FemtoClock®2 GUI User Guide

This guide assists those using the Renesas IC Toolbox software to configure and control a FemtoClock2 device. This includes (but is not limited to) the RC22504 and RC32504 devices.

Contents

1. Installation and Setup

Ensure that the latest version of the Renesas IC Toolbox software is installed. New versions are released frequently and can provide a better experience with new functionality. The Renesas IC Toolbox software can be located on the FemtoClock®2 Evaluation Kit page.

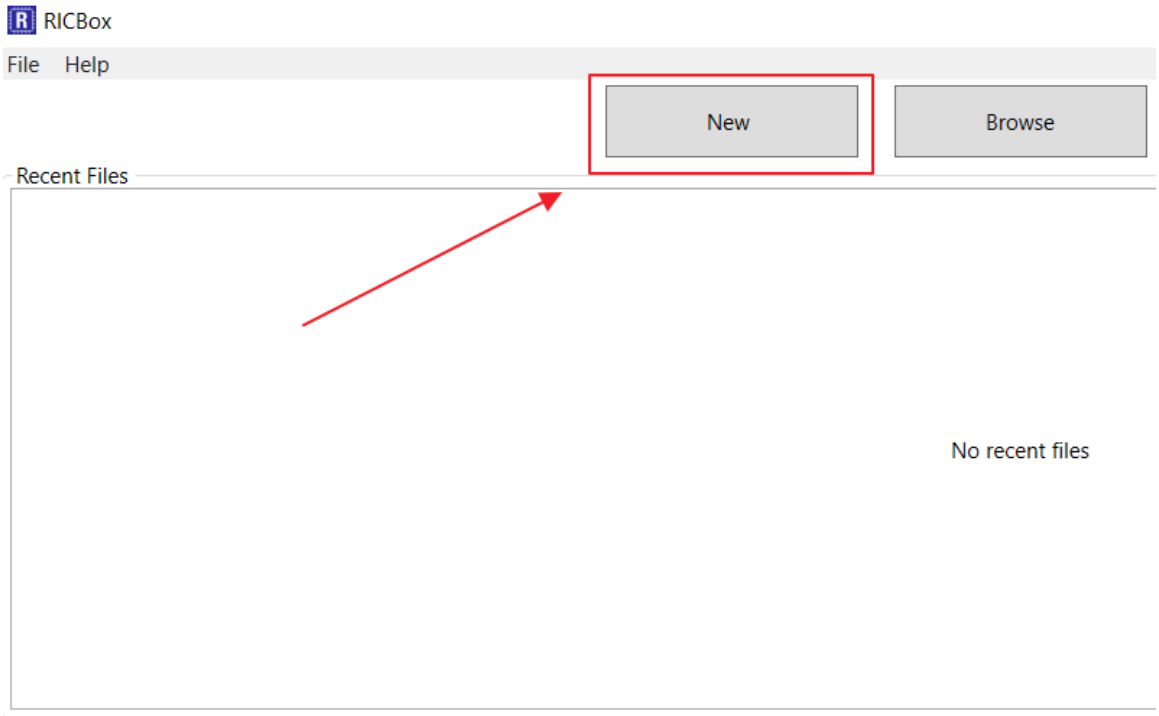
Each device that is compatible with the Renesas IC Toolbox software has its own individual installer. This is a convenient executable file that installs to a computer that already has the Renesas IC Toolbox software. The FemtoClock2 installer can be located on the FemtoClock®2 Evaluation Kit page. Always check for newer versions as new features are frequently added.

Download the installer and follow the prompts before proceeding through this document.

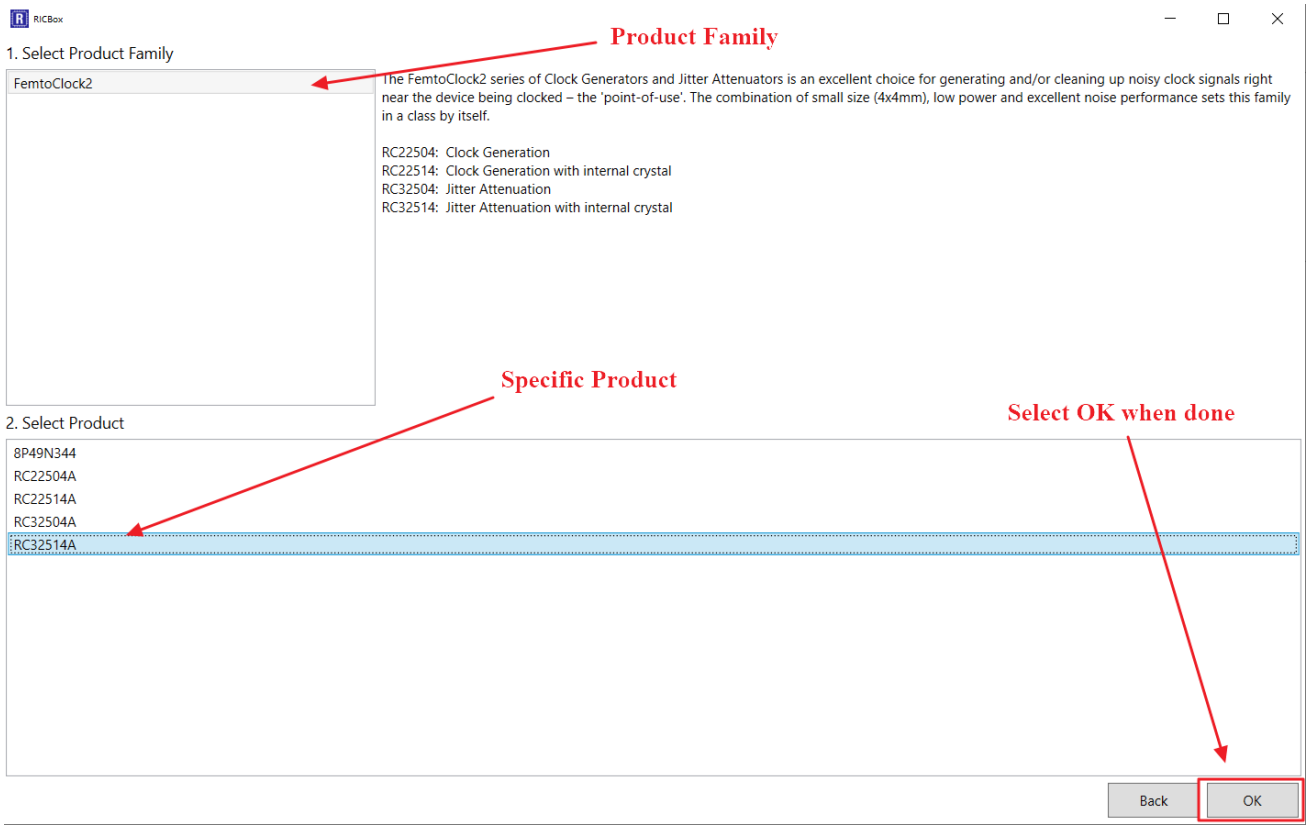
2. Loading and Creating Configurations

2.1 Creating a New Configuration

To create a new configuration, open the Renesas IC Toolbox software and click the *New* button.



In the “Select Product Family” section, select the FemtoClock2. From the “Select Product” section, select the working device. Click the *OK* button to open up the new configuration. It may take a couple of minutes to open for the first time.

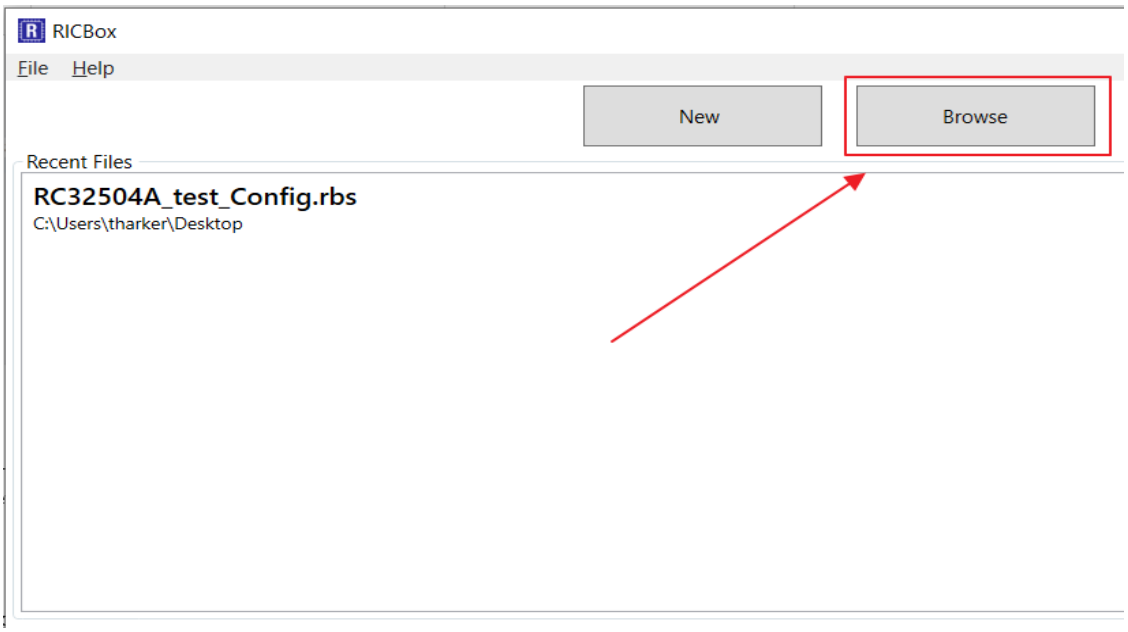


Note: Some variations between devices may show up in this guide. The intent of this guide is to encompass an overview of the entire device family.

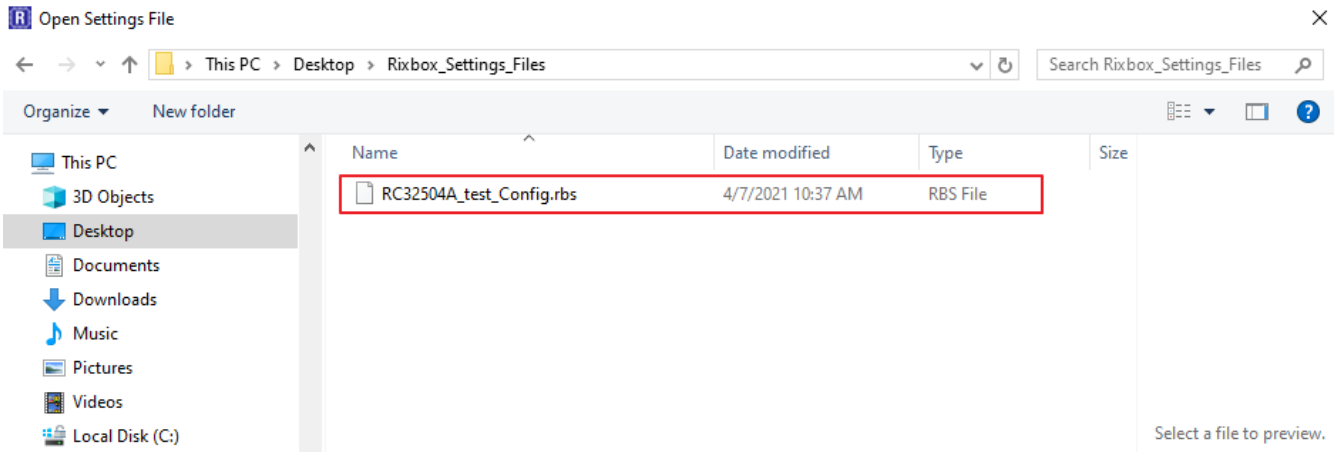
2.2 Loading a Settings File

Loading a settings file is similar to creating a new one. To load an existing settings file, click on the *Browse* button just after opening the Renesas IC Toolbox software. This will take the user to a file browser.

Note: Recently used settings files are under the “Recent Files” section.



Navigate to the directory that stores the settings file and select it. Renesas IC Toolbox settings files have the file type ‘.rbs’.

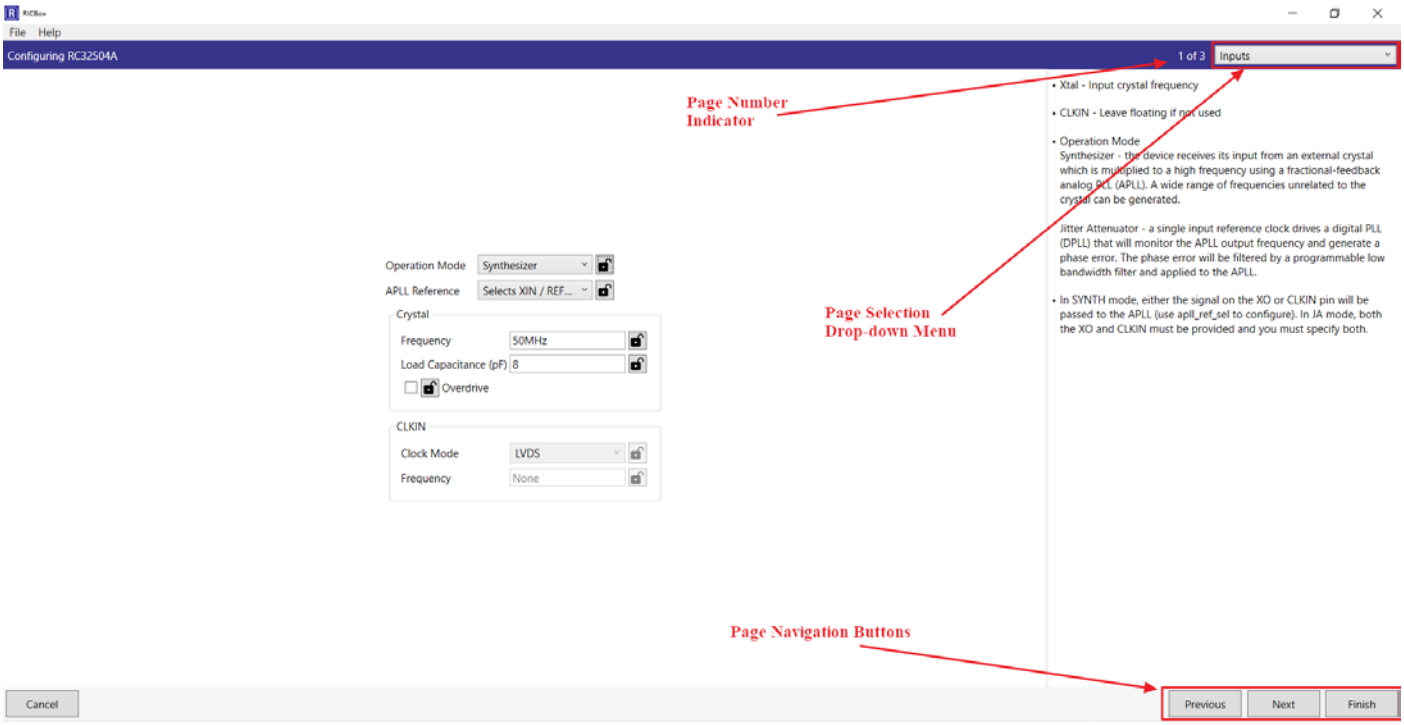


3. Wizard Setup

When creating a new configuration, the wizard page will be the first thing seen. For FemtoClock2 devices, there are three separate wizard pages: **Inputs**, **DPLL**, and **Outputs**. Each section pertains to a different portion of the device that needs to be configured for proper functionality.

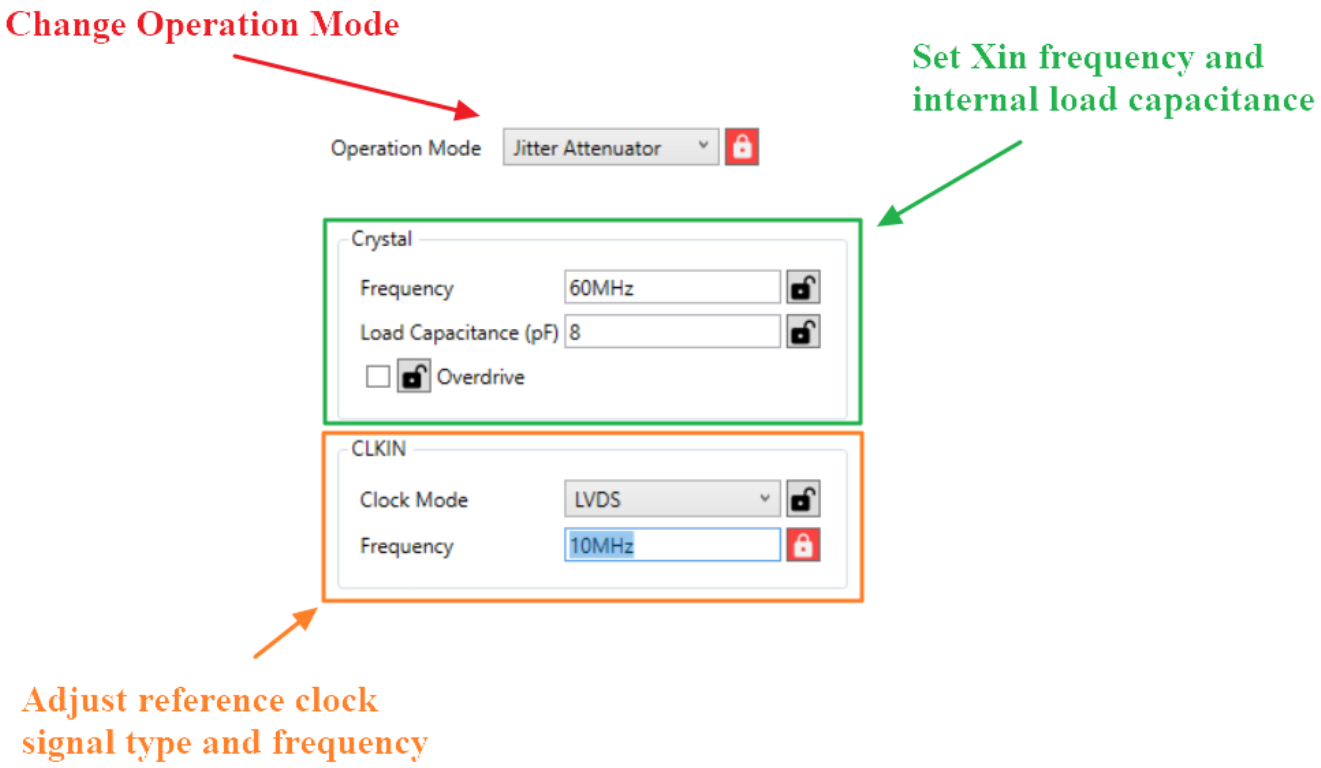
Note: Some FemtoClock2 devices may not have a DPLL.

Users can navigate to individual sections by using the *Next* and *Previous* buttons in the lower right corner of the screen or the drop-down menu in the upper right. Select the *Finish* button to enter the to the control panel page.



3.1 Inputs

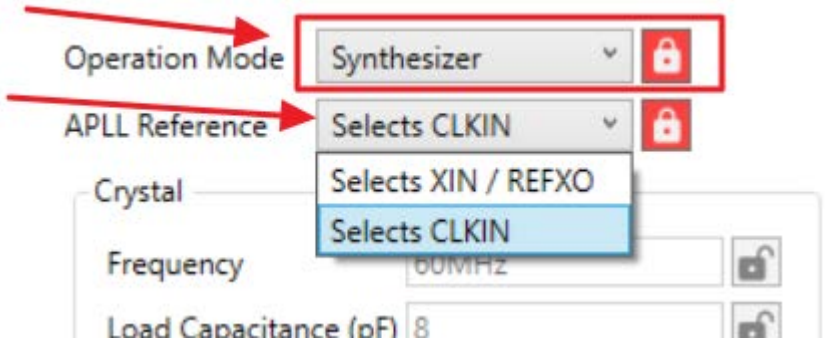
There are two sections to make note of when configuring the inputs: **Crystal** and **CLKIN**. The Crystal section is used when creating a configuration that is either in synthesizer mode and uses a clock at the XIN pin, or in any Jitter Attenuator mode. The same applies for the CLKIN section. Device mode is through the “Operation Mode” dropdown menu. Device modes include **Synthesizer**, **Jitter Attenuator**, and **DCO**.



Descriptions of each mode can be found on the right side panel of the page.

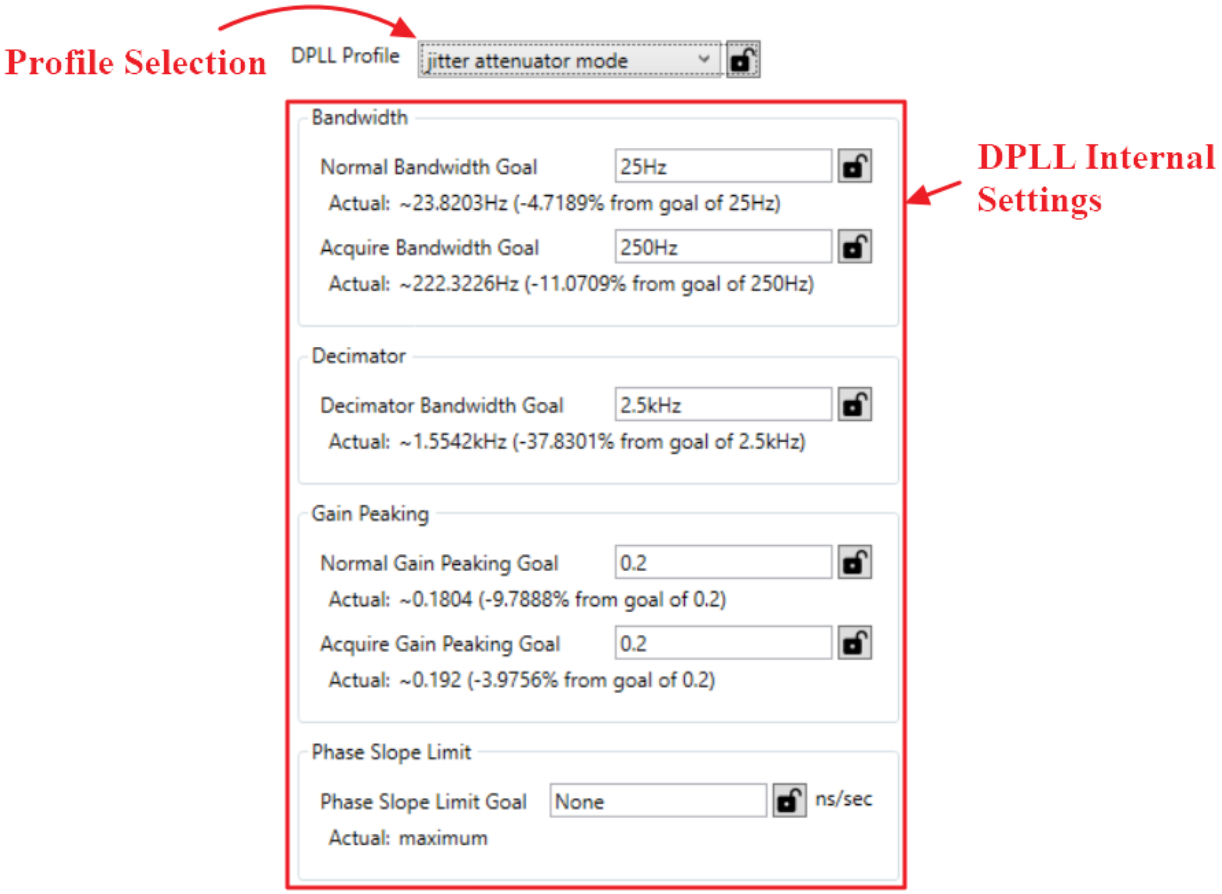
Note: Some devices may not have both Jitter Attenuator and Synthesizer modes together.

When using Synthesizer mode, the user has the ability to select the APLL reference through the “APLL Reference” drop-down menu.



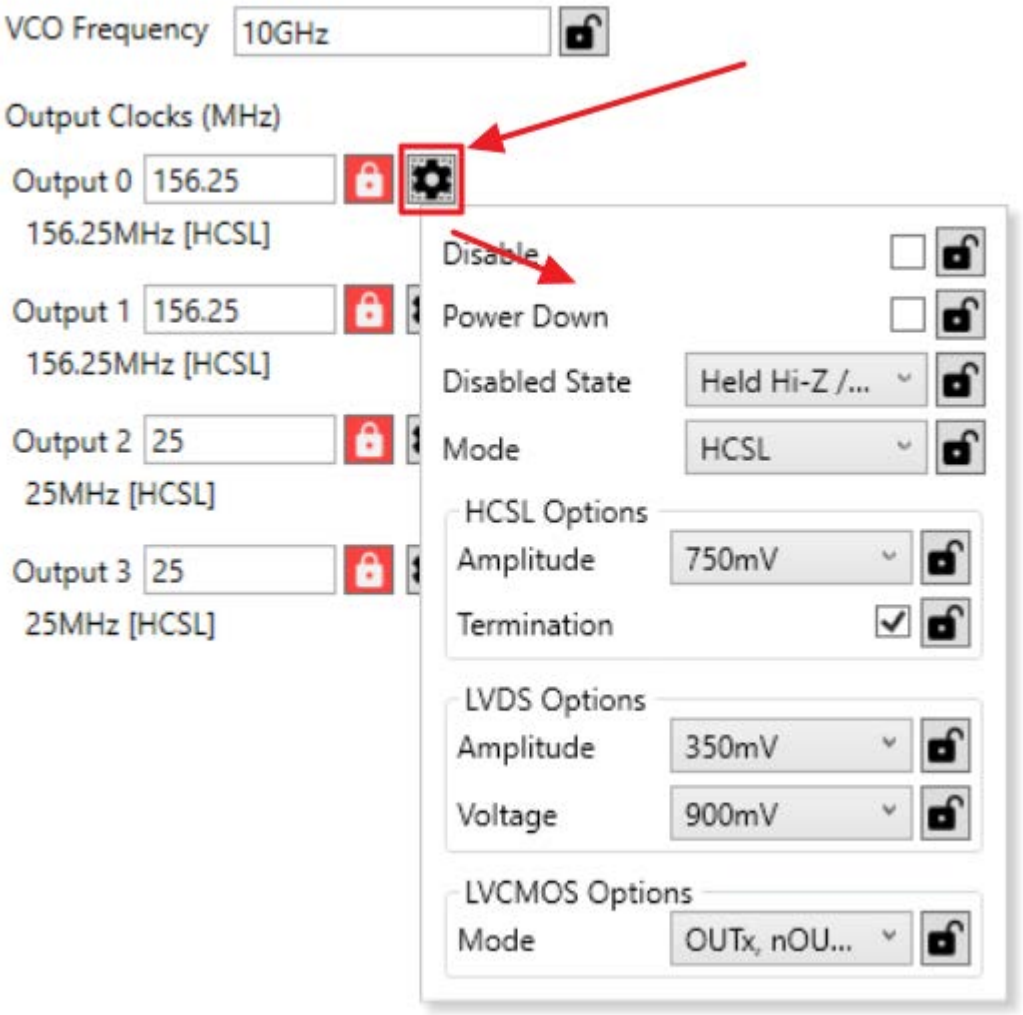
3.2 DPLL

If the device is configured for jitter attenuator mode, the DPLL section will become available. The DPLL section allows users to manually adjust bandwidth, decimator, gain peaking, and phase slope limit values. Alternatively, the user can select a predefined SyncE profile that will automatically populate the adjustable settings. Descriptions of each section and the SyncE profiles are on the right of the page.



3.3 Outputs

The outputs section allows users to set output frequencies and adjust the overall VCO frequency. Outputs can be further configured by clicking on the symbol next to the output field. This will give the user the ability to enable/disable the output, select the output type, and adjust the signal settings.



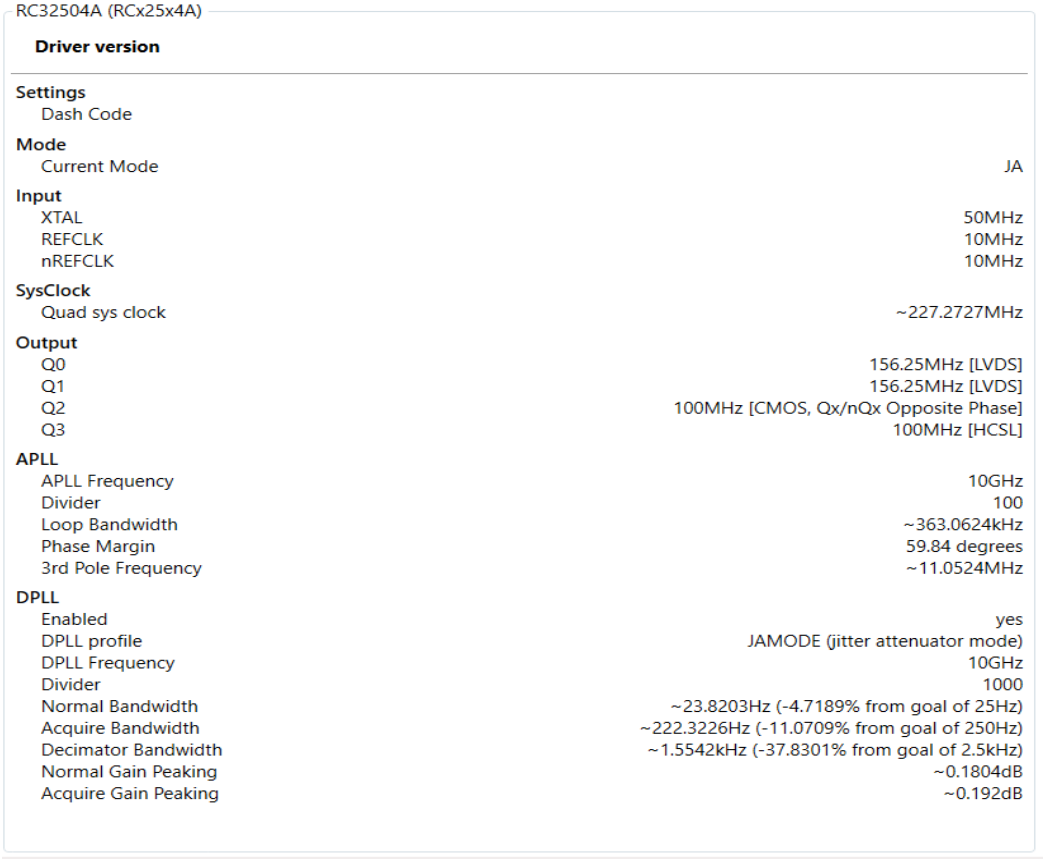
4. Side Panel Buttons

The side panel consists of five separate buttons. Each button takes the user to a separate page. Each page has a unique view, allowing users to configure the device from different perspectives.

- *Control Panel* button takes the user to the device overview
- *Wizard* button takes the user back to the initial wizard
- *Configuration* button displays the register settings in a readable text format with a search engine
- *Registers* button shows a graphic of the registers in the device
- *Block Diagram* button takes the user to a configurable block diagram view

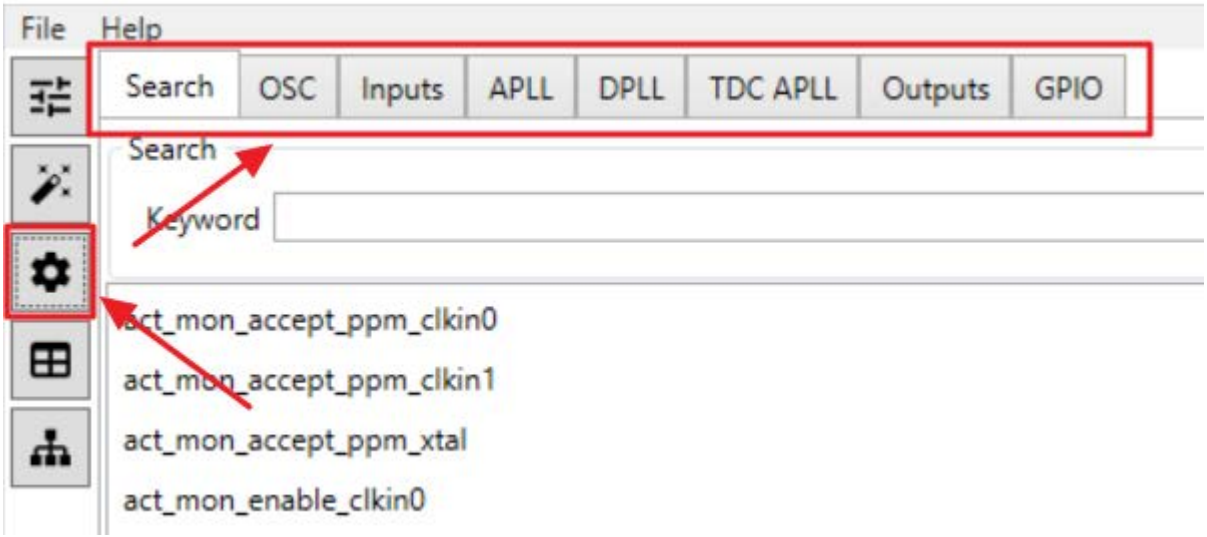
5. Control Panel View

The control panel view takes the user to an overview page depicting the major settings for the device. This page can be used as an important reference for the overall device configuration.

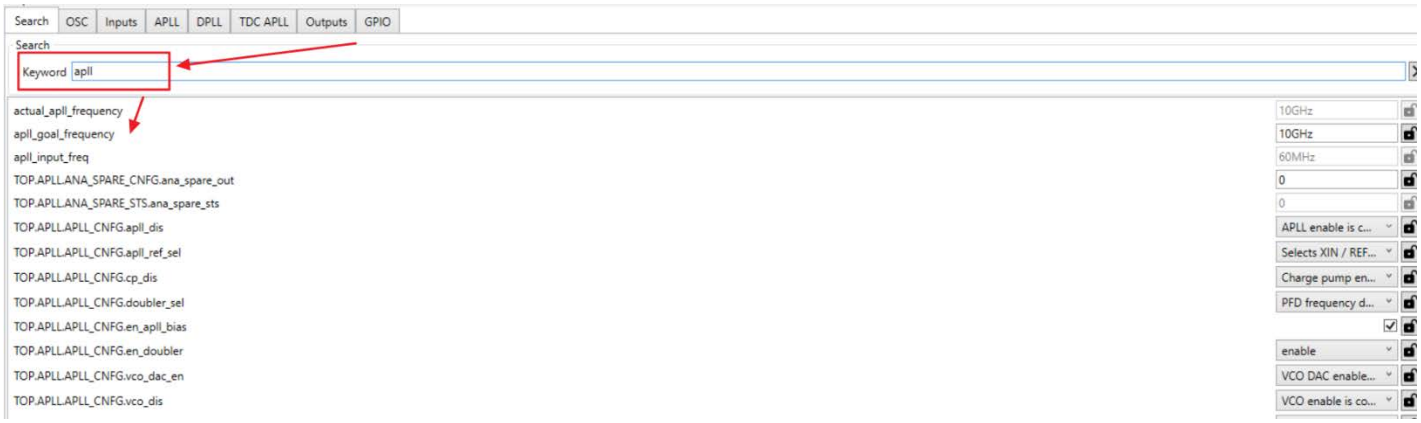


6. Configuration View

Configuration view allows the user to easily move through register settings via the tabs at the top of the page. Each section has all of the critical registers and data fields listed to allow the user to configure the device block.

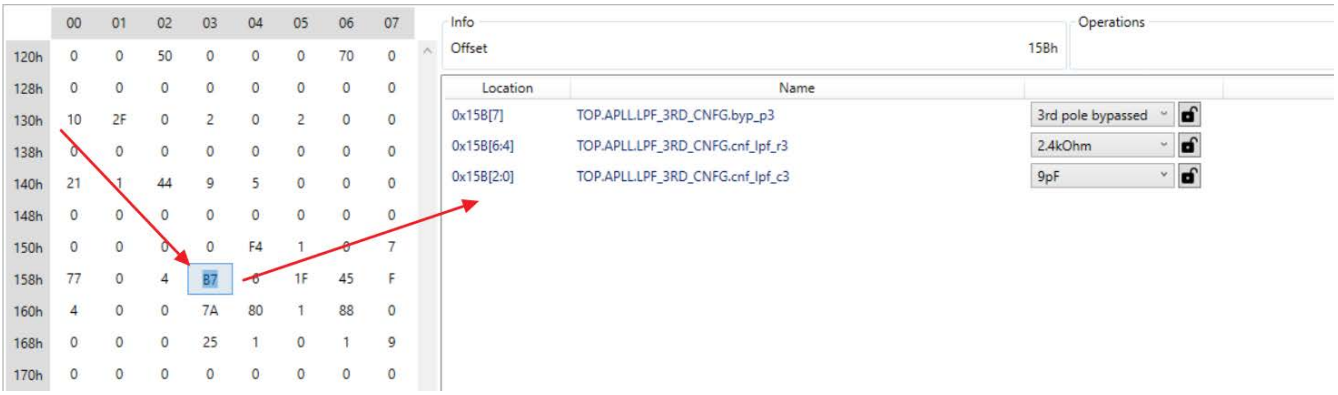


The search tab gives the user access to the configurable fields through a search bar. Users can use the search engine to find any specific field they are looking for.



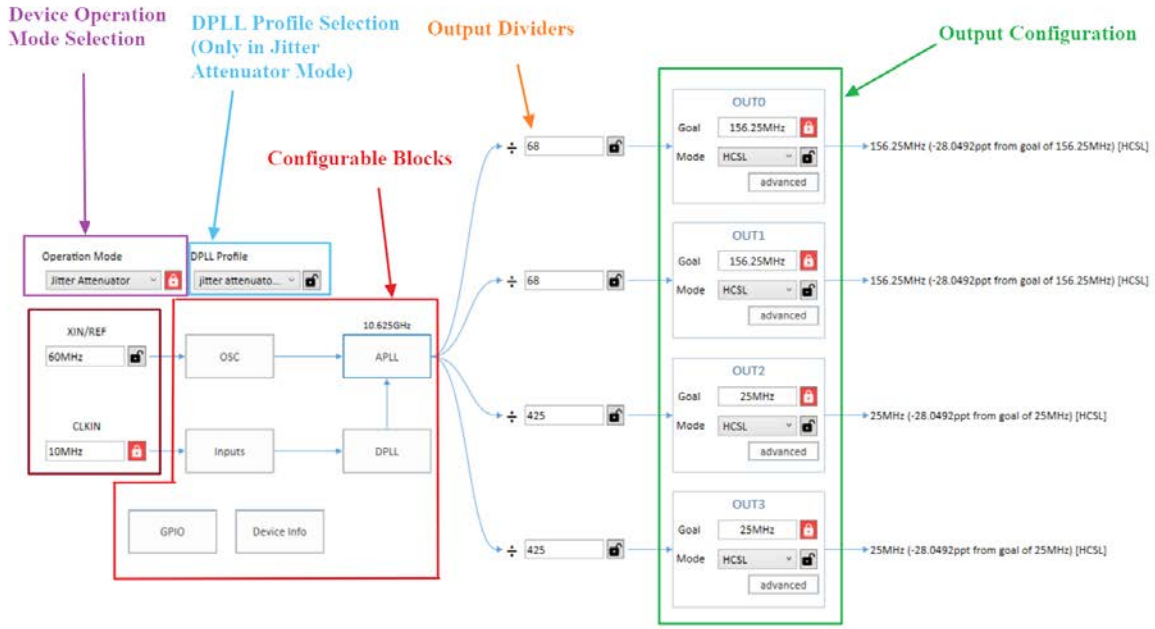
7. Register View

The register view shows a graphical diagram of the registers and allows the user to read or write any of the individual registers. By clicking on the individual register block, the given registers for that block will appear to the right. They can either be adjusted by writing directly to the diagram or entering values into the data fields on the right.



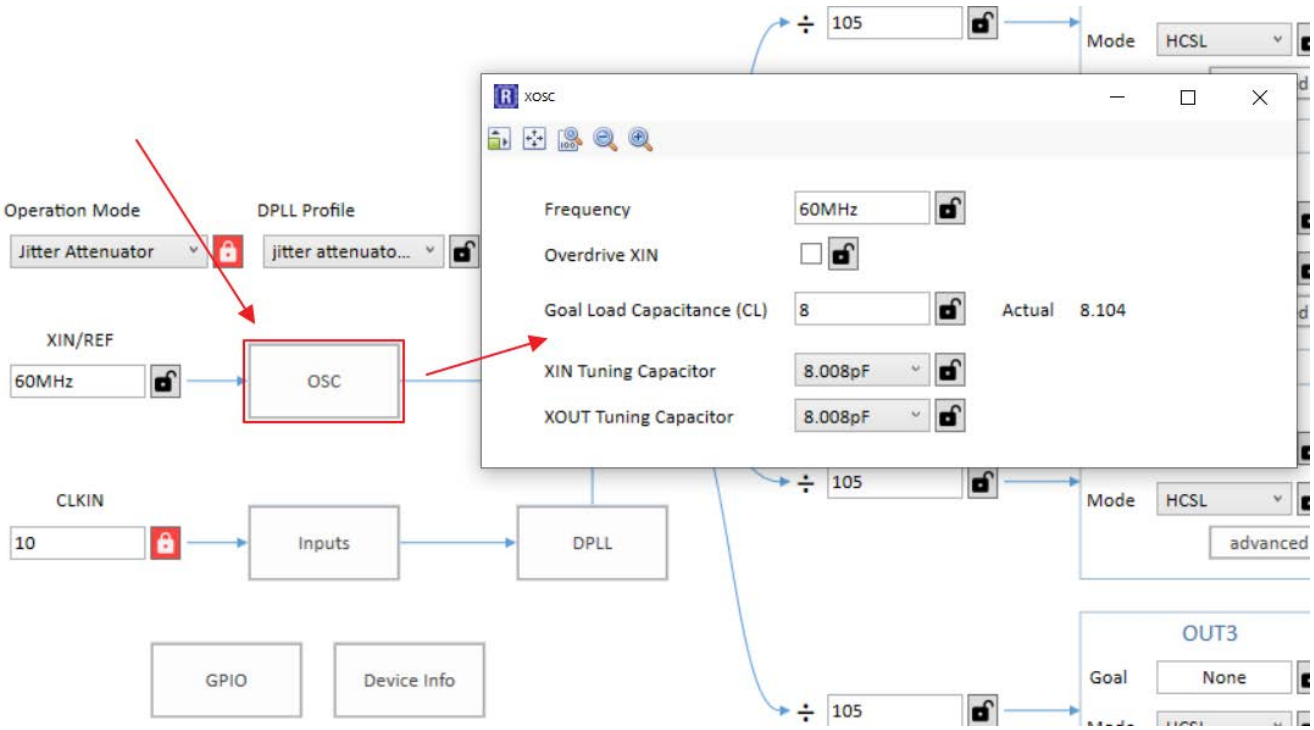
8. Block Diagram View

The block diagram view reflects the datasheet representation of the FemtoClock2 devices. From the main diagram, users can adjust the operation mode, set the output frequency and type, change the output divider, set the Xin frequency and the input frequency, and view the output frequency estimate. Each block has its own pop-out page. This can be accessed by clicking on the block.



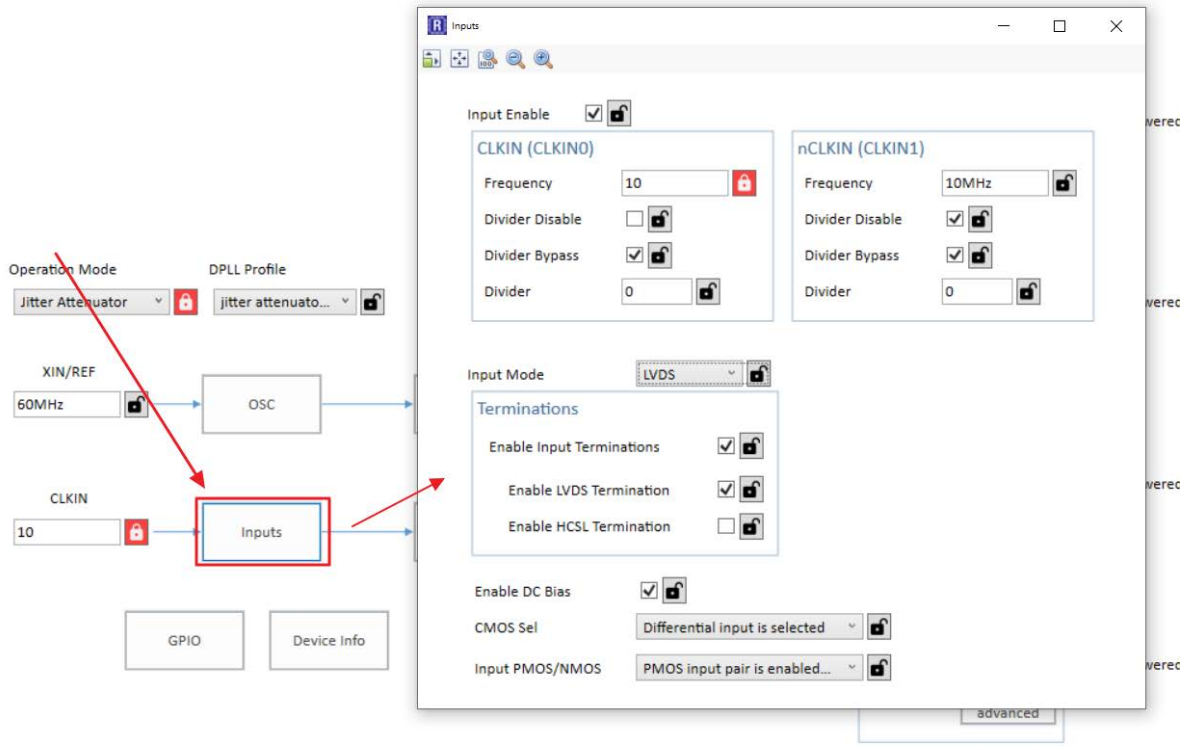
8.1 OSC Block

Clicking on the *OSC* block gives access to the settings that configure the Xin frequency and internal tuning capacitors.



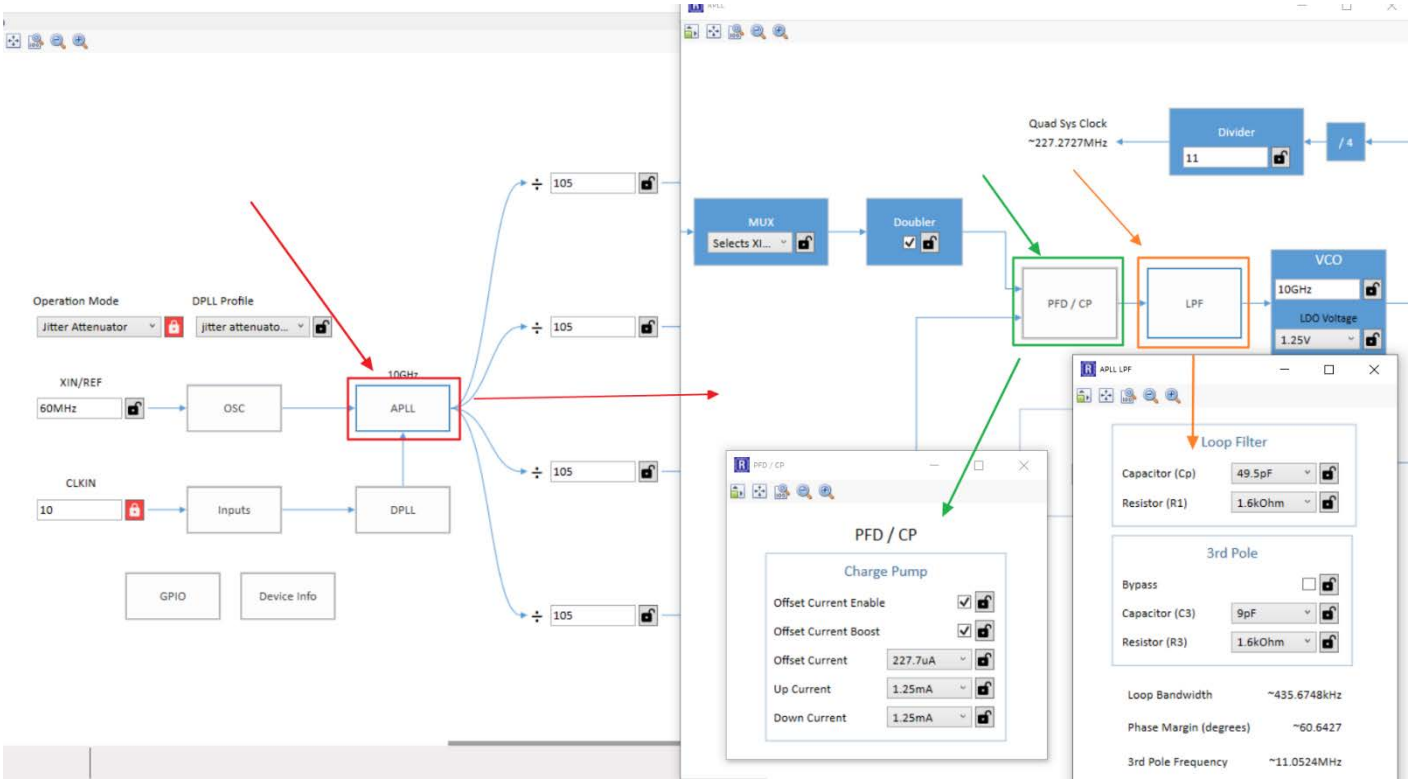
8.2 Inputs Block

Clicking on the *Inputs* block allows the control of the input signal type selection, input terminations, and CLKIN frequency.



8.3 APLL Block

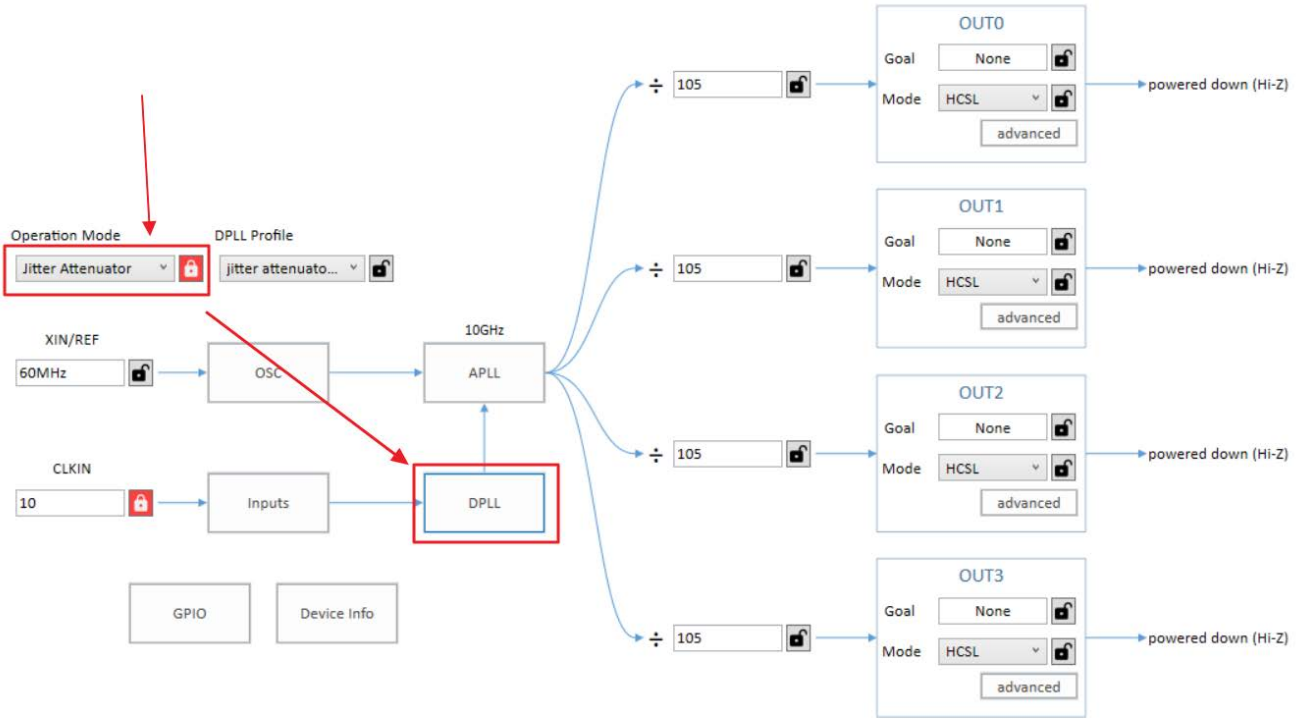
Clicking on the *APLL* block allows users to configure the input mux, charge pump settings, and internal low pass filter settings. Users can also change the VCO frequency and LDO voltage from here.

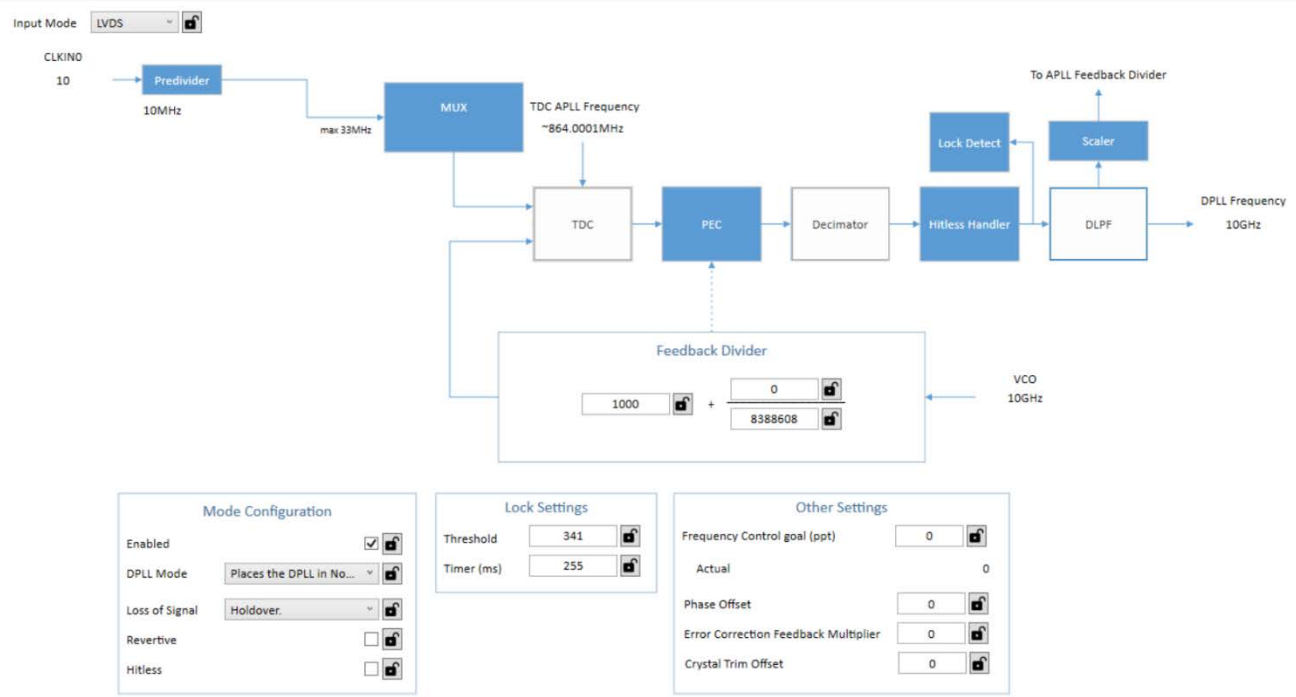


8.4 DPLL Block

The *DPLL* block is only accessible when the device operation mode is set to “Jitter Attenuator”. This block contains all features pertaining to the DPLL. Clicking on the *DPLL* block allows the user to enable reveritive or hitless switching, adjust the phase offset, and even change the digital loop filter settings.

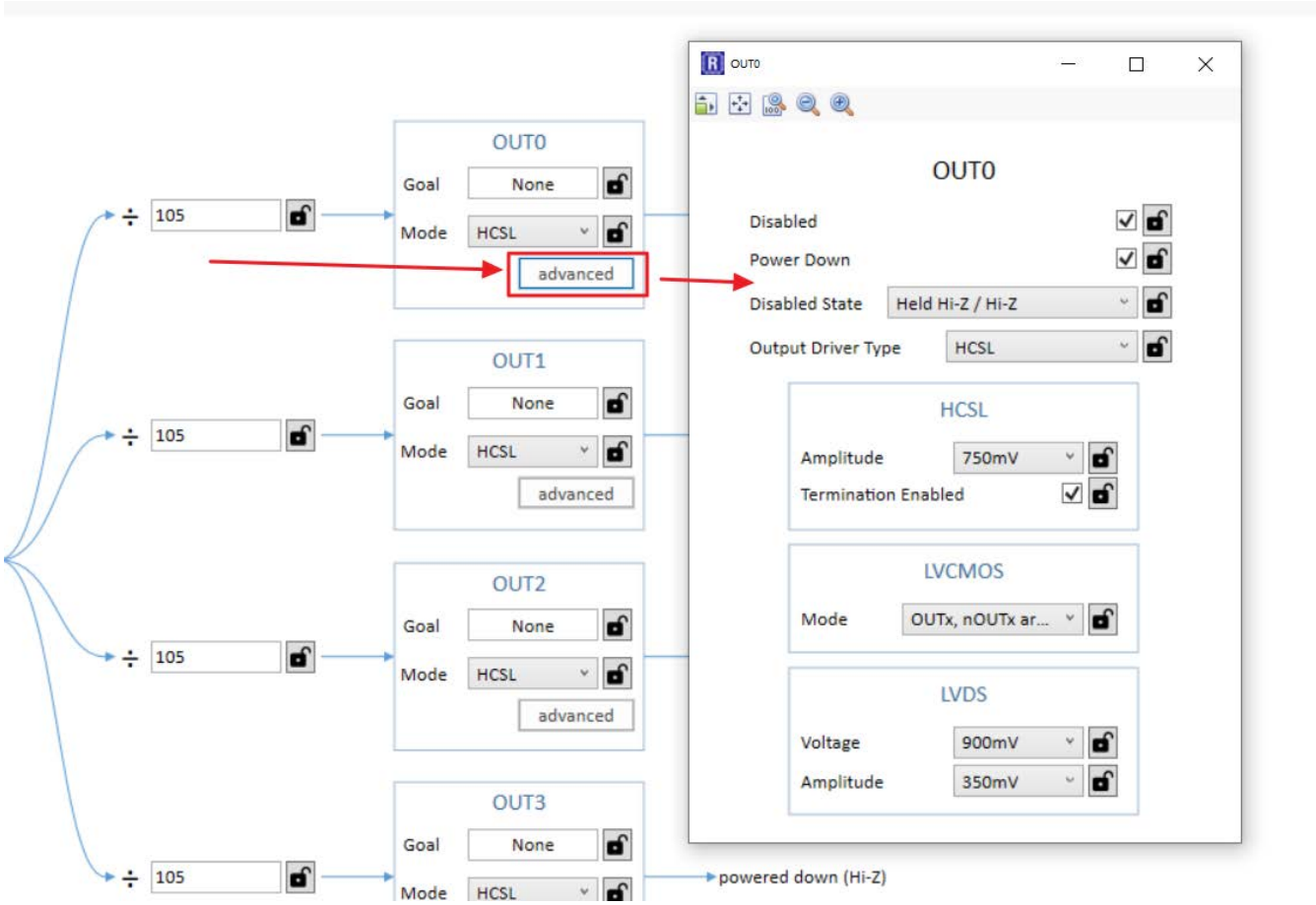
Note: Some FemtoClock2 devices may not have the ability to use this feature.





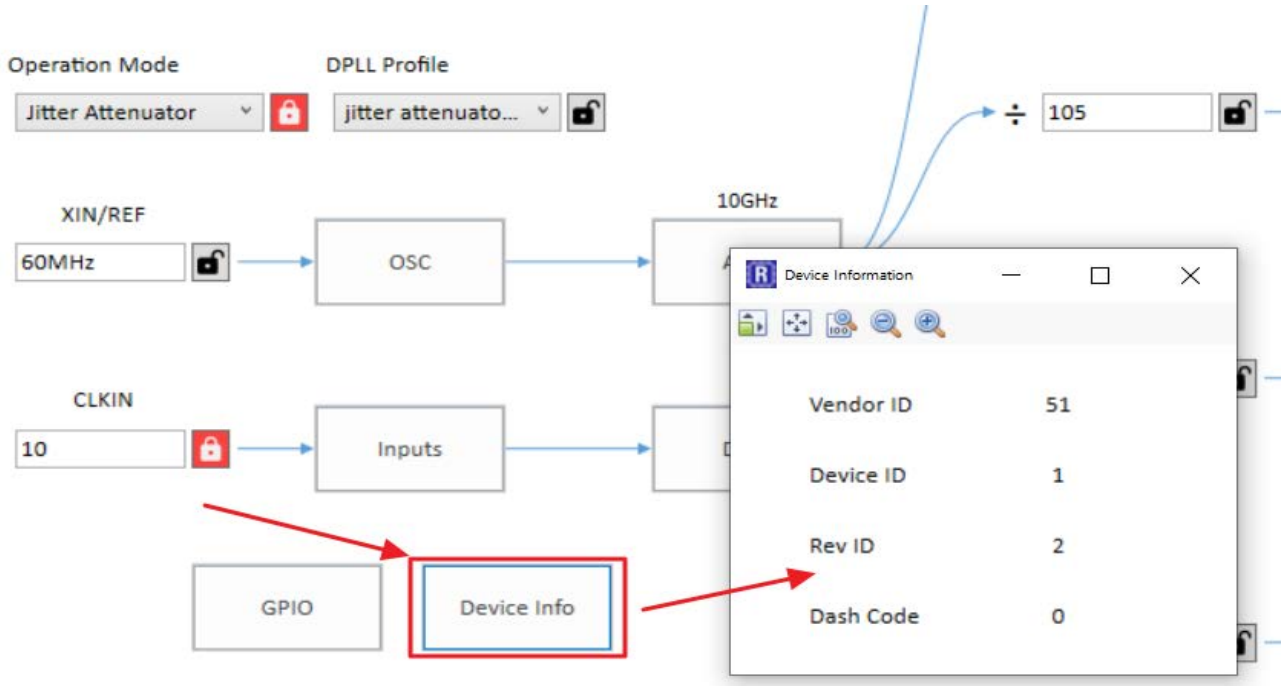
8.5 Outputs Block

Each output can be configured on the main block diagram. However to reach more adjustable settings, click on the *advanced* button.



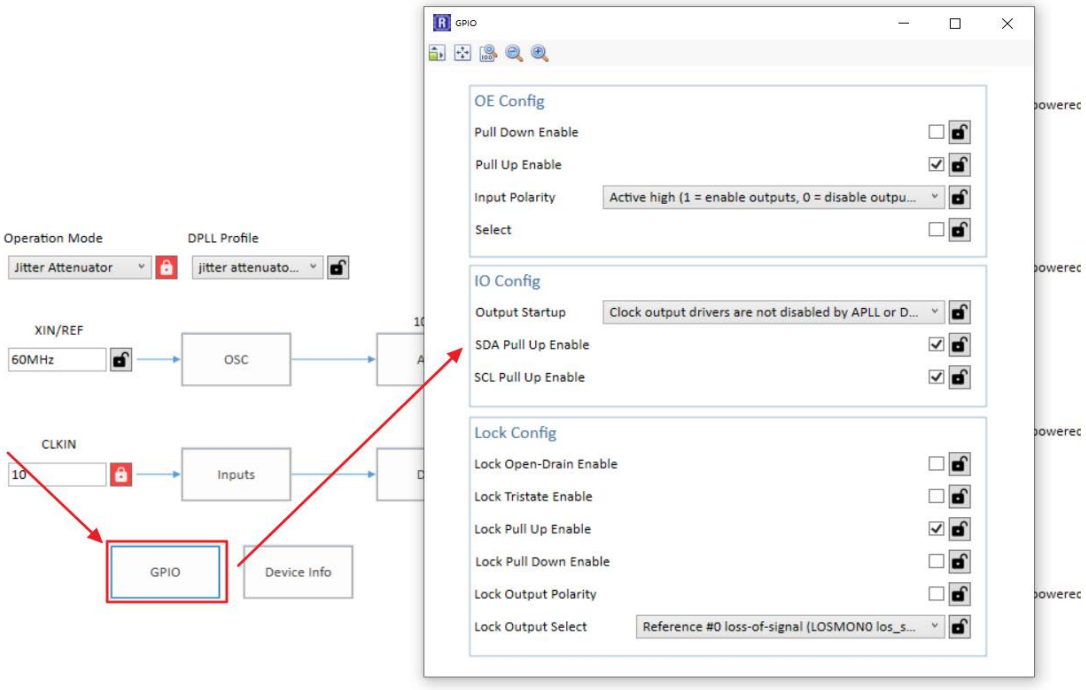
8.6 Device Info

The *Device Info* button opens a window that contains the Vendor ID, Device ID, Rev ID, and Dash Code.



8.7 GPIO Block

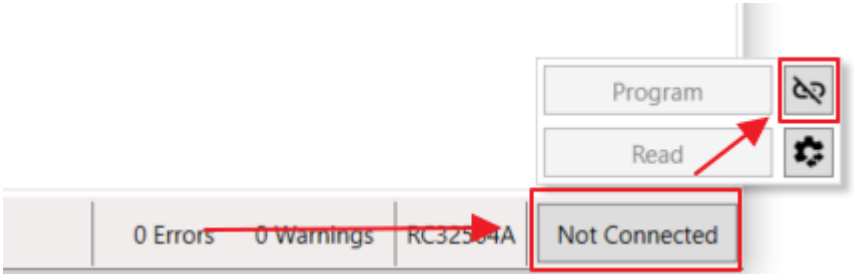
Clicking on the *GPIO* block allows users to configure the output enable pin, internal SDA and SCL pull-ups, and the lock detection.



9. Device Connection

Device connection can be done through the bottom right corner of every page. To connect one of the Renesas evaluation boards, ensure the device is powered and connected to the working computer. Then, click the *Not Connected* button in the corner of the screen. This will lead to a small pop-out page. Click the connect symbol in the corner of the page to establish a connection to the device.

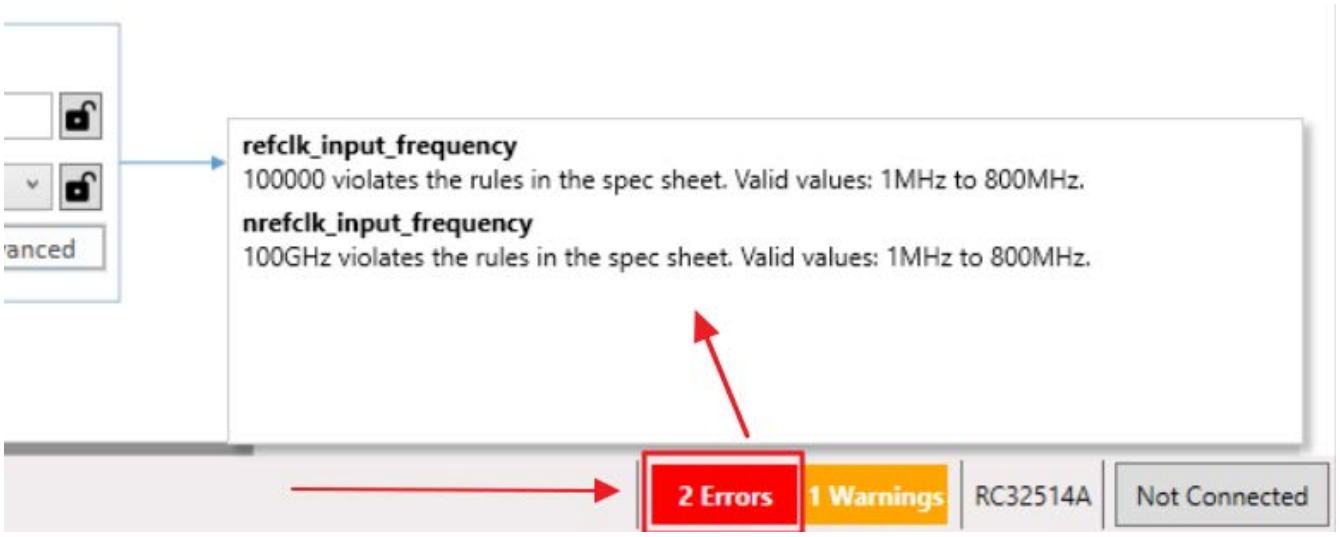
See the *Evaluation Board User Manual* for more information regarding device connection. This manual is located on the FemtoClock®2 Evaluation Kit page.



10. Errors and Warnings

When adjusting the values in the configuration, errors or warnings may arise. These are used to help users stay within the limitations of the device and give recommendations to how to configure it. Errors must be cleared before writing to the device.

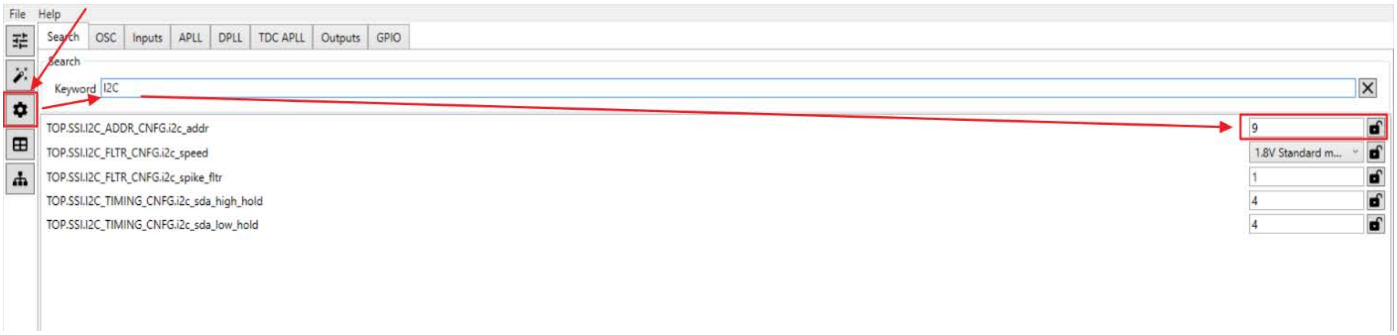
The bottom right corner of the screen shows how many errors or warnings have occurred. Click on either one to view the contents.



11. Common Configurable Settings

11.1 Changing the I2C Device Address

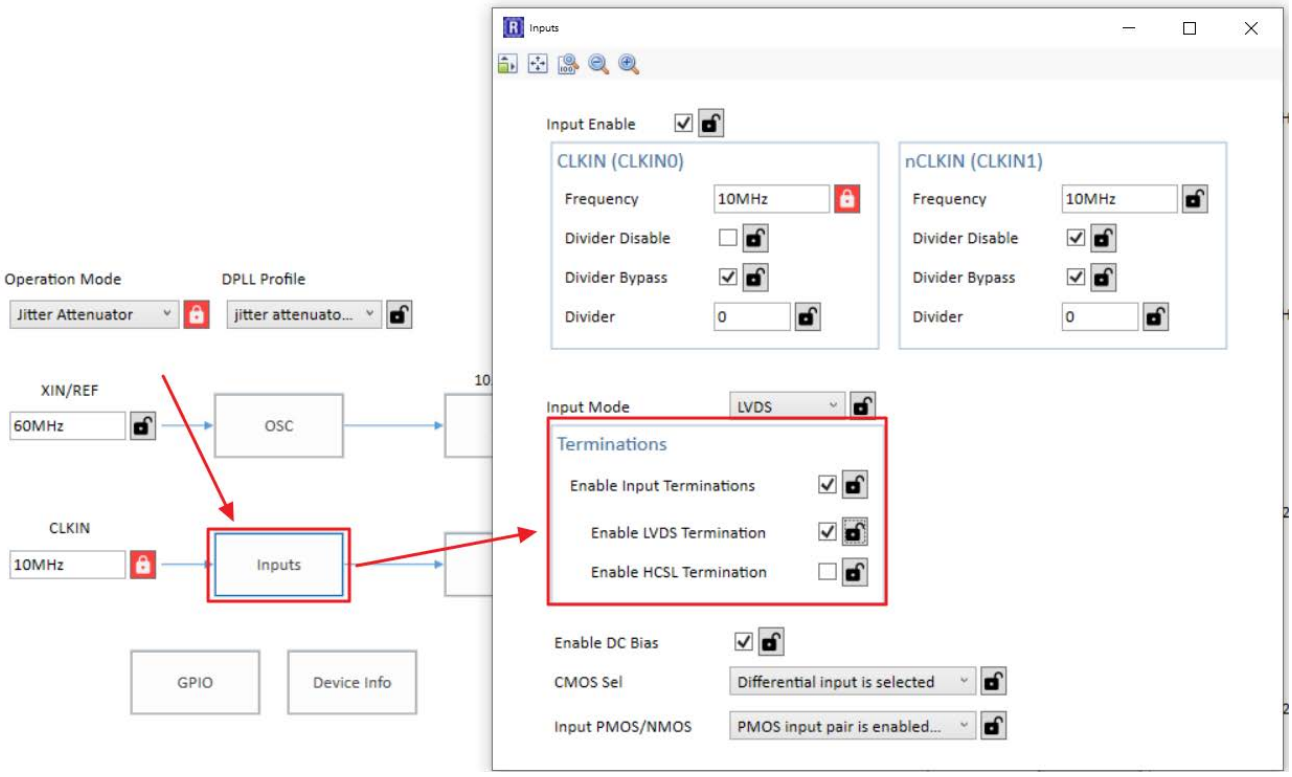
1. Enter the configuration view.
2. Type “I2C” into the search bar.
3. Change the ‘TOP.SSI.I2C_ADDR_CNFG.i2c_addr’ setting to the desired address.



11.2 Disabling the Internal Input and Output Terminations

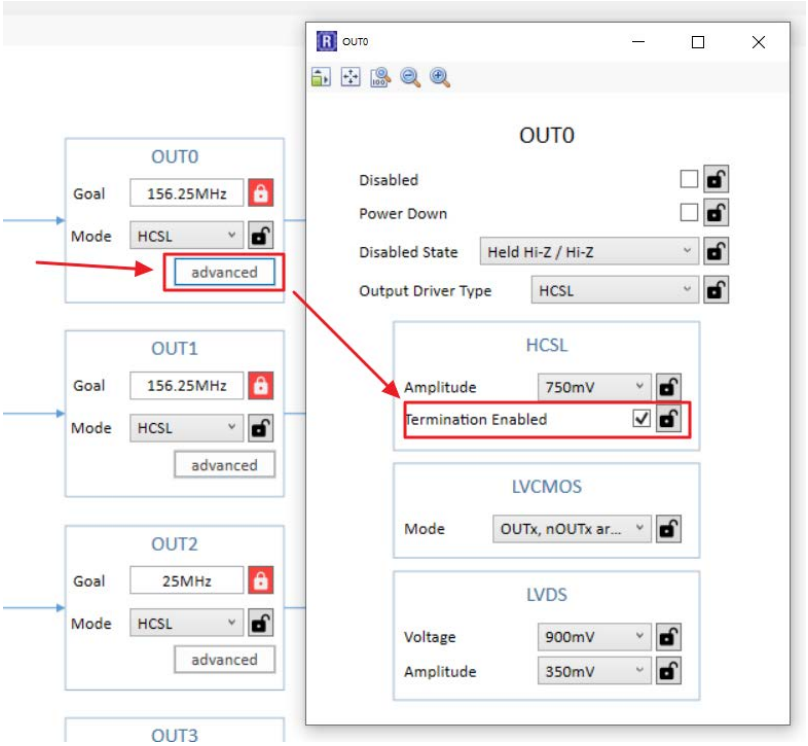
11.2.1. Disabling Input Terminations

1. Go to the block diagram view.
2. Click on the *Inputs* block.
3. Enable/Disable the terminations under the “Terminations” header.



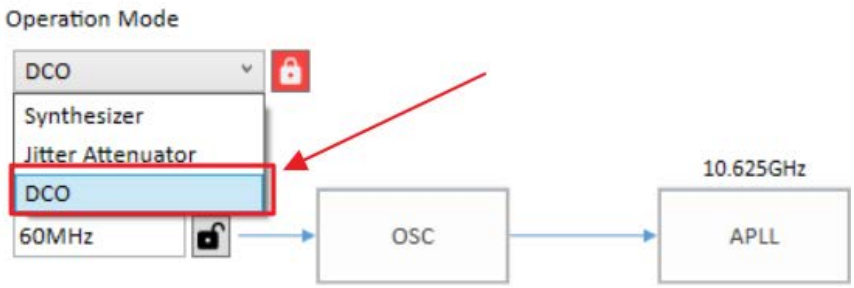
11.2.2. Disabling the Output Terminations

1. Go to the block diagram view.
2. Click the *advanced* button under the desired output.
3. Enable the HCSL terminations through the check box under the “HCSL” header.



11.3 Configuring the Device for Write Frequency Mode

1. Go to the block diagram view.
2. Change the Operation Mode to “DCO”.



3. Adjust the frequency control word through the “Frequency Control goal (ppt)” data field.

12. Revision History

Revision	Date	Description
1.0	Apr 22, 2021	Initial release.

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