TOOLSTICK PROGRAMMING ADAPTER USER'S GUIDE

1. Handling Recommendations

The ToolStick Base Adapter and daughter cards are distributed without any protective plastics. To prevent damage to the devices or the host PC, please take into consideration the following recommendations when using the ToolStick:

- Never connect or disconnect a daughter card to or from the ToolStick Base Adapter while the Base Adapter is connected to a PC.
- Always connect and disconnect the ToolStick Base Adapter from the PC by holding the edges of the board.

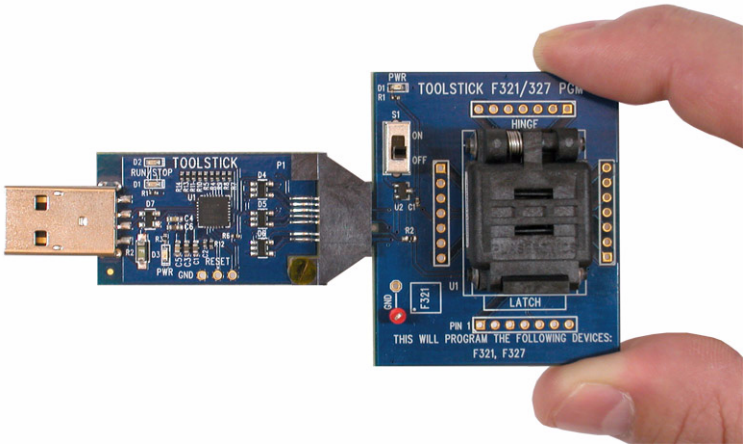

Figure 1. Proper Method of Holding the ToolStick

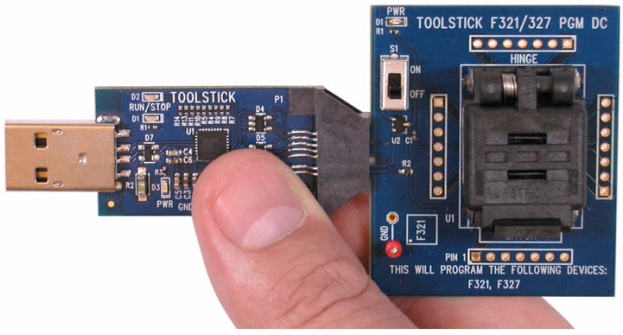

Figure 2. Improper Method of Holding the ToolStick

- Avoid directly touching any of the components other than the plastic connector or the socket.

2. Kit Contents

The ToolStick Programming Adapter package contains the following items:

- ToolStick Base Adapter
- ToolStick Programming Adapter Daughter Card
- USB extension cable

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3. ToolStick Programming Adapter Overview

The ToolStick Programming Adapters are an ideal platform for programming Silicon Labs microcontrollers for prototypes or for small volume production. Their low cost and ease-of-use make them easy to integrate into any production flow.

The ToolStick programming platform consists of two components: the ToolStick Base Adapter and the programming daughter card. The ToolStick Base Adapter provides a USB programming interface between a Windows PC and the target microcontroller. The socket daughter card includes the socket that houses the device, a power LED and an On/Off switch. Figure 3 shows an example daughter card.

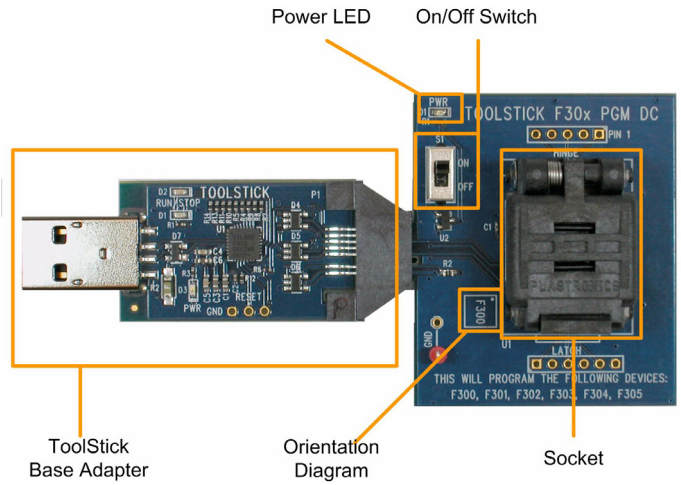

Figure 3. Example Programming Daughter Card

Silicon Labs MCUs are available in different packages: QFN (MLP), QFP, TSSOP, and DIP. The daughter cards use a different type of socket for each package type and each of these socket types is rated for a minimum number of insertions. Table 1 below shows the minimum guaranteed number of insertions for each socket type:

Table 1. Minimum Guaranteed Device Insertions Per Socket Type

Package Type	Minimum Insertions
QFN—Clam-Shell	5,000
QFP—Top-loader	10,000
TSSOP—Top-loader	5,000
DIP - ZIP / ZIF	20,000

Check the ToolStick website (www.silabs.com/toolstick) to ensure that the daughter card is the appropriate one for the device being programmed. Inserting a device into the wrong socket could damage the device.

4. Requirements

The following are required to use the ToolStick programming platform

- PC running Windows 2000 or later
- Silicon Labs MCU Production Programmer
- Tweezers

The Silicon Labs MCU Production Programmer is the PC application that is used to download the code to the target device. This program is available at: https://www.silabs.com/products/mcu/Pages/SoftwareDownloads.aspx. The source code for this program is available to enable development of custom programming applications.

5. Software Installation Instructions

This section describes how to download and install the Silicon Labs MCU Production Programmer. This program is used to download the firmware to the target MCU from a Windows PC.

Step 1. Download the MCU Production Programmer from https://www.silabs.com/products/mcu/Pages/SoftwareDownloads.aspx.

Step 2. Install the program by running the executable and following the on-screen instructions.

Step 3. Start the program from Start → All Programs → Silicon Laboratories → MCU Production Programmer.

Step 4. Connect the ToolStick to the socket daughter card, and connect it to the PC.

Step 5. Go to Program Menu → Configure Programming Information.

Step 6. Configure the required programming settings.

The required settings are Part Number, Debug Adapter, and Hex File. Configuration of the other, optional settings should be also done during this step.

Note: The ToolStick might not appear as a "Debug Adapter" selection until the MCU is inserted into the socket and the switch on the daughter card is set to the ON position. See Section 6 for hardware usage instructions.

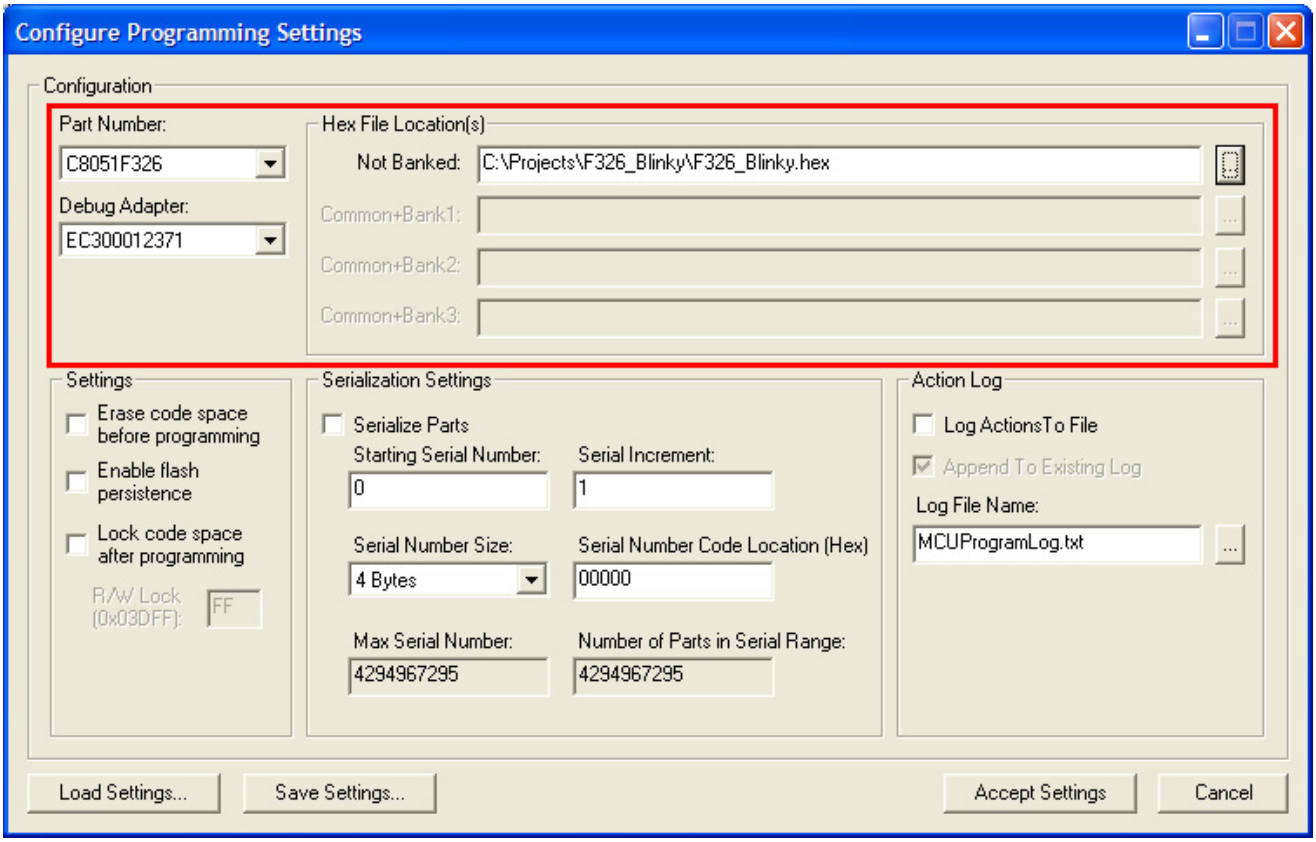

Figure 4. Configure Programming Settings

Step 7. Save these settings to a file using the "Save Settings" button.

Whenever the program is started, the settings saved in Step 7 can be restored using the "Load Settings" button in this same menu.

6. Usage Instructions

This section describes how to use the ToolStick Programming Adapter. It is recommended to use a clean workspace that includes a level surface to place the ToolStick.

Step 1. Connect the ToolStick Base Adapter and daughter card to the PC.

The ToolStick Programming Adapter kit includes a USB extension cable that can be used to make it easier to place the Base Adapter and daughter card on a level surface.

Figure 5. ToolStick Socket Platform Connected to PC

Step 2. Move the switch on the daughter card to the OFF position.

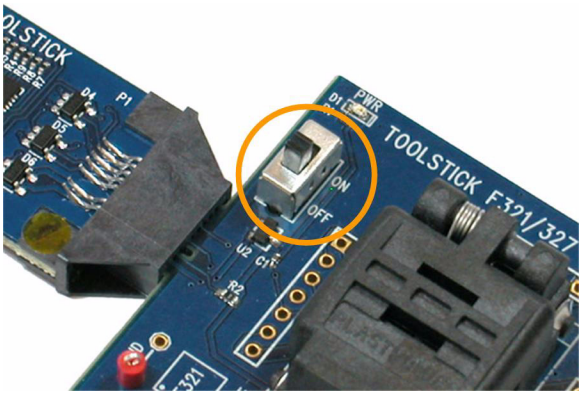

Figure 6. Switch on Daughter Card Moved to the OFF Position

Step 3. Insert the MCU into the socket

Note: The Programming Adapter has a diagram of the MCU that shows the proper orientation of the MCU in the socket. The circle in the diagram corresponds to the circle on the top-side of the package. Please check the orientation of the device before inserting into the socket. Inserting the device incorrectly into the socket could damage the device.

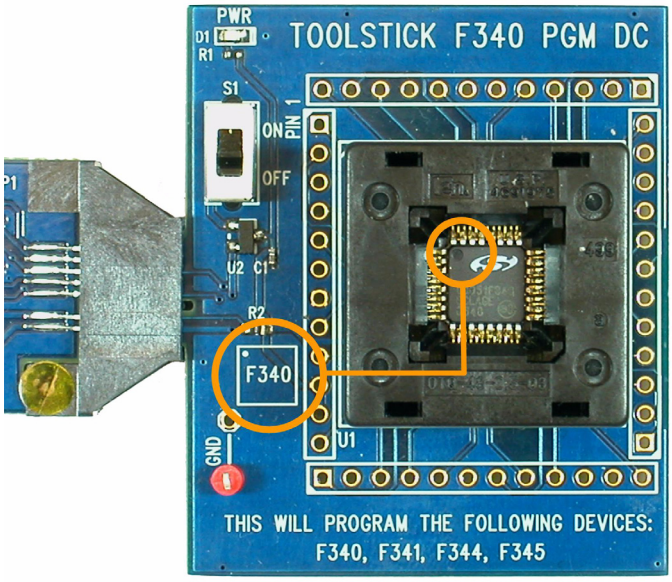

Figure 7. Socket Orientation

The procedure for inserting the device into the socket depends on the type of socket (Clam-Shell, Top-Loader, or ZIF).

Inserting a device into a Clam-Shell socket

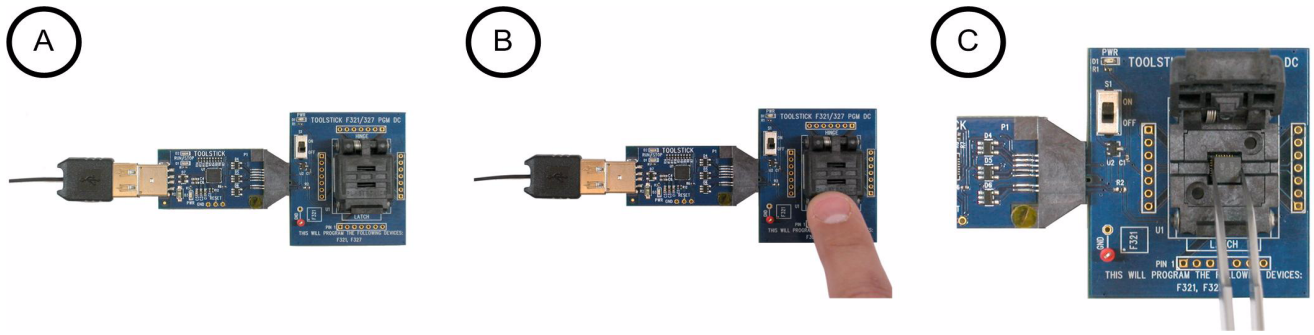

Figure 8. Clam-Shell Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.

B. Press the latch to open the socket.

C. Using the tweezers, carefully insert the device into the socket in the same orientation that is shown in the orientation diagram on the daughter card.

D. Slowly close the socket so that the device does not move during the process.

Inserting a Device into a Top-loading Socket

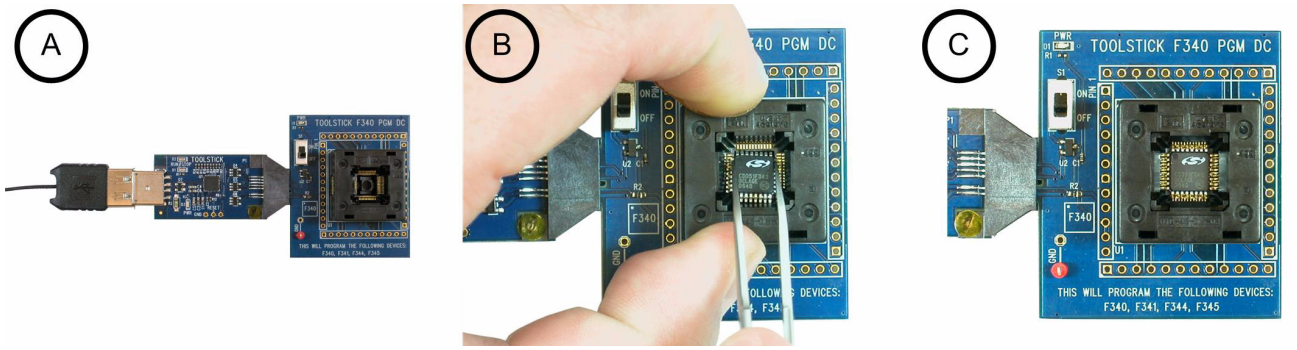

Figure 9. Top-loading Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.

B. Using one hand, press the socket downward to open the space for the device. Use tweezers to carefully put the device into the socket in the same orientation that is shown in the orientation diagram on the daughter card. Release the downward pressure once the device is properly situated.

C. Examine the socket and confirm that the device is properly aligned.

Inserting a Device into a ZIF Socket

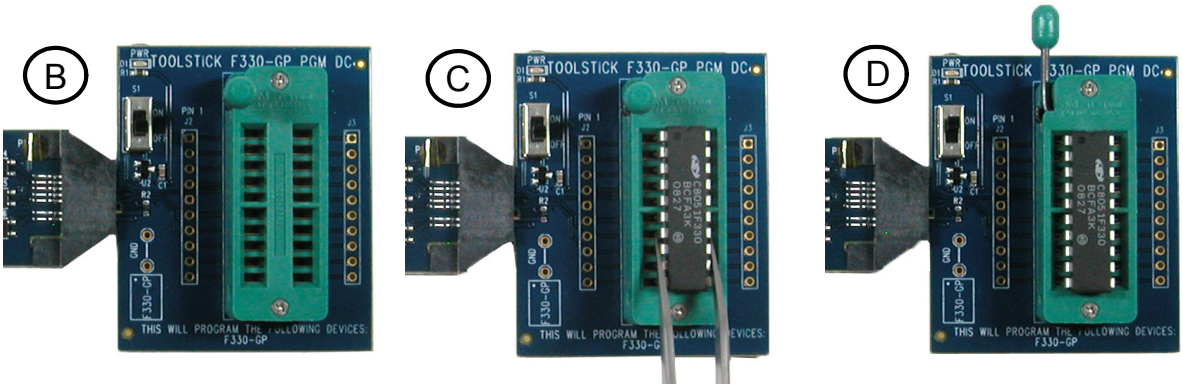

Figure 10. ZIF Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.

B. Move the lever to the open position

C. Use tweezers to carefully put the device into the socket in the same orientation that is shown in the orientation diagram on the daughter card.

D. Move the lever to the closed position.

E. Examine the socket and confirm that the device is properly aligned

Step 4. Move the Switch to the ON position.

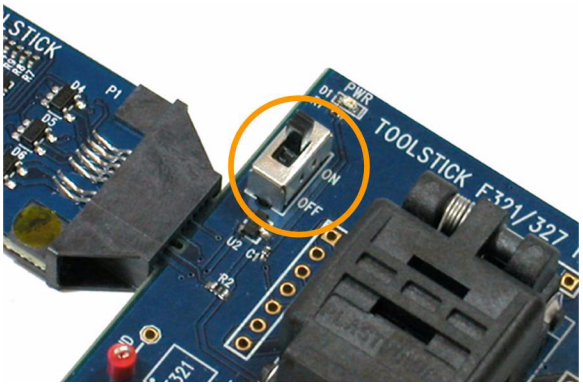

Figure 11. Switch in the ON Position

Step 5. Download the firmware to the MCU using the MCU Programming Utility

Note: this step assumes that the MCU Programming Utility has been configured using the instructions provided in Section 5. "Software Installation Instructions".

A. Verify that the settings are correct in the "Current Configuration."

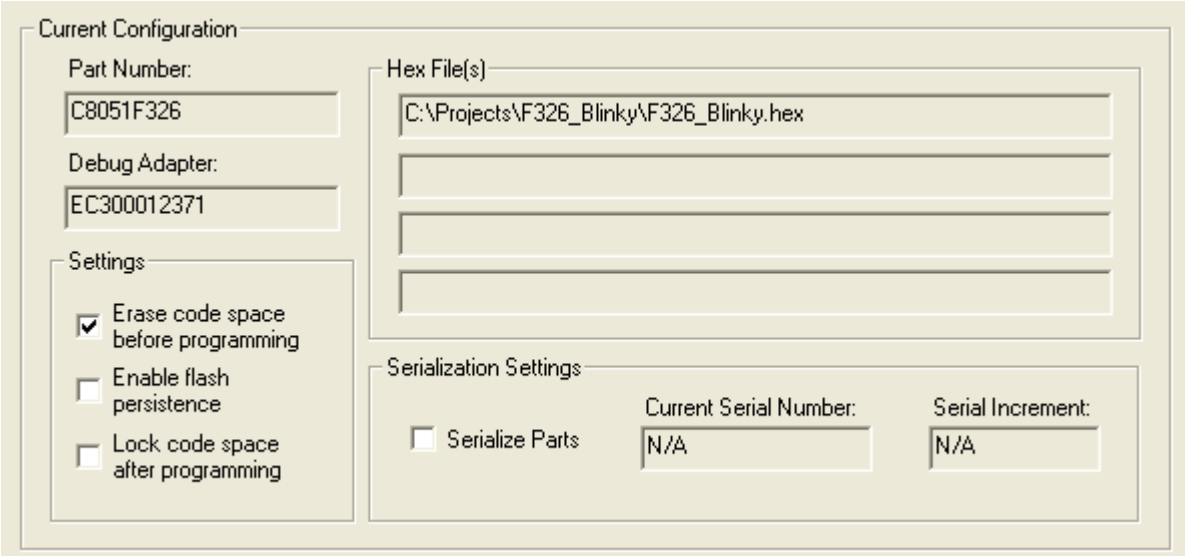

Figure 12. Current Configuration

B. Click the "Program Device" button to program the MCU.

Figure 13. Program Device Button

C. Verify that the MCU is programmed correctly by checking the Status Log.

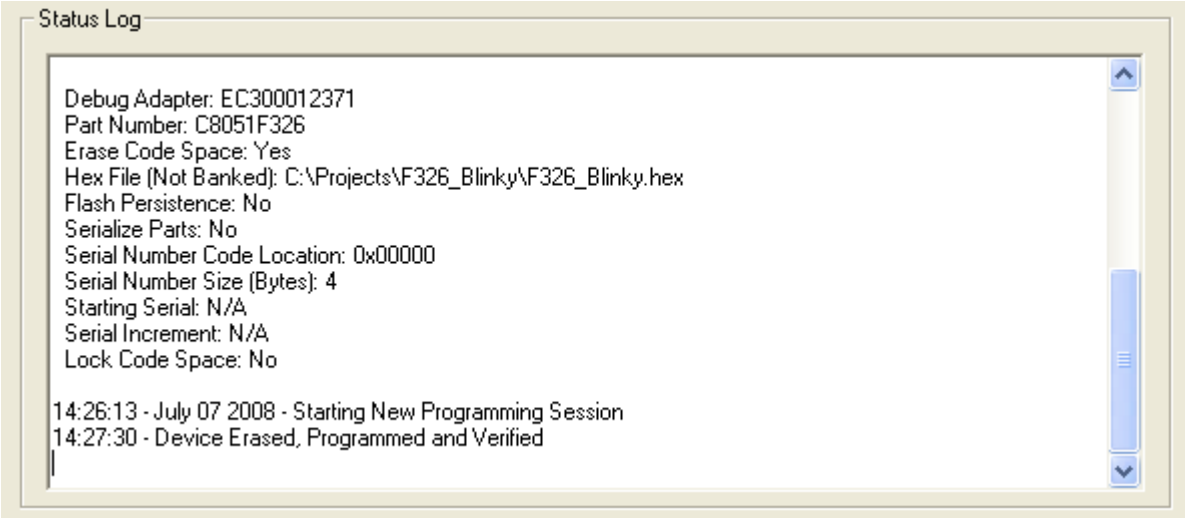

Figure 14. Status Log

Step 6. Turn the switch to the OFF position.

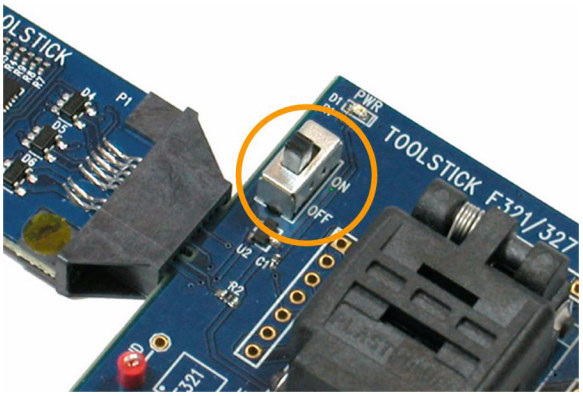

Figure 15. Switch in the OFF Position

Step 7. Remove the device.

Note: Removing the device before power has been removed from the daughter card could damage the device.

Removing the Device from a Clam-Shell Socket

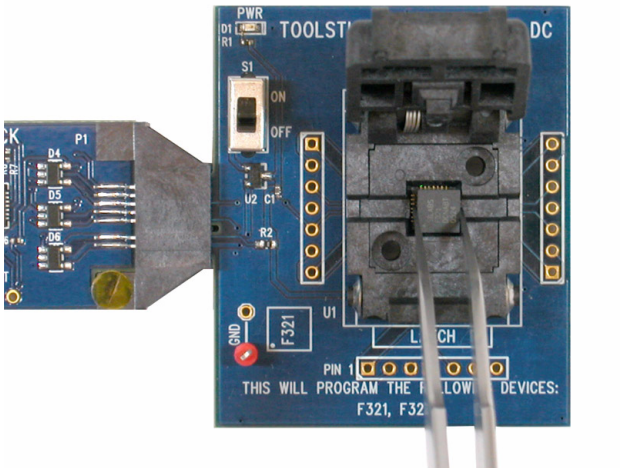

Figure 16. Removing a Device from a Clam-Shell Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.

B. Press the latch to open the socket.

C. Using the tweezers, carefully remove the device from the socket.

Removing the Device from a Top-loading Socket

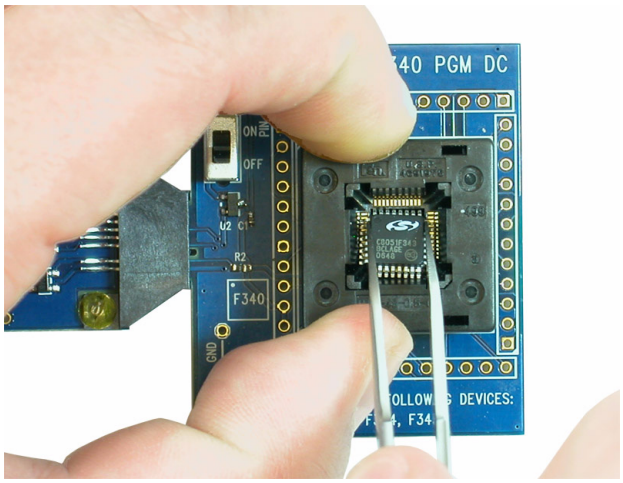

Figure 17. Removing a Device from a Top-loading Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.

B. Using one hand, press the socket downward to open the space for the device. Use tweezers to carefully remove the device from the socket. Release the downward pressure once the device is removed.

Removing the Device from a ZIF Socket

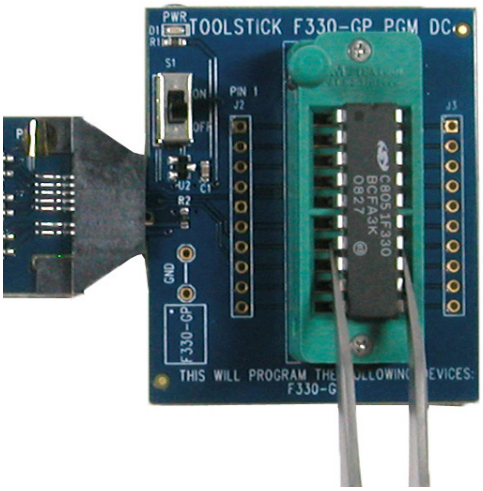

Figure 18. Removing a Device from a ZIF Socket

A. Ensure that the ToolStick Base Adapter and the daughter card are on a level surface.
B. Move the lever to the open position
C. Use tweezers to carefully remove the device from the socket.

To program another device, return to Step 3.

DOCUMENT CHANGE LIST:

Revision 0.2 to Revision 0.3

- Added documentation for ZIF sockets.
- Updated screenshots for new version of the MCU Production Programmer.

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