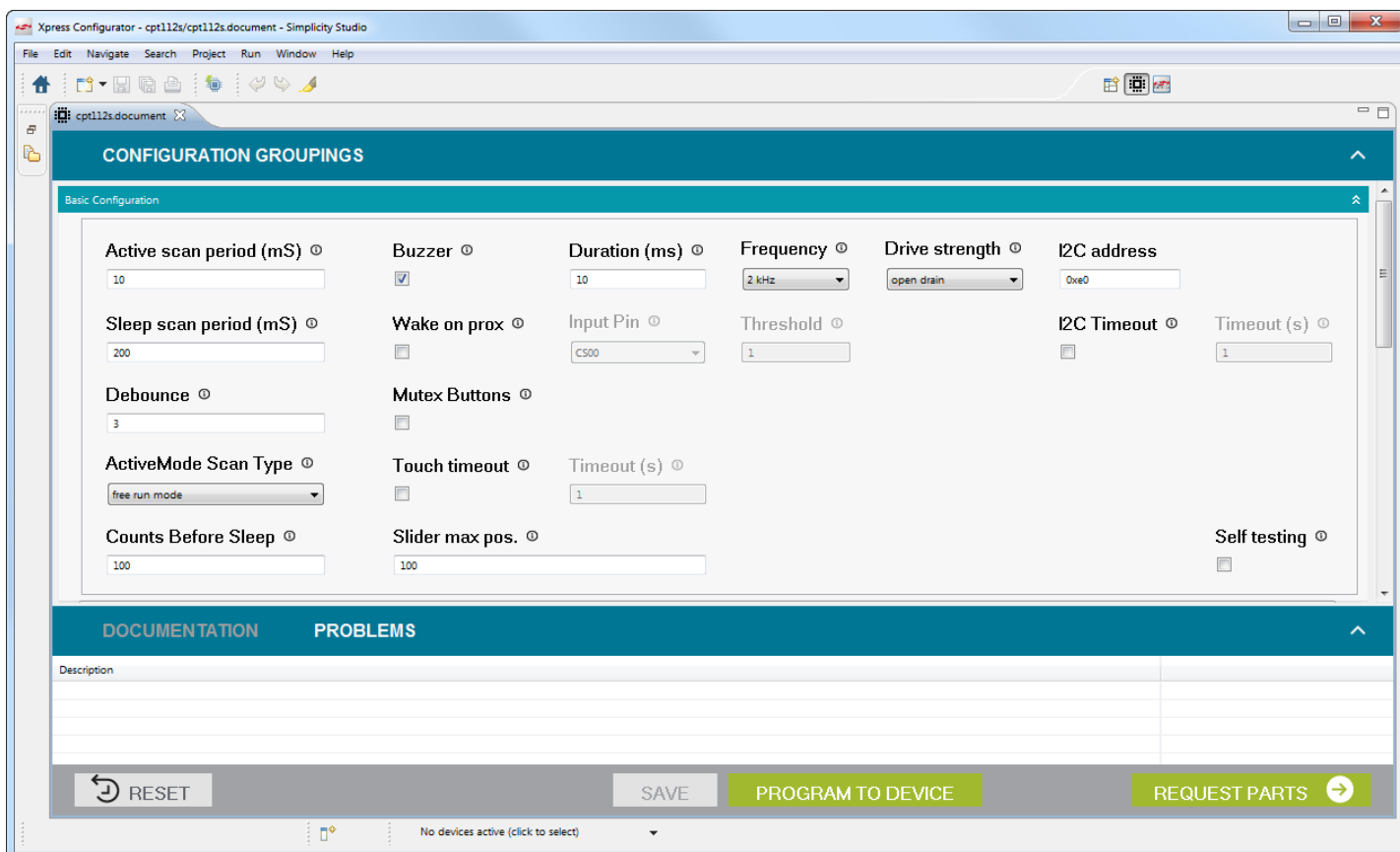# AN949: TouchXpress™ Programming Guide

This application note gives an overview of the programming options available for Silicon Labs TouchXpress CPT devices.

The two main categories for programming devices are in-system programming and pre-programming. The most appropriate type of programming depends on the number of devices being programmed and whether access is available to the configuration pins of the device. Additional information on production programming for Silicon Labs in general can be found on the website: https://www.silabs.com/products/mcu/Pages/ProgrammingOptions.aspx.

1. In-System Programming

In-system programming involves programming devices after installation in the end system, as in the case of the Capacitive Sense Evaluation Boards. In this scenario, access to the config pins (Config Clk or Config Data) is provided in the end system to enable connection to a programming master. This programming master can be a Silicon Labs USB Debug Adapter (UDA) or a ToolStick Base Adapter.

The 8-bit USB Debug Adapter (DEBUGADPTR1-USB, available here: https://www.silabs.com/products/mcu/Pages/USBDebug.aspx) or the ToolStick Debug Adapter (available at http://www.silabs.com/toolstick) can be used to program TouchXpress devices. These adapters provide a 2 x 5 0.1" header that can be connected to the custom PCB to program the TouchXpress device. If this header is too large for the application system, three test points can be located on the edge of the PCB for use with an adapter cable.
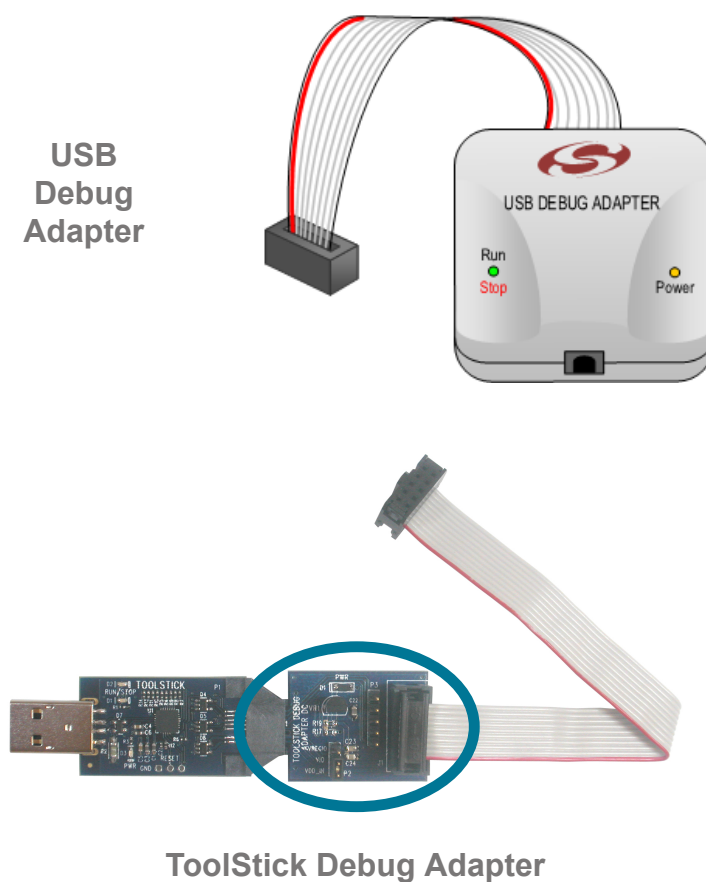
Figure 1.1. USB Debug Adapter and ToolStick Debug Adapter

The required connections to program a TouchXpress device with the USB Debug Adpater or ToolStick Debug Adapter are:

Table 1.1. Required Connections for USB Debug Adapter or ToolStick Debug Adapter Programming

TouchXpress Device Pin	USB Debug Adapter or ToolStick Debug Adapter Pin
Config Clk	TDI / C2CK (pin 7)
Config Data	TCK / C2D (pin 4)
GND	GND (Ground) (pins 2, 3, or 9)

More information on the USB Debug Adapter can be found in the USB Debug Adapter User Guide, which is available from the page linked above. More information about the ToolStick Debug Adapter can be found in the ToolStick Debug Adapter User Guide, which is linked on the ToolStick website (http://www.silabs.com/toolstick).
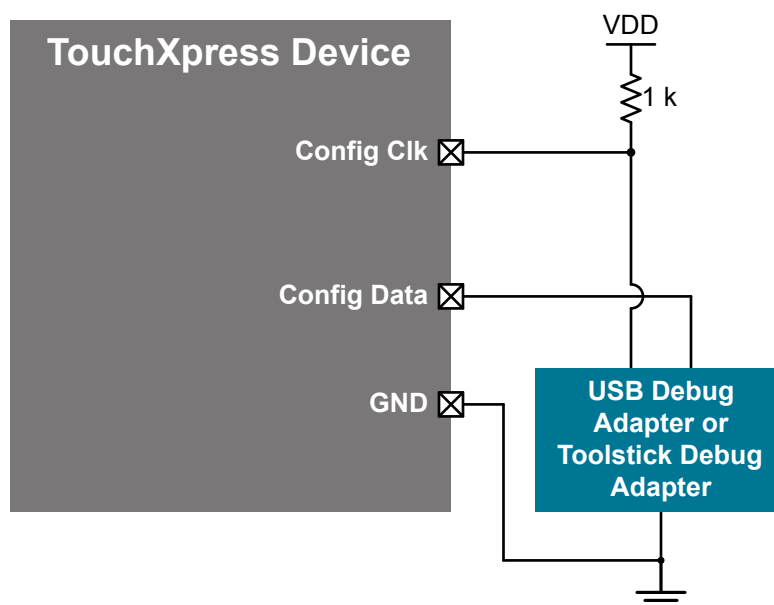
Figure 1.2. Programming a TouchXpress Device with a USB Debug Adapter or ToolStick Debug Adapter

Systems using these debug adapters should use the [**Xpress Configurator**] tile in Simplicity Studio to program the devices. More information about [**Xpress Configurator**] is available in AN0829: "Capacitive Sensing Library Configuration Guide." Application notes can be accessed within Simplicity Studio using the [**Application Notes**] tile or on the Silicon Labs website (www.silabs.com/interface-app-notes).

Figure 1.3. Xpress Configurator in Simplicity Studio

2. Pre-Programmed Devices

Pre-programmed devices are useful for end systems that do not provide access to the configuration pins on the device. Devices are programmed before being installed in the 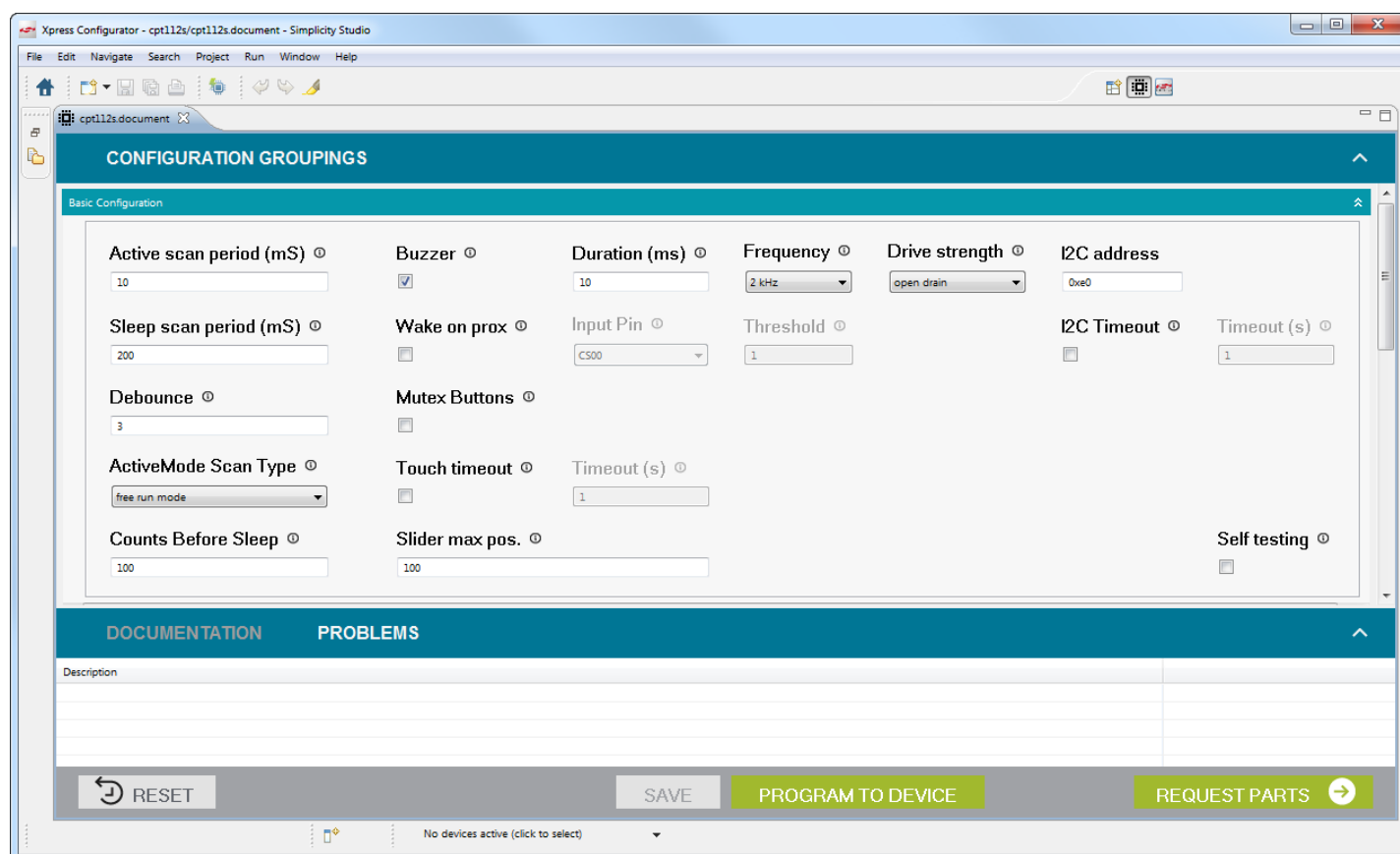end system. Pre-programming options include using a ToolStick programming socket, using a third-party programmer, or using Silicon Labs' in-house programming service.

2.1 Using a ToolStick Socket

The ToolStick sockets are available from http://www.silabs.com/toolstick. The ToolStick socket that's compatible with the CPT007B and CPT112S TouchXpress devices is the **ToolStick990MPP**.
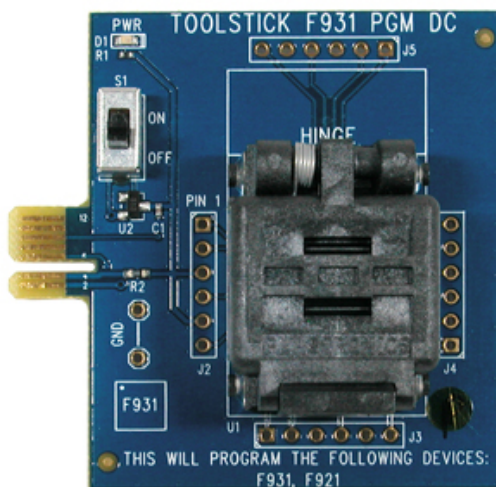

Figure 2.1. Example ToolStick Socket Board

The socket connects to a ToolStick Base Adapter. The following steps are initial setup instructions that must be completed once:

1. Download and install Simplicity Studio (http://www.silabs.com/simplicity) on the programming PC.
2. The auto-detect feature in Simplicity Studio can cause a CPT device to miss touches. First disable automatic detection by clicking the [**Settings**] icon, selecting [**Device Manager**]>[**TCF Device Discovery**], and selecting [**Never**] for [**USB Discovery Options**]. Click [**OK**].
3. Ensure the socket switch is in the OFF position.
4. Connect the board to the ToolStick Base Adapter.
5. Connect the ToolStick Base Adapter to the PC.

The programming procedure for this socket is:

1. Place the TouchXpress device to be programmed into the socket, using the guide in the corner to ensure proper orientation.
2. Move the socket board switch to the ON position.
3. Click the [**Refresh detected hardware**] button in Simplicity Studio.
4. Select the device under [**Detected Hardware**].
5. Click the [**Xpress Configurator**] tile.
6. Load the desired configuration and click the [**Program to Device**] button.
7. Move the socket board switch to the OFF position.
8. Remove the device from the socket.

More information about [**Xpress Configurator**] is available in AN0829: "Capacitive Sensing Library Configuration Guide." Application notes can be accessed within Simplicity Studio using the [**Application Notes**] tile or on the Silicon Labs website (www.silabs.com/interface-appnotes).

2.2 Third-Party Programmers

Support for Silicon Labs devices is being integrated into third-party production programmers from suppliers found on the Programming Options page from the Silicon Labs website: https://www.silabs.com/products/mcu/Pages/ProgrammingOptions.aspx. Contact these suppliers for more information about their programming solutions.

2.3 In-House Programming

For production orders, Silicon Labs offers a programming service for all TouchXpress devices. The pre-programmed devices can be installed directly in the end system without providing access to the debug pins. Contact your local sales representative for more information about this service: http://www.silabs.com/buysample/Pages/contact-sales.aspx.
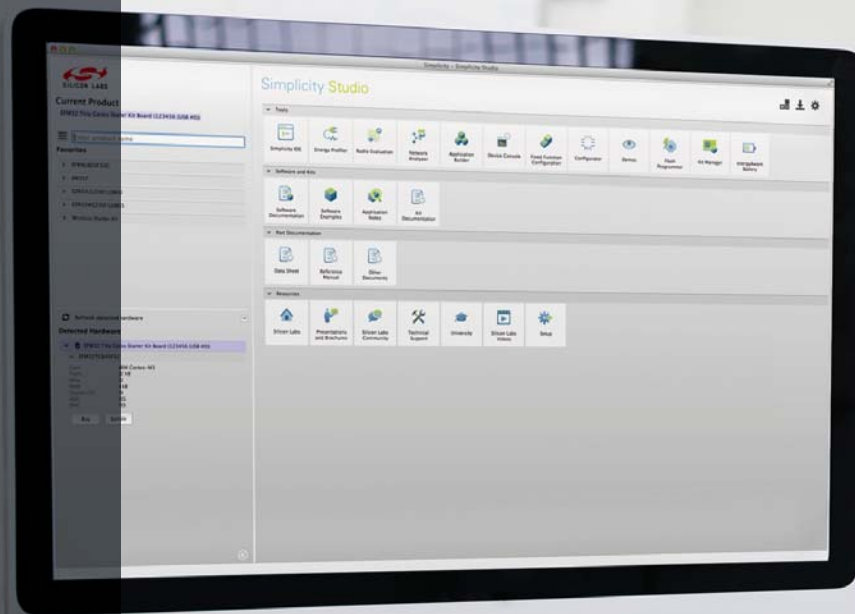
Simplicity Studio

One-click access to MCU and wireless tools, documentation, software, source code libraries & more. Available for Windows, Mac and Linux!

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