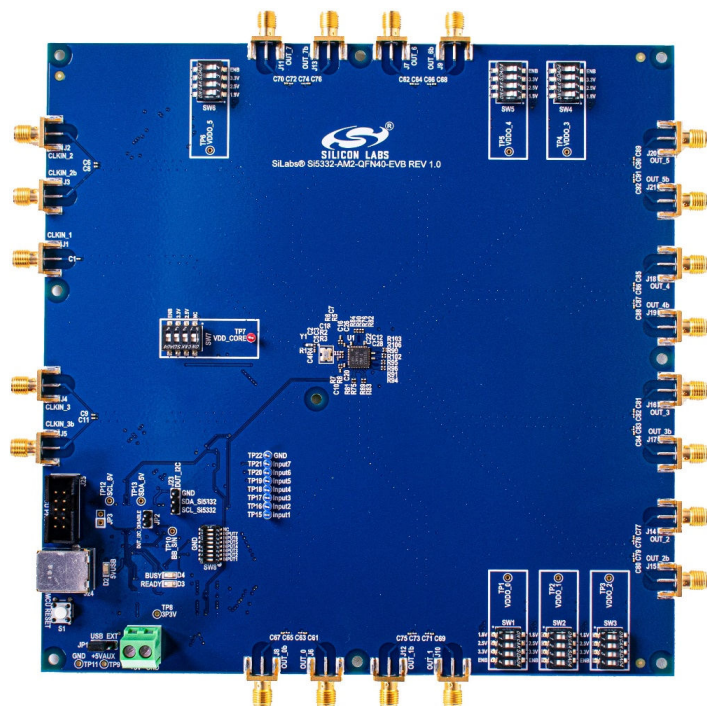


UG398: Si5332-8A-EVB User's Guide (Using Si5332-AM2-QFN40-EVB)

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.

Table of Contents

1. Functional Block Diagram	3
2. Si5332 CBPro™ Overview	4
3. Si5332-8A-EVB Operation	5
3.1 Initial Default Configuration	5
3.2 DIP Switch Functions	6
3.3 LEDs	6
3.4 Input Clocks	7
3.5 Output Clocks	8
4. Using CBPro™ with Si5332-8A-EVB	9
4.1 CBPro™ EVB GUI	10
4.2 Device Register Changes Using the CBPro™ EVB GUI	12
4.3 Creating a New Si5332-AM2 CBPro™ Configuration	13
5. Si5332-8A-EVB Rev 1.0 Schematics	14

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.

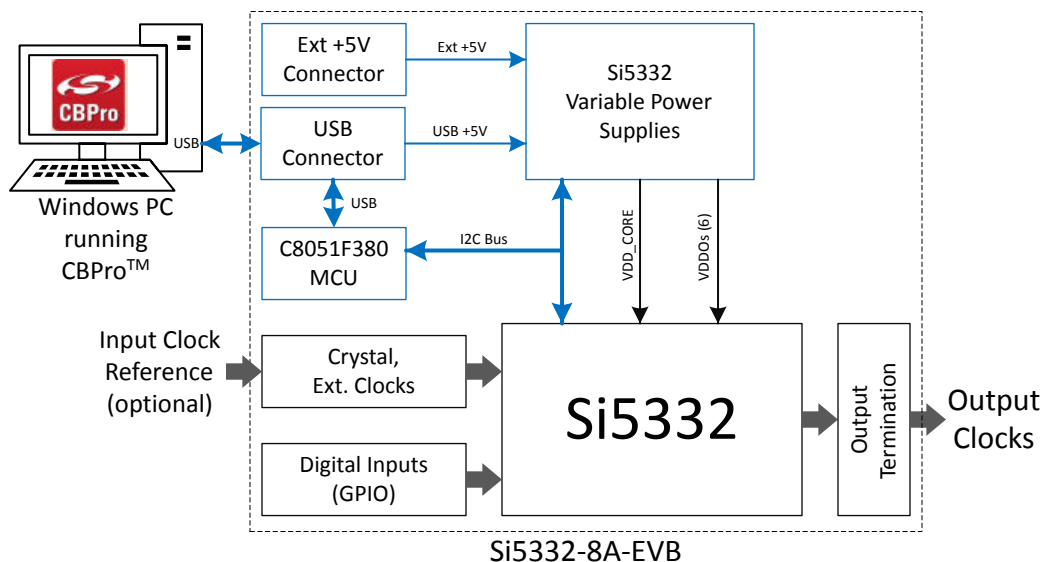


Figure 1.1. Si5332-8A-EVB Functional Block Diagram

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 I²C, 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.

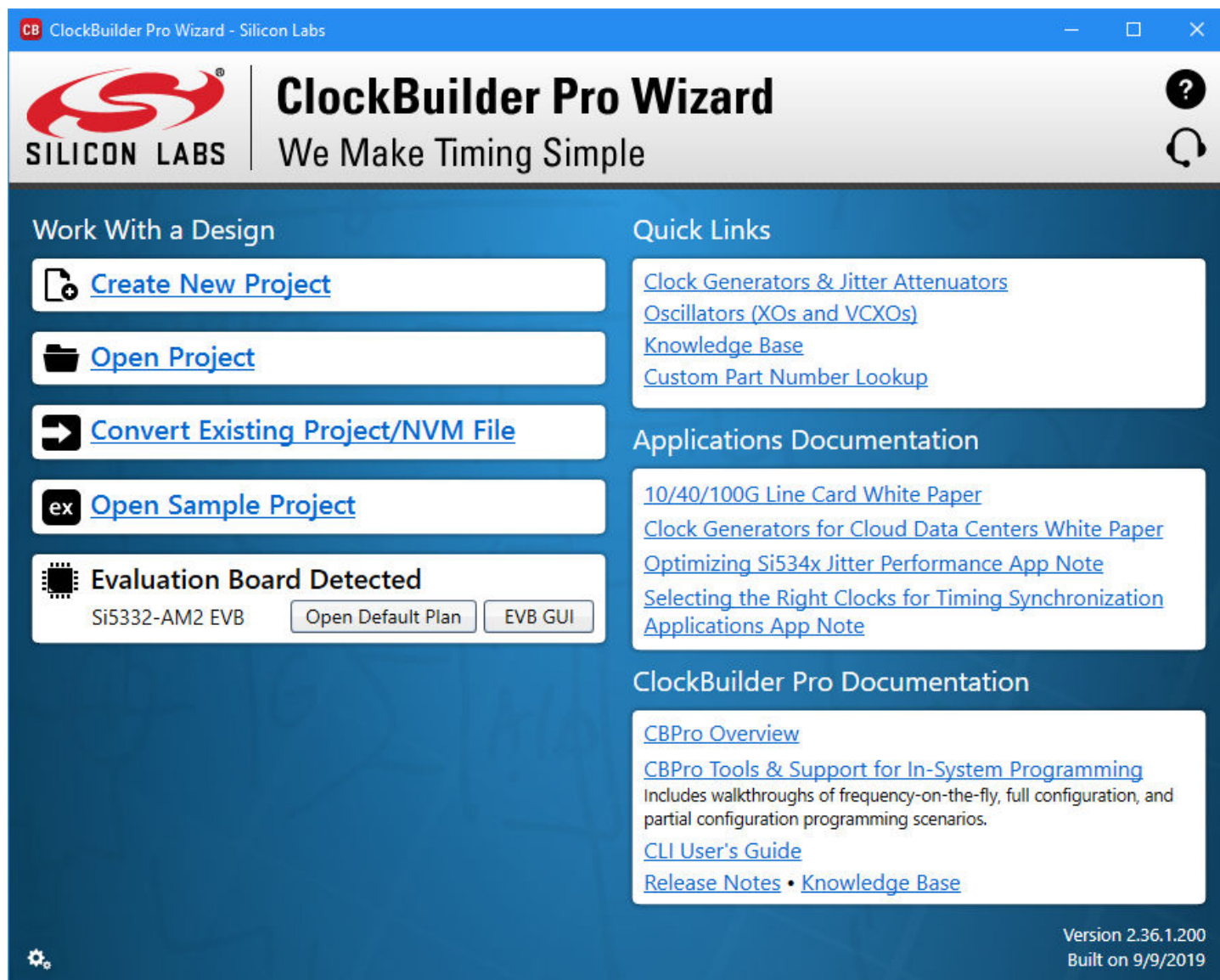


Figure 2.1. CBPro Start-up Window

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).

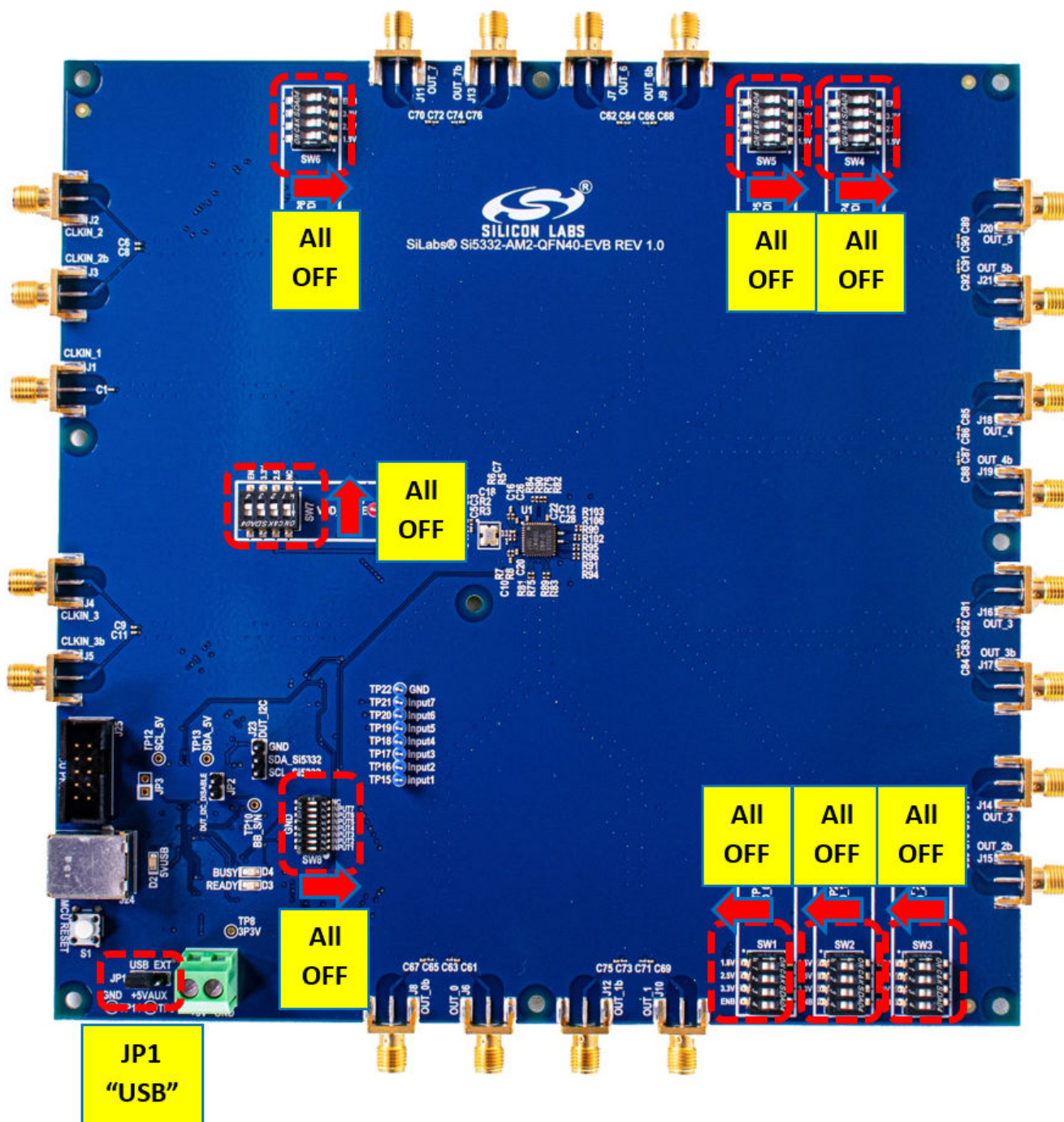


Figure 3.1. Si5332-8A-EVB Initial Default Configuration

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.

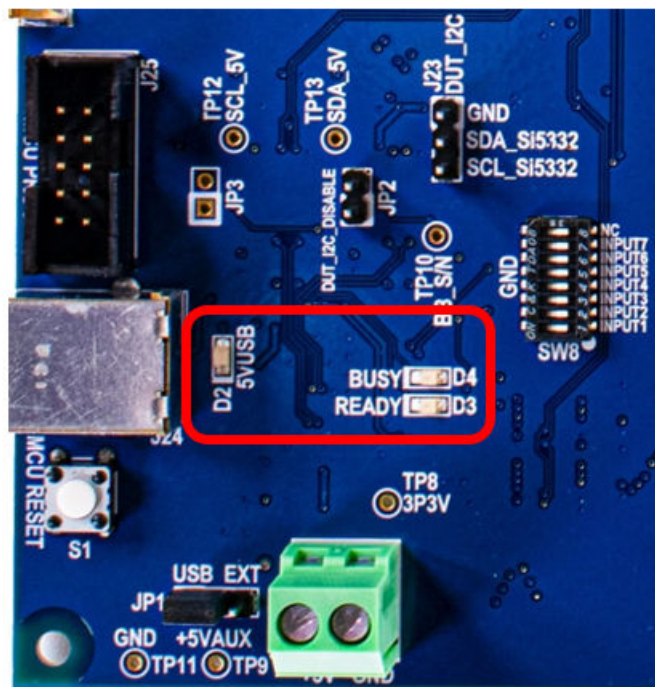


Figure 3.2. Si5332-8A-EVB LED Locations

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.

3.5 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 Ω & 0.1 μ 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 μ F caps can be replaced with 0 Ω resistors. Note that not all possible termination schemes can be supported by the circuit below and in some cases external components may be required.

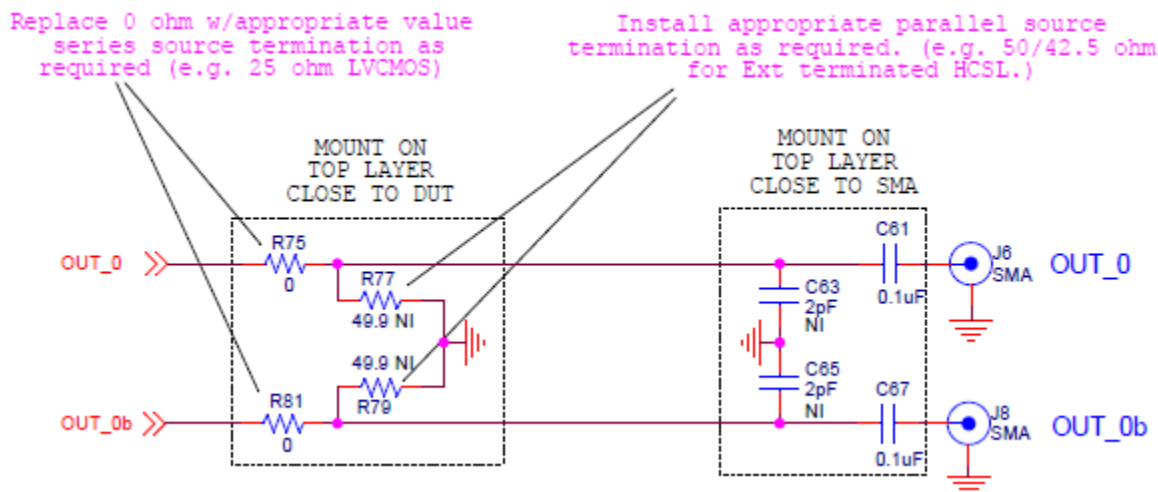


Figure 3.4. Si5332-8A-EVB Single Pair Output Clock Termination Circuit

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:

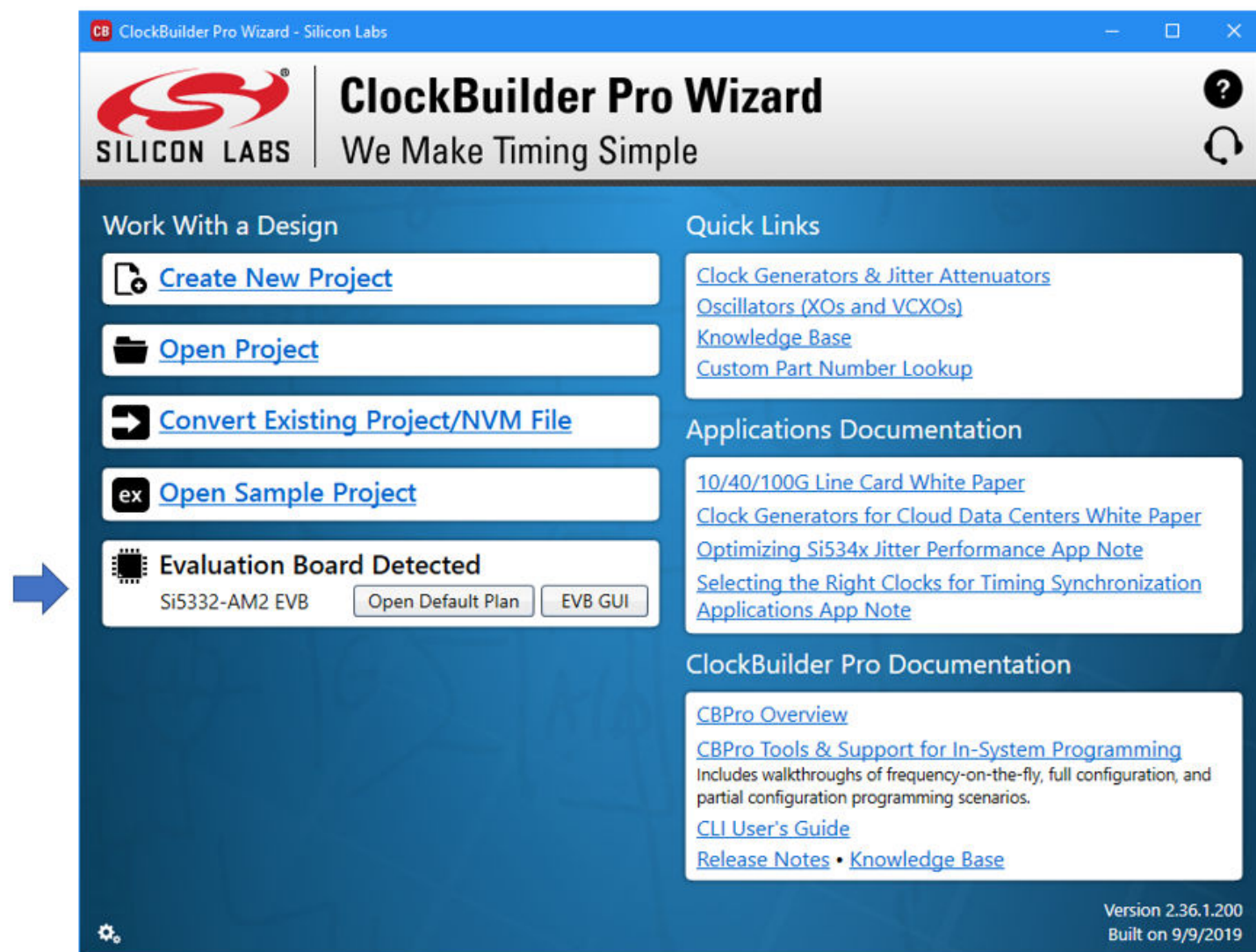


Figure 4.1. CBPro Start-up Window

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.

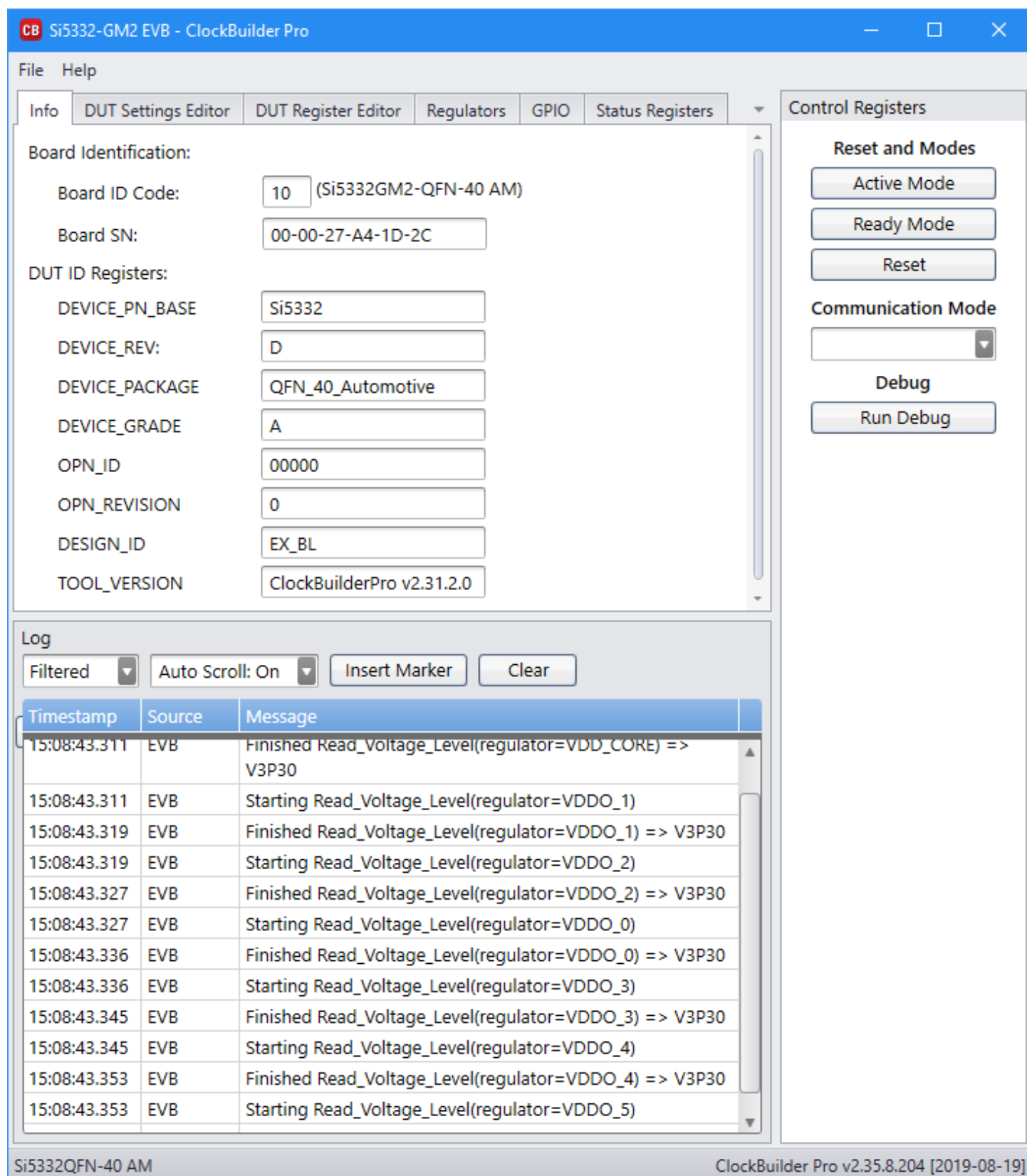


Figure 4.2. EVB GUI - Info Page

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.

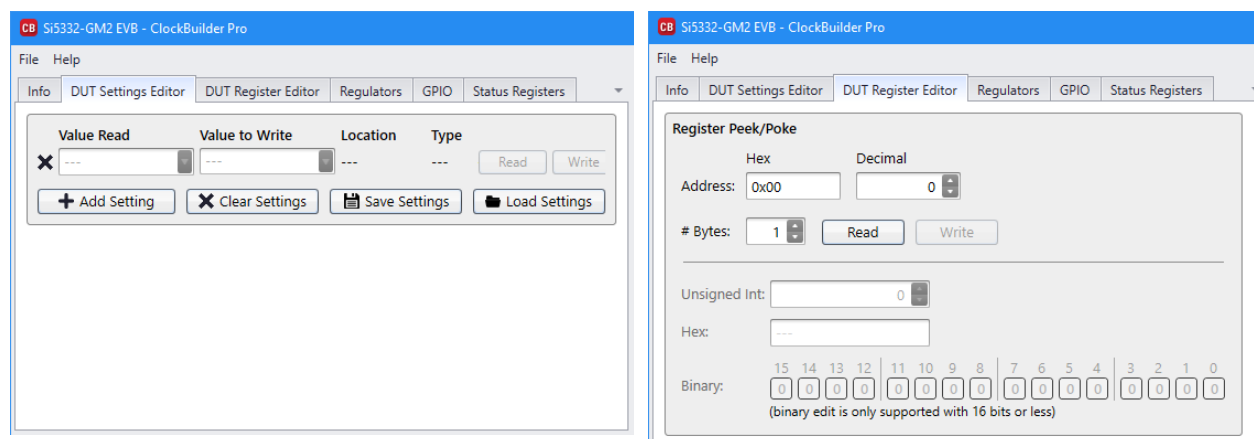


Figure 4.3. EVB GUI - DUT Settings / DUT Register Editors

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.

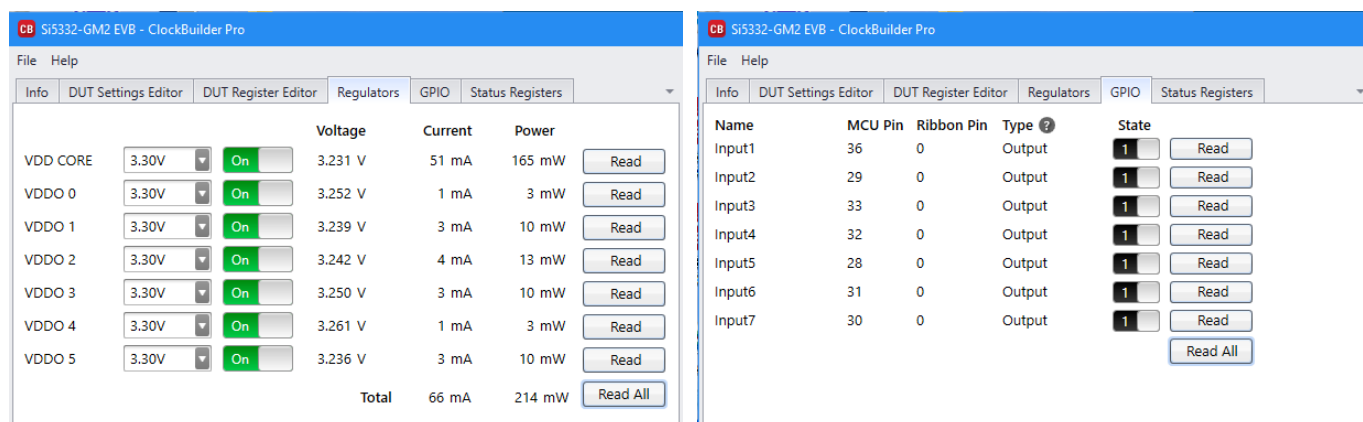


Figure 4.4. EVB GUI - Regulators and GPIO Monitoring/Control

4.2 Device Register Changes Using the CBPro™ EVB GUI

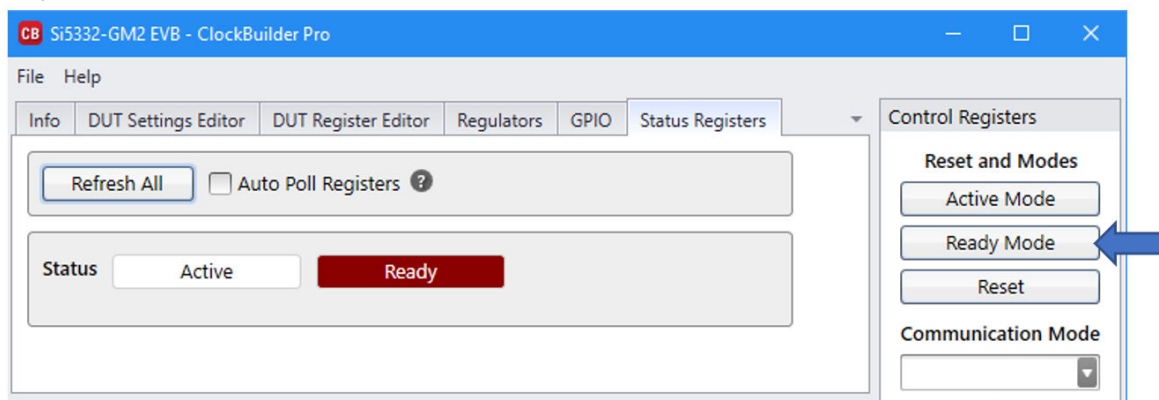
The last EVB GUI tab is the “Status Registers” tab which shows the present state of the device, in either “Active” or “Ready” mode.

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.

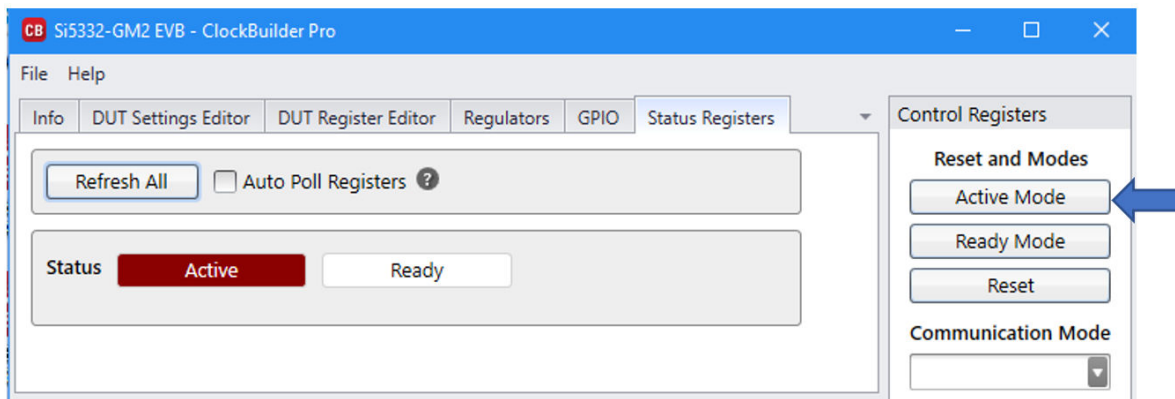
The only registers not requiring this process are Spread Spectrum enable/disable, Output Enable controls, Input Clock Selection, and the register placing the device into and out of Active or Ready mode. Do not rely on a Si5332 device being in “Active” mode to prevent inadvertent I²C write cycles from 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.



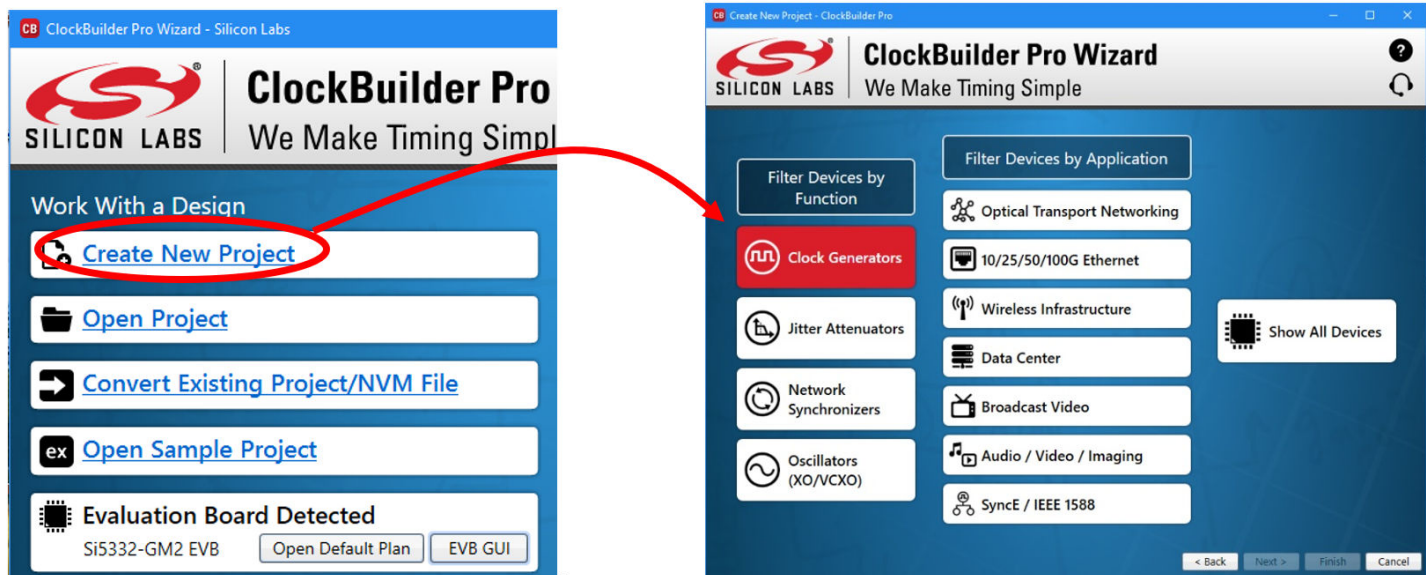
- Confirm device is in “Ready” mode.
2. Perform any register updates as desired.
 3. Place device back into “Active” mode for the register changes to take effect and outputs enabled.
 - Press “Active Mode” button, then “Refresh All” button to update Status.



- 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.

CB Create New Project - ClockBuilder Pro

ClockBuilder Pro v2.35.8.204 ⚙️

Clock Generator Parts

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.

CB New Si5332_GM2 Project - ClockBuilder Pro

ClockBuilder Pro v2.35.8.204 ⚙️

Step 3 of 12 - Package Selection ▼

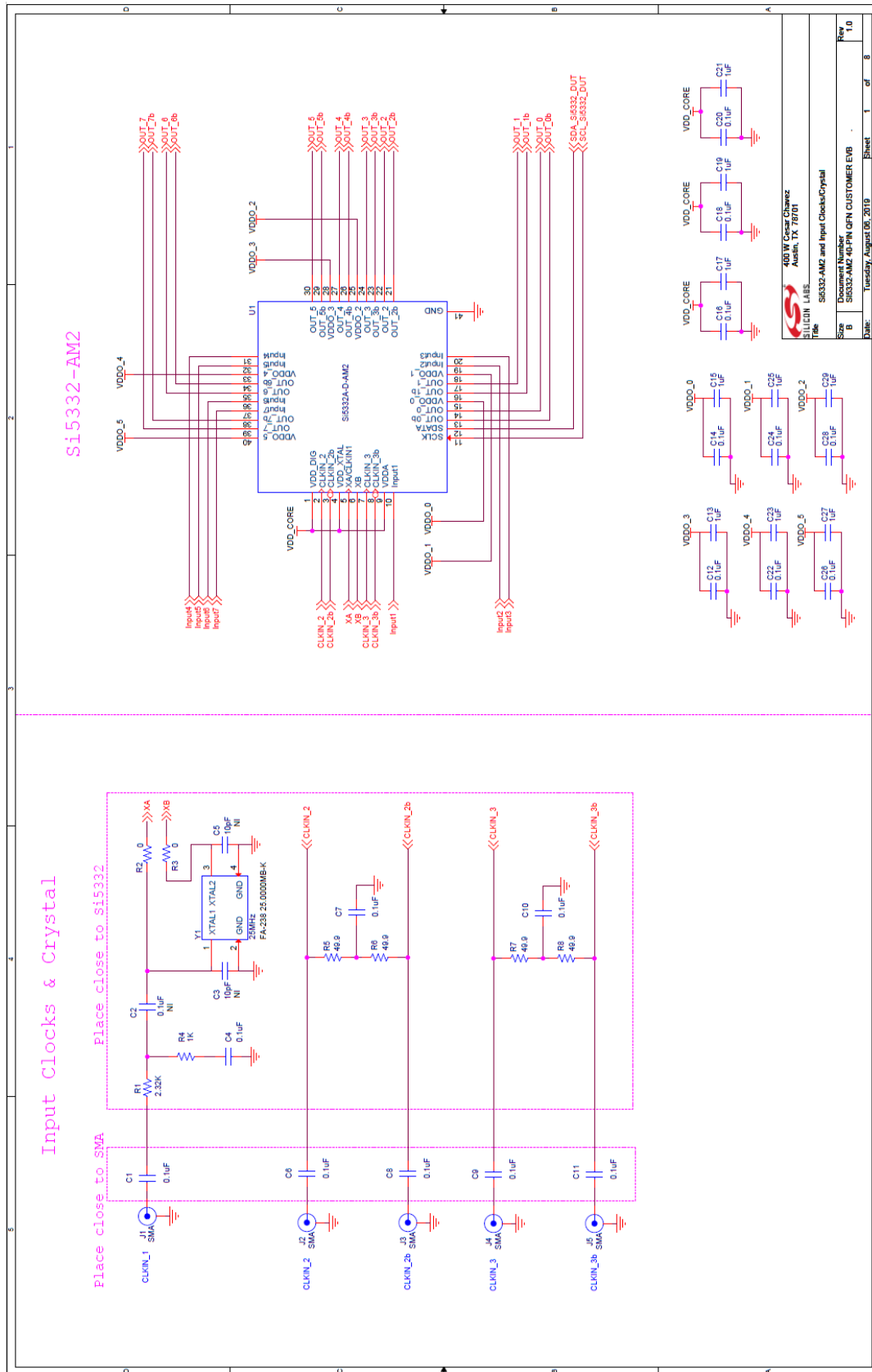
☐ Any Reference (Grades A, B, C, or D)
 An external crystal (XTAL) or oscillator (OSC) is supplied to XAXB.

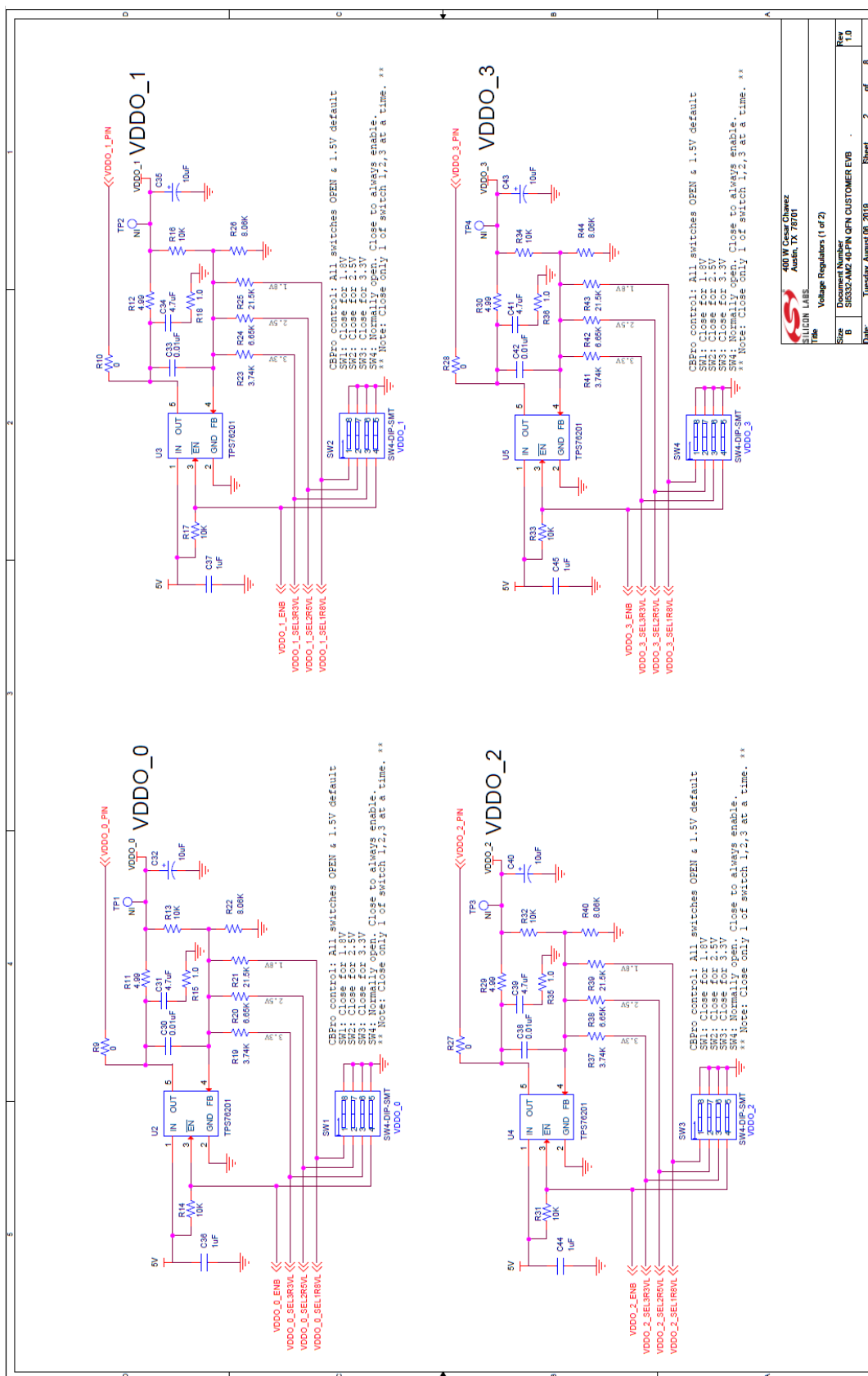
☒ Any Reference Automotive (Grades A, B, C, or D)
 An external crystal (XTAL) or oscillator (OSC) is supplied to XAXB.

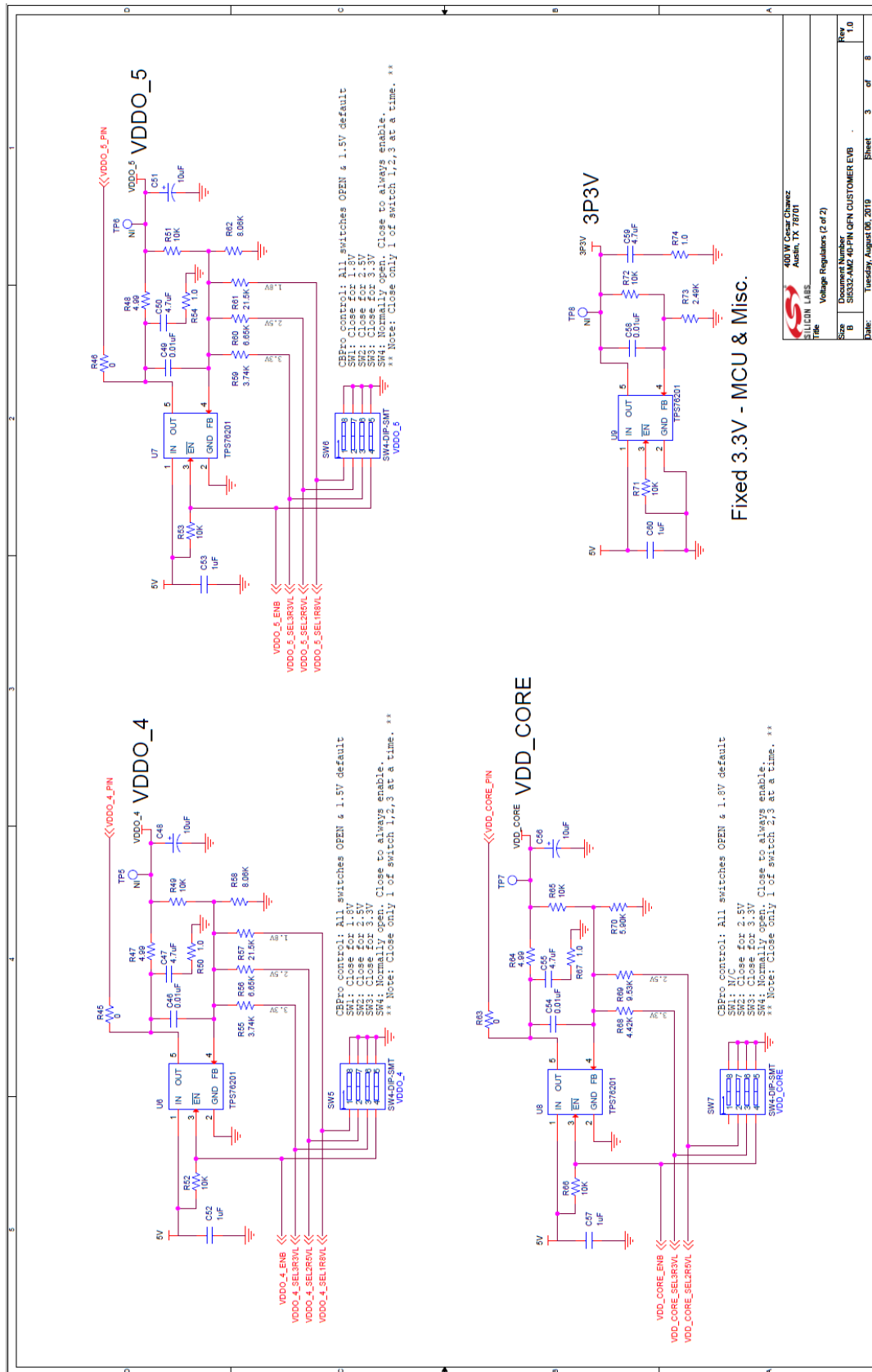
☐ Embedded Crystal (Grades E, F, G, or H)
 A 50 MHz crystal is included in the package.

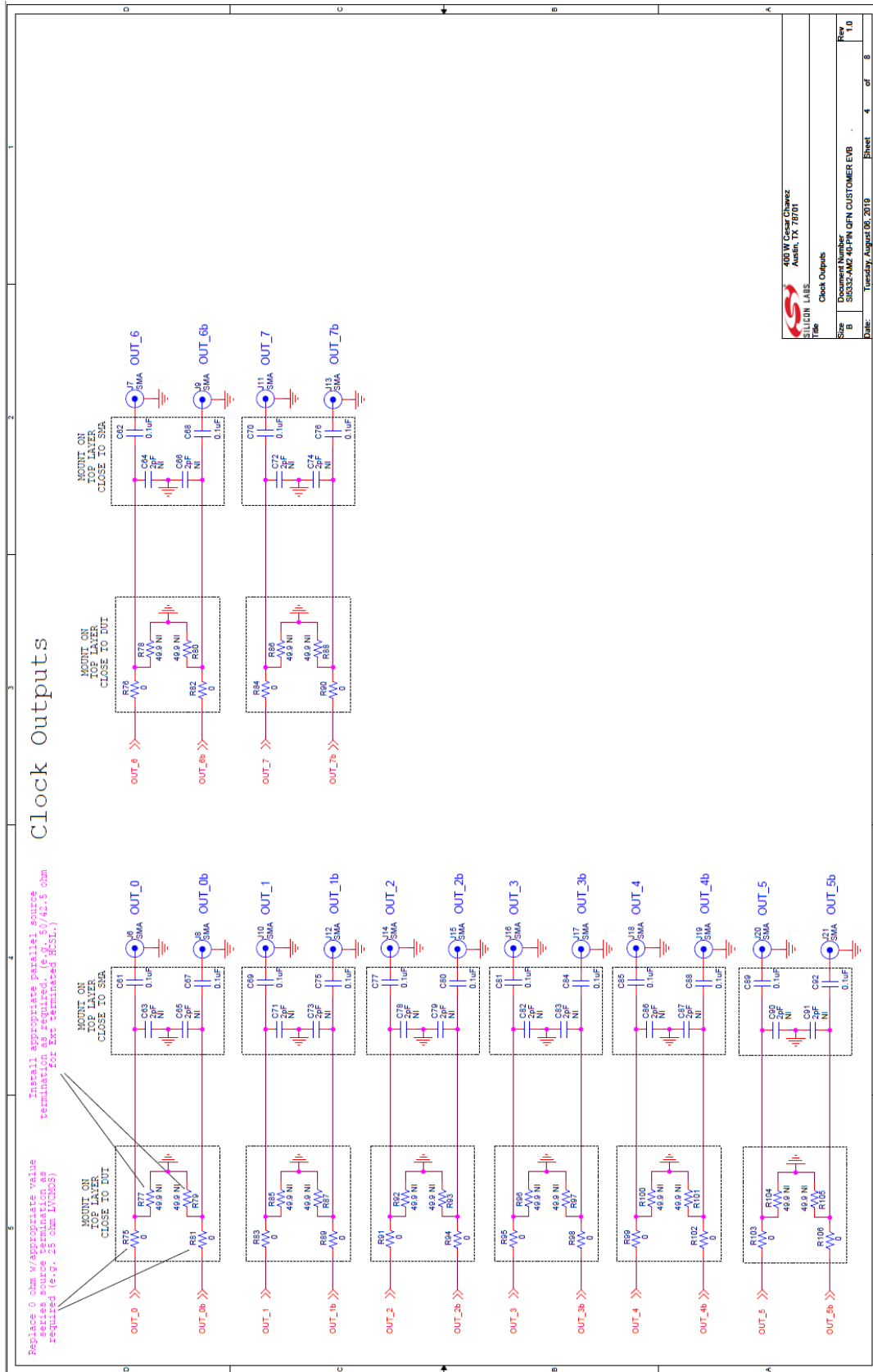
5. When complete with all steps, simply press the “Write to EVB” button to download the configuration to the connected EVB.
The configuration should now be actively running in the Si5332-8A-EVB.

5. Si5332-8A-EVB Rev 1.0 Schematics

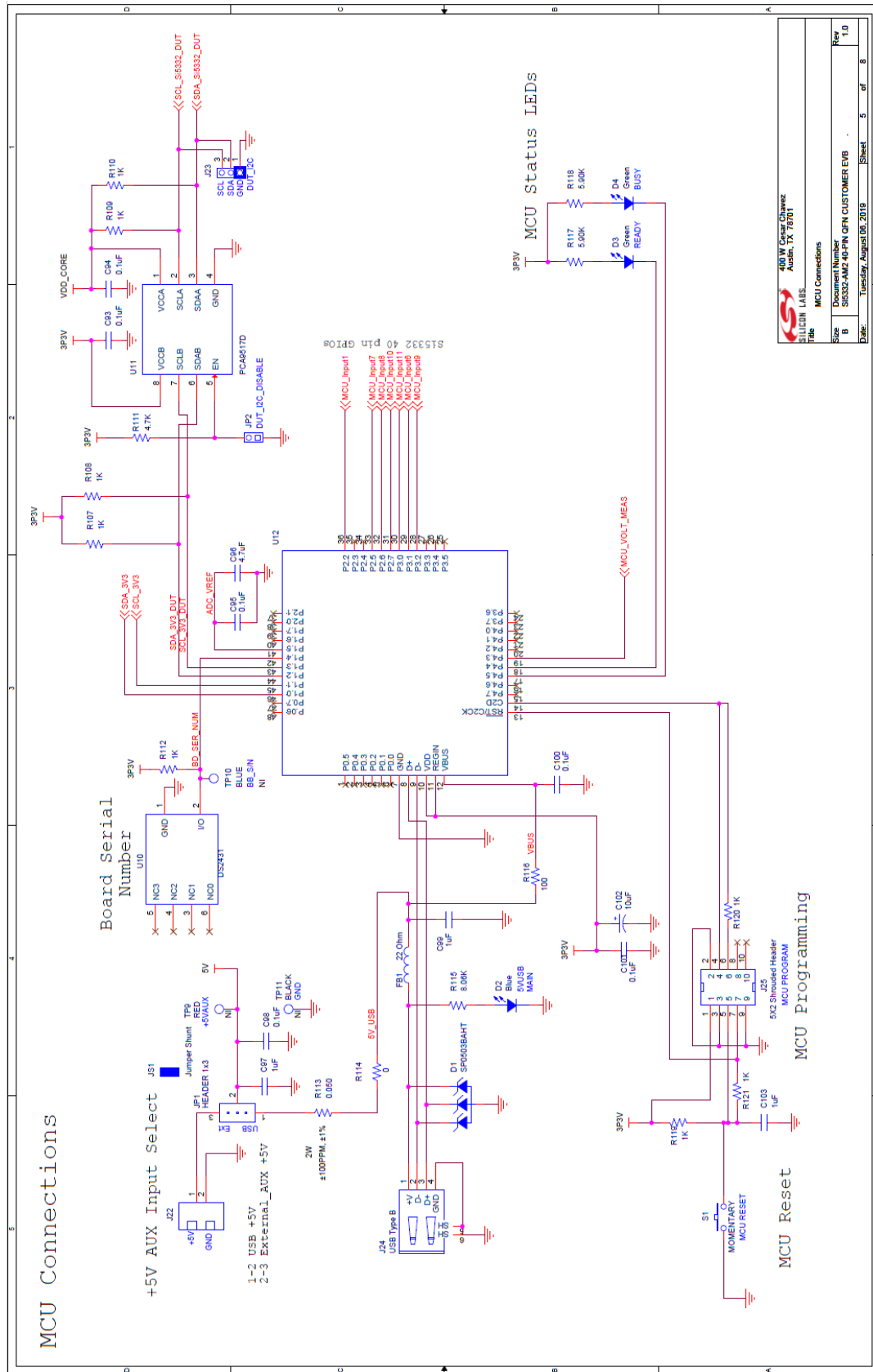




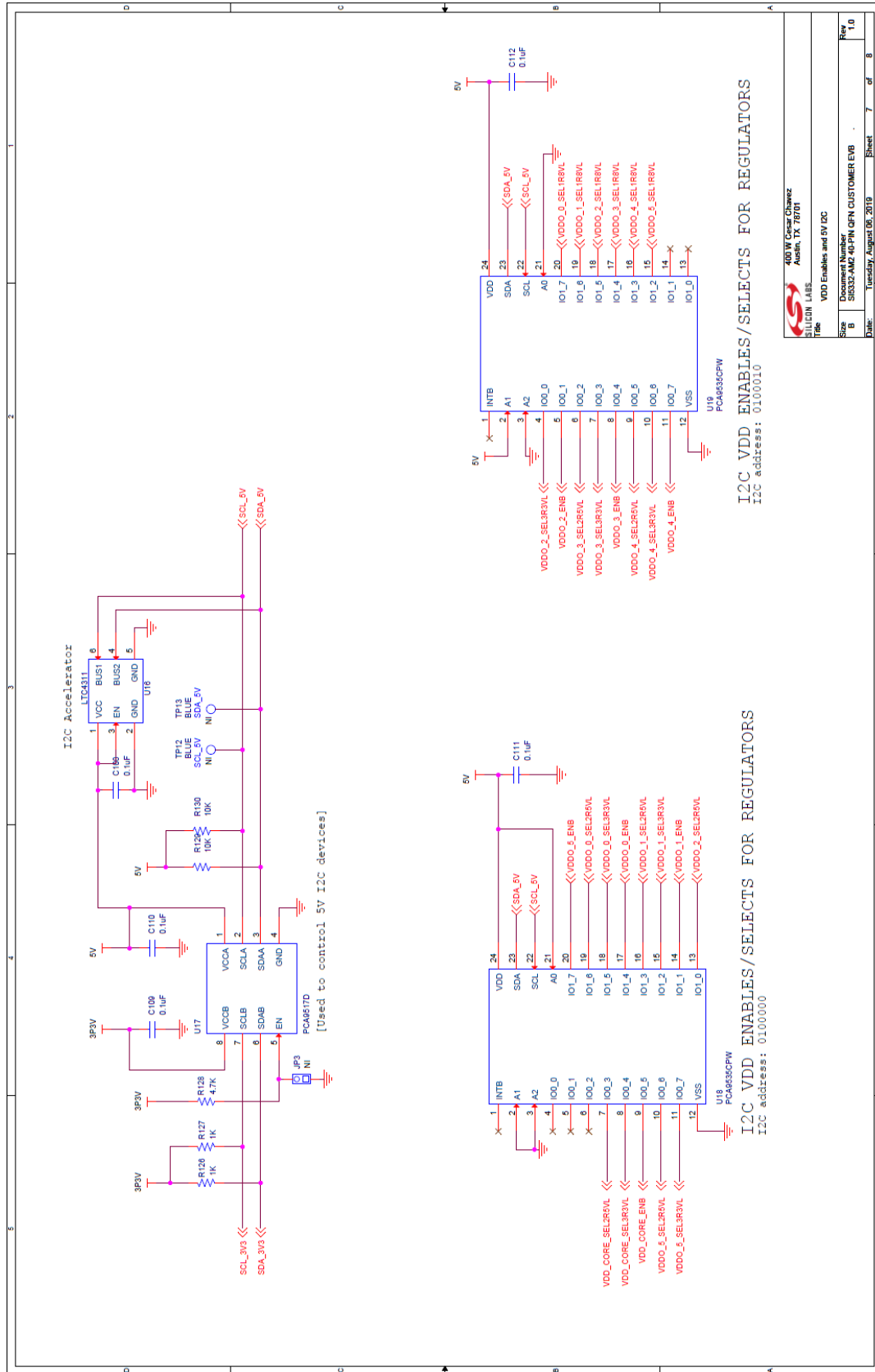




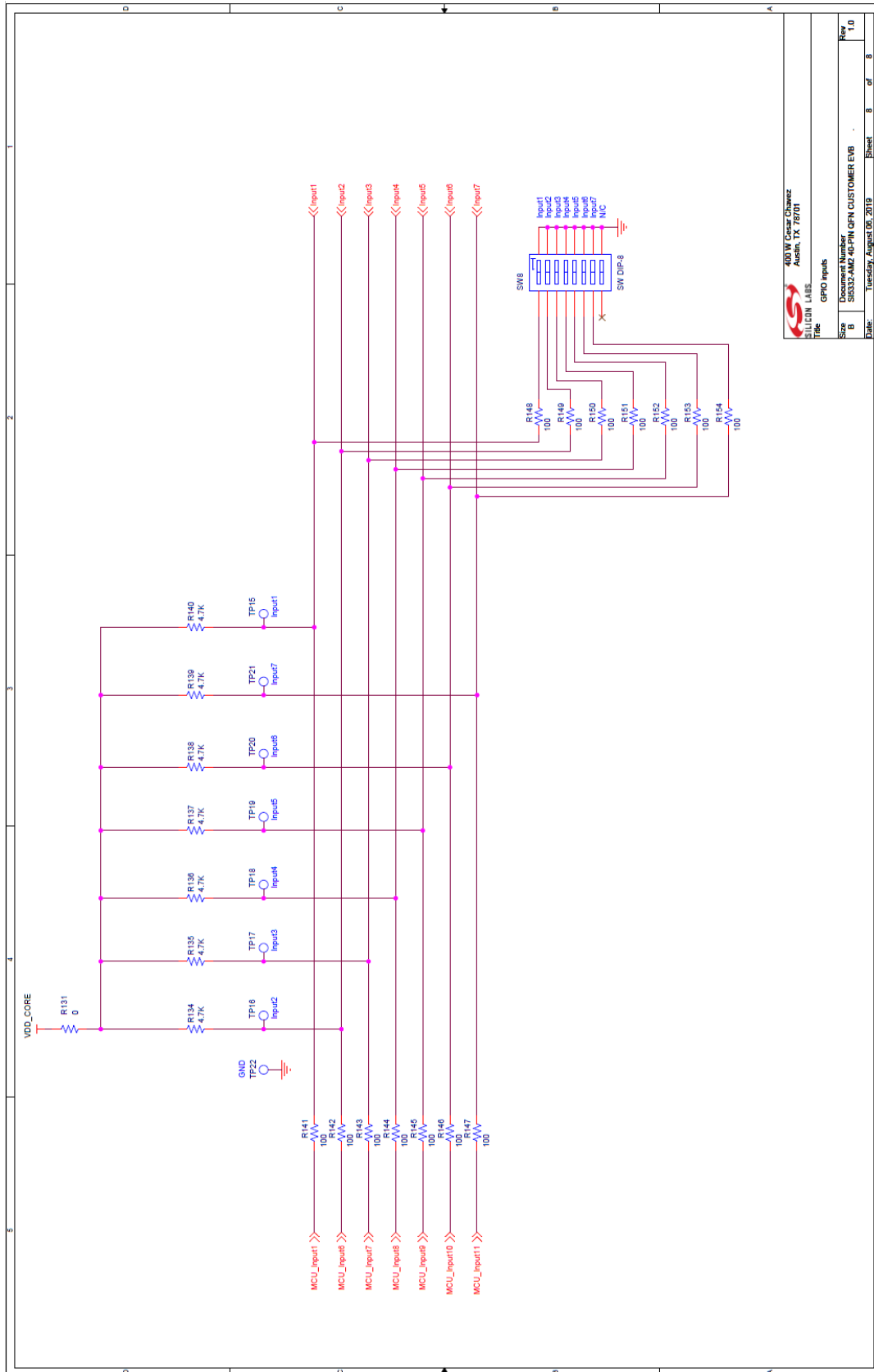
400 W Class Overview	
SILICON LABS	
Title	
Size	Document Number
B	UG398-AM2-QFN40-EVB
File	Thursday, August 09, 2018
Sheet	4 of 8



400 W Cesar Chavez Austin, TX 78701							
Si5332-8A-EVB							
MCU Connections							
Size	8	Document Number	UG398	Sheet	5	of	8
Date	Tuesday, August 06, 2019						



400 W Core Chassis	
SILICON LABS	
Austin, TX 78701	
Title: VDD Enables and 5V DC	
Size: B	Document Number: SI5332-AM2-QFN40-EVB
Rev: 1.0	Rev: 1.0
Date: Tuesday, August 08, 2018	Sheet: 7 of 8



400 W. Cesar Chavez Austin, TX 78701	
Title: GPO inputs	
Size: B	Document Number: 50030-AM2-QFN40-EVB
Rev: 1.0	File: Tuesday, August 06, 2019
Sheet: 8	of: 8

ClockBuilder Pro

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

www.silabs.com/CBPro



Timing Portfolio
www.silabs.com/timing



SW/HW
www.silabs.com/CBPro



Quality
www.silabs.com/quality



Support and Community
community.silabs.com

Disclaimer

Silicon Labs intends to provide customers with the latest, accurate, and in-depth documentation of all peripherals and modules available for system and software implementers using or intending to use the Silicon Labs products. Characterization data, available modules and peripherals, memory sizes and memory addresses refer to each specific device, and "Typical" parameters provided can and do vary in different applications. Application examples described herein are for illustrative purposes only. Silicon Labs reserves the right to make changes without further notice to the product information, specifications, and descriptions herein, and does not give warranties as to the accuracy or completeness of the included information. Without prior notification, Silicon Labs may update product firmware during the manufacturing process for security or reliability reasons. Such changes will not alter the specifications or the performance of the product. Silicon Labs shall have no liability for the consequences of use of the information supplied in this document. This document does not imply or expressly grant any license to design or fabricate any integrated circuits. The products are not designed or authorized to be used within any FDA Class III devices, applications for which FDA premarket approval is required or Life Support Systems without the specific written consent of Silicon Labs. A "Life Support System" is any product or system intended to support or sustain life and/or health, which, if it fails, can be reasonably expected to result in significant personal injury or death. Silicon Labs products are not designed or authorized for military applications. Silicon Labs products shall under no circumstances be used in weapons of mass destruction including (but not limited to) nuclear, biological or chemical weapons, or missiles capable of delivering such weapons. Silicon Labs disclaims all express and implied warranties and shall not be responsible or liable for any injuries or damages related to use of a Silicon Labs product in such unauthorized applications.

Trademark Information

Silicon Laboratories Inc.®, Silicon Laboratories®, Silicon Labs®, SiLabs® and the Silicon Labs logo®, Bluegiga®, Bluegiga Logo®, ClockBuilder®, CMEMS®, DSPLL®, EFM®, EFM32®, EFR®, Ember®, Energy Micro, Energy Micro logo and combinations thereof, "the world's most energy friendly microcontrollers", Ember®, EZLink®, EZRadio®, EZRadioPRO®, Gecko®, Gecko OS, Gecko OS Studio, ISOModem®, Precision32®, ProSLIC®, Simplicity Studio®, SiPHY®, Telegesis, the Telegesis Logo®, USBXpress®, Zentri, the Zentri logo and Zentri DMS, Z-Wave®, and others are trademarks or registered trademarks of Silicon Labs. ARM, CORTEX, Cortex-M3 and THUMB are trademarks or registered trademarks of ARM Holdings. Keil is a registered trademark of ARM Limited. Wi-Fi is a registered trademark of the Wi-Fi Alliance. All other products or brand names mentioned herein are trademarks of their respective holders.



Silicon Laboratories Inc.
400 West Cesar Chavez
Austin, TX 78701
USA

<http://www.silabs.com>