



**MPLAB<sup>®</sup> IPE**  
**(Integrated Programming Environment)**  
**User's Guide**

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# MPLAB® IPE USER'S GUIDE

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## Preface

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### NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site ([www.microchip.com](http://www.microchip.com)) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXA”, where “XXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® X IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

## INTRODUCTION

This chapter contains general information that will be useful to know before using the MPLAB® Integrated Programming Environment (IPE). Items discussed in this chapter include:

- [Document Layout](#)
- [Conventions Used in this Guide](#)
- [Recommended Reading](#)

## DOCUMENT LAYOUT

This document describes how to use the IPE as a programming tool to program devices. The document is organized as follows:

- **Chapter 1. IPE Application Overview** – Defines the IPE, provides software installation requirements and upgrade procedures, lists the supported tools, and provides a feature matrix.
- **Chapter 2. General Setup** – Discusses launching and setting up the application, and provides Advanced Mode login and options information.
- **Chapter 3. IPE Reference** – Provides reference information for the menu items.

## CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

### DOCUMENTATION CONVENTIONS

Description	Represents	Examples
<b>Arial font:</b>		
Italic characters	Referenced books	<i>MPLAB X IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	"Save project before build"
Underlined, italic text with right angle bracket	A menu path	<u><i>File&gt;Save</i></u>
Bold characters	A dialog button	Click <b>OK</b>
	A tab	Click the <b>Power</b> tab
N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
<b>Courier New font:</b>		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets [ ]	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: {   }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

## RECOMMENDED READING

This user's guide describes how to use Microchip MPLAB IPE. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

### **Processor Extension Pak and Header Specification (DS50001292)**

This booklet describes how to install and use headers. Headers are used to better debug selected devices using special -ICE device versions, without the loss of pins or resources. See also the Header online help file.

### **Transition Socket Specification (DS51194)**

Consult this document for information on transition sockets available for use with headers.

### **SQTP File Format Specification (DS50002539)**

This document shows how a Serial Quick Turn Programming (SQTP<sup>SM</sup>) file is produced and used by MPLAB<sup>®</sup> IPE Integrated Programming Environment. Engineers can use this information to generate their own SQTP file.

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## Chapter 1. IPE Application Overview

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### 1.1 IPE DEFINED

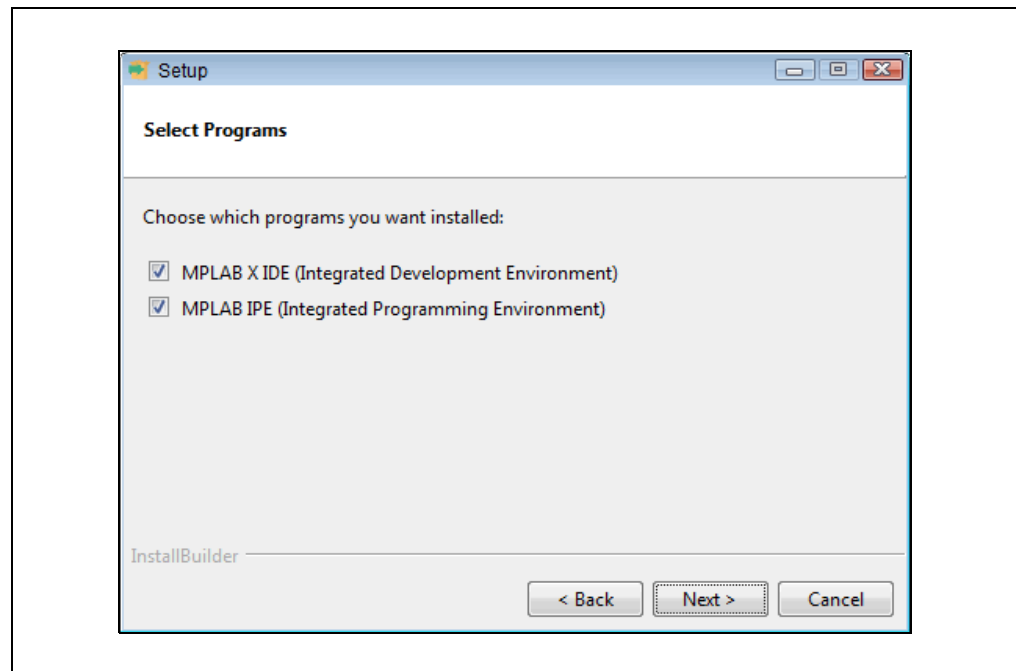
The MPLAB® Integrated Programming Environment (IPE) is a software application that provides a simple interface to quickly access key programmer features. The IPE provides a secure programming environment for production programming.

The IPE uses the MPLAB X IDE framework, Microchip Debugger (MDB) database, hardware tool interfaces and respective drivers to provide programming capabilities for all Microchip programmers.

### 1.2 SOFTWARE INSTALLATION REQUIREMENTS

The IPE application must be installed on your PC. It is available during the MPLAB X IDE installation process if the check box is selected (see [Figure 1-1](#)). You do not need to install the MPLAB X IDE in order to use the IPE application. However, you may want to refer to the online help for the MPLAB X IDE for additional information.

**FIGURE 1-1: SELECT PROGRAMS DIALOG**



**Note:** See the Release Notes for MPLAB IPE (Readme for MPLAB IPE.htm) for up-to-date version compatibility information. This can be found in:  
C:\Program Files (x86)\Microchip\MPLABX\vx.xx\docs  
where vx.xx represents the version.  
It can also be found in the installation directory, for example:  
C:\Program Files\Micro-  
chip\MPLABX\vx.xx\mplab\_ide\mplab\_ide\modules\docs  
where vx.xx represents the version.

Once you've installed the software, the IPE application can be accessed through the MPLAB IPE icon on your desktop or startup menu.

**Note:** The IPE must be run as ADMINISTRATOR for all features to be fully functional.

## 1.3 PROGRAMMING TOOLS SUPPORTED

The following programming tools work with the IPE:

- MPLAB ICD 3 In-Circuit Debugger – recommended for production programming
- MPLAB PICKit™ 3 Debugger/Programmer – for development programming only
- MPLAB PM3 Programmer – recommended for production programming
- MPLAB REAL ICE™ Emulator – recommended for production programming
- Licensed PKOB Starter Kits – recommended for development programming only

## 1.4 IPE MODES

### 1.4.1 Modes

The IPE application operates in two modes:

- Production Mode – in which you can perform production programming operations. By default, the IPE is in Production Mode when it is launched. The Production Mode capabilities are set from the Advanced Mode menu discussed in [Section 2.5.6 “Production Mode”](#) of this document.
- Advanced Mode – a feature-rich GUI interface in which you can view and change the settings for programming operations, and set up secure environments for production programming. To enable Advanced Mode, see [Section 2.3 “Setting Up the Programmer”](#).

### 1.4.2 Feature Matrix

The following matrix shows the default features that are accessible in Production Mode.

However, in Advanced Mode, the default behavior of Production Mode can be changed, and features can be added or removed as per the authorized personnel's discretion.

**Note:** The IPE must be run as ADMINISTRATOR for all features to be fully functional.

# IPE Application Overview

**TABLE 1-1: FEATURE MATRIX**

Feature	Description	Production Mode Defaults
Import Hex file	loads the Hex file	On
Import Environment	loads the Environment file	Off
Import SQTP file	loads the pre-built SQTP file	Off
Export Hex file	saves the all memory contents into a hex file	Off
Program	connects to hardware tool and performs program operation	On
Erase	erases the device	On
Verify	verifies the device against the memory contents of IPE	On
Blank Check	checks that the device is blank	On
Read	reads the device and fills the read content in memory	On
<b>Memory View</b>		
Program Memory	displays the program memory contents	Off
Auxiliary Memory	displays the auxiliary memory contents	Off
Config Memory	displays the configuration memory contents	Off
Flash Data	displays the Flash data memory contents	Off
User IDs	displays the User ID memory contents	Off
EEPROM	displays the data memory contents	Off
<b>Memory Edit</b>		
Program Memory	program memory contents can be edited	Off
Auxiliary Memory	auxiliary memory contents can be edited	Off
Flash Data Memory	Flash data memory contents can be edited	Off
EEPROM	data memory contents can be edited	Off
User IDs	User ID memory contents can be edited	Off
Boot Memory	boot memory contents can be edited	Off
Config Memory	configuration memory contents can be edited	Off
Save Environment	creates or overwrites the environment	Off
View Memory Settings	views the memory ranges	On
Edit Memory Settings	changes the memory ranges	Off
View Voltage Settings	views the voltage values	On
Edit Voltage Settings	changes the voltage values	Off
Create SQTP	generates the SQTP file	Off
Manual Download Firmware	to select and download the firmware into the Hardware tool	On
Auto Download Firmware	when a tool is connected, the latest firmware (available in the system) will be downloaded	On
Erase All Before Program	erases the device before programming	Off

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## Chapter 2. General Setup

### 2.1 INTRODUCTION

Getting started using the IPE is discussed.

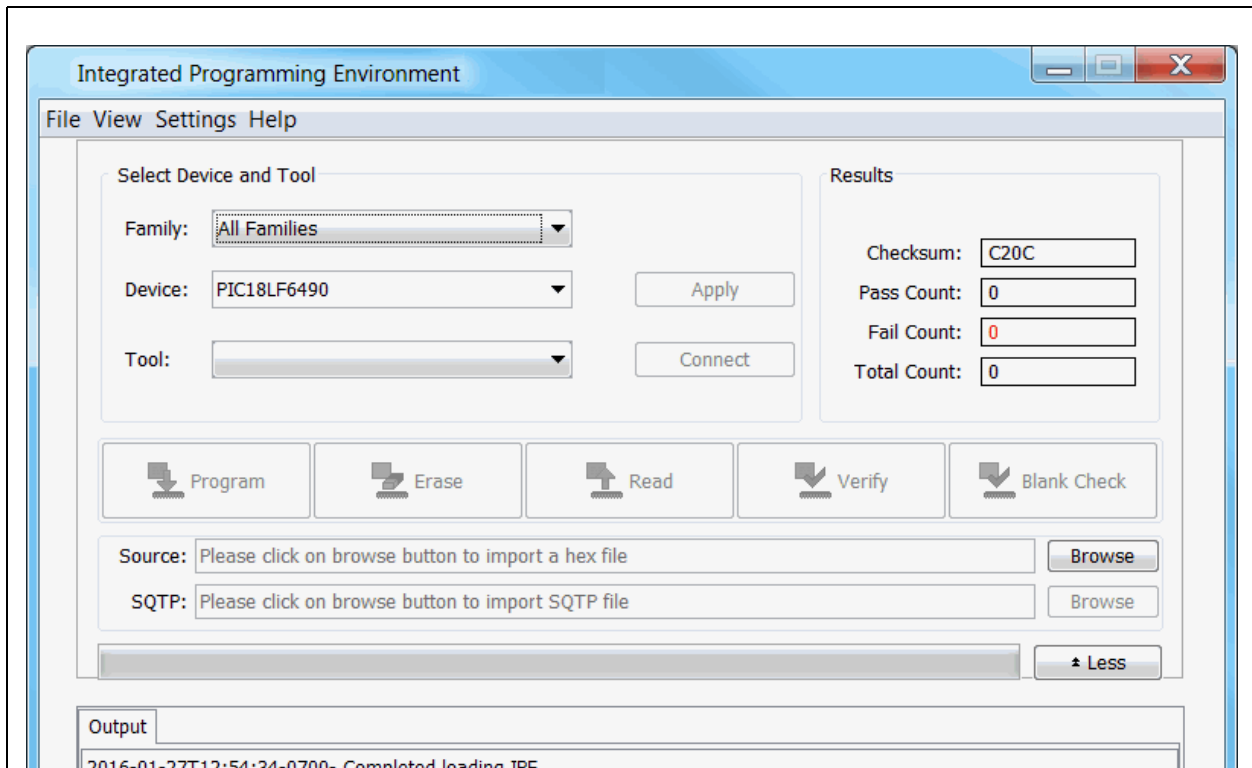
- [Launching the IPE Application](#)
- [Setting Up the Programmer](#)
- [Advanced Mode Login](#)
- [Advanced Mode Settings](#)
- [Creating Desktop Shortcuts](#)

### 2.2 LAUNCHING THE IPE APPLICATION

#### 2.2.1 Launching the IPE

After installing the software, double-click the MPLAB IPE application icon located on the desktop. The IPE main window opens.

**FIGURE 2-1: IPE MAIN WINDOW**



#### 2.2.2 Multiple Instances of IPE

If you need to have multiple instances of the IPE available, refer to the MPLAB X IDE help. Open MPLAB X IDE, go to [Help>Tool Help Contents>MPLAB X IDE Help](#) and navigate to the “Before You Begin” section, then “Launch Multiple Instances of the IDE.” Follow the instructions and apply to the IPE.

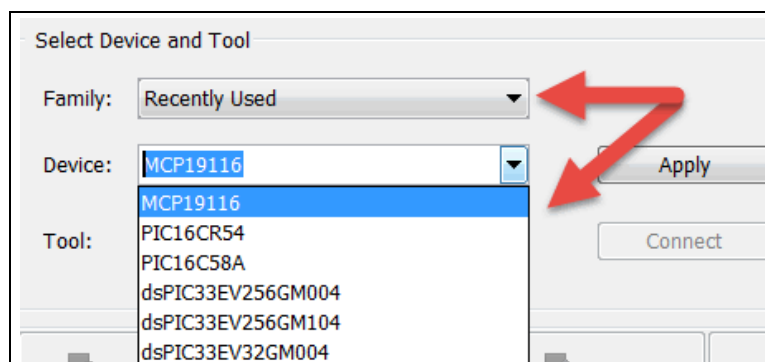
## 2.3 SETTING UP THE PROGRAMMER

**Note:** The IPE must be run as **ADMINISTRATOR** for all features to be fully functional.

For programming devices, you can use any of the supported tools (see [Section 1.3 “Programming Tools Supported”](#)). Refer to the online help of the selected tool (e.g., MPLAB ICD 3, PICkit 3, etc.) for information on programming a device.

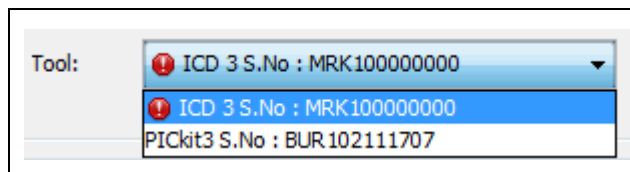
1. Using the Family drop-down menu, select the family of the device you wish to program and use the Device drop-down menu to select the device. Or, use the Device drop-down menu to directly select the device.

**Note:** Selecting the Recently Used option from the Family menu lists the latest 10 devices used in the Device menu.



2. Click **Apply** to configure the IPE to the current device (e.g., Memory View, checksum).
3. Connect the development tool to the PC. Attach the appropriate target board, device, and power. Refer to the tool's online help for additional instructions and information on connecting to target boards, etc.
4. Use the Tool drop-down menu to select the tool you want to use. If more than one development tool is connected to the PC, select the one you wish to use (see the figure below).

**Note:** An exclamation point before the tool name (as shown below) indicates that the USB drivers need to be updated. This will not occur with the PICkit 3. However, the USB drivers may need to be updated for the MPLAB ICD 3, MPLAB PM3, and REAL ICE.



For information on installing the correct USB drivers for Microsoft Windows®, launch MPLAB X IDE and click the **MPLAB IDE v8 Users - IMPORTANT** link, which is located on the Start Page of the Learn & Discover tab. Follow the instructions to install the driver; then, return to the IPE.

**FIGURE 2-2: SELECT TOOL**

The screenshot shows a software window titled 'File View Settings Help'. Inside, there's a 'Select Device and Tool' section with three dropdown menus: 'Family' (set to 'All Families'), 'Device' (set to 'PIC18F452'), and 'Tool' (showing a list with 'ICD 3 S.No : MRK100000000' selected). To the right of these is a 'Results' section with four input fields: 'Checksum' (82D8), 'Pass Count' (0000), 'Fail Count' (2), and 'Total Count' (2). There are 'Apply' and 'Connect' buttons next to the 'Tool' dropdown.

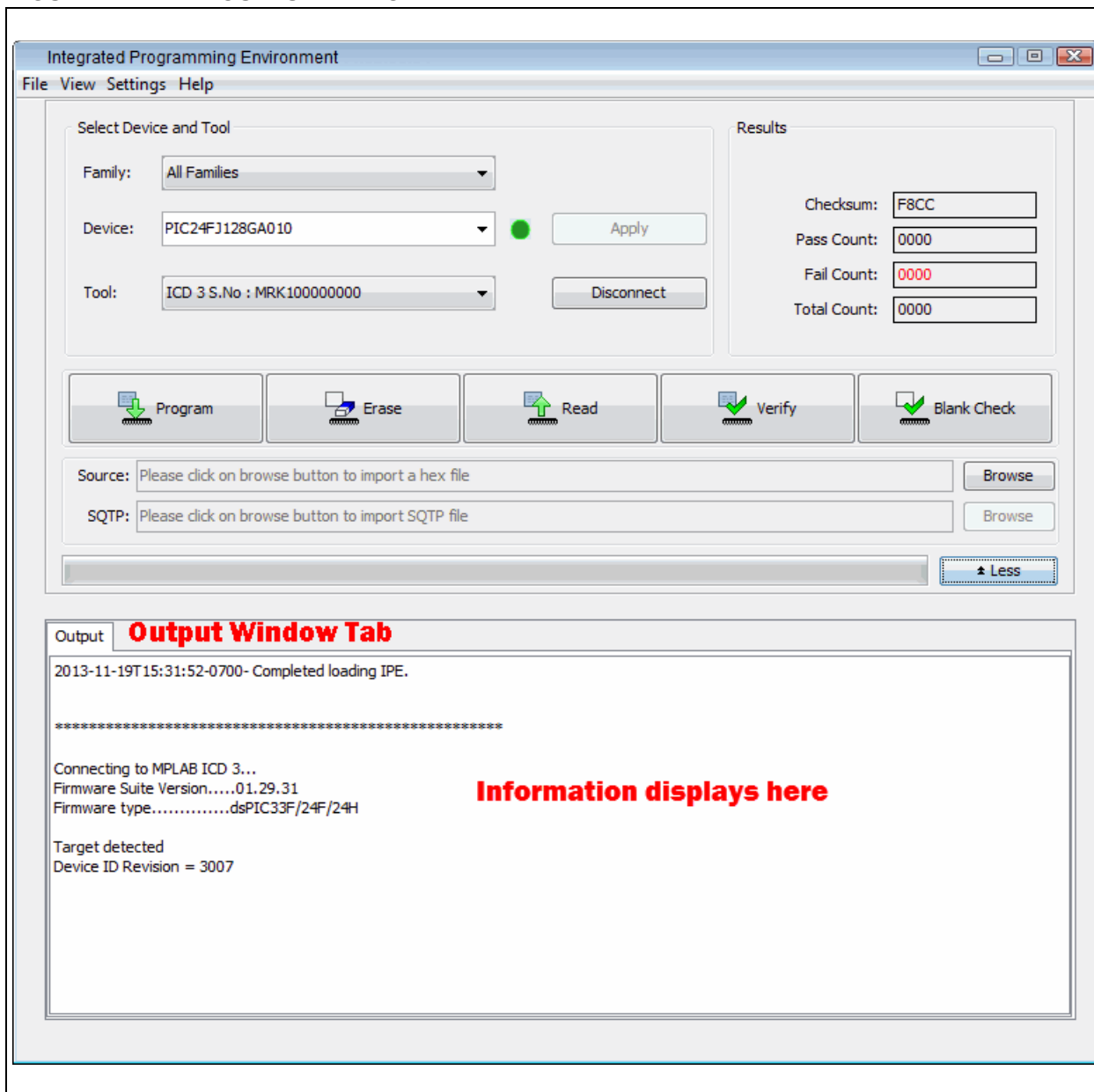
5. Click the **Connect** button (next to the Tool name) to establish a connection between the IPE and the tool.

**FIGURE 2-3: CONNECTING THE TOOL**

This screenshot shows the same 'Select Device and Tool' dialog box, but with different selections. The 'Device' dropdown is now set to 'PIC24FJ128GA010'. The 'Tool' dropdown is still set to 'ICD 3 S.No : MRK100000000'. The 'Connect' button is highlighted with a red oval, indicating it should be clicked to establish the connection.

- When the tool is connected, any messages or errors related to this tool will be displayed in the Output window, see [Figure 2-4](#).

**FIGURE 2-4: OUTPUT WINDOW**



- After the tool is successfully connected, proceed to [Chapter 3. "IPE Reference"](#) to program the device with the IPE.



## 2.4 ADVANCED MODE LOGIN

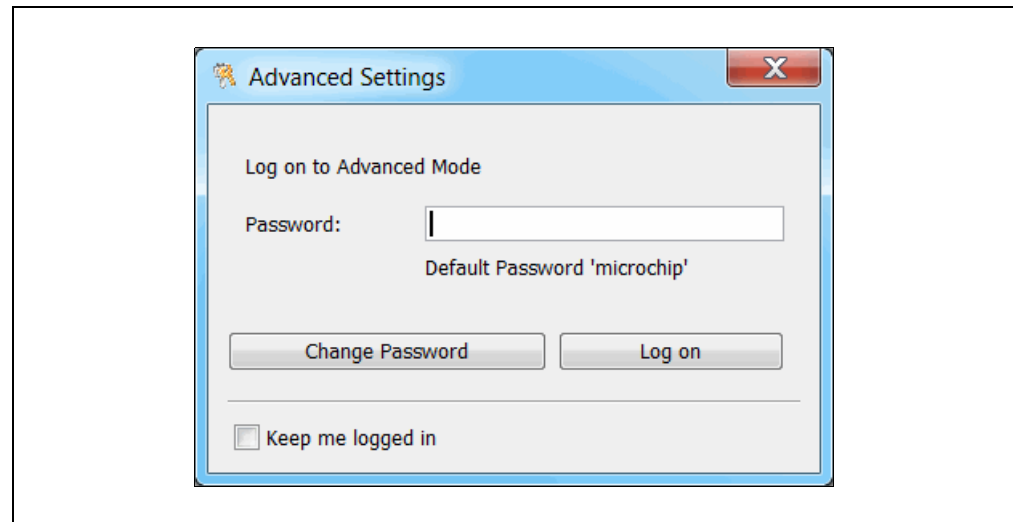
**Note:** The IPE must be run as ADMINISTRATOR for all features to be fully functional.

### 2.4.1 Logging In

Typically, someone has been authorized to establish the settings that production will use for the device and tool. To input those settings, log in to the Advanced mode.

Select Settings>Advanced Mode to open the Advanced Mode login dialog. The password is case sensitive. Type in the default password `microchip` and click **Log on**.

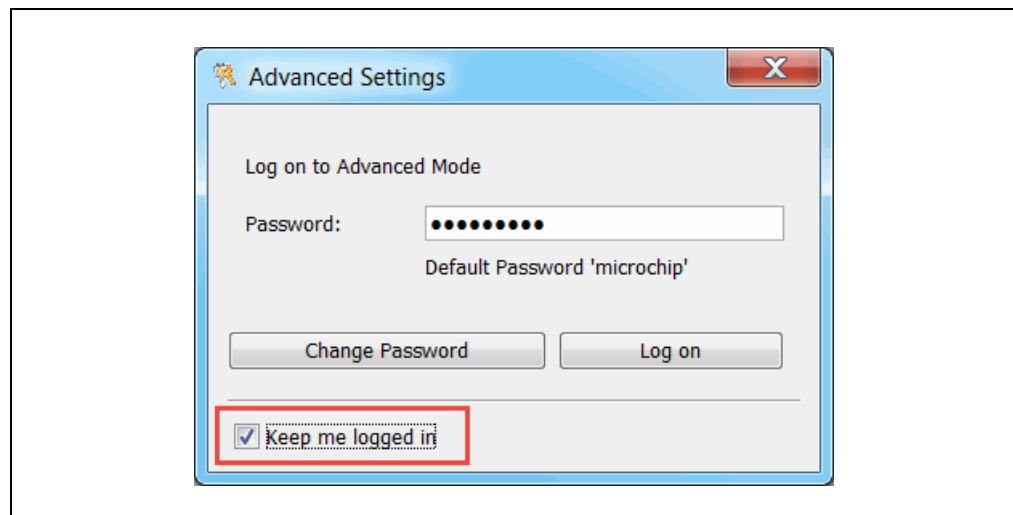
**FIGURE 2-5: ADVANCED MODE LOGIN**



### 2.4.2 Staying Logged In

To start up the MPLAB IPE directly in Advanced mode without entering the password again, type the password, check the “Keep me logged in” check box (see [Figure 2-6](#)), then click **Log on**. A new installation or first time usage will launch the MPLAB IPE in basic mode. Once the “Keep me logged in” check box is checked, subsequent launchings will open in Advanced mode.

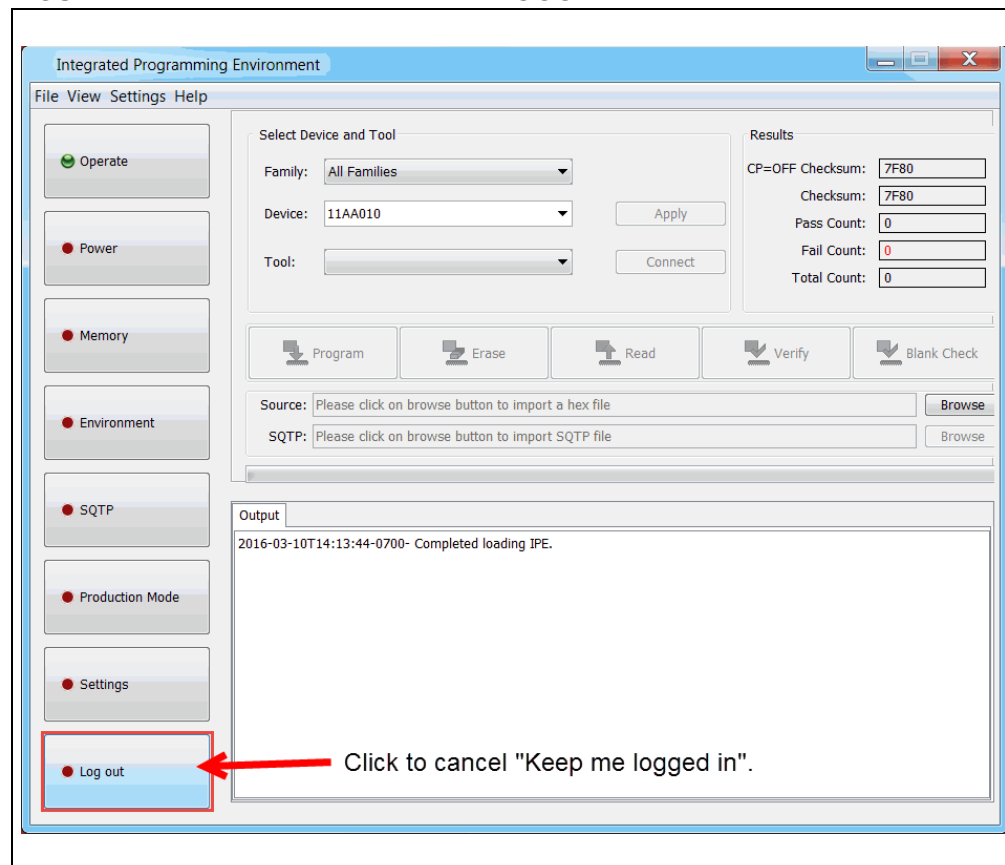
**FIGURE 2-6: KEEP ME LOGGED IN**



**Note:** Prior to MPLAB IPE v3.26 the Advanced Settings dialog had a “Remember password” check box instead of a “Keep me logged in” check box.

To cancel the automatic Advanced mode login, click Log Out (see [Figure 2-7](#)) on the Advanced Settings dialog.

**FIGURE 2-7: CANCEL KEEP ME LOGGED IN**

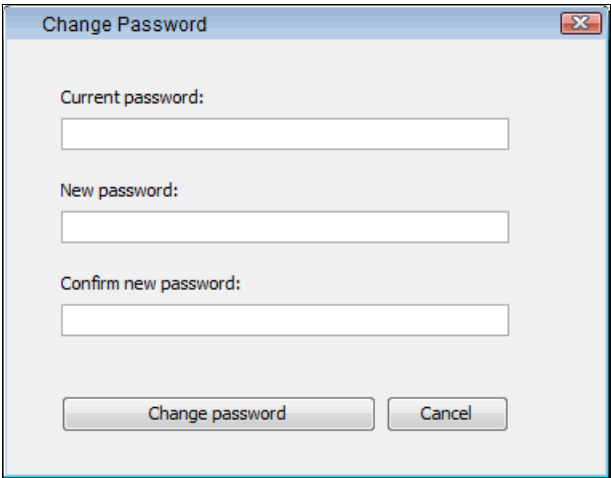


## 2.4.3 Changing the Password

To change the password after the initial log on, click **Change Password**.

If you forget the new password, you must uninstall the IPE, delete the `ipe.key` file (located in the IPE install directory) to remove any settings made previously in IPE, then reinstall the IPE to begin with the default password `microchip`.

**FIGURE 2-8: CHANGE PASSWORD DIALOG**



The image shows a 'Change Password' dialog box with a title bar containing a close button. The dialog contains three text input fields labeled 'Current password:', 'New password:', and 'Confirm new password:'. At the bottom, there are two buttons: 'Change password' and 'Cancel'.

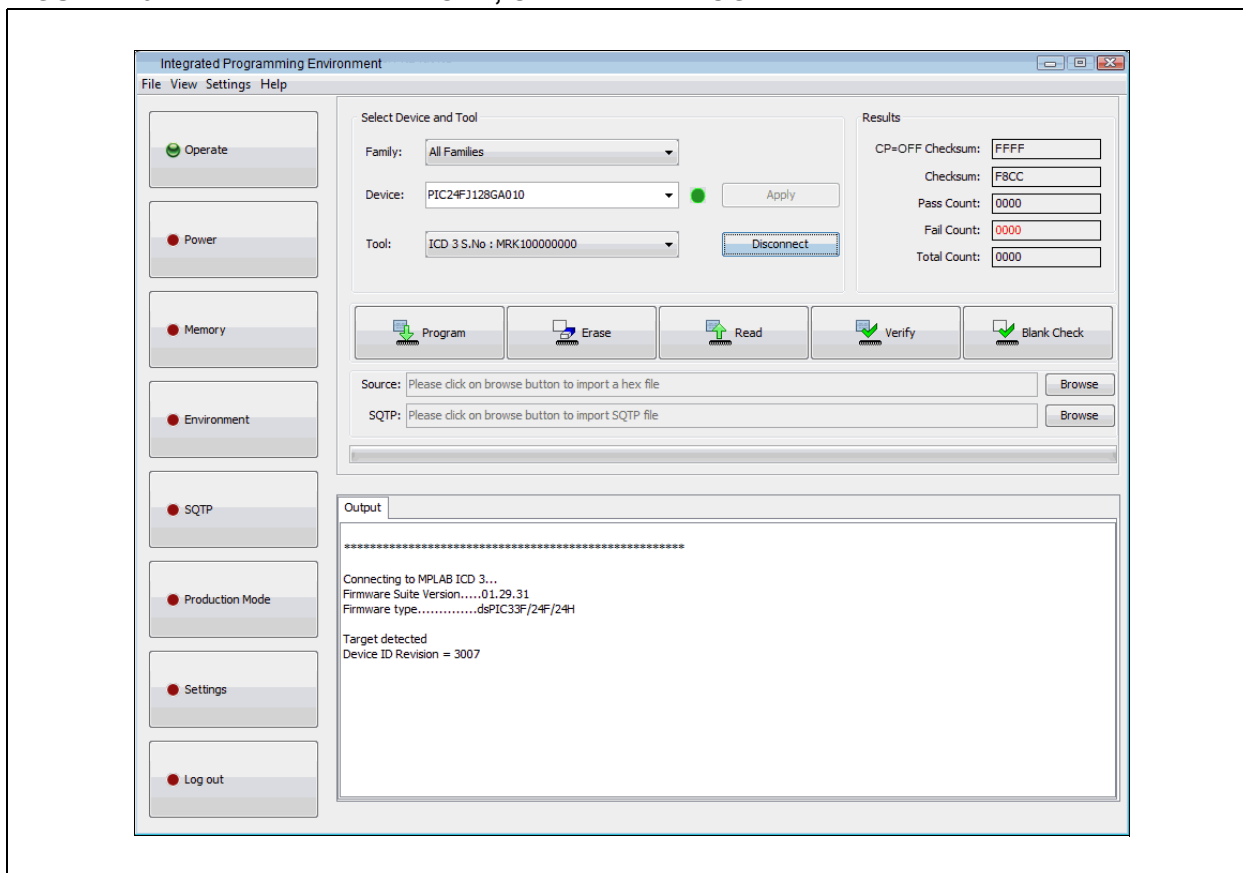
## 2.5 ADVANCED MODE SETTINGS

Advanced mode settings must be set by someone authorized to do so. Some settings that are selected in these dialogs will allow a production specialist to view and control certain commands from the IPE Menu bar, Settings menu.

### 2.5.1 Operate

After validating the password to log in to the Advanced Mode, the dialog opens in the Operate view. This display is similar to the main display, with the addition of option buttons located along the left side of the window. The dialog shows the device and tool that has been selected (see [Section 2.3 “Setting Up the Programmer”](#)).

**FIGURE 2-9: ADVANCED MODE, OPERATE DIALOG**



## 2.5.2 Power

The Power option is only available when a tool is connected. From the Advanced Mode dialog, click **Power** to display the available settings.

**TABLE 2-1: POWER SETTINGS**

Setting	Description
<b>Voltage Settings:</b> Voltage settings will vary for different device families. All of the settings and parameters are similar to MPLAB X IDE.	
VDD	This voltage is used by the programmer to verify memory. The value should be the maximum voltage for the designated circuit. The default is the device's maximum voltage value.
VPP	This is the voltage used to bring the device into a programming mode. Although this is dependent on the device's programming specification, it can be changed.
VDD Nom	The default value depends on the device. For example, PIC32 has 3.3V as default VDD Nom.
VDD APP	This is the voltage used by the programmer to verify Flash memory. The default is the device's nominal voltage value.
Reset Voltages	Returns voltages to their default settings
<b>ICSP™ Options:</b>	
Low voltage program	The tool allows low voltage programming (LVP) with certain PICXXFXXX Flash devices. The Flash device selected must be capable of low voltage and programming must be performed in ICSP mode.
Power Target Circuit from tool	This setting enables the connected tool to power the target.
High Voltage on MCLR	This setting enables high voltage to be used on a Master Clear Reset (MCLR).

## 2.5.3 Memory

From the Advanced Mode dialog, click **Memory** to display the available settings for the device and tool you selected. You can control the memory address and other parameters related to a programming operation. Some of the options in this window are also available on the main screen, for viewing and to provide easy access to these settings.

**Note:** The memory settings for the MPLAB PM3 Programmer may be different in versions of MPLAB IPE prior to v3.60.

**TABLE 2-2: MEMORY SETTINGS**

Setting	Description
Allow Tool to select memories and ranges	When the check box is selected, the programmer tool sets the memory types and ranges. If selected, the Program Memory fields are disabled.
<b>Manual Select:</b>	
• Program Memory	Allows the tool to program the program memory
• Auxiliary Memory	Allows the tool to program the auxiliary memory
• Flash Data	Allows the tool to program the Flash data
• EEPROM	Allows the tool to program the EEPROM
• User IDs	Allows the tool to program the User IDs
• Boot Flash	Allows the tool to program the Boot Flash
• Configuration Memory	Allows the tool to program the configuration memory
<b>Program Memory Range</b> - define the addresses to be used to preserve memory for range programming of the program memory.	
Enter Range:	The address range in Hex of the program space that will be programmed
Reset Addresses	Returns addresses to default settings
<b>Preserve Memory<sup>1</sup></b> - define the addresses to be used for EEPROM or Flash memory.	
Preserve EEPROM on Program <sup>2</sup>	When the check box is selected, the device will not be programmed with any new data that is present in the memory (shown in the EEPROM window). The data in the EEPROM memory area on the device will not be erased.
Enter Range:	The address range in Hex of the program space that will be preserved
Preserve Flash on Program <sup>2</sup>	When the check box is selected, the program memory range specified in the following Program Memory (Start and End Address) fields will not be programmed with any new data.
Enter Range:	The address range in Hex of the program space that will be preserved
Preserve Auxiliary Memory	When the check box is selected, the auxiliary memory will not be programmed with any new data that is present in the auxiliary memory.
Preserve ID Memory	When the check box is selected, the ID memory will not be programmed with any new data that is present in the ID memory. Only available if device has user ID memory.

**Note 1:** The MPLAB PM3 programmer does not support the Preserve Memory options in the environment .pm3 files.

**2:** If you wish to use any of the Preserve Memory options, first ensure that your code is **not** code-protected. For memory to be preserved, the programmer reads the section it needs to save, performs a bulk erase of the device, reprograms the device and then rewrites the area that is preserved with what was saved. Therefore, this area cannot be code protected.

## 2.5.4 Environment

Environments allow you to save settings, so that all of the same settings can be reloaded in another programming session. Environments are supported, under all tools, as either .pen files or .pm3 files.

**Note:** MPLAB PM3 programmer does not support the Preserve Memory options in the environment .pm3 files.

From the Advanced Mode dialog, click **Environment** to display the available settings.

**TABLE 2-3: ENVIRONMENT SETTINGS**

Setting	Description
Environment Name	the environment name you specify
.pm3 file	for MPLAB PM3, select this type of file
.pen file	for MPLAB ICD 3, PICKit 3 and REAL ICE tools, select this type of file
Description	the description you use for the environment
SQTP File	the SQTP file name used in the environment
Misc Files	other files used in the environment, e.g., data sheets, instructions, etc. Multiple files can be selected.
Save to PM3 SD Card	saves the environment file to a MPLAB PM3 SD card destination See <a href="#">Section 3.4.2 “Save Firmware into SD Card”</a> for additional information on saving multiple operating system firmware to the SD card.
Save to PC	saves the environment file to a destination on the PC
Copy	opens the Copy Environment dialog to select source and destination for copying the environment
More > >	opens the Environment Browser dialog with two tabs: <ul style="list-style-type: none"> <li>• <b>From PC</b> tab lets you select an environment to delete or view.</li> <li>• <b>From PM3</b> tab lets you perform the following on the SD card in the MPLAB PM3: <ul style="list-style-type: none"> <li>- display the properties</li> <li>- format the SD card</li> <li>- select an environment to delete</li> <li>- select an environment to view</li> </ul> </li> </ul>

## 2.5.5 SQTP

SQTP (serial quick turn programming) is used to program a unique serial number into each device. This number can be used as an entry code, password or ID number. From the Advanced Mode dialog, click **SQTP** to display the available settings.

If using SQTP with MPLAB PM3, see [Section 2.5.5.1 “Using SQTP with MPLAB PM3”](#) for additional information. If using PIC32 devices, see [Section 2.5.5.2 “Using SQTP with PIC32 Devices”](#) for information on the import methods. For information about how the SQTP files are produced, refer to the *SQTP File Format Specification* (DS50002539).

**TABLE 2-4: SQTP SETTINGS**

Setting	Description
<b>Generation Method:</b>	
Random	Select this option to generate unique, random numbers for each part. Also enter the start address, number of bytes and number of parts in the corresponding fields.
Pseudo Random Seed Value (Hex):	Select this option to generate a pseudo-random set of non-repeating numbers based on the Hex value you enter into the Seed Value field. Also enter the start address, number of bytes and number of parts in the corresponding fields.
Sequential Start Value (Hex): Increment (Hex):	Select this option to generate sequential numbers based on the starting value specified and incrementing each number by the amount specified. Also enter the start address, number of bytes and number of parts in the corresponding fields.
Start Address (Hex)	Enter the starting address (in Hex) for the serial number.
Number of bytes (Dec)	Enter the size of the serial number (in decimal). Make sure a large enough serial number is specified for the number of parts planned to program using this file.
Number of parts (Dec)	Enter the number of parts to be programmed using this file.
Generate	Click <b>Generate</b> to create the SQTP (.num) file.
<b>Location:</b>	
Program Memory	Select this option to load the SQTP number in program memory.
EEPROM	Select this option to load the SQTP number in EEPROM.
<b>Access Method:</b>	
RETLW	Select this option to use a series of RETLW (Return Literal W) instructions with the serial number bytes as the literal data.
Raw Data	Select this option to use the raw data.
Format for PSV	If the Raw Data option is selected, selecting Format for PSV formats SQTP data to make it compatible with PSV (Program Space Visibility).



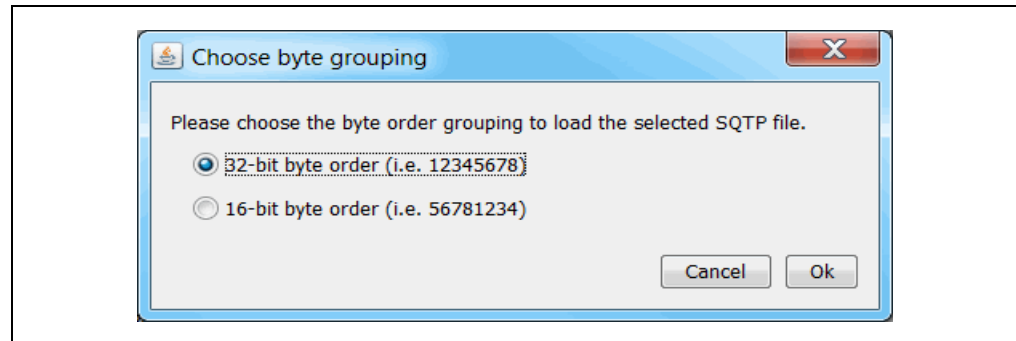
## 2.5.5.1 USING SQTP WITH MPLAB PM3

SQTP files for Flash Data memory that were generated prior to MPLAB IPE v2.20 will work with MPLAB PM3 firmware up to v3.00. SQTP file generation for Flash Data memory has been modified to the 32-bit byte order (12345678) and the firmware is updated accordingly. A new SQTP file must be regenerated to work with MPLAB IPE v3.00 and higher.

## 2.5.5.2 USING SQTP WITH PIC32 DEVICES

For PIC32 devices only, starting with MPLAB IPE v3.15, a dialog box, similar to the one below, is provided to choose either 32-bit byte order (12345678) or 16-bit byte order (56781234) when loading an SQTP file.

**FIGURE 2-10: IMPORT SQTP FILE DIALOG**



## 2.5.6 Production Mode

From the Advanced Mode dialog, click **Production Mode** to display the available Production Mode Settings.

The Production Mode Settings dialog enables authorized personnel to select the options that are available during production programming. The options that are selected in the Production Mode Settings determine which commands will be available under the File, View, and Settings menus in Production Mode.

Select the appropriate settings for your production programming project by checking or unchecking the settings. Selecting a check box in the Production Mode Settings dialog causes a check mark to display in front of that option under the IPE Settings menu.

A check mark indicates that an option has been set in the Advanced Mode. If the item is available and has a check mark, then the production specialist can control this item by toggling it on or off.

**TABLE 2-5: PRODUCTION MODE SETTINGS**

Setting	Description
<b>Production Mode Settings</b>	
Allow Export Hex	This setting enables a production specialist to export Hex files. If checked, this option displays under the <i>File&gt;Export</i> menu.
Allow Import Hex file	enables a production specialist to import Hex files. If checked, this option displays under the <i>File&gt;Import</i> menu. <b>Note:</b> If using a Hex file in the IPE and the file is modified using Notepad, MPLAB X IDE, etc., outside of the IPE, a message displays: <i>"File modified. The loaded hex file has been modified externally. Would you like to reload hex file?"</i>
Allow Import Environment	This setting enables a production specialist to import environments. If checked, this option displays under the <i>File&gt;Import</i> menu.
Allow Import SQTP file	This setting enables a production specialist to import SQTP files. If checked, this option displays under the <i>File&gt;Import</i> menu.
Generate Reports	This setting enables reports to be generated. If Generate Reports is checked, click <b>Browse</b> to set the location where the reports will be placed.
Limit the Program Count to	If selected, this option limits the pass, fail, and total counts to the value that is entered into the associated field. This actually halts further programming operations from occurring. To clear the counts on the main window, click <b>Reset Counters</b> .
Allow "Verify Device ID before Program" under Settings menu	This setting activates this option in the Settings menu and enables a production specialist to control this option. This setting is valid only for tools that are capable of performing this function, e.g., MPLAB PM3.
Allow "Auto Download Firmware" under Settings menu	If selected, this option displays in the Settings menu and can be controlled by a production specialist. If it is not selected, the IPE automatically downloads the latest firmware for the tool, if needed.
Allow "Erase All before Program" under Settings menu	If selected, this option displays in the Settings menu and can be controlled by a production specialist. If it is not selected, the production specialist cannot control this option from the Settings menu.

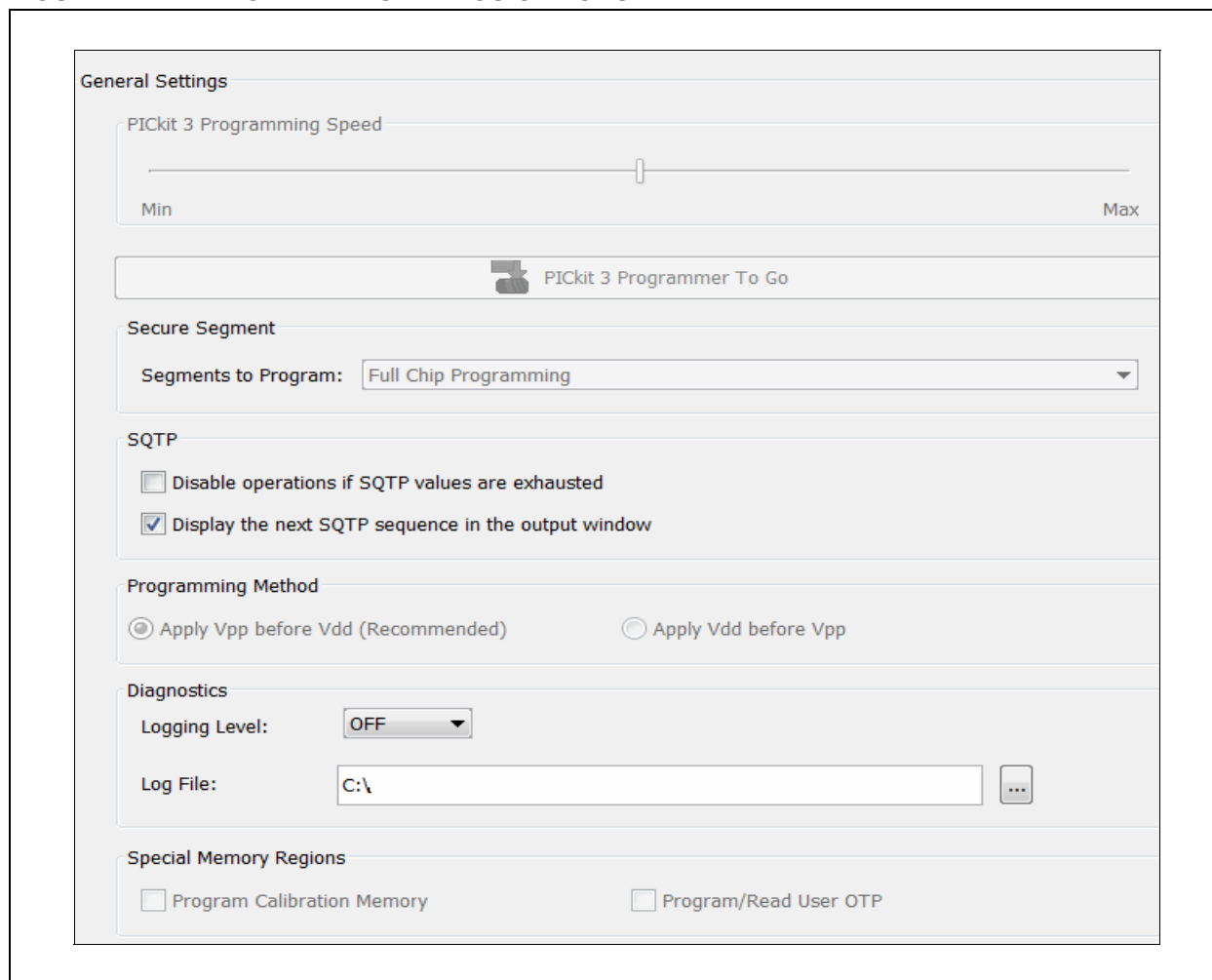
**TABLE 2-5: PRODUCTION MODE SETTINGS (CONTINUED)**

Allow “Communication” under Settings menu	If selected, this option is enabled ( <a href="#">Section 3.4 “Settings Menu”</a> ) and can be controlled by a production specialist. If using the MPLAB PM3 programmer COM port (RS-232), you must select this option in order to set the appropriate COM port.
Remove Read button from main window	If this option is selected, the Read button is removed from the main window.
Audible notification on successful program completion	If selected, this option generates a sound when programming completes successfully.
Allow memory editing and filling	Enables memory editing and filling of memory. If enabled, this option is accessed in Production Mode from the <a href="#">View&gt;Fill Memory</a> option.
Display EEPROM checksum in the output window	If selected, the EEPROM checksum is displayed in the output window.
Display imported hex checksum with CP=OFF	If selected, the non-code protected checksum is displayed in the Results area.
Enable programming operations only if hex file is loaded	If selected, a) If Hex file is not loaded: All the programming buttons (Program, Read, Erase, Verify, Blank Check) will be disabled. b) If Hex file is loaded, all the programming buttons will be enabled.
<b>Allow Memory View</b>	
Program Memory	If this option is selected, program memory can be displayed in the Memory View pane on the main window.
Auxiliary Memory	If this option is selected, auxiliary memory can be displayed in the Memory View pane on the main window.
Config Memory	If this option is selected, configuration memory can be displayed in the Memory View pane on the main window.
Flash Data	If this option is selected, Flash memory can be displayed in the Memory View pane on the main window.
User IDs	If this option is selected, user IDs can be displayed in the Memory View pane on the main window. This is only applicable if user IDs are supported by the tool.
EEPROM	If this option is selected, EEPROM memory can be displayed in the Memory View pane on the main window.

## 2.5.7 Settings

From the Advanced Mode dialog, click **Settings** to display the available options (Figure 2-11).

FIGURE 2-11: GENERAL SETTINGS OPTIONS



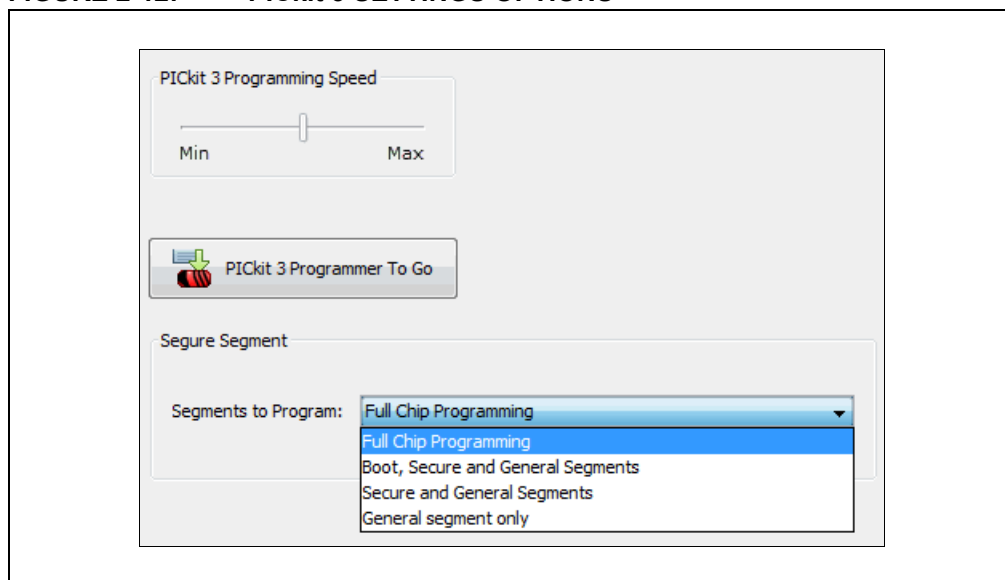
**TABLE 2-6: GENERAL SETTINGS**

Settings	Description
PICkit 3 programming speed	Use the slider to adjust the programming speed (see <a href="#">Figure 2-12</a> ). This option can be used to help troubleshoot problems by slowing the speed to allow sufficient time for signal levels. The PICkit 3 slider will slow down ICSP programming which may help communication problems created by heavy loading on the ICSP lines. It is suggested that these lines are clear of any components. The programming speed control may help to program boards that already have existing components on these lines.
PICkit 3 Programmer To Go	Opens the PICkit 3 <b>Programmer To Go</b> dialog (see <a href="#">Figure 2-13</a> ) showing the settings that will be applied the next time the Programmer-To-Go feature is used. Enter an Image Name that will be used for the image on the PICkit 3. Click <b>Programmer To Go</b> to activate. Refer to the PICkit 3 In-Circuit Debugger/Programmer User's Guide, DS52116, for information on the Programmer-To-Go feature. This feature may not be supported on all devices. <b>Note:</b> Programmer To Go does not support the Preserve Memories options.
Secure Segments	
Segments to Program	Available only for devices with CodeGuard, e.g., dsPIC33FJ12GP202, etc. Supported by REAL ICE, MPLAB ICD 3 and PICkit 3. Select the segments to program: <ul style="list-style-type: none"> <li>• Full Chip Programming</li> <li>• Boot, Secure and General Segments</li> <li>• Secure and General Segments</li> <li>• General Segment Only</li> </ul>
SQTP	
Disable operations if SQTP values are exhausted	Selecting the check box prohibits further programming if all SQTP values from the specified .num file have been exhausted.
Display the next SQTP sequence in the output window	Select this check box to display the next SQTP sequence in the output window.
Program Method	This option allows you to choose the Test mode entry method for devices. This feature is supported by the tools which can power the target (except for PM3). This setting refers to the order in which the VPP and VDD voltages will be applied when programming/reading the target device.
Apply VPP before VDD (Recommended)	This is the default setting.
Apply VDD before VPP	Caution is recommended when using this setting as it may have adverse side effects. This options is available only when powering the device from the debug tool.

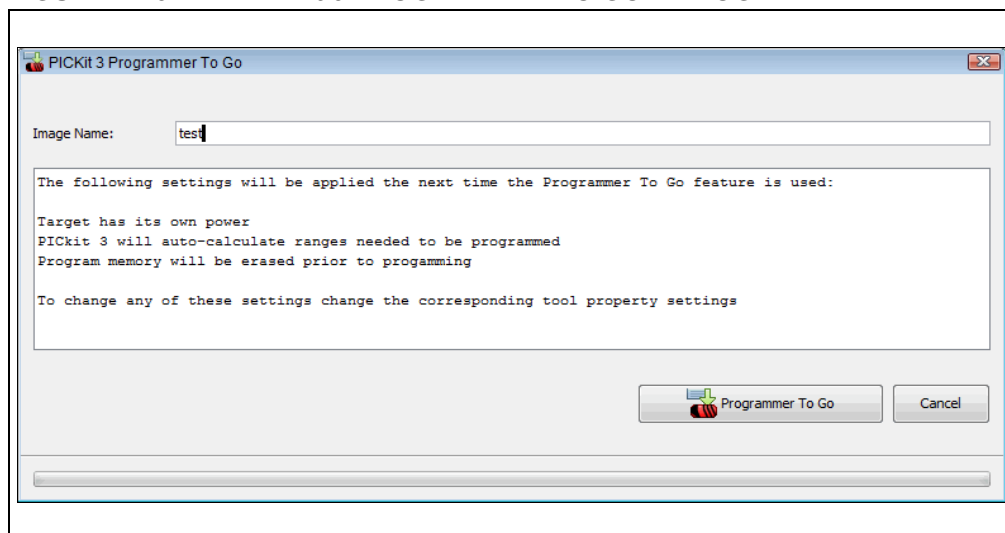
TABLE 2-6: GENERAL SETTINGS (CONTINUED)

Settings	Description
Diagnostics	
Logging Level	Set the message logging level. <b>OFF:</b> No logging <b>SEVERE:</b> Log severe (error) messages only. <b>WARNING:</b> Log warning messages only. <b>INFO:</b> Log informational messages only. <b>CONFIG:</b> Log configuration information only. <b>FINE:</b> Log some module-to-module communication. <b>FINER:</b> Log more module-to-module communication. <b>FINEST:</b> Log all module-to-module communication.
Log File	Path and name of log file.
Special Memory Regions	
Program Calibration Memory	Enables programming of registers used to hold calibration values for a device.
Program/Read User OTP	Enables programming or reading of a serial user ID that is OTP (one time programmable). Once programmed, it cannot be changed.

**FIGURE 2-12: PICKit 3 SETTINGS OPTIONS**



**FIGURE 2-13: PICKit 3 PROGRAMMER TO GO DIALOG**



## 2.5.8 Log out

After the settings are selected, click **Log out** to save your settings, exit the Advanced Mode, and return to the main window.

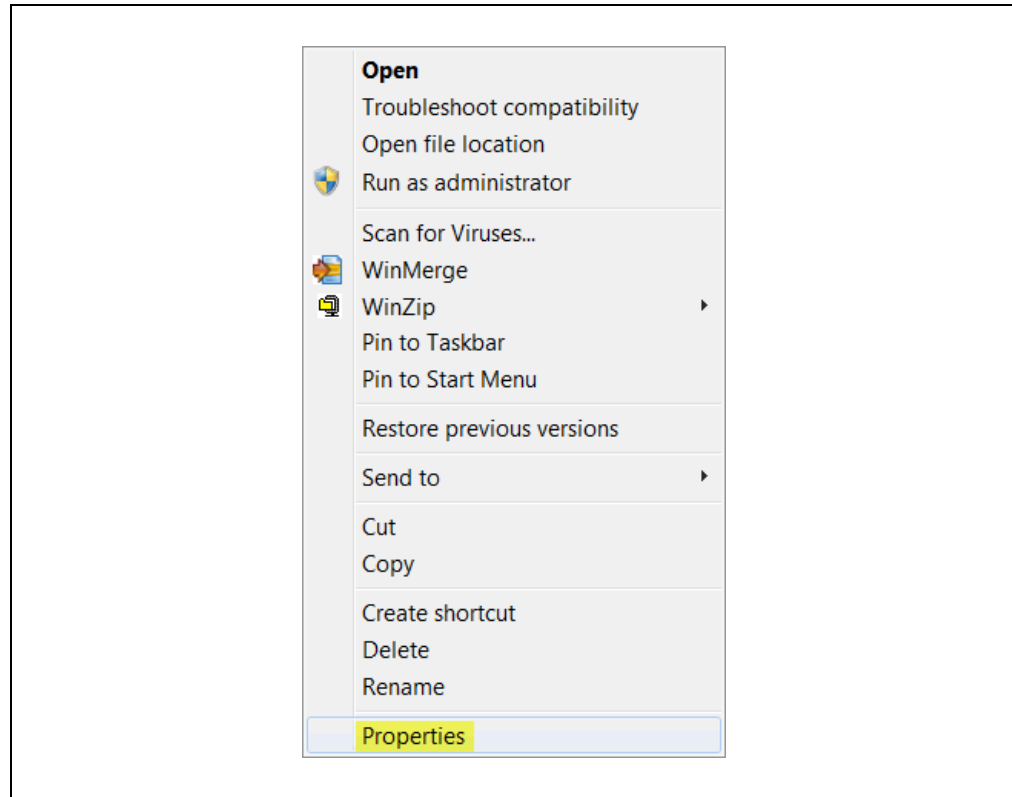
## 2.6 CREATING DESKTOP SHORTCUTS

Desktop shortcuts can be created for devices, Hex files, or environments.

To do this:

1. Create a copy of the MPLAB IPE desktop icon.
2. Right click the new shortcut icon, then click **Properties**.

**FIGURE 2-14: RIGHT CLICK MENU**

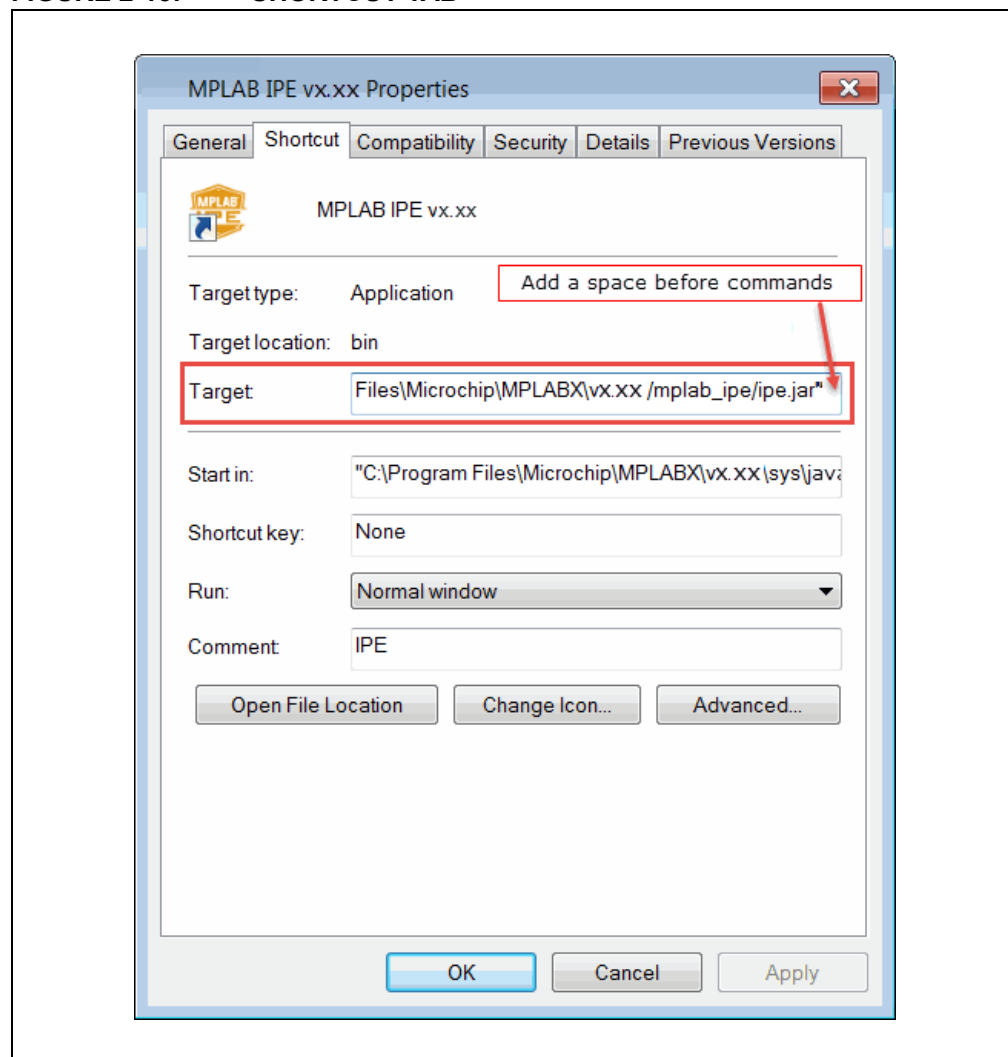


3. The Properties dialog opens. Click the **Shortcut** tab.
4. In the Target field (see [Figure 2-15](#)), add additional commands that will load a specified device, Hex file or environment. Place the command in the Target field at the end of the string after the "...jar". You must add a space before the command. Command are preceded by a dash. Commands are not case sensitive. Paths must be in quotations.

Switch	Command	Description
-P	-P18f1220	Select the specified device when IPE is launched.
-P,-F	-P12f1501 -F"E:\12f1501.hex"	Load the specified device for the specified Hex file when IPE is launched.
-BL	-BL"E:\18f1220.pm3"	Load the specified environment when IPE is launched.



FIGURE 2-15: SHORTCUT TAB



5. Click **OK**.
6. Right click the new shortcut icon, then click **Rename**. Type a new name for the shortcut.
7. Double click the new shortcut icon to launch IPE. The specified target (environment, device, etc.) automatically loads when the IPE opens.

NOTES:

## Chapter 3. IPE Reference

### 3.1 IPE MAIN WINDOW

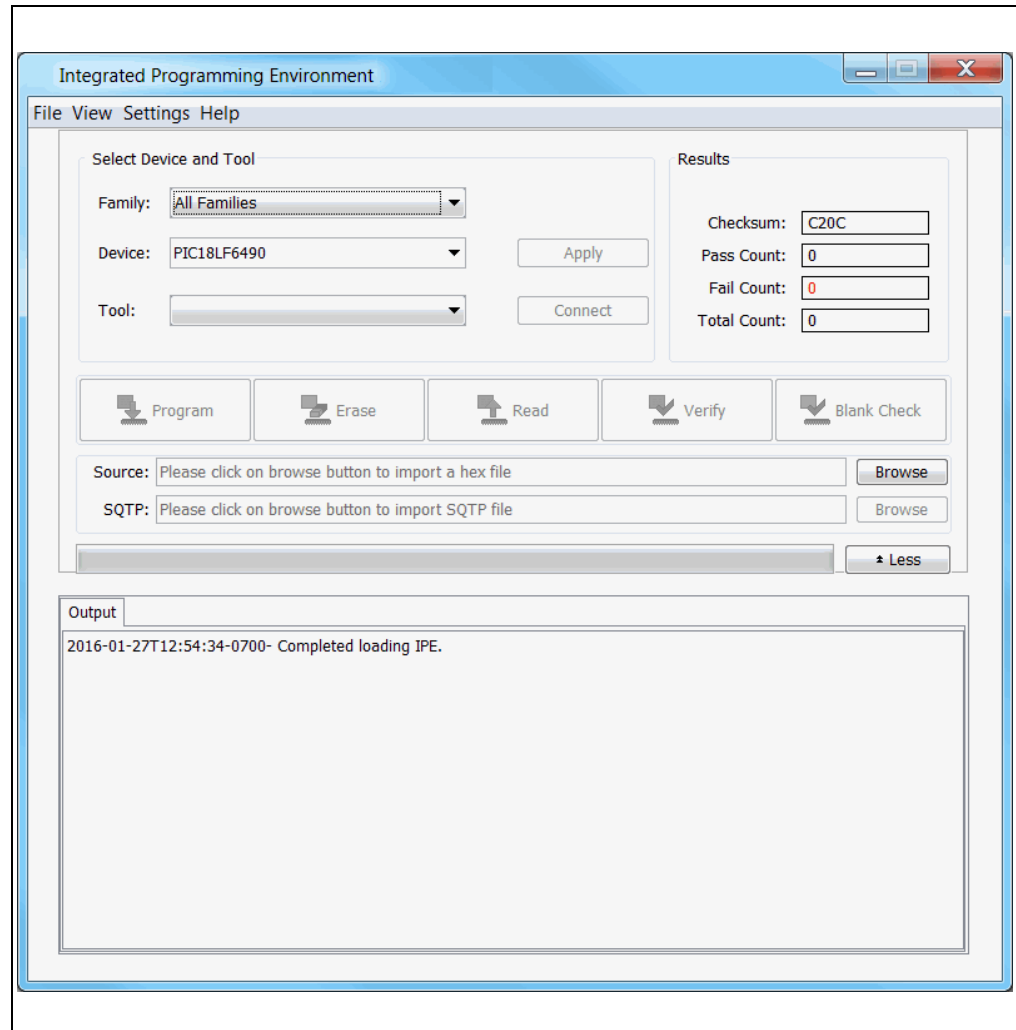
**Note:** The IPE must be run as **ADMINISTRATOR** for all features to be fully functional.

The following figure shows the main window of the IPE. The IPE Menu bar contains the following menus, with commands:

- [File Menu](#)
- [View Menu](#)
- [Settings Menu](#)
- [Help Menu](#)

Commands are available or not depending on the settings selected in Advanced Mode.

**FIGURE 3-1: IPE MAIN WINDOW**



**TABLE 3-1: IPE MAIN WINDOW FIELDS**

Item	Description
<b>Select Device and Tool:</b>	
• Family	filters devices by family or recently used
• Device	specifies the device; click <b>Apply</b> to select
• Tool	specified the tool; click <b>Connect</b> or <b>Disconnect</b> as appropriate
<b>Results:</b>	
• CP=OFF Checksum	<i>This field displays only if enabled in Advanced Mode.</i> Displays the imported hex checksum as if code protect is off for the device with current memory contents; value can be copied using CTRL+C.
• Checksum	checksum value for the device with current memory contents; value can be copied using CTRL+C
• Pass Count	details the programming operations that passed
• Fail Count	details the programming operations that failed
• Total Count	the total amount of programming operations
<b>Command Buttons:</b>	
• Program (Alt+F5)	programs the device
• Erase(Alt+F6)	erases the device
• Read(Alt+F7)	reads the device
• Verify(Alt+F8)	performs a verify operation on the device
• Blank Check(Alt+F9)	checks whether the device is blank
<b>Other:</b>	
Source	the Hex file location, <b>Browse</b> to locate the file
SQTP	the SQTP file location, <b>Browse</b> to locate the file
More/Less	display more or less information
Output Tab	display of output data. Right-click in the Output window to undock, split view, clear contents, or copy.
Tool Tab	display of specific tool data, i.e., PM3, ICD 3, PICKit 3 If a tool is connected, right-click in the Output area and select <i>Split View</i> to display the tool tab.
Memory View	displays only if the <i>View&gt;Show Memory</i> is selected This option displays memory addresses, device ID, configuration memory, etc. Right click in the Memory View to undock, fill memory, go to, find, or print. To re-dock an undocked memory view, close the undocked window.

## 3.2 FILE MENU

On the IPE Menu bar, the File menu provides three commands:

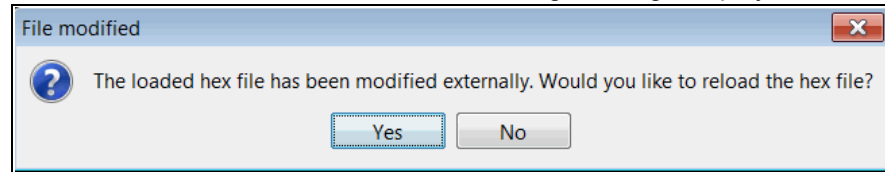
- [Import](#)
- [Export](#)
- [Exit](#)

### 3.2.1 File>Import

The Import menu item allows you to import files into the IPE.

**File->Import->Hex** – select to import the hexadecimal file (\*.hex).

**Note:** If using a Hex file in the IPE and the file is modified using Notepad, MPLAB X IDE, etc., outside the IPE, the following message displays:



**File->Import->Environment** – select to import (load) the environment (\*.pen or .pm3 file).

**File->Import->SQTP** – select to load the SQTP file (\*.num file).

### 3.2.2 File>Export

The Export menu item allows you to export data from IPE to storage media. By default, these commands are not available in Production Mode. However, in Advanced Mode, an authorized user can change the default states of this feature for the Production Mode.

**File->Export->Hex** – this command allows you to export all the memory contents into Intel® Hex file format.

### 3.2.3 File>Exit

This command closes the IPE application.

## 3.3 VIEW MENU

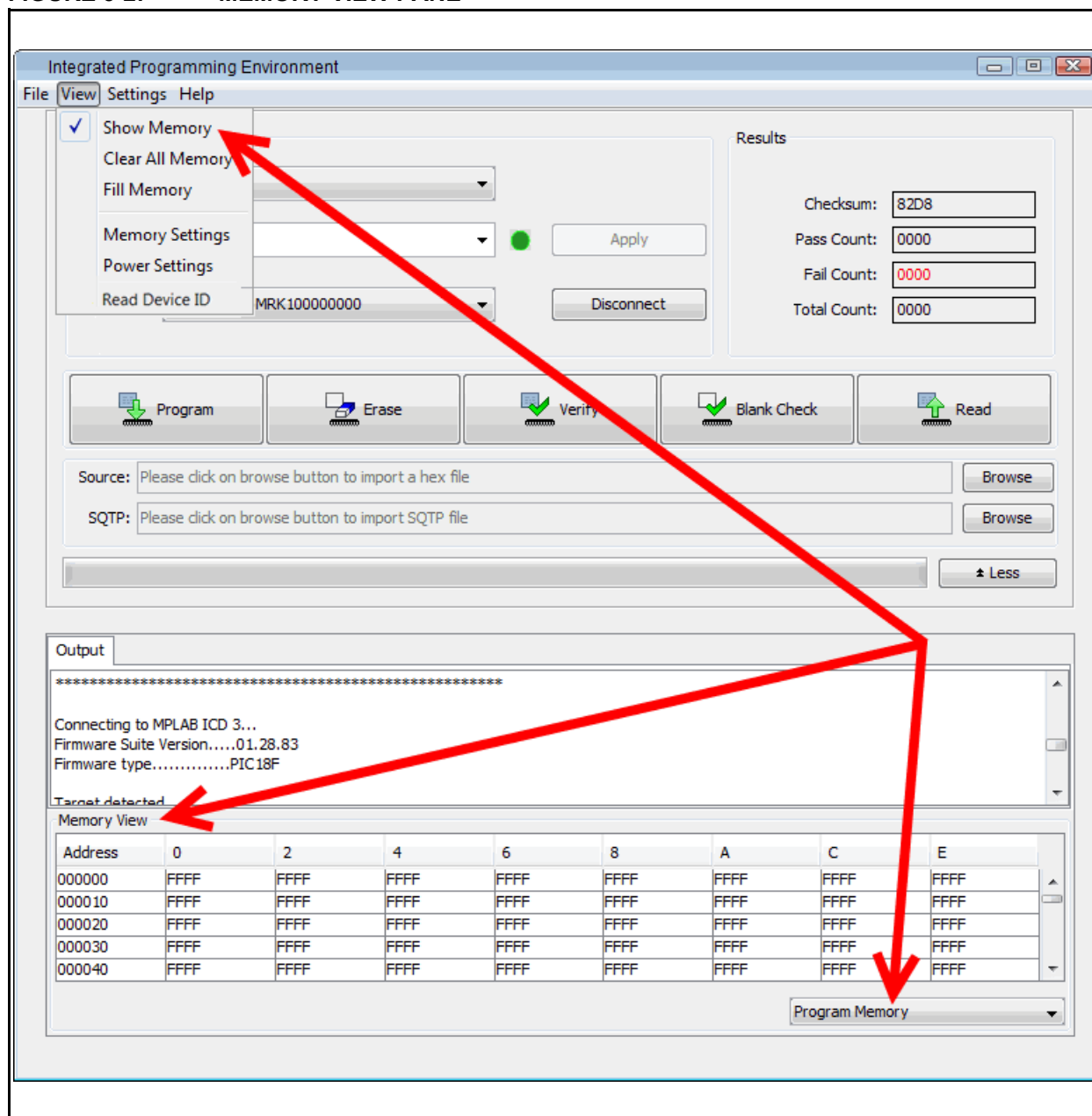
The View menu commands are described below:

- [Show Memory](#)
- [Clear All Memory](#)
- [Fill Memory](#)
- [Memory Settings](#)
- [Power Settings](#)
- [Read Device ID](#)

### 3.3.1 Show Memory

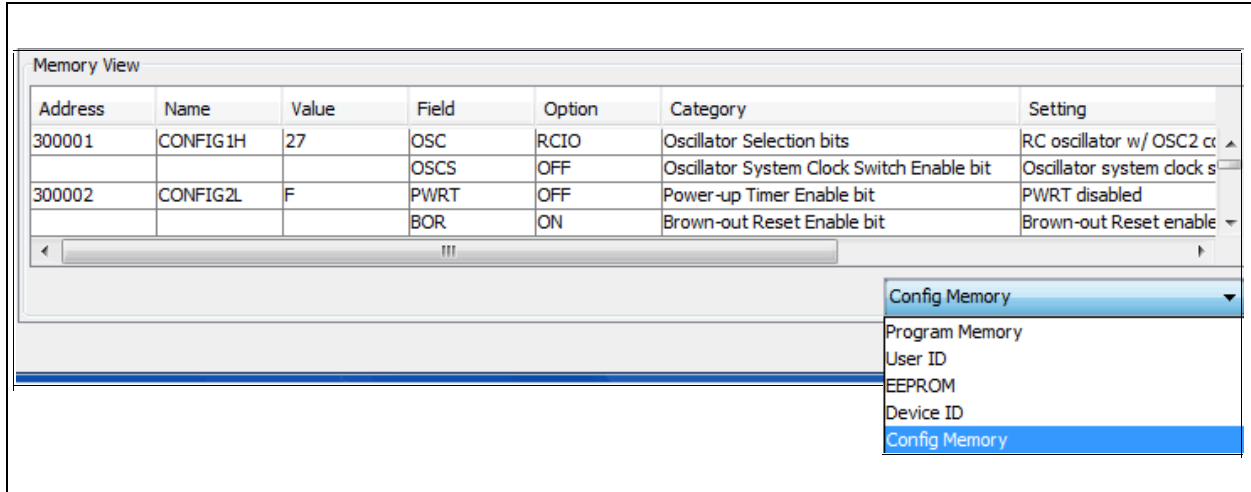
The specific kinds of memory that are shown are determined by Advanced or Production Mode settings. This command toggles between showing and not showing the memory. A check mark before the command indicates it is enabled (showing) in the Memory View pane that is located near the bottom of the window; unchecked indicates that the memory is not showing.

**FIGURE 3-2: MEMORY VIEW PANE**



The viewable memory types are determined by the Production settings that are selected in the Advanced Mode.

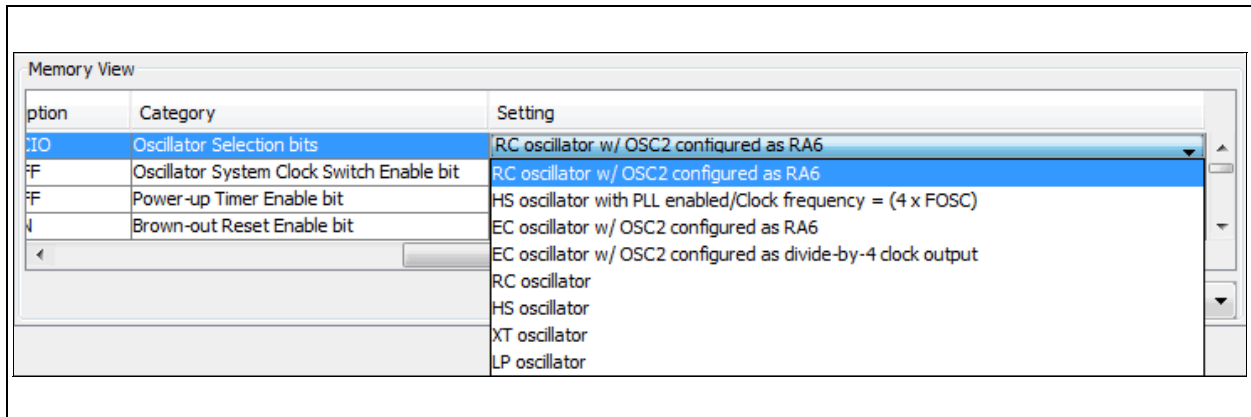
**FIGURE 3-3: MEMORY TYPES**



If enabled, the configuration settings can be edited. Select Config Memory from the drop-down list in Memory View. Use the scroll bar to view the Setting column. Click the setting you want to edit and a list displays that shows the options that are available for that setting. Click on your selection.

This is shown in the following figure.

**FIGURE 3-4: EDITING A CONFIGURATION SETTING**



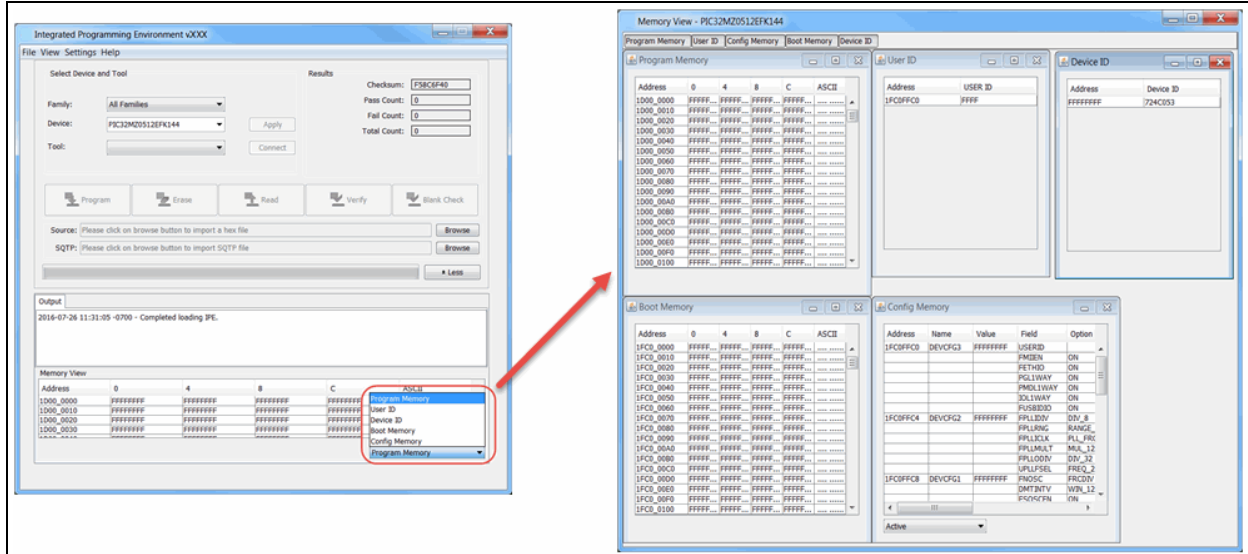
## 3.3.1.1 RIGHT-CLICK MENU COMMANDS

**Undock/Dock** – when viewing the memory window, a right-click menu is available with commands to undock/dock, fill memory and print.

The memory window can be undocked to view a larger area in a separate window. Right-click on any value in the Memory View and select *Undock* (see following figure).

To return the undocked window to the IPE window, close the memory window.

**FIGURE 3-5: UNDOCKED MEMORY VIEW**



**Fill Memory** – you can also access this dialog by right-clicking on any value in the Memory View window and select *Fill Memory*.

**Print** – to print the memory window, right-click on any value in the Memory View window and select *Print*.

Note: this command will print the entire contents of the memory. So, if you have a large device, such as a PIC32, the printout will probably be quite large. You might consider printing to a file, rather than to a printer, in some cases.

## 3.3.2 Clear All Memory

Clears all of the memory views.

## 3.3.3 Fill Memory

If enabled in Advanced Mode, the Fill Memory command is available in Production Mode under the View menu.

**TABLE 3-2: FILL MENU OPTIONS**

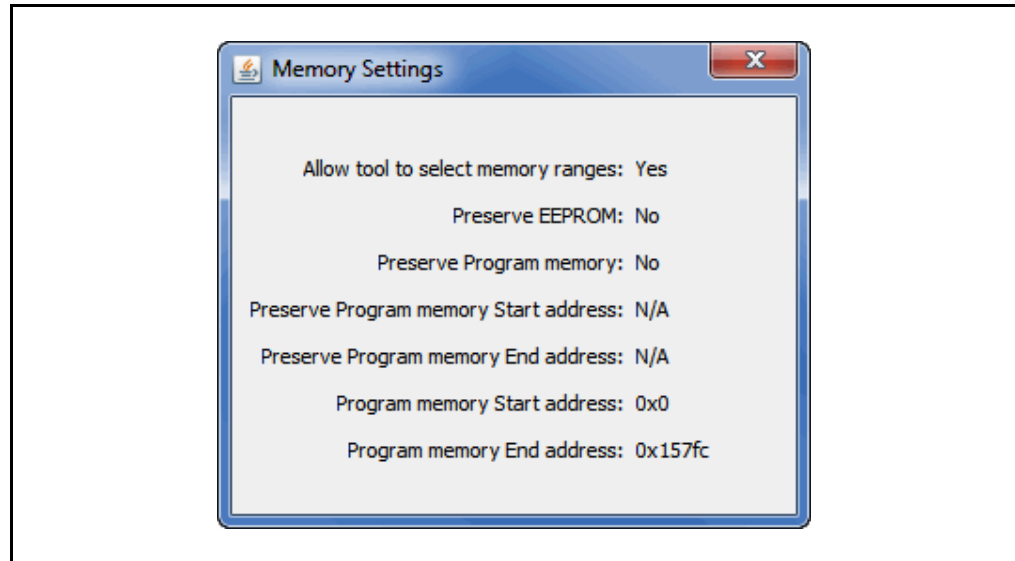
Setting	Description
Start Address	start address of the fill operation
End Address	end address of the fill operation
Data	the value used for the fill operation
Use Data as	Fill Value – fills each address with the Data value Sequence Start – fills each address with incrementing Data value Randomize – fills each address with a random value
Write	writes addresses to the memory view
Close	exits the dialog



### 3.3.4 Memory Settings

Displays the current memory settings (see [Figure 3-6](#) for an example). The Memory Settings are view-only and cannot be changed from this window.

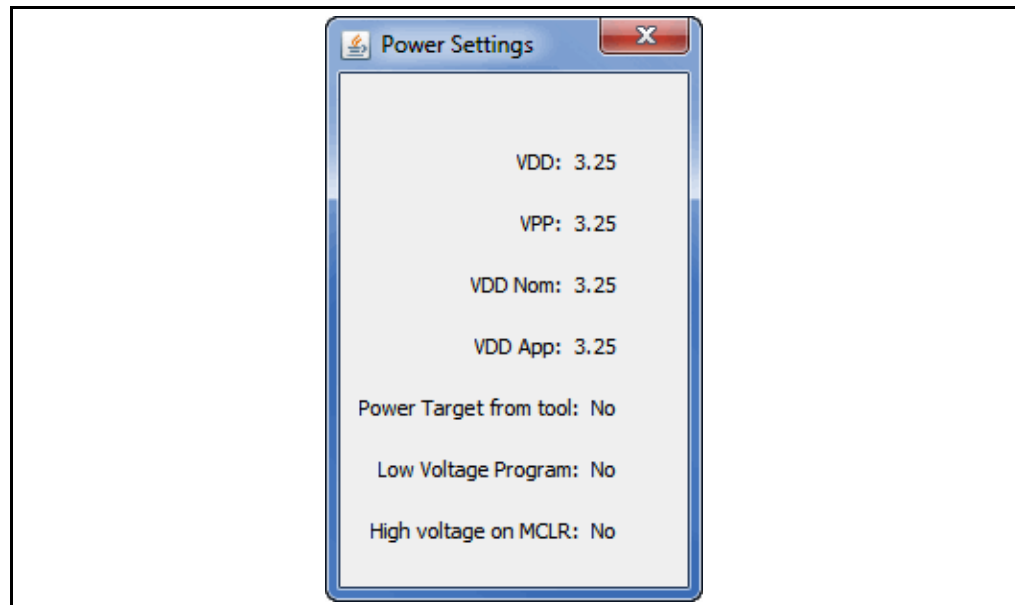
**FIGURE 3-6: MEMORY SETTINGS DISPLAY**



### 3.3.5 Power Settings

Displays the current power settings (see example in [Figure 3-7](#)).

**FIGURE 3-7: POWER SETTINGS DISPLAY**



### 3.3.6 Read Device ID

Displays the device ID of the selected device in the Output window.

## 3.4 SETTINGS MENU

### 3.4.1 Understanding the Settings Menu Commands

The Settings menu on the IPE Menu bar (see [Table 3-3](#)) contains commands available for production personnel. Many of these commands are made available through the Advanced Mode, Production Mode dialog.

Menu commands are shown as active (black) or unavailable (grayed out).

Active commands with a check mark indicate that the production personnel can control these settings.

Active commands without a check mark indicate that only authorized personnel can access them.

Unavailable commands with or without a check mark indicate that production personnel cannot control these settings.

**TABLE 3-3: SETTINGS MENU COMMANDS**

Setting	Description
Advanced Mode	This command opens the Advanced Mode login dialog. Once the login is validated, additional settings can be set by authorized personnel. Refer to “ <b>Setting Up the Programmer</b> ” and “ <b>Advanced Mode Settings</b> ” for more information.
Verify Device ID Before Program	This command is only appropriate when using devices that have device IDs.
Erase All Before Program	This command is used to control whether or not the contents of the device will be erased before it is programmed. It is not applicable to One-Time-Programmable (OTP). When the “Erase All Before Program” command is enabled (check box is checked), the device will be erased before it is programmed. If it is disabled (unchecked), the device will not be erased before it is programmed
Auto Download Firmware*	If this command is selected, the application verifies that the firmware is the latest available; and, if needed, downloads the newer firmware automatically.
Manual Download Firmware*	This command enables manual download of firmware.
Save Firmware into SD Card	This command downloads the operating system firmware into an SD Card that has been inserted into the MPLAB PM3 programmer. See <a href="#">Section 3.4.2 “Save Firmware into SD Card”</a>
Hold on Reset	This command prevents the code from running after programming.
Release from Reset	This command removes the Reset and allows the code to run.
Communication	This command is only used with the MPLAB PM3 programmer. This command opens the PM3 Communication Setting dialog. Use this dialog to set communications for COM or USB ports. See <a href="#">Section 3.4.3 “PM3 Communication Setting Dialog”</a> for more information.

\* The download of firmware will not occur until the connect/disconnect button is clicked or a programming operation is performed.

## 3.4.2 Save Firmware into SD Card

In production houses, there may be a need to program several different device family architectures without having access to a computer.

Between MPLAB IPE v3.25 and v3.40, the PM3 operating system was split into two parts based on the device architecture (32-bit vs all other devices). In MPLAB IPE v3.40, the PM3 operating system and database are split into three parts based on the architectures for 8-, 16- and 32-bit devices.

MPLAB IPE v3.40 or greater enables you to save the three PM3 operating system firmwares supporting each of the device family architectures into a PM3 SD card.

Once all the PM3 operating system firmwares are downloaded, when a PM3 environment is selected in Stand-Alone mode, the MPLAB PM3 programmer will load the correct operating system and database for the device from the PM3 SD card.

This feature is available only in the MPLAB IPE v3.40 or greater, not in the MPLAB X IDE.

To save all three operating systems into the PM3 SD card:

1. Insert any supported SD card into PM3 SD card slot.
2. Open MPLAB IPE v3.40 or greater and connect the MPLAB PM3 programmer to the computer.
3. Select Settings>Save firmware into SD Card. The output window in the MPLAB IPE displays messages when the operating systems and databases for the 8-bit, 16-bit and 32-bit MCUs are successfully saved onto the SD card.

### Points To Be Considered:

- Please ensure the PM3 operating system firmware version stored on the SD card matches the operating system firmware version on the MPLAB PM3 programmer. A mismatch may occur if an upgrade of the PM3 operating system was performed but the SD card firmware was not updated. Use the MPLAB IPE v3.40 or greater to select the Settings>Save firmware into SD Card option to load the PM3 SD card with the desired PM3 operating system firmware version.
- Any firmware versions of v3.40 or greater are not compatible with earlier versions of MPLAB IPE. It is highly recommended that the MPLAB PM3 use the firmware packaged within the same MPLAB IPE version

Version	Support
Prior to MPLAB IPE v3.25	One operating system supported
MPLAB IPE v3.25-3.35	Two operating systems supported (32-bit and all other devices)
MPLAB IPE v3.40 or greater	Three operating systems supported (8-, 16-, 32-bit devices)

## 3.4.3 PM3 Communication Setting Dialog

The PM3 Communication Setting dialog is available under the IPE Menu bar, Settings menu only when the associated check box for *Allow "Communication" under Settings menu* is selected in the Advanced Mode, Production Mode dialog.

The MPLAB PM3 must be connected to the PC, using the appropriate cable, prior to using the PM3 Communication Setting dialog.

This dialog enables selecting the communication port for the MPLAB PM3 programmer through the IPE.

To use the RS-232 port on the MPLAB PM3, select the COM port option button and use the drop list to select the available port. Click the refresh button if necessary to view available ports. Click the **Test** button to check communication between the IPE and the MPLAB PM3.

To use USB for the communication port, select the USB option button.

### Setting up the COM Port Manually

On some systems, you may need to set up the communications port manually.

On Windows, from the **Start** menu, select **Control Panel**, then **System and Security**. Under the **System** settings, click **Device Manager**. Expand the Ports drop-down list and double-click on the port you are trying to use. Click the **Port Settings** tab, and select the following:

Bits per second: **57600** (baud rate)

Data bits: **8**

Parity: **None**

Stop bits: **1**

Flow control: **Hardware**

Click **Advanced**. Uncheck the Use FIFO buffers check box.

Reboot the PC to implement the change.

## 3.5 HELP MENU

The Help menu provides access to the online IPE help, the readme for IPE and information about the program.

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## Appendix A. Revision History

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### Revision A (December 2013)

This is the initial release of this document.

### Revision B (August 2015)

Modified [Section 1.2 “Software Installation Requirements”](#). The IPE is now a separate installation than the MPLAB X IDE.

Modified the description of Production Mode.

In [Chapter 2. “General Setup”](#):

- Added information on new features: Recently Used option in the Family list of devices and Creating Desktop Shortcuts.
- Added information on Preserve Memory options.
- Added notes regarding MPLAB PM3 programmer environment files.
- Added a note in the description of the Allow Import Hex file option in [Table 2-5](#).
- Added information regarding using the MPLAB PM3 programmer with the option Allow “Communication” under Settings menu in [Table 2-5](#).
- Added Special Memory Regions information to [Table 2-6](#).

In [Chapter 3. “IPE Reference”](#):

- Added a note regarding the [File>Import>Hex](#) option.

### Revision C (March 2017)

- Added Note with location of Readme file for MPLAB IPE in [Section 1.2 “Software Installation Requirements”](#).
- Added [Section 2.4.2 “Staying Logged In”](#).
- Updated memory range descriptions in [Table 2-2](#).
- Updated environment settings options in [Table 2-3](#).
- Revised [Section 2.5.5 “SQTP”](#) and added sections for using SQTP with MPLAB PM3 and with PIC32 devices.
- Added new SQTP setting in [Table 2-6](#).
- Updated [Table 3-1](#) to add more field descriptions to the main IPE window.
- Added new Read Device ID option to the View menu in [Section 3.3 “View Menu”](#).
- Added new settings menu command in [Table 3-3](#) for saving firmware into SD card and added a revised [Section 3.4.2 “Save Firmware into SD Card”](#).

NOTES:

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## Support

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### INTRODUCTION

Please refer to the items discussed here for support issues.

- [Warranty Registration](#)
- [The Microchip Web Site](#)
- [myMicrochip Personalized Notification Service](#)
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- **MPLAB X IDE** – The latest information on Microchip MPLAB X IDE, the Windows® Integrated Development Environment for development systems tools.
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Technical support is available through the web site at <http://support.microchip.com>.

Documentation errors or comments may be emailed to [docerrors@microchip.com](mailto:docerrors@microchip.com).



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