*User's Guide*

# *InterConnect Studio*


**ABSTRACT**

InterConnect Studio is used to configure the TPLD family of devices from TI. This document describes the various features of the InterConnect Studio and how to use them. This document is helpful in deepening your understanding of what is available to you while designing your circuits.


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# 1 Introduction

The TPLD family is a family of programmable logic. Creating the connections and configuring the blocks creates a long binary string that is rather unwieldy. To help this, the InterConnect Studio software was created to provide a graphical drag and drop interface that then generates the necessary binary string. This purpose of this document is to describe all the tools available in ICS, and help to ease the barrier of entry into the programmable world.

# 2 Getting Started

To get started using InterConnect Studio follow the steps listed below.

## 2.1 Installation

1. Locate the downloaded setup file on your machine. Open the executable. Click *Next*.

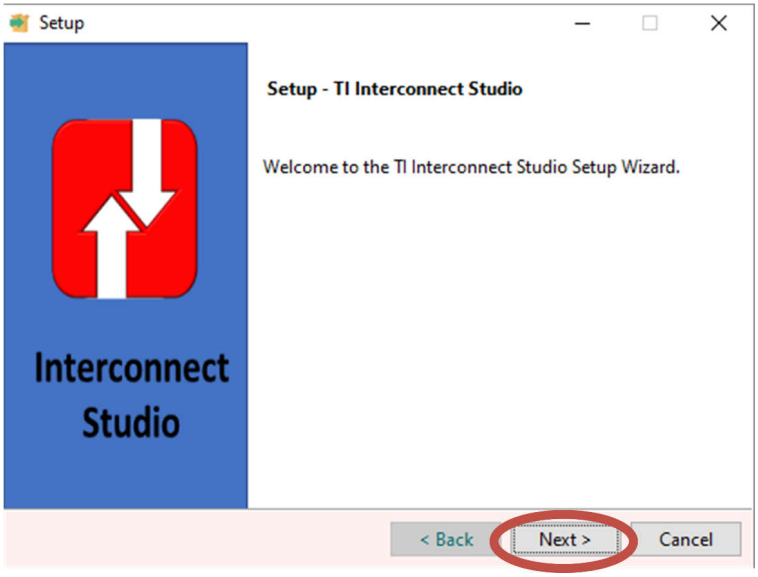


**Figure 2-1. Opening Screen**

2. Click *I accept the agreement*. Then click *Next*.

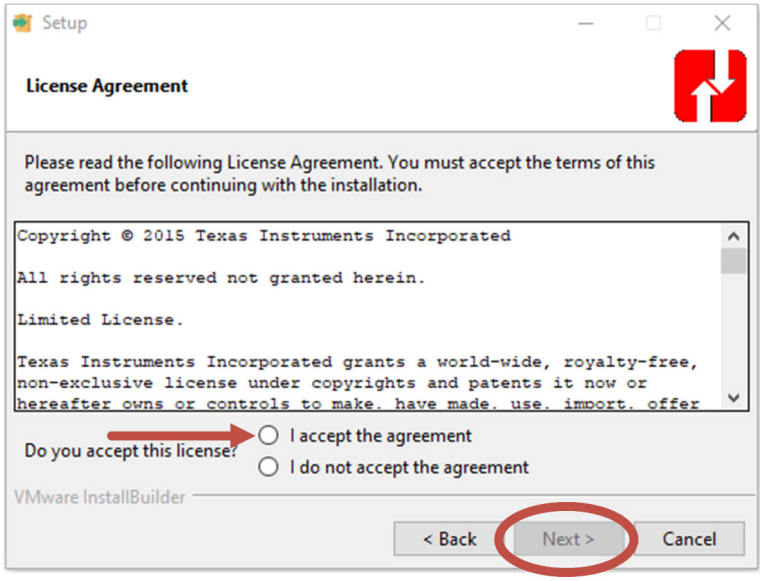


**Figure 2-2. License Agreement**



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3. Type where you want the installation directory to be, or click the folder to open a file explorer and browse for the desired location. Then click *Next*.

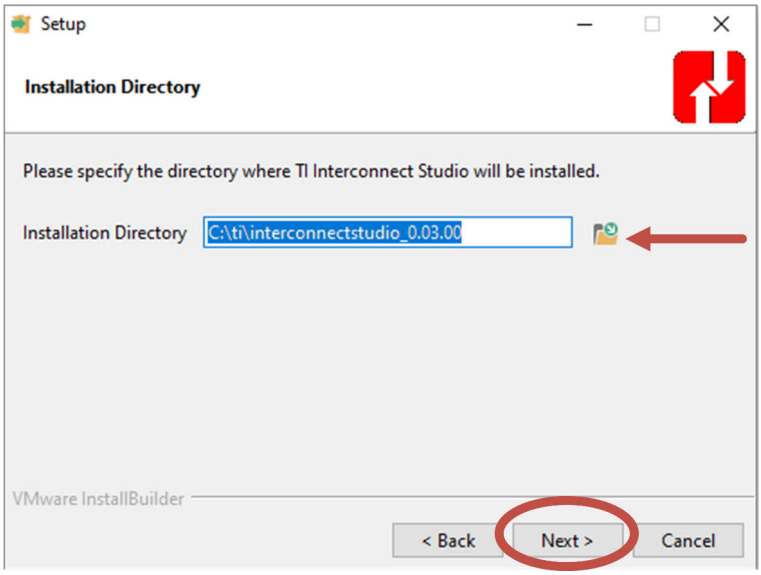


**Figure 2-3. Installation Directory**

4. Wait for the install to finish. Then click *Next*.

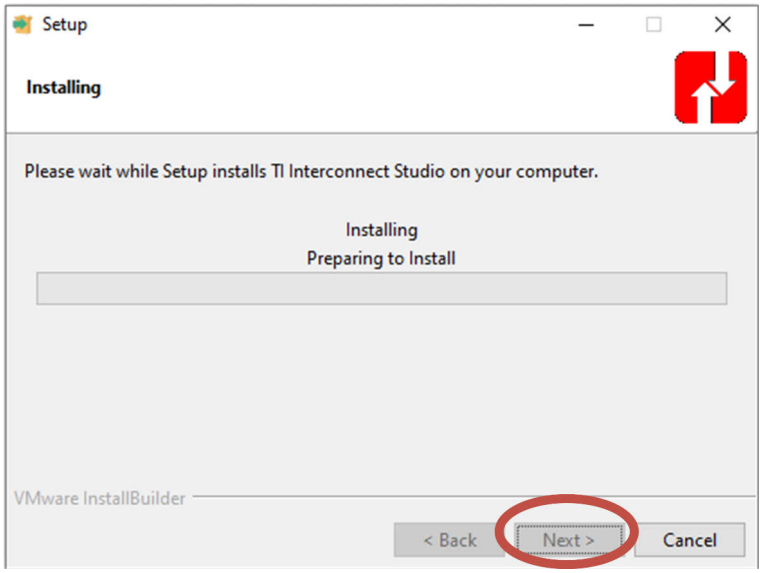


**Figure 2-4. Installation Progress**



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5. When the Complete screen appears, click *Finish*.

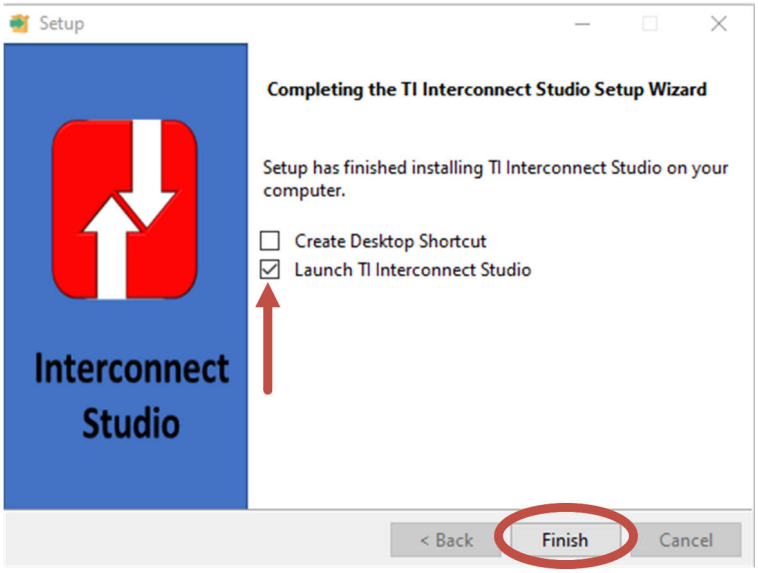


**Figure 2-5. Final Screen**

The first option creates an ICS version onto the users desktop. The second option immediately launches ICS as soon as Finish is clicked and the box is checked. Ensure the Launch TI InterConnect Studio box is checked and click Finish.

## 2.2 Open Design

After opening the software click on the device dropdown (1). Then select a device to start development on (2).

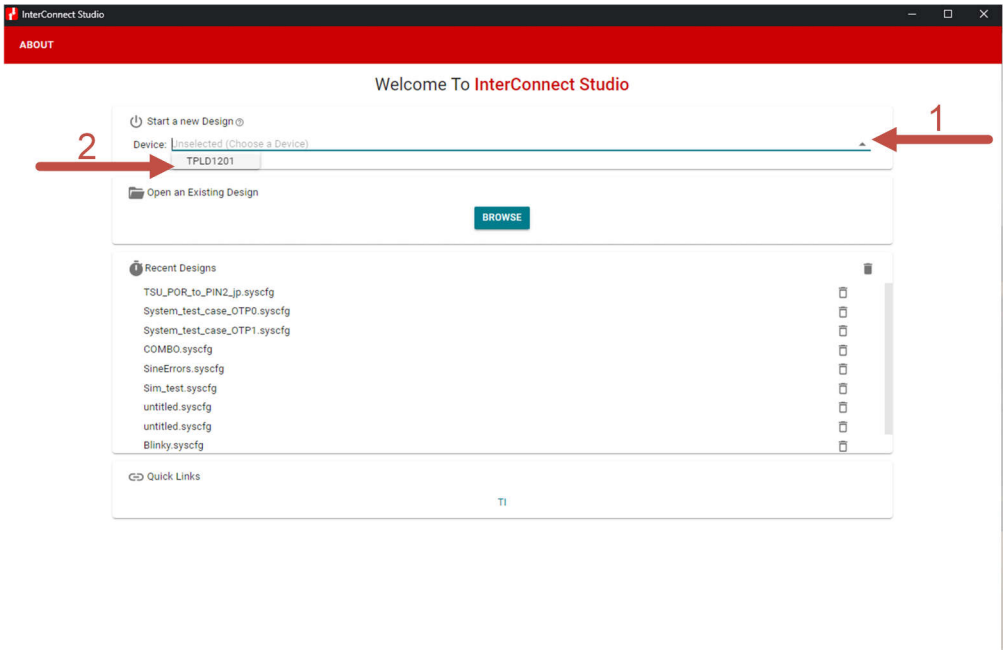


**Figure 2-6. Home Page**


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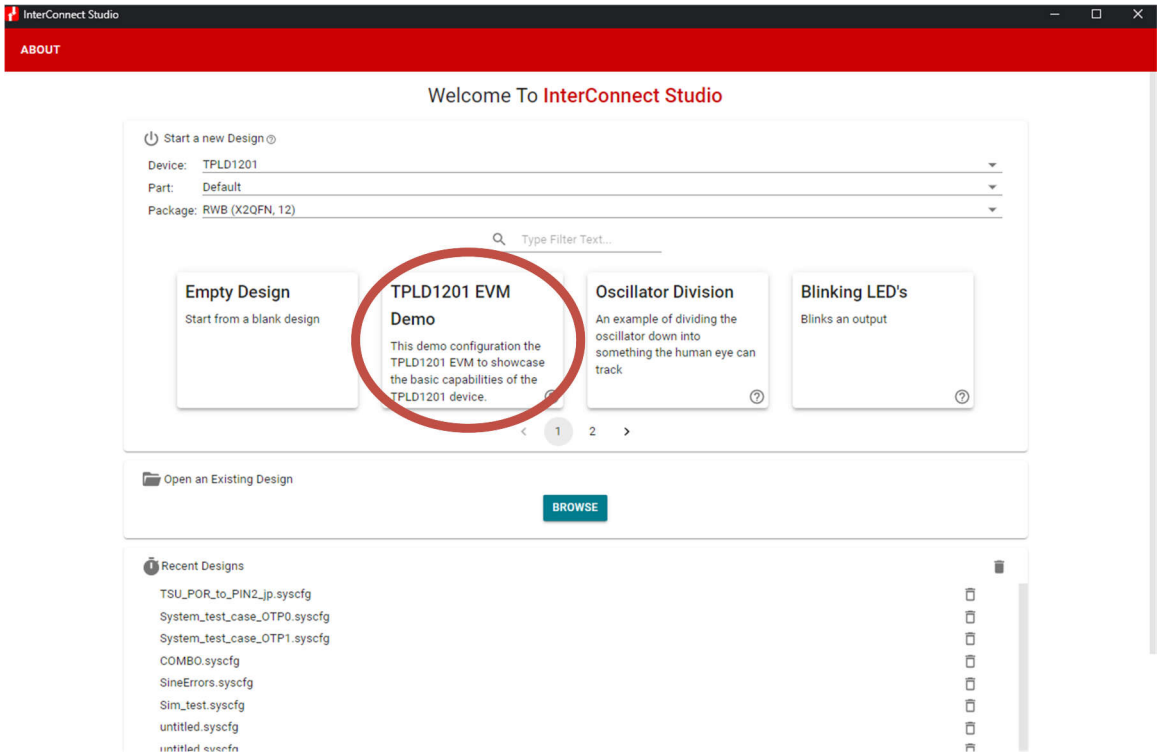


**Figure 2-7. Open the Workspace**

For a faster startup clicking the device specific EVM demo launches the user into the workspace. To start with a blank design, click Empty Design, and begin building a circuit.

## 2.3 Configure Hardware

Follow the directions on the device-specific EVM quick start guide to connect the programmer and EVM to your machine.

1. Select the TPLD Programmer (1). Click Connect (2).

**Figure 2-8. Serial Device Selection**

2. Wait for programming to complete.



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## 2.4 Simulate

Click the simulation tab as shown in Figure 2-9. Wait for the simulation to complete.

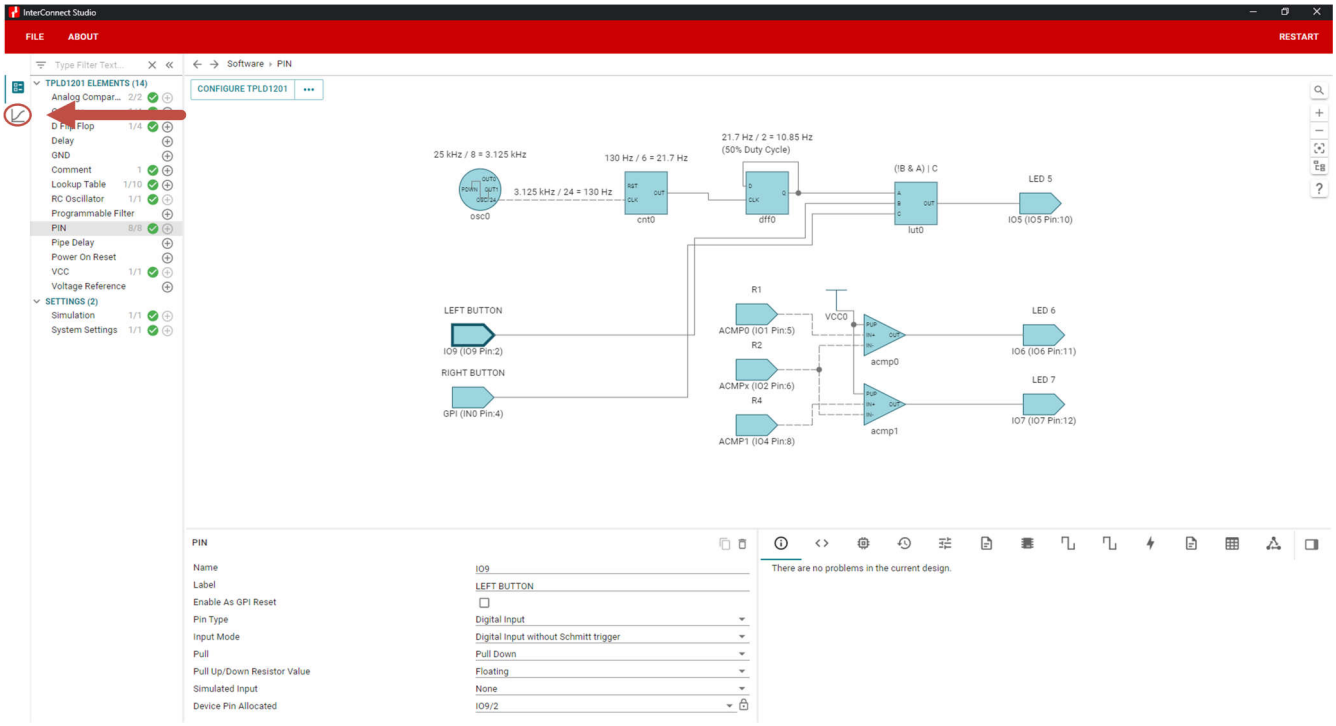


**Figure 2-9. Where to Find Simulation Icon**

### 2.4.1 Adjust Simulation Inputs

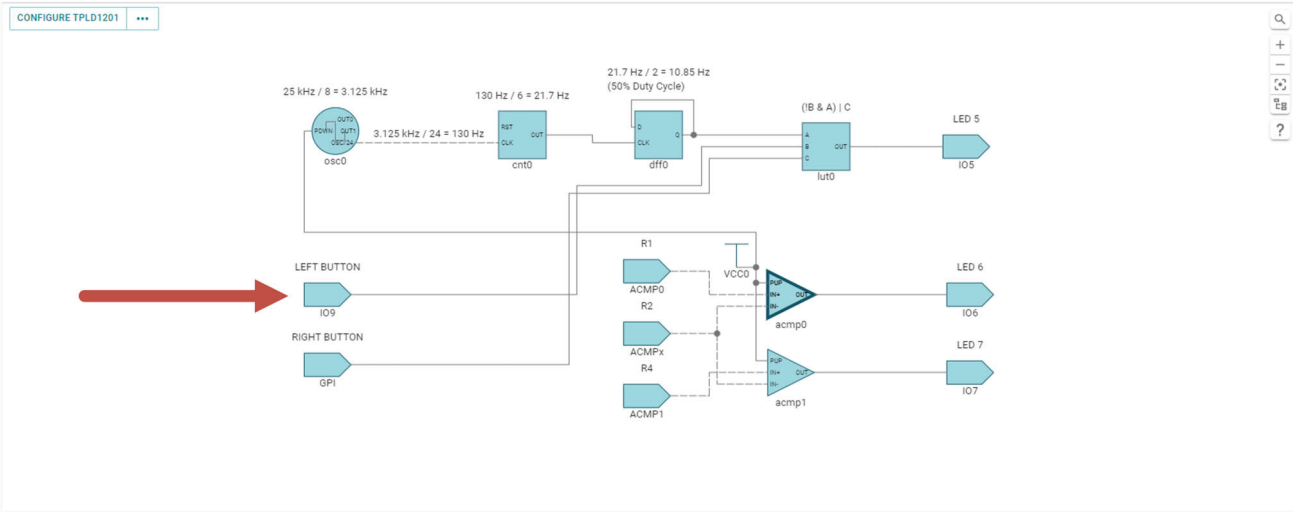


**Figure 2-10. Input Pin**


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1. Select an input pin.

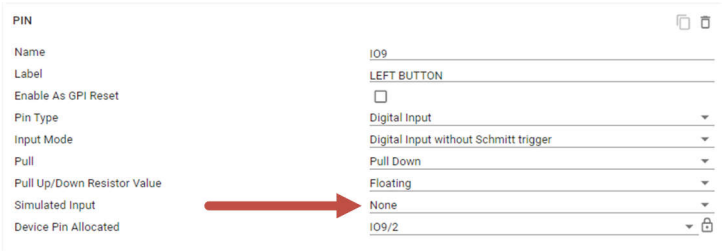


**Figure 2-11. Pin Options**

2. In the configurable options in the bottom left click the Simulated Input dropdown. Select an option.

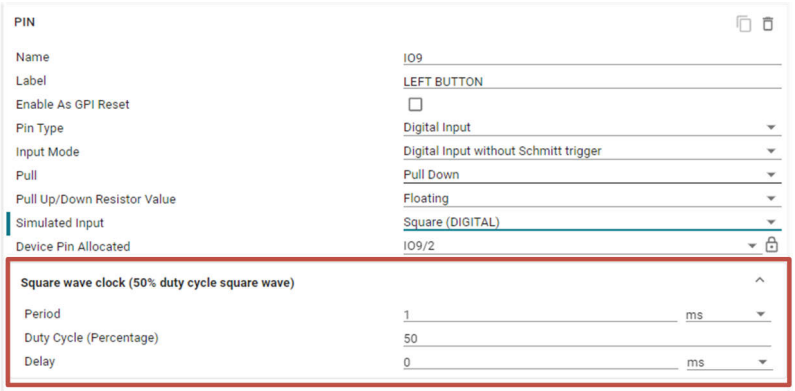


**Figure 2-12. Configure Simulated Input**

3. Adjust Simulated Input options as shown in Figure 2-13. Run the simulation by clicking the *Simulation* tab in the top left.

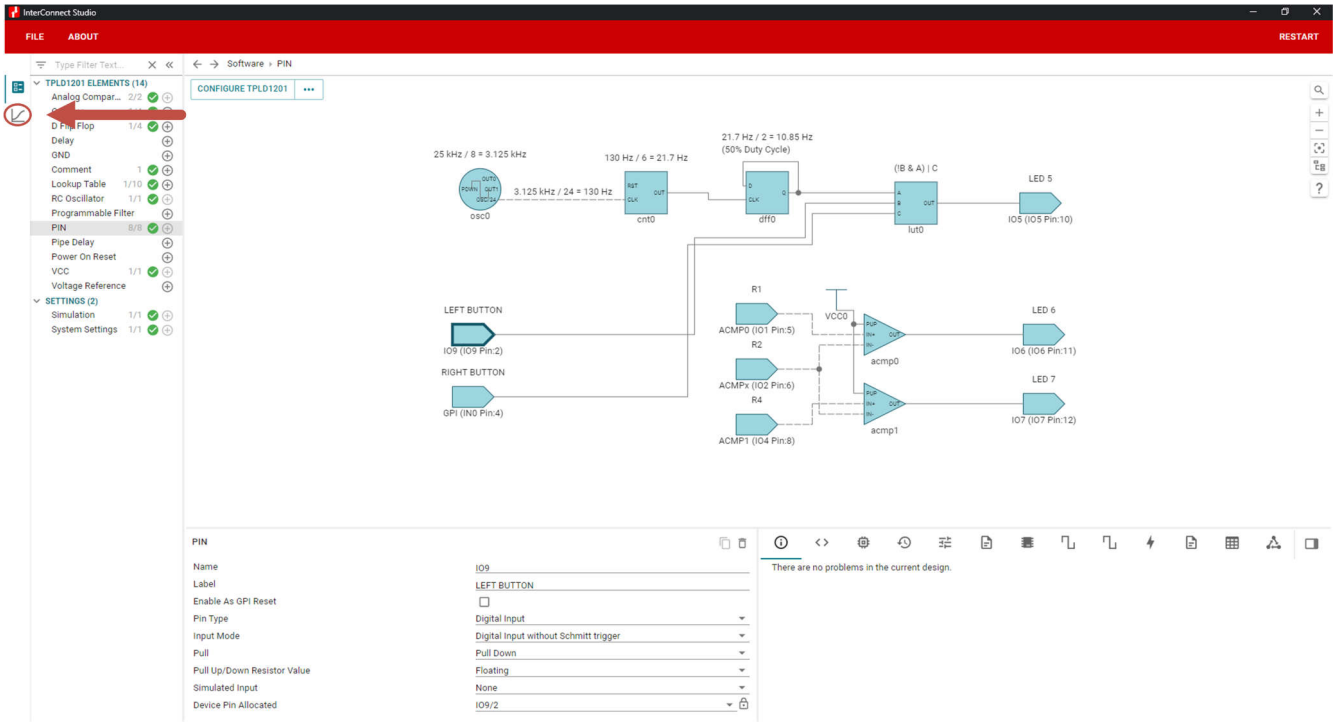


**Figure 2-13. Run Simulation**



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## 2.5 Getting Help

### 2.5.1 In Tool Help

There are three types of in tool help. The first is tooltips that appear when something is hovered over. These will appear within a few seconds of the cursor being over the object. The second is detailed help found in the question marks. While a block is selected, there is detailed help that provides additional information on what a block is as well as certain configurables detailed help to provide additional help on them. The third is online links found within the detailed help. These links go to the device-specific data sheet or any additional materials that can be found on TI.com to help provide an even more in depth guide.

### 2.5.2 Out of Tool Help

Go to E2E. First search for your issue and see if somebody else has encountered your problem or browse our FAQs. If none of these answered your question select ask a new question in the top right. Fill out the form, and if your problem is related to the software be sure to include the .syscfg that is generated when the design is saved and the version of ics used as shown in section Section 4.1.2, or Section 3.1

# 3 Home Page

When the software opens the user is greeted with the page shown in Figure 3-1.

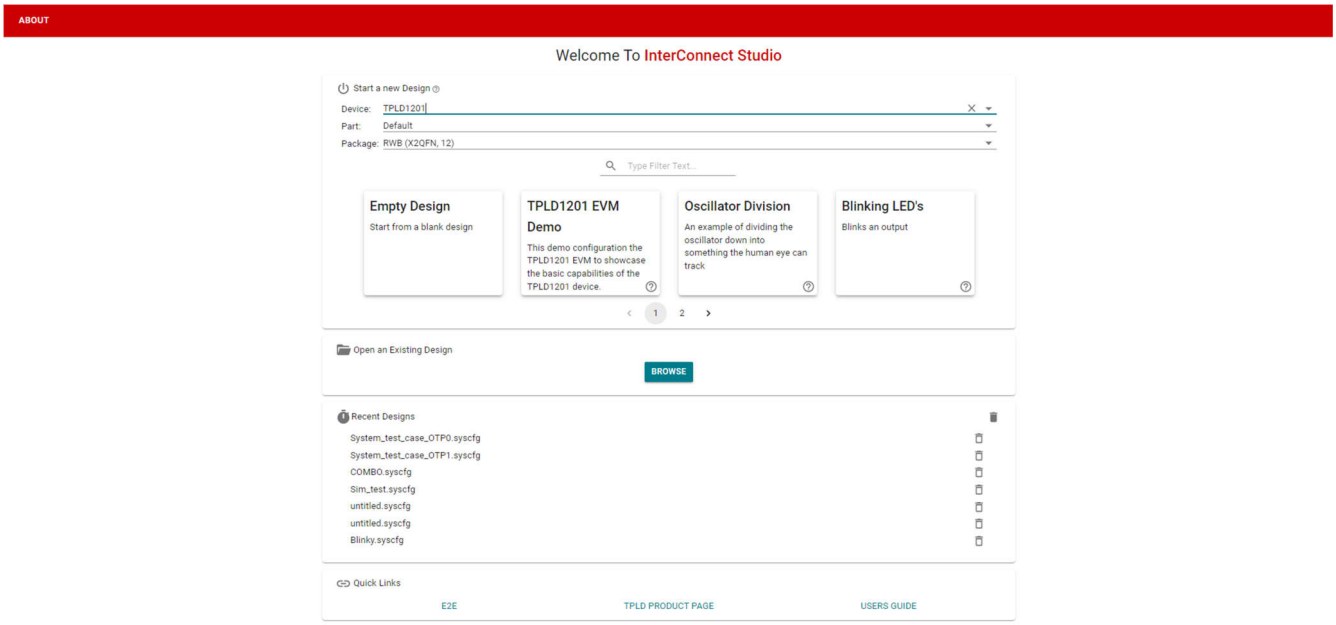


**Figure 3-1. Home Page**



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## 3.1 About

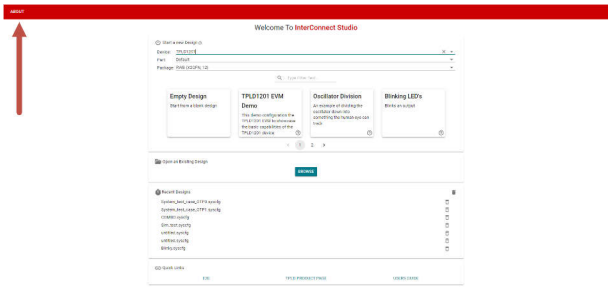


Figure 3-2. Opening the About Dialog

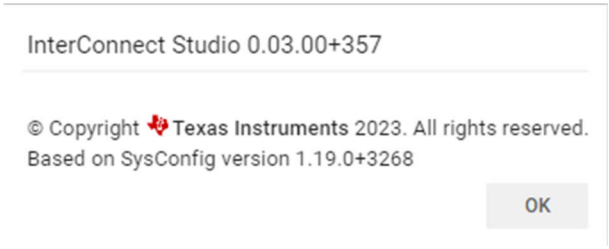


Figure 3-3. About Popup Window

## 3.2 Open an Existing Design

Clicking the browse button opens a file manager to search the system for any existing designs to open, as shown in Figure 3-4.

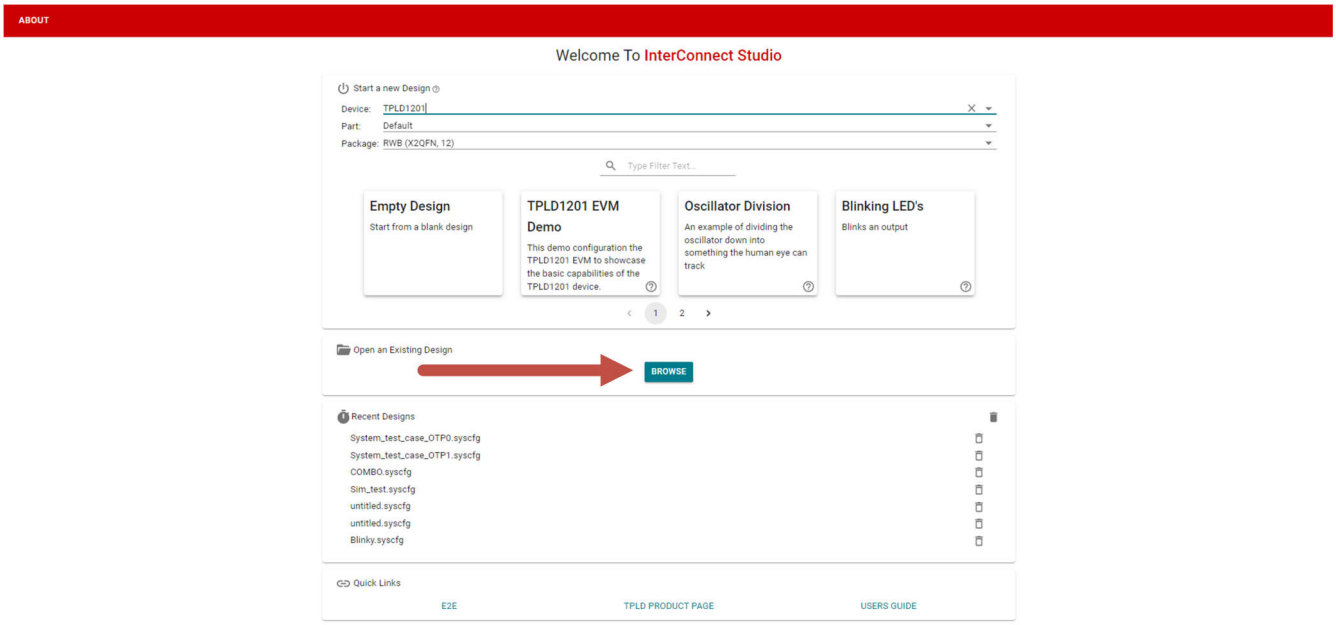


Figure 3-4. Button to Open Existing Designs



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## 3.3 Recent Designs

This is a list of the 10 most recent designs opened on the users machine. Clicking one of the past designs launches into the workspace with that design.

Clicking the trash can icon removes that design from the current table of recent designs. This does not delete the file. Opening the file again and saving a new version returns the design back to the recent designs table.

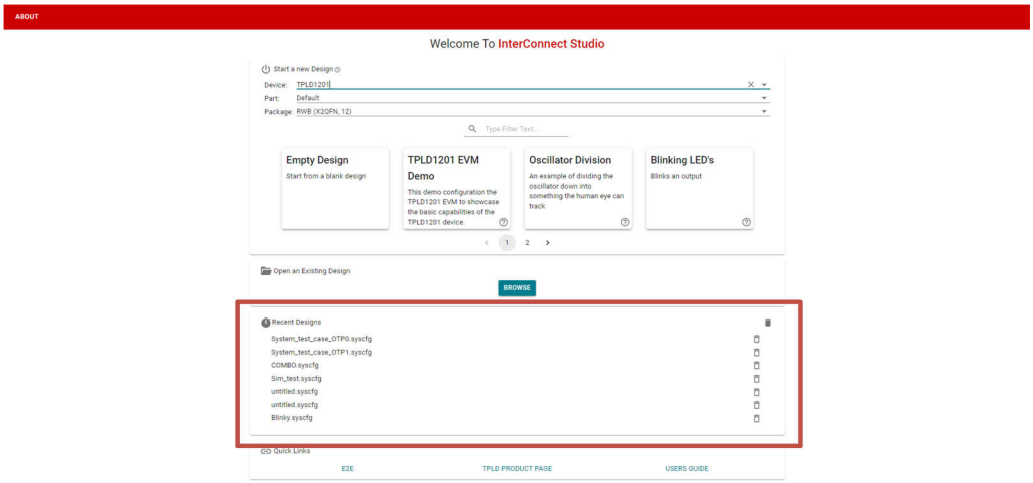


**Figure 3-5. Recent Designs**

## 3.4 Quick Links

Links to quickly access some useful information. The links are to E2E, TPLD Product Page, and this user's guide.

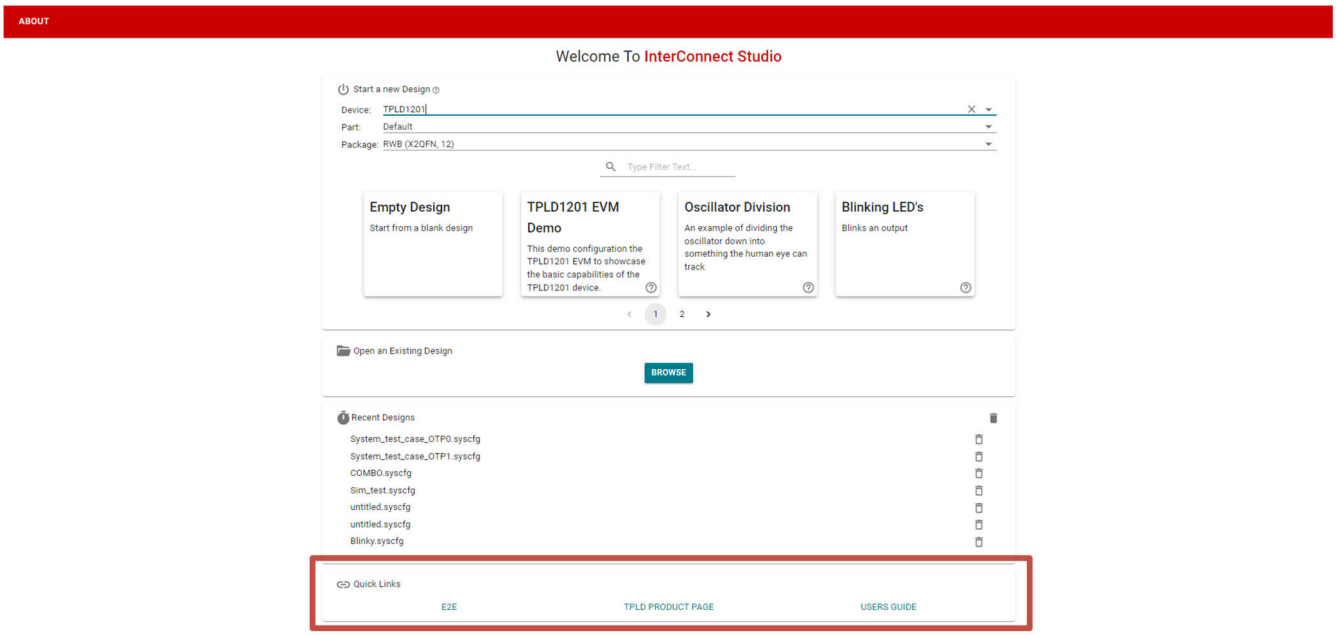


**Figure 3-6. Quick Links**



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## 3.5 Update

This section is not always populated. If the version of ICS is not the most current one, a button is visible to download the newest version.

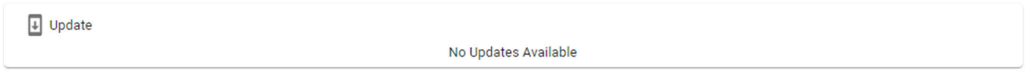


**Figure 3-7. Update Banner**

## 3.6 Start a New Design

The device dropdown allows the user to select from supported devices. Typing while the dropdown is open filters the list of available parts as shown in Figure 3-8

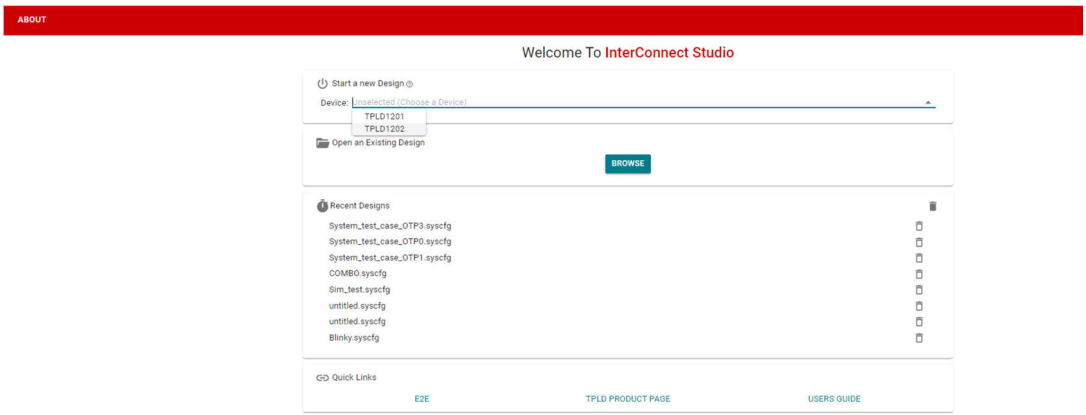


**Figure 3-8. Device Dropdown**

Once the device has been selected, the user can change which package is drawn in the tool as shown in Figure 3-9.

**Figure 3-9. Selecting Package**

### *3.6.1 Reference Designs*

Once the steps shown in Section 3.6 have been completed reference designs appear below. Clicking the Blank Design option launches the software into a blank workspace to begin creating a circuit. The reference designs have a search bar at the top to filter the list down to a more manageable amount. Each reference design has a short description, and by clicking on the question mark in the bottom right, a longer description appears. The user can click one of these reference designs to launch into the workspace with that design selected.

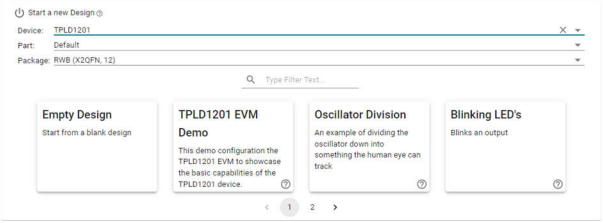


**Figure 3-10. Reference Designs**

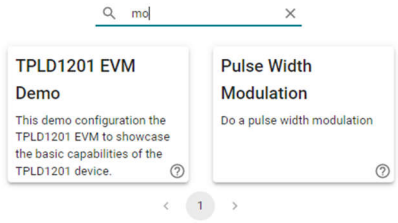


**Figure 3-11. Reference Designs Filtered**



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# 4 Workspace

## 4.1 Menus

This section is describing items that are on the periphery of the workspace screen.

### *4.1.1 File Button*

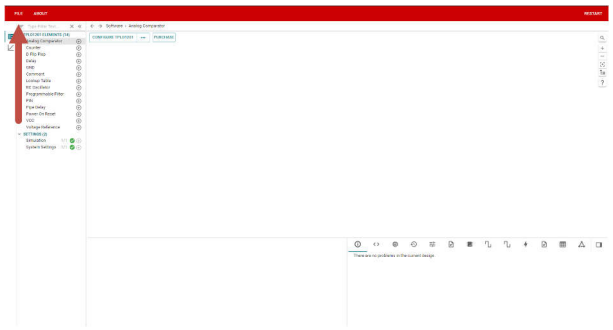

Figure 4-1. FIle Button Location

Figure 4-2. File Dropdown

**New** - The New button takes the user back to the Home Page. If there is any unsaved progress a prompt appears to save their progress. All unsaved progress is lost.

**Open** - The Open button opens a file manager to select previously saved designs. If a design is selected a prompt appears to save the current progress. All unsaved progress is lost.

**Save** - The Save button saves the current design over the existing save. If no existing save is found ICS opens a file manager to choose the location and name of the saved file.

**Save as** - The Save as button opens a file manager to prompt the user for the location and name of the saved file. Once saved ICS no longer saves to the original file name, and only overwrites the file with the new file name in that location.

### *4.1.2 About*

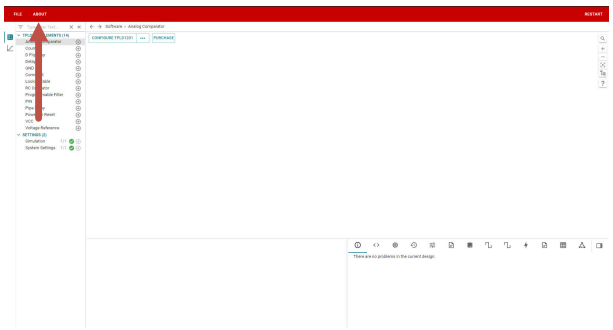

Figure 4-3. Location of About Button

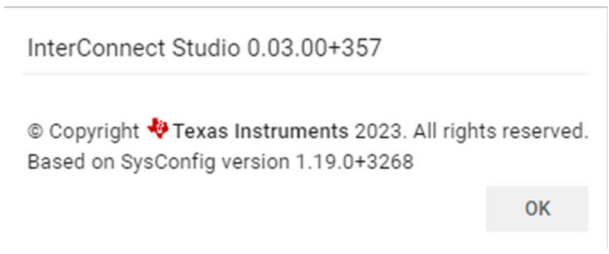


Figure 4-4. About Popup

The About button opens a text box that states the current version of ICS and what version of SysConfig the current version is based on.



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### 4.1.3 Restart

The Restart button resets the current configuration to the last save. When selected a prompt appears warning the user about unsaved progress, and any unsaved progress is lost.

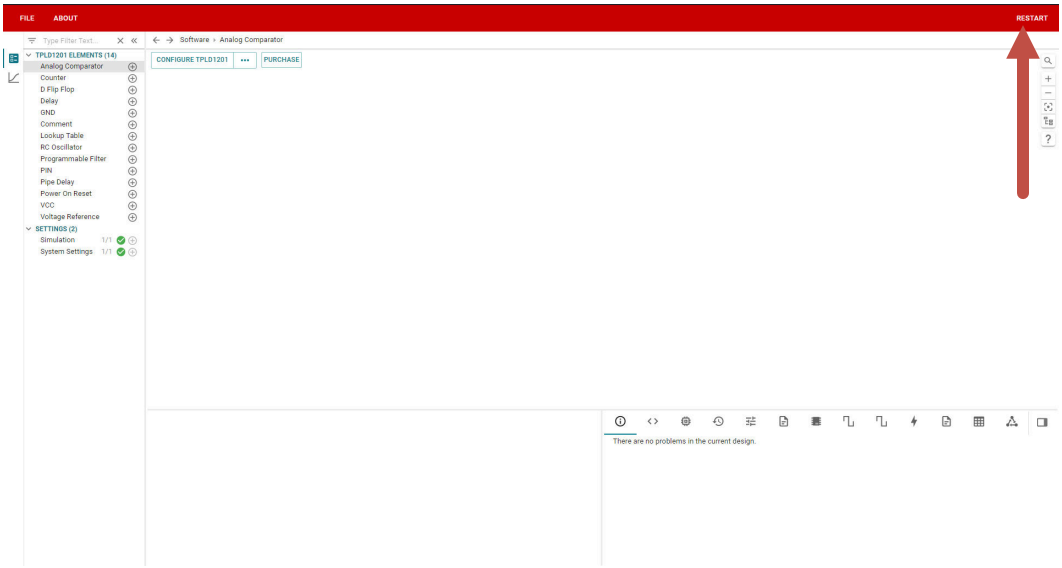


**Figure 4-5. Location of Restart Button**

### 4.1.4 Window Selection

On the far left of the tool there are two icons. The top icon refers to the workspace view and the lower icon refers to the simulation view. While in the workspace, clicking on the second icon initiates the simulation. Once the simulation finishes running, the window shows the waveform results of the simulation. While in simulation view clicking on the top icon return to the workspace to continue creating the design.

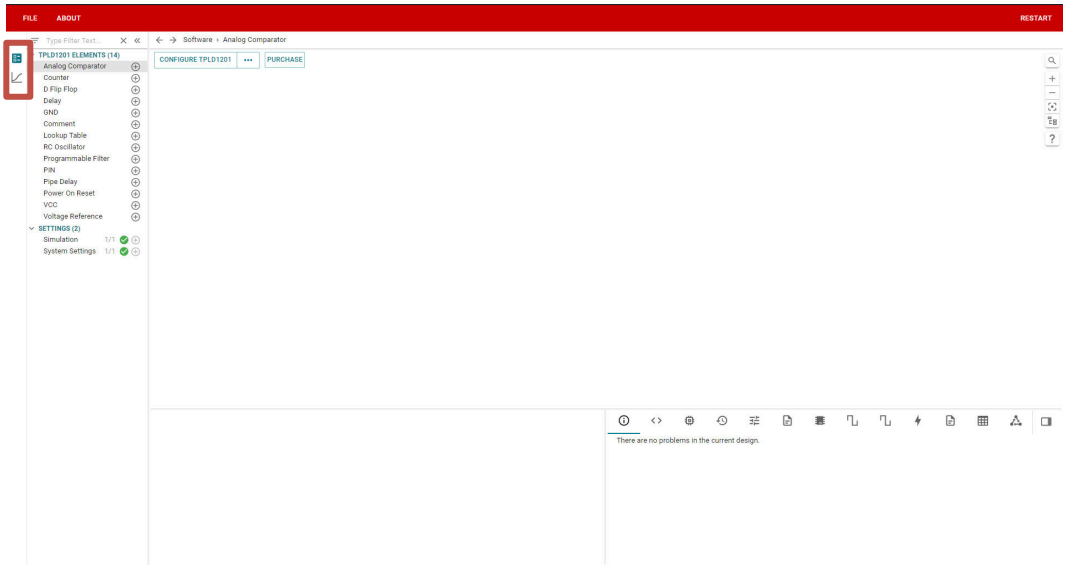


**Figure 4-6. Window Selection Location**



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### 4.1.5 Elements List

The elements list as shown in Figure 4-7 displays the current available elements for this device. Clicking the + button adds said element to the design space. The gray numbers that appear are indicative of how many of a specific element are added to the current design versus the total possible for the selected device.

Many resources that can be allocated use multiple elements. The max number for an element does not reflect the max currently available to the user. The number instead reflects the total possible for that device. If there are no resources available for that element an error appears.

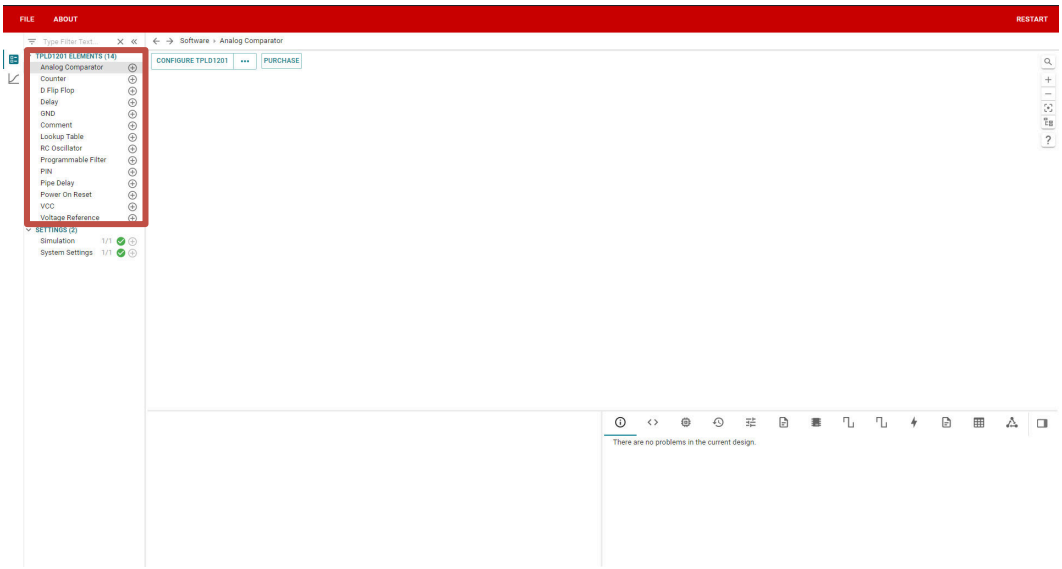


**Figure 4-7. Elements List Location**

### 4.1.6 Static Buttons

At the top left of the design space are buttons labelled Configure|... and Purchase as shown in Figure 4-8.

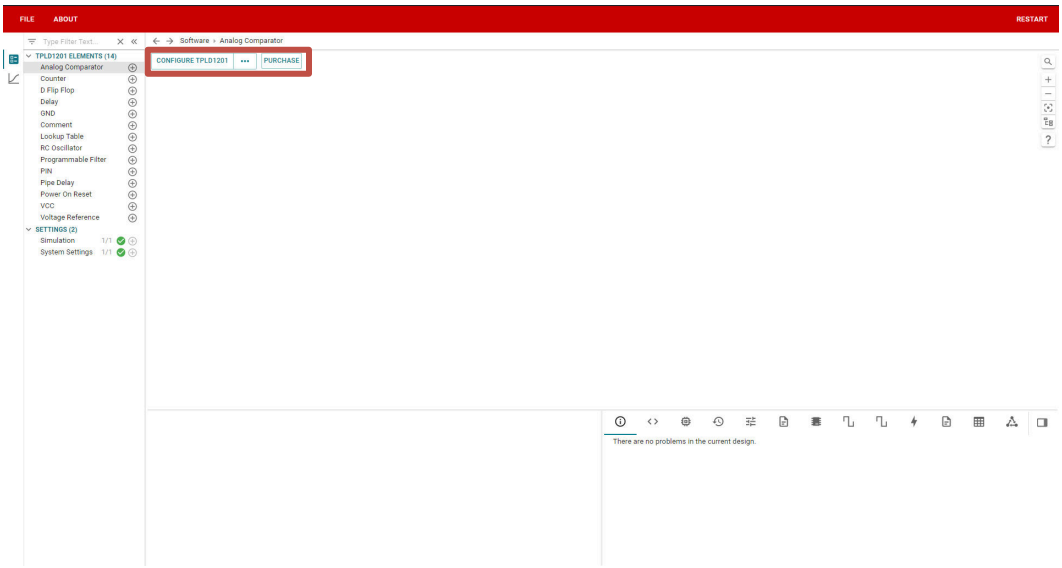


**Figure 4-8. Floating Buttons Location**

Figure 4-9 - Clicking the Configure button opens a popup to connect the machine to a programmer. This list is filtered to only support TI Programmers and does not support custom boards. (1) Click the desired programmer if multiple are connected. This choice is remembered for the next configure as well. (2) Click connect and the communication starts.



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Figure 4-10 - Clicking the Additional Settings button opens a popup to allow the user to switch ports, enable permanent configuration, and select where the power after configuring comes from. The choices made in this window are remembered for the next time the user clicks Configure. Clicking OK starts communication between programmer and machine.

Figure 4-9. Configure Popup

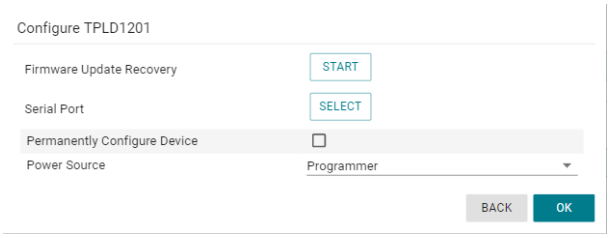


Figure 4-10. Additional Settings Popup

Figure 4-11 - Clicking the Purchase button opens a form for the user to fill out. Information for the acknowledgment section can be found in the question mark that appears when the cursor hovers over the text. Once the form has been adequately completed, clicking OK opens a browser window informing the user the request has been submitted.

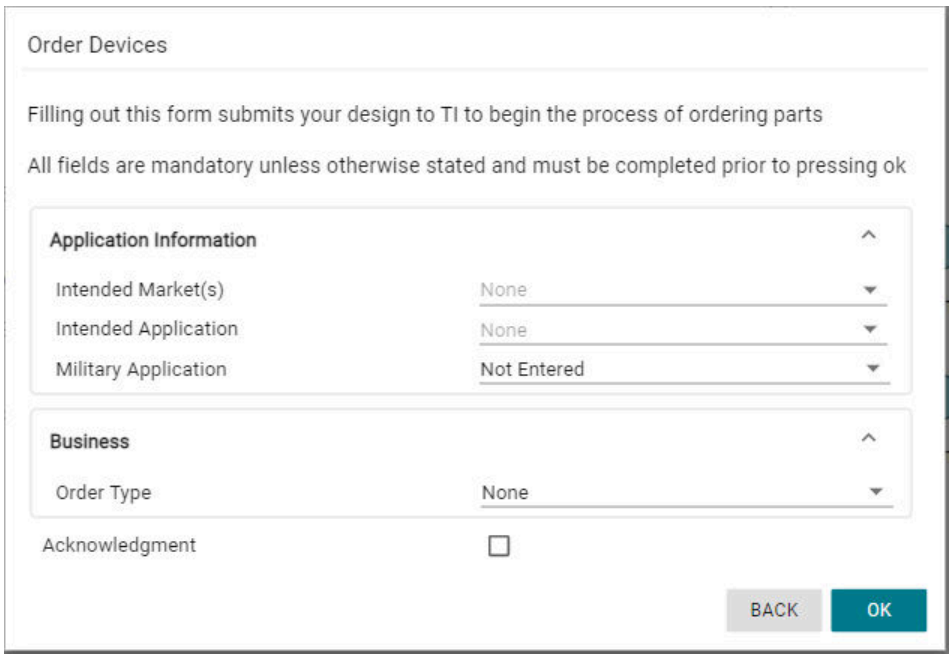


Figure 4-11. Order Devices Popup



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### 4.1.7 Workspace Toolbar

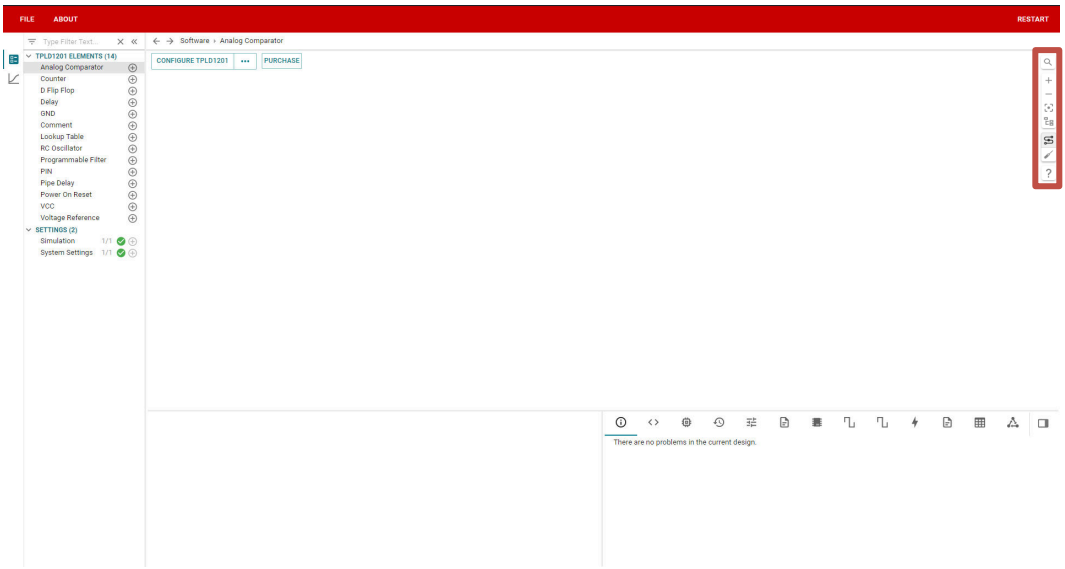


**Figure 4-12. Location of Worksace Toolbar**

**Magnifying Glass** - Clicking the Search button opens a text box to allow the user to search through their workspace for certain element names. Elements with names matching the search remain fully bright and visible as those that do not become subdued.

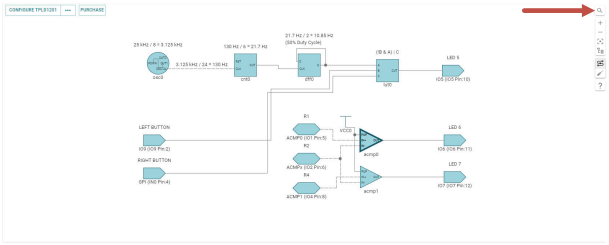

**Figure 4-13. 1201 Demo Unfiltered**

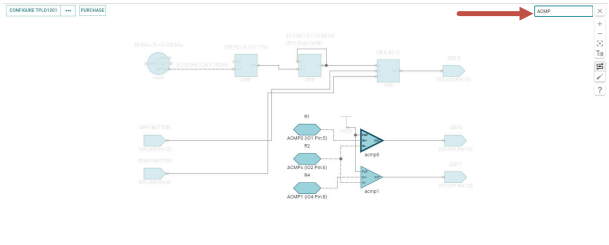

**Figure 4-14. 1201 Demo Filtered to "acmp"**

**Plus Sign** - Clicking the Plus button zooms into the current center of the design space. Shortcut: Ctrl + Scroll Wheel Up.

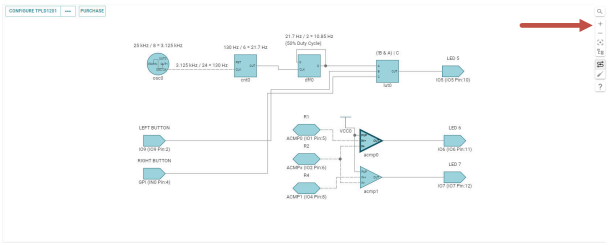

**Figure 4-15. 1201 Demo Standard Zoom**

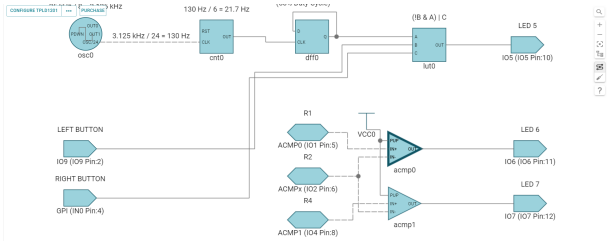


**Figure 4-16. 1201 Demo Zoomed In**



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**Minus Sign** - Clicking the Minus button zooms out while maintaining the center of the design space. Shortcut: Ctrl + Scroll Wheel Down.

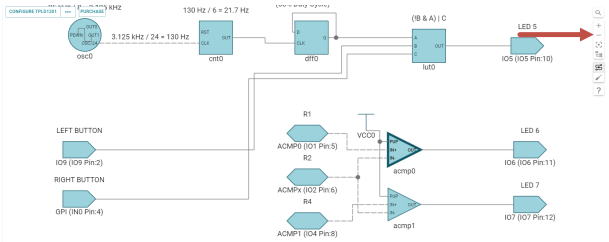


**Figure 4-17. 1201 Demo Zoomed in**

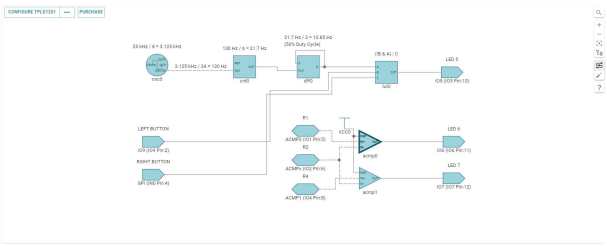

**Figure 4-18. 1201 Demo Zoomed Out**

**Dot Inside Square** - Clicking this icon centers the design space and zooms to fit.

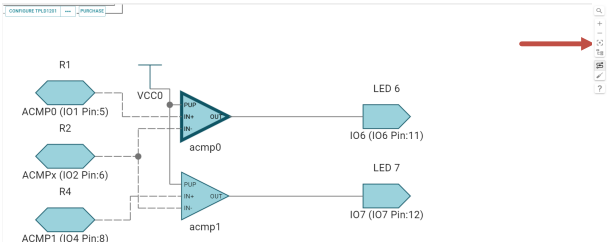


**Figure 4-19. 1201 Demo Zoomed in and Off-center**

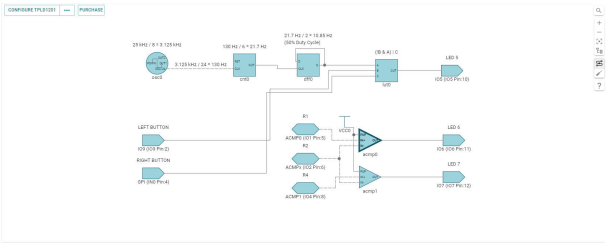

**Figure 4-20. 1201 Demo Recentered**

**Arrange** - Clicking the Arrange icon auto arranges the instantiated components.

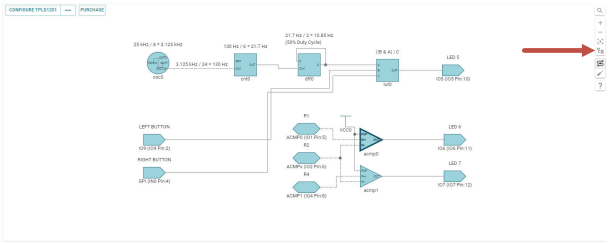

**Figure 4-21. TPLD1201 EVM Demo**

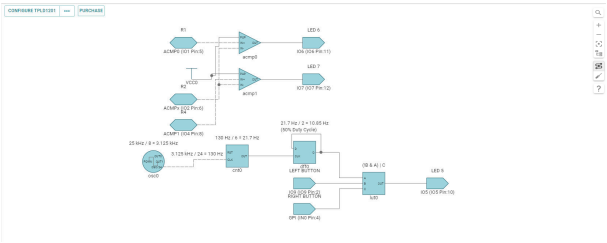

**Figure 4-22. TPLD1201 EVM Demo Auto Arranged**



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**Connect Wires** - Connect wires is the default option for the cursor. This icon can only be clicked when in the connect probes setting. Clicking this option allows the user to connect two ports together.

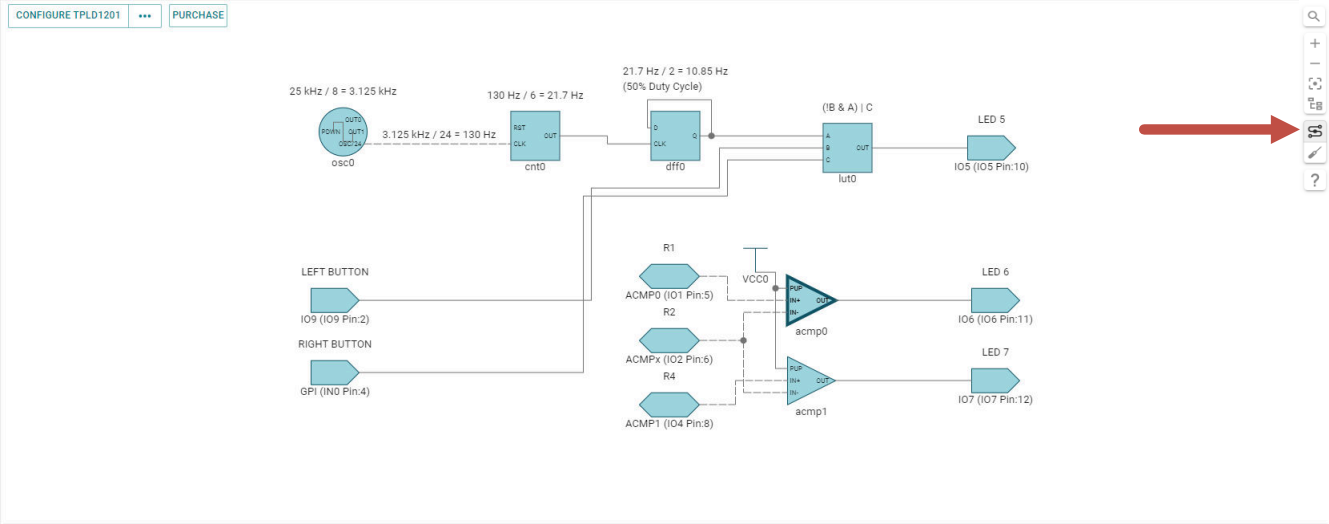


**Figure 4-23. Connect Wires Location**

**Connect Probes** - Clicking the Connect Probes icon allows the user to probe ports. Ports that appear green are probed, and ports that appear gray are not. More information on probes can be found in Section 5.1.

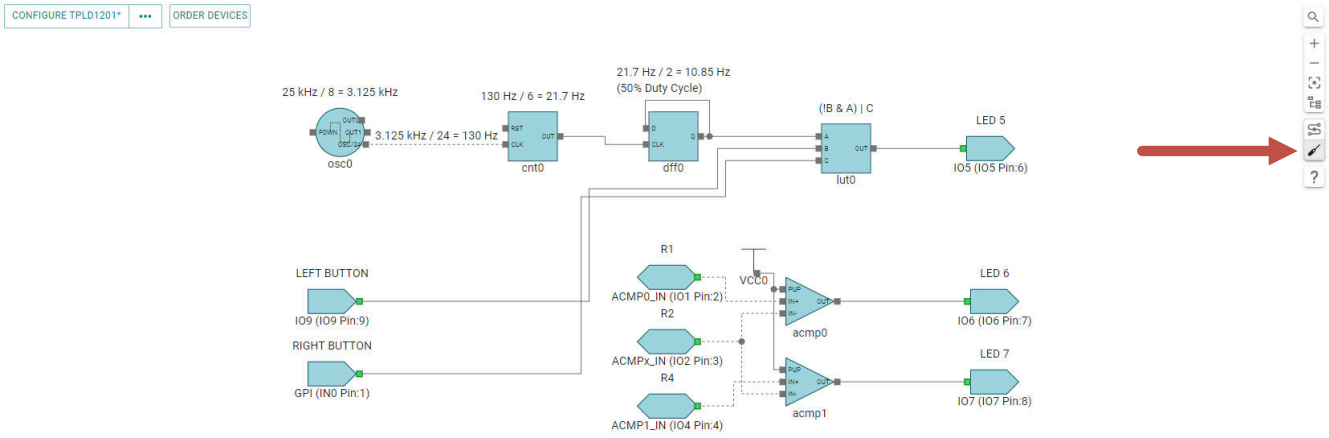


**Figure 4-24. Connect Probes Location**



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**Question Mark** - Clicking the question mark opens a floating window with information regarding various controls and items the user can view in the design space.

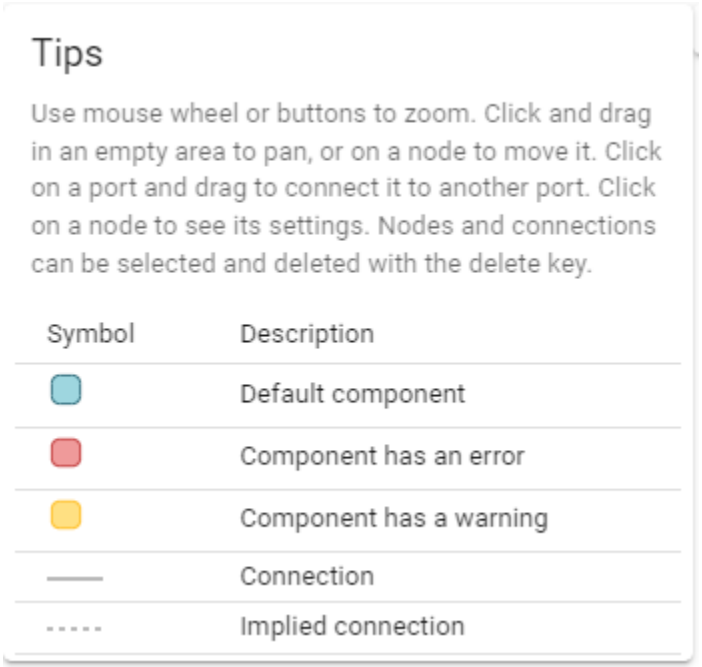


**Figure 4-25. Help Popup**

## 4.2 Views

This section refers to all the information that appears in the bottom right of the workspace.

### *4.2.1 Problems View*

The problems view is a space to find all errors and warning currently present in the design. This view is the default view for the editor.



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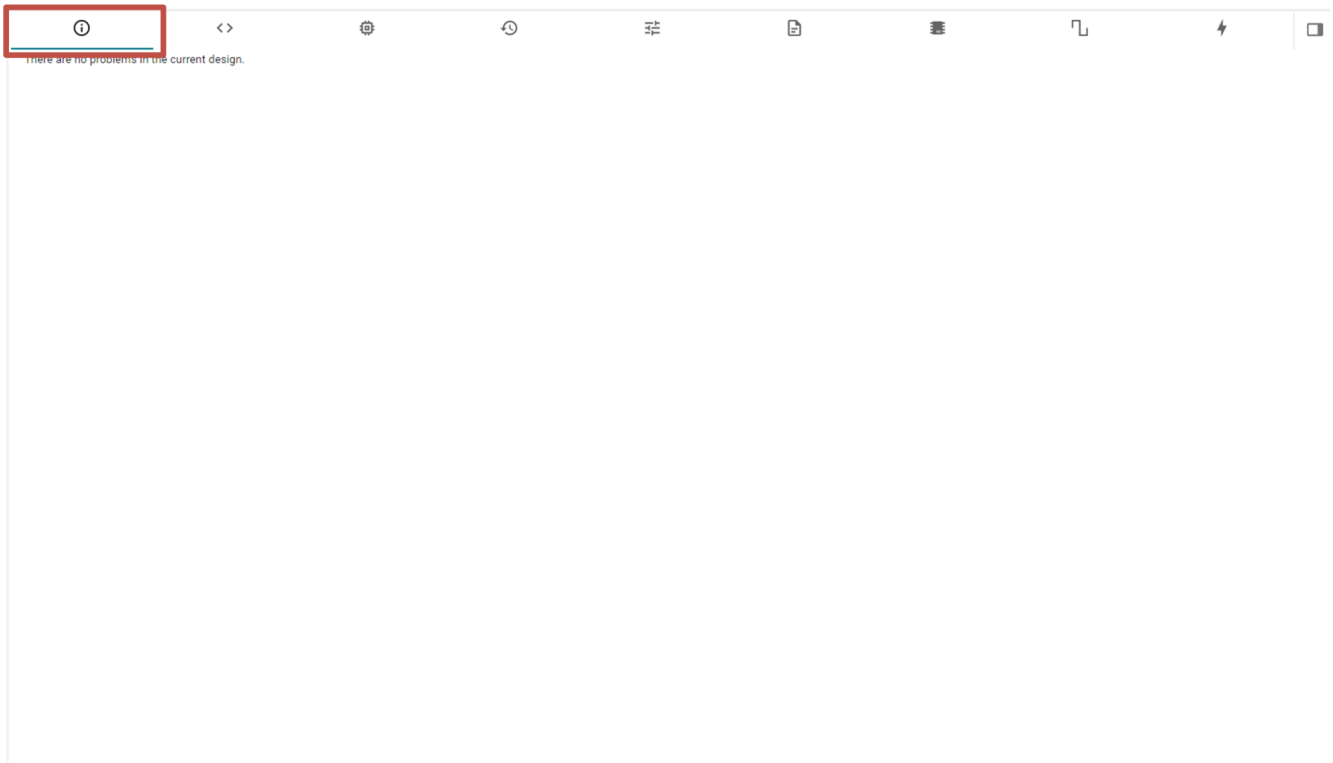


**Figure 4-26. Problems View With no Errors or Warnings**

Figure 4-26 shows an example of the problem view with no errors or warnings. Making changes that result in errors changes the view to something similar to Figure 4-27

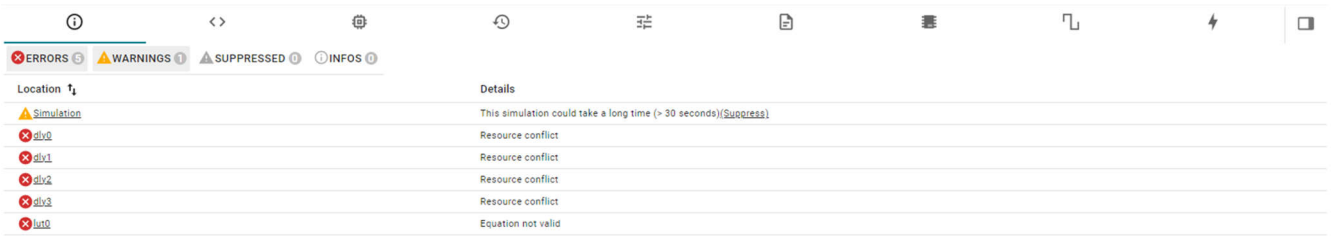


**Figure 4-27. Problems View With Errors and Warnings**

Highlighted in Figure 4-28 are hyperlinks. Clicking one of these hyperlinks highlights the block or configurable that contains that specific error. A warning does not indicate that the design will fail, so the warning can be suppressed here.

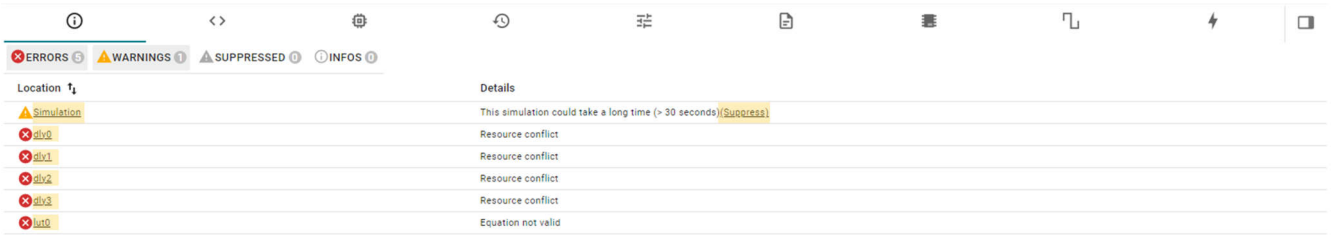


**Figure 4-28. Problems View With Hyperlinks Highlighted**


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### 4.2.2 Generated Files View

This view displays the generated files that the tool makes in the background. The files are in order the .cir that is used to run simulation. the .hex file that is pushed to the programmer, and the save file.

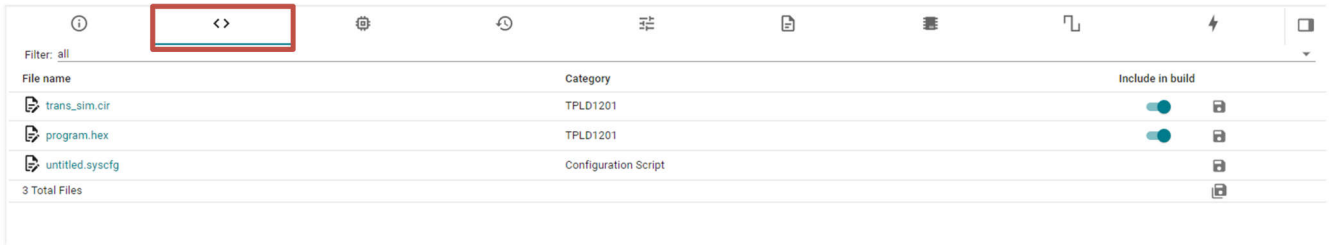


**Figure 4-29. Generated Files View**

Each file has a hyperlink that upon being clicked opens a file preview window.

Shown in Figure 4-30 is the program.hex for a configuration. The file preview is currently set into the No Diff mode meaning the preview is showing exlusively the latest version of that file. Clicking the three vertical dots at the top right of the file preview opens a popup to select different types of Diff modes.

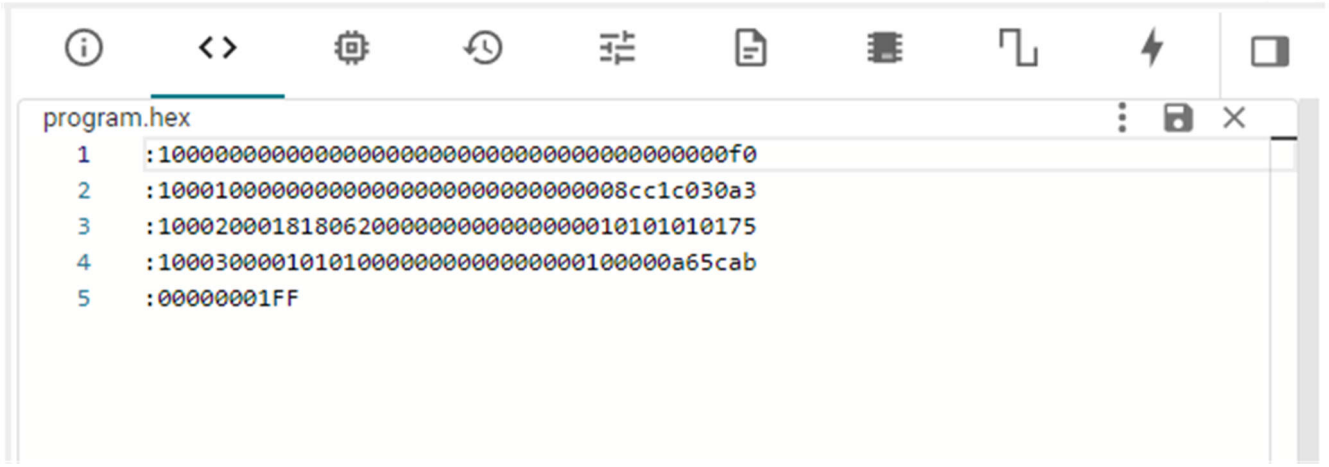


**Figure 4-30. Generated Files View File Preview, No Diff**



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In unified diff mode, shown in Figure 4-31, the new text is highlighted in green while the old text is highlighted in red above the new text. In side-by-side diff, shown in Figure 4-32, the old text is shown on the left, with the changes highlighted in red, while the new text is shown on the right with the changes highlighted in green.

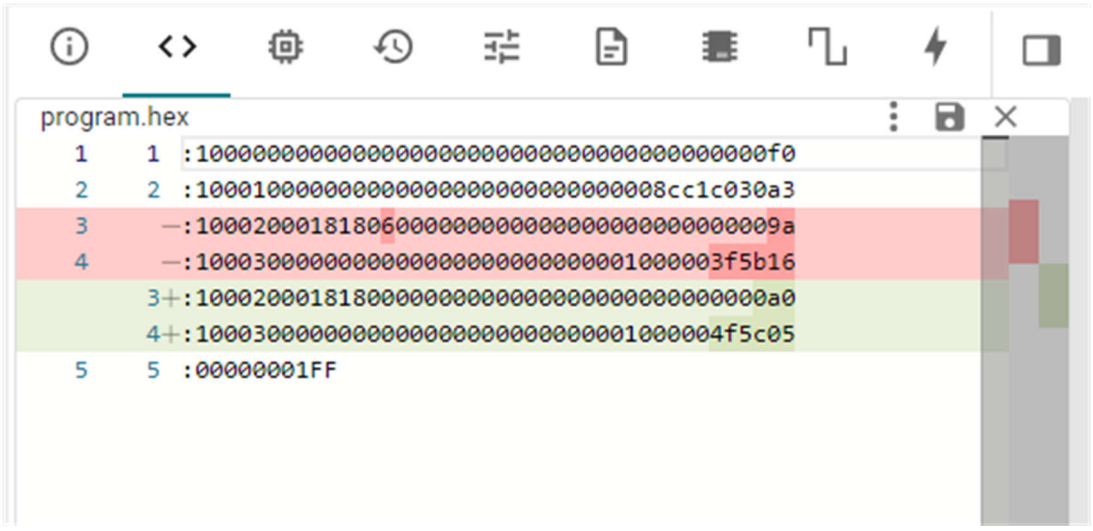


**Figure 4-31. Generated Files View File Preview, Unified Diff**

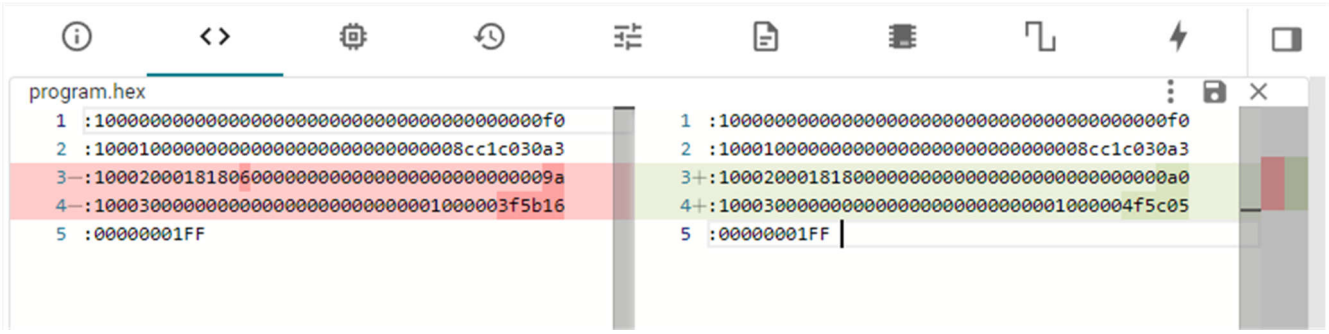


**Figure 4-32. Generated Files View File Preview, Side-by-Side Diff**



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### 4.2.3 Device View

The device view shows the pin out of the device and highlights which pins are still available and which are being used.

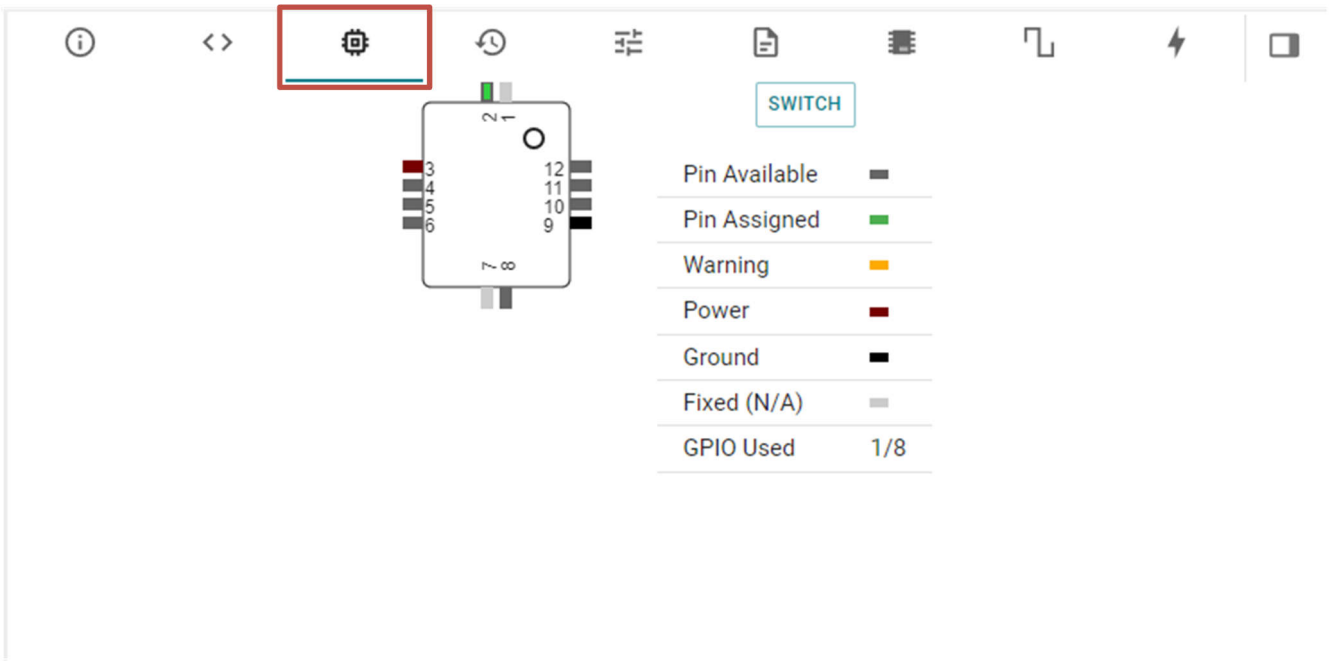


**Figure 4-33. Device View**

#### 4.2.3.1 Switching Device

Clicking the switch button opens the prompt shown in Figure 4-34.

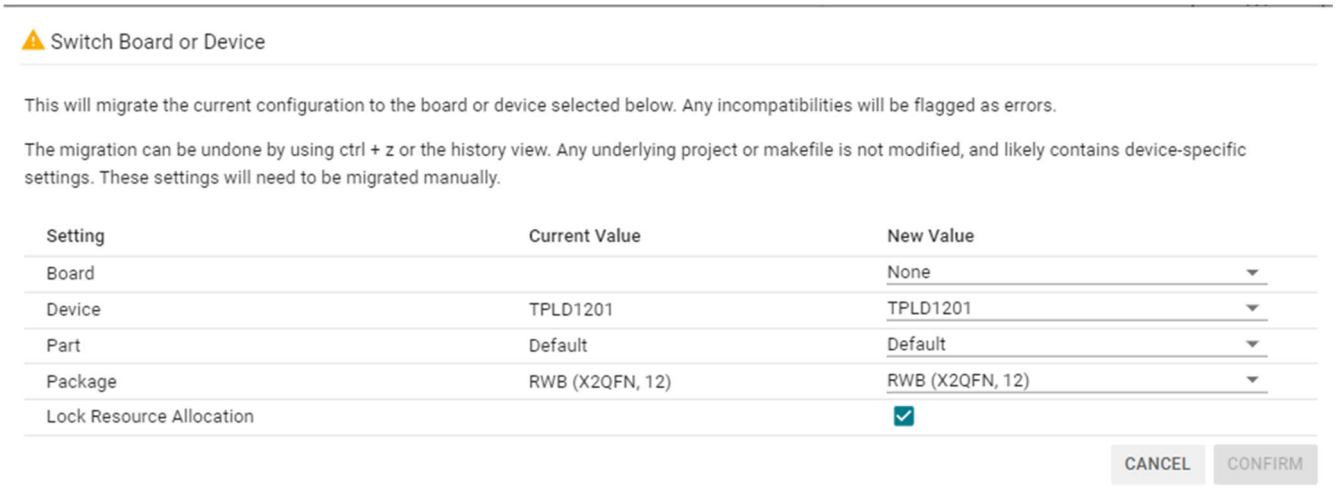


**Figure 4-34. Switch Device Window**

This window allows the user to carry their current design over to a potentially new device. The Board dropdown can be ignored as TPLD do not use specific boards. Use the device and package dropdowns to select the new device to migrate the design to. If the lock resource allocation is checked the tool tries to map any given resource to a resource with the exact same name on the new device. Unchecking this box allows the tool to dynamically allocate new resources to the blocks that are already instantiated in the design.

Switching devices is no different from other changes made within the tool and can be quickly undone with CTRL+Z or by clicking on the history as shown in Section 4.2.4.



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### 4.2.4 History View

The history view is used to see the latest changes made to a design in the current session.

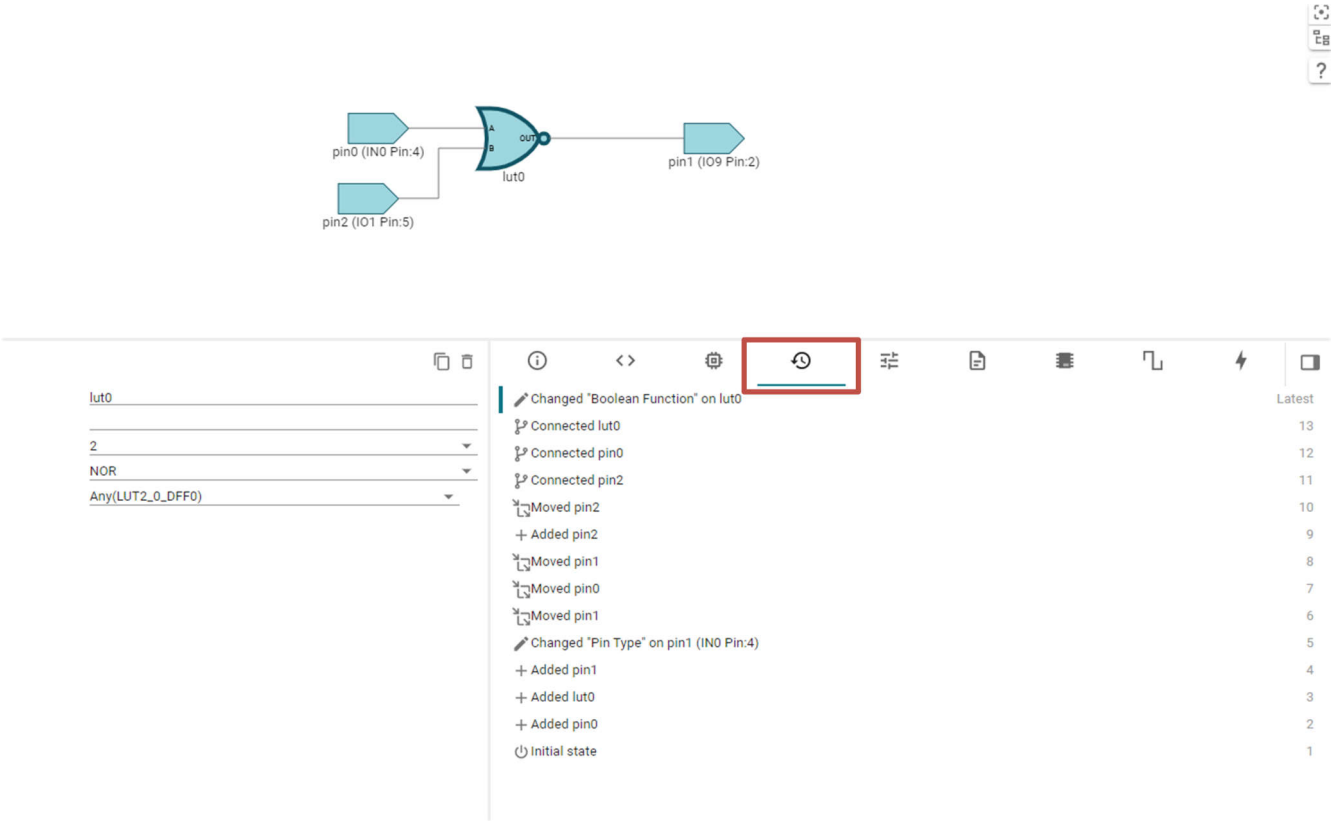


**Figure 4-35. History View**



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Pressing Ctrl+Z undoes the latest change made as shown in Figure 4-36. Repeated presses of Ctrl+Z continues down the history undoing past changes.

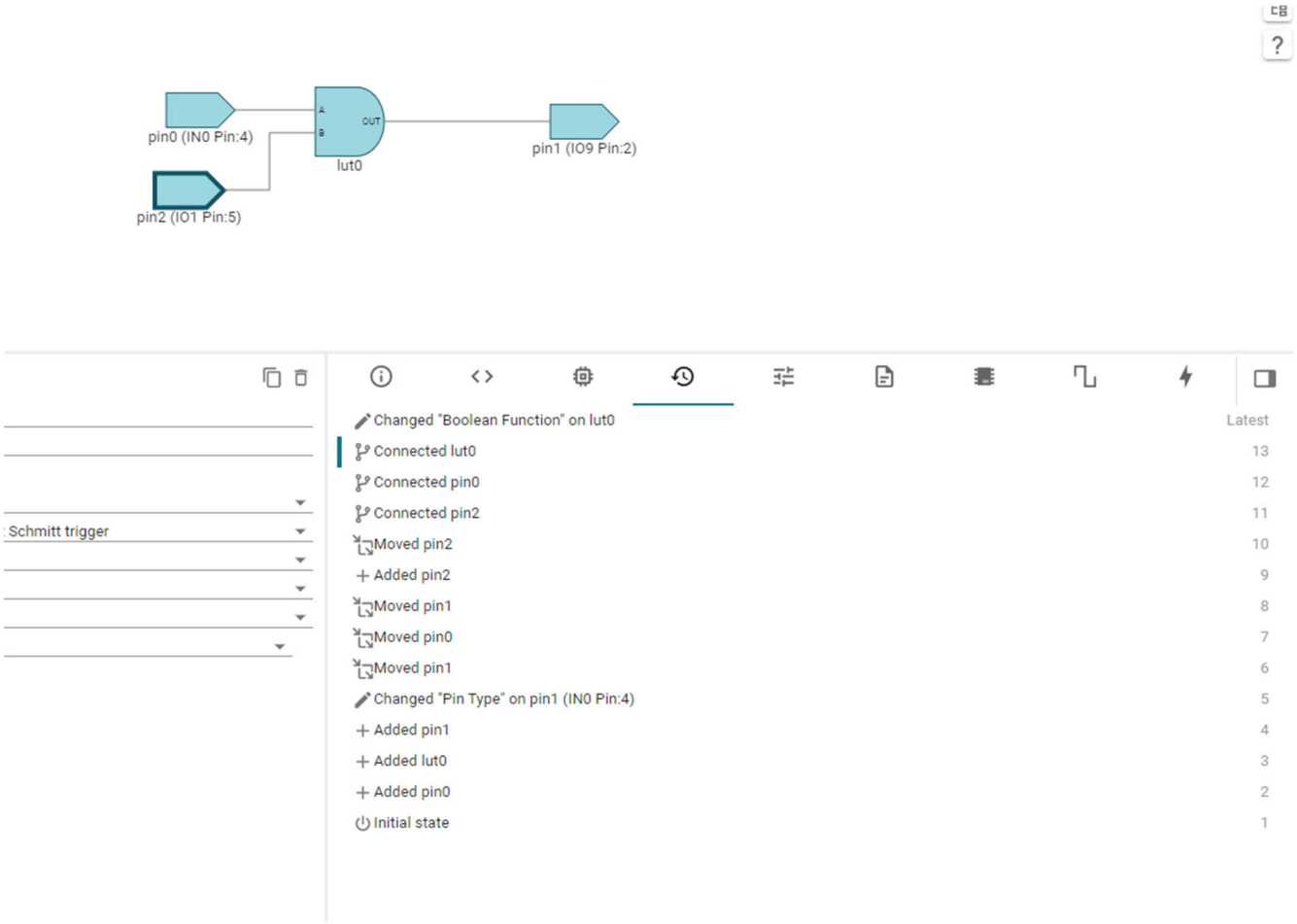


**Figure 4-36. History View After a CTRL+Z**



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Clicking earlier in the history view restores the design to the state the design was in when that action was completed as shown in Figure 4-37.

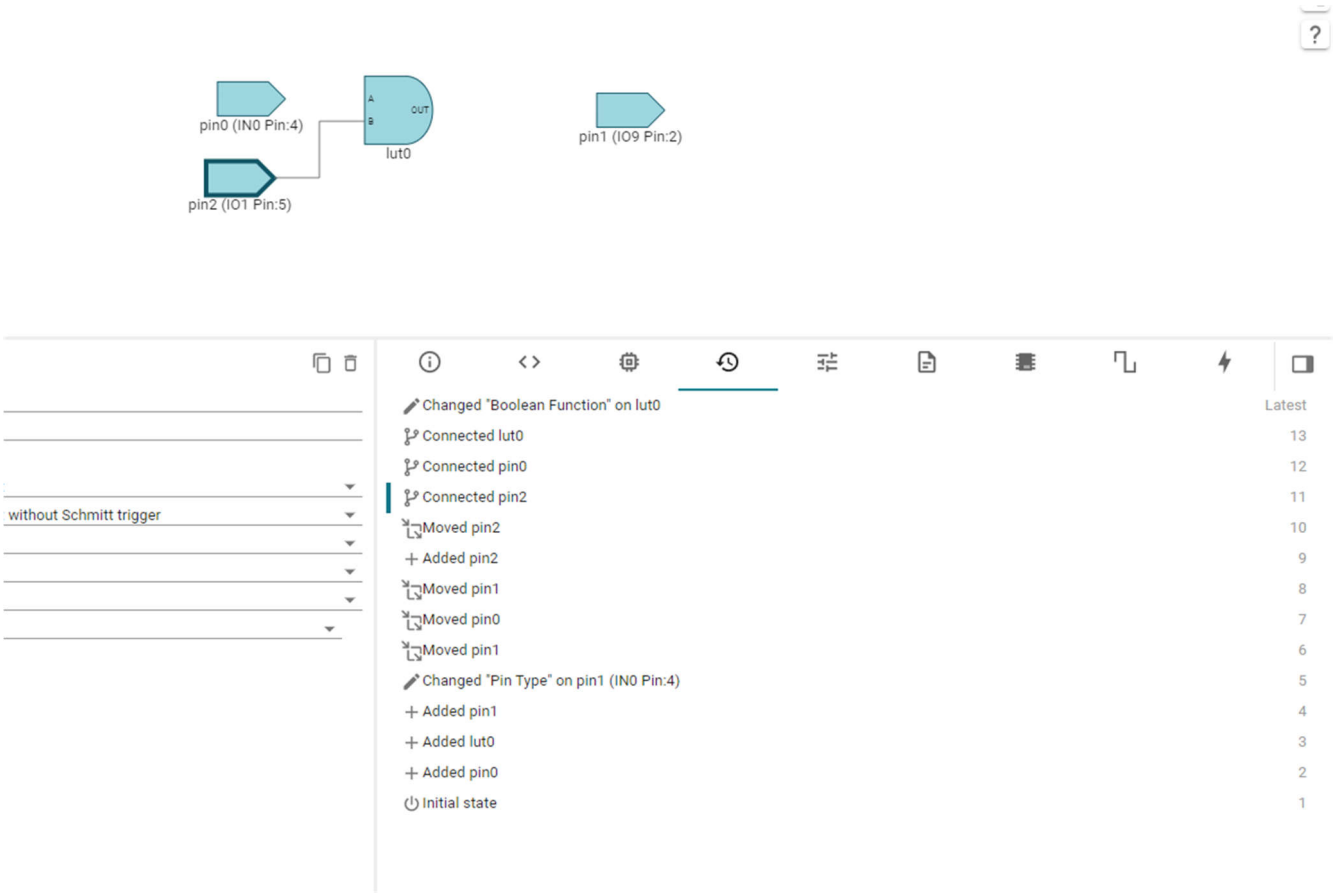


**Figure 4-37. Clicking Earlier in the History View**



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### 4.2.5 Preferences and Actions View

The preferences and actions view is a location for a few settings, the button to switch devices, and the button to globally lock resource allocation. Preferences are saved and are applied every time after the tool starts up.

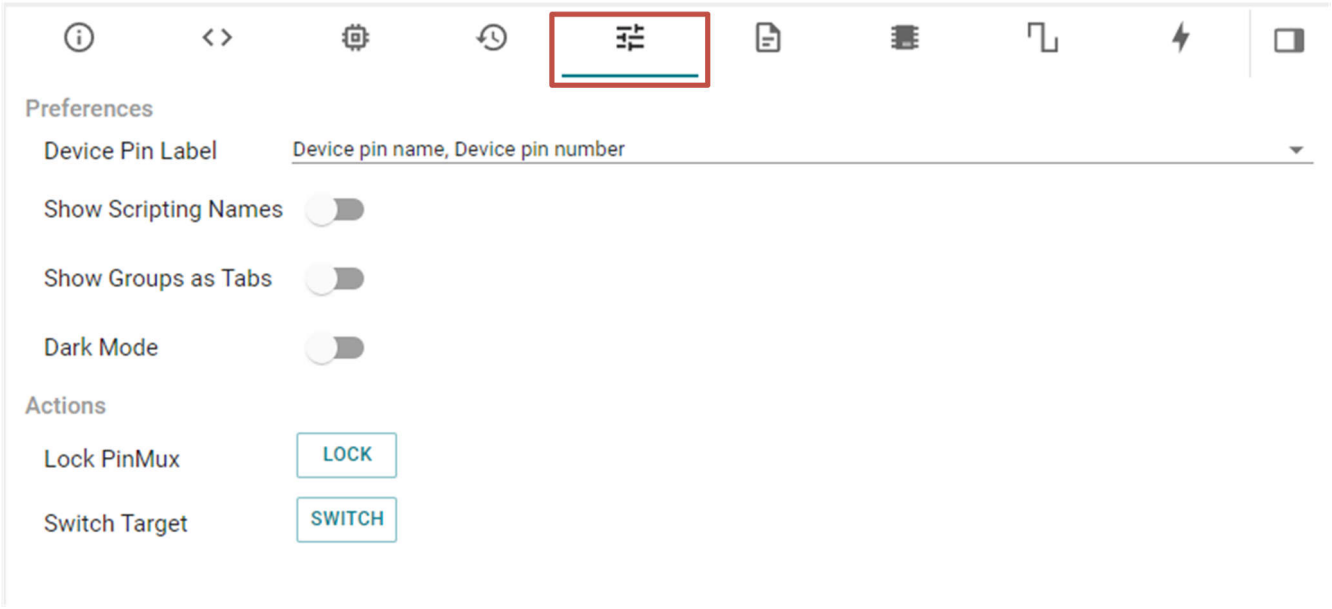


**Figure 4-38. Preferences and Actions View**

#### 4.2.5.1 Device Pin Label

The device pin label option changes how the device pin allocated appears. Figure 4-39 shows the setting in the preferences and actions view and a pin configurable with the resource allocated highlighted.

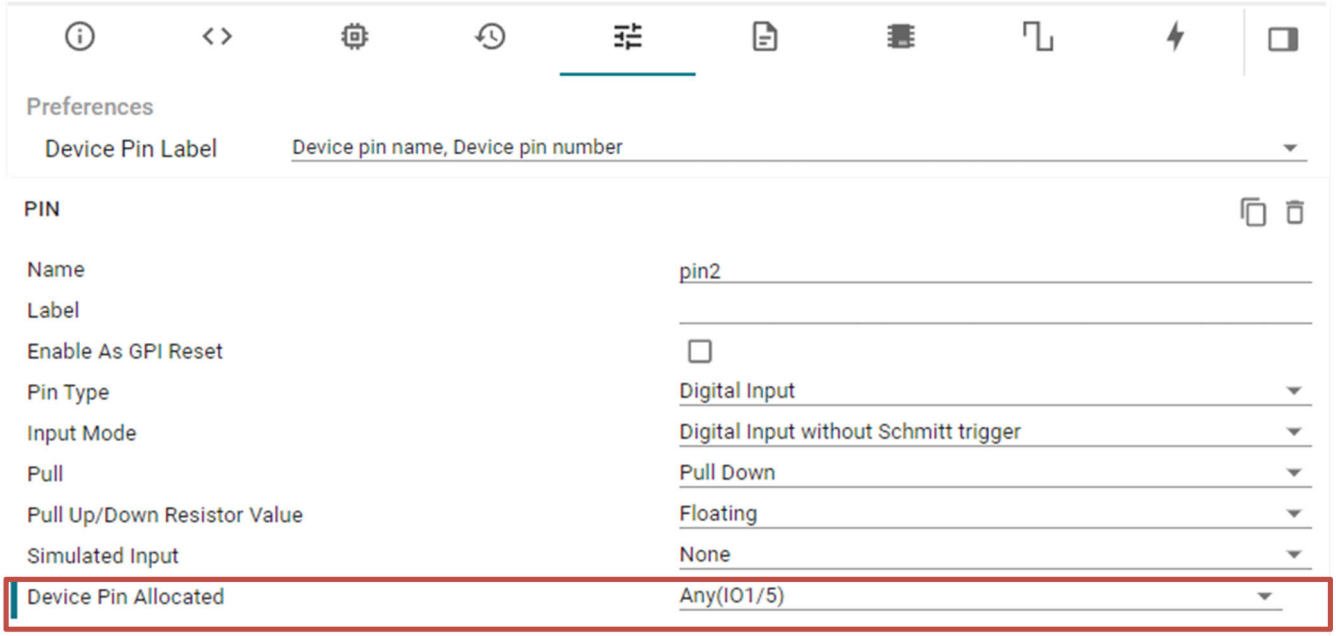


**Figure 4-39. Device Pin Label**



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As shown in Figure 4-39, Figure 4-40, Figure 4-41, there are three main options for the device pin label. The device pin number exclusively refers to the physical pins on the device as shown in the device view, and the device pin name refers to the names that the pins are refereed to in the device-specific data sheet.

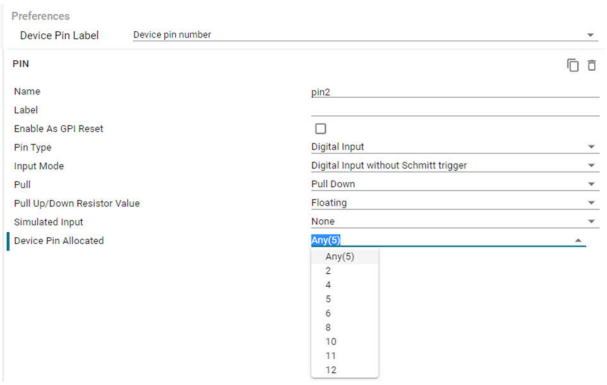


Figure 4-40. Device Pin Number Only

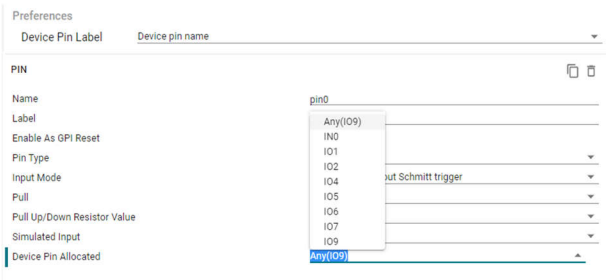


Figure 4-41. Device Pin Name Only

### 4.2.5.2 Show Groups as Tabs

The Show Groups as tabs option collapses all the groups into tabs to allow for easier switching.

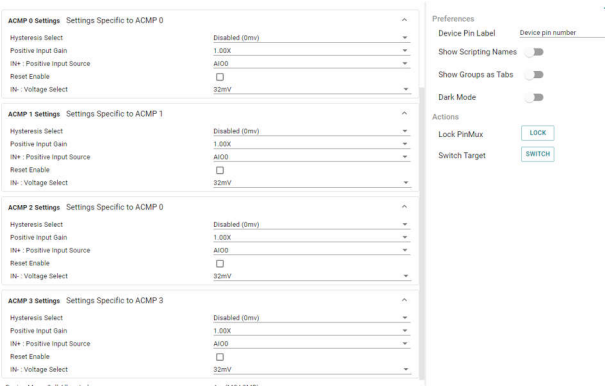


Figure 4-42. Groups as Groups

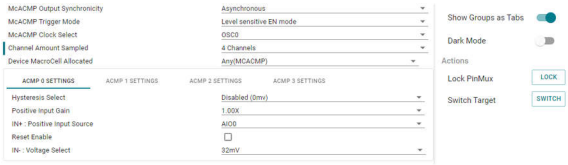


Figure 4-43. Groups as Tabs

### 4.2.5.3 Dark Mode

The tool has two different color palettes. As shown in Figure 4-44 is the default color palette. Selecting the Dark Mode option toggles the color palette shown in Figure 4-45.

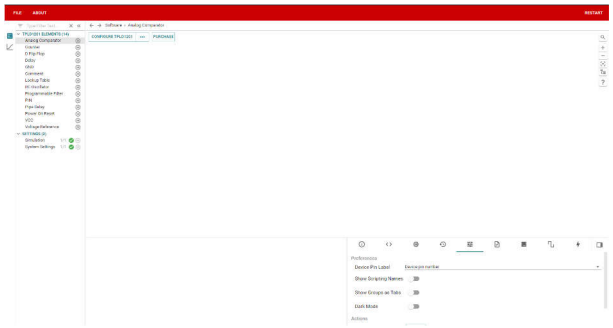

Figure 4-44. Light Mode

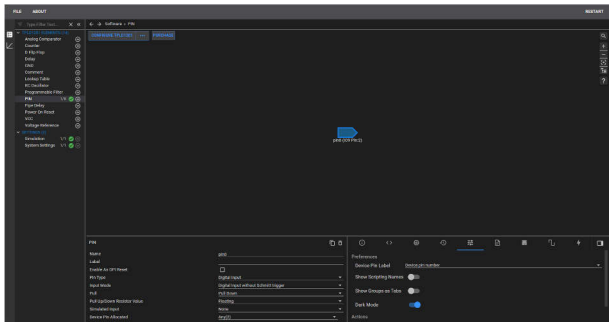

Figure 4-45. Dark Mode



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#### 4.2.5.4 Lock Pinmux

The lock pinmux button globally locks all the resource allocation. Figure 4-46 shows the setting and a pin configurable's resource allocation. The pin resource in this state is dynamic, and while changing the settings the tool automatically finds available pins that match said setting. Once the button has been clicked, as shown in Figure 4-47, the resource is now locked to this pin.

It is recommended to select this option after a configuration has already been set as changing configurable options sometimes unlocks the resource.

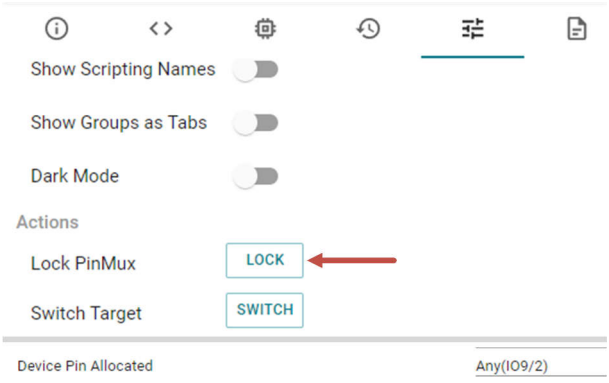


**Figure 4-46. Before Clicking Lock Pinmux**

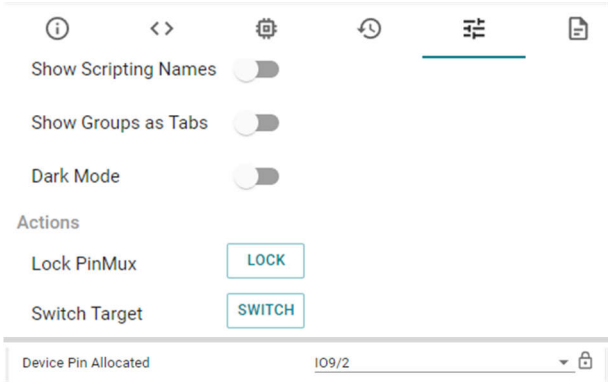


**Figure 4-47. After Clicking Lock Pinmux**

#### 4.2.5.5 Switch Target

The switch button is used for switching between devices while maintaining the configuration. The popup uses the same functionality as Section 4.2.3.1.

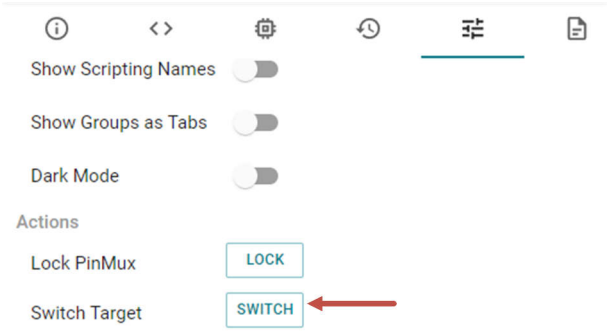


**Figure 4-48. Switch Button**

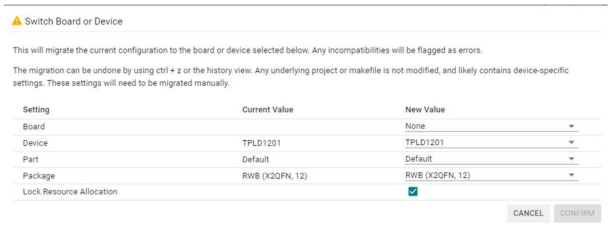


**Figure 4-49. Switch Window**



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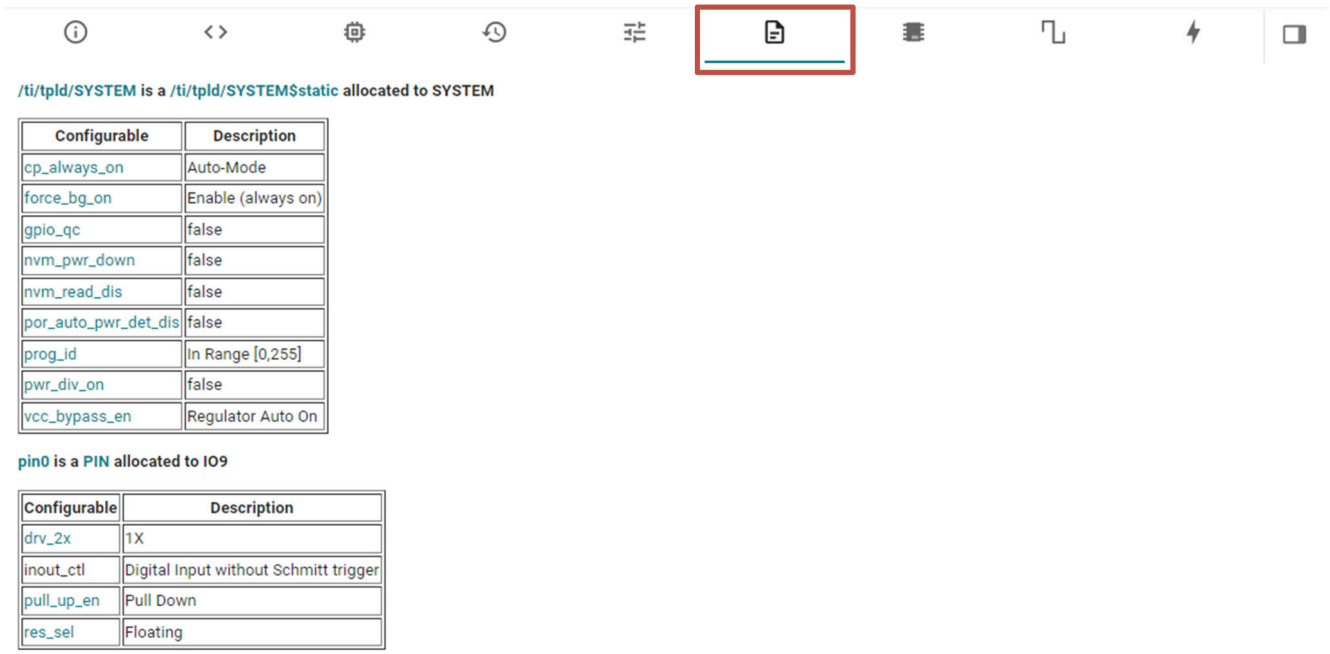
### 4.2.6 Design Overview View

The design overview view is used to give an overview of the whole system. Clicking on a hyperlink highlights the block and if a specific configurable is clicked then the configurable is highlighted for the user. This is great for reviewing the system, as there is no need to click through every block on the design space to check the configuration.



/ti/tpld/SYSTEM is a /ti/tpld/SYSTEM$static allocated to SYSTEM

| Configurable | Description |
|---|---|
| cp_always_on | Auto-Mode |
| force_bg_on | Enable (always on) |
| gpio_qc | false |
| nvm_pwr_down | false |
| nvm_read_dis | false |
| por_auto_pwr_det_dis | false |
| prog_id | In Range [0,255] |
| pwr_div_on | false |
| vcc_bypass_en | Regulator Auto On |

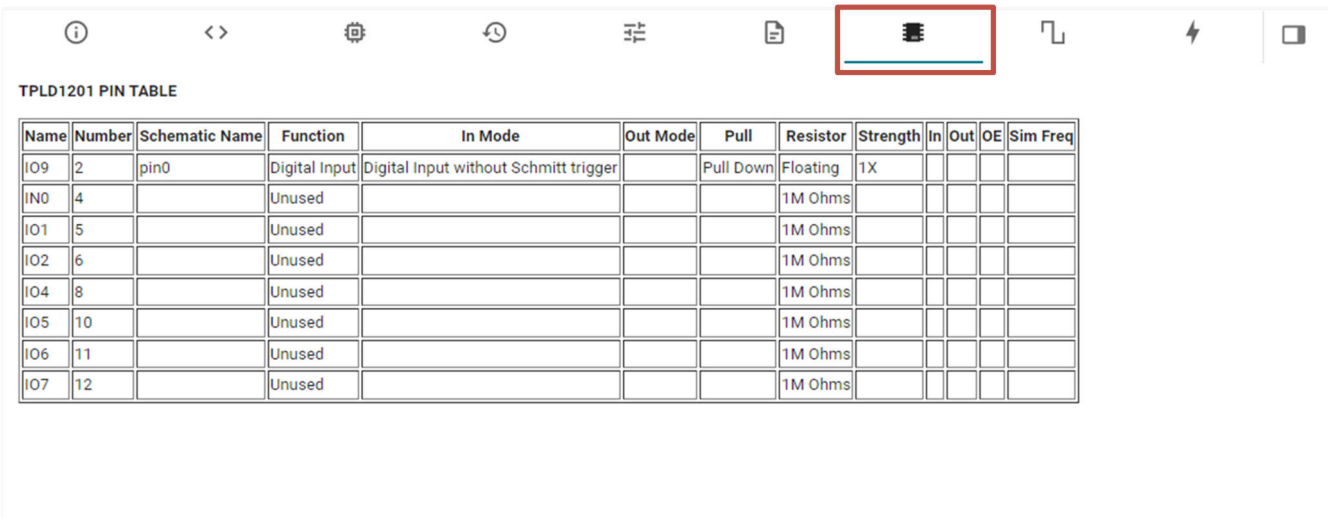
pin0 is a PIN allocated to IO9

| Configurable | Description |
|---|---|
| drv_2x | 1X |
| inout_ctl | Digital Input without Schmitt trigger |
| pull_up_en | Pull Down |
| res_sel | Floating |

**Figure 4-50. Design Overview View**

### 4.2.7 Pin View

The pin view is a table that shows all instantiated pins, and how those pins are configured.



TPLD1201 PIN TABLE

| Name | Number | Schematic Name | Function | In Mode | Out Mode | Pull | Resistor | Strength | In | Out | OE | Sim Freq |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IO9 | 2 | pin0 | Digital Input | Digital Input without Schmitt trigger | | Pull Down | Floating | 1X | | | | |
| IN0 | 4 | | Unused | | | | 1M Ohms | | | | | |
| IO1 | 5 | | Unused | | | | 1M Ohms | | | | | |
| IO2 | 6 | | Unused | | | | 1M Ohms | | | | | |
| IO4 | 8 | | Unused | | | | 1M Ohms | | | | | |
| IO5 | 10 | | Unused | | | | 1M Ohms | | | | | |
| IO6 | 11 | | Unused | | | | 1M Ohms | | | | | |
| IO7 | 12 | | Unused | | | | 1M Ohms | | | | | |

**Figure 4-51. Pin View**



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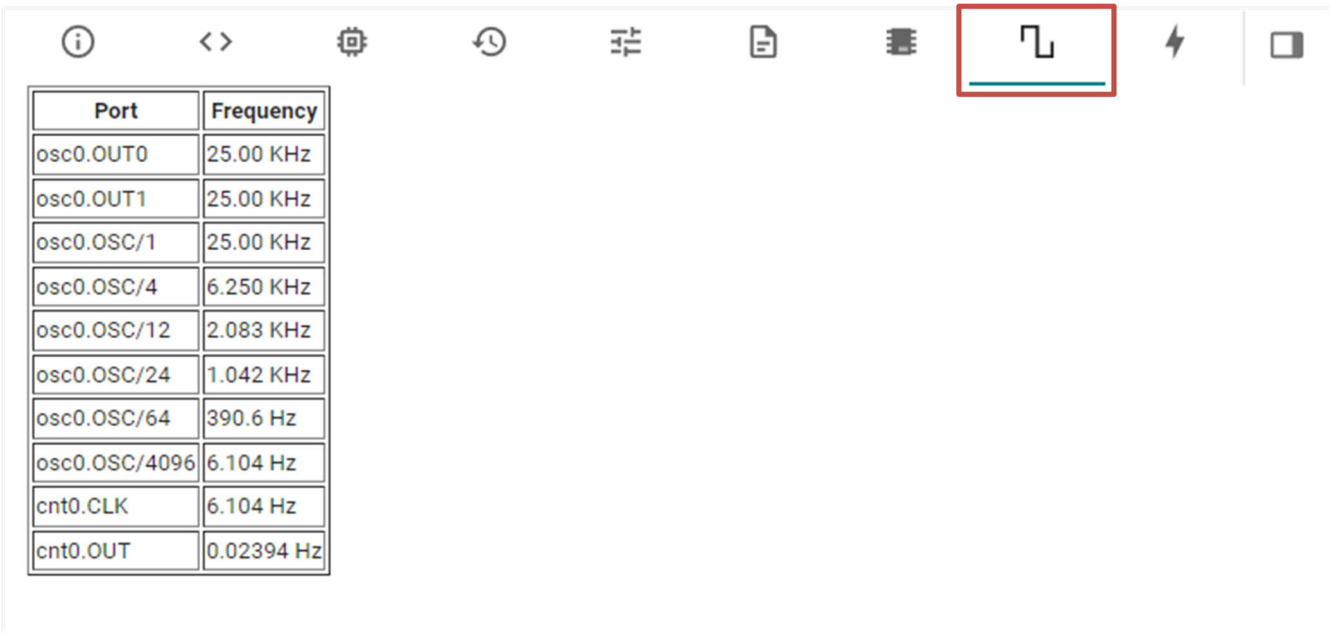
**Note**

**ALL NOT INSTANTIATED PINS ARE PULLED DOWN TO GROUND THROUGH A 1 MΩ RESISTOR**

### *4.2.8 Frequency View*

The frequency view is there to show the known frequencies that are propagating through the system.



| Port | Frequency |
|---|---|
| osc0.OUT0 | 25.00 KHz |
| osc0.OUT1 | 25.00 KHz |
| osc0.OSC/1 | 25.00 KHz |
| osc0.OSC/4 | 6.250 KHz |
| osc0.OSC/12 | 2.083 KHz |
| osc0.OSC/24 | 1.042 KHz |
| osc0.OSC/64 | 390.6 Hz |
| osc0.OSC/4096 | 6.104 Hz |
| cnt0.CLK | 6.104 Hz |
| cnt0.OUT | 0.02394 Hz |

**Figure 4-52. Frequency View**

### *4.2.9 Power View*

The power view gives an estimate of power consumed. Clicking on the hyper link opens the simulation settings, where depending on the supply voltage provided, changes the estimated power consumed.

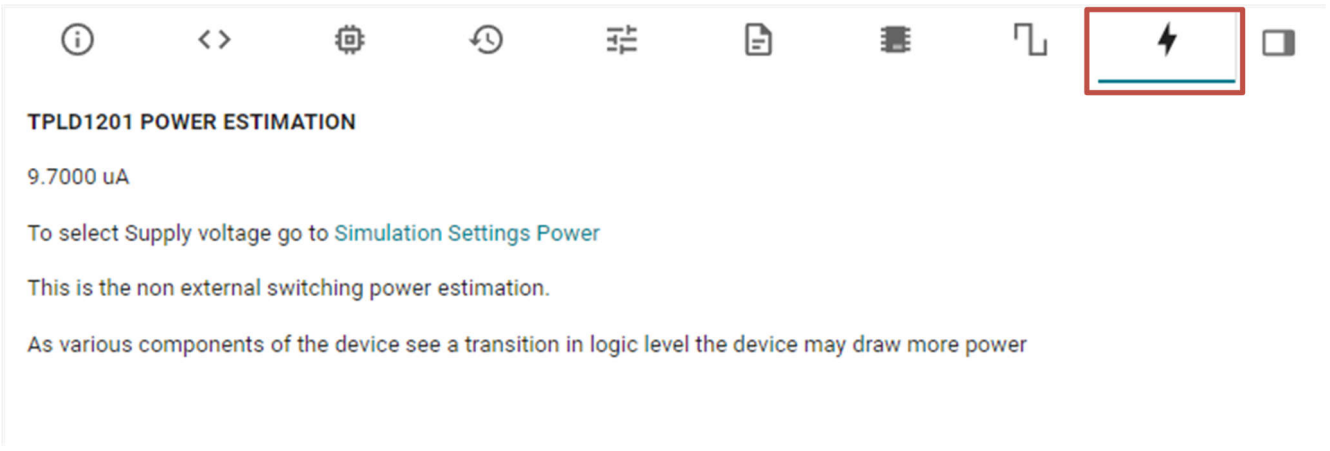



**Figure 4-53. Power View**



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### 4.2.10 Moving Views

The view box can be adjusted by dragging the lines shown in Figure 4-54 to manipulate the box to the users preference.

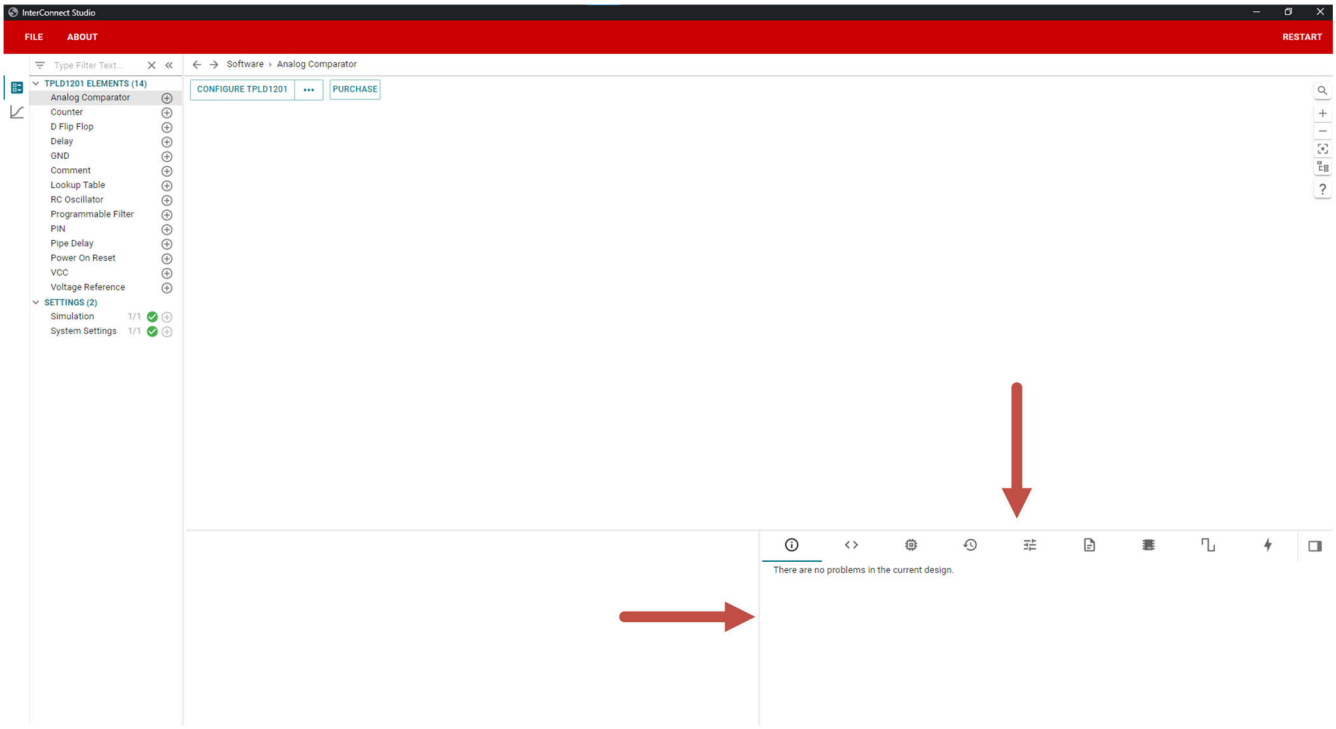


**Figure 4-54. Lines To Change View Size**

Clicking the dock right button shown in Figure 4-55 moves the views to a vertical view on the right side of the screen. For those familiar with SysConfig this can be a more preferable view.

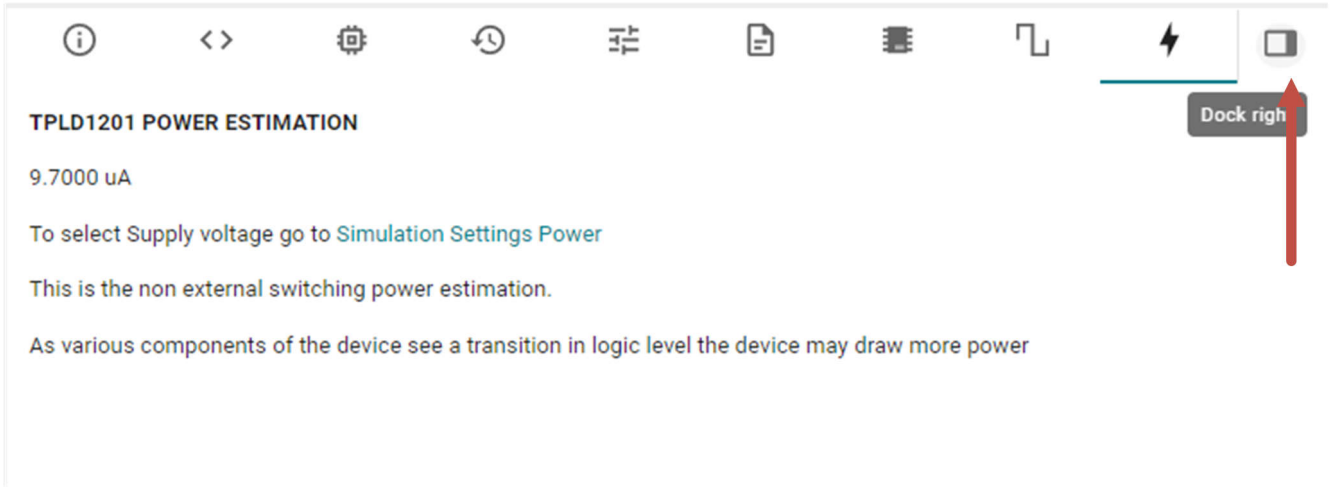


**Figure 4-55. Dock Right**



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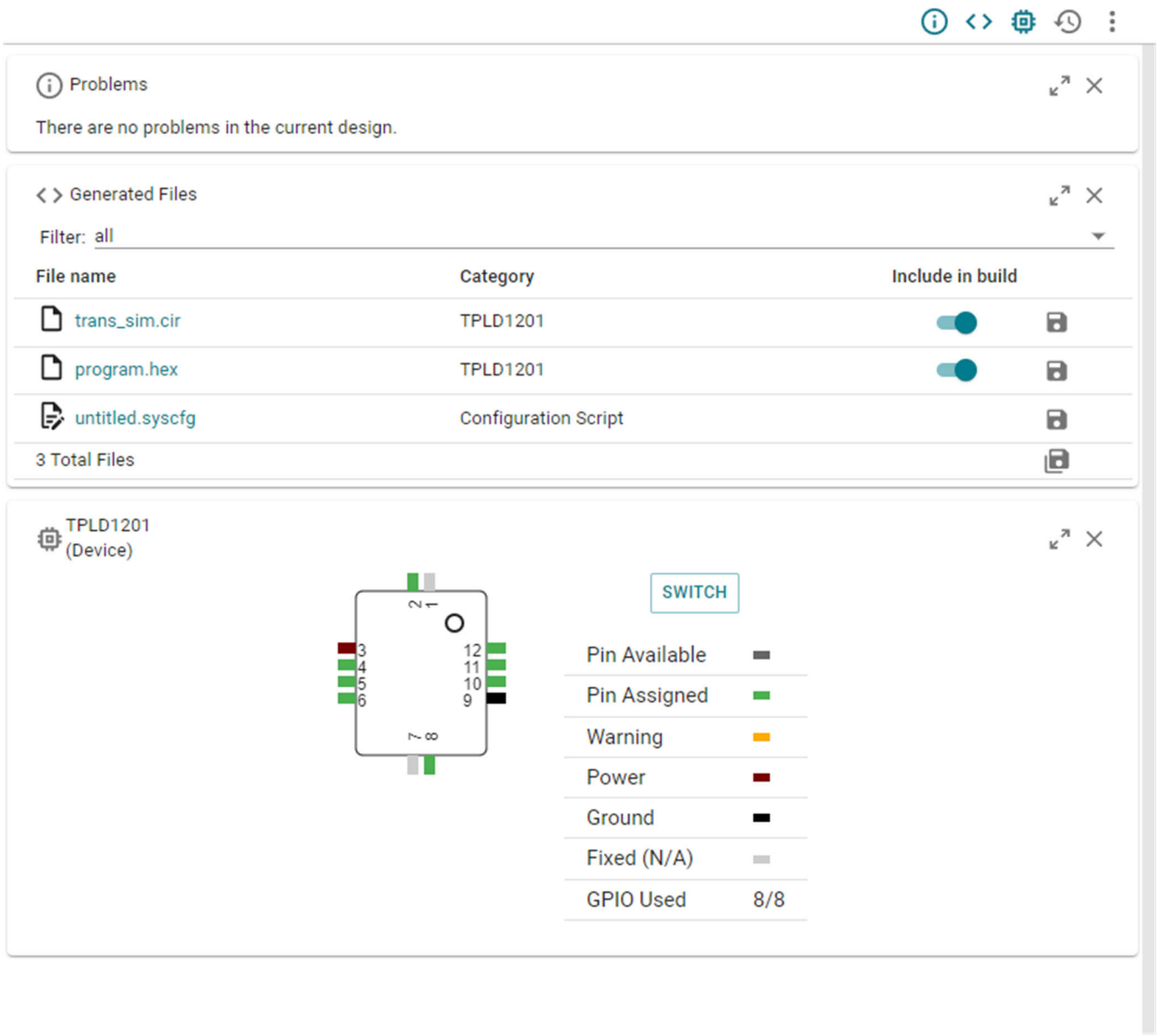


**Figure 4-56. Dock Right**

Clicking the three vertical dots under the restart button opens a popup. Clicking on one of the views here adds said view to the vertical views. The last item of the popup is dock bottom which once clicked returns the view box to the bottom right.

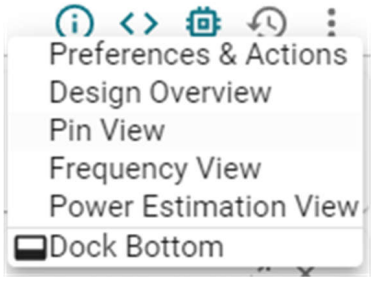


**Figure 4-57. 3 Dot Popup**



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## 4.3 Design Space

The design space refers to the area where circuit creation occurs as shown in Figure 4-58.

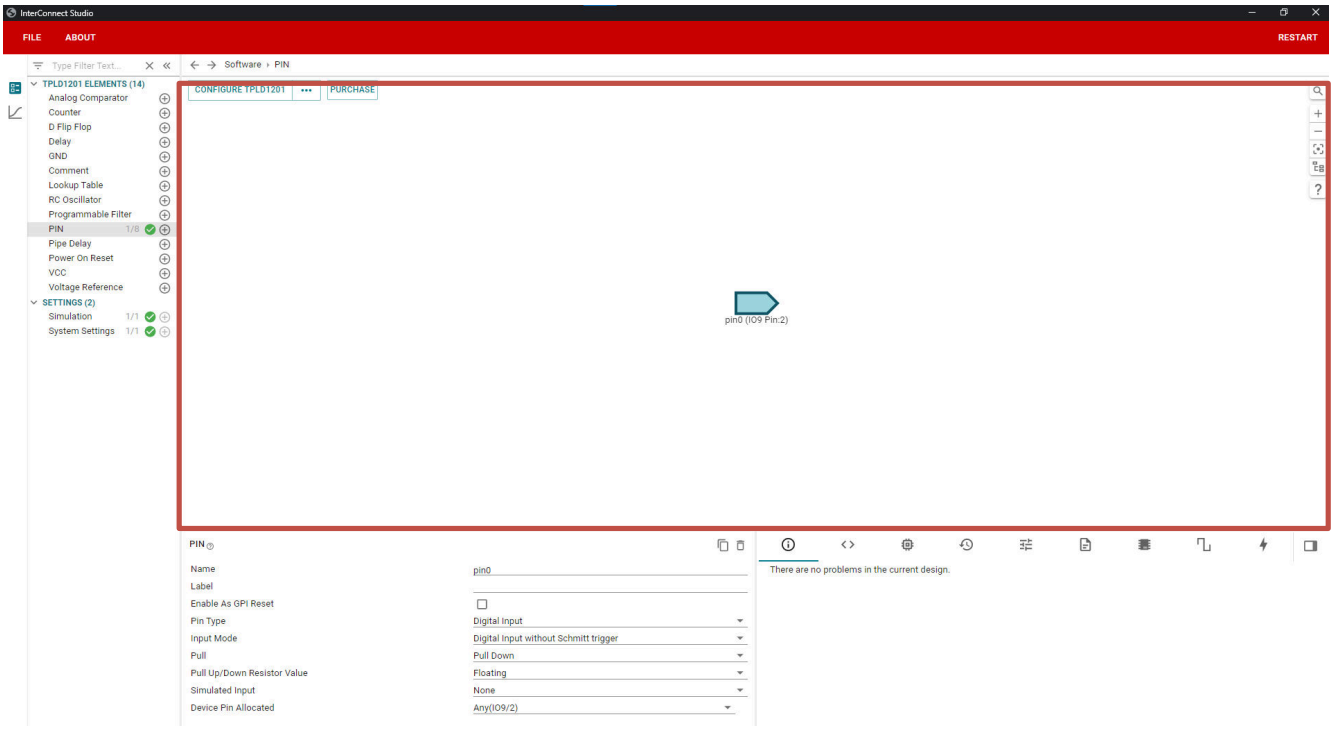


**Figure 4-58. Location of Design Space**

### *4.3.1 Blocks*

Blocks refer to the objects that appear in the design space when the + button is clicked in the elements list.

Blocks can be dragged around the design space. This is done by clicking on a block then while holding drag the block to the desired location and release. Multiple blocks can be selected at one time by holding CTRL while clicking on them.

Blocks have a name and label associated with them. The name is always present below the block and the label above the block. Changing these is described in text configurable, and long text configurable respectively. Double clicking on the text in the design space allows for direct changes to the text without going to the configurable space.



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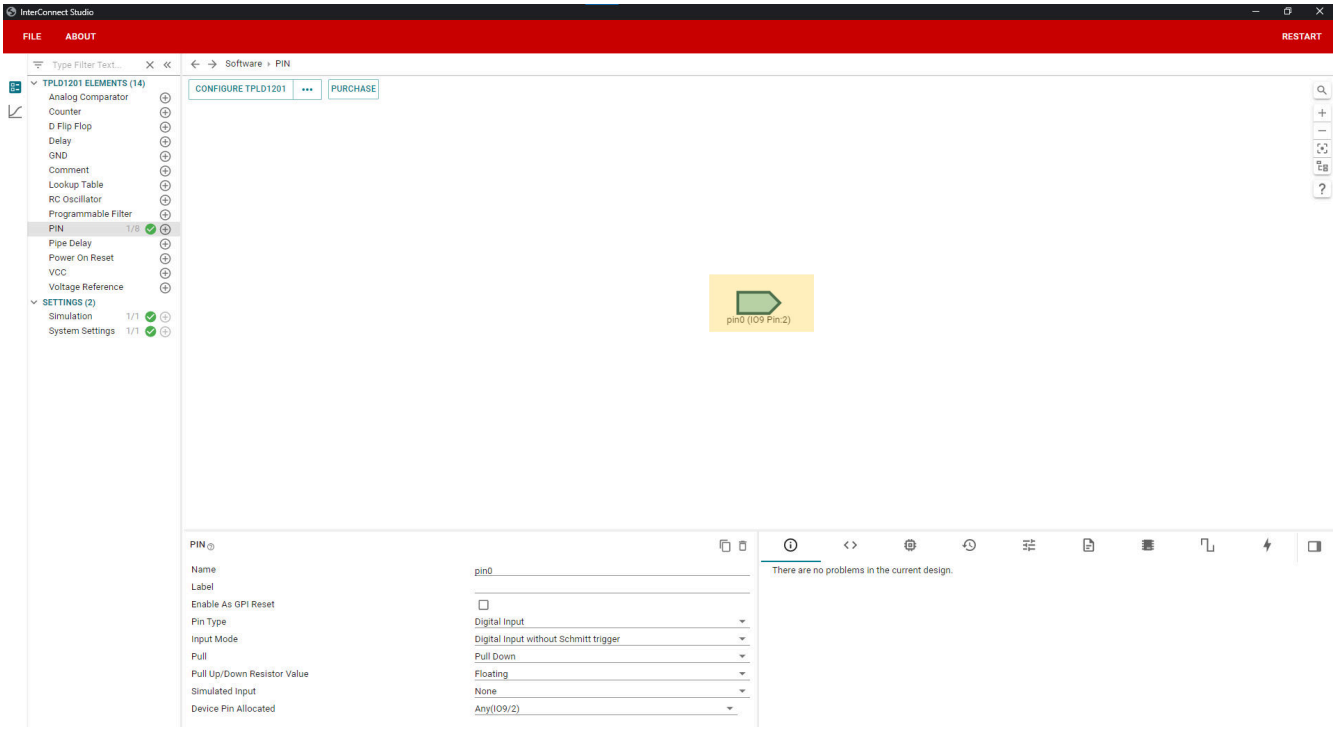


**Figure 4-59. Example of a Block**

Blocks can be copied along with the block's settings by clicking copy button in the configurable space as shown in Figure 4-60 and Figure 4-61.

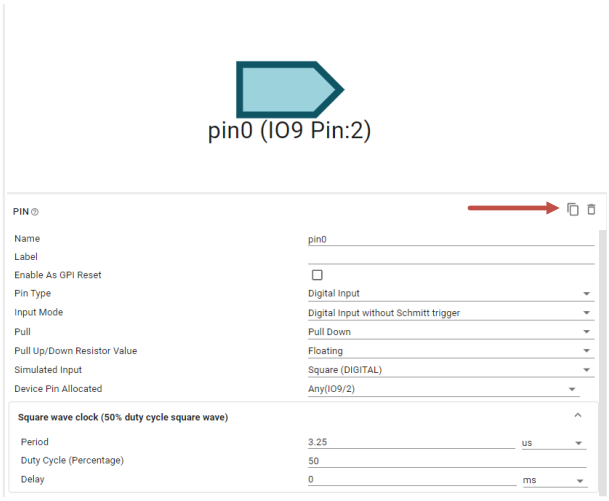


**Figure 4-60. Copy Button Location**

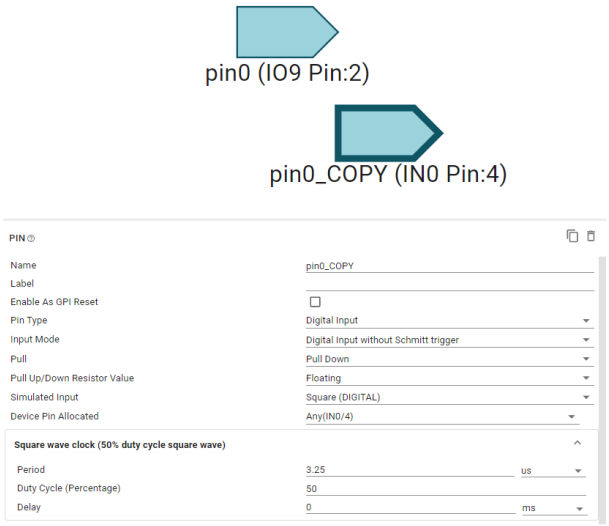


**Figure 4-61. Block Copied**



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### 4.3.2 Ports

While hovering over a block in the design space ports appear on the left and right side of the block.

Ports on the left side of a block are inputs, as shown in Figure 4-62. Only one output can be connected to any input.

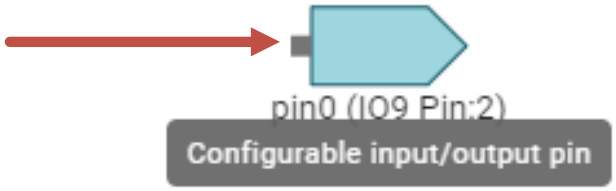


**Figure 4-62. Example of Input Port**

Ports on the right side of a block are outputs, as shown in Figure 4-63. An output can connect to any number of inputs.

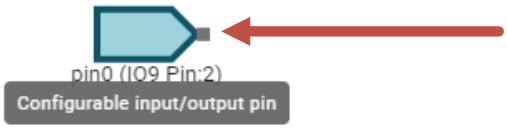


**Figure 4-63. Example of an Output Port**



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### 4.3.3 Connections

There are two types of connections in the design space.

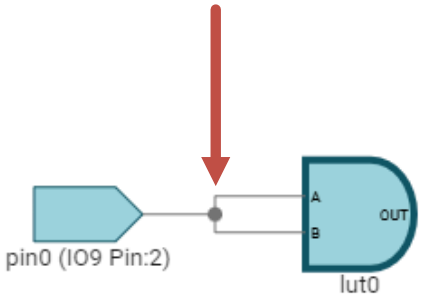


**Figure 4-64. Example of Standard Connection**

The first is a standard connection indicated by a solid line. Standard connections indicate that the signal is passing through the connection matrix from one macrocell to another. These connections are created by clicking on either an input or an output of a block and then clicking on an output or an input respectively. Standard connections can be removed by clicking on a connection to highlight and pressing the delete key.

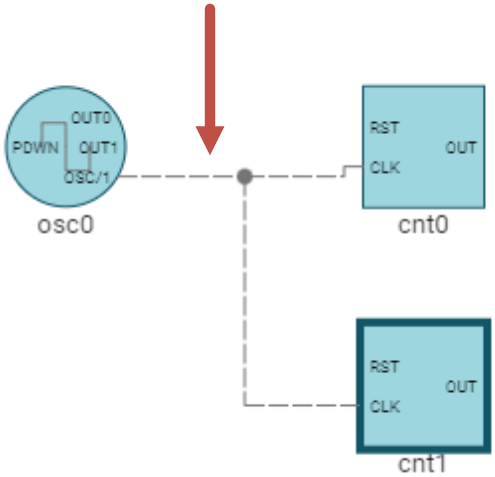


**Figure 4-65. Example of Implied Connection**

The second is an implied connection indicated by a dotted line. Implied connections do not go through the connection matrix and thus the implied connection cannot be intercepted by another block. Implied connections are controlled by a block on one side of the implied connection. Implied connections cannot be removed the same as standard connections instead the block controlling the implied connection must be selected, and the configurable must be altered to either remove the connection or change the block on the other side of the connection.



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## 4.4 Configurables

Configurables are anything located in the box highlighted by Figure 4-66.

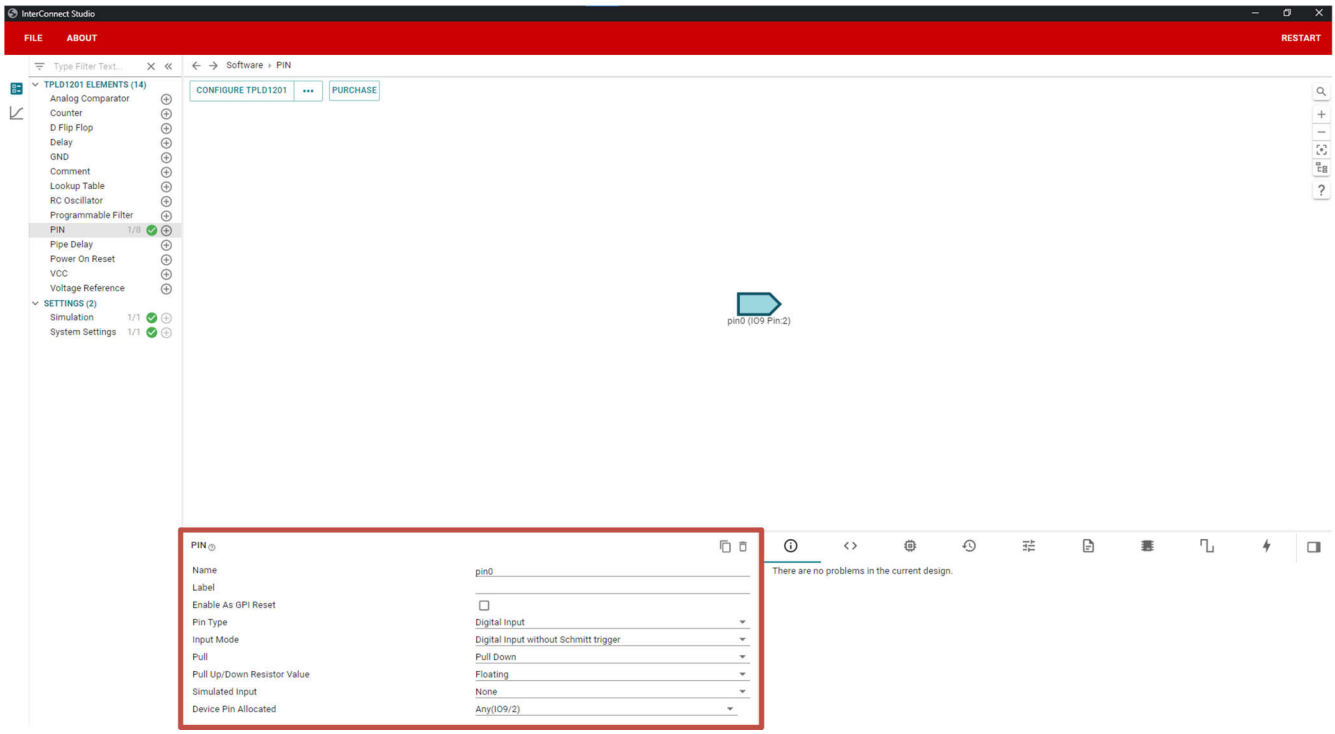


**Figure 4-66. Location of Configurables**

### *4.4.1 Text Configurable*

Text configurables, as shown in Figure 4-67, are input fields that accommodate any type of text input, such as alphanumeric characters, symbols, and special characters. To change the value for these simply click on the current text and begin writing.

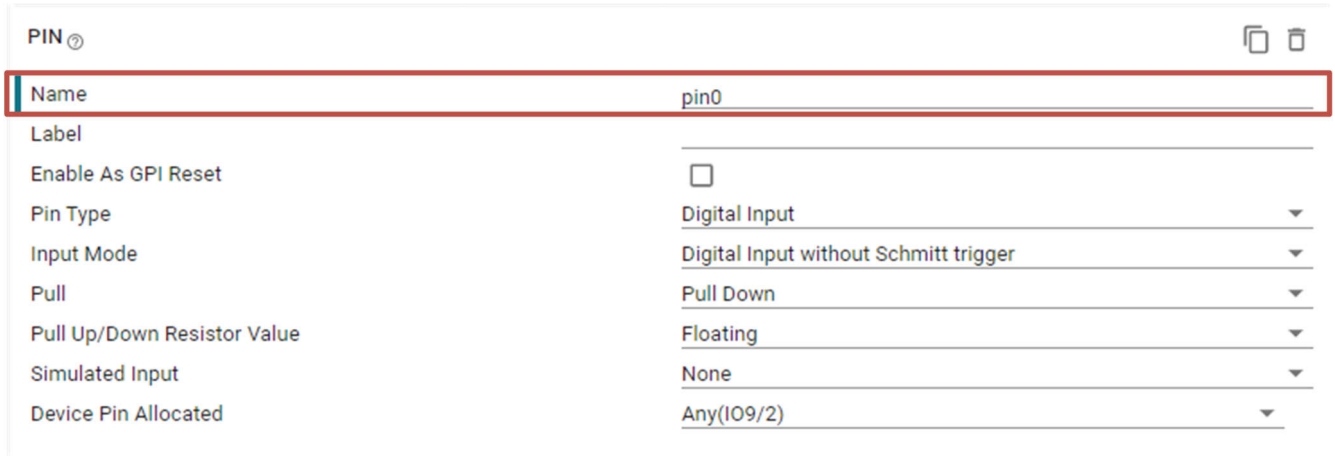


**Figure 4-67. Text Configurable**



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The most common form of these configurables are the name configurable. Changing the name changes the text that appears below a block in the design space.

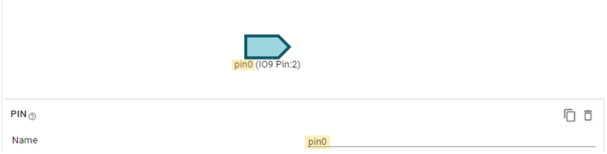


**Figure 4-68. Block With Default Name**

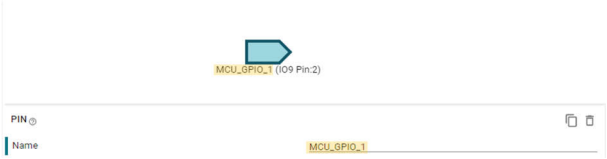


**Figure 4-69. Block With Changed Name**

### *4.4.2 Long Text Configurable*

Long Text Configurables are similar to text configurables in that both store text. The difference is that text configurables can only store text on one line where as long text configurables can be multiline as shown in Figure 4-70 and Figure 4-71. To change the value of this configurable click on the current text and begin typing. Pressing Enter starts a new line

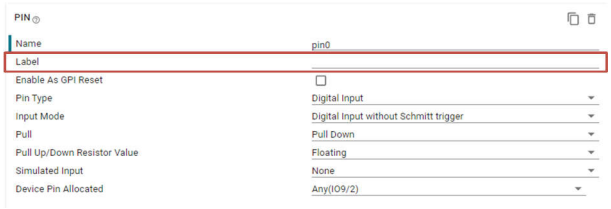


**Figure 4-70. Example of Long Text Configurable**

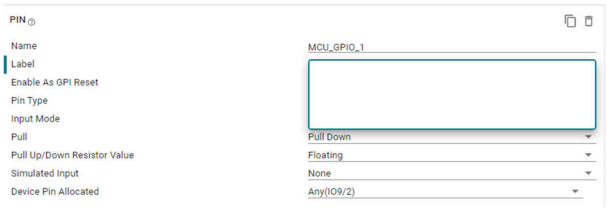


**Figure 4-71. Long Text Configurable Selected**

The most common form of this configurable is the Label configurable. This is the floating text above each block in the design space as shown in Figure 4-72. Adjusting this text to be descriptive of the configuration, as shown in Figure 4-73, can help clarify designs as this label floats directly above the block.

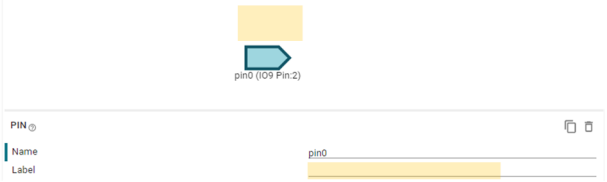


**Figure 4-72. Block with Default Label**

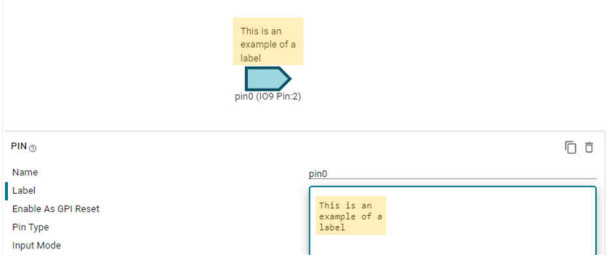


**Figure 4-73. Block with Changed Label**

### *4.4.3 Dropdown Configurable*

A dropdown configurable is often used to select a single item from a list as shown in Figure 4-74 and Figure 4-75. To change the value click the text or the down arrow on the right.

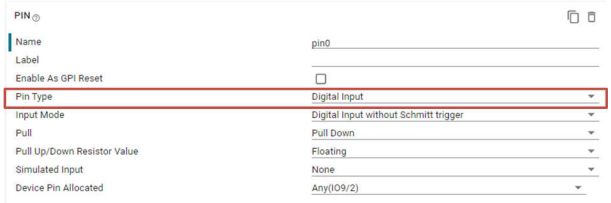


**Figure 4-74. Example of Dropdown Configurable**

**Figure 4-75. Dropdown Configurable Selected**



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Dropdowns can be filtered, as shown in Figure 4-76. To do this type the desired output and then select that option. Tooltips can appear on dropdown options to add additional context, as shown in Figure 4-77. To view the tooltip hover over the option within the dropdown for about a second. Not all dropdown options have a tooltip, so if one does not appear after one second that option does not have a tooltip.

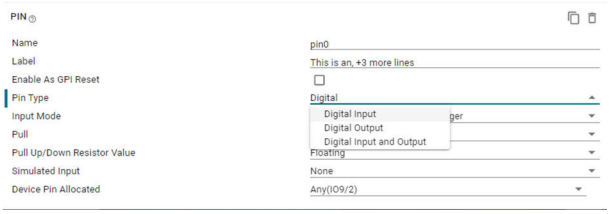


**Figure 4-76. Filter Dropdown**

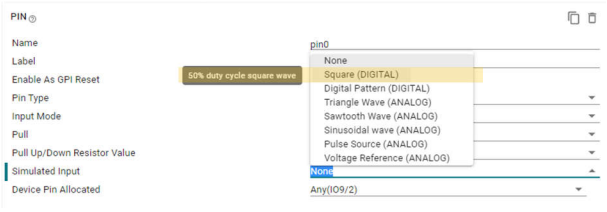


**Figure 4-77. Option Help**

### *4.4.4 CheckBox Configurable*

A checkbox configurable is for options that are either true or false. To change this configurable click the inside of the box. When the blue checkmark is present the configurable is true and when a blue checkmark is absent the configurable is false.

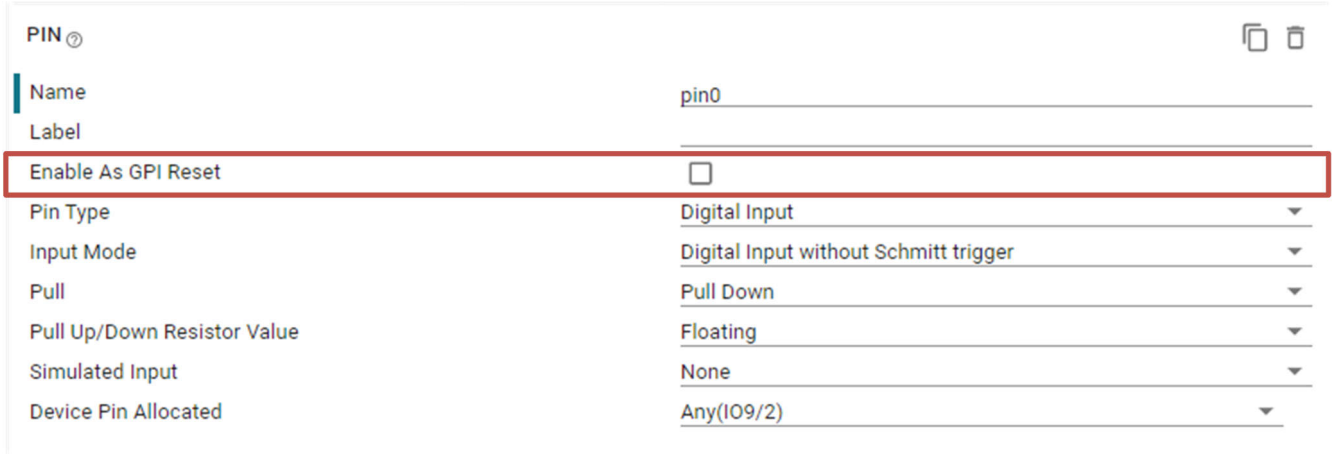


**Figure 4-78. Example of Checkbox Configurable**



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### 4.4.5 Table Configurable

The table configurable is primarily used for setting the function inside the logic elements as shown in Figure 4-79. To set find the input that the look up table outputs true for and select the corresponding box. For the checkboxes, see Section 4.4.4.

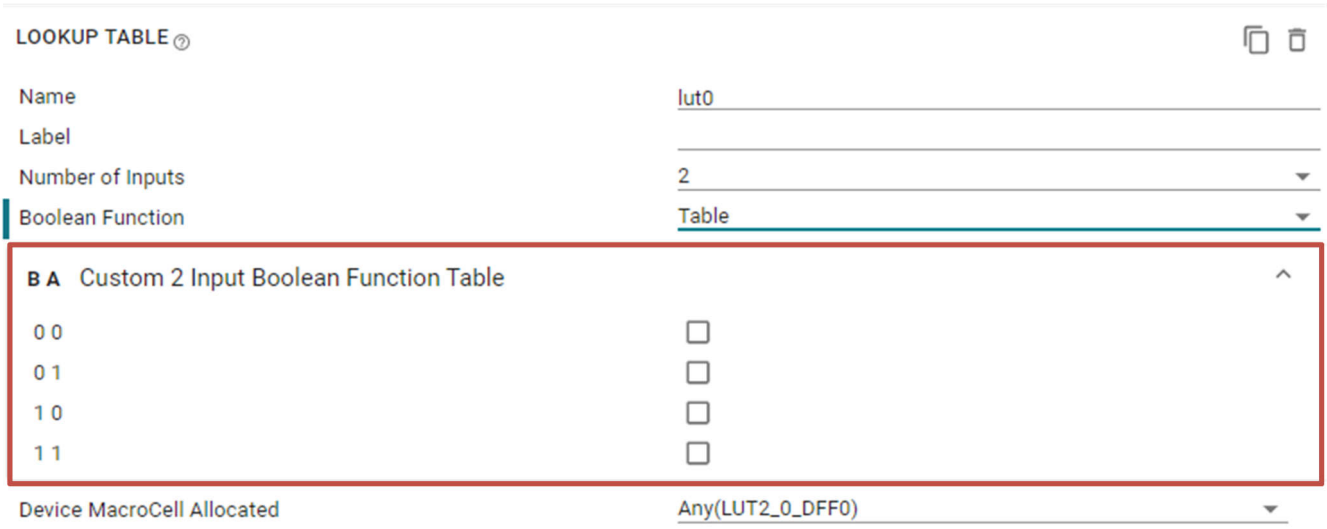


**Figure 4-79. Example of Table Configurable**

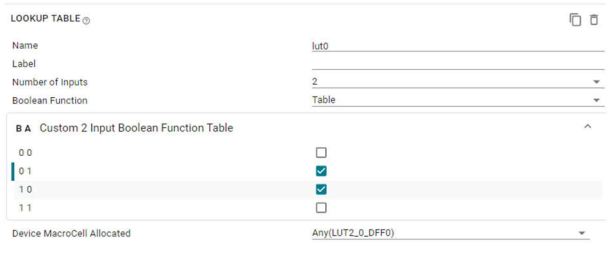


**Figure 4-80. Example of an XOR Gate With Two Inputs**

**Figure 4-81. Example of an XOR Gate With Three Inputs**

### 4.4.6 Equation Configurable

An equation configurable is similar to a Section 4.4.1, but is used to describe a boolean equation. To edit click on the current equation and begin typing.

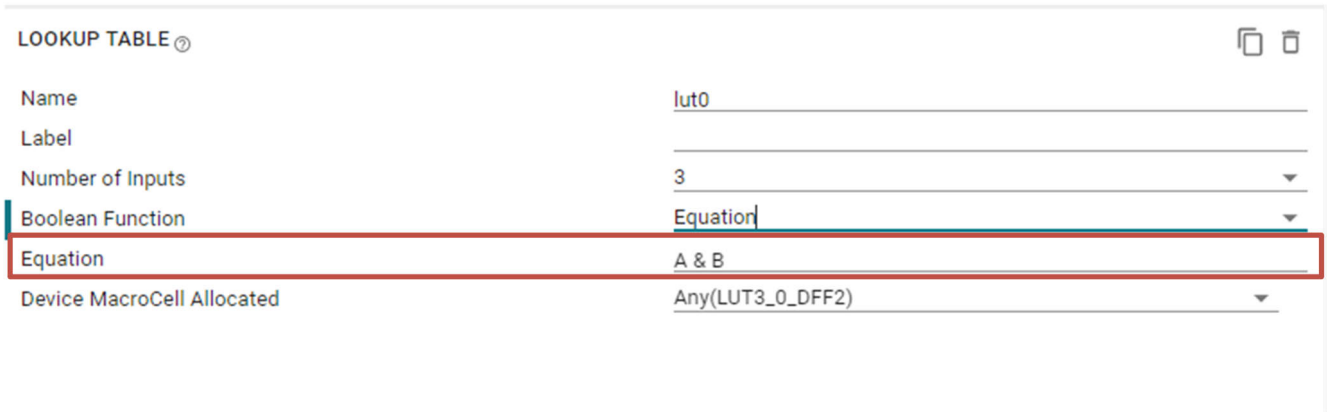


**Figure 4-82. Example of Equation Configurable**



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**Table 4-1. Valid Characters**

| Characters | Boolean Translation |
|---|---|
| A,B,C,D | Input to the LUT. |
| (, ) | Parenthesis. |
| !, ~ | NOT. |
| & | AND. |
| \| | OR. |
| ^ | XOR. |
| 1 | Logic high. |
| 0 | Logic low. |

### *4.4.7 Number Configurable*

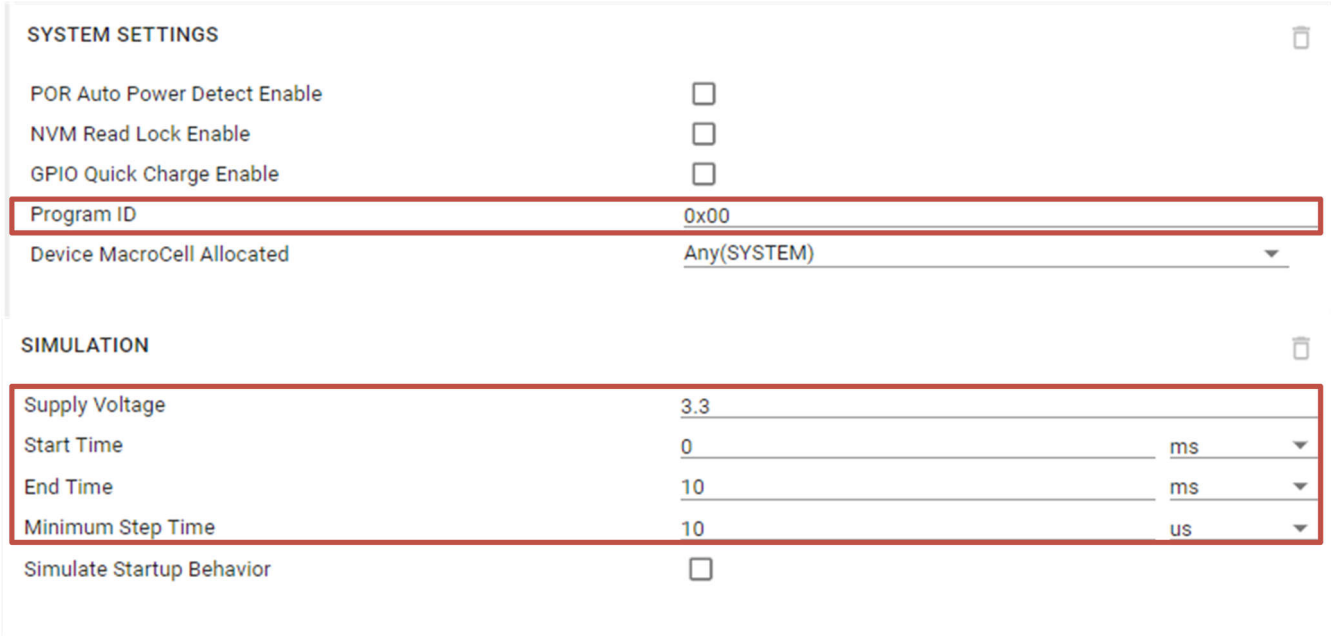


**Figure 4-83. Example of Number Configurable**

The number configurables look similar to text configurables, however, number configurables only allow numbers to be entered. The four types of number configurables used throughout the tool are standard number configurables, integer number configurables, numbers with units, and hex configurables.



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A standard number configurable allows any number entered between the range including decimal values, as shown in Figure 4-84.

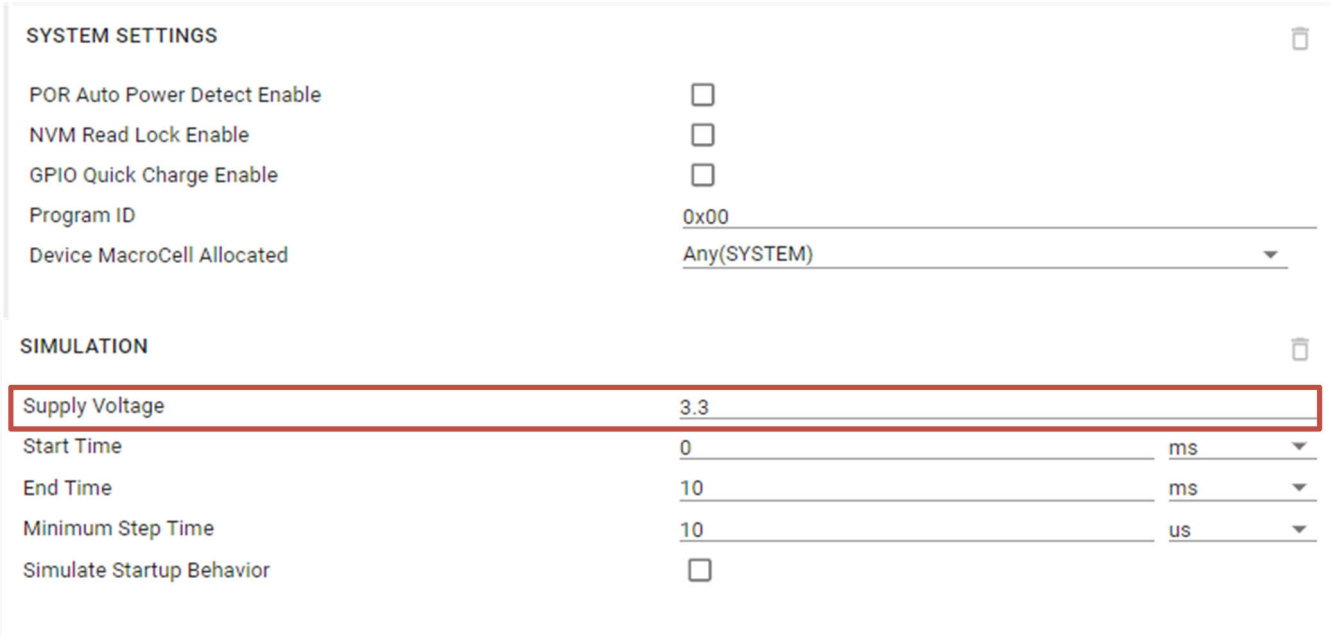


**Figure 4-84. Standard Number Configurable**

An integer number configurable allows any integer entered between the provided range, as shown in Figure 4-85.

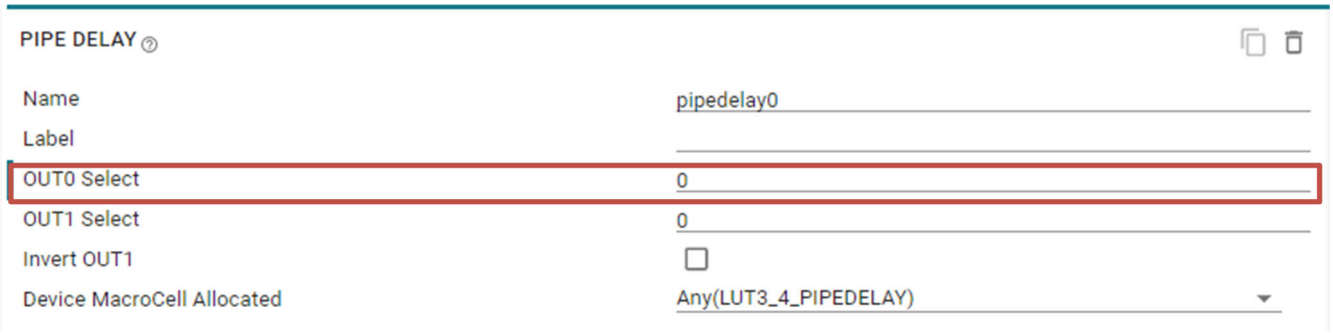


**Figure 4-85. Integer Number Configurable**



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A number with unit configurable uses a standard number configurable as well as a dropdown, as shown in Figure 4-86. This configurable solves for conversions. For example if the configurable is currently set to 1 s, and 0.001 is entered the configurable automatically switches to 1 ms.

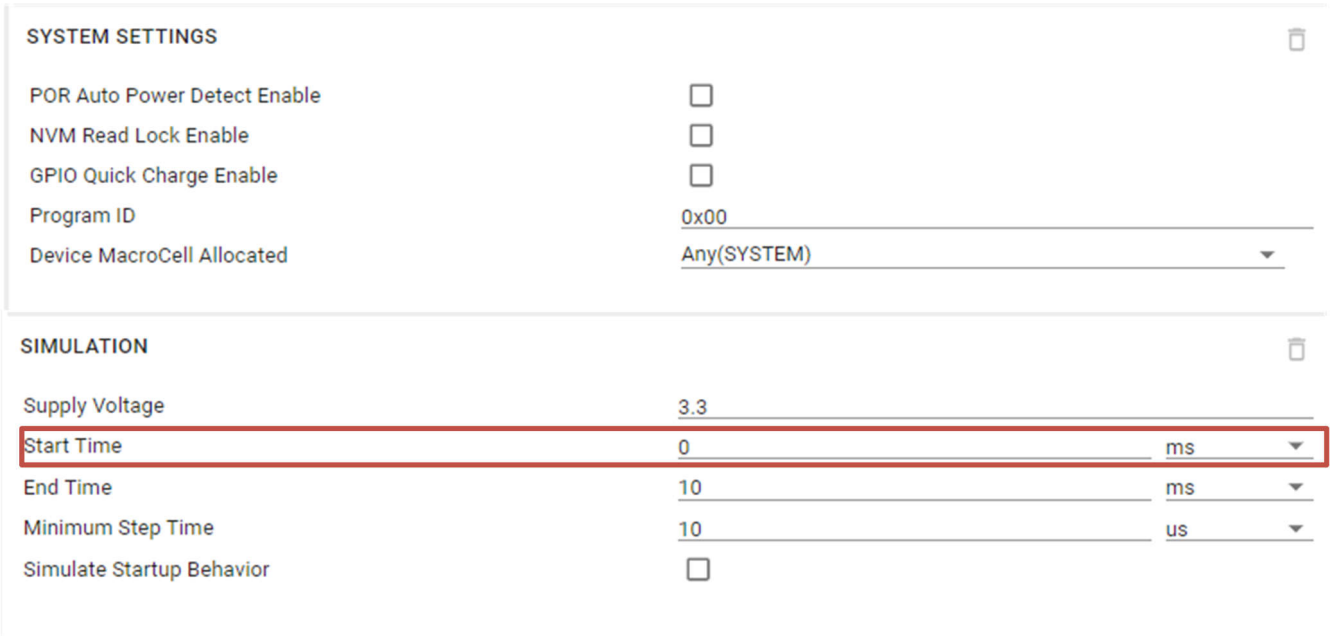


**Figure 4-86. Numbers With Units**

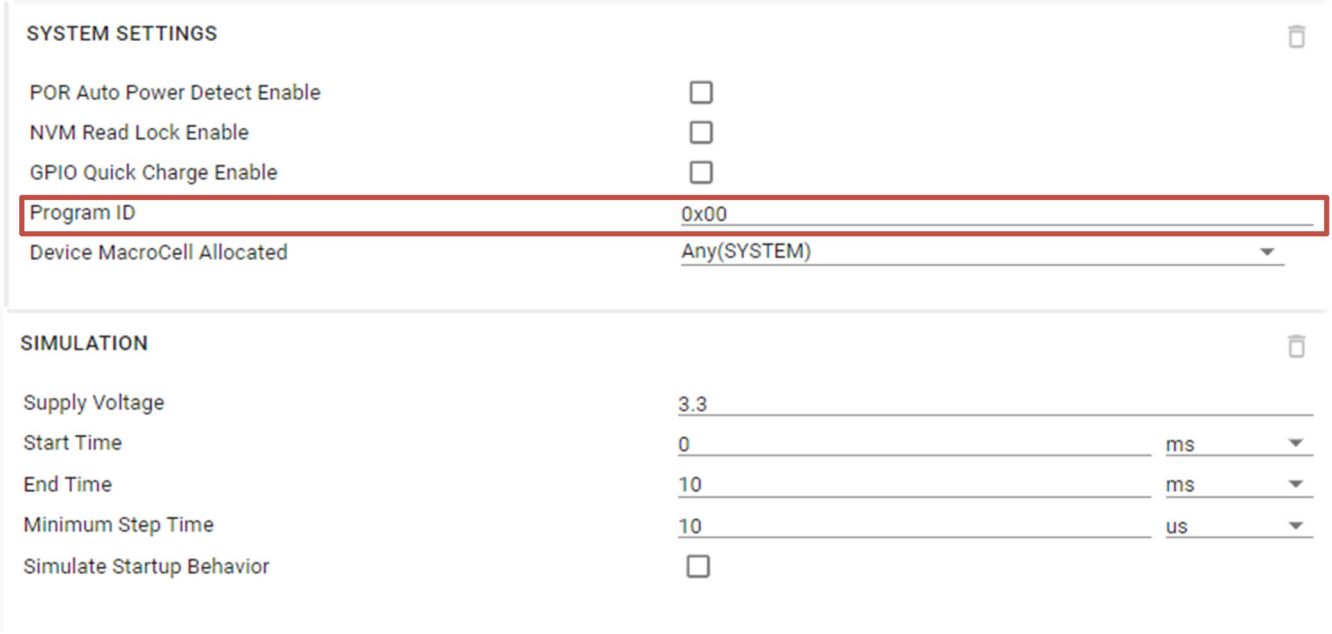


**Figure 4-87. Hex Number Configurable**

A hex number configurable uses the same rules as an integer number configurable, as shown in Figure 4-85, except the display format is in hex. If the value entered starts with 0x the value after is saved in the hex format however if the value entered does not start with 0x the configurable converts the integer that was entered into hex.



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# 5 Simulation

To run a simulation select the Simulation window as shown in Section 4.1.4.

## 5.1 Setting Up a Simulation

### *5.1.1 Setting Simulation Parameters*

To adjust simulation parameters select the simulation element, as shown in Figure 5-1.

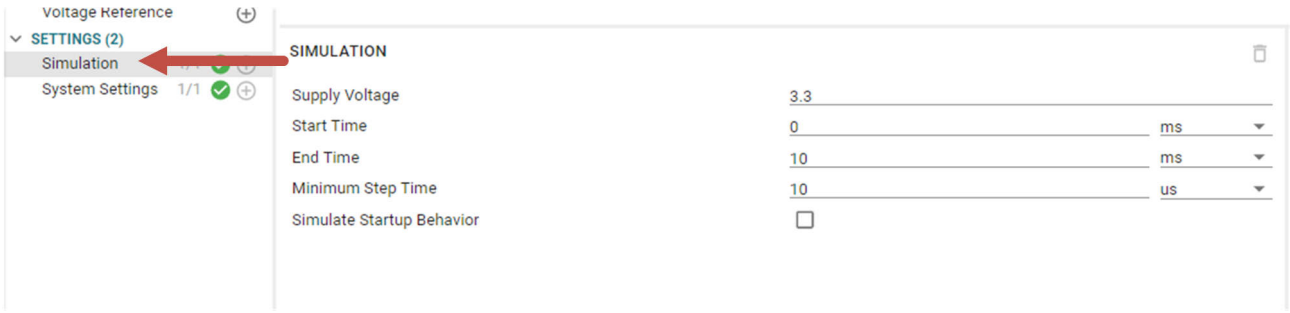


**Figure 5-1. Simulation Options**

### *5.1.2 Probing Ports*

Probing for simulation means the waveform, either input or output, is displayed in the simulation window once the simulation is complete. Please refer to connect probes on how to enable probe selection. Once enabled click on any gray port to select that port as a probe. All green ports while in this mode are probed. Increasing or removing probes has no affect on the speed of the simulation as the entire device is still being simulated.

### *5.1.3 Setting Simulation Inputs*

Select an input pin. In the configurable section of the selected pin select the simulated input dropdown, as shown in Figure 5-2. Once a simulated input is chosen a box appears below to configure the input wave form, as shown in Figure 5-3.

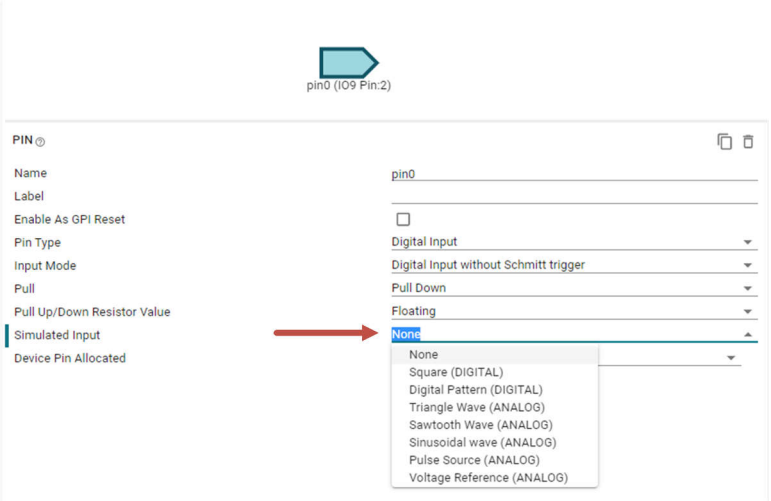


**Figure 5-2. Choosing a Simulated Input**



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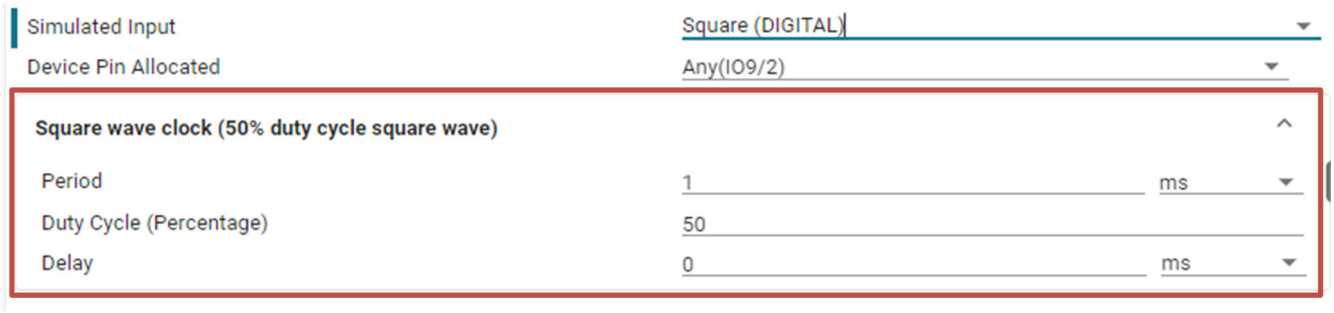


**Figure 5-3. Configuring a Simulated Input**

### *5.1.4 Setting Simulated Load*

Select an output pin. In the configurable section of the selected pin select the simulated load checkbox, as shown in Figure 5-4. Once a simulated load is enabled, a box appears below to configure the load on that pin, as shown in Figure 5-5.

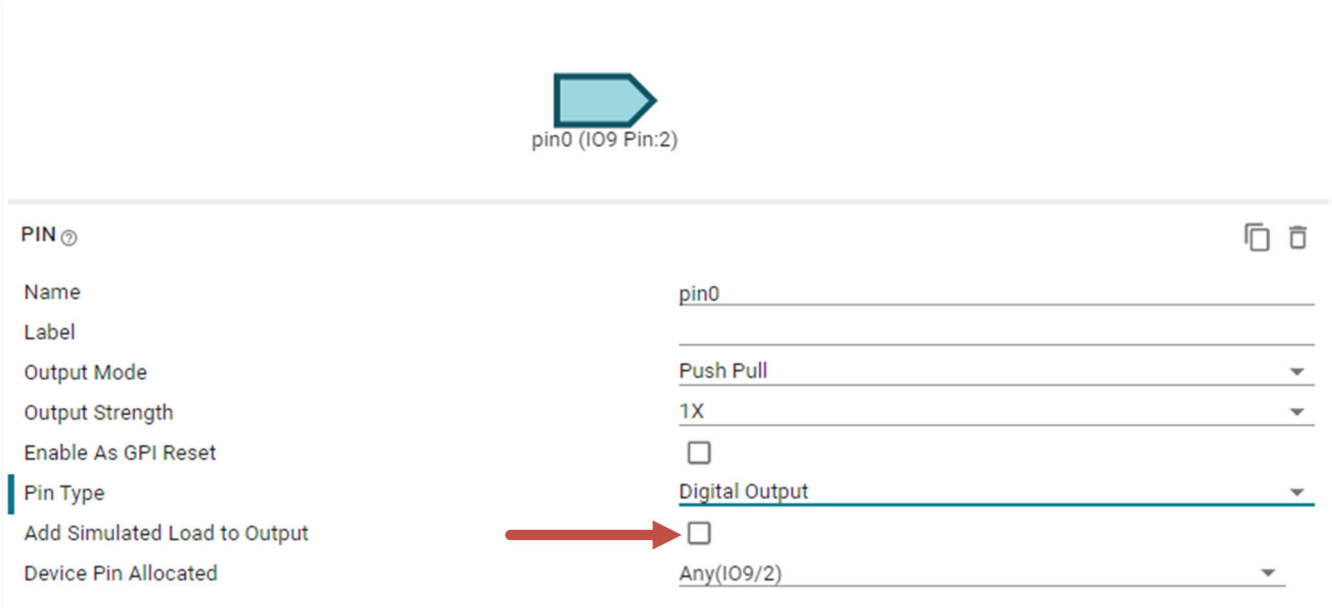


**Figure 5-4. Enabling a Simulated Load**

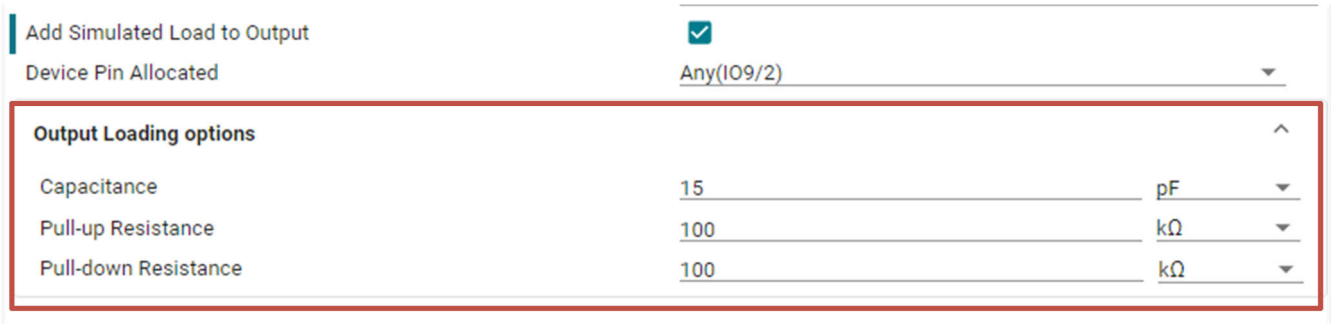


**Figure 5-5. Configuring a Simulated Load**



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## 5.2 Simulation Window Controls

### *5.2.1 Markers*

Select the mark point button in the top right, as shown in Figure 5-6. After this is selected clicking anywhere on the waveforms to place an initial marker. Clicking again on the wave form places a second marker.

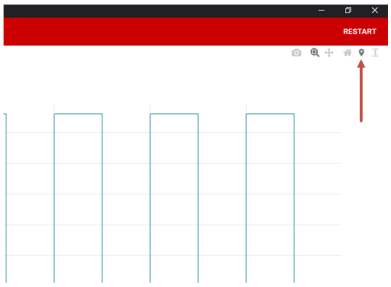


**Figure 5-6. Marker Button**

Once both markers have been placed voltage delta, time difference, frequency populate at the top of the window, as shown in Figure 5-7. Clicking on the waveforms again moves the initial marker, and a subsequent click moves the second marker placed.

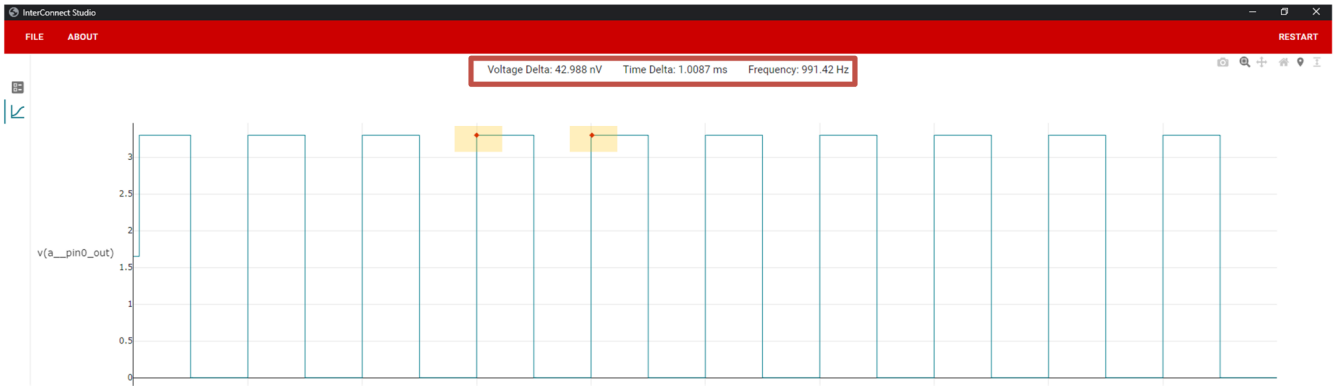


**Figure 5-7. Information When Both Markers are Placed**



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### 5.2.2 Zooming

Select the zoom button in the top right, as shown in Figure 5-8.

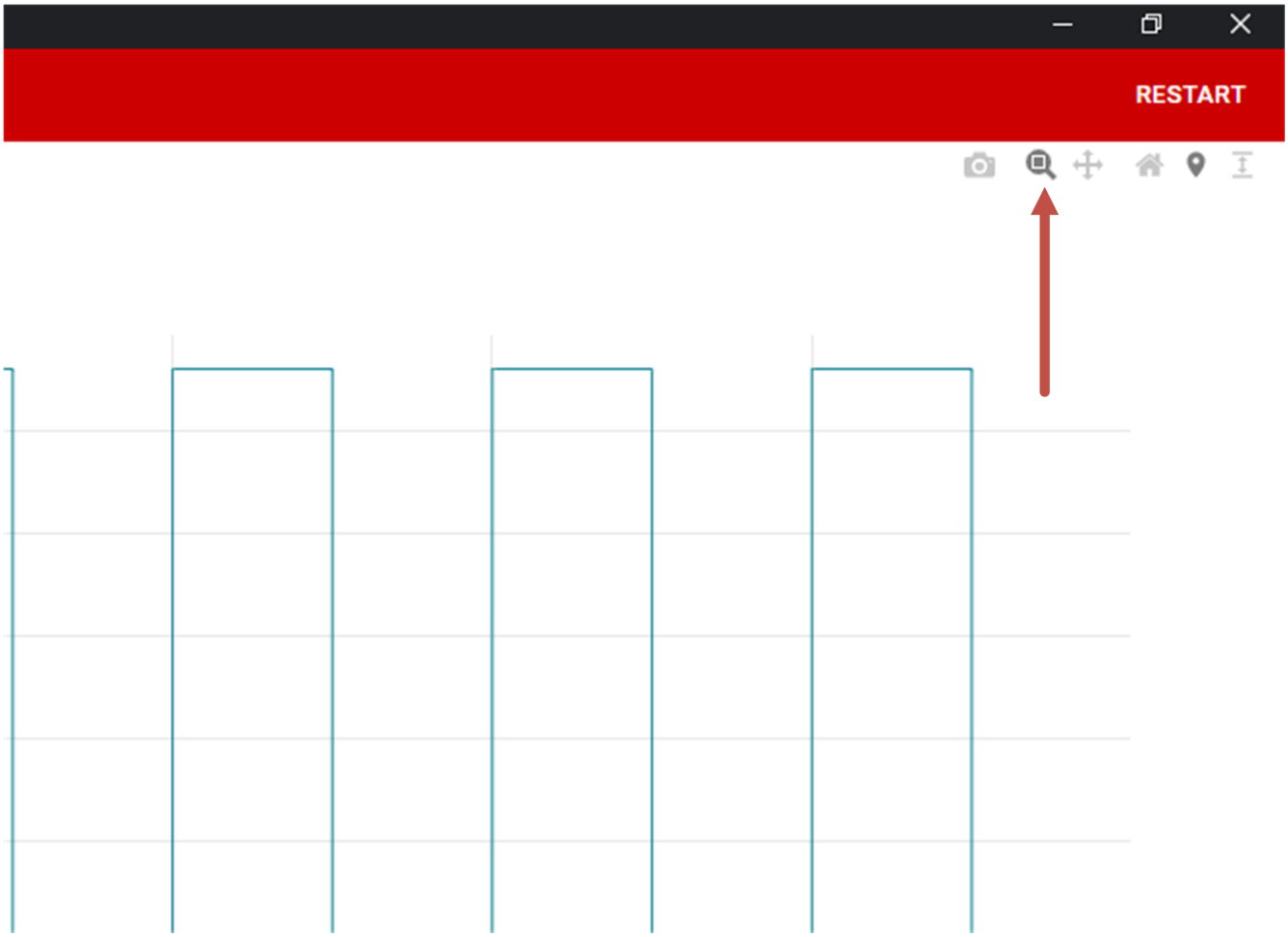


**Figure 5-8. Zoom Button**

Once selected highlighting a horizontal area, as shown in Figure 5-9, zooms all waveforms into that section of the x-axis, as shown in Figure 5-10. Highlighting a vertical area, as shown in Figure 5-11, zooms that waveform into that section of the y axis, as shown in Figure 5-12. Highlighting a square does both forms of zoom at the same time. Double clicking resets the window to it's original zoom scale, as shown in Figure 5-13.

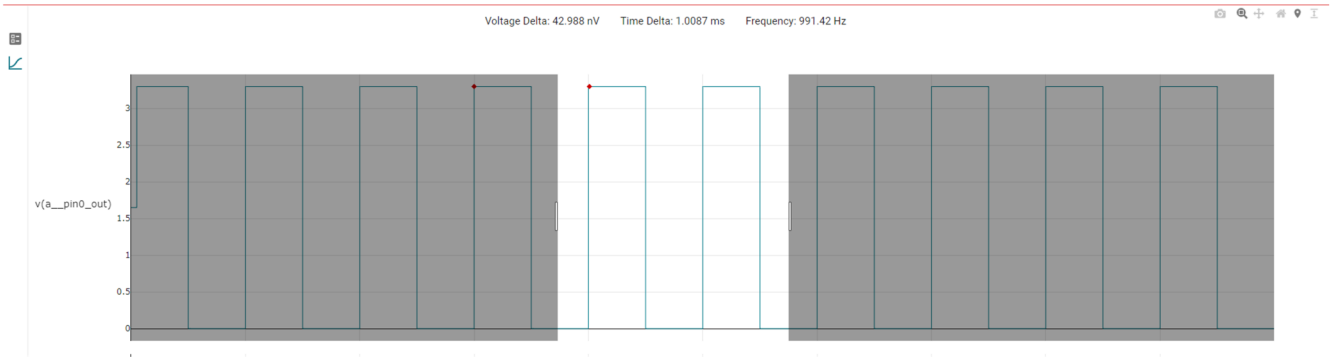


**Figure 5-9. Horizontal Zoom**



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**Figure 5-10. After Horizontal Zoom**

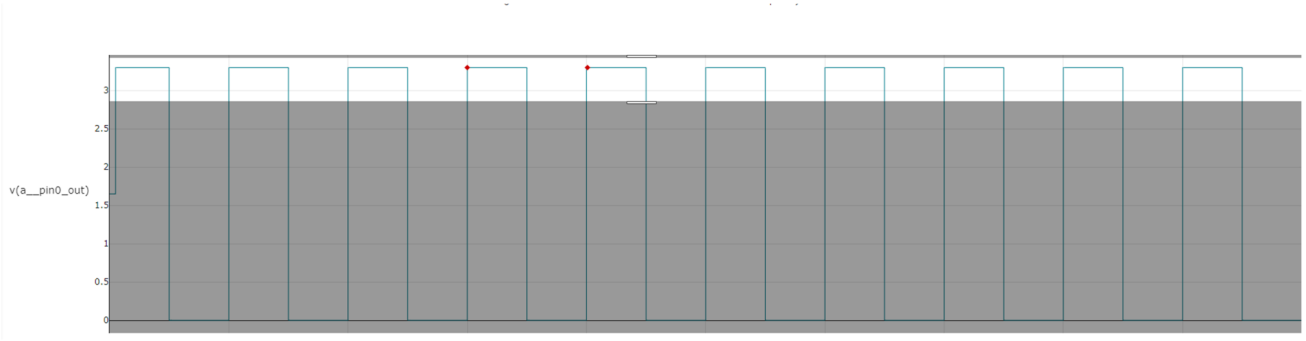


**Figure 5-11. Vertical Zoom**

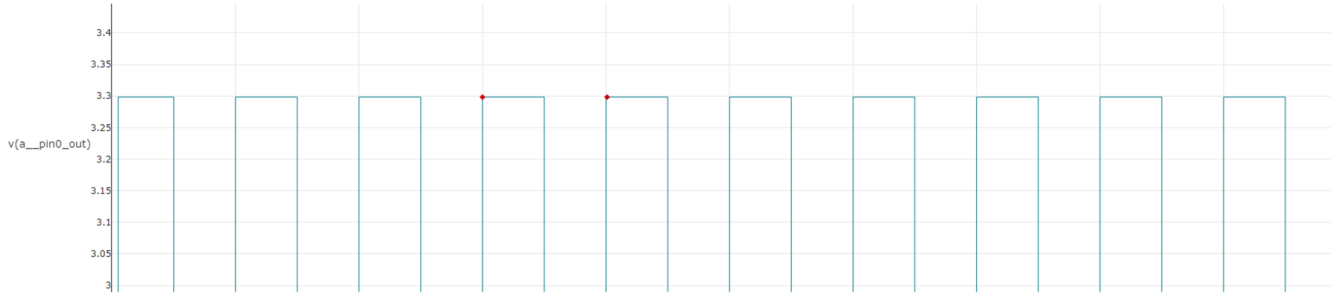


**Figure 5-12. After Vertical Zoom**

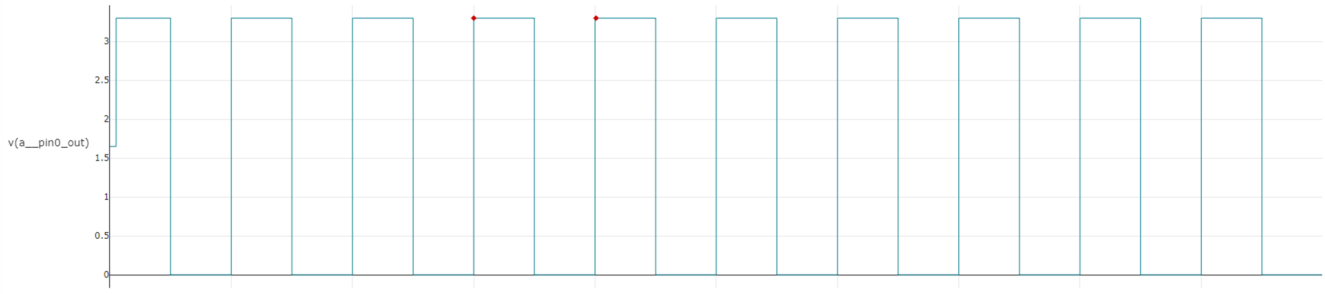


**Figure 5-13. Resetting Zoom**



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### 5.2.3 Reset Axes

Selecting the reset axes button, as shown in Figure 5-14, resets the x-axis to its original scaling.

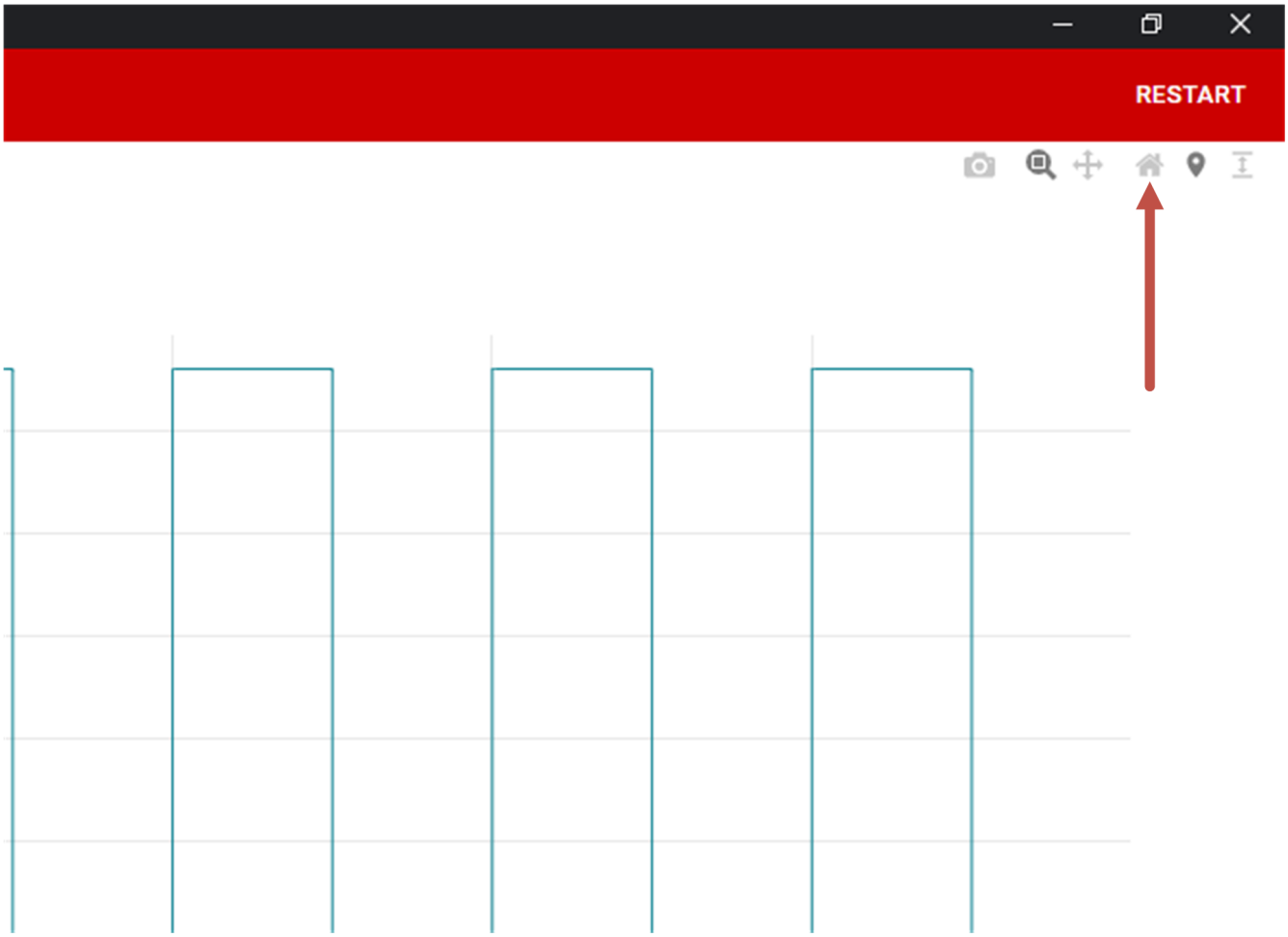


**Figure 5-14. Reset Axes Button**


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### 5.2.4 Compress and Expand Graphs

Select the compress and expand graphs button in the top right, as shown in Figure 5-15.

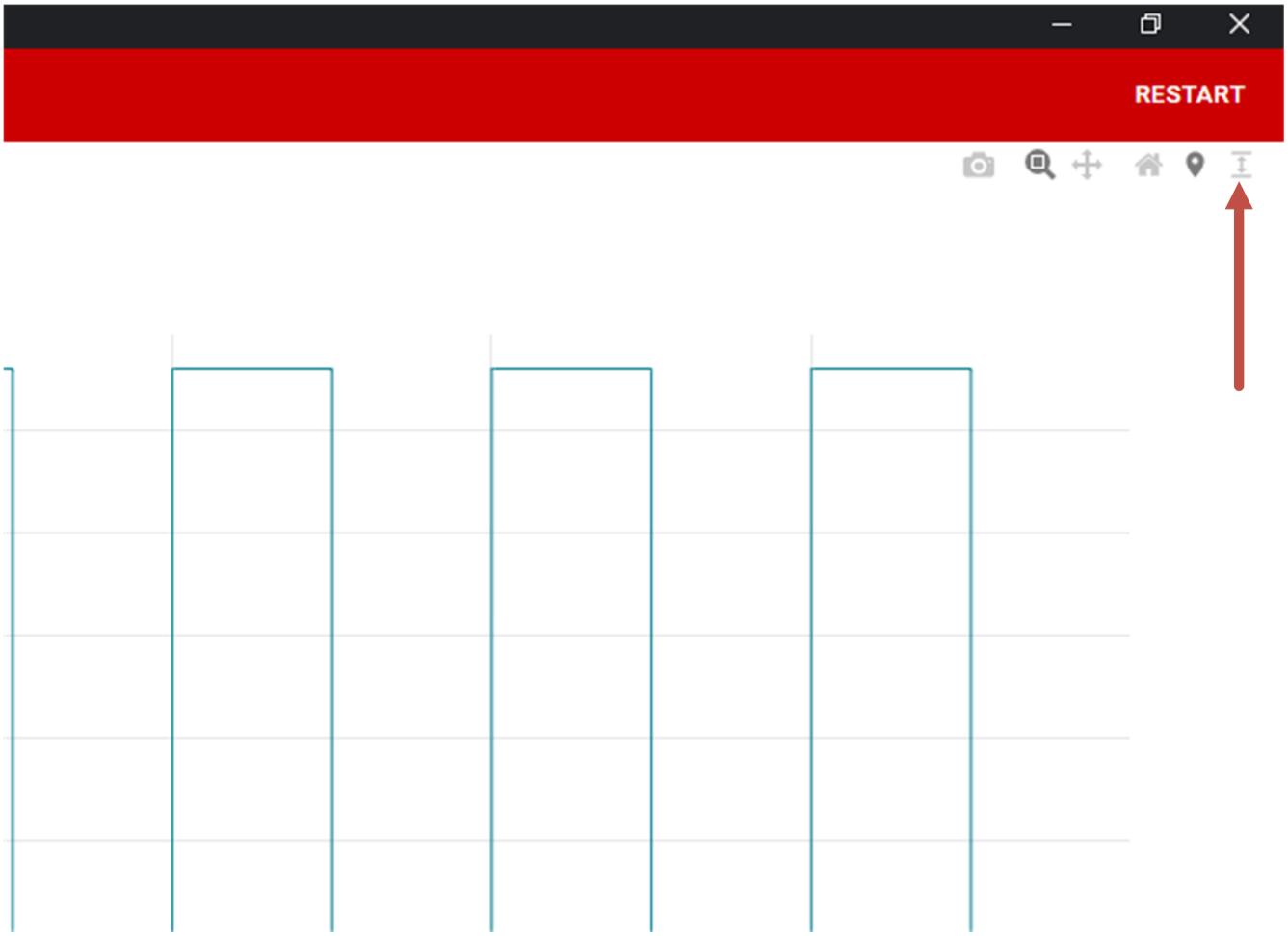


**Figure 5-15. Compress and Expand Button**

Once selected clicking a waveform compresses said waveform, as shown in Figure 5-16.

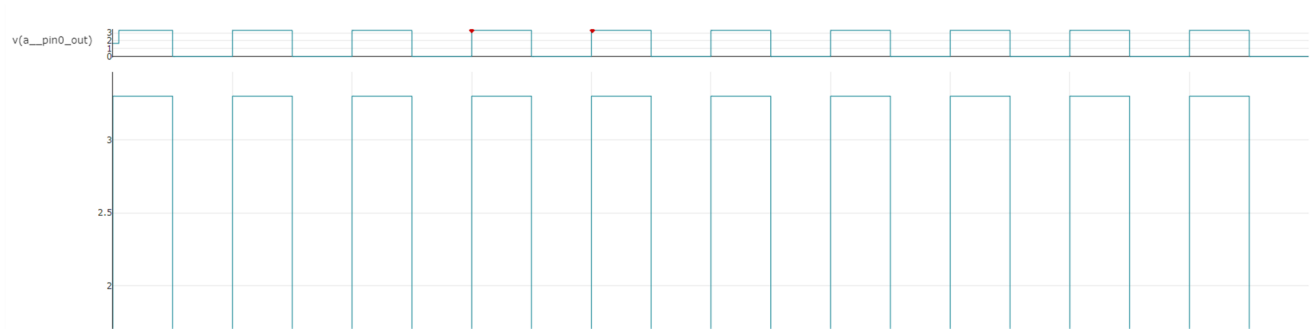


**Figure 5-16. Compress Waveform**



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Clicking a compressed waveform expands the waveform to fill the remaining space, as shown in Figure 5-17.

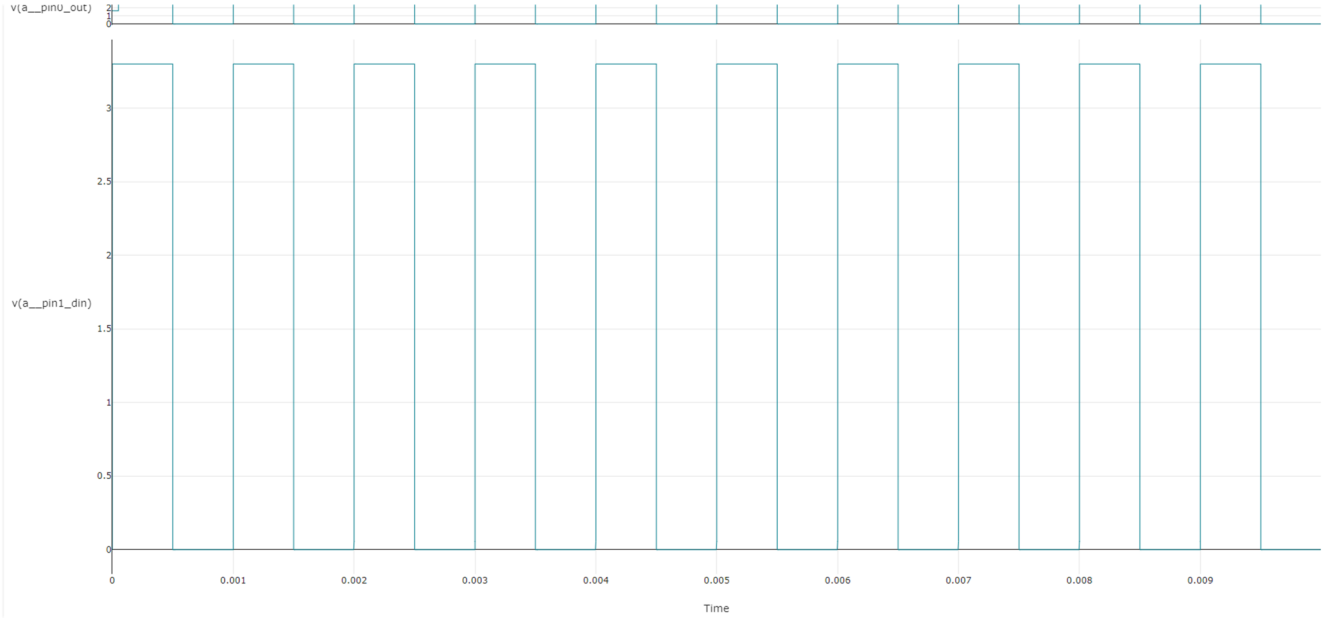


**Figure 5-17. Expand Waveform**



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### 5.2.5 Pan

Select the pan button in the top right, as shown in Figure 5-18. Once selected dragging a waveform moves the waveform to view a different section.

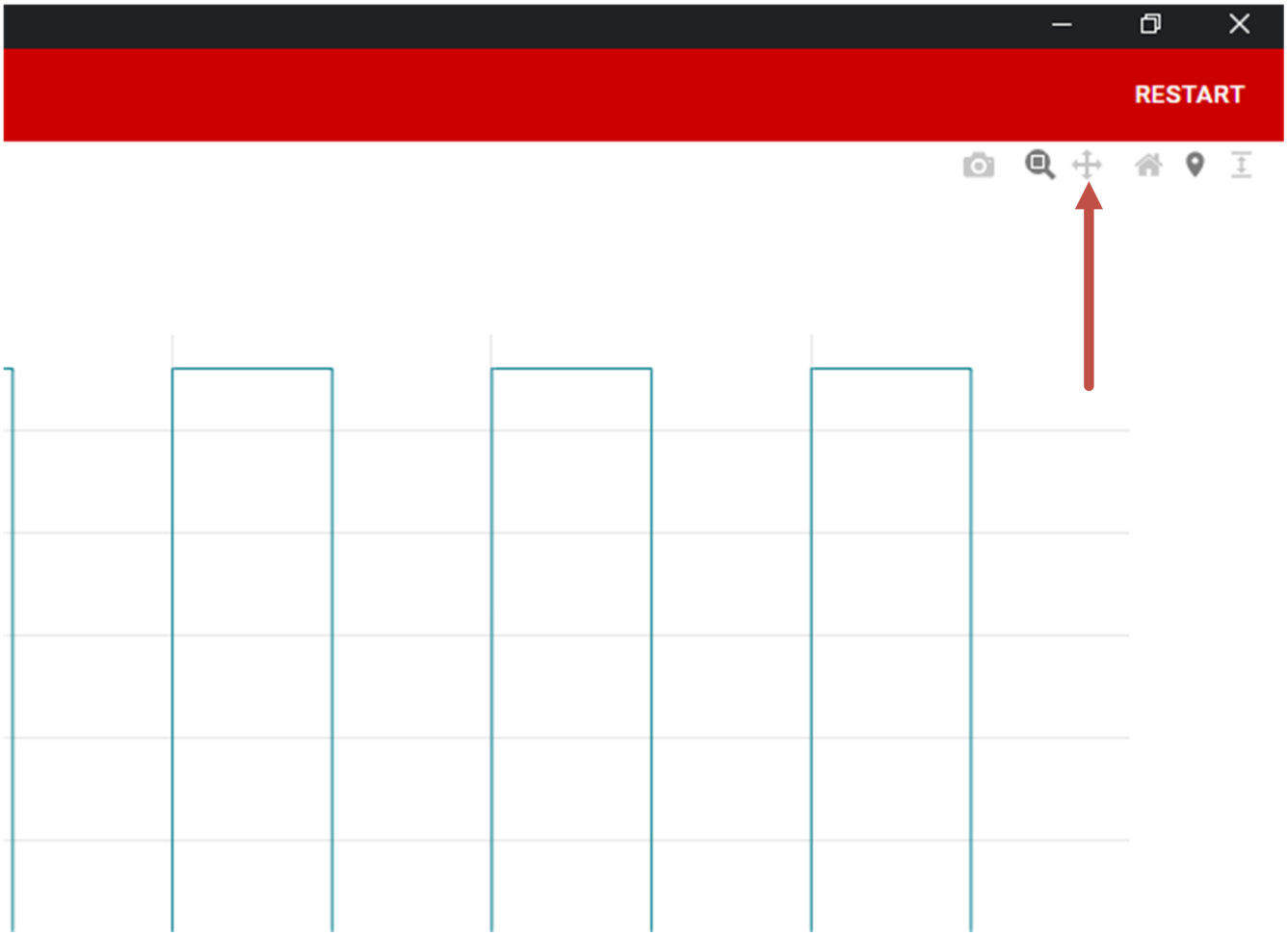


**Figure 5-18. Pan Button**



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### 5.2.6 Export Image as PNG

Select the download plot as a png button in the top right, as shown in Figure 5-19. Once selected a file manager opens to save the image.

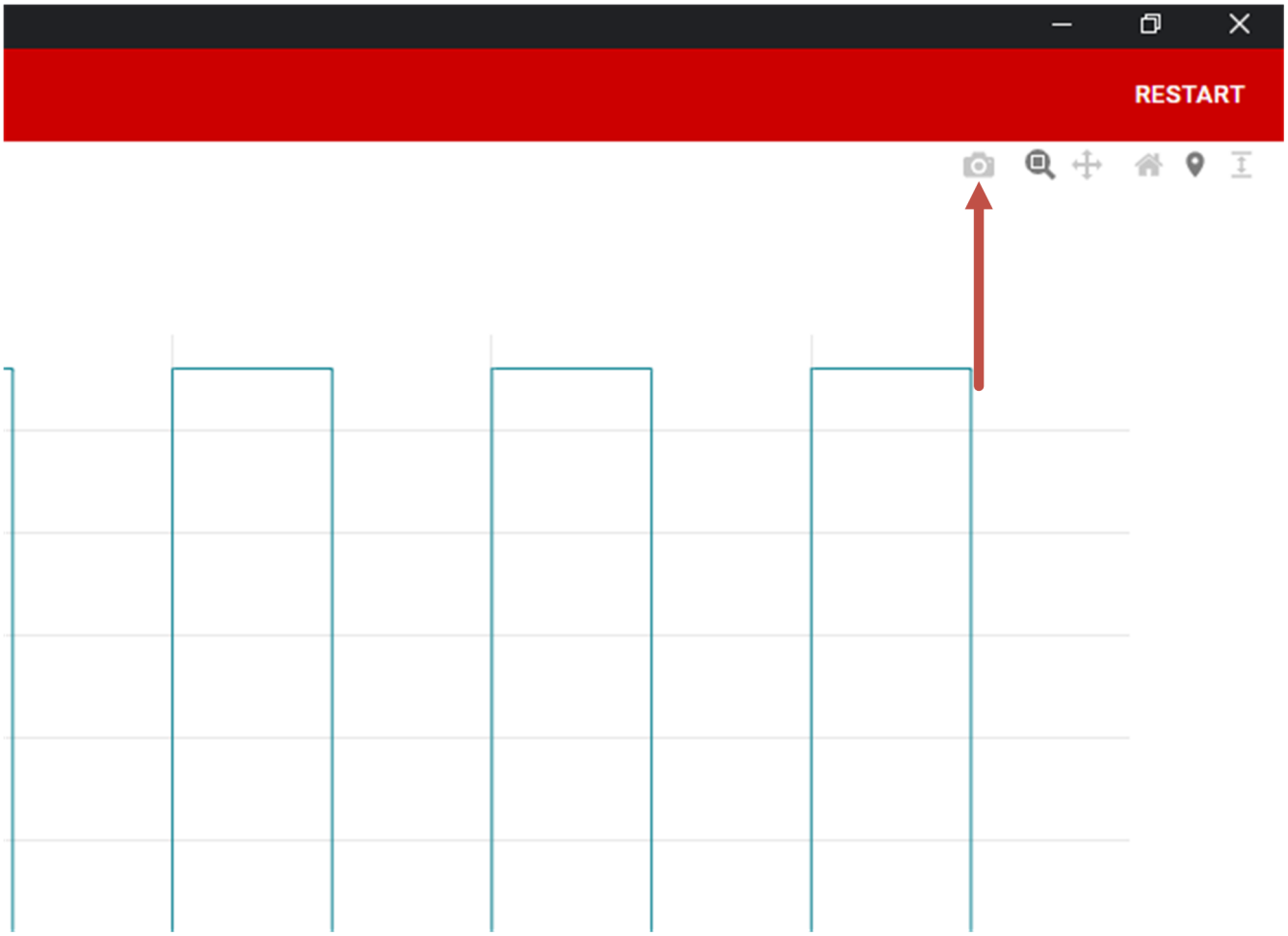


**Figure 5-19. Export Image as PNG Button**


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