

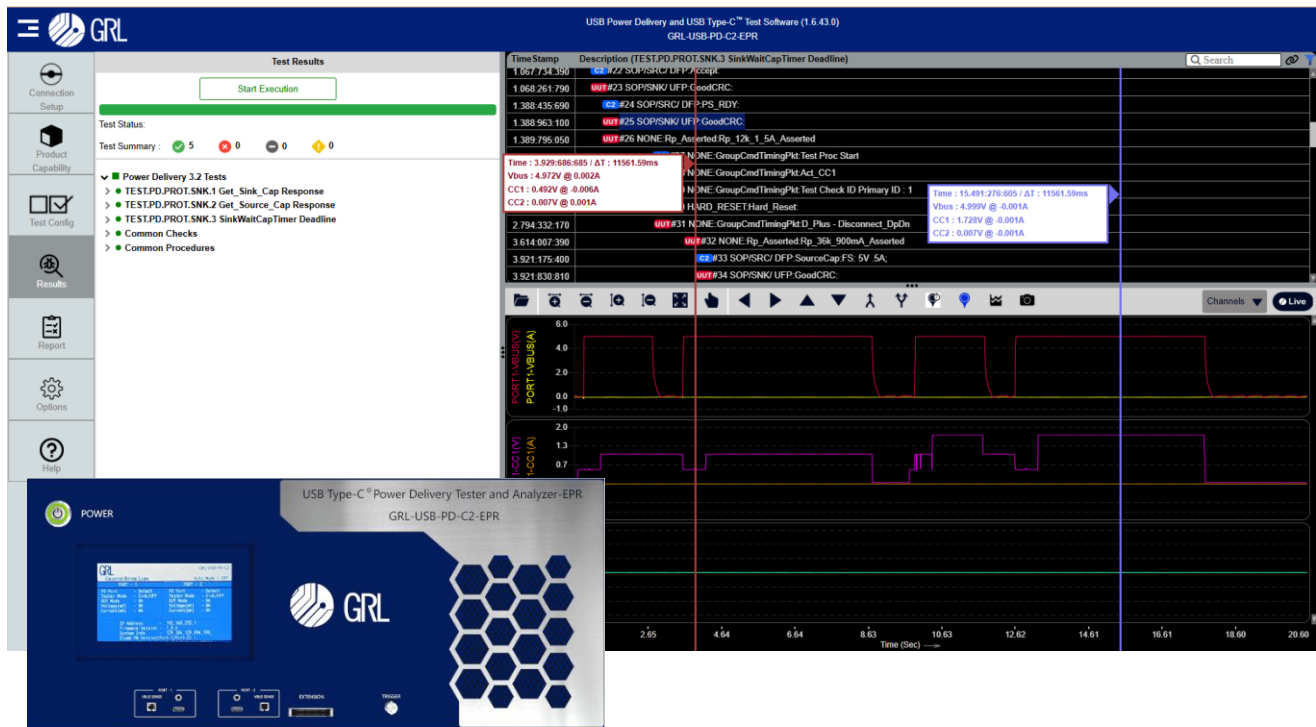


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GRL Platform Solutions

User Guide

USB Type-C® Power Delivery & Alt Mode Tester and Analyzer (GRL-USB-PD-C2-EPR) Application



This material is provided as a reference to get started with the GRL Platform Solutions USB Power Delivery Compliance Test (GRL-USB-PD-C2-EPR) Application.

For software support, contact support@grlps.com.

Published on 02 July 2026

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1 Reference Documents

The test methods outlined in this document are tests required by various technology adoptions of the USB Type-C connector. Specifications that have adopted the USB Type-C connector and may be referenced in this document include, but are not limited to, the latest USB-IF, VESA – DisplayPort™ and Qualcomm® Quick Charge™ (QC) specification versions respectively.

Note: In order to have access to all specifications, it may be required that you are a member of an industry group and have attained the proper permissions.

1.1 USB-IF

USB-IF Compliance Documents are available for download at:

<http://www.usb.org/developers/docs/>

1.2 VESA - DisplayPort

Download the DisplayPort document from the VESA website:

<http://www.vesa.org/join-vesamemberships/member-downloads/>

1.3 QC Testing

Approval and NDA as a QC5 and Legacy Adopter is required to gain access to the QC Compliance Test Spec. Contact your GRL Platform Solutions or Qualcomm QC representative for more details.

2 Scope of this User Guide

This User Guide serves as the primary user documentation for the GRL-USB-PD-C2-EPR (aka GRL-C2-EPR) USB Type-C Power Delivery Tester and Analyzers Hardware and the GRL-C2-EPR Automation Test Application. The subsequent sections describe the GRL-C2-EPR initial setup and each feature provided by the GRL-C2-EPR automation test application when connected to the GRL-C2-EPR tester hardware. For more details on the GRL-USB-PD-C2-EPR test solution, see related user documentation at <https://www.grlps.com/en-us/download-center> and general overview at <https://www.grlps.com/en-us/test-solutions/protocol-power-test-solutions>.

3 Getting Started with GRL-C2-EPR

This section describes how to get started with the GRL-C2-EPR test solution for USB Power Delivery compliance testing. Whether you are installing it for the first time or doing an upgrade, please make sure to follow all the steps in this section to verify your setup prior to testing a Device Under Test (DUT). The procedure is as follows:

1. Install the latest version of GRL-C2-EPR automation test application on the host computer (laptop or desktop) connected to the GRL-C2-EPR tester hardware. For the best system operation using this application, GRL Platform Solutions recommends that the host computer supports Intel Core i7 and 8GB RAM with Google Chrome version 80.0.3987.122 or above (64-bit). Make sure to clear the browser cache before launching the GRL-C2-EPR application server.
2. Make sure the GRL-C2-EPR tester firmware has been updated to the latest version (see Section 4).

If this procedure is followed and any issues arise, please contact support@grlps.com.

3.1 Install GRL-C2-EPR Application

1. Download the GRL-C2-EPR application from <https://www.grlps.com/en-us/download-center>.
2. Run the installer by double clicking the extracted executable (*GRL-USB-PD-C2-EPR_V1x.x.exe*) and then click on the 'Next' button.

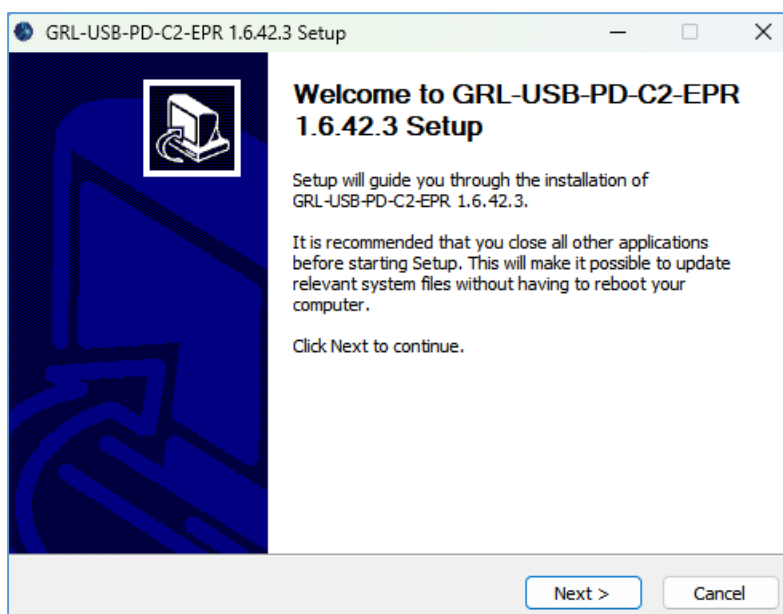


FIGURE 3.1: START GRL-C2-EPR APPLICATION INSTALLATION

3. Read and accept the license agreement by clicking on the 'I Agree' button.

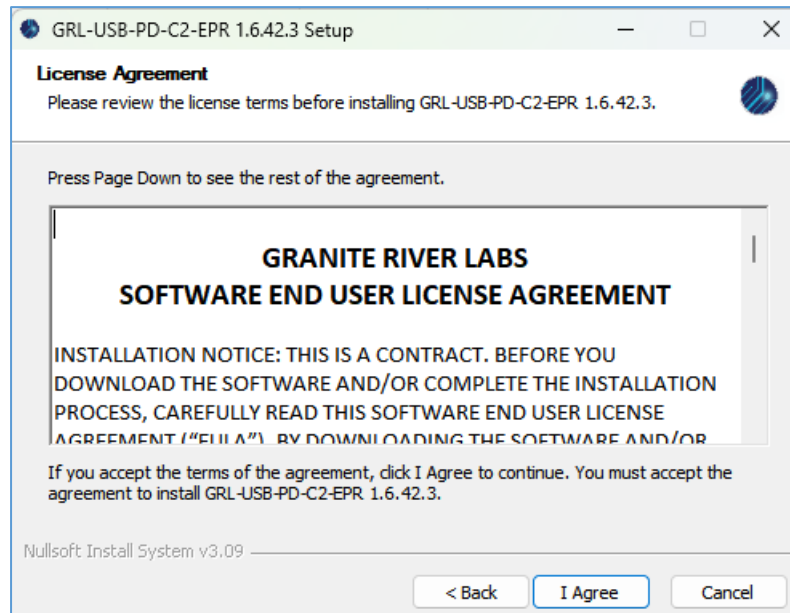


FIGURE 3.2: ACCEPT GRL-C2-EPR APPLICATION LICENSE AGREEMENT

4. The software installation will then proceed and upon completion, click on the 'Finish' button.

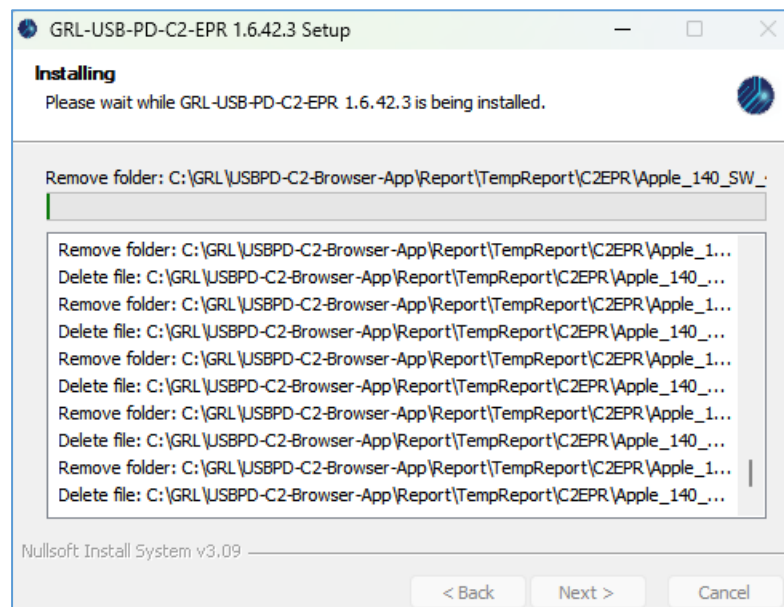


FIGURE 3.3: GRL-C2-EPR APPLICATION INSTALLATION IN PROGRESS

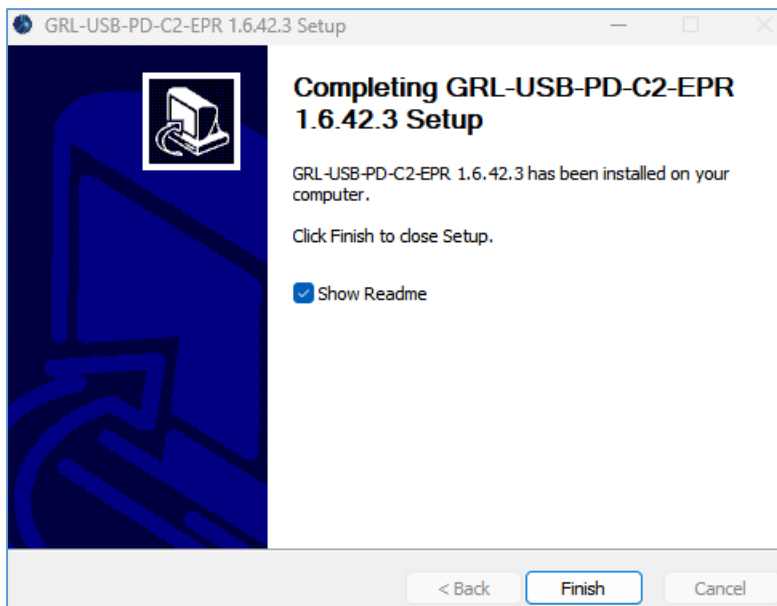


FIGURE 3.4: GRL-C2-EPR APPLICATION INSTALLATION COMPLETED

5. The GRL-C2-EPR application is now ready for use.

3.2 Start Up and Navigate GRL-C2-EPR Application

1. Once installed, you can directly open the GRL-C2-EPR application using the **GRL-USB-PD-C2-EPR** desktop shortcut. This will initiate the application server to run backend operations before launching the GRL-C2-EPR application.

Note: Do not close this window only unless you need to exit from the GRL-C2-EPR application.

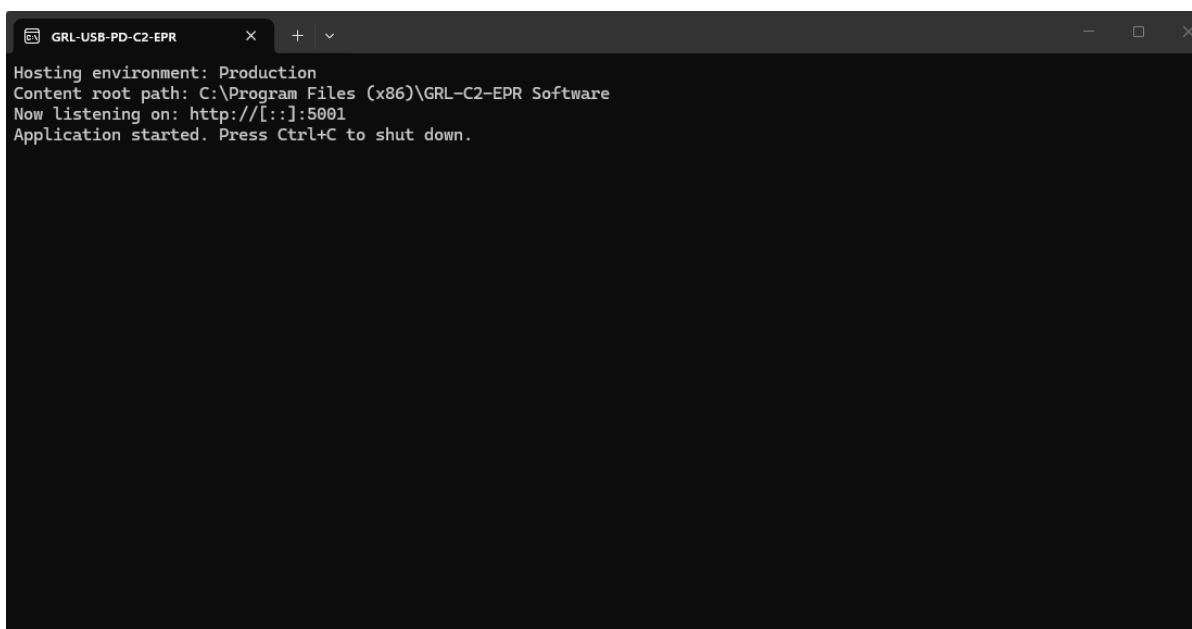


FIGURE 3.5: APP SERVER SCREEN RUNNING BACKEND OPERATIONS

2. The GRL-C2-EPR application should launch after a few seconds on a browser window with the appropriate port number. If for some reason the browser window does not appear after a few minutes, open a new browser tab and navigate to *http://IP address of windows software host PC:5001/* (for example, *http://192.168.3.241:5001/*).
3. The GRL-C2-EPR application when launched will display “Connection Setup” as the landing screen as follows:

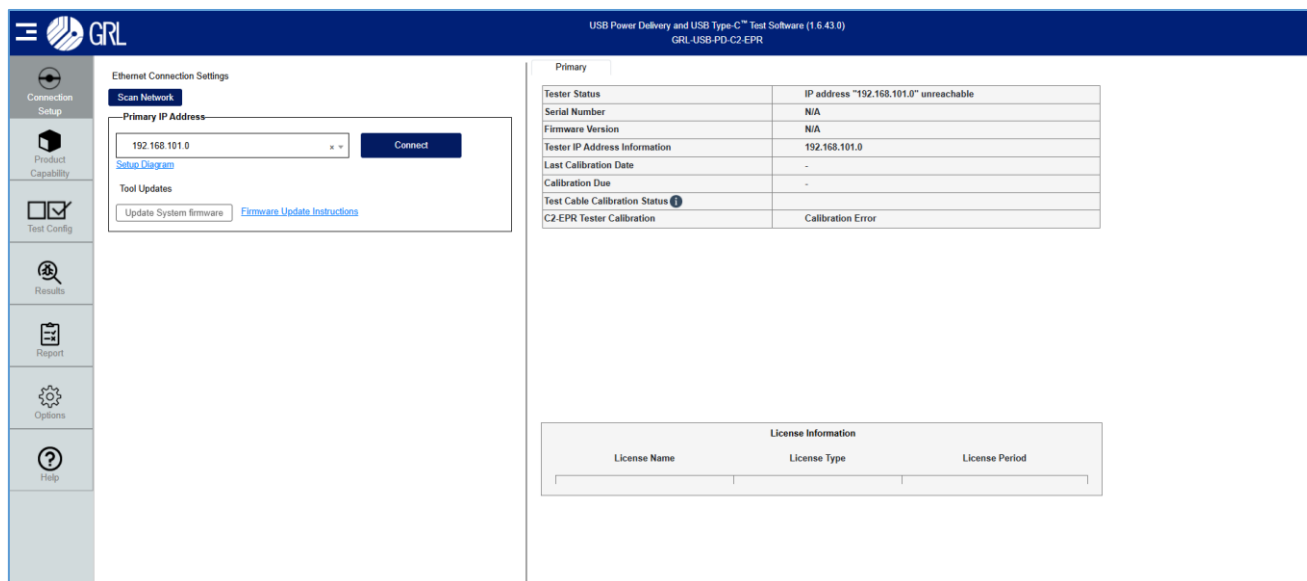


FIGURE 3.6: GRL-C2-EPR APPLICATION LANDING SCREEN

This screen allows you to set up connection between the GRL-C2-EPR application and the GRL-C2-EPR tester hardware as well as performing firmware/software updates. More details are provided in Section 4.

3.2.1 Using GRL-C2-EPR Application in Chrome OS

Note: Make sure that the GRL-C2-EPR tester hardware is connected to a control PC running Windows 10.

1. Install the GRL-C2-EPR application on a Windows 10 control PC connected to the GRL-C2-EPR tester hardware.
2. Once installed, open the GRL-C2-EPR application using the **GRL-USB-PD-C2-EPR** desktop shortcut.
3. Open a new Chrome browser tab in Chrome OS and navigate to *http://IP address of windows software host PC:5001/* (for example, *http://192.168.3.241:5001/*).

Note: Make sure that both the Windows 10 control PC and Google Chromebook are connected to the same Ethernet network (wired or wireless).

See Figure 3.7 below for an illustration of the above steps.

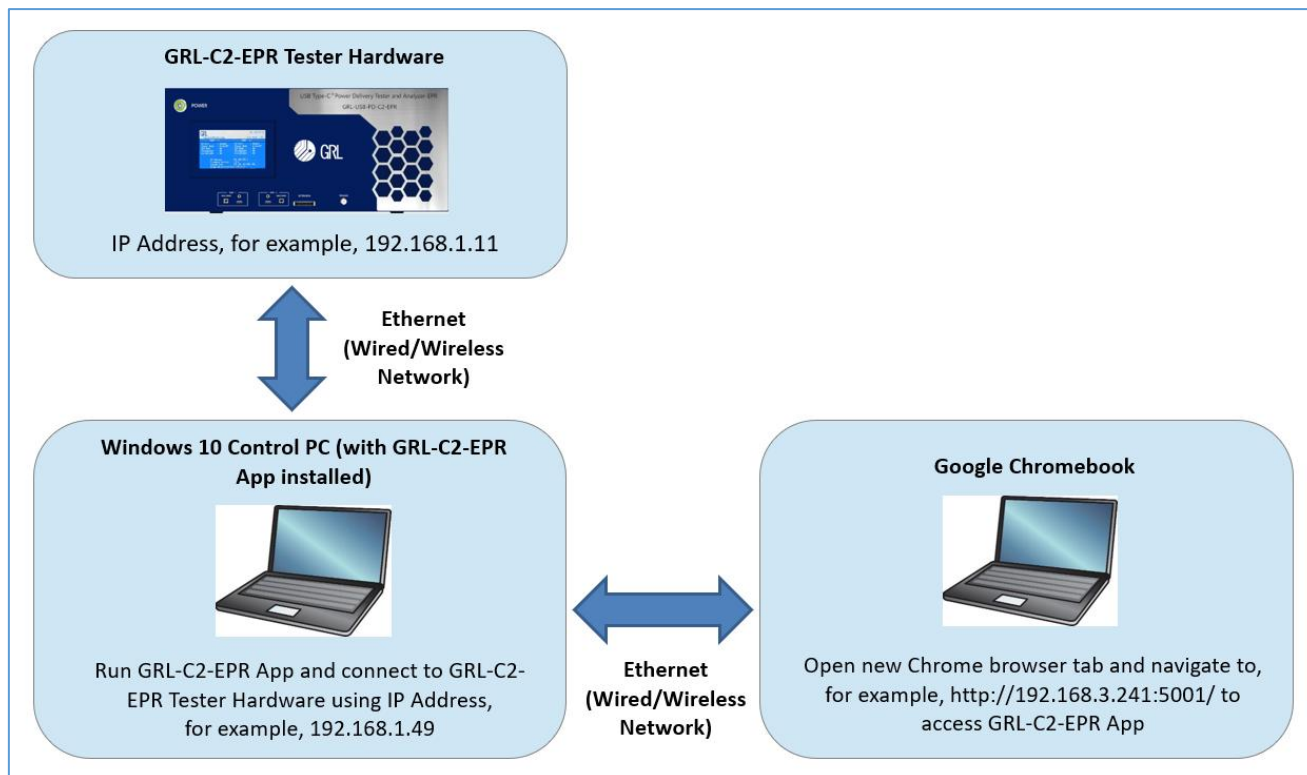


FIGURE 3.7: USING GRL-C2-EPR APPLICATION IN CHROME OS

3.2.2 Using GRL-C2-EPR Application in macOS

Note: Make sure that the GRL-C2-EPR tester hardware is connected to a control PC running Windows 10.

1. Install the GRL-C2-EPR application on a Windows 10 control PC connected to the GRL-C2-EPR tester hardware.
2. Once installed, open the GRL-C2-EPR application using the **GRL-USB-PD-C2-EPR** desktop shortcut.
3. Open a new Chrome browser tab in macOS and navigate to <http://IP address of windows software host PC:5001/> (for example, <http://192.168.3.241:5001/>).

Note: Make sure that both the Windows 10 control PC and Apple MacBook are connected to the same Ethernet network (wired or wireless).

See Figure 3.8 below for an illustration of the above steps.

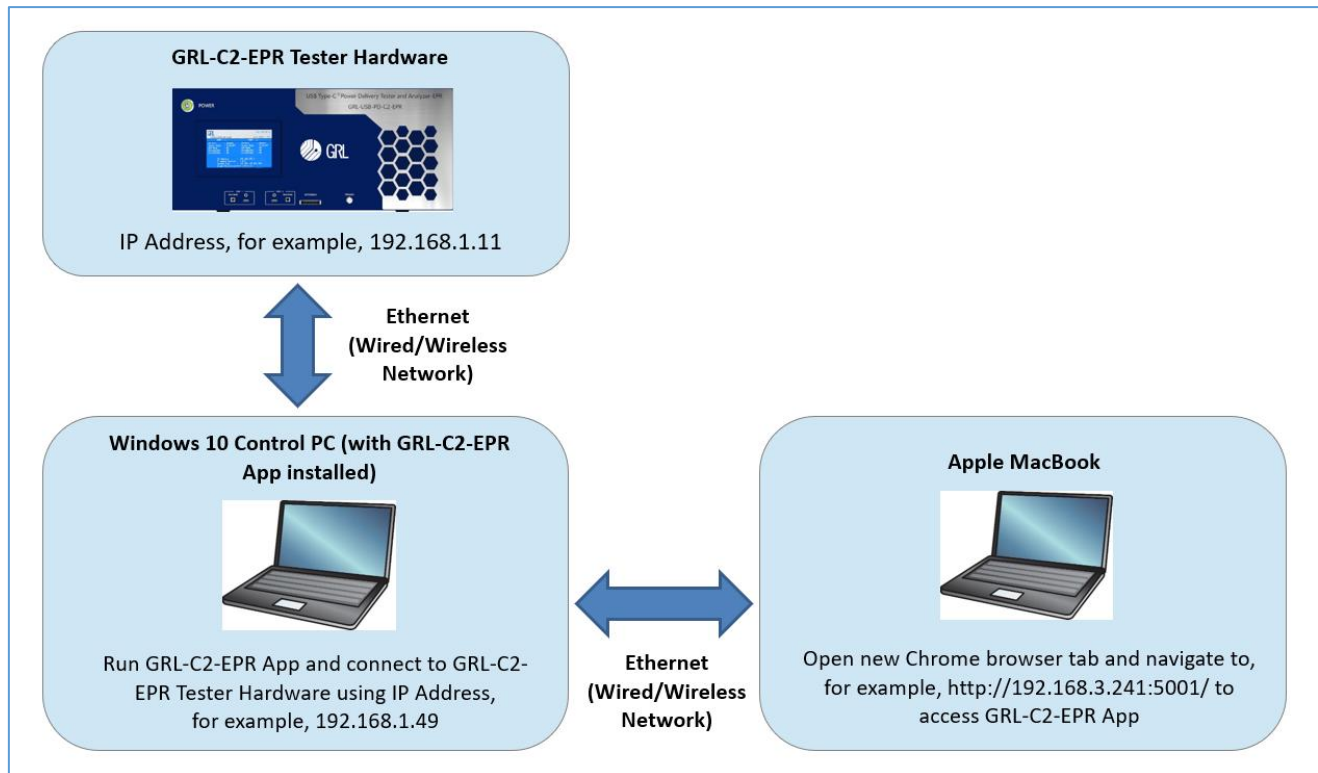


FIGURE 3.8: USING GRL-C2-EPR APPLICATION IN MACOS

4 Safety Precautions for GRL-C2-EPR

Make sure to read, follow and adhere to the following safety precautions when handling the GRL-C2-EPR tester hardware.

4.1 Operating Conditions

The following conditions must be fulfilled for optimum performance and functionality of the GRL-C2-EPR tester hardware:

- The GRL-C2-EPR tester hardware should be calibrated.
- The GRL-C2-EPR tester hardware should be kept for 10 minutes warm up before performing tests.
- The AC Mains voltage should be within the specification of 100 - 240 VAC and should not have excessive noise or surge levels.
- The GRL-C2-EPR tester hardware, DUT and any other equipment used for testing must be connected to the common ground.
- The GRL-C2-EPR tester hardware must be operating in a stable physical environment (no vibrations).
- The Room temperature should be $20^{\circ}\text{C} \pm 5$.
- The Relative humidity of the room must be maintained at $50\% \pm 20\%$.

4.2 Electrical Characteristics

The GRL-C2-EPR tester hardware should be operated with a 3-pin plug and the type of power source as indicated on the marking label of the tester hardware.

- 100-240 Volt AC, 50-60 Hz
- 10 Amps

4.3 Use Only in Laboratories

The GRL-C2-EPR tester hardware is designed to be used in a USB Test Laboratory for USB Compliance Testing, Research and Development.

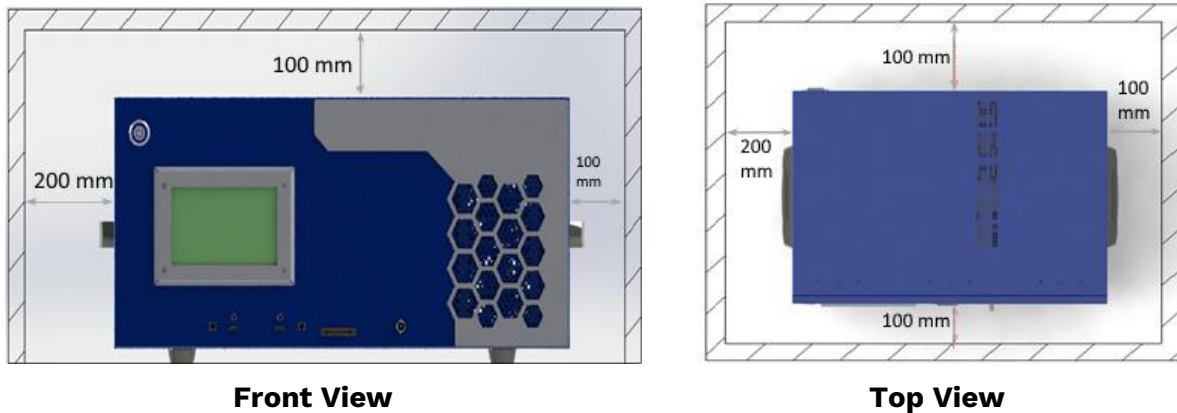
- The GRL-C2-EPR tester hardware should be kept on a stable desk or bench while in use.
- The GRL-C2-EPR tester hardware should not be mounted to a wall or ceiling.
- The GRL-C2-EPR tester hardware should be placed away from sources such as Radiators, Air Conditioners or other products that would affect the temperature around the GRL-C2-EPR tester hardware.

4.4 Ventilation

Air suction and exhaust vents in the cabinet must be provided for ventilation to ensure reliable operation of the GRL-C2-EPR tester hardware and protect it from overheating. These vents must not be blocked or covered. The GRL-C2-EPR tester hardware should

not be placed in a built-in installation such as a rack unless proper ventilation is provided, or the manufacturer's instructions have been followed.

The images below show where ventilation is required:



4.5 Cleaning

The following precautions should be observed when cleaning the GRL-C2-EPR tester hardware:

- Disconnect the AC Mains before cleaning the GRL-C2-EPR tester hardware.
- The GRL-C2-EPR tester hardware should be cleaned with a soft dry cloth only.
- NEVER clean the GRL-C2-EPR tester hardware with furniture wax, benzene, insecticides or other volatile liquids which may corrode the cabinet.

4.6 Hazard Warning/Caution

For own safety when using the GRL-C2-EPR tester hardware, take note of the following:

- To prevent a fire or shock hazard, do not expose the GRL-C2-EPR tester hardware to water or moisture.
- To prevent the risk of electric shock, do not open or remove the enclosure of the GRL-C2-EPR tester hardware.
- *Do not connect the DUT while the GRL-C2-EPR tester hardware is booting up. Also, remove the DUT before power cycling the GRL-C2-EPR tester hardware.*
- *Do not use the GRL-SPL-EPR cable in between the Source and Sink DUT's without the prior precaution. This is because the GRL-C2-EPR tester hardware will not source the VCONN voltage but the DUT's will source the VCONN voltage instead when the GRL-SPL-EPR cable is being used.*

Note: There are no user-serviceable parts inside. For any type of service assistance, please contact GRL Platform Solutions. Alterations or modifications carried out without appropriate authorization may void the warranty.

5 Connection and Setup of GRL-C2-EPR Tester Hardware

Figure 5.1 below shows how to connect the GRL-C2-EPR tester hardware with the host computer (control computer/PC) for testing a USB Power Delivery based DUT.

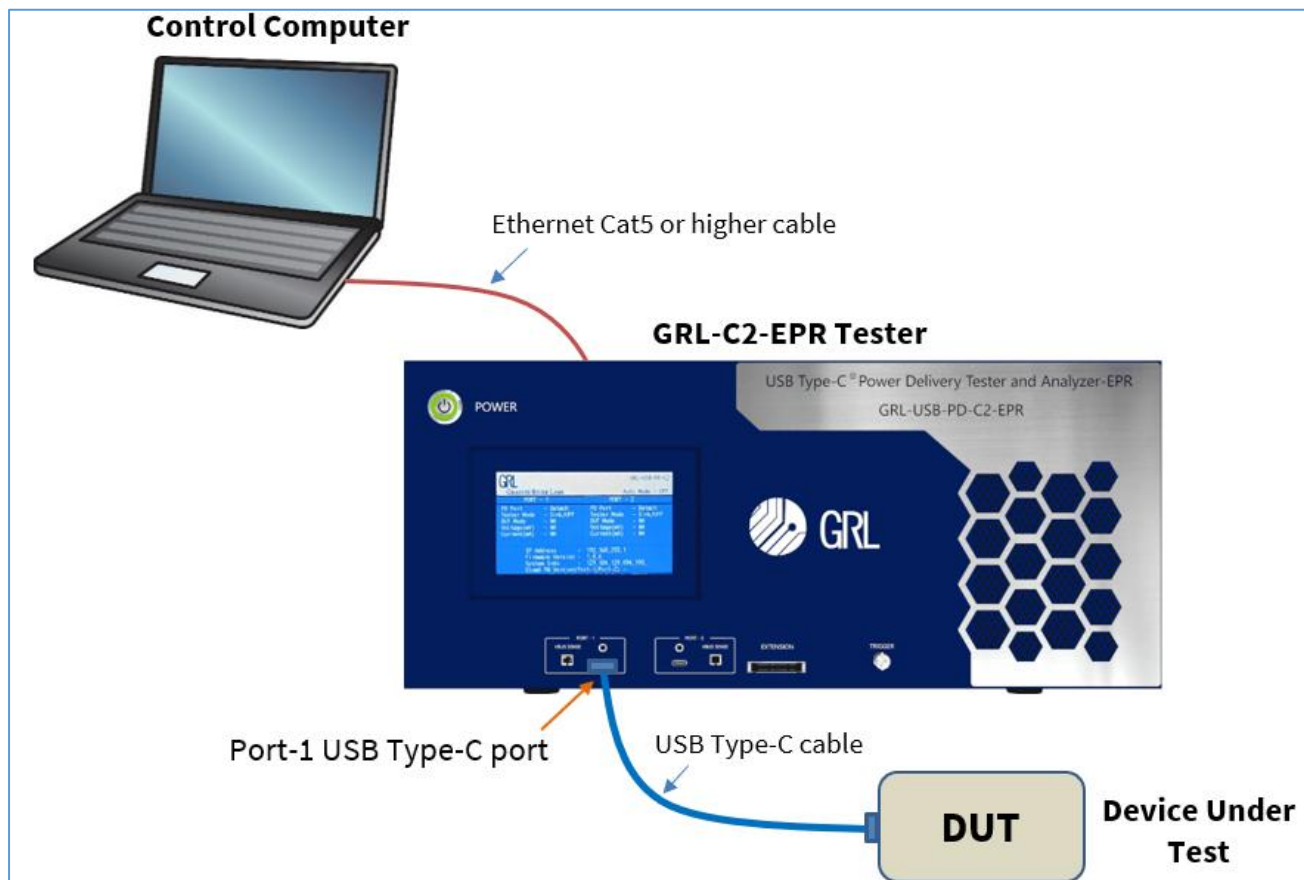


FIGURE 5.1: GRL-C2-EPR HARDWARE CONNECTION SETUP FOR TESTING DUT

The GRL-C2-EPR application installed on a Windows 10 (or higher) computer automates the testing process. Below is the procedure for connecting the hardware and verifying proper hardware connections.

Note: Make sure to read and adhere to the safety precautions as outlined in Section 4 of this User Guide before using the GRL-C2-EPR tester hardware.

1. Connect power supply to the GRL-C2-EPR tester hardware (see Section 5.1).
2. Connect the GRL-C2-EPR tester hardware using a physical Ethernet connection between the control computer and the tester.

Note: Automation of the DUT power supply switching in the GRL-C2-EPR tester hardware is handled internally to the tester. Thus, there is no Ethernet, USB or GPIB connection attached to the power supply.

5.1 Connect Power Supply to GRL-C2-EPR Tester Hardware

Connect the GRL-C2-EPR Power interface using the Power Brick included with the tester hardware.



FIGURE 5.2: GRL-C2-EPR POWER INTERFACE

5.2 Connect Ethernet Cable and Turn On GRL-C2-EPR Tester Hardware

Connect the Ethernet (RJ-45) connector to one of the control computer's Ethernet ports. A USB to Ethernet adapter can be used if there are no native Ethernet ports on the control computer.

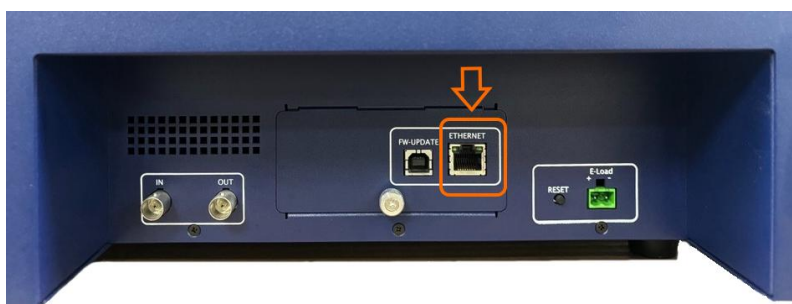


FIGURE 5.3: GRL-C2-EPR ETHERNET CONNECTOR

Turn on the GRL-C2-EPR tester hardware using the 'Power' on/off button on the front of the tester.



FIGURE 5.4: GRL-C2-EPR POWER BUTTON

5.2.1 Verify GRL-C2-EPR Tester Hardware Ethernet Connection

The Ethernet port on the control computer needs to be configured correctly for the GRL-C2-EPR tester hardware to recognize the control computer and vice versa.

To make sure the network connection is set up correctly, open the Network Connections panel from the control panel.

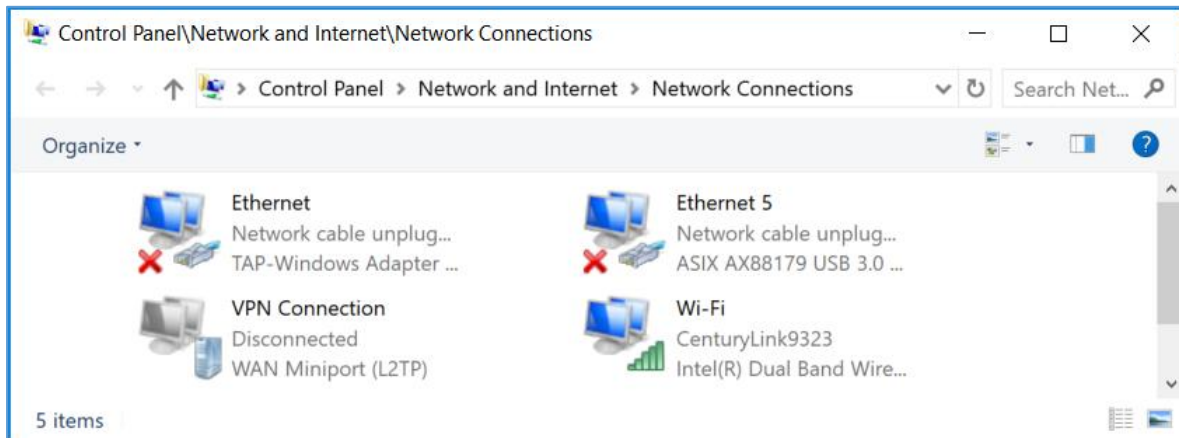


FIGURE 5.5: NETWORK CONNECTIONS BEFORE CONNECTING GRL-C2-EPR

Open the Ethernet panel for the Ethernet port that will connect to the GRL-C2-EPR tester hardware, select “Internet Protocol Version 4 (TCP/IPv4)” and click on the “Properties” button below and to the right.

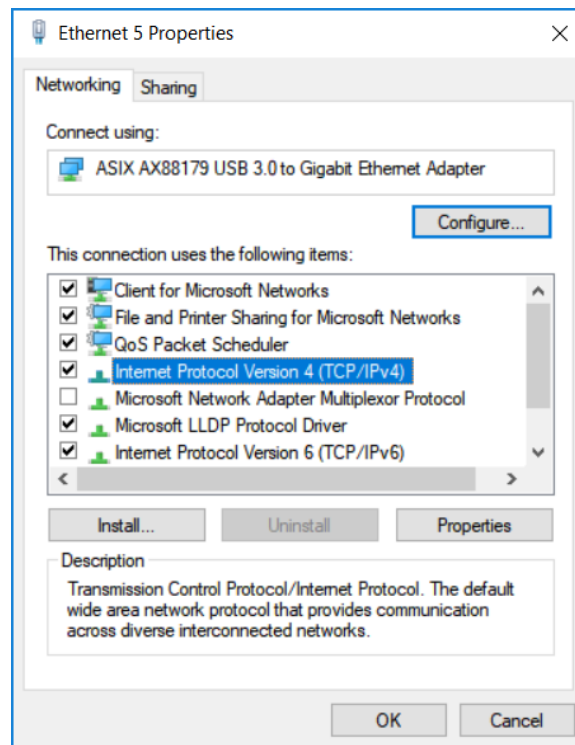


FIGURE 5.6: ETHERNET PROPERTIES

Set up the TCP/IPv4 properties as shown below.

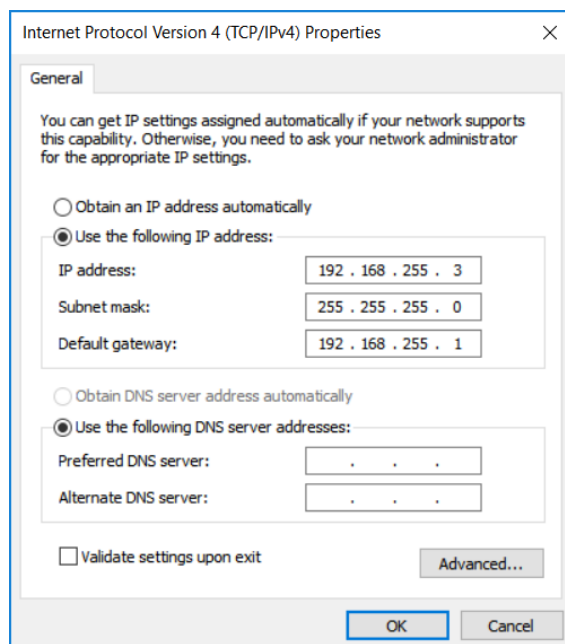


FIGURE 5.7: ETHERNET PROPERTIES WITH TCP/IPv4 SELECTED

Select a static IP address (“Use the following IP address:”) which should be 192.168.255.*n* where *n* is any number between 2 and 255. The subnet mask should be 255.255.255.0 and the default gateway should be 192.168.255.1. The rest of the items should remain unchanged.

Click on the “OK” button on the Internet Protocol Properties and close the Ethernet Properties. Make sure the GRL-C2-EPR tester hardware is powered on and completely booted up (front panel display shows firmware version number) then connect the Ethernet cable from the GRL-C2-EPR tester hardware to the computer’s Ethernet port that was just set up. The network connections panel should now look as pictured in Figure 5.8 below:

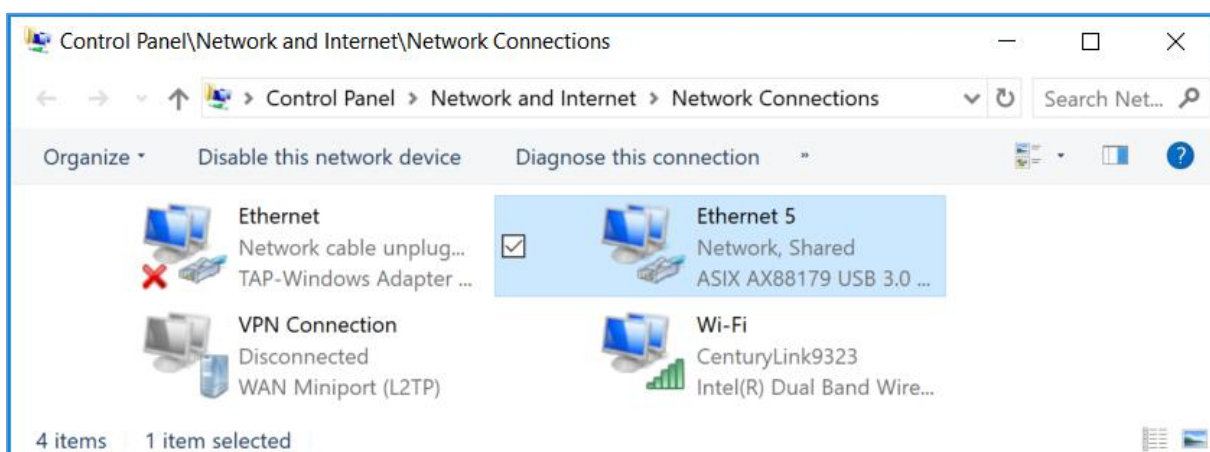


FIGURE 5.8: NETWORK CONNECTIONS AFTER SETUP AND CONNECTION OF GRL-C2-EPR

The GRL-C2-EPR tester hardware is now set up and ready for use.

Before running any tests, it is recommended that you verify that the control computer and the GRL-C2-EPR are communicating by going to the “Connection Setup” screen on

the GRL-C2-EPR application and clicking on the “Connect” button. The tester status should display “Connected”. Refer to Section 6 for more information.

5.3 Connect GRL-SPL-EPR Test Cable (with Link Cable & USB Type-C Connector Screw) to GRL-C2-EPR Tester Hardware

The GRL-SPL-EPR test cable refers to the GRL Platform Solutions special cable provided with the GRL-USB-PD-EPR pre-compliance board that is used to connect the board with the GRL-C2-EPR tester hardware and a USB Type-C based EPR Source/Sink DUT for EPR power testing.

Caution: Do not remove/disconnect the GRL-SPL-EPR cable during EPR power testing, to avoid damage to the GRL-C2-EPR tester hardware and DUT. Please make sure to tighten the screw on top of the cable before running tests.

Connect the GRL-SPL-EPR test cable assembly to the test port connectors as shown in below example:



FIGURE 5.9: GRL-SPL-EPR CABLE CONNECTION

Note: Make sure to place the GRL Platform Solutions logo on the cable in the upward position to maintain the same cable orientation. This is important to obtain accurate test measurement results.

In the above image, take note that the VBUS Sense pin will also need to be connected along with the GRL-SPL-EPR test cable. This is important when performing the Cable IR Drop calibration to compensate for voltage loss of the cable under test due to high resistance. To avoid this Cable IR Drop measurement in the GRL-C2-EPR, the VBUS Sense pin must be connected to directly measure the VBUS at the DUT’s Type-C connector.

Follow the steps below to properly connect/disconnect the GRL-SPL-EPR test cable assembly to/from the GRL-C2-EPR test port connectors to avoid damage to the cable.

5.3.1 Connect GRL-SPL-EPR Cable to GRL-C2-EPR Port

1. Position the GRL-SPL-EPR cable in a straight line as shown below:

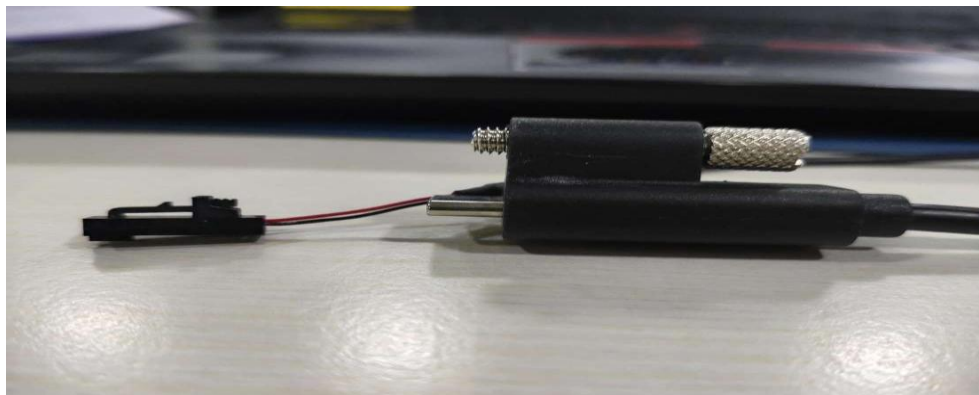


FIGURE 5.10: GRL-SPL-EPR CABLE IN STRAIGHT POSITION

2. Insert the USB Type-C connector of the GRL-SPL-EPR cable to the GRL-C2-EPR test port as shown in the example in Figure 5.11. Make sure to tighten the screw on top of the cable.



FIGURE 5.11: CONNECTING USB TYPE-C CONNECTOR OF GRL-SPL-EPR CABLE TO GRL-C2-EPR PORT

3. Insert the VBUS Sense pin to the GRL-C2-EPR VBUS SENSE port by pressing the notch in the Sense pin. Place the notch in the upward position when inserting the pin (see images below).

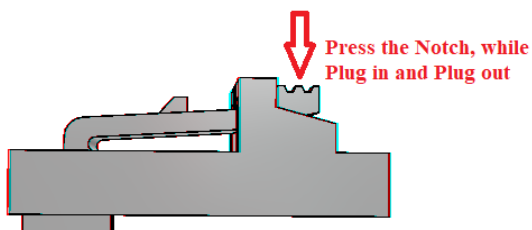




FIGURE 5.12: CONNECTING VBUS SENSE PIN TO GRL-C2-EPR PORT

5.3.2 Disconnect GRL-SPL-EPR Cable from GRL-C2-EPR Port

1. First, loosen the screw on top of the USB Type-C connector of the GRL-SPL-EPR cable. Then, remove the USB Type-C connector from the GRL-C2-EPR test port as shown below.



FIGURE 5.13: REMOVING USB TYPE-C CONNECTOR OF GRL-SPL-EPR CABLE FROM GRL-C2-EPR PORT

2. To remove the VBUS Sense pin from the GRL-C2-EPR VBUS SENSE port, press and hold the notch in the Sense pin and pull back gently (do not grab the Sense wires while doing so). Refer to the following images.

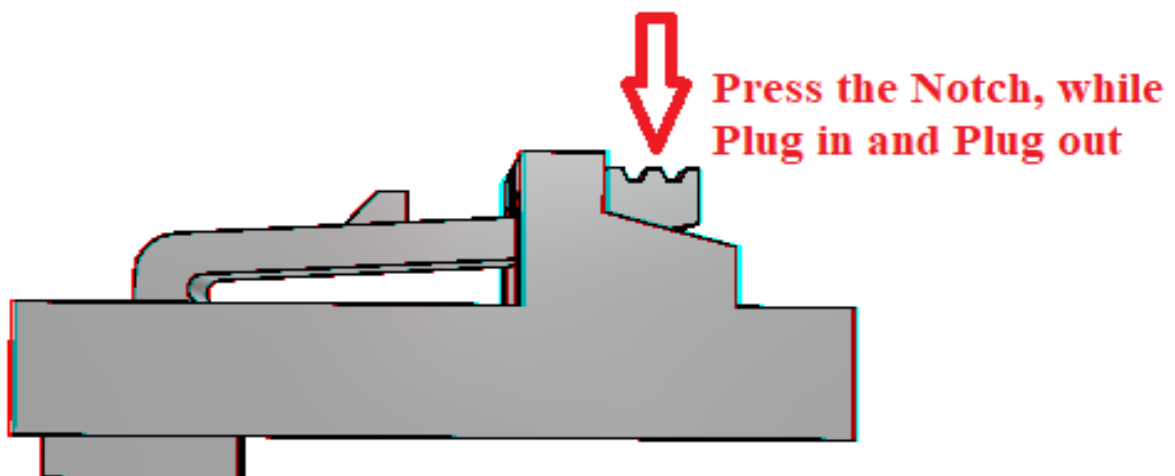




FIGURE 5.14: REMOVING VBUS SENSE PIN FROM GRL-C2-EPR PORT

5.4 Set Up GRL-C2-EPR Tester Hardware for Custom OEM Testing

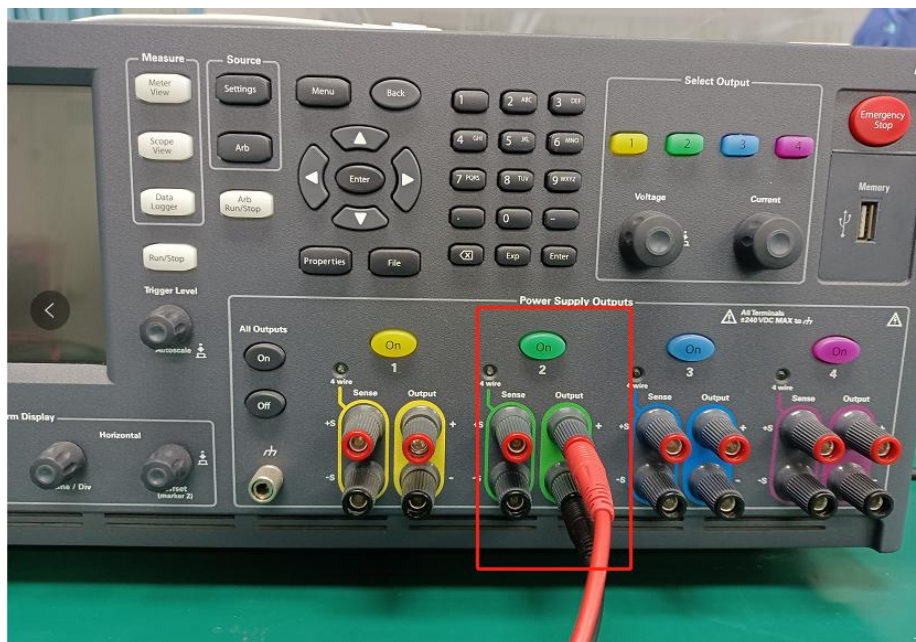
1. Connect the Custom OEM fixture to the DUT and GRL-C2-EPR tester hardware to perform Custom OEM tests as shown in below example:



FIGURE 5.15: CUSTOM OEM FIXTURE AND DUT CONNECTION

2. Connect channel 2 of the Keysight N6705C E-Load to the external E-Load port at the back of the GRL-C2-EPR tester hardware as shown below:

Note: The GRL-C2-EPR application currently supports only the Keysight N6705C E-Load. Please refer to the Custom OEM specifications for more details.



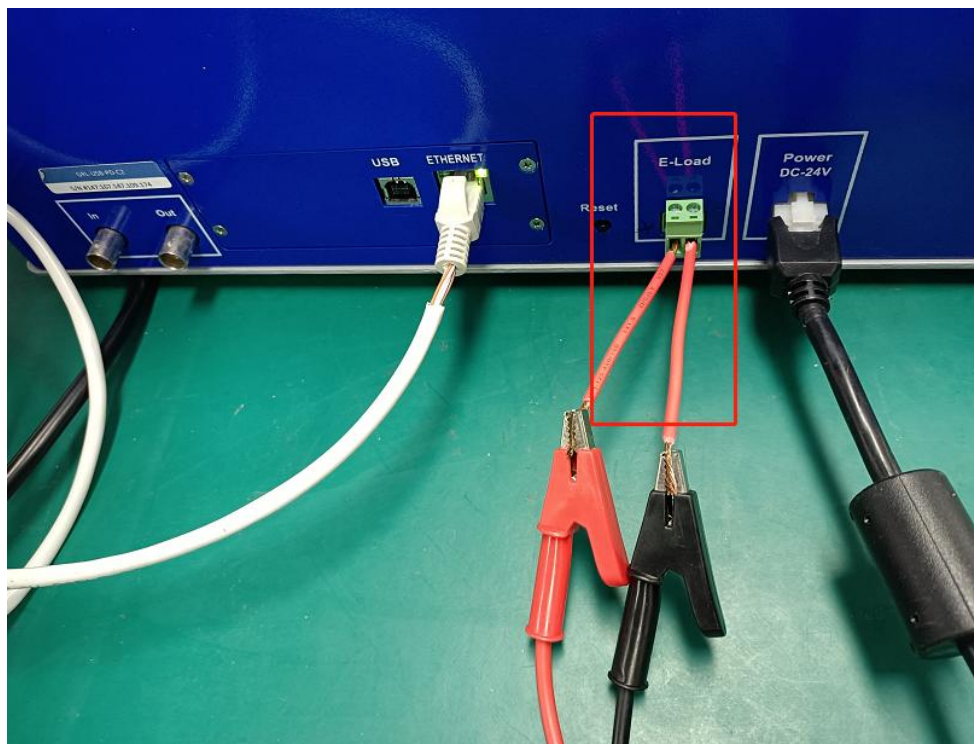


FIGURE 5.16: CUSTOM OEM EXTERNAL E-LOAD CONNECTION

3. Use a USB cable to connect the Keysight N6705C E-Load to the control PC where the GRL-C2-EPR application is being run.
4. Select all the Custom OEM test cases from the “Test Selection” panel and run the tests. Refer to Section 7.2.1.12 for more information.

Note: To run the CUSTOM OEM.TD.4.9.2 OCP and OVP Tests:

- On the GRL-C2-EPR, the external E-Load is not required.

6 Connection and Setup of GRL-C2-EPR Application

Note: The following procedure assumes that the GRL-C2-EPR tester hardware has been properly set up as described in above sections.

To connect the GRL-C2-EPR application with the GRL-C2-EPR tester hardware, do the following:

1. On the GRL-C2-EPR application landing page (“Connection Setup” screen), enter the IP address as displayed on the GRL-C2-EPR tester hardware screen and click on the **Connect** button. You can also click on the **Scan Network** button to detect all available GRL-C2-EPR tester hardware connected to the same network.

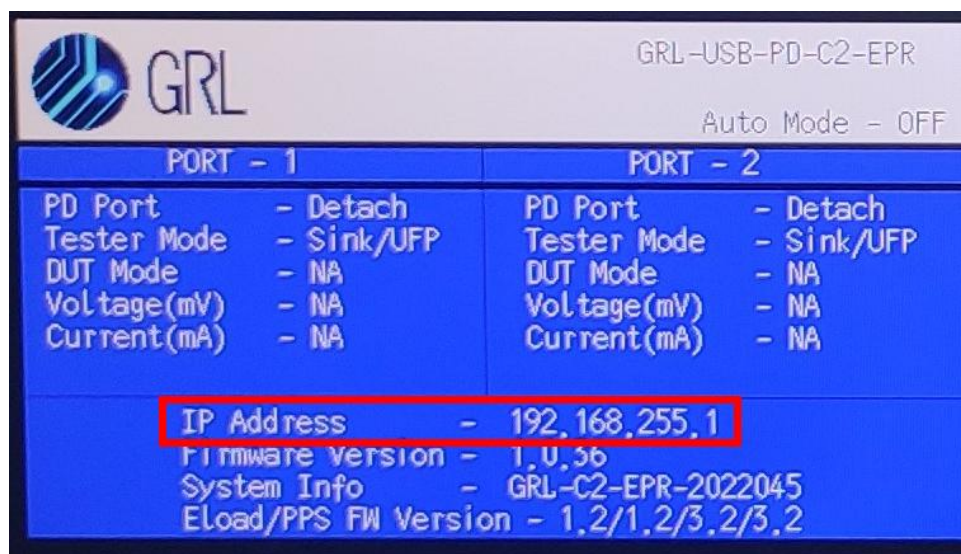


FIGURE 6.1: IP ADDRESS AS SHOWN ON GRL-C2-EPR TESTER HARDWARE SCREEN EXAMPLE

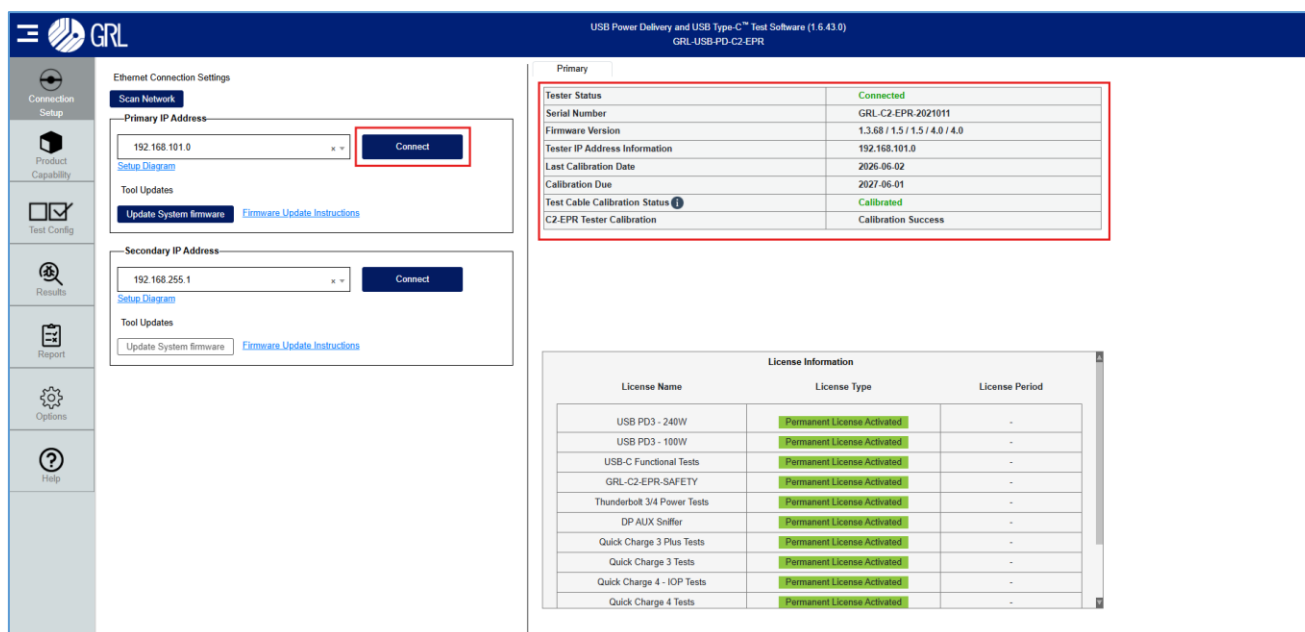


FIGURE 6.2: GRL-C2-EPR CONNECTION CONFIGURATION SCREEN AFTER SUCCESSFUL CONNECTION

2. The GRL-C2-EPR tester hardware and application are now connected as indicated by the tester information display (“Tester Status”, “Serial Number”, “Firmware Version”, etc.).
3. Optionally you can also select [“Setup Diagram”](#) below the IP Address field that shows you how to connect the DUT to the Port-1 USB Type-C port of the GRL-C2-EPR tester hardware using the USB Type-C cable provided by GRL Platform Solutions or a compliant USB Type-C cable.

Along with each GRL-C2-EPR application revision, a new version of firmware is provided. For the GRL-C2-EPR application, the baseboard firmware, E-load and PPS code should be updated. Use the following procedure to update the GRL-C2-EPR tester hardware’s firmware.

4. Click on the **Update System firmware** button to update the GRL-C2-EPR tester hardware’s baseboard firmware, E-load and PPS code. You can select [“Firmware Update Instructions”](#) next to the button to display the instructions to guide you through the entire updating process. Follow the instructions step by step to perform the updates accordingly.

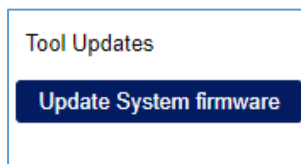


FIGURE 6.3: UPDATE GRL-C2-EPR FIRMWARE BUTTON

6.1 Update GRL-C2-EPR System Firmware

Follow the steps below to perform system firmware update for the GRL-C2-EPR tester hardware:

1. Using a standard USB Type-B cable, connect the USB Type-B port (for firmware update as indicated in the below image) at the back of the GRL-C2-EPR tester hardware to the control PC (where the GRL-C2-EPR application is running).



- When connected, click on the **Update System firmware** button to proceed with the PPS, E-Load and Baseboard firmware update respectively.

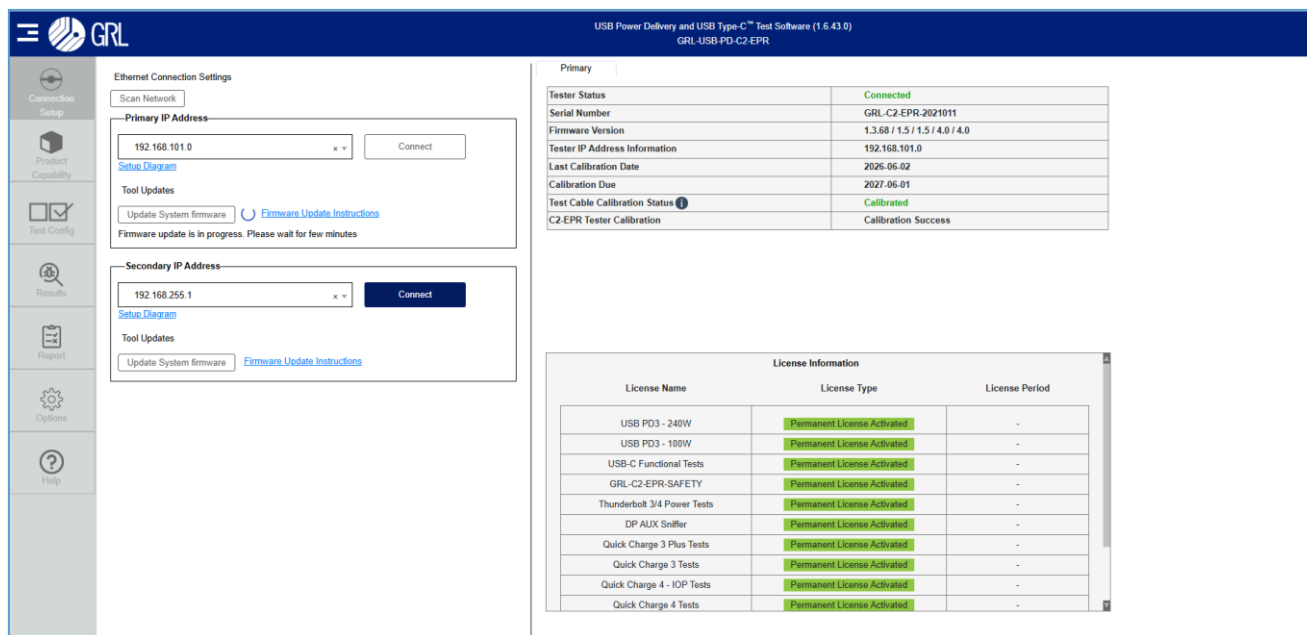


FIGURE 6.4: GRL-C2-EPR SYSTEM FIRMWARE UPDATE IN PROGRESS

- The firmware update process may take about 10 minutes at minimum to complete. During this time please do not interrupt the hardware connection setup until all firmware update has fully completed.
- A pop-up message will appear when the firmware update process has completed successfully as shown in below image. Click “Ok” and wait for the GRL-C2-EPR tester hardware to power cycle and reboot.

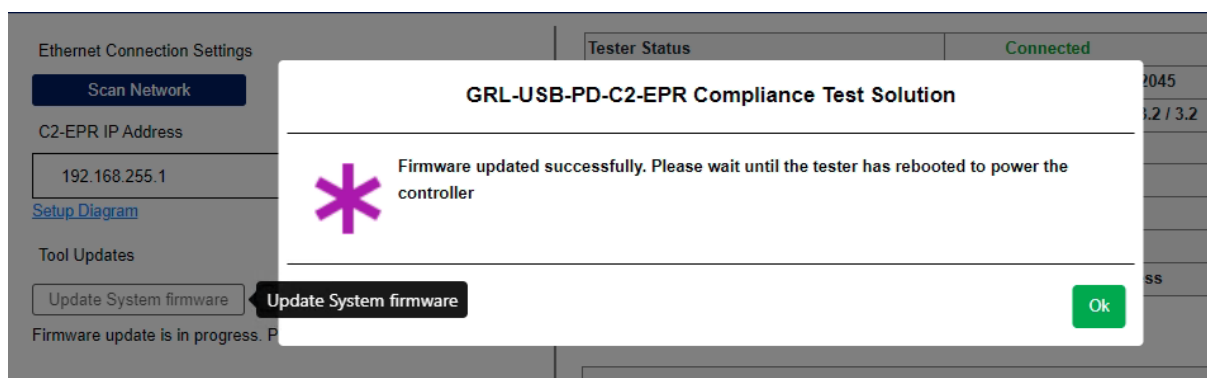


FIGURE 6.5: GRL-C2-EPR SYSTEM FIRMWARE UPDATE COMPLETED

- The GRL-C2-EPR tester hardware and application should now be connected and ready for use with updated firmware.



Connection Setup

Product Capability

Test Config

Results

Report

Options

Help

Ethernet Connection Settings

Scan Network

Primary IP Address

192.168.101.0

Connect

Secondary IP Address

192.168.255.1

Connect

Update System firmware

Firmware Update Instructions

USB Power Delivery and USB Type-C™ Test Software (1.6.43.0)

GRL-USB-PD-C2-EPR

Primary

Tester Status	Connected
Serial Number	GRL-C2-EPR-2021011
Firmware Version	1.3.68 / 1.5 / 1.5 / 4.0 / 4.0
Tester IP Address Information	192.168.101.0
Last Calibration Date	2026-06-02
Calibration Due	2027-06-01
Test Cable Calibration Status	Calibrated
C2-EPR Tester Calibration	Calibration Success

License Information

License Name	License Type	License Period
USB PD3 - 240W	Permanent License Activated	-
USB PD3 - 100W	Permanent License Activated	-
USB-C Functional Tests	Permanent License Activated	-
GRL-C2-EPR-SAFETY	Permanent License Activated	-
Thunderbolt 3/4 Power Tests	Permanent License Activated	-
DP AUX Sniffer	Permanent License Activated	-
Quick Charge 3 Plus Tests	Permanent License Activated	-
Quick Charge 3 Tests	Permanent License Activated	-
Quick Charge 4 - IOP Tests	Permanent License Activated	-
Quick Charge 4 Tests	Permanent License Activated	-

Note: If the firmware fails to update (after following the above steps), the user can manually update the firmware using the instructions as given by clicking on [Firmware Update Instructions](#) next to the “Update System firmware” button. This will display a set of instructions to guide the user through the entire manual updating process as shown in the image below.

Update C2-EPR Firmware Instruction



USB Type-B port for Firmware update

Automatic Firmware Update Procedure:

1. Connect firmware update USB port of C2-EPR to the test PC using standard USB Type-B cable where C2-EPR Browser Application is running
2. Click on the "Update Firmware Update" button
3. If automatic firmware update fails, please update the firmware manually using below instructions

Manual firmware update procedure:

1. Connect firmware update USB port of C2-EPR to the test PC using standard USB Type-B cable where

Ok

FIGURE 6.6: MANUAL GRL-C2-EPR SYSTEM FIRMWARE UPDATE INSTRUCTIONS

GRL-USB-PD-C2-EPR User Guide
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Version 7.0, July 2026. Updated 07.02.2026

Rev 7.0
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6.2 GRL-C2-EPR Application License Activation

The licensing for the GRL-C2-EPR tester hardware is built in which means no additional license activation is needed. Take note certain tests like the Thunderbolt 3 power and Custom OEM tests require separate licensing. Check the “License Info” panel in the *Connection Setup* screen. Check the “License Info” panel in the *Connection Setup* screen (Figure 6.2) to see which licenses are active on the tester. Contact GRL Platform Solutions support (support@grlps.com) if you have licensing questions or concerns.

7 Compliance Testing with GRL-C2-EPR

The GRL-C2-EPR tester hardware supports testing of various specifications such as the latest USB Power Delivery spec compliance, communications engine and deterministic tests as well as DisplayPort & Thunderbolt 3 Alt Mode tests and others. The GRL-C2-EPR tester hardware uses the GRL-C2-EPR application for automated or manual test execution.

The various screens presented by the GRL-C2-EPR application allow you to select, configure, run and generate reports from these tests for a variety of devices (Devices Under Tests or DUTs). There are also more specific controls that allow you to configure and debug specific DUT features and capabilities.

7.1 Product Capability

The Device Type and the Capabilities of a DUT define the compliance tests that need to be run on the DUT. There are two ways to gather the capabilities of the tests to be run. Either through using the DUT Type selection and querying the Capabilities of the DUT (**Informational** test mode) or by using a VIF File (**Compliance** test mode).

The *Product Capability* screen allows you to specify the method to determine the DUT type and display the capabilities of the DUT that is connected to either USB Type-C Port-1 or Port-2 or both Ports of the GRL-C2-EPR tester hardware.

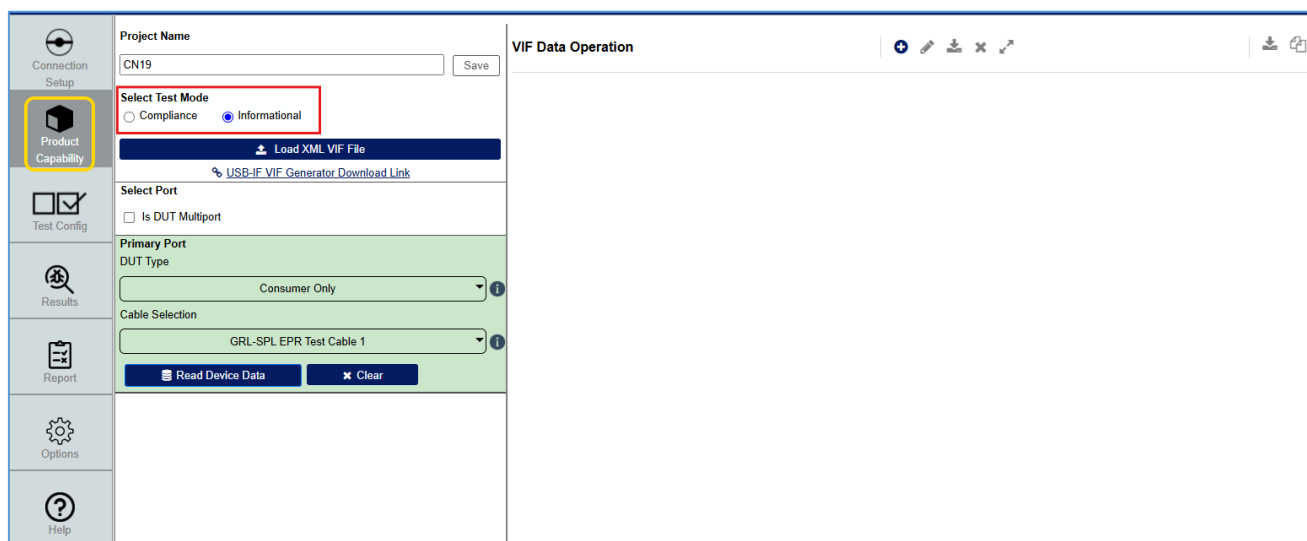


FIGURE 7.1: PRODUCT CAPABILITY SCREEN

You can also specify the name of the test session that is currently running by typing into the **Project Name** field at the top of the screen and click **Save**. All the test configuration and results will be saved under the specified name.

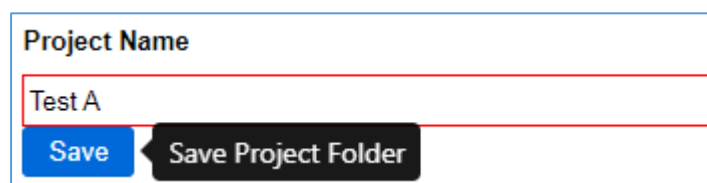


FIGURE 7.2: ENTER AND SAVE PROJECT NAME EXAMPLE

If a VIF File is not provided or available:

Select the **Informational** test mode. This method of defining the device type is most useful when a Vendor Information File (VIF) is not available. It allows you to select and configure multiple options to execute tests without a VIF file by selecting the DUT type, reading the DUT capabilities and generating a VIF file from the configuration.

Note: For this version of the GRL-C2-EPR application, the Informational test mode is the recommended method to be used.

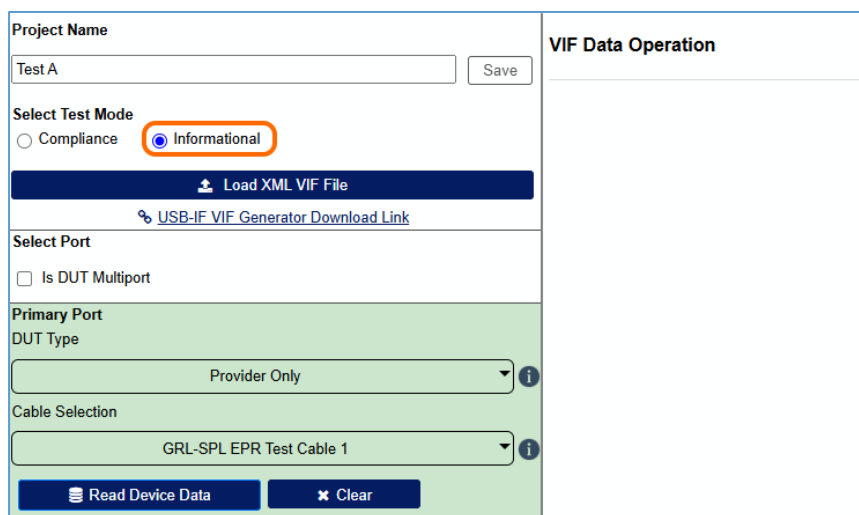


FIGURE 7.3: INFORMATIONAL TEST MODE DUT CONFIGURATION

- When testing a new DUT, clicking on the **Clear** button (see Figure 7.8) will clear all product configuration information including what has been read from a VIF and what was read directly from the device.
- “Primary Port” refers to the primary test port of the DUT that should be connected to Port-1 of the GRL-C2-EPR tester hardware. If the DUT is connected to both Port-1 and Port-2 of the GRL-C2-EPR tester hardware, select the “Is DUT Multiport” checkbox. This will enable the Secondary Port (Port -2) configuration panel as shown below.

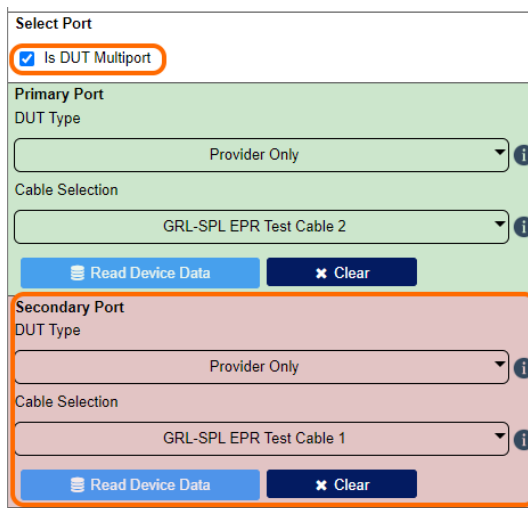


FIGURE 7.4: ENABLE 2-PORT DUT CONFIGURATION

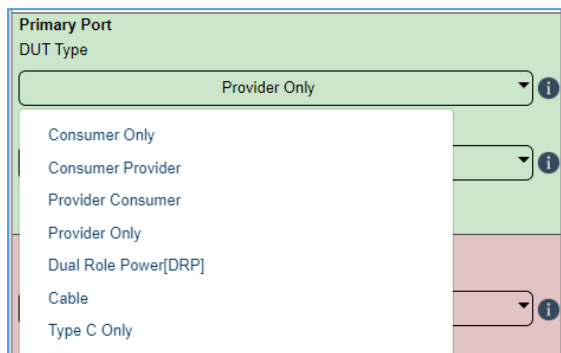


FIGURE 7.5: SELECTING DUT TYPE USING DROP-DOWN MENU

- c. Select the **DUT Type** field to enable the DUT type selection drop-down menus for both Port 1 and Port 2:

- **Consumer Only** – A device with a USB Power Delivery Port (typically a Device's upstream facing port) which sinks power from the power conductor (e.g., VBUS).

Note: A BUS-powered dock (Consumer Only) will have two different VIF files for testing.

- **Consumer/Provider** – A Power Consumer which can also act as a Power Provider.
- **Provider/Consumer** – A Power Provider which can also act as a Power Consumer.
- **Provider Only** – A device with a USB Power Delivery Port (typically a downstream facing port of a Host, Hub or Wall Wart DFP) which sources power over the power conductor (e.g., VBUS).
- **Dual Role Power (DRP)** – A Consumer/Provider or Provider/Consumer capable port: A port capable of operating as either a Source or a Sink.

Note: A self-powered dock (DRP) will have two different VIF files for testing.

- **Cable** – A USB Type-C cable that has a USB Power Delivery electronic marking chip which indicates through USB Power Delivery messaging its capabilities and vendor information. Such cables are known as Electronic Mark or E-Mark cables.
- **Type-C Only** – A device with a standard USB Type-C Port. When selected, the user can select the USB Type-C connection state machine of the DUT as either a Source (**SRC**), Sink (**SNK**) or Dual Role Powered (**DRP**):

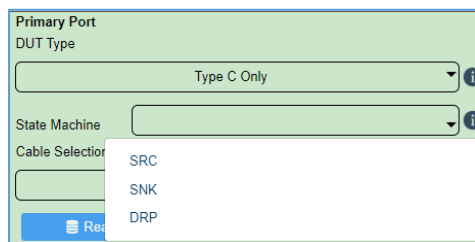


FIGURE 7.6: SELECTING USB TYPE-C DUT CONNECTION STATE MACHINE

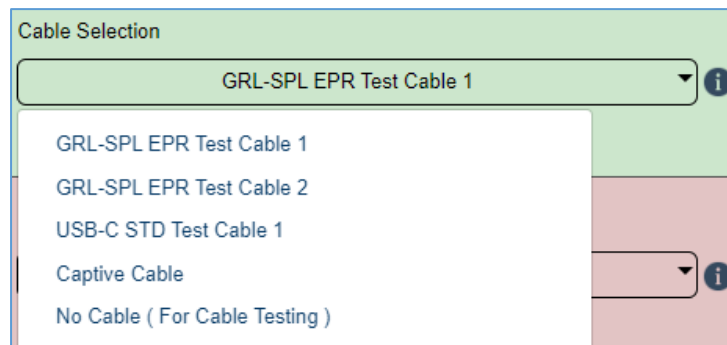


FIGURE 7.7: PRODUCT CAPABILITY TEST CABLE SELECTION

- d. The test **Cable Selection** drop-down menu allows you to specify what cable connects the DUT to the specific USB Port or both Port 1 and Port 2 on the GRL-C2-EPR tester hardware:
- The ‘GRL-SPL EPR Test Cable’ indicates the GRL Platform Solutions special cable provided with the GRL-USB-PD-EPR pre-compliance board that is used to connect the board with the GRL-C2-EPR tester hardware and a USB Type-C based EPR Source/Sink DUT for EPR power testing. **Caution: Do not remove/disconnect the GRL-SPL-EPR cable during EPR power testing to avoid damage to the GRL-C2-EPR tester hardware and DUT.**

Note: If the ‘GRL-SPL EPR Test Cable’ is used, make sure to place the GRL Platform Solutions logo on the cable in the upward position to maintain the same cable orientation. Also make sure to maintain the same cable orientation for the other cable types. These are important to obtain accurate test measurement results.

- The ‘USB-C STD Test Cable’ indicates the USB Type-C E-Mark cable.
 - The ‘No Cable’ indicates that the DUT is attached directly to the GRL-C2-EPR USB Port without using any cable in between.
 - The ‘Captive Cable’ indicates the USB Type-A to non-standard USB connector cable or the USB Type-C to non-standard USB connector cable.
- e. Once the device type has been defined, clicking on the **Read Device Data** button



will read the device capabilities from the device connected to each respective GRL-C2-EPR tester port. If no device is connected, the user will be notified. If the device type read using the **Read Device Data** button does not match the type selected from the ‘DUT Type’ drop-down menu, the user will also be notified.

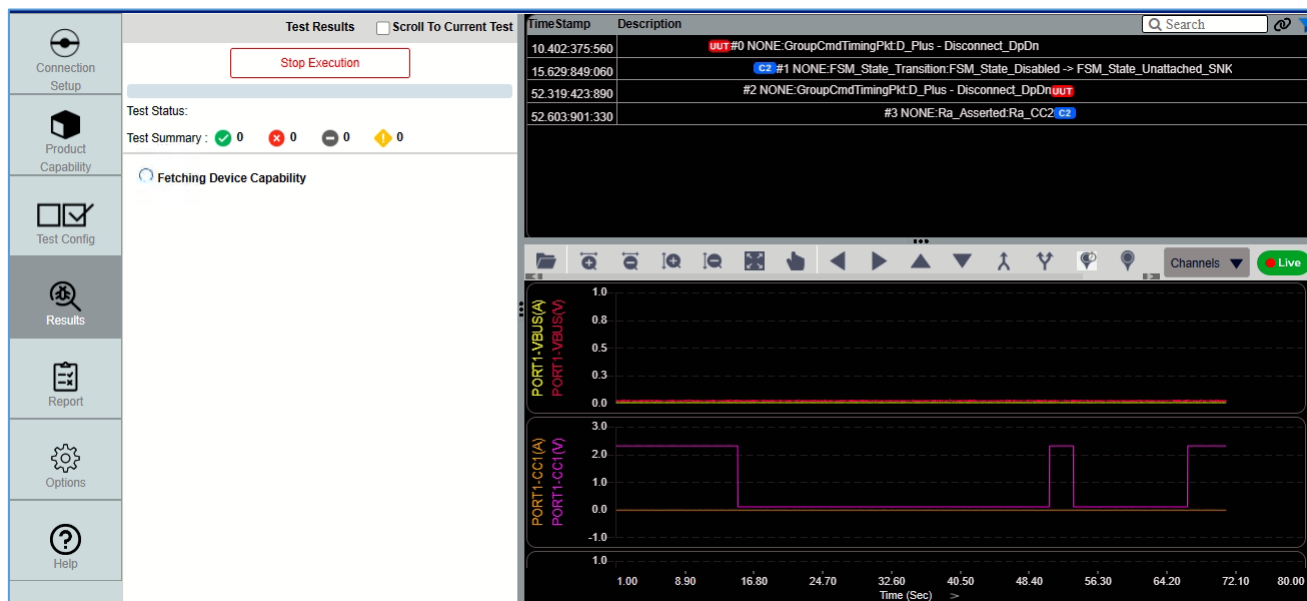
The information from the DUT will appear under the “Device Data [C2 Generated]” column on the right panel for each respective Port tab and the VIF Data column remains blank. See Section 7.1.1 below for more details.

7.1.1 Read/Clear Device Data



FIGURE 7.8: PRODUCT CAPABILITY ‘GET DEVICE DATA’ AND ‘CLEAR DEVICE DATA’ BUTTONS

- Click on the **Read Device Data** button to read the configuration information from the device connected to a specific tester Port and display it.
- After clicking on the **Read Device Data** button, the *Product Capability* screen will switch to the *Results* screen which will initiate acquisition for the DUT capabilities. An example is as shown below.



- Once the data acquisition has completed, the information from the DUT will appear under the “Device Data [C2-EPR Generated]” column on the right panel as shown in the example below.

VIF Data Operation			
VIF	Port Label []	Product	
Parameter		VIF Data	Device Data [C2-EPR Generated]
TID			0
Vendor Name			Texas Instruments
VIF Specification			3.00
VIF Product Type			Port Product
Model Part Number			Your Product Information
Product Revision			Your Product Information
Certification Type			Your Product Information

Note: When configuration information is read from both a VIF and the device, the information is listed side-by-side for easy comparison. This comparison is also provided in the report files. In some cases, if the VIF and Read Capabilities information do not match, the device can fail compliance.

- Click on the **Clear** button to clear all the configuration information in both the ‘VIF Data’ and ‘Device Data’ sections of the information display area for a specific tester Port. This includes all the different categories associated with the information display area as well.

7.1.2 Create/Manage New VIF

- a. The **Create New VIF** icon  on the right panel as shown below allows you to create a new VIF File in the XML format from the configuration when clicked.



- b. The VIF Config pop-up message will appear as below. Select the DUT Type and select whether to set the current configuration as default values, and then click 'Ok'.

VIF Config
✕

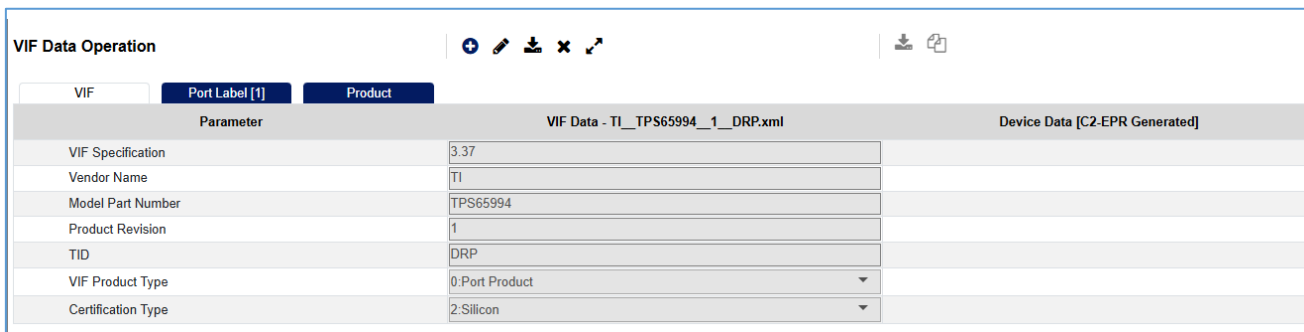
DUT Type Provider Only

Set Default Value ☒ Yes ☐ No

Ok

FIGURE 7.9: CREATE NEW VIF FILE

- c. An example of a new VIF file creation is as shown in Figure 7.10 below:



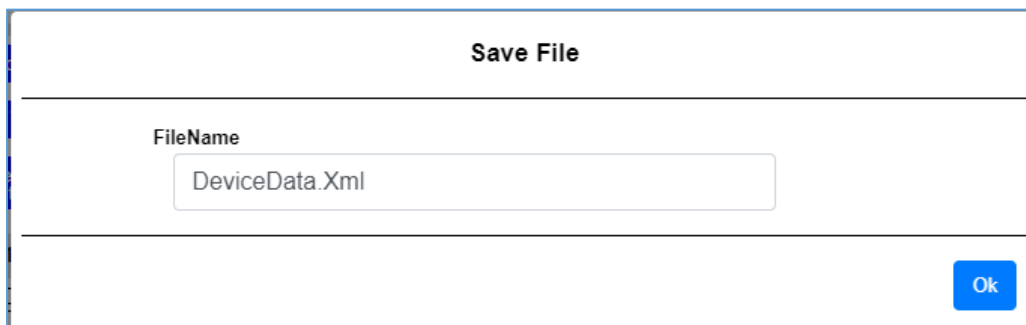
The screenshot shows the 'VIF Data Operation' panel with a table displaying VIF data. The table has three tabs: 'VIF', 'Port Label [1]', and 'Product'. The 'VIF' tab is active, showing a table with columns for 'Parameter', 'VIF Data - TI_TPS65994_1_DRP.xml', and 'Device Data [C2-EPR Generated]'. The table contains the following data:

Parameter	VIF Data - TI_TPS65994_1_DRP.xml	Device Data [C2-EPR Generated]
VIF Specification	3.37	
Vendor Name	TI	
Model Part Number	TPS65994	
Product Revision	1	
TID	DRP	
VIF Product Type	0:Port Product	
Certification Type	2:Silicon	

FIGURE 7.10: NEW VIF FILE CREATION EXAMPLE

- d. The “VIF” tab displays the product vendor information of the DUT while the “Port Label” tab displays the capabilities of the DUT. To edit, save or clear the displayed data, use the following icons     as described below:
- Select  to edit the values.
 - Select  to download/save the data to a VIF file.
 - Select  to remove all data.
 - Select  to expand all data under each main drop-down category.
- e. When configuration information is read from the device, you can generate a VIF file of the Read Capabilities information by clicking on the **Download VIF (Device Data)**

icon . The Save File pop-up message will appear as below. Specify the name of the file to save as, and then click 'Ok'.



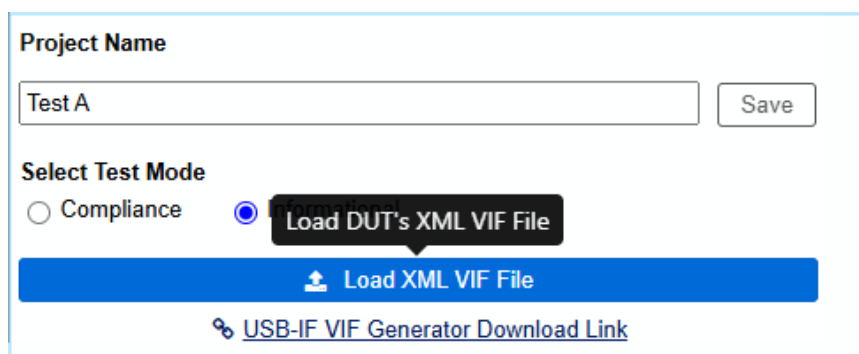
The image shows a 'Save File' dialog box. It has a title bar 'Save File'. Below the title bar, there is a label 'FileName' and a text input field containing 'DeviceData.Xml'. At the bottom right of the dialog box, there is a blue button labeled 'Ok'.

FIGURE 7.11: DEVICE DATA VIF FILE GENERATION

- f. To copy the device configuration information to VIF, click on the  icon.
- g. If you want to convert VIF data to the XML file format, select the [USB-IF VIF Generator Download Link](#) option. This will direct you to the USB-IF official website for the conversion process. *(Make sure you have permission from USB-IF to access the website.)*

If a VIF File is provided:

For Certification a Vendor Information File (VIF) must be provided by the Product Vendor. The VIF informs the tester of all its capabilities and provides some input information needed to provide full testing. If the VIF file is not provided, full certification testing cannot be run and tests performed are informational. If a Vendor File is provided, use the following procedure:



The image shows a form with the following elements:

- Project Name**: A text input field containing 'Test A' and a 'Save' button.
- Select Test Mode**: Two radio buttons. The first is 'Compliance' (unselected). The second is 'Load DUT's XML VIF File' (selected).
- Load XML VIF File**: A large blue button with a download icon.
- [USB-IF VIF Generator Download Link](#): A link with a download icon.

FIGURE 7.12: SELECTING COMPLIANCE TEST MODE USING VIF FILE

- a. In the Compliance Mode, click on the **Load XML VIF File** button to read and load information from a selected VIF XML file on the host PC. A file selection dialog box will appear which allows you to navigate to the location of the Vendor Information File (VIF), select the respective file and click the 'Open' button to load it.

- b. Once the VIF file has been selected and loaded, the contents of the VIF file will be displayed under the VIF Data Operation section on the right panel for each respective Port tab.
- c. Select the cable that connects the primary port of the DUT to Port-1 of the GRL-C2-EPR tester hardware, as described in page 37.

Notes:

- The ‘GRL-SPL EPR Test Cable’ (VCONN pass-through cable) needs to be connected for running tests in the Compliance Mode. Tethered and cable DUT’s can be attached directly to the GRL-C2-EPR tester hardware.
- If the standard USB Type-C cable is used to run tests, switch to the Informational Mode and select the test cable type.

7.2 Test Configuration

The *Test Config* screen allows you to select which set of tests is run on the DUT, set up test parameters for specific test categories, run selected tests and generate test reports.

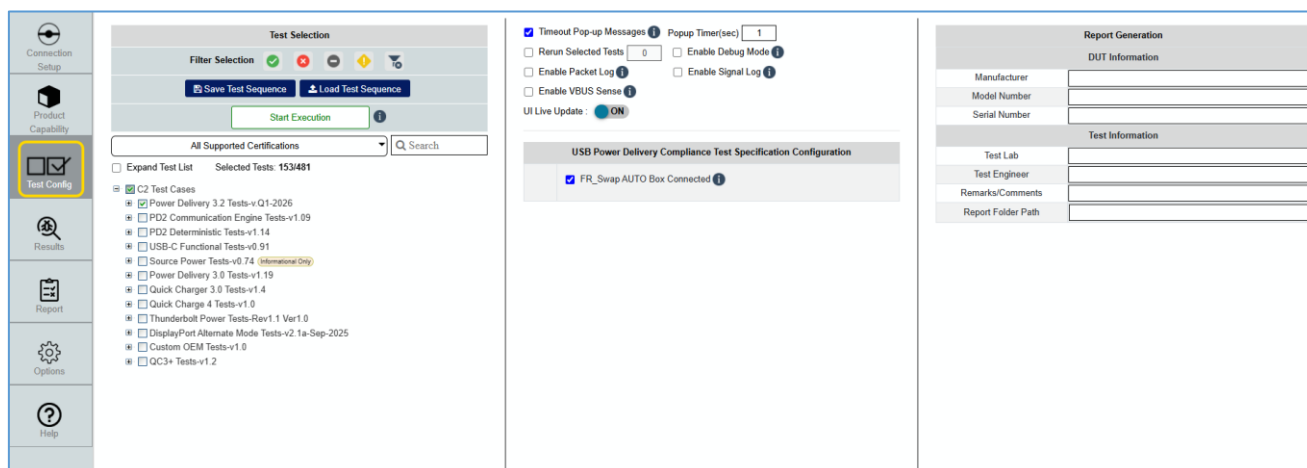


FIGURE 7.13: TEST CONFIGURATION SCREEN

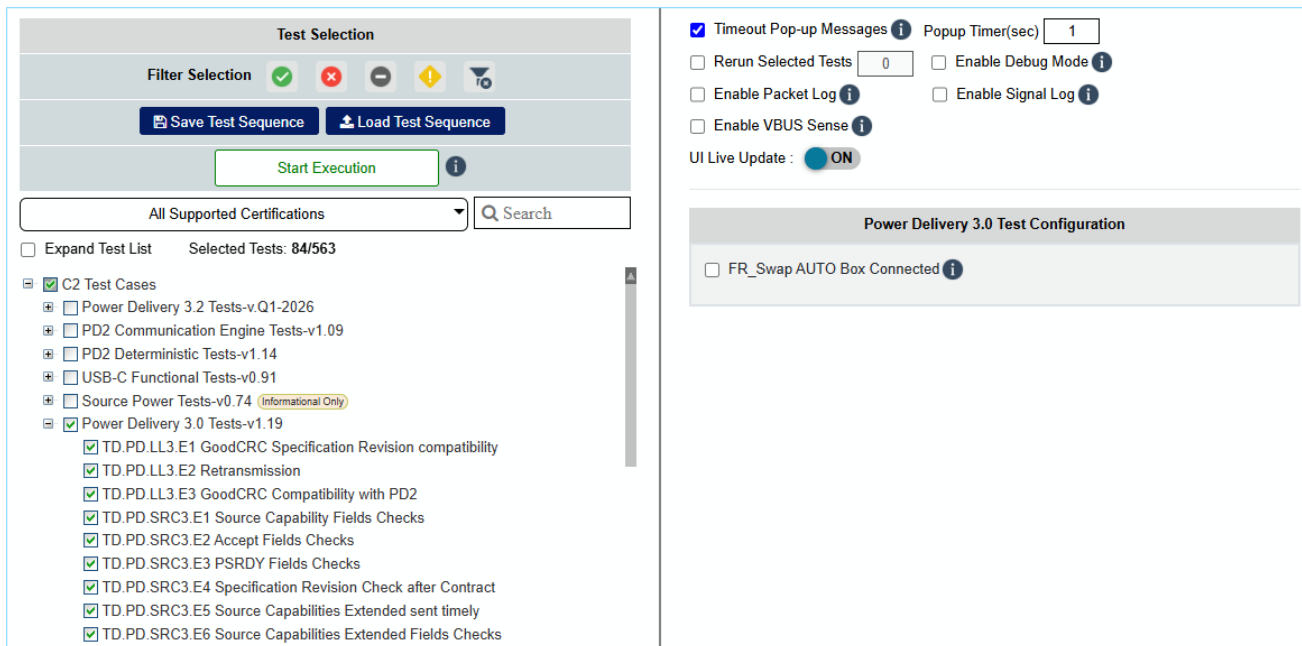
7.2.1 Test Selection and Configuration

Based on the type of DUT selected in the *Product Capability* screen and various specifications, the specific tests available to be run are shown on the “Test Selection” panel:

7.2.1.1 Power Delivery 3.0 Tests

Run the USB Power Delivery compliance tests based on the USB Power Delivery 3.0 specification.

When “Provider/Consumer” or “Dual Role Power (DRP)” is selected as the DUT type (see Section 7.1), an additional input is available to allow the user to perform tests using the GRL Platform Solutions Fast Role Swap (FRSWAP) Board (GRL-C2-FR-SWAP-AUTO Box Board) for automating the Fast Role Swap based testing when checked. *Note that the Fast Role Swap test results are currently meant for informational purpose only and not required for certification testing.*



Test Selection

Filter Selection: ✓ ✗ ⊖ ⚡ 🔍

Save Test Sequence Load Test Sequence

Start Execution ⓘ

All Supported Certifications Q Search

☐ Expand Test List Selected Tests: 84/563

- ☒ C2 Test Cases
 - ☐ Power Delivery 3.2 Tests-v.Q1-2026
 - ☐ PD2 Communication Engine Tests-v1.09
 - ☐ PD2 Deterministic Tests-v1.14
 - ☐ USB-C Functional Tests-v0.91
 - ☐ Source Power Tests-v0.74 Informational Only
 - ☒ Power Delivery 3.0 Tests-v1.19
 - ☒ TD.PD.LL3.E1 GoodCRC Specification Revision compatibility
 - ☒ TD.PD.LL3.E2 Retransmission
 - ☒ TD.PD.LL3.E3 GoodCRC Compatibility with PD2
 - ☒ TD.PD.SRC3.E1 Source Capability Fields Checks
 - ☒ TD.PD.SRC3.E2 Accept Fields Checks
 - ☒ TD.PD.SRC3.E3 PSRDY Fields Checks
 - ☒ TD.PD.SRC3.E4 Specification Revision Check after Contract
 - ☒ TD.PD.SRC3.E5 Source Capabilities Extended sent timely
 - ☒ TD.PD.SRC3.E6 Source Capabilities Extended Fields Checks

Power Delivery 3.0 Test Configuration

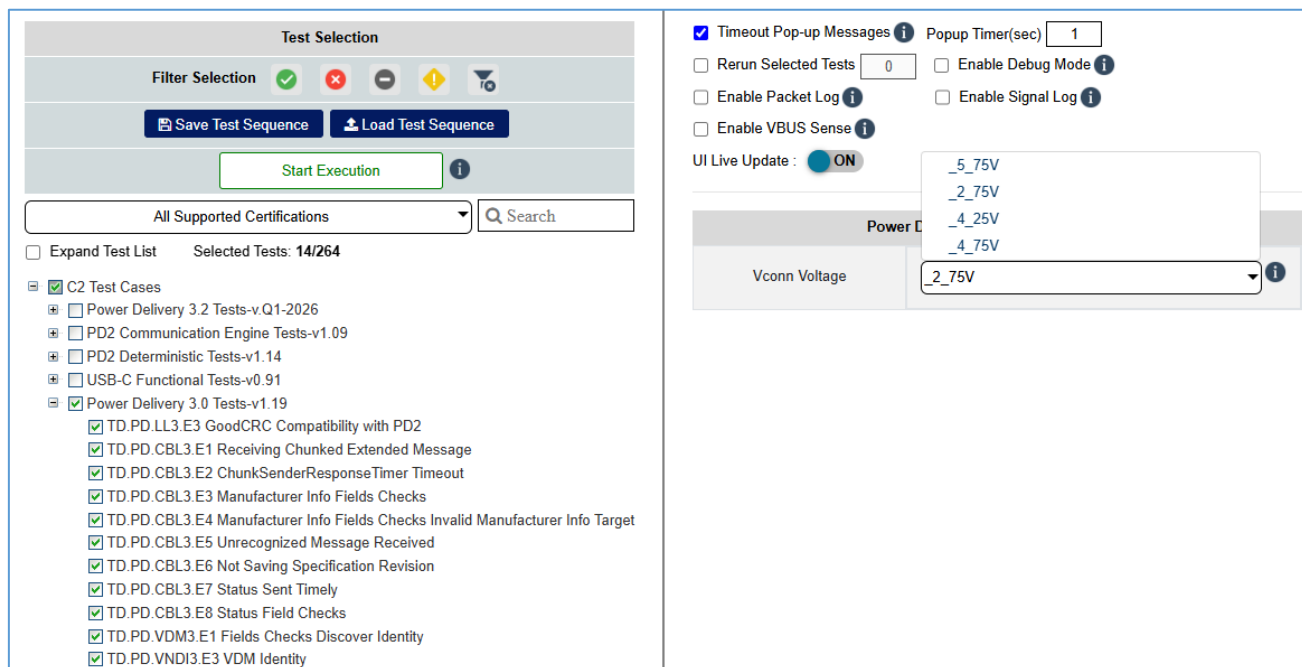
☐ FR_Swap AUTO Box Connected ⓘ

Configuration Options:

- ☒ Timeout Pop-up Messages ⓘ Popup Timer(sec)
- ☐ Rerun Selected Tests ☐ Enable Debug Mode ⓘ
- ☐ Enable Packet Log ⓘ ☐ Enable Signal Log ⓘ
- ☐ Enable VBUS Sense ⓘ
- UI Live Update: ON

FIGURE 7.14: CONFIGURATION FOR POWER DELIVERY 3.0 TESTS IF “PROVIDER/CONSUMER” OR “DUAL ROLE POWER (DRP)” UUT IS SELECTED

When “Cable” is selected as the DUT type (see Section 7.1), an additional input is available to select the V_{CONN} voltage.



Test Selection

Filter Selection: ✓ ✗ ⊖ ⚡ 🔍

Save Test Sequence Load Test Sequence

Start Execution ⓘ

All Supported Certifications Q Search

☐ Expand Test List Selected Tests: 14/264

- ☒ C2 Test Cases
 - ☐ Power Delivery 3.2 Tests-v.Q1-2026
 - ☐ PD2 Communication Engine Tests-v1.09
 - ☐ PD2 Deterministic Tests-v1.14
 - ☐ USB-C Functional Tests-v0.91
 - ☒ Power Delivery 3.0 Tests-v1.19
 - ☒ TD.PD.LL3.E3 GoodCRC Compatibility with PD2
 - ☒ TD.PD.CBL3.E1 Receiving Chunked Extended Message
 - ☒ TD.PD.CBL3.E2 ChunkSenderResponseTimer Timeout
 - ☒ TD.PD.CBL3.E3 Manufacturer Info Fields Checks
 - ☒ TD.PD.CBL3.E4 Manufacturer Info Fields Checks Invalid Manufacturer Info Target
 - ☒ TD.PD.CBL3.E5 Unrecognized Message Received
 - ☒ TD.PD.CBL3.E6 Not Saving Specification Revision
 - ☒ TD.PD.CBL3.E7 Status Sent Timely
 - ☒ TD.PD.CBL3.E8 Status Field Checks
 - ☒ TD.PD.VDM3.E1 Fields Checks Discover Identity
 - ☒ TD.PD.VNDI3.E3 VDM Identity

Power Delivery 3.0 Test Configuration

☐ FR_Swap AUTO Box Connected ⓘ

Configuration Options:

- ☒ Timeout Pop-up Messages ⓘ Popup Timer(sec)
- ☐ Rerun Selected Tests ☐ Enable Debug Mode ⓘ
- ☐ Enable Packet Log ⓘ ☐ Enable Signal Log ⓘ
- ☐ Enable VBUS Sense ⓘ
- UI Live Update: ON

Vconn Voltage

ⓘ

Dropdown menu options:
 _5_75V
 _2_75V
 _4_25V
 _4_75V

FIGURE 7.15: CONFIGURATION FOR POWER DELIVERY 3.0 TESTS IF “CABLE” DUT IS SELECTED

7.2.1.2 Source Power Tests

Runs the USB Type-C Source Power Tests or “QuadraMax” tests for power providers. These tests have an additional input that allows for the selection of what port is used in the testing.

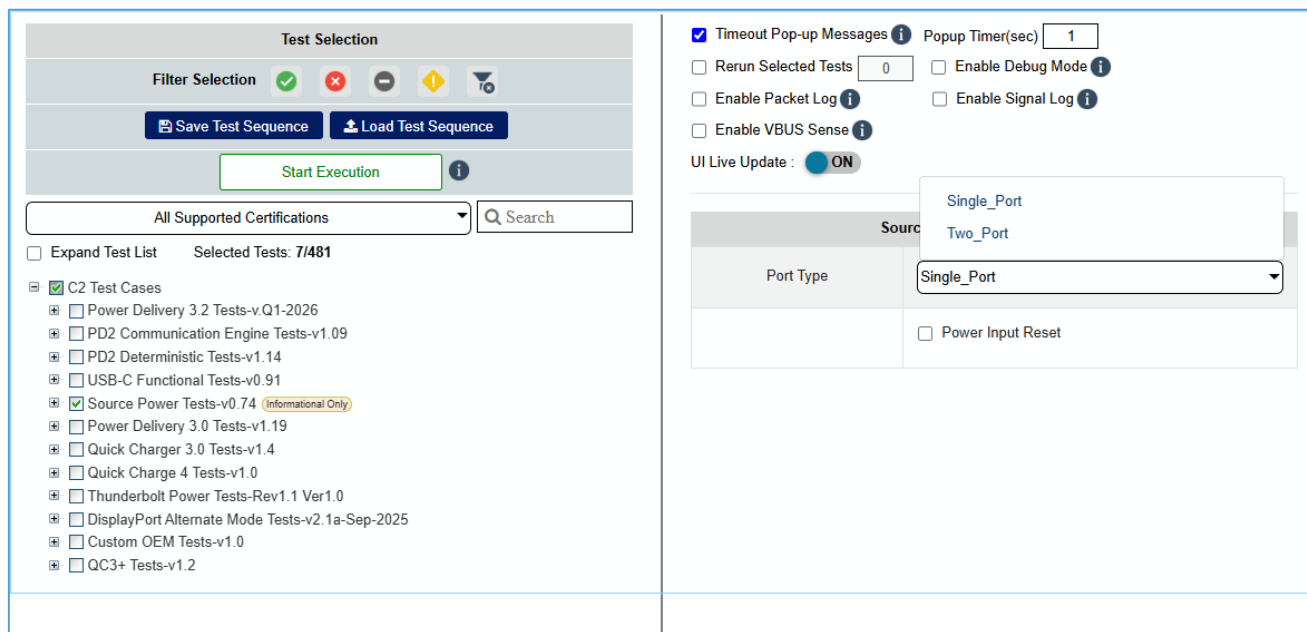


FIGURE 7.16: CONFIGURATION FOR USB TYPE-C SOURCE POWER TESTS

7.2.1.3 PD2 Deterministic Compliance Tests

Runs the USB Power Delivery deterministic compliance tests based on the USB Power Delivery 2.0 specification. When “Cable” is selected as the DUT type (see Section 7.1), an additional input is available to select the V_{CONN} voltage.

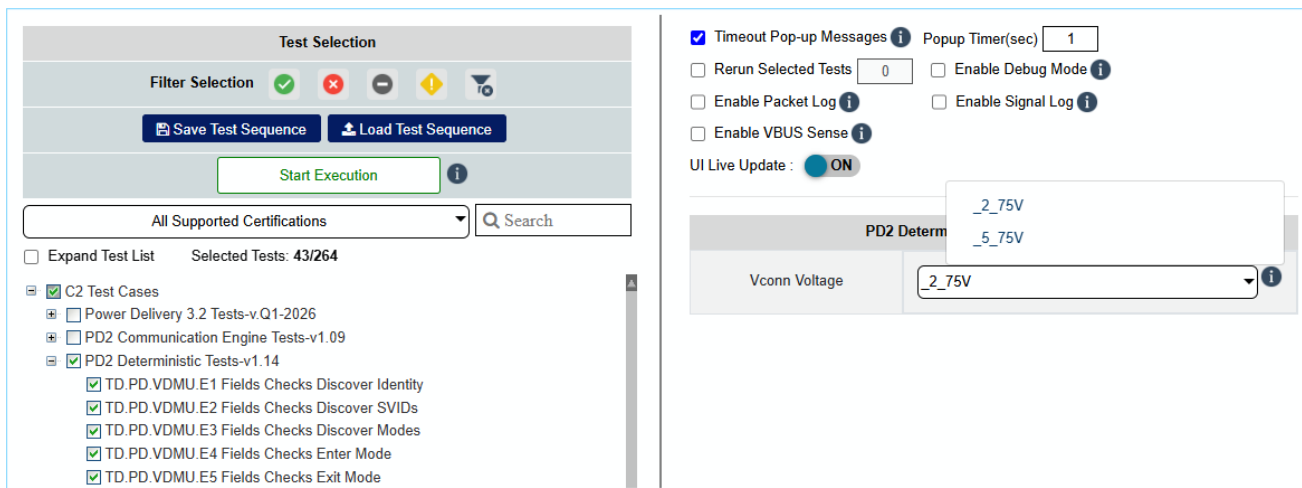


FIGURE 7.17: CONFIGURATION FOR PD2 DETERMINISTIC TESTS

7.2.1.4 PD2 Communication Engine Tests

Runs the USB Power Delivery communication engine compliance tests based on the USB Power Delivery 2.0 specification. These tests have an additional input that allows for the selection of Rx noise source.

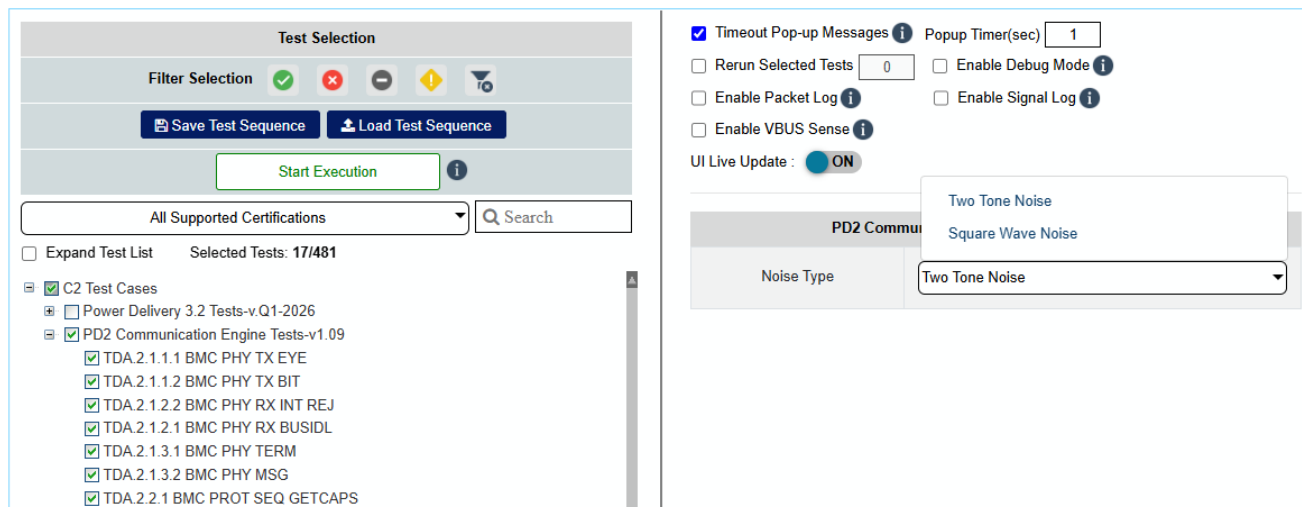


FIGURE 7.18: CONFIGURATION FOR PD2 COMMUNICATION ENGINE TESTS

When “Cable” is selected as the DUT type (see Section 7.1), an additional input is available to select the V_{CONN} voltage.

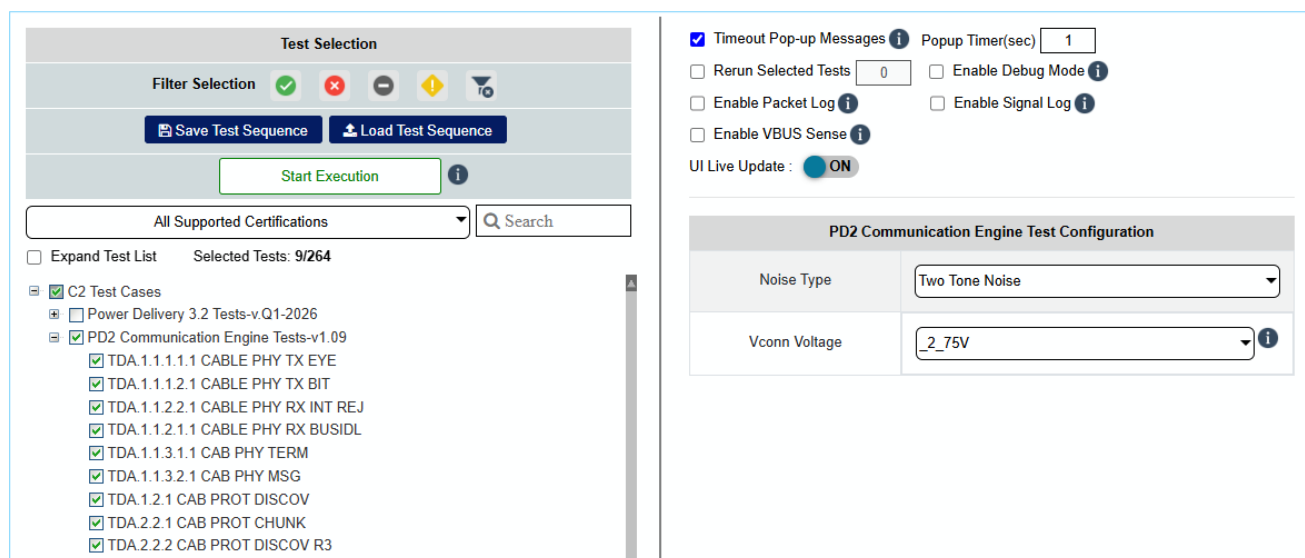


FIGURE 7.19: CONFIGURATION FOR PD2 COMMUNICATION ENGINE TESTS IF “CABLE” DUT IS SELECTED

7.2.1.5 DisplayPort Alternate Mode Tests

Load the VIF file generated using the DPAM VIF tool and run the DisplayPort Alternate (Alt) Mode compliance tests for the Alt Mode based DUT.

Test Selection

Filter Selection

Save Test Sequence
Load Test Sequence

Start Execution

All Supported Certifications
Search

☐ Expand Test List
Selected Tests: 44/264

☒ C2 Test Cases

- ☐ Power Delivery 3.2 Tests-v.Q1-2026
- ☐ PD2 Communication Engine Tests-v1.09
- ☐ PD2 Deterministic Tests-v1.14
- ☐ USB-C Functional Tests-v0.91
- ☐ Power Delivery 3.0 Tests-v1.19
- ☒ DisplayPort Alternate Mode Tests-v2.1a-Sep-2025
 - ☒ TC.10.2.1 Enter Mode ACK Response
 - ☒ TC.10.2.2 Status Update Command
 - ☒ TC.10.2.5 Proper Pin Assignment Support for Receptacle Based Video Sinks
 - ☒ TC.10.2.6 Proper Pin Assignment Support for C To DP Adaptor Cables
 - ☒ TC.10.2.7 Proper Pin Assignment Support for Adaptor Cables With Protocol Conv
 - ☒ TC.10.2.8 DPAM Version 2.1 UFP_U/DP Sink device Connected to DPAM Version
 - ☒ TC.10.2.9 DPAM Discovery Interoperability Flow for UFP_U/DP Sink devices
 - ☒ TC.10.3.1 Discover SVIDs ACK with DP SID in Arbitrary Locations
 - ☒ TC.10.3.2 DPAM2.1 Entry with C to C non-emarked cable
 - ☒ TC.10.3.3 DPAM2.1 Entry with C to C Passive TBT3 cable
 - ☒ TC.10.3.4 DPAM2.1 Entry with Passive E-Marked C to C
 - ☒ TC.10.3.5 DPAM2.1 Entry with C to C DP2.0 LRD Cable
 - ☒ TC.10.3.6 DPAM2.1 Entry with C to C DP2.0 Active Retimer cable
 - ☒ TC.10.3.7 DPAM2.1 Entry with C to C DP2.1 LRD cable
 - ☒ TC.10.3.8 DPAM2.1 Entry with C to C Active Non DP cable

☒ Timeout Pop-up Messages
☐ Rerun Selected Tests
☐ Enable Packet Log
☐ Enable VBUS Sense
UI Live Update : ☒ ON

Popup Timer(sec)

1

☐ Enable Debug Mode
☐ Enable Signal Log

FIGURE 7.20: DISPLAYPORT ALTERNATE MODE TESTS

7.2.1.6 Quick Charge 4 Tests

Runs the Quick Charge 4/4+ tests. These tests are proprietary to Qualcomm and are only available with arrangement through Qualcomm. These tests allow selection of the specific Quick Charge 4/4+ specification and additional setting of ambient room temperature to test against.

Test Selection

Filter Selection

Save Test Sequence
Load Test Sequence

Start Execution

All Supported Certifications
Search

☐ Expand Test List
Selected Tests: 33/481

☒ C2 Test Cases

- ☐ Power Delivery 3.2 Tests-v.Q1-2026
- ☐ PD2 Communication Engine Tests-v1.09
- ☐ PD2 Deterministic Tests-v1.14
- ☐ USB-C Functional Tests-v0.91
- ☐ Source Power Tests-v0.74 Informational Only
- ☐ Power Delivery 3.0 Tests-v1.19
- ☐ Quick Charger 3.0 Tests-v1.4
- ☒ Quick Charge 4 Tests-v1.0
- ☐ Thunderbolt Power Tests-Rev1.1 Ver1.0
- ☐ DisplayPort Alternate Mode Tests-v2.1a-Sep-2025
- ☐ Custom OEM Tests-v1.0
- ☐ QC3+ Tests-v1.2

☒ Timeout Pop-up Messages
☐ Rerun Selected Tests
☐ Enable Packet Log
☐ Enable VBUS Sense
UI Live Update : ☒ ON

Popup Timer(sec)

1

☐ Enable Debug Mode
☐ Enable Signal Log

Quick Charge

QC4
QC4Plus
QC5

QC4 DUT Type

QC5

Room Temperature

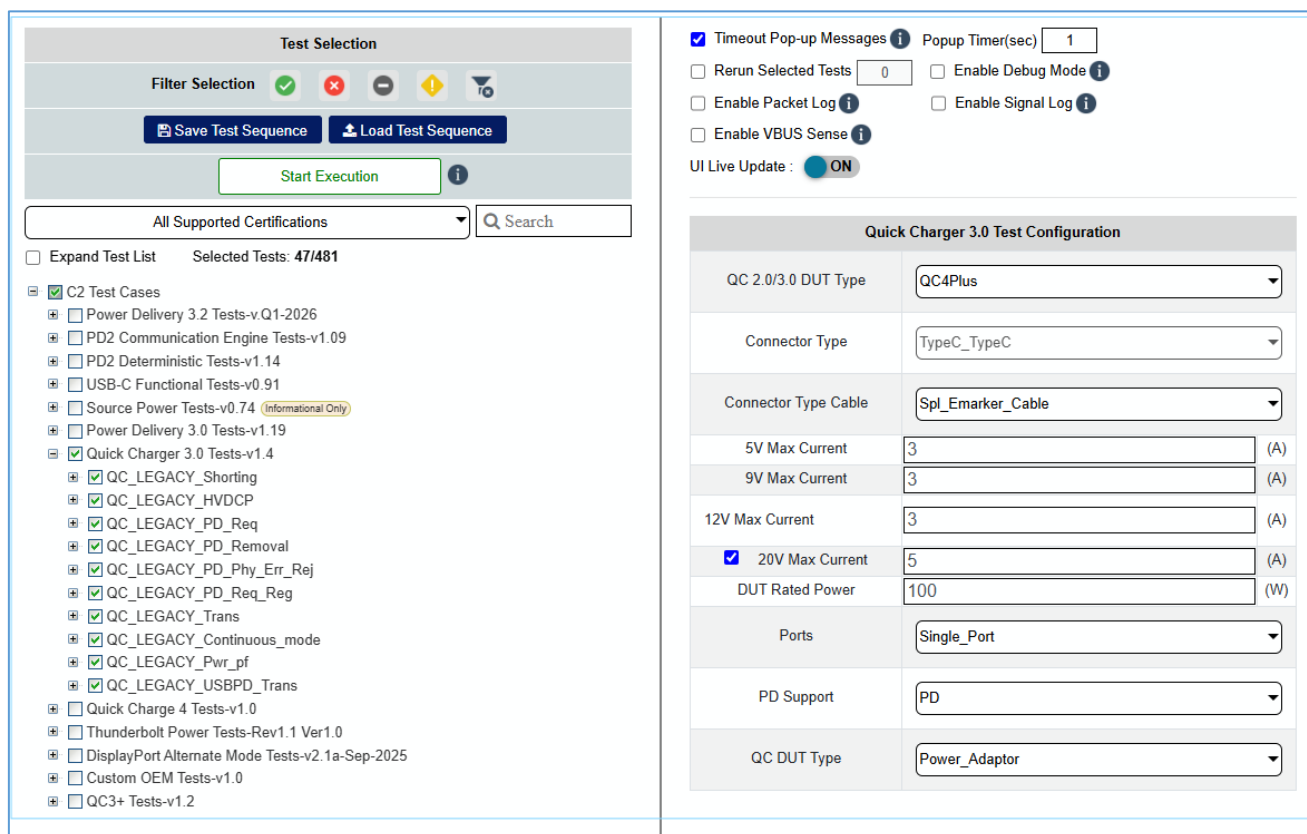
24

(°C)

FIGURE 7.21: CONFIGURATION FOR QUICK CHARGE 4 TESTS

7.2.1.7 Quick Charge 3.0 Tests

Runs the Legacy Quick Charge 2.0/3.0 tests. These tests are proprietary to Qualcomm and are only available with arrangement through Qualcomm. These tests have additional inputs to indicate the DUT's Quick Charge specification and what cable is connected to the DUT, to allow you to indicate the specific current rating (in amps) and power rating (in watts) as well as the IR drop value of the connected device to test against. Further inputs allow you to specifically select the type of Quick Charge based DUT that is connected to single/dual ports and with/without USB Power Delivery support.



The screenshot shows the 'Test Selection' and 'Quick Charger 3.0 Test Configuration' panels.

Test Selection Panel:

- Filter Selection: [Icons for Filter, Add, Remove, Search]
- Buttons: Save Test Sequence, Load Test Sequence, Start Execution
- Dropdown: All Supported Certifications
- Search: [Search]
- Expand Test List: [] Selected Tests: 47/481
- C2 Test Cases:
 - [] Power Delivery 3.2 Tests-v.Q1-2026
 - [] PD2 Communication Engine Tests-v1.09
 - [] PD2 Deterministic Tests-v1.14
 - [] USB-C Functional Tests-v0.91
 - [] Source Power Tests-v0.74 (Informational Only)
 - [] Power Delivery 3.0 Tests-v1.19
 - [x] Quick Charger 3.0 Tests-v1.4
 - [x] QC_LEGACY_Shorting
 - [x] QC_LEGACY_HVDCP
 - [x] QC_LEGACY_PD_Req
 - [x] QC_LEGACY_PD_Removal
 - [x] QC_LEGACY_PD_Phy_Err_Rej
 - [x] QC_LEGACY_PD_Req_Reg
 - [x] QC_LEGACY_Trans
 - [x] QC_LEGACY_Continuous_mode
 - [x] QC_LEGACY_Pwr_pf
 - [x] QC_LEGACY_USBDP_Trans
 - [] Quick Charge 4 Tests-v1.0
 - [] Thunderbolt Power Tests-Rev1.1 Ver1.0
 - [] DisplayPort Alternate Mode Tests-v2.1a-Sep-2025
 - [] Custom OEM Tests-v1.0
 - [] QC3+ Tests-v1.2

Quick Charger 3.0 Test Configuration Panel:

- Timeout Pop-up Messages: [x] Popup Timer(sec): 1
- Rerun Selected Tests: 0
- Enable Debug Mode: []
- Enable Packet Log: []
- Enable Signal Log: []
- Enable VBUS Sense: []
- UI Live Update: [ON]
- QC 2.0/3.0 DUT Type: QC4Plus
- Connector Type: TypeC_TypeC
- Connector Type Cable: Spl_Emarker_Cable
- 5V Max Current: 3 (A)
- 9V Max Current: 3 (A)
- 12V Max Current: 3 (A)
- [x] 20V Max Current: 5 (A)
- DUT Rated Power: 100 (W)
- Ports: Single_Port
- PD Support: PD
- QC DUT Type: Power_Adaptor

FIGURE 7.22: CONFIGURATION FOR LEGACY QUICK CHARGE TESTS

7.2.1.8 Quick Charge 3.0+ Tests

Runs the Quick Charge 3.0+ tests for power provider DUT's. These tests are proprietary to Qualcomm and are only available with arrangement through Qualcomm. These tests have additional inputs to indicate the DUT's Quick Charge specification and what cable is connected to the DUT, to allow you to indicate the specific current rating (in amps) and power rating (in watts) as well as the IR drop value of the connected device to test against. Further inputs allow you to specifically select the type of Quick Charge based DUT that is connected to single/dual ports and with/without USB Power Delivery support.

Test Selection

Filter Selection

Save Test Sequence
Load Test Sequence

Start Execution

All Supported Certifications
Search

Expand Test List
Selected Tests: 10/481

☒ C2 Test Cases

- ☐ Power Delivery 3.2 Tests-v.Q1-2026
- ☐ PD2 Communication Engine Tests-v1.09
- ☐ PD2 Deterministic Tests-v1.14
- ☐ USB-C Functional Tests-v0.91
- ☐ Source Power Tests-v0.74 (Informational Only)
- ☐ Power Delivery 3.0 Tests-v1.19
- ☐ Quick Charge 3.0 Tests-v1.4
- ☐ Quick Charge 4 Tests-v1.0
- ☐ Thunderbolt Power Tests-Rev1.1 Ver1.0
- ☐ DisplayPort Alternate Mode Tests-v2.1a-Sep-2025
- ☐ Custom OEM Tests-v1.0
- ☒ QC3+ Tests-v1.2
 - ☒ QC3Plus.TD.1.QC3+ Detection Test
 - ☒ QC3Plus.TD.2.20mV Step Size Test
 - ☒ QC3Plus.TD.3.Unsuccessful QC3+ Negotiation Test
 - ☒ QC3Plus.TD.4.Twait Test
 - ☒ QC3Plus.TD.5.TAdetection_TA Test
 - ☒ QC3Plus.TD.6.TACAP_TA Test
 - ☒ QC3Plus.TD.7.Ttransition Test
 - ☒ QC3Plus.TD.8.Incorrect pulse during Testing TACAP_TA Test
 - ☒ QC3Plus.TD.9.Incorrect pulses during Testing TAdetection_TA Test
 - ☒ QC3Plus.TD.10.Power Capability Test

☒ Timeout Pop-up Messages

1

Popup Timer(sec)

☐ Rerun Selected Tests

0

☐ Enable Packet Log

☐ Enable VBUS Sense

☐ Enable Debug Mode

☐ Enable Signal Log

UI Live Update :

ON

Quick Charge 3.0 Test Configuration

QC 2.0/3.0 DUT Type

QC4Plus

Connector Type

TypeC_TypeC

Connector Type Cable

Spl_Emarker_Cable

5V Max Current

3

(A)

9V Max Current

3

(A)

12V Max Current

3

(A)

☒ 20V Max Current

5

(A)

DUT Rated Power

100

(W)

Ports

Single_Port

PD Support

PD

QC DUT Type

Power_Adaptor

FIGURE 7.23: CONFIGURATION FOR QUICK CHARGE 3.0+ TESTS

7.2.1.9 Thunderbolt Power Tests

Runs the Thunderbolt power compliance tests. These tests have additional inputs to the number of ports to test, whether the DUT is self-powered or bus-powered and whether the DUT is a host or device along with supported Thunderbolt spec. Further inputs allow you to enable the capability mismatch flag and the giveback flag as well as also specify the time duration for adding stressors.

Test Selection

Filter Selection

Save Test Sequence
Load Test Sequence

Start Execution

All Supported Certifications
Search

Expand Test List
Selected Tests: 8/481

☒ C2 Test Cases

- ☐ Power Delivery 3.2 Tests-v.Q1-2026
- ☐ PD2 Communication Engine Tests-v1.09
- ☐ PD2 Deterministic Tests-v1.14
- ☐ USB-C Functional Tests-v0.91
- ☐ Source Power Tests-v0.74 (Informational Only)
- ☐ Power Delivery 3.0 Tests-v1.19
- ☐ Quick Charge 3.0 Tests-v1.4
- ☐ Quick Charge 4 Tests-v1.0
- ☒ Thunderbolt Power Tests-Rev1.1 Ver1.0
 - ☒ TBT.4.1 Power Capacity Host
 - ☒ TBT.4.2 Minimum PDO Check
 - ☒ TBT.4.3 Power Check UUT in Sleep Mode
 - ☒ TBT.4.6 Current Limit VBUS
 - ☒ TBT.4.7 Short Protection VBUS
 - ☒ TBT.4.8 Current Limit VCONN
 - ☒ TBT.4.9 Short Protection VCONN
 - ☒ TBT.4.14 Host Charging Power Consumption Test
- ☐ DisplayPort Alternate Mode Tests-v2.1a-Sep-2025
- ☐ Custom OEM Tests-v1.0
- ☐ QC3+ Tests-v1.2

☒ Timeout Pop-up Messages

1

Popup Timer(sec)

☐ Rerun Selected Tests

0

☐ Enable Packet Log

☐ Enable VBUS Sense

☐ Enable Debug Mode

☐ Enable Signal Log

UI Live Update :

ON

Thunderbolt Power Test Configuration

Ports

Single_Port

Powered Type

Self_Powered

Device Type

Host

TBT Version

TBT_4

Stress Test Timer

25

(secs)

Eload Duration

5

(secs)

☒ Port-A CapMisMatch

☐ Port-B CapMisMatch

☐ Port-A GiveBackFlag

☐ Port-B GiveBackFlag

☐ Manual DMM Measurement

DMM Manufacturer

DMM Model

FIGURE 7.24: CONFIGURATION FOR THUNDERBOLT POWER TESTS

Before running the Thunderbolt power tests, you will need to perform the following:

- Cable IR drop calibration (refer to Section 10 for details)
- Thunderbolt self-calibration

7.2.1.9.1 Thunderbolt Self-Calibration

Use the following procedure to perform the Thunderbolt self-calibration:

1. Go to the *Options* screen (see Section 8) and click on the **Config Controller** tab. In the Configure panel, select to enable Port 1 and Channel CC1 and then click on the **Run TBT Self Calibration** button as shown in Figure 7.25.
2. Next, select to enable Port 1 and Channel CC2 and click on the **Run TBT Self Calibration** button.
3. Next, select to enable Port 2 and Channel CC1 and click on the **Run TBT Self Calibration** button.
4. Finally, select to enable Port 2 and Channel CC2 and click on the **Run TBT Self Calibration** button.
5. When completed, power cycle the GRL-C2-EPR tester hardware.

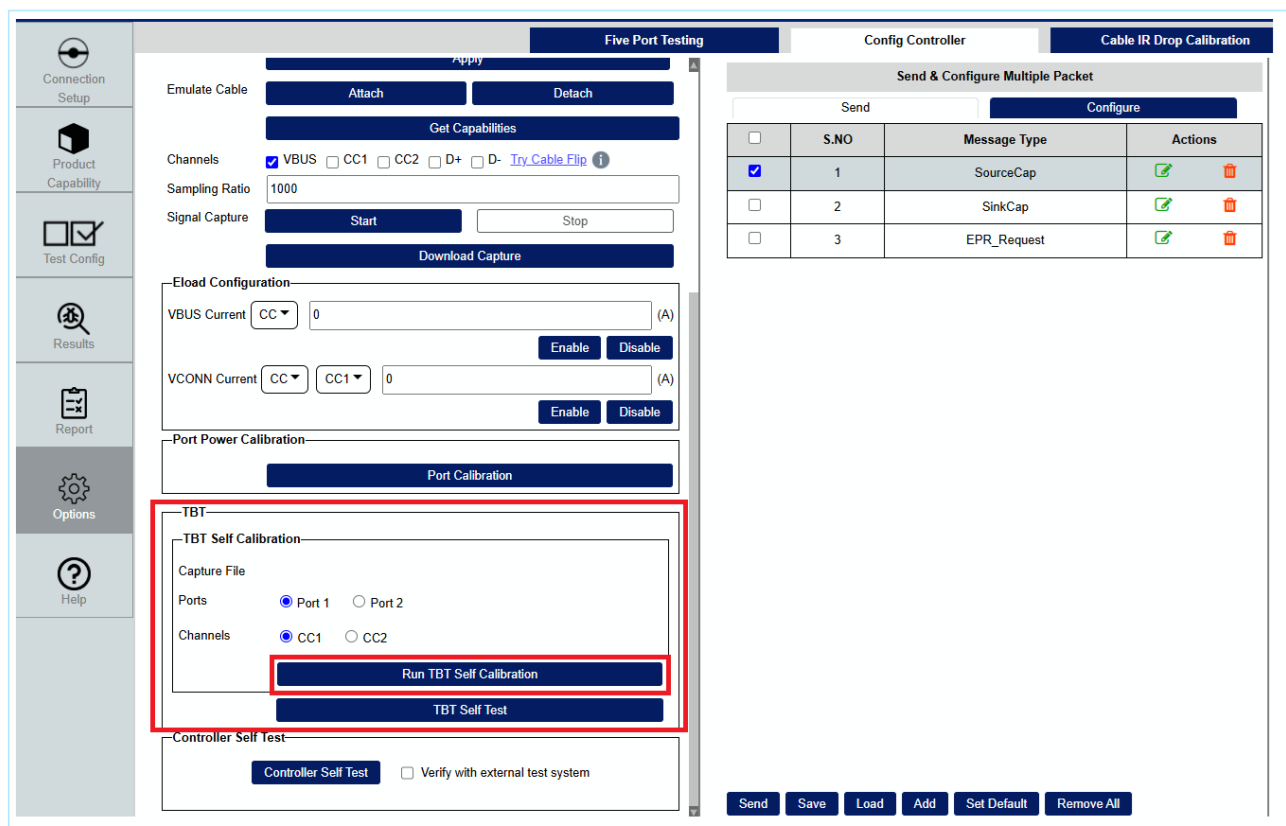


FIGURE 7.25: PERFORM THUNDERBOLT SELF-CALIBRATION

When running the Thunderbolt power tests for the GRL-C2-EPR, if the voltage measurement falls $\pm 1\%$ marginal to the minimum or maximum test limits e.g., 4.65 to 4.85, the GRL-C2-EPR application will update that particular test step as a warning and

request for the following hardware connections to be set up for the GRL-C2-EPR and Unit-Under-Test (UUT).

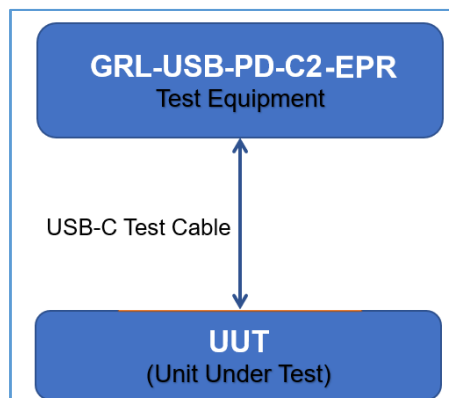


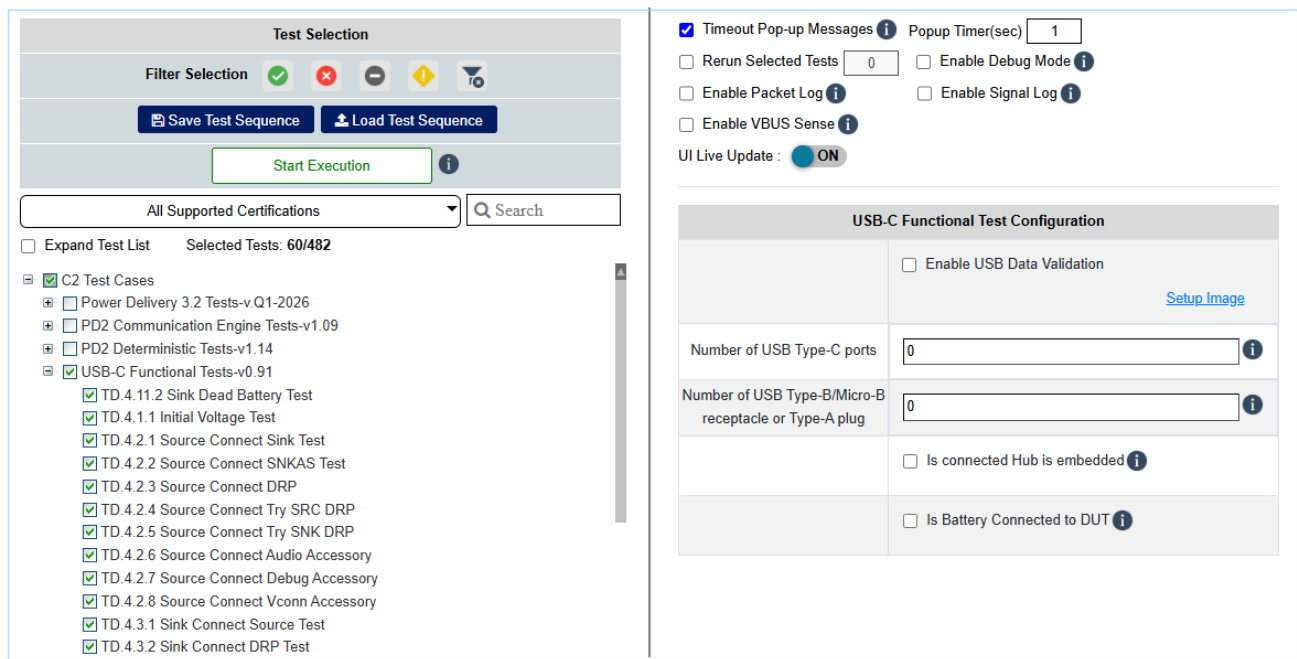
FIGURE 7.26: THUNDERBOLT TEST SETUP CONNECTION DIAGRAM

When running the Thunderbolt power measurements, a ‘Warning’ or ‘Incomplete’ alert indicates the following conditions:

- Warning: The voltage is either >4.65 or <4.85, or the voltage is >5.4 or <5.6
- Incomplete: The power is <1.45 or >1.55

7.2.1.10 USB Type-C Functional Tests

Runs the functional compliance tests for USB Type-C chargers. These tests have additional inputs that allow you to enable data validation at high USB speeds or through automation for the USB ports under test as well as select if the DUT is connected to a battery or whether the DUT is embedded if it is a hub.



The screenshot displays the 'Test Selection' and 'USB-C Functional Test Configuration' panels.

Test Selection Panel:

- Buttons: Filter Selection, Save Test Sequence, Load Test Sequence, Start Execution.
- Dropdown: All Supported Certifications.
- Search: Q Search.
- Expand Test List: Selected Tests: 60/482.
- Test Cases:
 - ☒ C2 Test Cases
 - ☐ Power Delivery 3.2 Tests-v.Q1-2026
 - ☐ PD2 Communication Engine Tests-v1.09
 - ☐ PD2 Deterministic Tests-v1.14
 - ☒ USB-C Functional Tests-v0.91
 - ☒ TD.4.11.2 Sink Dead Battery Test
 - ☒ TD.4.1.1 Initial Voltage Test
 - ☒ TD.4.2.1 Source Connect Sink Test
 - ☒ TD.4.2.2 Source Connect SNKAS Test
 - ☒ TD.4.2.3 Source Connect DRP
 - ☒ TD.4.2.4 Source Connect Try SRC DRP
 - ☒ TD.4.2.5 Source Connect Try SNK DRP
 - ☒ TD.4.2.6 Source Connect Audio Accessory
 - ☒ TD.4.2.7 Source Connect Debug Accessory
 - ☒ TD.4.2.8 Source Connect Vconn Accessory
 - ☒ TD.4.3.1 Sink Connect Source Test
 - ☒ TD.4.3.2 Sink Connect DRP Test

USB-C Functional Test Configuration Panel:

- ☒ Timeout Pop-up Messages (i) Pop-up Timer(sec)
- ☐ Rerun Selected Tests
- ☐ Enable Debug Mode (i)
- ☐ Enable Packet Log (i)
- ☐ Enable Signal Log (i)
- ☐ Enable VBUS Sense (i)
- UI Live Update: ☒ ON
- ☐ Enable USB Data Validation (Setup Image)
- Number of USB Type-C ports: (i)
- Number of USB Type-B/Micro-B receptacle or Type-A plug: (i)
- ☐ Is connected Hub is embedded (i)
- ☐ Is Battery Connected to DUT (i)

FIGURE 7.27: CONFIGURATION FOR USB TYPE-C FUNCTIONAL TESTS

You can refer how to set up the equipment to automate data validation by selecting [Setup Image](#).

Once the equipment has been set up, enter the URL as shown on the Golden device (i.e., Google Pixel phone) in the “Device URL” field.

7.2.1.11 USB Power Delivery Compliance Test Specification-v1.4 V2 OR (Merged Tests)

Runs the merged USB Power Delivery compliance tests as per CTS requirements.

For the GRL-C2-EPR tester hardware, when “GRL-SPL EPR Test Cable” is selected as the Cable Selection type (see Section 7.1), an additional input is available to allow you to perform tests using the GRL Platform Solutions Fast Role Swap (FRSWAP) Board (GRL-C2-FR-SWAP-AUTO Box Board) for automating Fast Role Swap based testing when checked. *Note that the Fast Role Swap test results are currently meant for informational purpose only and not required for certification testing.*

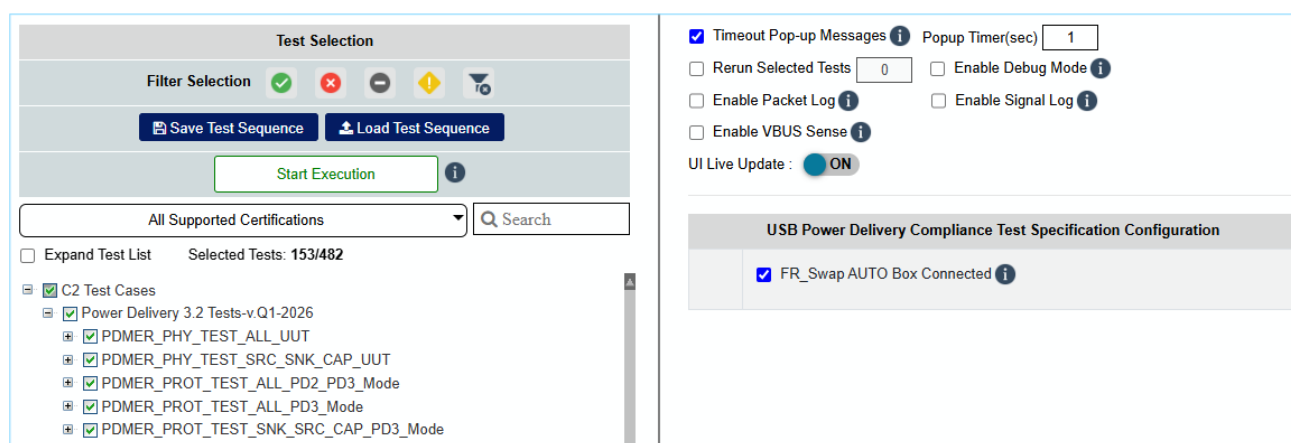


FIGURE 7.28: CONFIGURATION FOR USB POWER DELIVERY MERGED TESTS

7.2.1.12 Custom OEM Tests

Runs the Custom OEM compliance tests for Custom OEM chargers with Lightning connectors. These tests have additional inputs that allow you to configure external E-Load to run the Custom OEM tests. If the charger DUT has a Lightning cable attached to it or a captive cable, select the “Charger has captive lightning plug” checkbox. You will need to select the channel connected to the external E-Load. When the external E-Load is set up properly, enter the correct VISA address of the external E-Load and click “Connect” to establish connection with the external E-Load. Otherwise click on the “Scan Eload” button to reset the connection.

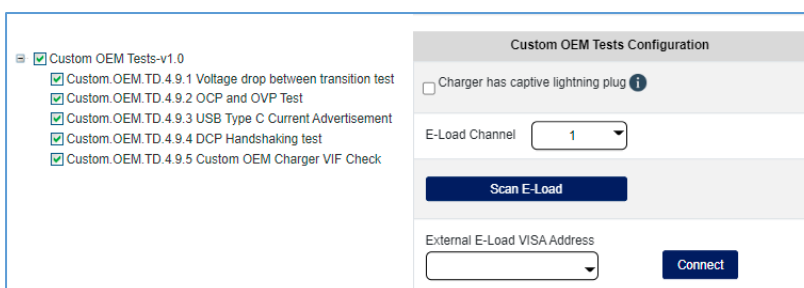


FIGURE 7.29: CONFIGURATION FOR CUSTOM OEM TESTS

Note: Refer to Section 5.4 for the procedure to set up the hardware connections for Custom OEM testing.

7.2.1.13 QC BC 1.2 DCP Sink Tests

Runs the QC Battery Charging 1.2 DCP Sink tests. These tests have additional inputs to the secondary detection mode, whether implemented or not and maximum current.

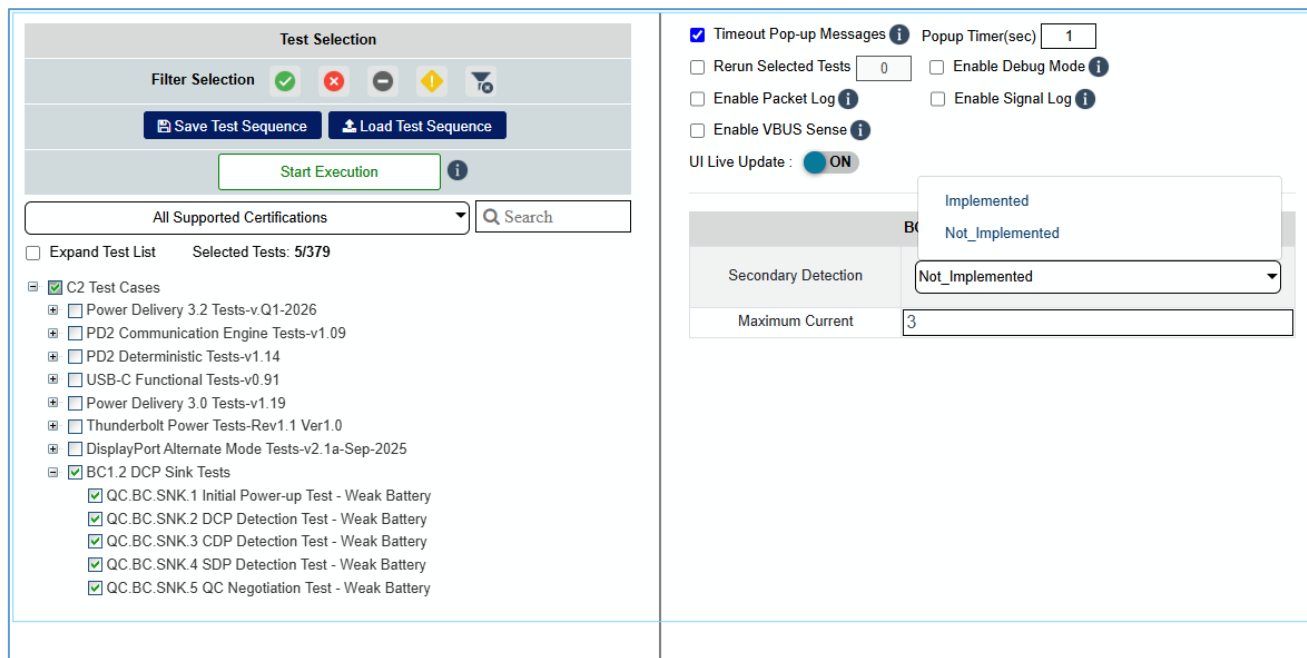


FIGURE 7.30: CONFIGURATION FOR QC BC 1.2 DCP SINK TESTS

Individual tests are grouped together based on their definition in the selected specification. Selecting a group will cause all tests in that group to be selected and run. Selecting individual tests within a group will run just the individual tests selected.

If you only want to select the tests that comply to a certain certification standard, click on the drop-down menu as shown below to filter out the test list as required.

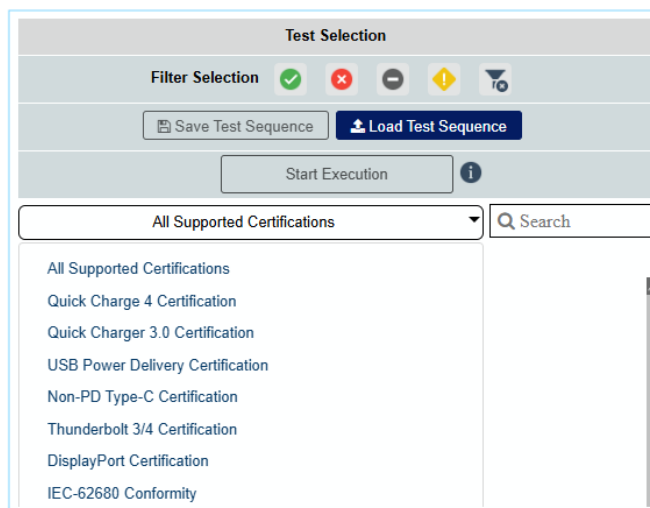


FIGURE 7.31: SELECTING CERTIFICATION COMPLIANCE FOR TESTS

Note: The GRL-C2-EPR supports several Compliance Test Specifications (CTS's) from different technologies using the USB Type-C Connector. For a detailed listing of all the tests and test methodology in the latest version of the specification, refer to the specification documents referenced in Section 1.

7.2.2 Report Generation

The “Report Generation” panel allows full reports to be created after running a set of tests.

Report Generation	
DUT Information	
Manufacturer	ABC
Model Number	Cable001
Serial Number	001
Test Information	
Test Lab	GRL Platform Solutions
Test Engineer	Tech 1
Remarks/Comments	Cable QC
Report Folder Path	

FIGURE 7.32: REPORT GENERATION PANEL

The “DUT Information” and “Test Information” sections are text entry fields in which you can enter information germane to the specific DUT and the specific set of tests just run. Once tests have completed, the test report can be viewed in the *Report* screen (see Section 7.3).

7.2.3 Running Tests

Once the desired tests have been selected, these tests can be run by clicking on the green **Start Execution** button:

Test Selection	
Filter Selection	☒ ☐ ☐ ☐ ☐
Save Test Sequence Load Test Sequence	
Start Execution	
All Supported C... Execute test cases Search	
☐ Expand Test List Selected Tests: 1/264	
☒ C2 Test Cases ☒ Power Delivery 3.2 Tests-v.Q1-2026 ☐ PD.MER.PHY.TEST.ALL.UUT ☐ PD.MER.PHY.TEST.SRC.SNK.CAP.UUT ☒ PD.MER.PROT.TEST.ALL.PD2.PD3.Mode ☒ TEST.PD.PROT.ALL.1 Corrupted GoodCRC	

FIGURE 7.33: RUN TESTS

- If you are only running tests for informational purpose, you can choose to disable pop-up messages from showing up during test runs by selecting the **Timeout Pop-up Messages** checkbox. If pop-up messages are enabled, enter the time interval in seconds in between pop-ups at the **Popup Timer(sec)** entry field.
- To repeat running selected tests for a specific number of times, select the **Rerun Selected Tests** checkbox and enter the desired number.
- For debug purposes, you can choose to turn on debug mode by selecting the **Enable Debug Mode** checkbox. This will cause additional data to be included in test acquisitions to be used for debugging.
- To enable Packet & signal logging and VBUS Sense, select the **Enable Packet Log**, **Enable Signal Log** and **Enable VBUS Sense** checkboxes respectively.
- To enable or disable real-time data acquisition mode, toggle the **UI Live Update** slider.

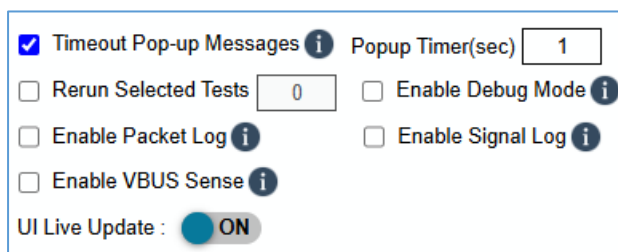


FIGURE 7.34: TEST RUN OPTIONS

Once testing has started you can view each test being run in real-time mode on the **Results** screen:

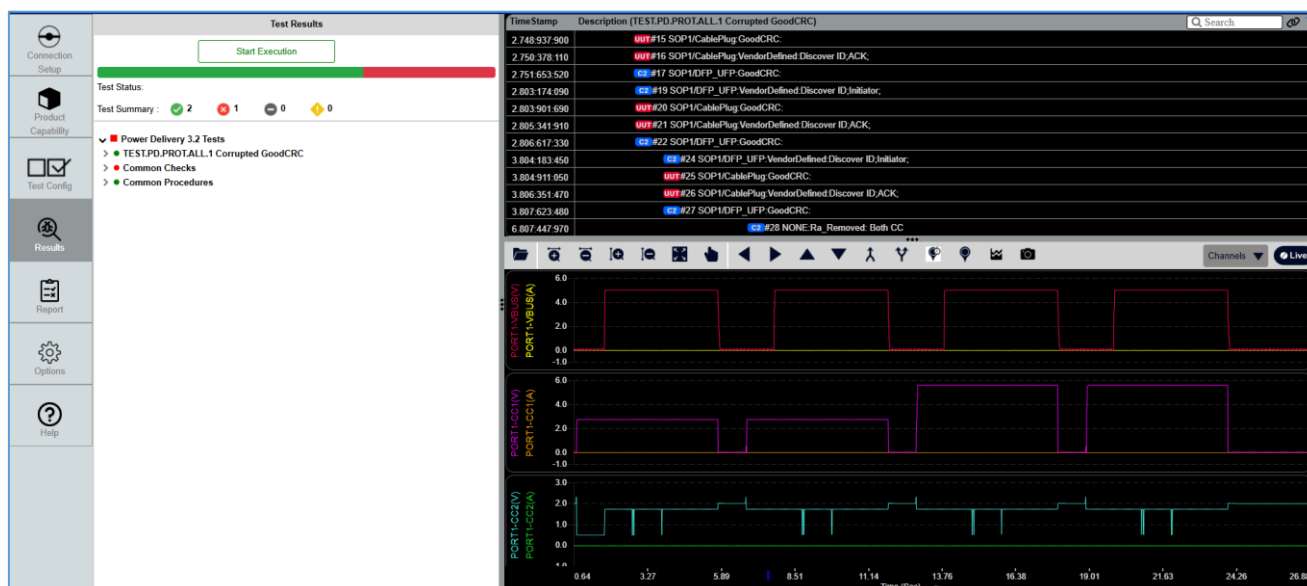


FIGURE 7.35: RESULTS SCREEN – TEST RUN INITIATION

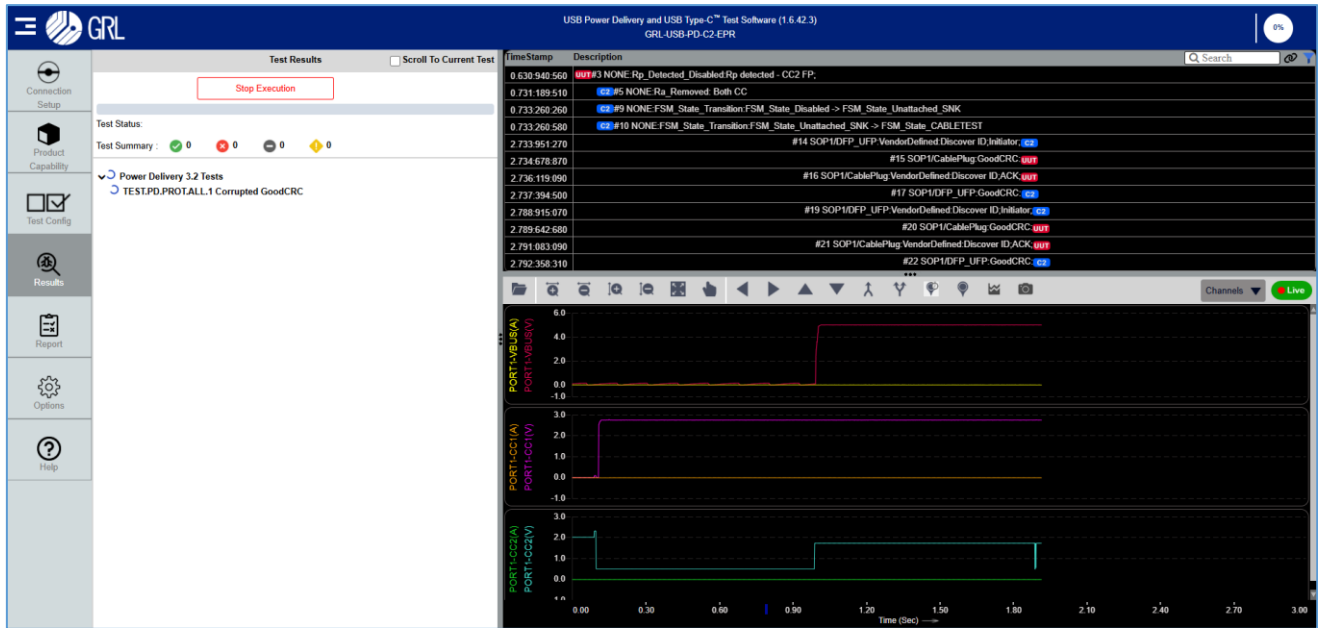


FIGURE 7.36: RESULTS SCREEN – TEST RUN IN PROGRESS

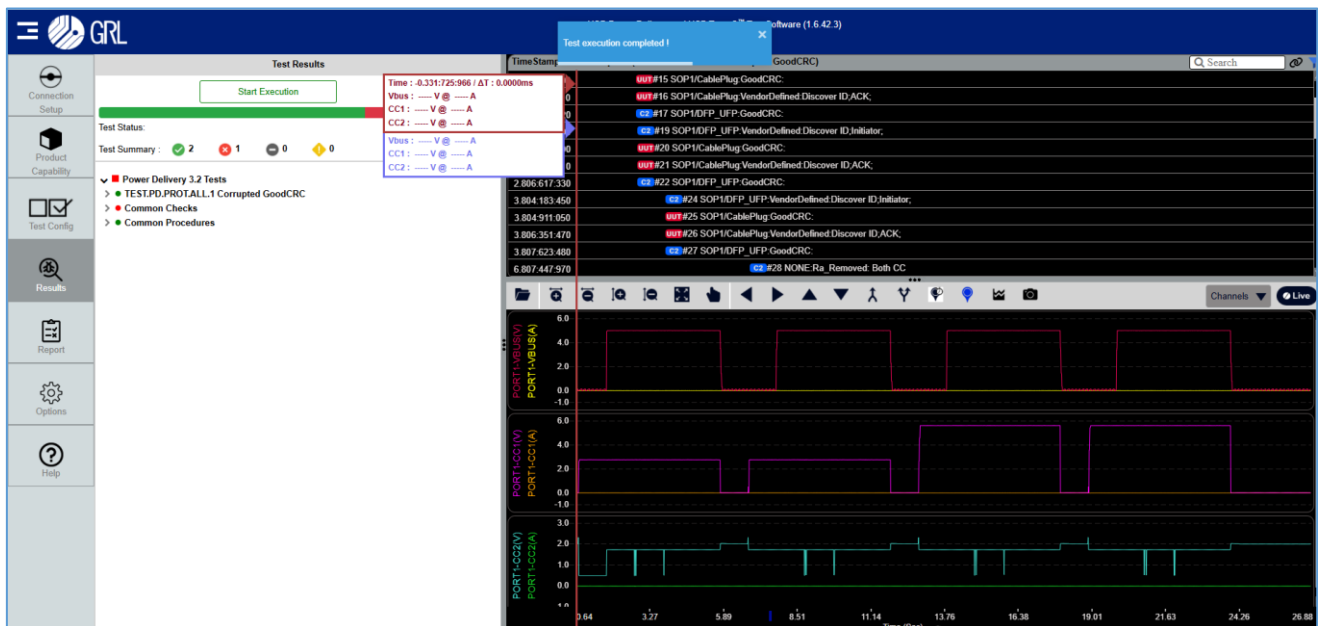


FIGURE 7.37: RESULTS SCREEN – TEST RUN COMPLETION

While tests are running, the Test Results pane will display the pass/fail status of each test as well as each subtest which you can view by clicking the drop-down arrow of the test group if applicable. The PDO communications exchange protocol and waveform displays next to the Test Results pane allow you to scroll to the section representing the start of the selected test– this allows you to trace failing test to determine the cause of the test failure.

If you only want to view specific channels on the trace plot, select the “Channels” drop down option and click/unclick on the checkbox(s) of the desired channels.

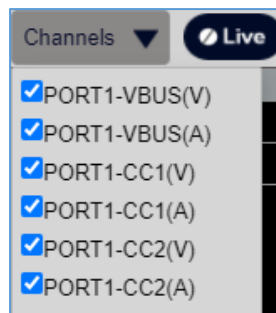


FIGURE 7.38: SELECT TRACE CHANNELS EXAMPLE

When the PDO communications exchange protocol is running, select the **Stop Execution** button  at the top of the screen at any time to end or pause the process respectively.

The common plot specific buttons can be used to control the power trace view as desired which includes panning, merge/unmerge, fit and zooming in/out of the trace

plots. The  button in particular can be selected to enable cursors for a test/subtest which lets you turn on/off markers at certain areas of the plot. Click on a test/subtest to navigate to the exact time stamp and packet details of the plot as shown in the following example:

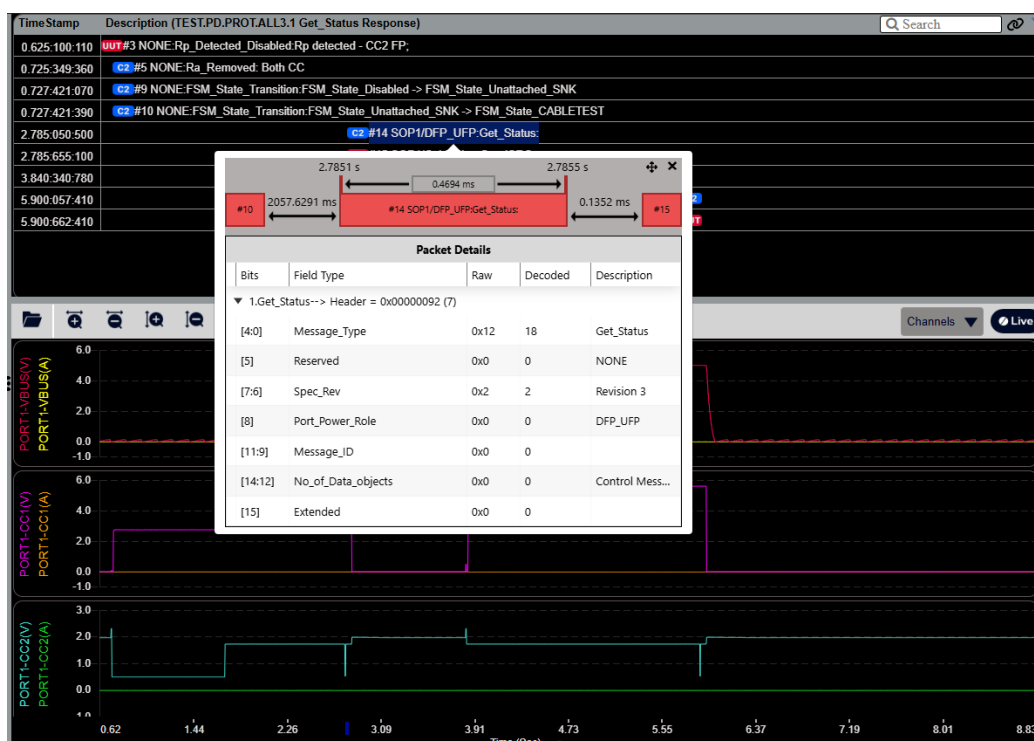


FIGURE 7.39: ENABLE TRACE MARKERS AND VIEW TEST DETAILS EXAMPLE

You can use your mouse cursor to hover on top of each plot specific button to view the description of each button function.

When the testing is complete, the screen displays all the data gathered during the testing process. Select the **Save**  button to save the power trace plot to a file and the **Load**  button to open and use an existing saved power trace file.

You can then also return to the *Test Config* screen to filter out the test selection list for those tests with Pass/Fail/Warning/Incomplete status. This allows you to easily determine the status of each test using the respective icons     under the Test Selection panel. Clicking  will undo this function.

7.3 Test Report View

After running a set of tests, the *Report* screen allows full reports to be created:

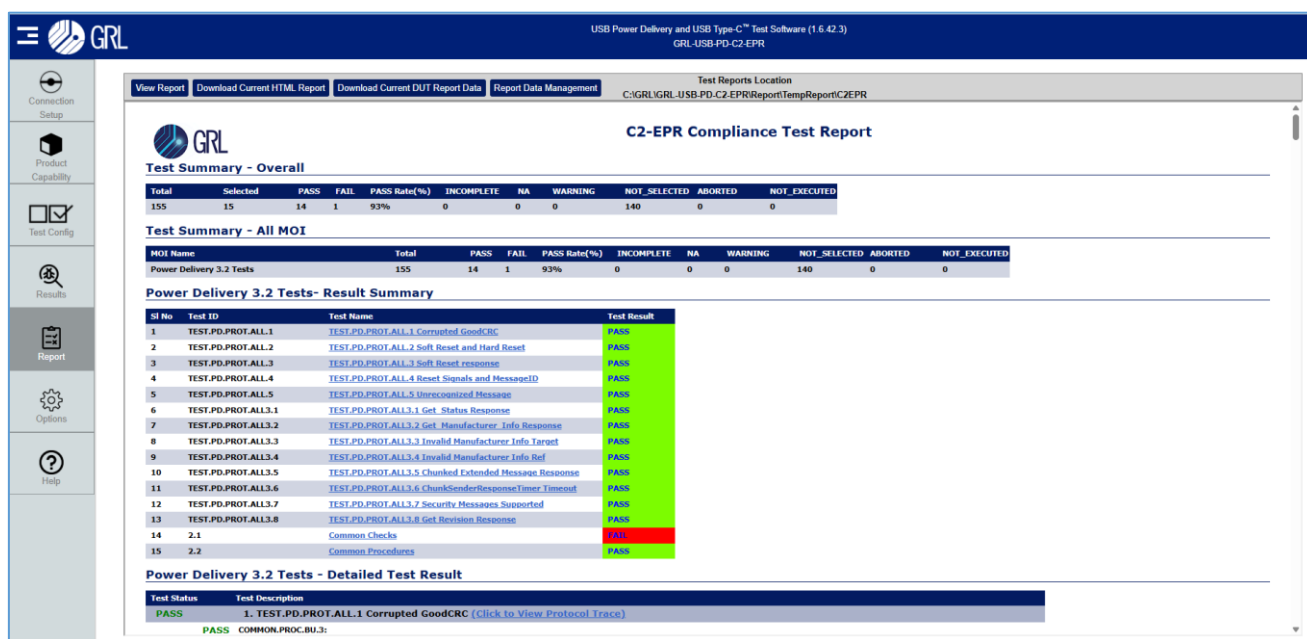


FIGURE 7.40: REPORT SCREEN

The content of the generated reports can consist of one or more of:

- **Configuration** – The product configuration information for the UUT.
- **Packet List** – A list of all the packets exchanged during testing.
- **Test Results** – The individual test Pass / Fail results.
- **Eye Diagrams** – Any eye diagrams created during physical layer (PHY) testing.
- **Saved Images** – Any other images created during the test process.

The most recent set of results for all tests run (regardless of when they were run) will be captured in the generated reports.

Scroll down to view the full report as shown in the example below:



Connection Setup

Product Capability

Test Config

Results

Report

Options

Help

USB Power Delivery and USB Type-C™ Test Software (1.6.42.3)

GRL-USB-PD-C2-EPR

View Report

Download Current HTML Report

Download Current DUT Report Data

Report Data Management

Test Reports Location

C:\GRL\GRL-USB-PD-C2-EPR\Report\TempReport\C2EPR

GRL USB-PD PPS Firmware Version	4.0 / 4.0
Calibration	Calibration Success
RX mask Power selection	Neutral Power
Device_Type	Cable
VCONN voltage	
Cable Type	NO_CABLE
Impedance (milli ohm)	0
PD_Merged CTS Version	v.Q1-2026
USB_PD_Spec Version	Rev3.2 Ver1.1RC2
USB_Type_C_Spec Version	v2.3 Oct-2023
VIF_File_Name	VL153_Via_Labs_A0_3830.xml
Noise Pattern Generation:	Two-Tone Noise
Application mode	Informational
Disabled all Pop-up during test execution	False
Pop-up Timer	0
Re-run Enabled	False
Re-run Count	1
Re-run Iteration	0
UI Live Update	False
Execution Time(In Minutes)	5

Power Delivery 3.2 Tests Information

Parameter	Value
Connect EPR Test Fixture	False
FR_Swap AUTO Box Connected	False

Product Capabilities

Parameter	Vendor Info file	GetCapabilities
VIF_Specification	3.36	
Vendor_Name	VL153	
Model_Part_Number	Via_Labs	
Product_Revision	A0	
TID	3830	

FIGURE 7.41: SCROLL DOWN TO VIEW FULL REPORT

Use these buttons above the report to perform the following functions:

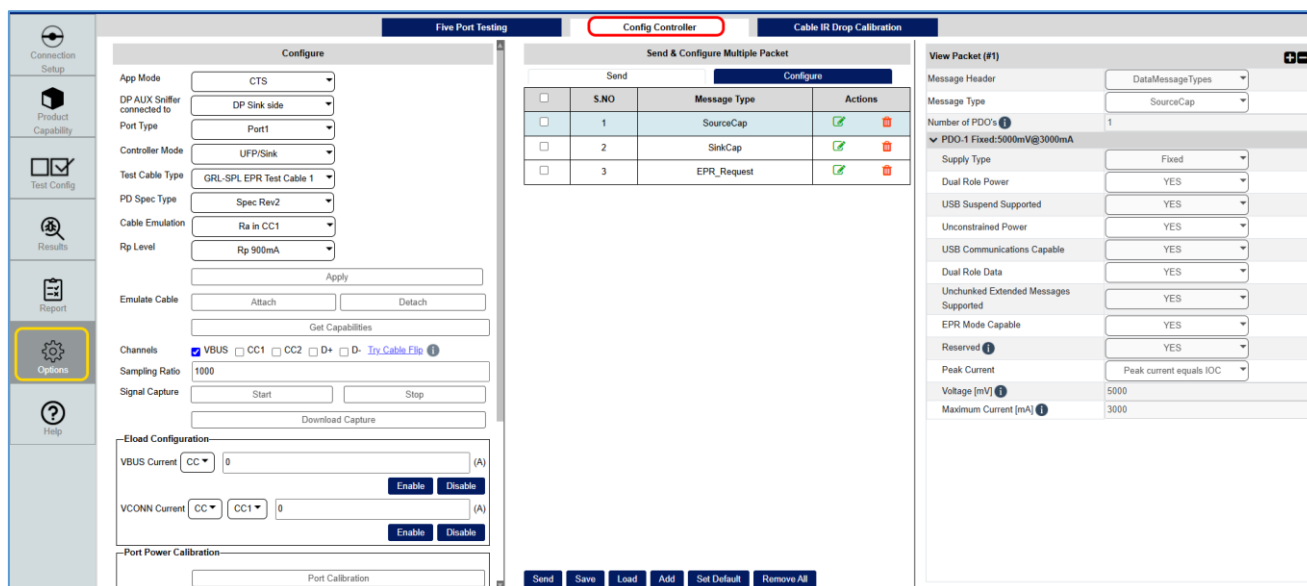
- **Download Current DUT Report Data** button: Save all the result information to a ZIP folder.
- **Download Current HTML Report** button: Save the test report in HTML format.
- **Report Data Management** button: Access other test reports including from previous test runs. This allows you to delete or save the reports as desired from the database.
- **View Report** button: Jump to the beginning of the report.

8 Using the Configuration Controller

This section describes how to use the **Config Controller** utility, which allows you to:

- configure the DisplayPort AUX fixture connected to the GRL-C2-EPR tester hardware for capturing sideband messages for DisplayPort Standard AUX or DisplayPort Alternate Mode, and
- manually send USB Power Delivery Packets from the GRL-C2-EPR tester hardware to the DUT.

The *Options* screen will display the Config Controller page by clicking on the **Config Controller** tab at the top of screen:



The screenshot displays the Configuration Controller interface with three main panels:

- Configure Panel:** Contains settings for App Mode (CTS), DP AUX Stroller connected to (DP Sink side), Port Type (Port1), Controller Mode (UFP/Sink), Test Cable Type (GRL-SPL EPR Test Cable 1), PD Spec Type (Spec Rev2), Cable Emulation (Ra in CC1), Rp Level (Rp 900mA), and buttons for Apply, Emulate Cable (Attach/Detach), Get Capabilities, Channels (VBUS, CC1, CC2, D+, D-), Sampling Ratio (1000), Signal Capture (Start/Stop), Download Capture, and E-load Configuration (VBUS Current, VCONN Current) with Enable/Disable buttons.
- Send & Configure Multiple Packet Panel:** Includes a table for sending packets.

	S.NO	Message Type	Actions
☐	1	SourceCap	
☐	2	SinkCap	
☐	3	EPR_Request	
- View Packet (#1) Panel:** Shows details for a selected packet, including Message Header, Message Type (SourceCap), Number of PDO's (1), and various USB Power Delivery parameters like Supply Type (Fixed), Dual Role Power (YES), USB Suspend Supported (YES), Unconstrained Power (YES), USB Communications Capable (YES), Dual Role Data (YES), Unchunked Extended Messages Supported (YES), EPR Mode Capable (YES), Reserved (YES), Peak Current (Peak current equals IOC), Voltage (5000 mV), and Maximum Current (3000 mA).

FIGURE 8.1: CONFIGURATION CONTROLLER SCREEN

Testing the DUT for a particular scenario can be performed using the **Config Controller** utility. The screen contains multiple panels with input fields that can be selected to focus on specific capabilities and requirements.

8.1 Configure Panel

The Configure panel allows the user to set the configuration of the controller.

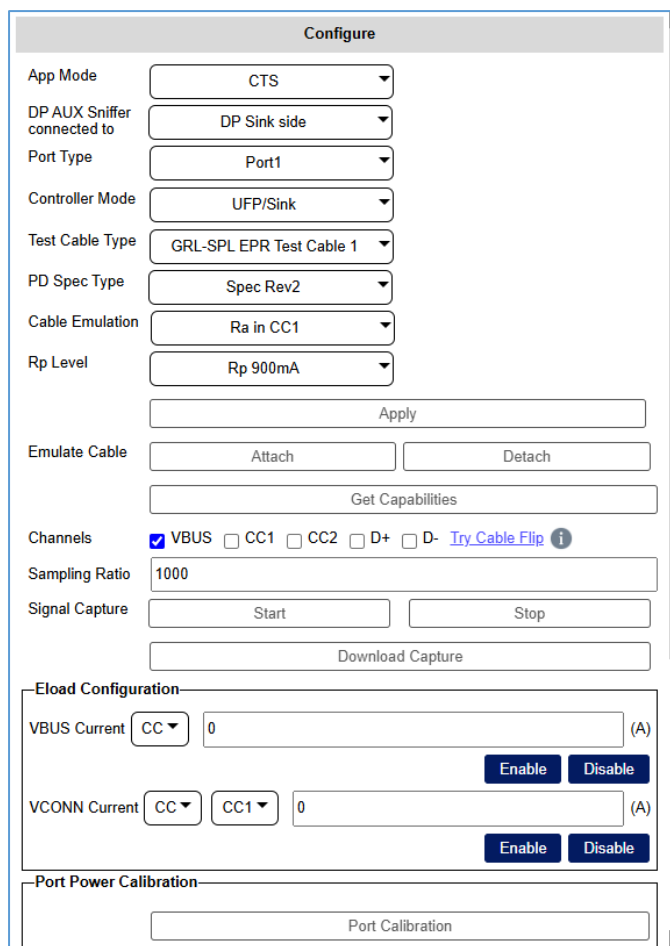


FIGURE 8.2: CONFIGURATION CONTROLLER – CONFIGURE PANEL

- **App Mode** – The App Mode drop down sets the tester hardware’s mode of application:
 - **CTS** – Standard USB Power Delivery Protocol for decoding of USB Type-C Power Delivery packets
 - **DP AUX** – DisplayPort Auxiliary Channel for decoding of DisplayPort sideband AUX messages
 - **SNIFFER** – Sniffer mode for sniffing USB Power Delivery and Qualcomm Quick Charge legacy traffic.
- **DP AUX Sniffer connected to** – This drop down sets the GRL Platform Solutions DP AUX Sniffer Fixture that is connected to either the DisplayPort Sink or Source side of the GRL-C2-EPR tester hardware for sniffing DisplayPort Standard Auxiliary traffic.
- **Port Type** – For a 2-port DUT, select either “Port1” or “Port2” to apply the configuration for the selected test port.
- **Controller Mode** – The Controller Mode drop down sets the tester hardware’s mode of operation:
 - **UFP/Sink** – Upward Facing Port, sink power
 - **DFP/Source** – Downward Facing Port, source power
 - **DRP** – Dual Role Port
 - **Cable Tester** – Cable only

- **Test Cable Type** – The Test Cable Type drop down allows you to select the type of cable DUT connected to the tester hardware.
- **PD Spec Type** – The PD Spec Type drop down allows you to select the USB Power Delivery specification limits to be applied accordingly.
- **Cable Emulation** – The Cable Emulation drop down sets the Ra on CC1 or CC2 or both CC lines of the cable DUT if cable emulation is enabled on the tester hardware when using the GRL Platform Solutions special test cable for testing.
- **Rp Level** – The Rp Level drop down sets the Rp value on the CC line of the cable DUT.

Clicking the **Apply** button causes all of the above configuration to be set.

- **Emulate Cable** – Select the **Attach** button to perform emulation for a connected cable. Depending on the controller mode, the **Attach** function presents Rp/Rd from the CC line and changes the state of the tester hardware to Source Attach or Sink Attach.

Select the **Detach** button to stop emulation and remove the connected cable. The **Detach** function removes all the Rp/Rd values from the CC line and changes the state of the tester hardware to Source Detach or Sink Detach.

Select the **Get Capabilities** button to acquire the capabilities of the connected cable.

- **Channels** – Select the display channels (VBUS, CC1, CC2, D+ and D-) to be added to the signal acquisition trace plot. You can select “[Try Cable Flip](#)” to allow the connected cable to be flipped during the test run.
- **Sampling Ratio** – Enter the sampling rate for signal acquisition.
- **Signal Capture** – Select the **Start** button to start running signal acquisition or the **Stop** button to stop signal acquisition for the DUT. The **Start** function will initiate the test run in the Results screen as shown in the example below:

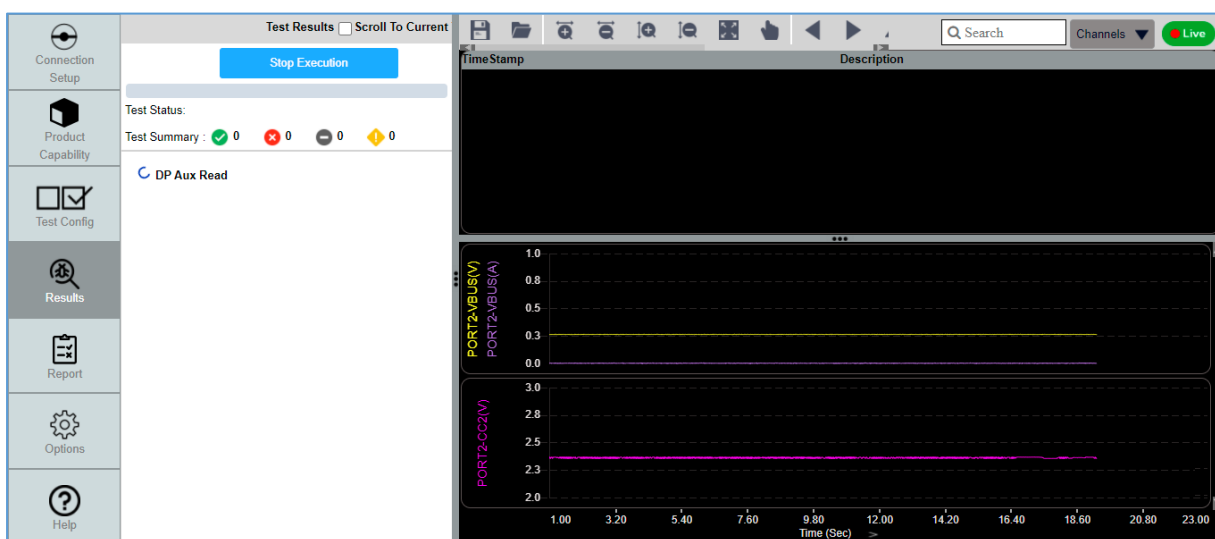


FIGURE 8.3: CONFIGURE PANEL – START SIGNAL CAPTURE IN RESULTS SCREEN EXAMPLE

- **Download Capture** – Select the **Download Capture** button to download and save the signal acquisition to a file.

- **ELoad Configuration** – Set the VBUS and VCONN current for high-power or low-current E-Load respectively and select the ‘Enable’ or ‘Disable’ button.
- **Port Power Calibration** – Select the **Port Calibration** button to perform calibration for the power capabilities of the selected tester port.
- **TBT Self Calibration** – Select the port and channel to perform self-calibration for Thunderbolt capabilities of the DUT followed by the **Run TBT Self Calibration** button.

8.2 Send & Configure Multiple Packets Panel

The Send & Configure Multiple Packets panel allows you to edit, send or request one or more Packets from the GRL-C2-EPR tester hardware during USB Power Delivery Contract negotiation phase.

8.2.1 Send Packets

The **Send** tab allows you to edit and send run-time packets/messages from the GRL-C2-EPR tester hardware to the connected DUT once a successful USB Power Delivery contract has been established. Figure 8.4 below shows the list of default packet/message types:

Send & Configure Multiple Packet			
Send		Configure	
☐	S.NO	Message Type	Actions
☐	1	SourceCap	 
☐	2	SinkCap	 
☐	3	EPR_Request	 

FIGURE 8.4: SEND PACKETS TAB

- The user selects the desired packet/message type and then clicks on the **Send** button at the bottom of the screen to send the run-time packets/messages from the tester hardware to the DUT. When the user selects a packet/message from the table, the user can view the packet/message configuration details on the right panel.
- The user can edit a specific packet/message by clicking on the Edit Packet icon  under the “Actions” column. This will enable the configuration fields for the respective packet/message to be editable on the right panel.
 - **Message Header** – The Message Header dropdown allows you to select the main category of USB Power Delivery message being accessed/negotiated.
 - **Message Type** – The Message Type dropdown allows you to select the type of USB Power Delivery Object (PDO) being accessed/negotiated for the selected message category. This includes Power, Data and VCONN swaps, Resets such as Hard Reset, Cable Reset and Soft Reset, Capability commands such as Get Sink Capability and Get Source Capability, Ping command, Get PPS Status and BIST Test Data command.

- **Number of PDO's** – The Number of PDO's entry field allows you to enter the number of PDO's (up to 15) for the selected PDO type to be sent. Once entered, the user can edit the PDO configuration as required and click on the **Save** button at the bottom to save the edits.

Send & Configure Multiple Packet

Send

Configure

☐	S.NO	Message Type	Actions
☒	1	SourceCap	1  
☐	2	SinkCap	 
☐	3	EPR_Request	 

Send

Save

Load

Add

Set Default

Remove All

Edit Packet (#1)

Message Header

DataMessageTypes

Message Type

SourceCap

Number of PDO's

1

▼ PDO-1 Fixed:5000mV@3000mA

Supply Type

Fixed

Dual Role Power

YES

USB Suspend Supported

YES

Unconstrained Power

YES

USB Communications Capable

YES

Dual Role Data

YES

Unchunked Extended Messages Supported

YES

EPR Mode Capable

YES

Reserved

YES

Peak Current:

Peak current equals IOC

Voltage [mV]

5000

Maximum Current [mA]

3000

2

3

Save

Cancel

FIGURE 8.5: EDIT PACKET CONFIGURATION

- To add more packets/messages to be sent, click on the **Add** button at the bottom of the screen. In the “Add Packet” screen, the user can configure the packet/message similar to Edit Packet. Once configured, click on the **Add** button at the bottom of the screen. This will cause the new packet/message to be added to the list under the “Send” tab.
- Once all required packets/messages have been added/configured as described above, select all in the list and click on the **Send** button to cause the tester hardware to send the packets/messages to the DUT. An example is as shown below.

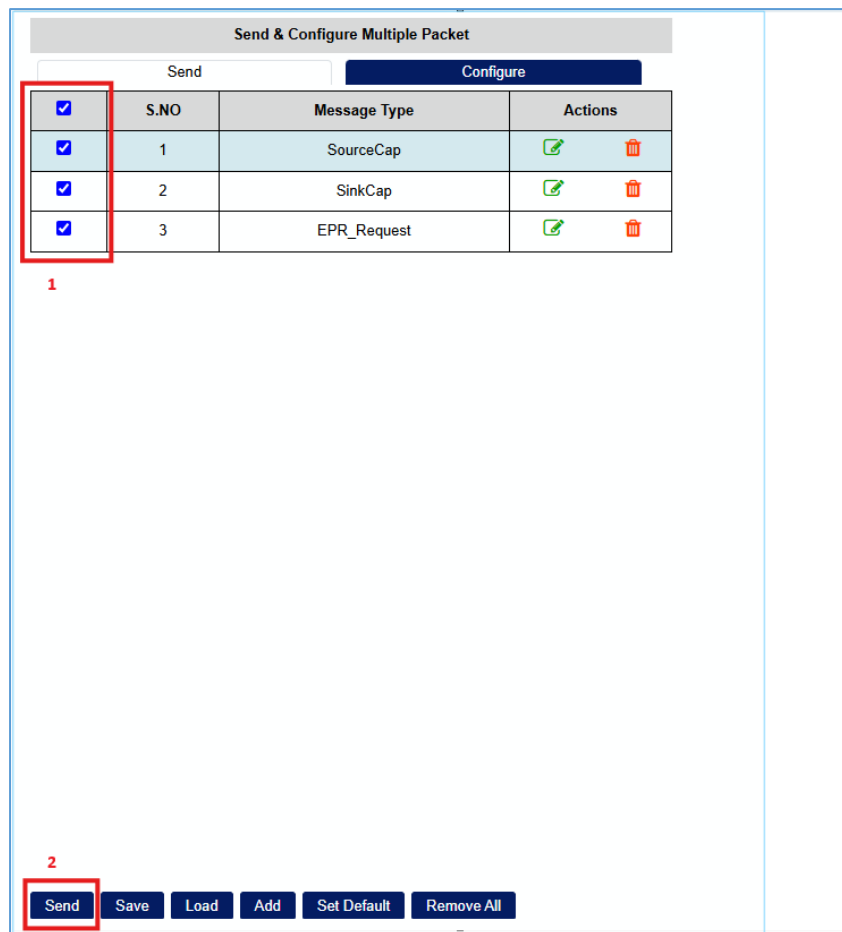


FIGURE 8.6: SEND PACKETS EXAMPLE

8.2.2 Write Packets

For writing packets/messages to registers, select the **Configure** tab and click on the **Add** button at the bottom of the screen to create a new list of packets/messages which is similar to “Edit Packets” as described under Section 8.2.1.

8.2.3 Save/Load/Set Default/Remove All Packet Data

The user can use the **Save** **Load** **Set Default** **Remove All** buttons at the bottom of the “Send & Configure Multiple Packet” panel to perform the following functions:

- **Save** button: Saves the packets/messages to the JSON file format in the Downloads folder when clicked.
- **Load** button: Loads the packet/message data from a selected saved JSON file when clicked. The user can then make configurations to the loaded packet/message data.
- **Set Default** button: Resets all user-defined packet/message configurations to the default state when clicked.
- **Remove All** button: Deletes all data in the “Send & Configure Multiple Packet” panel.

9 Using the Five Port Testing Utility

This section describes how to use the **Five Port Testing** utility, which allows you to set up a multiport switch for the UUT. The *Options* screen will display the Five Port Testing page by clicking on the **Five Port Testing** tab at the top of screen as shown below:

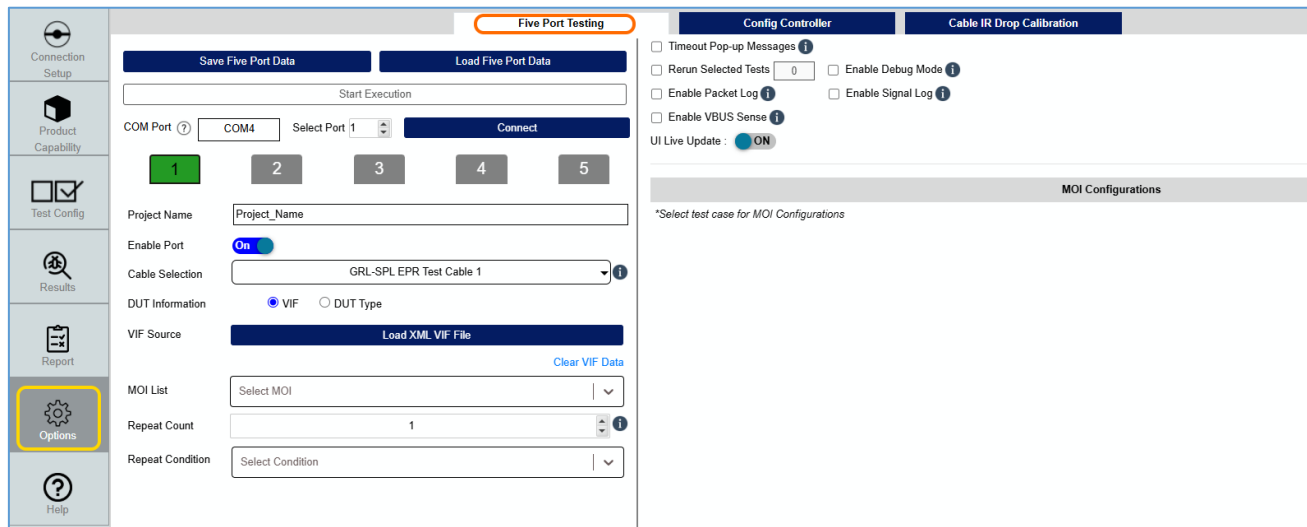


FIGURE 9.1: FIVE PORT TESTING SCREEN

This switch function requires the GRL Platform Solutions 5-Port Switch Board (GRL-USB-PD-MULT option) to be used which is provided as a separate accessory for the GRL-C2-EPR tester hardware. The 5-Port Switch Board consists of a five ports switch extension fixture that is plugged in to the GRL-C2-EPR tester hardware and is used to connect up to five DUT's to perform switching during tests. For more information on the 5-Port Switch Board, please contact support@grlps.com.

To set up the switch for measurements, select and enter the Port value and path that is to be used on the 5-Port Switch Board fixture that is connected with the GRL-C2-EPR tester hardware. Click on the **Connect** button next to it to verify the assigned Port connection.



FIGURE 9.2: FIVE PORT TESTING – ASSIGN AND CONNECT TO PORT

You can also assign a new project for the selected Port by entering in the **Project Name** field.

To make configurations to the switch, turn 'On' the **Enable Port** slider

Enable Port . The test cable selection drop down allows you to specify what cable connects the DUT to the specific USB Port on the GRL-C2-EPR tester hardware.

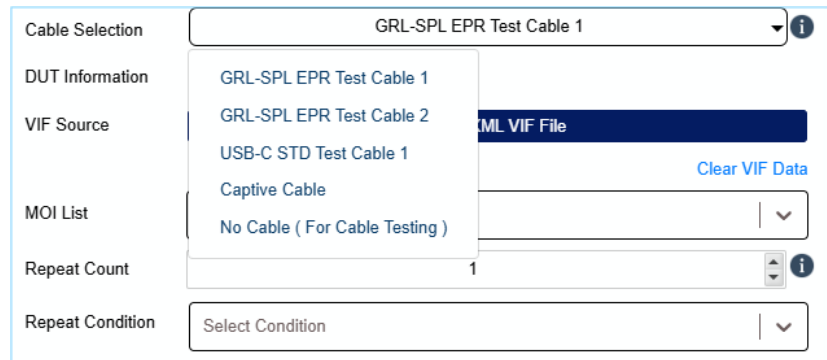


FIGURE 9.3: FIVE PORT TESTING – SELECT CABLE

You can then select whether to use a **VIF** file for the DUT or query the capabilities of the DUT (**DUT Type**) at the DUT Info field

- If the VIF file is used, clicking on the **Load XML VIF File** button



will read and load information from a selected VIF XML file on the host PC. To remove the VIF information, select [Clear VIF Data](#).

- If acquiring DUT capabilities, select the **DUT Type** checkbox to enable selection of the DUT type being used from the **DUT Type** drop down:

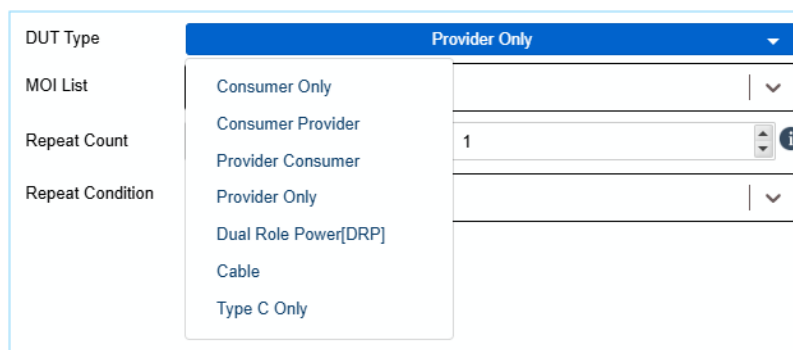


FIGURE 9.4: FIVE PORT TESTING – SELECT DUT TYPE

Finally select the tests that comply to a certain certification standard by selecting the MOI List drop down.

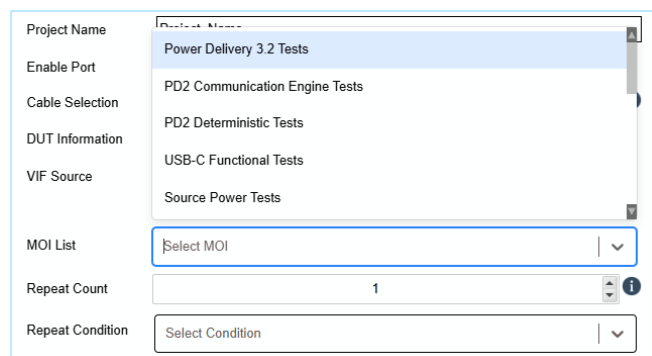
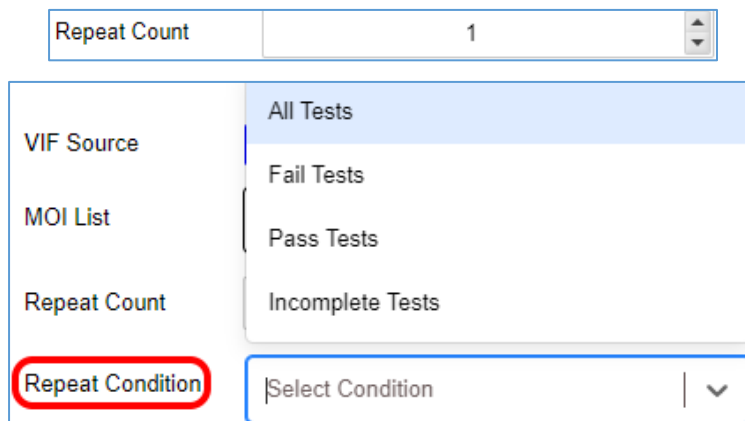


FIGURE 9.5: FIVE PORT TESTING – SELECT MOI TESTS

If required, you can set the number of times to repeat the test sequence (**Repeat Count** field) for the selected test status (**Repeat Condition** drop down).



The screenshot shows a configuration pane with the following elements:

- Repeat Count:** A numeric input field set to 1.
- MOI List:** A dropdown menu with options: All Tests, Fail Tests, Pass Tests, and Incomplete Tests.
- Repeat Condition:** A dropdown menu with the option: Select Condition.

The 'Repeat Condition' field is highlighted with a red circle.

FIGURE 9.6: FIVE PORT TESTING – SET REPEAT TEST AND CONDITION

The 'MOI Configurations' pane on the right allows you to set up parameters for the tests that have been selected from the 'MOI List' drop down.

Once all configurations have been made, click on the top **Start Execution** button to execute the switch function for selected tests.

To save the switch configuration to a file, click on the **Save Five Port Data** button at the top of screen. To load and use a previously saved switch configuration file, click on the **Load Five Port Data** button.



The screenshot shows three buttons arranged horizontally:

- Save Five Port Data** (dark blue button)
- Load Five Port Data** (dark blue button)
- Start Execution** (light gray button)

FIGURE 9.7: FIVE PORT TESTING – START TEST AND SAVE/LOAD FUNCTIONS

10 Using the Cable IR Drop Calibration Utility

This section describes how to use the **Cable IR Drop Calibration** utility to perform IR drop calibration to compensate for voltage loss of the cable under test due to high resistance. The *Options* screen will display the Cable IR Drop Calibration page when clicking on the **Cable IR Drop Calibration** tab at the top of screen as shown below:

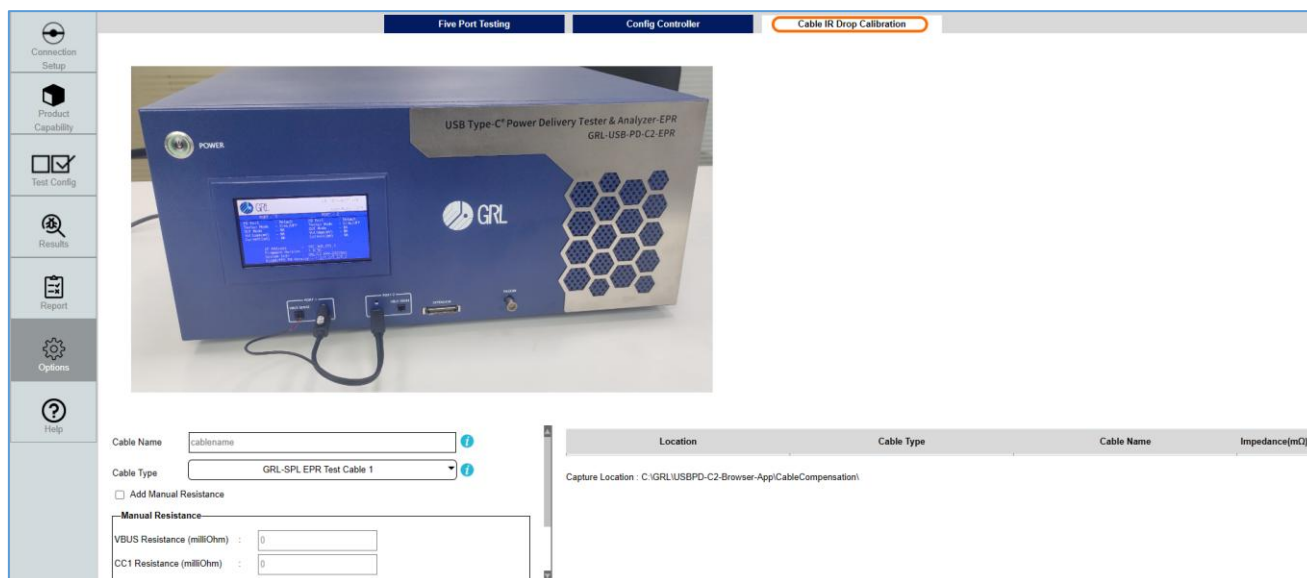


FIGURE 10.1: CABLE IR DROP CALIBRATION SCREEN

First make sure that the test cable is connected properly to the GRL-C2-EPR tester hardware test ports as shown in the setup image.

Select the **Cable Type** drop down to select what type of cable to be tested and enter a name for the selected cable in the **Cable Name** field.

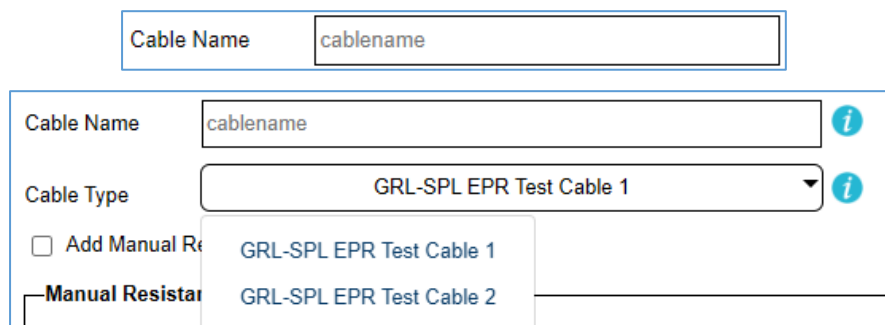


FIGURE 10.2: CABLE IR DROP CALIBRATION – SELECT AND ENTER NAME OF TEST CABLE

Take note of the 'Capture Location' file directory (*Capture Location: C:\GRL\USBPD-C2-Browser-App\CableCompensation*) under the table on the right that is used for saving the cable IR drop calibration data to a file after clicking on the **Download File** button.

Note: When using the GRL-SPL EPR Test Cable, make sure to place the GRL Platform Solutions logo on the cable in the upward position to maintain the same cable orientation. This is important to obtain accurate IR drop calibration values.

You can add manual resistance (VBUS, CC1 and CC2) by selecting the **Add Manual Resistance** checkbox and entering the respective values.

☒ Add Manual Resistance

Manual Resistance

VBUS Resistance (milliOhm) :	3
CC1 Resistance (milliOhm) :	5
CC2 Resistance (milliOhm) :	1

FIGURE 10.3: CABLE IR DROP CALIBRATION – ADD MANUAL RESISTANCE

Finally click on the **Calibrate** button to start running the IR drop calibration. Details of the calibration run will be logged accordingly in the table on the right and the status will be shown next to “Calibration Status”.

Calibration Status :

FIGURE 10.4: CABLE IR DROP CALIBRATION – RUN IR DROP CALIBRATION AND SAVE TO FILE

11 GRL-C2-EPR Application Information and Help

The *Help* screen allows you to view the current version of the GRL-C2-EPR application as well as a brief description of the GRL-C2-EPR tester hardware. You can also access customer support debug logs and API documentation using the links provided.

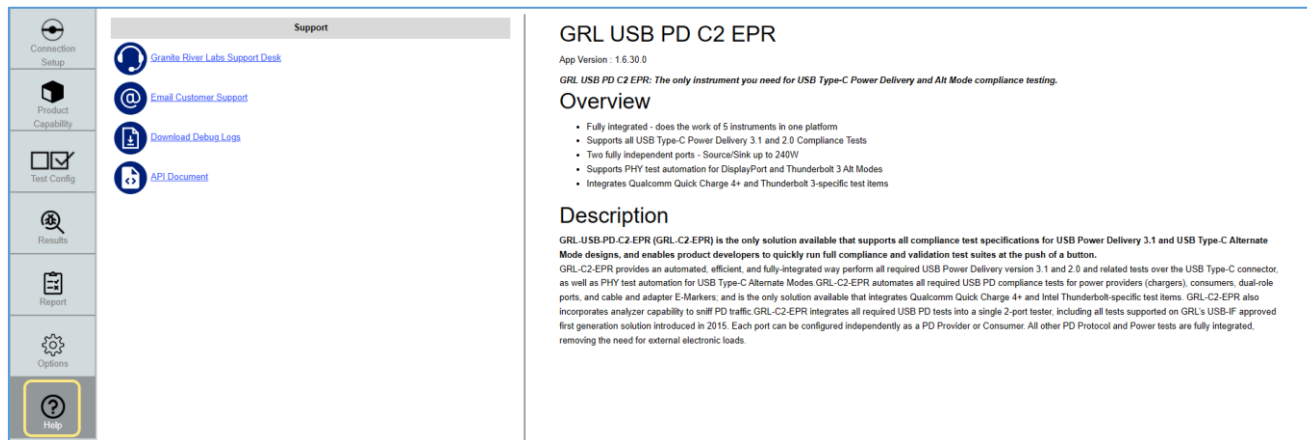


FIGURE 11.1: HELP SCREEN

END_OF_DOCUMENT