Microchip’s Bluetooth® Kit Provides Easy and Cost-Effective Method for Evaluating and Adding Bluetooth Connectivity to Embedded Designs

In Combination With CandleDragon’s Bluetooth Stack, Kit Enables Flexible Development With a Wide Range of 16-/32-bit PIC® MCUs and dsPIC® DSCs

Microchip announced the Microchip Bluetooth® Evaluation Kit, which includes third-party design partner CandleDragon, Inc.’s dotstack™ demonstration Bluetooth Stack. The kit provides an easy, cost-effective and flexible add-on for embedded evaluation and development using many 16-/32-bit PIC® microcontrollers or dsPIC® digital signal controllers (DSCs). To speed development and further reduce costs, the Microchip Bluetooth Kit works with the Company’s existing tools.

While Bluetooth wireless technology is a common short-range protocol for PCs and consumer electronics, it is rapidly gaining popularity among a broader set of embedded applications. However, the current Bluetooth wireless technology modules are costly and inflexible because they force developers to use their predetermined baseband radio and microcontroller. Microchip and CandleDragon’s Bluetooth solution enables designers to pair a wide range of radio ICs for Bluetooth connectivity with many of Microchip’s 16-/32-bit PIC microcontrollers or dsPIC DSCs. Additionally, CandleDragon’s dotstack Bluetooth stack is Bluetooth SIG compliant and supports multiple profiles in a single microcontroller – including SPP, HFP and HID – with more profiles planned for Microchip’s MCUs in the near future.

Microchip makes it easy for our customers to cost-effectively evaluate and add Bluetooth wireless technology to their designs, with minimal development time and low risk. Our new Microchip Bluetooth Evaluation Kit, combined with CandleDragon’s Bluetooth Stack, goes one step further in enabling embedded Bluetooth connectivity.

CandleDragon’s dotstack Bluetooth Stack is available today for free – for evaluation and development – via download from Microchip’s Web site.

To learn more about the new Bluetooth Kit, visit:
Does Your Design Call For a Cost-Effective Microcontroller With Additional Memory Options, Ethernet, CAN and USB Connectivity?

The New Six-Member PIC32 Family Has These Features and Low-Power Consumption and High-Flash Endurance

Microchip announced a new, six-member family of **32-bit PIC32MX5/6/7® microcontrollers** that provides the same integrated Ethernet, CAN, USB and serial connectivity peripherals with new, more cost-effective memory options. Additionally, design enhancements have been made that provide lower power consumption of 0.5 mA/MHz active current, higher Flash memory endurance of 20k read/write cycles and better EEPROM emulation capability, maintaining common pin outs, the **PIC32 microcontroller portfolio** provides designers with a seamless migration path to achieve the correct balance of memory and cost for their high-performance applications.

Embedded designers are constantly looking for ways to lower their costs without sacrificing performance or functionality. Microchip's newest 80 MHz PIC32 microcontroller family meets these needs by maintaining best-in-class performance of 1.56 DMIPS/MHz, and integrating Ethernet, CAN, USB and multiple serial communication channels, while offering more cost-effective memory options. Specifically, the family offers 32 Kbytes of RAM and up to 140 Kbytes of Flash.

We are committed to building upon the success of the PIC32 microcontroller portfolio by offering six new microcontrollers, each available in five different pin-compatible packages. These new high-performance, connectivity-rich MCUs give our customers lower-cost memory options that support scalability and seamless migration with the rest of our growing 32-bit product line.

Microchip has maximized the raw performance of the MIPS32® M4K® core, while taking advantage of its high flexibility, to create a 32-bit microcontroller architecture that exceeds the requirements of demanding embedded designs. Microchip is offering great value to designers through the price to performance ratio of this new PIC32 family, combined with its extensive set of integrated peripherals.

Example applications for this new PIC32 family include: Communications (point-of-sale terminals, Web servers, multi-protocol bridges); Industrial/Medical (automation controllers, medical devices, security monitoring); Consumer/Appliance (audio, MP3 decoders, displays, small appliances, fitness equipment) and Automotive (aftermarket, car alarms, GPS).

**Development Tools**
The PIC32 Ethernet Starter Kit (part #**DM320004**) was designed to enable easy Ethernet-based development, and the PIC32 USB Starter Kit II (part #**DM320003-2**) does the same for USB designs. Owners of the Explorer 16 Development Board (part #**DM240001**) can purchase a plug-in module for development with this new PIC32 family (part #**MA320003**).

To learn more about Microchip's latest PIC32 family, visit:
Join the Make It Last, a project build series and contest at Make: Online [makezine.com], brought to you 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 3 - The Drawbot

We’ve got an exciting third build for you called the Drawbot. With two stepper motors, some monofilament line, a binder clip, a Sharpie and a microcontroller, the Drawbot draws cubic Bezier curves, circles, and can move from one point to another accurately. Here’s a video of the Drawbot in action!

The third build of our Make It Last series will be a simple drawing. To be eligible for the drawing, post your Drawbot images on our MAKE Flickr pool, tagged "makeitlast". We will draw a first and second place winner from that tag pool.

The prizes for the third build are as follows:

Grand Prize
- Explorer 16 Demo Board
- $50 Maker Shed Gift Certificate
- Energizer® Night Strike Swivel Light

And the second place entry will take home:
- F1 Evaluation Kit
- $25 Maker Shed Gift Certificate
- Energizer® Night Strike Swivel Light

Here’s a handy checklist of Build Series links:
- MAKE Flickr Pool (tag all images "makeitlast")
- MAKE Forums Make It Last Build Discussion

Were looking forward to seeing your creations!
Gate Drive Schemes for Motor Control Applications

The type of motor, power-switching topology and the power-switching element will generally dictate the necessary gate drive scheme. The two fundamental categories for gate drive are high-side and low-side. High-side means that the source (MOSFET) or emitter (IGBT) of the power element can float between ground and the high-voltage power rail. Low-side means the source or emitter is always connected to ground. An example of both of these types can be seen in a half-bridge topology, shown here.

In this configuration, Q1 and Q2 are always in opposite states. When Q1 goes from being off to on, the voltage at the source of the MOSFET goes from ground up to the high-voltage rail. This means that the voltage applied to the gate must float up as well. This requires some form of isolated, or floating, gate drive circuitry. Q2, however, always has its source or emitter connected to ground so the gate drive voltage can also be referenced to ground. This makes the gate drive much simpler.

Various schemes exist for high-side gate drive applications. These include single-ended or double-ended gate drive transformers, floating bias voltages and opto-isolator drive. Examples of these drive schemes are shown in Figures 1 through 3.

Microchip’s MOSFET drivers fit a wide variety of applications using the gate drive schemes shown. Microchip’s single output drivers, which have ratings of 0.5A up to 12A, work well for the single-ended gate drive needs for the circuits in Figures 1 and 3. Microchip’s dual output drivers provide an excellent solution for the gate drive solution shown in Figure 2.

Resources:
Motor Control Design Center
Training Resources for Motor Control
Motor Control Design Solutions Brochure
Recommended Analog Peripherals for Motor Control
AN898: Determining MOSFET Driver Needs for Motor Drive Applications

To learn more about Microchips MOSFET solutions, visit:
http://www.microchip.com/mosfet
PIC32MX5/6/7 Series Delivers More Memory, USB-OTG and Great Connectivity Options

The **PIC32MX5/6/7** family of 32-bit microcontrollers delivers 1.56 DMIPS/MHz, offers up to 512 KB Flash, 128KB; as well as, USB-OTG, Ethernet and CAN connectivity. With such a high level of integration the MX5/6/7 series can help reduce hardware component count and cost.

The large internal RAM allows developers to run multiple software stacks simultaneously. Perfect for driving graphics, USB-OTG and various communications stacks in your design.

The **PIC32** family is supported by Microchip’s **MPLAB® Integrated Development Environment**, and several other wellknown industry tools and software providers. The MPLAB development environment spans the entire Microchip portfolio of microcontrollers thus enabling use of a single tool chain from the lowest cost 8-bit MCU to the highest performing and largest memory PIC32 MCU.

### Features and Benefits
- USB2-OTG with integrated PHY for convenient user data transport and interface
- Dedicated DMA Channel for USB OTG to minimize core processing interrupts
- 10/100 Mbps Ethernet MAC with R/MII interface for flexible PHY choice
- CAN2.0B for reliable communication in electrically noisy environments
- 16-bit Parallel Master Port Supporting TFT displays and memory
- MIPS16e mode for up to 40% smaller code size
- Pin compatible with 16-bit PIC® MCUs
- Supported by MPLAB Integrated Development Environment for an easy to use consistent development experience across all PIC microcontrollers

### Technical Specs
- MIPS32® M4K® 32-bit core with 5-stage pipeline
- 80 MHz maximum frequency, 1.56 DMIPS/MHz (Dhrystone 2.1) performance at 0 wait state flash access
- Operating voltage range of 2.3V to 3.6V
- 64K to 512K Flash memory (plus an additional 12 KB of Boot Flash)
- 16K to 128K SRAM memory

### Availability
The PIC32MX5/6/7 family of MCUs is available in TQFP, QFN and XBGA packages of varying sizes from 64-121 pins.

### Application Areas
The PIC32MX5/6/7 MCUs bring the perfect blend of processing power, user interface support and networking capability to applications such as security systems, medical devices, barcode readers, data loggers, MP3-Player interface, patient monitoring, dosing pumps, GPS modules, home appliances and many other consumer and industrial devices.
Microchip Technology's New Dedicated Video Page Featuring:

- MCHP Tube Episode 4
- XLP 16-bit Energy Harvesting Development Kit
- MCP794XX I²C™ Real-Time Clock/Calendar
- The World's Lowest Power in Sleep MCU
- Smart Energy Solutions from Microchip

Microchip Technology's Video Training

Microchip offers a wide variety of video training tools available online to boost your technical knowledge and Microchip's product offerings and how they can enhance your current project or future products.

- mTouch™ Solutions for Analog Resistive Touch Screen
- Microchip Technology Multimedia Expansion Board
- PIC® MCU Solutions for LCD Displays
- Graphics Display Designer Introduction
- PIC24FJ256DA210 Development Board Overview

- MCP6S2x PGA Evaluation Board
- MCP3909RD 3-Phase Energy Meter Reference Design
- XLP 16-bit Development Board
- The nanoWatt XLP PIC16LF1823
- MCP1640 Sync Boost Converter Evaluation Board

For more visit: http://www.microchip.com/videos
Join **Jeffery Lawton**, **Product Marketing Engineer** as he presents “Signal Chain Conditioning with Op Amps and ADCs”.

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 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.ecnmag.com/tags/Sections/Webcasts/](http://www.ecnmag.com/tags/Sections/Webcasts/)

Join **Microchip** at the EE Times Integrating Touch Interfaces virtual conference, the leading resource for engineers to learn about the latest hardware and software solutions, design techniques and algorithms that industry leaders are using in successful designs. In this virtual setting, you can hear expert keynotes and participate in panel sessions and interactive chat to learn the latest about evaluating and choosing between several sensor technologies, touch surface materials, front and back-end analog and digital controllers, as well as device drivers, middleware and application-level touch routines.

Register online at: [http://www.eetimes.com/touch/](http://www.eetimes.com/touch/)

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, but 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](http://www.e-driveonline.com)

Join **Microchip Technology** at the Embedded World Exhibition & Conference, the world’s biggest exhibition of its kind and the meeting place of the international embedded community. Embedded technologies are in action everywhere – whether in the car, data and telecommunication systems, industrial and consumer electronics, military systems or aerospace. Last year 730 exhibitors showed the 18,350 visitors a full range of products for embedded technologies in 2010: hardware, software, tools, services and lots more. Drop by booth 9/9 451 to view Microchip’s latest innovations including the newest PIC32.

Register online at: [http://www.embedded-world.de/en/](http://www.embedded-world.de/en/)
Microchip Around Town – Get the latest updates by clicking HERE!

Microchip’s Digital Power Seminars: 2nd Edition

Learn about the latest in digital power conversion from Microchip with the next generation of reference designs.

The Second Edition of Microchip's Digital Power Seminar explores the benefits digital control can bring to advanced topologies and applications.

Designed for those new to digital power and those already familiar with the subject, the seminar covers a wide range of topics using Microchip’s new reference designs. Traditional power conversion uses fixed function analog ICs to regulate power conversion. Using a Microchip dsPIC® DSC the power stage can be controlled digitally through software, enabling a fully programmable and flexible solution. This is becoming increasingly important as the market is looking for more efficient power supplies that pack more features into a single design. The seminar reviews the basics of digital power and then explores how digital power brings more capabilities to lots of applications. Using Microchip’s new reference designs, the seminar takes an in depth look at how digital control can be used in modern power conversion applications and covers the following topics in detail:

1. DC/DC Power Conversion Using a Quarter Brick Sized Phase Shifted Full Bridge
2. Resonant Power Conversion Using a DC/DC LLC Topology
3. Solar Micro Inverter Using a Grid Tied Inverter System
4. LED Lighting Using a Buck or Boost Topology
5. HID Lighting Using Digital Control

Space is limited, register today!
Lunch is provided.
Every registrant in attendance will be eligible to win a digital power start kit bundle, which includes:
- 16-bit 28-pin Starter Board
- PICkit™ 3 Programmer/Debugger
- Buck/Boost PICtail™ Plus Daughter Board

Huntsville, AL  February 16, 2011
Chicago, IL  February 17, 2011
Boston, MA  February 22, 2011
Toronto  February 24, 2011

Register today for your FREE ticket!

Register online, today at: http://www.microchip.com/dps
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.

Training Opportunities From Microchip and Avnet Memec

Want to learn from an expert?

These classes include hands on motor control development work, so you can learn the theory and then put it into practice. Additional classes are available that cover the device programming and peripheral usage, C language and control techniques that are not specific to motor control.

<table>
<thead>
<tr>
<th>Class</th>
<th>Hours</th>
<th>Hands On</th>
<th>Abstract</th>
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<tr>
<td>MCT 0101: Overview of Intelligent Motor Control</td>
<td>4</td>
<td>No</td>
<td>This class reviews common motor types, control algorithms and motor interface design. It serves as a broad introduction to Microchip’s motor control portfolio.</td>
<td>Minneapolis: Mar. 23</td>
</tr>
<tr>
<td>MCT 3101: BLDC Control Techniques</td>
<td>7</td>
<td>Yes</td>
<td>This class presents an in-depth analysis of Microchip’s BLDC motor control algorithms. The class also provides an overview of the dsPIC® DSC’s motor control peripherals. Attendees will use the DMCI to modify algorithms and control the motor. Sensors, sensorless and field oriented control are all covered.</td>
<td>Minneapolis: Mar. 24</td>
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### What's New in Microchip Literature?

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<td>PIC16(L)F1507 Product Brief</td>
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www.microchipDIRECT.com/programming

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

Two new categories have been added to www.microchipDIRECT.com making it easier to find third-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:

Third-Party Tools
Select 3rd Party Tools from the Development Tools Menu:

Academic Tools
Select Academic Tools from the Development Tools Menu: