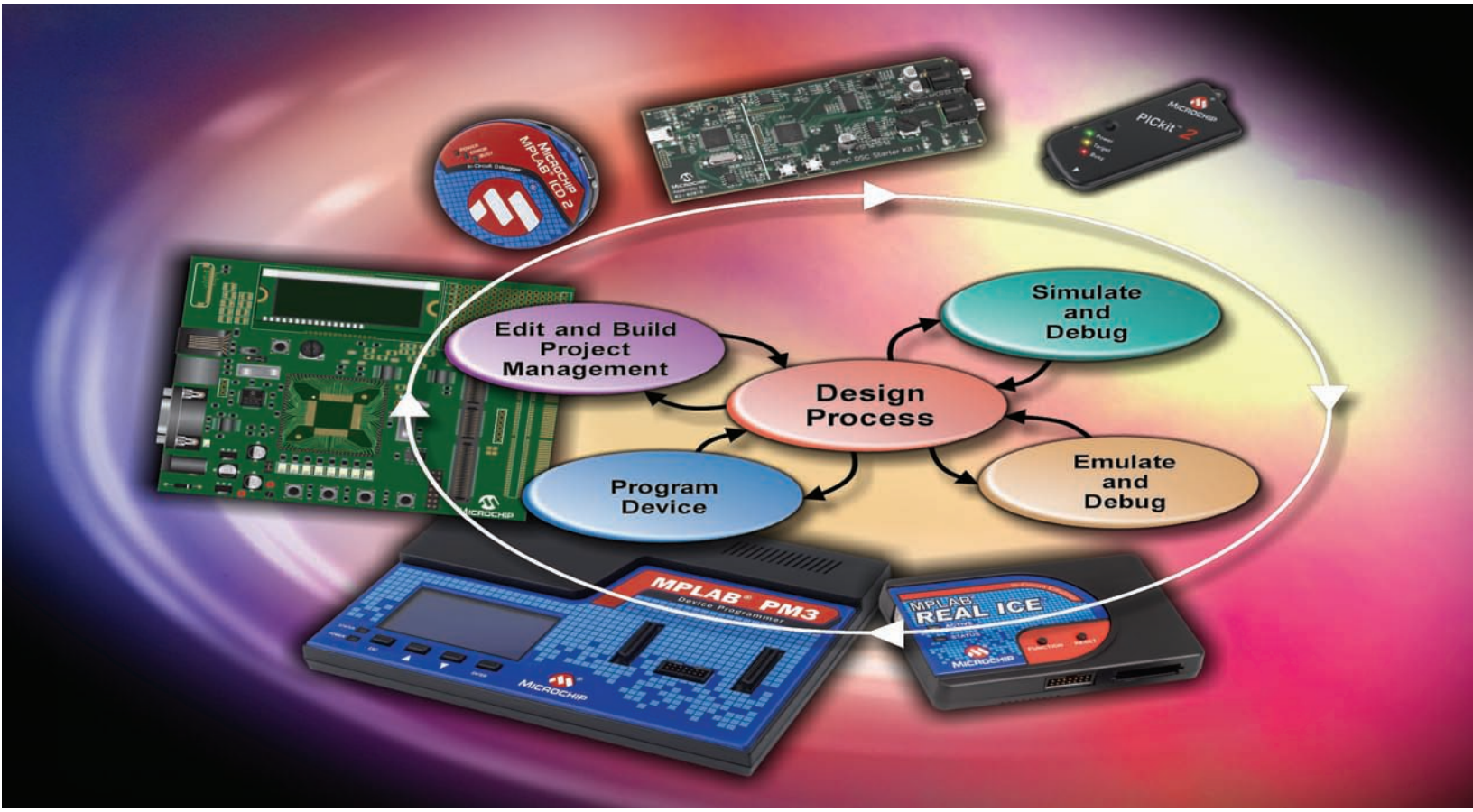
MICROCHIP

Integrated Development Environment

Transforming Ideas Into Realities ...

The typical product development life cycle is comprised of smaller cycles – each representing an iterative process toward designing and refining an embedded system application. MPLAB® Integrated Development Environment (IDE) is designed to assist in all these cycles with an integrated application. MPLAB IDE helps engineers correlate information from the conceptual design phase through coding, debugging, optimization and programming.



MPLAB CERTIFIED™

www.microchip.com/tools

Microchip Technology has established a reputation for its comprehensive set of world-class, low-cost, easy-to-use application development tools. The MPLAB certified tools help system designers quickly design, debug and program PIC® microcontrollers (MCUs) and dsPIC® Digital Signal Controllers (DSCs) for specific applications. To date, Microchip has shipped over half a million development systems.

MPLAB® IDE

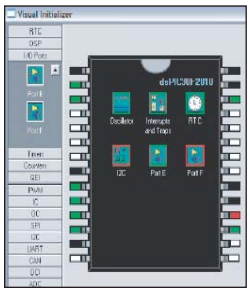
Design – Implementation – Test – Production

MPLAB IDE is Microchip's free, integrated toolset for the development of PIC microcontroller and dsPIC digital signal controller embedded applications. MPLAB IDE runs as a 32-bit application on MS Windows®, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third-party software/hardware development tools. Moving between tools is easy, and upgrading from the free simulator to MPLAB In-Circuit Debugger (ICD) 2 or the MPLAB In-Circuit Emulator (ICE) is effortless, since MPLAB IDE has the same user interface for all tools.

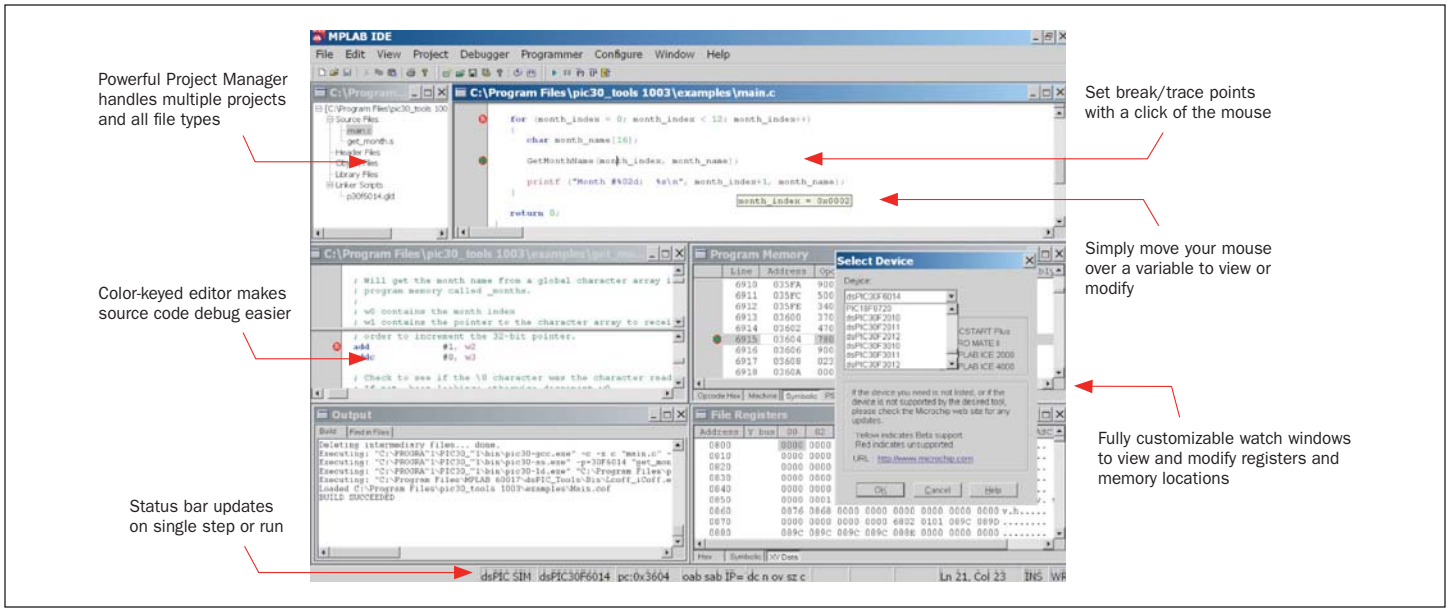
Download MPLAB IDE and use the MPLAB IDE Quick Start manual to discover how easy it is to create an application. Write code, build and assemble your project with MPLAB's wizards, then test your code with the built-in simulator and debugger. Explore the capabilities of all Microchip microcontrollers. When you are ready to test your application, use MPLAB ICD 2 to program a device and analyze your hardware, or choose the PICSTART® Plus or MPLAB PM3 programmers to program your code. For the ultimate in analysis, rely upon the MPLAB REAL ICE™ in-circuit emulator to help find the toughest bugs and fine tune your application.

Free Software Components of MPLAB IDE

- **MPLAB SIM –** High-speed software simulator features peripheral simulation, complex stimulus injection and register logging. MPLAB SIM executes your code and can be exercised with stimulus signals from files, from mouse clicks and from easily set up waveforms. The contents of variables and special function registers can be logged to a file for analysis.
- **PROGRAMMER'S TEXT EDITOR –** Color-coded context easily shows typos and incorrect assembler and C statements. Full debugging is performed while in the editor window, including setting breakpoints, displaying variable values with mouse over and setting trace ranges.
- **FULL-FEATURED DEBUGGER –** Watch windows show C structures and arrays, as well as all variables from C and assembler source. Step-over, step-into, step-out and run to cursor allow quick inspection of code operations.



- **VISUAL DEVICE INITIALIZER (VDI) –** Tedious initialization code that previously required digging through data books and doing calculations is eliminated with this graphical tool.
- **VERSION CONTROL SUPPORT –** For MS Source Safe, CVS, PVCS and Subversion.
- **MACRO ASSEMBLER –** For all current Microchip devices, with linker and librarian for building reusable code libraries. These can be used for assembly language programming and are also delivered with the Microchip C Compilers.
- **GRAPHICAL PROJECT MANAGER –** Source files can be instantly opened and edited, different optimizations can be applied to different source files and all project files are displayed in the project window.



Microchip's MPLAB® C Compilers

Highly Optimized Code for Microchip Microcontrollers

Microchip's MPLAB C compilers are full-featured, ANSI-compliant high-performance tools that are tightly integrated with MPLAB IDE. Source level debugging allows single-stepping through C source code and inspecting variables and structures at critical points in the code. Being integrated with MPLAB IDE allows a single environment to write source code, debug with the free MPLAB SIM simulator, and full hardware debugging with MPLAB ICD 2 and MPLAB REAL ICE. Code can be programmed into the target using the hardware debuggers or with Microchip's MPLAB PM3 device programmer. Compiler switches and linker customizations are done within the MPLAB IDE to provide a full graphical front end to these powerful compilers. Editing errors and breakpoints instantly switch to the corresponding lines in source code. Watch windows show data structures with defined data types, including floating point.

Microchip's C Compilers cover all the PIC18 MCUs, the dsPIC DSCs, PIC24 MCUs and the PIC32 MCUs.

Many third-party RTOS plug-ins are available and MPLAB IDE provides debugging features for RTOS-enabled applications.

Microchip's C Compilers are based upon open source GCC code (except for the PIC18 compiler), and source code is freely available.

Features:

- ANSI-compliant, with standard math, memory, data conversion and math libraries
- Generates relocatable object modules and libraries for enhanced code reuse
- Optimized to generate as much as 30% less code than other commercial compilers
- Strong support for in-line assembly when total control is absolutely necessary
- Allows complete freedom to mix C and assembler modules in a single project
- Extensive libraries including Microchip peripheral libraries
- Multiple optimization levels
- Full user control over data and code memory allocation
- Full interrupt support
- Free upgrades
- Support for DSP intrinsics (for dsPIC DSCs)
- Download free unrestricted use student editions and the free MPLAB IDE at www.microchip.com

Real-Time Debugging and Universal Programming

Microchip's debuggers and programmers work seamlessly from the MPLAB IDE desktop, providing high-value tools across a price range that can be suited to your development studio. Microchip's fast service and repair policy ensures that downtime will be minimal in the case of failure, and the various support avenues yield quick answers to most questions.

MPLAB® ICD 2 Debugger/Programmer (DV164005)

The MPLAB ICD 2 in-circuit debugger is a low-cost, all-in-one, real-time debugger/programmer solution for selected PIC microcontrollers. Programs can be downloaded, executed in real time and examined in detail using the proprietary debug functions of MPLAB IDE. Watch variables and breakpoints can be set from symbolic labels in C or assembly source code. Single-stepping can be done through C source line, assembly code level, or from a mixed C source and generated assembly level listing. MPLAB ICD 2 can also be used as a development programmer for supported devices.

MPLAB® REAL ICE™ Emulator (DV244005)

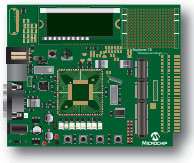
MPLAB REAL ICE in-circuit emulator system is Microchip's next generation high-speed emulator for Microchip Flash MCU and DSC devices. It debugs and programs PIC MCUs and dsPIC DSC Flash microcontrollers with the easy-to-use but powerful graphical user interface of the MPLAB IDE, included with each kit. MPLAB REAL ICE features low-cost, full-speed emulation, debugging and programming. High-speed USB 2.0 communications allows high-speed uploads of trace and monitoring of variables in real time.

MPLAB® PM3 Device Programmer (DV007004)

The easy-to-use MPLAB PM3 device programmer operates with a PC or as a stand-alone unit, and programs the entire PIC microcontroller series as well as current dsPIC30F DSCs. Features include: Serialized Quick Turn Programming (SQTP℠) and alternate DOS command line interface for batch control. MPLAB PM3 accepts PRO MATE® II socket modules via an adapter (sold separately), large easy-to-read display, field-upgradable firmware for quick new device support, and Secure Digital (SD) and Multimedia Card (MMC).

Learning Technology and Quick Prototyping

Explorer 16 Development Board (DM240001)



The Explorer 16 development board is a low-cost, efficient development board to evaluate the features and performance of Microchip's new PIC24 microcontroller and dsPIC33 digital signal controller families. Coupled with the MPLAB ICD 2 in-circuit debugger, real-time emulation and debug facilities speed evaluation and prototyping of application circuitry. The Explorer 16 features two interchangeable Plug-In Modules (PIMs), one each for the PIC24FJ128GA010 and the dsPIC33FJ256GP710 DSC.

PICkit™ 2 Starter Kit (DV164120)

The PICkit 2 starter kit is a low-cost development kit with an easy-to-use interface for programming many of Microchip's baseline, midrange and PIC18F families of Flash memory microcontrollers. This starter kit is designed to help you get up to speed quickly using PIC MCUs. The kit provides everything needed to program, evaluate and develop applications using Microchip's powerful Mid-Range Flash memory family of microcontrollers.

PICDEM™ HPC Explorer Board (DM183022)

The low-cost PICDEM HPC board is used to evaluate the performance of high-end 8-bit PIC18F series microcontrollers. The board features a PIC18F8722 MCU, which is the superset of the entire 64- and 80-pin PIC18FXXXX general purpose family. A PCB only daughter board is also part of the kit and allows different processors sharing the same pinout to be mounted and tested on the explorer board. A serial bootloader firmware example is provided.

PICDEM™ FS-USB Demonstration/Evaluation Board (DM163025)

The PICDEM FS-USB is a demonstration and evaluation board for the PIC18F4550 family of Flash microcontrollers with full-speed USB 2.0 interface. The board contains a PIC18F4550 microcontroller in a 44-pin TQFP package, representing the superset of the entire family of devices.

MPLAB Starter Kits

MPLAB Starter Kits are a complete hardware and software solution for understanding Microchip microcontrollers and digital signal controllers. Each starter kit is targeted to a particular technology or Microchip solution, runs a demo immediately "out of the box" and contains everything needed to get a jump start from the demo into developing new applications.

Each MPLAB starter kit includes: application PC boards with an integrated hardware debugger, cables, manuals, application notes and software. To get started with a complete solution, just connect to the PIC USB port.

The starter kit PC boards have integrated in-circuit debuggers, so no external hardware is necessary to download sample or new code to run on the starter kit. No emulators or in-circuit debuggers are necessary, yet hardware breakpoints, single-stepping, register inspection and modification, and other hardware debugging features are fully functional. MPLAB starter kits all run in the MPLAB IDE, so all the tools of the development environment are easily learned and are ready to be applied to your application.

Current MPLAB starter kits include:

- MPLAB Starter Kit for dsPIC DSCs (DM330011)
- MPLAB Starter Kit for PIC24 MCUs (DM240011)
- MPLAB Starter Kit for PIC32MX MCUs (DM320001)

More starter kits will be available soon. Check the Microchip web site for availability.

Start Now – Microchip Tools Information

The integration of development tools within the MPLAB IDE means learning a single development environment to enjoy rapid project development. To quickly learn how to use MPLAB IDE, most of the user guides and the MPLAB IDE components have "Getting Started" sections as well as introductory tutorials on using the tool.

This and other "Getting Started" information is also available on the Microchip web site, **www.microchip.com/tools**. Additionally there are a series of webinars that cover applications and device-specific information, including these Development Tool webinars:

- An Introduction to MPLAB
- Microchip Development Tools
- Getting Started with MPLAB SIM
- What's New in MPLAB
  – MPLAB's Visual Device Initializer
- dsPIC DSC Development Tools
- Choosing a Debug Tool
- Using Simulator Stimulus for Algorithm Verification
- Optimizing Interrupt Routines in MPLAB C compiler for PIC18
- Using Asynchronous Stimulus with MPLAB SIM

Also on Microchip's web site are a series of forums to communicate with other engineers doing similar development work and with Microchip Development Tools engineers, who monitor the forums, answer questions and provide technical and support tips.

There is also a "Start Now" section on the Microchip web site that has two main sections, one for PIC® microcontrollers and one for Development Tools. Go to the Development Tools page and click on "Start Now" or go directly to **www.microchip.com/tools**.

For in-depth assistance from Microchip Corporate Application Engineers, please register at: **http://support.microchip.com**

Additional Resources

Webinars

Microchip Webinars provide technical training on your schedule 24 hours a day, 7 days a week. More than 75 presentations are available on the Microchip web site with both audio and visual training elements to make learning easier. These short training modules have become very popular with designers. Visit **www.microchip.com/webseminars** for a complete list of classes.

Regional Training Centers

To meet customers' demands for more training more often, Microchip has established a global network of Regional Training Centers (RTCs) that provide workshops and seminars on a year-round basis. Each RTC offers a variety of courses on a regular basis to fit with your demanding schedule. You can benefit by learning in small hands-on classroom settings that focus on your specific needs. Visit **www.microchip.com/RTC** for the latest list of RTC locations and classes.

Third-Party Design Resources

If you require assistance with your product design, Microchip has many third-party resources to help you. These resources include a large selection of consultants that are screened by Microchip and rated based on the number of Microchip designs. You can find a list of these consultants, resumes and ratings on the Microchip web site at **www.microchip.com/partners.**

Support

Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. In addition, the following service areas are available at www.microchip.com:

- **Support** link provides a way to get questions answered fast: http://support.microchip.com
- **Sample** link offers free evaluation samples of any Microchip device: http://sample.microchip.com
- **Training** link offers webinars, registration for local seminars/workshops and information on annual MASTERs events held throughout the world: www.microchip.com/training
- **Forum** link provides access to knowlege base and peer help: http://forum.microchip.com

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