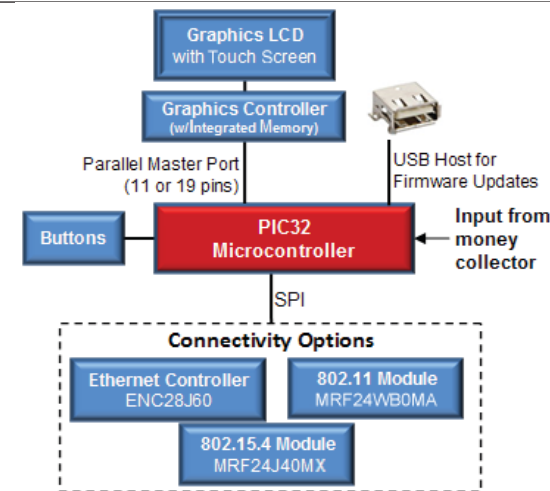
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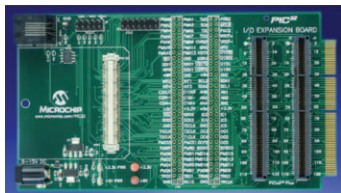
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# Next Generation Vending Machines

Vending machines require frequent inventory stocking and are unattended, thus, exposed to mischievous consumers. To reduce operating costs operators can use existing networks to monitor stocking levels from a remote location only sending workers when required. The public nature of vending machines leaves them vulnerable to unscrupulous individuals seeking free product. An easy way to counter this is to update the firmware using a bootloader via a simple USB flash drive or network connection. These technologies are easily added using Microchip's low-cost PIC32 MCU family and free USB and TCP/IP software.



## Development Tools:



### PIC32 USB Starter Board

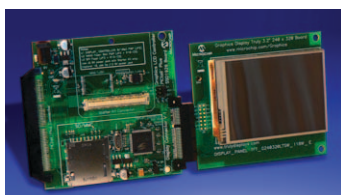
The PIC32 USB Starter Board provides the easiest and lowest cost method to experience the USB On-The-Go family of PIC32 microcontrollers. Users can develop USB embedded host, device, dual-role or On-The-Go applications by combining this board with Microchip's free USB software (On-The-Go support provided in a future software release). The USB Starter Board has the same form

factor and expansion connector as the PIC32 Starter Kit (# DM320001). New in **MPLAB**® 8.10 is support for the 32-bit edition of Microsoft Windows® Vista™, with support for the 64-bit edition currently in development for a future release. Windows XP and Windows 2000 are also supported.



### PIC32 I/O Expansion Board

The PIC32 I/O Expansion Board provides starter kit and starter board users with full access to MCU signals, additional debug headers and connection of PICTail™ Plus daughter cards. MCU signals are available for attaching prototype circuits or monitoring signals with logic probes. Headers are provided for connecting JTAG tools or Microchip tools using the 2-wire (ICSP™) interface.



### Ethernet PICTail™ Plus

The Ethernet PICTail Plus daughter board provides a cost-effective method of evaluating and developing Ethernet control applications. The board is designed for flexibility and can be plugged into **Microchip's Explorer 16 (DM240001)** development boards. The development board is populated with **Microchip's 28-Pin ENC28J60 Ethernet Controller** which interfaces to the RJ-45 female connector. When used in conjunction with the Microchip TCP/IP stack, the Ethernet PICTail Plus daughter board allows a developer to connect any Microchip 16-bit product to the Ethernet.



### Graphics PICTail™ Plus

The Graphics PICTail Plus daughter board with 3.2" Display Kit allows evaluation of Microchip's solution and graphics library for 16- and 32-bit microcontrollers. It includes a **Graphics LCD Controller PICTail Plus SSD1926 Board (AC164127-5)** and a **Graphics Display Truly 3.2" 240x320 board (AC164127-4)**. The kit is compatible with the **Explorer 16 Development Board (DM240001)** or one of the **PIC32 Starter Boards (DM320001, DM320003)**.

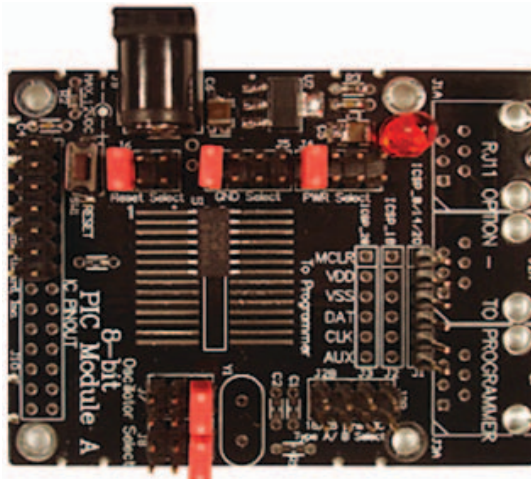
For more information, visit:

[http://www.microchip.com/stellent/idcplg?IdcService=SS\\_GET\\_PAGE&nodeId=2860&dDocName=en542646](http://www.microchip.com/stellent/idcplg?IdcService=SS_GET_PAGE&nodeId=2860&dDocName=en542646)

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# SchmartBoard: An EZ way to hand-solder PIC<sup>®</sup> microcontrollers in SOIC packages



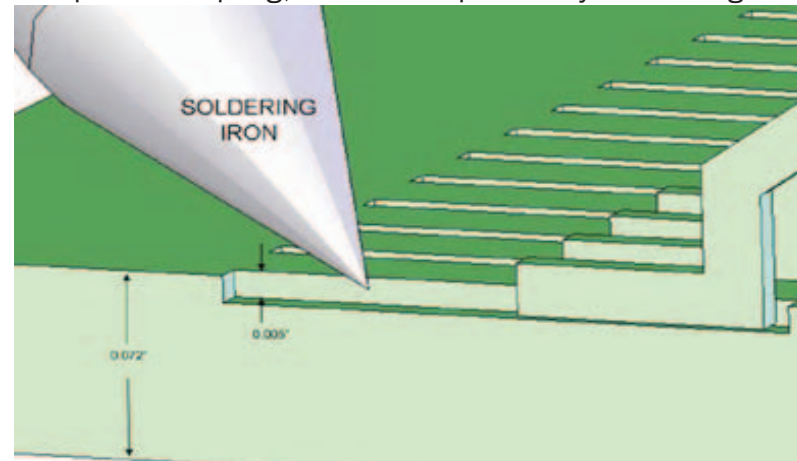
Once upon a time, an engineer, student or hobbyist could easily use prototyping boards, wire-wrap and bread boards to prototype and troubleshoot a circuit. The ICs were in DIP form and soldering was not a hindrance. With advances in IC packaging technology though, it is uncommon to find a new IC available in a DIP package. For most of us, hand soldering, SOIC, QFP, QFN or BGA with pitches as fine as .4 mm is not possible.

SchmartBoard's patented "EZ" technology resolves this problem. On any normal Printed Circuit Board (PCB), the electronics pads (which the components are soldered to) are slightly higher than the solder mask (the colored part of the PCB).

SchmartBoard has reversed this. On a SchmartBoard|ez, the solder mask is much higher than the pads. This creates canals for the chip legs to sit in. Additionally, the canals have solder in them. This allows the user to easily melt the solder in each canal to the respective chip leg, without the possibility of creating a bridge. Virtually anyone can now hand solder a .4 mm pitch IC easily, quickly and flawlessly.

The "SchmartBoard 8 Bit PIC<sup>®</sup> Microcontroller Development SchmartModule A" supports all 8-bit PIC MCUs in an SOIC package, up to 28 pins. The user simply solders the chip onto the board using SchmartBoard|ez technology and then configures the on-board jumpers. The 2" x 2.5" board has a 5V voltage regulator, onboard reset, external clock options, and ISCP header and RJ11 option for programming.

The SchmartModule A is available at microchipDIRECT. (part # **TSB8BITDB**)  
For a limited time, a free sample of **PIC16F1827-I/SO** is also included.



Enter the **SchmartBOARD™**  
2010 MCU Challenge!



Win 1 of 3 Apple iPads<sup>®</sup>  
or many other great  
prizes!

For datasheets and other information, check out:  
[www.microchip.com](http://www.microchip.com)

Information available at: [www.schmartboard.com](http://www.schmartboard.com)  
Contest ends December 31<sup>st</sup>, 2010.

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## myPIC32.com Redesigned for You!

Recently, [myPIC32.com](http://myPIC32.com) has been re-launched as a site for our community of designers to share their ideas with the world. Project containers allow for uploading software, block diagrams, Bills of Materials, schematics, prototype photos and videos. An active community of designers discuss their ideas and projects, and help each other with hardware and software development. If you're interested in seeing what PIC32 can do, and what creative minds have made happen, visit [www.myPIC32.com](http://www.myPIC32.com) today!



**PIC<sup>32</sup>**™

**Performance Leadership**  
**Free Software**  
**ETHERNET • USB • CAN**

**PIC<sup>®</sup> MCU to the power of 32**

The advertisement features a large, stylized 'PIC32' logo in silver and red. Below it is a glowing PIC32 microcontroller chip with the Microchip logo and 'PIC32' text. To the right, the text 'Performance Leadership Free Software ETHERNET • USB • CAN' is displayed. At the bottom, the slogan 'PIC® MCU to the power of 32' is written in a bold, italicized font.

## Looking for More RAM?

### Standalone Serial SRAM Devices

**SPI  
BUS**



**Serial  
SRAM**

[www.microchip.com/SRAM](http://www.microchip.com/SRAM)

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***MCHP Tube provides the opportunity for Students, Teachers and Professors to interact with Microchip directly!!***



## ***Interact with Microchip at “MCHP Tube”***

Microchip's Academic Program team has launched a YouTube-based show called “**MCHP Tube**.” – an online video newscast for all things Microchip with a focus on Academia. Here you'll find the latest information on new products, technologies and software/hardware development tools from both Microchip and Third-party sources.

This monthly show targets academics worldwide and is divided into four sections:

**Headliners** – we will discuss new academic-friendly development resources brought to you by Microchip and our authorized Design Partners.

**University Student Project** – students can submit a video featuring a student project based on Microchip products.

**Ask Microchip** – viewers can ask a question and a qualified Microchip support person will answer it.

**Where in the World is Marc McComb?** – Marc is Microchip's Academic Sales Engineer and in each edition will talk about new products and tools that are a good fit for academics.

To submit a video on a student project or ask a question for the “Ask Microchip” section, email us at [mchptube@microchip.com](mailto:mchptube@microchip.com).

You can also visit [www.microchip.com/mchptube](http://www.microchip.com/mchptube) for more information on the show.



Click on the image above to view the third episode of MCHP Tube. To view Microchip's YouTube channel, click [HERE](#).

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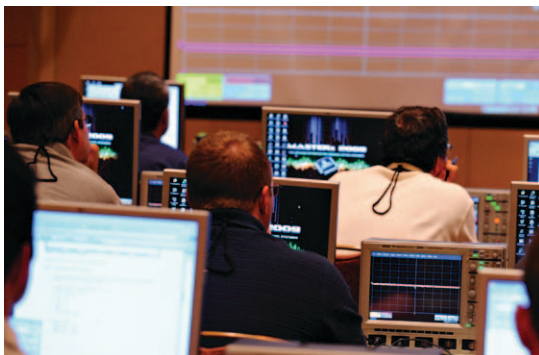
# Looking to Enhance Your Embedded Control Designs?



## MICROCHIP

### Regional Training Centers

In tough economic times, companies often look for ways to trim expenses as a means to cope with a downturn in sales. One of the areas often targeted for cutbacks is employee training. There is not only the direct cost of the training to contend with, but also travel expenses and time an employee spends away from the job. During this challenging business climate, however, competitive pressures and technology changes don't stop and it is training that can help a company be better positioned to take advantage of the potential upswing.



Microchip, with its global network of Regional Training Centers (RTCs) and third-party training partners, is here to help companies stay competitive with cost-effective, local training. To help companies deal with issues of travel expense and time, classes are given not only in Microchip's facilities, but are also taken on the road. Customized

customer premise sessions can be scheduled offering the most convenience. Time away can be managed more efficiently with the flexibility of half or full day class sessions.

To be effective in teaching, instruction must take into account the needs and expertise level of the attendee. Microchip's Regional Training Center classes are developed to provide a coordinated flow, enabling engineers to implement a solution to their product development needs. Instruction is developed and presented in product, technology and implementation classes that are grouped into application based curriculum.

Each curriculum flow enables the individual to engage with the training at a level that meets his or her current knowledge and needs. The intent is to provide

training that is relevant to each attendee while eliminating the frustration often associated with attending classes that present too much known information or assume a level of knowledge beyond what the attendee currently possesses.

Product/tool classes provide knowledge on how Microchip's products and development tools operate. This knowledge provides the foundation upon which all application instruction is based. Attendance at one of these classes can provide significant value through the reduction in time associated with instruction manuals and data sheet review or trial and error attempts to learn individually. Market forces constantly press companies to add functionality and features to their products often outside their areas of core competence. As a result, engineers must continually broaden their knowledge base. Microchip's technology classes are intended to help engineers gain an understanding of a new field.

Implementation classes combine elements of product and technology instruction to teach engineers how to design a real world application. Classes at this level provide how-to instruction rather than what or why instruction.

Microchip is currently offering classes in the following curriculum: DSP, Ethernet, Human Interface, Motor Control, Power Management, Signal Chain, System Design and USB. Future curriculum is expected to include CAN/LIN, IrDA<sup>®</sup>, Lighting and RF.

With a worldwide network of Regional Training Centers and certified third-party trainers, Microchip makes it easy to enhance your technical skills, with locations in nearly every metropolitan area across the world!

For those organizations who desire to have a number of employees attend a course at the same time, Microchip can customize any curriculum to meet your specific needs. Our instructors arrive at your location with all presentation materials and equipment, making it easy for your whole team to benefit from a specific course topic in one setting. In addition to the instruction, most Regional Training Center classes offer the opportunity to purchase a set of the development tools used in the class at a discounted price.

If the class you are interested in is not scheduled in your area, you can sign up to receive an alert when a session is scheduled.

For information on scheduling custom in-house training, contact your local RTC directly or visit the Microchip RTC web site: [www.microchip.com/RTC](http://www.microchip.com/RTC)

For a complete list of classes and locations, visit [www.microchip.com/RTC](http://www.microchip.com/RTC)

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**Microchip Around Town - Get the latest updates by clicking [HERE!](#)**

22-24 September 2010

**Vienna, Austria**

Reed Messe Wien

## **Join Microchip at the Annual 2010 Metering Europe Convention September 22-24**

Metering, Billing/CRM Europe 2010 is THE industry leading meeting place for smart metering professionals and the only event that will give you real return on knowledge, time and investment!

The 12th annual Metering, Billing/CRM Europe event brings together the perfect blend of key industry stakeholders including representatives from the top 100 utilities, energy regulators and government agencies from all five continents, the world's leading utility suppliers and established industry associations giving you the opportunity to meet and greet the people that matter under one roof!

The 2010 conference program will focus on five major themes:

- Successful smart metering programs and the move to a smart grid infrastructure
- Smart metering data handling, discussing the increasing need for system security and data privacy
- Implementing and preparing your business for a smart communication infrastructure
- New value added services and customer management through smart metering systems
- Enhanced billing operations for smarter utilities

**Register today for your  
FREE exhibition ticket!\***

Visit Microchip's booth for free!

You must register online in order to obtain a free pass to visit the exhibition only. You will also receive a 10% discount on a conference pass!

[Click here to learn more](#)



Register online, today at: <http://www.metering-europe.com/>

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**Microchip Around Town - Get the latest updates by clicking [HERE!](#)**

NOVEMBER 16-17, 2010, BOSTON, MA, USA

[WWW.IDTECHEX.COM/BOSTON](http://WWW.IDTECHEX.COM/BOSTON)**Join Microchip at the Annual 2010 Energy Harvesting Conference – Booth #9**

Microchip will be participating in this International conference and exhibition assessing the applications, technologies and opportunities for energy harvesting and storage.

This IDTechEx event, focusing on the uses, potential users and market forecasts as well as giving the latest technology developments and trends, is the meeting place for users, investors, suppliers, developers, system integrators and government representatives. It is the World's largest event on the topic, with 400 attendees and 30 exhibitors anticipated.

Topics covered at the event include:

- End user needs and experiences, from users in oil and gas, healthcare, automotive, building automation, government, manufacturing/industrial, retail and other industries
- Case studies: assessment of paybacks from energy harvesters
- Energy harvesting technologies: electrodynamic, thermovoltaic, photovoltaic, piezoelectric, bioelectric
- Energy storage technologies: batteries and capacitors
- Ultra low power electronics
- Market and technology analysis and forecasts

**Join Jason Tollefson, Product Marketing Manager at Microchip Technology as he describes how to "Take Low Power Design to the eXtreme"**

**Presentation Summary**

- Introduction to Microchip's eXtreme Low Power (XLP) Microcontrollers
- Complementary Analog
- Applications of XLP in Energy Harvesting

**Speaker Biography**

Jason Tollefson is Product Marketing Manager for Microchip Technology's Advanced Microcontroller Architecture Division, specializing in low-power products. His responsibilities include new product definition and low-power marketing for Microchip's PIC18 and PIC24 product lines. Jason holds a Bachelors degree in Electrical Engineering from the University of Minnesota's Institute of Technology, and a M.B.A from the University of Phoenix. Jason worked in new product development for eight years before moving to marketing.

Register online, today at: <http://www.idtechex.com/energyharvestingandstorageusa10/index-eh.asp>

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# Microchip Around Town - Get the latest updates by clicking [HERE!](#)

11<sup>th</sup> Annual

## China MASTERS

November 8-10 Beijing  
November 15-17 Shanghai  
November 18-19 Chengdu

7<sup>th</sup> Annual

## India MASTERS

November 25-26 Bangalore  
November 29-30 Mumbai

Technical Training Conference for Embedded Control Engineers

Technical Training Conference for Embedded Control Engineers

### What is the Microchip MASTERS Conference?

Microchip Annual Strategic Technical Exchange Review Conference is a bi-directional exchange of technical information between the technical work force at Microchip and our strong technical partners including consultants, customers, third parties, distributor FAEs and design houses. MASTERS is a highly in-depth conference, including hands-on technical training, structured to meet the needs of today's embedded control design engineers.

### Who Should Attend?

Those who are looking for solutions to embedded control challenges or in-depth education on Microchip's products. Design engineers and engineering managers will benefit from the Conference by learning about solutions and interfacing with the Microchip personnel. Attendees graduating from the MASTERS program will be equipped to go out and use Microchip products to full advantage. Microchip reserves the right to refuse registration or entry to anyone for any reason. Certificates will be awarded upon completion of the Conference.

### 11<sup>th</sup> Annual China MASTERS

November 8 - 10 Beijing  
November 15 - 17 Shanghai  
November 18 - 19 Chengdu

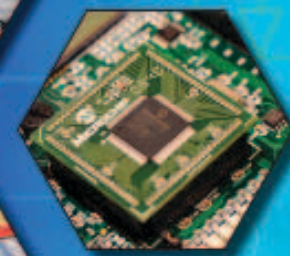
[Click here to learn more and to register](#)

### 7<sup>th</sup> Annual India MASTERS

November 25 - 26 Bangalore  
November 29 - 30 Mumbai

[Click here to learn more and to register](#)

[Check out Pictures of The Worldwide MASTERS Conference - Click Here](#)





# Join Microchip At The Following Worldwide Events



**Battery Technology Expo 2010**  
San Jose, CA  
October 5-7, 2010

Join *Jonathan Dillon, Senior Applications Engineer* and *Michael Stuckey, Applications Engineer Security, Microcontroller & Technology Development Division*, as they discuss "Secure Digital Authentication of Battery Packs."

Third-party, unauthorized batteries may offer reduced system performance and have reduced built-in protection, which may impact the overall safety of the system. Battery backs can securely authenticate themselves to the system via the addition of software functions to an existing battery-monitoring processor, or by embedding a small embedded microcontroller, to prevent the use of unauthorized packs. Authentication can prevent the use of counterfeit batteries and can allow electronic tracking of battery serial numbers for warranty and safety reasons.

Register online at: [http://www.e-driveonline.com/Conf-11/motors\\_conf11\\_program.php](http://www.e-driveonline.com/Conf-11/motors_conf11_program.php)



**Battery Power 2010**  
Dallas, TX  
Oct 19-20, 2010

Join *Keith Curtis, Technical Staff Engineer* as he presents "A Simple Topology for Solar-Charged Battery Systems."

Solar power chargers are convenient, in that they provide a completely wireless power system. Unfortunately, the stacked efficiency of the various switching converters typically results in a loss of 20 to 30 percent. Learn how when using a converter topology efficiency can be increased, while decreasing both cost and board space. The secret is a unified system that handles maximum power conversion for the solar cells, battery charging and load regulation. This presentation will discuss the topology in depth, including tradeoffs and the role of load regulation.

Register online at: [http://www.batterypoweronline.com/bppt-conf10/bp10\\_reg.php](http://www.batterypoweronline.com/bppt-conf10/bp10_reg.php)



**Batteries 2010**  
Cannes-Mandelieu, French Riviera  
Sept 29-Oct 1, 2010

Join *Chris MacCallum, Applications Engineer* as he presents "Battery Pack Authentication via Secure Digital Signatures."

Prevent the use of counterfeit or incorrect batteries by implementing digital authentication of the battery pack using a small embedded microcontroller. Digital authentication relies on the battery pack responding correctly to a challenge communication from the system, where the response is based on an encryption of the challenge by both parties. Create random challenges, battery pack encryption schemes and how to implement them, as well as communication methods that add minimal overhead.

Register online, today at: <http://www.electronic-displays.de/registration.html>



**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.batterytechexpo.com/register.php?n=reg>

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

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# WHAT'S New IN MICROCHIP LITERATURE?

Visit our **Technical Documentation** page at [www.microchip.com](http://www.microchip.com) to view the documents.

| Doc. Type   | Doc. Title  | DS No.  |
|---|---|---|
| <b>Application Note</b>   | Techniques for Robust Touch Sensing Design  | 01334A  |
|   | The Effect of Adding Radios on 802.11g Network Throughput                               | 01339A  |
| <b>Data Sheet</b>   | 93AA46A/B/C Data Sheet  | 21749H  |
|   | 24AA014/LC014 Data Sheet  | 21809G  |
|   | 23A256/K256 Data Sheet  | 22100E  |
|   | 23A640/K640 Data Sheet  | 22126D  |
|   | LIN Transceiver with Voltage Regulator  | 22230C  |
|   | MRF24J40 Data Sheet   | 39776C  |
|   | PIC18F6393/6493/8393/8493 Data Sheet  | 39896C  |
|   | PIC24FJ64GB004 Family Data Sheet  | 39940D  |
|   | PIC24FJ64GA104 Family Data Sheet  | 39951C  |
|   | PIC16F/LF1825/29 Data Sheet   | 41440A  |
|   | <b>User's Guide</b>   | Projected Capacitive Development Kit User's Guide |
| MCP3907 Energy Meter Reference Design                               |   | 51917A  |
| MCP1640 Single Quadruple-A Battery Boost Converter Reference Design |   | 51922A  |
| <b>Family Reference Manual</b>                                      | PIC24F Family Reference Manual, Section. 9. Watchdog Timer (WDT)                        | 39697B  |
|   | PIC24F Family Reference Manual, Section. 49. 10-Bit ADC with 4 Simultaneous Conversions | 39737A  |
|   | PIC32MX Family Reference Manual, Section 20. Comparator Voltage Reference               | 61109E  |

| Doc. Type                        | Doc. Title  | DS No. |
|----------------------------------|---|--------|
| <b>Errata</b>                    | PIC16F1934/36/37 Silicon Errata                               | 80479E |
|                                  | PIC16F/LF1826/27Silicon Errata                                | 80485E |
|                                  | PIC16F/LF1933 Silicon Errata                                  | 80490E |
|                                  | PIC18F87J11 Family Silicon/Data Sheet Errata                  | 80495C |
|                                  | PIC24FJ64GA104 Family Silicon/Data Sheet Errata               | 80496C |
|                                  | PIC24FJ64GB004 Family Silicon/Data Sheet Errata               | 80497D |
|                                  | PIC18F25K22 Silicon Errata                                    | 80498B |
|                                  | PIC16F/LF1938/39 Silicon Errata                               | 80501B |
|                                  | PIC16F/LF1824/28 Silicon Errata                               | 80510B |
|                                  | PIC18F23K22 Silicon Errata                                    | 80512B |
|                                  | PIC16F72XA Silicon Errata                                     | 80513A |
| <b>Programming Specification</b> | PIC16F193X/194X Memory Programming Specification              | 41397B |
|                                  | PIC12F/LF1840 Programming Specification                       | 41439A |
|                                  | PIC16F/LF151X/152X Memory Programming Specification           | 41442A |
|                                  | PIC32MX Flash Programming Specification                       | 61145G |
| <b>Technical Brief</b>           | Projected Capacitive Touch Screen Sensing Theory of Operation | 93064A |
| <b>Misc.</b>                     | Microchip Product Tape and Reel Specifications                | 00151G |

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# 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](http://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)

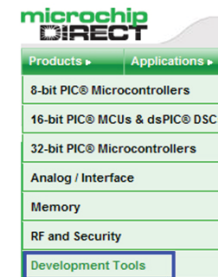
[www.microchipdirect.com/programming](http://www.microchipdirect.com/programming)

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

Two new categories have been added to [www.microchipDIRECT.com](http://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.

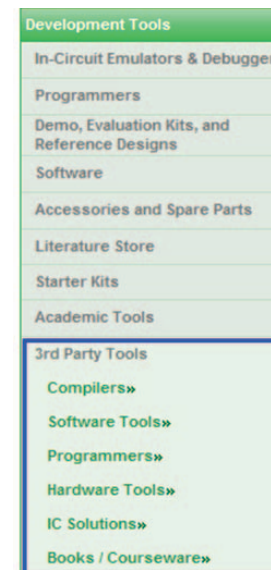
How to access the new categories:

Select the products pull-down menu:



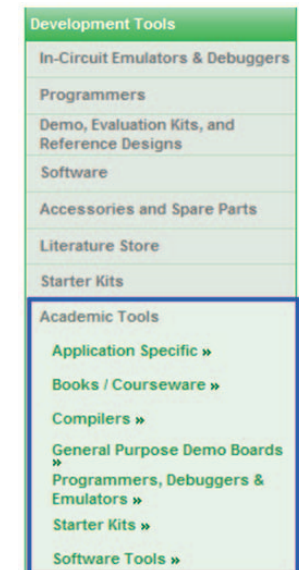
### 3rd Party Tools

Select 3rd Party Tools from the Development Tools Menu:



### Academic Tools

Select Academic Tools from the Development Tools Menu:



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