



MICROCHIP

MPLAB[®] IPE
(Integrated Programming Environment)
User's Guide



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Table of Contents

Preface	5
Chapter 1. IPE Application Overview	
1.1 IPE Defined	9
1.2 Software Installation Requirements	9
1.3 Programming Tools Supported	10
1.4 IPE Modes	10
Chapter 2. General Setup	
2.1 Introduction	13
2.2 Launching the MPLAB IPE Application	13
2.3 Setting Up the Programmer	14
2.4 Advanced Mode Login	16
2.5 Advanced Mode Settings	17
Chapter 3. MPLAB IPE Reference	
3.1 IPE Main Window	29
3.2 File Menu	31
3.3 Settings Menu	32
3.4 View Menu	34
3.5 Tools Menu	36
3.6 Window Menu	36
3.7 Help Menu	36
Appendix A. Revision History	
Support	39
Index	41
Worldwide Sales and Service	45

MPLAB® IPE USER'S GUIDE

Preface

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) 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 “DSXXXXXXXXA”, where “XXXXXXXX” 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) is installed. This document is compatible with the version of the IPE installed with MPLAB X IDE v4.20 or greater. Items discussed in this chapter include:

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

DOCUMENT LAYOUT

This document describes how to use the MPLAB IPE 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. MPLAB 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
Arial font:		
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>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power 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>
Courier New font:		
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.

Multi-Tool Design Advisory (DS51764)

Please read this first! This document contains important information about operational issues that should be considered when using the MPLAB IPE with your target design.

MPLAB X IDE Online Help

This is an essential document to be used with any Microchip hardware tool.

This is an extensive help file for the MPLAB X IDE. It includes an overview of embedded systems, installation requirements, tutorials, details on creating new projects, setting build properties, debugging code, setting configuration bits, setting breakpoints, programming a device, etc. This help file is generally more up-to-date than the printable PDF of the user's guide (DS50002027) available as a free download at <http://www.microchip.com/mplabx/>.

Release Notes for MPLAB IPE

For the latest information on using the MPLAB IPE, read the notes under "Release Notes and Support Documentation" on the MPLAB X IDE Start Page. The release notes contain updated information and known issues that may not be included in this guide.

MPLAB IPE Online Help File

A comprehensive help file for the MPLAB IPE is included with MPLAB X IDE. This help file may be more up-to-date than the printed documentation.

Processor Extension Pak and Header Specification (DS50001292)

This booklet describes how to install and use headers. Headers are used to better debug selected devices, without the loss of pins or resources. See also the PEP and 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 (SQTPSM) file is produced and used by MPLAB[®] IPE Integrated Programming Environment. Engineers can use this information to generate their own SQTP file.

MPLAB® IPE User's Guide

NOTES:

Chapter 1. IPE Application Overview

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 production user interface for use on the manufacturing floor.

The MPLAB IPE (now based on NetBeans) uses the MPLAB X IDE v4.20 or greater framework, Microchip Debugger (MDB) database, hardware tool interfaces and respective drivers to provide programming capabilities for all Microchip programmers.

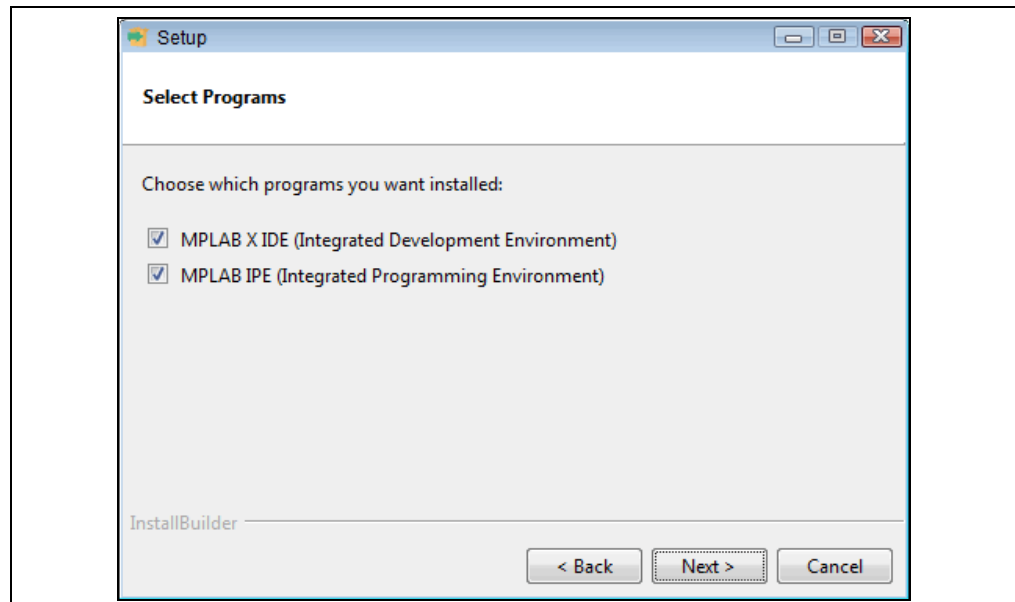
The MPLAB IPE is compatible with any of these platforms:

- Microsoft Windows® 7 or later
- Linux®
- macOS™

1.2 SOFTWARE INSTALLATION REQUIREMENTS

The MPLAB 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



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

1.3 PROGRAMMING TOOLS SUPPORTED

The following programming tools work with the IPE:

- MPLAB ICD 4 In-Circuit Debugger – recommended for production programming
- MPLAB ICD 3 In-Circuit Debugger – recommended for production programming
- MPLAB PICKit™ 4 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”](#) 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 a production user interface for use on the manufacturing floor. See [Section 2.3 “Setting Up the Programmer”](#) for information to enable Advanced Mode.

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.

TABLE 1-1: FEATURE MATRIX

Feature	Description	Production 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
Memory View		
Program Memory	Displays the program memory contents	Off
Auxiliary Memory	Displays the auxiliary memory contents	Off

IPE Application Overview

Feature	Description	Production Defaults
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
Memory Edit		
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

NOTES:

Chapter 2. General Setup

2.1 INTRODUCTION

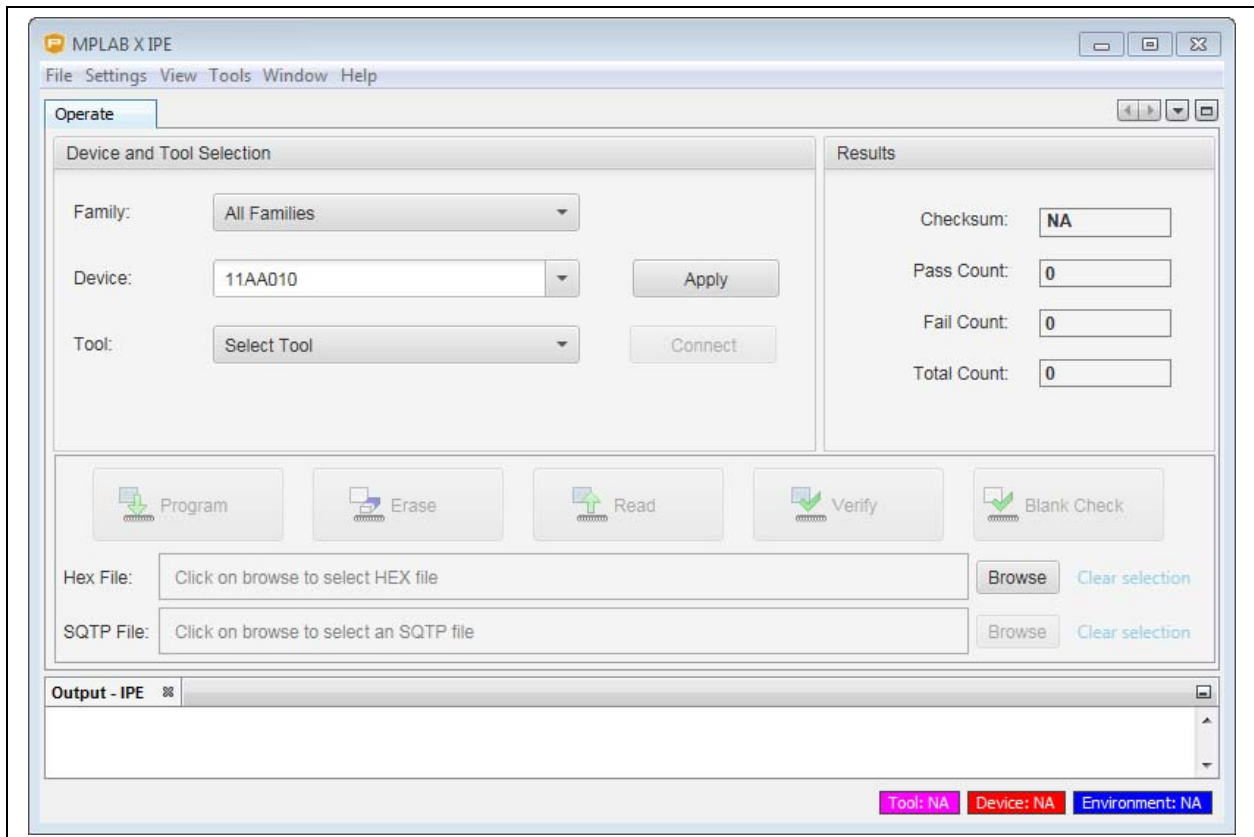
Getting started using the MPLAB® IPE is discussed.

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

2.2 LAUNCHING THE MPLAB IPE APPLICATION

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

FIGURE 2-1: MPLAB IPE MAIN WINDOW

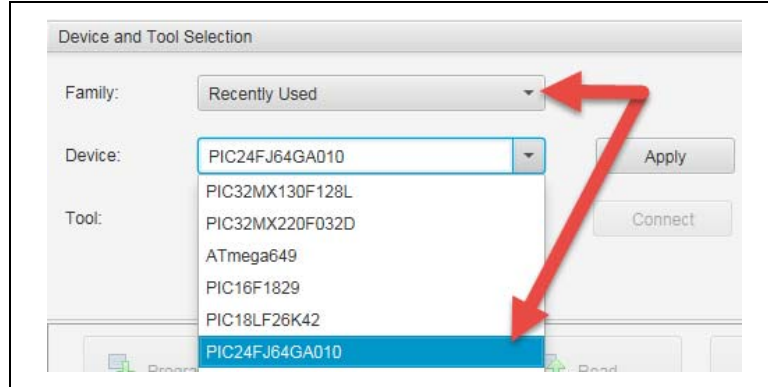


2.3 SETTING UP THE PROGRAMMER

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 4, PICkit 4, etc.) for information on programming a device.

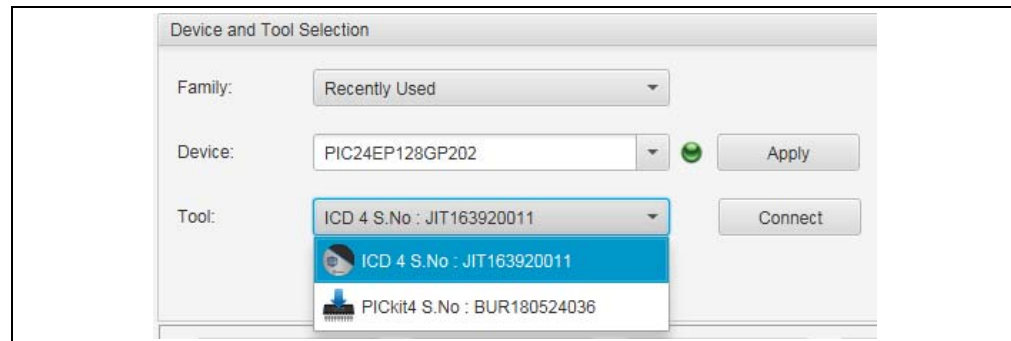
1. Using the Family drop-down menu, select the family of the device you wish to program, then use the Device drop-down menu to select the device. Or use the Device drop-down menu to directly select the device.

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., Target Memory Views, checksum).
3. Connect the development tool to the PC and 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.

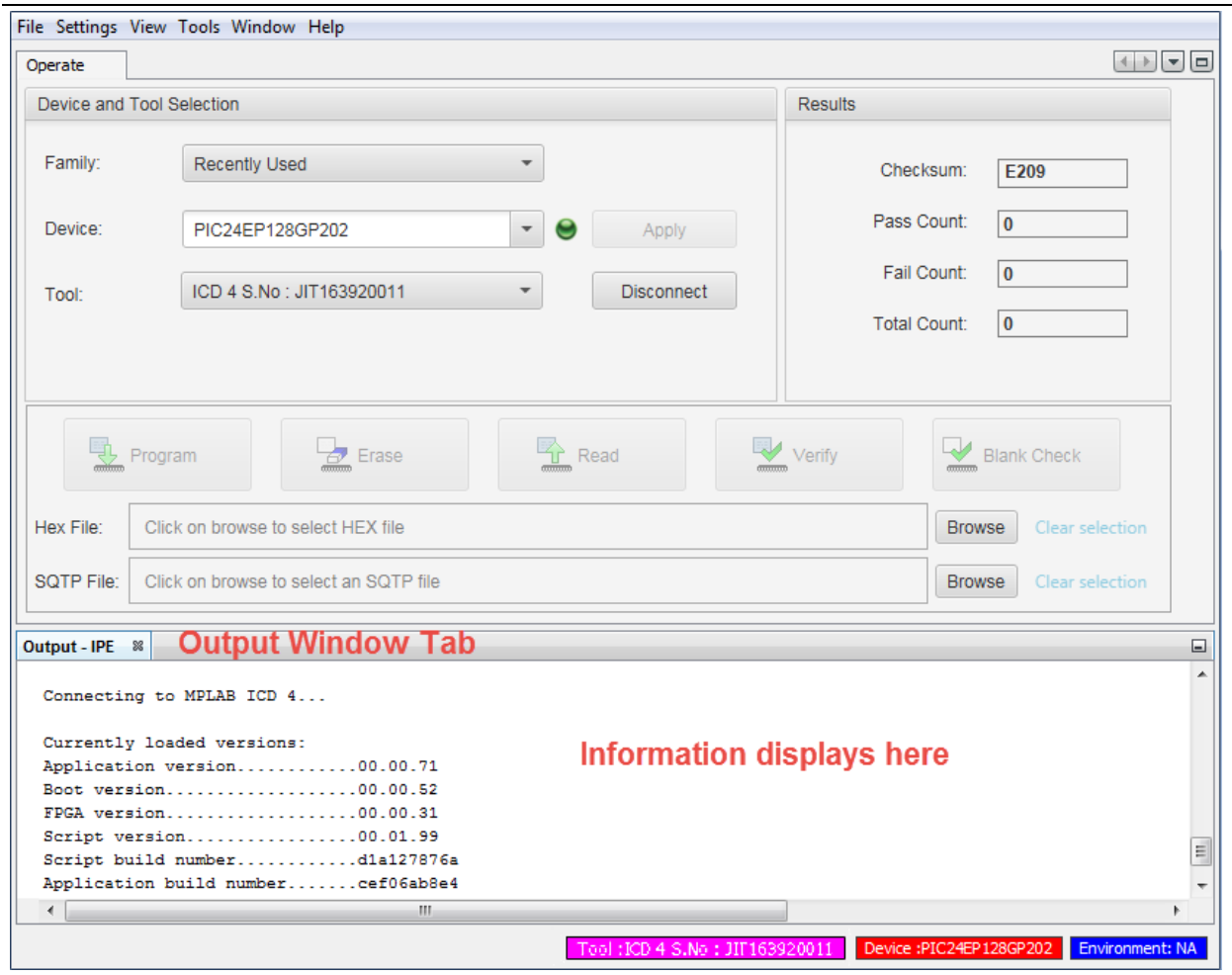
FIGURE 2-2: SELECT TOOL



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

- When the tool is connected, any messages or errors related to this tool will be displayed in the Output window, see [Figure 2-3](#).

FIGURE 2-3: OUTPUT WINDOW



- After the tool is successfully connected, proceed to **Chapter 3. “MPLAB IPE Reference”** to program the device with the IPE.

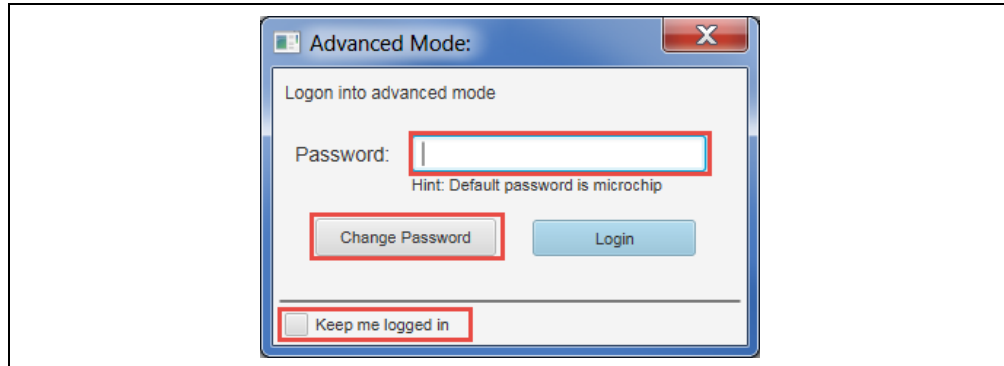
2.4 ADVANCED MODE LOGIN

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 into 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 the **Login** button.

FIGURE 2-4: ADVANCED MODE LOGIN



2.4.2 Changing the Password

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

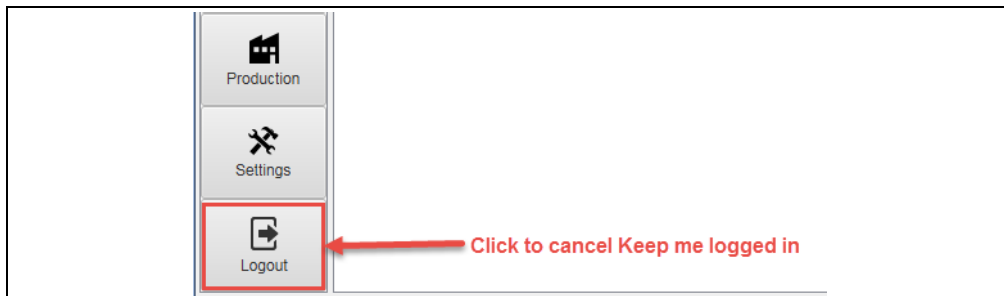
If you forget the new password, you must uninstall the IPE, delete the `ipe.key` file (located in the IPE install directory) to remove any settings made previously in IPE, then reinstall the IPE to begin with the default password `microchip`.

2.4.3 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 2-4](#)), then click the **Login** button. A new installation or first time usage will launch the MPLAB IPE in basic mode. Once the "Keep me logged in" check box is selected, subsequent launchings will open in Advanced mode.

To cancel the automatic Advanced mode login, click the **Logout** button (see [Figure 2-5](#)) on the Advanced Settings dialog.

FIGURE 2-5: CANCEL KEEP ME LOGGED IN



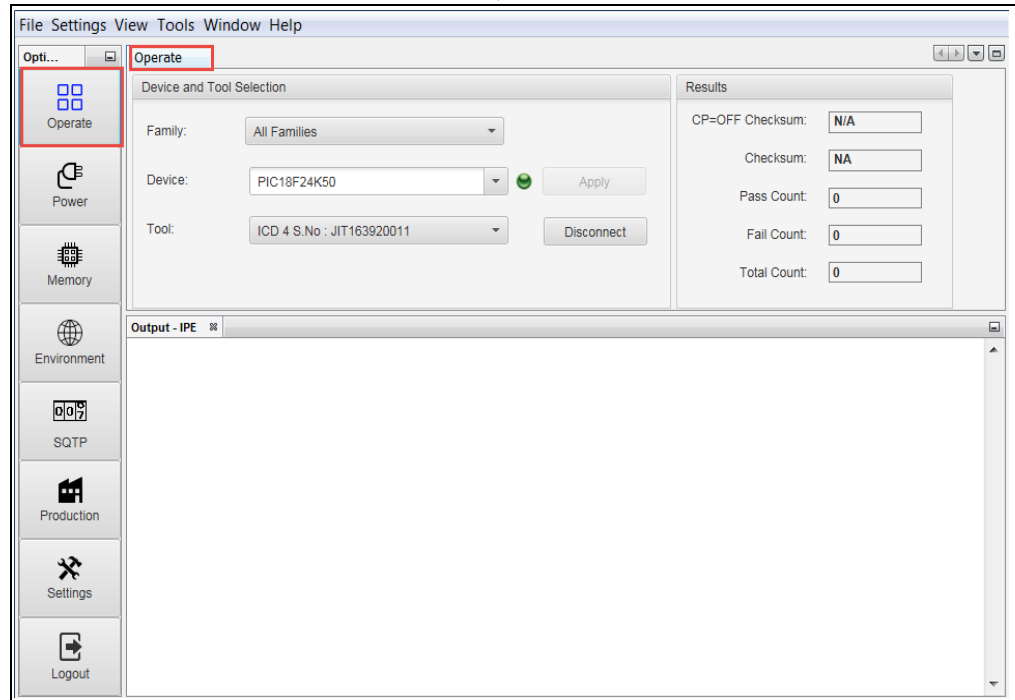
2.5 ADVANCED MODE SETTINGS

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 2-6: ADVANCED MODE, OPERATE DIALOG



2.5.2 Power

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

TABLE 2-1: POWER SETTINGS

Setting	Description
Voltage options: Voltage options 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.
ICSP™ Options	
Use Low Voltage Program mode entry	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.
Use High Voltage Program mode entry	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.
Manual Select	
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.

TABLE 2-2: MEMORY SETTINGS (CONTINUED)

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.
Program Memory Range - define the address range to be used for programming the program memory.	
Enter Range:	The address range in Hex of the program space that will be programmed.
Reset	Returns addresses to default settings.
Preserve Memory¹ - define the addresses to be preserved when programming memory.	
Preserve EEPROM on Program ²	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 ^{2, 3}	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 ³	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.

3: PIC32M devices do not support preserving User ID or Boot Memory.

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

Create Environment Tab	
Setting	Description
Environment Information	
Name	Enter a name for the environment.
.pm3 file	For MPLAB PM3, select this type of file.
.pen file	For MPLAB ICD 3/4, PICKit 3/4 and REAL ICE tools, select this type of file.
Description	Enter the description for the environment.
Misc Files	Add or remove other files used in the environment, e.g., data sheets, instructions, etc. Multiple files can be selected.
SQTP File	Browse or enter the SQTP file name used in the environment.
Save to PM3 Card	Saves the environment file to a MPLAB PM3 SD card destination. See Section 3.3.2 “Save Firmware into PM3 SD Card” 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.
Browse Environments Tab	
Browse on:	Select either PC or MPLAB PM3 Card .
PC	When the PC is selected, it opens the PM3 Environment file selection browser for you to select an environment to load into the MPLAB PM3.
MPLAB PM3 Card	When this option is selected, it opens the PM3 Card browser for you to select an environment from the files on the PM3 Card. In the browser, you can: <ul style="list-style-type: none"> • view the properties of the PM3 SD Card. • format the PM3 SD card. • select an environment to load into the MPLAB PM3; the information displays in the Environment Settings window. • select an environment to delete from the PM3 Card. • select an environment to view information; information displays in the Environment Settings window.
Environment Information	Displays information related to the selected environment file. From here, you can select to clear the information or load the environment into the MPLAB PM3.

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
Generation Method:	
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 (Dec):	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.
Configuration:	
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.
Location:	
Program Memory	Select this option to load the SQTP number in program memory.
EEPROM	Select this option to load the SQTP number in EEPROM.
Auxiliary Memory	Select this option to load the SQTP number in auxiliary memory.
User ID Memory	Select this option to load the SQTP number in user ID memory.
Boot Memory	Select this option to load the SQTP number in boot memory.
Flash Data	Select this option to load the SQTP number in Flash memory.
Access Method:	
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).
Generate	Click Generate to create the SQTP (.num) file.

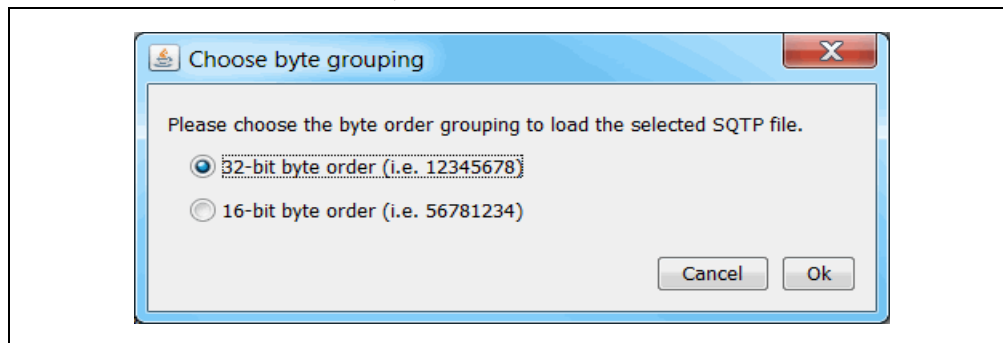
2.5.5.1 USING SQTP WITH MPLAB PM3

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 2-7: IMPORT SQTP FILE DIALOG



2.5.6 Production

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

The Production Settings dialog enables authorized personnel to select the options that are available during production programming. The options that are selected in the Production 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 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 SETTINGS

Setting	Description
Production Mode Settings	
Allow Export Hex	This setting enables a production specialist to export Hex files. If this option is selected, it displays under the <i>File>Export</i> menu.
Allow Import Hex file	Enables a production specialist to import Hex files. If this option is selected, it displays under the <i>File>Import</i> menu. Note: 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 this option is selected, it displays under the <i>File>Import</i> menu.
Allow Import SQTP file	This setting enables a production specialist to import SQTP files. If this option is selected, it displays under the <i>File>Import</i> menu.
Generate Reports	This setting enables reports to be generated. If Generate Reports is checked, click Browse 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 Reset Counters .
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 this option is selected, it 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 this option is selected, it 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.

MPLAB® IPE User's Guide

TABLE 2-5: PRODUCTION SETTINGS (CONTINUED)

Allow "Communication" under Settings menu	If selected, this option is enabled (Section 3.7 "Help Menu") 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 Execution Memory, Configuration Bits, User ID Memory or Device ID Memory. If enabled, this option is accessed in Production Mode from the Window>Target Memory Views option.
Display EEPROM checksum in the output window	If selected, the EEPROM checksum is displayed in the output window. EEPROM checksum is the checksum of the EEPROM Memory in the MCUs (PIC18F1220, for example) and not the memory from the exclusive devices such as 11AA/LCxxx, 24AA/LC/FCxxx.
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.
Allow Memory View	
Program Memory	If this option is selected, program memory can be displayed in the Windows>Target Memory Views on the main window.
Auxiliary Memory	If this option is selected, auxiliary memory can be displayed in the Windows>Target Memory Views on the main window.
User IDs	If this option is selected, user IDs can be displayed in the Windows>Target Memory Views on the main window. This is only applicable if user IDs are supported by the tool.
Config Memory	If this option is selected, configuration memory can be displayed in the Windows>Target Memory Views on the main window.
Flash Data	If this option is selected, Flash memory can be displayed in the Windows>Target Memory Views on the main window.
EEPROM	If this option is selected, EEPROM memory can be displayed in the Windows>Target Memory Views on the main window.

2.5.7 Settings

From the Advanced Mode dialog, click **Settings** to display the available options. If you are connected to an MPLAB ICD 4 or PICkit 4 In-Circuit Debugger, there are additional options.

TABLE 2-6: GENERAL SETTINGS

Settings	Description
PICkit 3 Programming Speed	The Programming Speed slider is enabled only if an enhanced mid-range device (PIC16F family) is connected. Use the slider to adjust the programming speed (see Figure 2-8). 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 Programmer To Go dialog (see Figure 2-9) 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 Programmer To Go 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. Note: Programmer To Go does not support the Preserve Memories options.
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.
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"> • Full Chip Programming • Boot, Secure and General Segments • Secure and General Segments • General Segment Only
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.
Programming 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.	

MPLAB® IPE User's Guide

TABLE 2-6: GENERAL SETTINGS (CONTINUED)

Settings	Description
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 option is available only when powering the device from the debug tool.
Diagnostics	
Logging Level	Set the message logging level. OFF: No logging SEVERE: Log severe (error) messages only. WARNING: Log warning messages only. INFO: Log informational messages only. CONFIG: Log configuration information only. FINE: Log some module-to-module communication. FINER: Log more module-to-module communication. FINEST: Log all module-to-module communication.
Log File	Path and name of log file.
ICD 4/PICKit 4	
LED Brightness setting	Select the level of brightness from 1 (darkest) to 10 (brightest); the default is 5.
Program Speed	Select either Low, Normal or High; the default is Normal.
PGC Configuration	Select either none, pull up or pull down. The default is pull down.
PGC resistor value (Kohms)	Type in a resistor value from 0-50. The default value is 4.7 Kohms.
PGD Configuration	Select either none, pull up or pull down. The default is pull down.
PGD resistor value (Kohms)	Type in a resistor value from 0-50. The default value is 4.7 Kohms.

FIGURE 2-8: PICKit 3 PROGRAMMING SPEED OPTION

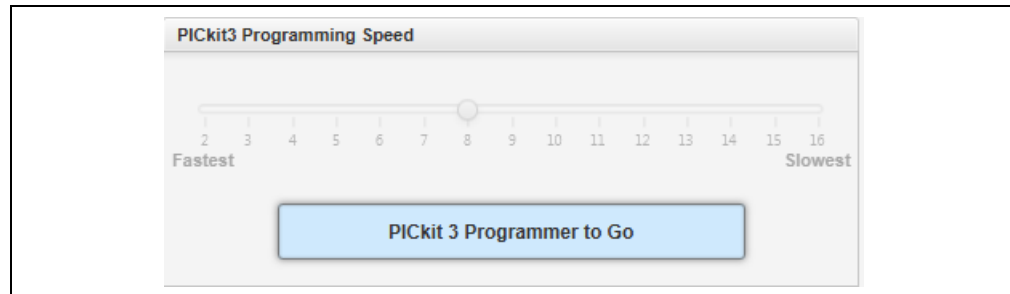
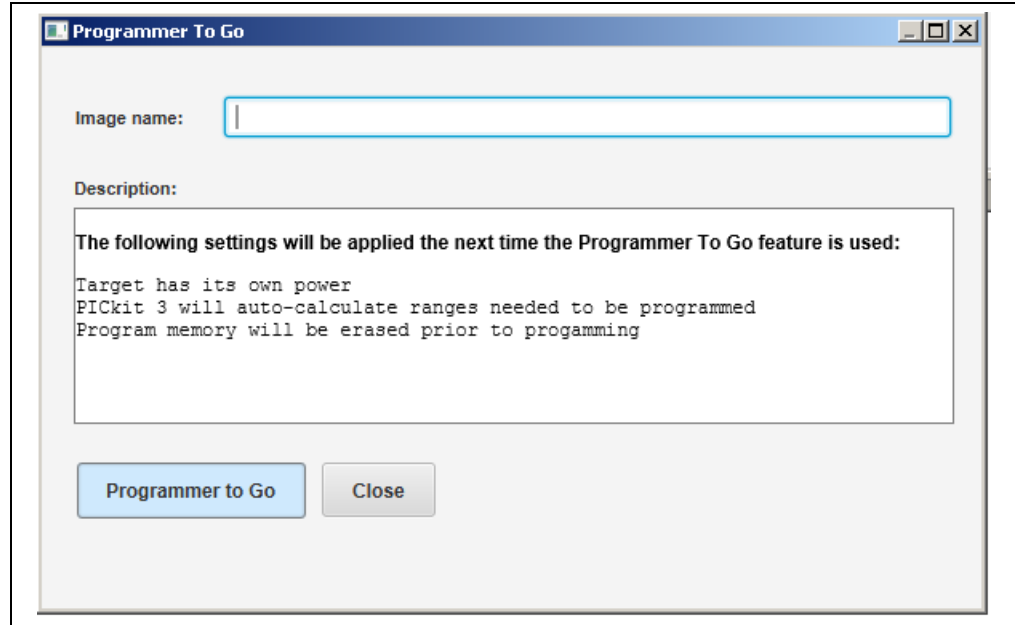


FIGURE 2-9: PROGRAMMER TO GO DIALOG



2.5.8 Logout

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

NOTES:

Chapter 3. MPLAB IPE Reference

3.1 IPE MAIN WINDOW

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

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

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

FIGURE 3-1: IPE MAIN WINDOW

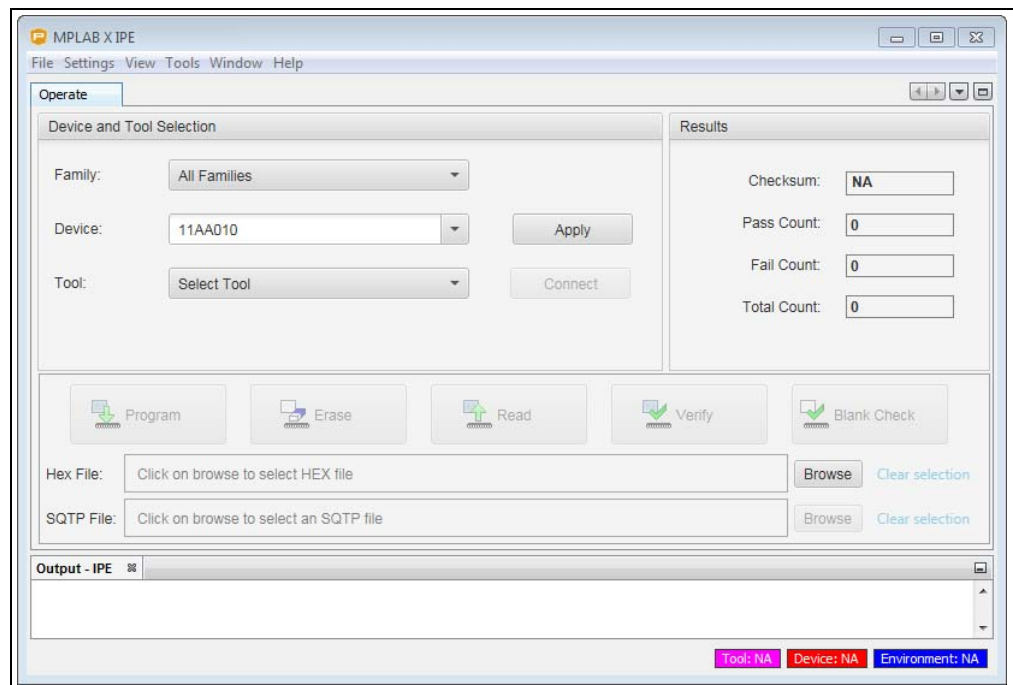


TABLE 3-1: IPE MAIN WINDOW FIELDS

Item	Description
Select Device and Tool	
• Family	Filters devices by family or recently used.
• Device	Specifies the device; click Apply to select.
• Tool	Specifies the tool; click Connect or Disconnect as appropriate.
Results	
• CP=OFF Checksum	Displays only if enabled in Advanced Mode. The imported hex checksum is handled 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 number of programming operations that passed.
• Fail Count	Details the number of programming operations that failed.
• Total Count	The total number of programming operations.
Command Buttons:	
• Program	Programs the device.
• Erase	Erases the device.
• Read	Reads the device.
• Verify	Performs a verify operation on the device.
• Blank Check	Checks whether the device is blank.
Other	
Hex File	The Hex file location, Browse to locate the file.
SQTP	The SQTP file location, Browse to locate the file.
Output Tab	Display of output data. Right-click in the Output window to access additional options.
Tool Tab	Display of specific tool data, i.e., PM3, ICD 4, PICKit 4.

3.2 FILE MENU

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

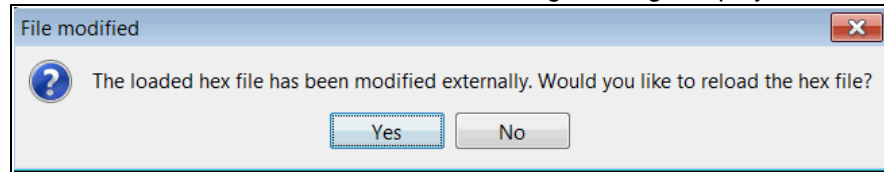
- Import
- Export
- Exit

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 SETTINGS MENU

3.3.1 Understanding the Settings Menu Commands

The Settings menu on the IPE Menu bar (see [Table 3-2](#)) 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 3-2: 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 “ Setting Up the Programmer ” and “ Advanced Mode Settings ” 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 command is enabled (check box is selected), the device is 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. The Firmware Browser dialog opens and locates directory containing the latest PM3.jar firmware file. click on the Firmware File, then click the OK button to download the 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 Section 3.3.2 “Save Firmware into PM3 SD Card”).
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.
PM3 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 Section 3.3.3 “PM3 Communication Setting Dialog” for more information.

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

3.3.2 Save Firmware into PM3 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).

3.3.3 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 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 Port** option.

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.

3.4 VIEW MENU

The viewable memory types are determined by the Production settings that are selected in the Advanced Mode. The View menu commands are described below:

- [Clear All Memory](#)
- [Memory Settings](#)
- [Power Settings](#)
- [Transfer from PM3](#)
- [Transfer to PM3](#)
- [Read Device ID](#)
- [View PM3 Socket Info](#)

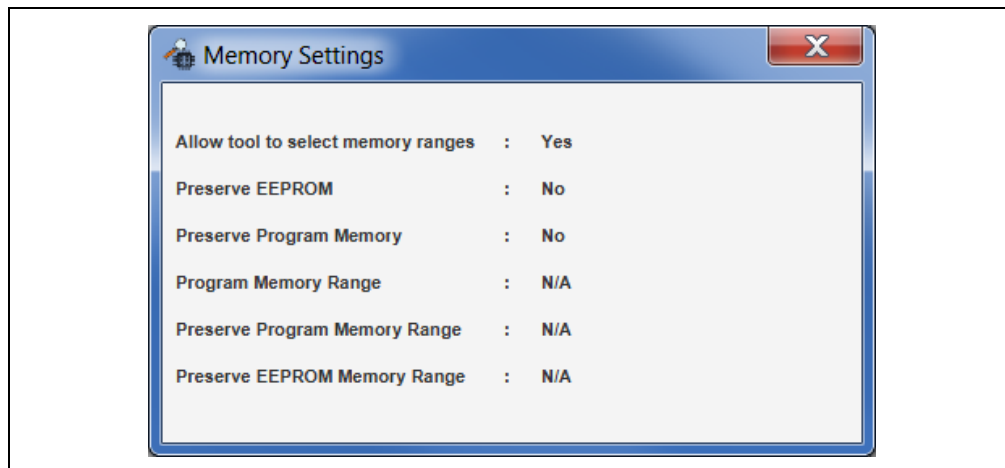
3.4.1 Clear All Memory

Clears all of the memory views.

3.4.2 Memory Settings

Displays the current memory settings (see [Figure 3-2](#) for an example). The Memory Settings are view-only and cannot be changed from this window.

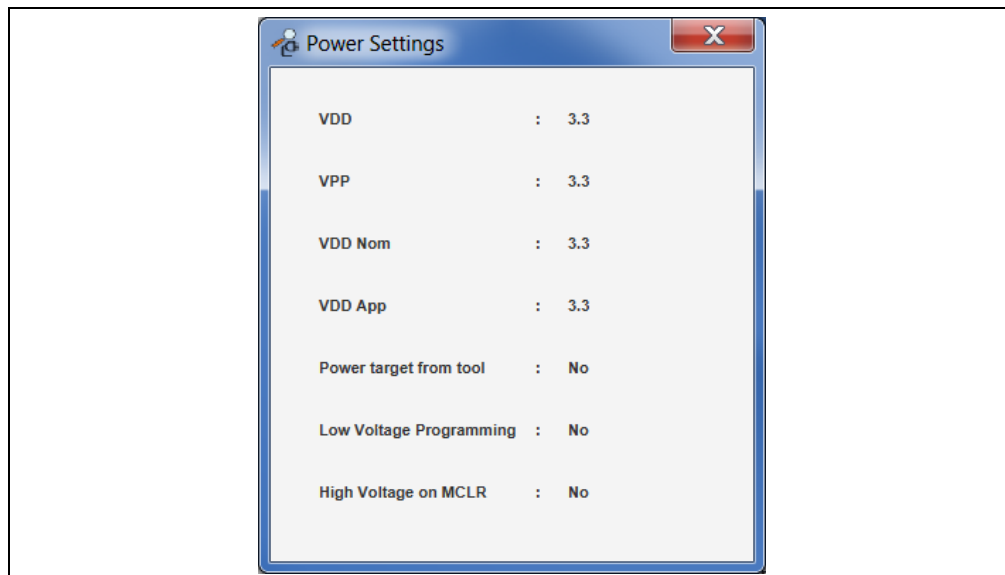
FIGURE 3-2: MEMORY SETTINGS DISPLAY



3.4.3 Power Settings

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

FIGURE 3-3: POWER SETTINGS DISPLAY



3.4.4 Transfer from PM3

When selected, this option transfers the image from the connected MPLAB PM3 Programmer. The status displays in the Output window.

3.4.5 Transfer to PM3

When selected, this option transfers the image to the connected MPLAB PM3 Programmer. The status displays in the Output window.

3.4.6 Read Device ID

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

3.4.7 View PM3 Socket Info

Displays the PM3 socket information in the Output window.

3.5 TOOLS MENU

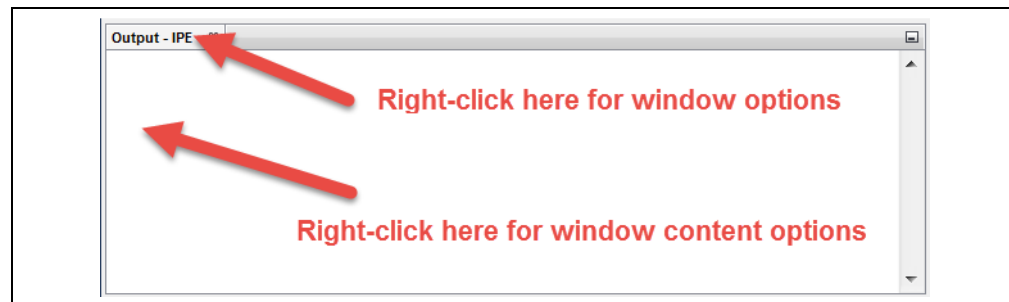
The Tools menu provides access to Plugins. Select **Plugins** to display the Plugins Manager. For details, see the NetBeans help topic: [Managing Plugins in the IDE](#). If MPLAB X IDE is installed, see the MPLAB X IDE Help file, Additional Tasks, Add PlugIn Tools.

3.6 WINDOW MENU

3.6.1 Output

This option opens the Output window at the bottom of the display. Right-click the tab title to display window options, such as Close, Float, Move, etc. Right-click in the body of the window to display Output window content options, such as Find, Wrap text, etc. (see Figure below).

FIGURE 3-4: OUTPUT WINDOW RIGHT-CLICK MENUS



3.6.2 Target Memory Views

This option is available only if Production Settings are set in Advanced Mode to view the different types of memory. Some of the possible memory views include Execution Memory, Configuration Bits, User ID Memory, Device ID Memory, etc.

3.6.3 Reset Windows

Selecting this option will reset all the program windows to the default settings.

3.7 HELP MENU

The Help menu provides access to the following online information:

- Read Me Docs - MPLAB IPE Readme and Programmer Command-line Readme.
- Help Contents - displays the master set of all installed documentation.
- Tool Help Contents - lists help for several Microchip tools.
- About - displays information specific to the current version of MPLAB IPE.

Appendix A. Revision History

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. “MPLAB 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 2.4.3 “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 3.4 “View Menu”](#).
- Added new settings menu command in [Table 3-2](#) for saving firmware into SD card and added a revised [Section 3.3.2 “Save Firmware into PM3 SD Card”](#).

Revision D (June 2018)

- In the Preface, added compatibility note that this document reflects the changes as of MPLAB X IDE v4.20 or greater.
- Multiple updates throughout to reflect changes made to the program for the Net-Beans platform. Added Tools and Windows menus, updated graphics, text, and menu options.

NOTES:

Support

INTRODUCTION

Please refer to the items discussed here for support issues.

- [Warranty Registration](#)
- [The Microchip Web Site](#)
- [myMicrochip Personalized Notification Service](#)
- [Customer Support](#)

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When you are selecting your preferences, choosing “Development Systems” will populate the list with available development tools. The main categories of tools are listed below:

- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLAB C compilers; all MPLAB assemblers (including MPASM™ assembler); all MPLAB linkers (including MPLINK™ object linker); and all MPLAB librarians (including MPLIB™ object librarian).
- **Emulators** – The latest information on Microchip in-circuit emulators. These include the MPLAB REAL ICE in-circuit emulators
- **In-Circuit Debuggers** – The latest information on Microchip in-circuit debuggers. These include the MPLAB ICD 3 and MPLAB ICD 4 in-circuit debuggers and PICKit™ 3 and MPLAB PICKit 4 in-circuit debuggers.
- **MPLAB® X IDE** – The latest information on Microchip MPLAB X IDE, the multi-platform (Windows®, macOS™, Linux®) Integrated Development Environment for development systems tools.
- **Programmers** – The latest information on Microchip programmers. These include the device (production) programmers MPLAB REAL ICE in-circuit emulator, MPLAB ICD 4 in-circuit debugger, MPLAB PICKit 4 in-circuit debugger, MPLAB PM3 and development (non-production) programmer and PICKit 3.
- **Starter/Demo Boards** – These include MPLAB Starter Kit boards, PICDEM demo boards, and various other evaluation boards.

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- Field Application Engineer (FAE)
- Technical Support

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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.

Index

A

Access Method 21
 Advanced Mode 16, 17, 32
 Allow "Auto Download Firmware" 23
 Allow "Communication" 24
 Allow "Erase All before Program" 23
 Allow "Verify Device ID before Program" 23
 Allow Export Hex 23
 Allow Import Environment 23
 Allow Import Hex File 23
 Allow Import SQTP File 23
 Allow Memory Editing and Filling 24
 Allow Memory View 24
 Apply Vdd Before Vpp 26
 Apply Vpp Before Vdd 26
 Audible Notification 24
 Auto Download Firmware 11, 32
 Auxiliary Memory 10

B

Blank Check 10
 Browse Environments Tab 20

C

Change Password 16
 Change the Password 16
 Clear All Memory 34
 COM Port
 Manual Settings 34
 Config Memory 11
 Configuration 21
 Create Environment Tab 20
 Create SQTP 11
 Customer Support 40

D

Default Password 16
 Diagnostics 26
 Disable Operations 25
 Display EEPROM checksum in output window 24
 Display hex checksum with CP=OFF 24
 Display SQTP sequence 25
 Documentation
 Layout 5

E

Edit Memory Settings 11
 Edit Voltage Settings 11
 EEPROM 11
 Enable programming if hex file loaded 24
 Environment 20
 Environment Settings 20

Erase 10
 Erase All Before Program 11, 32
 Exit 31
 Export 31
 Export Hex File 10

F

Feature Matrix 10
 Features 10
 File Menu 31
 Exit 31
 Export 31
 Import 31
 Flash Data 11
 Forget New Password? 16

G

General Settings
 Apply Vdd Before Vpp 26
 Apply Vpp Before Vdd 26
 Diagnostics 26
 Disable Operations 25
 Display SQTP sequence 25
 ICD 4 26
 Log File 26
 Logging Level 26
 PICkit 3 Programmer To Go 25
 PICkit 3 Programming Speed 25
 PICkit 4 26
 Program Calibration Memory 25
 Program User OTP 25
 Programming Method 25
 Secure Segments 25
 Segments to Program 25
 Special Memory Regions 25
 SQTP 25
 Generate 21
 Generate Reports 23
 Generation Method 21

H

Header Board
 Specification 7
 Hold on Reset 32

I

ICD 4 26
 Import 31
 Import Environment 10
 Import Hex File 10
 Import SQTP File 10
 Internet Address, Microchip 39

MPLAB® IPE User's Guide

IPE Feature Matrix	10	Program Calibration Memory	25
K		Program Memory.....	10
Keep me logged in	16	Program User OTP.....	25
L		Programming Method.....	25
Launching the IPE Application	13	Pseudo Random.....	21
Limit the Program Count to	23	R	
Location.....	21	Random.....	21
Log File	26	Read.....	10
Logging Level.....	26	Read Device ID	35
M		Reading, Recommended.....	7
Manual Download Firmware.....	11, 32	Readme.....	7
Memory Settings	34	Release from Reset.....	32
Modes	10	Remove Read Button	24
Advanced.....	10	Reset Windows	36
Production.....	10	S	
Multiple Instances of MPLAB IPE.....	13	Save Environment	11
myMicrochip Personalized Notification Service.....	39	Save Firmware into SD Card.....	32, 33
N		Secure Segments.....	25
Number of Bytes	21	Segments to Program	25
Number of Parts	21	Sequential	21
O		Setting Up the Programmer.....	14
Output	36	Settings	25
P		Settings Menu	
PICKit 3 Programmer To Go.....	25	Advanced Mode	32
PICKit 3 Programming Speed.....	25	Auto Download Firmware.....	32
PICKit 4.....	26	Erase All Before Program	32
Plugins	36	Hold on Reset	32
PM3 Communication.....	32	Manual Download Firmware	32
PM3 Socket Info.....	35	PM3 Communication.....	32
Power	18	Release from Reset	32
Power Settings	35	Save Firmware into SD Card	32
Production Mode	23, 25	Verify Device ID Before Program.....	32
Production Mode Settings	24, 25	Software Installation Requirements.....	9
Allow "Auto Download Firmware"	23	Special Memory Regions	25
Allow "Communication"	24	SQTP.....	21, 25
Allow "Erase All before Program"	23	Access Method	21
Allow "Verify Device ID before Program"	23	Configuration.....	21
Allow Export Hex	23	Generation Method	21
Allow Import Environment.....	23	Location	21
Allow Import Hex File.....	23	SQTP Dialog for PIC32 Devices	22
Allow Import SQTP File	23	SQTP Files for Flash Data Memory	22
Allow Memory Editing and Filling.....	24	SQTP Settings	
Allow Memory View	24	EEPROM	21
Audible Notification	24	Format for PSV	21
Auxiliary Memory	24	Generate	21
Config Memory	24	Number of Bytes	21
Display EEPROM checksum in output window	24	Number of Parts.....	21
Display hex checksum with CP=OFF	24	Program Memory	21
EEPROM	24	Pseudo Random	21
Flash Data	24	Random	21
Generate Reports	23	Raw Data	21
Limit the Program Count to.....	23	RETLW	21
Program Memory	24	Sequential.....	21
User IDs.....	24	Start Address	21
Production Settings	23	Start Address.....	21
Program	10	T	
		Tools Menu.....	36
		Plugins	36

Transfer from PM3	35
Transfer to PM3	35
Transition Socket Specification	7

U

User IDs	11
----------------	----

V

Verify	10
Verify Device ID Before Program	32
View Memory Settings	11
View Menu	34
Clear All Memory	34
Memory Settings.....	34
PM3 Socket Info	35
Power Settings	35
Read Device ID	35
Transfer from PM3.....	35
Transfer to PM3.....	35
View Voltage Settings	11

W

Web Site, Microchip	39
Window Menu	36
Output.....	36
Reset Windows.....	36



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