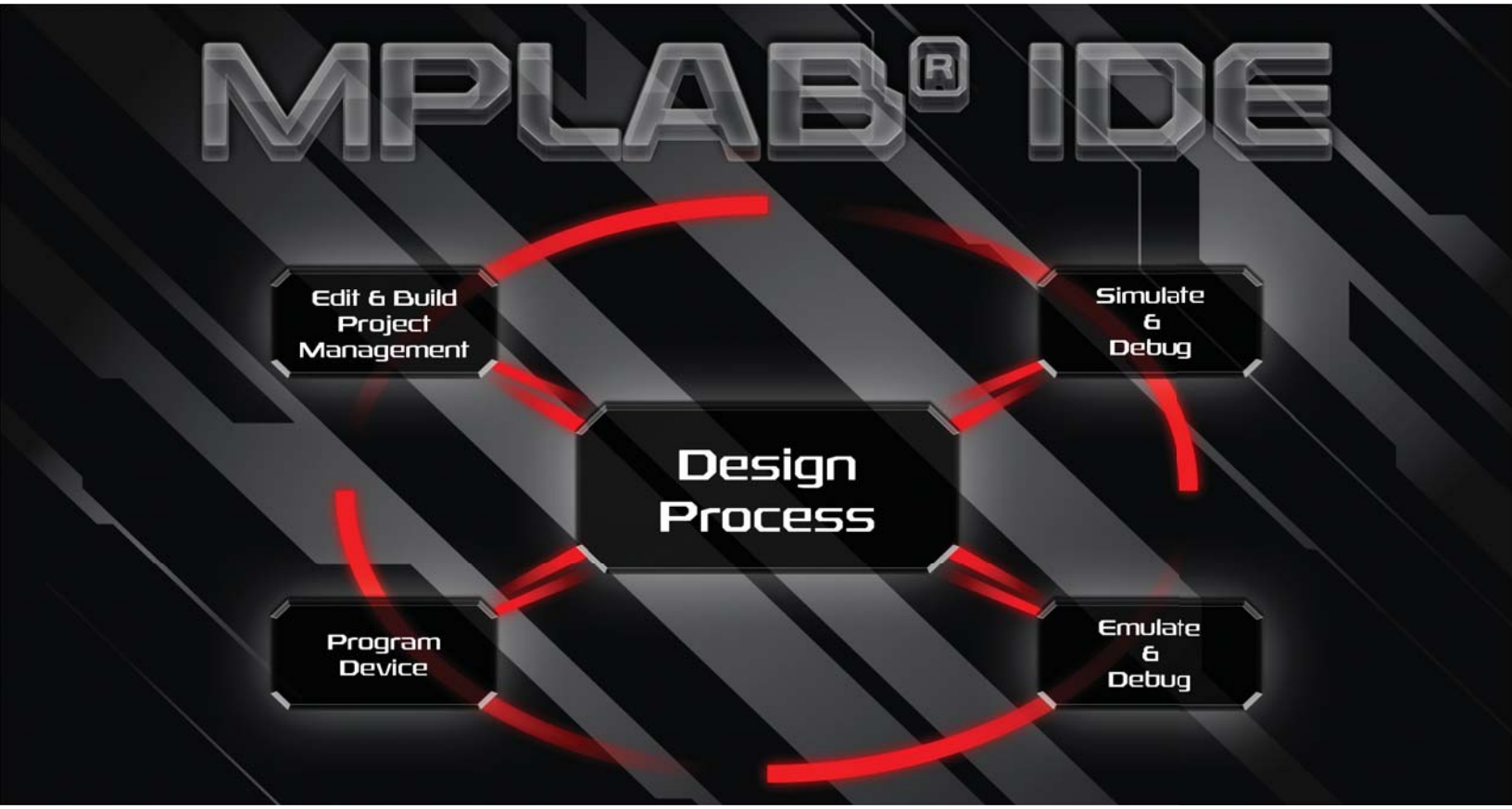
MICROCHIP

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

Integrated Development Environment Software 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 more than 700,000 development systems.

MPLAB® IDE

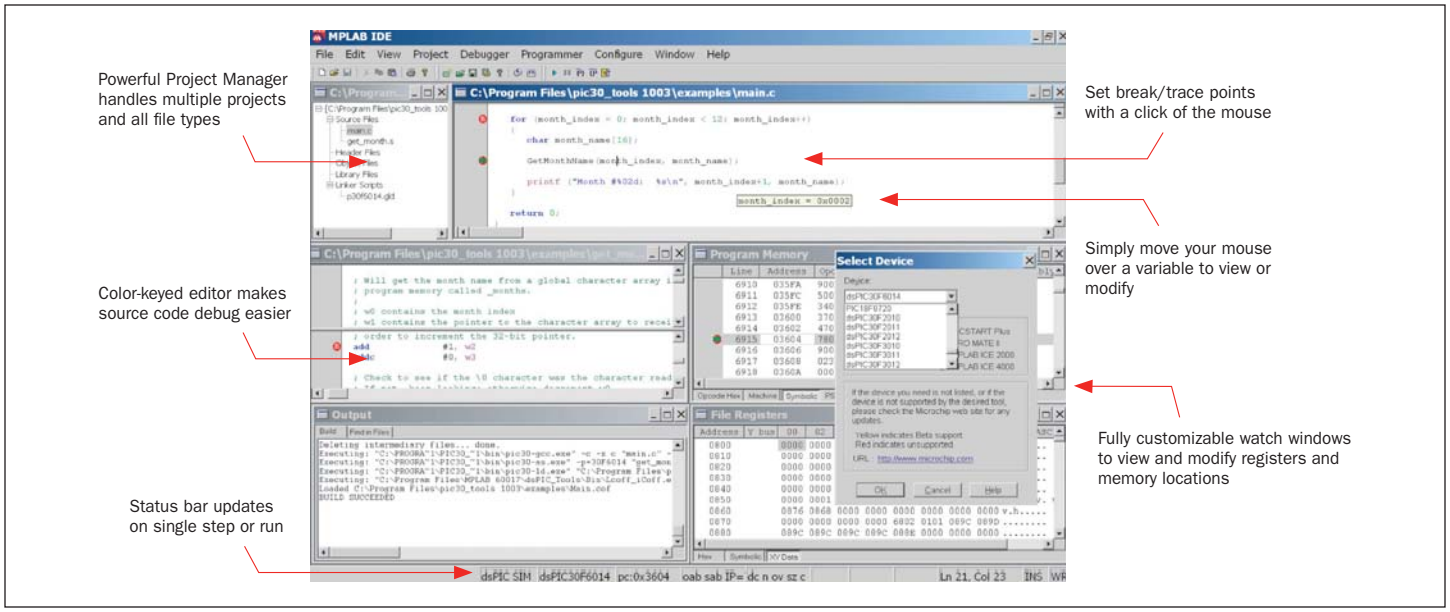
Design – Implementation – Test – Production

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 MPLAB SIM simulator to MPLAB ICD 3 In-Circuit Debugger or the MPLAB REAL ICE™ In-Circuit Emulator 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 3 to program a device and analyze your hardware, or choose a production-graded, universal MPLAB PM3 programmer 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.
- **Data Monitor Control Interface (DMCI) –** Provides a graphical method to input and adjust software motor parameters. Plots can be used to show a time history of control variables so that the motor dynamic response can by analyzed. Useful for tweaking software parameters and visualizing historical data during debug sessions.
- **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.



Software and Hardware Tools

HI-TECH C® Compilers

Featuring Omniscient Code Generation™

HI-TECH C compilers are enabled with Omniscient Code Generation™ (OCG), a whole-program compilation technology, to facilitate more intelligent, state-of-the-art code generation and enhance product usability.

OCG extracts information from multiple source files simultaneously, allowing code generation that can deliver up to double the code density, better RAM utilization and faster interrupts than other compilers. OCG technology:

- Optimizes the size of each pointer variable in your code based on its usage
- Reduces overhead required for interrupt context switching
- Removes unused functions and variables
- Automatically handles memory banking without requiring special qualifiers
- Automatically analyzes user assembly and object code files
- Eliminates the need for many non-standard C qualifiers and compiler options
- Automatically detects and implements printf features required by program and eliminates unused features

Other HI-TECH C Compiler Features:

- Integrates into MPLAB IDE and fully compatible with all Microchip debuggers and emulators
- Fully ANSI-compliant
- Includes Library source – for standard libraries and sample code for I/O drivers
- Includes macro assembler, linker, preprocessor and one-step driver
- Runs on Windows, Linux and Mac OS X

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 3 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 for 16-bit and 32-bit MCUs and DSCs are based upon open source GCC code, 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
- 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 Lite editions and the free MPLAB IDE at www.microchip.com

Hardware Tools, Demonstration and Evaluation Boards

Real-Time Debugging and Universal Programming

MPLAB® ICD 3 Debugger/ Programmer (DV164035)

MPLAB ICD 3 In-Circuit Debugger System is Microchip's latest and most cost-effective high-speed emulator for Microchip devices. It debugs and programs PIC Flash microcontrollers and dsPIC DSCs with the powerful, yet easy-to-use graphical user interface of MPLAB Integrated Development Environment (IDE). MPLAB ICD 3 In-Circuit Debugger provides significant performance enhancements for embedded systems designers. Programming times are typically 15x faster than previous systems. A 40 MHz dsPIC33 and high-speed FPGA yield faster communications, downloads and debugging.

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 these devices 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 features 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

PICDEM PIC18 Explorer Board (DM183032)

This low-cost demo board is used to evaluate Microchip's PIC18 MCU families. The PIC18 Explorer features a PIC18F8722 MCU and comes with the PIC18F87J11 processor PIM which is a superset of the PIC18 J-series of 3V MCUs for cost sensitive applications. The single development board supports dozens of general purpose PIC18 families using various processor Plug-In Modules (PIMs). PICtail daughter boards enable many different accessory boards to connect to the PIC18 Explorer board for a flexible and complete development environment. When used with the MPLAB ICD 3 debugger and programmer, this board provides a full-featured PIC18 development environment.

dsPICDEM™ MCLV Development Board (DM330021)

This development board provides a cost-effective method of evaluating and developing sensored or sensorless brushless DC (BLDC) and Permanent Magnet Synchronous motor control applications. The board supports Microchip's 28-pin SOIC and a variety of Plug-In Modules with dsPIC33F DSCs. The board is capable of controlling motors rated up to 48V and 15 Amps. This board is designed to work with the 24V BLDC Motor (AC300020) and the 24V motor power supply (AC002013) to create a complete 24V BLDC development kit. This board also supports multiple communications channels such as USB, CAN, LIN and RS-232.

PICkit™ 3 Debug Express (DV164131)

The PICkit 3 Debug Express allows debugging and programming of PIC Flash microcontrollers and dsPIC DSCs using the powerful graphical user interface of the MPLAB Integrated Development Environment (IDE). This kit is affordably priced and includes a 44-pin demo board with a PIC18F45K20 microcontroller, a USB cable and a CD of software and learning resources.

PICDEM™ Lab Development Kit (DM163035)

This development kit is designed to provide a comprehensive development and learning platform for virtually all of Microchip's Flash-based 6-, 8-, 14-, 18- and 20-pin, 8-bit PIC Microcontrollers. Geared toward first-time users and university students, the PICDEM Lab development board is supplied with five of the most popular 8-bit PIC MCUs and a host of discrete components used to create a number of commonly used circuits. Expansion headers provide complete access/connectivity to all pins on the connected PIC MCUs and all mounted components.

mTouch™ Cap Touch Evaluation Kit (DM183026)

The mTouch Capacitive Evaluation Kit provides a simple platform for developing a variety of capacitive touch sense applications using PIC16F or PIC24F microcontrollers. The diagnostic tool provided allows the user to analyze application-critical information in real-time as it relates to touch sensor behavior.

Microchip Tools and Additional Resources

PICDEM Mechatronics Demo Board (DM163029)

The PICDEM Mechatronics demo board is an easy-to-use mechatronics development and demonstration platform. Mechatronics refers to implementing intelligent control into a mechanical system. Learn how to use PIC MCUs to enhance or replace a mechanical design.

MPLAB Starter Kit for Memory Products (DV243003)

Designers of Serial EEPROM applications can enjoy the increased productivity, reduced time to market and rock-solid design that only a well thought out development system can provide. Microchips MPLAB Starter Kit for Serial Memory Products includes everything necessary to quickly develop a robust and reliable Serial EEPROM design while greatly reducing the time required for system integration and hardware/software fine-tuning.

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 new or sample code to run on the starter kit. No emulators are necessary, yet hardware breakpoints, single-stepping, register inspection and modification, and other hardware debugging features are fully functional. All MPLAB starter kits run in the MPLAB IDE, so the tools of the development environment are easily learned and are ready to be applied to an application.

Current MPLAB starter kits include:

- MPLAB Starter Kit for PIC18 MCUs (DM180021)
- MPLAB Starter Kit for dsPIC DSCs (DM330011)
- MPLAB Starter Kit for PIC24F MCUs (DM240011)
- MPLAB Starter Kit for PIC24H MCUs (DM240021)
- 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
- 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

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 evaluation samples of any Microchip device: **http://sample.microchip.com**
- **Forum** link provides access to knowledge base and peer help: **http://forum.microchip.com**
- **Buy** link provides locations of Microchip Sales Channel Partners: **www.microchip.com/sales**

Training

If additional training interests you, then Microchip can help. We continue to expand our technical training options, offering a growing list of courses and in-depth curriculum locally, as well as significant online resources – whenever you want to use them.

- Regional Training Centers: **www.microchip.com/rtc**
- MASTERs Conferences: **www.microchip.com/masters**
- Worldwide Seminars: **www.microchip.com/seminars**
- eLearning: **www.microchip.com/webseminars**
- Resources from our Distribution and Third Party Partners **www.microchip.com/training**

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