# Si5338/56-PROG-EVB

## 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 ClockBuilder Pro user interface
- Status LEDs for Pass or Fail indication

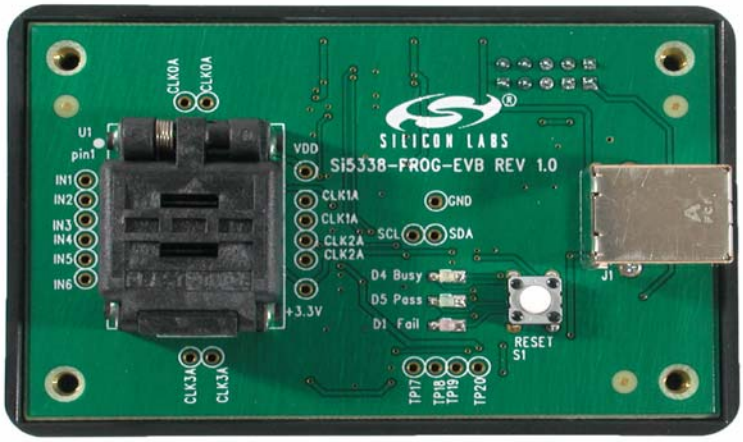


**Figure 1. Si5338-PROG-EVB**


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# 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 $I^2C$ 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.

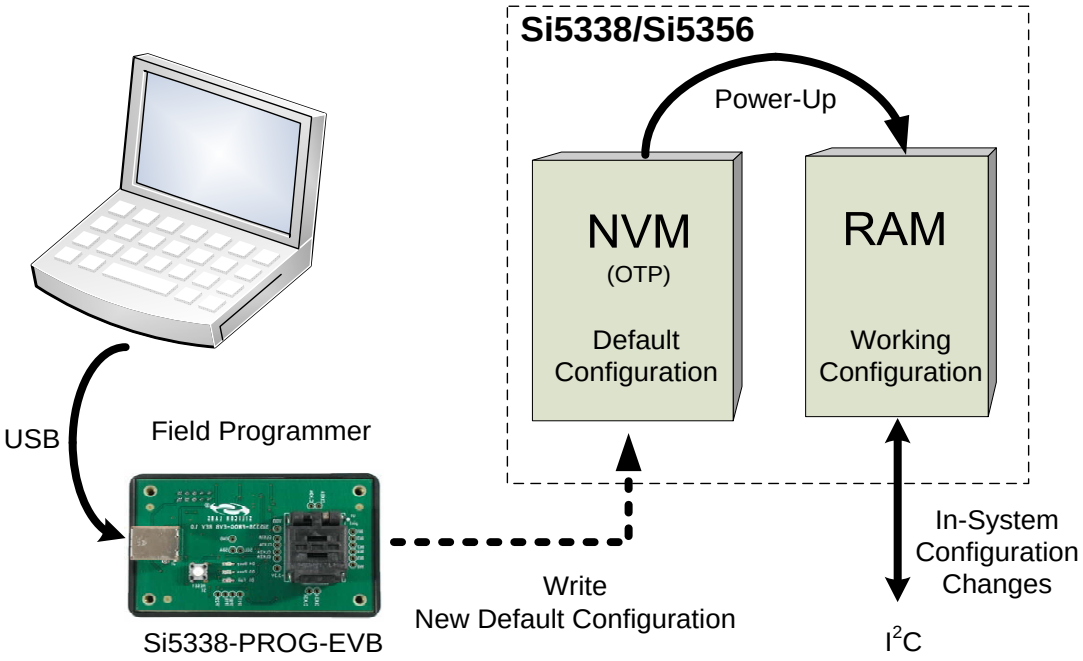



**Figure 2. Memory Configuration**

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) and a USB cable. This user's guide outlines the steps necessary to write new default values to the NVM.

The NVM file must be created in ClockBuilder Pro before writing it to the Si5338/Si5356. NVM file support for the Si5338 and Si5356 is included in version 2.36 or later of the ClockBuilder Pro 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.

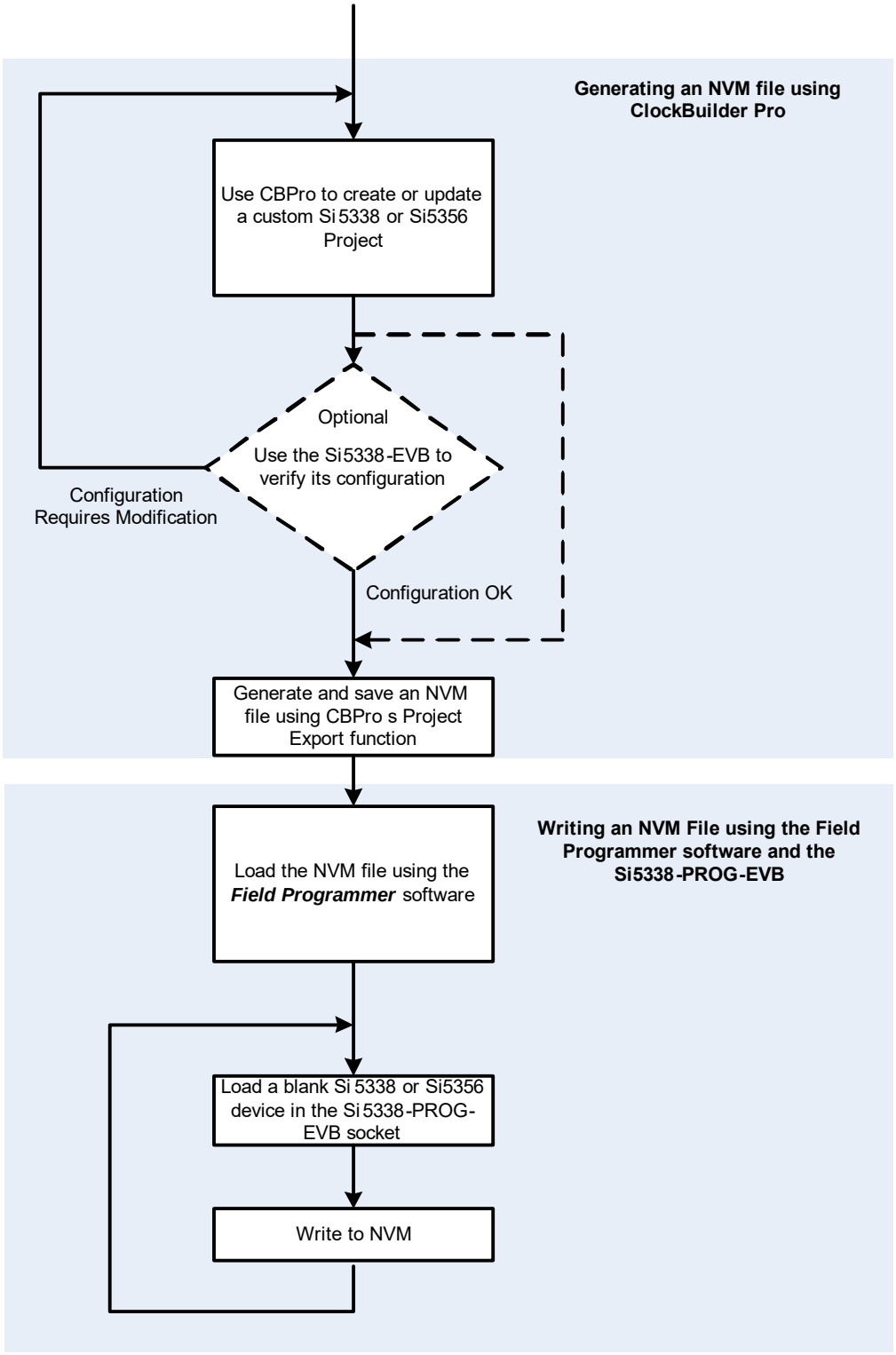



**Figure 3. Generating and Writing an NVM File to the Device**

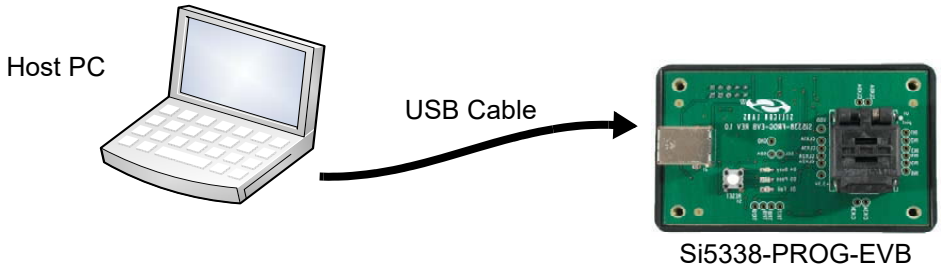
# 3. Getting Started with the Si5338/Si5356 Field Programmer (Si5338-PROG-EVB)

## 3.1. Installing the Software

Before connecting the Field Programmer (Si5338-PROG-EVB) to the host PC, please download and install the latest version of ClockBuilder Pro from the Silicon Labs website.

## 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, open ClockBuilder Pro and connect the Si5338/56-PROG-EVB to the computer with a USB cable. ClockBuilder Pro will recognize the EVB and an option to open the “NVM Program Tool” will show up on the home menu.

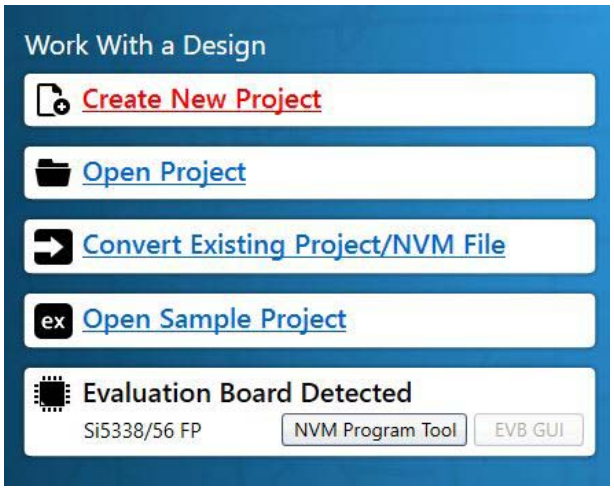
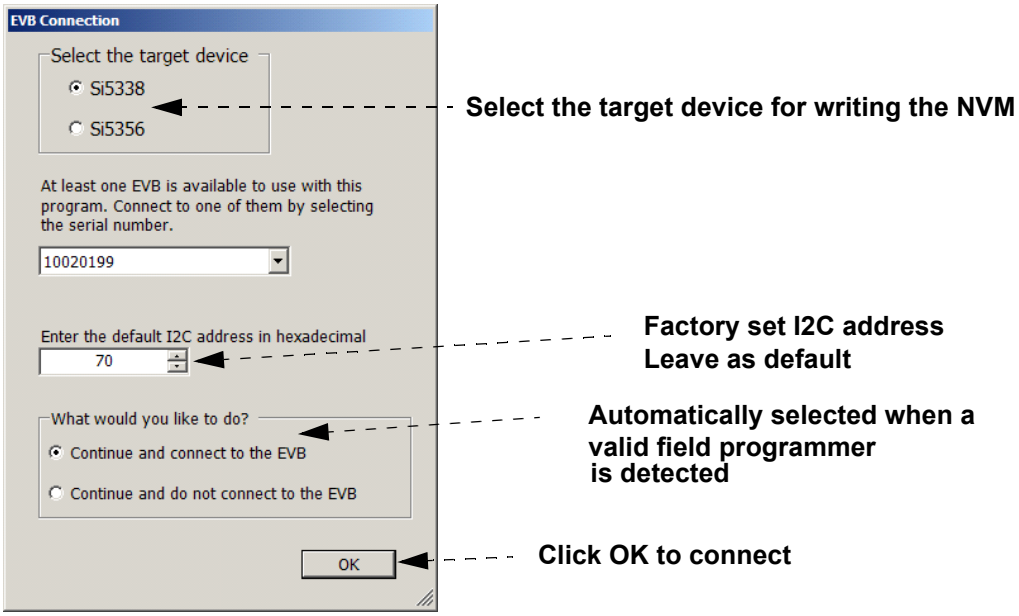



**Figure 4. Field Programmer in ClockBuilder Pro**

### 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 $I^2C$ address of 0x70. The field programmer software will automatically use this $I^2C$ address when communicating with a device loaded into the socket. If the device has a different $I^2C$ 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 of a blank Si5338 or Si5356. Valid Register Map Files have a .nvm extension and are generated in ClockBuilder Pro's Project Export menu.

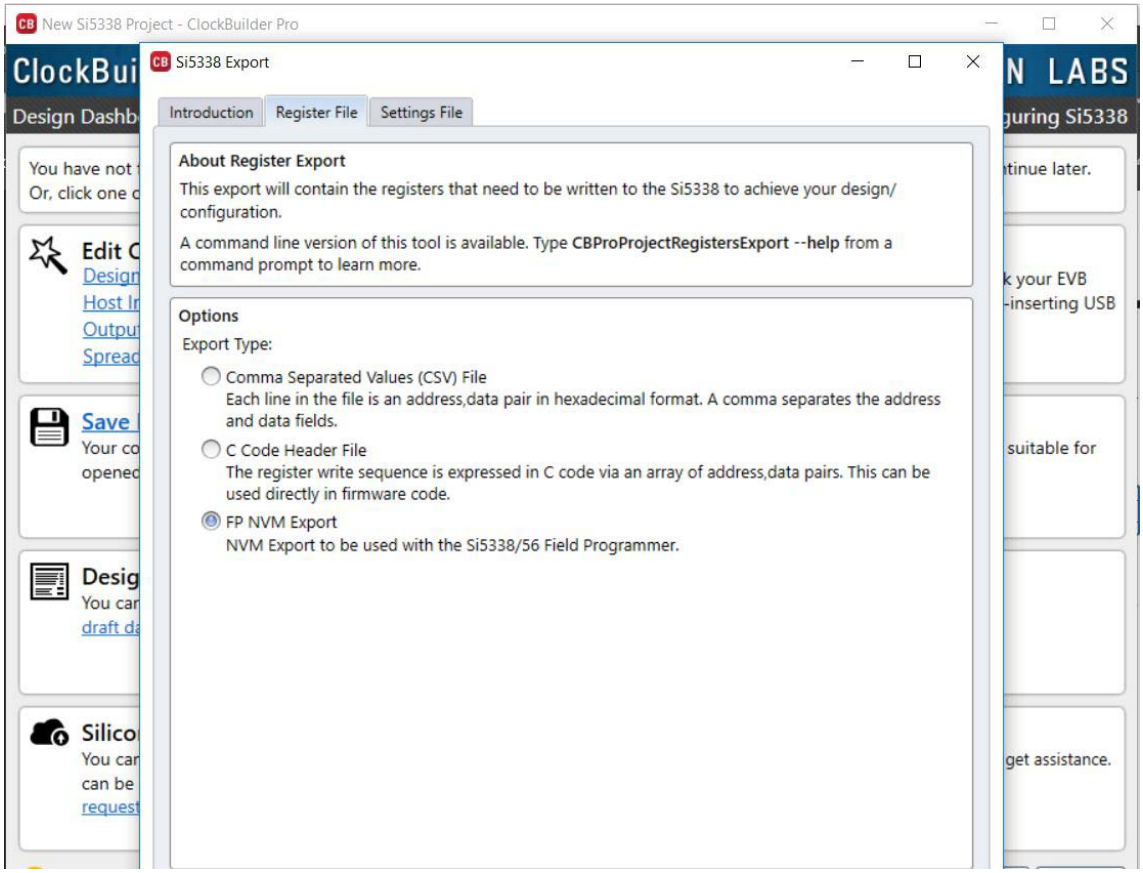
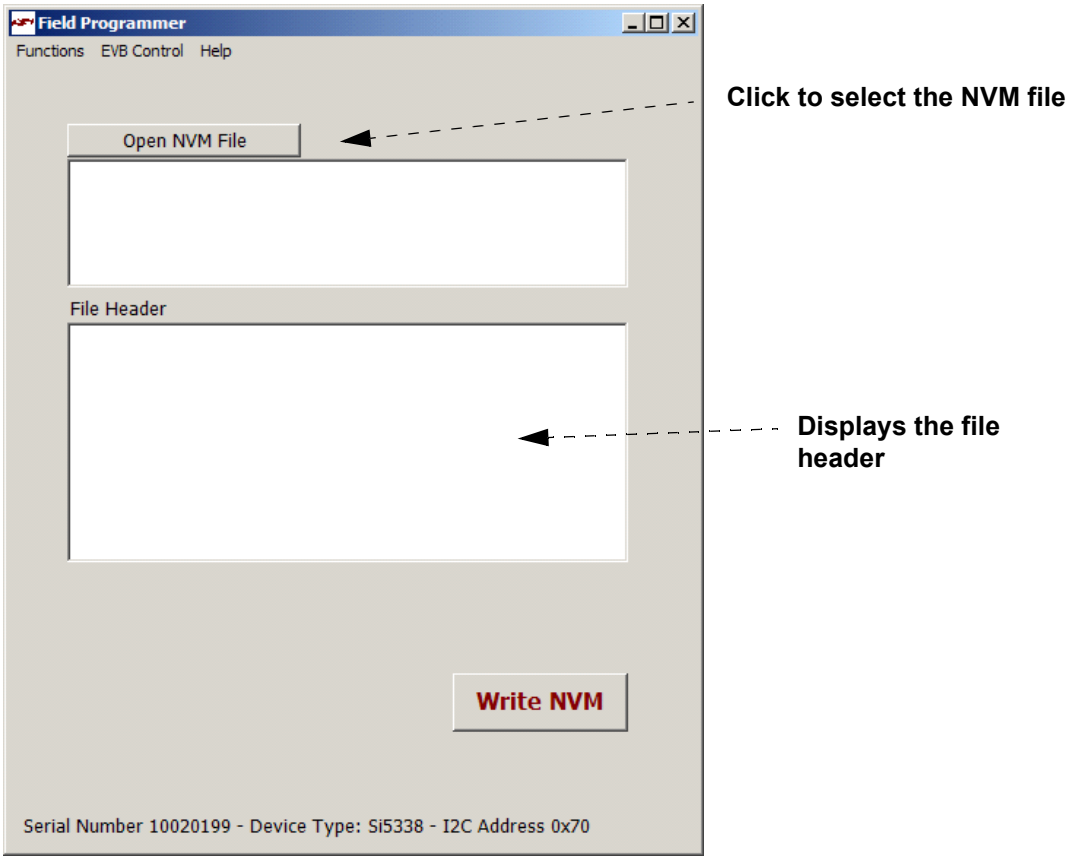



**Figure 5. NVM Export Screenshot**

## 4.1. Loading the NVM File

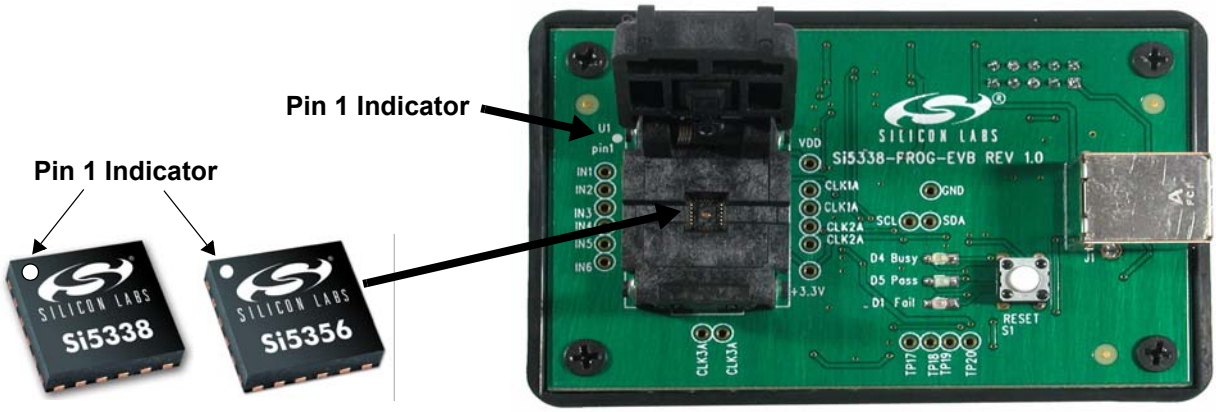
Click on the Open NVM File button to select the desired .nvm file. The header of the register map file is displayed in the File Header window if the software detects that it is a valid NVM file.



## 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.**

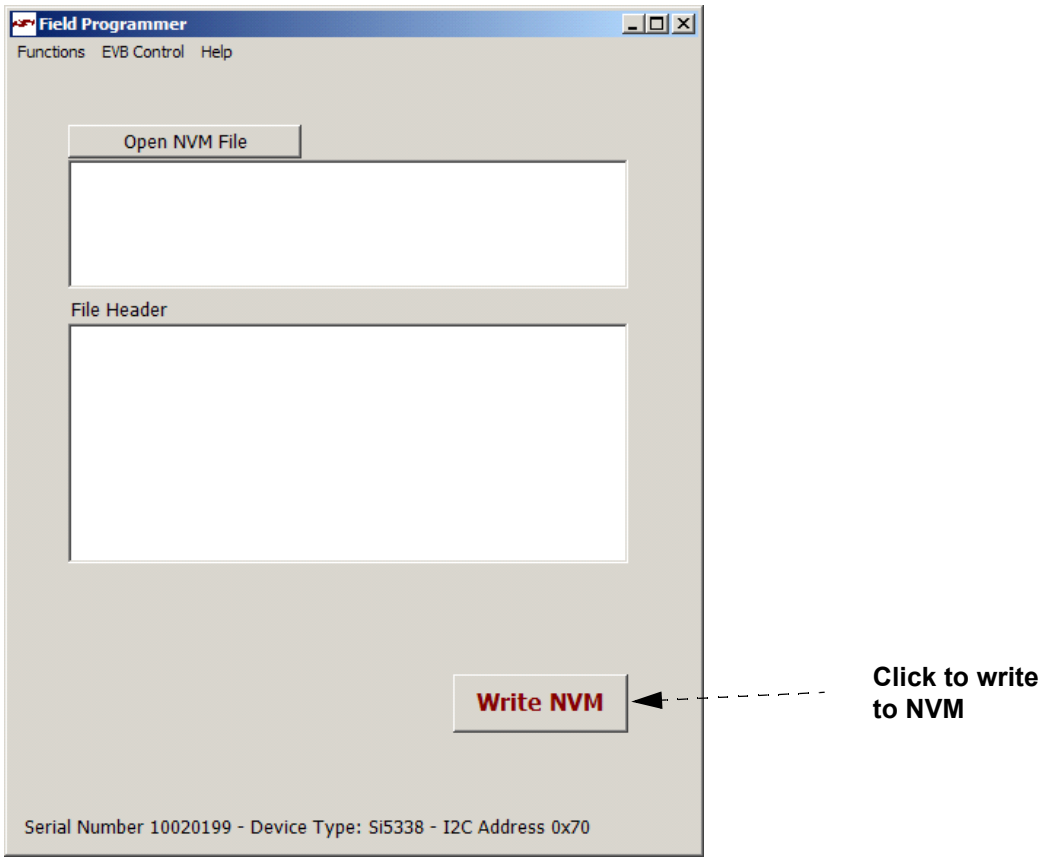
2. Insert a blank Si5338 or Si5356 device in the socket using a pair of tweezers or a suction tool. **It is very important that the Si5338 or Si5356 be inserted into the socket with the correct pin 1 orientation.** Pin 1 on the device is marked with a white dot. Pin 1 on the socket is labeled on the 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 10 to find the possible causes of an NVM failure.

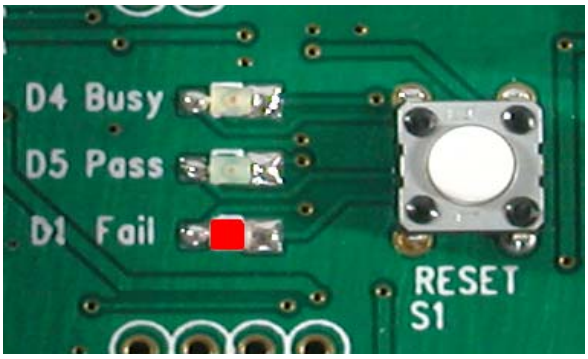



2. Once the NVM is written, the device is ready for use.
3. Remove the device from the socket.
4. Load a new device into the socket.
5. Press the Write NVM button.
6. Repeat Steps 3 to 5.

# APPENDIX A—TROUBLESHOOTING GUIDE

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

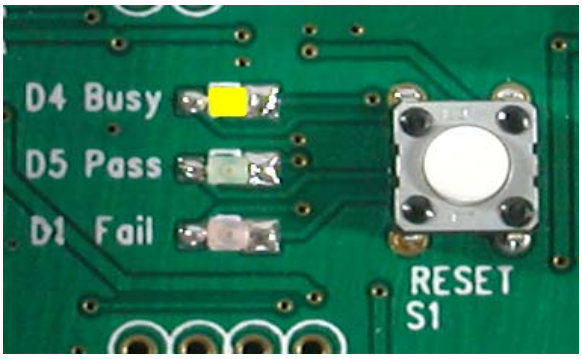
## Writing to NVM Results in a “Fail” Status




## 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.

# Revision History

## Revision 0.5

April, 2020

- Replaced ClockBuilder Desktop instructions with ClockBuilder Pro instructions.

## Revision 0.4

June, 2010

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

## Revision 0.3

March, 2010

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

## Revision 0.2

August, 2009

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

## Revision 0.1

March, 2009

- Initial release.

## ClockBuilder Pro

One-click access to Timing tools, documentation, software, source code libraries & more. Available for Windows and iOS (CBGo only).

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