

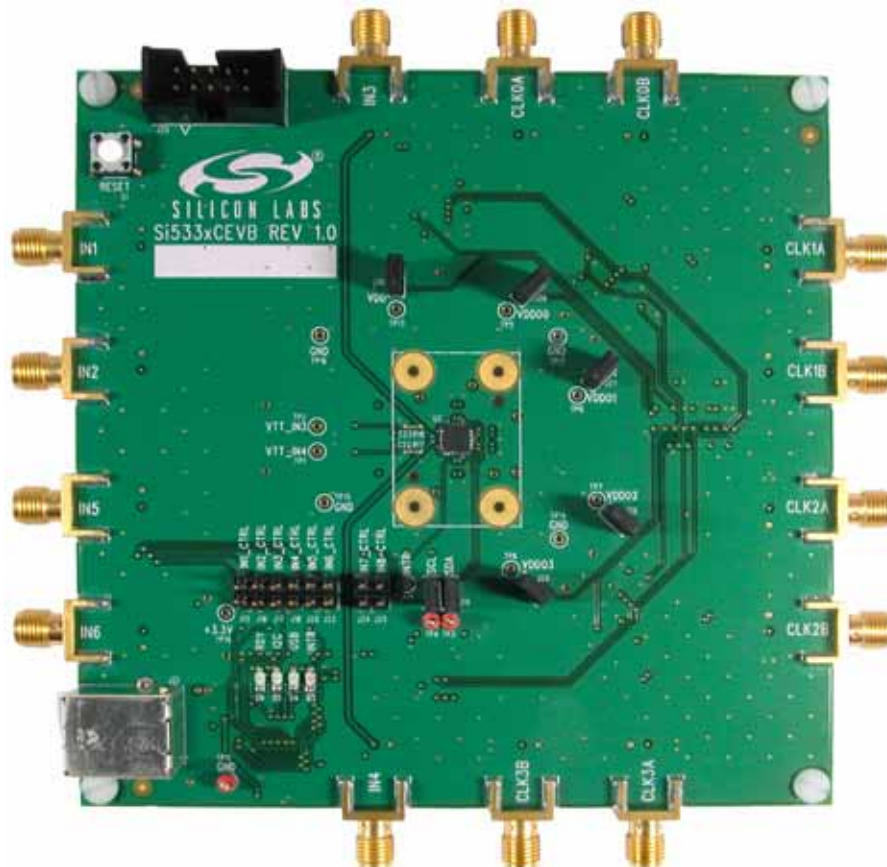
## Si5330/34/38 EVALUATION BOARD USER'S GUIDE

### Description

The Si5338-EVB is used for evaluating the Si5330/34/38 family of Any-Rate, Any-Output Clock Generators and Clock Buffers.

### EVB Features

- Fully powered from a single USB port.
- Onboard 25 MHz XTAL allows standalone asynchronous operation on the Si5338 and Si5334.
- GUI programmable  $V_{DD}$  supply allows device to operate from 3.3, 2.5, or 1.8 V.
- GUI programmable  $V_{DDO}$  supplies allow each of the four outputs to have its own supply voltage selectable from 3.3, 2.5, 1.8, or 1.5 V
- GUI-controlled voltage, current, and power measurements of  $V_{DD}$  and all four  $V_{DDO}$  supplies.
- Voltage supply jumpers allow easy access for use of external supplies or current measurements.
- Input signal jumpers allow external control of pin functions, such as output enable, phase inc/dec, frequency inc/dec, and I2C\_LSB.



# Si5338-EVB

## 1. Functional Block Diagram

A functional block diagram of the EVB is shown in Figure 1. The MCU performs the USB to I<sup>2</sup>C conversion, controls the voltage regulators, monitors the INTR pin, and controls the four status LEDs. It also provides control of the eight input pins when the INx\_CTRL jumpers are populated. There are five programmable voltage regulators (VDD, VDDO0, VDDO1, VDDO2, VDDO3), which supply power to the Si533x device. VDD and VDDO jumpers allow the option of powering the device from external supplies, or as a convenient point for measuring current. I<sup>2</sup>C jumpers allow disconnection of the Si533x device from the I<sup>2</sup>C bus to allow external control from another I<sup>2</sup>C master.

For Si5338 and Si5334 devices, the EVB is shipped with an onboard 25 MHz XTAL to allow stand-alone asynchronous operation. The Si533x can be synchronized to an external reference by removing the XTAL and adding two 0 Ω resistors to complete the input signal path to the SMA connectors.

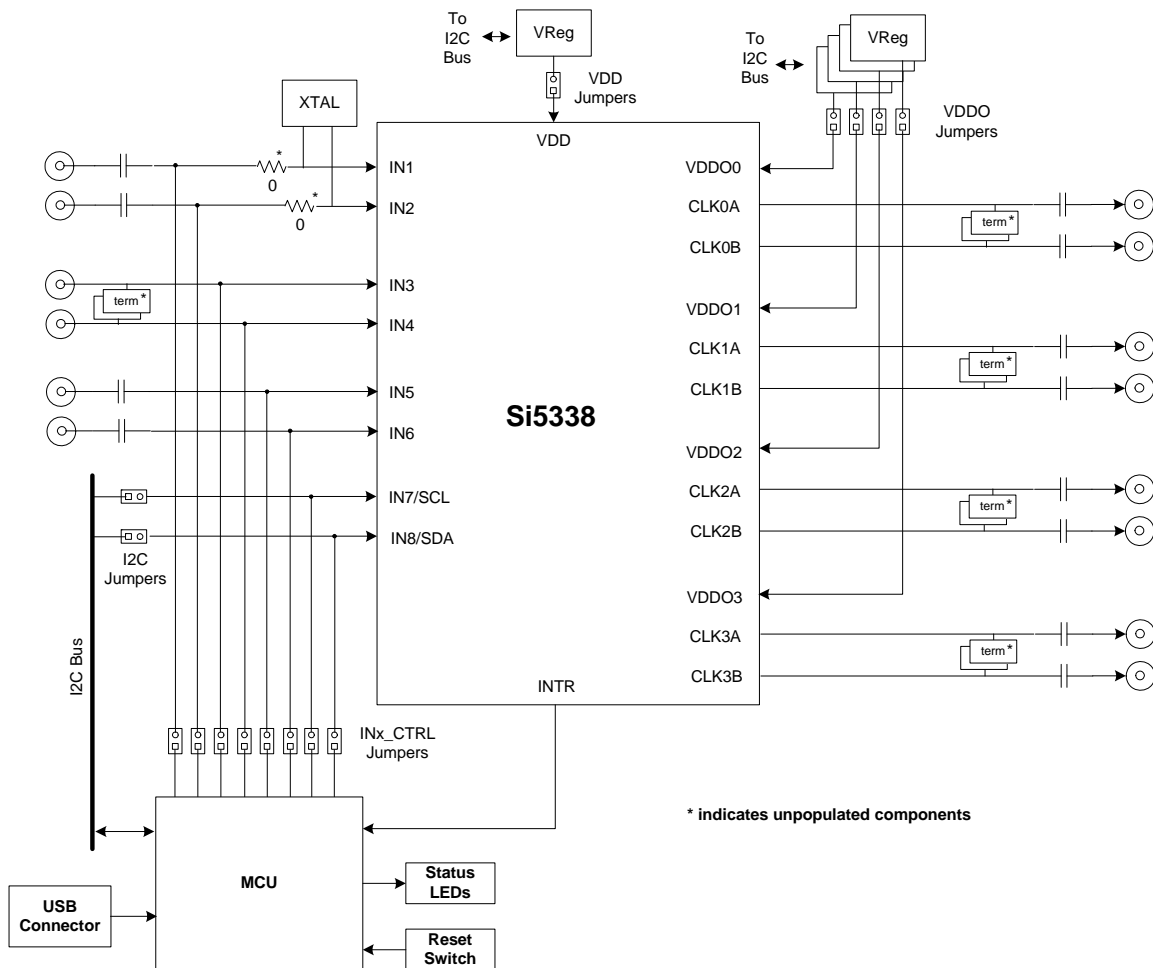


Figure 1. EVB Functional Block Diagram

## 2. Quick Start

1. Install the Si533x configuration software and driver (assumes that Microsoft .NET Framework 1.1 is already installed).
2. Connect a USB cable from the EVB to the PC where the software was installed.
3. Leave the jumpers as installed from the factory, and launch the Si533x configuration software by clicking on **Start** → **Programs** → **Silicon Laboratories** → **Si533x Configuration Software**. Click one of the shortcuts in the group.

### 3. Jumpers

The Si533x-EVB is shipped with jumpers installed on the following positions:

- **VDD** - Connects the Si533x VDD pin to the VDD programmable voltage regulator.
- **VDDO0** - Connects the Si533x VDDO0 pin to the VDDO0 programmable voltage regulator.
- **VDDO1** - Connects the Si533x VDDO1 pin to the VDDO1 programmable voltage regulator.
- **VDDO2** - Connects the Si533x VDDO2 pin to the VDDO2 programmable voltage regulator.
- **VDDO3** - Connects the Si533x VDDO3 pin to the VDDO3 programmable voltage regulator.
- **SCL** - Connects the Si533x SCL pin to the I<sup>2</sup>C bus from the MCU.
- **SDA** - Connects the Si533x SDA pin to the I<sup>2</sup>C bus from the MCU.

The INx-CTRL jumpers are optional jumpers for enabling MCU control of the Si533x input pins. This feature may be available in future software releases.

### 4. Status LEDs

There are four status LEDs on the Si533x-EVB:

- **RDY** (Green) - Indicates that the EVB is operating normally. This LED should always be on.
- **I<sup>2</sup>C** (Green) - Indicates when there is active I<sup>2</sup>C communication between the MCU and the Si533x device or between the MCU and voltage regulators.
- **USB** (Green) - Indicates when there is active communication between the PC and the MCU over the USB bus.
- **INTR** (Red) - The MCU has detected that the interrupt pin of the Si533x device is enabled. The most probable cause for an interrupt is because the Si533x has lost its input signal or the PLL has lost lock. The “Status” tab of the GUI will identify the event that caused the interrupt to occur.

### 5. Inputs

The Si5338-EVB has six SMA connectors (IN1-IN6) for receiving external signals. Two of the signals are differential, and two are single-ended.

#### 5.1. Differential Inputs (IN1/IN2, IN5/IN6)

The differential inputs only need a differential voltage swing of 300 mV to operate, which makes them compatible with most differential signal types. See “AN408: Termination Options for Any-Rate, Any-Output Clock Generators and Clock Buffers—Si5338, Si5334, Si5330” for details on interfacing with compatible signal types. It is also possible to lock the Si5338 or Si5334 to an external signal generator using one side of the differential input and grounding its complementary side. Take care not to exceed the max differential voltage of 1.2 V on these inputs. The board is shipped with a 25 MHz XTAL connected to IN1/IN2. It is possible to replace the XTAL with an external signal by removing the XTAL and adding a 0 Ω resistor to positions R12 and R13, and a 100 Ω resistor to position R10 (see Figure 2 for resistor locations). When evaluating the Si5330, the XTAL must be removed. The differential input on pins IN5/IN6 is ac-coupled with a 100 Ω line termination (R39).

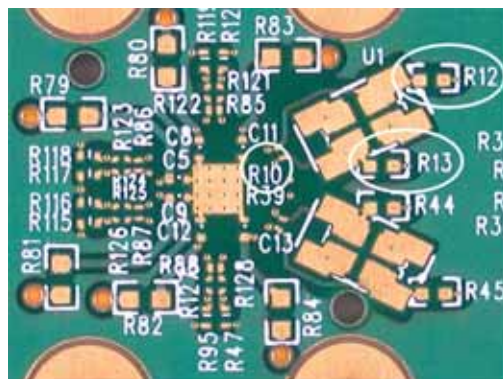


Figure 2. Optional Termination Resistors for Differential Inputs IN1/IN2

## 5.2. Single-Ended Inputs (IN3, IN4)

These inputs are dc-coupled to the device. They are compatible with a signal swing as low as 100 mV and a maximum of 3.63 V. The signal should have a minimum amount of dc bias to ensure that it is never below ground level.

The EVB provides pads for optional input terminations. These may be necessary when interfacing to SSTL and HSTL signals.

## 6. Outputs (CLKxA/CLKxB)

Each of the four output differential output drivers is capacitively coupled to the SMA connectors; so, the output signal will have no dc bias. If a signal with dc bias is required, the ac coupling capacitors can be replaced with a 0  $\Omega$  resistor.

The EVB provides pads for optional output terminations. These may be necessary when interfacing to SSTL and HSTL signals.

## 7. Si533x Configuration Software Installation

The following sections describe how to install and begin using the Si533x Configuration Software. There is also a readme.txt file with the installation files as well as a user guide installed with the software.

### 7.1. System Requirements

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

**Note:** USBXpress 3.1.1 driver is provided and installed with the Si533x configuration software. Newer or older versions of USBXpress available from other EVB kits or online have not been tested with this software.

### 7.2. Microsoft .NET Framework Installation

The Microsoft .NET Framework is required before installing and running the Si533x software. Details and installation information about the .NET Framework are available via a shortcut in the NETFramework directory or at the following web site:

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

There are multiple versions of the .NET Framework available from Microsoft, and they can be installed side-by-side on the same computer. The Si533x Configuration Software requires version 1.1. Contact your system administrator for more details.

### 7.3. Si533x Configuration Software Installation

The Si533x Configuration Software is installed from the Si533xConfigSwInstall.exe file.

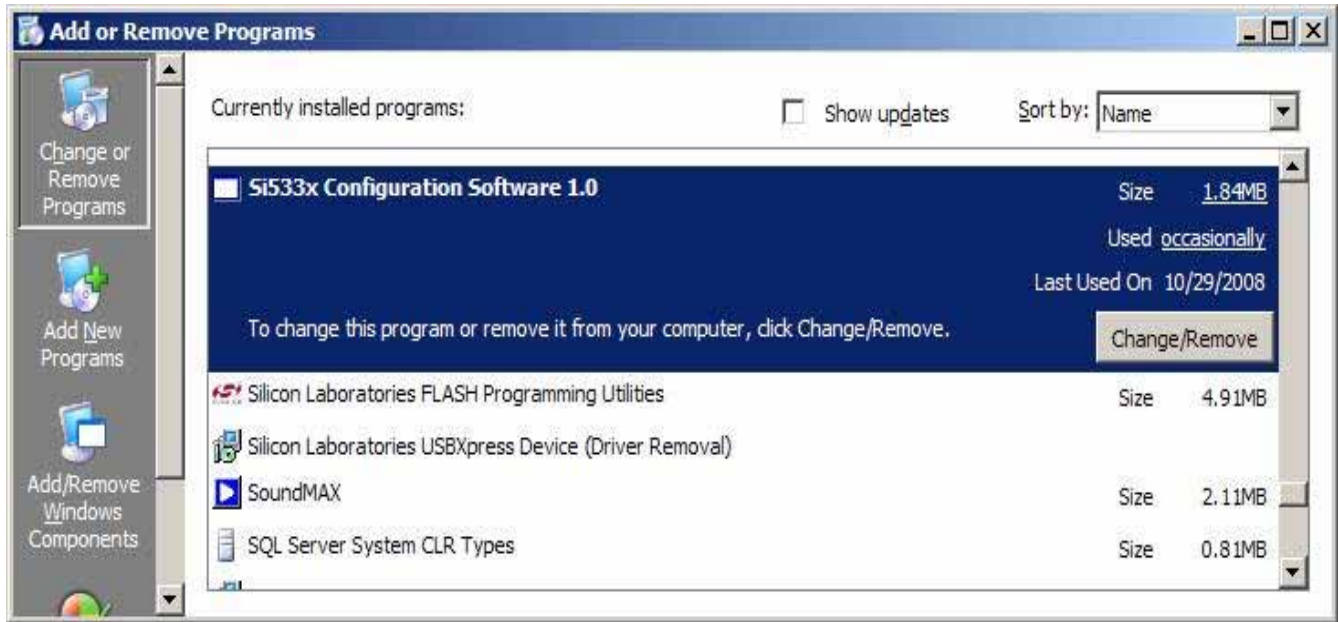
1. Double-click the install file to start the wizard.
2. Follow the wizard instructions to complete the installation for both the software and the driver. Use the default installation location for best results.
3. After the installation is complete, click on **Start** → **Programs** → **Silicon Laboratories** → **Si533x Configuration Software X.X**. Select one of the items in the menu including the User Guide to get more details on how to run the software.

## 7.4. Si533x Configuration Software Uninstall Instructions

**Note:** Note: Close all the Si533x Configuration Software and help files before running the uninstaller to ensure complete removal of the software.

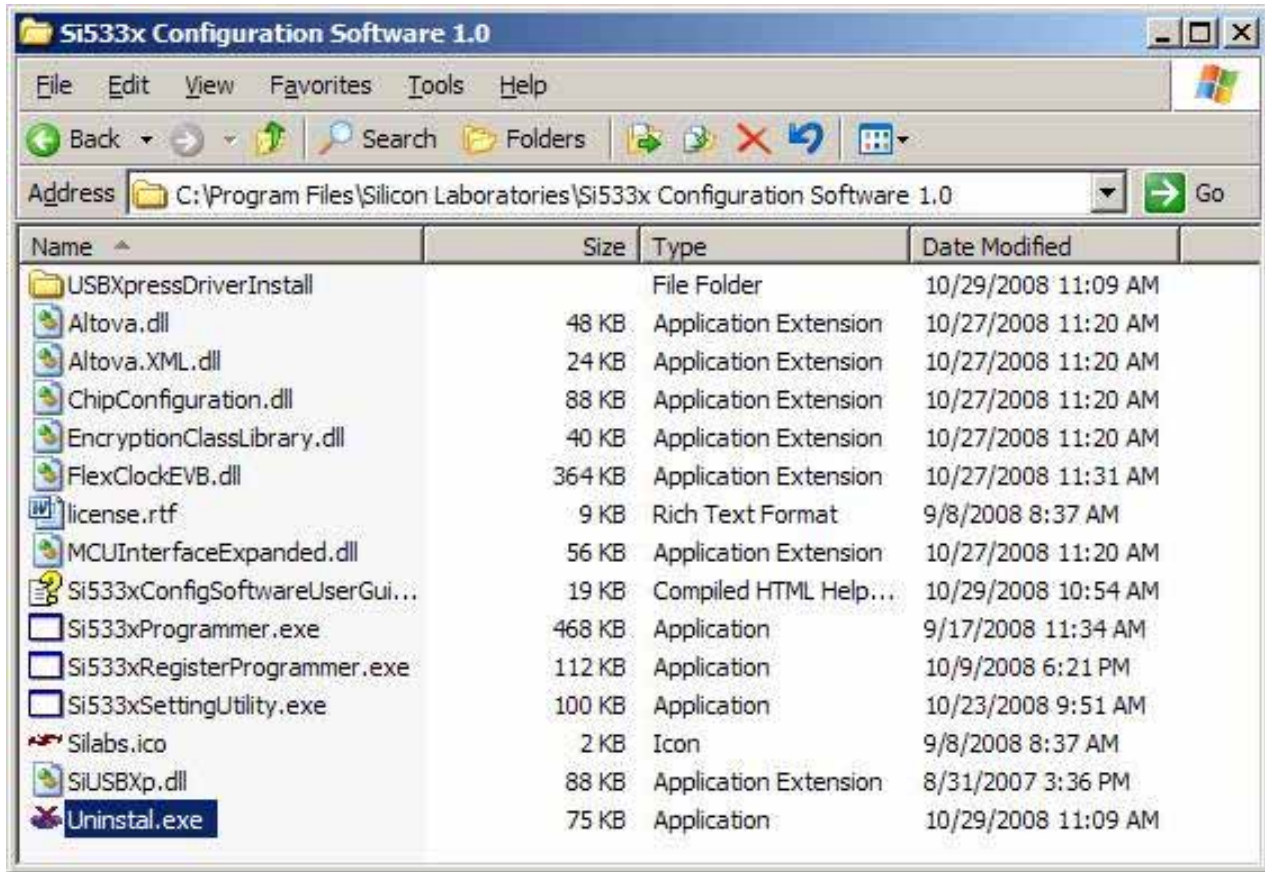
The driver software must be uninstalled separately. See “7.5. Si533x Configuration Software Description” for details.

To uninstall the software, use the Add and Remove Programs utility in the Control Panel, as shown in Figure 3.



**Figure 3. Uninstall in Add and Remove Programs**

Or double-click on the Uninstal.exe file in the Si533x configuration software directory as shown in Figure 4.



**Figure 4. Uninstall in the Software Directory**

## 7.5. Si533x Configuration Software Description

There are several programs to control the Si533x device. These are available by clicking **Start** → **Programs** → **Silicon Laboratories** → **Si533x Configuration Software X.X**, where X.X is the software version number. There is a detailed user guide accessible here and in the **Help** → **Help Menu** option of the software.

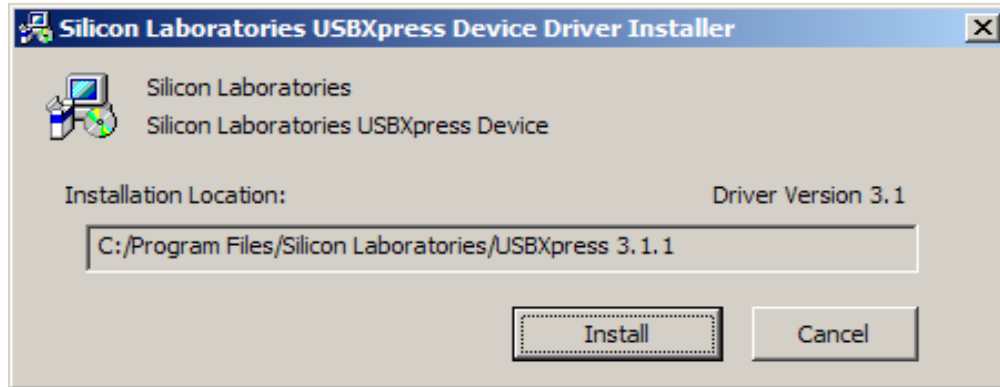
**Table 1. Programs**

Program	Description
Programmer	This automatically programs the necessary registers based on the customer's desired frequency plan for the Si533x device.
Setting Utility	This utility provides access to each bit field in the register map of the device; so, no masking and shifting is required to decode each setting or control in the register map.
Register Programmer	This provides low-level control of the device with individual 8-bit register accesses.

## 7.6. USBXpress Driver Installation

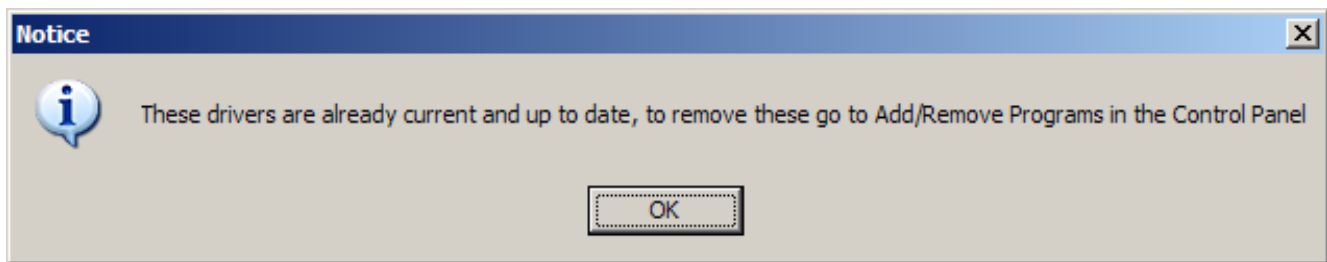
The EVB uses the Silicon Laboratories' USBXpress driver to allow the EVB to communicate with the computer via USB.

The driver is installed after the EVB software is installed. Click **Install** to run the driver installation. Clicking **Cancel** will not install any files, and the EVB will not work with the software.



**Figure 5. Driver Installer Dialog**

**Note:** If the driver has already been installed on the computer before, it will not be reinstalled, and a message box will appear as shown in Figure 6.



**Figure 6. Driver Already Installed**

The installer will copy the necessary driver files and update the operating system. However, for every different EVB connected to the same computer, the hardware installation wizard will run to associate this driver with the new EVB. Let the wizard run with its default settings. Figure 7 shows a successful driver installation.

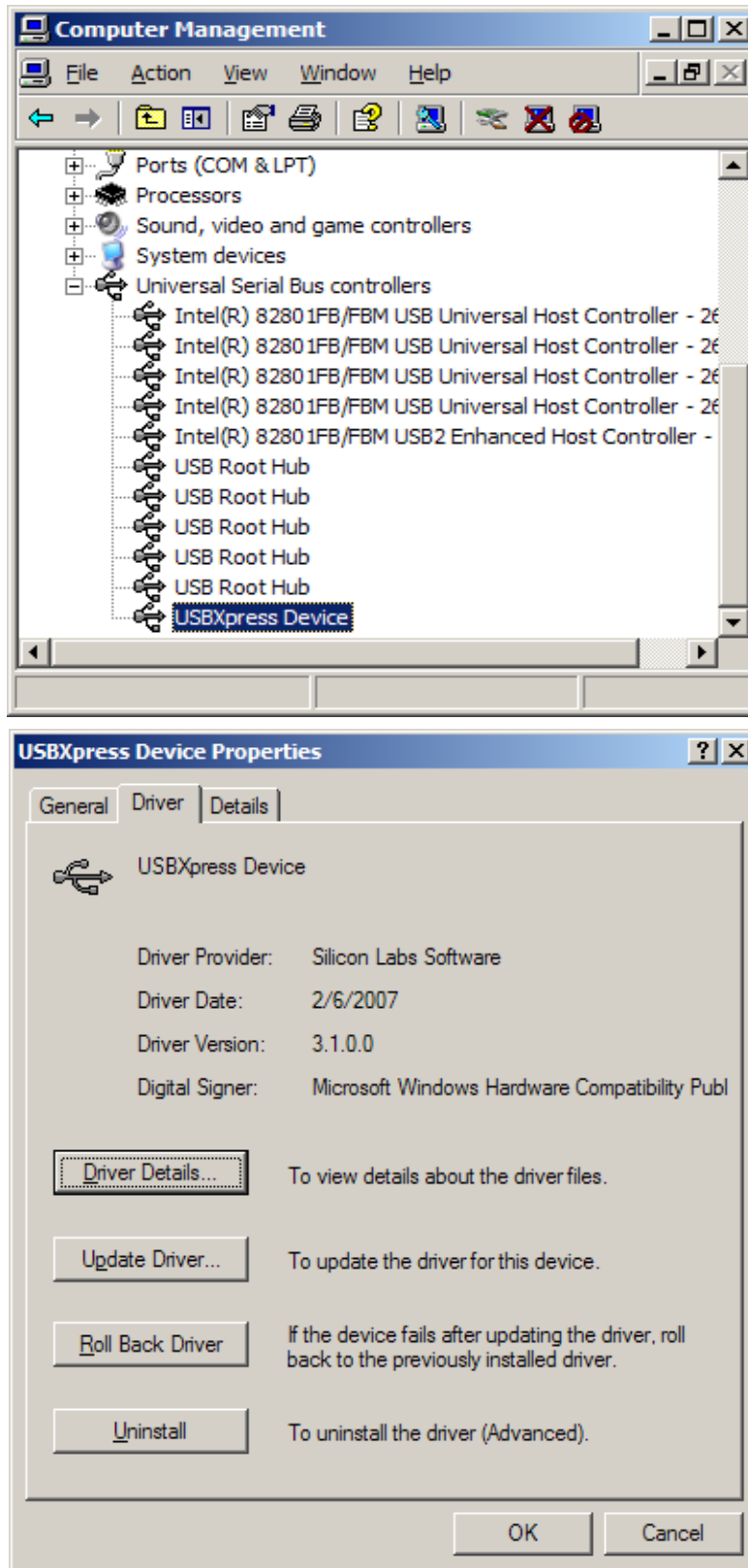
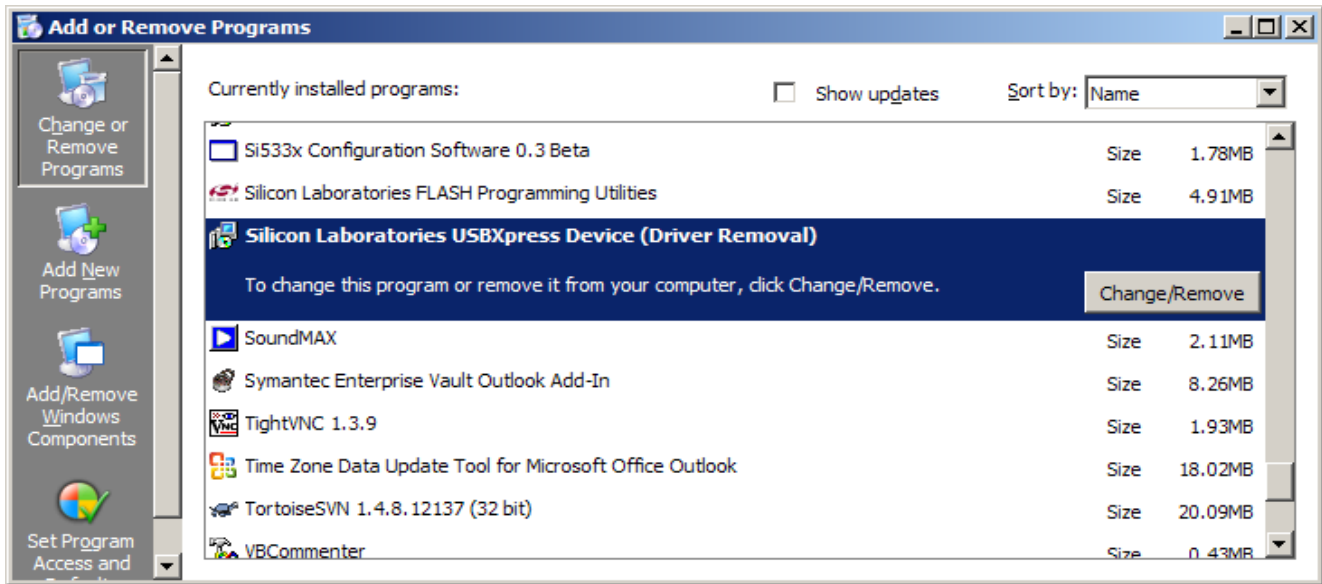


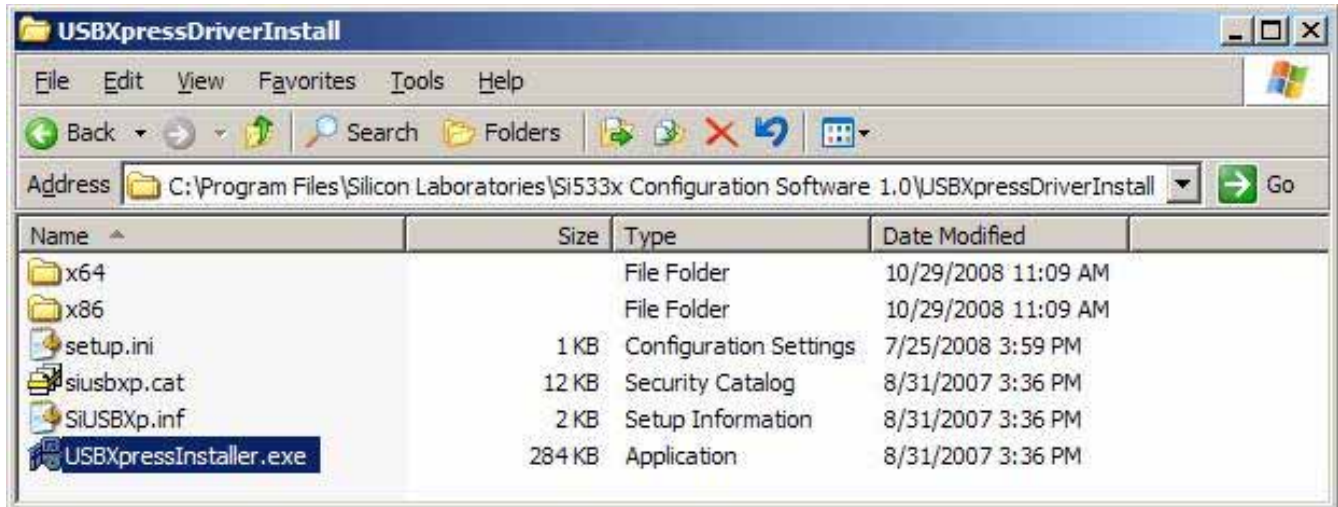
Figure 7. Successful Driver Installation

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 it will remove.



**Figure 8. Driver Uninstall Location**

The USBXpress installation files are located with the Si533x Configuration Software. The driver files for the EVB may be reinstalled from this location or by running the install software.



**Figure 9. Driver Installation Files**

## 8. Si5338x-EVB Schematics

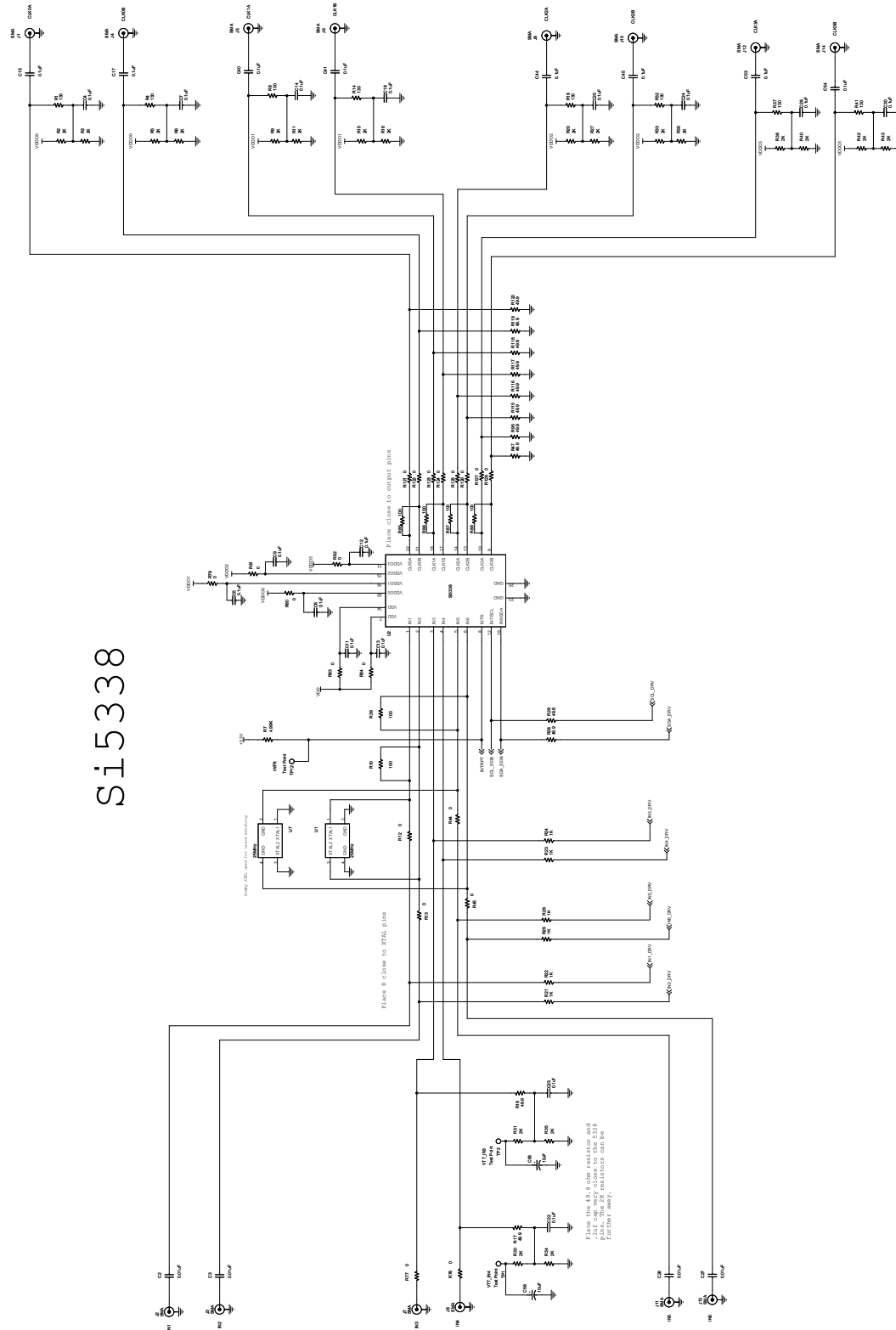


Figure 10. Si5338-EVB Main Schematic



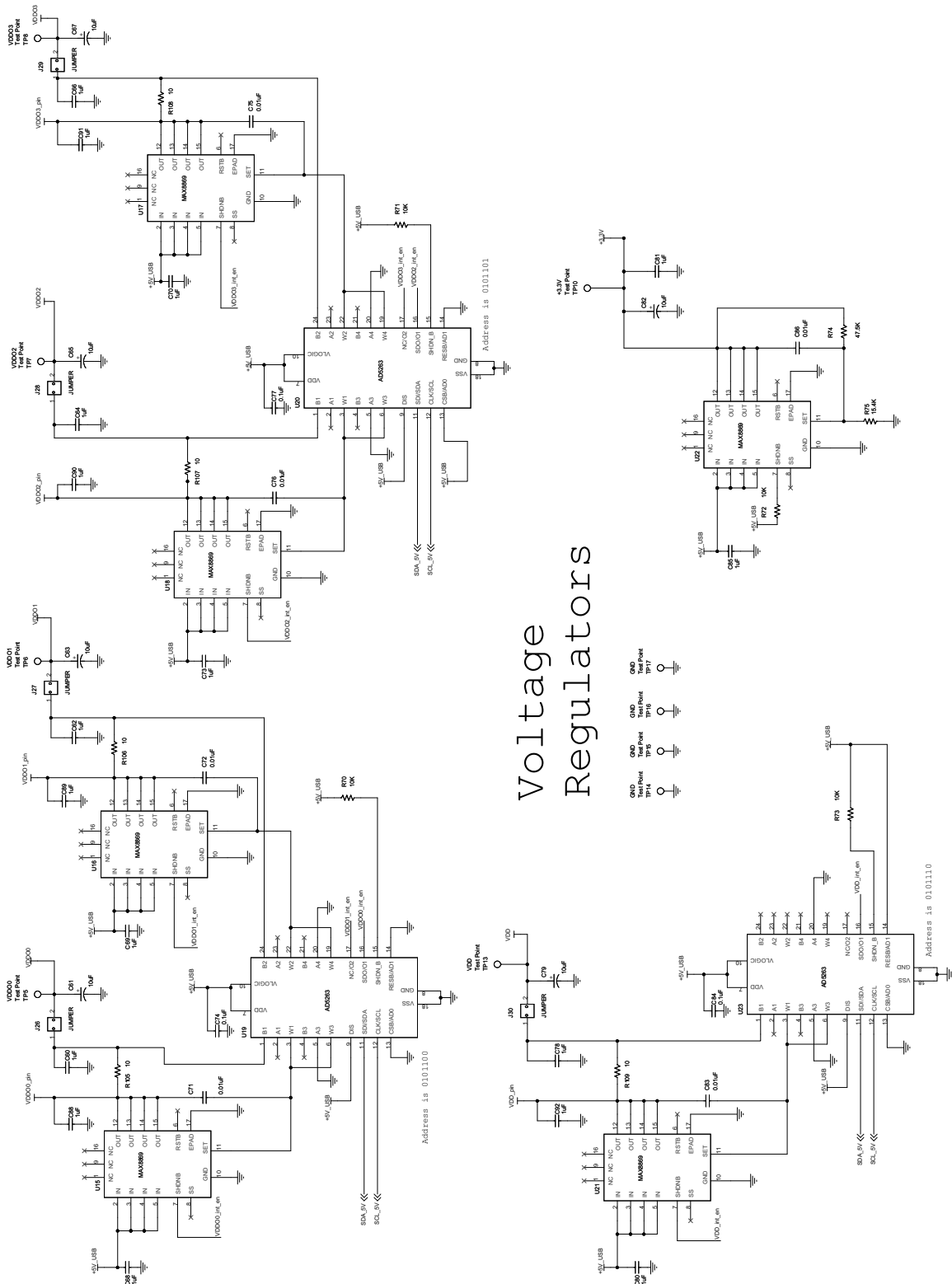


Figure 12. Si5338-EVB Voltage Regulation Schematic

## DOCUMENT CHANGE LIST

### Revision 0.1 to Revision 1.0

- Replaced the voltage input terminal block with programmable regulators.
- The board is entirely powered from USB power.
- Added an additional LED to indicate MCU ready.
- Added jumpers on all input pins to allow external control of features, such as output enable, and frequency and phase increment and decrement.

## CONTACT INFORMATION

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