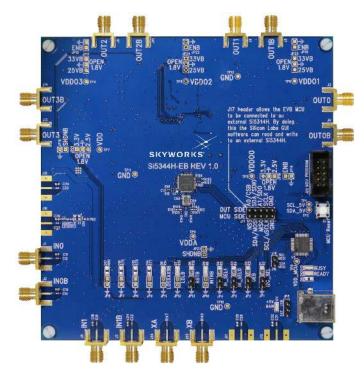


# UG149: Si5344H Evaluation Board User's Guide

The Si5344H-EVB is used for evaluating the Si5344H Any-Frequency, Any-Output, Jitter Attenuating Clock Multiplier. The Si5344H combines 4<sup>th</sup> generation DSPLL and Multisynth<sup>™</sup> technologies to enable any-frequency clock generation for applications that require the highest level of jitter performance. The Si5344H-EVB has two independent input clocks and four independent output clocks. The Si5344H-EVB can be controlled and configured using the ClockBuilder<sup>®</sup> Pro (CBPro) software tool.



Si5344H Evaluation Board

#### EVB FEATURES:

- Powered from USB port or external power supply.
- Onboard 48 MHz XTAL or Reference SMA Inputs allow holdover mode of operation on the Si5344H.
- CBPro GUI-programmable VDD supply allows the device to operate from 3.3, 2.5, or 1.8 V.
- CBPro GUI-programmable VDDO supplies allow each of the ten outputs to have its own supply voltage, selectable from 3.3, 2.5, or 1.8 V.
- CBPro GUI-controlled voltage, current, and power measurements of VDD and all VDDO supplies.
- Status LEDs for power supplies and control/status signals of Si5344H.
- SMA connectors for input clocks, output clocks, and optional external timing reference clock.

UG149: Si5344H Evaluation Board User's Guide • Overview

# 1. Overview

# 1.1 Functional Block Diagram

A functional block diagram of the Si5344H-EVB is shown below. This EVB can be connected to a PC via the main USB connector for programming, control, and monitoring. See Section 1.2 Si5344H EVB Support Documentation or Section 1.3 Quick Start for more information.

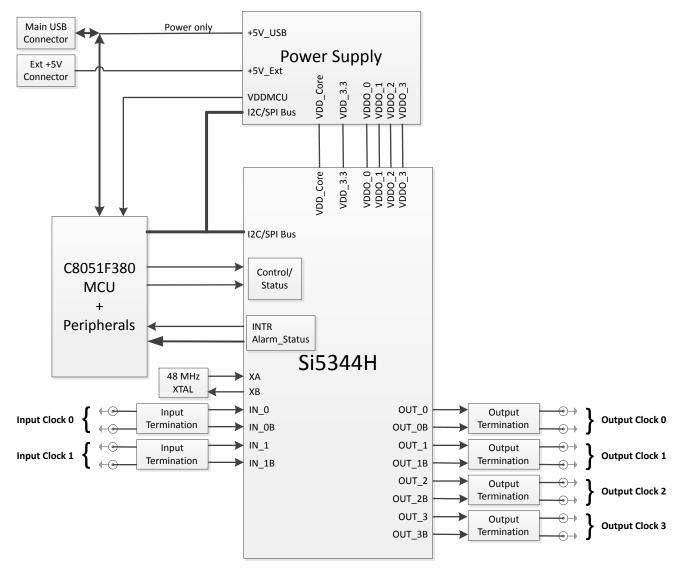


Figure 1.1. Si5344H-EVB Functional Block Diagram

# 1.2 Si5344H EVB Support Documentation

The Si5344H EVB Schematic and Bill of Materials (BOM) can be found online at: https://www.skyworksinc.com/en/Products/Timing/Evaluation-Kits/jitter-attenuator/si5344h-si5342h-evaluation-kit. Contact Skyworks for related user's guides, data sheets, and software.

Note: The Si5344H EVB schematic is in OrCad Capture hierarchical format and not in a typical "flat" schematic format.

UG149: Si5344H Evaluation Board User's Guide • Overview

# 1.3 Quick Start

- 1. Install ClockBuilder Pro desktop software: https://www.skyworksinc.com/en/application-pages/clockbuilder-pro-software.
  - Installation instructions and the user's guide for ClockBuilder Pro can also be found at the download link shown above.
- 2. Connect a USB cable from the Si5344H-EVB to the PC where the software is installed.
- 3. Confirm jumpers are installed as shown in Table 1.1 Si5344H EVB Jumper Defaults on page 3.
- 4. Launch the ClockBuilder Pro software.
- 5. You can use ClockBuilder Pro to create, download, and run a frequency plan on the Si5344H-EVB.
- 6. Contact Skyworks for the Si5344H data sheet.

# **1.4 Jumper Defaults**

Location	Туре	I = Installed	Location	Туре	I = Installed
		0 = Open			0 = Open
JP1	2 pin	I	JP14	2 pin	0
JP2	2 pin	I	JP15	2 pin	0
JP3	2 pin	I	JP16	3 pin	all open
JP4	2 pin	I	JP17	3 pin	all open
JP5	3 pin	1 to 2	JP18	2 pin	0
JP6	2 pin	0	JP19	2 pin	0
JP7	2 pin	0	JP20	3 pin	all open
JP8	2 pin	0	JP21	3 pin	all open
JP9	2 pin	0	JP22	2 pin	0
JP10	2 pin	0	JP23	2 pin	0
JP11	2 pin	0	JP24	3 pin	all open
JP12	2 pin	0			
JP13	2 pin	0	JP17	5x2 Hdr	All 5 installed

# Table 1.1. Si5344H EVB Jumper Defaults

#### Note:

1. Refer to the Si5344H EVB Schematics for the functionality associated with each jumper.

# 1.5 Status LEDs

Location	Silkscreen	Color	Status Function Indication
D5	INTRB	Blue	DUT Interrupt
D7	LOLB	Blue	DUT Loss of Lock
D8	LOSXAXBB	Blue	DUT Loss of Reference
D11	+5V MAIN	Green	Main USB +5 V present
D12	READY	Green	MCU Ready
D13	BUSY	Green	MCU Busy

# Table 1.2. Si5344H EVB Status LEDs

D11 is illuminated when USB +5 V supply voltage is present. D12 and D13 are status LEDs showing on-board MCU activity.

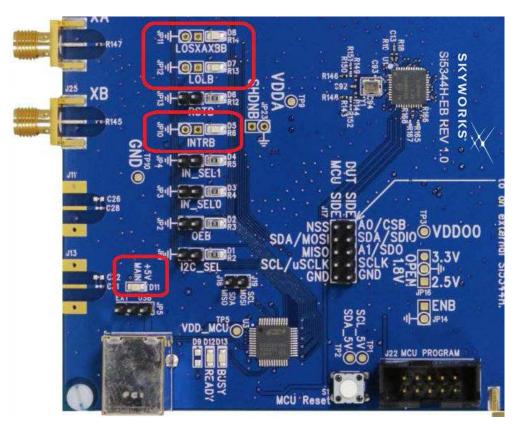


Figure 1.2. Status LEDs

#### 1.6 External Reference Input (XA/XB)

An external reference (XTAL) is used in combination with the internal oscillator to produce an ultra-low jitter reference clock for the DSPLL and for providing a stable reference for the free-run and holdover modes. The Si5344H-EVB can also accommodate an external reference clock instead of a crystal. To evaluate the device with a REFCLK, C93 and C94 must be populated and the XTAL removed (see the figure below). The REFCLK can then be applied to J25 and J26.

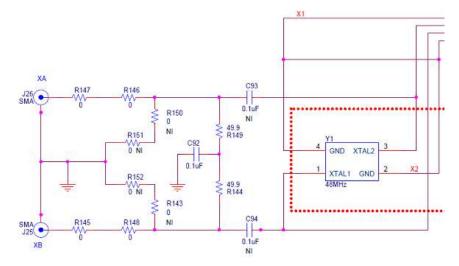


Figure 1.3. External Reference Input Circuit

#### 1.7 Clock Input Circuits (INx/INxB and FB-IN/FB-INB)

The Si5344H-EVB has four SMA connectors (IN0/IN0B and IN1/IN1B) for receiving external clock signals. All input clocks are terminated, as shown in the figure below.

Input clocks are AC coupled and 50 W terminated. This represents four differential input clock pairs. Single-ended clocks can be used by appropriately driving one side of the differential pair with a single-ended clock. See the Si5344H data sheet for details on how to configure inputs as single-ended.

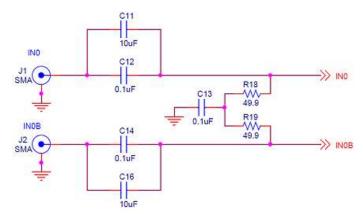


Figure 1.4. Input Clock Termination Circuit

# 1.8 Clock Output Circuits (OUTx/OUTxB)

Each of the eight outputs (four differential pairs) is AC coupled to its respective SMA connector. The output clock termination circuit is shown in the figure below. The output signal has no DC bias. If DC coupling is required, the AC coupling capacitors can be replaced with a resistor of appropriate value. The Si5344H-EVB provides pads for optional output termination resistors and/or low frequency capacitors.

**Note:** Components with schematic "NI" designation are not normally populated on the Si5344H-EVB and provide locations on the PCB for optional DC/AC terminations by the end user.

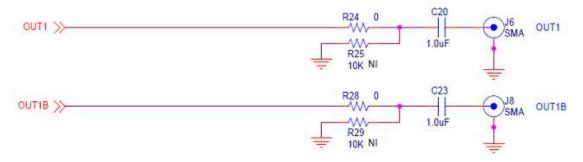


Figure 1.5. Output Clock Termination Circuit

UG149: Si5344H Evaluation Board User's Guide • Using Si5344H EVB

# 2. Using Si5344H EVB

# 2.1 Connecting the EVB to Your Host PC

Once ClockBuilder Pro software is installed, connect the software to the EVB with a USB cable, as shown in the figure below.

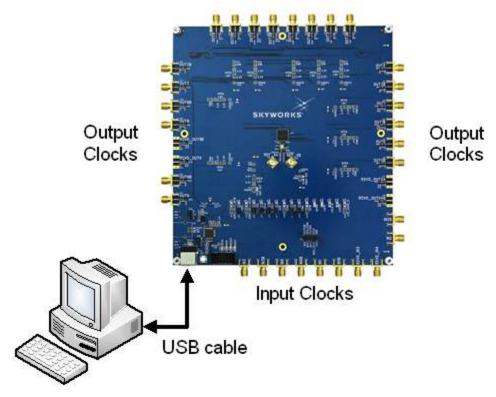


Figure 2.1. EVB Connection Diagram

# 2.2 Main Features of ClockBuilder Pro Applications

The ClockBuilder Pro installer installs two main applications: the ClockBuilder Pro Wizard and the EVB GUI.

CB ClockBuilder Pro Wizard - Skyworks	- D ×
<ul> <li>ClockBuilder Pro Wizard</li> <li>We Make Timing Simple</li> </ul>	SKYWORKS
Work With a Design	Quick Links
Create New Project	Skyworks Timing Solutions Knowledge Base
🖶 Open Project	Custom Part Number Lookup
Convert Existing Project/NVM File	Applications Documentation <u>10/40/100G Line Card Whitepaper</u>
ex Open Sample Project	Clock Generators for Cloud Data Centers Optimizing Si534x Jitter Performance Selecting the Right Clocks for Timing Synchronization
Evaluation Board Detected Si5344H Rev D EVB Open Default Plan EVB GUI	Applications PCIe Gen 4.0 Jitter Requirements Selecting a PCIe Reference Clock Source Making Accurate Clock Jitter Measurements
	ClockBuilder Pro Documentation
	CBPro Overview CBPro Tools & Support for In-System Programming CLI User's Guide Release Notes
0,	Version 4.1.5.100 Built on 11/15/2021

Figure 2.2. Application #1: ClockBuilder Pro Wizard

Use the CBPro Wizard to do the following:

- · Create a new design.
- · Review or edit an existing design.
- Export: create in-system programming.

CB Si5344H Rev D EVB - ClockBuilder Pro				
File Help				
Info DUT SPI DUT Settings Editor E	OUT Register Editor	Regulators A	II Voltages GPIO	Status Registers
	Voltage	Current	Power	
VDD 1.80V 📳 On	1.786 V	149 mA	266 mW	Read
VDDA 3.30V 📄 On	3.292 V	122 mA	402 mW	Read
VDDO0 2.50V 🔽 On	0.001 V	0 mA	0 mW (	Read
VDDO1 2.50V	Off 0.001 V	0 mA	0 mW (	Read
VDDO2 2.50V	Off 0.020 V	0 mA	0 mW (	Read
VDDO3 2.50V 🔽 On	1.782 V	0 mA	0 mW (	Read
All Output	Total	271 mA	0.668 W	Read All
Supplies Power On Power	er Off Co	ompare Design E	estimates to Measu	urements

Figure 2.3. Application #2: EVB GUI

Use the EVB GUI to do the following:

- Download configuration to EVB's DUT (Si5344H).
- Control the EVB's regulators.
- Monitor voltage, current, power on the EVB.

UG149: Si5344H Evaluation Board User's Guide • Using Si5344H EVB

# 2.3 Common ClockBuilder Pro Workflow Scenarios

There are three common workflow scenarios when using CBPro and the Si5344H EVB. These workflow scenarios are as follows:

Workflow Scenario #1:	Testing a Skyworks-created Default Configuration
Workflow Scenario #2:	Modifying the Default Skyworks-created Device Configuration
Workflow Scenario #3:	Testing a User-created Device Configuration

Each scenario is described in more detail in the following sections.

# 2.3.1 Workflow Scenario #1: Testing a Skyworks Created Default Configuration

The flow for using the EVB GUI to initialize and control a device on the EVB is as follows.

1. Once the PC and EVB are connected, launch ClockBuilder Pro by clicking on this icon on your PC's desktop.



Figure 2.4. ClockBuilder Pro Desktop Icon

2. When the EVB is detected, select the "Open Default Plan" button on the Wizard's main menu. CBPro automatically detects the EVB and device type.

CIOckBuilder Pro Wizard - Skyworks	- 🗆 X
<ul> <li>ClockBuilder Pro Wizard</li> <li>We Make Timing Simple</li> </ul>	SKYWORKS
Work With a Design	Quick Links
Create New Project	Skyworks Timing Solutions Knowledge Base
🖶 <u>Open Project</u>	Custom Part Number Lookup
Convert Existing Project/NVM File	Applications Documentation
ex Open Sample Project	Clock Generators for Cloud Data Centers Optimizing SI534x Jitter Performance Selecting the Right Clocks for Timing Synchronization
Si5344H Rev D EVB Open Default Plan EVB GUI	Applications PCIe Gen 4.0 Jitter Requirements Selecting a PCIe Reference Clock Source Making Accurate Clock Jitter Measurements
Anton DE Market	ClockBuilder Pro Documentation
	<u>CBPro Overview</u> <u>CBPro Tools &amp; Support for In-System Programming</u> <u>CLI User's Guide</u> <u>Release Notes</u>
0.	Version 4.1.5.100 Built on 11/15/2021

Figure 2.5. Open Default Plan

3. Once you open the default plan (based on your EVB model number), a popup window opens.



Figure 2.6. Write Design to EVB Dialog

4. Select "Yes" to write the default plan to the Si5344H device mounted on your EVB. This ensures the device is completely reconfigured per the Skyworks default plan for the DUT type mounted on the EVB.

Writing Si5344H D	sign to EVB		
Address 0x0249			

Figure 2.7. Writing Design Status

5. After CBPro writes the default plan to the EVB, select "Open EVB GUI".

p 1 of 15 - Design ID & Notes 🔻	Configuring Si5344H Re
VB sample plan for Si5344H has been loaded. You can mak	e edits to the EVB's configuration using the interactive Wizard.
Edit Configuration with Wizard Design ID & Notes · Revision · Host Interface · XA/2 Free Run · Inputs · Input Select · Outputs · DCO · Pla DSPLL · LOS · OOF · LOL · INTR	
Save Design to Project File Your configuration is stored to a project file, which ca opened in ClockBuilder Pro at a later time.	n be You can export your configuration to a format suitable for in-system programming.
Design Report & Datasheet Addendum You can view a <u>design report (text)</u> or create a <u>draft datasheet addendum (PDF)</u> for your design.	Documentation Si5342H/44H Rev D Family Reference Manual Si5342H/44H Rev D Datasheet Si5342H/44H Rev D EVB User's Guide
Skyworks Cloud Services You can create a custom part number for your design which can be used to order factory pre-programmed devices. Or request a phase noise report for this design	

Figure 2.8. Open EVB GUI

6. The EVB GUI opens. All power supplies are set to the values defined in the device's default CBPro project file created by Skyworks, as shown in the figure below.

nfo DUT SPI	DUT Settings Editor	DUT Register Editor	Regulators	All Voltages	GPIO	Status Registers	Control Registers
		Voltage	Curren	t Power			Soft Reset and Calibration
VDD	1.80V	0n 1.786 V	149 1	mA 266 r	nW [	Read	SOFT_RST_ALL
VDDA	3.30V	Dn 3.292 V	122 1	mA 402 r	mW [	Read	SOFT_RST
VDD00	1.80V	Off 0.001 V	0 1	mA 0ı	nW [	Read	Hard Reset, Sync, & Power Do
VDDO1	1.80V	Dn 1.786 V	0 1	mA 0 r	mW [	Read	HARD_RST
VDDO2	1.80V 🔽	Off 0 V	0 1	mA Or	mW [	Read	SYNC
VDDO3	1.80V 🔽 🚺	Dn 1.782 V	0 1	mA 0 r	mW [	Read	PDN: 0
All Output	- Select Voltage	Total	271	mA 0.668 '	w	Read All	Frequency Adjust
Supplies	Power On Po	wer Off Co	mpare Desig	n Estimates to	Measu	rements	FINC
							FDEC
Supplies –	Power On Po uto Scroll: On urce Message		Clear	Copy to Clipbo	pard	Pause	FINC

Figure 2.9. EVB GUI Window

# Verify Free-run Mode Operation

Assuming no external clocks have been connected to the INPUT CLOCK differential SMA connectors (labeled "INx/INxB") located around the perimeter of the EVB, the DUT should now be operating in free-run mode, as the DUT will be locked to the crystal in this case.

You can run a quick check to determine if the device is powered up and generating output clocks (and consuming power) by clicking on the "Read All" button (bottom right-hand corner of Figure 2.9 EVB GUI Window on page 12) and then reviewing the voltage, current, and power readings for each VDDx supply.

**Note:** Shutting the VDD and VDDA power supplies "Off" and then "On" will power-down and reset the DUT. Every time you do this, to reload the Skyworks-created default plan into the DUT's register space, you must go back to the Wizard's main menu and select "Write Design to EVB".

CB Si5344H EVB Default Configuration - ClockBuilder Pro	- 🗆 X
ClockBuilder Pro v4.1.5.100 🍫	SKYWORKS
Design Dashboard 🔻	Configuring Si5344H Rev D
You have made edits to the EVB design. You can also save your new o Design to Project File" link.	configuration to a project file for future use by clicking the "Save

# Figure 2.10. Write Design to EVB

Failure to do the step above will cause the device to read in a pre-programmed plan from its non-volatile memory (NVM). However, the plan loaded from the NVM may not be the latest plan recommended by Skyworks for evaluation.

At this point, you should verify the presence and frequencies of the output clocks (running in free-run mode from the crystal) using appropriate external instrumentation connected to the output clock SMA connectors. To verify the output clocks are toggling at the correct frequency and signal format, click on "View Design Report" as highlighted in the figure below.

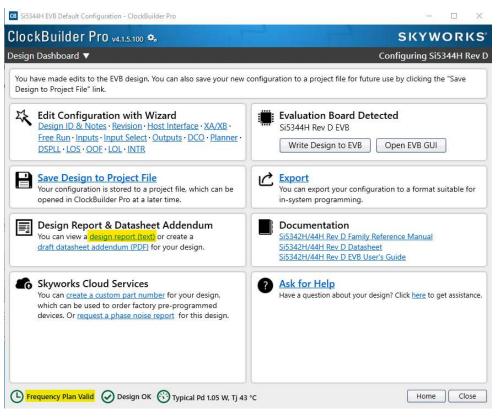


Figure 2.11. View Design Report

Your configuration's design report opens in a new window, as shown in the figure below. Compare the observed output clocks to the frequencies and formats noted in your default project's Design Report.

#### CB Si5344H Design Report

Design Report

```
.
- No warnings
Design
_____
Host Interface:
  I/O Power Supply: VDD (Core)
  SPI Mode: 4-Wire
  I2C Address Range: 104d to 107d / 0x68 to 0x6B (selected via A0/A1 pins)
XA/XB:
  48 MHz (XTAL - Crystal)
Inputs:
   IN0: 155.52 MHz
        Standard
   IN1: Unused
Outputs:
  OUT0: 2.104658 GHz
         Enabled, High-Speed Diff 2.5 V
  OUT1: 155.52 MHz
        Enabled, LVDS 2.5 V
  OUT2: 1.5784935 GHz
        Enabled, High-Speed Diff 2.5 V
  OUT3: 156.25 MHz
        Enabled, LVDS 2.5 V
Frequency Plan
_____
Priority: maximize the number of low jitter outputs
Fvco = 12.627948 GHz
Fpfd = 1.9938461538461538... MHz [ 1 + 323/325 MHz ]
Fms0 = 2.104658 GHz
Fms1 = 622.08 MHz
Fms2 = 1.5784935 GHz
Fms3 = 937.5 MHz
                      Save Report
Copy to Clipboard
                                        Ask for Help
                                                                        Close
```

Figure 2.12. Design Report Window

### Verify Locked Mode Operation

Assuming you connect the correct input clocks to the EVB (as noted in the Design Report shown above), the DUT on your EVB will be running in "locked" mode.

# 2.3.2 Workflow Scenario #2: Modifying the Default Skyworks Created Device Configuration

1. To modify the "default" configuration using the CBPro Wizard, select "Edit Configuration with Wizard".

CB Si5344H EVB Default Configuration - ClockBuilder Pro	- 🗆 X
ClockBuilder Pro v4.1.5.100 🎭	SKYWORKS
Design Dashboard 🔻	Configuring Si5344H Rev D
You have made edits to the EVB design. You can also save your new con Design to Project File" link.	nfiguration to a project file for future use by clicking the "Save
Edit Configuration with Wizard           Design ID & Notes · Revision · Host Interface · XA/XB ·           Free Run · Inputs · Input Select · Outputs · DCO · Planner ·           DSPLL · LOS · OOF · LOL · INTR	Evaluation Board Detected Si5344H Rev D EVB Write Design to EVB Open EVB GUI
Save Design to Project File Your configuration is stored to a project file, which can be opened in ClockBuilder Pro at a later time.	You can export your configuration to a format suitable for in-system programming.
Design Report & Datasheet Addendum You can view a <u>design report (text)</u> or create a <u>draft datasheet addendum (PDF)</u> for your design.	Documentation Si5342H/44H Rev D Family Reference Manual Si5342H/44H Rev D Datasheet Si5342H/44H Rev D EVB User's Guide
You can create a custom part number for your design, which can be used to order factory pre-programmed devices. Or request a phase noise report for this design.	Ask for Help Have a question about your design? Click here to get assistance.
Erequency Plan Valid O Design OK Typical Pd 1.05 W, Tj 43	Home Close

Figure 2.13. Edit Configuration with Wizard

2. You will now be taken to the Wizard's step-by-step menus to allow you to change any of the default plan's operating configurations.

	ult Configuration - ClockBuilder Pro	– 🗆 ×
lockBuild	er Pro v4.1.5.100 🎭	SKYWORKS
ep 1 of 15 - De	sign ID & Notes 🔻	Configuring Si5344H Rev
<b>Design ID</b> The device has 8 r	egisters, DESIGN_ID0 through DESIGN_ID7, that can be used to store a design/cor	nfiguration/revision identifier.
Design ID:	5344HEB1 (optional; max 8 characters)	
	The string you enter here is stored as ASCII bytes in registers DESIGN_ID0 through	ugh DESIGN_ID7.
Padding Mode:	NULL Padded If you do not enter the full 8 characters, the remaining bytes of DESIGN_ID: character).	x will be padded with 0x00 bytes (aka NULL
	<ul> <li>Space Padded If you do not enter the full 8 characters, the remaining bytes of DESIGN_ID: character).</li> </ul>	x will be padded with 0x20 bytes (space
	ord wrapped in reports, you can use newlines to start a new paragraph.	

Figure 2.14. Design Wizard

**Note:** You can click on the icon on the lower left hand of the menu to confirm that your frequency plan is valid. After making your desired changes, you can click on "Write to EVB" to update the DUT to reconfigure your device in real-time. The Design Write status window opens each time you make a change.

Writing Si5344H Design to EVB		
Address 0x0249		

Figure 2.15. Writing Design Status

# 2.3.3 Workflow Scenario #3: Testing a User Created Device Configuration

1. To test a previously-created user configuration, open the CBPro Wizard by clicking the icon on your desktop and then selecting "Open Design Project File".

CB ClockBuilder Pro Wizard - Skyworks	- 🗆 X
<ul> <li>ClockBuilder Pro Wizard</li> <li>We Make Timing Simple</li> </ul>	SKYWORKS
Work With a Design	Quick Links
Create New Project	Skyworks Timing Solutions Knowledge Base
🖶 Open Project	Custom Part Number Lookup
<u>Convert Existing Project/NVM File</u>	Applications Documentation 10/40/100G Line Card Whitepaper
ex Open Sample Project	Clock Generators for Cloud Data Centers Optimizing Si534x Jitter Performance
Si5344H Rev D EVB Open Default Plan EVB GUI	Selecting the Right Clocks for Timing Synchronization Applications PCIe Gen 4.0 Jitter Requirements Selecting a PCIe Reference Clock Source Making Accurate Clock Jitter Measurements
	ClockBuilder Pro Documentation
	CBPro Overview CBPro Tools & Support for In-System Programming CLI User's Guide Release Notes
<b>0</b> ,	Version 4.1.5.100 Built on 11/15/2021

Figure 2.16. pen Design Project File

2. Locate your CBPro design file (\*.slabtimeproj or \*.sitproj file) design file in the Windows file browser.

CB Open CBPro Project File				×
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\square$ $\rightarrow$ This	PC > Documents > CBPro	5 V	Search CBPro	م
Organize 👻 New folder				• 🔟 ?
> 📌 Quick access	Name	Date modified	Туре	Size
	Bi5344H-RevD-5344HEB1-Project	12/17/2021 11:50 AM	Skyworks Timing	11 KB
> 🦲 OneDrive - Persor				
🗸 🛄 This PC				
> 🧊 3D Objects				
> 📃 Desktop				
🔉 🔮 Documents 🗸 🗸				
File na	me: Si5344H-RevD-5344HEB1-Project	~	Skyworks Timing P Open	Cancel

Figure 2.17. Browse to Project File

UG149: Si5344H Evaluation Board User's Guide • Using Si5344H EVB

3. Select "Yes" when the WRITE DESIGN to EVB popup appears:

CB Clo	ckBuilder Pro v4.1.5.100	_		$\times$
0	Write Design to EVB? The EVB may be out-of-sync with your design. Woul your design to the EVB?	d you li	ke to wri	ite
	Yes No			

Figure 2.18. Write Design to EVB Dialog

4. The progress bar is launched. Once the new design project file has been written to the device, verify the presence and frequencies of your output clocks and other operating configurations using external instrumentation.

# 2.4 Exporting the Register Map File for Device Programming by a Host Processor

You can also export your configuration to a file format suitable for in-system programming by selecting "Export", as shown in the figure below.

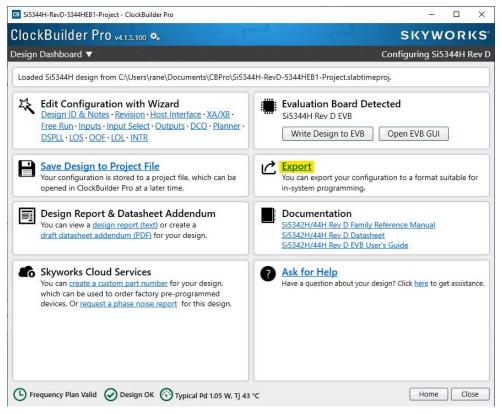


Figure 2.19. Export Register Map File

You can now write your device's complete configuration to file formats suitable for in-system programming.

Si5344H Expo	ort				_		×
Introduction	Register File	Settings File	Multi-Project Register/Settings	Regmap			
About Regi	ster Export						
This export configuration		e registers that	need to be written to the Si5	344H to ach	ieve your des	sign/	
	l line version o prompt to learr		ailable. Type CBProProjectRe	Jisters Expor	thelp from	1 a	
Options							
Export Type	2:						
Each and c	line in the file i lata fields.	Values (CSV) Fil is an address,d	e ata pair in hexadecimal forma	t. A comma	separates the	e address	
The rused	de Header File egister write se directly in firm summary head	ware code.	ressed in C code via an array o	f address,da	ata pairs. This	can be	
If check	ed, an informa I by the # char	tional header v	vill be included at the top of t der will contain some basic inf				
Certain This ens the dow	control registe sures the devic	e is stable duri	egister writes tten before and after writing t ng configuration download ar urn inclusion of this sequence	id resumes r	normal opera	tion after	
		Preview	v Export Save to File				

Figure 2.20. Export Settings

UG149: Si5344H Evaluation Board User's Guide • Writing A New Frequency Plan or Device Configuration to Non-volatile Memory (OTP)

# 3. Writing A New Frequency Plan or Device Configuration to Non-volatile Memory (OTP)

**Note:** Writing to the device non-volatile memory (OTP) is NOT the same as writing a configuration into the Si5344H using ClockBuilder Pro on the Si5344H EVB. Writing a configuration into the EVB from ClockBuilder Pro is done using Si5344H RAM space and can be done virtually unlimited number of times. Writing to OTP is limited, as described below.

Refer to the Si534x/8x Family Reference Manuals and device datasheets for information on how to write a configuration to the EVB DUT's non-volatile memory (OTP). The OTP can only be programmed a maximum of two times. Care must be taken to ensure the configuration desired is valid when choosing to write to OTP.

UG149: Si5344H Evaluation Board User's Guide • Serial Device Communications (Si5344H ↔ MCU)

# 4. Serial Device Communications (Si5344H ↔ MCU)

#### 4.1 On-Board SPI Support

The MCU on-board the Si5344H-EVB communicates with the Si5344H device through a 4-wire SPI (Serial Peripheral Interface) link. The MCU is the SPI master and the Si5344H device is the SPI slave. The Si5344H device can also support a 2-wire I2C serial interface, although the Si5344H-EVB does NOT support the I2C mode of operation. SPI mode was chosen for the EVB because of the relatively higher speed transfers supported by SPI vs. I2C.

### 4.2 External I2C Support

I<sup>2</sup>C can be supported if driven from an external I<sup>2</sup>C controller. The serial interface signals between the MCU and Si5344H pass through shunts loaded on header J17. These jumper shunts must be installed in J17 for normal EVB operation using SPI with CBPro. If testing of I<sup>2</sup>C operation via external controller is desired, the shunts in J17 can be removed thereby isolating the on-board MCU from the Si5344H device. The shunt at JP1 (I2C\_SEL) must also be removed to select I<sup>2</sup>C as Si5344H interface type. An external I2C controller connected to the Si5344H side of J17 can then communicate to the Si5344H device. (For more information on I<sup>2</sup>C signal protocol, please refer to the Si5344H data sheet.)

The figure below illustrates the J17 header schematic. J17 even numbered pins (2, 4, 6, etc.) connect to the Si5344H device and the odd numbered pins (1, 3, 5, etc.) connect to the MCU. Once the jumper shunts have been removed from J17 and JP1, I2C operation should use J17 pin 4 (DUT\_SDA\_SDIO) as the I<sup>2</sup>C SDA and J17 pin 8 (DUT\_SCLK) as the I<sup>2</sup>C SCLK. Please note the external I<sup>2</sup>C controller will need to supply its own I<sup>2</sup>C signal pull-up resistors.

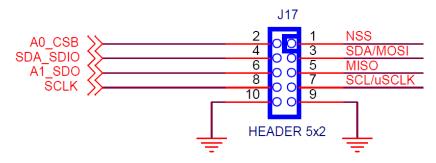


Figure 4.1. Serial Communications Header J17

# SKYWORKS

# **ClockBuilder Pro**

Customize Skyworks clock generators, jitter attenuators and network synchronizers with a single tool. With CBPro you can control evaluation boards, access documentation, request a custom part number, export for in-system programming and more!

www.skyworksinc.com/CBPro



**Portfolio** www.skyworksinc.com/ia/timing



SW/HW www.skyworksinc.com/CBPro



Quality www.skyworksinc.com/quality



Support & Resources www.skyworksinc.com/support

# Copyright © 2021 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks' Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of Skyworks' published specifications or parameters.

Skyworks, the Skyworks symbol, Sky5<sup>®</sup>, SkyOne<sup>®</sup>, SkyBlue<sup>™</sup>, Skyworks Green<sup>™</sup>, Clockbuilder<sup>®</sup>, DSPLL<sup>®</sup>, ISOmodem<sup>®</sup>, ProSLIC<sup>®</sup>, and SiPHY<sup>®</sup> are trademarks or registered trademarks of Skyworks Solutions, Inc. or its subsidiaries in the United States and other countries. Third-party brands and names are for identification purposes only and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.

