

Use with the Following Devices

M88, M68, M64, Si5118, Si5332, Si5334, Si5335, Si5338, Si5340, Si5341, Si5342, Si5342H, Si5344, Si5344H, Si5345, Si5346, Si5347, Si5348, Si5350, Si5351, Si5355, Si5356, Si5357, Si5360, Si5361, Si5362, Si5363, Si5371, Si5372, Si5380, Si5381, Si5382, Si5383, Si5384, Si5386, Si5388, Si5389, Si5391, Si5392, Si5394, Si5395, Si5396, Si5397, Si5401, Si5402, Si5403, Si5508, Si5510, Si5512, Si5518, Si51210, Si51211, Si51214, Si51218, Si53352, Si53354, Si53358

Use with the Following EVBs

M88/M68/M64	M-EVK
Si5332	Si5332-12EX-EVB, Si5332-8EX-EVB, Si5332-6EX-EVB, Si5332-12IX-EVB, Si5332-8IX-EVB, Si5332-6IX-EVB, Si5332-8A-EVB (Si5332-AM2-QFN40-EVB), Si5332-6A-EVB (Si5332-AM1-QFN32-EVB), Si5332-12A-EVB (Si5332-AM3-QFN48-EVB)
Si5338	Si5338-EVB
Si534x/7x/8x/9x	Si5340-D-EVB, Si5340-EVB, Si5341-D-EVB, Si5341-EVB, Si5342-D-EVB, Si5342-EVB, Si5344-D-EVB, Si5344-EVB, Si5344H-EVB, Si5345-D-EVB, Si5345-EVB, Si5346-D-EVB, Si5346-EVB, Si5347-D-EVB, Si5347-EVB, Si5348-D-EVB, Si5348-E-EVB, Si5348-EVB, Si5372A-A-EVB, Si5372J-A-EVBs, Si5380A-D-EVB, Si5380-D-EVB, Si5381A-E-EVB, Si5381-EVB, Si5382A-E-EVB, Si5382-EVB, Si5383-D-EVB, Si5386A-E-EVB, Si5389-EVB, Si5389F-EVB, Si5391A-A-EVB, Si5391P-A-EVB, Si5392E-A-EVB, Si5394A-A-EVB, Si5394E-A-EVB, Si5394P-A-EVB, Si5395A-A-EVB, Si5395E-A-EVB, Si5395P-A-EVB, Si5397A-A-EVB
Si535x	Si535X-B20QFN-EVB, Si5356-EVB, Si5357-EVB
Si536x	Si5360-A-EVB, Si5361-A-EVB, Si5362-A-EVB, Si5363-A-EVB
Si540x	Si540x-A-EVB
Si55xx	Si55xx-A-EVB
Si51211x	Si51211-EVB, Si51218-EVB

PC System Requirements

Operating System:

ClockBuilder Pro (CBPro) requires Windows 7 Service Pack 1, Windows 8.1 Update, Windows 10 v1607-v1809, or Windows 11. Either 32- and 64-bit versions are supported.

CBPro uses Microsoft.NET Framework version 4.8. The installer will check to see if it is installed and, if not, prompt to automatically download and install it. Newer Windows operating systems will already have .NET 4.8 installed.

If you need to install CBPro on a PC that does not have an Internet connection and does not have .NET 4.8, you can download Microsoft's stand-alone installer from <https://go.microsoft.com/fwlink/?linkid=2088631>. Install .NET 4.8 before running the CBPro installer.

1024 x 768 screen resolution or greater

USB 2.0 or higher if you want to connect to a supported EVB

Export Regulations

The International Traffic in Arms Regulations (ITAR), 22 C.F.R. sections 120-130, governs the export and re-export of defense articles, defense services and related technical data from the United States to any foreign destination, or to any foreign person, whether located in the United States or abroad. ClockBuilderPro is not authorized to create Orderable Part Numbers (OPNs) for use with products that are subject to export control regulations under ITAR. Do not use this software to create an OPN if you do not have a license from the U.S. Department of State's Directorate of Defense Trade Controls (DDTC) to export the configuration files outside of the United States.

Note: alternatives to OPNs include in-system programming of device configuration and burning non-volatile memory using ITAR compliant processes. Please review ClockBuilder Pro Tools & Support for In-System Programming documented bundled with CBPro

for additional information. Contact your local Skyworks sales office or distributor for assistance or email us at sales@skyworksincl.com.

Si536x/Si540x/55xx Firmware Release Notes & CBPro Support Matrix

Firmware Version	Release Notes	First Support In	Last Supported In
1.0	N/A (initial release)	CBPro 4.2 [2022-01-31]	N/A (still supported by CBPro, but not recommended for new or updated designs; see Si5512/18 PTP-Steered RF + SyncE Mode)
1.1	Release Notes	CBPro 4.5 [2022-08-23]	N/A (still supported)
1.2	Release Notes	CBPro 4.10 [2023-07-31]	N/A (still supported)
1.3	Release Notes	CBPro 4.13 [2024-05-31]	N/A (still supported)

Si536x/Si540x/Si55xx CBPro, Planner, and Firmware Version Correlation Table

Software and Firmware Versioning				Hardware Support			
CBPro Version	CBPro Planner Version ^{1,3,5}	Si55xx/Si540x FW Version ^{2,4,5}	CBPro Build Date	Si55xx	Si540x	Si536x	Notes
4.13.0.2	24.5.30.588 or 1.0.0.7371	1.3.0.14049 or 1.2.0.11252 or 1.1.0.8413 or 1.0.0.6566	2024-06-05	Y	Y	Y	Firmware 1.3 release
4.12.0.3	24.1.17.436 or 1.0.0.7371	1.2.0.11252 or 1.1.0.8413 or 1.0.0.6566	2024-03-06	Y	Y	Y	
4.11.0.1	23.8.17.336 or 1.0.0.7371	1.2.0.11252 or 1.1.0.8413 or 1.0.0.6566	2023-09-14	Y	Y	Y	Si5360 launch
4.10	23.7.10.271 or 1.0.0.7371	1.2.0.11252 or 1.1.0.8413 or 1.0.0.6566	2023-07-31	Y	Y	Y	Firmware 1.2 release
4.9	1.1.5.10066 or 1.0.0.7371	1.1.0.8413 or 1.0.0.6566	2023-04-11	Y	Y	Y	
4.8	1.1.3.9396 or 1.0.0.7371	1.1.0.8413 or 1.0.0.6566	2023-02-14	Y	Y	Y	
4.7	1.1.0.9153 or 1.0.0.7371	1.1.0.8413 or 1.0.0.6566	2022-11-18	Y	Y	Y	Si5361/2/3 launch
4.6	1.1.0.8801 or 1.0.0.7371	1.1.0.8413 or 1.0.0.6566	2022-10-07	Y	Y	N	Si5512/18 PTP-Steered RF + SyncE projects should update to this CBPro release and firmware 1.1.0
4.5	1.1.0.8448 or 1.0.0.7371	1.1.0.8413 or 1.0.0.6566	2022-08-23	Y	Y	N	CBPro 4.5 drops support of pre-production engineering sample ICs
4.4	1.0.0.6567	1.0.0.6566	2022-03-30	Y	Y	N	
4.3	1.0.0.6567	1.0.0.6566	2022-02-23	Y	Y	N	
4.2	1.0.0.6567	1.0.0.6566	2022-01-31	Y	Y	N	
4.1	0.10.1.5353	0.10.1.5352	2021-09-22	Y	N	N	Last version where PPS PLL is small enough to fit into NVM. Plans using PPS PLL with CBPro > 4.1 must load

							PPS_PLL plans via the HOST_LOAD command post-boot.
4.0	0.10.1.5200	0.10.1.5196	2021-07-26	Y	N	N	
Pre-4.0	Varies	Varies	Varies	N	N	N	ClockBuilder Pro <4.0 is no longer supported for Si55xx/Si540x. Upgrade to the latest version when possible.

Footnotes for table above:

1. The CBPro Planner is the algorithmic engine (embedded in CBPro) that generates programming data based on project configuration.
2. Firmware version is the version of firmware that runs on the MCU within the clock device. The firmware processes Device API command requests and manages the clock device's registers during operation. The firmware is included along with the user configuration when exporting for in-system programming or creating an Orderable Part Number (OPN, where supported).
3. Each planner/FW version is tied to a specific ClockBuilder Pro version. To roll back to a pre-release firmware version, use an earlier ClockBuilder Pro version. Contact Skyworks for support when necessary.
4. To upgrade the user frequency configuration to a new cbpro version, see the PowerPoint titled "ClockBuilder Pro Version Upgrade Instructions", linked to in the documentation panel within ClockBuilder Pro
5. When multiple planner and firmware versions are listed, which version to use is user selectable. Only firmware version is selected: the associated planner version is automatically used and documented in the project's design report.

CBPro Revision List

CBPro releases are documented in reverse chronological order in the sections that follow. See *CBPro Revision Index* at the end of this document for a linked list of all official CBPro releases.

CBPro v4.13.0.2 [2024-06-10]

Miscellaneous

- Improved support for pre-production devices.

CBPro v4.13.0.1 [2024-06-05]

Si536x/55xx/540x

- Fixed: for certain configurations, CBPro could crash if the Pulse Width Select page was selected (TMGSW-3720)

CBPro v4.13 [2024-05-31]

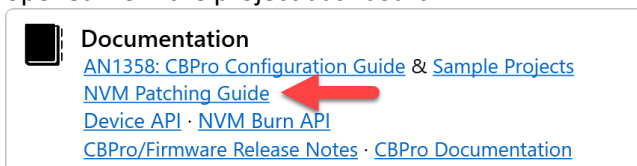
CBPro Improvements

Miscellaneous

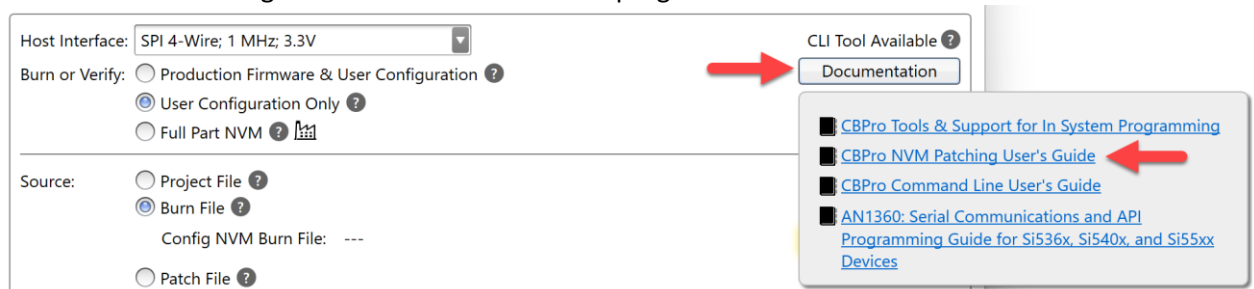
- Improved support for pre-production devices.
- Improved the message shown in the OPN wizard when the part/grade/revision is not supported. (TMGSW-3523)
- In the CBPro wizard part/sample list, allow search by package name, such as 8x8 or QFN-56. Package names have been normalized to facilitate this.
- Add "pause" to the end of CLI sample batch files so the window stays open if launched from Windows Explorer. (TMGSW-1140)

Si536x/55xx/540x

- Firmware 1.3 is now available and is the new recommended version; see [release notes](#)
- Fixed: the EVB GUI Status API tab could hang when using the CBPro field programmer. (TMGSW-3588)
- Fixed: clicking Next> through CBPro wizard very quickly could crash CBPro on the LOL page. (TMGSW-3573)
- Fixed: Si5362/3: in a configuration that required A grade, the design report grade section was using wording inferring other grades were supported even though grade A was forced. (TMGSW-3591)
- Fixed: frequency was removed from PHRD input clock labels in the wizard (TMGSW-3690)
- Fixed: Si5510 did not properly implement O/O static skew. (COGSFW-4198)
- Improved REF OOF alarm thresholds when REFIN=Crystal and OOF_REF=TCXO/OCXO. (TMGSW-3492)
- Added support for new firmware v1.3 features:
 - Input edge interrupts: (TMGSW-3618)
 - Configured in new CBPro page, “Input Edge Interrupts.”
 - The page is hidden by default: enable via Advanced Features page. Note the page is automatically shown if an AccuTime grade is selected.
 - INT_INA/B software interrupt options were added to INTR mask editor. They are enabled by default for new projects, but not for existing projects.
 - PPS pulse width select: (TMGSW-3413; COGSFW-3423)
 - Configured in new CBPro page, “PPS Pulse Width Select.”
 - The page is hidden by default: enable via Advanced Features page.
 - Available for parts supporting 0.5Hz, 1Hz outputs.
 - Multi-group sync: (TMGSW-3636)
 - The Si5518/12/10/08 and Si5403/2/1 now support two phase jam groups (0 and 1), which allow independent phase adjustments of two different output groups.
 - Configured in new CBPro page, “Sync Groups.”
 - The page is hidden by default: enable via Advanced Features page.
 - Group 0 is selected by default for existing and new projects, but Group 1 can now be selected.
- Added NVM patching support: ([TMGSW-3394](#))
 - User configuration (frequency plan) can now be updated in NVM with the field programmer using the NVM Program Tool.
 - Uses the latest NVM burn program 1.1 which is embedded in CBPro.
 - Host-based NVM patching using the Device API is supported through a new project Export mode in CBPro, whereby a patch file can be generated.
 - A user’s guide is available for both field programmer and host-based workflows. The guide can be opened from the project dashboard:



and also the NVM Program Tool used with the field programmer:



- The capabilities of Si5512 were expanded: (TMGSW-3600; COGSFW-4205)
 - Added support for VCXO mode.
 - Changed supported firmware to only v1.3. The user will be warned on opening an older project and it will be switched to v1.3.
 - Added support for OSYNC.

- Now support Q output frequencies up to 3.2GHz.
 - Device grades were updated.
- Si5508/10: removed references to PPS inputs and improved help text. (TMGSW-3505)
- Improved the DRC error message when Dynamic Phase Adjust is not supported when both Q and R output dividers are required. (TMGSW-3630)

Si534x/8x/9x

- Removed OE0/1/2/3_PIN2DRV registers from export for 1 OE pin parts. (TMGSW-3579)
- Removed BETA label from estimated phase noise plots. (TMGSW-3710)

Si5332

- Fixed: an output could be disabled in multi-profile configuration. (TMGSW-3536).
- Fixed: when an output was used in buffer mode, there was no output clock divider setting in CBPro. (TMGSW-2842)
- Fixed: PLL Input (Buffer) was not selectable in CBPro when XA/XB of Si5332 is unused. (TMGSW-3510)
- Improved design report and the OPN datasheet addendum when "Disable I2C Bus" is checked. (TMGSW-2678)
- In multi-profile, display new message in place of I2C Base Address in the NVM text file when I2C is disabled. (TMGSW-3584)
- A DRC error is now generated when there is no selection made for Output Clock Dividers under the Pin Controlled Frequency Select. (TMGSW-3584)

AccuTime Assistant Improvements

- Added the ability to view or change verbosity channels for ptpstack in "Log Level Status" panel in right "Status Bar".
- Added new configuration parameters introduced in AccuTime v3.2 and v3.3 to "PTP Config Editor" tab. (TMGSW-2929)
- Added the ability to select AccuTime version which in turn makes unsupported configuration parameters read only by default in the GUI and does not include them in output file in "PTP Config Editor" tab. (TMGSW-2929)
- Added the ability to hide unsupported configuration parameters in "PTP Config Editor" tab as dictated by AccuTime version selection instead of making them read only. (TMGSW-2929)
- Added the ability to cancel download of log files in "Log Tracker" tab.
- Added the ability to do an intermediate SSH hop when connecting to an AccuTime enabled platform while maintaining functionality including download/upload. (TMGSW-3310)
- Add ability to auto set AccuTime Version and PTP Config File based on running DUT. (TMGSW-2929)
- Refactored file download infrastructure to reuse client. This should in theory make it faster to download files instead of having to re-establish connection for every file which was done previously.
- Ensure ifconfig is shown when connected to a device. (TMGSW-3609)

Si536x/540x/55xx Firmware 1.3 Release Notes

- The Si5512 now includes support for the JESD_SYSREF_PULSER API command. (COGSFW-3809)
- Execution of commands with incomplete arguments will now fail with a bad argument error. The command action is not taken in this case. The following commands are affected: MANUAL_INPUT_CLOCK_SELECT, VARIABLE_OFFSET_DCO, FORCE_HOLD OVER, PHASE_JAM_SYNC_OUT, and PLL_SOFT_RESET. (COGSFW-3864)
- Fixed bug where PHDEC API had a slightly different step value than the assigned step value. All steps in both the PHINC and PHDEC API now match step value exactly. (COGSFW-3832)
- The OUTPUT_ENABLE API now returns the current enabled status of outputs. (COGSFW-3732)
- Firmware now supports 50% or less duty cycle options for 1 PPS and 1 PP2S outputs. (COGSFW-3653)

- Added new LOSS_OF_LOCK_XO field to REFERENCE_STATUS API, which informs the user if the XO PLL Loses Lock (COGSFW-3612)
- Added a new DCO_READOUT API command, which will return the current DCO applied to a divider from VARIABLE_OFFSET_DCO. (COGSFW-3449)
- INA and INB input rising edge interrupt source added for low frequency (<10 Hz) inputs. (COGSFW-3690)
- Fixed potential FSC overflow issue which could result in unexpected spurs on output clocks on select frequency plans (COGSFW-4018)
- Fixed issue where polling the PHINC/PHDEC_IN_PROGRESS bit when NSTEPS=0 incorrectly returned BADARG instead of reporting the current status. (COGSFW-4251)

Si536x/540x/55xx NVM Burn Program v1.1 Release Notes

- NVM_BURN has several new commands to support patching the user configuration NVM (frequency plan, FPLAN):
 - NVM_FPLAN_PATCH_INVALIDATE - disable a previously applied user configuration patch in preparation for applying a new patch.
 - NVM_FPLAN_CRC - Report the CRC of the active user configuration and the CRC of the baseline user configuration from which it is derived.
 - NVM_FPLAN_READ_INIT - Initialize the read of a baseline user configuration stored in NVM.
 - NVM_FPLAN_READ - Read the baseline user configuration stored in NVM.
 - NVM_SPACE_AVAILABLE.ENTRIES_AVAILABLE reports the number of file descriptors available for further NVM programming.
 - NVM_BURN_VERIFY.NUMBYTES now reports the number of bytes programmed, including any ECC bytes.
- NVM Burn command buffer size increased to 32768 bytes.
- Additionally, NVM_BURN supports more robust burn files which contain embedded file integrity information as well as safety features to ensure a frequency plan patch is being applied to the correct device. CBPro 4.13 and higher generates robust burn files. The burn firmware is backwards compatible, supporting burn files generated by earlier versions of CBPro. Note burn files created by CBPro 4.13 and higher are not supported by NVM burn program v1.0.

CBPro v4.12.0.3 [2024-03-06]

Si536x/55xx/540x

- Fixed: there was an error trying to create an Orderable Part Number (OPN) with a “blank” (no firmware) configuration (TMGSW-3571)

CBPro v4.12.0.2 [2024-02-24]

Si536x/55xx/540x

- Fixed: there could be problems reliably communicating with some EVBs (TMGSW-3501)
- Fixed: the NVM Program Tool did not reboot the part correctly after NVM activities, leading to an error when trying to verify that the DUT was in application mode. The APP_INFO command would fail to execute because of this (the DUT was in bootloader mode instead of application mode). The NVM was still programmed correctly. (TMGSW-3568)

Both issues were only present in CBPro 4.12 and 4.12.0.1.

CBPro v4.12.0.1 [2024-02-16]

Si5342/4/5

- Fixed: the XA/XB XTAL option was missing in CBPro 4.12 when creating a new project (TMGSW-3512)

CBPro v4.12 [2024-01-19]

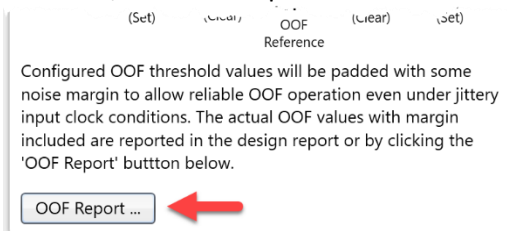
Added support for pre-release devices

Miscellaneous

- Fixed: reading or writing very large DUT settings in EVB GUI could show different value in GUI than the actual DUT value (TMGSW-3379)
- Fixed: forcing of US-based number formatting and parsing stopped working in CBPro 4.10 with the change to .NET4.8, causing CBPro errors with certain parts on locales that use “,” as the decimal separator, such as France (TMGSW-3443)
- Fixed: on the Field programmer, changing the serial interface mode did not always result in successful DUT scan/reads, requiring CBPro restart (TMGSW-2580)

Si536x/55xx/540x

- Fixed: after writing a project, CBPro could report "Error running design checker: object reference not set an instance of an object" as a sole DRC error (TMGSW-3313)
- Fixed: the OOF Reference editor and design report listed XAXB even if XO selected as reference (config was OK, reporting issue) (TMGSW-3349)
- Fixed: Si5360: selecting XTAL_XO divider was causing a DRC error
- Fixed: the common mode voltage of the clocks was being set too low when using custom differential modes of 500 and 600. Previously it was being set to 0.9V. Now it is being set to 1.2V unless the VDD voltage is 1.8V (COGSFW-3764)
- Fixed: VCXO buffered outputs were causing invalid DRC error + exception on output page
- Improved PLL bandwidth ratio 10x ratio DRC warning text
- If device grade is changed to AccuTime on the Device Revision page, the "Force DSPLL A into free run on device startup and reset" option on Input Clock Selection will be changed to checked; likewise, if you change to non-AT, it will be unchecked. Existing project files will never be changed unless you switch between AT and non-AT. Updated Si540x, Si5518 APTS, and Qualcomm small cell reference design sample project files with this new default. (TMGSW-3030)
- Added support to create OPNs with firmware but no configuration, to speed up customer in-system programming workflows (TMGSW-3077)
- OOF improvements (TMGSW-3456)
 - Fixed: clear threshold was not programmed correctly
 - Added "actual" programmed thresholds to the design report
 - In wizard, mini OOF report is now available:



- Removed the XO disclaimer on XAXB pages (TMGSW-1537)
- Improved DUT revision check on project write

- Changed HCSL fout(max) from 400M to 500MHz (TMGSW-3420)
- Added support for frequency planner options -- select lowest jitter output or factory selected specific plan -- in the CBProFOTF3 tool (TMGSW-3411)
- Added support for Frequency Planner Options on Si536x (TMGSW-3359)
- Improved DSPLL Startup Behavior tooltip (TMGSW-3404)
- Updated the I2C Host API command driver used with the field programmer to always write API0(0xF0), API1(0x0F) word between API command execution and REPLY check; this ensures no issues when executing RESTART/ GLOBAL_SOFT_RESET commands, where the API interface is reset
- Host API documentation and CBPro EVB GUI Device API tab
 - Added note to METADATA API description that CBPro does not support the OFFSET field. (COGSFW-3971)
 - Clarified the descriptions of "Application" in the APP_INFO API to make it clear that application refers to the firmware version and the "Firmware" field indicates which firmware is running (i.e. non-PPS, PPS, NVM_BURN) (COGSFW-3960)
 - Updated the GET_TEMPERATURE_READOUT example to show both a positive and negative case (COGSFW-3773)

Si5391/2/4/5 E/P Precision Calibration Grades (TMGSW-3319)

- Allow HCSL and LVCMOS (complementary) on any output; a DRC warning will be asserted for each output, and Skyworks highly recommends submitting a Phase Noise Report request for this configuration
- If an LVCMOS and Differential output does not have at least 2 output and corner separation, a DRC error is asserted
- Outputs adjacent to an HCSL output will only support Standard performance

Si538x

- Fixed: CBPro allowed crystal selection on 5386/82/81 (TMGSW-1881)

Si5388/9

- When settings, registers, or regmap is exported, warn about pseudo read-only registers that are included (TMGSW-3154)

Si5332

- Fixed: CBPro export + addendum included information about I2C even when disabled (TMGSW-2678)
- Remove LVDS 1.8V option (TMGSW-2825)
- Improve titlebar and sub-title labeling regarding package selection (TMGSW-2814)

Si5338

- Fixed: I2C address was not correct in CSV register export; replaced Pre/Post download message with message describing address 27d (TMGSW-1547)

Si535x

- Fixed: the input termination description was not correct (TMGSW-1353)
- Fixed: writing an Si5351 settings file generated by CBPro would raise error (TMGSW-3326)

- Added in-phase option to Si5356 output driver setting (TMGSW-2126)

Si5335x

- Added Si53350 to updated input termination description (TMGSW-1353)

AccuTime Assistant

- Added option to use SCP instead of SFTP for file transfer (TMGSW-3309)
- Added ability hide and dock right "Status Bar" and bottom "miniTerminal"
- Added the ability to remember the hide/dock status of "Status Bar" and "miniTerminal"
- Add "Log Level Status" panel in right "Status Bar" capable to view or change log levels of running applications
- Added "Active Configuration File" to ESMC and PTP Stack in connect tab
- Fix issue in "Save Debug Information ..." button related to dmesg log file
- Changed the behavior of the "Start" button in "Log Tracker" tab to delete the Data and clear the plot (TMGSW-3043)
- Added "Clear Data" button for "Log Tracker" tab that completely deletes the data and also clears the plot to allow for more control of the realtime plotting capability
- Added ability to see which file is being download in "Log Tracker" tab after clicking on "Download Log Files" button (TMGSW-3049)
- Add groups for the "Select Plot Parameter" in "Log Tracker" and "PTP Log Parser" tabs
- Enhanced Statistics of "Loopcontrol Messages" section in "Log Tracker" and "PTP Log Parser" tabs by ensuring Parameter name stays visible and allowing the statistics to be collapsed/expanded
- Added the ability to remember the collapse/expand status of the statistics inside "Loopcontrol Messages" section in "Log Tracker" and "PTP Log Parser" tabs
- Added the infrastructure to add more information about loopcontrol events
- Fixed missing statistics for "ptp2config st i" in "PTP2Info" tab (TMGSW-3399)

CBPro v4.11.0.1 [2023-09-14]

Si534x/9x

- Fixed: projects converted from 10- to 12-output parts (Si5341 -> Si5391, Si5345 -> Si5395, Si5346 -> Si5396) with CBPro 4.11 could not export programming data or create OPNs. There is no need to re-convert any existing projects, as this version of CBPro will "fix" any projects converted with 4.11. (TMGSW-3351)

CBPro v4.11 [2023-08-21]

Added support for Si5360 18-Output, Any-Frequency, Any-Output Clock Generator with Ultra-Low Jitter

CBPro v4.10 [2023-07-31]

CBPro Improvements

Miscellaneous

- Moved to .NET Framework 4.8
- With this change, Windows Vista support is dropped

Si536x/540x/55xx

- Firmware 1.2 is now available and is the new recommended version; see [release notes](#)

- Fixed: PPS PLL could not be locked in certain configurations (TMGSW-2871; COGSFW-3152)
- Fixed: the CBProFOTF3 FOTF CLI tool did not stop when no common VCO frequency could be found
- Fixed: in Automatic switching mode and if all clocks are set to non-revertive mode, the part remains in revertive mode (TMGSW-3085)
- Fixed: 0.5Hz, 1Hz inputs could be assigned to other PLLs if they were also assigned to PPS_PLL (TMGSW-3071)
- Expanded number of possible frequency planner solutions, allowing more configurations to be generated without error and optimizing phase noise performance (COGSFW-2987)
- Removed CLEAR_STATUS_FLAGS text in Interrupt Configuration page, describing recommended INTERRUPT_STATUS clear behavior in its place (TMGSW-3143)
- Si5361/2/3: updated the default bandwidth ranges: DSPLL: 20 - 400 Hz - DSPLLA/B: 20 - 4000 Hz (TMGSW-3148)
- Improved Input Switching label on PPS PLL page (TMGSW-3101)
- Added Qualcomm Small Cell Reference sample project files (TMGSW-3042)
- Removed DRC error if PLLA has PHRD_FB output with PTP Steered-RF (TMGSW-3185)
- Allow secondary SPI checkbox to be selected by anyone (TMGSW-3106)

Si534x/7x/8x/9x

- Fixed: could not create an Si5386 Orderable part Number (OPN) ()
- Fixed: Si5340/41/9: LOS thresholds and val time were not editable (TMGSW-3108)
- In DCO report, if N=7.5 explain differences between effective Nx divider value to be used in DCO calculations vs. DUT register value (TMGSW-3062)
- Report device revision instead of Skyworks internal die revision in customer export headers (TMGSW-2279)
- Support OE pin configuration on devices with 2 or more OE pins: Si5346/47/48/96/97 (TMGSW-2850)

Si5338/35

- Fix C Code register export: register 230 is not included, with 0x0F mask (TMGSW-3197)
- Add HSTL/SSTL complementary & in-phase output driver options (TMGSW-2603)

Si5332

- Fixed: When using the Si5332 in buffer mode (NO PLL input, CLKIN2 and CLKIN3 are selected as “buffer”), CBPro gives an error saying “profile not sufficiently complete to calculate frequency plan” (TMGSW-3110)
- Fixed: CBPro power estimate was missing buffered outputs (TMGSW-3194)

AccuTime Assistant

- Fix firmware version parsing exception and ATA compatibility warning (TMGSW-3198)
- Fix ifconfig showing inaccurate information after load script (TMGSW-3224)

Si536x/540x/55xx Firmware 1.2 Release Notes

Bug fixes and Improvements

- COGSFW-3450 5500: PLL_LOOP_FILTER_RAMP_IN_PROGRESS API reply does not assert when in frequency slop limiting (FSL) or phase slope limiting (PSL)
API function modified to include FSL and PSL along with hold over exit ramp when reporting RAMP_IN_PROGRESS.
- COGSFW-3225 PPS PLL auto-relock phase limit should apply to the total phase instead of the phase with bleedout subtracted
Fixed PPS_PLL auto relock threshold issue which could cause auto relock to not occur in certain scenarios such as exiting holdover.

- COGSFW-2894 PPS PLL does not lock with the NA divider output as ZDM feedback
Fixed PPS PLL initial lock issues when PPS ZDM is sourced from NA divider.
- COGSFW-3593 GPIO state logic bug - Would impact startup when GPI forced holdover mode is used
The forced holdover via pin feature had a bug that if the feature were enabled, the pin would always readback as "force holdover". This causes the device to skip waiting for those PLLs to lock. If a set lock order is desired, this could cause issues. The bug is now fixed, and the pin will be interpreted correctly.
- COGSFW-3176 Put PPS_PLL into free run when RFPLL/REF_PLL/PLL goes unlocked
PPS_PLL will enter free run when PLLR enters holdover or short-term holdover.
- COGSFW-3226 PPS PLL coarse+fine LOL claims to be locked during PPI even with large phase offset.
Fixed PPS_PLL LOL behavior when exiting holdover.
- COGSFW-3363 PPS PLL: Improved handling of freerun vs holdover
- COGSFW-3432 JESD 204B Pulse mode busy, not pulsed
Fixed SYSREF Pulser always busy in some configurations where continuous SYSREF is included.
- COGSFW-3284 Improved jitter optimization for the Si536x.

API Documentation Improvements

- COGSFW-2354/COGSFW-3036 DEVICE_INFO is missing a pad byte
- COGSFW-3044 DEVICE_INFO links are wrong
Corrected the HTML links for DEVICE_INFO API command.
- COGSFW-3237 Add notice to top of Device API HTML documentation documenting location of firmware release notes
Updated the API HTML to point to CBPro for release notes.
- COGSFW-3516 Add "or FWERR" to READ_REPLY
Minor adjustment to READ_REPLY API command description to account for FW_ERR.

CBPro v4.9 [2023-04-11]

Si536x/540x/55xx

- Fixed: I/O alignment could be out of specification if a configuration used Q or NB divider but NA divider was not used; this only occurred in CBPro 4.7.6 through 4.8.6 (COGSFW-3370)
- Fixed: the DRC warning for differences between GPIO digital logic voltages could be triggered erroneously and report "NaN" VDDIO voltage (TMGSW-3031)
- Adjusted bandwidth ranges, defaults and PLL interaction DRC BW ratio checks and synchronized sample projects to the defaults (TMGSW-2982; TMGSW-3035; TMGSW-3041)

New recommended, default bandwidths:

Part / Topology	PLL/RFPLL/REF_PLL	PLLA	PLLB
Si536x, Si55xx Single Ref	30 Hz	300 Hz	300 Hz
Si55xx Dual Ref CG, Si540x PLLA disabled	30 Hz	300 Hz	300 Hz
Si5512/18 Dual Ref JA, Si540x PLLA enabled	30 Hz	2 Hz	300 Hz
Si5512/18 Dual Ref JA PTP Steered-RF	30 Hz	2 Hz	2 Hz

- Added support for the CBProProjectEdit CLI, which supports editing input/output MUX and frequencies via small text files, creating new project file as an output. This plus existing CBProBootfileExport CLI can be used to create larger edits for full reconfiguration scenario, complementing FOTF. See the [CBProProjectEdit user manual](#) for examples and [CBPro Tools & Support for In-System Programming](#) for an overview of in-system programming options. (TMGSW-3022)
- Estimated power improvements: improve calculation accuracy + updated Theta-JA no airflow values to match datasheet (TMGSW-3013)

- Removed unsupported “Unassigned” option on API input select combo (TMGSW-3025)
- Improved free-run page warning for Si5362/3 (TMGSW-3011)

Si540x/55xx Only

- It is now a DRC error to have an input MUXd to both RFPLL/REF_PLL and PLLA on Si540x or Si5512/18 Dual-Reference JA (TMGSW-2960)
- OCXO/TCXO and OOF Reference changes (TMGSW-2960)
 - Si5512/18
 - Only max 2 TCXO/OCXO references can be defined; it is now a DRC error if 3+ are selected
 - Holdover reference type must now be selected for PLLR inputs; a DRC error “INx: holder reference type must be defined” may be seen on existing project files that violate this rule
 - Due to this change, the minimum input frequency for a PLLR input is 10MHz
 - On OOF page, if there are 2 OCXO/TCXO references only XAXB can be selected as OOF Reference
 - Si540x
 - OCXO/TCXO reference is now defined on the input clocks page
 - Up to 2 clocks (REF and/or INx) can now be assigned to REF PLL and be an OCXO/TCXO reference
 - OOF reference logic has been adjusted:
 - There is now a “set for me” checkbox and this is checked by default
 - If there is only a single OCXO/TCXO reference, it will be the default
 - If there are 2 OCXO/TCXO references, OCXO/TCXO cannot be selected and XAXB will always be used
 - Added DRC warning if OOF reference is not OCXO/TCXO (TMGSW-2960)
- Changed RFPLL/REF_PLL max bandwidth from 4k to 400 Hz (TMGSW-3041)
- Bandwidth/Fpfd ratio check is now performed on desired BW, not estimated actual (TMGSW-2982 ; TMGSW-1813)

Si540x Only

- The MA DCO option is no longer supported on new projects when the PPS PLL is disabled (TMGSW-2965)
- Added Qualcomm Small Cell grade E option to the Device Revision & Grade page (TMGSW-3044)

Si51211/18

- Added DRC warning that these parts are not recommended for new design and OPN is not supported (TMGSW-3065)

Si5332/57

- Fixed: invalid pin mux settings could be included in an OPN if Frequency Select was swapped between O/N dividers (or vice versa) (TMGSW-2605)

Si534x/7x/8x/9x

- Force field programmer firmware v0.83 to fix issues with 1.8V SPI (TMGSW-2972)

Si535x

- Fixed: CBPro crashed if phase offset was blank (TMGSW-2769)

M64/M68/M88 Modules

- Fixed: CBPro reported "Error running design checker" (TMGSW-3057)

AccuTime™ Assistant (password required; contact Skyworks for access)

- A new User Guide is available in the tool; available from the Host Connection panel (TMGSW-3019)
- Added automatic detection of Host disconnect (TMGSW-3034)
- Added the ability to run/load setup scripts on Xilinx-based demo platforms (TMGSW-2783)
- Added the ability to run the Skyworks Sample ESMC Stack (TMGSW-2838)
- Added ESMC Stack status indicator to the status bar (TMGSW-2838)
- Added PTP2 Info tab that displays the PTP stack information available through ptp2config (TMGSW-2539)
- Added automatic polling of indicators and information throughout the tool (TMGSW-2606)
- Many commands are now run on a secondary background shell while the primary shell is used for mirroring the log, ensuring the user interface is responsive and more up-to-date (TMGSW-2606).
- Added tooltips for all plotting options (TMGSW-3033)
- Added a checkbox ("Use All Data and Events") to the Log Tracker and PTP Log Parser that displays the events that happened outside the plot limits

CBPro v4.8 [2023-02-14]

Si536x/Si540x/Si55xx

- Fixed: if clock placement wizard was used, OUT6/11 GPIOs could be mislabeled in the wizard (TMGSW-2968)
- Fixed: clock placement wizard could crash when a GPI output was present (TMGSW-2949)
- Fixed: it was possible to get a "parameter name index" DRC error for projects changed from single to dual reference (TMGSW-2958)
- Fixed: on Si55xx with PTP Steered-RF, could receive error 'No legal values for PB ratio after DRC check' when TCXO/OCXO used would result in fractional Px input divider (TIMINGSYS-1164)
- Fixed: clicking Next> on the Outputs page could show error popup about unassigned divider even though not applicable (TMGSW-2984)
- Fixed: after writing a project file, logging in the EVB GUI could be disabled (TMGSW-2990)
- Si540x:
 - Fixed: the topology diagram could be stuck in a cleared state (TMGSW-2942)
 - Add support for NA cascaded from DSPLLb; selected on Topology page (TMGSW-2896)
- Si5361/2/3
 - Fixed: if there was a ZDM input and all non-ZDM outputs were "Auto" divider, received DRC error "you must assign a non-Zero Delay Mode output to DSPLL P" (TMGSW-2924)
 - Custom Orderable Part Numbers (OPN) can now be created by any customer (TMGSW-2981)
 - Improve output divider 'Auto' algorithm (COGSWORTH_FW-3149)
 - Allow ZDM output divider to be Auto; if a ZDM input is added, set the auto created ZDM output to Auto instead of forcing on Q (TMGSW-2924; TMGSW-2941)
- Si5512/18: change Synchronization Modes NB output tracking option default from PTP to OCXO/TCXO; sample projects also updated (TMGSW-2927)
- Add "GPS Input" checkbox to PHMON page; when checked, auto set threshold is set to 25 ns (TMGSW-2914)
- Allow adjustment of estimated power core supply voltage assumptions (TMGSW-2971)
- Coupling DRC message improvements (TMGSW-2936)

Si534x/7x/8x/9x

- Fixed: changing an output to custom differential could cause error "unexpected Si538xVoltageSwingMode" (TMGSW-1116)
- Fixed: with a Si5391/5 project, when writing to EVB the OUT0A driver format was not configured properly (TMGSW-2964)
- Fixed: the EVB GUI "All Voltages" tab had unreadable layout (TMGSW-2987)

Si5332, Si5357

- Fixed: airflow was not selectable in the power estimation window when embedded XTAL was selected (TMGSW-2935)
- Support burning NVM when target DUT has I2C_A0 asserted, and current device I2C address is different than the “base” I2C address to be programmed (TMGSW-2969)

Miscellaneous

- Fixed: opening a project file shows "Step 1 of X" in header instead of Dashboard label (TMGSW-2986)
- New EVB GUI DUT Settings Dump tool
 - Can be used to read and save all device settings on Si534x/7x/8x/9x, Si5332, Si5357
 - This returns the same data that CBProDeviceRead --all command line tool does
 - Example:

Info DUT Settings Editor DUT Register Editor **DUT Settings Dump** Status

Refresh Settings ... Save to CSV ...

Examples: oid cal (setting names matching OID and CAL); 1000 (settings at register 0x1000)


	Location	NVM	Type	Name	Value	Value
▶	0x0000[3:0]	None	R/O	DIE_REV	6	0x6
	0x0002[15:0]	SiLab	R/W(L)	PN_BASE	21396	0x5394
	0x0004[7:0]	User	R/W	GRADE	10	0xA
	0x0005[7:0]	SiLab	R/W(L)	DEVICE_REV	0	0x0
	0x0006[23:0]	User	R/W	TOOL_VERSION	525327	0x8040F
	0x0009[7:0]	SiLab	R/W(L)	TEMP_GRADE	0	0x0
	0x000A[7:0]	SiLab	R/W(L)	PKG_ID	5	0x5
	0x000B[6:0]	SiLab	R/W	I2C_ADDR	104	0x68
	0x000C[0]	None	R/O	SYSINCAL	1	0x1
	0x000C[1]	None	R/O	LOSXAXB	0	0x0
	0x000C[5]	None	R/O	SMBUS_TIMEOUT	0	0x0
	0x000D[3:0]	None	R/O	LOS	0	0x0


CBPro v4.7 [2022-11-18]

Added support for Si5361/2/3 18-Output, Any-Frequency, Any-Output Jitter Attenuator/Clock Multiplier with Ultra-Low Jitter

Miscellaneous

- Work around Acrobat error when CBPro tried to open a PDF (TMGSW-2492)
- CBPro release notes and documentation can now be opened from the “Design Dashboard” in addition to CBPro welcome screen


Documentation
[Si5397/96 Reference Manual](#)
[Si5397/96 Data Sheet](#)
[Si5397 EVB User's Guide](#)
[CBPro Release Notes](#) · [CBPro Documentation](#)





- Add AccuTime Assistant shortcut option to CBPro installer (TMGSW-2891)


Si534x/7x/8x/9x




- Fixed: CBProFOTF1 CLI could raise "object reference" error if a clock expression referenced another clock (TMGSW-2886)
- In power estimate, add breakout by regulator voltage
- EVB GUI estimated power comparison to actual now uses measured regulator voltage when calculating estimated power instead of requested (TMGSW-2285)

Si536x/Si540x/Si55xx

- Estimated power and device junction temperature (Tj) is now reported (TMGSW-2285; TMGSW-2875)
 - Click the power widget in CBPro to view a breakdown of power estimate by regulator and change estimate assumptions, such as ambient temperature (Ta), board/ΘJA, and core supply regulator voltages.
-  Frequency Plan Valid

 Design OK

 Typical Pd 2.04 W, Tj 46 °C
Est Worst Pd 2.59 W, Tj 123 °C


- Also included in design report
 - The model is preliminary. Use the EVB GUI Regulators comparison tool and Device API TEMPERATURE_READOUT command to measure actual current and Tj under typical and worst-case operating conditions.
 - Firmware 1.1 only (Si5361/2/3 always firmware 1.1; Si540x/Si55xx where selected)
- Coupling (crosstalk) improvements (TMGSW-2864)
 - LVCMOS clocks no longer generate DRCs as victim (TMGSW-2864)
 - A new model is used to evaluate potential coupling between outputs based on estimated spurs and resulting jitter. Spurs and jitter for outputs with up to 4 gaps between each clock is estimated.
 - Critical coupling issues are now identified by  on the output page, while less critical – referred to as significant – coupling is identified by . The design report and indicator tooltip explain the thresholds used in scoring.
 - Detailed spur and jitter data available in design report and from new “Spur Analysis” button on the Outputs page:
- Spur Analysis ...

Clock Placement Tool ...
- FOTF improvements
 - Fixed: FOTF CLI would throw error generating template files when an LOS offset was not editable (TMGSW-2876)
 - Fixed: could get "Value was either too large or too small for an Int64" when running tool (TMGSW-2878)
 - Add check for firmware 1.0 selection, aborting if in project file (TMGSW-2877)
 - New CBProBootfileExport command line tool (TMGSW-2885)
 - Exports volatile in-system programming files
 - Given a project file, saves user_config.boot.*, prod_fw*.boot.*, and design_report.txt
 - Complete user manual via CBProBootfileExport –help or the [CLI User's Guide](#)
 - Also added to [CBPro Tools & Support for In-System Programming](#) training
 - Remove I2C warning when an AccuTime grade is selected; AccuTime now supports fully supports either I2C or SPI (TMGSW-2892)
 - Si540x: added support for PPS PLL modulating NA divider (TMGSW-2881)
 - Si540x: in OOF and PHMON, hide REF in GUI and design reports as these are don't cares (TMGSW-2790)
 - Fixed Synchronization mode text (TMGSW-2872)
 - Fixed Xilinx Ultrascale typo (TMGSW-2867)
 - Fixed: if PPS PLL was previously enabled and an input clock was assigned to it and later PPS PLL was disabled, CBPro might still think an input was assigned to this PLL (TMGSW-2848)
 - Improved performance of the EVB GUI Status API tab, especially when multiple EVBs are attached and GUIs open (TMGSW-2851)
 - Hide firmware version selection, low power mode enable when custom blank part mode is enabled, since these are not applicable (TMGSW-2786)

CBPro v4.6 [2022-10-07]

Si5512/18 PTP-Steered RF + SyncE Mode

This is a mode to support applications which use PTP alongside Synchronous Ethernet (SyncE) in which the NetSync device must operate as a G.8262/G.8262.1-compliant SyncE wander filter while simultaneously providing low phase noise/low jitter PTP-steered output clocks. A typical example of such a use case would be a 5G radio device that requires PTP-steered low noise clocks for driving the RF data converters and which includes a down-stream, SyncE-capable, data port to allow daisy-chaining of additional radio units.

In this mode, DSPLL A operates as the master PLL, providing both SyncE wander filtering and the PTP DCO function (for control by AccuTime™ or similar software). This allows the lowest noise Q-divider output paths to be used to generate the local clocks for the radio circuitry that are stabilized by SyncE and disciplined by the external software to align them to the remote PTP grandmaster. To generate a SyncE transmit clock that meets the requirements of a G.8262 Ethernet Equipment Clock (EEC) or G.8262.1 Enhanced Ethernet Equipment Clock (eEEEC), DSPLL B is repurposed to compensate for the DCO modulation applied by the external PTP servo.

NetSync™ firmware versions 1.0.0 and earlier contained an issue that could result in sub-optimal output transient behavior for PTP-Steered RF + SyncE mode when the SyncE source was lost or restored and DSPLL A entered or exited holdover. This shortcoming was corrected in firmware version 1.1.0. Therefore, any designs using this mode should select firmware version 1.1.0 or later. Versions of CBPro prior to version 4.6 could however cause firmware 1.1.0-based designs to be created that would exhibit an excessively large phase transient on the SyncE clock outputs when the PTP servo performed large DCO steps as part of its operation. Although such large DCO steps typically wouldn't be seen during normal operation, and hence excessive transients wouldn't be observed, any existing design using PTP-Steered RF + SyncE mode should be refreshed with CBPro 4.6 or later, and selecting firmware version 1.1.0 or later. If necessary, a new custom OPN should also be created to support factory-programming of the refreshed design. This will ensure that any SyncE output transient generated, even from an abnormally large DCO step, will not contribute significantly to the G.8262/G.8262.1 noise generation limits.

Si534x/7x/8x/9x FOTF Tool (CBProFOTF1 CLI)

Fixed: the tool could crash if an output on one divider or PLL used a frequency expression which referenced a clock on another divider/PLL (TMGSW-2855)

AccuTime™ Assistant

Fixed: clicking the "See changes from base" button on the Config File Editor panel was crashing the application

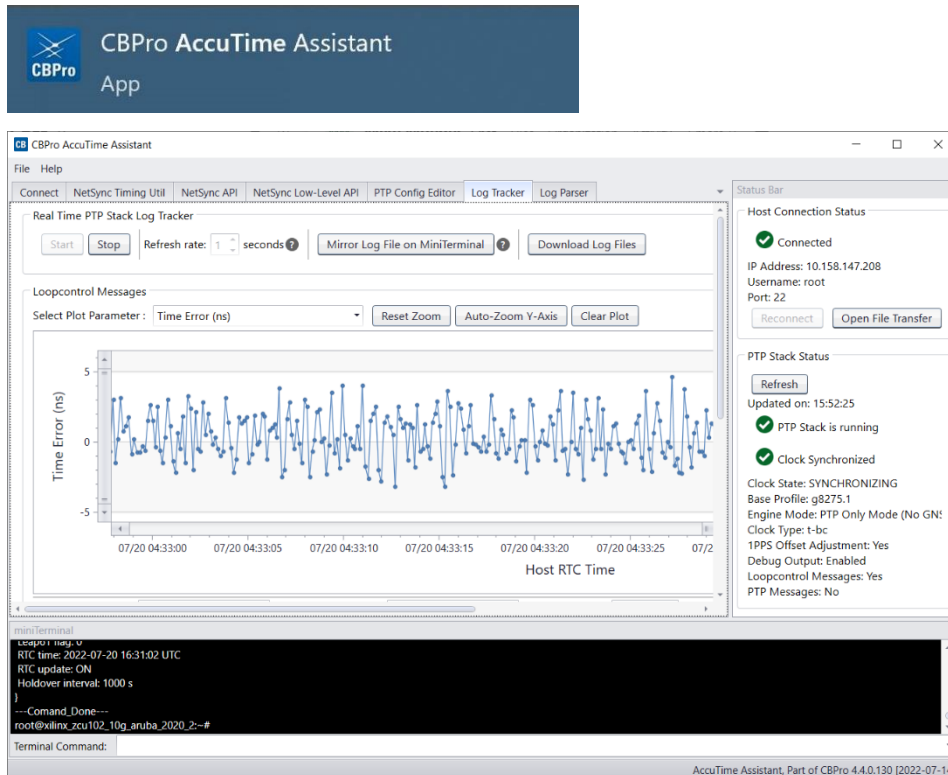
CBPro v4.5 [2022-08-23]

Jump to:

- [New AccuTime™ Assistant Tool](#)
- [Si540x/Si55xx](#)
 - [Firmware v1.1 Available](#)
 - [Some Device Features Now Hidden by Default](#)
 - [New Frequency on the Fly \(FOTF\) Tool](#)
 - [Other CBPro Improvements](#)
 - [Firmware v1.1 Improvements](#)
- [Si5332/38](#)
- [Si534x/7x/8x/9x](#)
- [Miscellaneous](#)

New AccuTime™ Assistant Tool

A new tool is available to help configure, monitor, and debug AccuTime IEEE 1588 Software. Available from the Windows “Start” menu: just type accutime:

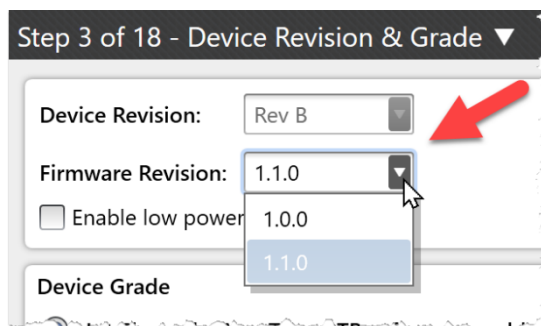


Password required. Please contact Skyworks for access.

Si540x/55xx - Firmware v1.1 Available

A new revision of application firmware (FW) is available, version 1.1. New projects will automatically use FW v1.1.

If your project file is using 1.0 firmware, you can upgrade to the latest release on the “Device Revision & Grade” page of CBPro:



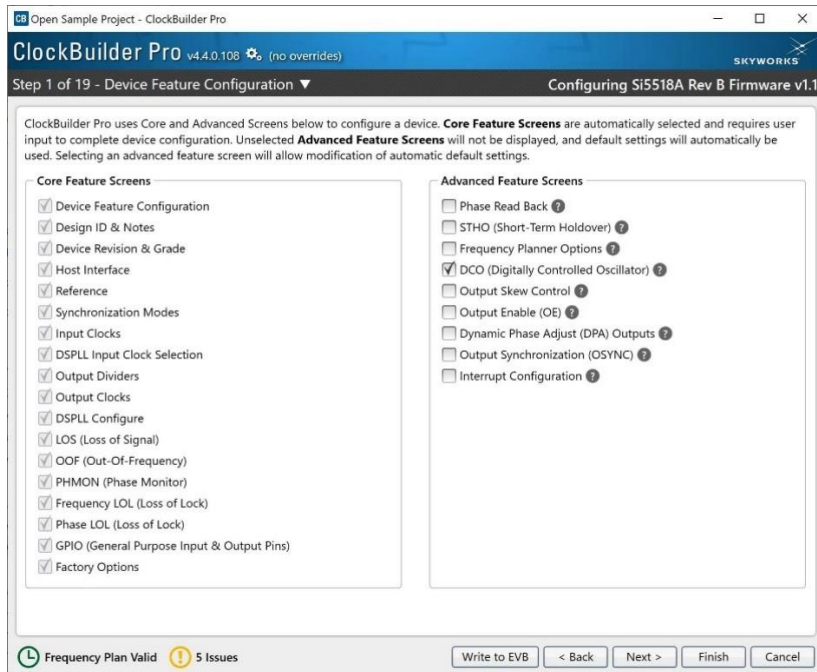
You will be warned when a project file that has FW v1.0 selected is opened. A Design Rule Checks (DRC) warning will also be generated.

If your project was running pre-production firmware (pre-v1.0), the project will be upgraded to FW v1.1 and a message shown.

Many improvements have been made for both 1.0 and 1.1 firmware targets. You may see new DRC errors and warnings. Please review the [CBPro](#) and [firmware](#) release notes in full.

Si540x/55xx - Some Device Features Now Hidden by Default

To streamline device configuration, pages for features that are typically not used or have defaults that work for most scenarios are now hidden by default. Step 1 of the CBPro wizard has a “Device Feature Configuration” page where you can control whether pages for these advanced/optional features are shown. For example:



Si540x/55xx – New Frequency on the Fly (FOTF) Tool

New command line tool “CBProFOTF3”. Use the tool to change input frequency, bandwidth, and output frequency. Also supports change of alarm thresholds for LOS, OOF, PHMON, Frequency LOL, and Phase LOL. Changes are specified in text files. The tool outputs programming files that can be used to update a specific PLL or output divider, leaving other PLLs/dividers undisturbed.

Type **CBProFOTF3 --help** to view a detailed user manual. Note two special modes:

- **CBProFOTF3 --list-supported-edits**
Lists what edits can be made on each PLL/divider for a given project
- **CBProFOTF3 --make-plan-templates**
Creates template files for edits that can be applied to each PLL/divider

The *CBPro Tools & Support for In-System Programming* training available on the CBPro welcome screen has been updated with an overview of the Si540x/55xx FOTF tool.

Si540x/55xx – Other CBPro Improvements

Device / EVB Volatile Programming

- Fixed: the EVB GUI could not write a binary .boot file via the File menu (TMGSW-2424)
- Allow AccuTime project to be written to (and boot file used on) other AccuTime grades (TMGSW-2716)
 - For example, a project that has grade E selected can be written to grade B, D, E, or F graded DUT
 - Add list of compatible grades to design report
- Improve programming check for bootloader state (after Device API RESTART command execution) to handle longer times needed with XTAL reference (TMGSW-2533)

- When reprogramming a device, improve the debug information provided if the BOOT command returns an error code (TMGSW-2674)
- When OOF reference is an input, check INPUT_STATUS after programming TMGSW-2427)
- When a project file is written to the EVB, assert any GPIOs for Output Enable (OE) (with appropriate polarity conditionalization); note that jumper settings may need to be modified on your EVB (TMGSW-2638)
- Add a popup warning if a low-power project is written to the CEVB: EVB modifications are required to evaluate this mode on Skyworks EVBs (TMGSW-2689)

Device Non-Volatile Programming

- Fixed: the EVB GUI File->Write Boot File feature did not work w/ the field programmer and I2C DUT
- Improved support for burning NVM on I2C configured devices via updated NVM burn firmware, now at v1.0 (TMGSW-2740)
- Burnfile export now also saves NVM burn program application (firmware) in the selected formats (TMGSW-2572)
- Remove need for password for NVM burn tool GUI and CLI (TMGSW-2559)
- The NVM Program Tool (aka Burn Tool) now prompts and walks through field programmer firmware update if needed; general process also improved (TMGSW-2569)

Short-Term Holdover (STHO)

- Si540x: don't show REF on STHO page/report
- Force input clocks that are holdover references to disabled

PLL

- Update PLL bandwidth defaults for new projects (TMGSW-2611)
- Update PLL bandwidths in EVB sample projects bundled with CBPro (TMGSW-2611)
- Improved loop bandwidth to Fpfd ratio check DRC logic, and now avoid invalid DSPLL warning in PTP-Steered RF mode (TMGSW-2706)
- Add frequency ramp diagram to PLL page help (TMGSW-2357)
- Improved PLLA holdover exit behavior in triple loop configurations (FW1.1 only; COGSWORTH_FW-2524)
- Improved the Phase Slope Limiting (PSL) feature (FW1.1 only; COGSWORTH_FW-1163)
- Initial lock PSL set for me default improvements (FW1.1 only; COGSWORTH_FW-2440; COGSWORTH_FW-2479)

PPS PLL

- Adjust PPS PLL Phase LOL defaults (TMGSW-2509)
- Add checkbox to Input Select page to allow the PPS PLL to start in free-run mode (FW1.1 only; TMGSW-2382)
- Add new PPS PLL lock behavior option, lock with noisy inputs (FW1.1 only; TMGSW-2628)
- PPS PLL Phase pull in: reduced min value to 1 and force integer only values (TMGSW-2703)
- Add DRC warning if PPS PLL "fastest lock" option is selected (TMGSW-2701)
- Improved PPS PLL status information on EVB GUI Status API tab (TMGSW-2433; TMGSW-2710)

Improved clock coupling (aka crosstalk) checks and warnings (TMGSW-2587)

- Flag IN0->XTAL coupling in DRCs and GUI
- Updated REF<->OUT16/OUT17 coupling rules

Output Clocks

- Fixed: OO Skew between NB and other outputs could be incorrect in certain cases (FW1.1 only; COGSWORTH_FW-2726)
- On the Output Clocks page, "SYSCLK & 1PPS/PP2S" is now "SYSCLK and SYNC" (TMGSW-2425; COGSWORTH_FW-2457)
 - Previous 1PPS/PP2S selection now labeled SYNC
 - Q and NA divider outputs can also be marked as SYNC if less than 2 MHz, but there must be at least one 1PPS/PP2S SYNC output
 - 2 unique SYNC output frequencies are supported along with a 1PPS/PP2S
 - All SYNC output frequencies must be integer related to each other and 1PPS/PP2S
 - SYNC outputs must all come from the same type of divider, like the restriction for SYSCLK/1PPS
 - SYNC outputs can be assigned to any number of device outputs
 - Static phase offsets programmed for Q divider SYNC outputs are preserved after phase jam.
 - SYNC outputs can be marked as phase read back outputs, but not ZDM outputs
- Support additional topologies where NA divider can be marked SYSCLK (TMGSW-2367)
- Force Q divider alignment to VCXO buffer if there's at least one VCXO buffer output and at least one ZDM output assigned to Q Divider (TMGSW-2542)
- In custom differential mode, support 500mVpp_se and 600mVpp_se amplitude at VDDO=1.8V (TMGSW-2801)
- Output Disable State: add two more Hi-Z options with Pulldown and Pullups (TMGSW-2379)
- New and updated DRCs related to Disabled outputs and Output Enable pins (TMGSW-2797)
- Enforce HCSL Fout(max)=400 MHz (TMGSW-2454)
- Add DRC warning if OUT16/17 > 500 MHz (TMGSW-2690)
- When using an auxiliary Nx divider on a PLL (such as NA divider on DSPLL), it is possible for there to be a small frequency offset on the auxiliary divider. A DRC warning is now generated if this is the case. (FW1.1 only; TMGSW-2728)
Example: Due to the constraints of driving cascaded output dividers, NB in this frequency plan will produce - 0.26458 ppt frequency offset on OUT14

DCO

- Fixed: NA and NB were not always available to DCO when they should be (TMGSW-2679)
- In Dual Reference Jitter Attenuator mode, hide MR DCO configuration/DRCs in GUI and design report, but continue to mirror MA setting (TMGSW-2671)
- In Si5360 DCO report, don't mark MI DCO range as being available through METADATA API (TMGSW-2687)
- Added VARIABLE_OFFSET_DCO range to DCO report and design report (TMGSW-2549)
- Add various ZDM/DCO topology limitation DRC errors and notes (TMGSW-2525)
- DCO'd dividers will no longer automatically clear hold over history when a DCO occurs (FW1.1 only; COGSWORTH_FW-2848)
- Added new DRC warning where Dual-Reference Clock Generator, no PPS_PLL, no non-TCXO/OCXO inputs, and no DCO (TMGSW-2789):
Si540x example: There are no modulation sources specified in this single-PLL frequency plan. This will result in a Clock Generator arrangement, which will not be able to track system frequencies. If this is not the desired arrangement, consider enabling divider DCOs to control output frequency.

LOS/LOL/OOF/PHMON

- Fixed: LOS actual LOS periods were not updated when auto set was checked (TMGSW-2621)
- Adjust LOS offset defaults for PPS PLL inputs to look at whether PSL is enabled to maximize the long period/hysteresis offsets and minimize the short period offset (TMGSW-2621)
- Adjust FLOL, PLOL, PHMON defaults (TMGSW-2437)
- OOF changes (TMGSW-2427)
 - REF is now always the default and recommended OOF reference
 - New DRC if INx selected as reference

GPIO

- Add support for PPS_PLL_FINE_LOL and PPS_PLL_COARSE_LOL GPOs (FW1.1 only; TMGSW-2637; COGSWORTH_FW-2285)
- GPI OE changed Pullup/Pulldown to assert the pin (FW1.1 only; COGSWORTH_FW-2905)
- Si540x: change GPIO names to XO_OOF and XO_LOS (TMGSW-2669)

Output Enable

- Disable Instant OE for SRL LVCMOS outputs (TMGSW-2655)

Dynamic Phase Adjust

- Do not include outputs that do not support DPA in editor, design report (TMGSW-2543)
- Add DRC error if a DPA output uses R divider (< 1) (TMGSW-2633)

Output Sync (OSYNC)

- Fixed: ZDM output clocks were excluded from OSYNC groups, including OSYNC Group 8. This led to mis-alignment between ZDM and non-ZDM output clocks. (TMGSW-2541)
- Fixed: OSYNC GPI polarity was flipped; now matches user's active low selection (FW1.1 only; COGSWORTH_FW-2896)
- OSYNC delay is now reported per-output in GUI and design report (FW1.1 only; TMGSW-2764; COGSWORTH_FW-2919)
- ZDM outputs now support OSYNC and are included in group 8 (TMGSW-2541)
- Add configuration of group OSYNC GPI pin controls on the OSYNC page (FW1.1 only; TMGSW-2600)
- Do not include outputs that do not support OSYNC in editor, design report (TMGSW-2543)
- Add DRC warning if OSYNC GPI is defined but there are no outputs enabled in the group (TMGSW-2816)

Frequency Planning

- Improve phase noise on frequency plans that use a VCXO (FW1.1 only; COGSWORTH_FW-2603)
- Improved DRC error message when VCXO reference is not legal due to fractional divide value issue (TMGSW-2556)
- Check NA,NB outputs against Fid range and generate more friendly error message if there is no common multiple (TMGSW-2593)
- Other improvements to frequency plan calculation error messages (FW1.1 only; COGSWORTH_FW-2796)

Miscellaneous

- Fixed: Phase Read Back (PHRD) DRC that checked that the PFD frequency is an integer multiple of the input was not run for PHRD only inputs (TMGSW-2627)
- Fixed: nearly duplicate ZDM DRC error messages could be generated (TMGSW-2525)
- Improved the CBPro speed when opening projects, performing edits, and calculating the frequency plan (TMGSW-2526)
- The CBProDeviceWrite CLI can now write a bootfile (--bootfile option)
- Stop forcing SPI 4-wire on AccuTime Grade B: I2C or SPI 3-wire can be selected (TMGSW-2581)
- Simplify warning when OOF reference is not XAXB/XO input (TMGSW-2787)
- Si540x: hide holdover reference on input page (TMGSW-2647)
- Added support for additional reference design device grades (TMGSW-2704)
- Improve input select help text (TMGSW-2747)
- Add hex I2C address to design report; add decimal version to GUI

Documentation

- The *CBPro Tools & Support for In-System Programming* training available on the CBPro welcome screen has been updated with information about Si540x and Si55xx devices
- Si5518/12: *AN1358 Configuring the Si5518-12 with ClockBuilder Pro* PDF and sample projects are available from the project dashboard Documentation pane (TMGSW-2680)
- Added NVM burn API documentation to dashboard (TMGSW-2559)

Si540x/Si55xx - Firmware v1.1 Improvements

General

- Firmware 1.0 can appear to be working when running on pre-production ICs, but will not perform to the expected level. Firmware 1.1 will refuse to run on these older devices. Only firmware prior to 1.0 will work on those devices. The older devices were intended for engineering use only and should be replaced with production ICs. (COGSWORTH_FW-2807)

Device API related

- Fixed an issue where PLL_STATUS may not report PLLx_HITLESS_SWITCH. (COGSWORTH_FW-2470)
- Resolved potential output-to-output skew issue when using Pulsed SYSREF with multiple non-integer-related JESD204B SYSREF frequencies (COGSWORTH_FW-2977)
- Improved the description of the API FWERR and HWERR bits. (COGSWORTH_FW-2844)
- Added FORCE_HOLDOVER indicator bit to PLL_STATUS API command. (COGSWORTH_FW-2466)
- Clarified API documentation for I2C command bytes. (COGSWORTH_FW-2797)
- Fixed an issue with PLL_ACTIVE_INPUT_CLOCK API where it could return the wrong value for the PPS/PP2S PLL in 1.0. (COGSWORTH_FW-2451)
- Fixed an issue that makes it possible to now control OSYNC via pin and/or API. In 1.0 there is a bug that disabled pin control after the API was used. (COGSWORTH_FW-2430)
- Added a note in the API that if a VARIABLE_OFFSET_DCO command attempts to go out of range, the DCO will not occur. (COGSWORTH_FW-2634)
- Fixed issue where PLL_STATUS API command could return live status of PHASE_PULLIN rather than latched status. (COGSWORTH_FW-2642)
- Add RAW_PHASE_DIFFERENCE field to PHASE_READOUT reply. This is a direct readout of the phase instead of a processed version centered between $[-T/2, T/2]$ where T is the period of the input clock to the PHRD. (COGSWORTH_FW-2845)
- Minor documentation update to change example BOOT command string to show MODE=0 instead of 1. (COGSWORTH_FW-2783)
- Fixed FW crash when certain invalid OSYNC_GROUP arguments are sent to OSYNC_REQ API. (COGSWORTH_FW-2889)
- Corrected an issue with triple loop plans where a step could occur on outputs tied to NB while PLLA/B are in holdover. (COGSWORTH_FW-2514)
- OUTPUT_ENABLE OUTX mask fields were renamed from OEn to OUTn (COGSWORTH_FW-2920)
- Fixed API PHASE_JAM_SYNC_OUT's field PHASE_JAM_STATUS.PHASE_JAM_BUSY clearing before phase jam is complete. (COGSWORTH_FW-2944)

PPS/PP2S

- General PPS/PP2S performance improvements. (COGSWORTH_FW-2586)
- Added ability to route PPS/PP2S coarse and/or fine LOL status to GPIO pins. (COGSWORTH_FW-2285)
- Added a feature to allow the PPS/PP2S PLL to start in freerun. (COGSWORTH_FW-2454)
- Improved PPS PLL to support PP2S (COGSWORTH_FW-2123)
- Added new PPS_PLL_STATUS command specifically for PPS/PP2S (COGSWORTH_FW-2456)

- Fixed issue on PPS/PP2S PLL where HO flag sometimes wouldn't clear upon taking the PLL out of holdover. (COGSWORTH_FW-2226)
- In PPS/PP2S plans that configured SYNC, there was a possibility of the alignment to fail. This is fixed in this release. (COGSWORTH_FW-2788)
- Fixed an issue with PPS/PP2S that could incorrectly flag FLOL (COGSWORTH_FW-2490)
- Improved behavior of PPS/PP2S if input clock switch occurs prior to PLL lock. (COGSWORTH_FW-2135)
- Fixed PPS_PLL coarse LOL asserting when fine LOL isn't asserted. (COGSWORTH_FW-2853)
- Fixed holdover history for PPS_PLL plans. PPS_PLL caused holdover history to be invalidated. (COGSWORTH_FW-2828)
- Fixed issue with FORCE_HOLDOVER API and PPS/PP2S PLL which made the API inoperable on 1.0 (COGSWORTH_FW-2429)
- Improved behavior of PPS/PP2S when exiting holdover. (COGSWORTH_FW-2208)
- PPS_PLL now waits to start locking until after PLLR locks and PLLA attempts to lock. (COGSWORTH_FW-2803)
- PPS_PLL DCO step size chosen independently than customer step size for PPS_STEERED_RF plans. This fixes an I/O delay issue that can be observed. (COGSWORTH_FW-2397)

Si5332/38

- Fixed: Si5338 “design not sufficiently complete” error could block register export (TMGSW-2582)

Si534x/7x/8x/9x

- Fixed: if DCO was enabled on an Nx divider and the N divider value was < 10, Nx_HIGH_FREQ was 1 instead of 0; this effected OPNs, register exports, and FOTF projects that DCOd high frequency outputs with N<10 (TMGSW-2496)
- Force crosstalk update on clock when its PLL changes (TMGSW-2635)

Miscellaneous

Improved support for pre-production devices

CBPro v4.4 [2022-03-30]

Si5332

- Fixed: error "Unknown input source" when writing a Buffer project to EVB
- Add more informative explanation to DRC when the frequency plan cannot be calculated (TMGSW-2321)

Si5350/51: updated OPN file header (TMGSW-1432)

Si55xx: improved performance defaults for VCXO reference use cases (TMGSW-2515)

Updates to support latest Orderable Part Number (OPN) server backend

CBPro v4.3 [2022-02-23]

Si533x

- Si533x phase offset: don't allow negative values for 'initial phase offset' when MultiSynth is configured for Fvco/8; add DRC check for existing projects (TMGSW-2358)
- Si5332: add 1.5V option to LVCMOS output drivers; add notice that not supported on our EVBs: when a 1.5V output is written to CEVB, it is changed to 1.8V (TMGSW-2396)
- Si5334/5: add PLL calibration to DUT write if a PLL output is present (was '38 only previously) (TMGSW-2243)

Updates to support latest Orderable Part Number (OPN) server backend

CBPro v4.2.0.1 [2022-02-15]

Resolve installer, runtime issues with SiLabsPythonRunner.exe due to false positive by some anti-virus systems.

CBPro v4.2 [2022-01-31]

Add support for new devices

- Si5401/2/3 NetSync™ Wireline Network Synchronizer Clocks for 5G/SyncE/IEEE 1588 applications
- Si5508/10 5G/eCPRI Wireless Jitter Attenuating Clock
- Si5512/18 5G/eCPRI/SyncE/IEEE 1588 Wireless NetSync Network Synchronizer Clock
- Access to these parts in CBPro is restricted

Si535x

- Add I2C address to design report for Si5351 parts (TMGSW-2336)

M6x/M88 Modules

- Fixed: some properties that should have been hidden were shown in the property grid (TMGSW-2290)

Miscellaneous

- The CBPro wizard window can now be resized vertically (TMGSW-1562)
- The wizard step pulldown will now use two columns when it will be taller than the CBPro window size, ensuring all steps can be seen and more quickly selected (TMGSW-2267)

CBPro v4.1 [2021-09-22]

Si5332

- Potential coupling (crosstalk) is now estimated and reported on the Output Clocks page and DRCs (TMGSW-1075)
- Add support for new field programmer sockets (TMGSW-2083)
 - Si5332-LGA40
 - Si5332-LGA48
 - Si5332-QFN48-AM3
- Add AM3 package label and automotive application to GM/AM3 part selector (TMGSW-2199)

Si534x/7x/8x/9x

- Si5380: change to not recommended for new design (NRND) (TMGSW-2208)
- Si5386: remove internal XTAL (grade E) support (TMGSW-2207)
- Si5371/2: change to NRND (TMGSW-2081)
- Si5342H/44H: make rev C NRND (TMGSW-2080)
- Si5348: change rev D to NRND (TMGSW-2209)
- Si5348: fix family reference manual link on dashboard (TMGSW-2154)
- PLL transfer function analysis is now available on PLL configuration page(s). Review open-loop gain, phase, and closed-loop transfer functions. (TMGSW-1007)

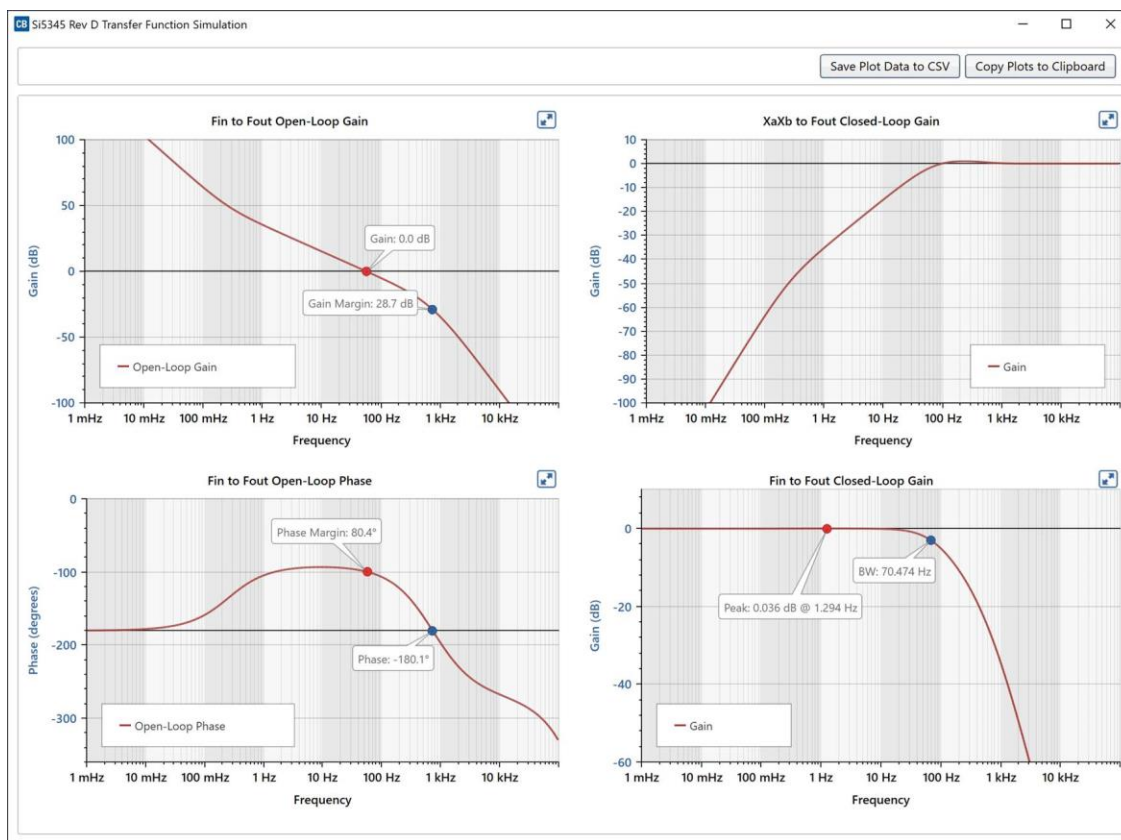
Step 12 of 16 - DSPLL Configure ▾ Configuring Si5345A Rev D

Bandwidth

Target Loop Bandwidth ? 100 Hz (Est. Actual: 69.76 Hz)

Transfer Function Analysis

Review open-loop gain, phase and closed-loop transfer functions for the DSPLL.



Updated support for pre-release devices

CBPro v4.0 [2021-07-26]

Skyworks Solutions, Inc. has acquired the Infrastructure & Automotive (I&A) business from Silicon Labs. This CBPro update supports Orderable Part Number (OPN) and Phase Noise requests using the Skyworks cloud services backend. We truly appreciate your business and look forward to working together at Skyworks.

Device Changes

- Si5396: unlock CDLM grades (Dual/Quad DSPLL™ Any-Frequency, Any-Output Jitter Attenuators)
- Si5388/9: add configurable I/O voltage with field programmer and only set A0/A1 pins to logic high when socket is attached (TMGSW-2028)
- Si5388/9: using the field programmer will require an update to the dongle's firmware; CBPro will automatically detect when an upgrade is required and step you through the update procedure
- Fixed: Si51218 frequency plan was unable to find solutions for frequencies above 5Mhz on Pin4/CLK1 (TMGSW-1406)
- Fixed: Si5338: switching I2C Bus voltage to 1.8V was not changing the proper register (TMGSW-1717)
- Fixed: Si5332: re-add Disabled State (TMGSW-2096)

Updated support for pre-release devices

CBPro v3.4 [2021-06-02]

Si534x/8x

- Si5386 O/O delay improvements (TMGSW-1493)
 - Make lead/lag time absolute
 - Add DRC error if any N-Divider is fractional with 1+ SYSREF outputs
 - Change target output to be SYSREF if exists on the divider
 - Update delay calculations to only consider R-values of SYSREF or DCLK outputs on divider (if exist) for LCM calculation
- Si534x/8x: no longer allow rev B to be selected (TMGSW-2051)

Updated support for pre-release devices

CBPro v3.3 [2021-04-8]

Si5332

- Fixed: in CBPro 3.2, the NVM Program Tool could not scan for device, displaying “error reading user config from part” (TMGSW-1916)
- Fixed: NVM Burn verify was failing for encapsulated grades (TMGSW-1932)

Si5388/9

- If configuration is AccuTime grade, T-BC / T-TSC , and has no 1pps PTP function identified, set PTP_1PPS_STEP_SCALED to 0x10000 to ensure smooth PTP Servo operations

CBPro v3.2 [2021-03-29]

Misc

- Fixed: CBPro could hang if you clicked EVB GUI button while project is being written to DUT (TMGSW-1762)
- When creating a new project or reviewing sample projects, you can now search by part number or description

Si534x/7x/8x/9x

- Si537x/8x/9x: fixed: if using ZDB on OUT9 and OUT9A was different frequency, CBPro could change OUT9A frequency back to OUT9 frequency when the project was saved, or other change made (TMGSW-1726)
- Improve VDDA current measurement for select CEVBs (TMGSW-1691)

Si5355

- Fixed: CBPro was incorrectly configuring XTAL input to PLL (TMGSW-1768)

Si5332

- Fixed: Field Programmer was not properly burning FOOF patch in NVM (TMGSW-1779)
- Fixed issue where clock buffers had FOOF as pin options (TMGSW-1791)
- Fixed: NVM burn verification was failing with change of I2C address (TMGSW-1678)
- Added direction to the spread units to make clearer that center spread is plus minus a specified percentage (TMGSW-1461)
- LOS threshold is now set to 10% below the frequency it monitors (TMGSW-1799)

Updated support for pre-release devices

CBPro v3.1 [2021-01-18]

New Part Support

- Added SmartClock™ features to Si5332-AM1/2/3 AEC-Q100 Qualified, Any-Frequency clock generators
- Added support for Si5118-AM, an AEC-Q100 Qualified SmartClock™ Synthesizer
- Added support for Si5332-AM3, an AEC-Q100 Qualified, Any-Frequency Clock Generator in a 7x7 mm 48-QFN Package
- Added support for Si53350, an AEC-Q100 Qualified, Clock Buffer in a 7x7 mm 48-QFN Package

Si5332

- Added power-up state to datasheet addendum (TMGSW-1671)

Si53352/54/58

- Removed "disabled" mode for outputs (TMGSW-1675)

Si51210/11

- Fixed: Wizard was allowing customers to select spread spectrum "Always Enabled" and "SSON" (TMGSW-1581)

Si5388/9

- Support field programmer socket (TMGSW-776)
- Limit field programmer SPI speed options in GUI and force to valid speed (100-500k) (TMGSW-776)
- Add support for Si5389F EVB (TMGSW-1438)

Si534x/8x

- Si5386: fixed: error computing frequency plan if free-run only mode was enabled (TMGSW-1733)
- Si5345W: removed automatic clock switch option; this is not supported per datasheet (TMGSW-1688)

AccuTime Modules

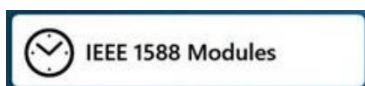
- New introductory page provides overview of module capabilities and configuration (TMGSW-1662)

Updated support for pre-release devices

CBPro v3.0 [2020-11-15]

Added Support for Configuring M88/6x AccuTime Modules

- Available through new function in the CBPro part selector:



- M88, M68, and M64 part wizards step you through configuring the module:

DSPLL A	DSPLL A
Input Source	None
Bandwidth	Opt1
DSPLL C	DSPLL C
Input Source	None
DCO Control	Disabled
Frequency Plan	1G SyncE / GPS (1 GHz)
Bandwidth	Opt1
DSPLL D	DSPLL D
Input Source	Auto
Input Priority	
Priority 1	
Input	2
Priority 2	
Input	1
Priority 3	
Input	3
DCO Control	Disabled
Frequency Plan	1G SyncE / GPS (1 GHz)
Bandwidth	Opt1

Input Source
If manual is selected, you must specify an Input Pin to be this DSPLLs source. If auto is selected, the Si5348 will be choose the inputs for you, but the Input Priority must be specified for each input pin.

- As with other CBPro supported devices, design rule checks are continuously run and verify functioning configuration
- When complete, use the Export tool to save a *startup.ini* file for your configuration:

Startup.ini

Part: M88 AccuTime Module (Default IEEE1588-2008 Profile)

Project File: Project file has not been saved.

Creator: ClockBuilder Pro v2.45.15 [2020-10-28]

Created on: 2020-10-28 10:57:37 GMT-05:00

#

The startup.ini file should live in the A:/system directory of your device.

Along with the system.ini file, the startup.ini file is what most applications

should check to setup the module in its environment and give the PTP engine the

parameters for the synchronization scheme.

#

ipconfig enet0 -d

ipconfig enet1 -u

#

p1l config dspll A insel none

p1l config dspll A freqplan 1g opt1

p1l config dspll A dco on

p1l config dspll C insel none

p1l config dspll C freqplan 1g opt1

p1l config dspll C dco on

p1l config dspll D insel none

p1l config dspll D freqplan 1g opt1

p1l config dspll D dco on

#

p1l load

#

ptp2 config -n g -c 111

#

ptp2 start 1

ptp2 clock profile default

#

ptp2 clock twostep off

ptp2 clock priority 1 128

ptp2 clock priority 2 128

ptp2 clock domain 0

Copy to Clipboard

Save startup.ini

Ask for Help

Close

Si5349/81/82/86

- Updated conditions under which input-to-output delay DRC warning is triggered: Fpfd < 1MHz without ZDM will trigger (TMGSW-1523)

Si5332

- Fixed: Multiprofile with GPIO_DIN_ENA_[L|H] setting varying between profiles will cause mcu to only load profile 0 (TMGSW-1426)
- Fixed: Output skew control was displaying 'Input Needed' when unused
- Fixed: Input clocks page was allowing user to continue with wizard even if no input was defined (TMGSW-1288)
- Fixed: NVM burn tool was failing when multiple Si5332/57 devices were in the same I2C Bus (TMGSW-1117)
- Added extra GPIO information to Datasheet Addendum (TMGSW-1466)

Si5351/50

- Fixed: 10-MSOP package was displaying crosstalk warning about frequencies not available in that package (TMGSW-1399)

Misc

- Fixed high DPI rendering issues (TMGSW-1113)

Added and updated support for pre-release devices

CBPro v2.45 [2020-07-16]

Misc

- Do not calculate estimated power if there is outstanding DRC error

Si534x/7x/8x/9x

- Si5392/4/5P/E: fixed: could not have both 125 & 200 MHz in the same project (TMGSW-1435)
- Fixed: defining an output as custom differential could cause DRC error that could only be cleared by making a change elsewhere; also, do not flag custom differential issues first time through the wizard (TMGSW-1116)

Si5334/35/38/55/56

- Removed option to “disable” output drivers from parts that do not have I2C to prevent users from accidentally order OPNs where outputs were stuck as disabled.
- Added DRC warning to alert the user that the OEB pin will not have effect on outputs set as “disabled”

Si51210/11/14/18

- Fixed: Output enable active state was confusing in GUI, removed “inversion mode” for “active state” (TMGSW-973)
- Fixed: GPI design report had active state backwards (TMGSW 1404, TMGSW-1386)

Added ITAR Export Control Notices (TMGSW-1417)

- CBPro has been updated to communicate that it should not be used to create Orderable Part Numbers (OPNs) for use with products that are subject to export control regulations under ITAR
- Information has been added to the release notes (README), installation guide (bundled in ZIP downloaded from silabs.com), and end-user license
- A new page has been added to the installer and OPN wizard that requires the user to acknowledge this restriction

Updates for pre-release devices

CBPro v2.44 [2020-06-11]

Miscellaneous

- Allow "no clock" configurations to be written to EVB and field programmer from CBPro wizard, allowing customer to mimic a similar OPN, which is fully supported

Si534x/7x/8x/9x

- Fixed: DUT dump was crashing when used with the field programmer (TMGSW-1371)
- Si5342H/44H/71/72: in register export scripts, for non-DCO configurations removed write to 0x0540 register in the "body" of the script in favor of postamble write. This reduces FCAL variability in more frequency plans when DCO mode is off. (TMGSW-1395)
- Si5348/83/84 RevD: if DSPLL D is set to manual input select mode and IN3 or IN4 are inputs to the PLL, force IN_LOS_MSK_PLLD and IN_OOF_MSK_PLLD bits 0:1 to 1 (i.e. lower two bits set to 3). This is to work around the following issue: If DSPLL D is set for "manual input select" and selects IN3, it goes LOL when IN0 is disabled (it doesn't matter whether this input is selected by other PLLs or not). The same issue occurs when DSPLL D is in manual input select mode and selects IN4 and IN1 is disabled. Rev E devices do not have this issue. (TMGSW-1396)
- For parts that support the FOTF CLI, added a button to the bottom of the output page that, when clicked, provides an overview of the tool and has links to the bundled documentation (TMGSW-1291)

Clock Placement Wizard ...

FOTF Supported ...



- Si5388/9:
 - Allow Non-Standard CMOS and Pulsed CMOS (TMGSW-1380)
 - Support grade E/F via update to Mode page, now Grade & Mode (TMGSW-1316)

Device Grade

- ☒ **Grade A/B/C/D - Silicon Labs AccuTime PTP software capable device**
Final grade determined by selected I/O supply voltage and maximum output frequency.
- ☐ **Grade E/F - Not Silicon Labs AccuTime PTP software capable**
Final grade determined by selected I/O supply voltage.

- Updated mode diagram (TMGSW-1316)
 - Support CBProDeviceRead --all mode (CLI to dump all device register settings to console or file)
- Si5383/4/8/9: support DUT dump tool

Si5332/57

- Fixed: Tooltip for spread spectrum was calling SSON pin function instead of SSEN (TMGSW-1123)
- Fixed: Output skew wizard page description was listing step size in nanoseconds instead of picoseconds (TMGSW-1306)
- Fixed: Frequency plan was allowing output frequencies greater than 250 MHz on fractional dividers (TMGSW-1401)

- Wizard pages and datasheet addendum now show the device grade(s) supported for the current configuration (TMGSW-1027)
- Added better description for Pin MUX functionality and limitations (TMGSW-991)

Si5334/38

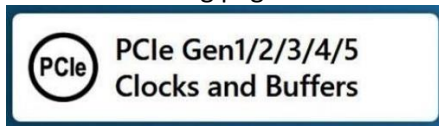
- Fixed: ac-coupled was misspelled (TMGSW-1295)
- Fixed: Incorrect part name in input and output wizard page description (TMGSW-1296)

Si5350

- Modified the use of FIXREGs to enable the use of center spread for 10-MSOP devices

CBPro Home Screen and Part Selector Update (TMGSW-1378, TMGSW-1402)

- New documents added to welcome page
- Part meta-data updates
- New PCIe landing page



Updates for pre-release devices

CBPro v2.43 [2020-03-31]

Si5348/83/84/88/89

- Fixed: if DSPLL (REF) LOL auto set thresholds was unchecked and the threshold values were changed from their defaults and the project saved, when the project was reloaded the threshold values would return back to their default values (TMGSW-1330)

Si5350/51

- Support 16-QFN packages
- Added support for users to specify synchronous and asynchronous output clocks for grade C parts
- Added support for user to set input pin as power down (PDN)
- Added custom CEVB DUT write window for emulating pin functionality as well as different packages. The user can now emulate frequency select, spread spectrum, and 10-MSOP/16-QFN parts on the Si5350/51-20QFN-EVB

CBPro v2.42 [2020-03-17]

Si5381/2/6

- Support lower loop bandwidth when Zero Delay Mode is enabled (TMGSW-1317)

Si5332

- Added Grade-L support for embedded crystal devices

Si5334/35/38/55/56

- Fixed: datasheet addendum was showing entry for Design ID which was not applicable to this part family (TMGSW-1269)
- Si5356: Fixed: Si5356-EVB was failing VCO calibration (TMGSW-1319)
- Si5334: Fixed: part selector wizard had incorrect input frequency range (TMGSW-1151)

Miscellaneous

- Update links on the Welcome screen

CBPro v2.41 [2020-02-05]

Si5334/38

- Fixed: CBPro was allowing setting IN1/2 and IN5/6 as single ended format (TMGSW-1040)
- Si5334: Added DRC error for configurations that use IN3 or IN4 and user choose incorrect input pin setup

Si5397

- Fixed: with Si5397A EVB attached, selecting 'Open Default Plan' changes XAXB frequency to 54MHz, causing lock issues; should be 48M (TMGSW-1294)

CBPro v2.40 [2020-01-21]

Miscellaneous

- The CBPro Overview presentation available from the welcome screen has been updated

Si534x/7x/8x/9x

- Fixed: DRC message "with the selected configuration, a Si539xE or Si539xP grade device would have lower jitter" was generated even when CMOS outputs are configured (TMGSW-1289)
- FOTF Changes (CBProFOTF1 CLI)
 - Fixed: on single PLL / clock generator devices could generate changes for other MultiSynth; for example, if N1 was being targeted in a set of plans, it was possible for N0 to be modified (TMGSW-1283)
 - The tool is faster for single PLL / clock generator case
 - Added support for Si5388/9
 - Updated user manual and in-system programming guide to reflect support for Si5371/72/88/89
- Si5388/9: added support for firmware v1.2 (TMGSW-1266)
 - This is the default for new projects
 - The EVB sample project uses this version as well
 - Existing projects can change to it on the Revisions page
 - Please contact your Skyworks representative for additional information

Si5334/35/38/55/56

- Fixed: the Si5338/56 field programmer was being detected by EVB GUI, causing it to crash (TMGSW-1243)
- Si5334/8: added option for "CMOS Single (Only B)" in output format dialog (TMGSW-1148)
- Added support for clock names in the input/output frequency entries (for example, "CLK1*2") (TMGSW-1114)
- Si5338/56: removed old copyright comment from "C header" export file

CBPro v2.39 [2019-12-11]

Si5350/51

- Fixed: Unused PLL was set to auto reset on LOL causing INTRB to trigger every 25 ms (TMGSW-1196)
- Fixed: CBPro wizard was allowing CLK6 and CLK7 to be set to 200 MHz causing frequency plan calculation to lock application (TMGSW-1186)
- Added feature to allow users to invert any output (TMGSW-1144)

Si5338

- Fixed: EVG GUI was crashing when the application could not talk through I2C with the DUT (TMGSW-1185)
- Fixed: Setting an output as CMOS complementary was keeping output as in-phase (TMGSW-1242)

Si5332/57

- Fixed: EVB GUI first regulator current was always high after a power cycle (TMGSW-1226)
- Fixed: EVB GUI was losing communication with the DUT after assigning an "I2C Address Pin" (TMGSW-724)
- Added support for users to disable internal crystal for embedded crystal grades E/F/G/H (TMGSW-982)
- Added I2C base address to Datasheet Addendum (TMGSW-1233)

Si534x/7x/8x/9x Miscellaneous

- Fixed: CBPro could crash if design report was open and DCO enable state was changed (TMGSW-1246)
- Fixed: CBProRegistersToSettings and CBProSi534x8xFirmwareExport CLIs did not return CBPro version when invoked with --version argument
- Si5349/81/82: Support fractional Px input dividers (TMGSW-974)
- Add DRC error if gapped clock less than 10MHz, to match datasheet (TMGSW-633)
- Si5392/4/5EP: removed pulsed CMOS input option; if an existing project has this selected, a DRC error will be generated (TMGSW-1050)
- FINC/FDEC pins on CEVB now de-asserted in CBPro launch (TMGSW-1245)
- Si5383/84: allow XTAL frequency down to 24.97M (25M with margin) to match datasheet (TMGSW-1238)
- On parts that allow XTAL reference below 48MHz, generate DRC warning if any frequency less than 48M is selected (TMGSW-1276)

Incompatible XTAL frequency XXX MHz [1]

[1] For optimal jitter and phase noise performance, Skyworks requires the use of 48 to 54 MHz XTALs compliant with the specifications noted in the Si534x/8x Family Reference Manuals. Using XTAL frequencies other than these may be possible, but jitter and phase noise performance may be degraded. Contact Skyworks to determine the impacts on your configuration.

Previously 25M was special cased and a DRC warning was not generated. The change is to now generate the DRC warning even for 25MHz XTAL

- Don't generate "You cannot mix 1Hz/1pps and non-1Hz/1pps inputs on DSPLL D" DRC if current configuration is not even 1Hz capable
- Fixed: firmware export tool did not remember previous settings

Si5386

- Simplify DRC warnings if there is a fractional P divider
- Higher bandwidth can be achieved with fractional P dividers

Si5388/89

- Setting/register export now supported (TMGSW-1253)
 - If the device is already in network synchronizer mode, the register script can be used to reconfigure the device

- In T-BC / T-TSC mode, full reconfiguration can only be performed by re-flashing the device configuration. Device setting/register values are provided for partial reconfiguration use cases and informational purposes only.
- A header in the export files explains this
- Multi-project export is not supported
- Design report now includes register/setting table (TMGSW-1253)

CBPro v2.38 [2019-10-31]

Miscellaneous

- CBPro now requires Microsoft.NET version 4.5 or higher
- Windows XP is no longer supported
- CBPro now uses less memory, especially on high DPI / 4K displays
- Fixed: link to "AN1077: Selecting the Right Clocks for Timing Synchronization Applications" on welcome screen was broken (TMGSW-1191)
- Fixed: if an EVB was connected and the "sample plan" was opened from the CBPro Welcome screen or you double clicked a supported project in Windows Explorer, you could be prompted multiple times to write the project to the EVB (or even hang) (TMGSW-607)
- Fixed: silabs.com password in Orderable Part Number (OPN) wizard was not being restored (TMGSW-1021)

Si5332/57

- Fixed: Frequency planner was failing to find solutions for plans that needed a higher VCO frequency in order to avoid running out of fractional MultiSynth dividers (TMGSW-895)
- Fixed: Automotive grade CEVB's first regulator reading was high by a few milliamps (TMGSW-1226)
- Fixed: Reset can only be assigned to specific universal hardware pins (TMGSW-1232)
- Fixed: CBPro was only showing Si53354B as a single input buffer instead of a two input buffer (TMGSW-1229)
- Added functionality for users to compare design estimates to Automotive grade CEVB measurements (TMGSW-1222)

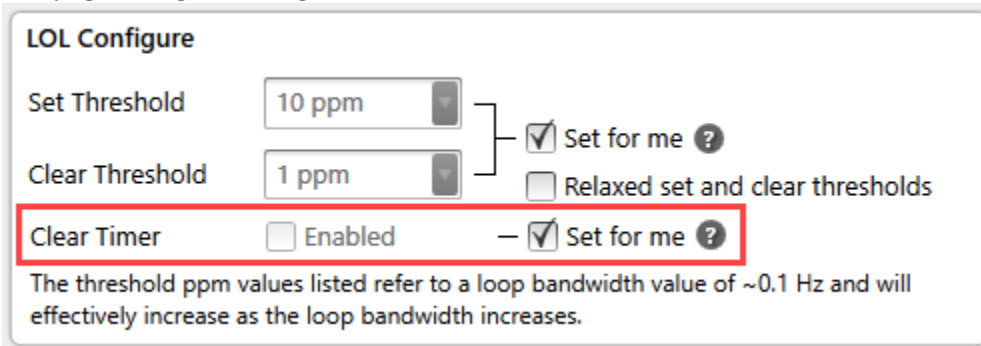
Si5350

- Fixed: VCXO's APR range maximum was 120 ppm instead of 240 ppm (TMGSW-1150)

Si534x/7x/8x/9x

- Fixed: Si539xE/P: the Nx divider widget did not update when a change in frequency would cause a different divider to be used (TMGSW-1225)
- Fixed: CBProDeviceRead --all gives error "read of 326 bytes would span multiple register PAGE boundaries" (TMGSW-1198)
- Allow no clock design to be burned to NVM via field programmer (TMGSW-1195)
- Provide independent configuration for "Enable ramp at initialization" on DSPLL page independent of ramping mode. This applies to die B0+ devices. The default is on which maps to existing CBPro behavior (TMGSW-1107)
- Si5371/2: add documents to dashboard (datashort, EVB user's guide, and AN1206) (TMGSW-701)
- LOL clear timer changes (TMGAPPS-350, TMGSW-1018)
 - Provide editor for LOL clear timer enable and "set for me" mode
 - Affected devices:
 - Si5342/44/45/46/47/80/83 Rev D
 - Si5348/49 Rev D/E
 - Si5381/2/6 Rev E

- Si5370/71/88/89/92/94/95/96/97 Rev A
- If existing CBPro project opened, there will be no change to configuration or operation unless you actively change the configuration; details below
- LOL page changes for single PLL device such as Si5345 Rev D and Si5395 Rev A:



LOL Configure

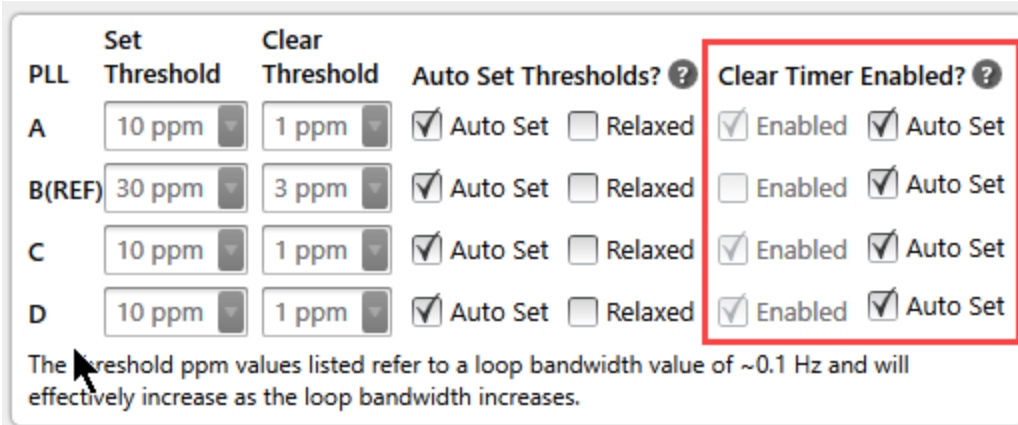
Set Threshold ☒ Set for me ?

Clear Threshold ☐ Relaxed set and clear thresholds

Clear Timer ☐ Enabled — ☒ Set for me ?

The threshold ppm values listed refer to a loop bandwidth value of ~0.1 Hz and will effectively increase as the loop bandwidth increases.

- LOL page changes for multi-PLL parts such as Si5348 Rev E:



PLL	Set Threshold	Clear Threshold	Auto Set Thresholds? ?	Clear Timer Enabled? ?
A	<input type="text" value="10 ppm"/>	<input type="text" value="1 ppm"/>	<input checked="" type="checkbox"/> Auto Set <input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Enabled <input checked="" type="checkbox"/> Auto Set
B(REF)	<input type="text" value="30 ppm"/>	<input type="text" value="3 ppm"/>	<input checked="" type="checkbox"/> Auto Set <input type="checkbox"/> Relaxed	<input type="checkbox"/> Enabled <input checked="" type="checkbox"/> Auto Set
C	<input type="text" value="10 ppm"/>	<input type="text" value="1 ppm"/>	<input checked="" type="checkbox"/> Auto Set <input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Enabled <input checked="" type="checkbox"/> Auto Set
D	<input type="text" value="10 ppm"/>	<input type="text" value="1 ppm"/>	<input checked="" type="checkbox"/> Auto Set <input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Enabled <input checked="" type="checkbox"/> Auto Set

The threshold ppm values listed refer to a loop bandwidth value of ~0.1 Hz and will effectively increase as the loop bandwidth increases.

- The LOL clear timer is recommended for loop bandwidth values less than 40 Hz. When the timer is enabled, the lock acquisition will be faster, but LOL assertion time will be longer. When "set for me" / "auto set" is checked, CBPro will set the clear timer enable setting based on the effective loop bandwidth for the PLL.
- "Set for me" / "Auto set" is enabled by default for new projects
- For existing projects where the clear timer was never enabled, set for me is off and the timer is still disabled, to match previous behavior
- The device configuration is modified as follows:
 - Set FASTLOCK_EXTEND_MASTER_DIS (0x00E5[0]) to 0 always
 - Set FASTLOCK_EXTEND_EN (0x00E5[5]) / FASTLOCK_EXTEND_EN_PLLx (0x00E5[4..7]) to 1 when clear timer is enabled
 - Set LOL_TIMER_EN (0x00A[1]) / LOL_TIMER_EN_PLLx (0x00A[0..3]) to 1 when clear timer is enabled
- All sample projects that are bundled with CBPro have been updated to turn on LOL clear timer "set for me" mode

CBPro v2.37.0.1 [2019-09-26]

Si5332:

- Fixed: CBPro was not enabling OMUX5 causing outputs tied to VDDO5 to be disabled (TMGSW-1194). This bug was introduced in CBPro 2.37.

CBPro v2.37 [2019-09-22]

Added Support for Si53352/4/8 Output Clock Buffers

- Device can be simulated with a Si5332 AM Evaluation Boards (Si5332-AM2-QFN40-EVB and Si5332-AM1-QFN32-EVB)
- Custom factory programmed parts (Orderable Part Numbers) can be created

Si5332

- Support automotive grade packages AM1 and AM2
- Support Si5332-8A-EVB (Si5332-AM2-QFN40-EVB) automotive EVB
- Support Si5332-6A-EVB (Si5332-AM1-QFN32-EVB) automotive EVB

Si537x/8x/9x

- The Hitless Input Switching Assistant threshold for using ramped input switching – instead of hitless switching – was tightened from ± 10 ppm to ± 5 ppm. This more conservative approach minimizes output clock phase transients by insuring that hitless switching, by default, will only be used for input clocks that can differ by a maximum of $+ 5$ ppm - $(-5$ ppm) = 10 ppm total. (TMGSW-1180)

Miscellaneous

- CBPro now runs as a 64-bit process
- CBPro should consume less memory in most workflows
- CBPro about screen provides a way to get more details about system and install
- Fixed: in the multi-project export GUI, the 'Copy project file to output folder' and 'Create C code configuration scripts' checkbox effect on export were swapped

Updates for pre-release devices.

CBPro v2.36 [2019-09-04]

Si5338/56

- Added Field Programmer dongle support
- Added support for legacy Field Programmer
- Added export of NVM register file to be used with Legacy Field Programmer
- Added EVB GUI support
- Design report now shows lowest jitter output option is one selected
- Fixed: Mod rate for NVM spread spectrum was displaying 0 kHz (TMGSW-818)
- Fixed: Frequency plan overrides were not being used when solving for a solution (TMGSW-1100)
- Fixed: Configuring 4 outputs as buffers was displaying frequency plan error (TMGSW-993)
- Fixed: CBPro was allowing RESET pin to be configured to P5 and P6 contradicting the datasheet (TMGSW-1033)

Si5335/55

- Fixed: Datasheet addendum was not displaying output voltage (TMGS-981)

Si51210/14

- Added support for Rev B

Si534x/9x

- Fixed: the Si5345->Si5395 project converter had these issues:
 - If an input or output was used in OUT9 frequency, OUT9A would show an error after conversion
 - If OUT9 was used in another clocks expression, it was not converted to OUT9A and so would show an error after conversion

- Fixed: in select projects, enabling the hitless switching helper would cause the frequency planner to abort and generate a DRC error (TMGSW-1163)
- Fixed: Si5346/47/96/97: the frequency planner might not find a solution when input frequency was less than 100 kHz (TMGSW-1166)

Si5383/4/8/9 NVM Burn Tool Improvements (TMGSW-1158)

- Fixed: stop looking for ACK after final “execute program” bootloader command which could cause download tool to report error even though device was now back in program mode
- In each programming step, better inspection of bootloader response code and code-specific messages reported on and will stop programming
- Add option to accept a bootloader programming file

Updates for pre-release devices.

CBPro v2.35 [2019-06-18]

Si538x/9x:

- Add support for Si5392/4/5/6/7 Grade J/K/L/M integrated reference
- Add support for Si5392/4/5 Grade E integrated reference
- Si5388/89: support config/firmware flash image export for all customers

Si5332:

- Fixed: field programmer NVM burn was clearing out crystal trim settings for embedded crystal grades (TMGSW-1125)

CBPro v2.34.1 [2019-05-31]

CBPro Programmer:

- Fixed: dongle would not be detected if socket was not attached

CBPro v2.34 [2019-05-29]

Si5332

- Factory VCO calibration is now disabled for new Orderable Part Numbers (OPNs) in favor of device VCO self-calibration at power-up (TMGSW-1108)

Si534x/7x/8x/9x

- Fixed rare crash during DCO control update (TMGSW-1110)

CBPro v2.33 [2019-05-12]

Added Support for Si5371/2 Jitter-Attenuating, Single-PLL Coherent Optics Clock with Integrated Reference

Si5332

- Fixed: Frequency plan solver was calculating wrong P value when XA/XB had been previously configured and CLKIN1/CLKIN2 were being used with InSEL enabled (TMGSW-1074)
- Fixed: Pin configuration was keeping selections when setting to ‘none’ and incorrectly writing settings (TMGSW-1076)

- Fixed: Profiles pages and driver format page was showing 0Hz frequency when output is a buffer (TMGSW-1067)
- Fixed: wizard was allowing users to create pin controlled spread spectrum designs with unassigned SSEN pin (TMGSW-1106)
- Modified spread spectrum behavior to clear current configuration when there are no outputs assigned to its respective N divider (TMGSW-1084)
- GUI now allows the user to configure the default spread spectrum state when is being controlled by register

Si5350B

- Fixed: CBPro was overwriting VC pin when the general-purpose hardware input P0 was configured (TMGSW-1088)

Si534x/7x/8x/9x

- Fastlock, Hitless Switching (HSW) Assistant Improvements (TMGSW-670)
 - The HSW assistant will enable fastlock if actual loop bandwidth is ≤ 20 Hz
 - New DRC if the HSW assistant disables fastlock and actual LBW is > 20 Hz
 - New DRC if fastlock is disabled and actual LBW is ≤ 20 Hz (not using HSW assistant, manually disabled fastlock)
- Si5383/4: fixed: CBPro error when P divider is fractional and DSPLL is in 1pps mode (TMGSW-1097)
- Si5348 Rev E: resolve issue with creating an Orderable Part Number
- Si5349/81/82/86 RevE, Si5392/4/5/6/7 Rev A: updated input clock buffer mode descriptions to be more clear; added explicit "Non-Standard CMOS" option which ensures that IN_CMOS_USE1P8[x] is 0 for the selection (TMGSW-1078)

Updates for pre-release devices.

CBPro v2.32 [2019-04-10]

Miscellaneous

- Fixed: CLI documentation links on last slide of "CBPro Tools & Support for In-System Programming" were broken (TMGSW-1065)

Si5332

- Fixed: Assigning output as buffered was not adding correct power consumption to estimate (TMGSW-1056)
- Fixed: GUI was losing FSEL pin assignment in Output Configuration page after reopening project (TMGSW-984)
- Fixed: GUI was allowing user to select 1.8V for LVPECL (TMGSW-946)
- Fixed: OPN wizard was displaying external crystal grades in text description for encapsulated crystal (TMGSW-975)
- Fixed: Host Interface configuration was allowing the selection of invalid I2C address (TMGSW-1063)
- Fixed: Multi-profile configurations were not properly terminated in NVM causing OPNs to sometimes display erroneous outputs
- Updated Theta JA parameters in power estimation model for a more accurate estimate (TMGSW-1046)
- Added "debug dump" to EVB GUI which dump NVM, XREGs, and DPRAM
- Added GUI support to be able to select LVCMOS as CLKIN1/CLKIN2 format
- The default ambient temperature for Tj estimation was changed to 25C

Si534x/7x/8x/9x - Miscellaneous

- Fixed: Si5371/2: in the part selector, max Fout was listed as 2.75 MHz instead of 2.75 GHz (TMGSW-1061)

Si534x/7x/8x/9x - Power, Temperature Estimation Improvements

- Improved power (and therefore junction temperature) estimation model and GUI:
 - Improved accuracy in most cases
 - User entry of custom Theta-JA is now supported
 - The default Ta and JEDEC board selections have changed:
 - Ta: 25C
 - JEDEC: 0 m/s airflow for Si5380/6; 2 m/s for all others

Note: Existing project files will get switched over to the new default

- For Si5349/80/81/82/86, worst-case Tj and power are estimated in addition to typical that uses the Ta entered by the user. Worst-case:

- Ta = 85C
 - All supplies at Nominal+5% voltage
 - Takes into account increased leakage current possible at the extremes of normal process variation

It is expected that this combination of conditions will be very unlikely to occur, and is provided to give guidance for maximum current requirements.

- When worst-case is calculated, it will appear in the power widget in CBPro and power/design report:

Typical Pd 1.18 W, Tj 50 °C
Est Worst Pd 1.63 W, Tj 120 °C

Condition	On Chip Power	Overall Power	Ta	Tj
Typical Ta, Voltage, Current	1.135 W	1.185 W	25 °C	50 °C
Worst-Case Ta, Voltage, Current	1.577 W	1.631 W	85 °C	120 °C

	Frequency	Format	Typical			Worst-Case		
			Voltage (V)	Current (mA)	Power (mW)	Voltage (V)	Current (mA)	Power (mW)
VDD			1.8	236	424	1.9	417	788
VDDA			3.3	132	436	3.5	138	478
VDDO0A	153.6 MHz	LVDS	2.5	16	41	2.6	17	46
VDDO0	30.72 MHz	LVDS	2.5	16	39	2.6	17	44
VDDO1	491.52 MHz	LVDS	2.5	18	44	2.6	19	50
VDDO2	1.92 MHz	LVDS	2.5	16	39	2.6	17	44

Si5380/81/82/86 - Updated JESD204B/C Clock Identification

- JESD clocks are identified on the Outputs page:

OUT3	Enabled	Stop Low	LVDS 2.5 V	DCLK	N0	245.76 MHz
OUT4	Enabled	Stop Low	LVDS 2.5 V	SYSREF of OUT3	N2	1.92 MHz
OUT5	Unused	N/A	N/A			N/A
OUT6	Unused	N/A	N/A			N/A
OUT7	Unused	N/A	N/A			N/A
OUT8	Enabled	Stop Low	LVDS 2.5 V			156.25 MHz
OUT9	Unused	N/A	N/A			N/A

☐ Off
☐ DCLK
☐ SYSREF of OUT1
☒ SYSREF of OUT3

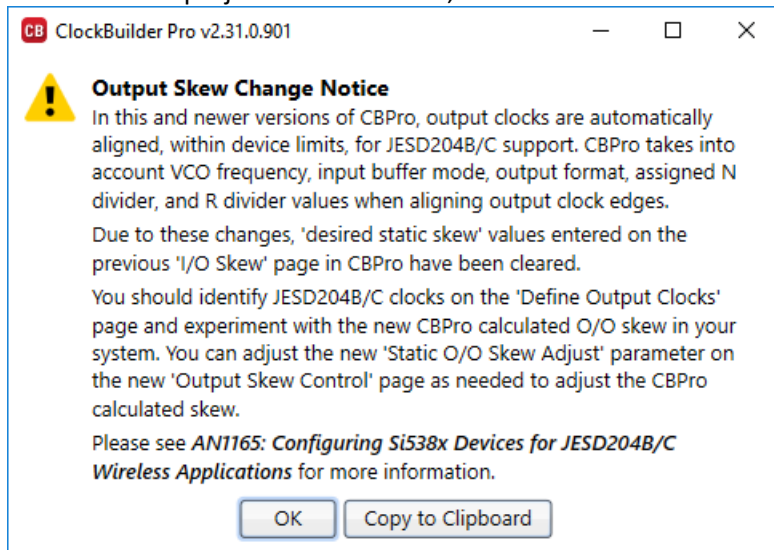
Select whether an output is a JESD204B/C DCLK or SYSREF. If neither, select Off.

- DCLK integer relationship to VCO frequency is enforced
- SYSREF relationship to its DCLK is enforced
- JESD clocks must be manually assigned to an N divider (enforced by CBPro)

Si5381/82/86 Rev E - Reworked Static Skew Control

- CBPro will automatically calculate overall I/O delay for each output based on input buffer mode, output format, assigned N divider, and R divider values
- CBPro will then, within device limitations, align all JESD204B/C clocks to a common clock rising edge

- Customer may now specify an output-to-output skew adjust on top of the baseline alignment
- **Due to these changes, CBPro will write different register values for Nx_DELAY, Nx_IODELAY_STEP, and Nx_IODELAY_COUNT compared to previous versions and overall I/O delay will be different for the same project file**
- When opening a project file created with an earlier version of CBPro, any existing 'desired static skew' value entered in the project will be cleared, The user will see the following notice:



- A detailed O/O skew report is in the design report
- See “AN1165: Configuring Si538x Devices for JESD204B/C Wireless Applications” for more information

Si5349/80/81/82/86 - Miscellaneous

- Si5380/81/82/86: EVB sample projects have been updated
- Si5349/80/81/82/86: Hitless switching is disabled by default on DSPLL B; if enabled, a new DRC warning is issued
- Si5349/81/82: the default input MUX configuration for new designs has been updated
- New DRC warning when DSPLL B shares an input clock with DSPLL A/C/D, DSPLL B has fastlock disabled, and DSPLL A/C/D has HSW/ fine HSW enabled (transient behavior on DSPLL B may have a stronger effect on the other DSPLLs under these conditions) (TMGSW-919)
- Si5381/82: new DRC warning if an output on DSPLL A/C/D requires an integer Nx divider (degraded jitter) (TMGSW-900)
- Si5386: fixed: various fractional P divider related settings/registers were not included in setting/register export files; this would cause the device not to lock if there was a fractional P divider and the corresponding input was selected (TMGSW-1059)

Updates for pre-release devices.

CBPro v2.31 [2019-03-25]

Si534x/8x/9x:

- Si5395: modified project conversion from Si5345 to Si5395: map OUT9 to OUT9A (TMGSW-1039)
- Si5380/86/91/95: the output diagram was updated to show R dividers (TMGSW-992)
- Si5342H/44H DCO changes (TMGSW-1045)
 - Removed the DCO mode selection: only direct register mode is supported (no FINC/FDEC)
 - The design report now always shows the direct register write equation
 - MXAXB_FSTEP_MSK and MXAXB_FSTEPW are excluded from the design report, exports, etc.

Si5391/2/4/5P: (TMGSW-1035)

- Input/output frequency ranges have been updated
- Input format: only “Standard” mode is supported on IN2/IN3 (no LVCMOS, no Pulsed CMOS, no single ended of any type)
- Output format: custom differential has been removed; HCSL is restricted to 25/50/100/125/200 MHz
- The fixed N divider assignments have been updated
- The EVB sample projects have been updated
- An output’s P-Grade status/capability is reported via a new widget on the output page; the coupling check is still performed, but is only shown if there is a coupling issue not covered by one of the P-Grade rule checks for domain 1 (156.26/312.5/625 MHz) frequencies

Updates for pre-release devices.

CBPro v2.30.1 [2019-02-19]

Si534x/8x/9x: fixed: clicking a checkbox on the INTRb mask page had no effect

CBPro v2.30 [2019-02-19]

Si534x/8x/9x:

- Fixed: Si5340/41/42/44/45/81/82/86/91/92/94/95: the frequency planner could not always find a solution when an output had a high resolution fractional component; example, 322*419020819/418995225 MHz (TMGSW-988)
- Fixed: if DCO was enabled on a PLL and then it is changed to free-run only mode, you would receive an error when trying to calculate the frequency plan
- Si5392P/94P: improved phase noise performance (TMGSW-827)
- Si5391/2/4/5P: disabled export for in-system programming; please contact Skyworks for assistance
- Si5380/81/82/86, Si5391/2/4/5P: increase preamble delay from 300 ms to 625 ms to account for worst case device calibration time
- Si5340/1 Rev B,D: I/O Skew support removed
- Si5346/47/96/97 All PLLs, Si5348/83/81/82/88 DSPLL A/C/D: when possible, select fractional P divider to keep Fpfd >= 100 kHz, resulting in less output jitter in some cases (TMGSW-1019)
- Si5380/81/82/86: changed the minimum loop bandwidth to 20 Hz on DSPLLb when XO selected (TMGSW-1017)

Si5335:

- Fixed: datasheet addendum did not show assigned output voltage (TMGSW-981)
- Fixed: CBPro and datasheet contradicted RESET function pin assignment (TMGSW-1033)

Updates for pre-release devices.

CBPro v2.29 [2018-11-4]

Si534x/7x/8x/9x:

- Fixed: the I2C address burn tool gave "Object reference not set to an instance of an object" error
- Update CBProFOTF1 CLI to support frequency-on-the-fly (FOTF) on multi-PLL devices when PLL is in “free-run only” mode
- Using field programmer and socket, support burning NVM when target device and project file SPI mode do not match. I.e. target is configured for 4-wire and project is 3-wire (and vice versa). The support is automatic: there is nothing for user to do.
- Coupling (crosstalk) DRC footnote explains harmonic contribution to the coupling check

Si5332:

- Fixed: a device that had NVM burned using the field programmer with CBPro 2.27.2 through 2.28.4 would not operate normally when coming out of reset; any parts programmed with this version can be recovered by burning the desired configuration a second time with CBPro 2.28.5 or higher
- Fixed: writing Si5357 project file via field programmer over-wire was causing a part mismatch error

Si5334/38:

- Fixed: EVB DUT write was failing PLL calibration when input source was IN4 or IN5/6

Updates for pre-release devices.

CBPro v2.28.1 [2018-09-24]

Support Si5348 Rev E (Network Synchronizer for SyncE/ 1588 PTP Telecom Boundary (T-BC) and Slave (T-SC) Clocks)

CBPro v2.28 [2018-09-24]

Si5332:

- Fixed: MultiSynth dividers were keeping spread spectrum settings even though outputs were set to “Auto” divider
- Fixed: GPIOs were configured backwards for Multiprofile, for example, LSB was being set as MSB
- Fixed: Multi-profile NVM required size calculation was missing 2 bytes per frame
- Fixed: Setting output as buffer was displaying corresponding R divider as being unused
- Fixed: multi-profile GPIO configuration was adding extra bytes for unused pins when translated to NVM
- Fixed: output buffer was triggering DRC error when bank was previously set to divider
- Fixed: C code header export had 16-bit addressing instead of 8-bit
- Add one time Field Programmer support for multi-profile projects

Si5335/55:

- Fixed: FS pin assignments in the GUI were swapped for 3 profile configuration. P1 was FS0 and it should be FS1 and P2 was FS1 and should be FS0. This was not causing a functional issue but it was not in agreement with the datasheet. Pin frequency select behavior is now driven by number of profiles
- Fixed: DUT Write read back was failing because of REVID setting is read-only, when writing to EVB this setting is now ignored
- Fixed: DUT Write was hanging when trying to perform the VCO calibration step if no signal is provided, the DUT write now fails gracefully after 500ms
- Enabled the ability for users to specify loop bandwidth at a profile level, rather than being global

Si534x/7x/8x/9x:

- Si5380: Fixed: DRC warning "When in Zero Delay Mode, because N0 is within the feedback loop, any phase/delay adjustments to the output clocks coming from N0 will have no effect" was shown even when ZDM was not enabled
- Support static I/O skew adjust on Si5381/2/6 Rev E
- Removed support for static I/O skew adjust feature on new Si5342/44/45 Rev B/D and Si5342H/44H Rev C/D projects. If any existing project has a non-zero static I/O delay value, the feature will continue to be available and further exits can be made to the project file. See [PCN 180920394 Si5342-44-45-46-47 Rev D Datasheet and Crystal/TCXO/OCXO Ref. Manual Update](#).
- Improve Si5341/45 -> Si5391/95 Project Conversion:

- Fixed: if OUT0 or OUT9 in the original 41/45 projects had manual N divider assignments and OUT0A or OUT9A were later enabled in the 91/95 project, there was a frequency planner error; future converted projects will not have this issue; if any previously imported project has this issue, you can fix the new project by temporarily changing the divider assignment to Auto and then back to the specific divider
- OUT0A and OUT9A disabled state is now set to the existing OUT0 and OUT9 value
- OUT0A and OUT9A output frequencies are set to OUT0 and OUT9 respectively (but still set to Unused)
- No longer distinguish between harmonic and significant crosstalk in output page [!] icon color and tooltip: always show solid yellow and use phrase "may have coupling" in the tooltip
- Frequency-on-the-Fly (FOTF):
 - Added support for FOTF on Si5348/83/84 with the following restrictions:
 - DSPLL B inputs, outputs, bandwidth, etc. cannot be adjusted
 - On Si5383/84/89, if a 1 Hz (1pps) input is present, DSPLL D cannot be adjusted
 - A 1 Hz output frequency cannot be set in a plan file; it can only be present in the base project (but can be switched to non-1 Hz in a plan)
 - All of the restrictions above are enforced by the tool
 - Further restrict multi-PLL such that FOTF is not supported on a PLL that has an input that is shared with another PLL
 - Update user manual and in-system programming overview to reflect this
- Move output disabled state and format to existing output frequency pages for all parts

New Si5381/2/6, Si5392/4/5/6/7, Si5348 Rev E Hitless Input Switching Assistant:

- A new page is available in the wizard, before the DSPLL page:

Open Sample Project - ClockBuilder Pro

ClockBuilder Pro v2.27.6 **SILICON LABS**

Step 9 of 14 - Hitless Input Switching Assistant Configuring Si5397A Rev A

When enabled on a PLL, the Hitless Input Switching Assistant will automatically configure optimal settings for:

- Hitless switching enable/disable
- Fastlock enable/disable
- Ramped input switching and exit from holdover
- Holdover history preservation

Assistant settings are determined by the expected frequency offset range of the input clocks being switched. This is usually defined by the telecommunications standards used. The user may enter a custom offset range for other cases.

When CBPro is managing the settings above, they will be greyed out in the configuration wizard and not directly editable. Previous selections will be overridden in favor of the hitless input switching assistant optimal settings.

PLL	Inputs	Use HSW Assistant?	Externally Switched Inputs?	Communication Standards	Max Frequency Offset Allowed
A	IN0, IN1, IN2, IN3	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes	Select G.8262 Opt 1/2 • G.812 II/IV • G.813 Opt 1	±4.6 ppm
B	IN0, IN1, IN2, IN3	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> ITU-T G.8262 SyncE EEC Option 1/2 (± 4.6 ppm) <input checked="" type="checkbox"/> ITU-T G.812 Type II/IV (± 4.6 ppm)	N/A
C	IN0, IN1, IN2, IN3	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> ITU-T G.813 Option 1 (± 4.6 ppm)	N/A
D	IN0, IN1, IN2, IN3	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Telcordia GR-253/GR-1244, Stratum-3/3E (± 4.6 ppm) <input type="checkbox"/> Telcordia GR-253/GR-1244, Stratum-4/4E (± 32 ppm)	N/A

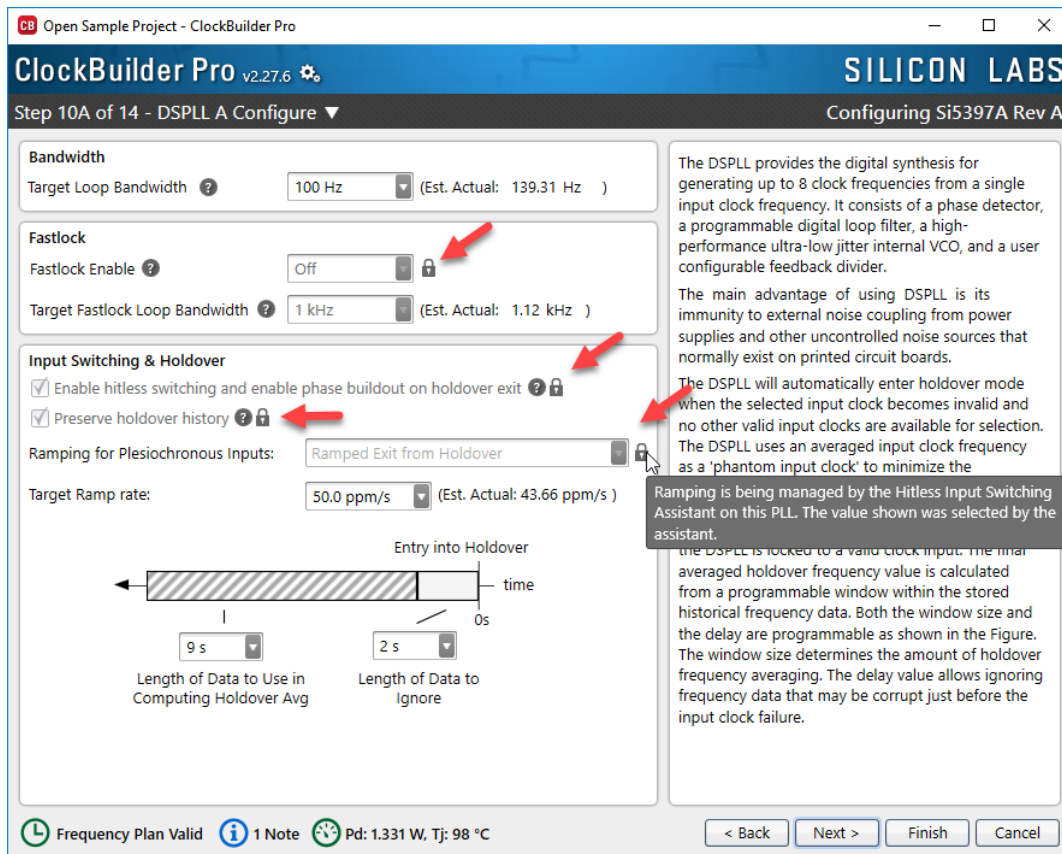
☐ Other ± ppm (0 - 100 ppm)

Select other if the standard you must adhere to is not listed above, or your PLL input(s) have a different frequency offset than the standard calls for. CBPro will use the largest frequency offset selected when configuring hitless switching related parameters.

Frequency Plan Valid 1 Note Pd: 1

Next > Finish Cancel

- When assistant is enabled on a PLL, the settings managed by it are auto set and locked:



- Bandwidth recommendations are made via DRC notes:

Ignore?	Category	Message	Note
<input type="checkbox"/>	Note	DSPLL A: selecting the highest bandwidth allowed by the application is recommended to minimize phase deviation on input switch	[1]
<input type="checkbox"/>	Note	DSPLL C: selecting the lowest bandwidth allowed by the application is recommended to minimize phase deviation on input switch	[1]

Footnotes:

[1] Recommendation is based on the frequency plan and selections in the hitless input switching assistant. Loop bandwidth is configured on the "DSPLL Configure" page of the CBPro wizard.

- A new section is included in your design report:

Hitless Input Switching Assistant

DSPLL A: Assistant Enabled

Switched Externally: No

Standards: ITU-T G.8262 SyncE EEC Option 1/2 (± 4.6 ppm)
ITU-T G.812 Type II/IV (± 4.6 ppm)
ITU-T G.813 Option 1 (± 4.6 ppm)

Max Freq Offset: ± 4.6 ppm

DSPLL C: Assistant Enabled

Switched Externally: Yes

Standards: Other (± 15 ppm)
Max Freq Offset: ± 15 ppm

DSPLL D: Assistant N/A

CBPro v2.27 [2018-08-10]

Si5332:

- Support Revision D
- Support encapsulated crystal packages (grade E/F/G/H)
- Support Si5332-12IX-EVB, Si5332-8IX-EVB, and Si5332-6IX-EVB encapsulated crystal EVBs
- Support multi-profile mode
 - Up to 32 profiles can be configured via up to 5 profile select pins
 - Selectable global or per-profile feature configuration to speed data entry and ensure synchronization of configuration common between profiles

Si534x/8x/9x:

- Fixed: CBProProjectSettingsExport was not including SiLab bank registers that are included in the CBPro GUI register/settings export
- Fixed: could receive export/write/OPN error regarding LOLx_INT_TIMER_SCL if fastlock bandwidth was low (or fastlock was disabled and loop bandwidth was low)
- Si5348/83/84: Fixed: on input clock selection mask, IN3/IN4 checkboxes were enabled even though they have no effect and OOF is not supported
- Si5348/83/84: new DRC error if hitless switching is enabled on PLL with IN3/4 CMOS input
- For all parts that allow mix of integer $N < 10$ and fractional $N > 10$, in certain cases the frequency planner could not find a solution when there was a mix of frequencies $> F_{vco}(\min)/20$ and those that require $N < 10$
- Show OOF[3] disabled when ZDM is enabled
 - Set OOF_EN[3] and FAST_OOF_EN[3] to 0 and clear THR/etc settings for ZDB
 - Disable INTR mask checkbox and clear OOF_INTR_MSK[3]
- Don't allow DCO on N0 if ZDM is enabled: add DRC error if already configured in project; customize lock icon in DCO editor
- Add DRC warning if set non-zero I/O delay on N0 if ZDM is enabled

CBProv 2.26.0.1 [2018-06-28]

Si5332/57:

- Fixed: NVM burn with field programmer socket or wired would result in invalid NVM configuration. This bug was introduced in CBPro 2.25.2

CBPro v2.26 [2018-06-24]

Added Support for Si5391 (Low-Jitter, 12-Output, Any-Frequency, Any-Output Clock Generator)

- Detects and controls a Si5391A-A-EB and Si5391P-A-EB
- Can create a custom factory programmed part (Orderable Part Number)
- Can export a configuration for in-system programming using I2C or SPI
- Supports NVM burning through field programmer socket and wired to customer PCB using serial cable

Si534x/8x/9x:

- Fixed: if DSPLL C or D were used in a configuration, pin control mode on DSPLL B was ignored and register controlled mode was configured via IN_SEL_REGCTRL_PLLB
- Fixed: some older CBPro project files could not be opened on German (and possibly other) PCs; would get the equivalent of "bad data" as the error message

- Fixed: Si5340/1: if only a single input was defined and ZDM was enabled, received DRC error "must define a non-Zero Delay Mode input on DSPLL" erroneously
- Si5392/4/5/6/7: update documentation links
- Si5380/86: changes for F_{pdf} ≥ 1.024 MHz: minimum DSPLL B loop bandwidth in ZDM relaxed from 100 Hz down to 10 Hz; minimum gapped input clock frequency requirements increased by a factor of two
- Small updates to fractional P divider / gapped clock and input frequency warning thresholds based on PFD frequency and selected loop bandwidth

Si5334/35/38/55/56/57:

- Fixed: LVCMOS In-Phase format was raising an error when trying to submit an OPN
- Fixed: Si5338 NVM file conversion to CBPro project now works even if the resulting CBPro project has a frequency planner error, possibly due to ClockBuilder Desktop allowing synthesis errors. CBPro will show the DRC error(s) after opening the converted file.

Si5332:

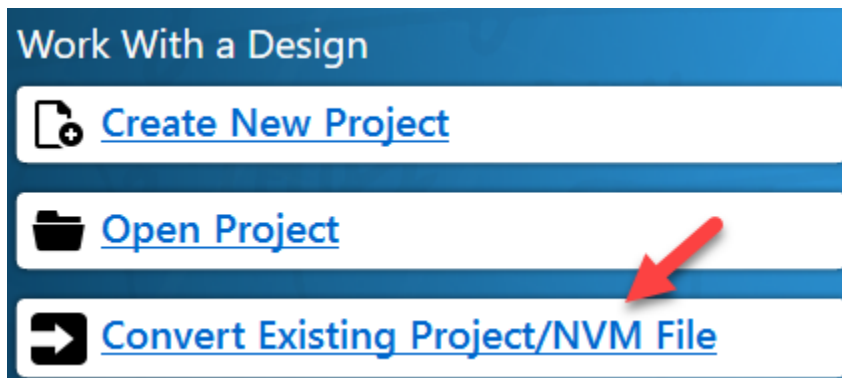
- Fixed: Field programmer communication config dialog was not properly setting communication to I2C, it was remembering previously set mode
- Fixed: LVDS Fast power calculation was showing 0 W in design report

CBPro v2.25 [2018-06-04]

Added Support for Si5392/4/5 (Up to 12 Output Any-Frequency, Any-Output Jitter Attenuator/Clock Multiplier with Ultra-Low Jitter)

Added Support for Si5396/7 (Dual/Quad DSPLL™ Any-Frequency, Any-Output Jitter Attenuator)

- Detects and controls a Si5394A-A-EB, Si5394P-A-EB, Si5395A-A-EB, Si5395P-A-EB, and Si5397A-A-EB Evaluation Boards
- Can create a custom factory programmed part (Orderable Part Number)
- Can export a configuration for in-system programming using I2C or SPI
- Supports NVM burning through field programmer socket and wired to customer PCB using serial cable
- Existing Si534x project files can be converted to equivalent Si539x design using the new project conversion tool, available from the CBPro welcome screen:



- See [AN1155 Differences between Si5342-47 and Si5392-97](#) for more information

Misc:

- Fixed: closing a popup using the down arrow can cause opening another popup not to work, instead showing the previous popup

CBPro v2.24 [2018-05-23]

Added Support for Si5357 (12-Output Any-Frequency Clock Generator)

- Detects and controls a Si5357 Evaluation Board (Si5357-EVB)
- Can create a custom factory programmed part (Orderable Part Number)
- Can export a Si5357 configuration for in-system programming using I2C
- Support NVM burning through field programmer socket and wired to customer PCB using serial cable

Si5334/35/38/55/56:

- Fixed: Si5338 datasheet addendum was missing output format voltage and pin 6 description was incorrect
- Fixed: EVB regulators were not in sync with output format voltage

Si5332:

- Fixed: the frequency planner could select a PFD frequency (Fpfd) outside of the maximum limit. This could only occur for configurations with input frequencies greater than 50 MHz.
- Fixed: Field Programmer could not talk to devices configured at 1.8/2.5V IO voltage
- Fixed: PLL was not being disabled for Buffered only parts
- Fixed: Register export was missing registers to switch the part between ready and active mode
- Changed default output driver format to LVPECL
- Added support for Single LVCMOS output driver format
- Added support to select from internal/external termination for HCSL driver format

Si534x/8x:

- Fixed: FOTF for Si5340/41/42/42H/44/44H/45 could give error "some outputs on the same VDD supply do not have an even common multiple within the Fdco range" when there is no issue
- Fixed: bandwidth could be set lower than needed
- Fixed: planner could give error "calculated NF, Infinity, is too large for register"
- Si5380: support phase noise estimate tool
- Make CBProFOTF1.exe the documented, primary name for Si534x/8x FOTF; allow CBProSi534x8xFOTF.exe to be run still for backwards compatibility

Misc:

- Fixed: the field programmer selector in Design Dashboard was not customized for non-Si534x/8x families when the socket was missing
- Show special message in Orderable Part Number / Phase Noise Request wizard if user has not consented to the new silabs.com data policy
- Updates to *CBPro Tools & Support for In-System Programming*
- Improved support for pre-production devices

CBPro v2.23 [2018-04-10]

Added support for Si5334/35/38/55A/56A, Si5338-EVB, and Si5356-EVB.

Si534x/8x:

- Fixed: high frequency outputs (require $N_x < 10$) could not always be manually assigned to an N_x divider
- Add tooltip to explain DCO Range

Si5381/2/6 Phase Noise Estimate Tool:

- Fixed: closing CBPro without first closing the PN window would leave hung CBPro running in the background
- Do not calculate estimate if the output frequency is less than 10 MHz
- Set the maximum frequency of the input phase noise plot to be no higher than the maximum frequency of the output phase noise plot
- Update output selector items if an output is added/removed from project while the tool window is still open
- Misc. user interface

CBPro v2.22.1 [2018-03-28]

Si534x/8x:

- Fixed: NVM program tool could abort with "error parsing NVM file"

CBPro v2.22 [2018-03-27]

Misc:

- There is a new EVB/USB driver README in C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\Drivers. Please review it if CBPro is not detecting a supported Skyworks Timing EVB.

Si5332:

- Register exports created by CBPro GUI Export tool, CBProProjectRegistersExport CLI, and related CLIs now include preamble and postamble required to fully reconfigure the device (via register 0x06 write).

Si534x/8x:

- Si5342H/44H: support outputs down to 100 Hz (was 8 kHz)
- Si5340/1/2/4/5: jitter optimization has been improved when DCO is enabled on a MultiSynth. When DCO is enabled, the planner priority page is no longer shown. A MultiSynth (Nx) divider that was previously integer may now have a fractional value after this change, to reduce jitter across all outputs (DCO and non-DCO).
- Si5346/47/96/97: better error message if can't calculate a frequency plan due to required resolution of dividers
- Si5380: default OLPD gain now varies depending on reference type: XTAL=1,XO=8; previously it was always 1. When using a low noise XO, increasing the OLPD gain improves the close in phase noise. This change is consistent with the default settings for the rest of the Si538x devices.
- Si5380: switch to XO as default reference for rev D
- Si5380/1/2/6: the clock output editor and frequency planner now supports discrete frequency entry and driver configuration on OUT0/0A and OUT9/9A. For example:

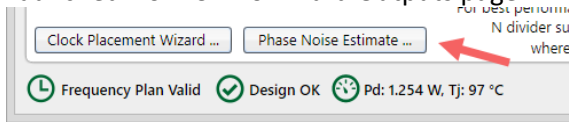
Output	Mode	Disabled State	Format	DSPLL/N	Frequency	
OUT0A	Enabled	Stop Low	LVDS 2.5 V	A	155.52 MHz	✓
OUT0	Enabled	Stop Low	LVDS 2.5 V		51.84 MHz	✓

- If an Si5381/2 CEVB rev D is detected, "Open Default Plan" will set XAXB mode to XTAL
- Change Si5344 EVB sample input select mode to auto-revert

New Si5381/2/6 Phase Noise Estimate Tool:

- Supports three input phase noise data modes:
 - Jitter generation only (-200 dBC/Hz input)
 - Very high input jitter example
 - Custom PN CSV file
- Calculates RMS Jitter calculation, with configurable integration bandwidth
- Can save PDF report

- Can save plot data to CSV
- Launched from CBPro wizard Outputs page:



Improved Si5346/47 FOTF (CBProSi534x8xFOTF CLI):

- Updated preamble and postamble in DSPLL plan scripts to ensure PLL operates as expected on plan change. In prior releases, a PLL could generate wrong frequency(s) after PLL plan script write.
- LOL and OOF settings can now be configured in plan scripts:
 - LOL thresholds for a DSPLL can optionally be changed using the LOL_SET_THR and LOL_CLR_THR keywords. Decimal values are accepted. Can only be used if the base project file has "Auto Set" unchecked.
 - OOF thresholds for an input can be set using the OOF_SET_THRx, OOF_CLR_THRx (precision OOF) and FAST_OOF_SET_THRx, FAST_OOF_CLR_THRx (fast OOF) keywords, where x is the INx input number starting at 0. Thresholds can only be specified if the Enabled checkbox is set on the corresponding input. Decimal values are supported for precision OOF and integer values for fast OOF. OOF can only be changed on an input that feeds a single DSPLL.
 - Example:


```
1,LOL_SET_THR,30
1,LOL_CLR_THR,3
1,OOF_SET_THR0,10
1,OOF_CLR_THR0,1
1,FAST_OOF_SET_THR0,2000
1,FAST_OOF_CLR_THR0,1000
```
- Si5346/7 plan scripts now contain read-modify-write mask column. When mask is not 0xFF, read-modify-write should be performed for the register write.
 - Under certain FOTF conditions, PLL settings that share a common address/register may need to change on a per-plan basis
 - For example, LOL_SLW_DETWIN_SEL_PLLA and LOL_SLW_DETWIN_SEL_PLLB share the same register, 0x009B
 - PLL DCO frequency or target bandwidth change can affect these values
 - Writes to registers that have multiple PLL settings (bitfields) at the address therefore now have a read-modify-write mask
 - The mask is documented within the PLL plan script via comment:


```
Address,Value,Mask
# If mask is 0xFF, no read-modify-write is required. Otherwise,
# read register value and write to device Read&~Mask + Value&Mask
```
 - Example:


```
# Write Configuration
0x009B,0x56,0xF0
0x009D,0x95,0x0C
0x00A9,0x35,0xFF
0x00AA,0x0A,0xFF
```
 - The first two writes require read-modify-write. The last two do not.
 - Only Si5346/7 FOTF plan scripts will contain the mask. The full config script does not. Other parts, like single PLL Si5345, do not include the mask at all.
- DSPLLx-Register-Script-All-Plans.csv files are no longer created by the tool because of more complex preamble/postamble. If any file is found in the output folder, it is removed to ensure existing users of tool do not try to use the out-of-date script.

- Device revision B is no longer supported by the FOTF tool. The updated preamble and postamble required to guarantee configured output frequency on PLL plan change is not supported by Si5346/7 revision B. If you try to run the CBProSi534x8xFOTF CLI against a revision B project file, the tool will abort with an error.
- The samples, CLI manual, and programming overview deck have been updated for recent changes (mask, LOL, OOF)

Read-Modify-Write Mask is Supported by Register Write Tools:

- The EVB GUI File->Write Register File to Device feature now supports optional read-modify-write mask, allowing new Si5346/7 FOTF scripts to be tested
- Mask is after data; e.g.
Address,Data[,Mask]
Spaces and tabs can also be used to separate fields
- CBProDeviceWrite CLI --registers mode also can handle the mask field
- Example for Si538x/4x:
 - CBProDeviceRead --settings DESIGN_ID0
Searching for EVBs/FPs ...
Reading from device ...

Location	Type	Setting Name	Decimal Value	Hex Value
0x026B[7:0]	R/W	DESIGN_ID0	53	0x35
 - mask1.txt:
0x026B 0xFF 0x0F <- Only write lower nibble of register; upper nibble is kept as is and data in second column is ignored when masked
 - CBProDeviceWrite --registers mask1.txt
Searching for EVBs/FPs ...
Writing registers on Si5341A Rev D EVB (with validation) ...
 - CBProDeviceRead --settings DESIGN_ID0
Searching for EVBs/FPs ...
Reading from device ...

Location	Type	Setting Name	Decimal Value	Hex Value
0x026B[7:0]	R/W	DESIGN_ID0	63	0x3F

New CBProRegistersToSettings CLI:

- Breaks out device register values by named setting (bitfield).
- For example, if the device is Si5345 Revision D and regs.txt contains:
0x0302,0x00
0x0303,0x00
0x0304,0x00
0x0305,0x80
0x0306,0x05
0x0307,0x00
0x0308,0x00
0x0309,0x00
0x030A,0x00
0x030B,0x80
- CBProRegistersToSettings --part si5345 --rev d --infile regs.txt:

Location	NVM	Flag	SettingName	DecValue	HexValue
0x0302				0	0x00
0x0303				0	0x00
0x0304				0	0x00
0x0305				128	0x80
0x0306				5	0x05
0x0307				0	0x00
0x0308				0	0x00
0x0309				0	0x00
0x030A				0	0x00
0x030B				128	0x80

0x0302[43:0]	User	R/W	N0_NUM	23622320128	0x580000000
0x0308[31:0]	User	R/W	N0_DEN	2147483648	0x80000000

- Text, CSV, and HTML output format is supported using the --format option

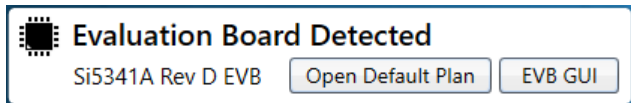
CBPro v2.21 [2018-01-19]

Misc:

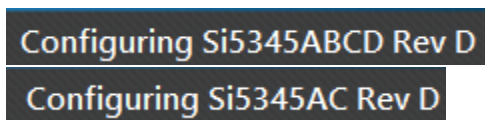
- Fixed: EVB detection could fail on Windows XP

Si534x/8x:

- Fixed: when exporting or writing a free-run only project, could get error "input clock select mode must be defined"
- Fixed: Si5349/81/82: in ZDB mode, Fpfd(min) of 1 MHz was not being enforced
- All bandwidths forced to be Fpfd/40 or less; previously fastlock could be up to Fpfd/20
- Based on Px divider, Fpfd, & ZDM state, apply bandwidth range restrictions on fastlock and holdover exit bandwidth the same as loop bandwidth
- Include device grade in EVB labels in all cases:



- For select configurations, the wizard header now reflects possible OPN grades based on Fout(max) and possibly fractional MultiSynth state:

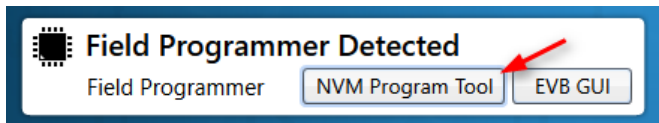


Si5332:

- Fixed: Changing XAXB input mode was not updating its use to PLL and causing a DRC error
- Fixed: register and setting exports were displaying 2 byte address instead of 1 byte address

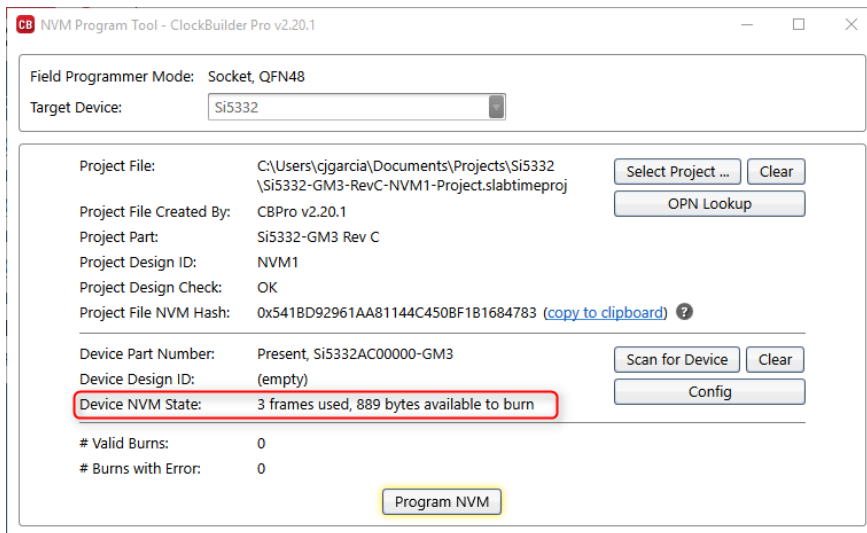
New Si5332 NVM Program Tool:

- Device to program can be:
 - In field programmer socket (Si5332-32SKT-DK, Si5332-40SKT-DK, Si5332-48SKT-DK)
 - Wired to customer PCB using serial cable
- Launched from CBPro Welcome page, just like when targeting Si538x/4x



- Scan reports on the number of non-volatile memory frames used, available free memory, and the part's OPN
- Note: if the Field Programmer's firmware needs to be upgraded to support Si5332, a dialog will prompt the user to upgrade the firmware upon programming a DUT's NVM. If upgrade fails, there is a new tool in CBPro's Start menu Misc folder to re-flash a Field Programmer with corrupt firmware. This would only occur if user disconnects field programmer during the one time firmware upgrade process.

- Example:



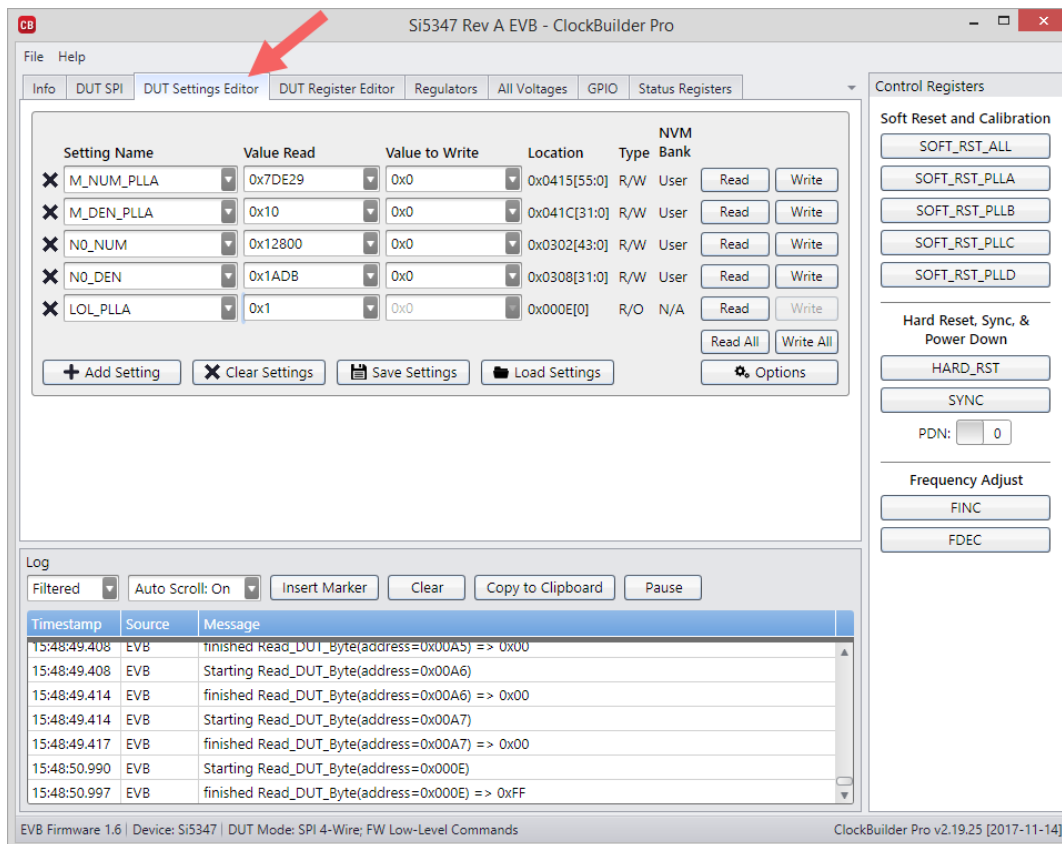
CBPro v2.20 [2017-11-21]

Misc:

- Fixed: rare crash when trying to select save filename in export, etc.
- Fixed: CBProMultiProjectExport.exe CLI was not creating delta full reconfigure scripts even though it was documented to do so
- The USB driver now fully supports Windows 10 UEFI Secure Boot PCs via a certified driver that is installed on such PCs. Non-secure boot PCs will continue to use the existing driver.

New Settings Editor in EVB GUI:

- Read and write registers based on their setting names (aka bitfields)
- Supported on Si5332, Si535x, and Si538x/4x: EVB or field programmer
- New tab next to Register Editor



- CBPro automatically saves your current settings group to its preferences, keyed off of part number. So when you relaunch, they will be reloaded. But you can also save a group to a text file using the “Save Settings” button, and later restored using the “Load Settings” button

- Example saved settings file:

```
# Si5347 Settings
# Saved by ClockBuilder Pro v2.19.25 [2017-11-14] EVB GUI Settings Editor
# Saved on 2017-11-14 15:53:05 GMT-06:00
SettingName,Location,Type,NVM,ReadValue,WriteValue
M_NUM_PLLA,0x0415[55:0],R/W,User,0x7DE29,0x0
M_DEN_PLLA,0x041C[31:0],R/W,User,0x10,0x0
NO_NUM,0x0302[43:0],R/W,User,0x12800,0x0
NO_DEN,0x0308[31:0],R/W,User,0x1ADB,0x0
LOL_PLLA,0x000E[0],R/O,None,0x1,0x0
```

Si5332:

- Fixed: adding spread spectrum pin could cause error, preventing the plan from being calculated
- Fixed: Spread Spectrum not working in grades C and D Orderable Part Numbers (OPNs)
- Modified Output Enable (OE) universal hardware pin to be OE bar
- Added support for Si5331 CEVB

Si51218:

- Fixed: mux was configured incorrectly for two clock outputs

Si538x/4x:

- Fixed: in rare cases, enabling outputs on old project files could crash CBPro

- Fixed: if DCO step size was the same as range, design report would list output as "DCO not supported on this output"; device settings were still OK
- Fixed: exporting firmware boot record or upgrading firmware on Si5383/4 was not working on 32-bit Windows
- Fixed: clicking the input priority arrow very fast could crash CBPro
- The NVM Program Tool now validates volatile writes before initiating burn; if mismatch, burn is aborted and user is notified of differing registers
- Si5381/2/6: Grade A (external) reference frequency now selected via pulldown, limited to 48.0231 MHz and 54MHz
- Si5348/83/84: the setting (register bitfield) name for REF priority was changed from IN3_PRIORITY_PLLx to REF_PRIORITY_PLLx
- Si5346/47/48/83/84: the following settings were removed from exports, design reports because they do not apply to these devices:
 - 0x0240[1] MXAXB_FSTEP_DEN
 - 0x0240[0] MXAXB_FSTEP_MSK
 - 0x0241[43:0] MXAXB_FSTEPW
- The frequency planner for Si5340/1/2/4/5 and Si5381/2/6 has been improved to allow integer N<10 across a wider range of output frequencies. Previously this set out outputs:
 - 20 MHz
 - 40 MHz
 - 60 MHz
 - 140 MHz
 would not be placed on single N divider. Now they are, via automatic or manual N divider assignment

Updates for pre-release devices.

CBPro v2.19.3 [2017-09-25]

Si5382:

- Fixed: CBPro could crash on free-run only wizard page

CBPro v2.19.2 [2017-09-25]

Si5332:

- Fixed: DRC error was taking into account unused clock outputs in VDDO check

CBPro v2.19 [2017-09-24]

Added support for **Si5381/82** 12-channel Multi-DSPLL Wireless Jitter Attenuating Clocks

Added support for **Si5386** 12-channel, Any Frequency, Wireless Jitter Attenuating Clock

Misc:

- Fixed: when a project file was opened by double clicking it from Explorer, Outlook, etc. the filename was not reused when you later re-saved, created a design report, etc.

Si538x/4x:

- Remove 0x0402 and 0x0502 addresses from exports on select parts, where the register values never vary from factory programmed values, are never modified by CBPro, and would never be reprogrammed by customers.

- Small modification to BW0-BW5 DSPLL coefficient calculation. Generally will not result in operational bandwidth change on device, just +-1 change in any one BW0-BW5 setting value. I.e. the “actual bandwidth” value reported in the CBPro design report will normally not change as a result of this update.

Si5332:

- Fixed: changing output format to LVCMOS was not updating properly the output frequency range
- Fixed: Output skew page was incorrectly displaying “ns” instead of “ps” for the offset
- Fixed: frequency planner could select N divider outside range in certain cases, resulting in visible Design Rule Check error
- Added part grade description to OPN Wizard

CBPro v2.18 [2017-09-17]

Si5332 Support Added (6/8/12-Output Any-Frequency Clock Generator):

- Detects and controls a Si5332 Evaluation Boards (Si5332-12EX-EVB, Si5332-8EX-EVB, Si5332-6EX-EVB).
- Can create a custom factory programmed part (Orderable Part Number)
- Can export a Si5332 configuration for in-system programming using I2C

Updates for pre-release devices.

CBPro v2.17 [2017-09-11]

Misc:

- Add new --noscan-in-fp-registers-mode option to CBProDeviceRead and CBProDeviceWrite CLIs. Communication with the device using the field programmer is normally verified before an operation by reading fixed identification register(s) such as PN_BASE on Si538x/4x. Specifying this option will disable this behavior when --registers mode is used.

Si538x/4x:

- Fixed: Si5342H/44H: in register export scripts, don't include 0x0540=0x00 register write (OLB_TM_OUT_ZERO=0) in postamble if DCO mode is enabled. This needs to remain 0x01 (OLB_TM_OUT_ZERO=1) to disengage the other loop. This bug was introduced in CBPro 2.13.3.
- Fixed: when targeting device using field programmer, writing a rev B project file would yield an error due to locked SiLab register being written and failed read back validation
- Fixed: on rev D+, INIT_LP_CLOSE_HO[_PLLx] configuration bit is now set to 1 when either ramped exit from holdover option is selected in CBPro DSPLL Configure page. Previously, it would have been 0. Without this setting, if the DSPLL first initializes with no input clocks, enters free-run, and later an input is available, the DSPLL will not ramp when exiting free-run.
- Fixed: if you wrote a design from the CBPro wizard without EVB GUI open, launched the EVB GUI, and then ran the power measurement compare, it complain saying must write project.
- Remove ID settings refresh button from field programmer EVB GUI; use scan instead
- On rev D+, support 1/16 ppm resolution on precision OOF thresholds through writing of OOFx_CLR_THR_EXT, OOFx_TRG_THR_EXT settings
- Add text to gapped clock tooltip: "A valid gapped clock must have a minimum frequency and clock cycle density as specified in the datasheet."
- Raise Fpfd(min) when Zero Delay Mode is enabled from 64k to 128k
- OOF improvements:
 - Editor enforces that OOF clear threshold must be <= trigger threshold

- New DRC error if OOF clear threshold must be > trigger threshold; therefore existing projects that violate new editor rules will be flagged with error
- Only include N_FSTEP_MSK in exports/reports on devices that do DCO on Nx (40/41/42/44/45, not 42H/44H).
- Improve Zero Delay Mode (ZDM) phase alignment at low PFD frequencies by changing how loop gain coefficients are calculated
- DUT Dump feature in EVB GUI supported in field programmer again

CBProSi534x8xFOTF CLI:

- Fixed: the tool ignored the plan(s) for N4 divider. I.e. the --plans-n4 option was being ignored.
- For Si5340/41/42/42H/44/44H/45, the frequency planner in FOTF mode now optimizes for lowest jitter even if that means that no single N divider is integer.

Updates for pre-release devices.

CBPro v 2.16.1 [2017-07-19]

Si538x/4x

Fixed: when creating a new Si5348/83/84 design, IN3/4 CMOS only inputs were auto assigned to DSPLL A&C; these inputs are DSPLLD only

CBPro v2.16 [2017-07-18]

Si535x

Fixed: Incorrect pin mux configuration for Si5351A

Si538x/4x

Si5340/41/46/47 Stuck Divider Fix:

- During power up or upon hard reset, some Si5340/41/46/47 devices may, on rare occasion, see an unusual clock divider failure resulting in output clocks not being generated. Once a device has successfully generated clock outputs, they will continue running without issue. Although the failure mechanism is random, Skyworks has not observed successive failures in tests run over many parts. Skyworks has observed that in several devices cycled with a hard reset more than a million times, output clock failure rates can be seen in rare instances (a few hundred times). Multiple workarounds in case of clocks not being generated have been identified and are detailed below.
- Fix: Orderable Part Numbers (OPNs) created by CBPro 2.15.6+ will have a baseline register changes to address the issue
- Fix: Register script exports generated by CBPro (wizard,CLIs) have fix via update to programming preamble

Si5342/42H/44/44H/45/46/47/48/83 Precision & Fast OOF Disabled Exit From Holdover Fix:

- If both precision and fast OOF were disabled for an input clock and holdover history was valid the device, exit from holdover would not occur on clock recovery
- Example sequence showing issue:
 - Lock the device all is OK
 - Remove the clock all is OK; OOF, LOS and LOL are all asserted
 - Put the input clock back OOF, LOS, HOFRB are negated, LOL is asserted, the input and output are not locked
 - Issue a soft reset all is OK
- Fix: if both precision and fast OOF were disabled, CBPro now:
 - Sets OOF_CLK_DIS[in] and OOF_DIV_CLK_DIS[in] to 1 if input is not enabled (change)

- Sets OOF_ON_LOS[in] if input is not enabled OR precision OOF is enabled OR fast OOF is enabled (new setting; change so that device does not assert OOF with LOS)

Si5342H/44H N_PIBYP Fix:

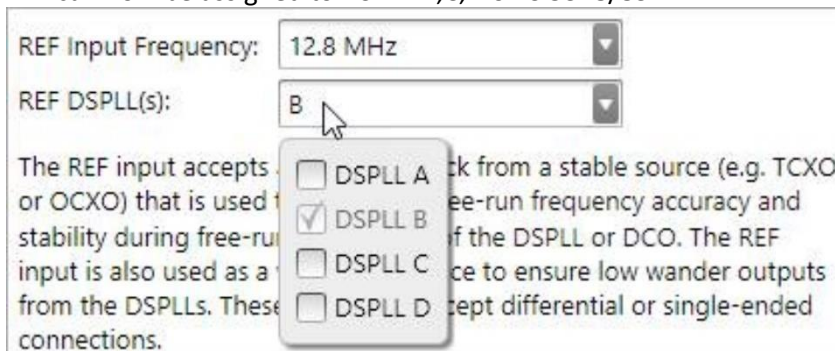
- When DCO mode was enabled and N0 divider was integer, N_PIBYP[0] would have the wrong value.
- If DCO mode was enabled, N0 divider was integer, and N_PIBYP[x] was incorrectly set, then frequency plans approaching the upper frequency limit could yield no output clock.
- Fix: N_PIBYP[x] set to 1 if Nx is integer and 0 if Nx is fractional.

Other Bug Fixes:

- Fixed: OUT1_DIV2_BYP (Si5342H/44H) and OUT3_DIV2_BYP (Si5344H) were not included in design reports and settings exports; the correct values were reflected in register exports and NVM images, however, so no customer configuration issues
- Fixed: Si5342H/44H: was not always supporting R bypass for high speed outputs when manually assigned to an N divider
- Fixed: Si5383/84: if the project used fixed host I2C address mode, the address was not editable until mode was toggled
- Fix rare crash when close NVM burn tool window

Misc:

- Si5340/41/42/44/45 Rev D: Nx_HIGH_FREQ bit is now set if a MultiSynth (Nx) divider value is less than 10. This bit is in 0x0A14[3], 0x0A1A[3], 0x0A20[3], 0x0A26[3], and 0x0A2C[3]. This improves clock stability for high MultiSynth frequencies.
- Changed the default ramping for new designs to ramped exit from holdover only. This is the recommended setting when switching between input clocks that differ in frequency by less than 10 ppm. The text has been improved for available options.
- Rev D: new checkbox on PLL page to enable or disable preserve holdover history. This controls the HOLD_PRESERVE_HIST[_PLLx] setting. Preserve holdover history should be turned OFF if clock switching between two input clock that are different in frequency by more than 10 ppm.
- Improved spur avoidance in frequency planner.
- New LOS threshold “set for me mode”. This is the default for new designs. Skyworks recommends checking this when hitless switching is enabled to ensure optimal performance.
- Miscellaneous Design Rule Check (DRC) changes
- REF can now be assigned to DSPLL A,C,D on Si5348/83



- GRADE, PKG_ID, OPN_IDx, and OPN_REVISION are now included in datasheet addendums, matching the value programmed on the device at the factory.
- Updates for pre-release devices

CBPro v2.15 [2017-05-12]

Si535x:

- Fixed: OE control was not being cleared when exporting
- Fixed: Outputs were being powered down when selecting Disabled
- Fixed: No solution plan was showing as empty plan in design report instead of displaying error.

Si538x/4x:

- Si5348/83/84: show DSPLL B(REF) options (bandwidth)
- Si5383/84:
 - Fixed: Fout(max)=33.554432MHz on OUT6 when OUT5=1Hz was not being enforced; would allow entry, but any real/virtual DUT write such as orderable part number creation, register export, or EVB write would generate error due to R divider range being exceeded
 - Power estimate improvements

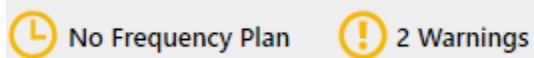
ClockBuilder Pro Field Programmer:

- CBProDeviceWrite, CBProDeviceRead Command Line Tools (CLI)
 - New: supports in-socket read/write
 - New: supports Si5383/84 via the new --family argument (--family si538x4x or --family si538x4xfw)
 - The --family argument is now required when targeting a PCB via I2C or SPI serial connection except for CBProDeviceWrite --project mode (family can be inferred in this use case)
- CBProSi534x8xFirmwareDownload CLI now supports the field programmer in socket mode
- NVM Programming Tool:
 - Now supports Si5383/84 flash programming, in-socket or in-system (wired to PCB)
 - The button to launch the tool on the welcome screen, previously labeled “NVM Burn Tool”, is now labeled “NVM Program Tool”
 - Improvements for other Si538x/4x (non-firmware) devices:
 - Reporting of full part number of detected device
 - Explicit design rule check results performed on project selection
 - Improved organization/layout
- The EVB GUI now supports the Si5383/84 via field programmer, using new LGA56 field programmer socket or in-system (wired to PCB)
- The CBPro wizard now supports in-socket or in-system (wired to PCB) write to DUT; previously the dashboard forced the field programmer to assume wire mode

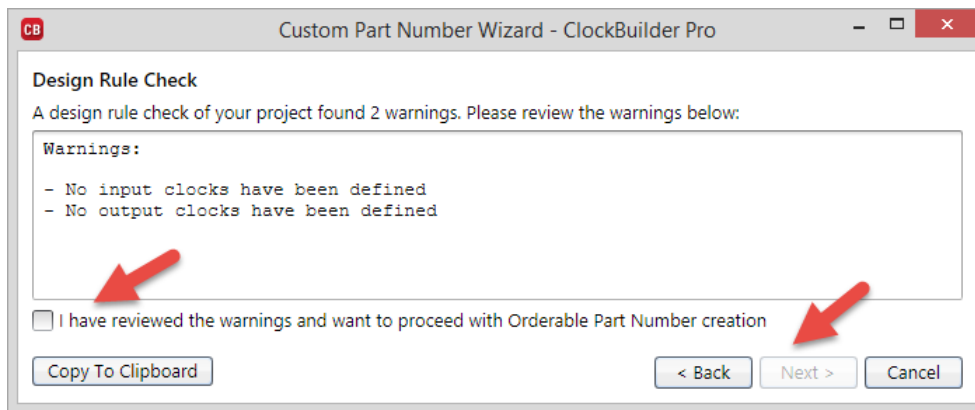
CBPro v2.14 [2017-04-21]

General:

- You can now create “no plan” projects when a device supports in-system programming. For example, on Si5351A and Si5345 you don’t have to define an input or an output to create an OPN or export the design. DRC warnings are generated instead of errors.



- The OPN wizard now requires you to review any DRC warnings present and acknowledge them by clicking a checkbox before continuing:



- Fixed rare error “cannot set Owner property to a Window that has not been shown previously” when opening project with frequency plan change
- When exporting file from dashboard, device revision is included in the default filename
- Updates for pre-release devices

Si535x:

- Fix bug where the pin mux mapping between C0/C1 and P1/P2 was switched for Si5350B/C
- Improved frequency planner to allow the use of both PLLs when it cannot find a solution and all outputs share the same feature

Si538x/4x Register Export Improvements:

- Improved programming reliability for the following conditions:
 - Writing a configuration script too slowly can cause a faulty VCO calibration that may trigger a LOL signal (Si5342/44/45/48, Si5342H/44H, and all Si538x) operating over temperature.
 - If a new configuration is loaded within 300 msec of reset or within 300 msec of loading a previous configuration, the device may still be running its calibration sequence, possibly leading to a faulty VCO calibration that may trigger a LOL signal.
- The changes described below ensures programming functions as intended under all conditions regardless of how slowly the configuration script is written or how recently another configuration has been loaded.
- Register export changes:
 - Si5342/44/45/48, Si5342H/44H, and all Si538x: added register 0x0540 writes to preamble/postamble
 - All devices: added 300 msec delay after preamble to export scripts and real DUT writes for all devices (i.e. done on EVB and field programmer). In export scripts the delay is added as a comment.
 - Added comment blocks to register export scripts breaking preamble, configuration, and postamble into sections

- Example of new export script:

```
# Start configuration preamble
0x0B24,0xC0
0x0B25,0x00
0x0540,0x01
# End configuration preamble
#
# Delay 300 msec
#   Delay is worst case time for device to complete any calibration
#   that is running due to device state change previous to this script
#   being processed.
#
# Start configuration registers
0x000B,0x68
```

0x0016,0x02

...

0x0B57,0x0E

0x0B58,0x01

End configuration registers

#

Start configuration postamble

0x0514,0x01

0x001C,0x01

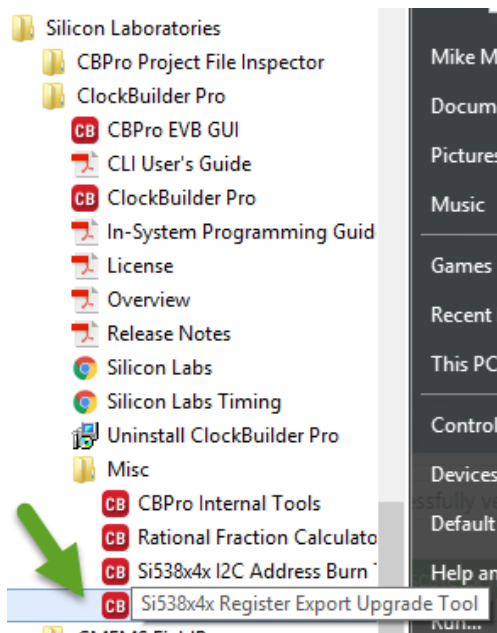
0x0540,0x00

0x0B24,0xC3

0x0B25,0x02

End configuration postamble

- New “Si538x/4x Register Export Upgrade Tool” is available to add 0x0540 write, delay comment, and section comments to an existing register export
 - CSV and C header file files supported
 - Launched from Start Menu:



- Does in place edit, creating backup of original

Si5348/83/84:

- 83/84: Fixed: an N divider could be selected outside the restricted DCO range in 1pps mode; you would get a plan check DRC error if this occurred
- 83/84: Fout(max) now set to 685 MHz on DSPLL D if 1pps input mode
- 83/84: rapid lock calculation update
- Si5383 sample design updated: DSPLLA and C set to 10Hz with 100 Hz fastlock
- Si5384 sample design added
- All: changed default nominal and fastlock bandwidth for new designs on DSPLL A/C/D from 100/1k to 10/100 Hz
- All: new DRC when DSPLL A, B, or D bandwidth is \geq DSPLLB bandwidth. Example:
Because DSPLL A,C bandwidth is equal to or higher than DSPLL B bandwidth, the stable clock connected to the REF input will not be used as a jitter / wander reference for DSPLL A,C. It will, however, continue to function as the free-run / holdover reference.

Si538x/4x Misc:

- Fixed: could not load very early (old) Si5348 project files that did not use all PLLs
- Fixed: if Zero Delay Mode (ZDM) was enabled, the planner could place even common multiple related outputs on the ZDM divider even though the divider range could not support this, leading to confusing planner error. For example, if the ZDM output was 64kHz and there was a 400 MHz output, the planner would try to put these both on N0 even though the N divider range would not support this.
- Don't add hitless switching performance DRC if only 1 input clock on PLL
- Improved silab bank burn sequence used by I2C Address Burn tool
- File->Write Register File now detects "Delay XXX" comments in register file and pauses, where XXX is in milliseconds. For example:
Delay 100 or
Delay 100 msec

CBPro v2.13.0.1 [2017-03-27]

Si535x:

- Fixed: bug where the pin mux mapping between C0/C1/C2 and P0/P1/P2 was switched for Si5350B/C

CBPro v2.13 [2017-03-03]

Add support for Si5383/84, a network synchronizer supporting 1 PPS to 750 MHz inputs.

Export Improvements (All I2C/SPI Configurable Devices):

- Fixed: the multi-project export GUI was not creating per-project register write scripts and setting dumps
 - Added a copy project option to multi-project export GUI and CLI. For example, if you do multi-project export on 4 project files, P1-Project.slabtimeproj through P4-Project.slabtimeproj will be created.
 - Added option to create C code register config scripts to the multi-project export GUI (this was already in the CBProMultiProjectExport CLI).
 - Multi-project export now handles projects that write different settings. If a register is not written (not defined and a don't care) by one project but is defined by another, the value cell will be empty for the project(s) that do not define the register. These empty cells will not count towards the Varies computation. Previously multi-project export would fail with an error under these conditions.
 - Multi-project export now creates delta register write scripts in addition to full configuration scripts for each project, similar to what the CBProSi534x8xFOTF CLI creates. Each delta script includes the programming pre-amble sequence, the register writes that vary between any one project, and the post-amble sequence. This provides a more efficient way to switch between configurations using the following workflow:
 - Device power up or reset
 - Write a full configuration write script (P*-Registers-Script.txt)
 - Write any delta update configuration write script (P*-Registers-Script-Delta-Only.txt)
- All multi-project export samples, user manuals, and the training presentation bundled with CBPro have been updated to discuss this.
- Updated the CLI user guide, in-system programming overview, and samples to reflect these changes.

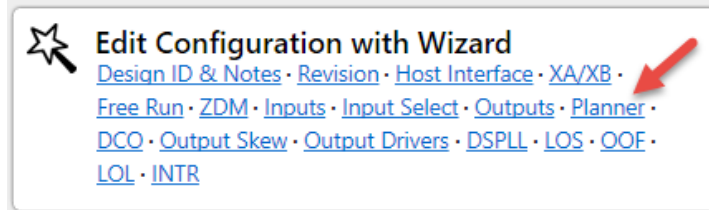
Si538x/4x:

- New frequency planner priority page added to wizard for Si5340/41/42/42H/44/44H/45 projects
 - Allows you to select an output to be lowest jitter and guaranteed to be placed on an integer MultiSynth:

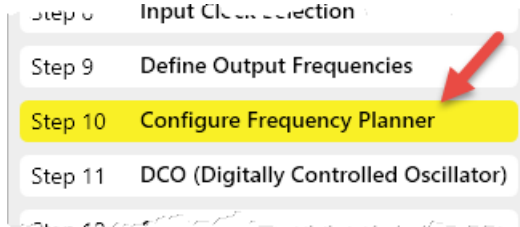
- ☐ Maximize the number of low jitter outputs
CBPro will select the frequency plan with the most number of outputs on an integer N divider.
- ☒ Select one output as lowest jitter
CBPro will ensure that the selected output is on an integer N divider. Where possible, other outputs that are even common multiple related will be placed on the same divider, within the bounds of any manual N divider assignment you have configured.

Output:

- Getting to the new page from the dashboard:



- From the step menu:



- Changed the threshold for "hitless switching performance may not meet datasheet specification due to Fpfd less than XXX" DRC from 64kHz to 1MHz
- Si5348: removed OLB_HO_FORCE (and associated FIXREGS) from design report, exports: never needs to be written on PLLB since free-run only mode is not supported on PLLB
- NVM burn tool improved:
 - Now reports on:
 - CBPro version that created the project file
 - A unique hash (similar to a checksum) for the user NVM bytes that will be burned. This is useful to create a fingerprint of a project's resulting device configuration.
 - Cumulative # good/bad burns since the tool was launched
 - If the project file has a DRC error or other error, this is now immediately reported on instead of having to wait until the "Burn NVM" button is pressed
- EVB sample projects updated for Si5341/46/47

Misc:

- EVB GUI no longer does device reset detection polling when the SPI, I2C, or register editor tabs are selected
- Updates for pre-release devices

CBPro v2.12.1 [2016-12-15]

Si538x/4x:

- Fixed: The EVB GUI status registers were not properly customized for the target device when using the CBPro Field Programmer.

CBPro v2.12 [2016-12-12]

Si5350/51 Support Added:

- Detects and controls an Si5350/51 Evaluation Board (Si535X-B20QFN-EVB). EVB control is not supported on Windows XP.
- Can create a factory programmed part (Orderable Part Number)
- Can export an Si5351 configuration for in-system programming using I2C

Si538x/4x:

- Fixed: 1 Hz outputs on Si5348 could be relocated by the clock placement wizard. Also, it might relocate the related cascade output or assign an output to the cascade if it was not being used.
- Fixed CBProProjectEdit, CBProMultiEditAndExport, CBProSi534x8xFOTF CLI bugs:
 - Bandwidth value in m (milli) were being mapped to M (mega). CBPro now strictly treats bandwidth m as 1e-3 in edit files. In clock frequency edits, m continues to map to 1e6.
 - Setting a clock to Disabled was not working
- Fixed: Fvco was not always constant in Si5347 FOTF, causing Nx divider value written for a plan to be off
- Fixed: on Si538x/4x, CBProDeviceWrite CLI in --project mode was always setting IO_VDD_SEL to 1 when writing to a DUT via the field programmer, ignoring the setting in project file; this would cause errors when writing a project with I/O Power Supply option set to VDD(Core)
- Fixed: DSPLL holdover timing text was clipped on rev D
- The Si5340/41/42/42H/44/44H/45 frequency planner further optimizes for reduced jitter by optimizing the values of fractional N dividers
- New DRC warning on Si5340/41/42/44/45 if the DCO range is greater than 350 ppm

New CBProDeviceRead Command Line Tool:

- Reads device registers and associated named settings (aka bitfields) from an EVB or the CBPro Field Programmer (FP). Has three modes of operation:
 - Read one or more named settings you specify on the command line (--settings option). Reads are done at the register level, but output is per-setting.
 - Read one or more registers you specify either on the command line (--registers option). In this mode, no mapping to setting names is done: you get back a simple register address, value list.
 - Read all read-only and read-write settings on the device (--all option). Reads are done at the register level, but output is per-setting.

- Supports Si538x/4x, Si535x, and Si512xx EVBs. Field programmer support is currently limited to Si538x/4x devices.

- Examples:

```
C:\> CBProDeviceRead.exe --quiet --settings PN_BASE DEVICE_REV
```

Location	Type	Setting Name	Decimal Value	Hex Value
0x0002[15:0]	R/O	PN_BASE	21317	0x5345
0x0005[7:0]	R/O	DEVICE_REV	3	0x03

```
C:\> CBProDeviceRead --all --quiet --format csv
```

```
Location,Type,SettingName,DecimalValue,HexValue
0x0000[3:0],R/O,DIE_REV,5,0x5
0x0002[15:0],R/O,PN_BASE,21317,0x5345
0x0004[7:0],R/O,GRADE,0,0x00
0x0005[7:0],R/O,DEVICE_REV,3,0x03
...
0x0B4A[4:0],R/W,N_CLK_DIS,0,0x00
0x0B57[11:0],R/W,VCO_RESET_CALCODE,270,0x10E
```

```
C:\> CBProDeviceRead.exe --quiet --registers 0x0002 0x0003 0x0005
```

Address	Decimal Value	Hex Value
0x0002	69	0x45
0x0003	83	0x53
0x0005	3	0x03

Misc:

- Updated in-system programming training available on the Welcome screen
- Updates for pre-release devices

CBPro v2.11.1 [2016-10-26]

Fixed: on Windows XP, project files could not be opened.

CBPro v2.11 [2016-10-24]

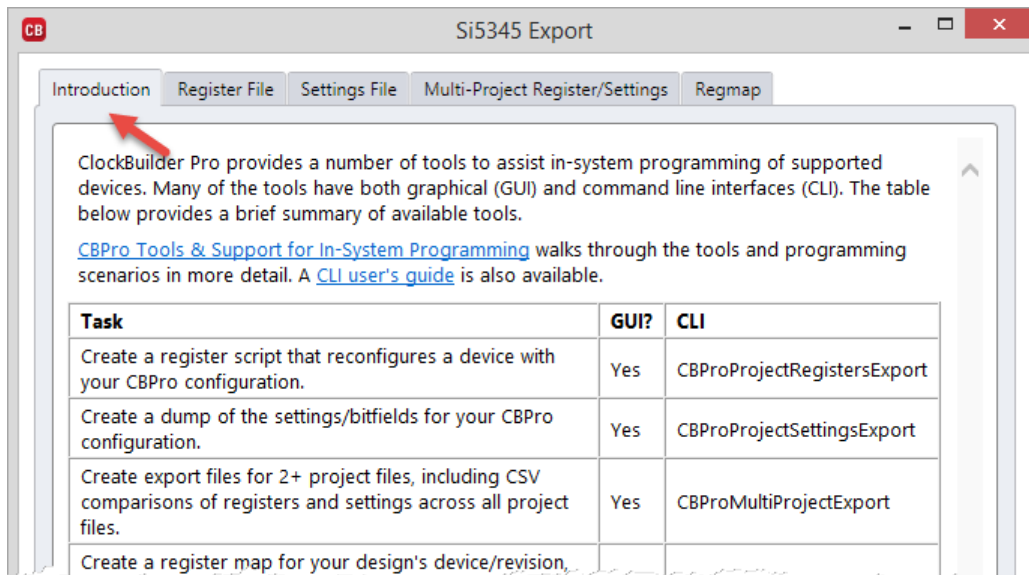
General Changes

Command Line Tools:

- New CLI, CBProMultiEditAndExport, that combines the features of CBProProjectEdit and CBProMultiProjectExport into a single tool:
 - You define a base project file
 - You define alternate clock configurations in the form of simple text file(s) (like FOTF tool)
 - You run this tool to create new (edited) project files and export files for both the base project file and created project files
 - Unlike FOTF tool, the frequency plan for each is independently solved
 - So this helps automate creating clock variations of a project in situations where the FOTF tool does not make sense – such as wanting optimal Fvco for each plan -- or is not supported (Si535x, Si5348, etc)
- More and improved CLI samples in [C:\Program Files \(x86\)\Silicon Laboratories\ClockBuilder Pro\CLI\Samples](C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\CLI\Samples)
- The individual user guides for each CLI are also now copied to [C:\Program Files \(x86\)\Silicon Laboratories\ClockBuilder Pro\CLI\Docs](C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\CLI\Docs)
- Brand new training deck, *CBPro Tools & Support for In-System Programming*, walks through common in-system programming scenarios/workflows and provides an overview of related tools
- Updated the CLI user manual
- Both are available through on CBPro Welcome screen and the Windows Start Menu

Misc:

- Don't allow draft datasheet addendum to be created if there are DRC errors
- The Export GUI now has an intro tab that is customized to the current part. It briefly describes available export GUIs and CLIs



- Updates for pre-release devices

Si538x/4x Family Changes

Misc:

- Fixed: if a clock frequency expression had an error and the clock was then marked Unused, further edits to unrelated clocks might not be accepted
- CBPro no longer allows an unconfigured clock to be used in a frequency expression
- Si5380: added 921.6, 460.8, 230.4, and 115.2 MHz to supported output frequency list
- GRADE (0x0004[7:0]) & TOOL_VERSION (0x0006[23:0]) DUT settings are no longer included in rev D register and settings exports; these are read only

Command Line Tools:

- Fixed: CBPro device write and firmware download CLIs – CBProDeviceWrite.exe and CBProSi534x8xFirmwareDownload – did not parse --io-voltage decimal in US-centric mode on non-US systems, causing disconnect to user manual
- CBProSi534x8xFOTF CLI:
 - Fixed: tool would fail on 40/41/42/42H/44/44H/45/80 if an output had been manually assigned to an N divider and then set to Unused
 - 41/45 mode now forces N_PIBYP[x] bit to 0 in base config and register script if an N divider is doing FOTF. This ensures that N_PIBYP remains fixed across the base and all plan scripts (and is therefore not included in any plan scripts)
- Project edit and FOTF plan files can now specify HOBW to update exit from holdover bandwidth; this is required if OLBW has been specified and ramping has been disabled

EVB GUI:

- Improved memory footprint by decreasing the number of log message lines that are cached; this should speed up EVB GUI on most systems
- Suspend status register polling during project file, register file, and setting file writes to EVB

CBPro v2.10 [2016-09-07]

General Changes

Bug Fixes:

- Fixed: in datasheet addendums PDF files, the Ω character was a blob of text
- Fixed: the step pulldown menu in the wizard had "(A)" after every step

New CBProDeviceWrite Command Line Tool (CLI):

- Writes a project file, settings file, or registers file to a supported EVB
- Writes to a system board using the [ClockBuilder Field Programmer](#) via I2C or SPI
- Same effect as the EVB GUI File menu "Write XXX" tools
- Help available via CBProDeviceWrite --help

Misc:

- Change addr[x:y] bitfield callouts to little endian ordered msb:lsb. For example, 0x0302[43:0] for Si538x/4x NO_NUM.
- Text in design report and frequency plan windows can now be selected
- Allow trailing // and # comments in setting and register files that can be written using the EVB GUI or CBProEVBWrite CLI. Example:
DESIGN_ID0,65 # Decimal value (ASCII 'A')
0x026B,0x41 // DESIGN_ID0 = 'A'

Si538x/4x Family Changes

Bug Fixes:

- Fixed: frequency ranges in rev B output editor and rev D device grade section of design reports were incorrect on Si5340/41/42/44/45
- Fixed: Fout(min) for LVCMOS outputs for all revisions changed from 1kHz to 100Hz to match datasheet

LOS Enable Changes:

- An issue exists where a loss of input signal can cause an inadvertent DSPLL recalibration when LOS is disabled. During the recalibration sequence, a loss of output clocks from the DSPLL occurs.
- As of this release, LOS can no longer be disabled.
- If a project file is opened that has LOS disabled, you will be notified and LOS will be re-enabled.

New Hitless Switching Restrictions/Warnings:

- Zero Delay Mode (ZDM) and hitless switching results in conflicting behavior. As of this release, ZDM and hitless switching can no longer be used together.
- New DRC warning if automatic clock selection is enabled, hitless switching is enabled, and a PFD frequency is less than 64 kHz: hitless switching performance is reduced in this scenario.

Misc:

- On Si5348, set PFD_TRIM_PLLx for any DSPLL not in free-run only mode
- Better Fdco selection on 47-like DSPLLs on rev D for certain designs
- VDD voltage can no longer be changed in EVB GUI; it is forced to 1.8V
- Updates for pre-release devices

CBPro v2.9 [2016-7-29]

Si538x/4x Family Changes

Support Si538x/4x Revision D:

- This is the default revision for new designs
- Note you will no longer be able to create a revision B custom part number (aka OPN) without the assistance of Skyworks
- While you will no longer be able to create revision B custom part numbers, you can still open and edit revision B project files, and create new in-system programming exports incorporating the enhancements included in this CBPro release

New Free Run Only Mode:

- The device can now be configured to operate in free-run mode. The DSPLL will operate like a clock generator in free-run mode, locking to the crystal (or XO) on XA/XB
- Supported on Si5342/42H/44/44H/45/46/47/48/80
- Available on a per-DSPLL basis on Si5346/47/48
- FORCE_HOLD, FIXREGSAx, and FIXREGSDx register settings defined to support this feature
- Select via step menu or dashboard:



Edit Configuration with Wizard

[Design ID & Notes](#) · [Revision](#) · [Host Interface](#) · [XA/XB](#) ·

[Free Run](#) · [ZDM](#) · [Inputs](#) · [Input Select](#) · [Outputs](#) · [DCO](#) ·

[Output Skew](#) · [Output Drivers](#) · [DSPLL](#) · [LOS](#) · [OOF](#) · [LOL](#) · [INTR](#)

FOTF CLI Improved (CBProSi534x8xFOTF.exe):

- Now supports Si5340/41/42/42H/44/44H/45/80 in addition to the Si5346/47:
 - Requires you to manually assign outputs to a specific N divider
 - Alternate plans are specified on a per-N divider basis
 - Searches all desired plans for optimal Fvco
 - Creates simple register write scripts to switch a single N divider from one plan to another
 - Example included with CBPro (C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\CLI\Samples\Single-PLL-FOTF)
- Example added for Si5347 (C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\CLI\Samples\Multi-PLL-FOTF)
- Improved the user manual available via the --help option

Misc:

- Improvements to frequency planner, resulting in lower output jitter for many designs.
- New DCO Design Rule Checks (DRCs) to warn if FINC/FDEC could go beyond output frequency range
- New FIXREGSAx and FIXREGSDx register settings are included in design reports, setting exports, and register exports. These settings are NVM backed and define register address/data sequence to restore on NVM reload (such as at device reset). With FIXREGS, a DUT register that is normally not NVM backed can be essentially be made NVM backed. CBPro uses these to set the FORCE_HOLD setting in free-run only mode on Si5342/42H/44/44H/45/46/47/48/80 and OUTERLOOP_DIS on Si5342H/44H based on DCO enable state. Additional FIXREGS are included in Si5346/47 to support certain factory only features.
- Improved support for pre-production devices

Bug Fixes:

- Fixed: on Si5348, DSPLL LOL gain factor could be miscalculated on DSPLL A/C/D
- Fixed: CBProSi534x8xFOTF command line tool would fail to export if an output had been assigned to a DSPLL previously, and then is marked Unused
- Fixed: 41/45 DCO report mislabeled Nx_DEN as Nx_NUM
- Fixed: if an existing project is opened that has unsupported output driver mode selected due to Fout \geq 1.5 GHz, fixing the mode would not always cause the frequency planner to re-run.

Si5121x Family Changes

Changed maximum input frequency from 166 MHz to 165 MHz

CBPro v2.8 [2016-4-24]

Add support for Si5342H and Si5344H. These are 2- and 4-output high frequency, ultra-low jitter attenuating clocks with digitally controlled oscillators.

Si538x/4x:

- Fixed: writing a project to the field programmer with a pre- production device would generate an error on 2nd or later writes
- Fixed: the first voltage measurement on an Evaluation Board after power up could be off significantly; this would normally surface as low VDD reading on “Read All”
- Improved support for pre-production devices

Si5121x:

- Update EVB user guide links
- Update pin editor to reflect that SSON input is active low

CBPro v2.7.1 [2016-4-20]

Add Support for Si5121x Family of Clock Generators:

- Devices: Si51210, Si51211, Si51214, and Si51218
- EVBs: Si51211-EVB and Si51218-EVB

Si538x/4x:

- Fixed: on single DSPLL parts, setting name for 0x0511[5:0] was FAST_BW_PLL instead of FAST_BW3_PLL; this change affects design reports and setting exports
- Fixed: the clock placement wizard could crash if a frequency had never been entered on an output clock
- Adjust calculation of Fastlock Bandwidth coefficients in plans with low Fpfd (near 8kHz) to ensure LOL operates properly when transitioning from Fastlock to phase lock. If affected by this change, when CBPro project file is opened you will be notified of frequency plan change and be prompted to save your updated design to a project file. Changes may occur to Fastlock bandwidth coefficient settings and LOL related DUT settings (registers).
- Added support for 46 ohm LVCMOS impedance @ 1.8V
- Increased 40/41 XO range from 120M to 200M
- Changed Si5340/41 LOS clear threshold default for new designs to 4, so that it passes the design rule check
- Improved XO-related documentation on XA/XB wizard page on Si5342/44/45/80
- Improved support for pre-production devices

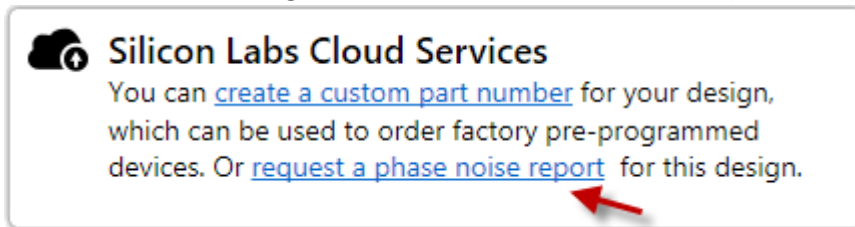
CBPro v2.6 [2016-3-29]

Bug Fixes:

- Fixed: entering typo or other bad input for clock frequency would crash CBPro
- Fixed: the clock placement wizard did not take into account output names used in frequency expressions. After a manual or automatic reorder, expressions were not adjusted and further editing would lead to unpredictable results.
- Fixed: setting a GPO in the EVB GUI had no effect
- Fixed: frequency plan might not recalculate when an error in design was resolved and the plan was now out-of-date
- Fixed: in the power model to EVB comparison results, the VDD and VDDA measured values were swapped, leading to incorrect difference % listed
- Fixed: TOOL_VERSION decode was wrong in EVB GUI's Info tab
- Fixed: on 41/45 variants, an integer M, fractional P solution might not be used in plan even when possible

New Phase Noise Measurement Service

- Provides a way you can request a custom phase noise report – created by Skyworks support engineers in our lab – for one or more outputs in your Si538x/4x design.
- Click the link in the design dashboard Cloud Services section (lower left):



- You will need a www.silabs.com account to make a request.

Si538x/4x:

- Si5346/47/48: stop setting Mx_NUM/Mx_DEN and Nx_NUM/Nx_DEN to 1/1 left shifted when DSPLL is not used; also, stop setting FRACN_CLK_DIS_PLLx to 1 in this case as it is a don't care
- Max output frequency support extended to 712.5M on Si5346/47 rev B
- Max output frequency support reduced to 711.5M on Si5348 rev B. If an output frequency between 711.5M and 712.5M is desired, contact Skyworks.
- Small changes to power estimation model
- Improved support for pre-production devices

Misc:

- Export link removed from CBPro home page; open a project file and use the "Export" link on the design dashboard

CBPro v2.5 [2016-2-23]

DCO:

- Additional detail added to all design reports, including Fout equations and all components used in the equation such as Fvco, Fpfd, and Rx
- Added similar detail to the Si5342H/44H DCO editor
- Fixed instructions clipping issue
- Made setting names in all Fout editor equations match the Family Reference Manual

Automatic Input Clock Switching:

- No longer write input clock priority related settings when manual mode is used.
- Input clock priority no longer has a gap for un-assigned inputs

Misc:

- Fixed: on Si5348/83, LOS_INTR_MSK[3] and OOF_INTR_MSK[3] were always 1 and were not editable in CBPro, causing LOS and OOF on REF to never contribute to INTRb.
- Si5340/41: REFCLK_EN, REFCLK_CLK2PLL_EN, and FRACNP_CLK_DIS are now optimized for case where IN0-IN2 and IN3(ZDB_IN) are not used.
- Improved support for pre-production devices
- Updated description of Si538x/4x Revertive Input Clock Select Mode
- Updated Target Holdover Exit Bandwidth label on DSPLL page
- Updated SPI 3-/4-wire descriptions
- Block Orderable Part Number creation (OPN) on Windows XP: not supported

CBPro v2.4.0.3 [2016-1-8]

Digitally sign the USB drivers so they can be installed easily on Windows 10. Update CBPro installer digital signature to avoid publisher warnings.

CBPro v2.4 [2015-12-8]

Misc:

- Fixed: DUT revision check was not being handled correctly with field programmer when writing design/project to volatile memory, giving incorrect error about revision mismatch
- Fixed: on Si5346/47/48, frac(Px) less than 5 could be permitted when non-zero ppm frequency offset workaround was enabled
- Fixed: opening very old project file (CBPro 0.7 and earlier) could crash CBPro
- Updates to EVB GUI "Create DUT Dump" tool (used to send device volatile and non-volatile configuration snapshot to Skyworks support personnel)
- Updates for pre-release devices

Si5348:

- Fixed: disabling non-zero ppm frequency offset did not affect MB divider search
- Fixed: Fvco was fixed value optimized for 48MHz XA/XB default, instead of varying based on XA/XB. This could cause non-optimized dividers to be selected when using an XA/XB that is not the 48 MHz default.
- Change Fpfd(max) from 2M to 2.048M; this will raise Fpfd when IN3/4 is above 2 MHz, potentially improving performance.

New Si5346/47 Frequency-On-The-Fly Command Line Tool:

- CBProSi534x8xFOTF.exe is the tool name
- This tool is used to define alternate output frequency plans for a supported device
- Tool output are register write scripts to load base config and switch to a single DSPLL to an alternate plan, plus various reports and support files
- Currently only Si5346/47 multi-PLL devices are supported
- Handles the requirement that Fpfd be fixed across frequency plans when a DSPLL shares an input of another DSPLL
- Type **CBProSi534x8xFOTF.exe -help** from a DOS prompt to review the user manual, including an example

- The example described in the user guide can be downloaded from <http://www.silabs.com/internal-apps-management/Timing/cbpro/Si538xF0TF-CLI-User-Manual-Example.zip> (the link is provided in the user guide)

CBProProjectEdit Command Line Tool Improvements:

- You can now edit DSPLL bandwidth
- Example for single DSPLL device:
OLBW,,100 Hz
FLBW,,1k
- Example for multi-DSPLL device:
OLBW,,A,100
FLBW,,A,1k
OLBW,,B,200
FLBW,,B,2k
- You can also specify bandwidth for multiple DSPLLs at once:
OLBW,,AB,100 Hz
FLBW,,AB,1 kHz

CBPro v2.3.1 [2015-11-4]

Fixed: opening a very old CBPro project file, such as created before version 0.7, could crash the GUI.

CBPro v2.3 [2015-10-26]

Bug Fixes:

- Fixed: IN3/IN4 on Si5348 could erroneously trigger Px divider Design Rule violations
- Fixed: on 46/47/48, Fdco for PLLs that have the same single unique frequency might be different (for example, 100M,100M on A, 100M on C)
- Fixed: on Si5380, the EVB GUI *Compare Design Estimates to Measurements* tool would report 0 (zero) estimated current/power on VDDO0 and VDDO9 if only the "A" output was enabled (but the estimated total values were correct).
- Fixed: bad pin names on Si5348 output diagram
- Fixed: the Jitter Attenuator Clock Products link on CBPro home page was broken

Si5348:

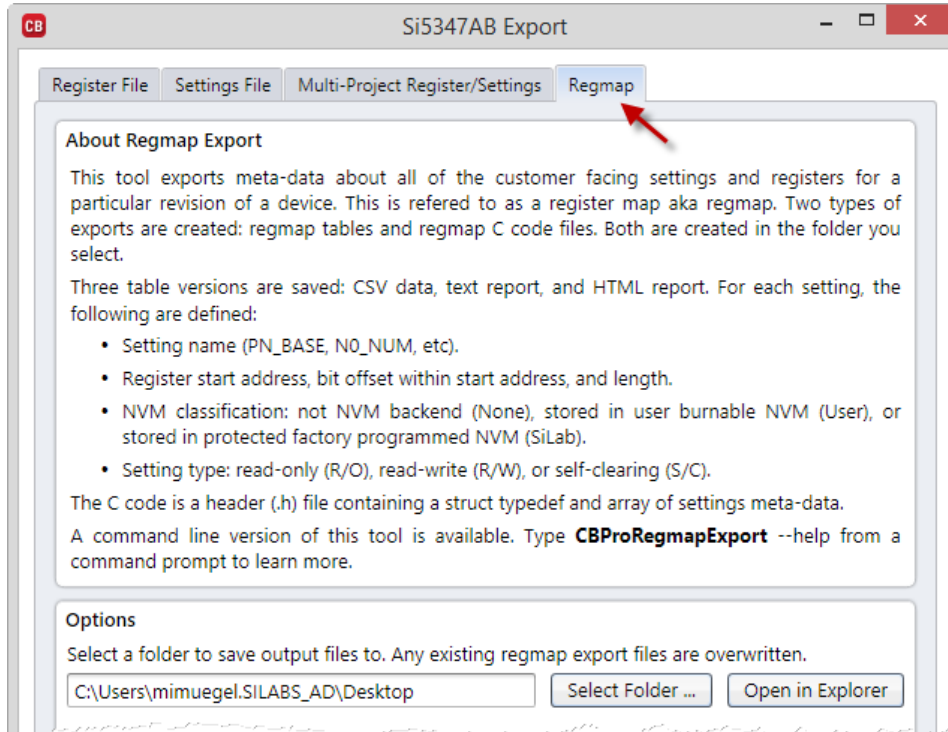
- DSPLL B configuration page is now hidden in the wizard; there is no need to configure DSPLL B
- Default bandwidth settings for new designs and the EVB sample project changed to 100 Hz (open loop and Fastlock).
- New DRC if BW not 100 Hz on DSPLL B.
- Please contact Skyworks if your existing design uses a DSPLL B bandwidth that is not 100 Hz.

Misc:

- Fractional Px divider less than 5 will no longer be selected by the frequency planner
- Improvements and support for pre-release devices

Export Improvements & Additions:

- New register map (aka regmap) tab in the GUI's export tool:



- This creates:
 - Regmap tables: CSV, text, and HTML regmap tables for the user's part+revision
 - Regmap as C code: C code definition of the regmap

Where a regmap contains meta-data about each setting (register bit field) on a device, such as starting address and # bits for a setting

Example table (HTML shown; CSV and text versions also created):

Setting Name	Location	Start Address	Start Bit	Num Bits	NVM	Type
DIE_REV	0x0000[0:3]	0x0000	0	4	None	R/O
PAGE	0x0001[0:7]	0x0001	0	8	None	R/W
PN_BASE	0x0002[0:15]	0x0002	0	16	SiLab	R/W
GRADE	0x0004[0:7]	0x0004	0	8	SiLab	R/W
...

Example C header file:

```
#define SI5345_REVB_NUM_SETTINGS 373
#define SI5345_REVB_MAX_NUM_REGS 10

#define SLAB_NVMT_NONE 0
#define SLAB_NVMT_SLAB 1
#define SLAB_NVMT_CUST 2

#define CHAR char
#define UINT8 unsigned char
#define UINT16 unsigned int
```

```

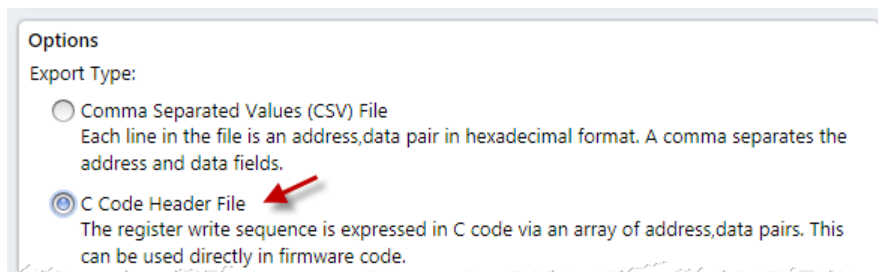
typedef struct
{
    CHAR* name; /* Setting/bitfield name */
    UINT8 read_only; /* 1 for read only setting/regs or 0 for read/write */
    UINT8 self_clearing; /* 1 for self clearing setting/registers or 0 otherwise */
    UINT8 nvm_type; /* 0 for not NVM backed; 1 for "silabs" bank; 2 for "user" bank */
    UINT8 bit_length; /* Number of bits in setting */
    UINT8 start_bit; /* Least significant bit of the setting */
    UINT8 reg_length; /* Number of registers that the setting is stored in */
    UINT16 addr[SI5345_REVB_MAX_NUM_REGS]; /* Addresses the setting is contained in */
    UINT8 mask[SI5345_REVB_MAX_NUM_REGS]; /* Bitmask for each register containing the setting */
} si5345_revb_regmap_t;

si5345_revb_regmap_t const si5345_revb_settings[SI5345_REVB_NUM_SETTINGS] =
{
    /* DIE_REV */
    {
        "DIE_REV",
        1, /* 1 = IS Read Only */
        0, /* 0 = NOT Self Clearing */
        SLAB_NVM_NONE, /* Not stored in NVM */
        4, /* 4 bits in this setting */
        0, /* setting starts at b0 in first register */
        1, /* contained in 1 registers(s) */
        {
            0x0000, /* Register address 0 b7:0 */
        },
        {
            0x0F, /* Register mask 0 */
        }
    },
    ...
}

/* Setting indexes into si5345_revb_settings array */
#define SI5345_REVB_DIE_REV 0
#define SI5345_REVB_PAGE 1
#define SI5345_REVB_PN_BASE 2
#define SI5345_REVB_GRADE 3
#define SI5345_REVB_DEVICE_REV 4
...

```

- New command line tool CBProRegmapExport.exe that does the same thing
- Register File export updated with new C code mode (similar to “Jump Start” option in other Skyworks Timing tools):



Example output:

```

#define SI5345_REVB_REG_CONFIG_NUM_REGS 418

typedef struct
{
    unsigned int address; /* 16-bit register address */
    unsigned char value; /* 8-bit register data */
} si5345_revb_register_t;

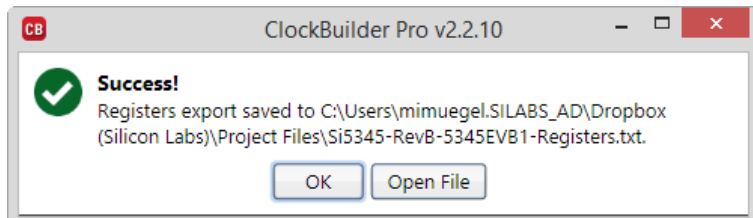
```

```

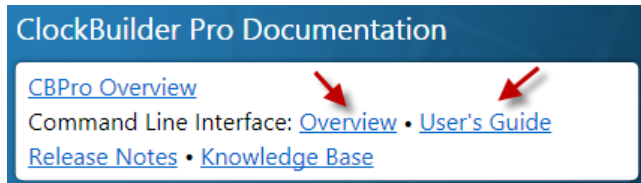
si5345_revb_register_t const si5345_revb_registers[SI5345_REVB_REG_CONFIG_NUM_REGS] =
{
    { 0x000B, 0x68 },
    { 0x0016, 0x02 },
    { 0x0017, 0x1C },
    { 0x0018, 0x00 },
    ...
}

```

- Existing CBProProjectRegistersExport.exe CLI updated to support exporting existing CSV format or new C code format. You now must specify the type of output via --format csv or --format cheader
- GUI export now shows confirmation dialog in all cases, which button to open file/folder:



- The Command Line Interface (CLI) overview and user's guide has been updated. This is available from the home screen of CBPro:



CBPro v2.2 [2015-09-10]

Design Rule Updates:

- Removed warning if fastlock bandwidth is less than 10x open loop bandwidth.
- Added new warning if LVCMOS impedance selected is not the lowest available value:

Warning	OUT0: For the best signal integrity, Silicon Labs strongly recommends selecting the lowest LVCMOS output impedance (24 Ω) and then choosing the proper external source resistor to produce the best signal shape at the end of the signal trace
---------	---

Misc:

- Exclude PXAXB, PO_FRACN_EN, and FRACNB_EN from Si5380 exports and design reports: these settings have fixed values. The default DUT values are never modified by CBPro.
- Work around for lack of field programmer wire/socket mode selector on the design dashboard: the field programmer is forced to "wire" mode (field programmer connected to system board via SPI/I2C serial connection) in this case. A mode selector will be added to the dashboard in a future release of CBPro.

Bug Fixes:

- Fixed: when outputs were manually assigned to an N divider, in rare cases CBPro could not find a plan solution when it should be able to.
- Fixed: when Zero Delay Mode was enabled, you could get an invalid warning about input-to-output phase delay with certain frequency plans.

- Fixed: the Named Systems Monitor menu item was missing in CBPro 2.1; this is available when you have created or opened a project file, and allows you to monitor changes to proposed DUT settings as you change your design goals.

CBPro v2.1 [2015-08-18]

New Devices:

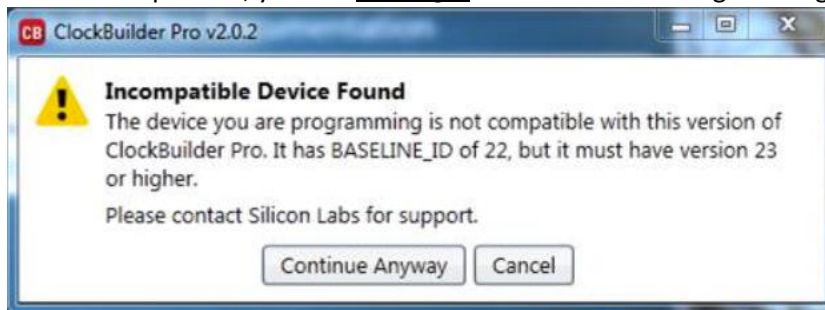
- Support added for Si5347CD, a 4-Output Quad DSPLL Any-Frequency Jitter Attenuating Clock Multiplier.
- Support added for Si5348, a 7-Output SyncE/IEEE-1588 Telecom Boundary Clock Synchronizer. Contact Skyworks for access.

New DCO Support:

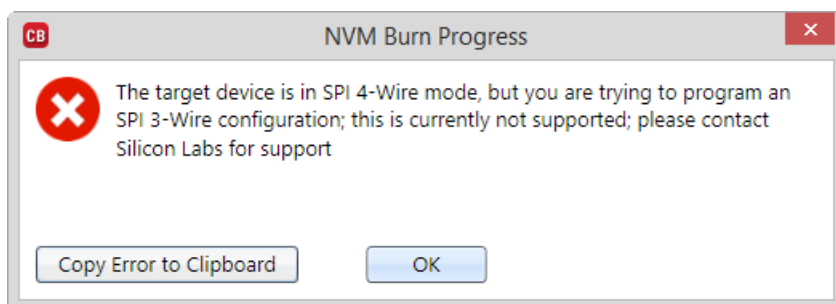
- Digitally-Controlled Oscillator (DCO) mode can be used by to make small, glitchless frequency changes on supported Si538x/4x devices. Changes are made by host via I2C/SPI or pin control (where supported).
- Available on Si5340/41/42/44/45/46/47/48.
- The DCO editor is a new page in the CBPro Wizard, immediately after the output frequency page.
- An [introductory video](#) is available (and is linked to from the CBPro DCO page).
- Refer to your device's Family Reference Manual for detailed information on DCO mode.

ClockBuilder Pro Field Programmer:

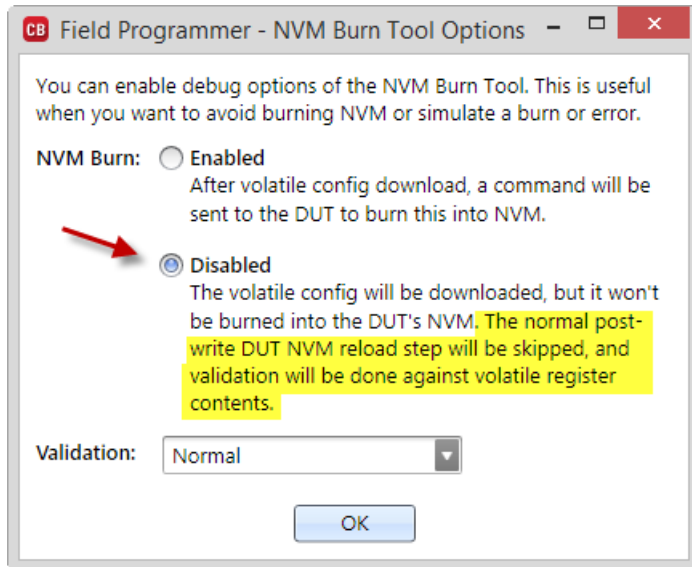
- Loosened requirements for "baseline" NVM state on programming target for Si538x/4x revision "B". If baseline 22 device is present, you will no longer receive the following warning:



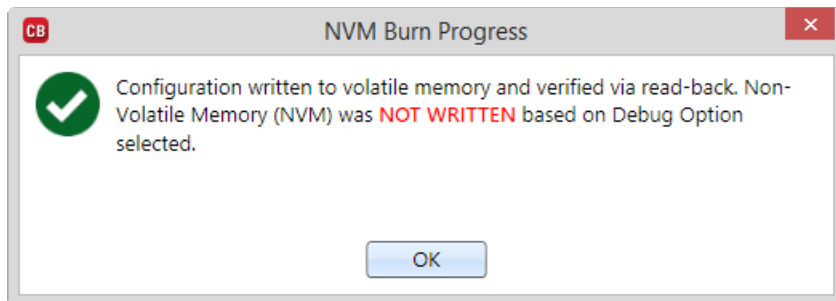
- Socket-based burns are currently limited to SPI 4-wire mode. If you are trying to burn a project file that configures 3-wire mode, the burn will be cancelled with the following notice:



- Changed the behavior of the field tool debug options. NVM Burn->Disabled now skips the NVM reload step, ensuring that the DUT is left with the new config in volatile memory and the validation should normally pass



And the confirmation dialog explains this:



Misc:

- The Clock Placement Wizard has been improved to better isolate outputs capable of contributing to jitter.
- Design Rule Check (DRC) improvements.

Bug Fixes:

- Fixed: on Si5340/41, if XA/XB is mixed with standard INx clock inputs and a fractional M divider was required, the frequency planner could not find a solution.
- Fixed: on Si5346/47, N_PIBYP register setting is no longer actively set based on frequency plan. It will always be set to 0.
- Fixed: if “optimize plan for zero ppm frequency offset” was unchecked on Si5346/47 and hitless switching was turned off, Fdco could be higher than necessary.
- Fixed: the “optimize plan for zero ppm frequency offset” checkbox was shown on the Si5340/41 output editor page in the Wizard, even though it had no effect on frequency plan and did not apply to these devices.
- Fixed: in very rare circumstances, trying to open a project file can yield “cannot access a closed file” error
- Fixed: in CBProProjectEdit command line tool, if the edit file results in an unrealizable plan, you could get a message “Object reference not set to an instance of an object” instead of planner error details.

CBPro v2.0.2 [2015-06-16]

Bug Fixes:

- Fixed: if a frequency plan could not be calculated, clicking the design report could crash CBPro.
- Fixed: an ultra-low frequency input such as 8 kHz, with unrelated outputs, could result in no frequency plan on Si5340/41/42/44/45.
- Fixed: the Si5380 EVB User's Guide PDF shortcut was not valid.
- Fixed: on PCs with "large fonts" (high DPI) enabled, edit page shortcuts in the dashboard could be clipped.

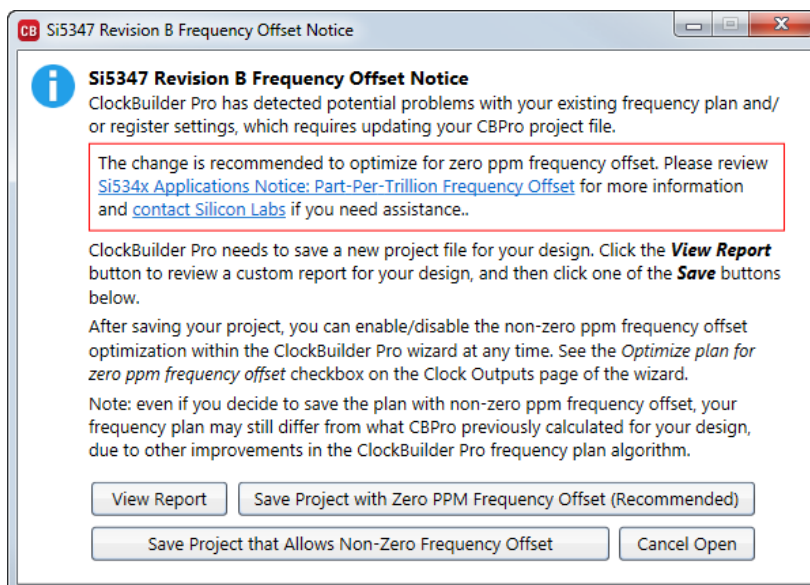
CBPro v2.0 [2015-06-15]

Misc:

- The Si5380 ultra-low phase noise jitter-attenuating clock generator can now be selected in CBPro. You can create a new design, or open a sample design that matches the Si5380 Evaluation Board configuration.
- Zero Delay Mode (ZDM) is now fully supported on Si5340/41/42/44/45/80. ZDM is available for applications that require fixed and consistent minimum delay between the input clock and outputs.
- Output Skew (aka Phase Delay) is now supported on Si5340/41/42/44/45/80. This feature is available for applications that need a specific output skew configuration. This is useful for PCB trace length mismatch compensation.
- The frequency planner now favors integer M (Si5340/41/42/45/80) and integer MA-BD (Si5346/47), as long as it can do so with Fpfd 1 MHz or higher. This may improve jitter performance for certain designs.
- Default Fastlock bandwidth changed to 1 kHz (10x nominal 100 Hz default)
- Sample designs (plans) have been updated for Si5342/44/46/80.

Part-Per-Trillion Frequency Offset:

- A frequency offset issue in a small percentage of Si534x devices' frequency plans can result in an offset between <1 and 10,000 parts-per-trillion (ppt). This frequency offset issue can affect any of the following: Si5342/44/45/46/47.
- CBPro has been updated to address this issue via an enhanced frequency planner algorithm. If you open your existing project file in CBPro 1.9 or higher, it will be inspected to determine if it has the issue. If your existing design has the issue, you will receive this notice:



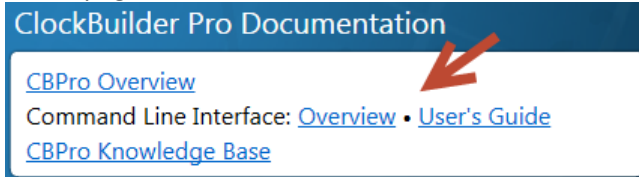
If you do not see this notice, your existing design is not effected by the issue.

- Please read [Si534x Applications Notice: Part-Per-Trillion Frequency Offset](#) for more information.

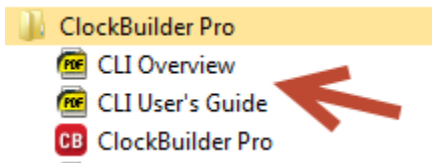
Command Line Interface (CLI):

- The CLI allows you to perform batch oriented project edit, frequency planning, and export activities from the command line. Note the CLI tools have always been bundled with CBPro, available in C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\Bin.
- New in this release: CLI documentation and samples are now bundled with CBPro.
- Documentation:

- Home page:



- Start Menu:



- The CLI samples -- project files, edit files, and DOS batch files -- are in C:\Program Files (x86)\Silicon Laboratories\ClockBuilder Pro\CLI. The User's Guide references these.

CBPro v1.8 [2015-04-30]

Support added for the new [ClockBuilder Pro Field Programmer Kit](#). This kit allows you to program a Si538x/4x device “in-system” using I2C or SPI. Volatile and non-volatile programming modes are supported. Socket-based programming can also be performed, including burning a CBPro project file to NVM on a loose device. Please read the [ClockBuilder Pro Field Programmer Kit User Guide](#) to learn more.

Your target nominal loop bandwidth can be achieved in more cases. Previously, 2 kHz and 4 kHz selections could never be achieved.

If nominal loop bandwidth would result in increased output jitter and/or increase peaking, a new DRC warning will be displayed and added to your design report.

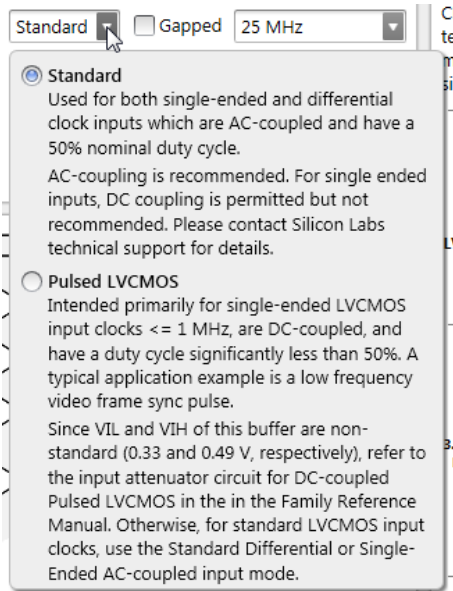
Si5380 LVDS amplitude register settings updated for 1.47456 GHz output.

CBPro v1.7.1 [2015-04-03]

Fixed: the EVB GUI would not launch when connected to the Field Programmer dongle.

Input Buffer Changes:

- Previous differential selection now labeled Standard. Previous CMOS selection is now labeled Pulsed LVCMOS, with updated explanation for each:



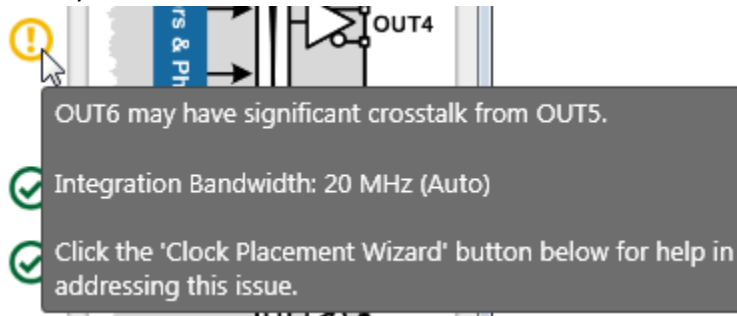
- The CMOS option has been removed outright from the Si5340/41 wizard, as the CMOS selection has not been used for these devices and had no effect.
- New Pulsed LVCMOS diagram.
- If Pulsed LVCMOS is selected, a Design Rule Check (DRC) warning will be generated.
- The IN_CMOS_EN DUT setting has been renamed IN_PULSED_CMOS_EN.

New Output Crosstalk-Related Features:

- On the output frequency page of the wizard, potential crosstalk issues are now flagged and shown directly in the editor:

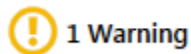


- Move your cursor over the icon to learn more:

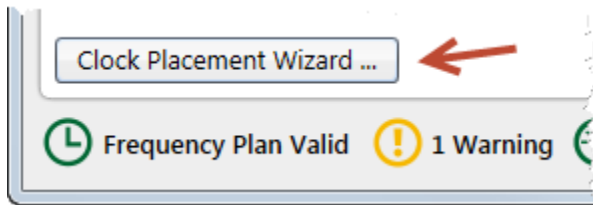


- There are three possible icons that can be shown:
 - No crosstalk issues expected.
 - Potential fundamental (1st order) crosstalk issues.
 - Potential 2nd, 3rd, or 4th order crosstalk issues. The icon will get dimmer from 2nd to 4th order.

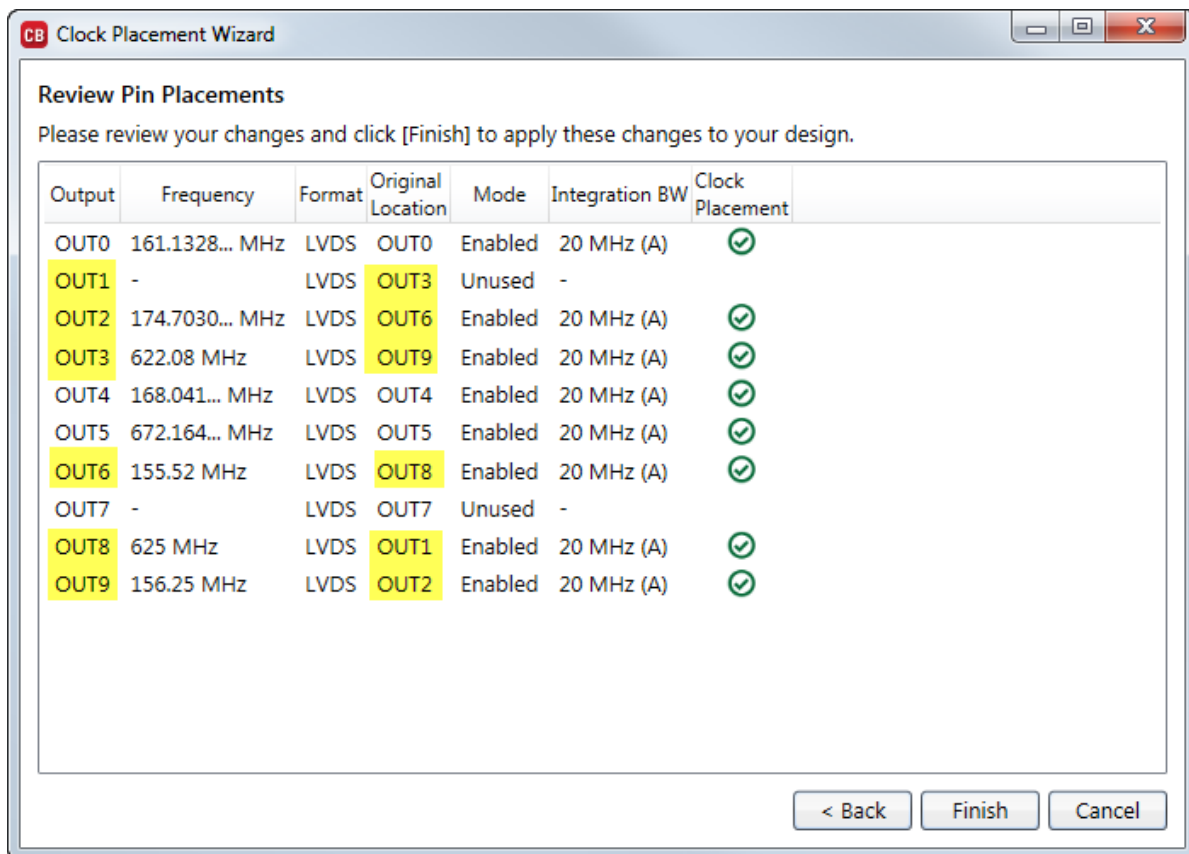
- A DRC will continue to be generated:



- A new Clock Placement Wizard is available that will optimize output clock pin placement to minimize jitter and potential crosstalk issues. Click the new “Clock Placement Wizard” button that is located at the bottom left of the output frequency page:



- The clock placement wizard supports a fully automatic mode as well as a manual mode, where you can reposition output frequencies via drag-and-drop.
- Example of automatic mode placement. Before and after columns indicate which frequencies were moved:



New Estimated vs. Measured Current/Power Comparison Tool:

- In the EVB GUI, you can now compare actual current/power as measured on the EVB using the built-in EVB sensors vs. what CBPro estimated and shows in the power widget / design report.

- Click this button:

The screenshot shows the 'Regulators' tab in the ClockBuilder Pro software. It displays a table of power supplies with columns for Voltage, Current, and Power. Each supply has a dropdown menu for voltage, a toggle switch for power, and a 'Read' button. A 'Total' row summarizes the overall power consumption. A red arrow points to the 'Compare Design Estimates to Measurements' button.

	Voltage	Current	Power
VDD	1.783 V	193 mA	344 mW
VDDA	3.281 V	118 mA	387 mW
VDDO0	2.490 V	15 mA	37 mW
VDDO1	2.483 V	17 mA	42 mW
VDDO2	2.477 V	15 mA	37 mW
VDDO3	2.486 V	18 mA	45 mW
Total		374 mA	0.885 W

- Example report:

Assumptions
VDD: 1.8 V Ta: 70 °C Airflow: None

	Frequency	Format	Estimated			Measured			Power Delta
			Voltage	Current	Power	Voltage	Current	Power	
VDD	N/A	N/A	1.8 V	192.6 mA	346.8 mW	1.782 V	194.0 mA	345.7 mW	-0.3 %
VDDA	N/A	N/A	3.3 V	116.4 mA	384.0 mW	3.276 V	116.0 mA	380.0 mW	-1.0 %
VDDO0	161.132812... MHz	LVDS	2.5 V	16.0 mA	39.9 mW	2.490 V	15.0 mA	37.4 mW	-6.5 %
VDDO1	644.53125 MHz	LVDS	2.5 V	19.2 mA	48.0 mW	2.488 V	17.0 mA	42.3 mW	-11.9 %
VDDO2	174.703083... MHz	LVDS	2.5 V	16.1 mA	40.2 mW	2.478 V	14.0 mA	34.7 mW	-13.6 %
VDDO3	698.812334... MHz	LVDS	2.5 V	19.6 mA	48.9 mW	2.487 V	18.0 mA	44.8 mW	-8.4 %
Total				380 mA	908 mW		374 mA	885 mW	-2.5 %

Misc:

- OUTx_CM common mode setting for LVDS at 1.8V VDDO changed from 14 to 13.
- Stop-mid disabled state is now longer available.
- Improved support for pre-release devices.

CBPro v1.6.1 [2015-02-12]

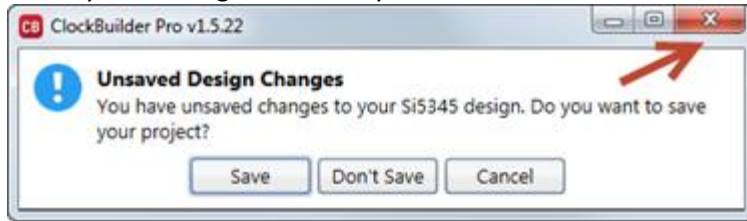
Fixed: prepare orderable part number wizard for Si538x/4x revision B.

CBPro v1.6 [2015-02-11]

Bug Fixes:

- Fixed: 46/47: don't run DRC on DSPLLs that have not been assigned to an input.
- Fixed: if you changed power/Tj estimation assumptions and quit CBPro, future launches of CBPro would give a fatal error because the CBPro process was still active in the background.

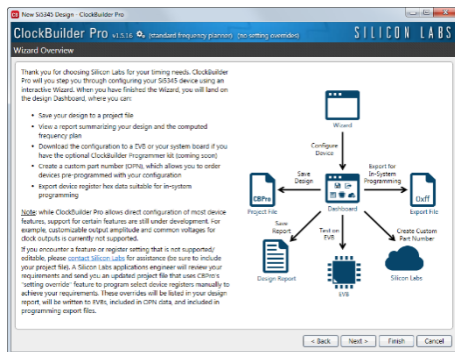
- Fixed: DRCs related to frac P/gapped clock/BW restrictions triggered false error for certain mixed input scenarios.
- Fixed: power widget was not showing warn/error icon when XTAL-based Tj limits were reached
- Fixed: on Si5380, the customer register names related to OUT0, OUT0A, and OUT9A were incorrect. Thus design reports, datasheet addendums, and setting exports were incorrect.
- Fixed: you would get a crash if you clicked the Windows close button on the unsaved changes dialog:



Now clicking will be the same as cancel.

Misc:

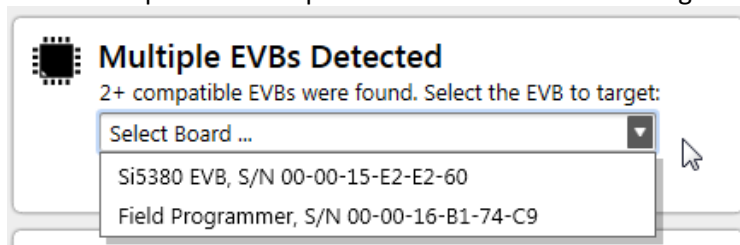
- A new CBPro introduction page is displayed in the wizard when you create a new design:



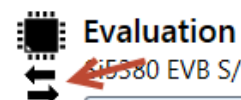
- Includes Beta support for upcoming ClockBuilder Pro Field Programmer device. This kit will allow customers to write their configuration to a Si538x/4x device located on a system board via I2C or SPI. The kit also supports burning NVM of a DUT on either a system board or included kit socket board.

Improved Multiple EVB Support

- When you open a project and there are 2+ combined of EVB(s) that are compatible or field programmer(s), CBPro now provides an option to select which one to target:



- Once selected, you can switch to targeting another board via the two arrows icon:



Si538x/4x:

- Supports creating Si5340/41/42/44/45/46/47/80 Revision B Custom Part Numbers (OPNs) after PCN is published.
- Revision B is now assumed when you are editing a design. This only factors into the junction temperature (Tj) limits used in the power/Tj estimation calculations.

- Si5346/47: frequency planner algorithm optimizes for low output jitter by adjusting Fdco/R dividers.
- Si5340/41: the setting name for the 0x0018[0:3] register has been changed from LOSFB_IN_INTR_MSK to LOSIN_INTR_MSK to be consistent with related registers LOSIN and LOSIN_FLG.
- Si5380: AMPL and CM driver settings now vary for 1.2288 GHz and 1.47456 GHz output frequencies in LVDS and LVPECL modes.
- Any Tj warning or violation that would be displayed in the power widget and power section of the design report will now generate an equivalent Design Rule Check (DRC) warning.
- The EVB GUI now shows HOLD_HIST_VALID and FASTLOCK_STATUS status bits in the Status tab.
- For devices with fixed grading such as Si5380, the datasheet addendum now lists that grade instead of “X” placeholder. For example:

Si5380A Datasheet Addendum
Device Configuration Summary for Si5380A-XXXXXX-GM

- 40/41: in design report, XA/XB moved into Inputs section and always shown, even if not used:

Inputs: XAXB: Unused IN0: 48 MHz Differential IN1: 48 MHz Differential IN2: Unused	Inputs: XAXB: 48 MHz External Reference Clock Mode IN0: Unused IN1: Unused IN2: Unused
---	--
- The “I am targeting pre-production samples” export option has been removed. This was used to include additional internal registers in exports to “patch” Si538x/4x pre-production samples to current device register baseline. If you are still targeting pre-production samples, please contact Skyworks for support.

New Command Line Tools

There are three new command line tools in CBPro, oriented at project edit and export:

CBProProjectEdit	Accepts a project file and a simple text file describing changes to input and/or output clocks in the design. Saves updated design back to a project file.
CBProProjectRegistersExport	A command line version of CBPro’s register export tool. Accepts a single project file and creates a register export file.
CBProProjectSettingsExport	A command line version of CBPro’s setting export tool. Accepts a single project file and creates a named settings export file.

These join the previously existing multi-project export tool:

CBProMultiProjectExport	A command line version of CBPro’s multi-project export tool. This accepts 2+ project files, and outputs unified settings and register export files that define what setting/register differs between each project, and the values for each input project.
-------------------------	---

Documentation on each tool can be displayed by typing Tool --help at a command/shell prompt. For example:

```
> CBProProjectEdit --help
```

CBPro v1.5 [2014-12-03]

Loop Bandwidth:

- Fixed: the BW4_PLL/ BW5_PLL DSPLL loop bandwidth coefficient register values calculated by CBPro were incorrect by a factor of two in most cases in CBPro versions 1.3 and 1.4. This would result in actual measured BW ~2x CBPro estimate. This only applies to Si5342/44/45/46/47/80.

- Coefficients are now shown in design report, and included in “plan updated” messages that are shown when you open a project file. This will ensure you are notified of the above bugfix when opening a project file created with an affected version of CBPro.

Frequency Planner:

- On Si5341/45/80, for cases where there was only 1 distinct frequency on an N divider, the N&R dividers are now optimized to favor integer N, low OID tone, and low R in the case of a tie. This will result in lower power consumption and reduced jitter in certain plans having only one unique frequency on an N divider.

OOF (Out-Of-Frequency):

- Fixed: OOF_DIV_CLK_DIS[INx] was being set if precision OOF and fast OOF was disabled on INx. This would erroneously disable OOF functionality. Now CBPro will ensure OOF_DIV_CLK_DIS[INx] is not set if INx is the OOF reference clock.
- If OOF is completely disabled by unchecking all precision and fast OOF checkboxes, the OOF Reference Clock selector is disabled as it will be a don't care. OOF_DIV_CLK_DIS will be set to 15d in this case.

Misc:

- Timestamps in datasheet addendums, design reports, and exports now show timezone and use a more consistent, culture neutral formatting scheme. For example, from a datasheet addendum:

```
Overview
=====
Part:      Si5345
Design ID: 5345EVB2
Created By: ClockBuilder Pro v1.4.2 [2014-12-02]
Timestamp: 2014-12-02 08:15:44 GMT-06:00
```

CBPro v1.4 [2014-11-5]

Frequency Planner:

- Updated the Si5342/44/45 frequency planner algorithm to optimize output jitter and minimize output phase transients during a input clock switch (via hitless switching) in certain plans. In previous versions of CBPro, integer Px divider and integer M divider solutions have been favored, regardless of low Fpfd frequency that might result. In this release, integer Px solution with highest Fpfd is favored, even if that selects a fractional M divider.
- Bug Fix: in v1.3, if all outputs were manually assigned to an N divider – i.e. there were no auto N assigned outputs – the planner would fail and you would see a DRC error “sequence contains no elements.”
- Bug Fix: in v1.3, any Fvco_Max frequency planner override defined by Skyworks would have been ignored.

CBPro v1.3 [2014-11-2]

Release Summary:

- As with any new CBPro release, Skyworks recommends using the latest version of the software so your designs can enjoy the benefits of the numerous performance, functionality and embedded DRC (Design Rule Check) enhancements of the new software.
- Loop bandwidth-related improvements: CBPro is more likely to achieve your desired nominal and fastlock bandwidth; mid-band phase noise performance has also been enhanced
- LOL improvements: set and clear thresholds are selected for you in “auto” mode make it easier to support a noisy input clock; new relaxed LOL mode; fix for clear timer disable bug
- Frequency planner improvements: much improved phase-frequency detector frequency (Fpfd) selection for certain plans; one fewer N divider used in certain plans, reducing power consumption; lower Fvco frequency selected in certain plans; reduced low-level spurs in certain plans

- New manual N divider assignment feature to support certain advanced in-system plan updates
- Stop mid disabled state is no longer recommended for differential drivers, as recovery is not glitch-less.
- The number of embedded DRCs has been expanded.

Bandwidth Changes:

- Bug Fix: Fastlock bandwidth was being limited based on estimated nominal bandwidth. This would result in much lower Fastlock bandwidth than desired in certain plans.
- The algorithm used to define loop bandwidth coefficients -- $BW[0-5]_{PLL} / BW[0-5]_{PLL[A-D]}$, $FAST_BW[0-5]_{PLL} / FAST_BW[0-5]_{PLL[A-D]}$, and $LOL_CLR_DELAY / LOL_CLR_DELAY_{PLL[A-D]}$ -- has been improved. For certain frequency plans, these changes may improve phase noise in the 100 Hz – 1 kHz band.
- The equations used to limit actual maximum loop bandwidth based on your target BW have been improved. Maximum bandwidth is now optimized based on P/M divider state F_{vco} , F_{pfd} , F_{dco} , gapped clock setting, and/or min (F_{in}). The optimized maximum bandwidth produces the lowest jitter for an integration bandwidth from 12 kHz to 20 MHz.
- Fastlock minimum values that can be selected are now filtered based on nominal selection: fastlock BW cannot be less than nominal BW. A DRC error will be shown if a project file created with previous version of CBPro that allowed this combination.
- New design rule checker warning if fastlock BW is > 100x nominal BW:

Warning	DSPLL fastlock bandwidth should normally be 100x or less than nominal bandwidth. A fastlock loop bandwidth that is greater than 100 times the nominal loop bandwidth value will lock faster. However, it may also introduce transients in the frequency vs. time behavior. For loop bandwidth values of near 0.1 Hz, this tradeoff might make sense. Normally, it should be avoided.
---------	--

- While ZDB is not fully supported by CBPro with this release, certain F_{pfd} /BW combinations will result in degraded ZDB performance. These will get flagged as a design rule checker warning:
- The minimum input frequency when there is a P divider or gapped input clock is now dynamic based on your approximate nominal BW. This may result in a DRC error condition for certain plans:

Warning	ZDB 100ps ip/ip delay cannot be met due to: F_{pfd} less than 64 kHz
Error	Because IN0 is a gapped clock, IN0 must be at least 20.5 MHz for your frequency plan

Please contact Skyworks for support if you encounter this condition on existing designs.

Frequency Planner Changes:

- The Si5342/44/45 planner now supports fractional P, fractional M plans. In cases where one of the P_x or M dividers do not have the required resolution, a planner error will be shown:
- The planner reduces low-level spurs on Si5340/41/42/44/45 devices. This may cause formerly integer divider to become fractional to avoid certain N_x divider spur conditions.
- On Si5340/41/42/44/45, the algorithm used to determine what F_{vco} frequency to use in cases where there are multiple output even common multiple groupings that would yield the same # N dividers has been adjusted. For some plans, a higher F_{vco} and sometimes fewer N dividers will now be selected, as prioritization is now given to higher N divider F_{id} in these “tie” cases.

Example:

CBPro 1.2

CBPro 1.3

Fvco = 13.5 GHz

N0:

Value: 27

OUT2: 50 MHz

OUT3: 125 MHz

N1:

Value: 10.3846153846153846... [10 + 5/13]

OUT0: 26 MHz

N2:

Value: 250

OUT1: 27 MHz

Fvco = 14.04 GHz

N0:

Value: 10

OUT0: 26 MHz

OUT1: 27 MHz

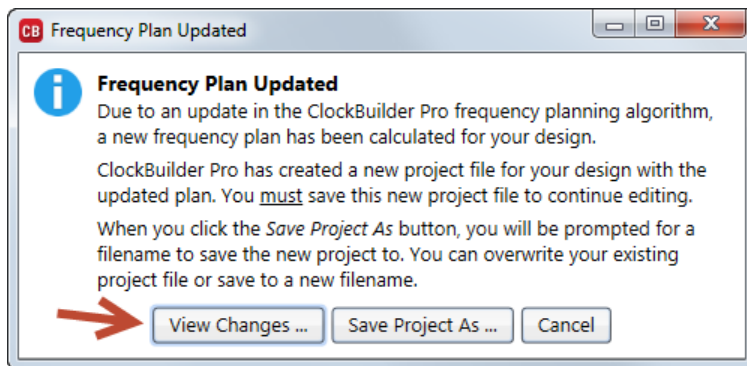
OUT2: 14.04 MHz [14 + 1/25 MHz]

N1:

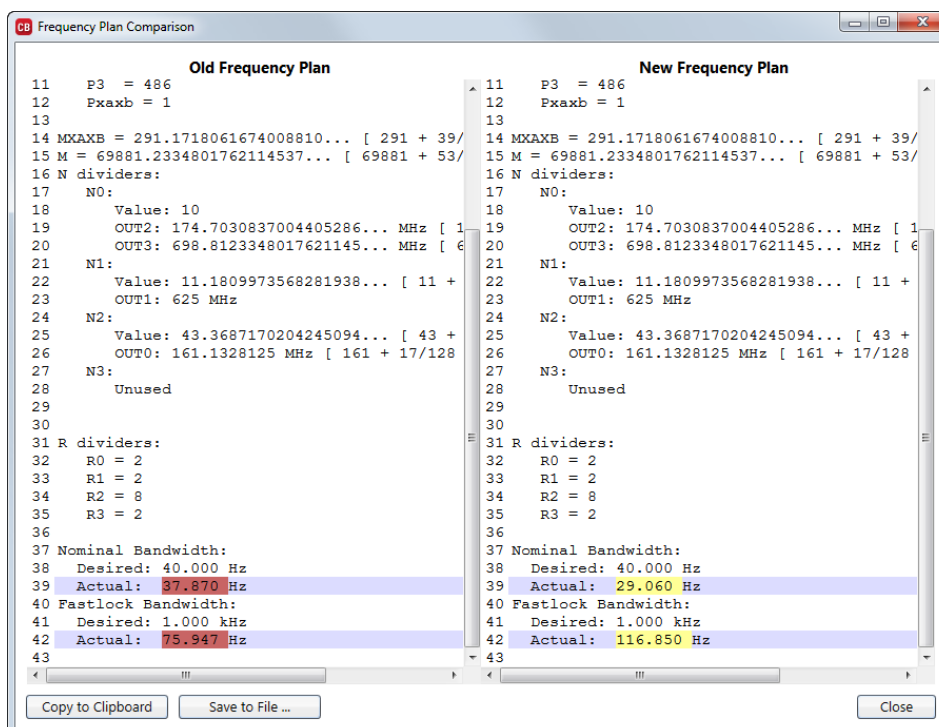
Value: 56.16 [56 + 4/25]

OUT3: 125 MHz

- Fixed: On Si5342/44/45/80, the Fpfd frequency selected when finding an integer P, integer M solution (always true for 80) would not select optimal (highest possible Fpfd) M divider in most cases.
- The frequency planner version has been up-revisioned, so opening any existing project will cause the frequency planner and bandwidth coefficient calculator to re-run. If CBPro calculates a new frequency plan for your design – dividers and/or bandwidth coefficients – you will be notified and prompted to save your design to a new project file (we recommend keeping the old file for backup):



New in CBPro 1.3 is the ability to view the differences between old and new project plan using the “View Changes” button. Clicking this will bring up a diff of old and new plan, such as:



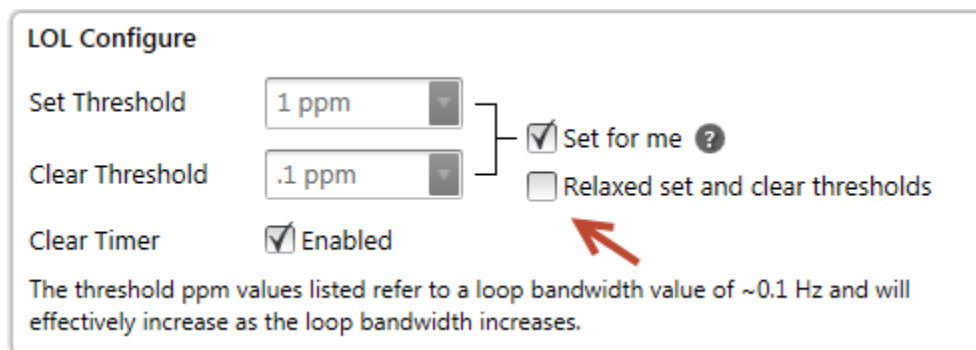
LOL (Loss of Lock) Improvements:

- Fixed: The LOL (Loss of Lock) “Clear Timer Enable” checkbox did not affect the correct DUT setting. Instead of affecting the state of LOL_TIMER_EN / LOL_TIMER_EN_PLL[A-D], LOL_SLOW_EN_PLL / LOL_SLOW_EN_PLL[A-D] was inadvertently being set. This bug would have only been triggered if you tried to disable the clear timer, which is not the default. If you had unchecked “Clear Timer Enable”, LOL would have been disabled due to this bug.
- Improved LOL_SLW_DETWIN_SEL and LOL_SLW_VALWIN_SEL settings are defined by CBPro. The changes should make it easier to support a noisy input clock: higher priority is given to a longer detection window size than number of windows. Note DETWIN and VALWIN are never directly set by you in the CBPro wizard: they are set based on plan, bandwidth, and clear threshold.
- The LOL auto set threshold option – which is on by default – now has a new mode to relax the set and clear thresholds.

- Example of use:

	Normal	Relaxed
Set	30 ppm	100 ppm
Clear	3 ppm	10 ppm

- Setting on Si5342/44/45/80:



LOL Configure

Set Threshold: 1 ppm

Clear Threshold: .1 ppm

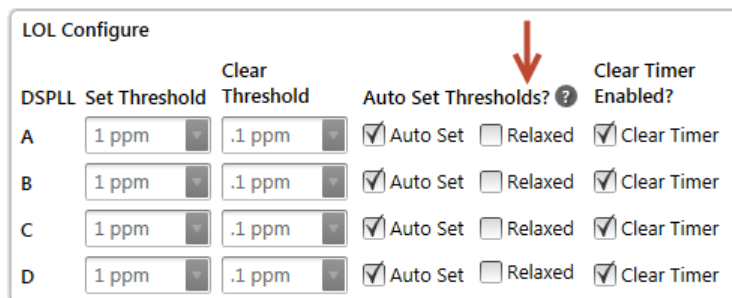
Clear Timer: ☒ Enabled

☒ Set for me ?

☐ Relaxed set and clear thresholds

The threshold ppm values listed refer to a loop bandwidth value of ~0.1 Hz and will effectively increase as the loop bandwidth increases.

- Setting on Si5346/47:



LOL Configure

	DSPLL	Set Threshold	Clear Threshold	Auto Set Thresholds?	Relaxed	Clear Timer Enabled?
A		1 ppm	.1 ppm	<input checked="" type="checkbox"/> Auto Set	<input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Clear Timer
B		1 ppm	.1 ppm	<input checked="" type="checkbox"/> Auto Set	<input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Clear Timer
C		1 ppm	.1 ppm	<input checked="" type="checkbox"/> Auto Set	<input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Clear Timer
D		1 ppm	.1 ppm	<input checked="" type="checkbox"/> Auto Set	<input type="checkbox"/> Relaxed	<input checked="" type="checkbox"/> Clear Timer

New Manual N Divider Assignment Feature:

- A new column has been added to the output frequency page to (optionally) force one or more outputs to a certain N divider. This is useful when you will be doing in-system frequency plan updates and need to ensure one or more outputs are consistently assigned to a certain N divider.
- When a divider is manually selected, that divider will no longer be used for automatic N divider assignment
- This only applies to Si5340/41/42/44/45.
- Divider assignment does not have to be contiguous
- Note:** while files created with this version of CBPro can be opened by an earlier GUI, the manual assignments will be ignored and the planner will auto assign those outputs.

- Example:

The screenshot shows the ClockBuilder Pro GUI. On the left, there's a list of frequencies: 12.34 MHz, 712.5 MHz, 118.75 Hz, and several N/A entries. To the right, the 'N Divider' column shows 'Auto' for the first two and 'N4' for the last two. A schematic diagram shows an oscillator (OSC) connected to two output buffers (OUT0 and OUT1). A dialog box is open, explaining the 'Auto select N divider' option and the 'Manual Assignment' options (N0, N1, N2, N3, N4). It states that manual assignment should be used when updating an output in-system by changing N divider registers or using frequency increment/decrement. It also notes that manually assigned outputs will not be used for any auto assigned outputs.

N dividers:

```

N0:
  Value: 577.3905996758508914... [ 577 + 241/617 ]
  OUT0: 12.34 MHz [ 12 + 17/50 MHz ]
N1:
  Unused
N2:
  Unused
N3:
  Unused
N4:
  Value: 10
  OUT1: 712.5 MHz [ 712 + 1/2 MHz ]
  OUT2: 118.75 Hz [ 118 + 3/4 Hz ]

```

R dividers:

```

R0 = 2
R1 = 2
R2 = 12000000

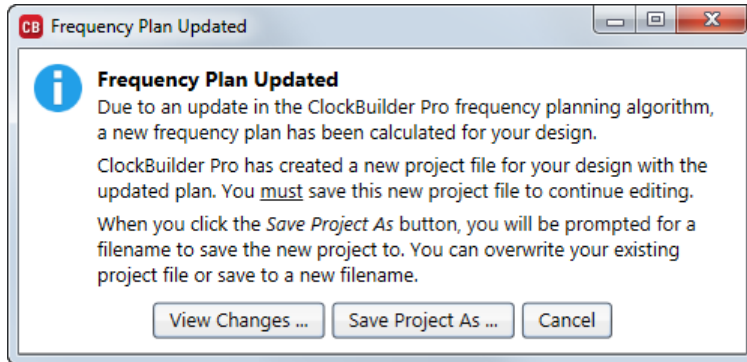
```

- If the outputs manually assigned to a divider are not even common multiples, a DRC error will be triggered:
 Some of your manual N divider assignments are not valid because there are no common even multiples between all output frequencies across the N divider output range:
 - - N4: OUT1,OUT2,OUT3

EVB GUI:

- The EVB GUI now fully supports the Si5342 evaluation board.
- The Si5340 EVB and Si5341 EVB default plans have been updated: IN0-IN2 are no longer enabled, which will ensure LOS does not cause INTRb to be asserted.

- The Write Project File feature now checks to see if the frequency plan was saved with older version of planner. If it was, a new plan is calculated. If the new plan differs from old, the same plan change dialog is shown to the user that the Wizard project open would show:



In order to write the project, it must be saved. So now the EVB GUI experience when working with out-of-date plans is in sync with Wizard.

Note that previously, the plan would be automatically recalculated behind the scenes, so you always got the new plan (which you might not realize).

Misc:

- The 0x0B44[5] setting name on Si5342 was changed from MDIV_FRANC_DIS to FRACN_CLK_DIS_PLL.
- Added DRC warning when CMOS buffer mode is used on Si5340/41:

Warning Using the CMOS input buffer option may result in jitter higher than when differential input buffer mode is selected. Silicon Labs strongly recommends using the differential input buffer option with the LVCMOS input termination circuit shown in the Si5341/40 Reference Manual.

- On Si5342/44/45, always set PLL_OUT_RATE_SEL to 1 to ensure expected behavior when using XO in range 30 MHz – 44 MHz.
- Stop-mid disable state is no longer recommended because recovery is not glitch-less. The sample projects and EVB sample plans bundled with CBPro have been changed to stop low disabled state. If your existing design uses stop mid, a design rule warning will be generated.

CBPro v1.2 [2014-09-09]

Bug Fixes:

- Fixed: 40/41/42/44/45 frequency planner could select invalid N (below 10) in certain edge cases.
- Fixed: the GUI could crash when entering output frequencies under certain rare conditions.
- Fixed: a crash could result if the software updater found a new version in the background, you had closed CBPro wizard, and EVB GUI was not active.

Write Design to EVB:

- Changed order in which output regulators are turned on and synced to I/O voltage defined in project file
- Old:
 - Enable VDD/VDDA
 - Write registers including soft reset/etc
 - Enable/set level of VDDOx
- New:
 - Enable VDD/VDDA
 - Enable/set level of VDDOx
 - Write registers including soft reset/etc

- This ensures all output buffers will be properly initialized to the same phase when the device soft reset completes.

EVB GUI:

- Changed byte ordering in register editor results/editor and logging:

The screenshot shows the 'DUT Register Editor' tab in the EVB GUI. The 'Address' is set to 0x020E (526 decimal). The '# Bytes' is 4. The 'Read' button is highlighted. Below, the 'Unsigned Int' is 1, and the 'Hex' field shows 0x00000001, with a red arrow pointing to it. The 'Log' section at the bottom shows a table with two entries:

Timestamp	Source	Message
09:46:24.495	EVB	starting Read_DUT_Bytes(address=0x020E, num_bytes=4)
09:46:24.504	EVB	finished Read_DUT_Bytes(address=0x020E, num_bytes=4) => 0x00000001

A red arrow points to the second log entry.

CBPro v1.1 [2014-08-13]

Bug Fixes:

- Fixed: in register exports when “I am targeting pre-production samples” was checked, register 0x0A06=0 containing device trim data was being included in the export. Writing this register to your pre-production samples could reduce performance.

Loss of Lock (LOL) Improvements:

- The LOL set/clear threshold values that are calculated for you when you select “set for me” on the LOL page are now defined based on the state of Px (integer vs fractional), gapped clock checkbox (see below), Mx outer loop state (integer vs fractional), and input frequencies or Fdco. Affected device settings are LOL_SLW_SET_THR, LOL_SLW_CLR_THR (42/44/45) and LOL_SLW_SET_THR_PLLx, LOL_SLW_CLR_THR_PLLx (46/47).
- Computation of LOL_SLW_DETWIN_SEL, LOL_SLW_VALWIN_SEL, LOL_CLR_DELAY (42/44/45) and LOL_SLW_DETWIN_SEL_PLLx, LOL_SLW_VALWIN_SEL_PLLx, LOL_CLR_DELAY_PLLx (46/47) has also been updated. The values selected are now based on bandwidth coefficients and plan VCO frequency.
- These new default values and register settings yield faster lock times when using fast lock, and less likelihood of false positive and false negative LOL status conditions.
- You can now mark an input clock as being gapped. This will influence LOL set/clear threshold “set for me” values:

The screenshot shows the 'Input Buffer' and 'Gapped Clock' settings. The 'Mode' is 'Enabled', 'Input Buffer' is 'Diff', and 'Gapped Clock' is checked. A red arrow points to the 'Gapped Clock' checkbox. The 'Frequency' is set to 25 MHz.

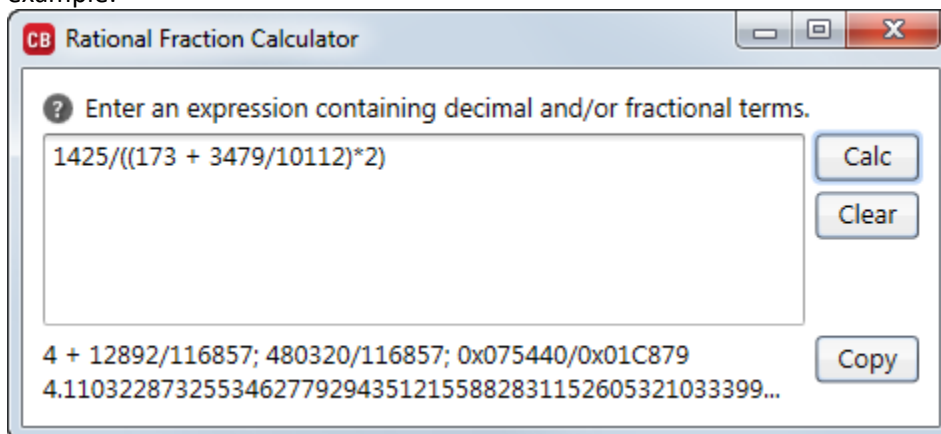
- The LOL threshold table was not in sync with actual device values:
 - Old: 0.2 ppm, 0.6, 2, 6, 20, ...
 - New: 0.1 ppm, 0.3, 1, 3, 10, ...
- To handle existing projects, if CBPro detects an invalid (i.e. old) PPM value, it will switch the DSPLL to “set for me mode”, which is the default for new designs.

Misc:

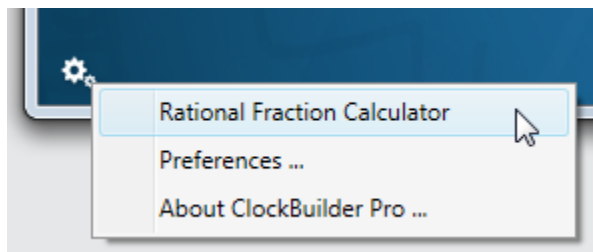
- NVM controller configuration register (0x1002=7) and settings (SLAB_NVMC_SILABSECCCHK_EN=1 and SLAB_NVMC_USRECCCHK_EN=1) were being included in exports when “I am targeting pre-production samples” was checked. These are no longer patched.
- No longer set OOF_CLK_DIS[x] based on user’s Precision & Fast OOF Enable checkbox. Now always set to 0 – similar to setting LOS_CLK_DIS=0 always – to work around RevA issue where corresponding FLG cannot be cleared unless OOF_CLK_DIS is 0.
- VCO frequency for Si5346/47 devices changed to 14.208 GHz. The frequency is now always listed in ’47 design reports. If you open a project using the old VCO frequency, your plan will be recalculated and you will be prompted to re-save your project file with the new Fvco.
- Added additional frequency selections to loop bandwidth combo boxes.
- Added new OID (Output Interpolative Divider) quantization spur design rule check.

New Rational Fraction Calculator:

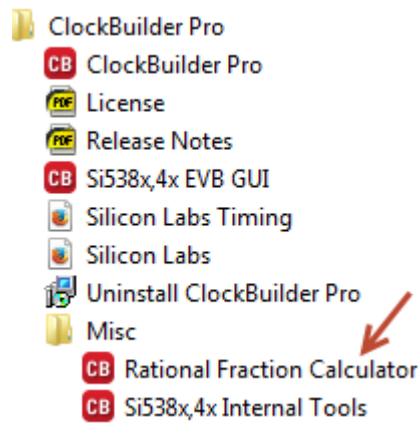
- Allows you to evaluate rational fraction expressions without loss of precision (as could be the case with a program like Microsoft Excel). Supports the same expression syntax used to define clock frequencies. For example:



- Launch from Wizard menu:



- Or Windows Start menu:



- Note pressing ENTER is a shortcut to the Calc button.

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Initial release

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