Table of Contents

PRODUCT SELECTION GUIDE

Table of Contents

The status of projects shown to be in development was effective at time of printing (September 1996). Please check with your Microchip distributor, sales representative or sales office for the latest product information.

INTRODUCTION

The Embedded Control Solutions Company®

Since its inception, Microchip Technology has focused its resources on delivering truly innovative semiconductor products to the global embedded control marketplace. To do this, we have focused our technology, engineering, manufacturing and marketing resources on two synergistic product lines: field-programmable 8-bit PIC16/17 microcontrollers (MCUs) and high-endurance Serial EEPROMs. Today, Microchip's expanding product portfolio is aimed at delivering a more comprehensive array of high-value solutions to a growing base of customers.

Highlights

Inside Microchip Technology you will find:

- An experienced executive team focused on innovation and committed to listening to our customers
- A focus on providing high-performance, cost-effective, field-programmable embedded control solutions
- 8-bit RISC field-programmable and ROM MCUs
- The world's first 8-pin MCU
- Patented KEELOQ® code hopping technology products
- QuickASIC™ gate array conversion technology
- Serial and Parallel EEPROMs and EPROMs
- A variety of end-user Application-Specific Standard Products (ASSP)
- Fully integrated manufacturing capabilities
- A global network of manufacturing and customer support facilities
- A unique corporate culture dedicated to continuous improvement
- Distributor network support worldwide including certified distribution FAEs

Business Scope

Microchip Technology Inc. manufacturers and markets a variety of VLSI CMOS semiconductor components to support the market for cost-effective embedded control solutions. In particular, the company specializes in highly integrated, field-programmable RISC MCUs, application-specific standard products and related non-volatile memory products to meet growing market requirements for high performance, yet economical embedded control capability in products. Microchip's products feature the industry's most economical One-Time-Programmable (OTP) EPROM, reprogrammable Flash and EEPROM, and ROM capability, along with the compact size, integrated functionality, ease of development and technical support so essential to timely and cost- effective product development by our customers.

Market Focus

Microchip targets selected markets where our advanced designs, progressive process technology and industry-leading product performance enable us to deliver decidedly superior performance. The company has positioned itself to maintain a dominant role as a supplier of high-performance, field-programmable MCUs and associated memory and logic products for embedded control applications which are found throughout the consumer, automotive, telecommunication, office automation and industrial control markets.

Fully Integrated Manufacturing

Microchip delivers fast turnaround and consistent quality through total control over all phases of production. Research and development, design, mask making, wafer fabrication, and the major part of assembly and quality assurance testing are conducted at facilities wholly-owned and operated by Microchip. Our integrated approach to manufacturing along with rigorous use of advanced Statistical Process Control (SPC) and a continuous improvement culture has resulted in high and consistent yields which have positioned Microchip as a quality leader in its global markets. Microchip's unique approach to SPC provides customers with excellent costs, quality, reliability and on-time delivery.

Chandler, Arizona: Company headquarters near Phoenix, Arizona; executive offices, R&D and wafer fabrication occupy this 242,000-square-foot multi-building facility.

Tempe, Arizona: Microchip's 170,000-square-foot wafer fabrication facility provides increased manufacturing capacity today and for the future.

INTRODUCTION

A Global Network of Plants and Facilities

Microchip is a global competitor providing local service to the world's technology centers. The Company's design and technology advancement facilities are located in Chandler and Tempe, Arizona. Product and technology development are located here, along with front-end wafer fabrication and wafer probe and sort.

In 1994, Microchip purchased a second wafer fabrication facility in Tempe, Arizona – thirteen miles from its Chandler, Arizona, headquarters. The additional 170,000 square foot facility meets the increased production requirements of a growing customer base, and provides production capacity which more than doubles that of Chandler. Assembly and test facilities, predominantly located in Kaohsiung, Taiwan, and Bangkok, Thailand, house the technology and assembly and test equipment necessary for modern plastic and ceramic packaging.

During fiscal 1996, Microchip invested more than $115 million for capital additions to the Tempe Fab II facility and for construction of an additional testing facility in Asia. These investments have led to significant improvements in the Company's output and overall cost structure.

Sales and application offices are located in key cities throughout the Americas, Asia/Pacific, Japan and Europe. Offices are staffed to meet the high quality expectations of our customers, and can be accessed for technical and business support.

Embedded Control Overview

Unlike "processor" applications such as personal computers and workstations, the computing or controlling elements of embedded control applications are buried inside the application. The user of the product is only concerned with the very top-level user interface (such as keypads, displays and high-level commands). Very rarely does an end-user know (or care to know) the embedded controller inside (unlike the conscientious PC users, who are intimately familiar not only with the processor type, but also its clock speed, DMA capabilities and so on).

It is, however, most vital for designers of embedded control products to select the most suitable controller and companion devices. Embedded control products are found in all market segments: consumer, commercial, PC peripherals, telecommunications (including fast-emerging personal telecommunication products), automotive and industrial. Most often embedded control products must meet special requirements: cost-effectiveness, low power, small footprint, and a high level of system integration.

Typically, most embedded control systems are designed around a MCU which integrates on-chip program memory, data memory (RAM) and various peripheral functions, such as timers and serial communication. In addition, these systems also usually require complementary Serial EEPROM memories, display drivers, keypads or small displays.

Microchip Technology has established itself as a leading supplier of field-programmable embedded control solutions. The combination of high-performance MCUs from the PIC12CXXX, PIC16C5X, PIC16CXXX and PIC17CXXX families, along with non-volatile memory products, provide the basis for this leadership.

Microchip is committed to continuous innovation and improvement in design, manufacturing and technical support to provide the best possible embedded control solutions to you.

PIC16/17 MCU Overview and Roadmap

PIC16/17 MCUs from Microchip combine high performance, low cost, and small package size, offering the best price/performance ratio in the industry. More than 100 million of these devices ship each year to cost-sensitive consumer products, computer peripherals, office automation, automotive control systems, security and telecommunication applications.

Microchip offers four families of 8-bit MCUs to best fit your needs: PIC12CXXX 8-pin, PIC16C5X 12-bit program word, PIC16CXXX 14-bit program word and PIC17CXXX 16-bit program word MCU families.

All families offer OTP, low-voltage and low-power options, as well as various packaging options. Selected members are available in ROM and reprogrammable EEPROM versions.

The widely-accepted PIC16C5X, PIC16CXXX and PIC17CXXX families are the industry's only 8-bit MCUs using a high-speed RISC architecture. Today, these families are joined by the industry's first 8-pin MCU family of devices – the PIC12CXXX. The PIC12CXXX combines the 8-bit high-speed RISC architecture of the PIC16/17 families with the smallest footprint MCU. Microchip pioneered the use of RISC architecture to obtain high speed and instruction efficiency.

PIC12CXXX: 8-Pin, 8-Bit Family

PIC12CXXX family packs Microchip's powerful RISC-based PIC16/17 architecture into 8-pin DIP and SOIC packages. These PIC12CXXX products have a 12-bit wide instruction set, low operating voltage of 2.5V and small package footprints. Future versions of the PIC12CXXX will include devices with the 14-bit wide instruction set, interrupt handling and a deeper hardware stack. All of these features provide an intelligence level to applications not previously available because of cost or size.

PIC16C5X: 12-Bit Architecture Family

PIC16C5X is the well established base-line family offering the most cost-effective solution. These PIC16C5X products have a 12-bit wide instruction set and are currently offered in 18-, 20- or 28-pin packages. In the SOIC and SSOP packaging options, these are among the smallest footprint MCUs. Low-voltage operation down to 2.0V for OTPs make this family ideal for battery operated applications.

PIC16CXXX: 14-Bit Architecture Family

The PIC16CXXX family offers a wide-range of options, from 18-pin to 68-pin packages as well as low to high levels of peripheral integration. This family has a 14-bit wide instruction set, interrupt handling capability and a deep 8-level hardware stack. The PIC16CXXX family provides the performance and versatility to meet the requirements of more demanding, yet cost-sensitive, mid-range 8-bit applications.

The PIC14C000 Programmable Mixed-Signal Controller allows engineers to design intelligent controllers for smart batteries, battery chargers, battery status monitoring, uninterruptible power supplies, HVAC, and other data acquisition and processing required for managing energy. The PIC14C000 can support

INTRODUCTION

any battery technology including Li Ion, NiMH, NiCd, Pb acid, Zinc Air. In addition, the product's I^2C™ port enables any system OEM, battery pack VAR, and battery manufacturer to design, build, and market SBD-compliant products supporting the System Management Bus standard.

PIC17CXXX: 16-Bit Architecture Family

The PIC17CXXX family offers the world's fastest execution performance of any 8-bit MCU family in the industry. The PIC17CXXX family extends the PIC16/17 MCU's high-performance RISC architecture with a 16-bit instruction word, enhanced instruction set and powerful vectored interrupt handling capabilities. A powerful array of precise on-chip peripheral features provide the performance for the most demanding 8-bit applications.

PIC16/17 MCU Naming Convention

The PIC16/17 architecture offers users a wide range of cost/performance options of any 8-bit MCU family. In order to identify the families, the following naming conventions have been applied to the PIC16/17 MCUs.

TABLE 1: PIC16/17 MCU NAMING CONVENTION

Family		Architectural Features	Name	Technology	Products
PIC17CXXX	8-bit High-Performance MCU Family	• 16-bit wide instruction set • Internal/external vectored interrupts • DC - 25 MHz clock speed • 160 ns instruction cycle (@ 25 MHz) • Hardware multiply	PIC17C4X	OTP program memory, digital only	PIC17C42A, PIC17C43, PIC17C44
			PIC17CR4X	ROM program memory, digital only	PIC17CR42, PIC17CR43
			PIC17C75X	OTP program memory with mixed-signal functions	PIC17C756 (Planned)
PIC16CXXX	8-bit Mid-Range MCU Family	• 14-bit wide instruction set • Internal/external interrupts • DC - 20 MHz clock speed (Note 1) • 200 ns instruction cycle (@ 20 MHz)	PIC14CXXX	OTP program memory with A/D and D/A functions	PIC14C000
			PIC16C55X	OTP program memory, digital only	PIC16C554, PIC16C556, PIC16C558
			PIC16C6X	OTP program memory, digital only	PIC16C62, PIC16C62A, PIC16C63, PIC16C64, PIC16C64A, PIC16C65, PIC16C65A
			PIC16CR6X	ROM program memory, digital only	PIC16CR62, PIC16CR63, PIC16CR64, PIC16CR65
			PIC16C62X	OTP program memory with comparators	PIC16C620, PIC16C621, PIC16C622
			PIC16C7X	OTP program memory with analog functions (i.e. A/D)	PIC16C710, PIC16C71, PIC16C711, PIC16C715, PIC16C72, PIC16C73, PIC16C73A, PIC16C74, PIC16C74A
			PIC16F8X	Flash program and EEPROM data memory	PIC16C84
					PIC16F83, PIC16F84
			PIC16CR8X	ROM program and EEPROM data memory	PIC16CR83, PIC16CR84
			PIC16C9XX	OTP program memory, LCD driver	PIC16C923, PIC16C924
PIC16C5X	8-bit Base-Line MCU Family	• 12-bit wide instruction set • DC - 20 MHz clock speed • 200 ns instruction cycle (@ 20 MHz)	PIC16C5X PIC16C5XA	OTP program memory, digital only	PIC16C52, PIC16C54, PIC16C54A, PIC16C55, PIC16C56, PIC16C57, PIC16C58A
			PIC16CR5X PIC16CR5XA	ROM program memory, digital only	PIC16CR54A, PIC16CR57B, PIC16CR58A
PIC12CXXX	8-bit, 8-pin MCU Family	• 12-bit wide instruction set • DC - 4 MHz clock speed • 1000 ns instruction cycle (@ 4 MHz)	PIC12C5XX	OTP program memory, digital only	PIC12C508, PIC12C509

Note 1: The maximum clock speed for some devices is less than 20 MHz.

Please check with your local Microchip distributor, sales representative or sales office for the latest product information.

INTRODUCTION

The Advantage of Field Programmability

The PIC16/17 MCU family provides a unique combination of a high-performance RISC processor with cost-effective OTP technology. Cost-effective OTP provides many benefits to the user at prices which can be comparable to competing ROM solutions. The benefits include:

1. Quick time-to-market.
2. Ease of code changes.
3. Ability to provide adaptable solutions to end-customer requirements.
4. Ability to meet upside potential via inventory positions at Microchip or worldwide distribution.
5. Reduced scrappage in manufacturing.
6. Reduced inventory in manufacturing.
7. Reduced work-in-process liability.

For most manufacturers, getting the product to market quickly has become the number one goal as global markets have become more competitive. Time-to-market puts pressure on all functions within the manufacturing process: development, purchasing, production, marketing and sales. Field-programmable OTP technology streamlines the process for all stages in the product life cycle. In the early product development stages, a programmable MCU allows much of the functionality to be implemented in software which can be modified more easily than hardware-only solutions.

In the manufacturing stage, the compression of the product life cycle curve puts pressure on the management of inventory and manufacturing cycle times. Minimizing inventory reduces the ability to meet upside demand. Using a traditional ROM-based MCU limits the ability to respond to the market with product enhancements or semi-customized products for specific customers. Using the standard OTP-based PIC16/17 MCU solves all these issues. Inventory can be managed effectively by using the same device in several systems. Costs can be reduced due to volume purchasing. Upsides can be met from either safety stock, directly from Microchip, or local distributors who regularly inventory all PIC16/17 MCU devices. A sudden decline in demand means no work-in-process ROM-based inventory and any excess safety stock can be consumed by the other products using the same standard device.

OTP is the 'Flexible Manufacturing' technology of the MCU world. As competition intensifies, the demand for customer-specific products increases. Having the ability to change (for example, the appearance of LCD displays or add extra features in a timely manner) can be a key competitive advantage. Programming the OTP device on the manufacturing floor allows easy customizing and internal tracking of the devices for each specific customer. Customization can significantly increase the overall product life cycle to provide better return on investment and help minimize the threat of competition.

Current PIC16/17 MCU product families include advanced features such as sophisticated timers, embedded analog-to-digital converters, extended instruction/data memory, inter-processor communication (I^2C bus, SPI™ and USARTs) and ROM, RAM, EPROM, EEPROM and Flash memories.

All PIC16/17 families are supported by user-friendly development systems including; assembler, software simulator, C Compiler, fuzzy logic development software, programmers and in-circuit emulators.

Development Systems

Microchip is committed to providing useful and innovative solutions to your embedded system designs. Our installed base of application development systems has grown to an impressive 75,000 systems worldwide. Significantly, more than half of the total system shipments over the past six years took place within the past 18 months.

Among support products offered are the PICMASTER® Real-Time Universal In-circuit Emulator running under the Windows® environment. Microchip's MPLAB™, a complete Integrated Development Environment (IDE), is provided with PICMASTER. MPLAB allows the user to edit, compile and emulate from a single user interface, making the developer productive very quickly. The MPLAB interface is easy-to-learn and easy-to-use, and can help to reduce overall system development time. PICMASTER is designed to provide product development engineers with an optimized design tool for developing target applications. This universal in-circuit emulator provides a complete MCU design tool set for all MCUs in the PIC12CXXX, PIC16C5X, PIC16CXXX and PIC17CXXX families. A CE compliant version of PICMASTER is available for European Union (EU) countries.

ICEPIC is a low-cost in-circuit emulator solution for the Microchip PIC16C5X and PIC16CXXX families of 8-bit OTP MCUs. PRO MATE® II, the full-featured, modular device programmer, enables you to quickly and easily program user software into PIC16/17 MCUs. The PRO MATE II operates as a stand-alone unit or in conjunction with a PC compatible host system. The PICSTART® Plus and Lite development kits, are low-cost development systems for the PIC12CXXX, PIC16C5X/PIC16CXXX and PIC17CXXX MCUs. PICSEEKIT and PICSEESTART provide product development engineers with a cost-effective and timely design tool solution for the MTA8XXXX family. PICDEM low-cost demonstration boards are simple boards which demonstrate the capabilities of the full range of Microchip's MCUs. Users can program the sample MCUs provided with PICDEM boards, on a PRO MATE II or PICSTART programmer, and easily test firmware. KEELOQ Evaluation and Programming Tools support Microchip's HCS Secure Data Products.

The Serial EEPROM Designer's Kit includes everything necessary to read, write, erase or program special features of any Microchip Serial EEPROM product including *Smart Serials*™ and secure serials. The *Total Endurance*™ Disk is included to aid in trade-off analysis and reliability calculations. The total kit can significantly reduce time-to-market and result in an optimized system. The *TrueGauge*® development tool supports system development with the MTA11200B TrueGauge Intelligent Battery Management IC.

INTRODUCTION

TABLE 2: PIC16/17 SYNERGISTIC DEVELOPMENT TOOLS

Development Tool	Name	PIC12CXXX	PIC16C5X	PIC16CXXX	PIC17CXXX
Integrated Development Environment (IDE)	MPLAB™	✔	✔	✔	✔
Universal Macro-Assembler	MPASM	✔	✔	✔	✔
C Compiler	MPLAB-C	✔	✔	✔	✔
Full-Featured, Modular In-Circuit Emulator	PICMASTER®	✔	✔	✔	✔
Low-Cost Modular In-Circuit Emulator	ICEPIC	—	✔	✔	—
Full-Featured, Modular Device Programmer	PRO MATE® II	✔	✔	✔	✔
Entry-Level Development Kit with Programmer	PICSTART® Plus	✔	✔	✔	✔
Low-Cost Entry Level Development Kit	PICSTART® Lite	✔	✔	✔	Planned
Fuzzy Logic Development Software	*fuzzy*TECH®-MP	✔	✔	✔	✔
Application Code Generator	MP-DriveWay™	—	✔	✔	✔

Software Support

Microchip's PIC16/17 MCU families are supported by an assembler, compiler, software simulator, fuzzy logic development software and application code generator. MPASM is a universal macro assembler supporting Microchip's entire product line of MCUs. A full-featured Integrated Development Environment (MPLAB), C-Compiler and Fuzzy Logic tools are also available for three MCU families. MP-DriveWay is an easy-to-use Windows-based Application Code Generator for visually configuring all the peripherals in a PIC16/17 device and, with a click of the mouse, generate all the initialization and many functional code modules in C language.

Microchip endeavors at all times to provide the best service and responsiveness possible to its customers. The Microchip Systems Bulletin Board Service (BBS) is one service to facilitate this service. It's a multi-faceted tool that can provide you with information on a number of different topics.

Special Interest Groups (SIGs) available through the BBS can provide you with the opportunity to discuss issues and topics of interest with others that share your interest or questions. The BBS is regularly used to distribute technical information, application notes, source code, errata sheets, bug reports, interim patches for Microchip systems products, and user contributed files for distribution.

The Microchip Internet Home Page can provide you with the latest technical information, production-released software for development tools, application notes and promotional news on Microchip products and technology. The Microchip Web address is http://www.microchip.com.

Please see the On-Line Technical Support Section on page 44 for more information on the Microchip BBS and WWW site.

Application-Specific Standard Products (ASSPs)

Microchip ASSPs provide value-added embedded control solutions by combining PIC16/17 MCU architecture, non-volatile memory, and innovative software technology for vertical applications. These products incorporate technology that offers a complete solution that is both unique to the customer and standard in manufacture to Microchip. In addition, Microchip ASSPs reduce or remove the barriers for customers to use Microchip solutions, in their products, through the use of software, embedded in secure OTP- or ROM-based MCUs. These MCUs are packaged to provide the highest integration, to the customer, at the best overall system cost.

The TrueGauge MTA11200B is the most accurate and most integrated battery management and charging solution available today. The TrueGauge family incorporates Microchip/SPAN patented technology which digitally integrates battery charge and discharge current to provide an accurate (>97% typical) state of charge indication. The family operates with NiCd and NiMH and lead acid battery packs from 3 VDC to 25 VDC. These products are ideal for portable PC, cellular phone, and portable consumer product applications.

The MTE1122 Energy Management Controller combines Microchip's proprietary PIC16/17 8-bit RISC MCU technology with a unique, patent pending power management firmware algorithm in a single package. This device, by monitoring and controlling the supply requirements into an AC induction motor, effectively reduces the power consumed by the motor. The MTE1122 is available in both plastic DIP and space-saving SOIC packages, and operates over commercial and industrial ranges.

Ease-of-use, low voltage, and low cost make the MTA41XXX mouse and trackball MCU firmware solutions ideal for implementing new designs for both PCs and Apple® computers. The products in the MTA41XXX family are 18-lead, low-power, CMOS MCU ICs combined with application-specific software. By adding a few external components, the user can easily realize a complete mouse or trackball system.

1996 Product Selection Guide

INTRODUCTION

The MTA8XXXX PICSEE® family of cost-effective system solutions integrates PIC16/17 MCUs with EEPROM technology. These PICSEE devices are ideally suited for automotive security, keyless entry, remote control, telecommunication applications and data acquisition. The combined product assembly techniques provide the user the highest performance solution in a compact and cost-effective package.

Future ASSP products will include advanced features such as mixed analog and digital capability as well as an ever broadening family of turnkey software solutions for the embedded control market.

Application-Specific Integrated Circuits (ASICs)

In June 1996, Microchip acquired quick-turn ASIC specialist ASIC Technical Solutions, Inc. With the acquisition, Microchip now offers the QuickASIC™ family which replaces standard field programmable gate arrays (FPGAs) and complex programmable logic devices (CPLDs) with a masked ASIC at a substantially reduced price per unit compared to programmable logic devices. Microchip's Quic ASIC family offers turnkey digital design conversion of any FPGA/CPLD device by transforming its net list into a masked ASIC – with very fast lead times of two-to-four weeks from design signoff to first production. QuickASIC devices can be used for any application prototyping with FPGAs/CPLDs including multimedia, data communications, telecommunications and computer peripherals.

In addition, Microchip plans call for customers being given the opportunity to combine Microchip's powerful RISC-based PIC16/17 MCU core with configurable gate arrays, providing a much wider range of flexibility, power ranges and custom functionality.

Serial EEPROM Overview

Microchip offers one of the broadest selections of CMOS Serial EEPROMs on the market for embedded control systems. Serial EEPROMs are available in a variety of densities, operating voltages, bus interface protocols, operating temperature ranges and space saving packages.

Densities:

Currently range from 1K to 64K with higher density devices in development.

Bus Interface Protocols:

All major protocols are covered: I^2C™, Microwire® and SPI.

Operating Voltages:

In addition to standard 5V devices there are two low voltage families. The "LC" devices operate down to 2.5V, while the breakthrough "AA" family operates, in both read and write mode, down to 1.8V, making these devices highly suitable for alkaline and NiCd battery powered applications.

Temperature Ranges:

Like all Microchip devices, Serial EEPROMs are offered in Commercial (0°C to +70°C), Industrial (-40°C to +85°C) and Automotive (-40°C to +125°C) operating temperature ranges.

Packages:

The focus is on small packages. Small footprint packages include: 8-lead DIP, 8-lead SOIC in JEDEC and EIAJ body widths, and 14-lead SOIC. The SOIC comes in two body widths; 150 mil and 207 mil.

Technology Leadership:

Microchip's Serial EEPROMs are backed by a 10 million Erase/Write cycle guarantee – an endurance breakthrough unmatched by its competitors. Microchip's erase/write cycle endurance is among the best in the world, and only Microchip offers such unique and powerful development tools as the Total Endurance disk. This mathematical software model is an innovative tool used by system designers to optimize Serial EEPROM performance and reliability within the application.

The Company has also developed the world's first 64K Smart Serial EEPROM. Device densities range from 256 bits up to 64K bits. Another first is the 24LC21, a single chip DDC1/DDC2™-compatible solution for plug-and-play video monitors. In addition, Microchip released a high-speed 1 MHz 2-wire Serial EEPROM device ideal for high-performance embedded systems.

Microchip is a high-volume supplier of Serial EEPROMs to all the major markets worldwide including consumer, automotive, industrial, computer and communications. To date, more than 300 million units have been produced. Microchip continues to develop new Serial EEPROM solutions for embedded control applications.

Parallel EEPROM Overview

CMOS Parallel EEPROM devices from Microchip are available in 4K, 16K and 64K densities. The manufacturing process used for these EEPROMs ensures 10,000 to 100,000 write and erase cycles typical. Data retention is more than 10 years. Fast write times are less than 200 µs. These EEPROMs work reliably under demanding conditions and operate efficiently at temperatures from -40°C to +85°C. Microchip's expertise in advanced SOIC, TSOP and VSOP surface mount packaging supports our customers' needs in space-sensitive applications.

Typical applications include computer peripherals, engine control, telecommunications and pattern recognition.

OTP EPROM Overview

Microchip's CMOS EPROM devices are produced in densities from 64K to 512K. Typical applications include computer peripherals, instrumentation, and automotive devices. Microchip's expertise in surface mount Packaging on SOIC, TSOP and VSOP packages led to the development of the Surface Mount OTP EPROM market where Microchip is a leading supplier today. Microchip is also a leading supplier of low-voltage EPROMs for battery powered applications.

INTRODUCTION

Secure Data Products Overview

Microchip's patented KEELOQ code hopping technology is the perfect solution for remote keyless entry and logical/physical access control systems. The initial device in the family, HCS300 encoder, will replace current fixed code encoders in transmitter applications and provide a low cost, integrated solution. The KEELOQ family is rapidly expanding with the HCS301 (high voltage encoder) and HCS200 (low-end, low-cost encoder). High-end encoders (HCS360 and HCS361) that meet OEM specifications and requirements.

Microchip provides flexible decoder solutions by providing optimized routines for Microchip's PIC16/17 MCUs. This allows the designer to combine the decoder and system functionality in a MCU. The decoder routines are available under a license agreement. The HCS509 and HCS512 are the first decoder devices in the KeeLoq family. These devices are single chip decoder solutions and simplify designs by handling learning and decoding of transmitters.

The KEELOQ product family is expanding to include enhanced encoders and decoders. Typical applications include automotive RKE, alarm and immobilizer systems, garage door openers and home security systems.

Ease of Production Utilizing Quick Turn Programming (QTP) and Serialized Quick Turn Programming (SQTP℠)

Recognizing the needs of high-volume manufacturing operations, Microchip has developed two programming methodologies which make the OTP products as easy to use in manufacturing as they are efficient in the system development stage.

Quick Turn Programming allows factory programming of OTP products prior to delivery to the system manufacturing operation. PIC16/17, EPROM and Serial EEPROM products can be automatically programmed, with the users program, during the final stages of the test operation at Microchip's assembly and test operations in the Philippine Islands, Taiwan and Thailand. This low-cost programming step allows the elimination of programming during system manufacturing and essentially allows the user to treat the PIC16/17 and memory products as custom ROM products. With one- to four-week lead times on QTP products, the user no longer needs to plan for the extended ROM masking lead times and masking charges associated with custom ROM products. This capability, combined with the off-the-shelf availability of standard OTP product, ensures the user of product availability and the ability to reduce his time-to-market once product development has been completed.

Unique in the 8-bit MCU market is Microchip's ability to enhance the QTP capability with Serialized Quick Turn Programming (SQTP). SQTP allows for the programming of devices with unique, random or serialized identification codes. As each PIC16/17 device is programmed with the customers program code, a portion of the program memory space can be programmed with a unique ID, accessible from normal program memory, which will allow the user to provide each device with a unique identification. This capability is ideal for embedded systems applications where the transmission of key codes or identification of the device as a node within a network is essential. Taking advantage of this capability allows the system designer to eliminate the requirement for expensive off-chip code implementation using DIP switches or non-volatile memory components. The SQTP offering, pioneered by Microchip, provides the embedded systems designer with a low cost means of putting a unique and custom device into every system or node.

Future Products and Technology

Microchip is constantly developing advanced process technology modules and products that will be integrated into present product lines to continue to achieve a range of compatible processes. Current production technology utilizes lithography dimensions down to 0.7 microns.

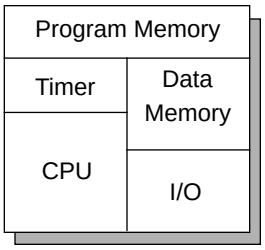
Microchip's research and development activities include exploring new process technologies and products that have industry leadership potential. Particular emphasis is placed on products that can be put to work in high-performance broad-based markets.

Equipment is continually updated to bring the most sophisticated process, CAD and testing tools online. Cycle times for new technology development are continuously reduced by using in-house mask generation, a high-speed pilot line within the manufacturing facility and continuously improving methodologies.

More advanced technologies are under development, as well as advanced CMOS RISC-based MCU, ASSP and CMOS EEPROM and EPROM, and QuickASIC products. Objective specifications for new products are developed by listening to our customers and by close co-operation with our many customer-partners worldwide.

PIC12CXXX FAMILY: 8-PIN FAMILY

Function/Description	Part Number	Package	Features
For many consumer, automotive and commercial applications, the PIC12CXXX family of CMOS MCUs offers the best combination of low-cost, low-power, smallest footprint and speed operation with the versatile field-programmable EPROM program memory. This advanced OTP technology provides the designer/manufacturer with a new level of cost savings and affordable versatility uncommon in today's MCU market. • Industry's first 8-pin MCU • Low cost, low power • Smallest footprint • Versatile field-programmable EPROM • Most cost-effective OTP solution • RISC-like Harvard architecture • 33 12-bit wide instructions • Highly efficient, easy-to-learn set of program instructions • Single cycle instruction execution • Single word instructions result in more compact software code • Instruction execution rates as fast as 1000 ns per instruction PIC12CXXX development is supported by user-friendly, Windows-based PICMASTER in-circuit emulator, PRO MATE II programmer and the low-cost PICSTART Plus development kit. Software support includes MPLAB Integrated Development Environment (IDE) and MPLAB C Compiler.	**PIC12C508***	8-Lead	• 512 x 12 EPROM program memory • 25 bytes general purpose RAM • 6 bidirectional I/O lines • TMR0 timer/counter • Watchdog timer • Fuse selectable oscillator configurations: RC, XT, LP, Internal RC for EPROM-based devices • DC through 4 MHz clock • DC to 1000ns instruction cycle • Wide operating voltage (2.5V to 5.5V) • Sleep Mode • Two temperature ranges (0°C to +70°C, -40°C to +85°C) • Packaging available: 8-lead PDIP, SOIC, CERDIP (Windowed)
	PIC12C509*	8-Lead	All features of the PIC12C509 but with 41 bytes of general purpose RAM and 1024 x 12-bit words of EPROM program memory.



*Contact Microchip Technology for availability.

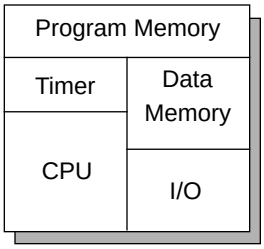
PIC16C5X FAMILY: BASE-LINE COST EFFECTIVENESS

Function/Description

For many consumer, automotive and commercial applications, the PIC16C5X family of CMOS MCUs offers the best combination of low-cost, low-power, small-footprint and speed operation with the versatile field programmable EPROM program memory. This advanced OTP technology provides the designer/manufacturer with a new level of cost savings and affordable versatility uncommon in today's MCU market.

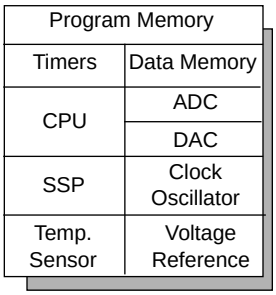
- Low cost, low power
- Small-footprint
- Versatile field-programmable EPROM
- Most cost-effective OTP solution
- RISC-like Harvard architecture
- 33 12-bit wide instructions
- Highly efficient, easy-to-learn set of program instructions
- Single cycle instruction execution
- Single word instructions result in more compact software code
- Instruction execution rates as fast as 200 ns per instruction

PIC16C5X development is supported by user-friendly, Windows-based PICMASTER in-circuit emulator, ICEPIC low-cost in-circuit emulator, PRO MATE II universal programmer and PICSTART development kits. Software support includes MPLAB IDE, MPLAB C Compiler, MP-DriveWay Applications Code Generator and *fuzzy*TECH-MP fuzzy logic development software .

Part Number	Package	Features
PIC16C52	18-Lead	Same as PIC16C54 except: • 384 x 12 EPROM program memory • No Watchdog timer • Fuse selectable oscillator configurations: RC, XT • DC through 4 MHz clock • DC to 1000ns instruction cycle • Two temperature ranges (0°C to +70°C and -40°C to +85°C) • Packaging available: 18-lead PDIP, SOIC
PIC16C54	18-Lead	 • 512 x 12 EPROM program memory • 25 bytes general purpose RAM • 12 bidirectional I/O lines • TMR0 timer/counter • Watchdog timer • Fuse selectable oscillator configurations: RC, XT, LP, HS for EPROM-based devices • DC through 20 MHz clock • DC to 200ns instruction cycle • Wide operating voltage (2.5V to 6.25V) • Sleep Mode • Three temperature ranges (0°C to +70°C, -40°C to +85°C, and -40°C to +125°C) • Packaging available: 18-lead PDIP, CERDIP (Windowed), SOIC and 20-pin SSOP
PIC16C54A	18-Lead	Same as PIC16C54 but with extended operating voltage range (2.0V to 6.25V) and lower operating current.
PIC16CR54A	18-Lead	Same as PIC16C54 but with ROM program memory in place of EPROM program memory.
PIC16C55	28-Lead	Same as PIC16C54 but with additional 8-bit I/O port (20 I/O) and 24 bytes general purpose RAM.
PIC16C56	18-Lead	All the features of PIC16C54 but with 1024 x 12-bit words of EPROM program memory.
PIC16C57	28-Lead	All features of the PIC16C55 but with 72 bytes of general purpose RAM and 2048 x 12-bit words of EPROM program memory.
PIC16CR57B	28-Lead	Same as PIC16C57 but with ROM program memory in place of EPROM program memory.
PIC16C58A	18-Lead	All features of the PIC16C57 but with one less 8-bit I/O port (12 I/O), 73 bytes of general purpose RAM and extended operating voltage range (2.0V to 6.25V).
PIC16CR58A	18-Lead	Same as PIC16C58A but with ROM program memory in place of EPROM program memory.

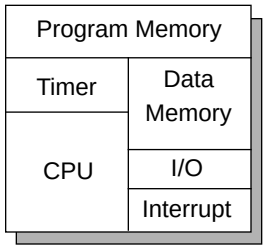
PIC16C6XX FAMILY: PIC14C000 MIXED-SIGNAL CONTROLLER

Function/Description	Part Number	Package	Features
The PIC14C000 is a high-performance mixed-signal MCU based on Microchip's powerful 8-bit RISC core that enables real-time measurement and processing of battery parameters including voltage, charge current, discharge current, temperature, and total number of cycles. It supports 4096 words of program memory, 192 bytes of RAM, 11 interrupts, 38 special function hardware registers and eight levels of hardware stack. The PIC14C000 is ideally suited for use in smart battery controllers, battery chargers, uninterruptable power supply controllers, smart sensors, HVAC controllers and data acquisition.	**PIC14C000**	28-Lead	• RISC core • 35 single word instructions • Fully code compatible with Microchip's standard PIC16/17 MCU family • 4K Program Memory, 192 bytes RAM, 11 interrupts, eight levels of stack • 8-channel A/D Converter with programmable resolution up to 16 bits • Two multi-range Digital-to-Analog (D/A) converters • Multiple power down controls for analog circuits • Synchronous Serial Port (SSP) compatible with I^2C System Management Bus • I/O pins with individual direction control allowing for support of any other communications interface such as RS-232 and one-wire • Internal temperature sensor, clock oscillator and voltage reference



PIC16CXXX FAMILY: MID-RANGE PIC16C55X

Function/Description	Part Number	Package	Features
The PIC16C5XX 8-bit MCU family provides the advantages of the enhanced CPU core along with a more powerful array of peripheral features designed to meet the demands of today's mid-range 8-bit embedded control applications. The enhanced CPU core includes enhancements such as multiple interrupt sources, 8 level deep hardware stack and 14-bit wide instruction words. • Higher level of peripheral integration • Upward compatible from PIC16C5X base-line family • Versatile field-programmable EPROM • Cost effective OTP user programmability • RISC-like Harvard Architecture • 35 single word instructions • Multiple Interrupt Sources • Deeper hardware stack • Low power consumption • Small footprint package options • Fast execution throughput • Fuse selectable oscillator options: RC, XT, LP, HS • Three temperature ranges: (0°C to +70°C, -40°C to +85°C and -40°C to +125°C)	**PIC16C554**	18/20-Lead	• 512 x 14 EPROM program memory • 80 bytes general purpose RAM • 3 external and internal interrupt sources • 13 bi-directional I/O lines • 8-bit timer/counter with 8-bit programmable prescaler • Extended operating voltage range (2.5V to 6.25V) • Watchdog Timer • Packaging options: 18-lead PDIP, SOIC, CERDIP (Windowed), 20-lead SSOP • Wide operating range (2.5V to 5.5V)
	PIC16C556*	18/20-Lead	Same as the PIC16C554 except: • 1K x 14 EPROM program memory
	PIC16C558	18/20-Lead	Same as the PIC16C556 except: • 2K x 14 EPROM program memory • 128 bytes general purpose RAM



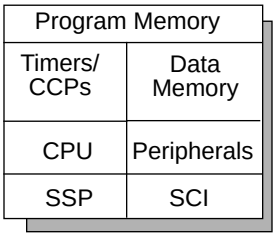
The PIC16C5XX family is supported by user-friendly, yet powerful development tools such as the Windows-based PICMASTER in-circuit emulator, PICSTART Plus development kit and the PRO MATE II programmer. In addition, fuzzy logic development tools and a C-Compiler as well as a host of other third party hardware and software tools are also available to support the PIC16C5XX family.

PIC16CXXX FAMILY: MID-RANGE PIC16C6X

Function/Description	Part Number	Package	Features
	PIC16C61	18-Lead	Same as PIC16C71 except: • No Analog-to-Digital Converter
	PIC16C62	28-Lead	• 2K x 14 EPROM program memory • 128 bytes general purpose RAM • 22 bi-directional I/O lines • Capture/Compare/PWM (CCP) module • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • 7 internal and external interrupt sources • 16-bit timer/counter: two 8-bit timer/counters with prescaler, one with postscaler • Operating frequencies: DC to 20 MHz • Packaging options: 28-lead PDIP (300 mil), CERDIP (Windowed), SOIC and SSOP
	PIC16C62A	28-Lead	Same as the PIC16C62 except: • Brown-out detection
	PIC16CR62	28-Lead	Same as the PIC16C62A except: • ROM program memory
	PIC16C63	28-Lead	Same as the PIC16C62 except: • 4K x 14 EPROM program memory • 192 bytes general purpose RAM • USART Serial Communications Interface (SCI) • Second Capture/Compare/PWM (CCP) • Brown-out detection • 10 external and internal interrupt sources
	PIC16CR63*	28-Lead	Same as PIC16C63 except: • ROM program memory
	PIC16C64	40/44-Lead	• 2K x 14 EPROM program memory • 128 bytes general purpose RAM • 33 bi-directional I/O lines • Capture/Compare/PWM (CCP) module • Parallel slave port (8-bit wide) • I^2C and 3-wire SPI compatible Synchronous Serial Port (SSP) • 8 internal and external interrupt sources • 16-bit timer/counter: two 8-bit timer/counters with prescaler one with postscaler • Operating frequencies: DC to 20 MHz • Packaging options: 40-lead PDIP, CERDIP (Windowed), and 44-lead PLCC, MQFP
	PIC16C64A	40/44-Lead	Same as the PIC16C64 except: • Brown-out detection
	PIC16CR64	40/44-Lead	Same as PIC16C64A except: • ROM program memory

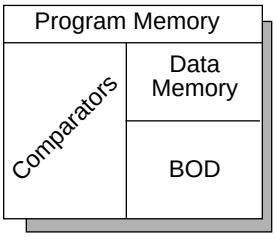
PIC16CXXX FAMILY: MID-RANGE PIC16C6X

Function/Description	Part Number	Package	Features
	PIC16C65	40/44-Lead	• 4K x 14 EPROM program memory • 192 bytes general purpose RAM • 33 bi-directional I/O lines • 11 external and internal interrupt sources • 2 Capture/Compare/PWM (CCP) modules • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • SCI provides USART functions • Parallel slave port • 3 counter/timers, one can be incremented during Sleep Mode via external clock • Operating Frequencies: DC to 20 MHz • Packaging options: 40-lead PDIP, CERDIP (Windowed), 44-lead PLCC, MQFP
	PIC16C65A	40/44-Lead	Same as the PIC16C65 except: • Brown-out detection
	PIC16CR65*	40/44-Lead	Same as PIC16C65A except: • ROM program memory



PIC16CXXX FAMILY: MID-RANGE PIC16C6XX

Function/Description	Part Number	Package	Features
	PIC16C620	18/20-Lead	• 512 x 14 EPROM program memory • 80 bytes general purpose RAM • 4 external and internal interrupt sources • 13 bi-directional I/O lines • Analog comparator module with two precision comparators • 8-bit timer/counter with 8-bit programmable prescaler • Brown-out detection • Extended operating voltage range (2.5V to 6.25V) • Watchdog Timer • Packaging options: 18-lead PDIP, SOIC, CERDIP (Windowed), 20-lead SSOP
	PIC16C621	18/20-Lead	Same as the PIC16C620 except: • 1K x 14 EPROM program memory
	PIC16C622	18/20-Lead	Same as the PIC16C620 except: • 2K x 14 EPROM program memory • 128 bytes general purpose RAM



PIC16CXXX FAMILY: MID-RANGE PIC16C6XX

Function/Description	Part Number	Package	Features
	PIC16C642*	28-Lead	• 4K x 14 EPROM program memory • 176 bytes general purpose RAM • 22 bi-directional I/O lines • Analog comparator module with two precision comparators • 8-bit timer/counter with 8-bit programmable prescaler • Brown-out detection • Extended operating voltage range (2.5V to 6.25V) • Watchdog Timer • Dual-bit parity array • Packaging options: 28-lead PDIP (300 mil), CERDIP (Windowed), SOIC
	PIC16C662*	40/44-Lead	• 4K x 14 EPROM program memory • 176 bytes general purpose RAM • 33 bi-directional I/O lines • Analog comparator module with two precision comparators • 8-bit timer/counter with 8-bit programmable prescaler • Brown-out detection • Dual-bit parity array • Extended operating voltage range (2.5V to 6.25V) • Watchdog Timer • Packaging options: 40-lead PDIP, CERDIP (Windowed), 44-lead PLCC, MQFP, TQFP

*Contact Microchip Technology for availability.

PIC16CXXX FAMILY: MID-RANGE PIC16C7X/7XX

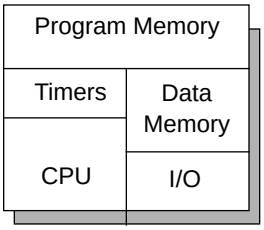
Function/Description	Part Number	Package	Features
	PIC16C710	18-Lead	Same as the PIC16C71 except: • 512 x 14 EPROM program memory • Brown-out detection • SSOP Package
	PIC16C71	18-Lead	• 1K x 14 EPROM program memory • 36 bytes general purpose RAM • 4-channel, 8-bit A/D converter with sample and hold, accuracy of ±1 LSB, 20µs conversion time • 13 bi-directional I/O lines • 4 internal and external interrupt sources • 8-bit timer/counter with programmable prescaler • Operating frequencies: DC to 20 MHz • Packaging options: 18-pin PDIP, CERDIP (Windowed), SOIC
	PIC16C711	18-Lead	Same as PIC16C71 except: • 68 bytes general purpose RAM • Brown-out detection • SSOP Package
	PIC16C715*	18-Lead	Same as the PIC16C711 except: • 2K x 14 EPROM Program Memory • 128 bytes general purpose RAM • Dual-bit parity array
	PIC16C72	28-Lead	• 2K x 14 EPROM program memory • 128 bytes general purpose RAM • 22 bi-directional I/O lines • 11 external and internal interrupt sources • 1 Capture/Compare/PWM (CCP) module • 5-channel, 8-bit A/D converter • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • Operating Frequencies: DC to 20 MHz • 16-bit timer/counter; two 8-bit timer/counters with prescaler, one with postscaler • Brown-out detection • Packaging options: 28-lead PDIP (300 mil), CERDIP (Windowed), SOIC, SSOP

PIC16CXXX FAMILY: MID-RANGE PIC16C7X/7XX

Function/Description	Part Number	Package	Features
	PIC16C73	28-Lead	• 4K x 14 EPROM program memory • 192 bytes general purpose RAM • 22 bi-directional I/O lines • 11 external and internal interrupt sources • 2 Capture/Compare/PWM (CCP) modules • 5-channel, 8-bit A/D converter • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • Serial Communications Interface (SCI) provides USART functions • 3 counter/timers, one can be incremented during Sleep Mode via external clock • Operating Frequencies: DC to 20 MHz • Packaging options: 28-lead PDIP (300 mil), CERDIP (Windowed), SOIC
	PIC16C73A	28-Lead	Same as the PIC16C73 except: • Brown-out detection
	PIC16C74	40/44-Lead	• 4K x 14 EPROM program memory • 192 bytes general purpose RAM • 33 bi-directional I/O lines • 12 external and internal interrupt sources • 2 Capture/Compare/PWM (CCP) modules • 8-channel, 8-bit A/D converter • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • Serial Communications Interface (SCI) provides USART functions • Parallel slave port • 3 counter/timers, one can be incremented during Sleep Mode via external clock • Operating Frequencies: DC to 20 MHz • Packaging options: 40-lead PDIP, CERDIP (Windowed), 44-lead PLCC, MQFP
	PIC16C74A	40/44-Lead	Same as the PIC16C74 except: • Brown-out detection

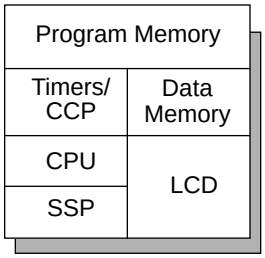
PIC16CXXX FAMILY: MID-RANGE PIC16FXX (REPROGRAMMABLE)

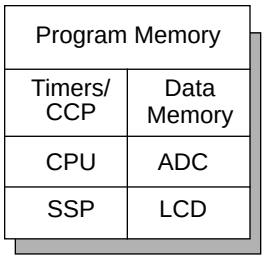
Function/Description	Part Number	Package	Features
For systems/applications needing reprogrammability, the PIC16FXX family provides a Flash type program memory with high-endurance E^2PROM data memory. The family uses the 14-bit instruction word enhanced CPU core.	**PIC16F83**	18-Lead	• Unique 512 x 14 Flash program memory • 64 bytes EEPROM data memory • 36 bytes general purpose RAM • Flash program memory can be serially programmed in the application circuit • 13 bi-directional I/O lines • 4 internal and external interrupt sources • 8-bit timer/counter with programmable prescaler • Operating frequencies: DC to 10 MHz • Packaging options: 18-lead PDIP, SOIC
	PIC16CR83	18-Lead	Same as PIC16F83 but with ROM program memory in place of Flash program memory.
	PIC16C84	18-Lead	Same as PIC16F83 except: • Unique 1K x 14 EEPROM program memory • 36 bytes general purpose RAM
	PIC16CR84	18-Lead	Same as PIC16F84 but with ROM program memory in place of Flash program memory and 68 bytes general purpose RAM.
	PIC16F84	18-Lead	Same as PIC16C84 except: • 68 bytes general purpose RAM • Flash program memory instead of EEPROM



PIC16CXXX FAMILY: MID-RANGE PIC16C9XX WITH LCD DRIVER

Function/Description	Part Number	Package	Features
The PIC16C9XX family builds on the features of the enhanced CPU core and adds support for Liquid Crystal Displays (LCD).	**PIC16C923**	18-Lead	• 4K x 14 EPROM program memory • 176 x 8 general purpose SRAM • 60 special function hardware registers • Eight levels deep hardware stack • Interrupt capability • 25 I/O pins with individual direction control • 25-27 input-only pins • Capture/Compare/PWM (CCP) pin • 3 counter/timers, once can be incremented during Sleep Mode • I^2C and 3-wire SPI-compatible Synchronous Serial Port (SSP) • Flexible LCD interface • Voltage source for LCD • Power-on reset • Power-up timer; Oscillator start-up • Watchdog timer • Programmable code protection • Power-saving SLEEP mode • 2-pin serial in-system programming • Packaging options: 64-lead PDIP
	PIC16C924	18-Lead	Same as the PIC16C923 except has: • 5-channel, 8-bit A/D converter





PIC17CXXX FAMILY: HIGH-PERFORMANCE PIC17C4X/PIC17C75X*

Function/Description

For high-end applications, the PIC17CXXX family of CMOS MCUs offers the industry's highest performance 8-bit MCU, powerful on-chip peripherals, OTP user flexibility, and world class development tools, all at competitive pricing.

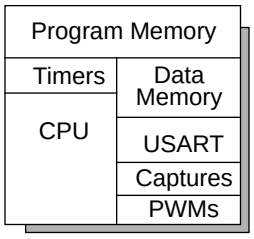
- RISC-like Harvard architecture
- Long 16-bit Instruction Word
- Instruction set includes 58 instructions
- Single-cycle/single-word instruction execution for extremely fast execution throughput and compact software code
- Instruction set includes enhanced capabilities such as easy and fast utilization of large look-up tables, and the ability to move data in a single instruction cycle
- Powerful vectored interrupt handling
- Watchdog Timer and Sleep Mode features effectively address the requirements of real-time embedded control applications
- Hardware multiply on PIC17C4X and PIC17C75X
- 4 fuse selectable oscillator options

The PIC17C42A, PIC17C43, PIC17C44 and PIC17C75X have 58 instructions including single-cycle hardware multiply.

PIC17CXXX development is supported by user-friendly, Windows-based PICMASTER in-circuit emulator, PRO MATE II programmer and PICSTART Plus development kit. Software support includes MPLAB IDE, MPLAB C Compiler, MP-DriveWay Applications Code Generator and *fuzzy*TECH-MP fuzzy logic development software.

*Contact Microchip Technology for availability.

Part Number	Package	Features
PIC17C756*	64/68-Lead	• 16K x 16 EPROM program memory • 902 bytes general purpose RAM • Can function as stand-alone MCU or address up to 64K word external Program Memory • 12 channel 10-bit A/D converter • Single cycle 8 x 8 multiply (120 ns) • Three fast PWM outputs: 130 kHz at 8-bit resolution; 32 kHz at 10-bit resolution (@ 33 MHz) • Four Capture Inputs with prescaler • Full featured USART (SCI) with baud rate generator; synchronous bit rate up to 8.25 megabits per second • 50 bi-directional I/O lines • Synchronous Serial Port (SSP) with two modes of operation: - 3-wire SPI™ - I^2C™ compatible including master mode support • Three 16-bit counter/timers which can be configured as two 16-bit and two 8-bit counter/timer • 11 internal and external interrupt sources • Operating frequencies: DC to 33 MHz • Temperature range: Commercial and Industrial • Packaging options: 40-lead PDIP, CERDIP (Windowed), 44-lead TQFP, PLCC, MQFP
PIC17C44	40/44-Lead	• 8K x 16 EPROM program memory • 454 bytes general purpose RAM • Can function as stand-alone MCU or address up to 64K word external Program Memory • Single cycle 8 x 8 multiply (120 ns) • Two fast PWM outputs: 130 kHz at 8-bit resolution; 32 kHz at 10-bit resolution (@ 33 MHz) • Two Capture Inputs with prescaler • Full featured USART (SCI) with baud rate generator; synchronous bit rate up to 8.25 megabits per second • 33 bi-directional I/O lines • Three 16-bit counter/timers which can be configured as two 16-bit and two 8-bit counter/timer • 11 internal and external interrupt sources • Operating frequencies: DC to 33 MHz • Temperature range: Commercial and Industrial • Packaging options: 40-lead PDIP, CERDIP (Windowed), 44-lead TQFP, PLCC, MQFP



PIC17CXXX FAMILY: HIGH-PERFORMANCE PIC17C4X/PIC17C75X*

Function/Description	Part Number	Package	Features
	PIC17C43	40/44-Lead	Same as the PIC17C44 except: • 4K x 16 EPROM program memory
	PIC17CR43	40/44-Lead	Same as the PIC17C44 except: • 4K x 16 ROM program memory
	PIC17C42A	40/44-Lead	Same as the PIC17C44 except: • 2K x 16 EPROM program memory • 232 bytes general purpose RAM
	PIC17CR42	40/44-Lead	Same as the PIC17C44 except: • 2K x 16 ROM program memory • 232 bytes general purpose RAM

*Additional products are in development. Contact your local sales support for more information.

TABLE 1: PIC16/17 MCU FAMILY

PIC16/17 8-BIT MICROCONTROLLER FAMILY

Product	Program Memory OTP Bytes	Program Memory OTP Words	Data RAM Bytes	Max. Speed MHz	I/O Ports	ADC 8-Bits	Serial I/O	PWM	DAC 8-Bits	Brown-Out Detection	Compara-tors	Timers	In-System Programming	Other Features	ROM Equivalent	Packages
PIC12CXXX — 1000ns Instruction Execution, 33/35 Instructions																
PIC12C508*	768	512x12	25	4	6							1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC12C509*	1536	1024x12	41	4	6							1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC12C670*	896	512x14	80	4	6	2						1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC12C671*	1792	1024x14	80	4	6	2						1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC12F680*	896	512x14 (Flash)	80 (16 E²)	4	6							1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC12F681*	1792	1024x14 (Flash)	80 (16 E²)	4	6							1+WDT	Yes	25mA source/sink per I/O, internal oscillator, 2.5V	—	8P, 8SM
PIC16C5X — 200ns Instruction Execution, 33 Instructions																
PIC16C52	576	384x12	25	4	12							1		10mA source/sink per I/O, 2.5V	—	18P, 18SO
PIC16C54	768	512x12	25	20	12							1+WDT		20mA source and 25mA sink per I/O, 2.5V	PIC16CR54A	18P, 18JW, 18SO, 20SS
PIC16C54A	768	512x12	25	20	12							1+WDT		20mA source and 25mA sink per I/O, 2.0V	PIC16R54A	18P, 18JW, 18SO, 20SS
PIC16C55	768	512x12	24	20	20							1+WDT		20mA source and 25mA sink per I/O, 2.5V	PIC16FR55	28P, 28JW, 28SP, 28SO, 28SS
PIC16C56	1536	1024x12	25	20	12							1+WDT		20mA source and 25mA sink per I/O, 2.5V	PIC16FR56	18P, 18JW, 18SO, 20SS
PIC16C57	3072	2048x12	72	20	20							1+WDT		20mA source and 25mA sink per I/O, 2.5V	PIC16FR57	28P, 28JW, 28SP, 28SO, 28SS
—	3072 (ROM)	2048x12	72	20	20							1+WDT		20mA source and 25mA sink per I/O, 2.5V	PIC16CR57B	28P, 28JW, 28SP, 28SO, 28SS
PIC16C58A	3072	2048x12	73	20	12							1+WDT		20mA source and 25mA sink per I/O, 2.0V	PIC16CR58A	18P, 18SO, 20SS
PIC16CXX — 4–12 Interrupts, 200ns Instruction Execution, 35 Instructions, Upwardly Compatible with PIC16C5X																
PIC14C000	7168	4096x14	192	20	20	8 SLAC	I²C™/ SMB	2	2			2+WDT	Yes	25mA source/sink, temperature sensor, GSM averaging, internal oscillator	—	28SP, 28SO, 28SS, 28JW
PIC16C554	896	512x14	80	20	13							1+WDT	Yes	25mA source/sink per I/O, 2.5V	—	18P, 18SO, 20SS, 18JW
PIC16C556	1792	1024x14	80	20	13							1+WDT	Yes	25mA source/sink per I/O, 2.5V	—	18P, 18SO, 20SS, 18JW
PIC16C558	3584	2048x14	128	20	13							1+WDT	Yes	25mA source/sink per I/O, 2.5V	—	18P, 18SO, 20SS, 18JW
PIC16C61	1792	1024x14	36	20	13							1+WDT	Yes	20mA source and 25mA sink per I/O	—	18P, 18SO, 18JW
PIC16C62	3584	2048x14	128	20	22		I²C/ SPI™	1				3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM	PIC16FR62	28SP, 28SO, 28SS, 28JW
PIC16C62A	3584	2048x14	128	20	22		I²C/SPI	1		Yes		3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM	PIC16CR62	28SP, 28SO, 28SS, 28JW
PIC16C63	7168	4096x14	192	20	22		USART/ I²C/SPI	2		Yes		3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM	PIC16CR63*	28SP, 28SO, 28JW
PIC16C64	3584	2048x14	128	20	33		I²C/SPI	1				3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, Capture/Compare/PWM	PIC16FR64	40P, 40JW, 44L, 44PQ
PIC16C64A	3584	2048x14	128	20	33		I²C/SPI	1		Yes		3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, Capture/Compare/PWM	PIC16CR64	40P, 40JW, 44L, 44PQ, 44PT
PIC16C65	7168	4096x14	192	20	33		USART/ I²C/SPI	2				3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, 2 Capture/Compare/PWM	PIC16FR65	40P, 40JW, 44L, 44PQ
PIC16C65A	7168	4096x14	192	20	33		USART/ I²C/SPI	2		Yes		3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, 2 Capture/Compare/PWM	PIC16CR65*	40P, 40JW, 44L, 44PQ, 44PT

* Contact Microchip Technology for availability date.

Abbreviations:

ADC = Analog-to-Digital Converter
CAP = Capture
CCP = Capture/Compare/PWM
DAC = Digital-to-Analog Converter
E² = EEPROM (Reprogrammable)
I²C = Inter-integrated Circuit Bus
PWM = Pulse Width Modulator
SPI = Serial Peripheral Interface
USART = Universal Synchronous/Asynchronous Receiver/Transmitter
WDT = Watchdog Timer
SLAC = Slope A/D Converter, up to 16 bits

Packages:

CL = Windowed CERQUAD
JW = Windowed CERDIP
L = Plastic Leaded Chip Carrier (PLCC)
P = Plastic DIP
PQ = Plastic Quad Flat Pack (PQFP)
SO = Plastic Small Outline (SOIC)
SP = Plastic Skinny DIP
SS = Plastic Shrink Small Outline (SSOP)
PT = Plastic Thin Quad Flat Pack (TQFP)

TABLE 1: PIC16/17 MCU FAMILY (CONTINUED)

PIC16/17 8-BIT MICROCONTROLLER FAMILY																
Product	Program Memory OTP Bytes	Program Memory OTP Words	Data RAM Bytes	Max. Speed MHz	I/O Ports	ADC 8-Bits	Serial I/O	PWM	DAC 8-Bits	Brown-Out Detection	Compara-tors	Timers	In-System Programming	Other Features	ROM Equivalent	Packages
PIC16CXXX — 4-12 Interrupts, 200ns Instruction Execution, 35 Instructions, Upwardly Compatible with PIC16C5X (Continued)																
PIC16C620	896	512x14	80	20	13					Yes	2	1+WDT	Yes	25mA source/sink per I/O, programmable V_{REF}, 2.5V	PIC16FR620	18P, 18SO, 20SS, 18JW
PIC16C621	1792	1024x14	80	20	13					Yes	2	1+WDT	Yes	25mA source/sink per I/O, programmable V_{REF}, 2.5V	PIC16FR621	18P, 18SO, 20SS, 18JW
PIC16C622	3584	2048x14	128	20	13					Yes	2	1+WDT	Yes	25mA source/sink per I/O, programmable V_{REF}, 2.5V	PIC16FR622	18P, 18SO, 20SS, 18JW
PIC16C642*	7168	4096x14	176	20	22					Yes	2	1+WDT	Yes	25mA source/sink per I/O, programmable V_{REF}	—	28SP, 28SO, 28JW
PIC16C662*	7168	4096x14	176	20	22					Yes	2	1+WDT	Yes	25mA source/sink per I/O, programmable V_{REF}	—	40P, 40JW, 44L, 44PQ, 44PT
PIC16C710	896	512x14	36	20	13	4				Yes		1+WDT	Yes	25mA source/sink per I/O	PIC16FR710	18P, 18SO, 20SS, 18JW
PIC16C71	1792	1024x14	36	20	13	4						1+WDT	Yes	20mA source/sink per I/O	PIC16FR71	18P, 18SO, 18JW
PIC16C711	1792	1024x14	68	20	13	4				Yes		1+WDT	Yes	25mA source/sink per I/O	PIC16FR711	18P, 18SO, 20SS, 18JW
PIC16C72	3584	2048x14	128	20	22	5	I²C/SPI	1		Yes		3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM	PIC16FR72	28SP, 28SO, 28JW, 28SS
PIC16C73	7168	4096x14	192	20	22	5	USART/ I²C/SPI	2				3+WDT	Yes	25mA source/sink per I/O, 2 Capture/Compare/PWM	PIC16FR73	28SP, 28SO, 28JW
PIC16C73A	7168	4096x14	192	20	22	5	USART/ I²C/SPI	2		Yes		3+WDT	Yes	25mA source/sink per I/O, 2 Capture/Compare/PWM	PIC16FR73A	28SP, 28SO, 28JW
PIC16C74	7168	4096x14	192	20	33	8	USART/ I²C/SPI	2				3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, 2 Capture/Compare/PWM	PIC16FR74	40P, 40JW, 44L, 44PQ
PIC16C74A	7168	4096x14	192	20	33	8	USART/ I²C/SPI	2		Yes		3+WDT	Yes	25mA source/sink per I/O, Parallel Slave Port, 2 Capture/Compare/PWM	PIC16FR74A	40P, 40JW, 44L, 44PQ, 44PT
PIC16F83	896 (Flash)	512x14 (Flash)	36 (64 E²)	10	13							1+WDT	Yes	20mA source and 25mA sink per I/O, 64 bytes data EEPROM, 2.0V Operation	PIC16CR83	18P, 18SO
PIC16C84	1792 (E²PROM)	1024x14 (E²PROM)	36 (64 E²)	10	13							1+WDT	Yes	20mA source and 25mA sink per I/O, 64 bytes data EEPROM, 2.0V Operation	—	18P, 18SO
PIC16F84	1792 (Flash)	1024x14 (Flash)	68 (64 E²)	10	13							1+WDT	Yes	20mA source and 25mA sink per I/O, 64 bytes data EEPROM, 2.0V Operation	PIC16CR84	18P, 18SO
PIC16C923	7168	4096x14	176	8	52		I²C/SPI	1				3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM, LCD module, static, 1/2, 1/3, 1/4 multiplex	—	64SP, 68CL, 68L, 64PQ
PIC16C924	7168	4096x14	176	8	52	5	I²C/SPI	1				3+WDT	Yes	25mA source/sink per I/O, Capture/Compare/PWM, LCD module, static, 1/2, 1/3, 1/4 multiplex	—	64SP, 68CL, 68L, 64PQ
PIC17CXXX — 120ns Instruction Execution Including Multiply, 58 Instructions, Upwardly Compatible with PIC16CXXX/PIC16C5X																
PIC17C42A	4096	2048x16	232	33	33		USART	2				4+WDT		20mA source and 35mA sink per I/O, 2 I/O w/60mA sink, 2 Capture, externally expandable, 1 cycle 8x8 multiply	PIC17CR42	40P, 40JW, 44L, 44PQ, 44PT
PIC17C43	8192	4096x16	454	33	33		USART	2				4+WDT		20mA source and 35mA sink per I/O, 2 I/O w/60mA sink, 2 Capture, externally expandable, 1 cycle 8x8 multiply	PIC17CR43	40P, 40JW, 44L, 44PQ, 44PT
PIC17C44	16384	8192x16	454	33	33		USART	2				4+WDT		20mA source and 35mA sink per I/O, 2 I/O w/60mA sink, 3 Capture, externally expandable, 1 cycle 8x8 multiply	PIC17FR44	40P, 40JW, 44L, 44PQ, 44PT
PIC17C756*	32768	16384 x16	902	33	50	12 (10-Bits)	USART (2), I²C/SPI	3		Yes		4+WDT		20mA source and 35mA sink per I/O, 2 I/O w/60mA sink, 4 Capture, externally expandable, 1 cycle 8x8 multiply	—	64SP, 68CL, 68L, 64PQ

* Contact Microchip Technology for availability date.

Abbreviations:

ADC = Analog-to-Digital Converter
CAP = Capture
CCP = Capture/Compare/PWM
DAC = Digital-to-Analog Converter
E^2 = EEPROM (Reprogrammable)
I^2C = Inter-integrated Circuit Bus
PWM = Pulse Width Modulator
SPI = Serial Peripheral Interface
USART = Universal Synchronous/Asynchronous Receiver/Transmitter
WDT = Watchdog Timer
SLAC = Slope A/D Converter, up to 16 bits

Packages:

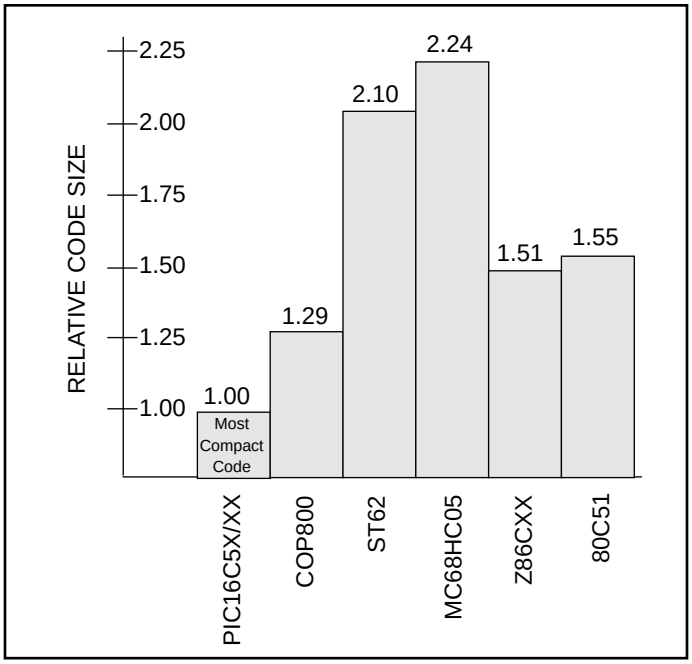
CL = Windowed CERQUAD
JW = Windowed CERDIP
L = Plastic Leaded Chip Carrier (PLCC)
P = Plastic DIP
PQ = Plastic Quad Flat Pack (PQFP)
SO = Plastic Small Outline (SOIC)
SP = Plastic Skinny DIP
SS = Plastic Shrink Small Outline (SSOP)
PT = Plastic Thin Quad Flat Pack (TQFP)

MICROCONTROLLER CODE COMPACTION COMPARISON

With its 12-bit wide program word size, Microchip's PIC16C5X MCU demonstrates a code compaction advantage over competing architectures. The table on the right summarizes code sizes for different MCUs. The overall relative code size number is an average of the individual relative code sizes. In this example, 1.5X is the average.

The PIC16C5X MCU exceeds this average in most comparisons because its 12-bit wide instruction word executes instructions in a single cycle. By comparison, all competing architectures have 8-bit program word size, and do not achieve maximum code compaction efficiency.

With its 16-bit wide instruction word, the PIC17CXXX MCU family produces even greater code compaction over the PIC16C5X/CXX and other MCU families.



MICROCONTROLLER EMULATOR AND PROGRAMMING SYSTEMS

Function/Description	
PICMASTER® In-Circuit Emulator with MPLAB™ Integrated Development Environment (IDE)	The PICMASTER In-Circuit Emulator is intended to provide the product development engineer with a complete MCU design tool set for PIC12C5XX, PIC14C000, PIC16C5X, PIC16CXXX and PIC17CXXX MCUs. Interchangeable target probes allow the system to be easily reconfigured for emulation of different processors. The universal architecture of the PICMASTER allows expansion to support all new Microchip PIC16/17 MCUs. PICMASTER includes the MPLAB Integrated Development Environment (IDE), which allows editing, "make" and download, and source debugging from a single environment. The PICMASTER system has been designed as a real-time emulation system with advanced features that are generally found on more expensive development tools. The PC compatible 386 (and higher) machine platform and Microsoft® Windows 3.x environment were chosen to best make these features available to you, the end user. A CE compliant version of PICMASTER is available for European Union countries.
ICEPIC Low-Cost PIC16C5X and PIC16CXXX In-Circuit Emulator	ICEPIC is a low-cost in-circuit emulator solution for the Microchip PIC16C5X and PIC16CXXX 8-bit OTP MCUs. ICEPIC is designed to operate on PC-compatible machines ranging from 286-AT®- to Pentium™-based machines under Windows 3.x environment. ICEPIC features real time, non-intrusive emulation. A CE compliant version of PICMASTER is available for European Union countries.
PRO MATE™ II Universal Device Programmer	The PRO MATE II Universal Device Programmer is a full-featured programmer that allows engineers to program user software into Microchip's entire line of PIC16/17 8-bit OTP MCUs. It is capable of operating in stand-alone mode and PC-hosted mode. The PRO MATE II has programmable V_{DD} and V_{PP} supplies which allow it to verify programmed memory at V_{DD} min. and V_{DD} max. for maximum reliability. It has an LCD display for displaying error messages, keys to enter commands and a modular detachable socket assembly to support various package types. In stand-alone mode, the PRO MATE II can read, verify or program PIC16C5X, PIC16CXXX, PIC17CXXX and PIC14C000 MCUs. It can also set configuration and code-protect bits in this mode. A CE compliant version of PICMASTER is available for European Union countries.

MICROCONTROLLER PROGRAMMING SYSTEMS AND DEVELOPMENT KITS

Function/Description	
PICSTART® Lite Ultra Low-Cost Development Kit	The PICSTART Lite is an introductory MCU design tool set that provides product development engineers with a fast, easy and very low-cost way to begin evaluation and code development for PIC16C5X and PIC16CXXX MCUs where real-time emulation is not required. PICSTART Lite is available in two versions: PICSTART Lite-16B1 (28-pin DIP socket) and the PISTART Lite-16C (40-pin DIP socket). It operates on any PC-compatible system running the DOS operating system. Each PICSTART Lite includes MPLAB-SIM software simulator, MPASM assembler, a MCU EPROM programmer board and a product sample. PICSTART Lite is not recommended for production programming.
PICSTART Plus Low-Cost Development Kit	The PICSTART Plus Low-Cost Development Kit is an easy-to-use, low-cost prototype programmer that provides product development engineers with the ability to program user software into PIC12C5XX, PIC14C000, PIC16C5X, PIC16CXXX and PIC17CXXX devices in 40-pin packages and below. Larger pin count devices such as the PIC16C923 and PIC16C924 may be supported with an adapter socket. PICSTART Plus connects to the PC via one of the COM (RS-232) ports. Included with the PICSTART Plus is MPLAB IDE software which, with its built-in editor, assembler and simulator, makes using the programmer simple and efficient. PICSTART Plus is not recommended for production programming.
MPLAB-C (C Compiler) Code Development System	The MPLAB-C Code Development System is a complete C Compiler and integrated development environment for Microchip's PIC16/17 MCU family. The compiler provides powerful integration capabilities and ease of use not found with other compilers. For easier source level debugging, the compiler provides symbol information that is compatible with the MPLAB IDE memory display (PICMASTER emulator software versions 1.13 and later).
fuzzyTECH®–MP Fuzzy Logic Development Tool	*fuzzy*TECH-MP Fuzzy Logic Development Tool is available in two versions: Explorer and Edition. *fuzzy*TECH-MP Explorer is a low-cost introductory version for designers to use to gain a comprehensive working knowledge of fuzzy logic system design. *fuzzy*TECH-MP Edition is a full-featured version for designers implementing more complex systems. Both versions include Microchip's *fuzzy*LAB™ demonstration board for hands-on experience with fuzzy logic systems implementation.

MICROCONTROLLER DEMONSTRATION BOARDS

Function/Description	
PICDEM-1 Low-Cost PIC16/17 Demonstration Board	The PICDEM-1 is a simple board which demonstrates the capabilities of PIC16C5X (PIC16C54 to PIC16C58A), PIC16C61, PIC16C62X, PIC16C71, PIC16C8X, PIC17C42, PIC17C43 and PIC17C44 MCUs. All necessary hardware and software is included to run basic demo programs. Users can program the sample MCUs provided with the PICDEM-1 board, on a PRO MATE II or PICSTART Lite-16B1 programmer, and easily test firmware. Users can also connect the PICDEM-1 board to the PICMASTER emulator and download the firmware to the emulator for testing. Additional prototype area is available for the user to build some additional hardware and connect it to the MCU socket(s). Features include an RS-232 interface, a potentiometer for simulated analog input, push-button switches and eight LEDs connected to PORTB.
PICDEM-2 Low-Cost PIC16CXXX Demonstration Board	**Same as PICDEM-1 except:** 1) supports the PIC16C62, PIC16C64, PIC16C65, PIC16C73 and PIC16C74 MCUs and 2) can program sample MCUs provided on a PRO MATE II programmer or PICSTART Lite-16C, and easily test firmware. Features include a RS-232 interface, push-button switches, a potentiometer for simulated analog input, a Serial EEPROM to demonstrate usage of the I^2C bus and separate headers for connection to an LCD module and a keypad.
PICDEM-3 Low-Cost PIC16CXXX Demonstration Board (Available in 3Q96.)	**Same as PICDEM-1 except:** 1) supports the PIC16C923 and PIC16C924 in the PLCC package (It will also support future 44-pin PLCC MCUs with a LCD Module) and 2) can program sample MCUs provided on a PRO MATE II programmer or PICSTART Plus with an adapter socket, and easily test firmware. Features include an RS-232 interface, push-button switches, a potentiometer for simulated analog input, a thermistor and separate headers for connection to an external LCD module and a keypad. Also provided on board is an LCD panel, with 4 commons and 12 segments, that is capable of displaying time, temperature and day of the week. The PICDEM-3 provides an additional RS-232 interface and Windows 3.1 software for showing the demultiplexed LCD signals on a PC. A simple serial interface allows the user to construct a hardware demultiplexer for the LCD signals.

MICROCONTROLLER SOFTWARE

Function/Description	
MPLAB™ Integrated Development Environment (IDE) Software	The MPLAB IDE Software brings an ease of software development previously unseen in the 8-bit MCU market. MPLAB is a Windows-based application which contains: • A full-featured editor • Three operating modes: editor, emulator and simulator • A project manager • Customizable tool bar and key mapping • A status bar with project information • Extensive on-line help MPLAB allows you to: • Edit your source files (either assembly or 'C') • One touch assemble (or compile) and download to PIC16/17 tools (automatically updates all project information) • Debug using: source files and absolute listing file • Transfer data dynamically via DDE (soon to be replaced by OLE) • Run up to four emulators on the same PC The ability to use MPLAB with Microchip's simulator allows a consistent platform and the ability to easily switch from the low cost simulator to the full-featured emulator with minimal retraining due to development tools.
MPASM Universal Macro Assembler	The MPASM Universal Macro Assembler is a PC-hosted symbolic assembler. It supports PIC12C5XX, PIC14C000, PIC16C5X, PIC16CXXX and PIC17CXXX MCUs. MPASM offers full-featured Macro capabilities, conditional assembly, and several source and listing formats. It generates various object code formats to support Microchip's development tools as well as third party programmers. MPASM allows full symbolic debugging from the PICMASTER Universal Emulator System. MPASM has the following features to assist in developing software for specific use applications: • Provides translation of Assembler source code to object code for all Microchip MCUs • Macro assembly capability • Produces all the files (Object, Listing, Symbol, and special) required for symbolic debug with Microchip's emulator systems • Supports Hex (default), Decimal and Octal source and listing formats MPASM provides a rich directive language to support programming of PIC16/17 MCUs. Directives are helpful in making the development of your assemble source code shorter and more maintainable.
MPLAB-SIM Software Simulator	The MPLAB-SIM Software Simulator allows code development in a PC host environment. It allows the user to simulate PIC16/17 MCUs on an instruction level. On any given instruction, the user may examine or modify any of the data areas or provide external stimulus to any of the pins. The input/output radix can be set by the user and the execution can be performed in; single step, execute until break, or in a trace mode. MPLAB-SIM fully supports symbolic debugging using MPLAB-C and MPASM. MPLAB-SIM offers low cost flexibility to develop and debug code outside of the laboratory environment making it an excellent multi-project software development tool.
MP-DriveWay™ Application Code Generator	MP-DriveWay is an easy-to-use Windows-based Application Code Generator. With MP-DriveWay, you can visually configure all the peripherals in a PIC16/17 MCU and, with a click of the mouse, generate all the initialization and many functional code modules in C language. The output is fully compatible with Microchip's MPLAB-C C compiler. The code produced is highly modular and allows easy integration of your own code. MP-DriveWay is intelligent enough to maintain your code through subsequent code generation.

TABLE 2: DEVELOPMENT TOOLS FROM MICROCHIP

Product	** MPLAB™ Integrated Development Environment	MPLAB™ C Compiler	MP-DriveWay Applications Code Generator	fuzzyTECH®-MP Explorer/Edition Fuzzy Logic Dev. Tool	*** PICMASTER®/ PICMASTER-CE In-Circuit Emulator	ICEPIC Low-Cost In-Circuit Emulator	****PRO MATE™ II Universal Microchip Programmer	PICSTART® Lite Ultra Low-Cost Dev. Kit	PICSTART® Plus Low-Cost Universal Dev. Kit
PIC12C508, 509	SW007002	SW006005	—	—	EM167015/ EM167101	—	DV007003	—	DV003001
PIC14C000	SW007002	SW006005	—	—	EM147001/ EM147101	—	DV007003	—	DV003001
PIC16C52, 54, 54A, 55, 56, 57, 58A	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167015/ EM167101	EM167201	DV007003	DV162003	DV003001
PIC16C554, 556, 558	SW007002	SW006005	—	DV005001/ DV005002	EM167033/ EM167113	—-	DV007003	—	DV003001
PIC16C61	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167021/ N/A	EM167205	DV007003	DV162003	DV003001
PIC16C62, 62A, 64, 64A	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167025/ EM167103	EM167203	DV007003	DV162002	DV003001
PIC16C620, 621, 622	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167023/ EM167109	EM167202	DV007003	DV162003	DV003001
PIC16C63, 65, 65A, 73, 73A, 74, 74A	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167025/ EM167103	EM167204	DV007003	DV162002	DV003001
PIC16C642, 662*	SW007002	SW006005	—	—	EM167035/ EM167105	—-	DV007003	DV162002	DV003001
PIC16C71	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167027/ EM167105	EM167205	DV007003	DV162003	DV003001
PIC16C710, 711, 715	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167027/ EM167105	—	DV007003	DV162003	DV003001
PIC16C72	SW007002	SW006005	SW006006	—	EM167025/ EM167103	—	DV007003	DV162002	DV003001
PIC16F83	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167029/ EM167107	—	DV007003	DV162003	DV003001
PIC16C84	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167029/ EM167107	EM167206	DV007003	DV162003	DV003001
PIC16F84	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167029/ EM167107	—	DV007003	DV162003	DV003001
PIC16C923, 924*	SW007002	SW006005	SW006006	DV005001/ DV005002	EM167031/ EM167111	—	DV007003	—	DV003001
PIC17C42A, 43, 44	SW007002	SW006005	SW006006	DV005001/ DV005002	EM177007/ EM177107	—	DV007003	—	DV003001

*Contact Microchip Technology for availability date

**MPLAB Integrated Development Environment includes MPLAB-SIM Simulator and MPASM Assembler

***All PICMASTER and PICMASTER-CE ordering part numbers above include PRO MATE II programmer

****PRO MATE socket modules are ordered separately. See development systems ordering guide for specific ordering part numbers

OTHER LOGIC PRODUCTS - LCD DRIVER

Function	Description	Part Number	Temp. Range	Supply Voltage	Package	Features
Static LCD Driver	Drives up to 32 segments	**AY0438**	-40°C to +85°C	+3.0V to +8.5V	40-Lead DIP 44-Lead PLCC	Static LCD Driver. Cascadable to drive larger number of segments. Serial, clocked data in.

Application Specific Integrated Circuits

QUICKASIC™ MASK PROGRAMMED GATE ARRAYS

Description		Part Number	Typical ASIC Usable Gates	Typical FPGA Equiv. Gates	I/Os	Packages Available*
QuickASIC Family	QuickASICs are lead-for-lead FPGA (field programmable gate array) replacements. Microchip will convert all popular FPGAs and CPLDs (complex programmable logic devices) available on the market today.	QIC7K	7K	10K	85	• 8-Lead SO • 16-, 20-, 24-, 28-Lead SOIC • 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC14K	14K	20K	118	• 16-, 20-, 24-, 28-Lead SOIC • 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC21K	21K	30K	151	• 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC28K	28K	40K	174	• 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC42K	42K	60K	208	• 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC56K	56K	80K	240	• 20-, 28-, 44-, 67-, 84-Lead PLCC • 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP
		QIC84K	84K	120K	304	• 64-, 80-, 100-, 128-Lead PQFP • 144-, 160-, 208-, 240-Lead PQFP • 64-, 80-, 100-, 128-, 144-Lead TQFP

* = QuickASICs are also available in smaller packages. Contact Microchip for additional information.

TRUEGAUGE® INTELLIGENT BATTERY MANAGEMENT

Function/Description		Part Number	Package	Features
Integrated Battery Capacity Monitoring and Charge Controller 	The **MTA11200B TrueGauge Battery "Fuel Gauge" and Charge Controller IC** is a simple full-featured solution to battery monitoring and charging. It is designed to operate with either NiCd, NiMH or lead acid battery packs. The MTA11200B digitally integrates battery charge and discharge current to determine the battery state of charge. The MTA11200B is ideally suited for use in portable computers, portable video equipment, cellular phones, and other products relying on rechargeable battery technology. It excels in applications where an accurate "fuel gauge" is desired to prevent interruption in use, or data loss due to insufficient battery power.	**MTA11200B**	28-Lead	• Low-cost • Operates with NiCd, NiMH or lead acid battery pack • From 3.0 volts to 25VDC • Real-time RS-232 interface provides battery data on remaining capacity, total capacity, battery voltage, current and temperature • Five levels of overcharge protection • Automatic measurement of battery capacity and request of condition cycles • Logs battery information such as number of charge cycles, over temperature, under temperature, and over voltage conditions

TRUEGAUGE DEVELOPMENT TOOLS

Function/Description		Part Number	Features
TrueGauge Development Tool 	The **MTA11200B TrueGauge Intelligent Battery Management IC** is support by a user friendly tool for system development. The DV114001 operates under Microsoft Windows. This development tool enables the management of all phases of product development including inception, debugging and maintenance. System design verification can be accomplished before a hardware prototype needs to be built, thus reducing time and cost. The user interface provides a graphically-oriented development environment. The data logging feature saves measured data into a file that can be imported to Excel®.	**DV114001**	The TrueGauge development tool is a tool for system development under Windows. The development tool kit contains the following: • NiCd battery with TrueGauge module • NiMH battery with TrueGauge module • Stand-alone TrueGauge module • Charger/Discharger Interface Board • Universal power supply with power cord • PC Interface Cable with DB9-DB25 converter • Design/Verification software on a 3.5″ diskette • MTA11200B and 24LC01B product samples • MTA11200B data sheet • *TrueGauge Development Tool User's Guide*

Application-Specific Standard Products

PC POINTING DEVICES

Function/Description		Part Number	Package	Features
Mouse Controller	The **MTA41XXX** Mouse Controllers are the heart of a simple, low-cost mouse or trackball solution. The MTA41XXX family supports all Apple Computer and IBM® PC-compatible formats.	**MTA41300**	18-Lead	Low-cost mouse controller with support for IBM PS/2®-compliant or Microsoft® serial-format-compatible.* The MTA41300 controller supports 2-button mouse or trackball operation. Packaging is available in 300 mil wide PDIP and SOIC
		MTA41110	18-Lead	Low-cost, low power mouse controller with complete support for IBM PS/2 interface format. Like the MTA41300, the MTA41110 controller supports 2-button mouse or trackball operation, but unique software features of the MTA41110 allow for direct input from optical encoders without the need for external comparators. LED strobing is also supported by the MTA41110 for low-power applications.
		MTA41120C	18-Lead	Same as MTA41110 except offers complete support for Apple Computer ADB™ interface.

* The code in this product was not developed or licensed by Microsoft Corporation.

ENERGY MANAGEMENT DEVICE

Function/Description		Part Number	Package	Features
Energy Management Controller	The **MTE1122** Energy Management Controller combines Microchip's proprietary PIC16/17 8-bit RISC microcontroller technology with a unique, patent pending power management firmware algorithm in a single package. This device, by monitoring and controlling the supply requirements into an AC induction motor, effectively reduces the power consumed by the motor. The MTE1122 is available in both plastic DIP and space-saving SOIC packages, and operates over commercial and industrial ranges.	**MTE1122**	18-Lead	• Low cost • Reduces power consumption of AC induction motors • Protects against brown-outs and power surges

PICSEE® MICROCONTROLLER WITH SERIAL EEPROM MULTI-CHIP MODULE

Function/Description		Part Number	Package	Features
8-Bit MCU with Serial EEPROM Multi-Chip Module	The **PICSEE®** microcontroller offers the unique combination of an EPROM-based microcontroller and a Serial EEPROM in a single package. The MTA85XXX is a multi-chip module that integrates a PIC16C54A or PIC16C58A low-cost, high-performance, 8-bit, fully-static, EPROM-based CMOS microcontroller with a 24LC01B or 24LC02B Serial EEPROM. The integration of these two popular chips into a single package reduces system cost, board area and inventory.	**MTA85XXX**	20-Lead	• 512 or 2048 x 12 on-chip EPROM • 1K or 2K EEPROM • 25 or 72 x 8 general purpose registers (SRAM) • 7 special function hardware registers • 12 I/O pins with individual direction control • 8-bit real time clock/counter (RTCC) with 8-bit programmable prescaler • Clock frequencies available: 4 MHz, 10 MHz • Packaging: available in 20-Lead SSOP

PICSEE FAMILY DEVELOPMENT TOOLS

Function/Description		Part Number	Package	Features
PICSEE Development Kit	**PICSEESTART** is a very low-cost entry-level development system for the PICSEE microcontroller. It is a combination of the PICSEE Adapter Kit and the PICSTART-16B1 Development Kit.	**DV853001** **PICSEESTART-85A**	20-Lead	• PICSEE Adapter Kit • PICSTART-16B1 • Product sample kit • Complete system documentation

PICSEE FAMILY PROGRAMMERS

Function/Description		Part Number	Package	Features
PICSEEKIT	The **PICSEEKITs** are programmer adapters for use in conjunction with PRO MATE or PICSTART programmers. Included is the in-circuit emulation adapter board for the PICMASTER-16D.	**AC852001** **PICSEEKIT-85A**	20-Lead	MTA85XXX programming adapter and emulation kit.
		AC854001	20-Lead	20-Lead SSOP programming adapter socket.

SERIAL EEPROMS: 3-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
256 Bit	16 x 16	**93C06**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	**For fast byte write (1ms) or E-temp applications only. All other applications see 93LC46.** Software READY/BUSY signal, 1 MHz max. clock rate.
1K Bit	64 x 16 or 256 x 16	**93C46**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	**For fast byte write (1ms) or E-temp applications only. All other applications see 93LC46.** Software READY/BUSY signal, 1 MHz max. clock rate.
8K Bit	1024 x 8 or 256 x 16	**93C76**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	Available in automotive (E) temp. only. Software READY/BUSY signal, 3 MHz max. clock rate.
16K Bit	2048 x 8 or 1024 x 16	**93C86**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	Available in automotive (E) temp. only. Software READY/BUSY signal, 3 MHz max. clock rate.
1K Bit	128 x 8 or 64 x 16	**93LC46**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Hardware READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, 1 million erase/write cycles, and sequential read function.
2K Bit	256 x 8 or 128 x 16	**93LC56**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
4K Bit	512 x 8 or 256 x 16	**93LC66**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
8K Bit	1024 x 8 or 512 x 16	**93LC76**	2.5V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 3 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
16K Bit	2048 x 8 or 1024 x 16	**93LC86**	2.5V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 3 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
1K Bit	64 x 16	**93LC46B**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Hardware READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, 1 million erase/write cycles, sequential read function, and x16 organization hard-wired by factory.
2K Bit	128 x 16	**93LC56B**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, sequential read function, and x16 organization hard-wired by factory.
4K Bit	256 x 16	**93LC66B**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, sequential read function, and x16 organization hard-wired by factory.

SERIAL EEPROMS: 3-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
1K Bit	128 x 8 or 64 x 16	**93AA46**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	Hardware READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, 1 million erase/write cycles, and sequential read function.
2K Bit	256 x 8 or 128 x 16	**93AA56**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
4K Bit	512 x 8 or 256 x 16	**93AA66**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	Software READY/BUSY signal, 2 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
8K Bit	1024 x 8 or 512 x 16	**93AA76**	1.8V to 6.0V	8-Lead PDIP 8-Lead SOIC	C	Software READY/BUSY signal, 3 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
16K Bit	2048 x 8 or 1024 x 16	**93AA86**	1.8V to 6.0V	8-Lead PDIP 8-Lead SOIC	C	Software READY/BUSY signal, 3 MHz max. clock rate, 4ms per word typical write time, **10 million erase/write cycles**, and sequential read function.
2K Bit	128 x 16	**93LCS56**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I	Software write protection signal, 2 MHz max. clock rate, 4ms per word typical write time, 1 million erase/write cycles, sequential read function and x16 organization hard-wired by factory.
4K Bit	256 x 16	**93LCS66**	2.0V to 6.0V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I	Software write protection signal, 2 MHz max. clock rate, 4ms per word typical write time, 1 million erase/write cycles, sequential read function and x16 organization hard-wired by factory.

SERIAL EEPROMS: 2-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
1K Bit	128 x 8	**24C01A**	5.0V	8-Lead PDIP 8-Lead SOIC	C,I,E	**For fast byte write (1ms) or E-temp applications only,** other applications should use 24LC01B. 2-byte page, 1 million erase/write cycles.
2K Bit	256 x 8	**24C02A**	5.0V	8-Lead PDIP 8-Lead SOIC	C,I,E	**For fast byte write (1ms) or E-temp applications only,** other applications should use 24LC02B. 2-byte page, 1 million erase/write cycles.
4K Bit	512 x 8	**24C04A**	5.0V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I,E	**For fast byte write (1ms) or E-temp applications only,** other applications should use 24LC04B. 8-byte page, 1 million erase/write cycles.
8K Bit	1K x 8	**24C08B**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	Available in automotive (E) temp. only.
16K Bit	2K x 8	**24C16B**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	E	Available in automotive (E) temp. only.

SERIAL EEPROMS: 2-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
1K Bit	128 x 8	**24LC01B**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	8-byte page, maximum write time 10ms/page, **10 million erase/write cycles**, 400 kHz clock, hardware write-protect.
2K Bit	256 x 8	**24LC02B**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	8-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 400 kHz clock, hardware write-protect.
4K Bit	512 x 8	**24LC04B**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I	16-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 400 kHz clock, hardware write-protect.
8K Bit	1K x 8	**24LC08B**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I	16-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 400 kHz clock, hardware write-protect.
16K Bit	2K x 8	**24LC16B**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I	16-byte page, maximum write time 10ms/page, **10 million erase/write cycles**, 400 kHz clock, hardware write-protect.
1K Bit	128 x 8	**24AA01**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	8-byte page, maximum write time 10ms/page, **10 million erase/write cycles**, 100/400 kHz clock, hardware write-protect.
2K Bit	256 x 8	**24AA02**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	8-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 100/400 kHz clock, hardware write-protect.
4K Bit	512 x 8	**24AA04**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C	16-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 100/400 kHz clock, hardware write-protect.
8K Bit	1K x 8	**24AA08**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C	16-byte page, maximum write time 10ms/page, 1 million erase/write cycles, 100/400 kHz clock, hardware write-protect.
16K Bit	2K x 8	**24AA16**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C	16-byte page, maximum write time 10ms/page, **10 million erase/write cycles**, 100/400 kHz clock, hardware write-protect.
32K Bit	4K x 8	**24C32**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	64-byte input cache, maximum write time 10ms/page (8-byte page), variable page size, up to 400 kHz clock, up to eight devices on same bus, split endurance. **10 million erase/write cycles** for high endurance block.
32K Bit	4K x 8	**24LC32**	2.5V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	64-byte input cache, maximum write time 10ms/page (8-byte page), variable page size, up to 400 kHz clock, up to eight devices on same bus, split endurance. **10 million erase/write cycles** for high endurance block.
32K Bit	4K x 8	**24AA32**	1.8V to 6.0V	8-Lead PDIP 8-Lead SOIC	C	64 byte input cache, maximum write time 10ms/page (8-byte page), variable page size, **10 million erase/write cycles** for high endurance block, up to 400 kHz clock, up to eight devices on same bus.

SERIAL EEPROMS: 2-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
32K Bit	4K x 8	**24C32A**	4.5V to 5.5V	8-Lead PDIP 8-Lead SN 8-Lead SM		JEDEC SOIC “SN” (150 mil wide) package.
32K Bit	4K x 8	**24LC32A**	2.5V to 6.0V	8-Lead PDIP 8-Lead SN 8-Lead SM		JEDEC SOIC “SN” (150 mil wide) package.
32K Bit	4K x 8	**24AA32A**	1.8V to 6.0V	8-Lead PDIP 8-Lead SN 8-Lead SM		JEDEC SOIC “SN” (150 mil wide) package.
16K Bit	2K X 8	**24FC16**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	1 MHz max. clock rate, two-wire serial interface, I^2C compatible, self-timed write cycle, hardware write protect for entire memory.
32K Bit	4K X 8	**24FC32**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	1 MHz max. clock rate, two-wire serial interface, I^2C compatible, self-timed write cycle, hardware write protect for entire memory.
64K Bit	8K X 8	**24FC65**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	1 MHz max. clock rate, two-wire serial interface, I^2C compatible, self-timed write cycle, hardware write protect for entire memory.
1K Bit	Dual Clock	**24LC21**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	Dual mode operation. 400 kHz clock. Maximum Write time 10ms/page. 1 million erase/write cycles. DDC1/DDC compatible.
1K Bit	128 X 8	**24LC21A**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	Same as 24LC21 with return to DDC1 feature.
1K Bit	128 X 8	**24LCS21A**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	Same as 24LCS21 with return to DDC1 feature.
1K or 4K Bit	128 X 8 512 X 8	**24LC41A**	2.5V to 5.5V	8-Lead PDIP 8-Lead SN		Dual Mode, Dual Port device. Completely implements DDC1/DDC2 interface for monitor identification (DDC port). Also includes 4K bit MCU port.
2K Bit	128 X 16	**24LCS52**	2.5V to 5.5V	8-Lead PDIP 8-Lead SN 8-Lead ST		Serial Presence Detect (SPD) device for PC memory modules.
16K Bit	2K x 8	**24LC164**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	16 byte page, cascadable up to eight devices on same bus, up to 400 kHz clock. **10 million erase/write cycles**.
16K Bit	2K x 8	**24AA164**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	16 byte page, cascadable up to eight devices on same bus, up to 400 kHz clock. **10 million erase/write cycles**.

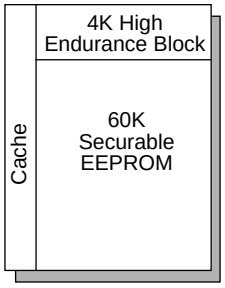
Non-Volatile Memory Products

SERIAL EEPROMS: 2-WIRE FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
16K Bit	2K X 8	**24LC174**	2.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	16K bit + 16 byte OTP security page. 400 kHz clock, **10 million erase/write cycles** guaranteed, cascadable up to eight devices on same bus.
16K Bit	2K X 8	**24AA174**	1.8V to 5.5V	8-Lead PDIP 8-Lead SOIC	C	16K bit + 16 byte OTP security page. 400 kHz clock, **10 million erase/write cycles** guaranteed, cascadable up to eight devices on same bus.
1K Bit	128 X 8	**24C01SC**	2.5V to 5.5V	Die, Wafer	C	Smart card specific memory device. Meets ISO Standard 7816 requirements.
2K Bits	256 X 8	**24C02SC**	2.5V to 5.5V	Die, Wafer	C	Smart card specific memory device. Meets ISO Standard 7816 requirements.
1K Bit	128 X 8	**85C72**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I,E	2-byte page, typical write time 1ms per byte, 1 million erase/write cycles, 100 kHz clock, can connect up to eight devices on the same bus. CMOS version of PCD8572.
2K Bit	256 X 8	**85C82**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I,E	2-byte page, typical write time 1ms per byte, 1 million erase/write cycles, can connect up to eight devices on the same bus. CMOS version of PCD8582.
4K Bit	512 X 8	**85C92**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC 14-Lead SOIC	C,I,E	8-byte page, typical write time 1ms per byte, 1 million erase/write cycles, can connect up to four devices on the same bus and hardware write-protect. Memory upgrade of PCD8582.

SERIAL EEPROMS: SMART SERIAL™ EEPROM FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
64K Bit Smart Serials™	8K x 8	**24C65**	4.5V to 5.5V	8-Lead PDIP 8-Lead SOIC	C,I	64-byte input cache, maximum write time 10ms/page (8-byte page), variable page size, split-endurance, **10 million erase/write cycles** for high endurance block, software write-protect, up to 400 kHz clock, up to eight devices on same bus.
		24LC65	2.5V to 6.0V	8-Lead PDIP 8-Lead SOIC	C,I	64-byte input cache, maximum write time 10ms/page (8-byte page), variable page size, split-endurance, **10 million erase/write cycles** for high endurance block, software write-protect, up to 400 kHz clock, up to eight devices on same bus.
		24AA65	1.8V to 6.0V	8-Lead PDIP 8-Lead SOIC	C	64-byte input cache, maximum write time 10ms/page (8-byte page), variable page size, split-endurance, **10 million erase/write cycles** for high endurance block, software write-protect, up to 400 kHz clock, up to eight devices on same bus.



SERIAL EEPROMS: SPI™ FAMILY

Density	Organization	Part Number	Supply Voltage	Package	Temp.	Features
8K Bit	1K x 8	**25C080**	4.5V to 5.5V	8-Lead PDIP 8-Lead SN		Page write mode. HOLD pin. Software enabled block write protection. Hardware write protect pin. Supports SPI Modes 0, 3.
16K Bit	2K x 8	**25C160**	4.5V to 5.5V	8-Lead PDIP 8-Lead SN		Same as 25C080.
32K Bit	4K x 8	**25C320**	4.5V to 5.5V	8-Lead PDIP 8-Lead SN 14-Lead TSSOP		Same as 25C080.
8K Bit	1K x 8	**25LC080**	2.5V to 6.0V	8-Lead PDIP 8-Lead SN		Page write mode. HOLD pin. Software enabled block write protection. Hardware write protect pin. Supports SPI Modes 0, 3.
16K Bit	2K x 8	**25LC160**	2.5V to 6.0V	8-Lead PDIP 8-Lead SN		Same as 25LC080.
32K Bit	4K x 8	**25LC320**	2.5V to 6.0V	8-Lead PDIP 8-Lead SN 14-Lead TSSOP		Same as 25LC080.
8K Bit	1K x 8	**25AA080**	1.8V to 6.0V	8-Lead PDIP 8-Lead SN		Page write mode. HOLD pin. Software enabled block write protection. Hardware write protect pin. Supports SPI Modes 0, 3.
16K Bit	2K x 8	**25AA160**	1.8V to 6.0V	8-Lead PDIP 8-Lead SN		Same as 25AA080.
32K Bit	4K x 8	**25AA320**	1.8V to 6.0V	8-Lead PDIP 8-Lead SN 14-Lead TSSOP		Same as 25AA080.

Non-Volatile Memory Products

PARALLEL EEPROM PRODUCTS

Density	Organization	Part Number	Access Time (ns)	Package	Features
4K Bit	512 x 8	**28C04A** **28C04A** **28C04A**	250 200 150	24-Lead PDIP 32-Lead PLCC	100,000 erase/write cycles, 1ms write cycle time, DATA POLLING signal, fast byte write time (200µs) option.
16K Bit	2K x 8	**28C16A** **28C16A** **28C16A**	250 200 150	24-Lead PDIP 28-Lead TSOP 28-Lead VSOP 32-Lead PLCC	100,000 erase/write cycles, 1ms write cycle time, DATA POLLING signal, fast byte write time (200µs) option.
16K Bit	2K x 8	**28C17A** **28C17A** **28C17A**	250 200 150	28-Lead PDIP 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP 32-Lead PLCC	100,000 erase/write cycles, 1ms write cycle time, DATA POLLING signal, and READY/BUSY signal, fast byte write time (200µs) option.
64K Bit	8K x 8	**28C64A** **28C64A** **28C64A**	250 200 150	28-Lead PDIP 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP 32-Lead PLCC	100,000 erase/write cycles, 1ms write cycle time, DATA POLLING signal and READY/BUSY signal, fast byte write time (200µs) option.
64K Bit	8K x 8	**28LV64A**	300	28-Lead PDIP 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP 32-Lead PLCC	

Note: Some package/speed/temperature combinations may not be available. Please consult your authorized Microchip Representative.

EPROM PRODUCTS: STANDARD FAMILY

Density	Organization	Part Number	Access Time (ns)	Operation	Supply Voltage	Package	Features
64K Bit	8K x 8	**27C64-25** **27C64-20** **27C64-17** **27C64-15** **27C64- 12**	250 200 170 150 120	Static	4.5V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC	Factory programming available.
128K Bit	16K x 8	**27C128-25** **27C128-20** **27C128-17** **27C128-15** **27C128-12**	250 200 170 150 120	Static	4.5V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC	Factory programming available.
256K Bit	32K x 8	**27C256-20** **27C256-15** **27C256-12** **27C256-10** **27C256-90**	200 150 120 100 90	Static	4.5V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP	Factory programming available.
512K Bit	64K x 8	**27C512A-20** **27C512A-15** **27C512A-12** **27C512A-10** **27C512A-90**	200 150 120 100 90	Static	4.5V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP	Factory programming available.

EPROM PRODUCTS: STANDARD FAMILY

Density	Organization	Part Number	Access Time (ns)	Operation	Supply Voltage	Package	Features
64K Bit	8K x 8	**27LV64-30** **27LV64-25** **27LV64-20**	300 250 200	Static	3.0V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC 28-Lead TSOP	27C64 compatible
256K Bit	32K x 8	**27LV256-30** **27LV256-25** **27LV256-20**	300 250 200	Static	3.0V to 5.5V	28-Lead PDIP 32-Lead PLCC 28-Lead SOIC 28-Lead TSOP 28-Lead VSOP	27C256 compatible

EPROM PRODUCTS: SERIAL EPROM FAMILY

Density	Organization	Part Number	Access Time (ns)	Operation	Supply Voltage	Package	Features
35K Bit	1134 x 32	**37LV36**	10 MHz Clock	Static	3.0V to 6.0V	8-Lead SOIC 8-Lead PDIP 20-Lead PLCC	Operational equivalent to Xilinx® XC1736
65K Bit	2048 x 32	**37LV65**	10 MHz Clock	Static	3.0V to 6.0V	8-Lead SOIC 8-Lead PDIP 20-Lead PLCC	Operational equivalent to Xilinx XC1765
128K Bit	4096 x 32	**37LV128**	10 MHz Clock	Static	3.0V to 6.0V	8-Lead SOIC 8-Lead PDIP 20-Lead PLCC	Operational equivalent to Xilinx XC17128

Note: Some package/speed/temperature combinations may not be available. Please consult your authorized Microchip Representative.

SERIAL EEPROM DEVELOPMENT SYSTEMS

Description	Part Number	Features
Total Endurance™ Disk	SW242001	Application oriented, predictive software model. Models the performance of erase/write cycle endurance (FIT, PPM levels and operating life) of Microchip Serial EEPROMs in a given application. Temperature, voltage, cycles per day, array size are taken into account to predict the endurance of a given device.
Serial EEPROM Designer's Kit	DV243001	Complete designer's kit for systems using Microchip's Serial EEPROMs. The **Serial EEPROM Designer's Kit** from Microchip includes Total Endurance Disk, SEEVAL® programming and evaluation board, CD-ROM Data Book, power supply and all necessary cabling. • RS-232 connection to IBM compatible PC • Windows and DOS based software to erase, write and fully exercise all Microchip Serial EEPROMs • Special Functions: user selectable security, programmable endurance and special pinouts • All Microchip Serial EEPROMs from 256 bits to 64K bits supported

Secure Data Products

KEELOQ® CODE HOPPING PRODUCTS

Description		Part Number	Package	Features
KEELOQ® Code Hopping Encoders and Decoders	The HCS family of KEELOQ encoders and decoders utilize the patented KEELOQ Code Hopping system. The HCSXXX encoders feature on-chip error corrected EEPROM for non-volatile operation. Components that are normally external to the encoder have been integrated. The only additional circuitry required are the push buttons, battery and RF circuitry. HCSXXX encoders are perfect solutions for unidirectional remote keyless entry and access control systems. Microchip provides several solutions for decoder implementations. The HCS5XX decoders are single-chip solutions featuring on-chip EEPROM for non-volatile operation. Normal and secure learning mechanisms are employed. Decoders can also be implemented on PIC16CXX MCUs and EEPROMs. This allows the designer to combine the decoder and system functionality into one device. Decoder software is available through a license agreement.	**Encoders**		
		HCS200	8-Lead	• 28-bit Serial Number • 64-bit Encryption Key • 66-bit Transmission Length • 32-bit Hopping Code • 32-bit Seed Transmission • Non-volatile • On-chip Oscillator • 3.5 to13.0V Operation • 7 Functions
		HCS300	8-Lead	Same as HCS200 plus: • Envelope Encryption • Low Battery Indication • 2.0 to 6.3V Operation • Current limited LED Output • 15 Functions
		HCS301	8-Lead	Same as HCS300 except: • 3.5 to 13.0V Operation
		HCS360	8-Lead	• Superset of HCS300 • 48-bit Seed Transmission • Seed Transmission Delayed on S0 and S1, Immediate on S3 • 2-bit CRC • PWM and Manchester Modulation • IR Mode
		HCS361	8-Lead	Same as HCS360 except: • PWM and VPWM Modulation • Receiver Wake-up
		Decoder		
		HCS509	18-Lead	• Single Chip Decoder • On-chip EEPROM • 4 Transmitters • 3 Function Outputs, Master, Repeat, Delay • Normal (serial number derived) Learning
		HCS512	18-Lead	• Single Chip Decoder • On-chip EEPROM • 4 Transmitters • Normal (serial number derived) and Secure (seed derived) Learning • 15 Functions • Parallel and 1-/2-wire Serial Interface

KEELOQ™ Rock Solid Security™

COMMERCIAL, INDUSTRIAL AND AUTOMOTIVE PARTS

Part Number Suffix Designations:

XXXXXXXXXX - XX X/XX XXX

QTP, SQTP or ROM Code; Special Requirements

Package:

L	=	Plastic Leaded Chip Carrier (PLCC)
P	=	Plastic DIP
S	=	Die in Waffle Pack
W	=	Die in Wafer Form
CB	=	Chip on Board (COB)
CL	=	68-lead Windowed CERQUAD
JW	=	Windowed CERDIP
PQ	=	Plastic Quad Flatpack (PQFP)
PT	=	Plastic Thin Quad Flatpack (TQFP)
SL	=	14-lead Small Outline (150 mil)
SM	=	8-lead Small Outline (200 mil)
SN	=	8-lead Small Outline (150 mil)
SO	=	Plastic Small Outline (SOIC)
SP	=	Plastic Skinny DIP
SS	=	Plastic Shrink Small Outline (SSOP)
ST	=	Thin Shrink Small Outline (4.4 mm) (TSSOP)
TS	=	Thin Small Outline (8mm x 20mm)
TQ	=	Thin Quad Flatpack (TQFP)
VS	=	Very Small Outline (8mm x 13.4mm)

Process Temperature:

Blank = 0°C to +70°C E (Extended) = -40°C to +125°C
I (Industrial) = -40°C to +85°C

Speed:

-55	=	55 ns
-70	=	70 ns
-90	=	90 ns
-10	=	100 ns
-12	=	120 ns
-15	=	150 ns
-17	=	170 ns
-20	=	200 ns
-25	=	250 ns
-30	=	300 ns

Crystal Frequency Designator for PIC16/17 MCUs:

LP	=	DC to 40 kHz, Low Power Crystal Oscillator
RC	=	DC to 4 MHz, Resistor/Capacitor Oscillator
XT	=	DC to 4 MHz, Standard Crystal Resonator Oscillator
HS	=	DC to 20 MHz, High Speed Crystal Oscillator
02	=	DC to 2 MHz, XT and RC Oscillator Support
04	=	DC to 4 MHz Internal, XT and RC Oscillator Support
04	=	DC to 200 kHz, LP Oscillator Support
10	=	DC to 10 MHz, HS Oscillator Support
16	=	DC to 16 MHz, XT Oscillator Support
20	=	DC to 20 MHz, HS Oscillator Support

Option:

T = Tape and Reel Shipments F = twc = 200 µs
Blank = twc = 1ms X = Rotated pinout

Device Type: (Up to 10 digits)

C	=	CMOS, EPROM MCU	HC	=	High Speed
LC	=	Low Power CMOS, EPROM MCU	LCS	=	Low Power Security
CR	=	CMOS ROM MCU	24	=	2-Wire (I2C)
LCR	=	Low Power CMOS ROM MCU	25	=	SPI
AA	=	1.8V EEPROM Memory	93	=	3-Wire (Microwire®)
LV	=	Low Voltage	PICXXCXX	=	PIC16/17 CMOS MCU
F	=	Flash MCU	PICXXLCXX	=	PIC16/17 Low-Power CMOS MCU
FR	=	FlexROM™ MCU	PICXXLVXX	=	PIC16/17 Low-Voltage CMOS MCU
LFR	=	Low Power FlexROM MCU			

On-Line Technical Support

BBS, WORLDWIDE WEB SITE AND DEVELOPMENT SYSTEM SUPPORT

Microchip provides two methods of on-line support: a Bulletin Board Service (BBS) and a Worldwide Web (WWW) site.

The BBS is provided as a communication channel for customers to get current information and help about our products and allow interaction with Microchip MCU and memory experts.

To provide the most responsive service possible, the Microchip Development Systems Team monitors the BBS, posts the latest component data and software tool updates, provides technical help and embedded systems insights, and discusses how Microchip products provide project solutions.

The WWW site, like the BBS, is used by Microchip as a means to make electronic files and information easily available to customers. To view the site, the user must have access to the Internet and a web browser, such as Netscape® or Microsoft® Explorer. Files are also available for FTP download from our FTP site.

Connecting to the Microchip Internet Web Site

The Microchip WWW site is available by using your favorite Internet browser to attach to:

www.microchip.com

The file transfer site is available by using an FTP service to connect to:

ftp.mchip.com/biz/mchip

The WWW site and file transfer site provide a variety of services. Users may download files for the latest development tools, data sheets, application notes, user's guides, articles and sample programs. A variety of Microchip-specific business information is also available including listings of factory sales offices, distributors and factory representatives. Other data available for review is:

- Latest Microchip Press Releases
- Technical Support Section with Frequently Asked Questions
- Design Tips
- Device Errata
- Job Postings
- Microchip Consultant Program Member Listing
- Links to other useful web sites related to Microchip Products

Connecting to the Microchip BBS

Connect worldwide to the Microchip BBS using either the Internet or the CompuServe® communications network.

Internet:

You can telnet or ftp to the Microchip BBS at the address:

mchipbbs.microchip.com

CompuServe Communications Network:

When using the BBS via the Compuserve Network, in most cases, a local call is your only expense. The Microchip BBS connection does not use CompuServe membership services, therefore, you do not need CompuServe membership to join Microchip's BBS. There is no charge for connecting to the Microchip BBS.

The procedure to connect will vary slightly from country to country. Please check with your local CompuServe agent for details if you have a problem. CompuServe service allows multiple users various baud rates depending on the local point of access.

The following connect procedure applies in most locations.

1. Set your modem to 8-bit, No parity, and One stop (8N1). This is not the normal CompuServe setting which is 7E1.
2. Dial your local CompuServe access number.
3. Depress the <Enter> key and a garbage string will appear because CompuServe is expecting a 7E1 setting.
4. Type +, depress the <Enter> key and “Host Name:” will appear.
5. Type MCHIPBBS, depress the <Enter> key and you will be connected to the Microchip BBS.

In the United States, to find the CompuServe phone number closest to you, set your modem to 7E1 and dial (800) 848-4480 for 300-2400 baud or (800) 331-7166 for 9600-14400 baud connection. After the system responds with “Host Name:”, type NETWORK, depress the <Enter> key and follow CompuServe's directions.

For voice information (or calling from overseas), you may call (614) 723-1550 for your local CompuServe number.

Microchip regularly uses the Microchip BBS to distribute technical information, application notes, source code, errata sheets, bug reports, and interim patches for Microchip systems software products. For each SIG, a moderator monitors, scans, and approves or disapproves files submitted to the SIG. No executable files are accepted from the user community in general to limit the spread of computer viruses.

Systems Information and Upgrade Hot Line

The Systems Information and Upgrade Line provides system users a listing of the latest versions of all of Microchip's development systems software products. Plus, this line provides information on how customers can receive any currently available upgrade kits.The Hot Line Numbers are:

1-800-755-2345 for U.S. and most of Canada, and

1-602-786-7302 for the rest of the world.

REPRESENTATIVES

AFRICA

Tempe Technologies Pty Ltd.... 27/11-447 5186

CANADA

Alberta
Enerlec Sales Ltd. 403-777-1550
British Colombia
Enerlec Sales Ltd. 604-273-0882
Manitoba
Enerlec Sales Ltd. 604-273-0882
Montreal
Pipe-Thompson Tech., Inc.....514-624-8760
Ottawa
Pipe Thompson Tech., Inc. 613-745-5927
Pipe Thompson Tech., Inc. 613-591-1821
Saskatchewan
Enerlec Sales Ltd. 604-273-0882
Toronto
Pipe Thompson Tech., Inc. 905-281-8281

EUROPE

Finland
Memec Finland 358-07001-9830
Germany
Active Rep GmbH..... 49-07043-940011
Active Rep GmbH.....49-089-89689181
Active Rep GmbH.....49-0441-2069986
Active Rep GmbH.....49-0212-230400
Ireland
Eltech Agencies, Ltd. 353-21-509-366
Israel
Elina Electronics Ltd. 972-3-649-8543
Netherlands
Sonetech SEI Benelux BV.....31-76-572-2333
Norway
Component-74 Eidsvold AS.....47-63-951-174
Scotland
Juniper Solutions 44-1786-446-220/1
Sweden
Memec Scandinavia AB.....46-8643-4190
Turkey
Inter Muehendislik Danismanlik
.....90-216-349-9400

MEXICO

CompTech de Mexico 52-36-47-83-60
CompTech Sales, Inc..... 52-73-12-27-33

SOUTH AMERICA

Brazil
Aplicacoes Eletronicas 55-11-231-0277

UNITED STATES

Alaska
Micro Sales.....206-451-0568
Alabama
Concord Component Reps Inc. ..205-772-8883
Arizona
Western High Tech Marketing, Inc.
.....602-860-2702
Arkansas
CompTech Sales, Inc..... 972-751-1181
California
Escondido
Eagle Technical Sales Assoc. Inc.
.....519-743-6550
Irvine
CTI Sales.....714-450-0170
Sunnyvale
Trinity Technologies.....408-733-9000
Colorado
Western Region Marketing.....719-548-8282
Western Region Marketing.....303-428-8088
Connecticut
Gilford
S-J Associates, Inc. 203-458-7558
Naugatuck
S-J Associates, Inc. 203-723-4707
Delaware
S-J Mid-Atlantic, Inc. 609-866-1234
District of Columbia
S-J Chesapeake.....703-533-2233
Florida
Altamonte Springs
Electramark Florida, Inc. 407-830-0844
Boca Raton
Electramark Florida, Inc. 407-347-1717
Tampa
Electramark Florida, Inc. 813-915-1177
Georgia
Concord Component Reps Inc. ..770-416-9597
Hawaii
Trinity Technologies.....408-733-9000
Idaho
Micro Sales.....206-451-0568
Illinois
Janus Incorporated.....708-250-9650
Indiana
Fort Wayne
Electro Reps, Inc. 219-489-8205
Indianapolis
Electro Reps, Inc. 317-842-7202
Iowa
Spectrum Sales 319-366-0576
Kansas
Spectrum Sales 913-648-6811
Kentucky
Northern
Technology Marketing Corp.....513-984-6720
Southern
Electro Reps, Inc. 317-842-7202
Louisiana
CompTech Sales, Inc. 713-781-7420
Maine
S-J New England, Inc. 508-670-8899
Maryland
S-J Chesapeake.....703-533-2233
Massachusetts
S-J New England, Inc. 508-670-8899
Michigan
Farmington Hills
J. L. Montgomery Associates, Inc.
.....810-489-0099
Grand Rapids
J. L. Montgomery Associates, Inc.
.....616-458-5490
Minnesota
Comprehensive Technical Sales Inc.
.....612-471-7181
Mississippi
Concord Component Reps Inc... 205-772-8883
Missouri
Spectrum Sales..... 314-731-4477
Montana
Western Region Marketing..... 303-428-8088
Nebraska
Spectrum Sales..... 913-648-6811
Nevada
Northern
Trinity Technologies..... 408-733-9000
Southern
Western High Tech Marketing, Inc.
.....602-860-2702
New Hampshire
S-J New England, Inc..... 508-670-8899
New Jersey
Northern
Parallax 516-351-1000
Southern
S-J Mid-Atlantic, Inc. 609-866-1234
New Mexico
Western High Tech Marketing, Inc.
.....602-860-2702
New York
Melville
Parallax 516-351-1000
Rochester
Apex Associates, Inc. 716-272-7040
North Carolina
Zucker Associates 919-782-8433
North Dakota
Comprehensive Technical Sales Inc.
.....612-941-7181
Ohio
Cincinnati
Technology Marketing Corp. 513-984-6720
Middleburg Heights
Technology Marketing Corp. 216-520-0150
Oklahoma
CompTech Sales, Inc. 918-266-1966
Oregon
Micro Sales 503-645-2841
Pennsylvania
Eastern
S-J Mid-Atlantic, Inc. 609-866-1234
Western
Technology Marketing Corp. 412-779-2140
Rhode Island
S-J New England, Inc..... 508-670-8899
South Carolina
Zucker Associates 919-782-8433
South Dakota
Comprehensive Technical Sales Inc.
.....612-941-7181
Tennessee
Eastern
Zucker Associates 919-782-8433
Western
Concord Component Reps Inc... 404-416-9597

MICROCHIP

Worldwide Sales & Service

REPRESENTATIVES

Texas
Austin
CompTech Sales, Inc. 512-272-9465
Brownsville
CompTech Sales, Inc. 210-504-9894
El Paso
CompTech Sales, Inc. 915-566-1022
Houston
CompTech Sales, Inc. 713-781-7420
Irving
CompTech Sales, Inc. 972-751-1181
Utah
Western Region Marketing 801-268-9768
Vermont
S-J New England, Inc. 508-670-8899
Virginia
S-J Chesapeake 703-533-2233
Washington
Micro Sales 206-451-0568
West Virginia
S-J Chesapeake 703-533-2233
Technology Marketing Corp. 412-779-2140
Wisconsin
Janus Incorporated 414-646-5420
Wyoming
Western Region Marketing 303-428-8088

DISTRIBUTORS

AFRICA

South Africa
Avnet ASD 27 11/4 44 23-33
Nanoteq 27/12-665-1338
Pace Electronic Components Ltd. 27/11-974-12116

ASIA/PACIFIC

Australia
Har-Tec Australia 61-3-826-89000
Zatek Australia Pty Ltd. 61-3-9574-9644
Zatek Australia Pty Ltd. 61-2-744-5711
China
Golden Research 0591-3350318
Wuhan Liyuan Research 86-27-780-2986
Goldenchip Electronics 86-591-784-4159
Infinitron Asia, Ltd. 852-2341-6611
Excelpoint Systems 852-2503-2212
Weikeng Industrial (Hong Kong) Co. Ltd. 852-2799-9035
India
Excelpoint Systems 91-80-526-1102
Japan
Dianichi Contronics Inc. 81-3-3818-8081
Global Electronics Corp. 81-3-3260-1411
Marubeni Hytech Co., Ltd. 81-3-5228-7241
Ryoden Trading Co. 81-3-5396-6211
Unidux 81-422-31-4111
Korea
ProCHIPS Inc. 822-849-8567
New Zealand
Har-Tec NZ Limited 64-9-278-0811
Singapore
Gates Engineering Pte. Ltd. 65-299-9937
Excelpoint Systems 65-741-8980
Taiwan, R.O.C.
Golden Technology Corp 886-2-652-2255
Infortech Computer Co., Ltd. 886-2-590-2735
Solomon Technology Corp. 886-2-788-8989
Pinnacle Technologies Co. Ltd. 886-2-788-4800
Weikeng Industrial Co., Ltd. 886-2-659-0202

CANADA

Vancouver, British Columbia
Farnell Electronic Services 604-606-8950
Pioneer/Zentronics 604-273-5575
Future Electronics 604-294-1166
Calgary, Alberta
Farnell Electronic Services 403-273-2780
Future Electronics 403-250-5550
Edmonton, Alberta
Future Electronics 403-438-5888
Pioneer Canada 403-482-3038
London, Ontario
Pioneer/Canada 519-672-4666
Toronto, Ontario
Farnell Electronic Services 416-798-4884
Future Electronics 905-612-9200
Pioneer/Canada 905-405-8300
Ottawa, Ontario
Farnell Electronic Services 613-596-6980
Pioneer/Canada 613-226-8840
Future Electronics 613-820-8313
Montreal, Quebec
Farnell Electronic Services 514-697-8149
Future Electronics/Branch 514-694-7710
Pioneer/Canada 514-737-9700
Quebec City, Quebec
Future Electronics 418-877-6666
Pioneer/Canada 418-654-1077
Winnipeg, Manitoba
Pioneer/Canada 204-989-1957
Future Electronics 204-944-1446
Farnell Electronic Services 204-786-2589

EUROPE

Austria
Avnet E2000 Ges.m.b.H 43 1/911 28 47
SEI-Elbatex GmbH 43/1-86642-0
Bulgaria
SEI-Elbatex 3592-624628
Czech Republic
SEI-Elbatex 422-4783707
Denmark
Arrow Exatec AS 45-44-92-7000
England
Abacus Eiger Ltd. 44-1925-626626
Abacus Hawke Ltd. 44-1256-880-800
Abacus Polar Ltd. 44-1525-858-000
Farnell Electronics Svs. Ltd. . 44-1279-441-144
Future Electronics Ltd. 44-1753-763-000
Eurodis H.B. Electronics Ltd. 44-1204-555-000
Finland
Arrow Field Oy 358-0-777-571
Memec Finland 358-07001-9830
France
Mecodis 33 1 43 99 44 00
Farnell Electronic Services 33 1 69 85 83 00
Future France 33-1-69-82-11-11
Scaib SA 33 1 69 19 89 00
Germany
Avnet E2000 GmbH 49/89-4 5110-01
Avnet Setron GmbH & Co. KG. 49 0/531 80 98-130
Future Electronics Deutschland GmbH 49/89-95727-0
Metronik GmbH 49/89-61108-0
Rutronik RSC-Halbleiter GmbH 49 7231/8 01-0
Semitron W. Roeck GmbH 49/7742-8001-0
Greece
P. Caritato & Associates S.A. 30-1-902-0115
Hungary
Humansoft Electronics Ltd. 36-1163-2879
SEI-Elbatex 381-269-9093
Israel
Elina Electronics Ltd. 972-3-498-543
Italy
Eurelettronica SPA 39-2-661491
Farnell Spa 39-2-824701
Kevin 39-2-33200914
Latvia
Ormix, Ltd. 371-2292839
Netherlands
Sonetech Nederland B. V. 32-2-460-0707
Sonetech Sei Benelux BV 31-76-5722-333
Norway
Berendsen 47-22-088500
Portugal
Digicontrole 35-11-840-5730
Poland
GAMMA ..... (+48) 22 6638376
SEI-Elbatex 48-22-6217122
Russia
Gamma Ltd. 7-812-5311-402
Slovakia
SK S. R. O. 427-572-41-74
Slovenia
SEI-Elbatex 36-61-1597198
Spain
Sagitron ..... +34-1-416-9261
Sweden
Memec Scandinavia AB 011-46-8643-4190
Switzerland
Elbatex Gruppe AG 41/56-4375111
Semitron W. Roeck & Co. 41/56-296040
Avnet E2000 AG 41/1-722-1330
Turkey
Inter Muehendislik Danismanlik 90-216-349-9400
Ukraine
Vector Ukraine 007-572-431-680

DISTRIBUTORS

MEXICO

Chihuahua
Dicopel, S.A. de C.V. 52-14-11-27-07
Guadalajara
Dicopel S.A. de C.V. 52-38-26-12-32
Future Electronics de Mexico .. 52-31-22-00-43
La Loma
Electronica Seta 525-390-7713
Merida
Dicopel, S.A. de C.V. 52-99-84-02-67
Mexico, D.F.
Dicopel, S.,A. de C.V. 52-57-03-18-19
Monterrey
Dicopel S.A. de C.V. 52-83-74-66-93

SOUTH AMERICA

All Other Countries Except Brazil:
Ibars Electronics Corporation 305-430-3740
Argentina
CIKA Electronica SRL..... 521-3188/8108
Electronica Elemnon SA..... 523-5555/3909
Brazil
Aplicacoes Eletronicas 55-11-231-0277

UNITED STATES

Alabama
Anthem Electronics, Inc..... 205-890-0302
Bell Industries..... 205-430-3150
Future Electronics..... 205-971-2010
Pioneer Standard Electronics..... 205-837-9300
Arizona
Anthem Electronics, Inc..... 602-966-6600
Bell Industries..... 602-905-2355
Future Electronics..... 602-968-7140
Pioneer Standard Electronics..... 602-231-6400
California
Agoura Hills
Future Electronics..... 818-865-0040
Pioneer Standard Electronics..... 818-865-5800
Chatsworth
Anthem Electronics Inc..... 818-775-1333
Irvine
Anthem Electronics, Inc..... 714-768-4444
Bell Industries..... 714-727-4500
Future Electronics..... 714-453-1515
Pioneer Standard Electronics..... 714-753-5090
Los Angeles
Bell Industries..... 310-826-2355
Rocklin
Anthem Electronics, Inc..... 916-624-9744
Roseville
Bell Industries..... 916-781-8070
Future Electronics..... 916-783-7877
San Jose Area
Anthem Electronics, Inc..... 408-453-1200
Bell Industries..... 408-734-8570
Future Electronics..... 408-232-1998
Future Electronics..... 408-434-1122
Pioneer Tech Products 408-954-9100
San Diego
Aegis Electronic Group, Inc..... 619-729-2026
Anthem Electronics, Inc..... 619-453-9005
Bell Industries..... 619-576-3294
Future Electronics..... 619-625-2800
Pioneer Standard Electronics..... 619-514-7700
West Lake Village
Bell Industries..... 805-373-5600
Colorado
Anthem Electronics, Inc..... 303-790-4500
Bell Industries..... 303-280-1115
Future Electronics 303-232-2008
Pioneer Standard Electronics..... 303-773-8090
Connecticut
Anthem Electronics, Inc..... 203-575-1575
Bell Industries..... 203-639-6000
Future Electronics 203-250-0083
Pioneer Standard Electronics..... 203-929-5600
Florida
Altamonte Springs
Anthem Electronics, Inc..... 407-831-0007
Bell Industries..... 407-339-0078
Future Electronics 407-865-7900
Pioneer Standard Electronics..... 407-834-9090
Deerfield Beach
Future Electronics 954-426-4043
Pioneer Standard Electronics..... 954-428-8877
Fort Lauderdale
Anthem Electronics, Inc..... 954-484-0990
Largo
Future Electronics 813-530-1222
Georgia
Anthem Electronics, Inc..... 770-931-3900
Bell Industries..... 770-446-7167
Future Electronics 770-441-7676
Pioneer Standard Electronics..... 770-623-1003
Illinois
Advent Electronics..... 847-297-6200
Anthem Electronics, Inc..... 847-884-0200
Bell Industries..... 847-640-3270
Future Electronics 847-882-1255
Pioneer Standard Electronics..... 630-495-9680
Indiana
Fort Wayne
Bell Industries..... 219-489-0283
Pioneer Standard Electronics..... 219-489-0283
Indianapolis
Bell Industries..... 317-842-4244
Future Electronics 317-469-0447
Pioneer Standard Electronics..... 317-573-0880
Iowa
Advent Electronics..... 319-363-0221
Kansas
Advent Electronics..... 913-381-9003
Future Electronics 913-498-1531
Maryland
Anthem Electronics, Inc..... 410-995-6640
Bell Industries..... 800-274-6953
Future Electronics 410-290-0600
Seymour Electronics 410-992-7474
Pioneer Standard Electronics..... 301-921-3822
Massachusetts
Anthem Electronics, Inc..... 508-657-5170
Bell Industries..... 508-474-8880
Future Electronics 508-779-3000
Pioneer Standard Electronics..... 617-861-9200
Michigan
Grand Rapids
Future Electronics 616-698-6800
Pioneer Standard Electronics..... 616-534-3145
Detroit Area
Future Electronics 313-261-5270
Pioneer Standard Electronics..... 313-525-1800
Minnesota
Bloomington
Bell Industries..... 612-888-7247
Eden Prairie
Anthem Electronics, Inc. 612-944-5454
Future Electronics 612-944-2200
Pioneer Standard Electronics..... 612-829-2252
Thief River Falls
Digi-Key Corporation..... 218-681-6674
Missouri
Future Electronics 314-469-6805
Pioneer Standard Electronics..... 314-542-3063
New Jersey
Northern
Anthem Electronics, Inc. 201-227-7960
Bell Industries..... 201-227-6060
Pioneer Standard Electronics..... 201-575-3510
Future Electronics 201-299-0400
Phase 1 Technology..... 201-791-2990
Seymour Electronics Corp. 201-465-7474
Southern
Bell Industries..... 609-439-9009
Phase 1..... 609-234-3237
Pioneer Standard Electronics..... 215-674-4000
Seymour Electronics 609-235-7474
Future Electronics 609-596-4080
New Mexico
Bell Industries..... 505-292-2700
New York
Binghamton
Pioneer Standard Electronics..... 607-722-9300
Long Island
Anthem Electronics, Inc. 516-864-6600
Future Electronics 516-234-4000
Phase 1 Technology..... 516-254-2600
Pioneer Standard Electronics..... 516-921-8700
Seymour Electronics 516-496-7474
Upstate New York
Pioneer Standard Electronics..... 716-389-8200
Future Electronics 716-387-9550
Future Electronics 315-451-2371
North Carolina
Anthem Electronics, Inc. 919-871-6200
Future Electronics 704-547-1107
Future Electronics 919-790-7111
Pioneer Standard Electronics..... 919-460-1530
Ohio
Cleveland
Future Electronics 216-449-6996
Bell Industries..... 216-498-2002
Pioneer Standard 216-498-6305
Dayton
Bell Industries..... 513-434-8231
Pioneer Standard Electronics..... 513-236-9900
Future Electronics 513-426-0090
Worthington
Pioneer Standard Electronics..... 614-848-4854
Oklahoma
Pioneer Standard Electronics..... 918-665-7840
Oregon
Anthem Electronics, Inc. 503-598-9660
Bell Industries..... 503-644-3444
Future Electronics 503-645-9454

Worldwide Sales & Service

DISTRIBUTORS

Pioneer Standard Electronics 503-626-7300
Pennsylvania
Philadelphia Area
Anthem Electronics, Inc. 215-443-5150
Pioneer Standard Electronics 215-674-4000
Pittsburgh
Pioneer Standard Electronics 412-782-2300
Texas
Austin
Anthem Electronics, Inc. 512-388-0049
Future Electronics 512-502-0991
Pioneer-Standard Electronics 512-835-4000
Dallas
Anthem Electronics, Inc. 972-238-7100
Bell Industries 972-458-0047
Future Electronics 972-437-2437
Pioneer-Standard Electronics 972-386-7300
Houston
Future Electronics 713-785-1155
Pioneer Standard Electronics 713-495-4700
Utah
Anthem Electronics, Inc. 801-973-8555
Bell Industries 801-561-9691
Future Electronics 801-467-4448
Washington
Anthem Electronics, Inc. 206-483-1700
Bell Industries 206-646-8750
Pioneer Standard Electronics 206-644-7500
Future Electronics 206-489-3400
Wisconsin
Future Electronics 414-879-0244
Pioneer Standard Electronics 414-784-3480
Bell Industries 414-547-8879

FACTORY SALES

AMERICAS

Corporate Office
Microchip Technology Inc.
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 602 786-7200 Fax: 602 786-7277
Technical Support: 602 786-7627
Web: http://www.microchip.com

Atlanta
Microchip Technology Inc.
500 Sugar Mill Road, Suite 200B
Atlanta, GA 30350
Tel: 770 640-0034 Fax: 770 640-0307

Boston
Microchip Technology Inc.
5 Mount Royal Avenue
Marlborough, MA 01752
Tel: 508 480-9990 Fax: 508 480-8575

Chicago
Microchip Technology Inc.
333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 708 285-0071 Fax: 708 285-0075

Dallas
Microchip Technology Inc.
14651 Dallas Parkway, Suite 816
Dallas, TX 75240-8809
Tel: 972 991-7177 Fax: 972 991-8588

Dayton
Microchip Technology Inc.
Suite 150
Two Prestige Place
Miamisburg, OH 45342
Tel: 513 291-1654 Fax: 513 291-9175

Los Angeles
Microchip Technology Inc.
18201 Von Karman, Suite 1090
Irvine, CA 92612
Tel: 714 263-1888 Fax: 714 263-1338

New York
Microchip Technmgy Inc.
150 Motor Parkway, Suite 416
Hauppauge, NY 11788
Tel: 516 273-5305 Fax: 516 273-5335

San Jose
Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408 436-7950 Fax: 408 436-7955

Toronto
Microchip Technology Inc.
5925 Airport Road, Suite 200
Mississauga, Ontario L4V 1W1, Canada
Tel: 905 405-6279 Fax: 905 405-6253

ASIA/PACIFIC

China
Microchip Technology
Unit 406 of Shanghai Golden Bridge Bldg.
2077 Yan'an Road West, Hongiao District
Shanghai, Peoples Republic of China
Tel: 86 21 6275 5700
Fax: 011 86 21 6275 5060

Hong Kong
Microchip Technology
RM 3801B, Tower Two
Metroplaza
223 Hing Fong Road
Kwai Fong, N.T. Hong Kong
Tel: 852 2 401 1200 Fax: 852 2 401 3431

India
Microchip Technology
No. 6, Legacy, Convent Road
Bangalore 560 025 India
Tel: 91 80 526 3148 Fax: 91 80 559 9840

Korea
Microchip Technology
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku,
Seoul, Korea
Tel: 82 2 554 7200 Fax: 82 2 558 5934

Singapore
Microchip Technology
200 Middle Road
#10-03 Prime Centre
Singapore 188980
Tel: 65 334 8870 Fax: 65 334 8850

Taiwan, R.O.C
Microchip Technology
10F-1C 207
Tung Hua North Road
Taipei, Taiwan, ROC
Tel: 886 2 717 7175 Fax: 886 2 545 0139

EUROPE

United Kingdom
Arizona Microchip Technology Ltd.
Unit 6, The Courtyard
Meadow Bank, Furlong Road
Bourne End, Buckinghamshire SL8 5AJ
Tel: 44 1628 850303 Fax: 44 1628 850178

France
Arizona Microchip Technology SARL
Zone Industrielle de la Bonde
2 Rue du Buisson aux Fraises
91300 Massy - France
Tel: 33 1 69 53 63 20 Fax: 33 1 69 30 90 79

Germany
Arizona Microchip Technology GmbH
Gustav-Heinemann-Ring 125
D-81739 Muenchen, Germany
Tel: 49 89 627 144 0 Fax: 49 89 627 144 44

Italy
Arizona Microchip Technology SRL
Centro Direzionale Colleone Pas Taurus 1
Viale Colleoni 1
20041 Agrate Brianza
Milan Italy
Tel: 39 39 6899939 Fax: 39 39 689 9883

JAPAN

Microchip Technology Intl. Inc.
Benex S-1 6F
3-18-20, Shin Yokohama
Kohoku-Ku, Yokohama
Kanagawa 222 Japan
Tel: 81 45 471 6166 Fax: 81 45 471 6122