

## Si5338/Si5356 FIELD PROGRAMMING KIT USER'S GUIDE

### Description

The Si5338/Si5356 Field Programming Kit provides all of the tools necessary for writing a new configuration file to the one-time programmable (OTP) non-volatile memory (NVM) in the Si5338/Si5356 any-frequency, any-output clock generator. This user's guide describes the procedure for writing to the device NVM.

### Field Programming Kit Features

- Fully-powered from a single USB port
- High-quality and easy-to-use socket
- Simple software-based user interface
- Status LEDs for Pass or Fail indication

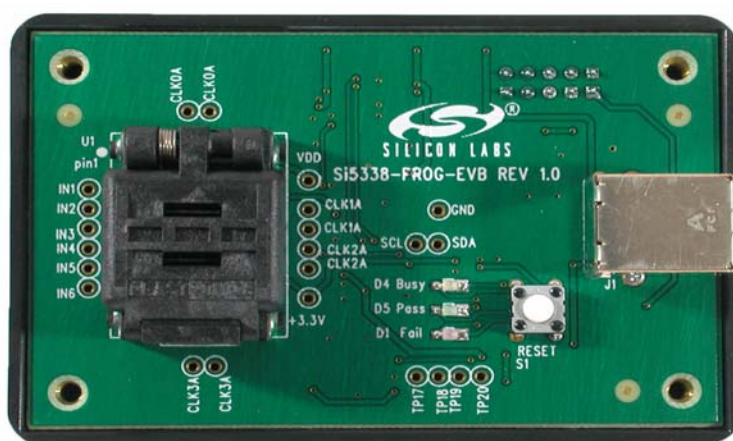


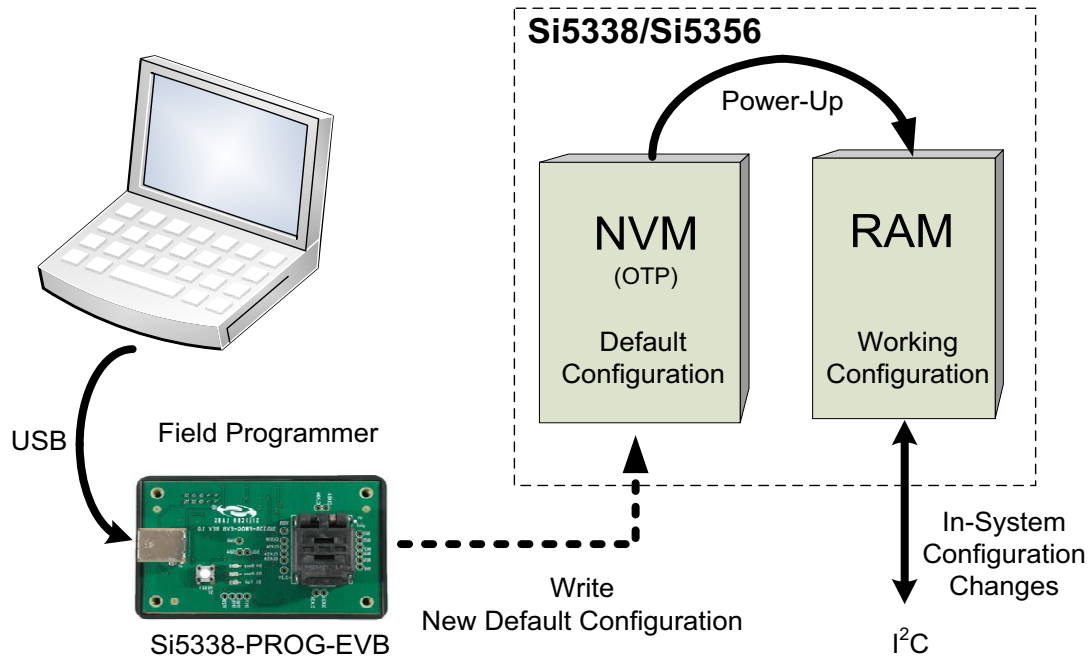
Figure 1. Si5338-PROG-EVB

# Si5338/56-PROG-EVB

## 1. Introduction

The Si5338/Si5356 is a highly-flexible and configurable clock generator/clock buffer. The device has a factory-defined default configuration stored in non-volatile memory (NVM). During powerup, the default configuration is copied into the random access memory (RAM). Having its working configuration stored in RAM allows in-system configuration changes through the I<sup>2</sup>C port. During a power cycle, any configuration changes stored in RAM are overwritten with the factory default configuration from the NVM.

The NVM is a one-time-programmable (OTP) memory that allows a user to define the default configuration. This is a useful feature, especially if the Si5338/Si5356 is providing clocks to devices that require pre-defined clocks at powerup. As its name implies, the OTP NVM can only be written once.



**Figure 2. Memory Configuration**

The field programming kit allows writing a new default configuration to the Si5338's NVM memory. The kit consists of the Field Programmer (Si5338-PROG-EVB), a USB cable, and the ClockBuilder™ Desktop Software. This user's guide outlines the steps necessary to write new default values to the NVM.

The NVM file must be created before writing it to the Si5338/Si5356. The NVM file is created using the ClockBuilder Desktop, which is part of the ClockBuilder Desktop Software. NVM file support for the Si5356 is in version 2.6 or later of the ClockBuilder Desktop Software. Version 2.5 or older only supports the Si5338. As always, use the latest software version for best results. See "Appendix B—Installing the ClockBuilder Desktop Software" on page 10 for installation instructions. Refer to the Si5338 or Si5356 user's guides (available at [www.silabs.com](http://www.silabs.com)) for information on using the ClockBuilder Desktop software.

## 2. Overview of Generating and Writing to NVM

The process of generating and writing an NVM file to the device is shown in Figure 3.

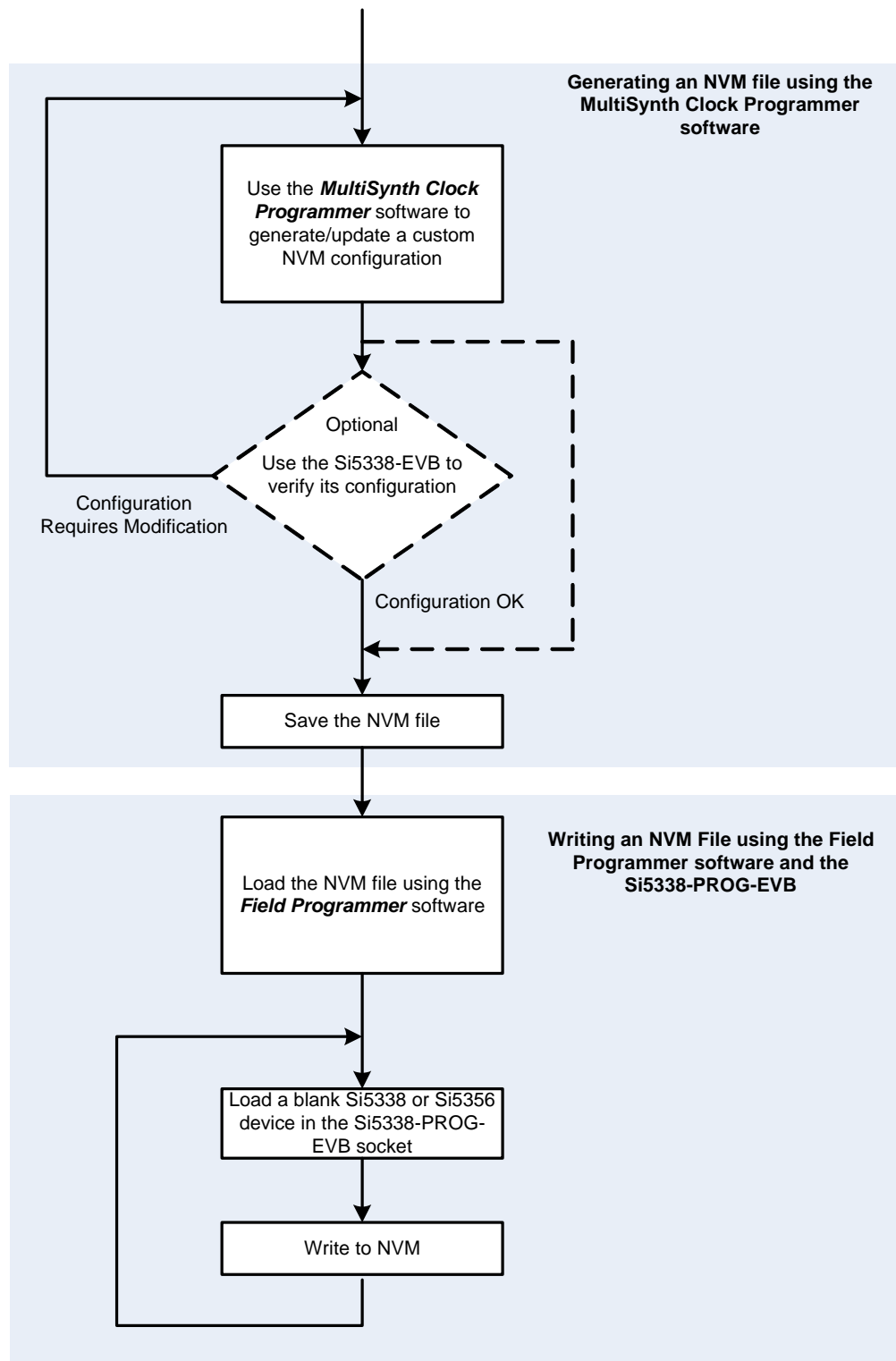


Figure 3. Generating and Writing an NVM File to the Device

# Si5338/56-PROG-EVB

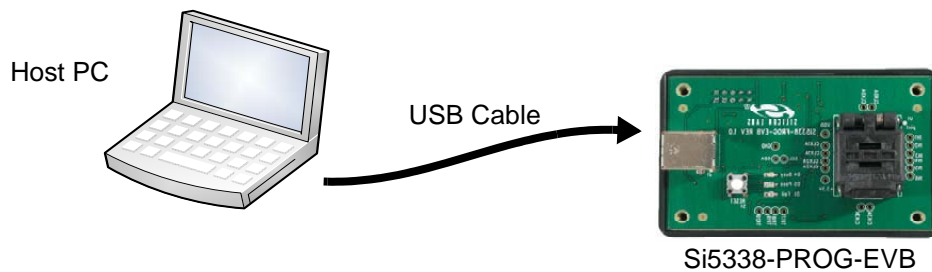
## 3. Getting Started with the Si5338/Si5356 Field Programmer (Si5338-PROG-EVB)

### 3.1. Installing the Software

Before connecting the Field Programmer (Si5338-PROG-EVB) to the host PC, the latest version of the ClockBuilder Desktop Software must be installed. Refer to "Appendix B—Installing the ClockBuilder Desktop Software" on page 10 for software installation instructions.

### 3.2. Connecting the Hardware

Connect a USB cable from the Si5338-PROG-EVB to the host PC. The Field Programmer is fully powered from the USB port, so no other connections are necessary.



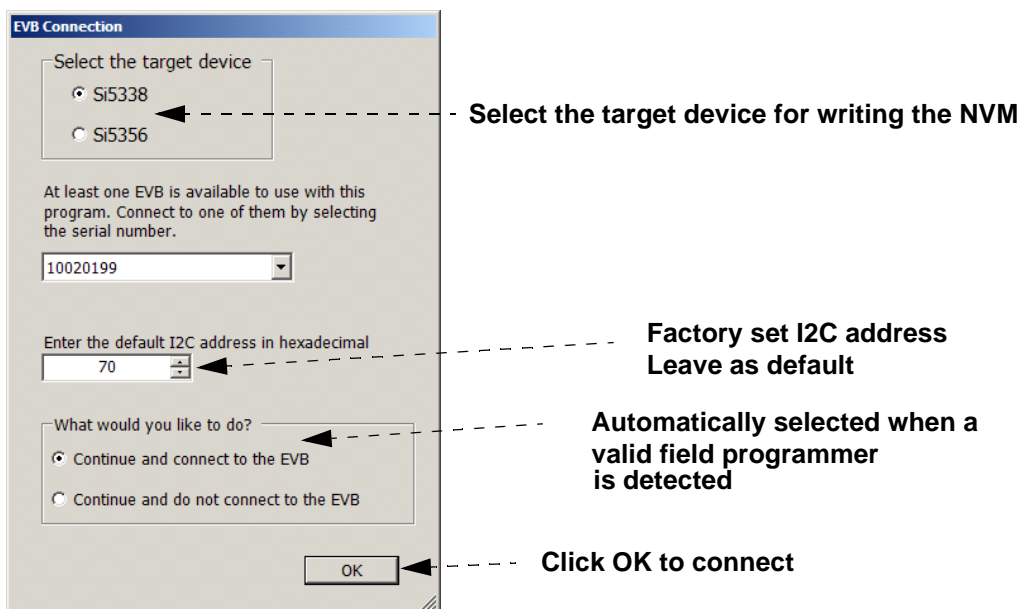
### 3.3. Running the Software

Once installed, run the *Field Programmer* software from the Windows Start menu.

**Start → Programs → Silicon Laboratories → ClockBuilder Desktop Software → Field Programmer**

#### 3.3.1. Setting up Communication

1. Select the desired target device, Si5356 or Si5338. The one that is selected must be placed in the socket when it is time to program the NVM.
2. Before the software connects with the Field Programmer (Si5338-PROG-EVB), it automatically detects its serial number. If more than one field programmer is connected to the same PC, use the drop-down box to select one of the field programmers. This feature allows one PC to control several field programmers simultaneously.



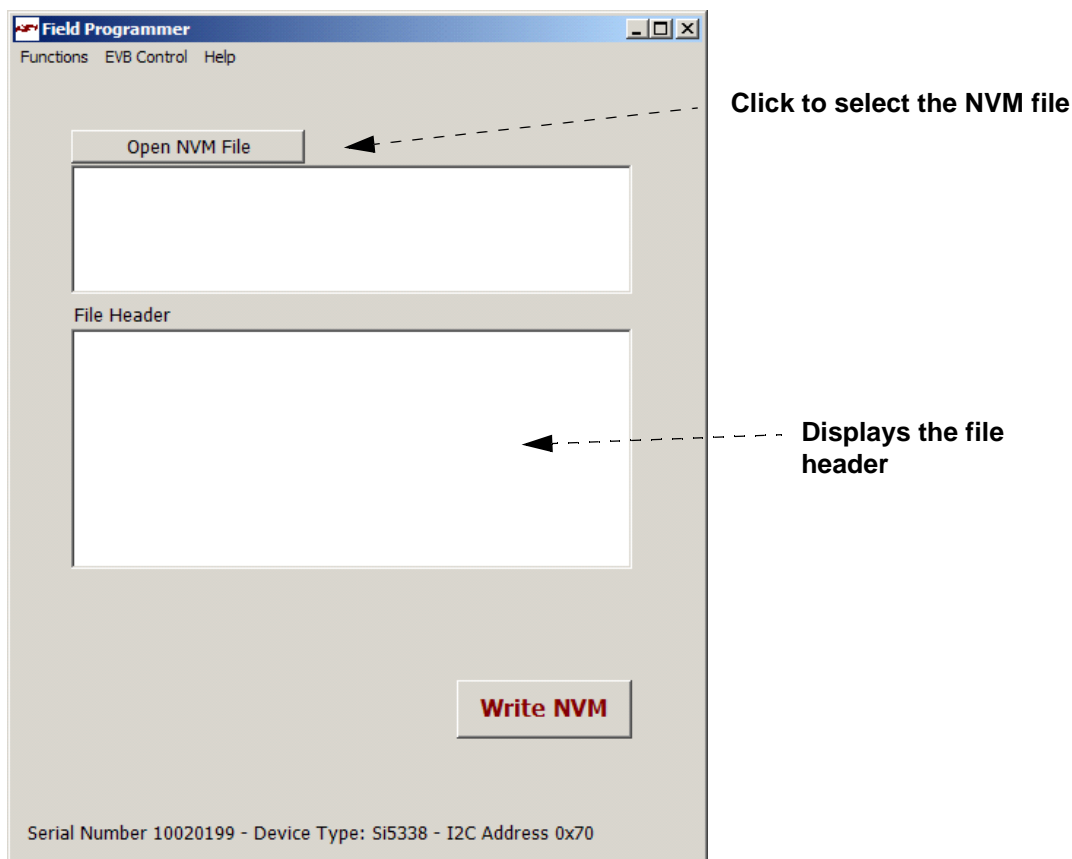
3. All devices shipped from the factory are pre-programmed with an I<sup>2</sup>C address of 0x70. The field programmer software will automatically use this I<sup>2</sup>C address when communicating with a device loaded into the socket. If the device has a different I<sup>2</sup>C address, enter its new address in the box provided.
4. If the PC is connected to a valid field programmer, it will automatically select “*Continue and connect to the EVB*”. If “*Continue and do not connect to the EVB*” is selected, the software could not find a valid field programmer. Ensure that the field programmer (Si5338-PROG-EVB) is properly connected to the host PC using a cable.
5. Click on OK.

## 4. Getting Ready to Write The NVM File

The NVM File contains all of the information needed to configure the NVM. Valid Register Map Files have a .nvm extension and are created using the *ClockBuilder Desktop* software included in the Si5338-EVB or Si5356-EVB. For more information about creating an NVM File, see the software User Guide available by clicking **Help** → **Help** in any of the software.

### 4.1. Loading the NVM File

Click on the “*Open Register Map File*” button to select the desired .nvm file. The header of the register map file is displayed in the File Header window if the software detects that it is a valid NVM file.

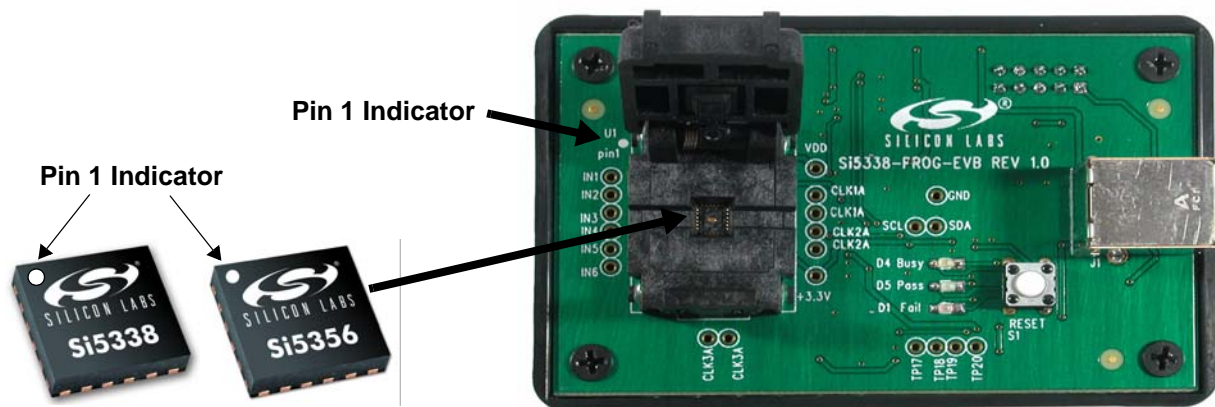


## 4.2. Load a Blank Device in the Socket

1. Before writing the NVM, a device must be loaded into the socket as shown below. Pull the lever to unlock the lid. Ensure that there is not another device in the socket before proceeding. **Note: Some field programming kits are shipped with a plastic slug loaded in the socket. This plastic slug must be removed before loading a device.**



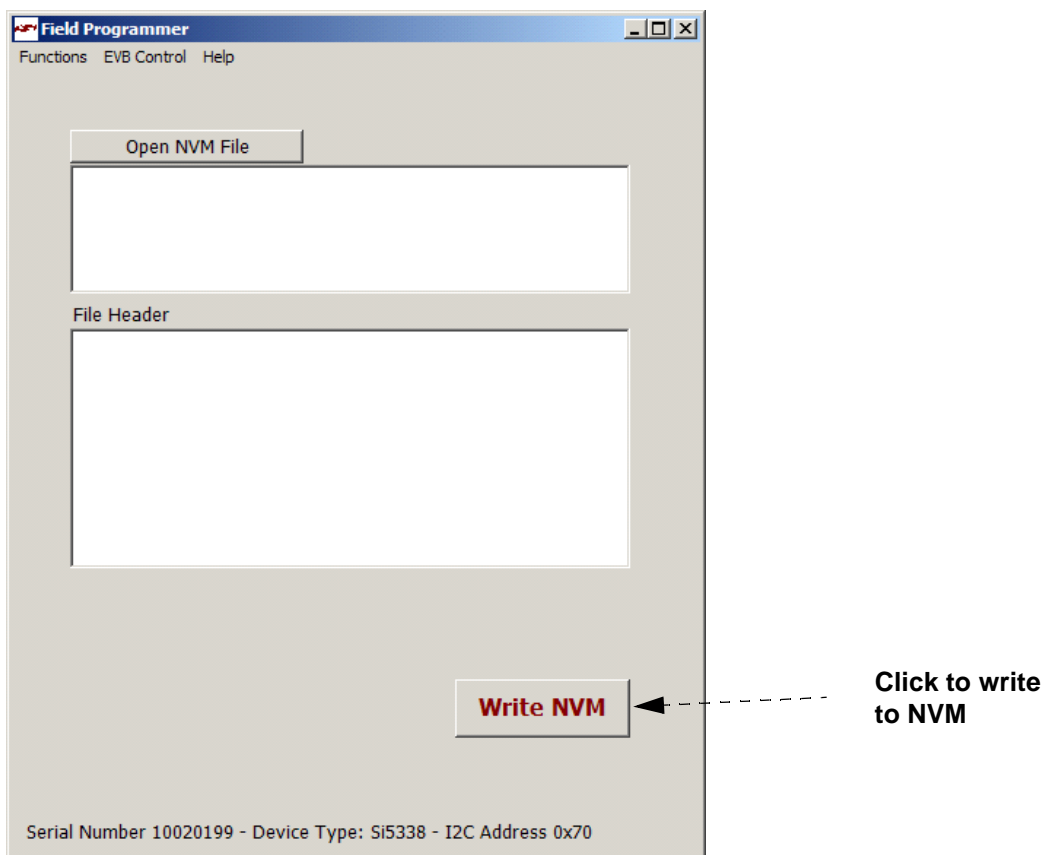
2. Insert a blank Si5338 or Si5356 device in the socket using a pair of tweezers or a suction tool. **It is very important that the Si5338 or Si5356 be inserted into the socket with the correct pin 1 orientation.** Pin 1 on the device is marked with a white dot. Pin 1 on the socket is labeled on the PCB as shown below.



3. Once the device is properly loaded, close the lid. Ensure that the lid is fully closed and in the locked position. Some tension is normal when closing the lid. This ensures proper contact with the device.

## 5. Write to NVM

1. Click on the “Write NVM” button to make a final write to the one-time programmable NVM. Writing to the NVM should only take a few seconds. When writing to the NVM is successful, the green LED will light. If there was an error while writing to the NVM, the red LED will light. See the “Appendix A—Troubleshooting Guide” on page 9 to find the possible causes of an NVM failure.



2. Once the NVM is written, the device is ready for use.
3. Remove the device from the socket.
4. Load a new device into the socket.
5. Press the Write NVM button.
6. Repeat Steps 3 to 5.



## APPENDIX A—TROUBLESHOOTING GUIDE

Use this guide to help troubleshoot possible sources of errors when an NVM write fails.

### Writing to NVM Results in a “Fail” Status



#### Possible Causes

1. A device can only be programmed once. If the device loaded into the socket has already been programmed (NVM was previously written), it cannot be re-programmed. This will cause a fail status. Load a blank device into the socket.
2. Writing to NVM failed. The device may be defective and should be discarded. Load a new device into the socket.

### Writing to NVM Causes the “Busy” LED to Stay On



#### Possible Causes

1. The device loaded into the socket has incorrect polarity. Refer to “4.2. Load a Blank Device in the Socket” for proper device orientation. Press the reset button on the Si5338-PROG-EVB; discard the device in the socket, and load a blank device into the socket.
2. There is no device loaded in the socket. Press the reset button on the Si5338-PROG-EVB and load a blank device into the socket.

Before connecting the Field Programmer (Si5338-PROG-EVB) to the host PC, ensure that the ClockBuilder Desktop Software has been installed on your PC. The software is shipped on a CD with the Si5338/Si5356 Field Programming Kit, or it can be downloaded from the Silicon Laboratories website ([www.silabs.com](http://www.silabs.com)).

The ClockBuilder Desktop Software contains the following programs:

- **ClockBuilder Desktop** (used to control the Si5338-EVB and Si5336-EVB)
- **Field Programmer** (used to control the Si5338-PROG-EVB)
- **Register Programmer** (used to read and write registers from the Si5338-EVB and Si5336-EVB)

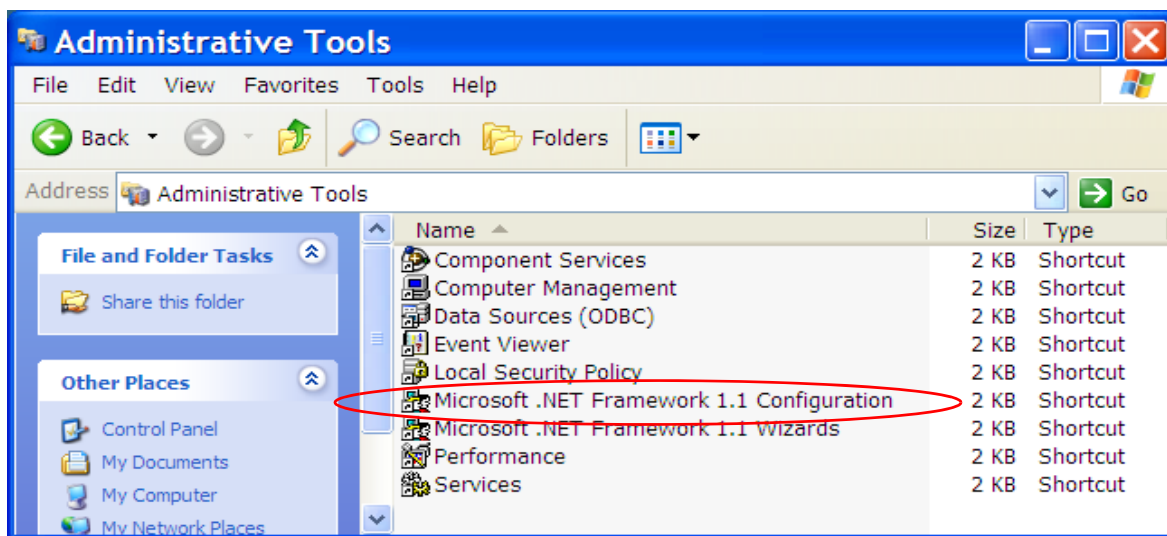
### System Requirements

- Microsoft Windows 2000® or Windows XP® or Windows Vista®
- USB 2.0
- 3.5 MB of free hard drive space
- 1024 x 768 screen resolution or greater screen resolution
- Microsoft .NET Framework 1.1
- USBXpress® 3.1.1 driver

**Note:** The USBXpress 3.1.1 driver is provided and installed with the software. Different versions of USBXpress (available from other EVB kits or online) have not been tested with this software.

### Microsoft .NET Framework

Microsoft .NET Framework 1.1 must be installed on your system before installing and running the ClockBuilder Desktop Software. To verify, click **Start > Control Panel > Administrative Tools** on the Windows start menu. If *Microsoft .NET Framework 1.1 Configuration* does not appear in the list, it will have to be installed as described in the following section.



## Installing Microsoft .NET Framework 1.1

Skip this section if Microsoft .NET Framework 1.1 has already been installed to your system. See Section for details. Installation instructions for the .NET Framework are available from the Microsoft website using the following link:

<http://www.microsoft.com/downloads/details.aspx?FamilyId=262D25E3-F589-4842-8157-034D1E7CF3A3&displaylang=en>

There are several versions of the .NET Framework available from Microsoft. Multiple versions can be installed on the same PC. The Software requires Version 1.1. Contact your system administrator for more details.

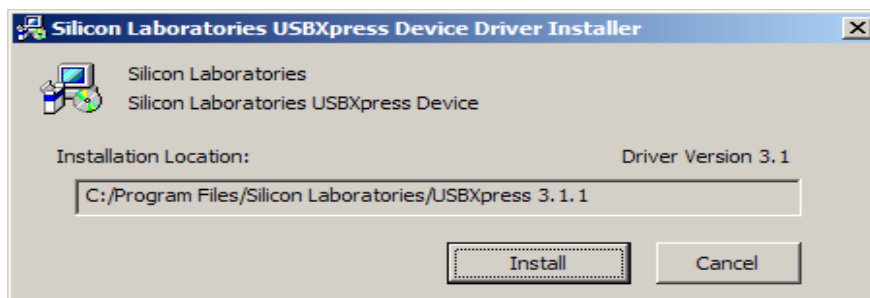
## ClockBuilder Desktop Software Installation

The ClockBuilder Desktop Software is installed from the ClockBuilderDesktopSwInstall.exe file.

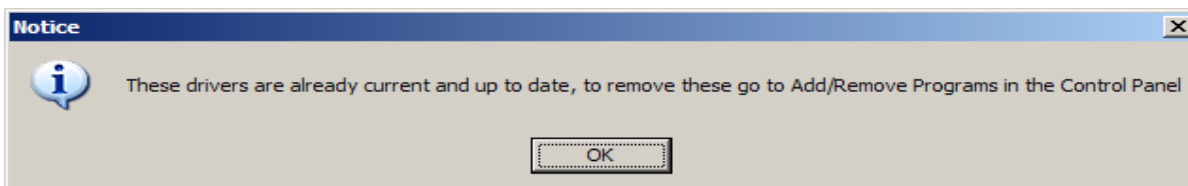
1. Double-click the ClockBuilderDesktopSwInstall.exe file to start the wizard.
2. Follow the instructions to complete the installation for both the software and the USB driver. Use the default installation location for best results.
3. Once the software installation is complete, refer to the next section for the USB driver installation.

## USBXpress Driver Installation

The Field Programmer uses the Silicon Laboratories' USBXpress driver to allow the EVB to communicate with the host PC. The driver must be installed after the ClockBuilder Desktop Software is installed. Click Install to run the driver installation.



If the USB driver was already installed from previous Silicon Laboratories evaluation software, it will not be reinstalled. A message box will appear as shown below. Click OK to close the message.



Your software installation is now complete.

Perform the following steps to uninstall the ClockBuilder Desktop Software and USB driver.

1. Close all the programs and help files before running the uninstaller to ensure complete removal of the software.
2. Use the Add and Remove Programs utility in the Control Panel, as shown in Figure 4, or click on **Start** → **Programs** → **Silicon Laboratories** → **ClockBuilder Desktop Software** → **Uninstaller**.

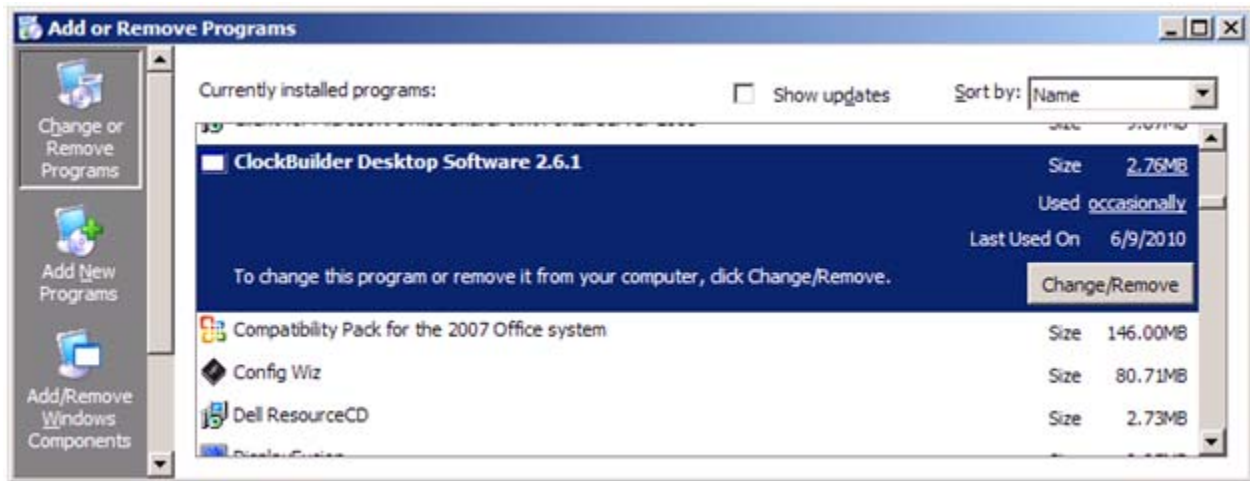


Figure 4. Uninstall in Add and Remove Programs

The USBXpress driver may be removed via the Add and Remove Programs utility in the Control Panel. Locate the entry called Silicon Laboratories USBXpress Device. Click the button and it should show the version and location of what will be removed.

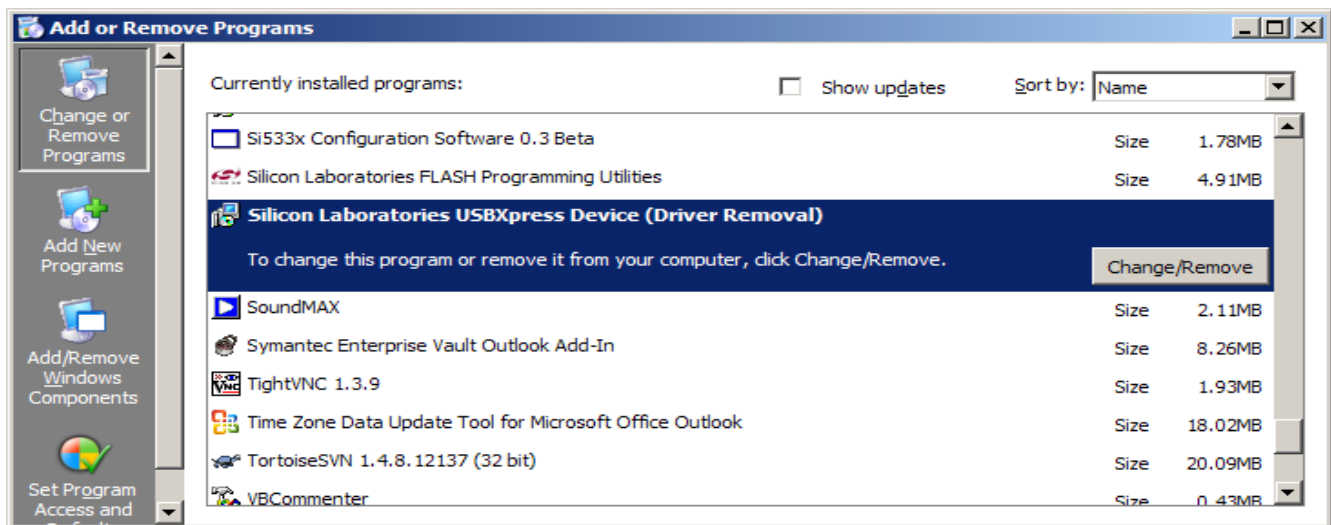


Figure 5. Driver Uninstall Location

## DOCUMENT CHANGE LIST

### Revision 0.1 to Revision 0.2

- Changed “Si533x configuration” to “Any Rate Clock Generator” throughout.
- Changed “Si5338 Programmer” to “MultiSynth Clock Programmer” throughout.
- Updated Figures 3 and 4.

### Revision 0.2 to Revision 0.3

- Changed document title from Si5338-PROG-EVB to Si5338/56-PROG-EVB.
- Added the Si5356 to the Field Programming Kit.

### Revision 0.3 to Revision 0.4

- Changed “Any Rate Clock Generator” to “ClockBuilder Desktop” throughout.
- Changed “MultiSynth Clock Programmer” to “ClockBuilder Desktop” throughout.
- Updated Figure 4 on page 12.

## NOTES:

## CONTACT INFORMATION

Silicon Laboratories Inc.  
400 West Cesar Chavez  
Austin, TX 78701  
Tel: 1+(512) 416-8500  
Fax: 1+(512) 416-9669  
Toll Free: 1+(877) 444-3032

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