Infineon Device Configurator user guide

Device Configurator version 5.90

About this document

A newer version of this document may be available on the web here

Scope and purpose

This guide provides information and instructions for using the Infineon Device Configurator to update various parameters for your device.

Intended audience

This document helps application developers understand how to use the Device Configurator as part of creating a ModusToolbox™ application.

Document conventions

Convention	Explanation
Bold	Emphasizes heading levels, column headings, menus and sub-menus
Italics	Denotes file names and paths.
`Monospace`	Denotes APIs, functions, interrupt handlers, events, data types, error handlers, file/folder names, directories, command line inputs, code snippets
File > New	Indicates that a cascading sub-menu opens when you select a menu item

Abbreviations and definitions

- **Resource** – Includes peripherals, pins, clocks, etc. used in an application.
- **Configurator** – A GUI-based tool used to configure a resource.
- **Application** – One or more projects related to each other.
- **Personality** – A file that defines a resource behavior.
- **Device Support Library** – A device support library provides critical firmware and device data files to configurators. Device support libraries are identified with a file named *props.json*. It is used to find things like other tools, devices, and personalities.

Reference documents

Refer to the following documents for more information as needed:

- ModusToolbox™ tools package user guide
- ModusToolbox™ tools package release notes
- API reference guides

Table of contents

About this document . . . 1
Table of contents . . . 2
1 Overview . . . 4
2 Stand-alone operation . . . 5
2.1 Install Infineon Device Configurator . . . 5
2.2 Run Device Configurator . . . 6
3 Using with ModusToolbox™ application . . . 12
3.1 Installation . . . 12
3.2 Launch the Device Configurator . . . 12
4 Quick start . . . 14
5 Code generation . . . 16
6 GUI description . . . 17
6.1 Menus . . . 17
6.2 Device tabs . . . 18
6.3 Resources tabs . . . 18
6.4 Panes . . . 18
6.5 Icons . . . 18
7 Resources tabs . . . 20
7.1 Tab features . . . 20
7.2 Solutions tab . . . 22
7.3 Peripherals . . . 23
7.4 Analog tab . . . 24
7.5 Pins . . . 25
7.6 Clocks tab . . . 26
7.7 Analog-Routing tab . . . 27
7.8 System tab . . . 30
7.9 Memory tab . . . 31
7.10 MMIO-Clocks tab . . . 47
7.11 Peripheral-Clocks tab . . . 48
7.12 DMA tab . . . 49
8 Panes . . . 50
8.1 Panes layout and arrangement . . . 50
8.2 Parameters pane . . . 51
8.3 Notice List . . . 54
8.4 Code Preview pane . . . 55
8.5 Notes pane . . . 56
9 Version changes . . . 57

Table of contents

Revision history 60

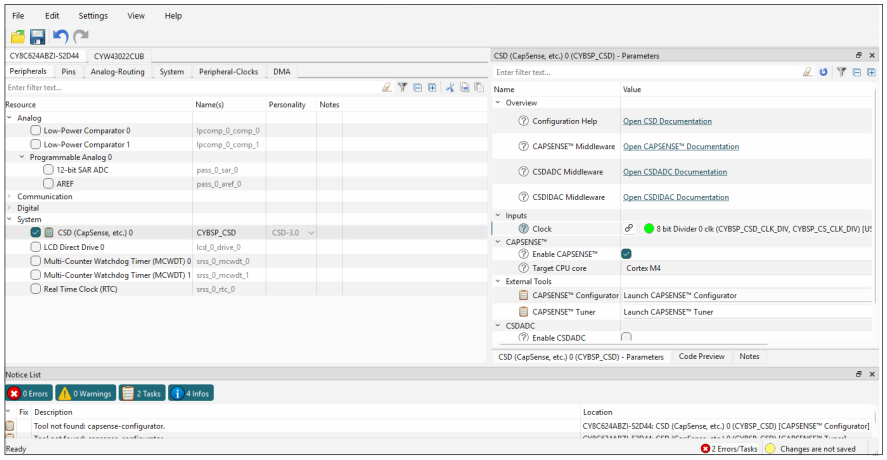
Disclaimer 61

1 Overview

The Infineon Device Configurator allows you to enable and configure device peripherals, such as clocks and pins, as well as standard MCU peripherals. When working in the ModusToolbox™ environment, this tool is included as part of the tools package, and it is required when working on devices such as PSOC™ MCUs.

This tool is also provided as an optional stand-alone configuration utility for you to use with the Keil µVision IDE when working on devices such as TLE994x_5x. This version is distributed via Infineon Developer Center: http://www.infineon.com/idc. Refer to the specific hardware documentation for your device to determine if this tool is supported.

After configuring and saving a particular device's settings, the Device Configurator generates firmware for use in your application (see Code generation).



2 Stand-alone operation

When the Device Configurator is used outside of the ModusToolbox™ environment, such as TLEXXX, it will not have the ModusToolbox™ application context. In the current stand-alone use case, the personalities and device-db are intended to be shipped in a CMSIS pack, typically distributed via Infineon Developer Center, that is used in Keil µVision and IAR Embedded Workbench. The Device Configurator can be run as a GUI and via the command line.

- Install Infineon Device Configurator
- Run Device Configurator

2.1 Install Infineon Device Configurator

The installer for the Infineon Device Configurator is provided on Linux, macOS, and Windows. At this time, using the tool with Keil µVision IDE or IAR Embedded Workbench outside of the ModusToolbox™ environment is only supported on Windows, as these are only available for that operating system. The installer can be downloaded here: http://www.infineon.com/idc

Launch the *deviceconfigurator_[version].[build #]_windows_x64.exe* installer and follow the installer wizard steps. We recommend installing as current user. By default, the tool is installed here:

C:\Users\[user-home]\Infineon\Tools\InfineonDeviceConfigurator-[version]

***Note**: The installer has options to open the Device Configurator tool and the text file release notes. Opening the tool this way will not be in the context of a supported project loaded in Keil µVision or IAR Embedded Workbench, and the tool will open without any configuration information with a message to that effect. We recommend deselecting this option on the installer, and opening the tool from the IDE in the context of a supported project. See the* Run Device Configurator *section.*

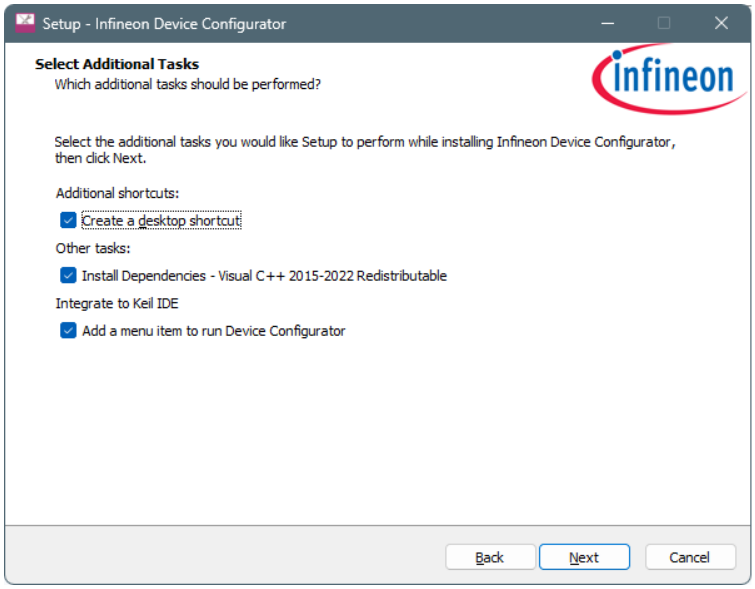
2.1.1 CMSIS Pack

In order to use devices such as TLE994x_5x, you need to install the appropriate CMSIS pack; for example, the *MOTIX_TLE994x_5x_PDL.pack*. You can find the pack on the Infineon Developer Center webpage: https://softwaretools.infineon.com/assets/com.ifx.tb.tool.motixtle994x5xpdl

2.2 Run Device Configurator

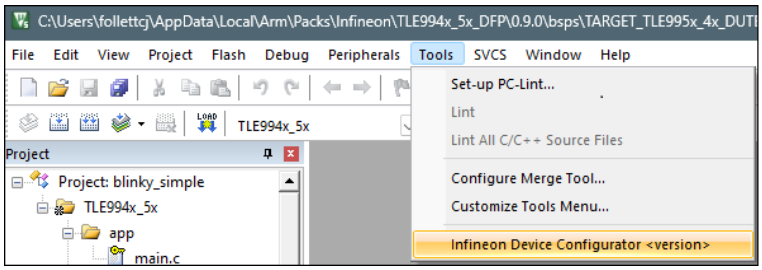
2.2.1 Keil µVision

The installer adds the **Run Device Configurator [version]** item to the **Tools** menu when the **Add a menu item to run Device Configurator** task (by default) is selected on the Custom Installation page. If needed, you can Add menu item to µVision (script) after the installer finishes.



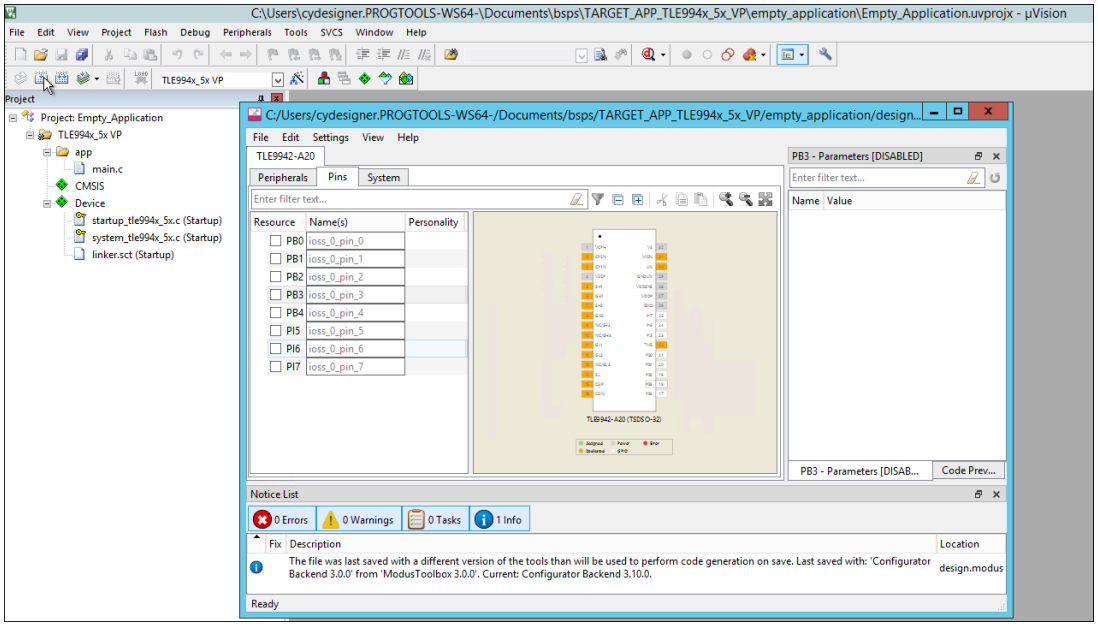
2.2.1.1 Using the GUI

To run the Device Configurator GUI tool, open the Keil µVision IDE with a project. Then, select the **Tools > Run Infineon Device Configurator [version]**. If you don't see the menu item, refer to Add menu item to µVision (script).



***Note**: This menu entry is for use with projects created out of supported CMSIS packs and **not** for applications exported from the ModusToolbox™ ecosystem. The CMSIS packs include the relevant files to be used via that menu entry. If you launch the Device Configurator without having a supported project loaded in Keil µVision, it may fail to open, and there may not be any warning or message.*

With a supported project loaded, the IDE launches the Device Configurator with the opened *design.modus* file located in the current project:



When you save updates, the Device Configurator generates/updates source code in the *GeneratedSource* directory next to the *design.modus* file. See the Code generation section for more details.

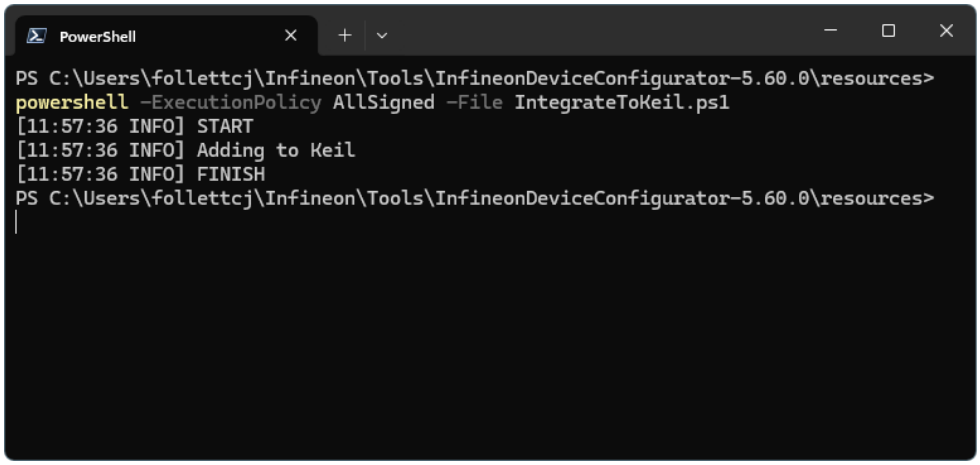
2.2.1.1.1 Add menu item to µVision (script)

In most cases, the installer adds the menu item to the Keil µVision IDE automatically. It also extracts a *IntegrateToKeil.ps1* script to the *[installation folder]\resources* folder. If the **Tools** menu in the Keil µVision IDE does not contain the item to launch the Infineon Device Configurator, you can run the script manually to add it.

To run the script, open a command prompt and navigate to the resources folder (for example, *C:\Users\[user-home]\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources* or *C:\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources*), type "powershell" in address bar.

Run the following command:

```
powershell -ExecutionPolicy AllSigned -File IntegrateToKeil.ps1
```



The CLI may require confirmation of script owned by Infineon Technologies publisher.

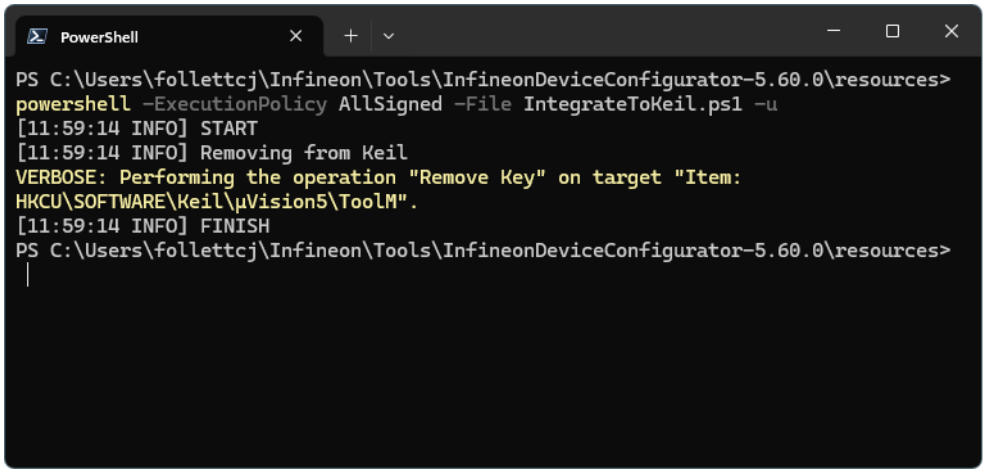
2.2.1.1.2 Remove menu item from µVision (script)

If you use the Device Configurator uninstaller, it will remove the **Run Device Configurator** menu item from the Keil µVision IDE automatically. To remove the item manually, run the *IntegrateToKeil.ps1* script with `-u`:

Open a command prompt and navigate to the resources folder (for example, *C:\Users\[user-home]\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources* or *C:\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources*), type "powershell" in address bar.

Run the following command:

```
powershell -ExecutionPolicy AllSigned -File IntegrateToKeil.ps1 -u
```



The CLI may require confirmation of script owned by Infineon Technologies publisher.

2.2.1.2 Using the command line

You can use the command line to run the Device Configurator with project context by providing specific arguments. For example (replace "[...]" with real values):

```
C:\Users\[user-home]\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources\launch-
tool.exe --library "$Sprops.json","$Sdevice-info\device-db\props.json" --design
"$Pconfig\design.modus" --set-device $D
```

2.2.2 IAR Embedded Workbench

The installer does not add any settings for IAR Embedded Workbench. You need to configure the GUI to add a menu item. You can also run the Device Configurator from the command line.

Create *design.modus* file

If you have a project without a *design.modus* file, follow these steps to allow configuration of your project with the Device Configurator:

1. Create a new text file called “design.modus” inside your project directory with the following minimal configuration:

```
<?xml version="1.0" encoding="UTF-8"?>
<Configuration app="BACKEND" formatVersion="14" lastSavedWith="Configurator Backend"
lastSavedWithVersion="3.50.0" xmlns="http://cypress.com/xsd/cydesignfile_v5">
    <Devices>
        <Device mpn="TLE9954EQA40">
            <BlockConfig/>
            <Netlist/>
        </Device>
    </Devices>
</Configuration>
```

2. Replace the “mpn” attribute with the part number of the used device in your project.
3. Save the “design.modus” file.

Run Device Configurator

Run the tool as described in Using the GUI or Using the command line.

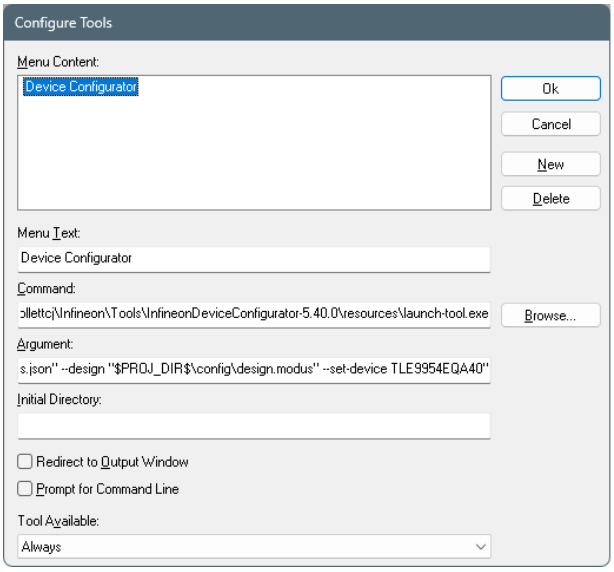
1. Upon first opening the Device Configurator for a project. resolve all pending tasks listed in the Notice List to achieve a valid configuration for the selected device. See Notice List for more details.
2. Set a configuration for your device by enabling desired blocks from the Peripherals, Pins, and System tab.
3. Save the configuration.
4. Add the newly created *GeneratedSource* folder to your build environment in the same location as your *design.modus* file.
5. Include the *ifxcfg.h* header file from the *GeneratedSource* folder, and insert an `init_ifxcfg_all()` call inside your application start-up routine.

2.2.2.1 Using the GUI

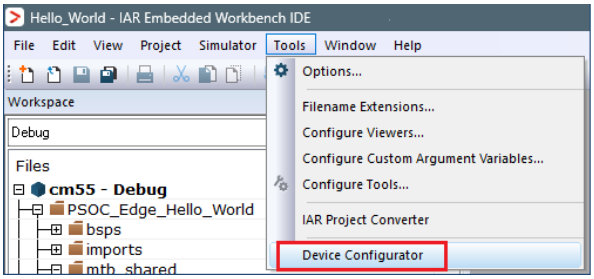
Configure menu

You need to configure IAR Embedded Workbench GUI manually to add Device Configurator to the menu, as follows:

1. On the main menu, select **Tools > Configure Tools...** to open the dialog.



2. On the dialog, enter the following:
   - **Menu Text**: Device Configurator
   - **Command**: `[path-to-device-configurator]\resources\launch-tool.exe`
     You can navigate to the executable using the [**Browse...**] button.
   - **Argument**: `"--library "[path-to-IAR-CMSIS-Packs]\Infineon\TLE994x_5x_DFP\1.0.0\props.json","[path-to-IAR-CMSIS-Packs]\Infineon\TLE994x_5x_DFP\1.0.0\device-info\device-db\props.json" --design "$PROJ_DIR$\config\design.modus" --set-device TLE9954EQA40"`
     This passes a command to the Device Configurator to use the specified library, device-db, and *design.modus* file, and set the device.
     The variable `$PROJ_DIR$` is the IAR Embedded Workbench project directory.
3. Click **OK** to close the dialog, and the menu item will be added:



2.2.2.2 Using the command line

You can use the command line to run the Device Configurator with project context by providing specific arguments. For example (replace "[...]" with real values):

```
C:\Users\[user-home]\Infineon\Tools\InfineonDeviceConfigurator-[version]\resources\launch-tool.exe --library "C:\Users\[user-home]\IAR-CMSIS-Packs\Infineon\TLE994x_5x_DFP\1.0.0\props.json","C:\Users\[user-home]\IAR-CMSIS-Packs\Infineon\TLE994x_5x_DFP\1.0.0\device-info\device-db\props.json" --design "[IAR EW project path]\config\design.modus" --set-device TLE9954EQA40
```

The following describe the arguments in detail:

- Mandatory: `--library "[lib-file1]","[lib-file2]"`
  Replace [lib-file1] with the local path to the top-level CMSIS pack *props.json* file. For example:

  ```
  "C:\Users\[user-home]\IAR-CMSIS-Packs\Infineon\TLE994x_5x_DFP\1.0.0\props.json"
  ```

  Replace [lib-file2] with the local path to the device-db *props.json* file in the CMSIS pack. For example:

  ```
  "C:\Users\[user-home]\IAR-CMSIS-Packs\Infineon\TLE994x_5x_DFP\1.0.0\device-info\device-db\props.json"
  ```

- Mandatory: `--design "[design-file]"`

Replace [design-file] with the local path to the *design.modus* file, usually located inside the project folder. For example:

```
"[your IAR EW project path]\config\design.modus"
```

- Optional: `--set-device [part-no]`

  Providing a valid [part-no] will update the device in the provided the *design.modus* file. For example, `TLE9954EQA40`

3 Using with ModusToolbox™ application

As part of a ModusToolbox™ application, the Device Configurator *design.modus* file is an integral part of the board support package (BSP) and requires an association to an application in order to obtain device configuration information.

3.1 Installation

The Infineon Device Configurator is installed as part of the ModusToolbox™ tools package. There are no other requirements for installing this tool.

3.2 Launch the Device Configurator

You can launch the Device Configurator in various ways as described in this section; however, the tool's configuration (*design.modus*) file requires an association to an application in order to obtain device configuration information.

The *design.modus* file contains all the required hardware configuration information about the device for the application. When you save updates, the Device Configurator generates/updates source code in the *GeneratedSource* directory next to the *design.modus* file. Applications use the *design.modus* file and generated source code in future application builds.

3.2.1 VS Code and Eclipse

VS Code and Eclipse have tools to launch the Device Configurator from within an open application. Refer to the applicable user guide for more details:

- VS Code for ModusToolbox™ user guide
- Eclipse IDE for ModusToolbox™ user guide

3.2.2 make command

As described in the ModusToolbox™ tools package user guide build system chapter, you can run numerous make commands in the application directory, such as launching the Device Configurator. After you have created a ModusToolbox™ application, navigate to the application directory and type the following command in the appropriate bash terminal window:

```
make device-configurator
```

This opens the Device Configurator using the application's *design.modus* file.

3.2.3 Executable (GUI)

If you don't have an application or if you just want to see what the configurator looks like, you can launch the Device Configurator GUI by running its executable as appropriate for your operating system (for example, double-click it or select it using the Windows **Start** menu). By default, it is installed here:

[install_dir]/ModusToolbox/tools_[version]/device-configurator-<version>

When launched this way, the Device Configurator opens without any configuration information. You can open a specific **.modus* file using the "Open" link or clicking **File > Open**, and then navigating to the location of the **.modus* file to open.

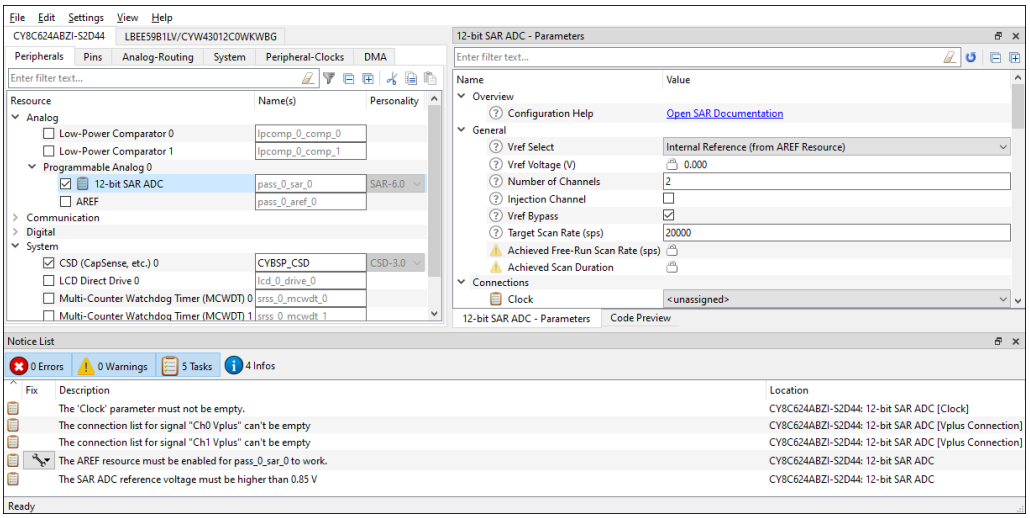
3.2.4 Executable (CLI)

The Device Configurator executable can be run from the command line, and it also has a "cli" version of the executable as well. Running configurator executables from the command line can be useful as part of batch files or shell scripts to re-generate the source code based on the latest configuration settings. The exit code for the executable is zero if the operation is successful, or non-zero if the operation encounters an error. For more information about the command-line options, run the executable using the `-h` option.

4 Quick start

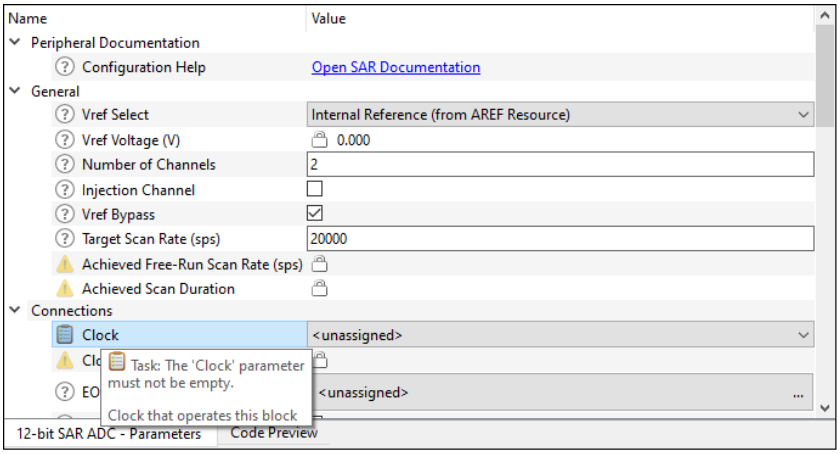
This section provides a simple workflow for how to use the Device Configurator.

1. Open the Device Configurator as applicable to your environment; that is, in stand-alone operation in Keil µVision or as part of a ModusToolbox™ application.
2. Enable a desired peripheral on the Peripherals tab by clicking the enable check box. Notice the Parameters pane becomes populated with fields.



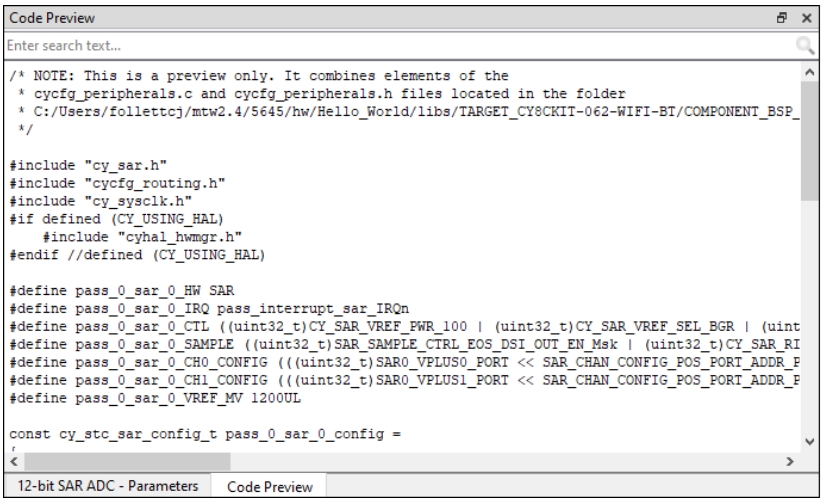
3. Notice also that a new task may appear in the Notice List pane.

   See Icons for descriptions of the various icons displayed in the Device Configurator.
4. Double-click on a task to jump to the parameter that needs to be addressed.



5. Select appropriate Parameter values and the task should be removed from the Notice List.
6. When all tasks have been completed, select the Code Preview pane to see a preview of the code that will be generated upon saving.

4 Quick start



7. Use the Resources tabs to enable and configure other resources as needed in the same manner as peripherals.
8. Save the **.modus* file to generate source code.

   The Device Configurator generates code into a "GeneratedSource" directory in your Eclipse IDE application, or in the same location you saved the **.modus* file for non-Eclipse IDE applications. That directory contains the necessary source (.c) and header (.h) files that use the relevant driver APIs to configure the hardware. Application code then uses this code to configure the system.
9. Use the appropriate API in your application code.

5 Code generation

The Device Configurator generates structures, defines, and initialization code for the blocks on the chip. All generated code is located in the *GeneratedSource* folder next to the **.modus* file. Refer to the Peripheral Driver Library (PDL) API Reference for more information about this code. Each enabled resource has a link to the specific driver documentation in the Parameters pane.

***Note**: The Device Configurator generates code based on the hardware resources that are enabled. If a resource is not enabled, no configuration will be generated for it. This means the resource will retain its default reset state. In most cases, this is powered off. However, some features are enabled by default, such as debug connectivity. To disconnect these features, you must call the appropriate API functions to turn the feature off.*

The defines and structures are all named based on the resource that created it. In general, these have the form `[resource-name]_config`. These structures can be passed to the PDL functions that are responsible for configuring the hardware block.

The functions are specific to a resource category and have names of the form `init_cycfg_[resource-category]`. The `init` function for a particular resource type is located in *GeneratedSource/cycfg_<resource-category>.h*. There are also the *cycfg.h* and *cycfg.c* files. Include the *cycfg.h* file in your application to access the generated header files. The *cycfg.c* file implements `init_cycfg_all()`, which calls all other generated functions, for example `init_cycfg_pins()`.

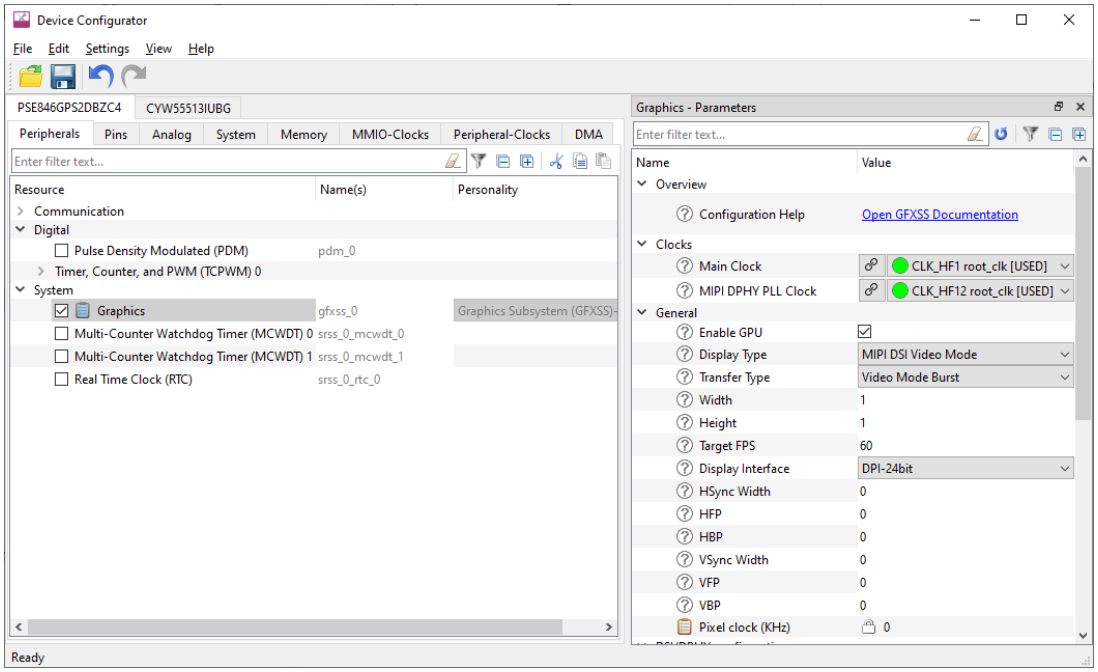
The resource types include:

- Clocks: Peripheral clocks
- Connectivity: Configuration of the programmable analog and digital routing resources
- Peripherals: Fixed function analog and digital peripherals
- System: Overall configuration function to setup all power and clock options

It is up to you to make use of the generated code based on the application's needs. This can be done as part of the application's `main()` loop.

6 GUI description

The Device Configurator GUI contains Menus, Icons, Resources tabs, and several Panes used to configure MCU peripherals.



6.1 Menus

File

- **Open** – Opens an existing *.*modus* file. The current file, if any, will be closed.
- **Close** – Closes the current file. If there are pending changes, you will be prompted to save the file.
- **Save** – Saves the current file and generates code for the related application. If there are errors in the application, a dialog will indicate such. The file will still be saved.
- **Open in System Explorer** – This opens your computer's file explorer tool to the folder that contains the *.modus file.
- **Recent Files** – Shows up to five recent files that you can open directly.
- **Update All Personalities** – Use this item to update all resource Personalities (see Resources tabs). This opens a dialog showing all the personalities in the design.

  For example, if you load a *.modus file made with an older device support library, there might be many warnings in the Notice List to update personalities or that a personality is no longer supported. Each warning must be addressed, and doing so one at a time can be annoying. The **Update All Personalities** menu item addresses them all at once.
- **Exit** – Closes the tool. You will be prompted to save any pending changes.

Edit

- **Undo** – Undoes the last action or sequence of actions.
- **Redo** – Redoes the last undone action or sequence of undone actions.

Settings

- **ModusToolbox™ Settings**: This opens the Centralized Settings tool, an editor that allows you to configure a wide range of settings for your environment, such as proxy settings, content modes, and manifest DB settings. See the Settings tool user guide for more details on specific features.

View

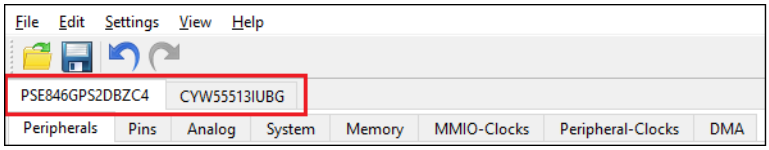
Contains toggles to hide or show different Panes. All panes are shown by default. There is also a command to show or hide the Toolbar (hidden by default) and reset the view of the configurator to the default.

Help

- **View Help** – Opens this document in either HTML or PDF format.
- **About** – Opens the About box for version information, with links to open Infineon.com and the current session log file.

6.2 Device tabs

The Device Configurator can be used to configure multiple devices. All devices in the BSP display in top-level tabs above the Resources tabs.



All the settings for each **Device** tab are configured separately.

***Note**: If you need to update or change devices, the best approach is to close the Device Configurator and then use the BSP Assistant. Refer to the BSP Assistant user guide for details.*

6.3 Resources tabs

See Resources tabs.

6.4 Panes

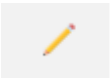
See Panes.

6.5 Icons

When configuring various options with this tool, you will see the following icons:

Icon	Description
	Indicates there is a tooltip. Hover over the icon to display a brief message about the setting.
	Enables or disables a specific resource.
	There may be occasions where an error, warning, task, or info icon displays for an enabled resource. See Notice List pane for more details.
	When shown in Parameters, this indicates that it is a read-only field. When shown for a Resource, this indicates the resource is locked and disabled. There is a tooltip explaining why the resource is locked.
	When shown for a Resource, this indicates the resource is locked and enabled. There is a tooltip explaining why the resource is locked.
	After assigning a signal, clicking this icon jumps to the linked resource(s).

6 GUI description

Icon	Description
	Opens a window to create, edit, and save notes.

7 Resources tabs

For some device families, the Device Configurator contains several tabs, each of which provides access to specific resources. Different devices have different resources tabs. However, for some device families, there are no separate tabs; resources are shown in a single pane, sometimes under collapsible trees.

When you enable a resource, or select an enabled resource, the Parameters pane displays various configuration options. As described under Icons, some enabled resources may contain errors, warnings, tasks, or infos that indicate some action might be required to resolve the issue. See Notice List for more details.

***Note**: Only the tabs relevant for a selected device are displayed, so some of the tabs may not be included for some devices.*

- Tab features
- Solutions tab – Options to configure multiple hardware blocks.
- Peripherals – Options to enable any of the analog (if available), digital, system, and communication hardware capabilities of the chip that are not related to the platform.
- Analog – For newer devices, options to enable and configure analog resources
- Pins – Options for all the pin related resources.
- Clocks tab – Clocks settings for newer devices.
- Analog-Routing tab – For older devices, this tab shows all the analog resources, whether enabled or not, and how they connect. It also allows you to edit routes.
- System tab – Options for chip-wide configuration settings such as power management and debug interfaces.
- Memory tab – Options to allocate memory to various cores.
- MMIO-Clocks tab– Options for all the MMIO clocks.
- Peripheral-Clocks tab – Options for all the peripheral clocks.
- DMA tab – Provides configuration of the DMA channel and transaction descriptors.

7.1 Tab features

Each of resource tab (except the Analog-Routing tab) has some of the following features:

Diagrams

Sections with diagrams, such as Pins, Analog-Routing, and System, include **Zoom** and **Fit to size** commands to resize the diagram as needed. You can also press and hold the [**Ctrl**] key and use the mouse scroll wheel to zoom in and out.

If you zoom the image larger than the frame area, scroll bars appear to move to different area of the diagram. You can also press and hold the [**Alt**] key with the mouse button to use the pan tool.

Filter

The **Resource** column shows all available resources in an expandable tree. The filter box above the list of peripherals allows you to limit the peripherals shown in the tree by entering a filter term. This will only show resources that contain that term. Use the **Erase** button to clear the filter. Use **Up** and **Down** arrow keys to view previous filter terms.

Use the **Hide disabled resources** filter button to only show resources that are enabled.

There are also **Expand** and **Collapse** commands that show all resources or show only the category nodes.

Cut, Copy, Paste

Use these commands to move and copy settings from one resource of the same type to another.

- When you use **Cut**, the settings will be copied to the clipboard, and the selected resource will be disabled.
- When you use **Copy**, the settings will just be copied to the clipboard.
- When you use **Paste**, the selected resource will be enabled if needed. The selected resource must support the same Personality name and version as the cut/copied resource.

Name(s)

This displays the current resource name(s). This is an editable field where you can specify optional, alternate names for this resource. This is also used in generated code.

Personality

Each resource has a "Personality" file that contains the information for the given resource.

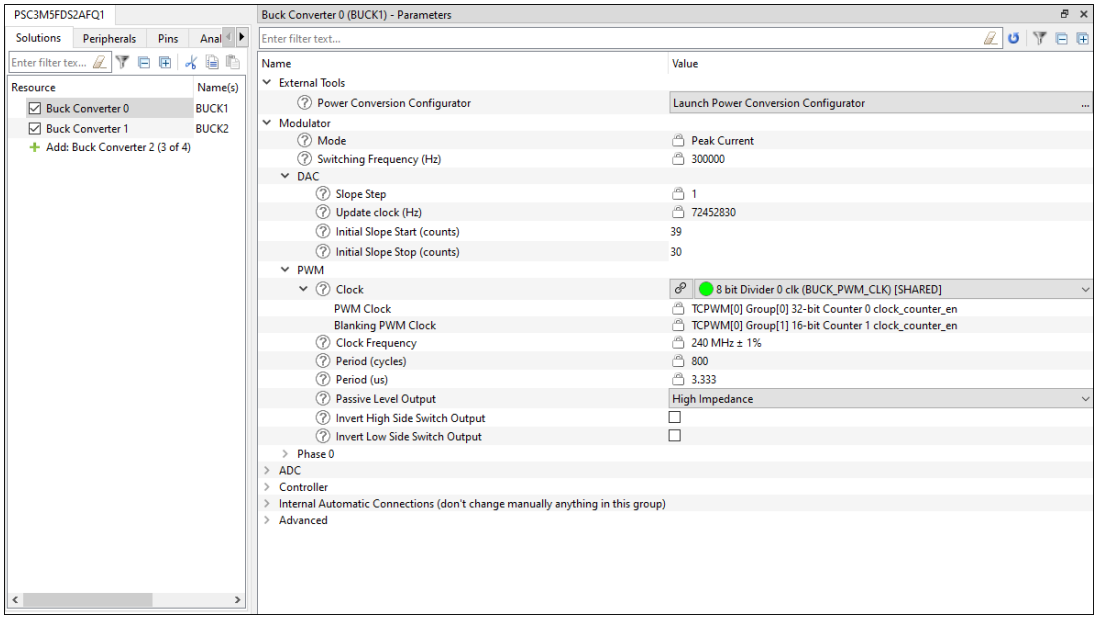
- Some peripherals, such as Serial Communication Block (SCB) and Timer, Counter, Pulse Width Modulator (TCPWM), have a pull-down menu to select a specific personality, such as UART, SPI, or I^2C.
- Some peripherals have multiple personality versions from which you can select.
- Some peripherals have a read-only field that only shows the name of this resource's personality file.

Notes

For each enabled resource, you can enter a note for whatever purpose makes sense to you. Click on the **Pencil** icon to open the Notes pane. After you have saved the note, the text will appear next to the **Pencil** icon.

7.2 Solutions tab

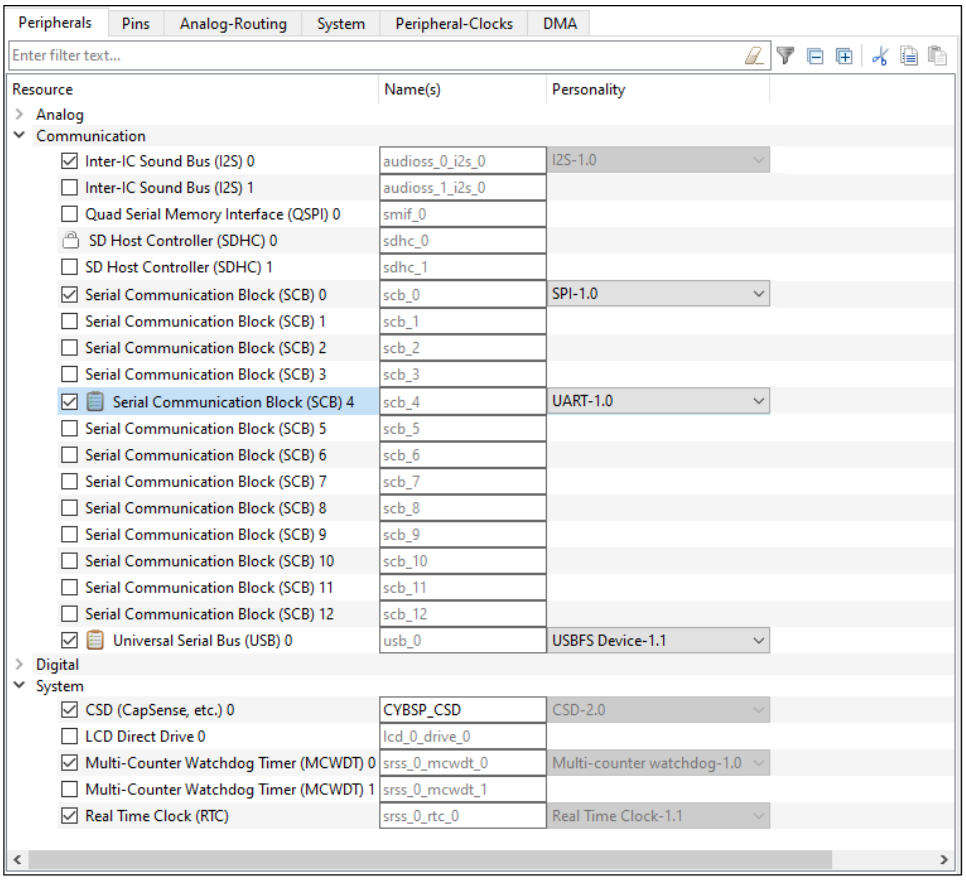
The **Solutions** tab displays for supported devices that provide configurations for a multi-resource solution. This tab provides configurable elements that generally consist of multiple hardware blocks. These elements pre-configure many of the low-level details and just present a higher-level interface to configure the solution-level element itself. All hardware that makes up the solution is configured in one **Parameters** pane, instead of having individual blocks on different panes. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.



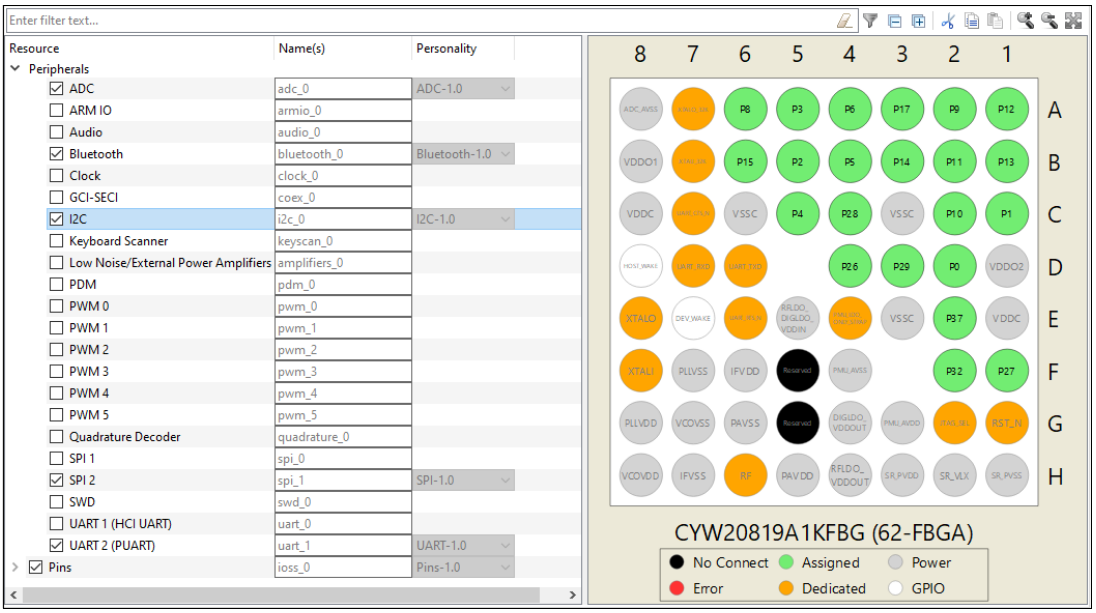
7.3 Peripherals

The **Peripherals** tab/tree is where you enable various analog, digital, system, and communication peripherals for the device to include in your application. The filter box and the hide disabled button above the list of peripherals allows you to limit the resources shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

7.3.1 Device families with tabs

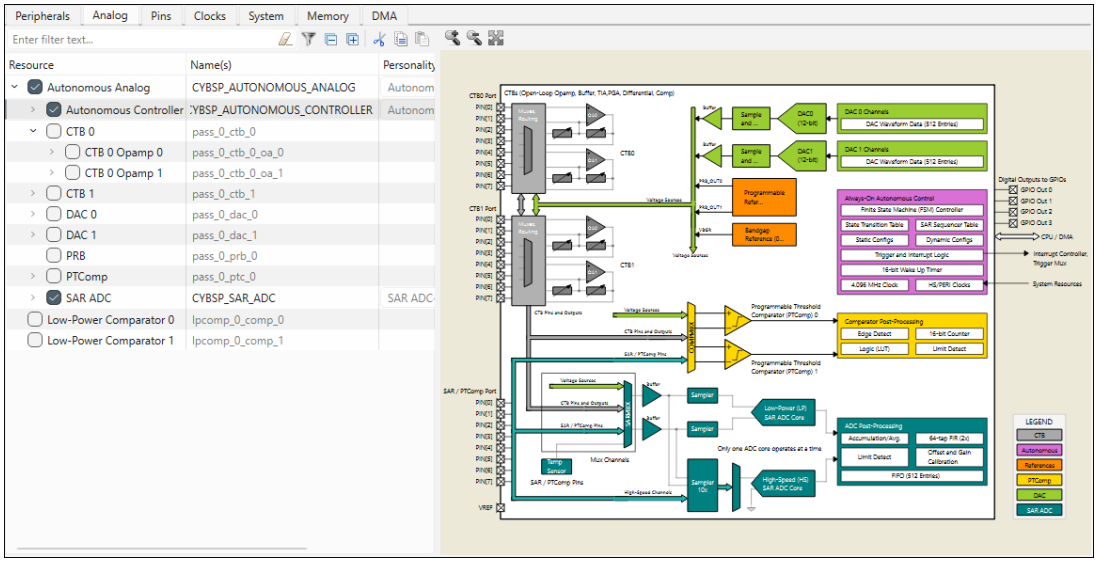


7.3.2 Device families without tabs



7.4 Analog tab

For newer devices, such as PSOC™ Edge and PSOC™ Control, the **Analog** tab allows you to enable the various analog resources for your application and configure their applicable parameters. These resources are not shown under the **Peripherals** tab as they are for older devices. The interactive diagram changes based on the enabled resource you have selected in the tree. You can also double-click on certain areas of a diagram to enable/disable a resource. There is no manual analog route-editing capability for these devices.



The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

7.5 Pins

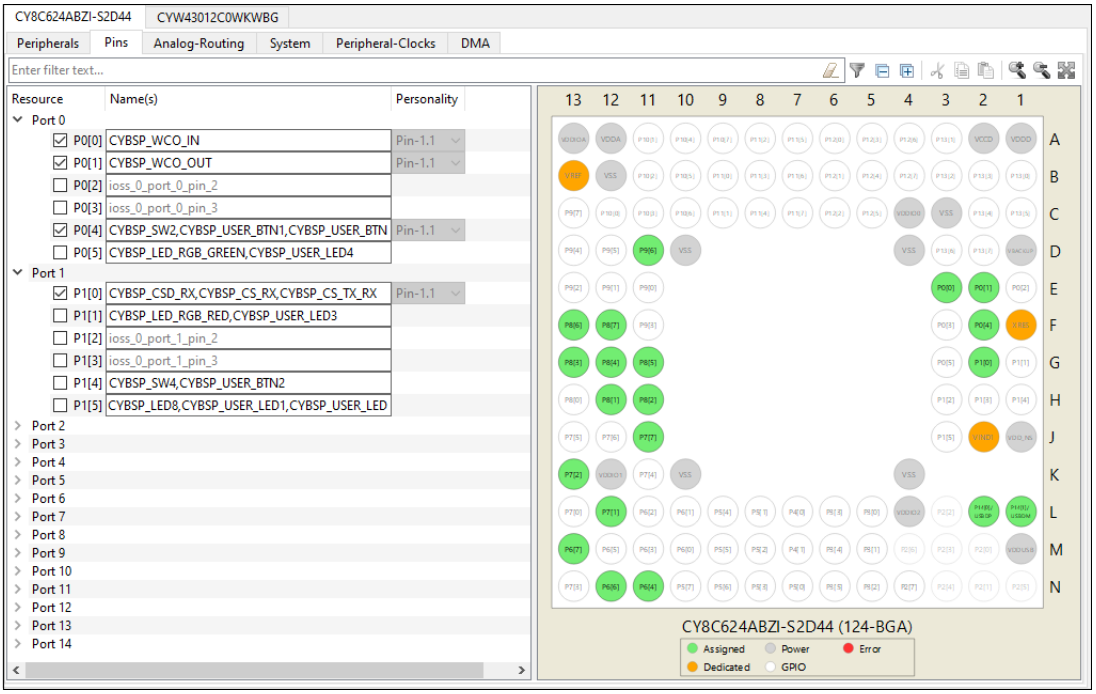
The **Pins** tab/tree is where you enable all the pin related resources. All available pins are shown in an expandable tree, arranged by port number. The filter box and the hide disabled button above the list of pins allows you to limit the pins shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

The interactive pin package diagram shows the different states of the pins; there is a legend on the diagram. You can enable/disable a pin by double-clicking it in the diagram.

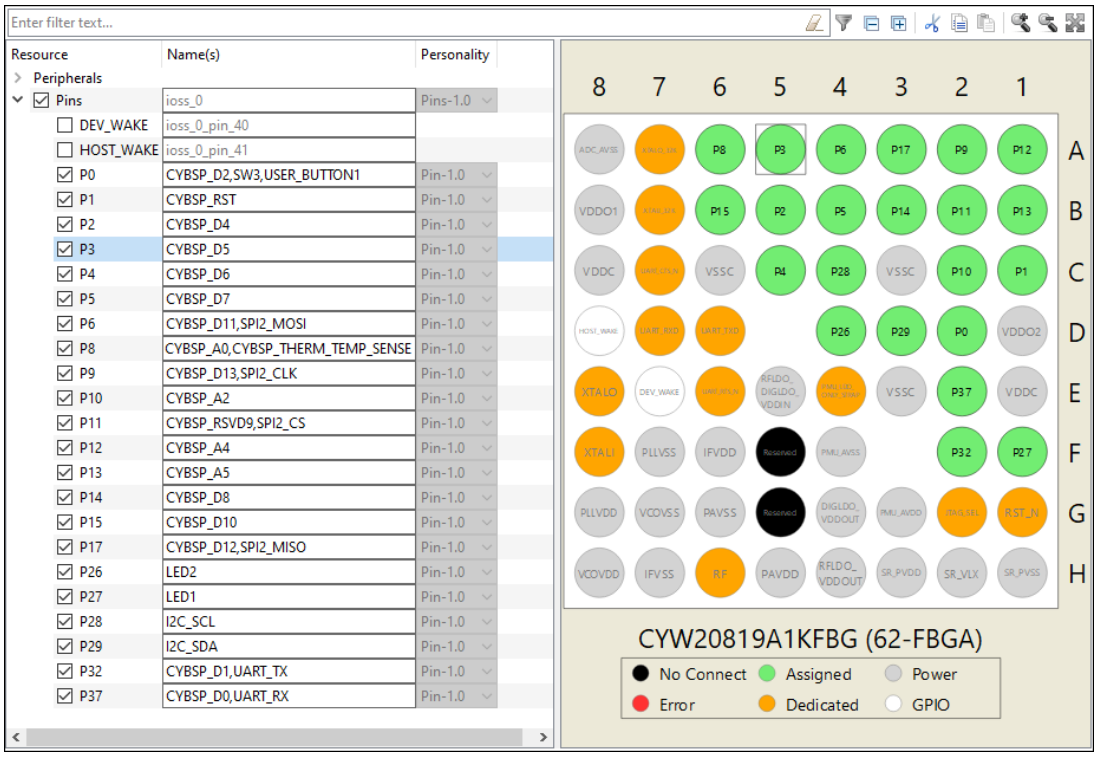
Pin states are shown in different colors:

- Black – No connect
- White – Disabled
- Green – Enabled
- Grey – Power/ground pins
- Orange – Fixed function pins
- Red – Error state
- Semi-transparent – The hardware resource's enabled state has been locked.

7.5.1 Device families with tabs

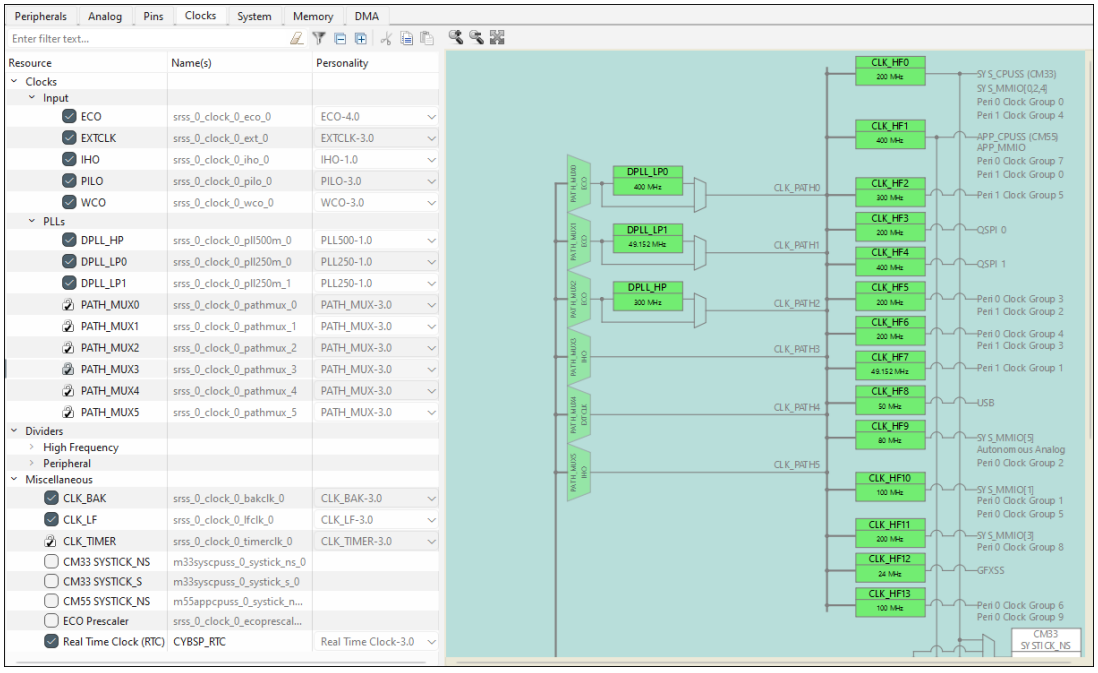


7.5.2 Device families without tabs



7.6 Clocks tab

For supported devices, the **Clocks** tab lists all the clocks in a design. All available clocks are shown in an expandable tree. The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

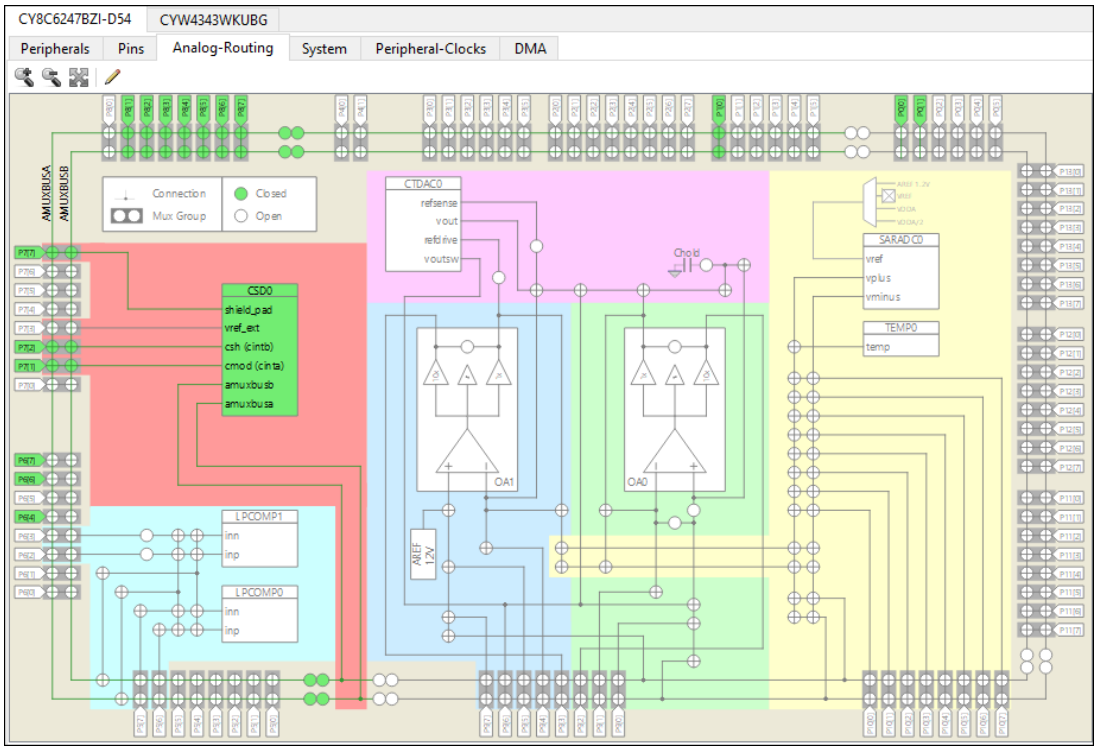


The interactive clock diagram shows all the system clocks and how they connect to each other. You can enable/disable a clock by double-clicking it in the diagram. Enabled clocks are green, disabled clocks are white, and clocks in error state are red.

***Note**: The semi-transparent (faded) elements in the diagram indicate that their enabled state is locked.*

7.7 Analog-Routing tab

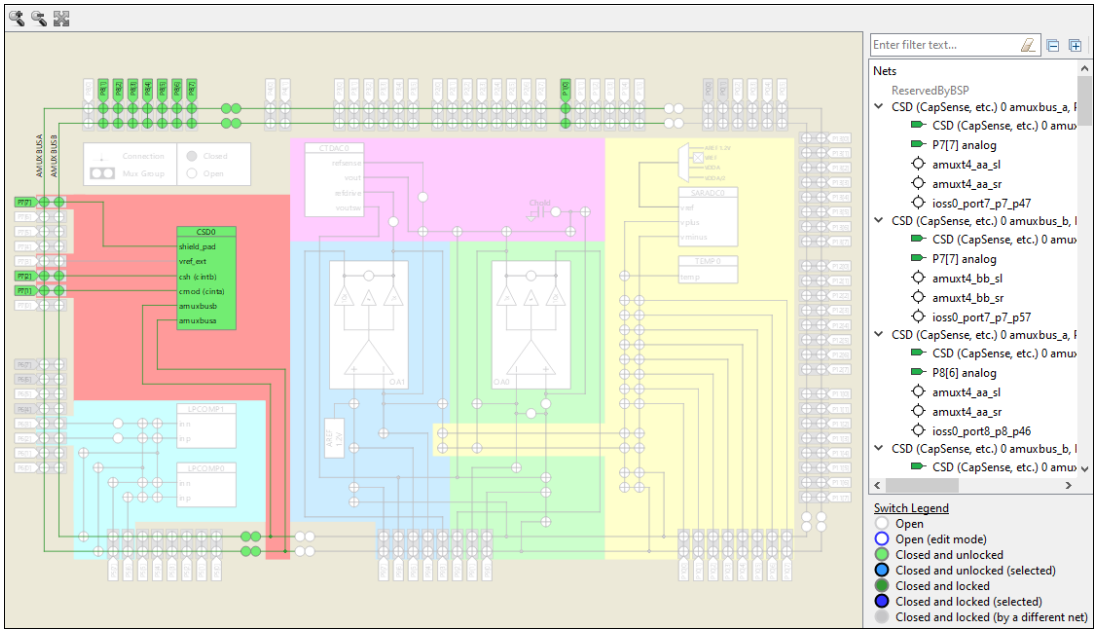
For older devices, such as PSOC™ 4 and PSOC™ 6 with analog subsystems, the **Analog-Routing** tab shows the various analog resources and the routing for your application. Enabled resources are green. You do not enable or disable resources on this tab; that is done on the **Peripherals**. This tab is used to show the routing of the enabled analog resources. You can use the **Edit Routes** button to open the Analog Route Editor and manually edit these routes, as needed.



7.7.1 Analog Route Editor

The Analog Route Editor allows you to manually edit the routing of analog resources in your application. It also provides the ability to lock-down all or some of the results.

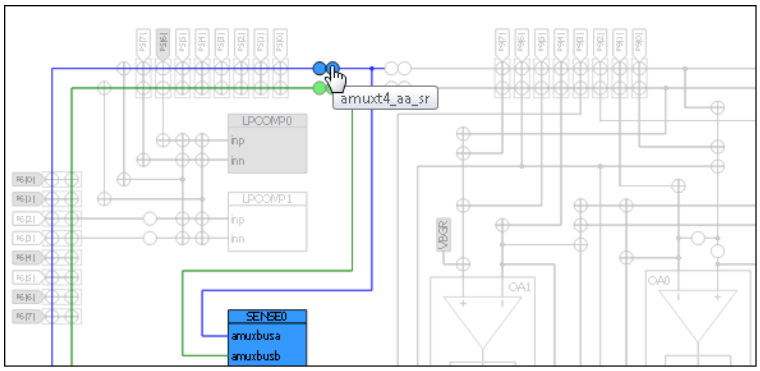
***Note**: The Analog Editor can some times be unresponsive during route recalculation. Please wait for it to finish algorithm execution.*



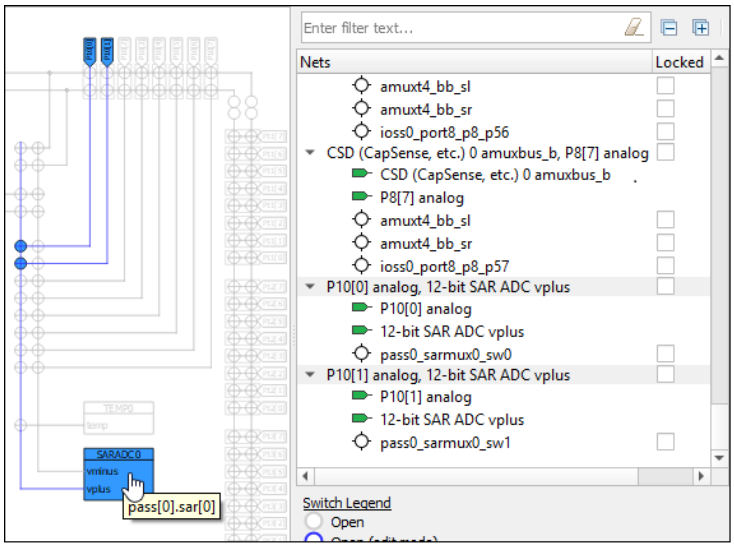
***Note**: If there are configuration errors, complete routing results will not be available; only locked resources. If you open the Analog Editor in this error state, a warning message will display. You can still lock and unlock switches, but you won't get complete routing results as long as the configuration has errors.*

7.7.1.1 Select a resource

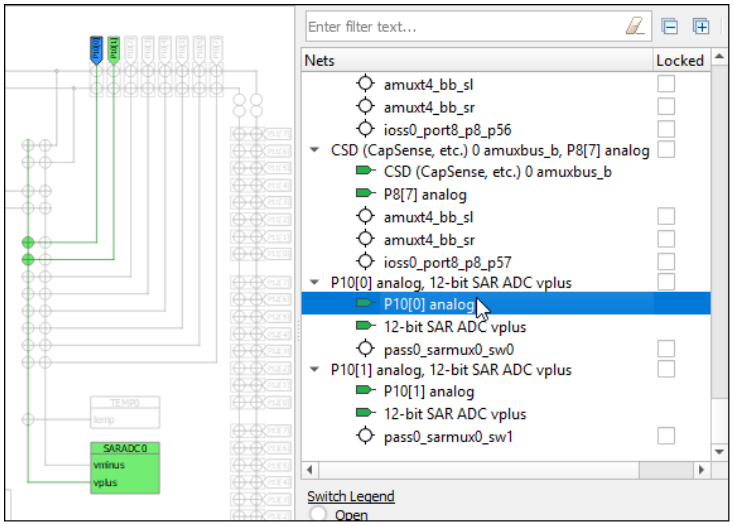
To select an analog resource, click on it. Any enabled (green) element in the tree can be selected. The resource and the associated route(s) become blue. Also, the **Edit Route** command appears on the toolbar. See Edit Route.



At the same time, the selected analog resource(s) is highlighted in the Nets tree.



You can also select items in the tree to highlight them in the diagram.



7.7.1.2 Edit Route

With an editable analog resource selected, click the **Edit Route** command to enable edit mode. If multiple routes are selected, a pull-down menu displays to select the route to edit. You cannot edit multiple routes at the same time.

In edit mode, the net tree shows only the applicable route entries, and you cannot select resources using the tree. However, the lock/unlock check boxes remain enabled for use. The inactive switches change color to indicate they can be selected to use for the route being edited.

Route changes are live with updates applied automatically as you make changes. Selecting a switch adds it to the current route in a locked state and the route tree is updated to reflect the modifications.

If a change results in an error, a message displays. The routes are automatically rolled back to the previous state, so you will lose at most the last invalid change.

The toolbar shows the **Finish edit** command to return the editor to selection mode.

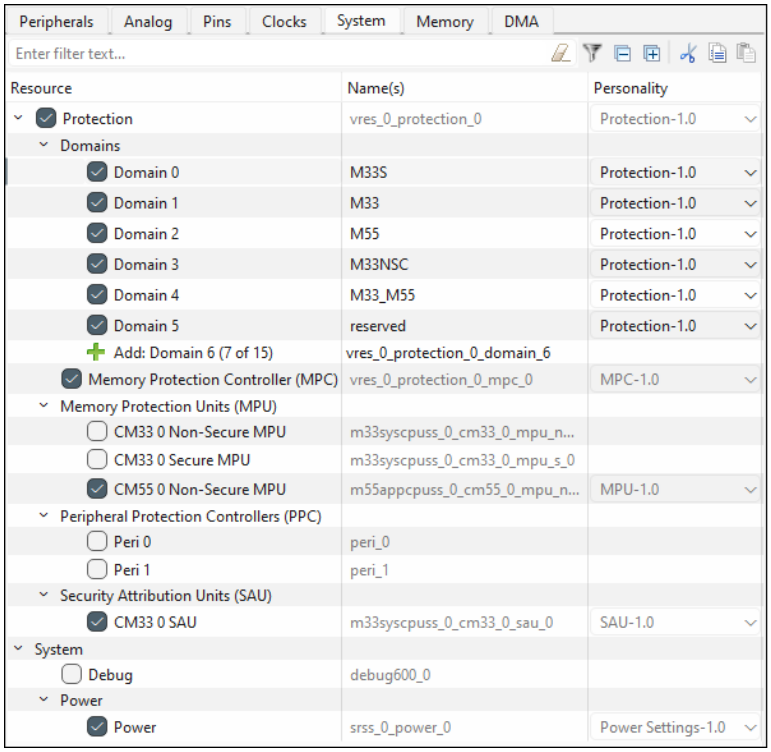
***Note**: If a route is edited so that it uses switches associated with a location where no personalities are instantiated, you must manually power on the containing block at startup in order for the switches to function. Refer to the PDL API Reference Guide and the Device Technical Reference Manual for more details.*

7.8 System tab

Depending on the device, the **System** tab provides access to system-level items, such as power management, debug interfaces, and system clocks (for older devices). All available resources are shown in an expandable tree. The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

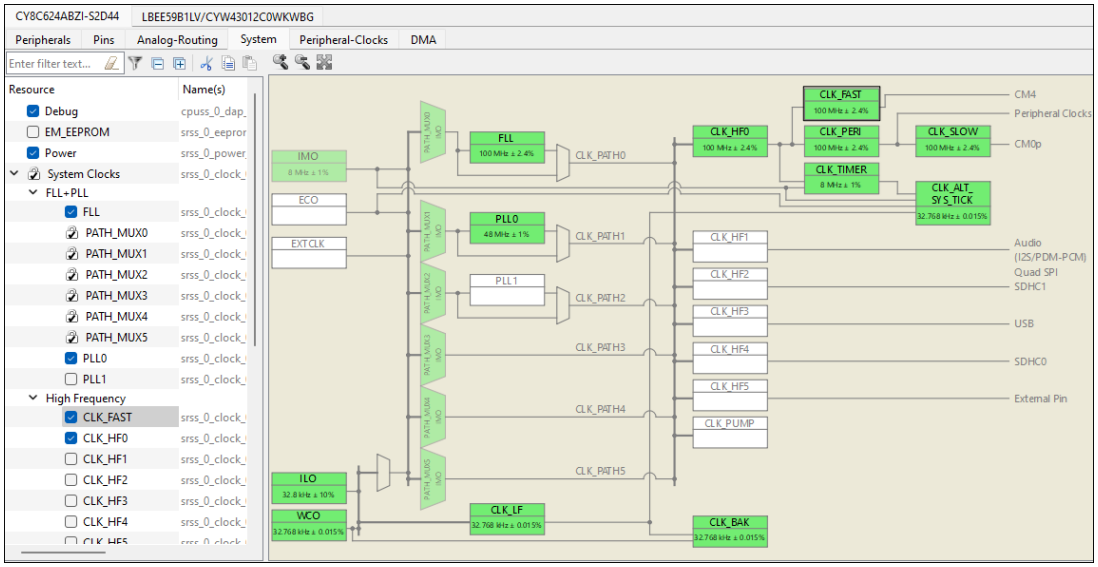
Newer devices

Newer devices only show system-level resources, such as protection, debug, power, etc.



Older devices

Older devices show various clocks and the clock diagram.



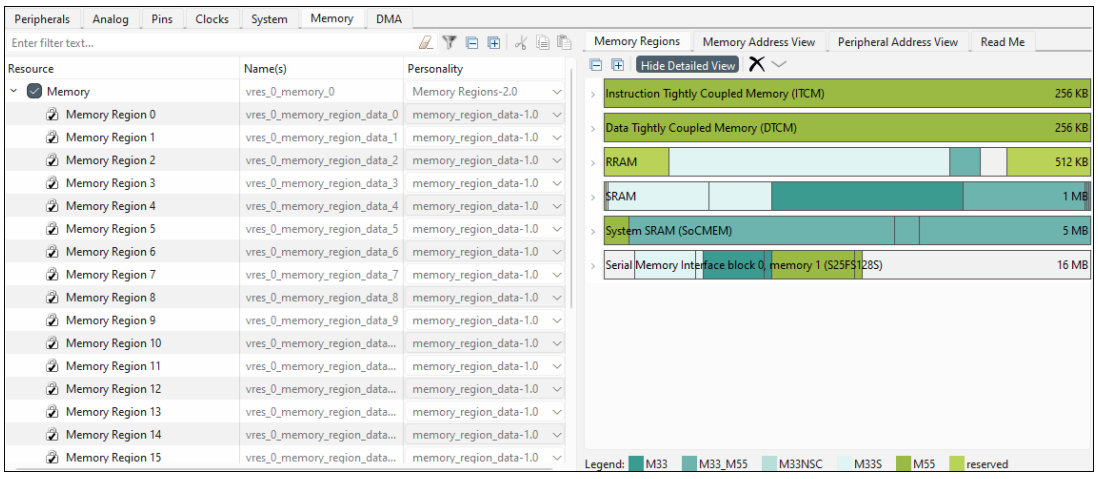
The interactive clock diagram shows all the system clocks and how they connect to each other. You can enable/disable a clock by double-clicking it in the diagram. Enabled clocks are green, disabled clocks are white, and clocks in error state are red.

***Note**: The semi-transparent (faded) elements in the diagram indicate that their enabled state is locked.*

7.9 Memory tab

The **Memory** tab becomes visible for supported devices to configure and visualize memory regions for each core in the device. Similar to other tabs, there is a **Resource** section to enable/disable the Memory, as well as the **Protection** section for the Memory Protection Controllers (MPC), Memory Protection Units (MPU), and Security Attribution Units (SAU). This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.

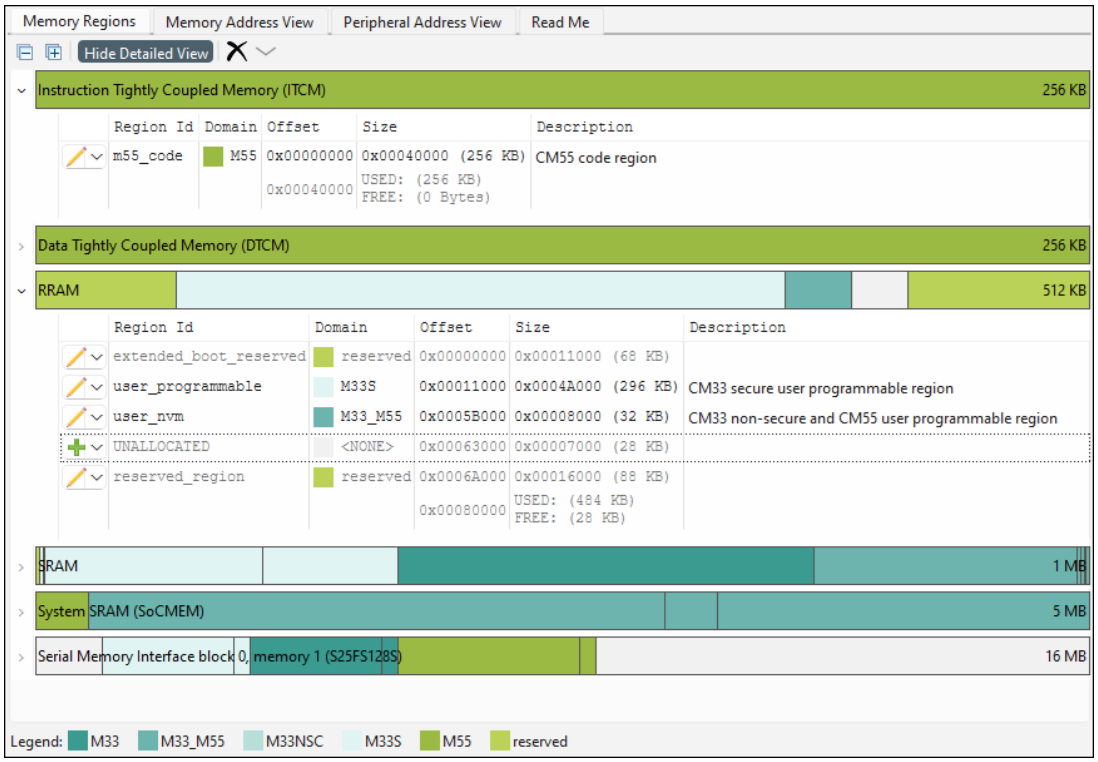
The main section of this tab contains various subtabs: **Memory Regions**, **Memory Address View**, **Peripheral Address View**, and **Read Me**



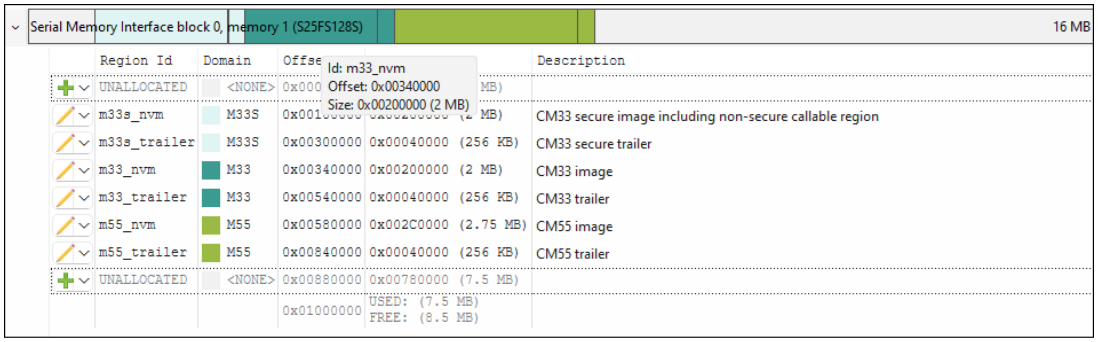
***Note**: The Parameters pane for this tab is similar to other tabs, except this area contains mostly information, as well as a button to launch the QSPI Configurator.*

7.9.1 Memory Regions subtab

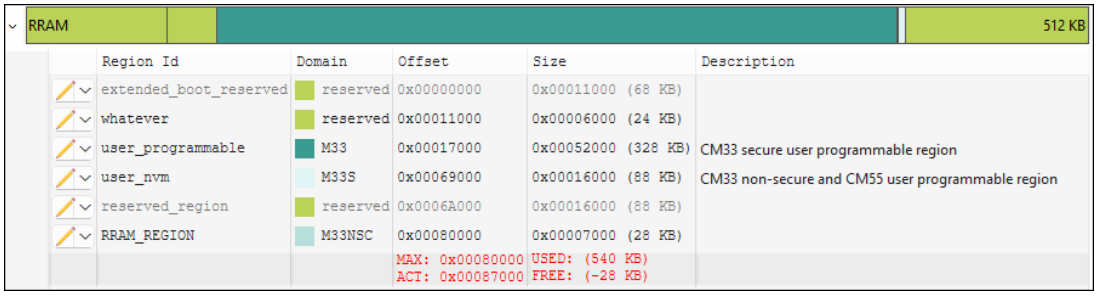
The **Memory Regions** subtab displays if the Memory resource has been enabled. It consists of a toolbar, table, and legend. The toolbar allows you to expand and collapse the available memory bars in the table area, as well as **Show/Hide Detailed View** of the memories, **Delete All** memory regions, and **Autocorrect All Overlaps**.



Each memory shows as a usage bar that when expanded displays the details of how it is being used. The bar itself shows the display name of the memory along with its overall size. Hover the cursor over a used section to displays a tooltip that corresponds to the same information provided in the rows under the memory.

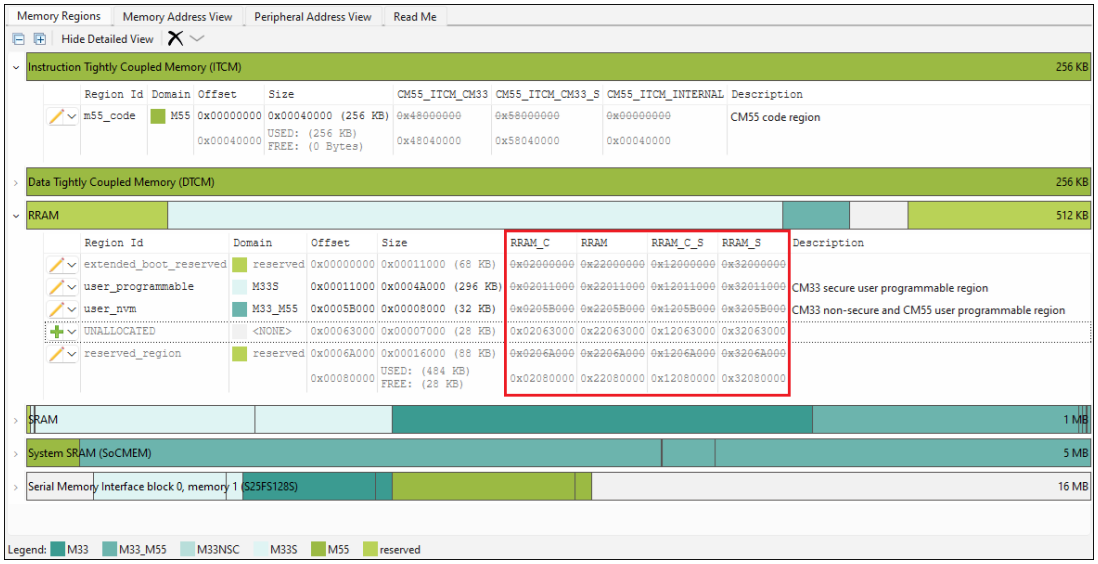


The rows show allocated and unallocated ranges of the memory. The final row shows the end offset of the memory along with a summary of used/free space. If the ending offset is outside the allowed range, the text becomes red and displays the maximum allowed offset along with the currently set offset that is in violation of the max. If more size is allocated then is available, that text will be in red as well.



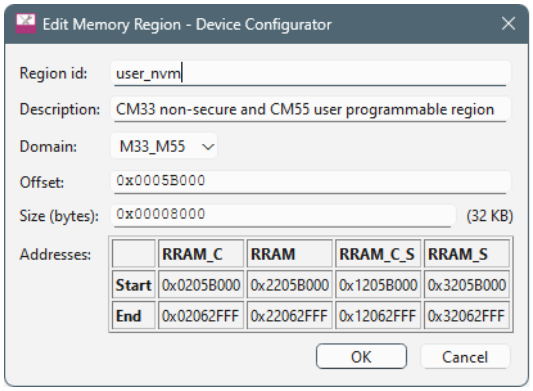
7.9.1.1 Show/hide detailed view

Click the **Hide Detailed View** button to toggle it off and on to show/hide detailed address maps. If any of the addresses do not apply (that is, the core that uses that map is not selected), the values will be stricken out.

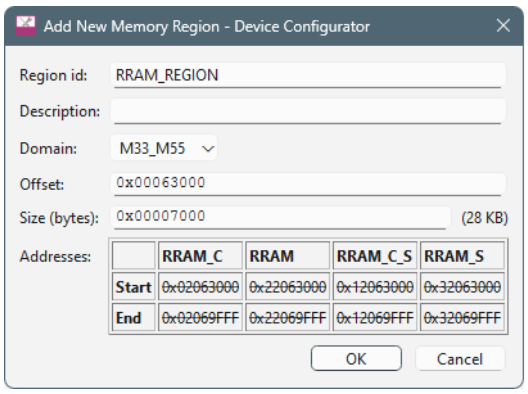


7.9.1.2 Add/edit memory allocations

To edit allocations, double-click an allocated row to open Edit Memory Region dialog.



To add an allocation, double-click an unallocated row to open the Add New Memory Region dialog.



Once the dialog is open, enter values:

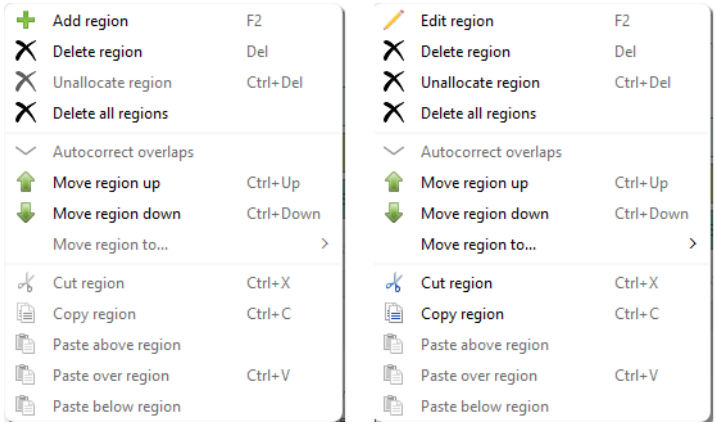
1. As needed, type the name of the **Region id**.
2. Select a **Domain** from the pull-down menu.
3. Enter the **Offset** and **Size**.

The **Size** entry allows for hex or decimal entry. It also accepts specifying units, which will always be converted to bytes. Units are case insensitive and can be entered as follows:

- bytes or b = byte
- kb or k = kilobyte (1 KB = 1,024 Bytes)
- mb or m = megabyte (1 MB = 1024KB = 1,048,576 Bytes)
- gb or g = gigabyte (1 GB = 1024MB = 1,048,576 KB = 1,073,741,824 Bytes)
- tb or t = terabyte (1 TB = 1024 GB = 1,048,576 MB = 8,388,608 KB = 1,099,511,627,776 Bytes)
- pb or p = petabyte (1 PB = 1024 TB = 1,048,576 GB = 1,073,741,824 MB = 1,099,511,627,776 KB = 1,125,899,906,842,624 Bytes)
- eb or e = exabyte (1 EB = 1024 PB = 1,048,576 TB = 1,073,741,824 GB = 1,099,511,627,776 MB = 1,125,899,906,842,624 KB = 1,152,921,504,606,846,976 Bytes)
- zb or z = zettabyte (1 ZB = 1024 EB = 1,048,576 PB = 1,073,741,824 TB = 1,099,511,627,776 GB = 1,125,899,906,842,624 MB = 1,152,921,504,606,846,976 KB = 1,180,591,620,717,411,303,424 Bytes)
- yb or y = yottabyte (1 YB = 1024 ZB = 1,048,576 EB = 1,073,741,824 PB = 1,099,511,627,776 TB = 1,125,899,906,842,624 GB = 1,152,921,504,606,846,976 MB = 1,180,591,620,717,411,303,424 KB = 1,208,925,819,614,629,174,706,176 Bytes)

If there are obvious errors, the dialog will not allow you to click **OK**. There may also be an error message.

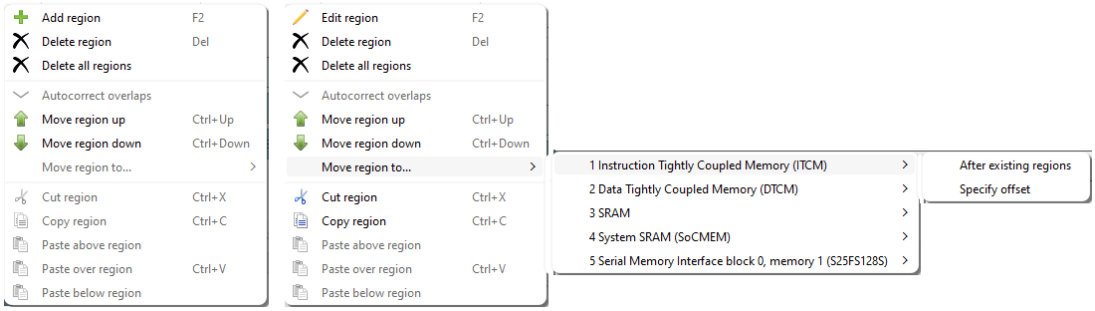
You can also open the dialog using the drop-down button at the beginning of a row or right-clicking on a row. Unallocated regions will start with an **Add region** option while allocated regions will have the **Edit region** option. Both options launch the same edit dialog.



If you prefer, use the keyboard shortcuts defined on the menus.

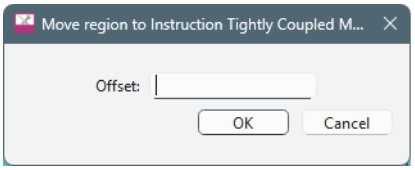
7.9.1.3 Rearrange memory regions

On the context menu, there are various options to move regions, as well as cut, copy, and paste regions.



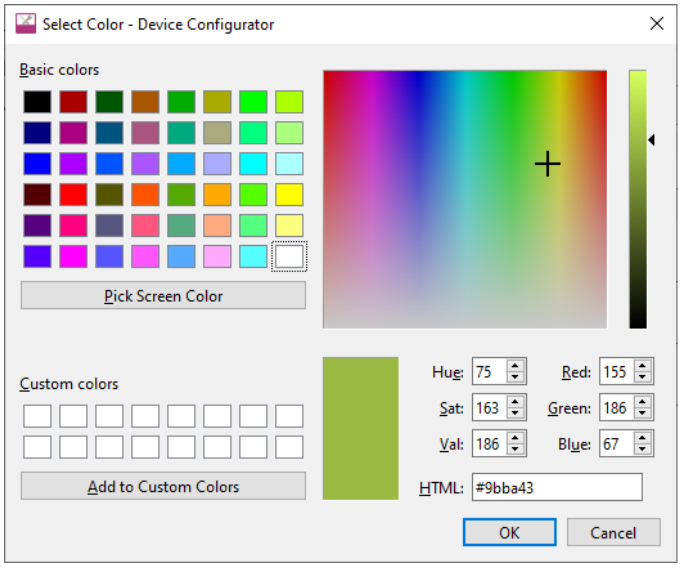
When moving a region, there are two options: **After existing regions** and **Specify offset**.

When you select **Specify offset**, this dialog displays to enter the offset.



7.9.1.4 Use the Legend

The legend shows you the color for each core. You can change the color associated with a used combination of cores. Just click on any of the colors in the legend to open the color picker.



7.9.1.5 How to find out which region the main goes in from the main ld

Code that doesn't have an explicit section name goes in .text (or .text.function_name when using -ffunction-sections). Search for .text in the linker script or search the .map file for the function name.

7.9.1.6 How to read the build output and associate it with the regions defined in the tool

For each project in an application, “make build” will display a summary of the output sections:

```
Memory region             Used Size  Region Size  %age Used
 m55_data_INTERNAL:         3796 B        256 KB      1.45%
 m55_code_INTERNAL:        12024 B        256 KB      4.59%
        user_nvm_C:            0 GB         32 KB      0.00%
           m55_nvm:        24900 B       2816 KB      0.86%
       m55_trailer:            0 GB        256 KB      0.00%
m55_code_secondary:            0 GB        256 KB      0.00%
m55_data_secondary:         2800 KB       2800 KB    100.00%
    m33_m55_shared:          256 KB        256 KB    100.00%

           gfx_mem:            0 GB       1808 KB      0.00%

          m33_data:            0 GB        256 KB      0.00%

m33s_allocatable_shared:       0 GB          4 KB      0.00%

m33_allocatable_shared:        0 GB          4 KB      0.00%

m55_allocatable_shared:     1088 B           4 KB     26.56%
```

The “.map” file generated by the linker contains details about which input sections the linker placed into each output section. To find the memory region corresponding to each output section, search for the memory region that contains the section's address.

Example of “.map” file from GNU ld:

```
.appText_1      0x60580400     0x1f70
...
.text.main     0x6058094c       0x14 build/APP_KIT_PSE84_EVAL/Debug/main.o
               0x6058094c                main
.text.Cy_PDL_Init
               0x60580960        0xc build/APP_KIT_PSE84_EVAL/.../cy_device.o
               0x60580960                Cy_PDL_Init
```

- .appText_1 is the output section name. It is followed by the output section start address (0x60580400) and the output section total size (0x1f70).
- .text.main is the input section name. It is followed by its address (0x6058094c) and size (0x14).

Initialized data in volatile memory also consumes space in a non-volatile memory.

```
.data           0x20000000       0x24 load address 0x60582658
```

The .data section consumes 0x24 bytes at both its writable address 0x20000000 and its non-volatile address 0x60582658.

7.9.1.7 How to define a new region for some data buffer variable

For uninitialized data:

1. In the memory tab, add a new region named “CUSTOM_DATA” in a writable memory such as SRAM.
2. In the linker script, add a section for the region:

   GNU ld or LLVM lld

```
.custom_data :
{
    *(.custom_data*)
} >CUSTOM_DATA
```

   armlink

```
LOAD_CUSTOM_DATA CYMEM_CM55_0_CUSTOM_DATA_START CYMEM_CM55_0_CUSTOM_DATA_SIZE
{
    EXEC_CUSTOM_DATA CYMEM_CM55_0_CUSTOM_DATA_START UNINIT CYMEM_CM55_0_CUSTOM_DATA_SIZE
    {
        *(.custom_data*)
    }
}
```

   ilinkarm

```
do not initialize { section .custom_data* }
place in CUSTOM_DATA { section .custom_data* }
```

3. In the source code, assign the variable to the section (GCC, armclang, or iccarm)

```
__attribute__((section ".custom_data"))
uint32_t data_buffer[DATA_BUFFER_COUNT];
```

For data in volatile memory

For data in volatile memory that requires run-time initialization, the linker script must configure a non-volatile location to initialize the data. For this example, create a region named “CUSTOM_CODE” in a non-volatile memory.

GNU ld or LLVM lld

```
.custom_data :
{
    *(.custom_data*)
} >CUSTOM_DATA AT>CUSTOM_CODE

.copy.table :
{
    /* ... */
    LONG(LOADADDR(.custom_data))
    LONG(ADDR(.custom_data))
    LONG(SIZEOF(.custom_data)/4)
    /* ... */
}
```

***Note**: If ADDR(.custom_data) is read-only, the .copy.table entry must use a writable address.*

armlink

```
LOAD_CUSTOM_CODE CYMEM_CM55_0_CUSTOM_CODE_START CYMEM_CM55_0_CUSTOM_CODE_SIZE
{
    EXEC_CUSTOM_DATA CYMEM_CM55_0_CUSTOM_DATA_START CYMEM_CM55_0_CUSTOM_DATA_SIZE
    {
        *(.custom_data*)
    }
}
```

ilinkarm

```
initialize by copy { section .custom_data* }
place in CUSTOM_DATA { rw section .custom_data* }
place in CUSTOM_CODE { ro section .custom_data* }
```

7.9.1.8 How to define a new region for the code and then assign code to the particular region

1. In the memory tab, add a new region named “CUSTOM_CODE” in a non-volatile memory such as RRAM.
2. In the linker script, add a section for the region:

   GNU ld or LLVM lld

   ```
   a.    .custom_code :
   {
       *(.custom_code*)
   } >CUSTOM_CODE
   ```

armlink

```
LOAD_CUSTOM_CODE CYMEM_CM55_0_CUSTOM_CODE_START CYMEM_CM55_0_CUSTOM_CODE_SIZE
{
    EXEC_CUSTOM_CODE +0
    {
        *(.custom_code*)
    }
}
```

ilinkarm

```
place in CUSTOM_CODE { section .custom_code* }
```

3. In the source code, assign the variable to the section (GCC, armclang, or iccarm)

```
__attribute__((section ".custom_code"))
void custom_code_function1(void);
```

7.9.1.9 How to assign a function or variable into a custom memory section

Variables and functions may be assigned to a section using the section attribute. The linker script must assign the section to an output section.

```
__attribute__((section ".custom_data"))
uint32_t data_buffer[DATA_BUFFER_COUNT];

__attribute__((section ".custom_code"))
void custom_code_function1(void);
```

7.9.1.10 How to modify the linker to include a specific file into a custom memory section

GNU ld or LLVM lld

```
.custom_code :
{
    main.o(.text* .rodata*)
} >CUSTOM_CODE
.custom_data :
{
    main.o(.data*)
    main.o(.bss*)
} >CUSTOM_DATA AT>CUSTOM_CODE
```

***Note**: The toolchain does not automatically initialize data. Sections that require initialization must be added to the .zero.table and/or .copy .table manually.*

armlink

```
LOAD_CUSTOM_CODE CYMEM_CM55_0_CUSTOM_CODE_START CYMEM_CM55_0_CUSTOM_CODE_SIZE
{
    EXEC_CUSTOM_CODE +0
    {
        main.o(+RO)
    }
    EXEC_CUSTOM_DATA CYMEM_CM55_0_CUSTOM_DATA_START CYMEM_CM55_0_CUSTOM_DATA_SIZE
    {
        main.o(+RW,+ZI)
    }
}
```

ilinkarm

```
place in CUSTOM_CODE { ro object main.o }
place in CUSTOM_DATA { rw object main.o }
```

7.9.1.11 How to modify the linker to include an entire middleware library into a custom memory section

The linker script example assigns all of the code and data from object files matching mtb_hal_*.o to the .custom_code and .custom_data sections respectively. If the middleware's object files cannot be described in a single pattern, it may be necessary to use multiple patterns.

GNU ld or LLVM lld

```
.custom_code :
{
    mtb_hal_*.o(.text* .rodata*)
} >CUSTOM_CODE
.custom_data :
{
    mtb_hal_*.o(.data*)
    mtb_hal_*.o(.bss*)
} >CUSTOM_DATA AT>CUSTOM_CODE
```

***Note**: The toolchain does not automatically initialize data. Sections that require initialization must be added to the .zero.table and/or .copy .table manually.*

armlink

```
LOAD_CUSTOM_CODE CYMEM_CM55_0_CUSTOM_CODE_START CYMEM_CM55_0_CUSTOM_CODE_SIZE
{
    EXEC_CUSTOM_CODE +0
    {
        mtb_hal_*.o(+RO)
    }
    EXEC_CUSTOM_DATA CYMEM_CM55_0_CUSTOM_DATA_START CYMEM_CM55_0_CUSTOM_DATA_SIZE
    {
        mtb_hal_*.o(+RW,+ZI)
    }
}
```

ilinkarm

```
place in CUSTOM_CODE { ro object mtb_hal_*.o }
place in CUSTOM_DATA { rw object mtb_hal_*.o }
```

7.9.1.12 How to re-balance the memory between the cores based on the build output

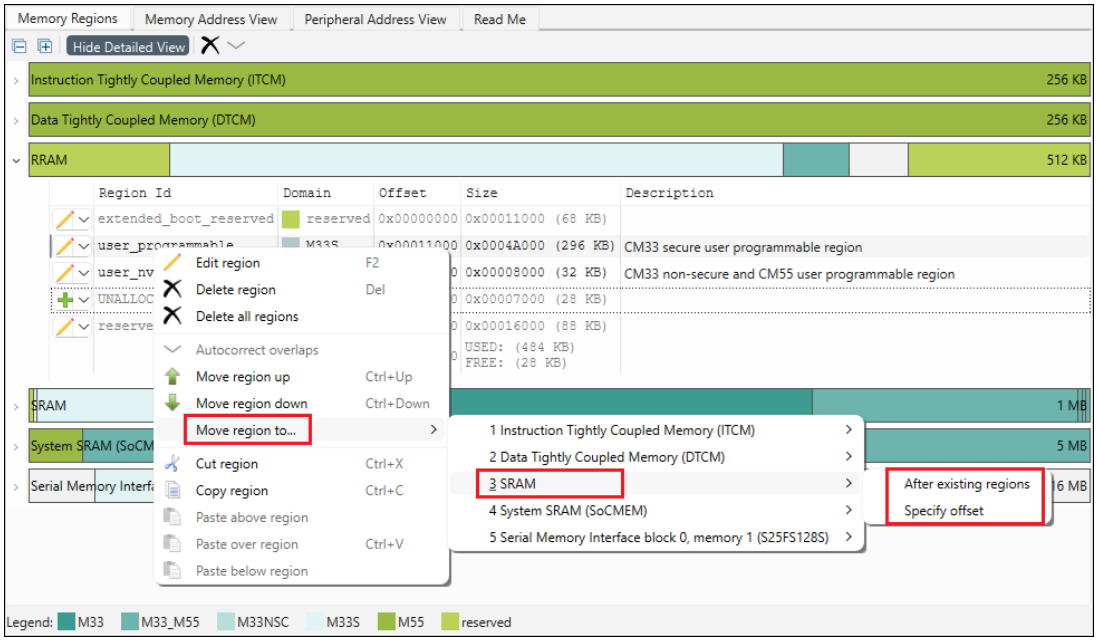
This is highly dependent on the needs of the customer's application. Solutions may include:

- Resizing existing regions
  - Double-click on the region to open the Edit dialog.
  - Update the Size. If the region needs to be moved, also update the Offset.
- Moving existing regions to another memory
- Updating linker scripts to place code or data in different regions

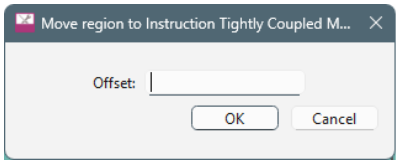
7.9.1.13 How to switch between internal and external memory

In the **Memory Regions** tab, use the context menu to move the desired memory region ID to another memory category.

7 Resources tabs



- If you want to let the tool just place it at the end of the other regions in the destination, select **After existing regions**.
- If you want to specify exactly what offset to put it at, then select **Specify Offset**. Then enter the value in the dialog.

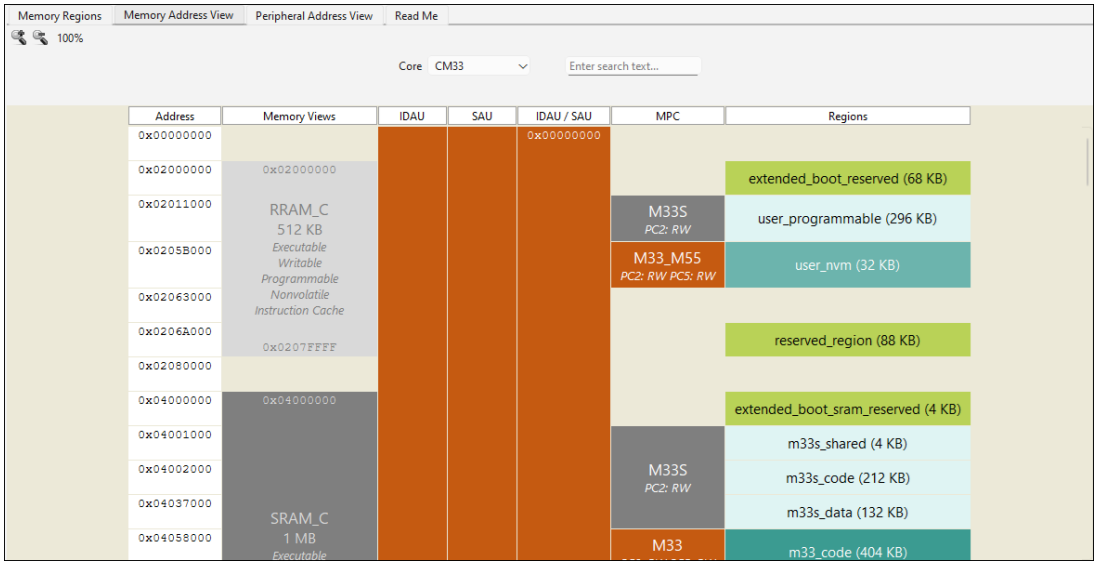


***Note**: The regions required for initial application start up must be in a non-volatile memory.*

***Note**: Some toolchains including GNU and LLVM do not initialize data automatically. If a region is moved to a volatile memory, entries must be added to .zero.table and/or .copy.table manually.*

7.9.2 Memory Address View subtab

The **Memory Address View** subtab displays the security status and access permissions enforced by the IDAU, SAU, and MPC at a given address or memory region. The **Core** pull-down allows you to switch to other cores, and the **Search** shows all occurrences of an entered term with **Forward** and **Back** buttons to jump to the next or previous term. This subtab also contains zoom commands.

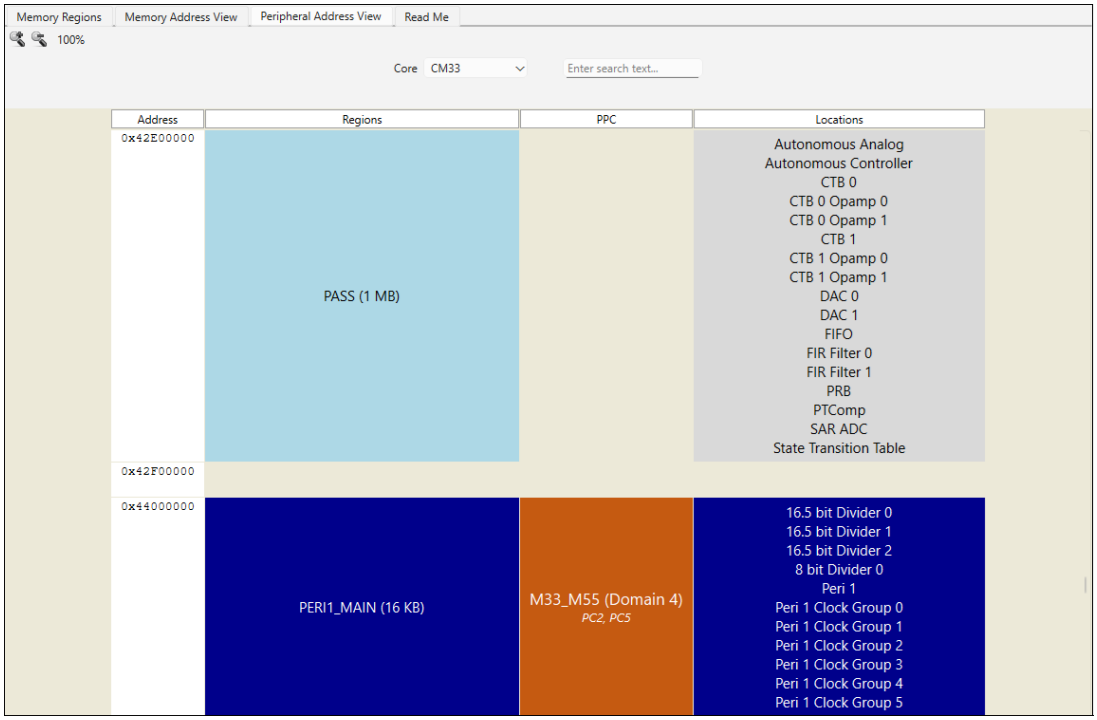


- The **Address** column shows the start address of every segment shown in the other columns.
- The **Memory Views** column depicts all the physical memories and external memory reservations for the device, along with the size and capabilities for each. Possible capabilities include Executable, Writable, Readable, Programmable, Nonvolatile, Secure, and Instruction Cache.
- The **IDAU** column shows the security across all address ranges determined by the device's IDAU. Each range lists a security status code and corresponding background color (S/green for Secure, NS/orange for Non-Secure, NSC/yellow for Non-Secure Callable, and X/gray for Exempted) and the address range size.
- The **SAU** column depicts the security across all address ranges as configured in the designs SAU entries. Each range lists a security status code and corresponding background color (S/green for Secure, NS/orange for Non-Secure, NSC/yellow for Non-Secure Callable) and the address range size.
- The **IDAU / SAU** column depicts the effective security across all address ranges combining the (fixed) device's IDAU and configured SAU entries. Each range lists a start address, end address, security status code and corresponding background color (S/green for Secure, NS/orange for Non-Secure, NSC/yellow for Non-Secure Callable, and X/gray for Exempted) and the address range size.
- The **MPC** column shows the address ranges that will be under MPC control according to the configured Protection Domains and access details for each. Each range lists the name of the governing Protection Domain and a background color corresponding the range's security (S/green for Secure in the context of a secure core or S/gray in the context of a non-secure core, NS/orange for Non-Secure, NSC/yellow for Non-Secure Callable) and the access permissions (R for Read, W for Write) for each Protection Context granted by the Protection Domain. E.g., the access permission string "PC2: RW PC5: RW" denotes read and write access is granted to Protection Contexts PC2 and PC5.
- The **Regions** column shows the memory regions that are configured in the Memory Regions subtab. For each region, the region id and size is shown, and has the same user-configured color coding from the Memory Regions tab.

In each of the columns, if the described content is not applicable – either because there is no such configuration or the device doesn't support it – the column will be omitted.

7.9.3 Peripheral Address View subtab

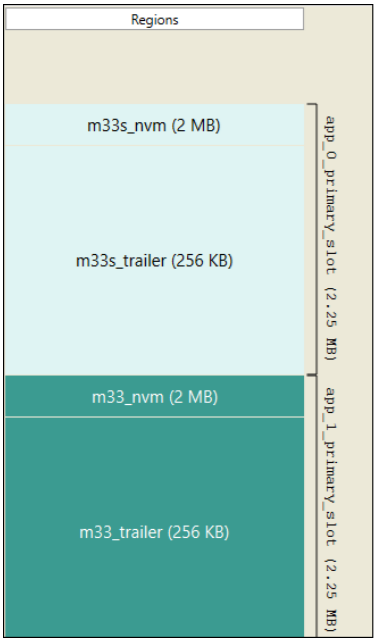
The **Peripheral Address View** subtab displays all peripheral regions and locations and (where used) the access permissions enforced by the PPC. The **Core** pull-down allows you to switch to other cores, and the **Search** shows all occurrences of an entered term with **Forward** and **Back** buttons to jump to the next or previous term. This subtab also contains zoom commands.



- The **Address** column shows the start address of every segment shown in the proceeding columns.
- The **Regions** column depicts all of the peripheral regions defined for the device. There is no meaning in the background colors of these regions; the colors simply alternate between two shades of blue for visual contrast.
- If a PPC is configured, the **PPC** column shows the address ranges that will be under PPC control according to the configured Protection Domains and access details for each. Each range lists the name of the governing Protection Domain and a background color corresponding the range's security (S/green for Secure in the context of a secure core or S/gray in the context of a non-secure core, NS/orange for Non-Secure, NSC/yellow for Non-Secure Callable) and the Protection Contexts having access to the peripherals in the region per the Protection Domain.
- The **Locations** column show all of the peripheral locations in the corresponding region. If there is no configured access to the locations in this region, they will be depicted with a gray background; if at least one Protection Context is granted access to the region and its locations, it will have the same blue or light blue coloring in the corresponding region.

7 Resources tabs

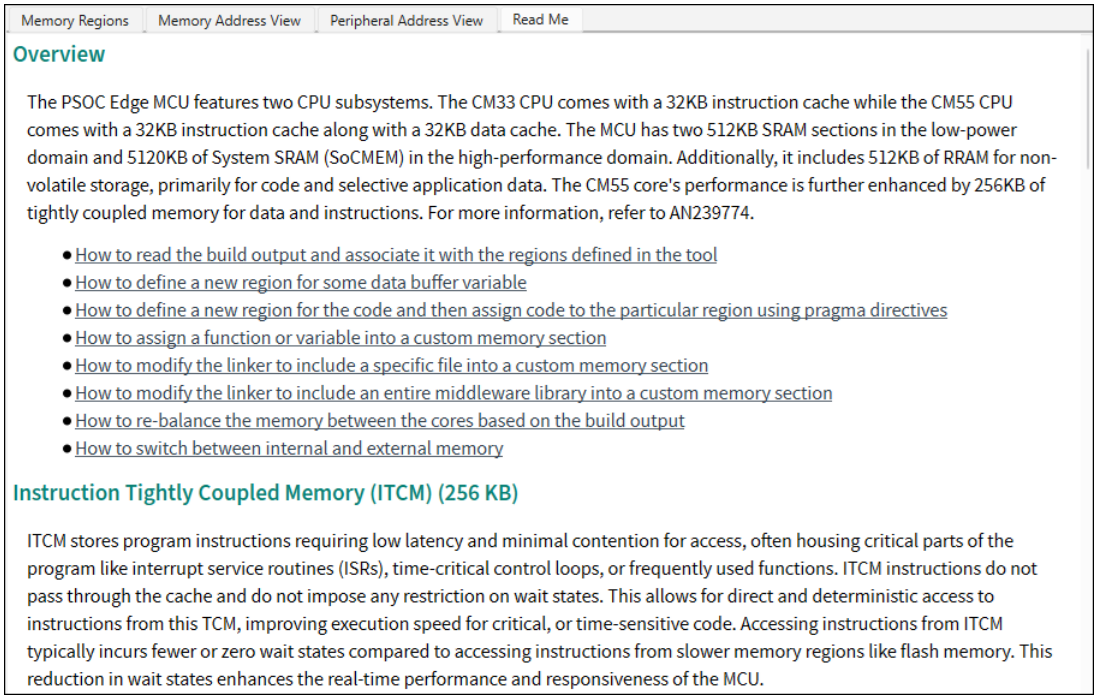
***Note**: For applications using the MCUboot library, memory ranges used to define the primary slot will be shown on the right side of the view.*



In the Memory Regions subtab, there is a corresponding table with links to the Solution parameters where the range is defined.

7.9.4 Read Me subtab

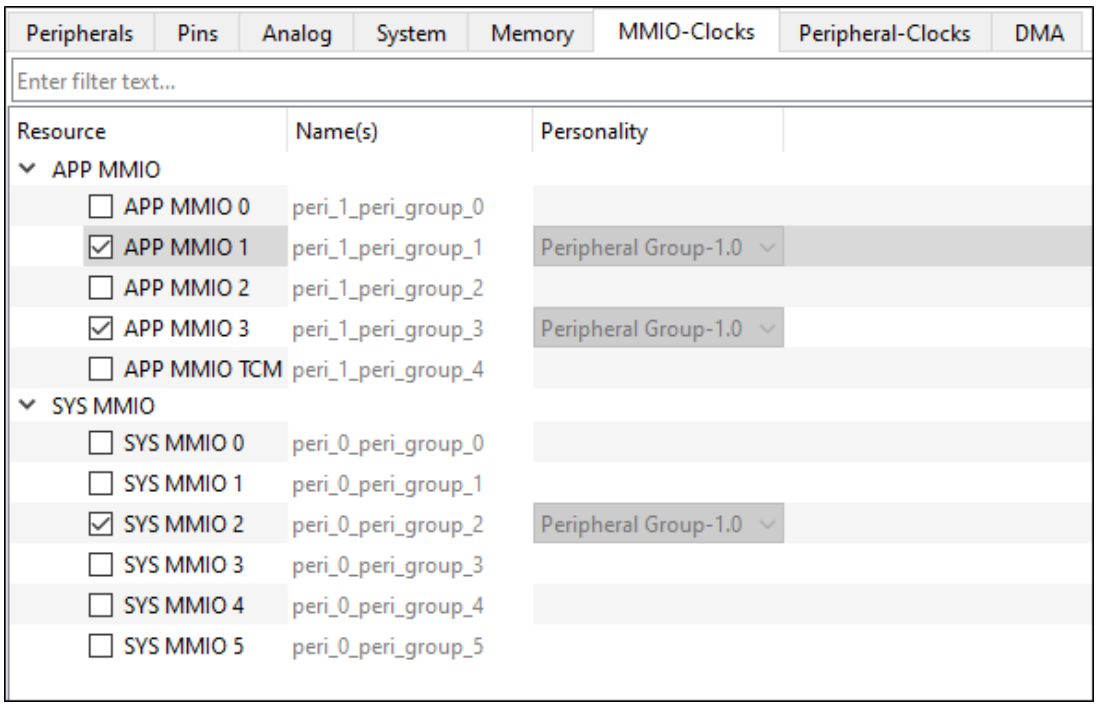
This subtab displays an HTML generated document with information from the device-db's *memories.cydata* file, combined with memory data exported from the QSPI configurator.



This file provides links to "how to" HTML topics to guide you how to configure memories.

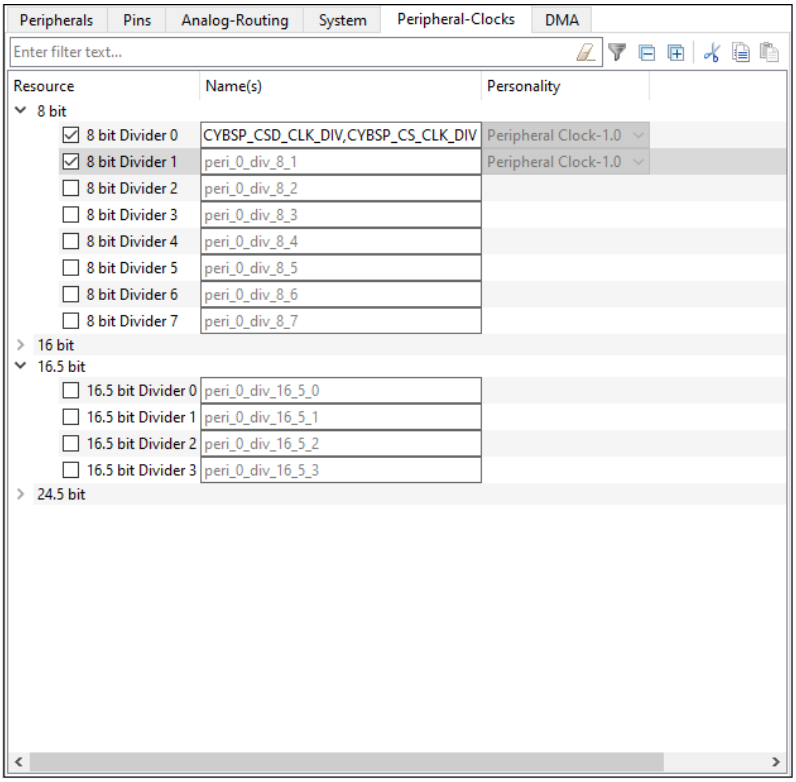
7.10 MMIO-Clocks tab

For supported devices, the **MMIO-Clocks** tab lists all the clocks in a design used to drive the various Memory Mapped IOs. All available clocks are shown in an expandable tree. The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.



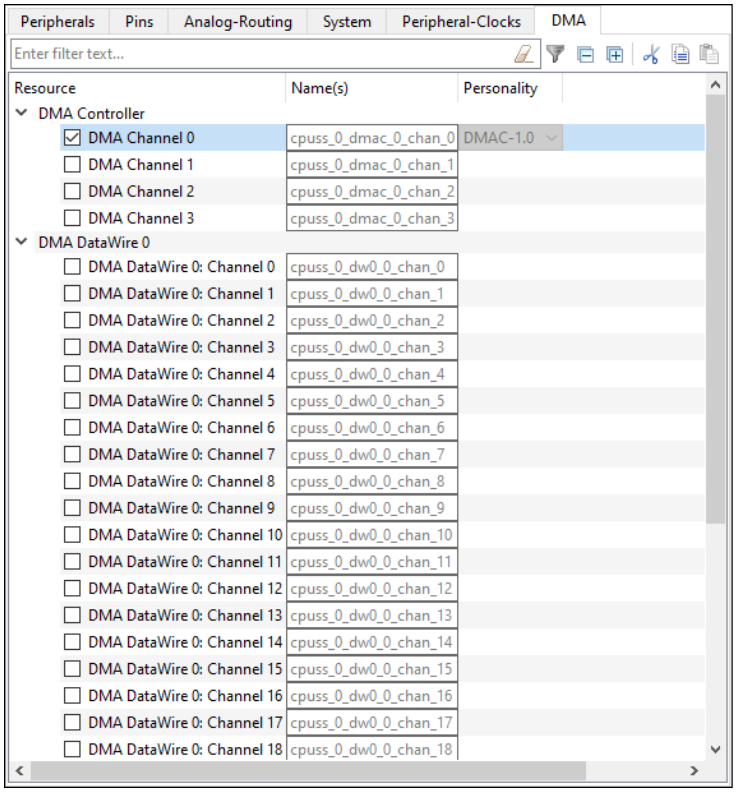
7.11 Peripheral-Clocks tab

For supported devices, the **Peripheral-Clocks** tab lists all the clocks in a design used to drive the various peripherals. All available clocks are shown in an expandable tree. The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.



7.12 DMA tab

The DMA tab lists all the DMA resources in the design. All available DMA channels are shown in an expandable tree. The filter box and the hide disabled button above the list of resources allows you to limit the items shown in the tree. This tab allows you to enter one or more Name(s) for the resource. It also shows the selected Personality where applicable.



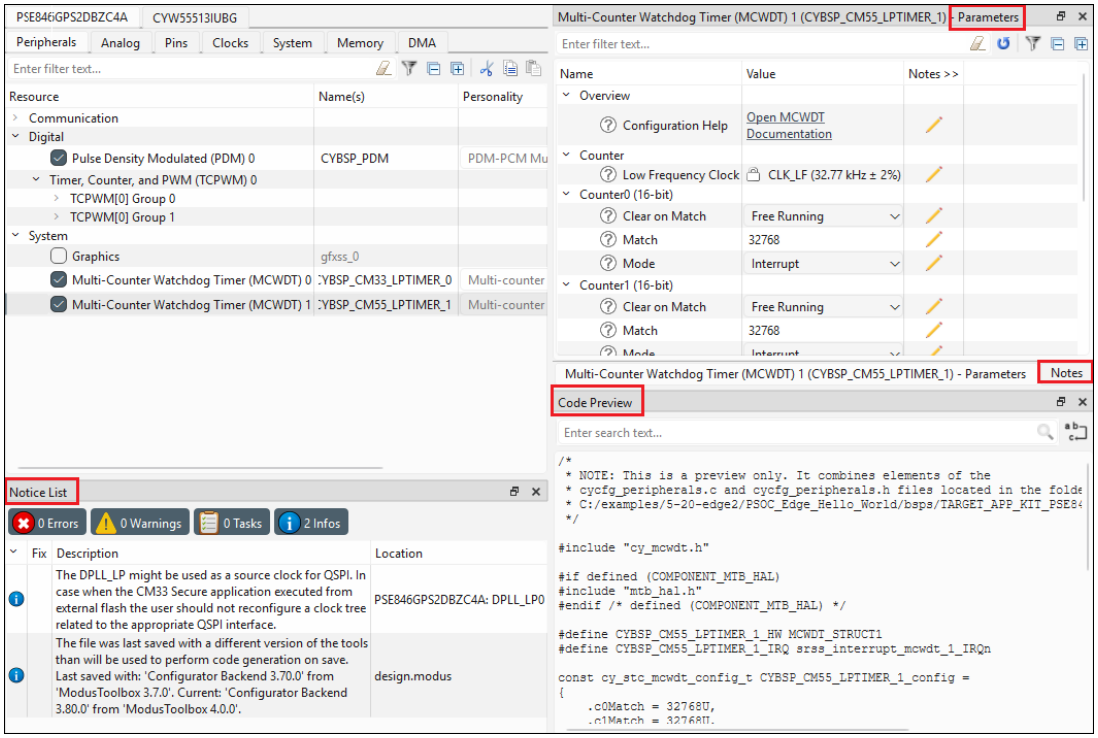
8 Panes

The Device Configurator tool contains the following primary panes that display information based on what is selected in a particular Resources tabs:

- Parameters pane – This pane shows the various parameters for any specific resource enabled in one of the tabs.
- Notice List – This pane shows any errors, warnings, tasks, and info for the application.
- Code Preview pane – This pane shows a preview of the code that will be generated for the selected resource when you save the *.*modus* file.
- Notes pane – This pane allows you to add notes for an enabled resource.

8.1 Panes layout and arrangement

By default, the panes are set to specific locations in the tool, as shown in the following image, with **Parameters** top right, with **Notes** as a sister tab, **Code Preview** below them, and **Notice List** bottom left.



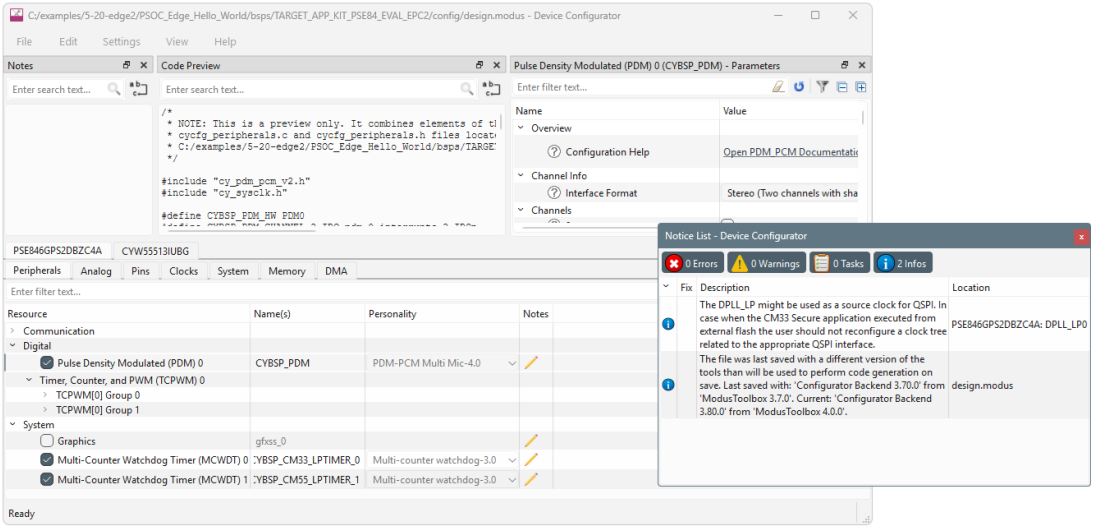
You can re-arrange these panes to fit your preference by clicking in the pane header and dragging it to another location in the tool.

You can also click the **Undock** icon  for an active Pane to enable moving it.

In this example, **Notes**, **Code Preview**, and **Parameters** are aligned at the top.



You can even drag a pane outside to the tool, as shown in this example:

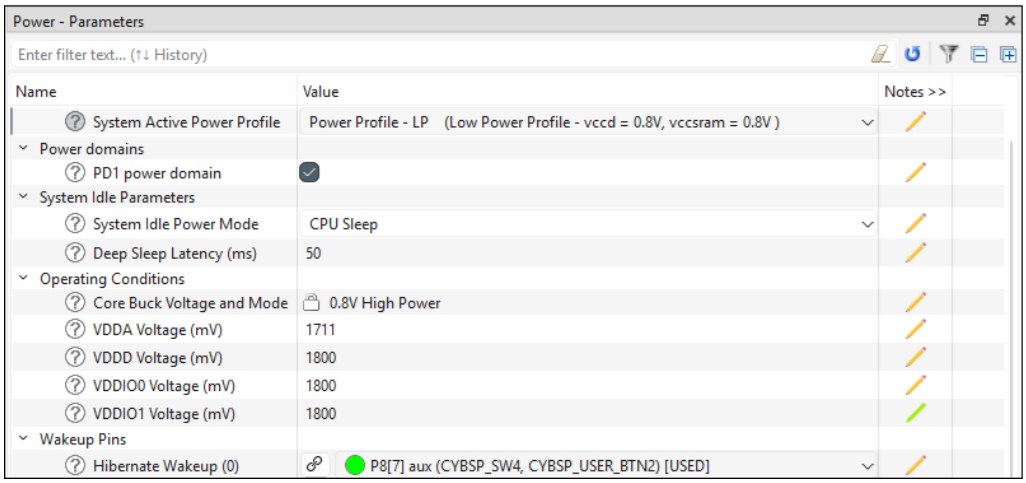


You can show or hide panes using the **View** menu.

Use the **View > Reset View** menu item to restore the panes to their default locations.

8.2 Parameters pane

The Parameters pane contains all the parameters for a selected, enabled resource. This pane will show different parameters for each resource, grouped by various categories in nodes. For example, the parameters for the TCPWM peripheral are completely different than those for a pin resource.



This pane contains a few tools:

- The filter box above the list of parameters allows you to limit the items shown in the pane and search for specific terms within the parameter descriptions.
  - You can search using plain text or regular expressions.
  - As you enter search items, they are saved in a list.
  - Use the up and down arrows to select previous searches.
  - Use the **Erase** button to clear the search.
- The **Reset** button resets all parameter values in the current view to their defaults.
- The **Filter** button toggles hides or shows non-editable parameters.
- The **-** and **+** buttons collapse and expand all nodes.

Some resources also provide a link to Launch other configurators.

8.2.1 Configuration help

Nearly all resources provide a link to open the Peripheral Driver Library (PDL) documentation to the specific driver. This is the Doxygen-generated HTML file located in the installation directory. To see links to the documentation, simply highlight a resource; you do not need to enable it.

8.2.2 Parameter descriptions

As described under Icons, all parameters have a tooltip icon (?) to indicate there is information about the parameter. Hover the mouse cursor over the icon to display a description of the parameter.

8.2.3 Parameter values

Different parameter types have different ways to specify a value, as follows:

- Pull-down Menu – For parameters with a specific set of values, use the pull-down menu to select the appropriate value.
- Selection Box – For parameters with a variable set of values, click the ellipsis […] button to open a selection box. There, use the check boxes to select one or more appropriate values for the parameter.

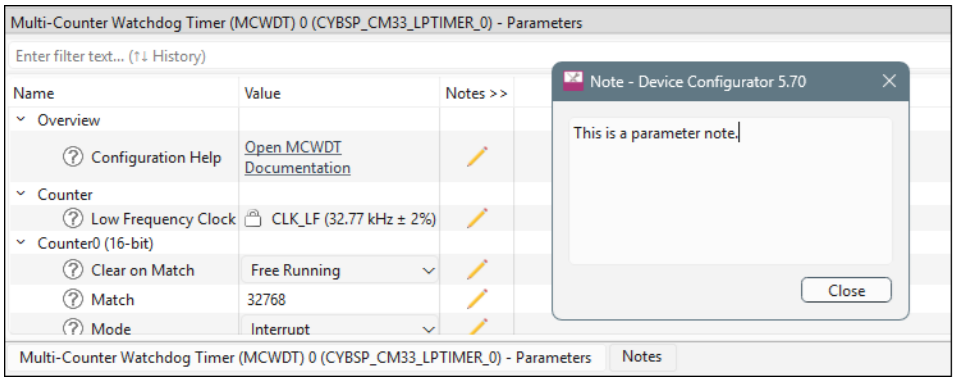
  ***Note**: After selecting these parameter types, use the Go To button to jump to the selected resource.*

- Check Box – For parameters with a true or false value, use the check box to enable or disable the parameter.
- Text Box – For parameters with editable values, type the value in the text box.

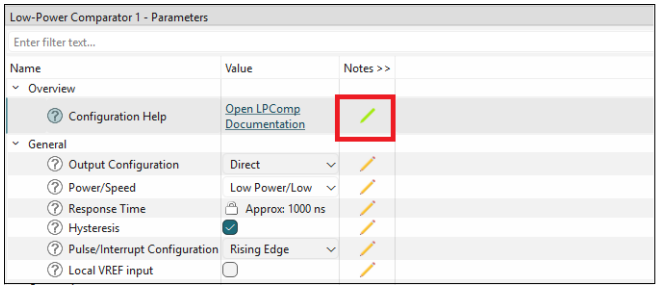
***Note**: Values preceded by '0' are interpreted as octal; values preceded by '0x', '0X', and '#' are interpreted as hexadecimal.*

8.2.4 Parameter notes

For any parameter, you can enter a note that makes sense to you. Parameter notes are shown in a pop-up dialog when you click the **Pencil** icon.

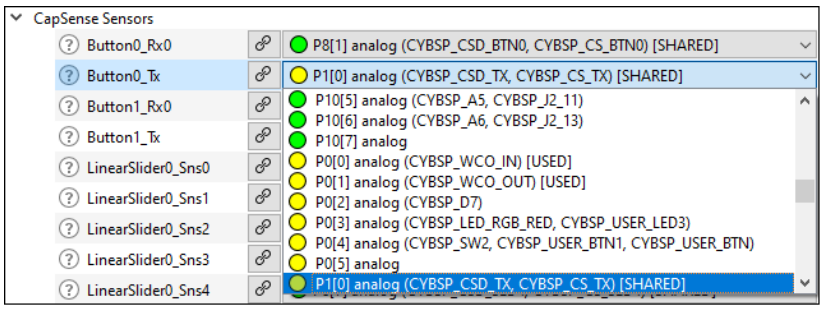


When you have entered a note for a parameter, the pencil icon will turn green, indicating that there is a note.



8.2.5 Signal Select Indicators

For parameters where you select a signal, there is a pull-down menu for single-select signals and a button to open a dialog for multi-select signals.



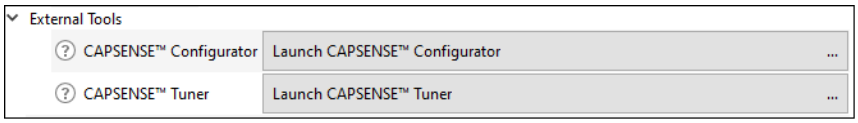
The signals have guidance icons next to them to indicate the status of the signal, as follows:

- Green – preferred
- Yellow – valid
- Red – constrained

After selecting one or more signals, use the **Go To** 🔗 button to jump to the selected signal or open a dialog to select from multiple signals.

8.2.6 Launch other configurators

For peripherals with their own configuration tools (CapSense, SegLCD, etc.), the Device Configurator provides links to launch those separate configurators. After enabling the peripheral on the Peripherals tab, the **Parameters** pane contains a **<Configurator>** parameter, where <Configurator> is the name of the other configurator.

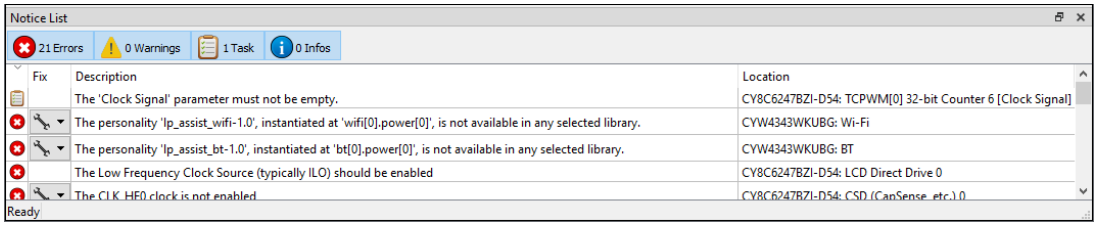


Click on **[Launch < Configurator > . . .]** to launch the configurator.

***Note**: When launching another configurator from the Device Configurator, it passes information, such as the location of the *.modus file and any configuration data, to that other configurator. Those other configurators can be launched independently from the Device Configurator. When launched independently, you will need to either open or create the appropriate configuration file for that tool. If you want to use the configuration tools independently for the same application, make sure to save the source files in the correct "GeneratedSource" folder for the appropriate application.*

8.3 Notice List

The Notice List pane combines notices (errors, warnings, tasks, and infos) from many places in your design into a centralized list. If a notice shows a location, you can double-click the entry to navigate to the error or warning.



Notices display in rows. Use the filters above the notices to show or hide different types of notices, as follows:

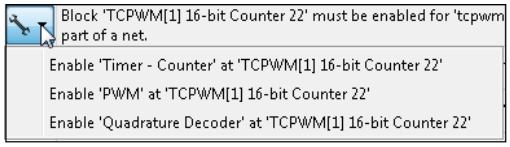
- **Errors** – These indicate there is at least one problem that must be addressed before you can build your application. Typical errors could include compiler build errors and connectivity errors.
- **Warnings** – These report unusual conditions that might indicate a problem, although you can usually build the application regardless.
- **Tasks** – These are actions you need to perform to resolve an issue, such as enabling a resource. If you save without resolving a task, it becomes an error.
- **Infos** – These are informational messages from the system to indicate something occurred.

The Notice List pane contains the following columns (each column header contains an arrow control to change the sorting of the notices in the table):

- **Icon** – Displays the icons for the error, warning, task, or info.
- **Fix** – This may display a wrench icon, which can be used to automatically address the required notice.
- **Description** – Displays a brief description of the notice.
- **Location** – Displays the specific line number or other location of the message, when applicable.

8.3.1 Fix a task/error

When a wrench icon displays in the **Fix** column, click on it and select the appropriate action from the pull-down menu. When all related issues have been addressed, the notice will be removed from the Notice List pane.



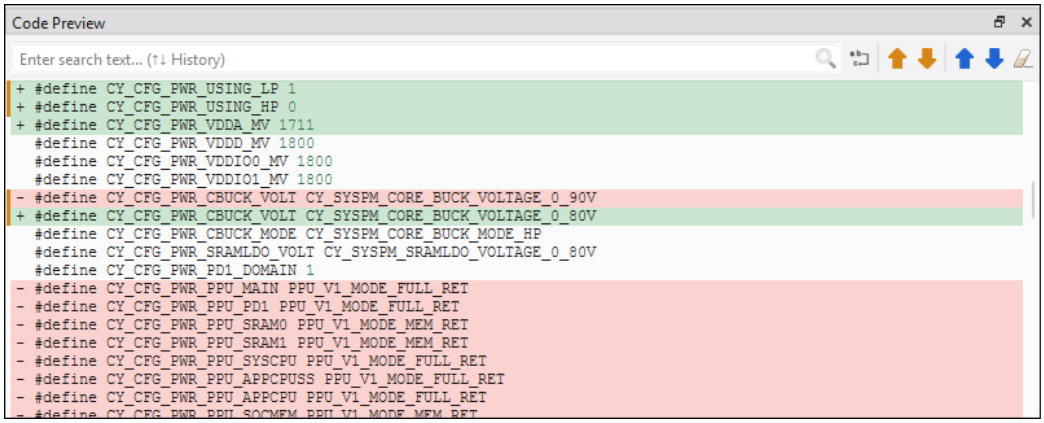
***Note**: The fixes listed are not necessarily the only way to fix the issue. They are merely common options. Also, if you save the *.modus file with outstanding tasks, they become errors saved in the GeneratedSource/cycfg_notices.h file.*

8.3.2 Copy a notice

You can copy a notice to your system's clipboard using [**Ctrl**]+[**c**] or right-click and select **Copy**. Then, paste the notice text into an email, document, and so on.

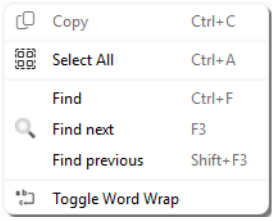
8.4 Code Preview pane

The **Code Preview** pane is a read-only preview of the code that will be generated for the currently selected resource when you save the **.modus* file. As you update configuration options, the **Code Preview** pane updates the code and shows you the changes. This code will be written to the appropriate file(s) located in the *GeneratedSource* folder of your application.

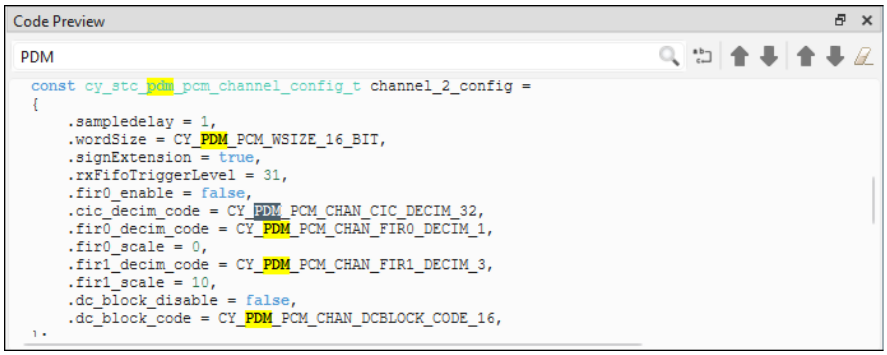


The Orange and Blue **Up** and **Down** arrow buttons let you jump to the previous and next change in the code. Orange is the current change, and Blue is all changes. The **Erase** icon will clear all the changes shown.

Select and copy code from this pane using [**Ctrl**]+[**c**] keys or using the right-click menu option. The context menu has additional commands.



Use the **Search** feature to highlight instances of specific terms. Use the **Find Next** button to jump to the next search term.



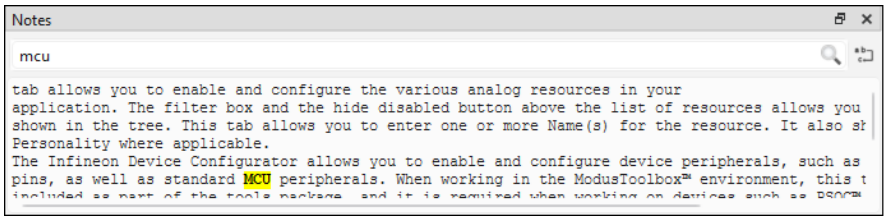
Use the **Toggle Word Wrap** feature to fit long lines of code into the pane.

8.5 Notes pane

The **Notes** pane displays when you click the **Pencil** icon for any enabled resource. You can enter a note for a disabled resource.



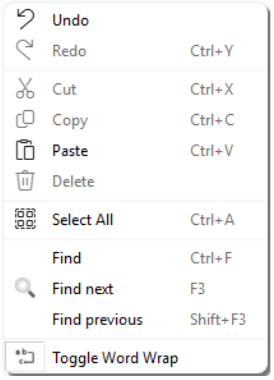
Use the **Search** feature to find instances of specific terms in the note.



Use the **Find Next** button to jump to the next matching search term.

Use the **Toggle Word Wrap** feature to fit longer lines of text inside the pane.

Right-click inside the pane to view the context menu:



9 Version changes

This section lists and describes the changes for each version of this tool.

Version	Change Descriptions	Notes
1.0	New tool.	
1.1	Added support for WICED Bluetooth® devices.	
2.0	Changed the Platform tab to System tab.	This affects the file name generated during code generation. Older versions of the Device Configurator generated cycfg_platform.(c/h) files; it now generates cycfg_system.(c/h) files. If you are updating a design from a previous version, manually remove the old cycfg_platform.(c/h) files and update any references you created to use the new file names.
	Moved the Analog-Routing Editor to a tab.	
	Updated the File menu for library settings.	
	Added Update All Personalities menu item.	
	Added the ability to enter multiple resource Names using comma-separated list.	
2.1	Added Open System Explorer menu item. Added Change Devices menu item and dialog. Added Undo/Redo operations to the Edit menu. Added major/minor version number to the title bar.	
2.20	Added Copy feature to the Notice List. Added ability to see documentation links without enabling a resource. Added frequencies to clock diagram. Added feature to support incremental patch updates.	
2.21	Added Search feature to Code Preview. Implemented various performance improvements. Fixed an issue with multiple font sizes in the GUI. Fixed the PDL display name when using the MTB flow. Updated to allow analog routing from the SAR to any analog resource or pin.	
3.0	Removed Change Devices dialog. Updated the tool to recognize obsolete devices. Added path to files in the Code Preview Pane.	Use command line tools instead. Displays an error in the Notice List instead of blocking the file from being opened.

9 Version changes

Version	Change Descriptions	Notes
3.10	Fixed the name conflict warning notices when the selected device is changed to not check against non-existent chip locations. Added a ‘Fix’ to name conflict warnings in the notice list. Locked down number entry to the English format (decimal place is always a period). Made various performance improvements. Added a search filter to the dialog that allows for the selection of multiple signals. Added additional MPN consistency checking preprocessor macros to cyf_notices.h. Added a log file that can be accessed from the About box. Debug messages are redirected to it. Added back the ‘Fix’ to the MPN consistency notice. Fixed error message displayed when the same *.modus file is opened in multiple instances of the Device-Configurator and mpn checking command line arguments are provided.	
4.0	Updated back-end to support multi-core applications. Updated Create Design dialog. Changed device library file from xml to props.json.	
4.10	Added Settings menu and items. Improved parameter view sizing.	
4.20	Removed the Save As and Change Libraries menu items. Removed New Design dialog and menu items. Added a Filter button to the Parameters pane to toggle off and on non-editable parameters. Deeper grouping is supported in the parameter view. Added the use of the back-end server, meaning that multiple editors can be open for the same design file at once. Added support for dynamically displayed resources. Used by some virtual locations to get a better user experience. Supports multiple "configurator_support" libraries being found by default to be included for a single design (i.e. personalities can be split across PDL and middleware libraries).	
5.0	Renamed to Infineon Device Configurator. Added section for stand-alone operation.	
5.10	Various bug fixes and back-end updates. Updates for future device support.	
5.20	Update to the **Settings** menu; back-end changes.	
5.30	Added HTML documentation in the tool. Created How to topics for memory configuration. Moved subtabs to the top of the **Memory** tab and renamed **Summary** to **Address View**. Added **Delete All** regions command to the **Memory** tab.	
5.40	Minor GUI updates for tooltips and improved display; minor back-end changes.	
5.50	Updates to the **Memory** tab; minor back-end changes.	
5.60	Added **Notes** pane and Toggle Word Wrap feature, minor back-end changes.	
5.70	Added a warning pop-up message to warn about overwriting manual edits in generated code. Added a save to all the settings of a resource so if you disable the resource, settings are restored when you re-enable that resource.	

9 Version changes

Version	Change Descriptions	Notes
5.80	Updated **Search** feature to include regular expression terms. Searches now have history; **Up** and **Down** arrow keys display previous terms. **Code Preview** pane updated to show changes and include buttons to jump to next previous change.	
5.90	Minor back-end changes.	

Revision history

Revision	Date	Description
**	2018-11-21	New document.
*A	2019-03-01	Updated to version 1.1.
*B	2019-10-17	Updated to version 2.0.
*C	2020-03-27	Updated to version 2.1.
*D	2020-09-01	Updated to version 2.20.
*E	2020-12-10	Updated to version 2.21.
*F	2021-03-15	Updated to version 3.0.
*G	2021-09-24	Updated to version 3.10.
*H	2022-09-12	Updated to version 4.0.
*I	2023-05-08	Updated to version 4.10.
*J	2024-02-05	Updated to version 4.20.
*K	2024-03-22	Updated to version 5.0.
*L	2024-09-27	Updated to version 5.10.
*M	2024-11-22	Update to include **Solutions** and **Memory** tabs configuration for early access pack.
*N	2024-12-06	Updated to version 5.20.
*O	2025-03-26	Updated to version 5.30.
*P	2025-06-20	Updated to version 5.40.
*Q	2025-09-05	Updated to version 5.50.
*R	2025-10-07	Added Clocks tab description, and updated System tab description.
*S	2025-12-12	Added section on **Notes** pane. Updated to version 5.60.
*T	2026-03-21	Updated to version 5.70.
*U	2026-05-29	Updated to version 5.80.
*V	2026-08-15	Updated to version 5.90. Updated link for the stand-alone CMSIS pack. Updated descriptions of the Analog and Analog-Routing tabs.

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Email: erratum@infineon.com

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