MPLAB® PICkit™ 5 In-Circuit Debugger

Quick Start Guide

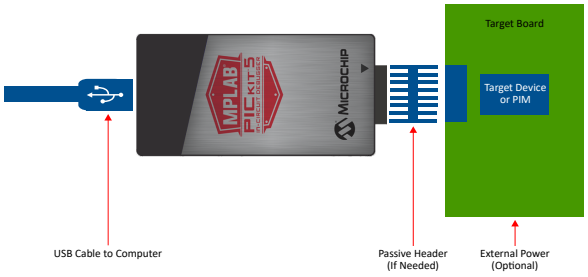
1 Install the Latest Software

Download the MPLAB X IDE software from microchip.com/mplabx and install onto your computer. The installer automatically loads the USB drivers. Launch MPLAB X IDE.

2 Connect to Target Device

1. Connect the MPLAB PICkit 5 to the computer using the supplied USB Type-C® cable.
2. Plug the 8-pin connector on the bottom of the PICkit 5 into the target (see figure.) For more on target connections, see "Additional Information".
3. Connect external power* to target board or select power from PICkit 5 in project properties.

Typical Debugger System – Device with On-Board Debug Circuitry



External target board power supply to be provided by user.

3 Create, Build and Run Project

1. Refer to the MPLAB X IDE User's Guide or online help for instructions to install language tools, create or open a project, and configure project properties.
2. Check that the configuration bits in your code match the Recommended Settings below.
3. To execute your code in Debug mode, perform a debug run. To execute your code in Non-Debug (release) mode, perform a run. To hold a device in Reset after programming, use the Hold in Reset icon in the toolbar.

Recommended Settings

Component	Setting
Oscillator	• OSC bits set properly • Running
Power	Supplied by target
WDT	Disabled (device dependent)
Code-Protect	Disabled
Table Read Protect	Disabled
LVP	Disabled
BOD	VDD > BOD VDD min.
JTAG	Disabled
AVDD and AVSS	Must be connected
PGCx/PGDx	Proper channel selected, if applicable
Programming	VDD voltage levels meet programming spec

Note: See MPLAB PICkit 5 In-Circuit Debugger online help for more information.

Reserved Resources

For information on reserved resources used by the debugger, see the MPLAB X IDE Help > Release Notes, Reserved Resources links.

MPLAB® Programmer-To-Go Operation

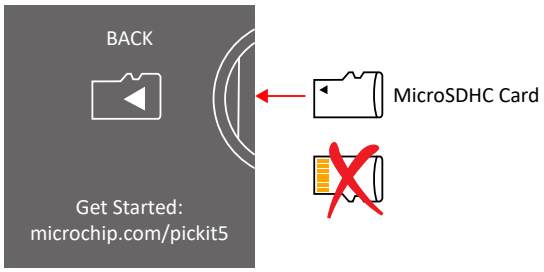
Quick Start Guide

1 Install

Once code development is complete, use the PICkit™ 5 to download a device memory image to a microSDHC card for later programming into a specific device. The button on the PICkit 5 can program the latest image or the MPLAB® PTG smartphone application can select, program, and manage other images on the SD card. See the MPLAB PICkit 5 In-Circuit Debugger User's Guide (DS50003525) for details on PTG.

2 Insert microSDHC Card

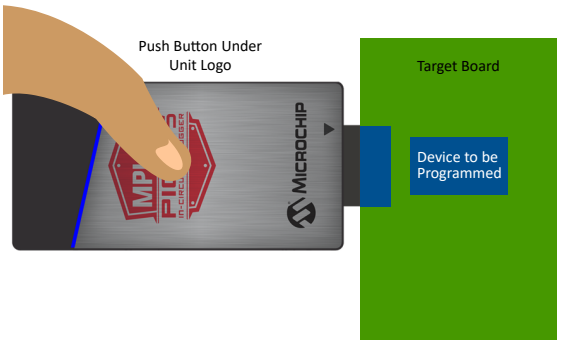
Download image(s) from MPLAB X IDE.



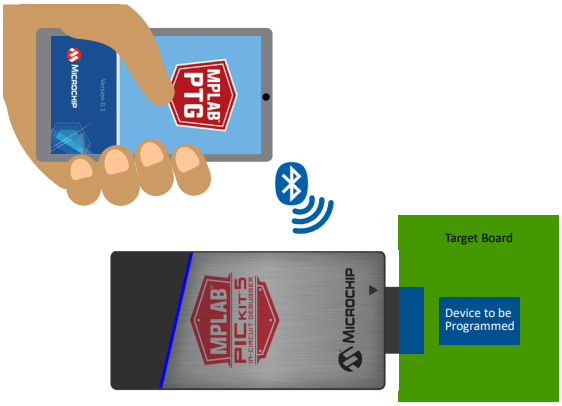
Program selected image using MPLAB PTG App.

3 Push Button to Program Target Device

Program the latest downloaded image.



4 Use MPLAB PTG to Program Target Device



Additional Information

Pinouts for Debug Interfaces

MPLAB® PICkit™ 5		DEBUG									Target[4]	
8-pin SIL Connector[1]	Pin Name	ICSP™ (MCHP)	MIPS EJTAG	Cortex® SWD	AVR® JTAG	AVR debugWIRE	AVR UPDI	AVR PDI	AVR ISP	AVR TPI	8-pin SIL Connector	6-Pin SIL Connector
1	TVPP	$\overline{\text{MCLR}}$/ VPP	$\overline{\text{MCLR}}$	$\overline{\text{RESET}}$			$\overline{\text{RESET}}$[3]				1	1
2	TVDD	VDD	VDD/ VDDIO	VDD	VTG	VTG	VTG	VTG	VTG	VTG	2	2
3	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	3	3
4	PGD	DAT	TDO	SWO[2]	TDO		DAT[3]	DAT	MISO	DAT	4	4
5	PGC	CLK	TCK	SWCLK	TCK				SCK	CLK	5	5
6	TAUX				$\overline{\text{RESET}}$	$\overline{\text{RESET}}$/ dW		CLK	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$	6	6
7	TTDI		TDI		TDI				MOSI		7	
8	TTMS		TMS	SWDIO[2]	TMS						8	

1. Use of a 6-pin header will result in the loss of funtions on Pins 7 and 8 affecting, EJTAG, JTAG, SWD and ISP.

2. SWO is used for trace. SWDIO is for debug.

3. Pin may be used for High-Voltage Pulse reactivation of UPDI function depending on device. See device data sheet for details.

4. These are example target connectors that are assumed similar to the debug unit (SIL).

Pinouts for Data Stream Interfaces

MPLAB® PICkit™ 5	DATA STREAM		Target[3]
8-pin SIL Connector[1]	PIC® and AVR® Devices	SAM Devices[2]	8-Pin SIL Connector
Pin #	DGI UART/CDC	DGI UART/CDC	Pin #
1			1
2	VTG	VTG	2
3	GND	GND	3
4		TX (target)	4
5			5
6			6
7	TX (target)	RX (target)	7
8	RX (target)		8

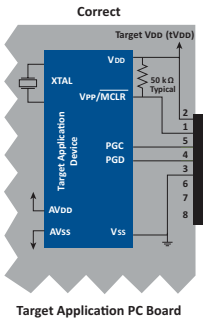
1. Use of an 8-pin connector is required for data streaming. A 6-pin connector will result in the loss of functions on Pins 7 and 8.

2. RX and TX pins moved because of wiring for other devices.

3. This is an example target connector that is assumed similar to the debug unit (SIL).

Additional Information

Circuitry and Connector Pinouts

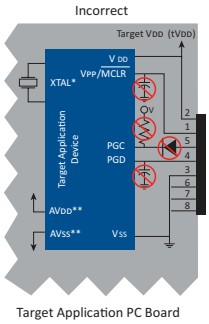


Connect Pin 1 to Pin 1

Typical 6-Pin ICSP Pinout

Pin	Target	MPLAB® PICkit™ 5
1	$\overline{MCLR}$/VPP	$\overline{NMCLR}$
2	VDD Target	VDD
3	VSS (ground)	Ground
4	PGD (ICSPDAT)	PGD
5	PGC (ICSPCLK)	PGC
6	Do Not Connect	Do Not Connect
7		Reserved for Future use
8		Reserved for Future use

Target Circuit Design Precautions



- **Do not use pull-ups on PGC/PGD:** they will disrupt the voltage levels, since these lines have programmable pull-down resistors in the debugger.
- **Do not use capacitors on PGC/PGD:** they will prevent fast transitions on data and clock lines during programming and debug communications.
- **Do not use capacitors on $\overline{MCLR}$:** they will prevent fast transitions of VPP. A simple pull-up resistor is generally sufficient.
- **Do not use diodes on PGC/PGD:** they will prevent bidirectional communication between the debugger and the target device.
- **Do not exceed recommended cable lengths:** Refer to the Hardware Specification of the MPLAB PICkit 5 online help or user's guide for cable lengths.