OCT 2004

Microchip Technology Incorporated

MICROSOLUTIONS

IN THIS ISSUE

MICROCHIP

Microchip Unveils World's First 28-Pin LCD Microcontrollers; First Programmable 80-pin Microcontroller Capable of Driving 192 LCD Segments

Microchip added eight new devices of the 8-bit PIC® microcontroller family featuring integrated Liquid-Crystal Display (LCD) modules.

LCD PIC microcontroller family features

- Flash program memory - enables maximum flexibility in code development and field reprogrammability
- Low-power consumption and LCD control
- nanoWatt Technology - meets industry low-power design requirements - including the need to drive LCD displays in SLEEP mode. The integrated LCD module is software-configurable and reduces system components, occupied board-space and system costs

Applications include

- **Automotive** - dashboard displays
- **Instrumentation/measurement** - medical instruments/monitors, meter reading, handheld terminal/remote reading
- **Appliance** - display/control units on stoves/ovens, microwaves
- **Industrial** - payment systems, water/gas/electric/heat utility meters, gasoline pumps
- **Consumer** - programmable thermostats/controls, irrigation control, home security systems, exercise equipment
- **Communications** - handset displays

The high-pin count **PIC18F8490/8390/6490/6390** LCD family has the performance and features needed for embedded control and meets the advanced display requirements of the segment and touchscreen LCD markets. The integrated LCD driver module is capable of driving 128 to 192 LCD segments in 64- and 80-pin packages, respectively.

Additional features include

- 8 to 16 Kbytes of Flash program memory options and 768 Bytes of SRAM
- Enhanced LCD module with four multiplex commons and up to 48 segment drivers
- Six power-managed modes featuring nanoWatt Technology and a 32 kHz to 32 MHz internal oscillator
- High-core performance of up to 10 MIPS

Additional features (continued)

- 10-bit analog-to-digital converter with up to 12 signal channels and 100k samples-per-second
- Two analog comparators, programmable brown-out detect and programmable low-voltage detect
- MI^{2}C/SPI™, EUSART (supports LIN) and AUSART communication protocol support Four timers and two Capture/Compare/PWM Modules

The cost-effective **PIC16F917/916/914/913** LCD family offer 28-, 40 and 44-pin package options for simple, cost-constrained display applications requiring embedded control. Sixty to 96 LCD segments can be driven by the integrated driver.

Additional features include

- 7 to 14 Kbytes of Flash program memory options, up to 352 Bytes of SRAM and 256 bytes of EEPROM data memory
- Enhanced LCD module with four multiplex commons and up to 24 segment drivers
- nanoWatt Technology power-managed modes and an 8 MHz internal oscillator
- 5 MIPS core performance
- 10-bit analog-to-digital converter with up to 8 signal channels
- Two analog comparators, SPI, I^{2}C™ and AUSART communication protocol support
- Three timers, two Capture/Compare/PWM Modules and one Watchdog Timer

Product Availability

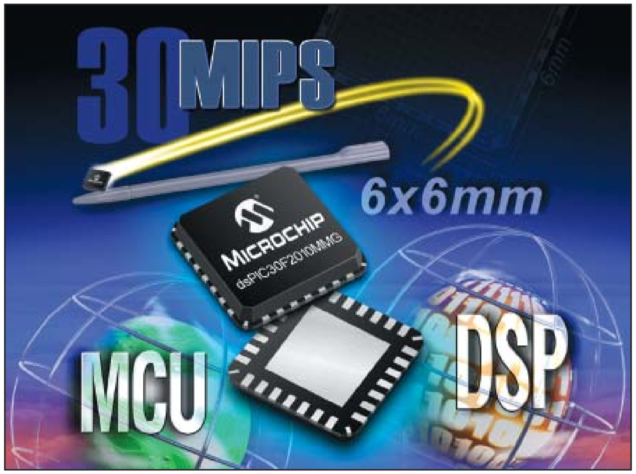
PIC18FXX90 - Available now for general sampling and volume production.

PIC16F916, **PIC16F917** - Samples are available and volume production is expected in December of 2004.

PIC16F913, PIC16F914 - Samples and volume production are planned for the first calendar quarter of 2005.

For more product information visit:
www.microchip.com/pic16F9XX
www.microchip.com/pic18FXX90

Microchip's dsPIC® Digital Signal Controller Brings 30 MIPS to a 6x6mm. 28-pin Package



High-performance device offers powerful digital signal control function to space-limited designs.

Microchip introduced the first Digital Signal Controller (DSC) in a 6x6 mm, 28-pin, QFN package. With 30 Million Instructions Per Second (MIPS) of performance, this small-packaged device gives engineers with limited board space a powerful, thermally-efficient design option.

The **dsPIC30F2010MMG** offers the same powerful performance as the **dsPIC30F2010**, but comes in a space-saving 28-pin QFN package. With the same powerful performance as the dsPIC30F2010, the dsPIC30F2010MMG can create smart nodes, put the processor closer to sensors, or off-load overburdened central processors in a broad range of embedded systems. Additionally, the QFN package offers thermal characteristics needed in a small design space.

The rich peripheral set of the dsPIC30F2010MMG permits a significantly reduced board component count. The DSC mixed-signal capabilities, such as low-voltage detect and a wide voltage range (2.5V to 5.5V), are advantages in many noisy analog environments.

"This 6x6 mm, QFN DSC is in a performance category that is dominated by devices with 100 pins plus, in large packages," said Sumit Mitra, vice president of Microchip's Digital Signal Controller Division. "In applications where space savings translates into end-product market viability or a competitive edge, the 28-pin dsPIC30F2010MMG offers many unique benefits."

dsPIC30F2010MMG Unique Features

- Enhanced Flash self-programming capability for remote upgrades to the Flash program memory, allowing code revisions in end-users' applications. Enhanced Flash provides flexibility, reduced development time, increased manufacturing efficiency and faster time to market.
- Addressable UART modules, 3-wire SPI™ interface and I^2C™ interface support.

dsPIC30F2010MMG Additional Features

- 12 Kbytes of on-chip Flash program memory
- 512 Bytes of on-chip data RAM
- Advanced Pulse-Width-Modulation
- 10-bit Analog-to-Digital Converter with 500 Ksps conversion rate

Development Tools, Application Libraries and Reference Designs

All dsPIC DSCs are supported by Microchip's high-performance development systems, including:

- MPLAB® Integrated Development Environment (IDE)
- MPLAB C30 C Compiler
- MPLAB ICD 2 In-Circuit Debugger
- MPLAB Visual Device Initializer
- MPLAB ICE 4000 In-Circuit Emulator (ICE)

Product Availability

The dsPIC30F2010MMG is available today for sampling and volume production.

About dsPIC DSC

The dsPIC DSC is a 16-bit (data) modified Harvard RISC machine that combines the control advantages of a high-performance 16-bit microcontroller with the high computational speed of a fully implemented Digital Signal Processor (DSP) to produce a tightly coupled single-chip, single-instruction stream solution for embedded systems design. All dsPIC DSCs integrate Flash program memory and most have EEPROM data storage.

For more information, contact your authorized worldwide distributor or visit Microchip's Web site at www.microchip.com

For more product information visit:
www.microchip.com/dsPIC30FXXXXMMG

Microchip Makes it Easy for Embedded Designers to Evaluate and Design with Analog Products

The following Analog Demonstration Boards and Evaluation Kits are the newest offerings in Microchip'a low-power analog products.

Interface

MCP215X IrDA® Data Logger Demo Board

Demonstrates the **MCP2150 (or MCP2155)** IrDA Standard Protocol Stack Controller device in a real world application. The system designer can use this design as an example of how to integrate an IrDA standard port in their embedded system.

Linear

MCP6S22 PGA PICtail™ Demo Board

Evaluate and demonstrate the **MCP6S21/2/6/8** Programmable Gain Amplifier (PGA) family. This board can be interfaced with Microchip's PICkit™ 1 Flash Starter Kit to demonstrate firmware integration between the PIC® microcontroller and PGA devices, while allowing the user to modify and develop firmware for their specific requirements.

MCP6SX2 PGA Thermistor PICtail Demo Board

This board features the **MCP6S22** and **MCP6S92** PGAs, which help overcome the non-linear response of the on-board NTC thermistor. They also provide the capability of multiplexing between two inputs; the other input can be any desired source. This opens the possibilities of temperature correcting another sensor and of increasing the number of PIC microcontroller I/O pins available for other purposes.

MCP6SX2 PGA Photodiode PICtail Demo Board

This board features a PNZ334 photodiode, MCP6001U op amp, and **MCP6S22/MCP6S92** PGAs. The op amp converts the photodiode's output current to voltage (transimpedance amplifier). Its output goes to one of the PGA's inputs. The other PGA input is available for any other desired source. This opens the possibilities of processing other sensor signals, and of increasing the number of PIC microcontroller I/O pin available for other purposes.

Mixed Signal

Mixed Signal PICtail Evaluation Board

Enables quick and accurate evaluation of the performance of Microchip's Analog-to-Digital Converters (ADCs), Digital-to-Analog Converters (DACs), Low Dropout Regulators (LDOs), V_{REF}s and Operational Amplifiers. The board interfaces to the PICkit 1 Flash Starter Kit or can utilize the on-board **PIC16F767** for "stand-alone" operation.

Power Management

MCP1601 Buck Regulator Evaluation Board

Demonstrates the **MCP1601** Synchronous Buck Regulator, developed for battery-powered applications as well as distributed power applications. The MCP1601 Evaluation Board is capable of operation over the entire 2.7V to 5.5V input range of the MCP1601 device.

Voltage Supervisor SOT-23 Evaluation Board

Allows the system designer to quickly evaluate the operation of Microchip's Voltage Supervisors and Voltage Detectors in the SOT-23-3 package. The board has been made generic so that other SOT-23-3 devices (such as LDOs and Voltage References) may also be evaluated using this board.

MCP7386X Evaluation Board

Evaluates simple stand-alone linear charging of single/dual cell Lithium-Ion/Lithium-Polymer battery packs (the battery packs are not included). The board design provides constant current charging, followed by constant voltage charging with automatic charge termination. As provided, the **MCP7386X** Evaluation Board is set for a fast charge current level of 1.1A for single-cell applications.

MCP1630 NiMH Battery Charger Demo Board

The **MCP1630** High-Speed, Pulse-Width-Modulator (PWM) is interfaced to the **PIC16LF818** to develop a complete NiMH battery charger with fuel gauge capability. The MCP1630 is used to regulate the battery charge current and protect the SEPIC power-train against an open circuit (removed battery) or a shorted battery.

MCP165X 3W White LED Demo Board

Demonstrates the **MCP165X** Boost Controller product family in a battery-powered white LED application. The MCP1651 (8-pin MSOP) with low-battery detect is featured in a SEPIC converter topology with an input voltage range of 2.0V to 4.5V.

For a complete list of all Analog and Interface product developemnt tools, visit: www.microchip.com

Protect Microcontrollers with New Low-Power Voltage Supervisors

Devices extend battery life with low-power consumption, low-voltage operation; small package ideal for space-constrained designs

Microchip announced a low-power voltage detection circuit that protects microcontrollers while it extends battery life. Consuming only 1 microamp and operating at 1V (minimum), these devices use less power, thereby extending the life of the battery. This low-power consumption, coupled with the small packaging, make the **MCP102/103/121/131** system supervisors ideal for portable or space-constrained applications.

Systems often need to take into account noisy environments, unreliable power sources or the voltage decay of the system's battery. These issues may create a variety of system-level problems, which can be eliminated by the use of a voltage supervisor device. The MCP102/103/121/131 voltage supervisors are designed to output a signal that can be used as a system reset indication. When the system voltage is below the operating range, the system enters into a reset condition. After the voltage recovers into the valid operating range, the voltage supervisor releases the system from reset. This process allows these system supervisors to provide system protection from brown-outs, power loss and decaying power supplies (commonly found in battery applications).

The MCP102/103/121/131 system supervisors are available in 3-pin SOT-23 and 3-pin SC-70 packages.

For more information, contact your authorized worldwide distributor or visit Microchip's Web site at www.microchip.com

For more product information visit:
www.microchip.com/MCP102/103/121/131

Stop holding your breath.........

A new world of Digital Signal Control is here.

dsPIC®
Digital Signal Controller

Introductory seminars are coming to a city near you!

The time has come to unleash your imagination with the dsPIC® Digital Signal Controller (DSC) from Microchip. Seamlessly blending a powerful 16-bit microcontroller (MCU) with outstanding Digital Signal Processing (DSP) capabilities, the dsPIC DSC brings the best of both worlds to your fingertips.

The dsPIC DSC breezes through demanding real-time control and fast, complex algorithm processing with equal ease, all in a package size as small as a pencil eraser. With an easy-to-use MCU look and feel, best in class C efficiency, cost-effective Flash, low-cost, real-time development tools and a substantial portfolio of libraries – the dsPIC DSC is the solution for you!

dsPIC DSC Introductory Seminars are coming to a city near you. Join us for a six-hour seminar and learn how to apply this exciting new family into your designs. **Don't waste time – register today!**

Princeton, NJ: 10/26	**Portland, OR:** 10/26	**Rochester, NY:** 10/28	**Seattle, WA:** 10/28	**Houston, TX:** 11/2	**Orlando, FL:** 11/2
Denver, CO: 11/3	**Austin, TX:** 11/4	**Nashville, TN:** 11/4	**Baltimore, MD:** 11/9	**Newton, MA:** 11/9	**El Paso, TX:** 11/9
Bedford, NH: 11/10	**Mashantucket, CT:** 11/11	**Raleigh, NC:** 11/11	**Tulsa, OK:** 11/11	**Toronto, ONT:** 11/30	
Montreal, Quebec: 12/1	**Ottawa, ONT:** 12/2				

For more information visit: www.microchip.com

Tips n' Tricks - PICmicro® Microcontroller Comparators

TIP 1. Multi-Vibrator (Square Wave Output)

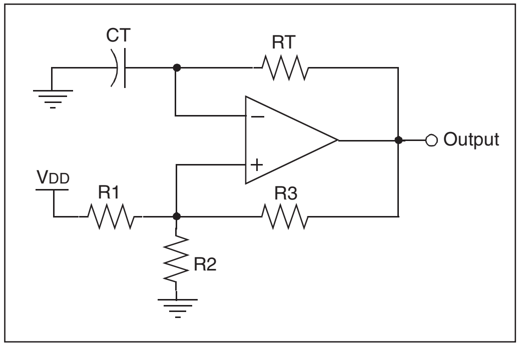


Figure 1-1 Multi-vibrator Circuit

A multi-vibrator is an oscillator designed around a voltage comparator or operational amplifier (see Figure 1-1). Resistors R1 through R3 form a hysteresis feedback path from the output to the non-inverting input. Resistor RT and capacitor CT form a time delay network between the output and the inverting input. At the start of the cycle, CT is discharged, holding the non-inverting input at ground, forcing the output high. A high output forces the non-inverting input to the high-threshold voltage (see TIP #3) and charges CT through RT. When the voltage across CT reaches the high-threshold voltage, the output is forced low. A low output drops the non-inverting input to the low-threshold voltage and discharges CT through RT. When the voltage across CT reaches the low-threshold voltage, the output is forced high and the cycle starts over.

To design a multi-vibrator, first design the hysteresis feedback path using the procedure in TIP #2. Be careful to choose threshold voltages (V_{TH} and V_{TL}) that are evenly spaced within the common mode range of the comparator and centered on $V_{DD}/2$. Then use V_{TH} and V_{TL} to calculate values for RT and CT that will result in the desired oscillation frequency F_{OSC}. Equation 1-1 defines the relationship between RT, CT, V_{TH}, V_{TL} and F_{OSC}.

Equation 1-1:

$$F_{OSC} = \frac{1}{2 * RT * CT \ln(V_{TH}/V_{TL})}$$

Example:

- V_{DD} = 5V, V_{TH} = 3.333, V_{TL} = 1.666V
- R1, to R2, to R3 = 10k
- RT = 15 kHz, CT = .1 µF for F_{OSC} = 480 Hz

TIP 2. Multi-Vibrator (Ramp Wave Output)

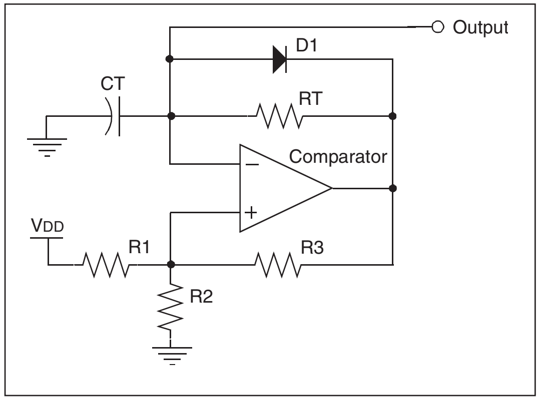


Figure 2-1. Ramp Waveform Multi-vibrator Circuit

A multi-vibrator (ramp wave output) is an oscillator designed around a voltage comparator or operational amplifier that produces an asymmetrical output waveform (see Figure 2-1). Resistors R1 through R3 form a hysteresis feedback path from the output to the non-inverting input. Resistor RT, diode D1 and capacitor CT form a time delay network between the output and the inverting input. At the start of the cycle, CT is discharged holding the non-inverting input at ground, forcing the output high.

A high output forces the non-inverting input to the high-threshold voltage (see TIP #3) and charges CT through RT. When the voltage across CT reaches the high-threshold voltage, the output is forced low. A low output drops the non-inverting input to the low-threshold voltage and discharges CT through D1. Because the dynamic on resistance of the diode is significantly lower than RT, the discharge of CT is small when compared to the charge time, and the resulting waveform across CT is a pseudo ramp function with a ramping charge phase and a shortsharp discharge phase.

Equation 2-1:

$$F_{OSC} = \frac{1}{RT * CT \ln(V_{TH}/V_{TL})}$$

This assumes that the dynamic on resistance of D1 is much less than RT .

Example:

- V_{DD} = 5V, V_{TL} = 1.666V and V_{TH} = 3.333V
- R1, R2 and R3 = 10k
- RT = 15k, CT = .1 µF for a F_{OSC} = 906 Hz

Tips n' Tricks - PICmicro® Microcontroller Comparators

TIP 2. Multi-Vibrator (Ramp Wave Output) - Continued

Note:
Replacing RT with a current-limiting diode will significantly improve the linearity of the ramp wave form. Using the example shown above, a CCL1000 (1 mA Central Semiconductor CLD), will produce a very linear 6 kHz output (see Equation 2-2).

Equation 2-2:

$$F_{OSC} = \frac{I_{CLO}}{C(V_{TH} - V_{TL})}$$

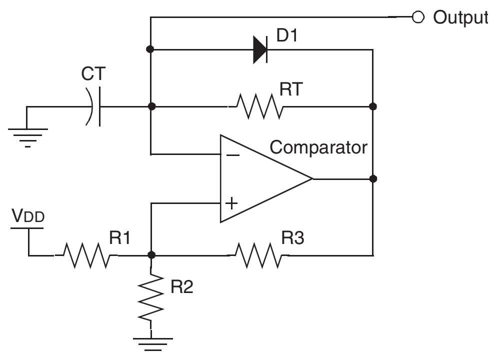


Figure 2-2. Alternate Ramp Waveform Multi-Vibrator Using a CLD

TIP 3. Hysteresis

When the voltages on a comparator's input are nearly equal, external noise and switching noise from inside the microcontroller can cause the comparator output to oscillate or "chatter". To prevent chatter, some of the comparator output voltage is fed back to the non-inverting input of the comparator to form hysteresis (see Figure 3-1). Hysteresis moves the comparator threshold up when the input is below the threshold and down when the input is above the threshold. The result is that the input must overshoot the threshold to cause a change in the comparator output. If the overshoot is greater than the noise present on the input, the comparator output will not chatter.

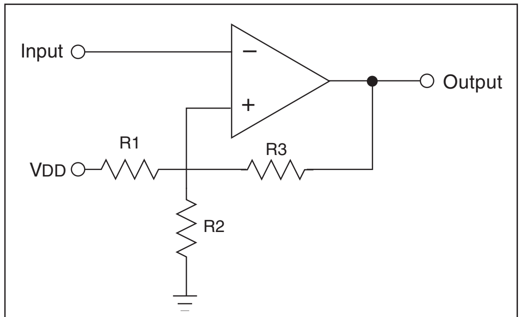


***Figure 3-1** Comparator with Hysteresis*

Equation 3-1:

$$DR = \frac{(V_{TH} + V_{TL})}{V_{DD}}$$

Finally, calculate the feedback resistor R3 using Equation 2-2.

Equation 3-2:

$$R3 = R_{EQ}\left[\left(\frac{1}{DR}\right) - 1\right]$$

Example:
- A V_{DD} = 5.0V, V_H = 3.0V and V_L = 2.5V
- V_{AVG} = 2.77V
- R = 8.2k and R2 = 10k, gives a V_{AVG} = 2.75V
- R_{EQ} = 4.5k
- D_R = .1
- R3 = 39k (40.5 calculated)
- V_{HACT} = 2.98V
- V_{LACT} = 2.46V

For more information visit:
www.microchip.com/solutions/tipstricks/oct04

WebSeminar Series on

www.microchip.com/webseminars

October 28, 1:00 PM Pacific Time

64 Kbyte Flash MCUs in 28- and 40-pin packages, the PIC18F4620 & PIC18F2620

Abstract: The PIC18F4620 and PIC18F2620 8-bit MCUs including up to 64 Kbytes Flash program memory were recently introduced by Microchip. This brief presentation provides an overview of the benefits and features of these products, as well as how to quickly get your design started with Microchip's easy-to-use development tools

Presenter: Terry Schmidt, Product Marketing Manager

Terry joined the Microchip PIC® Microcontroller Marketing team in the fall of 2003 and has product responsibility for the PIC18F4620/2620 and PIC18F4520/2520 MCUs. Prior to joining the team, he worked in the areas of marketing and business development of Digital Signal Processor and 8-bit MCU products. Earlier he held design engineering and management responsibilities for MCU products and development tools. He has a BSEE from Kansas State University.

November 17, 1:00 PM Pacific Time

Thermistor Application for the New MCP6S9X PGA

Abstract: Microchip's new MCP6S9X family of PGAs is based on the established MCP6S2X PGAs; it has reduced functionality for a lower price. This seminar will start by giving a quick overview of the differences between the two PGA families. This class will cover a temperature sensing application circuit using a NTC thermistor and the MCP6S22 or MCP6S92 PGA. Emphasis will be placed on how the PGA can increase resolution and accuracy, at an Analog-to-Digital-Converter (ADC) input by changing gain. It will also touch on the subject of adding hysteresis to the gain selection algorithm. The end of this presentation will give an overview of other materials on these subjects. It will show the thermistor PGA PICtail™ Daughter Board, which connects to the popular PICkit™ 1 Flash Starter Kit development board and measurements made with this hardware (and software). References to other PGA application documents will also be given.

Presenter: Kumen Blake, Analog Mixed-Signal Applications Engineering Manager

Kumen Blake has spent the last 12 years working for analog semiconductor manufacturers. He started as a designer at Comlinear Corp. producing SPICE models for the IC designers, and SPICE macro models for the applications group. He moved into Applications while at Comlinear and supported their high-speed amplifiers and professional serial digital video products. Later he went to Burr-Brown as the applications engineer for their high-speed op amps and DSL products. Today Kumen heads up the applications for Microchip's amplifiers and comparators. His focus has been on producing parts that work well in an embedded digital environment. Kumen received a BSEE from Colorado State University (Fort Collins, CO). He maintains an interest in SPICE modeling, analog filter design, op amp circuits, and analog and RF circuits in general.

December 15, 1:00 PM Pacific Time

Developing Intelligent Power Systems using the MCP1630 High Speed PWM

Abstract: New design methods and components bring a high level of intelligence to power system applications. This web seminar will introduce the MCP1630; Microchips high-speed pulse-width-modulator developed for embedded power system applications. Design examples will be used to demonstrate intelligent power system features and capabilities as a result of combining the MCP1630 with a PIC® microcontroller.

Presenter: Terry Cleveland, Analog-Mixed-Signal Product Applications Engineer

Terry Cleveland has more than 20 years of experience in the microelectronics industry. He began his career with IBM, spending 5 years as a System Engineer developing semiconductor test equipment and 5 years as a Product Failure Analysis Engineer analyzing new components and field failures. Terry spent an additional 8 years as a Power Systems Design Engineer with IBM, Celestica and Lockheed Martin Control Systems. Since joining Microchip Technology 3 years ago as a Product Applications Engineer, Terry has taken on the role of defining new power management products and applications along with assisting customers with their power management designs. His current interests are in developing applications and products for power supplies that employ embedded microcontrollers. Terry received his BSEE from Polytechnic University of Brooklyn and his MSEE from Binghamton University.

For more information visit: www.microchip.com

What's New in Microchip Literature?

Click on a **Document Title** to view the document.

Type of Document	Title of Document	DS#	Print/Web
Application Note	Making Your Oscillator Work	00949A	Web
	Transformerless Power Supplies	00954A	Web
	Applying the TC1219/20 Inverting Charge Pumps with Small External Capacitor Values, AN813	00813A	Web
Data Sheets	PS501-0901	21902A	Web
	PS5100	21903A	Web
	PS051 PowerInfo™ 2	21815C	Web
	PS052 PowerCal™ 2	21817B	Web
	PIC16F5X Flash-based, 8-bit CMOS MCU	41213C	Web
	PIC16F91X	41250A	Web
	dsPIC30F2010	70118D	Web
	dsPIC30F6011, 6012, 6013, 6014	70117D	Web
	dsPIC30F2011, 2012, 3012, 3013	70139A	Web
	dsPIC30F5011, 5013	70116D	Web
	dsPIC30F3014, 4013	70138B	Web
	9A High-Speed MOSFET Drivers (TC4421/2)	21420D	Web
	3A High-Speed Power MOSFET Drivers (TC4423/4/5)	21421D	Web
	1.5A Dual High-Speed Power MOSFET Drivers (TC4426/7/8)	21422C	Web
	1.5A Dual High-Speed Power MOSFET Drivers (TC4426A/7A/8A)	21423E	Web
	Advanced Single or Dual Cell Lithium-Ion/Lithium-Polymer Charge Management Controllers (MCP73841/2/3/4)	21823C	Web
	Micropower Voltage Supervisors (MCP102/103/121/131)	21906A	Web
	2-wire High-Accuracy Temperature Sensor (MCP9800)	21909B	Web
Erratas	PIC18F6520/8520 Rev. A1 Silicon/Data Sheet Errata	80157C	Web
	PIC18FXX2 Rev. B2 Silicon/Data Sheet Errata	80122J	Web
	PIC18F2420/2520/4420/4520 Rev. A1 Silicon Errata	80209A	Web
	PIC18F2410/2510/4410/4510 Rev. A1 Silicon Errata	80208A	Web
	PIC18F2582/2680/4585/4680 Rev. A1 Silicon/Data Sheet Errata	80202A	Web

(Continued)

What's New in Microchip Literature?

Click on a **Document Title** to view the document.

Type of Document	Title of Document	DS#	Print/Web
Erratas	PIC16F818/819 Rev. A4 Silicon/Data Sheet Errata	80159D	Web
	PIC16F7X7 Rev. A2 Silicon/Data Sheet Errata	80177C	Web
	PIC16F818/819 Rev. B0 Silicon/Data Sheet Errata	80212A	Web
	PIC16F87/88 Rev. B1 Silicon/Data Sheet Errata	80171E	Web
	PIC18FXX8 Rev. B4 Silicon/Data Sheet Errata	80134E	Web
	PIC18FXX8 Rev. C0 Silicon/Data Sheet Errata	80161E	Web
	PIC12F508/509 Rev. A Silicon Errata	80190B	Web
	PIC10F2XX Rev. A Silicon Errata	80194C	Web
	PIC16F505 Rev. A Silicon Errata	80211A	Web
	PIC12F635 Rev. A Silicon/Data Sheet Errata	80203A	Web
	PIC16F636 Rev. A Silicon Errata	80204A	Web
	dsPIC30F5011/5013 Rev. A1/A2 Silicon Errata	80210A	Web
Misc. Documents	Quality Systems Handbook	00169C	Web
Product Brief	PIC18F87J10 Family	39633B	Web
Programming Spec.	PIC18F6627/6722/8627/8722 Programming Spec	39643A	Web
	PIC18F87J10 Family Programming Spec	39644A	Web
	PIC16F505 Memory Programming	41226D	Web
	PIC12F508/509 Memory Programming	41227D	Web
	PIC10F2XX Memory Programming	41228D	Web
Sell Sheets	TC72, TC74, TC77, TCM75 & MCP9800/1/2/3 Serial Output Temperature Sensor Family	21651D	Web
	MPLAB® C30 C Compiler	51432B	Web
	MCP102/3/21/31 Microcontroller Supervisor Family	21905A	Web

What's New in Microchip Literature?

Click on a **Document Title** to view the document.

Type of Document	Title of Document	DS#	Print/Web
Technical Brief	Understanding Reset Events in the PIC10F20X	91082A	Web
User Guides	PS050, PowerTool™ 500 User's Guide	21885B	Web
	PICDEM™ LIN User's Guide	41185C	Web
	MPLAB® ICE 2000/4000 Transition Socket Specifications	51194J	Web
	MCP2120/2150 Developer's Kit User's Guide	51246A	Web
	MCP1650 3W White LED Demo Board User's Guide	51513A	Web
	MCP1601 Evaluation Board User's Guide	51511A	Web
	Voltage Supervisor SOT-23 Evaluation Board User's Guide	51510A	Web
	MCP2140 IrDA® Standard Wireless Temp. Sensor Demo Board User's Guide	51487A	Web
	MCP6S2X Evaluation Kit User's Guide	51327B	Web

web site HIGHLIGHTS

DID YOU KNOW.....

- **buy.Microchip** is being released in China and Mexico in October. In addition, more than 30 memory products now have discounted 5000 piece-pricing for online purchases.

buy.MICROCHIP

Visit Microchip Technology's user-friendly e-commerce site:

- Special offers on silicon and development systems
- Powerful parametric search tool
- Live inventory status
- Hassle-free buying

Figure 1. *Home Page*

DID YOU KNOW.....

- The Automotive Design Center has all the resources you need for tire pressure monitoring, supervisory/watchdog MCU, and a connectivity corner to help with your CAN/LIN connectivity automotive designs!

  Discover a new LIN 2.0 Starter kit from our 3rd party provider, Volcano. You'll also find information on EMI/EMC, quality information, business history and direction overviews.

For more information visit: www.microchip.com