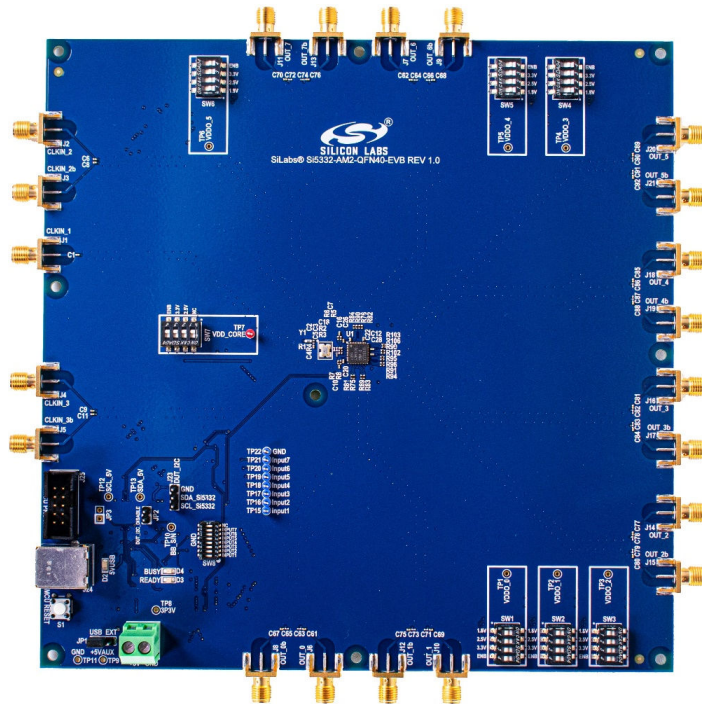


# UG398: Si5332-8A-EVB User's Guide (Using Si5332-AM2-QFN40-EVB)

The Si5332-8A-EVB is used for evaluating the eight-output Automotive Grade Si5332 Low Jitter Any-Frequency Clock Generator. The Si5332-AM2 device uses the patented Multisynth™ technology to generate up to eight independent clock frequencies each with 0 ppm synthesis error. The Si5332-8A-EVB has three independent input reference clocks or can use the on-board 25 MHz crystal as reference. The Si5332-8A-EVB can be controlled and configured using the Silicon Labs Clock Builder Pro™ (CBPro™) software tool.



## KEY FEATURES

- Powered from either USB port or external +5V power supply.
- 25 MHz crystal reference or external input clock reference.
- Programmable device VDD supply for operation at 3.3 V, 2.5 V, or 1.8 V, controlled by CBPro™ Software.
- Programmable VDDO supplies allow each of the 6 clock output banks to have its own power supply voltage selectable from 3.3 V, 2.5 V, 1.8 V, or 1.5 V (1.5 V LVCMOS only).
- CBPro™ GUI-controlled voltage, current, and power measurements of VDD and all VDDO supplies.
- SMA connectors for all input and output clocks.
- External digital input functions emulated via on-board switches.

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## 1. Functional Block Diagram

Below is a functional block diagram of the Si5332-8A-EVB. This EVB can be connected to a PC via the main USB connector for configuration, control, and monitoring using Silicon Labs' CBPro software. The EVB's power can be supplied from the USB connection or external +5V power source.

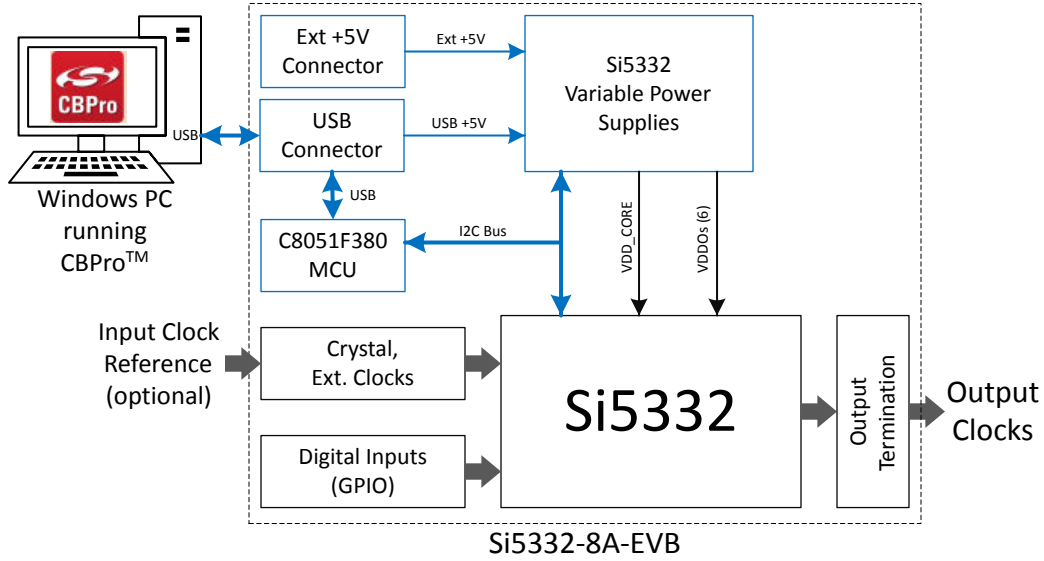


Figure 1.1. Si5332-8A-EVB Functional Block Diagram

## 2. Si5332 CBPro™ Overview

All Si5332 devices, and corresponding EVBs, are fully supported in Silicon Labs' ClockBuilder Pro (CBPro) software. Note that **CBPro software is required** to configure and use the Si5332-8A-EVB. Please download and install CBPro from the link shown below.

<https://www.silabs.com/products/development-tools/software/clockbuilder-pro-software>

With CBPro, users can perform the following:

- 1. Create full device configurations (frequency plans) including multi-profile configurations.
- 2. Get estimated power consumption and estimated operating junction temperature of the configuration.
- 3. Evaluate/Test configurations using a supported EVB.
- 4. Create downloadable configuration files designed to be I<sup>2</sup>C, downloaded into target Si5332 device.
- 5. Submit a configuration for creation of a custom, factory-programmed device with a unique orderable part number (no added cost).
- 6. Submit a request for a phase noise report of the specific configuration.



Figure 2.1. CBPro Start-up Window



### 3. Si5332-8A-EVB Operation

#### 3.1 Initial Default Configuration

The Si5332-8A-EVB has power supply configuration DIP switches (SW1 – SW7) which are set at the factory to the OFF position. The EVB also has a programmable digital I/O (GPIO) configuration DIP switch (SW8) also with all switches set to OFF position. The required EVB **default** DIP switch settings are all switches OFF (as shown below) and these settings are required to allow CBPro software to control and configure the EVB. In addition, JP1 jumper should be installed on the “USB” side (pins 1 & 2).

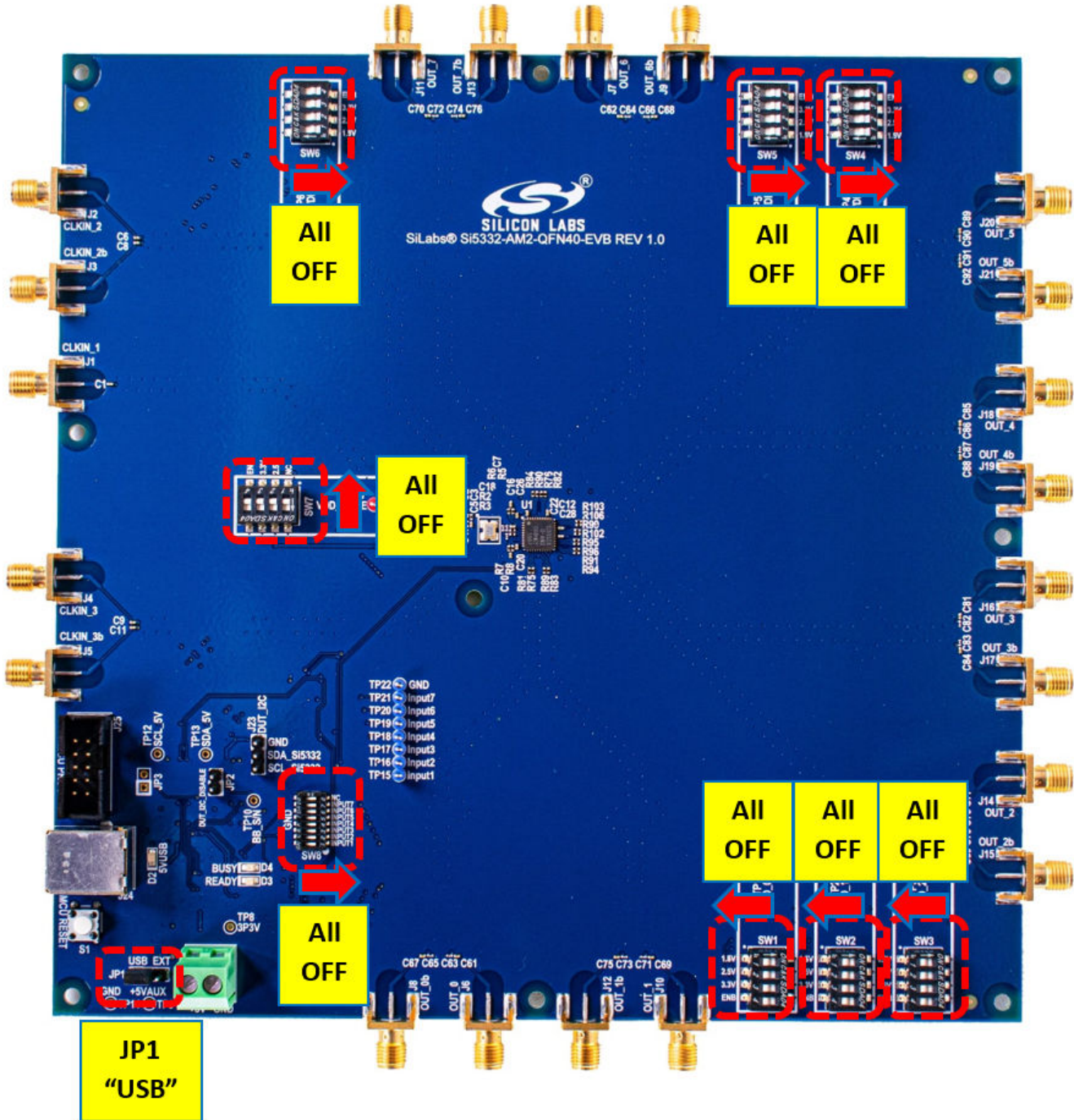


Figure 3.1. Si5332-8A-EVB Initial Default Configuration

### 3.2 DIP Switch Functions

The power supply DIP switches (SW1 – SW7) are intended to provide flexibility in cases when a pre-programmed Si5332-AM2 device is installed on the board and CBPro will not be used to configure the Si5332-AM2 device or to control the on-board power supply settings. Typically, the power supply DIP switches (SW1- SW7) will only be used if a configuration is burned into the Si5332-AM2's NVM by using the CBPro Field Programming Dongle or a pre-configured Si5332-AM2 (custom OPN) is installed on the EVB.

The programmable digital input (GPIO) signal configuration switch (SW8) will only be used to turn specific features on/off based on the CBPro configuration loaded into the Si5332-AM2 device. For example, a programmable digital input, such as an Output Enable (OE), can be assigned to Input 1. Once the Si5332-AM2 configuration with Input 1 assigned as OE is loaded, Input 1 on SW8 can be used to control this OE input signal by setting high/low. Input 1 switch OFF = 1, Input 1 switch ON = 0.

### 3.3 LEDs

The Si5332-8A-EVB has 3 indicator LEDs (D2, D3, D4) near the USB connector as shown and defined below.



Figure 3.2. Si5332-8A-EVB LED Locations

D2: This **Blue LED** (+5VUSB) lights to indicate USB +5V is present.

D3: This **Green LED** (Ready) lights to indicate the EVB's USB has enumerated with the host PC.

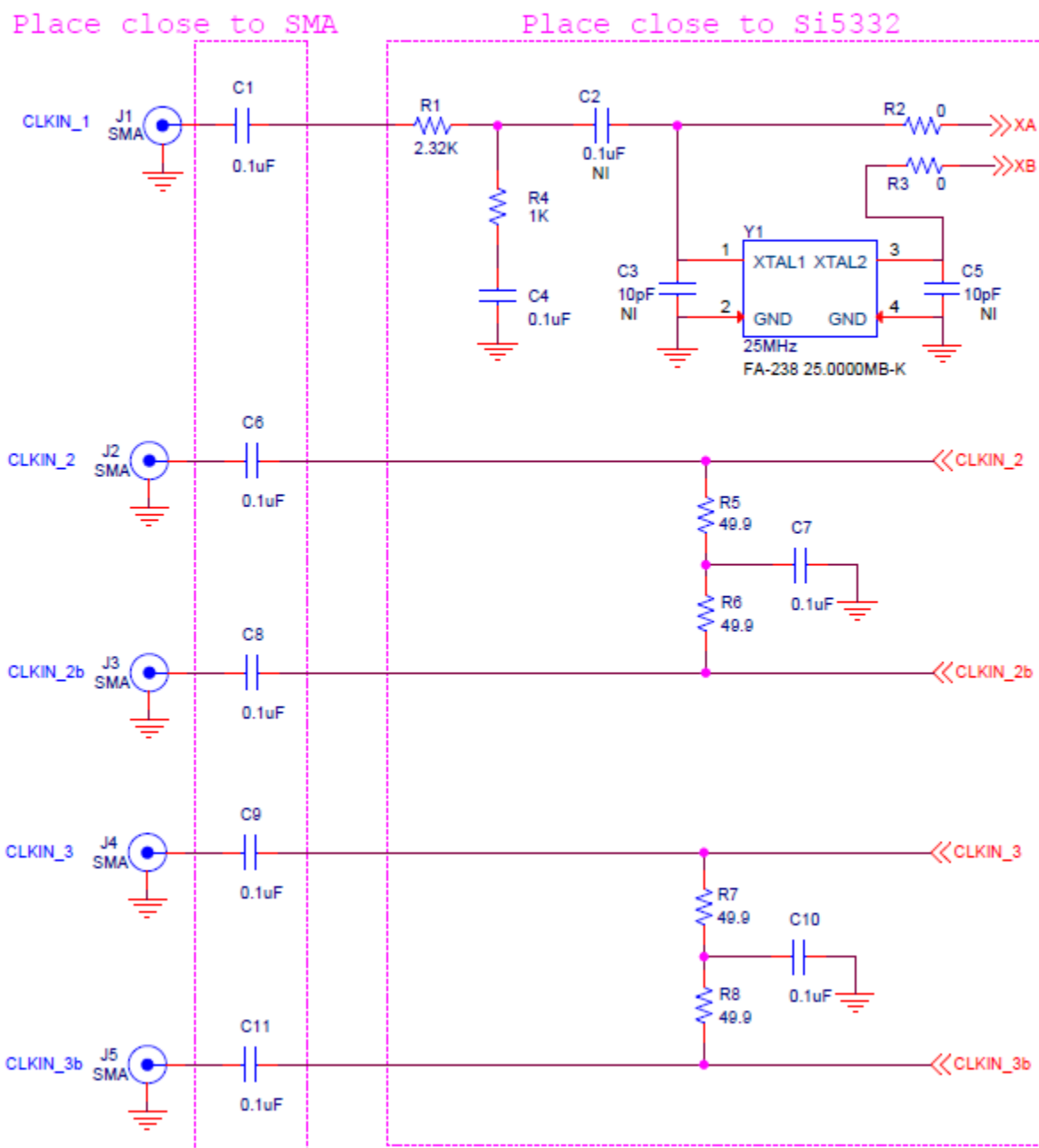
D4: This **Green LED** (Busy) lights to indicate that CBPro has successfully connected to the EVB.

### 3.4 Input Clocks

The Si5332-AM2 device can support 3 sources of input reference clock. One source is the crystal input on XA/XB pins. (XA can also be used as a single-ended external input if the crystal is removed, see Si5332-AM2 Data Sheet for more details.). The other 2 are separate external input clock sources which can be either differential or single-ended clocks.

As shown in the schematic below, the Si5332-8A-EVB is pre-populated with a 25 MHz crystal on the XA/XB crystal input. Both differential external clock inputs have 50-ohm terminations installed by default. The CLKIN1 input has “not-installed” (“NI”) components to isolate the CLKIN1 input from the crystal circuit when the crystal is installed.

## Input Clocks & Crystal



**Figure 3.3. Si5332-8A-EVB Input Clock Circuit**

### 3.5 Output Clocks

The Si5332-AM2 device can support up to 8 differential pair outputs, or 8 pairs of LVCMOS outputs (16 total LVCMOS outputs). Each output pair has an output termination circuit as shown in figure below. The default output termination is AC coupled outputs from Si5332-AM2 device with no other termination.

The default output termination components (0  $\Omega$  & 0.1  $\mu\text{F}$ ) combined with the "NI" (not installed) component sites on the EVB can be used as locations to create the desired output termination configuration. For example, if DC output termination is required, the 0.1  $\mu\text{F}$  caps can be replaced with 0  $\Omega$  resistors. Note that not all possible termination schemes can be supported by the circuit below and in some cases external components may be required.

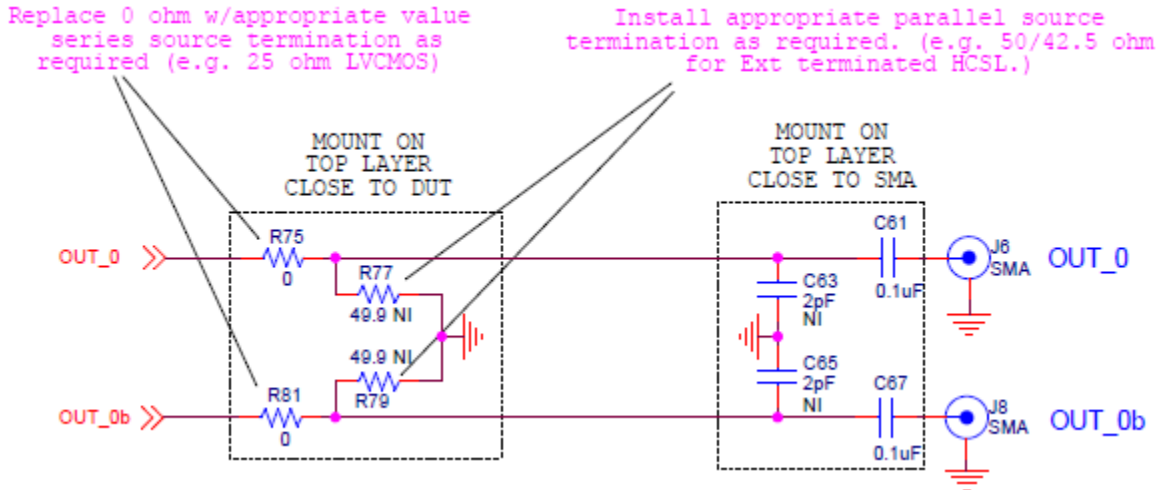


Figure 3.4. Si5332-8A-EVB Single Pair Output Clock Termination Circuit



## 4. Using CBPro™ with Si5332-8A-EVB

Silicon Labs' CBPro software is required for using the Si5332-8A-EVB. It can be downloaded from Silicon Labs' download link: <https://www.silabs.com/products/development-tools/software/clockbuilder-pro-software>.

Once downloaded and installed, running CBPro should present the following window:

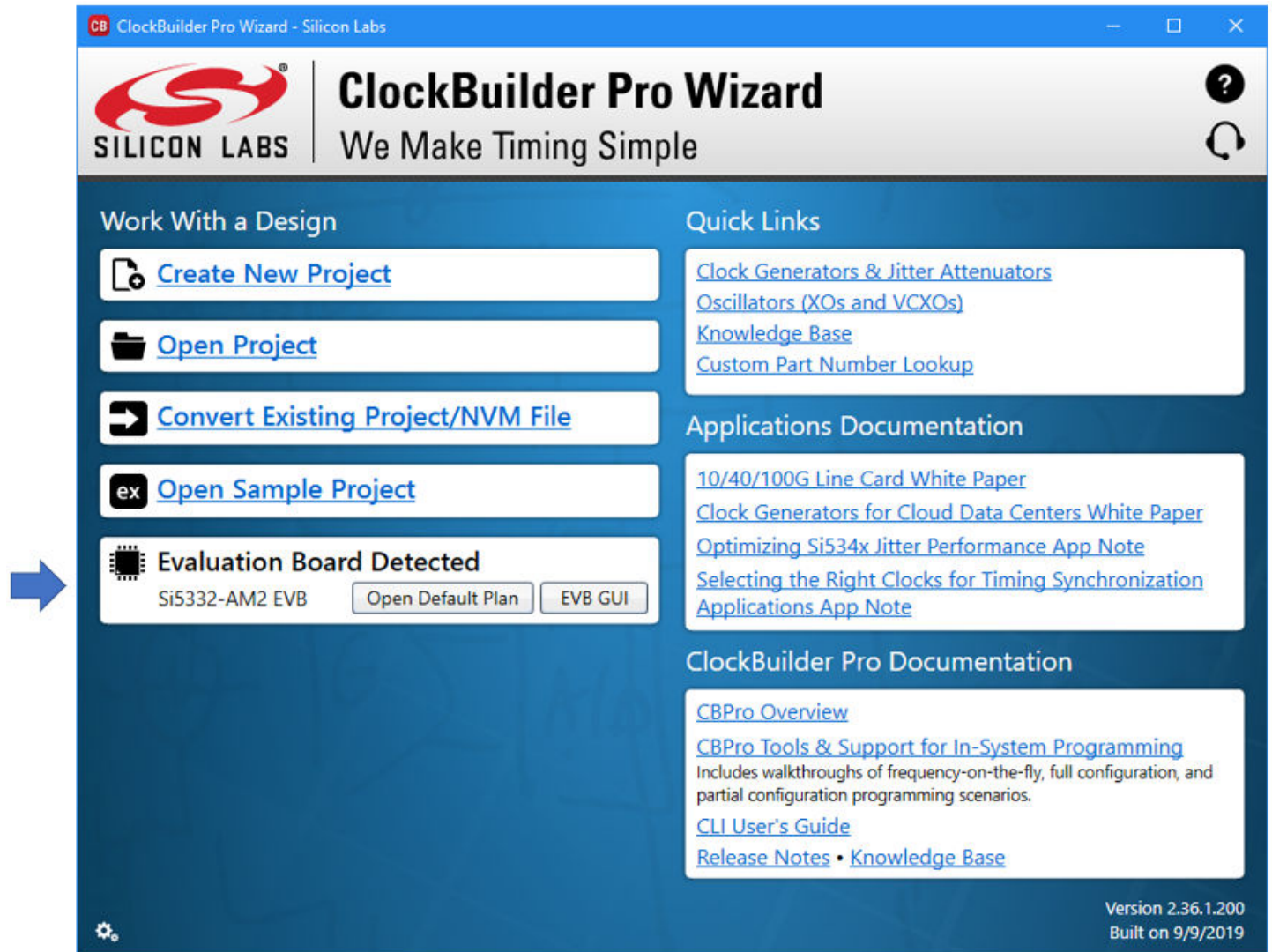


Figure 4.1. CBPro Start-up Window

If an evaluation board is connected via USB, the EVB should be detected and will be indicated as shown at the arrow in the above image. Multiple EVBs can be connected and individually selected in CBPro.

The EVB GUI is a useful tool as it will allow monitoring and control of EVB functions like the digital inputs and power supply voltage and current measurements. The EVB GUI can also be used to read and write on-chip registers and report other useful status information.

### 4.1 CBPro™ EVB GUI

The EVB GUI is invoked by pressing the “EVB GUI” button from CBPro’s main window. Across the top of the EVB GUI window, as shown below, are several tabs for selection of various useful informational pages, and pages for configuration, control, or monitoring of the EVB.

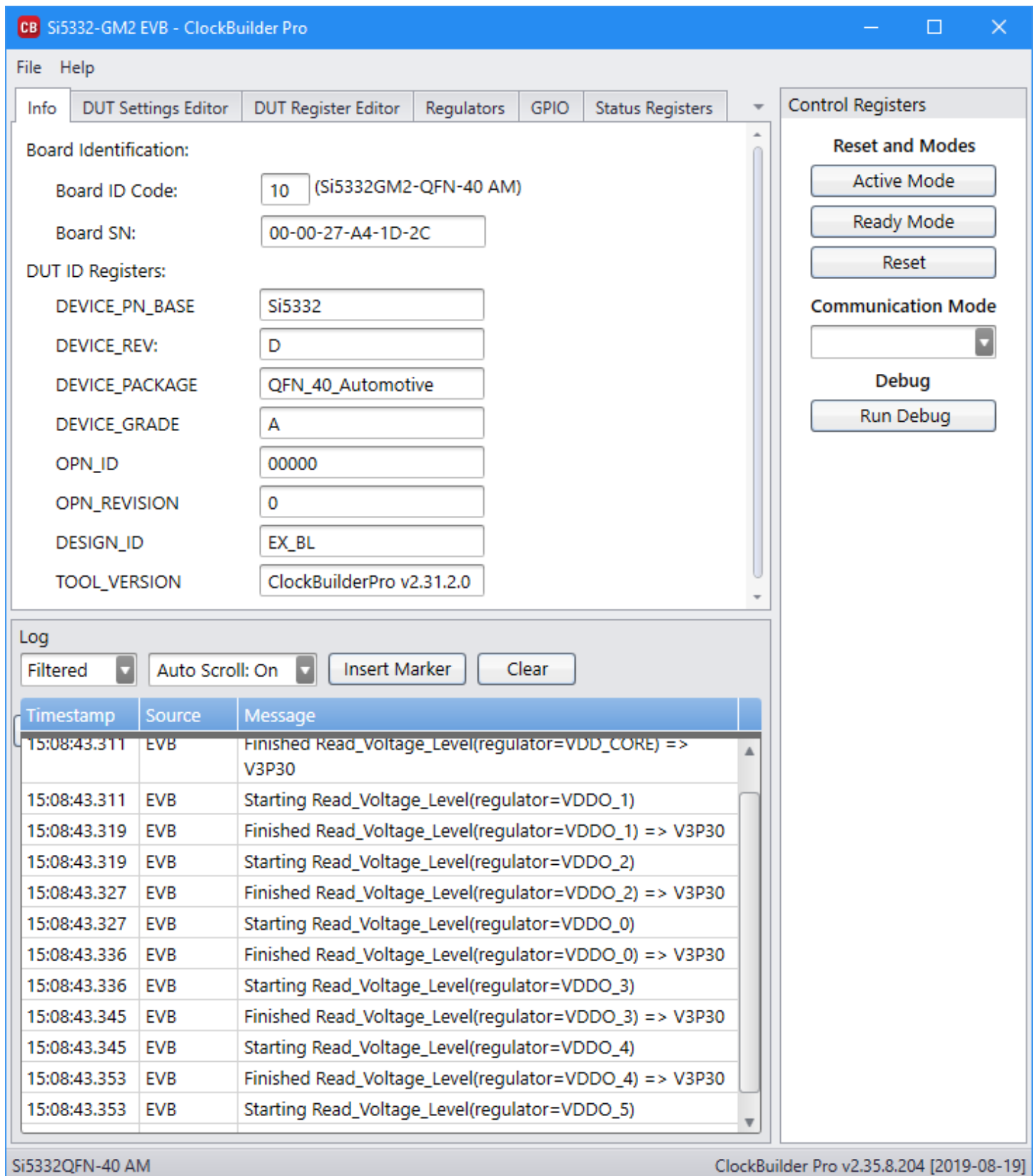


Figure 4.2. EVB GUI - Info Page

The “Info” tab shows information regarding EVB board and DUT device identification. Both the “Control Registers” and “Log” windows are shown in all EVB GUI tabs. The “Control Registers” are useful buttons to place Si5332 device in Active or Ready mode and well as Reset the device. (Refer to follow-on description of “Status Registers” tab for important information on device mode and its effect on register accesses.) The “Log” window is a log of all CBPro – EVB communications.

The “DUT Settings Editor” and “DUT Register Editor” tabs allow registers to be read/written by either the setting name or by direct hex byte access.

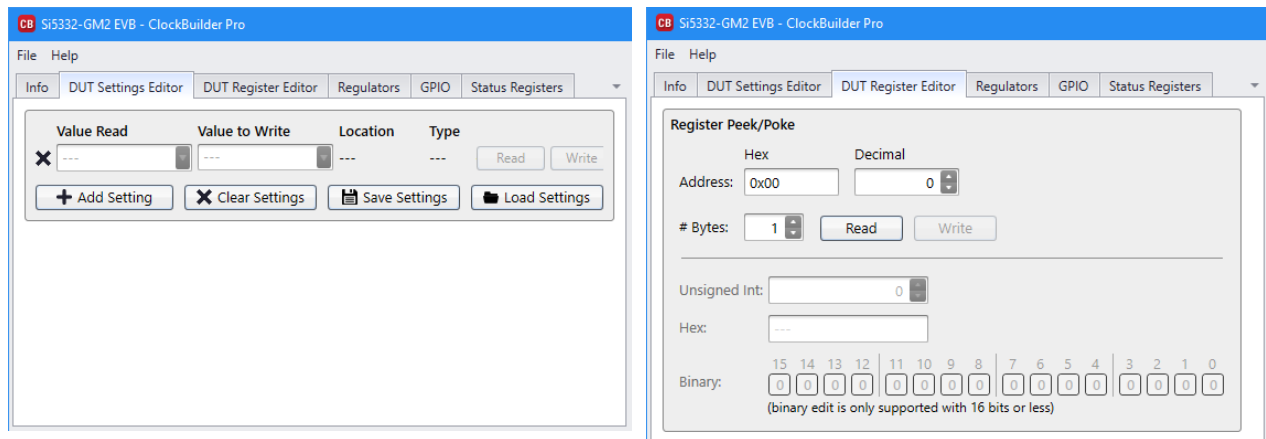


Figure 4.3. EVB GUI - DUT Settings / DUT Register Editors

The “Regulators” tab allows reading the voltages and currents for each on-board power supply. Each regulator may be switched on/off or voltage changed as necessary. Similarly, the “GPIO” tab allows for monitoring and control of the programmable digital inputs of the Si5332. Controlling regulators and GPIO functions within CBPro requires DIP switches on the EVB to be set to default positions (Off). See Section 3.1 Initial Default Configuration for more information.

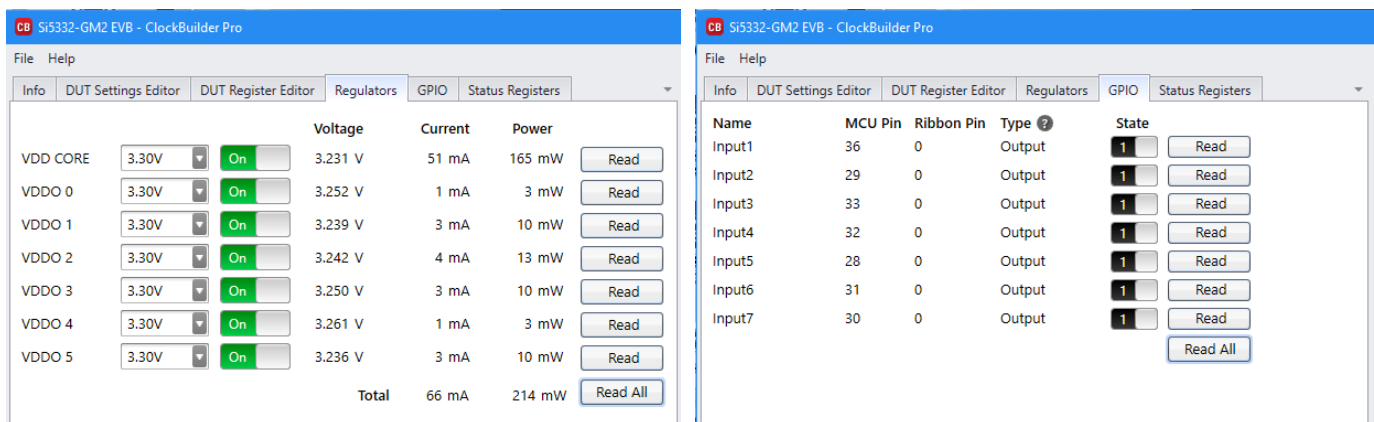


Figure 4.4. EVB GUI - Regulators and GPIO Monitoring/Control

## 4.2 Device Register Changes Using the CBPro™ EVB GUI

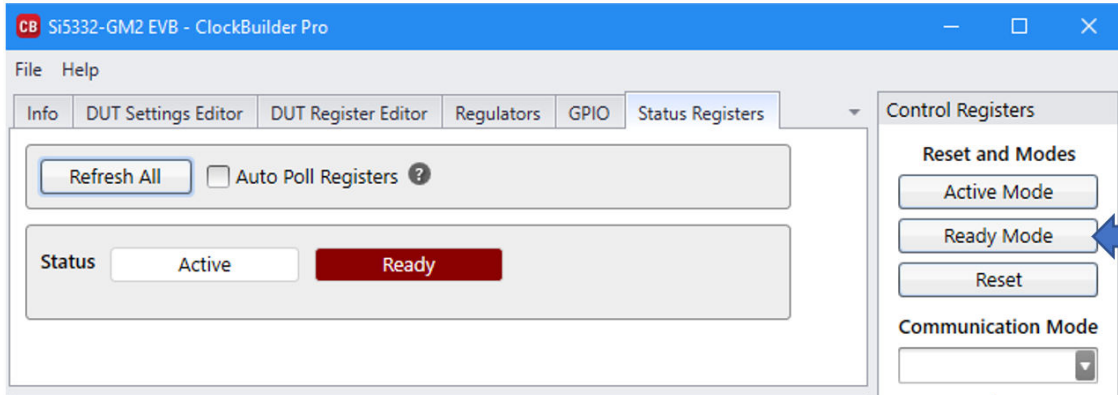
The last EVB GUI tab is the “Status Registers” tab which shows the present state of the device, in either “Active” or “Ready” mode.

**Important Note:** The Si5332 device must be in “Active” mode to output any clocks. While in “Active” mode *most* register write accesses will not be allowed and will be blocked by the device. The device must be in “Ready” mode to allow write access to many registers. While the device is in “Ready” mode the outputs are stopped. Once device is placed back in “Active” mode, the outputs will resume based on any register changes done while in “Ready” mode.

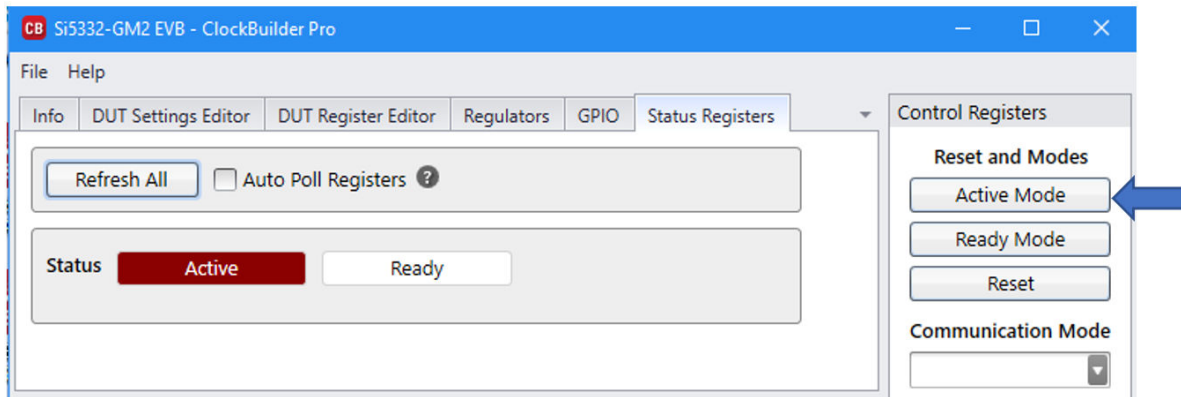
The only registers not requiring this process are Spread Spectrum enable/disable, Output Enable controls, Input Clock Selection, and the register placing the device into and out of Active or Ready mode. Do not rely on a Si5332 device being in “Active” mode to prevent inadvertent I<sup>2</sup>C write cycles from corrupting device registers.

The general process required to change register values (i.e., register writes) is shown below.

1. Place the device into “Ready” mode, at which time the outputs will stop and register changes can be made.
  - Press “Ready Mode” button, then “Refresh All” button to update Status.



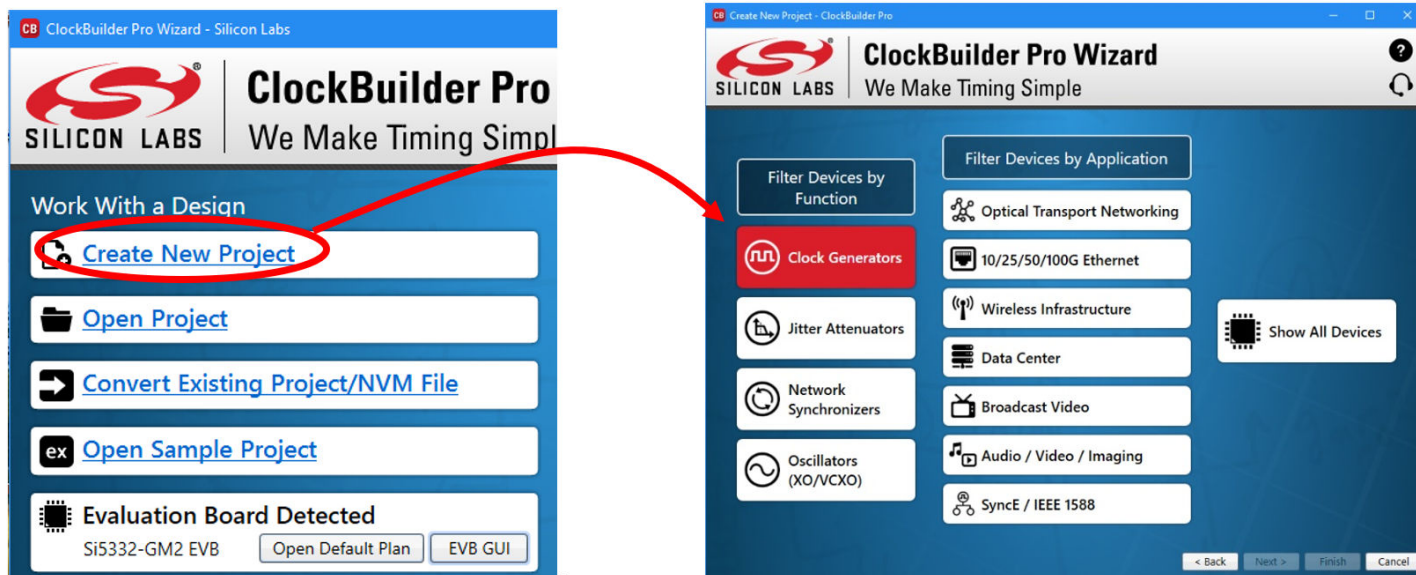
- Confirm device is in “Ready” mode.
2. Perform any register updates as desired.
  3. Place device back into “Active” mode for the register changes to take effect and outputs enabled.
    - Press “Active Mode” button, then “Refresh All” button to update Status.



- Confirm device is now in “Active” mode.

### 4.3 Creating a New Si5332-AM2 CBPro™ Configuration

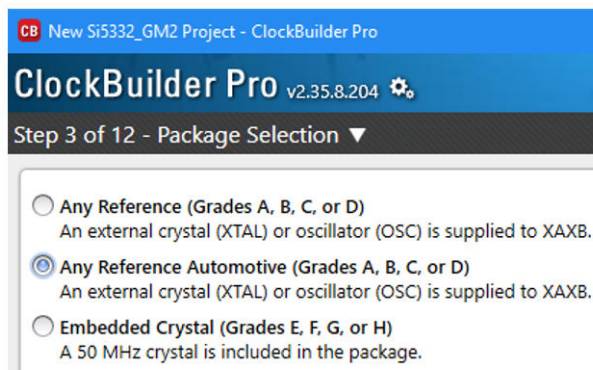
1. To start a new Si5332-AM2 project, click on “Create New Project” from CBPro opening window.
2. From selection window click on “Clock Generators”.



3. Then Select Si5332-GM2 from list of devices.

Part	Num PLLs	Num Inputs	Num Outputs	Input Frequency	Output Frequency
Si5332-GM2	1	3	8	16 MHz to 50 MHz, 10 MHz to 250 MHz	5 MHz to 312.5 MHz

4. Complete the guided step-by-step configuration process being sure to select Automotive grade in Step 3.

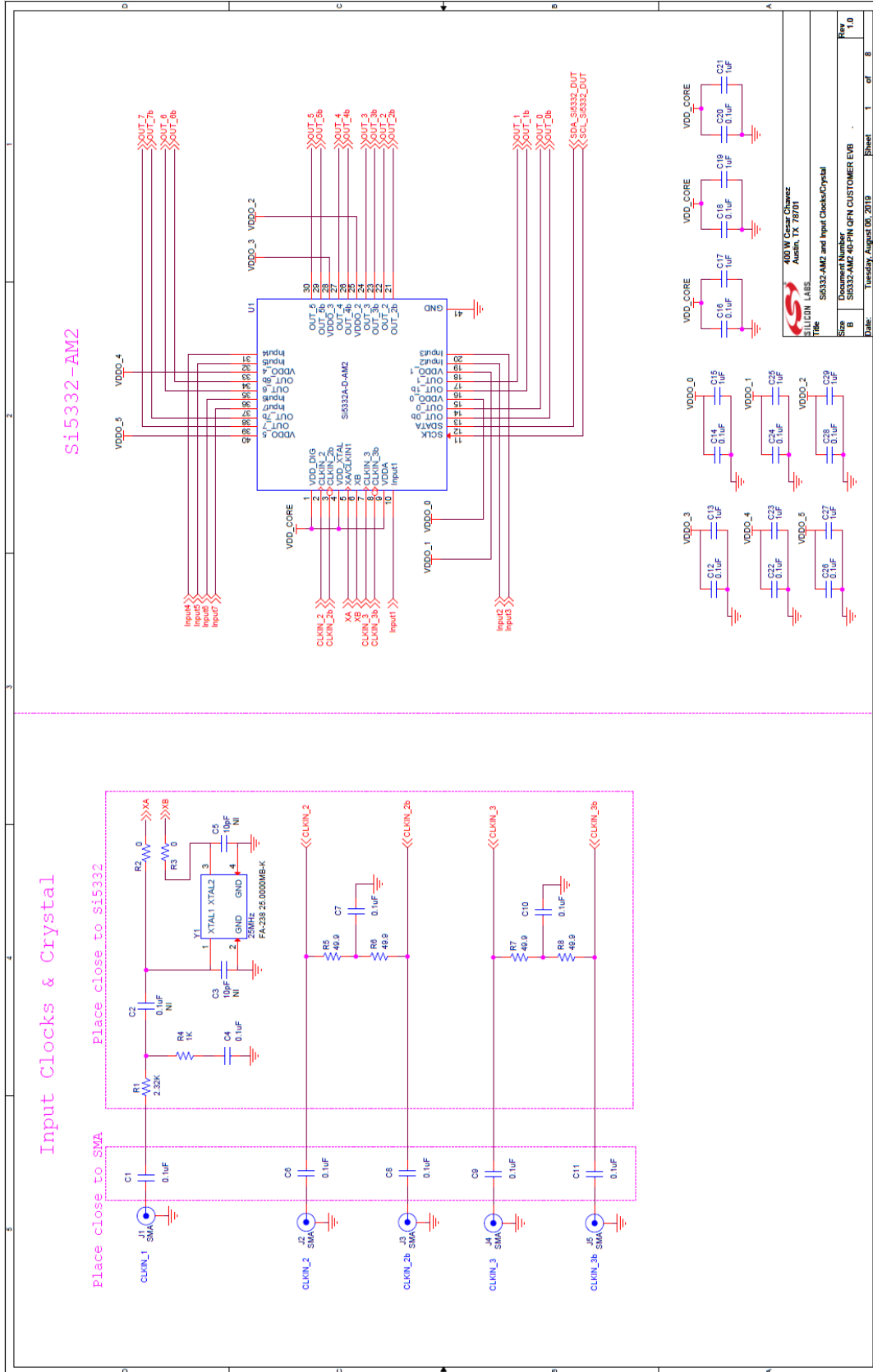


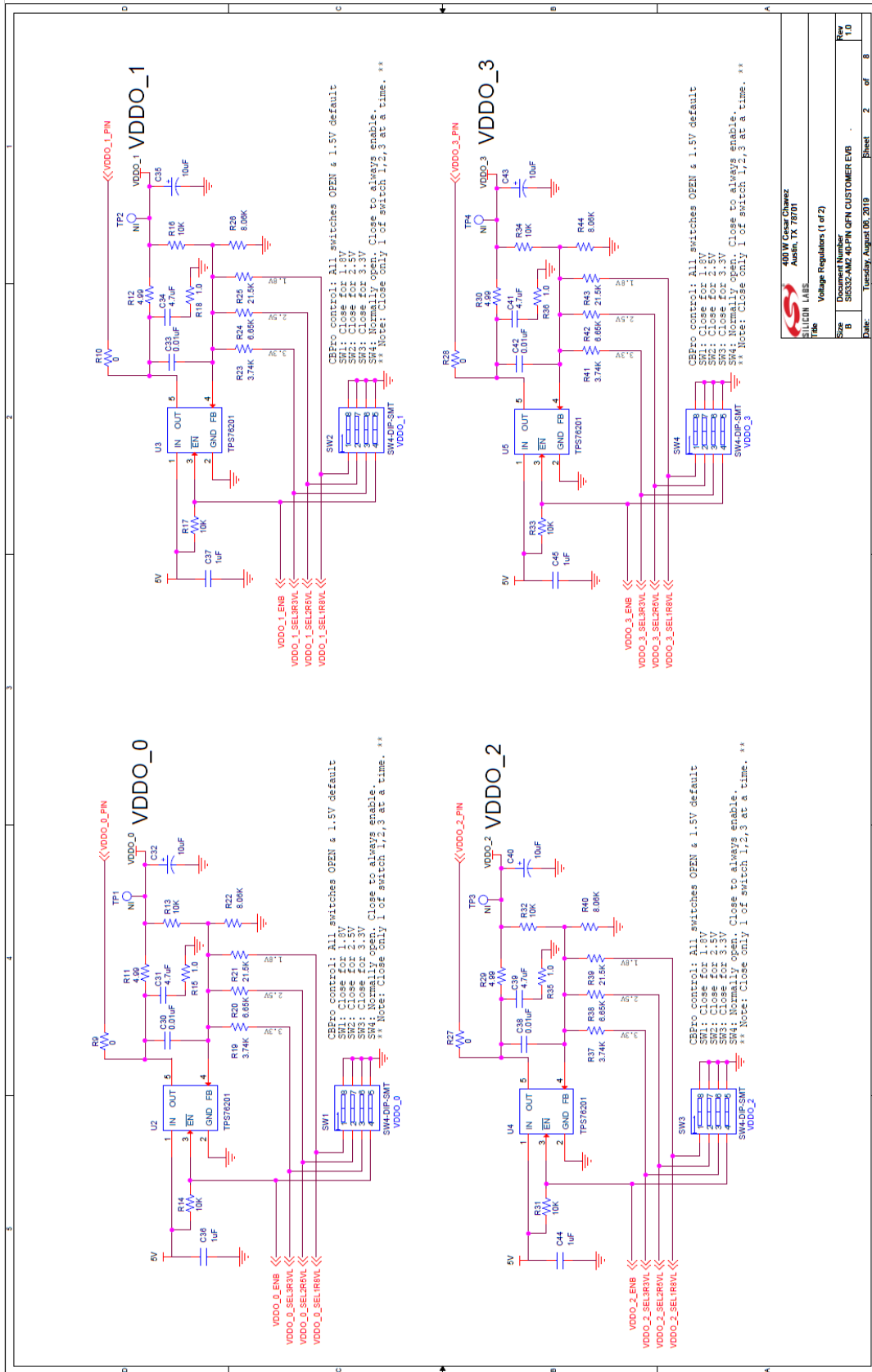
5. When complete with all steps, simply press the “Write to EVB” button to download the configuration to the connected EVB.

The configuration should now be actively running in the Si5332-8A-EVB.

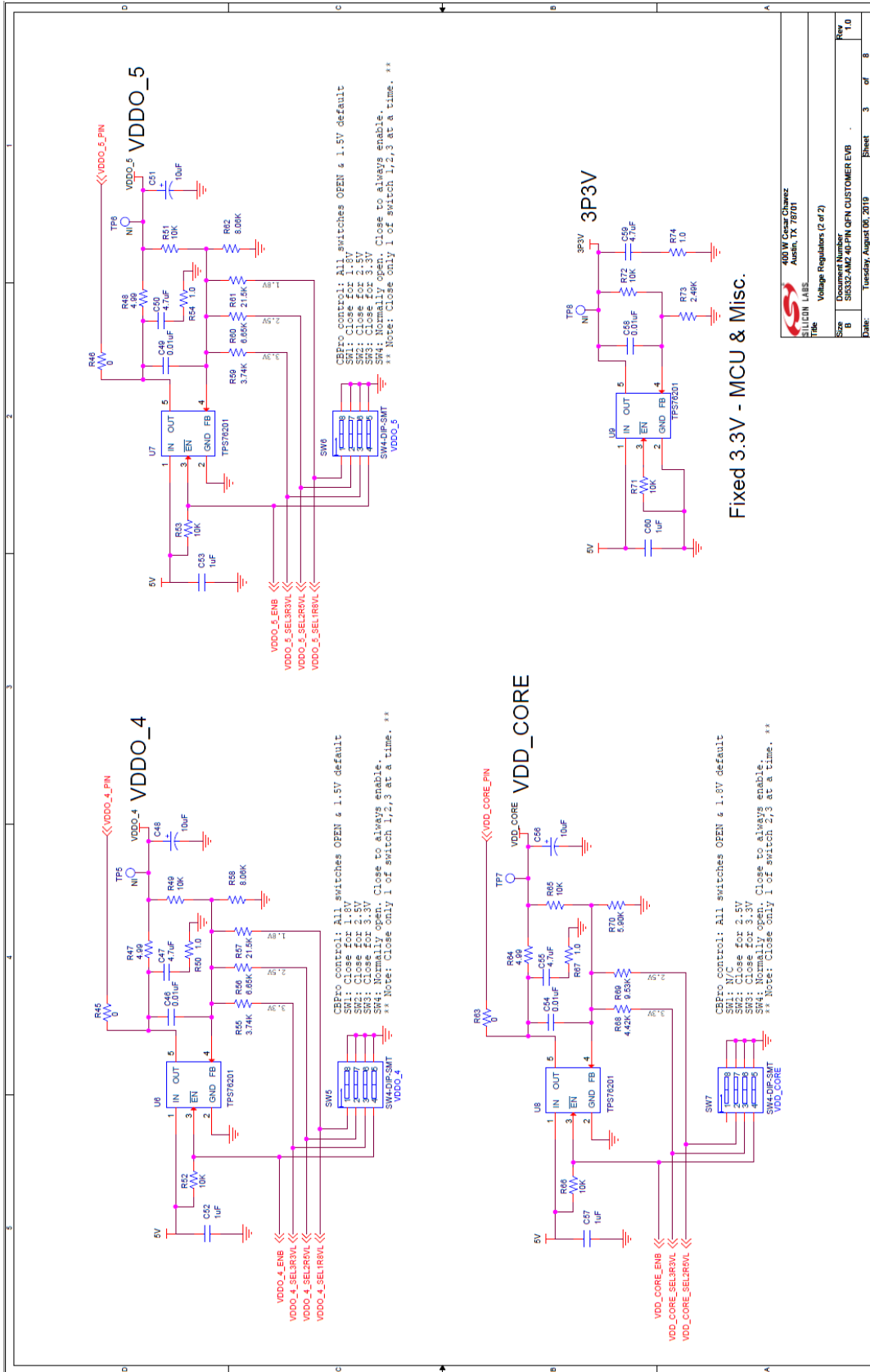


## 5. Si5332-8A-EVB Rev 1.0 Schematics



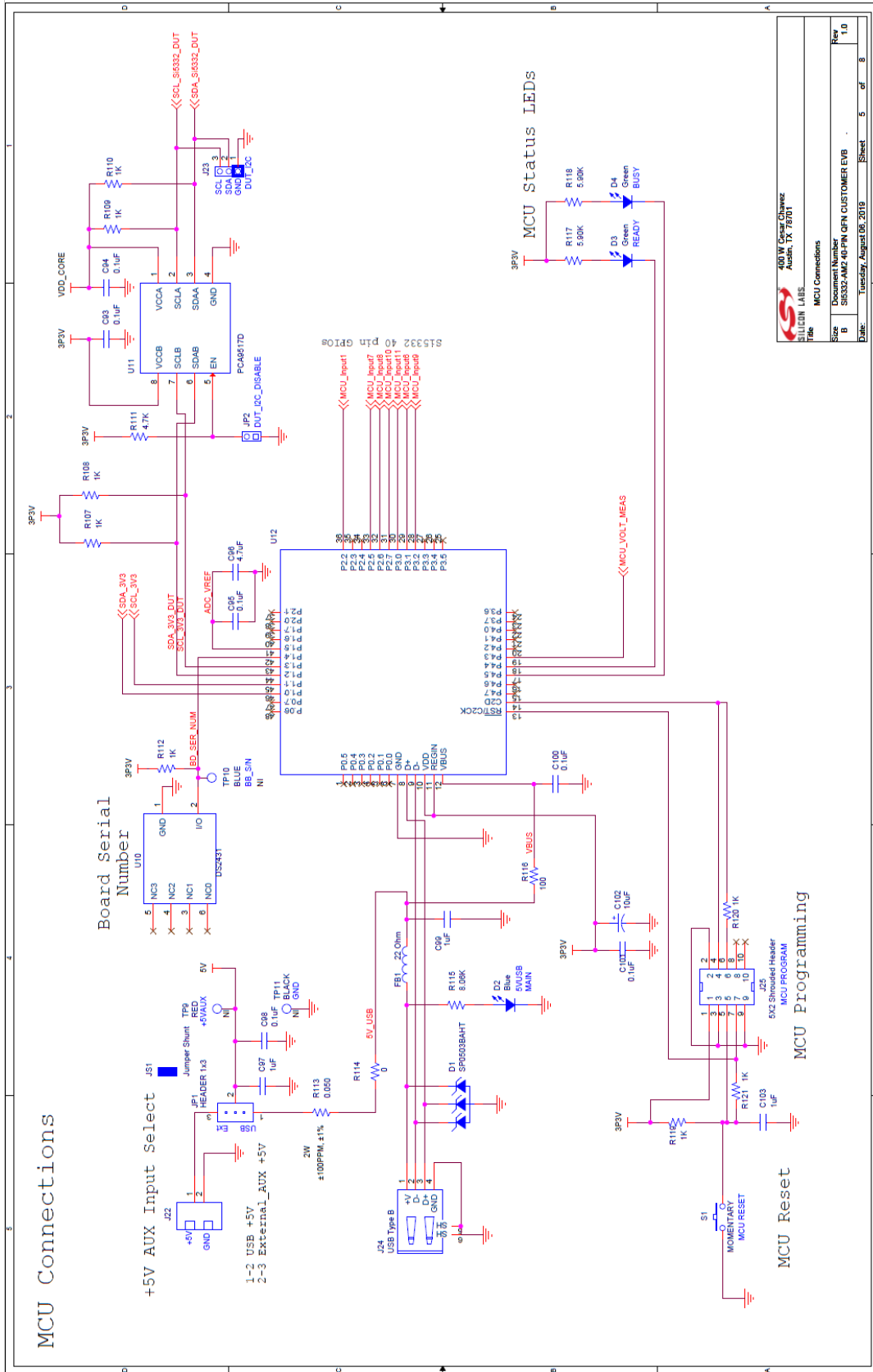


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Rev	1.0
Date	Tuesday, August 06, 2019
Sheet	2 of 8



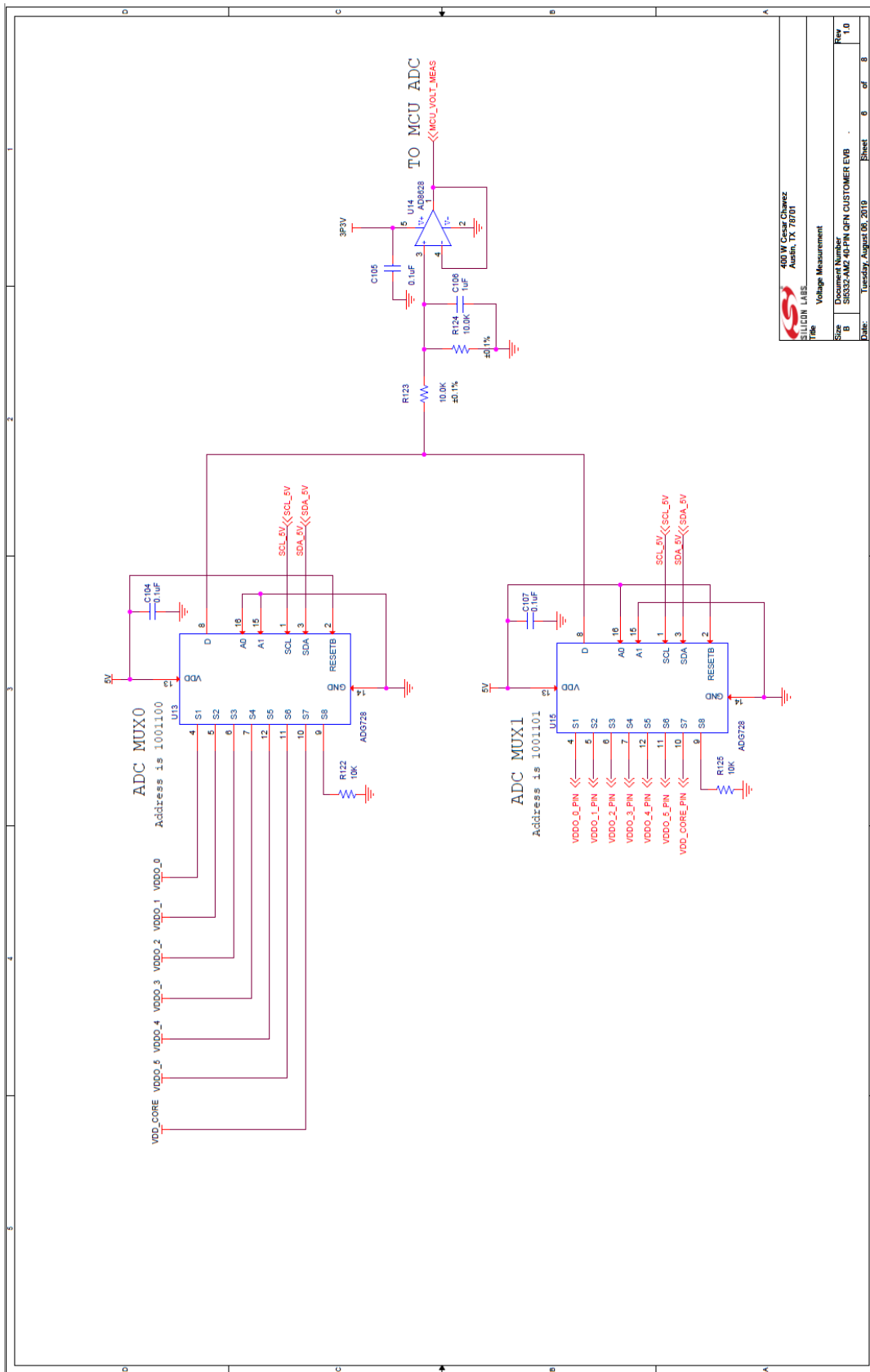
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Document Number SI5332-AM2-QFN40-EVB CUSTOMER EVB	Rev 1.0
Date Tuesday, August 06, 2019	Sheet 3 of 8



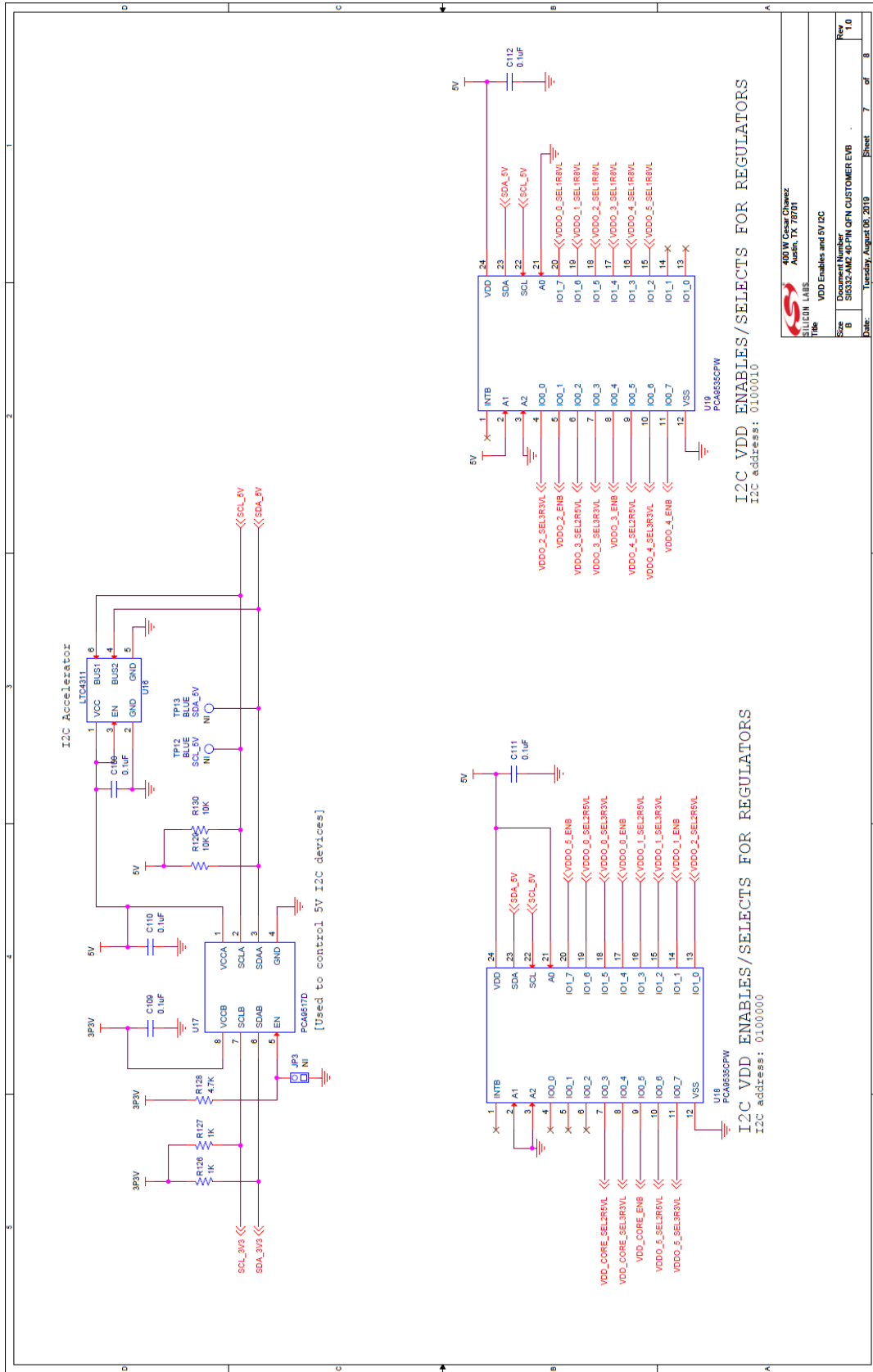


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Rev	1.0





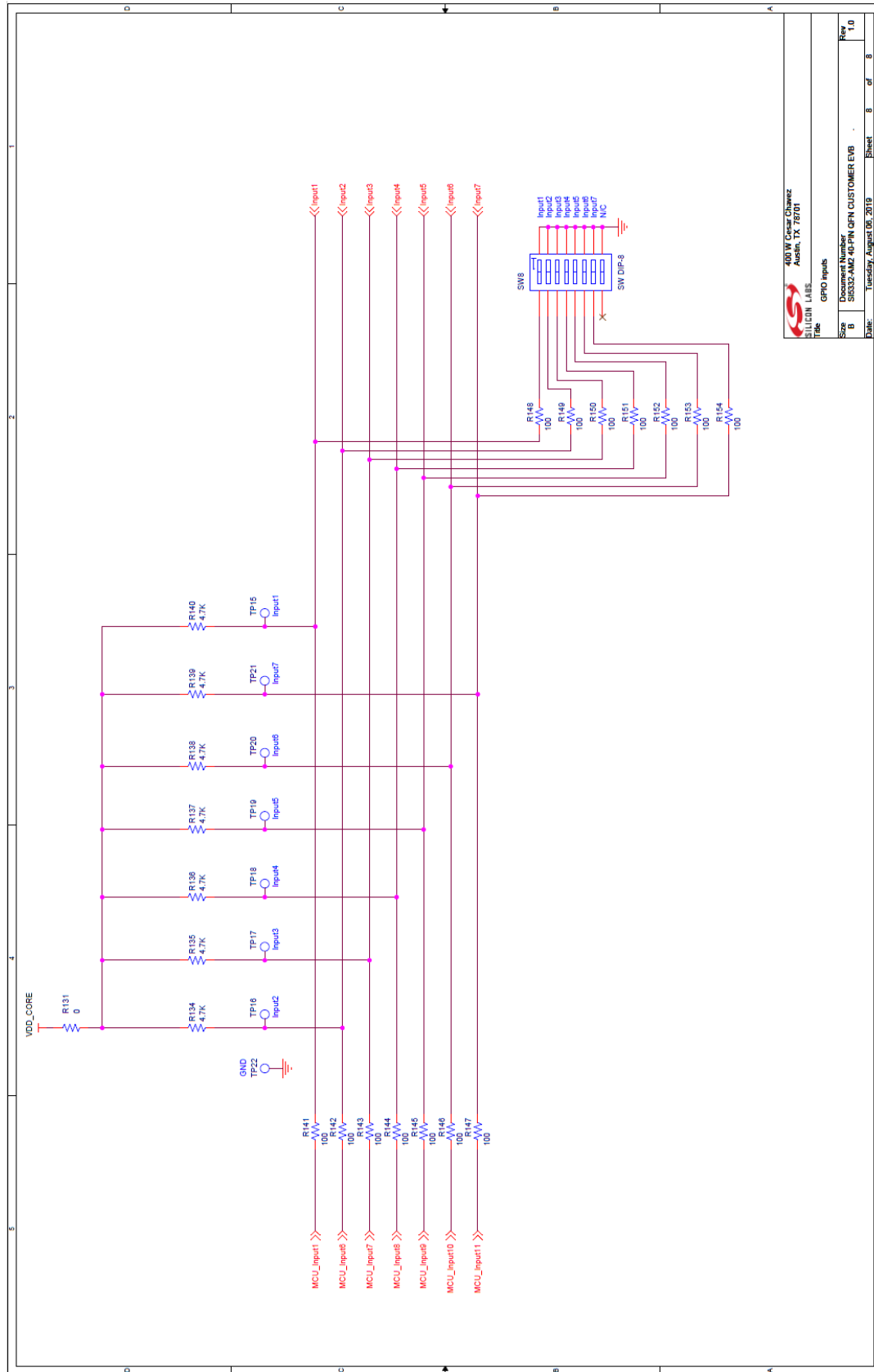
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Title Voltage Measurement	
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B	1.0
Date: Tuesday, August 06, 2019	Sheet 6 of 8



400 W Center Channel  
SILICON LABS  
Austin, TX 78701

Sheet: B  
Document Number: SI5332-AM2-QFN40-EVB-CUSTOMER-EVB  
Rev: 1.0

Date: Tuesday, August 06, 2019 Sheet: 7 of 8



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Date: Tuesday, August 06, 2019	Sheet: 8 of 8