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User Guide

WPC Qi2 Wireless Charging Power Transmitter [PTx] Tester (GRL-C3-MP-TPR) with Automation Test Application



This material is provided as a reference to get started with the GRL Platform Solutions WPC Qi2 Wireless Charging Power Transmitter [PTx] Tester (GRL-C3-MP-TPR) Hardware and Automation Test Application.

For software support, contact support@grlps.com.

Published on 09 June 2026

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1 Reference Documents

The test methods outlined in this document are tests required by the Wireless Power Consortium (WPC) for compliance of a Wireless Power Transmitter device to the Qi MPP Specification. The Qi MPP Specification may be referenced in this document that includes, but is not limited to, the following specification versions.

Note: In order to have access to all specifications, it is required that you are a member of the WPC Web site and have attained the proper permissions.

WPC Specification Compliance Documents are available for download at:

<https://www.wirelesspowerconsortium.com/knowledge-base/specifications/download-the-qi-specifications.html>

- *MPP Communication Protocol Version 2.0 (April 2023)*
- *MPP System Specification Version 2.0 (April 2023)*
- *MPP Power Transmitter (PTx) Test Tools Version 2.0 (October 2023)*
- *MPP Power Transmitter (PTx) Compliance Tests Version 2.0 (October 2023)*
- *Qi-v2.0-mpp-comms-protocol-errata_september_2023.pdf*
- *Qi-v2.0-mpp-PTx-test-tools-errata_december_2023_draft.pdf*
- *Qi-v2.0-mpp-PTx-compliance-tests-errata_december_2023_draft.pdf*
- *Qi-v2.0-mpp-system-errata_december_2023_draft.pdf*

2 Acronym/Abbreviation Glossary

MPP	Magnetic Power Profile
TPR	Test Power Receiver
DUT	Device Under Test
OS	Operating System
BSUT	Base Station Under Test
FPGA	Field Programmable Gate Array
API	Application Programming Interface
CTS	Compliance Test Specification
MOI	Method of Implementation
GP	Guaranteed Power
FOD	Foreign Object Detection
Power Tx or PTx	Power Transmitter
ID/Config	Identification & Configuration
RP	Received Power
Qf	Quality Factor
PRMC	Power Receiver Manufacturer Code

3 Scope of this User Guide

This User Guide serves as the primary user documentation for the GRL-C3-MP-TPR WPC Qi2 Wireless Charging Power Transmitter (PTx) Tester Hardware and Automation Test Application. The subsequent sections describe the GRL-C3-MP-TPR tester hardware initial setup as well as the features provided by the GRL-C3-MP-TPR automation test application when connected to the GRL-C3-MP-TPR tester hardware.

4 Overview of GRL-C3-MP-TPR Standard Purchase Items and Orderable Accessories

4.1 GRL-C3-MP-TPR Shipping Box Contents

SI No.	Description
1	GRL-C3-MP-TPR Tester Hardware
2	Power Adapter
3	Power Cord
4	USB Cable (Type-A to Type-B)
5	USB Cable (Type-A to mini-B)
6	Ethernet Cable
7	SMB to BNC Cable
8	SMA to BNC Cable
9	GRL-C3-TPR-MPP1 / GRL-C3-TPR-MPP4 (TPR Coil with Glass Surface)
10	GRL-C3-TPR-MPP3 (Reduced Ferrite with Glass Surface)
11	GRx Magnetic Force Testing Coil
12	GRL-C3-MP-RFO1 / RFO#MPP1A / RFO#MPP1B (Disk Radius 15mm)
13	GRL-C3-MP-RFO2 / RFO#MPP2B (Ring)
14	GRL-C3-MP-RFO3 / RFO#MPP3A / RFO#MPP3B (Foil)
15	GRL-C3-MP-RFO4 / RFO#MPP4A / RFO#MPP4B (Disk Radius 22mm)
16	GRL-C3-MP-FO-HOLDER
17	Z Spacer – 0.5mm
18	Z Spacer – 1mm
19	Z Spacer – 2mm
20	Z Spacer – 3mm
21	Thermal Data Logger & USB Cable
22	Pico Ambient Temperature Measurement Probe
23	Short Fixture

24	Short Fixture Cable Board
25	Positioning Tool
26	Thermal Puck



GRL-C3-MP-TPR – WPC Qi2 Wireless Charging Power Transmitter [PTx] Tester



Power Adapter



USB Cable – Standard USB Type-A to Type-B Programming cable used to update the GRL-C3-MP-TPR firmware. Connects to the GRL-C3-MP-TPR upgrade USB port.



Ethernet Cable – 3m Cat 5 cable to connect the GRL-C3-MP-TPR test controller to the control computer.



SMB to BNC Cable – Standard SMB to BNC cable used to connect the oscilloscope channels to the SENSE connectors (V_RECT/AC1/AC2) on the GRL-C3-MP-TPR test controller.

**SMA to BNC Cable****GRL-C3-TPR-MPP1 / GRL-C3-TPR-MPP4 (TPR Coil with Glass Surface)****GRL-C3-TPR-MPP3 (Reduced Ferrite with Glass Surface)****GRx Magnetic Force Testing Coil****E-Load Firmware Update Cable****PicoScope 8-Channel Temperature Datalogger - ThermoMux**



GRL-C3-MP-RFO1 / RFO#MPP1A / RFO#MPP1B (Disk Radius 15mm)



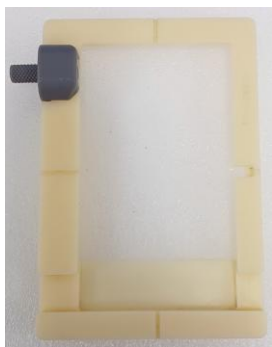
GRL-C3-MP-RFO2 / RFO#MPP2B (Ring)



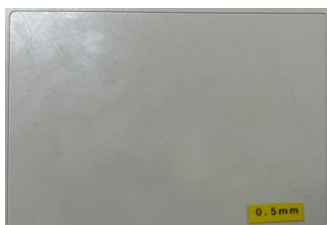
GRL-C3-MP-RFO3 / RFO#MPP3A / RFO#MPP3B (Foil)



GRL-C3-MP-RFO4 / RFO#MPP4A / RFO#MPP4B (Disk Radius 22mm)



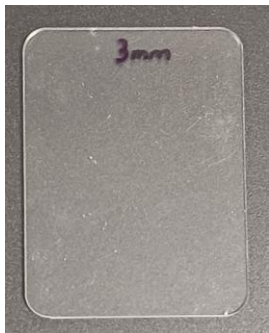
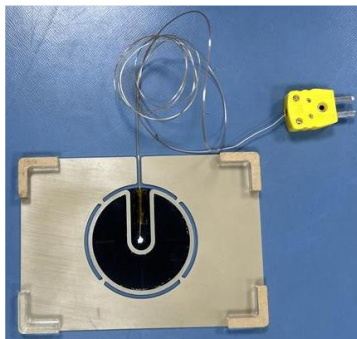
Foreign Object Holder



0.5mm Spacer



1mm Spacer

**2mm Spacer****3mm Spacer****Positioning Tool****Thermal Puck**

5 Getting Started with GRL-C3-MP-TPR

This section describes how to get started with the GRL-C3-MP-TPR test solution for Qi MPP Specification compliance testing. Whether you are installing 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-C3-MP-TPR automation test application on the host computer (laptop or desktop) connected to the GRL-C3-MP-TPR tester hardware. It is recommended that the host computer supports the Intel Core i7 processor and 8GB RAM with Google Chrome version 80.0.3987.122 or above (64-bit) for the application to run properly. Make sure to clear the browser cache before launching the GRL-C3-MP-TPR application.
2. Make sure the GRL-C3-MP-TPR tester firmware has been updated to the latest version. Refer to Section 7.

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

5.1 Install GRL-C3-MP-TPR Application

1. Download the GRL-C3-MP-TPR application from <http://grlps.com/download-center/>.
2. Run the installer by double clicking the extracted executable (`GRL_GRL-C3-MP-TPR_App_V1x.x.exe`) and then click on the 'Next' button.

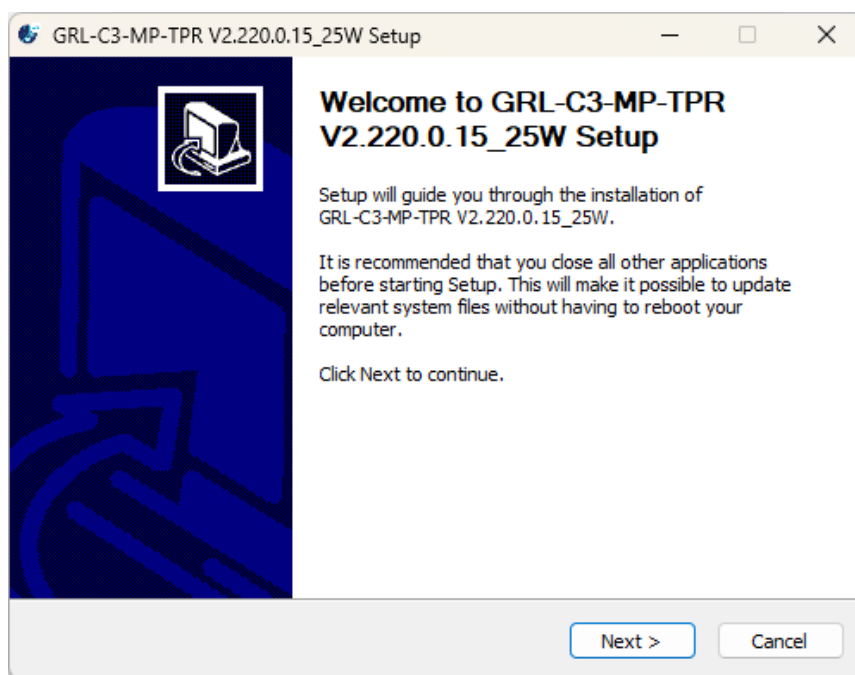


FIGURE 5.1: START GRL-C3-MP-TPR APPLICATION INSTALLATION

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

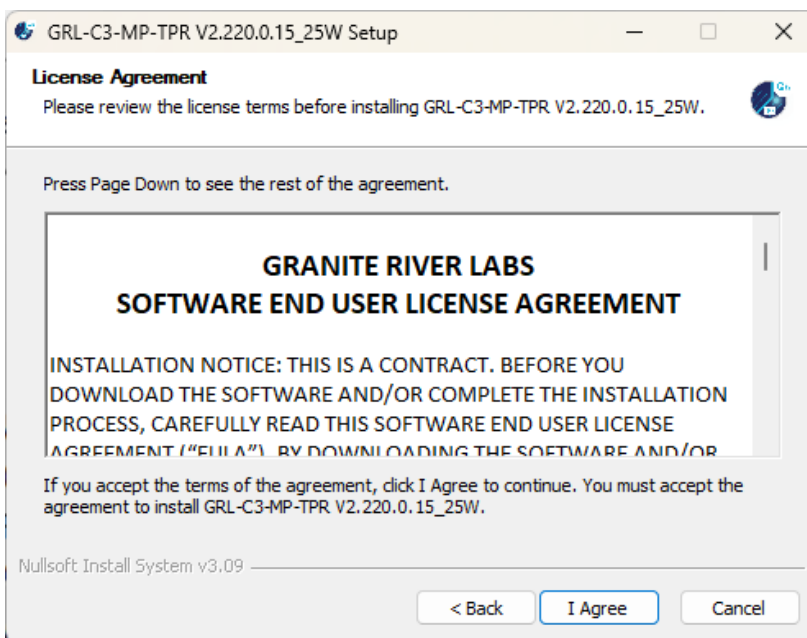


FIGURE 5.2: ACCEPT GRL-C3-MP-TPR APPLICATION LICENSE AGREEMENT

4. The software installation will then proceed.

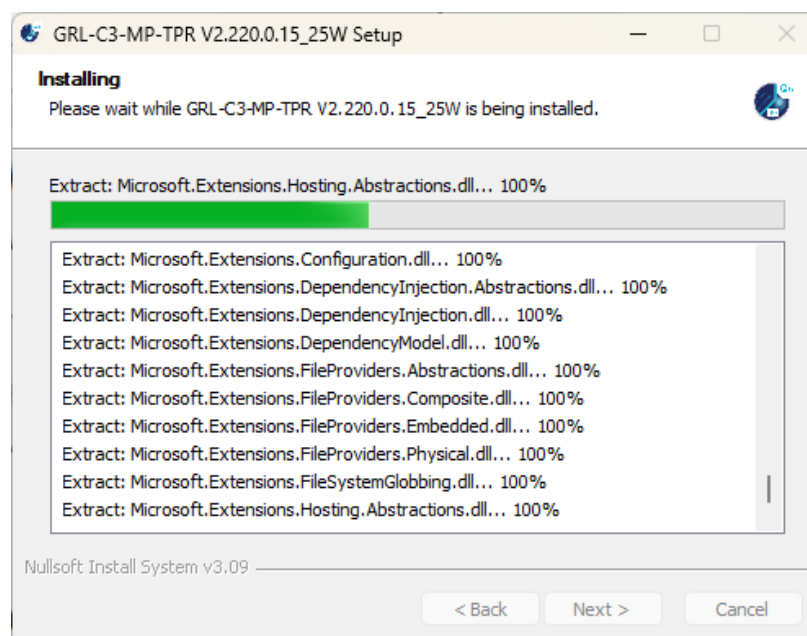


FIGURE 5.3: GRL-C3-MP-TPR APPLICATION INSTALLATION IN PROGRESS

5. Install the device driver when prompted. Click on the 'Next' button to proceed.

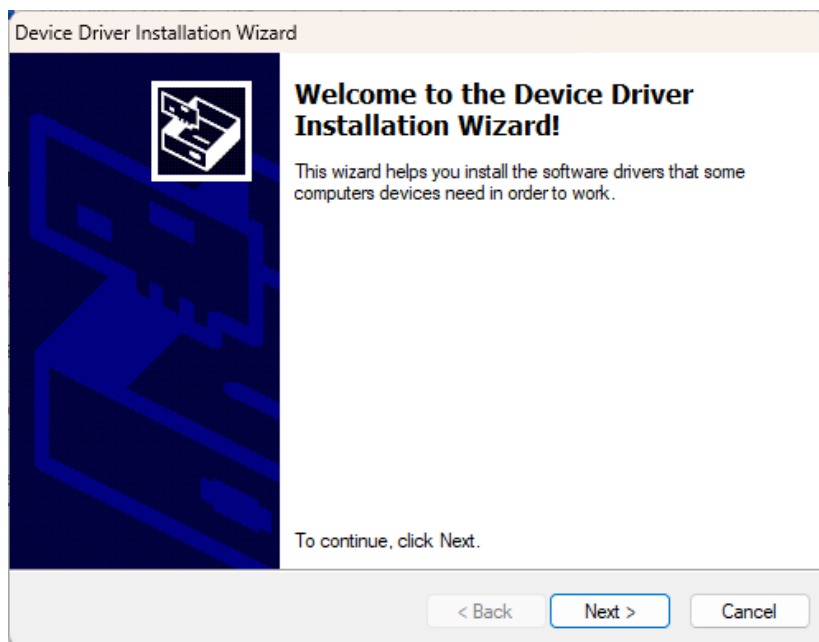


FIGURE 5.4: START GRL-C3-MP-TPR DEVICE DRIVER INSTALLATION

6. Upon completion, click on the 'Finish' button.

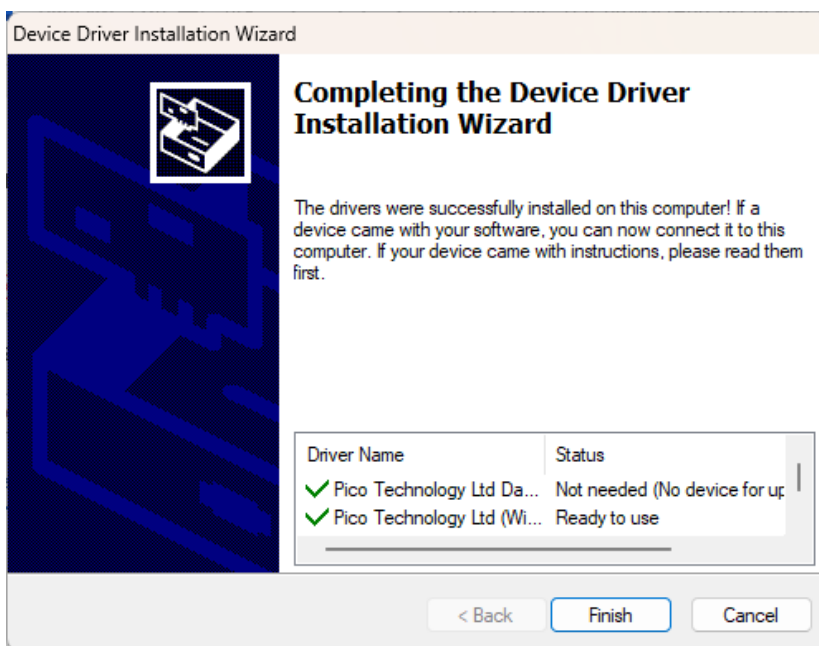


FIGURE 5.5: GRL-C3-MP-TPR DEVICE DRIVER INSTALLATION COMPLETED

7. Click on the 'Finish' button to complete the software installation.

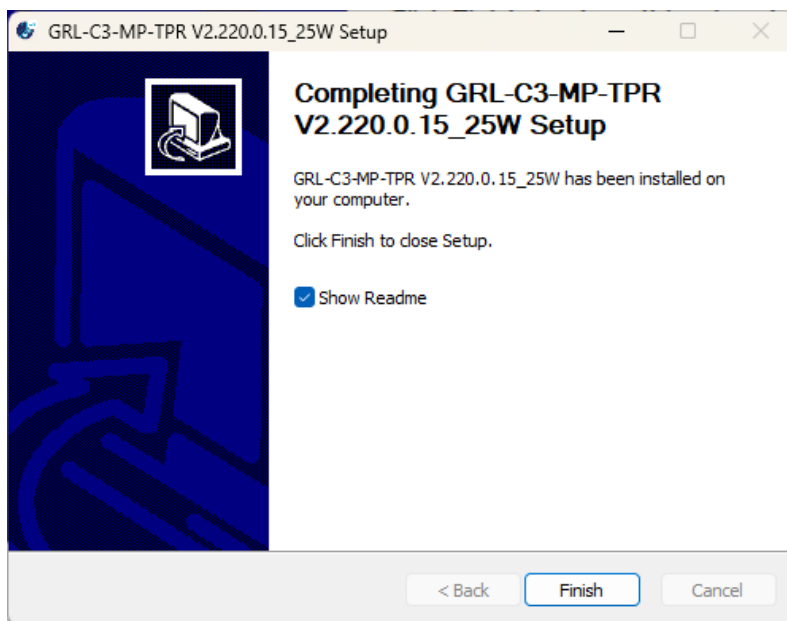


FIGURE 5.6: GRL-C3-MP-TPR APPLICATION INSTALLATION COMPLETED

8. The GRL-C3-MP-TPR application is now ready for use.

5.2 Start Up and Navigate GRL-C3-MP-TPR Application

1. Once installed, you can directly open the GRL-C3-MP-TPR application using the “**GRL-C3-MP-TPR**” application desktop shortcut. This will initiate the application server to run backend operations before launching the GRL-C3-MP-TPR application.

Note: Do not close this window except when you need to exit from the GRL-C3-MP-TPR application.

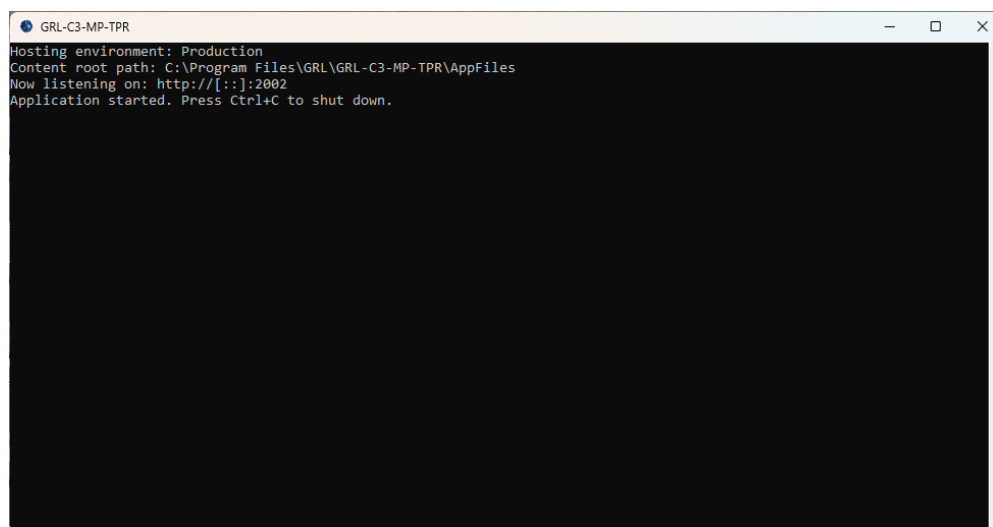


FIGURE 5.7: APP SERVER SCREEN RUNNING BACKEND OPERATIONS

2. The GRL-C3-MP-TPR 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 host PC Windows software:3003/* (for example, *http://192.168.3.241:3003/*).

3. The GRL-C3-MP-TPR application when launched will display “Connection Setup” as the landing screen as follows:

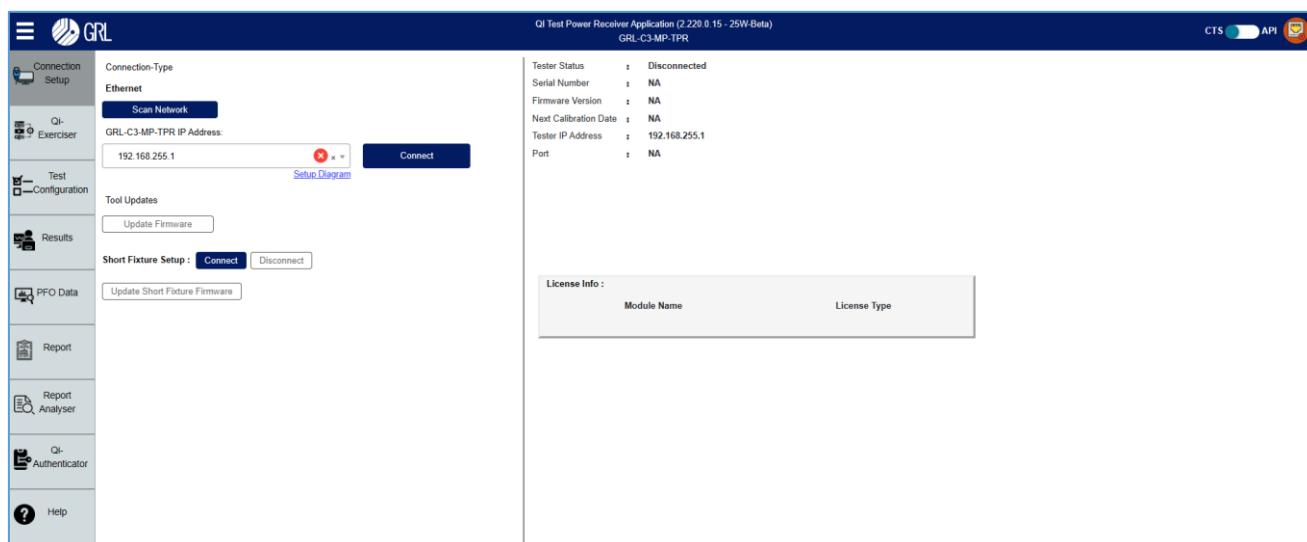


FIGURE 5.8: GRL-C3-MP-TPR APPLICATION LANDING SCREEN

This screen allows you to set up connection between the GRL-C3-MP-TPR application and the GRL-C3-MP-TPR Tester hardware as well as performing firmware/software updates. More details are provided in Section 7.

5.2.1 Using GRL-C3-MP-TPR Application in Chrome OS

Note: Make sure that the GRL-C3-MP-TPR tester hardware is connected to a control PC running Windows 10.

1. Install the GRL-C3-MP-TPR application on a Windows 10 control PC connected to the GRL-C3-MP-TPR tester hardware.
2. Once installed, open the GRL-C3-MP-TPR application using the **GRL-C3-MP-TPR** desktop shortcut.
3. Open a new Chrome browser tab in Chrome OS and navigate to *http://IP address of host PC Windows software:3003/* (for example, *http://192.168.3.241:3003/*).

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 5.9 below for an illustration of the above steps.

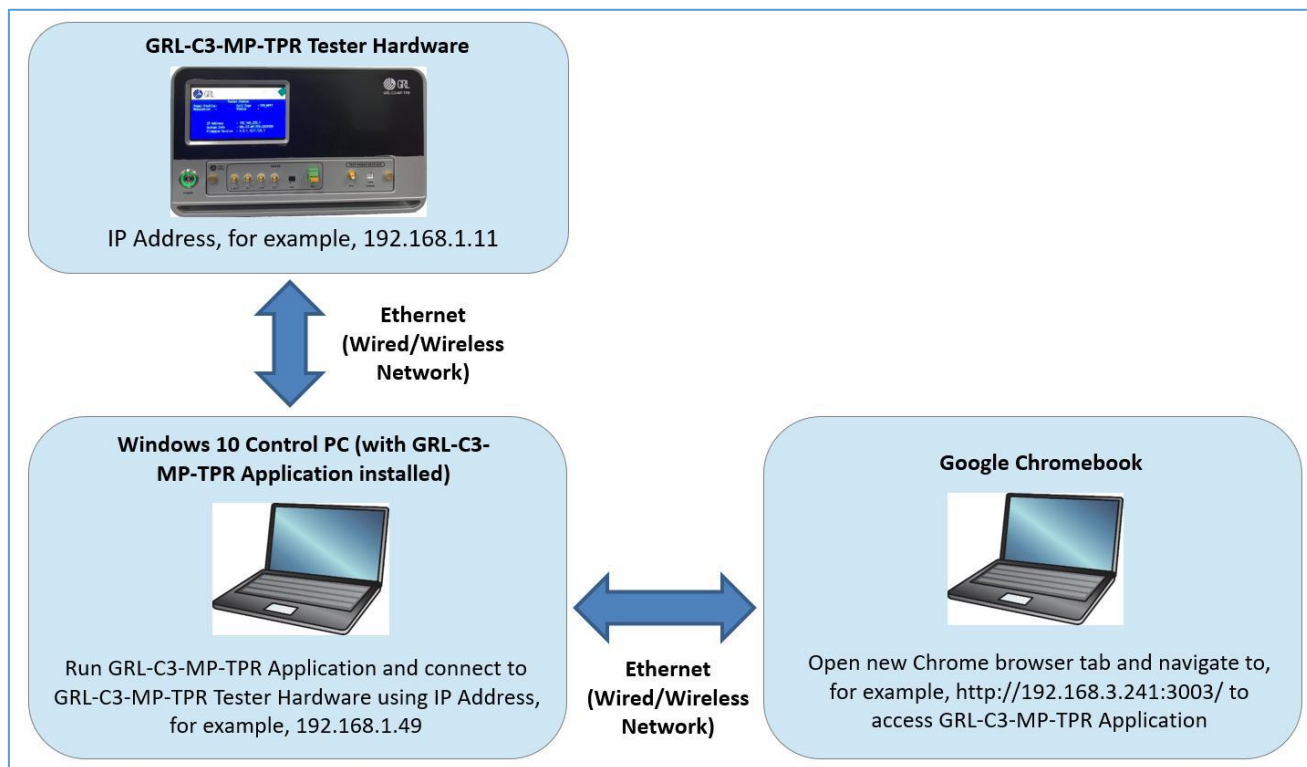


FIGURE 5.9: USING GRL-C3-MP-TPR APPLICATION IN CHROME OS

5.2.2 Using GRL-C3-MP-TPR Application in macOS

Note: Make sure that the GRL-C3-MP-TPR tester hardware is connected to a control PC running Windows 10.

1. Install the GRL-C3-MP-TPR application on a Windows 10 control PC connected to the GRL-C3-MP-TPR tester hardware.
2. Once installed, open the GRL-C3-MP-TPR application using the **GRL-C3-MP-TPR** desktop shortcut.
3. Open a new Chrome browser tab in macOS and navigate to *http://IP address of host PC Windows software:3003/* (for example, <http://192.168.3.241:3003/>).

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 5.10 below for an illustration of the above steps.

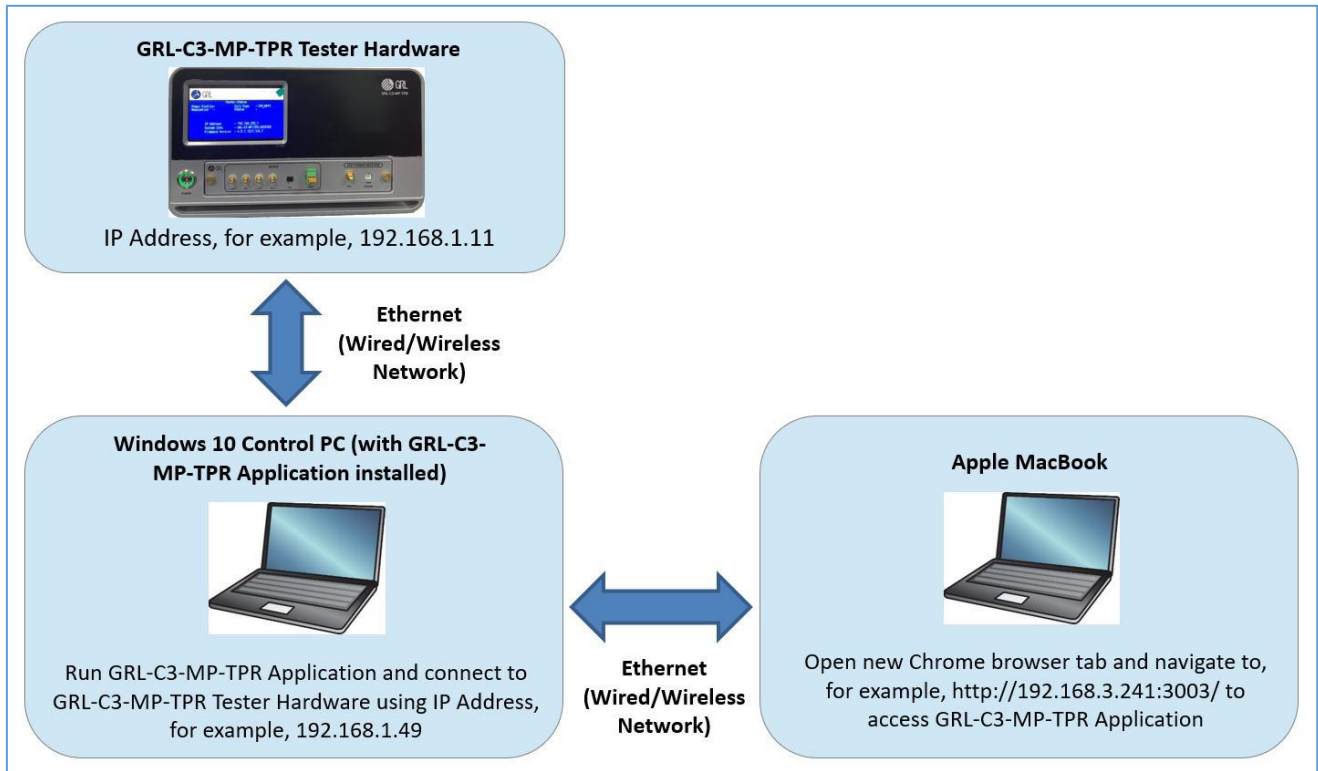


FIGURE 5.10: USING GRL-C3-MP-TPR APPLICATION IN MACOS

6 Connection and Setup of GRL-C3-MP-TPR Tester Hardware

Figure 6.1 below shows an example setup for testing a Qi MPP based power transmitter DUT.

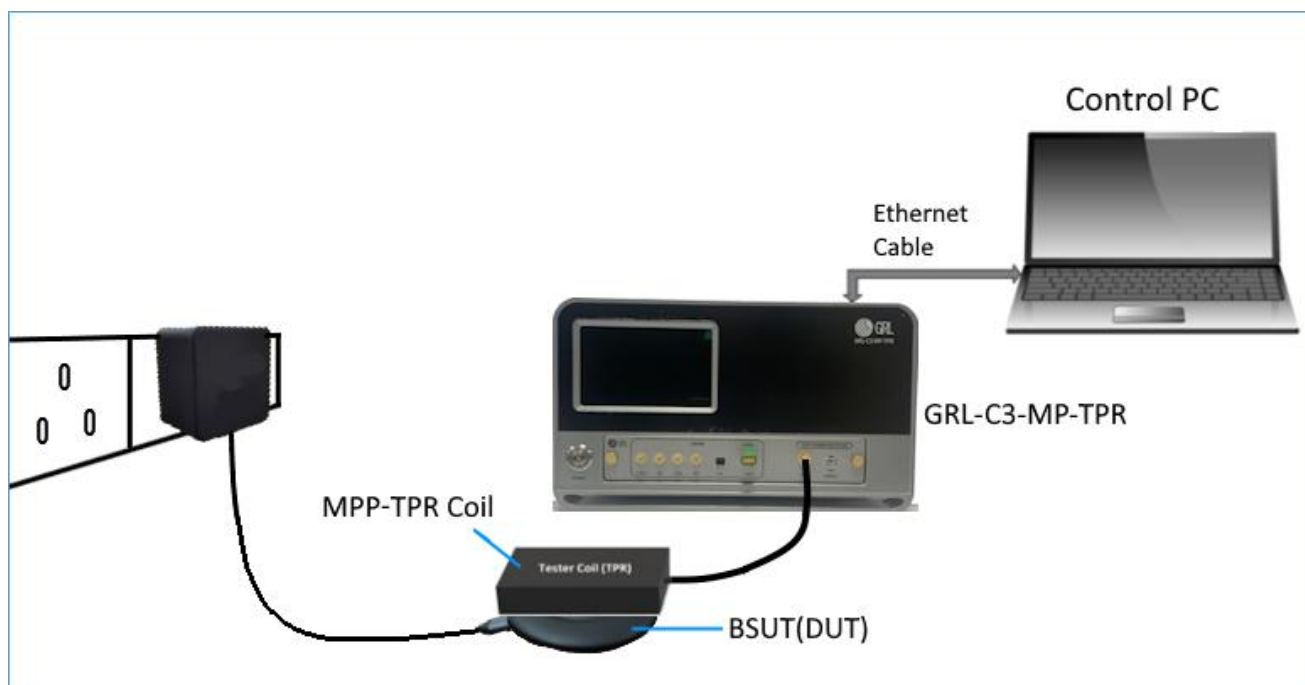


FIGURE 6.1: GRL-C3-MP-TPR HARDWARE SETUP FOR QI MPP BASED PTx DUT

The GRL-C3-MP-TPR application installed on a Windows 10 (or higher) computer automates the testing process. Below is a procedure for connecting the hardware and verifying proper hardware connections.

1. Connect power supply to the GRL-C3-MP-TPR tester hardware.
2. Connect the GRL-C3-MP-TPR tester hardware using a physical Ethernet connection between the control computer and the tester.
3. Connect the Base Station under test (BSUT) / DUT to a power outlet.
4. Connect the MPP Test Power Receiver (TPR) coil to the “Coil” connector on the GRL-C3-MP-TPR tester hardware. Place the MPP-TPR coil on the BSUT / DUT.

6.1 Connect Power Supply to GRL-C3-MP-TPR Tester Hardware

Connect the GRL-C3-MP-TPR Power interface using the Power Brick included with the tester hardware.



FIGURE 6.2: GRL-C3-MP-TPR POWER INTERFACE

6.2 Connect Ethernet Cable and Turn On GRL-C3-MP-TPR 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 6.3: GRL-C3-MP-TPR ETHERNET CONNECTOR

Turn on the GRL-C3-MP-TPR tester hardware using the Power On/Off button on the front of the tester as shown in Figure 6.4.



FIGURE 6.4: GRL-C3-MP-TPR POWER BUTTON

Note: Ensure that the **I_RECT** connector is attached to the GRL-C3-MP-TPR tester hardware before running tests, as shown below.

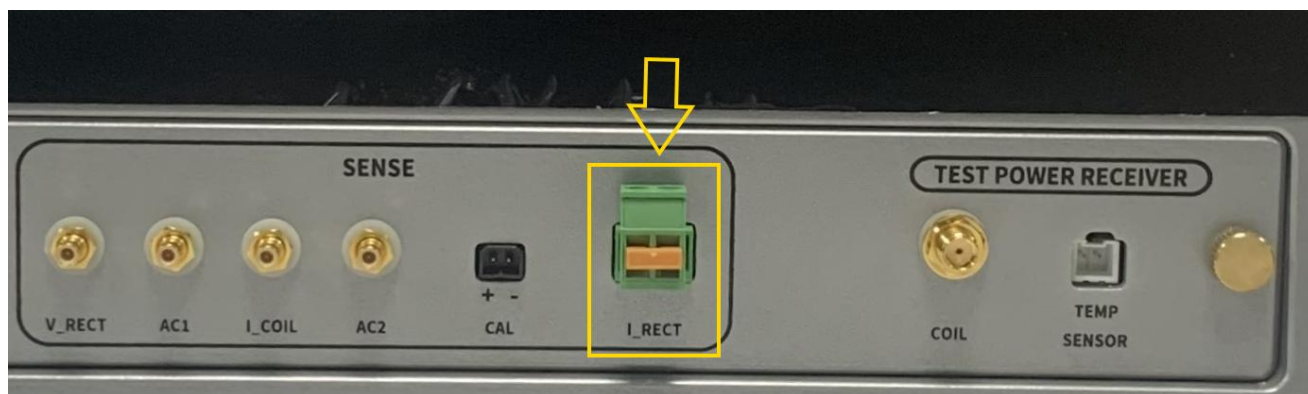


FIGURE 6.5: I_RECT CONNECTOR

6.2.1 Verify GRL-C3-MP-TPR Tester Hardware Ethernet Connection

The Ethernet port on the control computer needs to be configured correctly for the GRL-C3-MP-TPR 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.

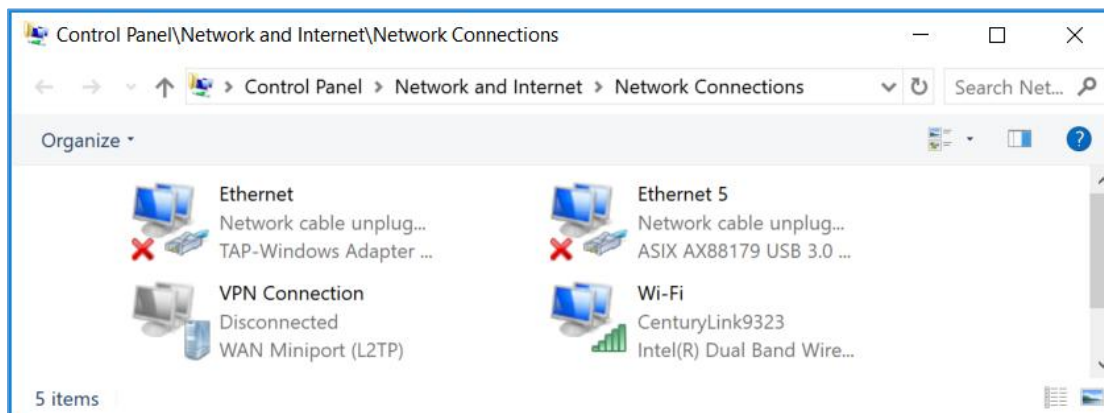


FIGURE 6.6: NETWORK CONNECTIONS BEFORE CONNECTING GRL-C3-MP-TPR

Open the Ethernet panel for the Ethernet port that will connect to the GRL-C3-MP-TPR tester hardware, select “Internet Protocol Version 4 (TCP/IPv4)” and click on the “Properties” button below and to the right.

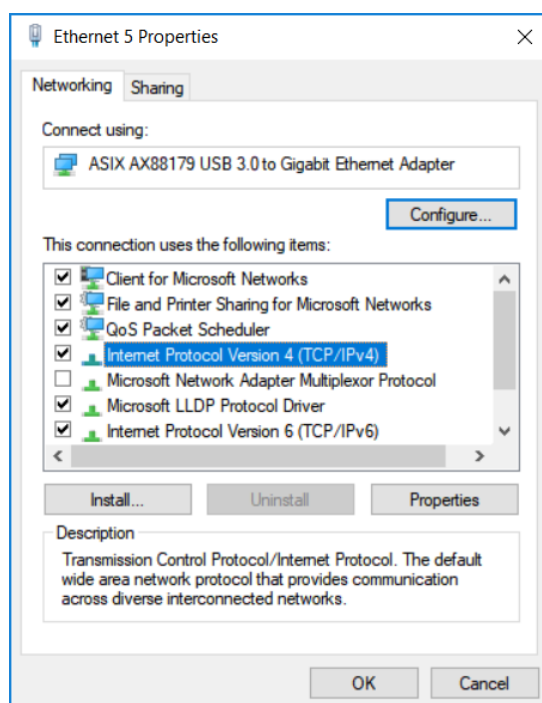


FIGURE 6.7: ETHERNET PROPERTIES

Set up the TCP/IPv4 properties as shown below.

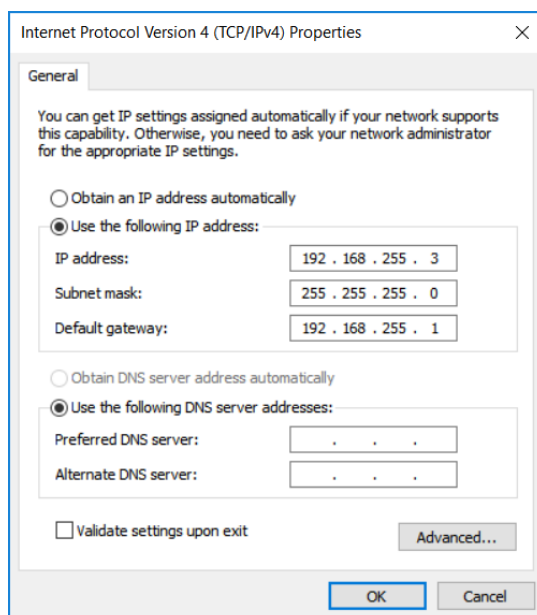


FIGURE 6.8: ETHERNET PROPERTIES WITH TCP/IPV4 SELECTED

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-C3-MP-TPR tester hardware is powered on and completely booted up (front panel display shows firmware version number) and then connect the Ethernet cable from the GRL-C3-MP-TPR tester hardware to the computer’s Ethernet port that was just set up. The network connections window should now look as pictured in Figure 6.9 below:

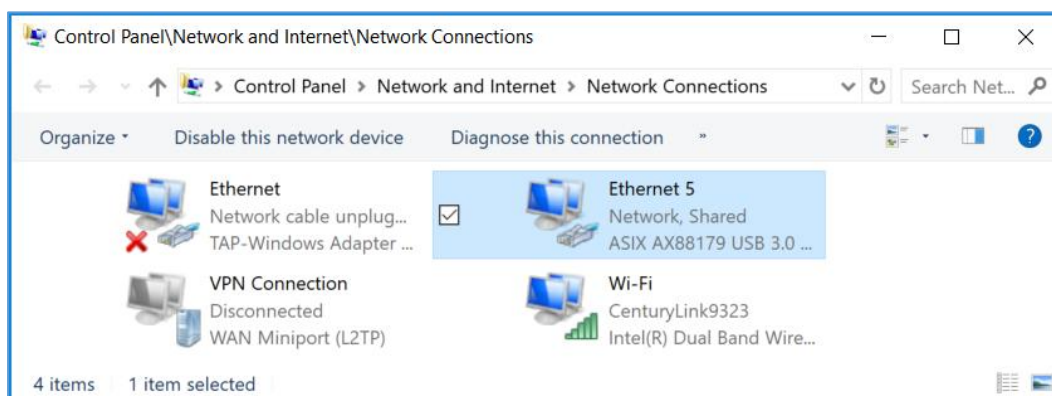


FIGURE 6.9: NETWORK CONNECTIONS AFTER SETUP AND CONNECTION OF GRL-C3-MP-TPR

The GRL-C3-MP-TPR 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-C3-MP-TPR are communicating by going to the “Connection Setup” screen

on the GRL-C3-MP-TPR application and clicking on the “Connect” button. The tester status should display “Connected”. Refer to Section 7 for more information.

6.3 Connect Oscilloscope to GRL-C3-MP-TPR Tester Hardware

An external oscilloscope can be connected to the GRL-C3-MP-TPR tester hardware to perform measurements. The GRL-C3-MP-TPR currently supports oscilloscope measurements with the Tektronix DPO7000 and PicoScope 6403D oscilloscopes.

Connect the oscilloscope channels to the SENSE connectors (V_RECT/AC1/AC2) on the front of the GRL-C3-MP-TPR tester hardware as indicated below using the SMB cable.



FIGURE 6.10: OSCILLOSCOPE TO GRL-C3-MP-TPR CONNECTIONS

The user can use the default oscilloscope configuration file, “TekScope Settings” which is available with the GRL-C3-MP-TPR application to load into the TekScope to perform measurements. This config file is located in C:\GRL\GRL-C3-MP-TPR\TekScopeSettings on the control computer.

6.4 Connect MPP-TPR Coil to GRL-C3-MP-TPR Tester Hardware

Connect the MPP-TPR coil to the “Coil” connector as shown in below example:

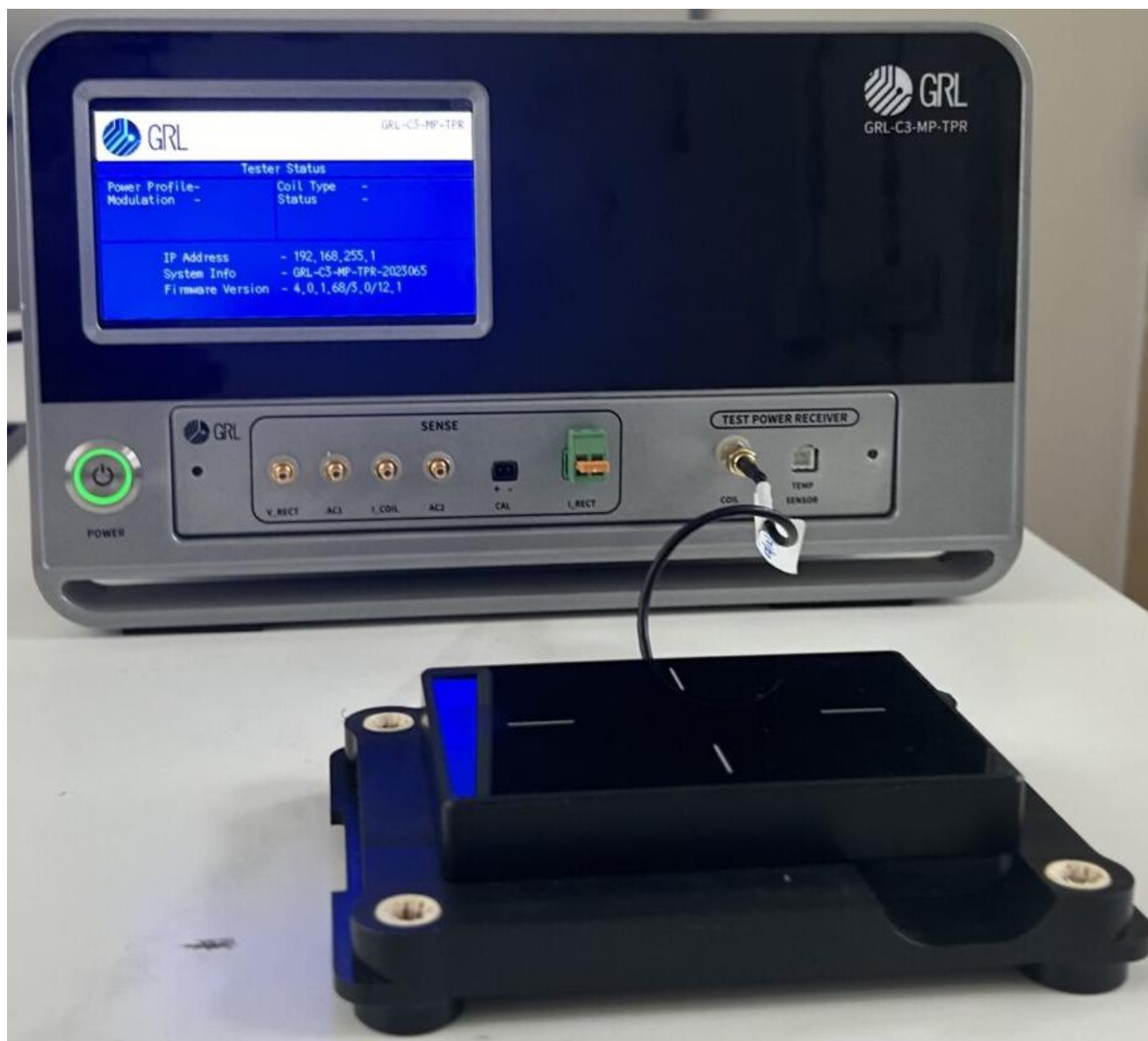


FIGURE 6.11: MPP-TPR COIL TO GRL-C3-MP-TPR CONNECTION

Note: Make sure to place the MPP-TPR coil on the DUT connected to a power outlet to perform testing.

6.5 Rx Coil Handling and Connection Guidelines

Make sure to read, follow and adhere to the following guidelines when handling the Rx coil.

1. **Avoid Lifting by the Cable:**

Always lift the Rx coil by its body. Do not pull or lift it using the cable, as this may cause internal damage or affect performance.

2. **Check for Cable Twisting:**

While connecting the Rx coil to the GRL-C3-MP-TPR tester hardware or LCR jig, inspect the cable for any twists. If the cable is twisted, gently straighten it before proceeding to ensure proper operation and to avoid stress on the connectors.

3. **Align SMA Connectors Correctly:**

Carefully align the SMA connector of the GRL-C3-TPR-MPP coil with the corresponding mating connector on either the GRL-C3-MP-TPR tester hardware or the LCR test jig. Do not force the connection as misalignment may damage the connectors.

4. **Hand-Tighten with Care:**

Thread the connector onto the mating part and hand-tighten until resistance is felt. Avoid over-tightening during this step to prevent thread damage.

5. **Use the Correct Tool:**

Once hand-tightened, place the SMA torque wrench firmly over the connector. Ensure the wrench is fully seated to avoid slipping or rounding off the connector edges.

6. **Apply the Specified Torque:**

Rotate the wrench clockwise, applying torque to the connector. Tighten until the wrench "clicks", indicating the correct torque of 3.98 in-lbs (0.45 Nm) has been reached. Stop immediately after hearing or feeling the click.

7. **Avoid Side Load on Cables:**

Ensure the cable remains free from tension or bending stress during and after connection. Route cables cleanly to avoid pulling on the connectors.

8. **Handle SMA Connectors with Care:**

Always keep the SMA connector ends clean and capped when not in use. Inspect for debris or wear before each use to maintain signal integrity.

9. **Use Proper ESD Precautions:**

When handling the coil or connecting to test equipment, follow ESD safety guidelines to prevent electrostatic discharge damage.

10. **Store Coils Properly After Use:**

Place coils in protective cases or designated holders to avoid physical or environmental damage when not in operation.

7 Connection and Setup of GRL-C3-MP-TPR Application

Note: The following procedure assumes that the GRL-C3-MP-TPR tester hardware has been properly set up as described above.

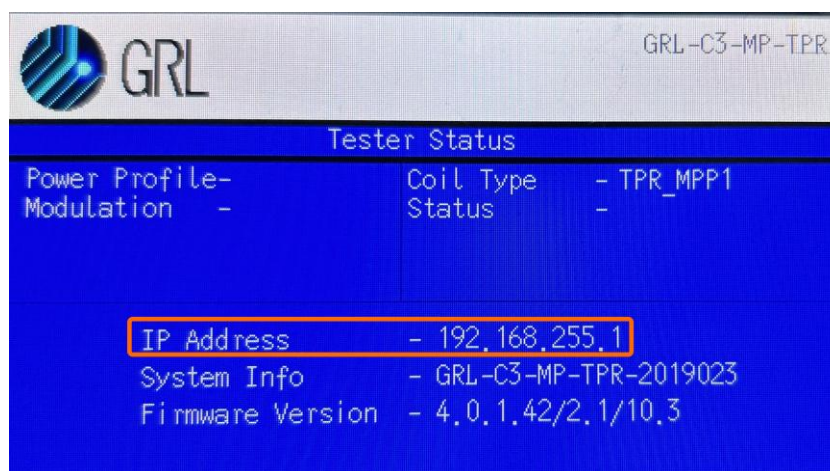
To connect the GRL-C3-MP-TPR application with the GRL-C3-MP-TPR tester hardware using a dynamic IP address, do the following:

1. Connect one end of the Ethernet cable to the Ethernet port at the back of the GRL-C3-MP-TPR tester hardware as indicated in Figure 7.1 below. Connect the other end of the Ethernet cable to an available LAN port.



FIGURE 7.1: CONNECT ETHERNET CABLE TO GRL-C3-MP-TPR ETHERNET PORT

2. After the Ethernet connection has been successfully established, power cycle and restart the GRL-C3-MP-TPR tester hardware.
3. On the GRL-C3-MP-TPR application landing page (“Connection Setup” screen), enter the IP address as displayed on the GRL-C3-MP-TPR tester hardware screen and click on the **Connect** button. You can also click on the **Scan Network** button to detect all available GRL-C3-MP-TPR tester hardware connected to the same network.



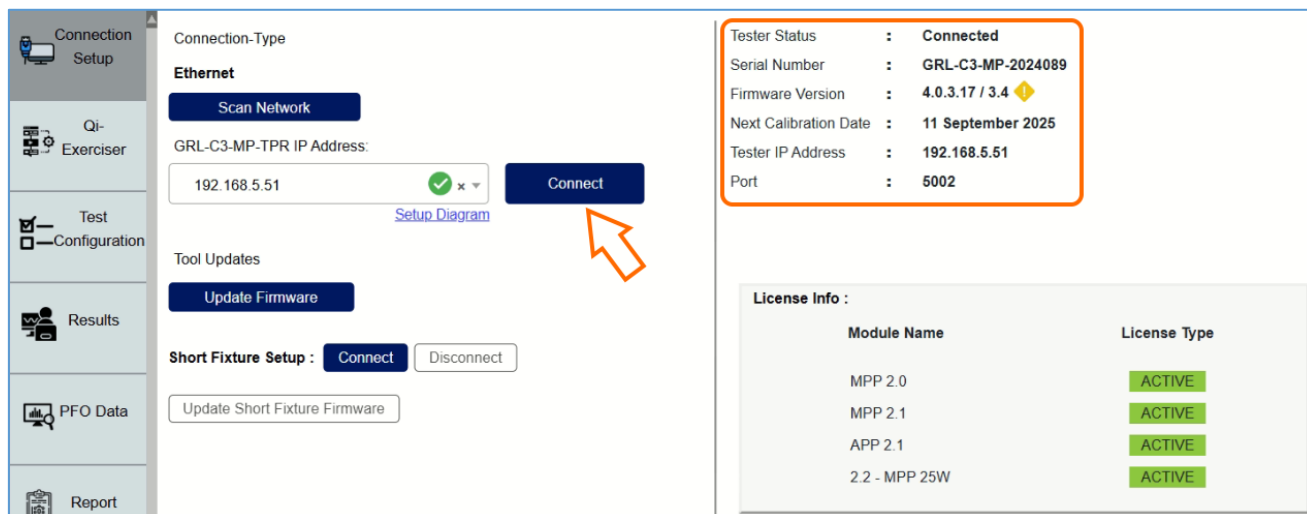


FIGURE 7.2: CONNECTION CONFIGURATION SCREEN AFTER SUCCESSFUL CONNECTION

4. Once the dynamic IP address is verified successfully, the GRL-C3-MP-TPR tester hardware and application should now be connected as indicated by the tester information display (“Tester Status”, “Serial Number”, “Firmware Version”, etc.). You can now proceed with test configuration and execution.
5. Optionally you can also select “[Setup Diagram](#)” below the IP address field to display the test setup connection diagram. This shows how to attach the TPR coil to the GRL-C3-MP-TPR tester hardware before placing the coil on the DUT and also shows how to connect the tester hardware to the control computer via Ethernet.

Along with each GRL-C3-MP-TPR application revision, a new version of FPGA firmware and E-Load code is provided. Use the following procedure to update the GRL-C3-MP-TPR tester hardware’s FPGA and E-Load firmware.

6. Click on the **Update Firmware** button to update the GRL-C3-MP-TPR tester hardware’s FPGA and E-Load firmware. Clicking on this button causes a set of instructions to appear to guide you through the entire updating process. Follow the instructions to perform the updates accordingly.

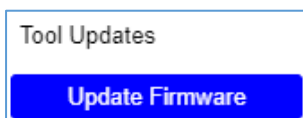


FIGURE 7.3: UPDATE GRL-C3-MP-TPR FIRMWARE BUTTON

7.1 Update GRL-C3-MP-TPR Tester Hardware's Firmware

Follow the steps below to perform firmware update for the GRL-C3-MP-TPR tester hardware:

1. Click on the **Update Firmware** button and the following pop-up message will appear (Figure 7.4 below).
 - Using a standard USB Type-A to Type-B cable, connect the USB Type-B port (for firmware update as indicated in the image) at the back of the GRL-C3-MP-TPR tester hardware to the control PC (where the GRL-C3-MP-TPR application is running). When connected, click “Ok” to proceed.

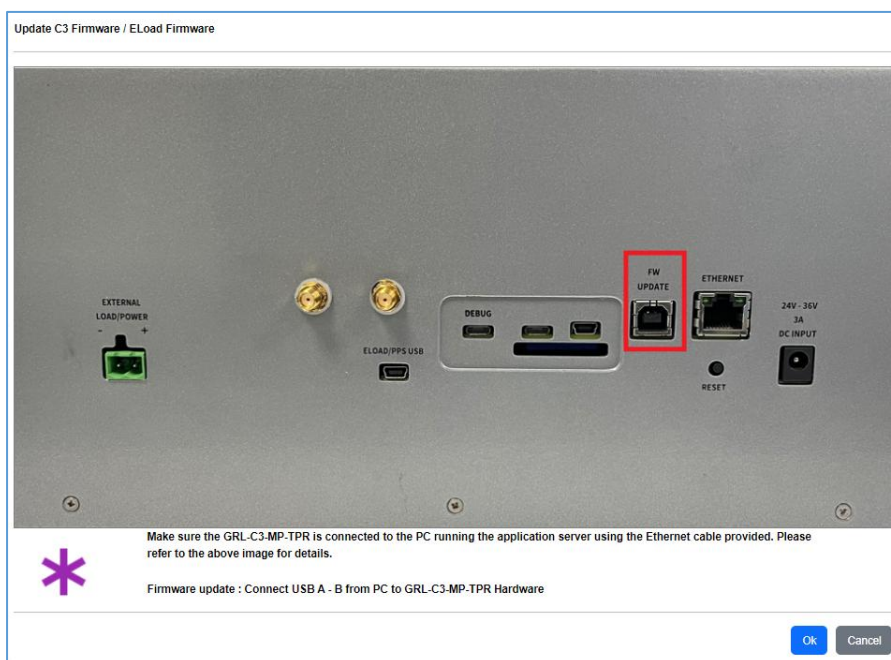


FIGURE 7.4: UPDATE GRL-C3-MP-TPR FIRMWARE– #1

2. The firmware update process will start and may take a few minutes to complete (Figure 7.5 below).

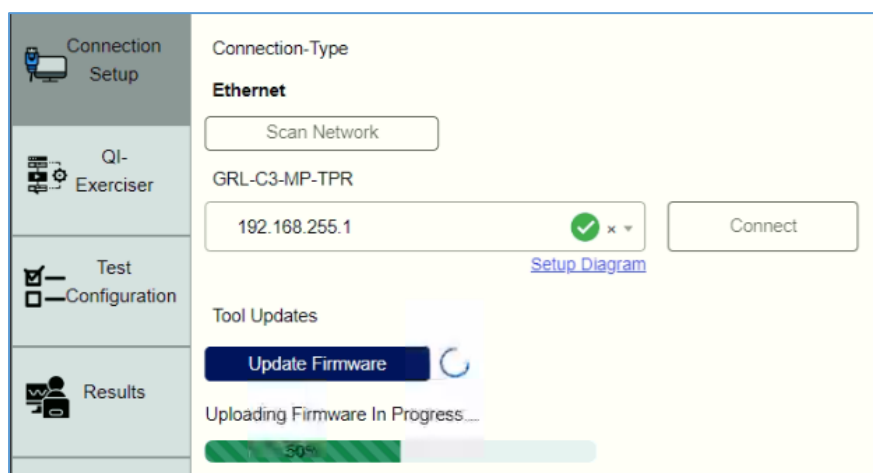


FIGURE 7.5: UPDATE GRL-C3-MP-TPR FIRMWARE– #2

3. A pop-up message will appear when the firmware update process has completed successfully (Figure 7.6 below). Click “Ok” to proceed with E-Load firmware update for the GRL-C3-MP-TPR tester hardware.

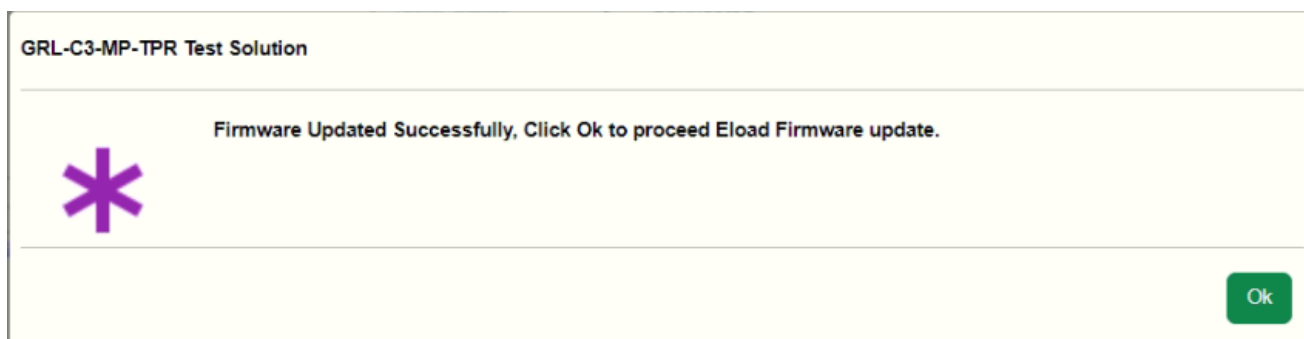


FIGURE 7.6: UPDATE GRL-C3-MP-TPR FIRMWARE– #3

4. Once the E-Load firmware update process has completed successfully, click “Ok” for the GRL-C3-MP-TPR tester hardware to power cycle and reboot (Figure 7.7 below).

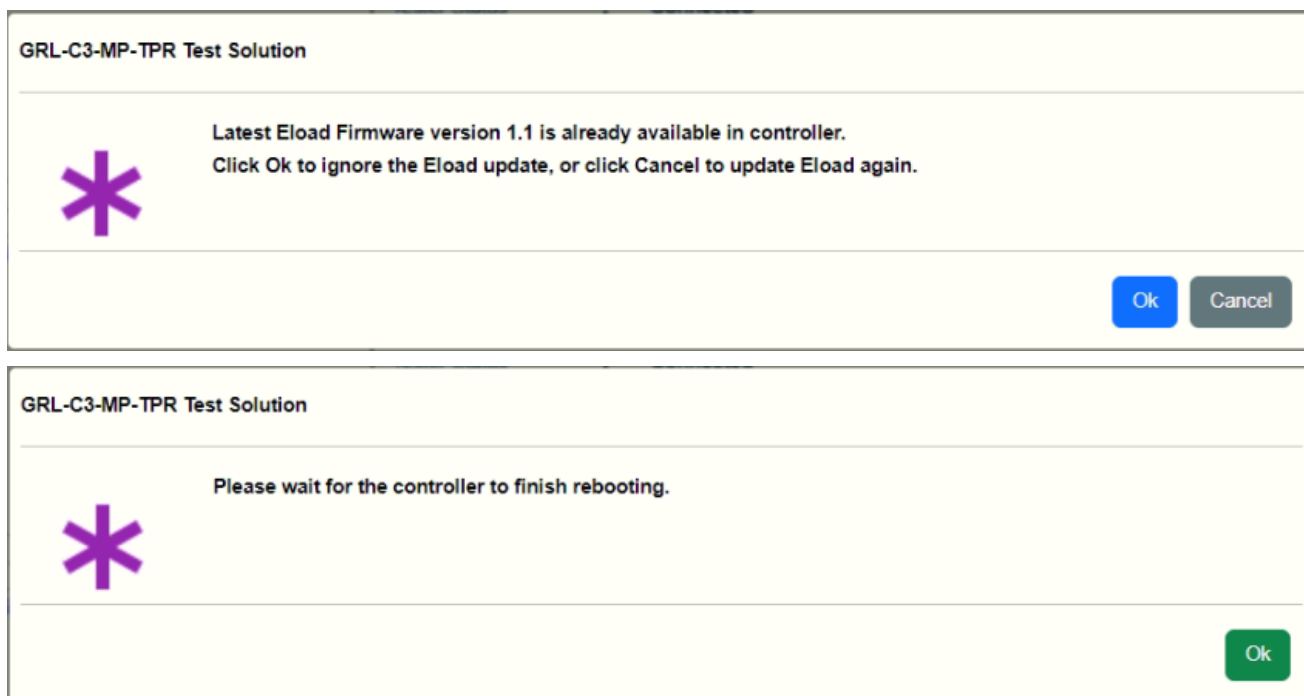


FIGURE 7.7: UPDATE GRL-C3-MP-TPR E-LOAD FIRMWARE

5. After the GRL-C3-MP-TPR tester hardware has rebooted, connect the tester to the application by clicking on the **Connect** button (Figure 7.8 below).

Connection-Type

Ethernet

[Scan Network](#)

GRL-C3-MP-TPR

192.168.255.1 

[Setup Diagram](#)

[Connect](#)

Tool Updates

[Update Firmware](#)

Tester Status : **Connected**

Serial Number : GRL-C3-MP-2023023

Firmware Version : 4.0.1.12 / 1.1

Next Calibration Date : 14 March 2024

Tester IP Address : 192.168.255.1

Port : 5002

License Info :

Module Name	License Type
MPP PTx Compliance	PERM

FIGURE 7.8: UPDATE GRL-C3-MP-TPR FIRMWARE– #5

- The GRL-C3-MP-TPR tester hardware and application should now be connected and ready for use with updated firmware.

In the event that the firmware fails to update automatically, a pop-up message will appear as shown in Figure 7.9 below. Follow the procedure as given in the pop-up message to update the firmware manually.

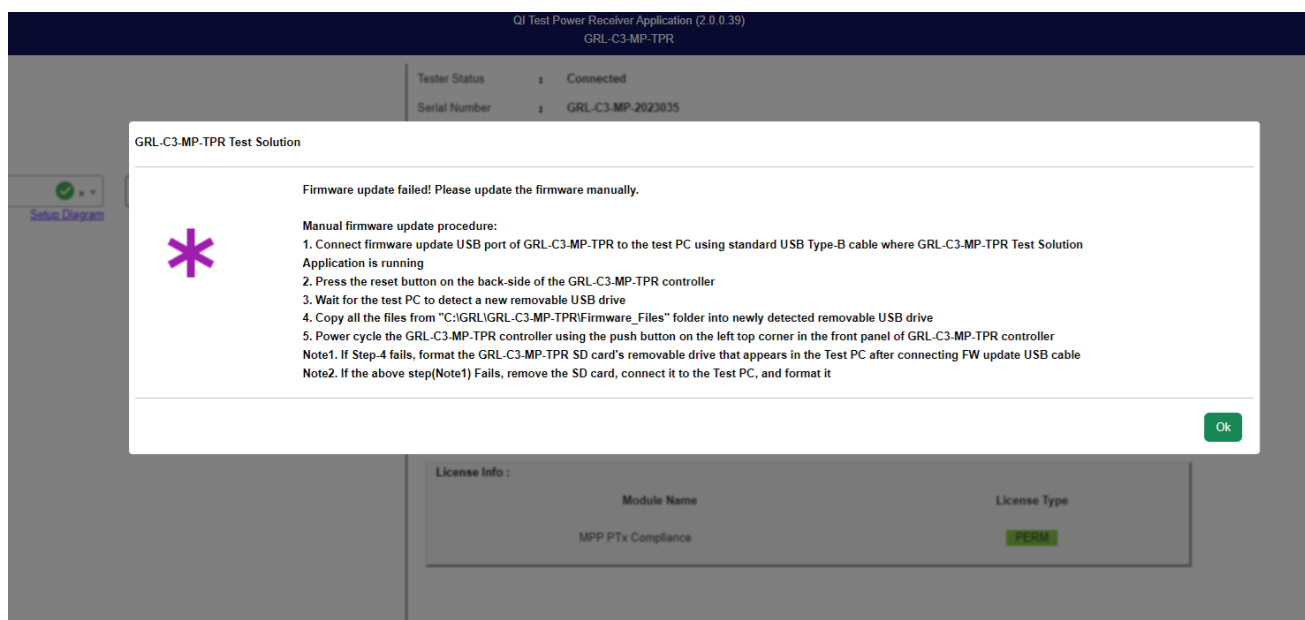


FIGURE 7.9: MANUAL GRL-C3-MP-TPR FIRMWARE UPDATE PROCEDURE

- Once the user presses on the **Reset button** at the back of the GRL-C3-MP-TPR tester (as indicated in Figure 7.10 below), the control PC should detect a new removable USB drive.



FIGURE 7.10: GRL-C3-MP-TPR RESET BUTTON

- b) Copy the files from “**C:\GRL\GRL-C3-MP-TPR\Firmware_Files**” into the newly detected removable USB drive. Refer to Figure 7.11 below.

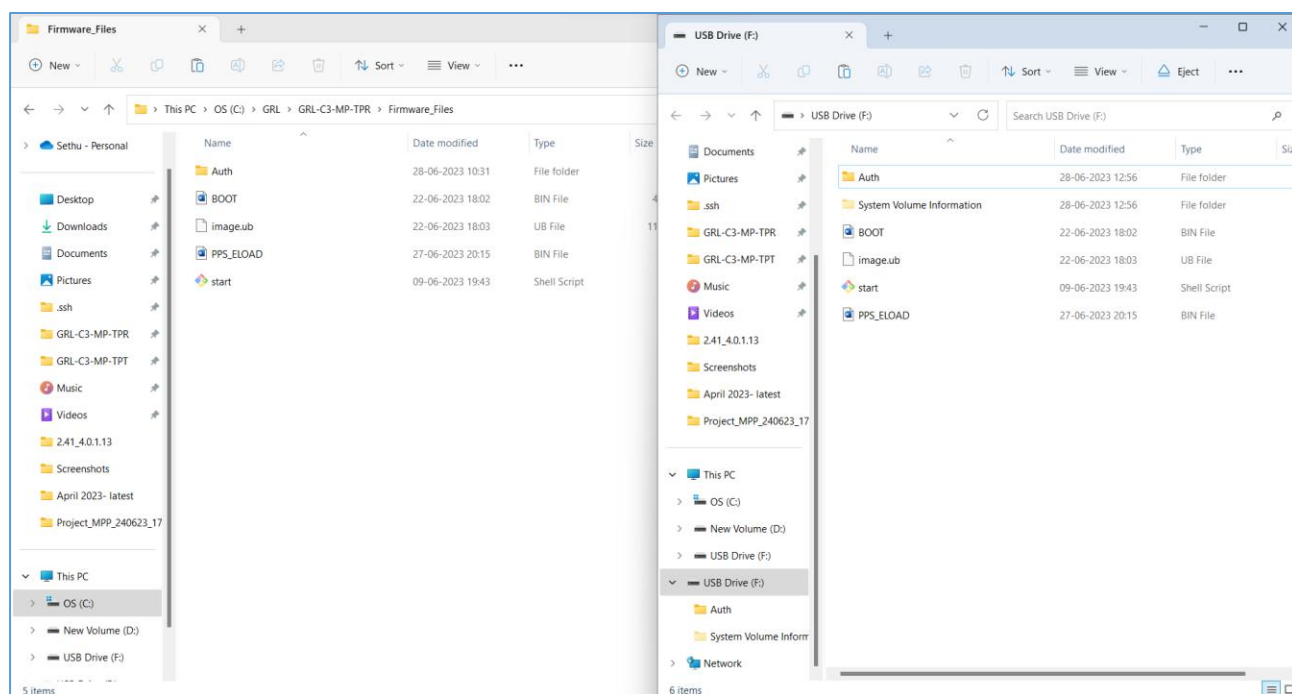


FIGURE 7.11: COPY GRL-C3-MP-TPR FIRMWARE FILES INTO REMOVABLE USB DRIVE

- c) Power cycle the GRL-C3-MP-TPR tester using the Power button on the front of the tester as shown in Figure 6.4.

Note 1: If Step (c) fails, format the GRL-C3-MP-TPR SD card's removable drive that appears in the control PC after connecting the firmware update USB cable.

Note 2: If the above step (Note 1) fails, remove the SD card, connect it to the control PC and format it.

8 Compliance Testing with GRL-C3-MP-TPR

The various screens presented by the GRL-C3-MP-TPR application allow the user to select, configure, run and generate reports from the CTS compliance tests for a variety of Qi MPP based PTx DUT's. There are also more specific controls that allow the user to perform offline analysis and debug specific DUT features and capabilities using saved waveforms.

Note: GRL-C3-MP-TPR also supports oscilloscope measurements with the Tektronix DPO7000 and PicoScope 6403D scopes.

8.1 Qi-Exerciser

The GRL-C3-MP-TPR application *Qi-Exerciser* screen allows the user to configure and test a specific sequence of Packets.

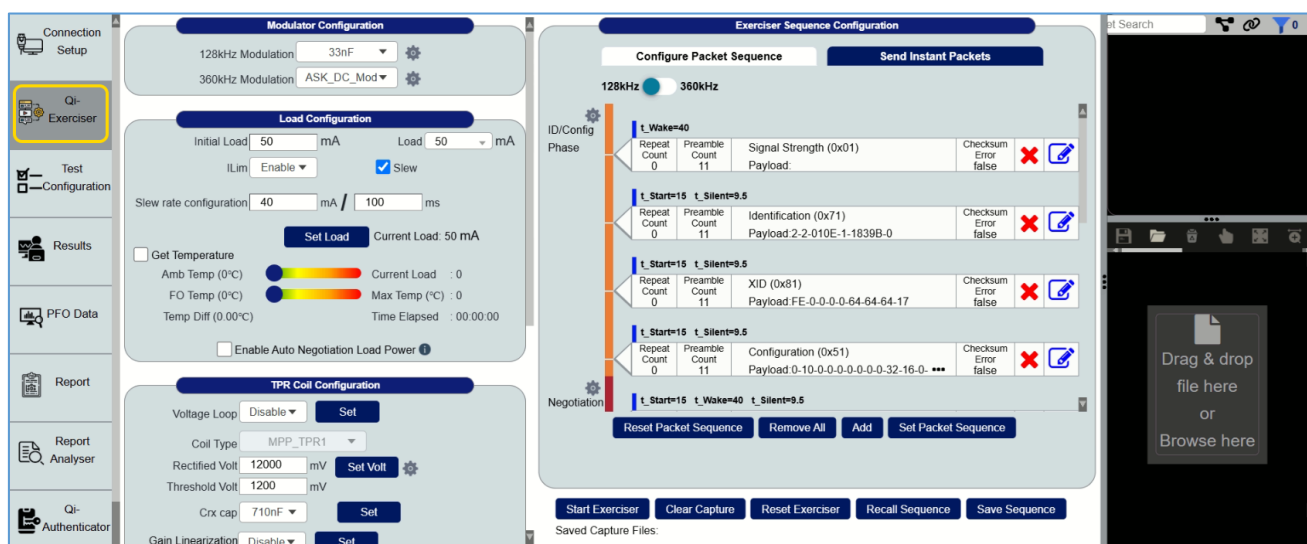


FIGURE 8.1: Qi-EXERCISER SCREEN

The following subsections describe how to set up and test the Packet sequence.

8.1.1 Configure GRL-C3-MP-TPR Tester Hardware

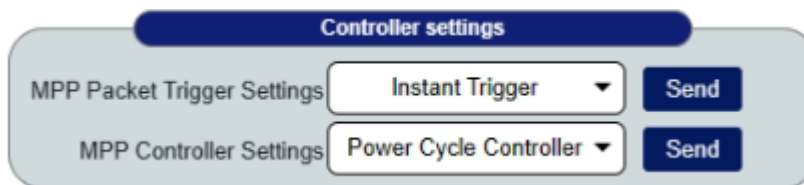


FIGURE 8.2: CONFIGURE GRL-C3-MP-TPR

- **MPP Packet Trigger Settings:** Select the type of Packet trigger for the GRL-C3-MP-TPR tester hardware by clicking on the **Send** button.
- **MPP Controller Settings:** Select to power cycle or perform a reset on the GRL-C3-MP-TPR tester hardware by clicking on the **Send** button.

8.1.2 Set Up DUT Power Transmitter Capability

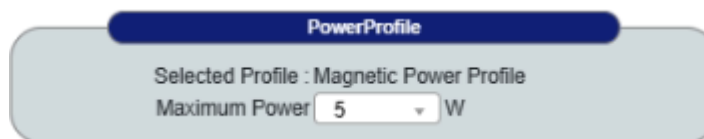


FIGURE 8.3: SELECT DUT POWER PROFILE

The **Power Profile** panel displays the Magnetic Power Profile (MPP) (up to 15W) as supported by the DUT. *Note: The displayed power profile will follow the TPR coil type in the Coil Type field (see Section 8.1.3 below).*

- **Maximum Power:** Displays the default maximum power supported by the DUT for the TPR coil in the Coil Type field (see Section 8.1.3 below). The user can also select an available power value from the drop-down list if required.

8.1.3 Select and Set Up Reference Test Power Receiver (TPR) Coil

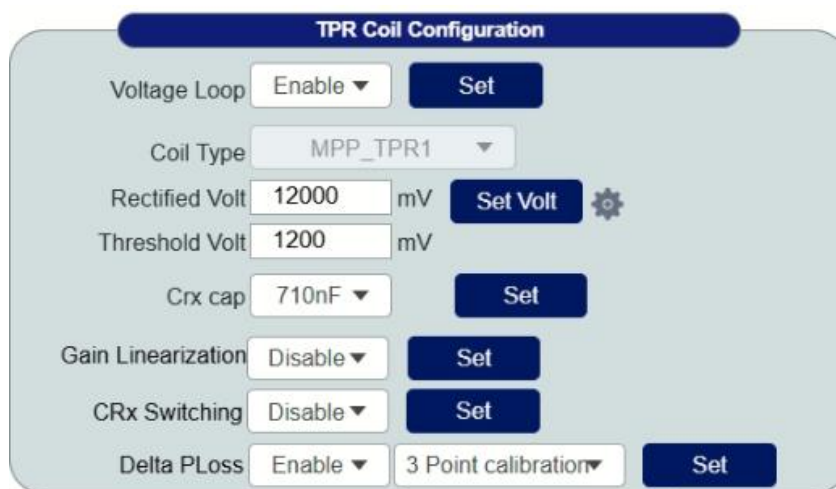
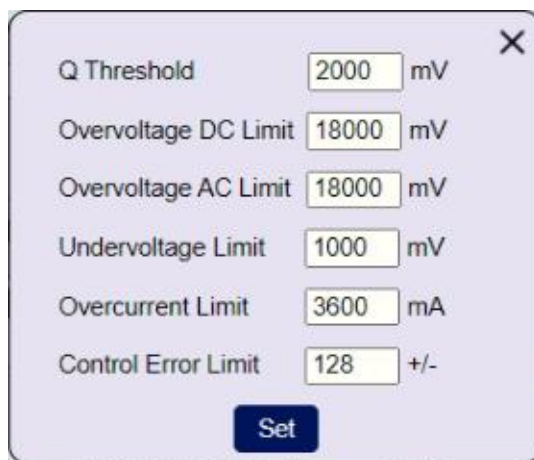


FIGURE 8.4: CONFIGURE TPR COIL

- **Voltage Loop:** Allows the user to enable or disable power from PTx to be increased or decreased quickly while still maintaining stable operation. Due to request by the PRx to increase or decrease the PTx V_{boost} voltage or inverter phase by sending the XCE packet to the PTx, the PTx will adjust the V_{in} and phase to increase or decrease the inverter drive based on the received XCE value (XCEV).
Once configured, click on the **Set** button to apply the configuration for testing.
- **Coil Type:** Displays the coil type of the reference TPR to be used that is compatible with the MPP Profile.
- **Rectified Volt:** Displays the default operating voltage for the TPR coil in the Coil Type field. The user can also enter a custom coil voltage value if required.
- **Set Volt:** Click on the Set Volt button to apply the configured voltage for testing. If required, the user can select  to configure additional parameters as follows:



Q Threshold	2000	mV
Overvoltage DC Limit	18000	mV
Overvoltage AC Limit	18000	mV
Undervoltage Limit	1000	mV
Overcurrent Limit	3600	mA
Control Error Limit	128	+/-

Set

FIGURE 8.5: CONFIGURE ADDITIONAL PARAMETERS

Click on the **Set** button to apply the above configuration for testing.

- **Threshold Volt:** Set the coil voltage limit for the TPR coil.
- **Crx cap:** Allows the user to select 710 nF or 174 nF for the resonant capacitor (Crx) tuning in MPP default power, low power and nominal power modes. The 174 nF value requires lower V_{inv} to deliver higher power but with more ZVS risk while the 710 nF value has less ZVS risk but requires higher V_{inv} to deliver power.

Once configured, click on the **Set** button to apply the configuration for testing.

- **Gain Linearization:** Allows the user to enable or disable circuit gain compensation when determining how much adjustment of voltage or phase is needed.

Once configured, click on the **Set** button to apply the configuration for testing.

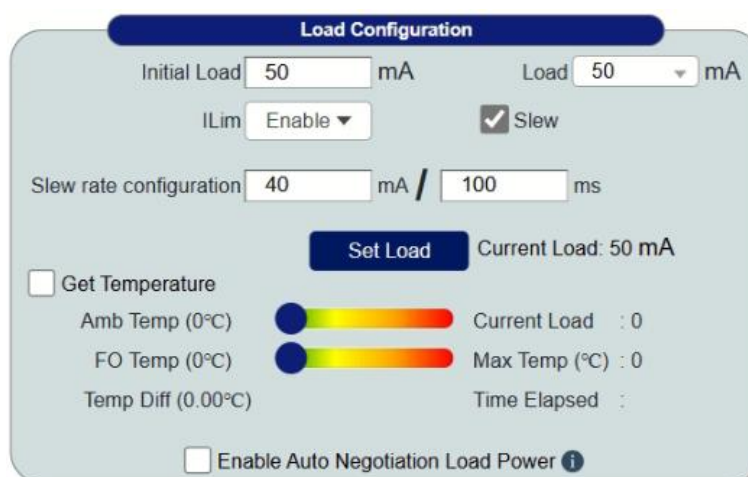
- **Crx Switching:** Allows the user to enable or disable Crx to be switched dynamically by the PRx in nominal power mode and high power mode during power transfer. Once the MPLA packet is sent, if the Crx is set to the 710 nF value, the PRx will check if it needs to switch to the 174 nF value. Likewise, if the Crx is set to the 174 nF value, the PRx will check if it needs to switch to the 710 nF value.

Once configured, click on the **Set** button to apply the configuration for testing.

- **Delta PLoss:** These drop-down fields allow the user to enable or disable the Delta PLoss ($\Delta PLOSS$) which is a method to leverage the Mated Q-Deflection's early detection of a Foreign Object, and a new calibration procedure to monitor the change in power loss estimates during power transfer. This helps to detect the presence of Foreign Objects during power transfer. Calibration is performed by collecting 3 or 4 data points across the V_{rect} and P_{rect} target range during the initial power transfer phase or at ≤ 15 W.

Once configured, click on the **Set** button to apply the configuration for testing.

8.1.4 Set Up Load Condition in Load Circuit



The screenshot shows the 'Load Configuration' panel. It includes fields for 'Initial Load' (50 mA) and 'Load' (50 mA). There is a dropdown for 'ILim' set to 'Enable' and a checked 'Slew' checkbox. The 'Slew rate configuration' is set to 40 mA / 100 ms. A 'Set Load' button is present, with 'Current Load: 50 mA' displayed next to it. Below this, there are three temperature-related fields: 'Amb Temp (0°C)', 'FO Temp (0°C)', and 'Temp Diff (0.00°C)', each with a color-coded slider. To the right of these are 'Current Load : 0', 'Max Temp (°C) : 0', and 'Time Elapsed :'. At the bottom, there is a checkbox for 'Enable Auto Negotiation Load Power' with an information icon.

FIGURE 8.6: CONFIGURE LOAD CONDITION

- **Initial Load:** Displays the default initial load resistance value for the TPR coil in the Coil Type field under the TPR Coil Configuration panel. The user can also enter a custom initial load value if required.
- **Load:** Displays the default load (with external load added) resistance value to be applied for the TPR coil in the Coil Type field under the TPR Coil Configuration panel. The user can also select/enter a custom load value if required.
- **ILim:** Allows the user to enable or disable the input current limit for the load. Usually, the input current limit has an update interval of ILIM_TIME_MIN = 100 ms. The input current limit loop does not perform any adjustment while the ASK (amplitude shifted keying) or FSK (frequency shifted keying) is active as the rectifier voltage and ISNS output are perturbed by frequency change or load change.
- **Slew:** The Slew checkbox when enabled increases the load with the slew rate as specified in the “Slew rate configuration” field.
- **Slew rate configuration:** If the Slew checkbox is enabled, the user can enter the slew rate value. For example, if the slew rate is 100 mA, the load will increase in 100 mA steps.
- **Set Load:** The Set Load button when clicked applies the configured load while the DUT is in the Power Transfer phase. The user can verify load change of the Guaranteed Power (GP) test using the Set Load function.

*Note: The user needs to click on the **Start Exerciser** button (below the Qi Exerciser screen; see Section 8.1.7) to execute the FOD test for the TPR using the configured load current and step values. Details of the test run will be displayed in the trace acquisition panel on the right of the Qi-Exerciser screen or the Results screen as shown in the below example:*



FIGURE 8.7: LOAD FOD TEST EXECUTION EXAMPLE

To terminate the test run, click on the **Stop Exerciser** button.

- **Get Temperature:** The **Get Temperature** checkbox when enabled acquires readings of top-surface temperature of the TPR coil and ambient temperature during the FOD test run.
- **Enable Auto Negotiation Load Power:** This checkbox when enabled allows the PRx tester to draw the load as per the negotiation load set by the PTx in ECAP.

8.1.5 Set Up Coil Modulation in Modulator Circuit

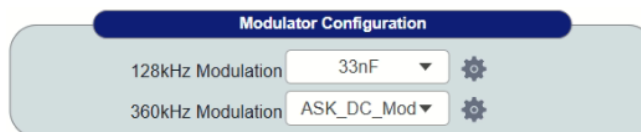
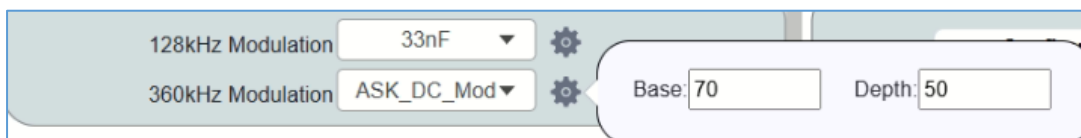


FIGURE 8.8: CONFIGURE COIL MODULATION

- 128Khz Modulation:** Select the default capacitance value for the capacitive modulator or the default resistance value for the resistive modulator when operating at 128 kHz. The user can select  to enable the custom “ASK_DC_Mod” MOD_DEPTH and MOD_BASE configuration in the “360Khz Modulation” drop down.

Note: The exact MOD_DEPTH and MOD_BASE currents required for successful communication will vary with the PRx operating conditions. At lighter loads, increasing the MOD_BASE current can improve signal quality (i.e., SNR). When the PRx load fluctuates, increasing the MOD_DEPTH current can improve signal amplitude. The user is encouraged to dynamically adjust the MOD_DEPTH and/or MOD_BASE currents during operation to maintain communications.

- 360Khz Modulation:** Select the custom “ASK_DC_Mod” MOD_DEPTH and MOD_BASE configuration for the ASK packets, the default capacitance value for the capacitive modulator or the default resistance value for the resistive modulator when operating at 360 kHz. If “ASK_DC_Mod” is selected, the user can select  to set the MOD_BASE and MOD_DEPTH currents as shown below.



8.1.6 Set Up Packet Simulation Test Sequence

Exerciser Sequence Configuration

Configure Packet Sequence

Send Instant Packets

128kHz ☒

360kHz ☐

ID/Config
Phase

t_Wake=40
Repeat Count 0
Preamble Count 11
Signal Strength (0x01)
Checksum Error false
✖
✎

Payload:

t_Start=15 t_Silent=9.5
Repeat Count 0
Preamble Count 11
Identification (0x71)
Checksum Error false
✖
✎

Payload: 2-0-010E-1-1839B111

t_Start=15 t_Silent=9.5
Repeat Count 0
Preamble Count 11
XID (0x81)
Checksum Error false
✖
✎

Payload: FE-0-0-0-0-64-64-17

t_Start=15 t_Silent=9.5
Repeat Count 0
Preamble Count 11
Configuration (0x51)
Checksum Error false
✖
✎

Payload: 0-10-0-0-0-0-0-0-32-16-0- ...

Negotiation
Phase

t_Start=15 t_Wake=40 t_Silent=9.5
Repeat Count 0
Preamble Count 11
GET (0x28)
Checksum Error false
✖
✎

Payload: 0-0-PTx Extended Identifica ...

Reset Packet Sequence

Remove All

Add

Set Packet Sequence

FIGURE 8.9: CONFIGURE PACKET SIMULATION TEST SEQUENCE

The Exerciser Sequence Configuration panel allows the user to configure each Packet Phase & Packet and send Packets as required for running the Packet simulation tests in a particular order.

8.1.6.1 Configure Packet Sequence

For each Phase, the user can select  to delete an existing Packet. To configure an existing Packet information, select  which opens the following settings panel:

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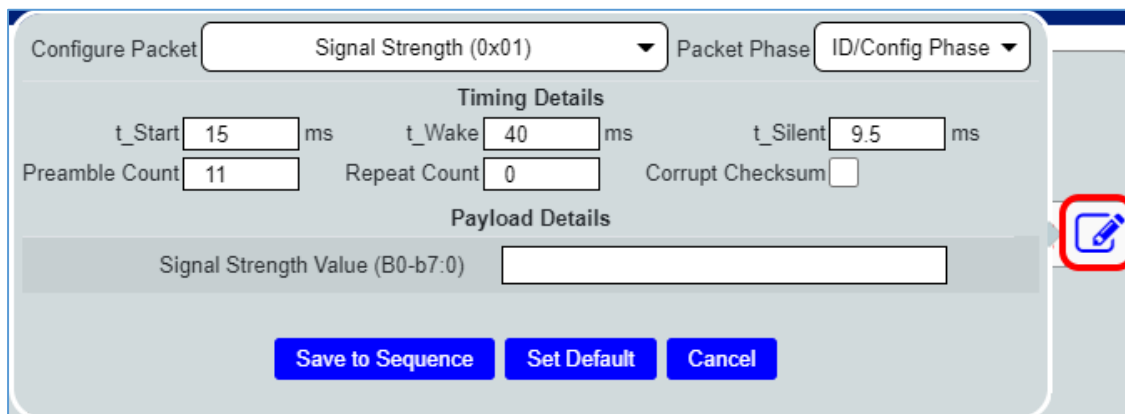


FIGURE 8.10: CONFIGURE PACKET INFORMATION

- **Configure Packet:** Select the Packet type to be applied.
- **Packet Phase:** Select the default Phase type of either ID/Config, Power Transfer, Negotiation or Ping Phase that corresponds to the selected Packet type.
- **Timing Details:** Displays the default settings for the selected Packet Phase. The user can also choose to enter custom values if required.
 - a) If the **ID/Config Phase** is selected, the following settings are available:
 - **t_Start (ms):** Set the time that elapses between Packets.
 - **t_Wake (ms):** Set the time period after the DUT has initiated the Digital Ping when the GRL-C3-MP-TPR tester hardware needs to initiate the first Packet.
 - **t_Silent (ms):** Set the silent time that elapses between the transmission of Packets.
 - **Preamble Count:** Set the number of preamble bits of the selected Packet.
 - **Repeat Count:** Set the number of times the selected Packet has to be sent.
 - **Corrupt Checksum:** The Corrupt Checksum checkbox when selected enables all bits of the selected Packet checksum to be inverted to obtain an incorrect value.
 - b) If the **PT Phase** (Power Transfer Phase) is selected, the following settings are available:
 - **t_Start (ms):** Set the time that elapses between Packets.
 - **t_Wake (ms):** Set the time period after the DUT has initiated the Digital Ping when the GRL-C3-MP-TPR tester hardware needs to initiate the first Packet.
 - **t_Silent (ms):** Set the silent time that elapses between the transmission of Packets.
 - **Preamble Count:** Set the number of preamble bits of the selected Packet.

- **Repeat Count:** Set the number of times the selected Packet has to be sent.
 - **Corrupt Checksum:** The Corrupt Checksum checkbox when selected enables all bits of the selected Packet checksum to be inverted to obtain an incorrect value.
 - **Send packet every # ms after 1st:** This checkbox when selected enables the Packet to be sent at every specified time interval and after the start of the first selected Packet type.
 - **Insert packet after RP-CE:** This checkbox when selected enables the selected Packet to be inserted after each Received Power Packet and Control Error Packet.
- c) If the **Negotiation Phase** is selected, the following settings are available:
- **t_Start (ms):** Set the time that elapses between Packets.
 - **t_Silent (ms):** Set the silent time that elapses between the transmission of Packets.
 - **t_Response timeout (ms):** Set the time period (after the end of a response) after which the power signal is to be removed if a Packet is not correctly received.
 - **Preamble Count:** Set the number of preamble bits of the selected Packet.
 - **Repeat Count:** Set the number of times the selected Packet has to be sent.
 - **Corrupt Checksum:** The Corrupt Checksum checkbox when selected enables all bits of the selected Packet checksum to be inverted to obtain an incorrect value.
 - **disableRetry:** The disableRetry checkbox when selected disables retry for the selected Packet.
- d) If the **Ping Phase** is selected, the following settings are available:
- **t_Start (ms):** Set the time that elapses between Packets.
 - **t_Wake (ms):** Set the time period after the DUT has initiated the Digital Ping when the GRL-C3-MP-TPR tester hardware needs to initiate the first Packet.
 - **t_Silent (ms):** Set the silent time that elapses between the transmission of Packets.
 - **Preamble Count:** Set the number of preamble bits of the selected Packet.
 - **Repeat Count:** Set the number of times the selected Packet has to be sent.
 - **Corrupt Checksum:** The Corrupt Checksum checkbox when selected enables all bits of the selected Packet checksum to be inverted to obtain an incorrect value.

- **Payload Details:** Displays the default settings for the selected Packet Type which set the raw data to be sent in the hex format. The user can also choose to enter custom values if required.

When all the above configurations have been made, click on the **Save to Sequence** button

Save to Sequence

to apply the configurations and update the existing Packet information in

the Configure Packet Sequence panel. Otherwise, click on the **Cancel** button

Cancel

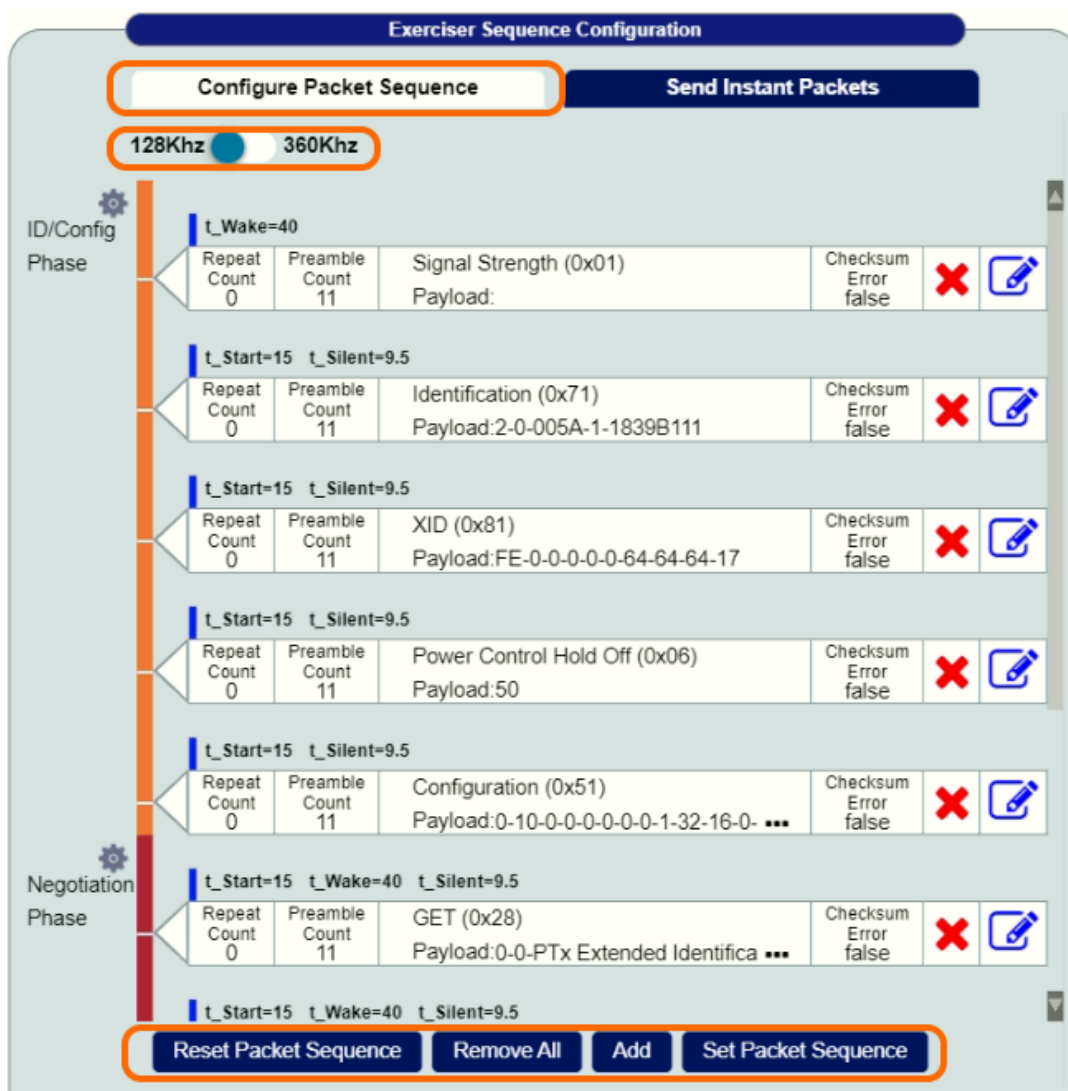
to keep the existing Packet information and exit the settings panel.

To reset the configurations to default values, click on the **Set Default** button

Set Default

8.1.6.2 Manage Packet Simulation Sequence (Configure Packet Sequence)

The user can choose to configure the Packet sequence when operating in 128kHz or 360kHz by selecting the **Configure Packet Sequence** tab and toggling the **128Khz / 360Khz** slider respectively.



Exerciser Sequence Configuration

Configure Packet Sequence **Send Instant Packets**

128Khz **360Khz**

ID/Config Phase

Repeat Count	Preamble Count	Signal Strength (0x01)	Checksum Error
0	11	Payload:	false
0	11	Identification (0x71) Payload: 2-0-005A-1-1839B111	false
0	11	XID (0x81) Payload: FE-0-0-0-0-0-64-64-64-17	false
0	11	Power Control Hold Off (0x06) Payload: 50	false
0	11	Configuration (0x51) Payload: 0-10-0-0-0-0-0-1-32-16-0- ...	false

Negotiation Phase

Repeat Count	Preamble Count	GET (0x28)	Checksum Error
0	11	Payload: 0-0-PTx Extended Identifica ...	false

Reset Packet Sequence **Remove All** **Add** **Set Packet Sequence**

FIGURE 8.11: CONFIGURE PACKET SEQUENCE IN 128KHZ OR 360KHZ

The Configure Packet Sequence panel allows the user to add a new Phase and/or Packet to the Packet Sequence by clicking on the **Add** button at the bottom of the panel. This will display a settings panel similar to the one described above in Section 8.1.6.1 which is obtained on clicking the edit button to configure Packet information. Once configured, clicking on the **Add to Sequence** button causes the new Phase and/or Packet to be added to the existing Packet Sequence.

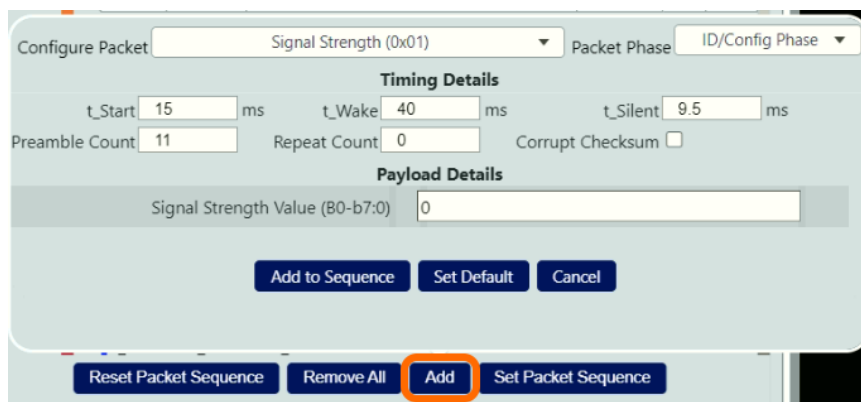
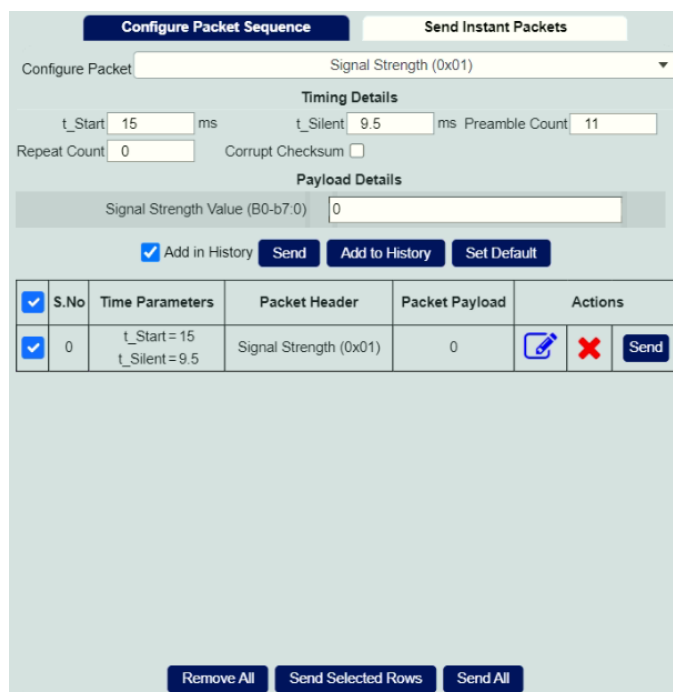


FIGURE 8.12: ADD NEW PHASE & PACKET TO PACKET SEQUENCE

Once the user has confirmed the Packet Sequence, click on the **Set Packet Sequence** button to apply the sequence for testing. In case there is a need to return to the default Packet Sequence, click on the **Reset Packet Sequence** button. To clear the existing Packet Sequence, click on the **Remove All** button.

8.1.6.3 Send Instant Packets

The user can configure and send any Packets in runtime (when Packet simulation test is running) through the **Send Instant Packets** panel.



S.No	Time Parameters	Packet Header	Packet Payload	Actions
0	t_Start = 15 t_Silent = 9.5	Signal Strength (0x01)	0	

FIGURE 8.13: CONFIGURE AND SEND INSTANT PACKETS

- **Configure Packet:** Select the Packet type to be applied.
- **Timing Details:** Displays the default settings for the selected Packet. The user can also choose to enter custom values if required.
 - **t_Start (ms):** Set the time that elapses between Packets.
 - **t_Silent (ms):** Set the silent time that elapses between the transmission of Packets.
 - **Preamble Count:** Set the number of preamble bits of the selected Packet.
 - **Repeat Count:** Set the number of times the selected Packet has to be sent.
 - **Corrupt Checksum:** The Corrupt Checksum checkbox when selected enables all bits of the selected Packet checksum to be inverted to obtain an incorrect value.
- **Payload Details:** Displays the default settings for the selected Packet which set the raw data to be sent in the hex format. The user can also choose to enter custom values if required.

After taking care of all the above configurations, the user can click on the **Send** button

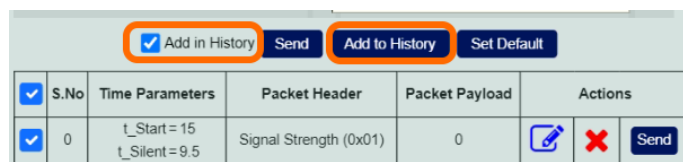
Send

to send the configured Packet to the GRL-C3-MP-TPR tester hardware. To reset

the configurations to default values, click on the **Set Default** button

Set Default

The user can also choose to add or log the configured Packet to the “History” table by selecting the **Add in History** checkbox and then clicking on the **Add to History** button.



☒	S.No	Time Parameters	Packet Header	Packet Payload	Actions
☒	0	t_Start = 15 t_Silent = 9.5	Signal Strength (0x01)	0	  

FIGURE 8.14: ADD PACKET TO HISTORY TABLE

Once the Packet is added to the table, the user can make edits to the Packet

configuration by clicking on  in the respective Packet row. When finished, click on the

Save to History button **Save to History** to apply and update the existing Packet row with the new configuration. To send out the Packet, select the Packet row checkbox and click on the **Send** button. If there is a need to delete a particular Packet row, click on .

To send out Packets for selected Packet rows only, select the desired Packet rows and

click on the **Send Selected Rows** button **Send Selected Rows** at the bottom. To send out all Packets in the History table, select all Packet rows and click on the **Send All** button

Send All

at the bottom. If there is a need to clear all Packet rows in the History table,

click on the Remove All button **Remove All**.

8.1.6.3.1 Set Up Cloaking



Configure Cloak Phase

Cloak Entry Reason: Generic [Send]

Cloak Exit Type: Natural Exit [Send]

Illegal Packet Type: Signal Strength (0x01) [Send]

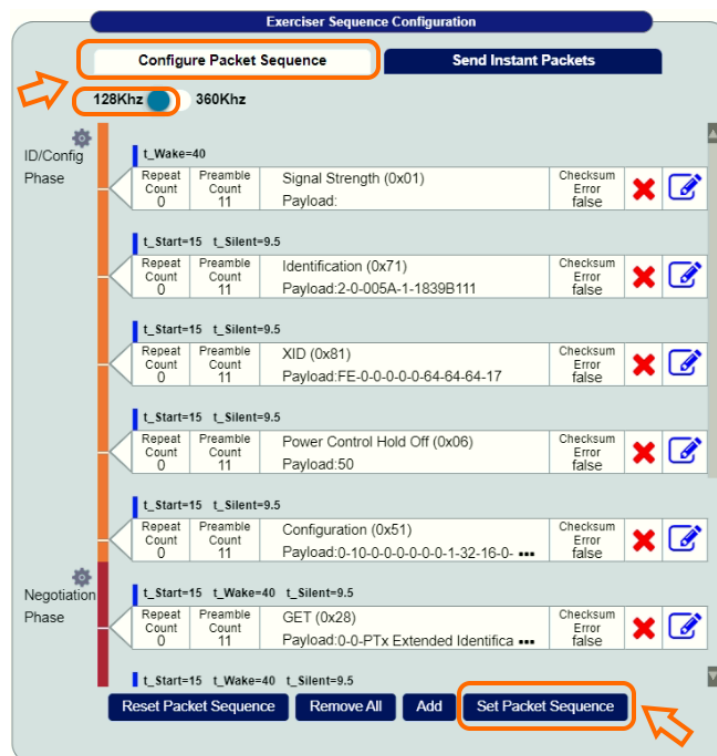
FIGURE 8.15: CONFIGURE CLOAK PHASE

- **Cloak Entry Reason:** Allows the user to declare a specific cloak phase of reason is supported by the PRx DUT as stated in self-declaration by selecting the drop-down menu and clicking on the **Send** button to send the selected clock entry reason Packet.
- **Clock Exit Type:** Click on the **Send** button to send the clock exit Packet.
- **Illegal Packet Type:** Allows the user to select an “illegal” Packet that is not allowed in a particular cloak phase.

8.1.7 Run Packet Simulation Test Sequence

The following example describes how to run a typical Packet simulation test sequence.

1. First, click on the **Configure Packet Sequence** tab and make sure that **128Khz** is selected on the slider as shown below. Then click on the **Set Packet Sequence** button at the bottom.



Exerciser Sequence Configuration

Configure Packet Sequence [Send Instant Packets]

128Khz [360Khz]

ID/Config Phase

Repeat Count	Preamble Count	Signal Strength (0x01)	Checksum Error
0	11	Payload:	false
0	11	Identification (0x71) Payload: 2-0-005A-1-1839B111	false
0	11	XID (0x81) Payload: FE-0-0-0-0-0-64-64-17	false
0	11	Power Control Hold Off (0x06) Payload: 50	false
0	11	Configuration (0x51) Payload: 0-10-0-0-0-0-0-1-32-16-0-...	false

Negotiation Phase

Repeat Count	Preamble Count	GET (0x28)	Checksum Error
0	11	Payload: 0-0-PTx Extended Identifica...	false

Reset Packet Sequence Remove All Add Set Packet Sequence

FIGURE 8.16: SELECT AND SET 128KHZ PACKET SEQUENCE

2. Next, drag the slider to **360Khz** and then click on the **Set Packet Sequence** button at the bottom, as shown below:

Exerciser Sequence Configuration

Configure Packet Sequence
Send Instant Packets

128Khz

360Khz

➔

ID/Config
Phase

t_Wake=40			
Repeat Count 0	Preamble Count 11	Signal Strength (0x01) Payload:	Checksum Error false
t_Start=15 t_Silent=9.5			
Repeat Count 0	Preamble Count 11	Identification (0x71) Payload:2-0-005A-1-1839B111	Checksum Error false
t_Start=15 t_Silent=9.5			
Repeat Count 0	Preamble Count 11	XID (0x81) Payload:FE-0-0-0-0-0-64-64-64-17	Checksum Error false
t_Start=15 t_Silent=9.5			
Repeat Count 0	Preamble Count 11	Power Control Hold Off (0x06) Payload:20	Checksum Error false
t_Start=15 t_Silent=9.5			
Repeat Count 0	Preamble Count 11	Configuration (0x51) Payload:0-10-0-0-0-0-0-1-32-16-0- ...	Checksum Error false

Negotiation
Phase

t_Start=15 t_Wake=40 t_Silent=9.5			
Repeat Count 0	Preamble Count 11	GET (0x28) Payload:0-0-PTx Extended Identifica ...	Checksum Error false
t_Start=15 t_Wake=40 t_Silent=9.5			

Reset Packet Sequence
Remove All
Add
Set Packet Sequence

➔

FIGURE 8.17: SELECT AND SET 360KHZ PACKET SEQUENCE

3. Click on the **Start Exerciser** button at the bottom of the screen to start the test execution/simulation for the Packet sequence. The test run details along with the signal trace acquisition will be displayed on the right panel as well as in the Results screen as shown in the example below:

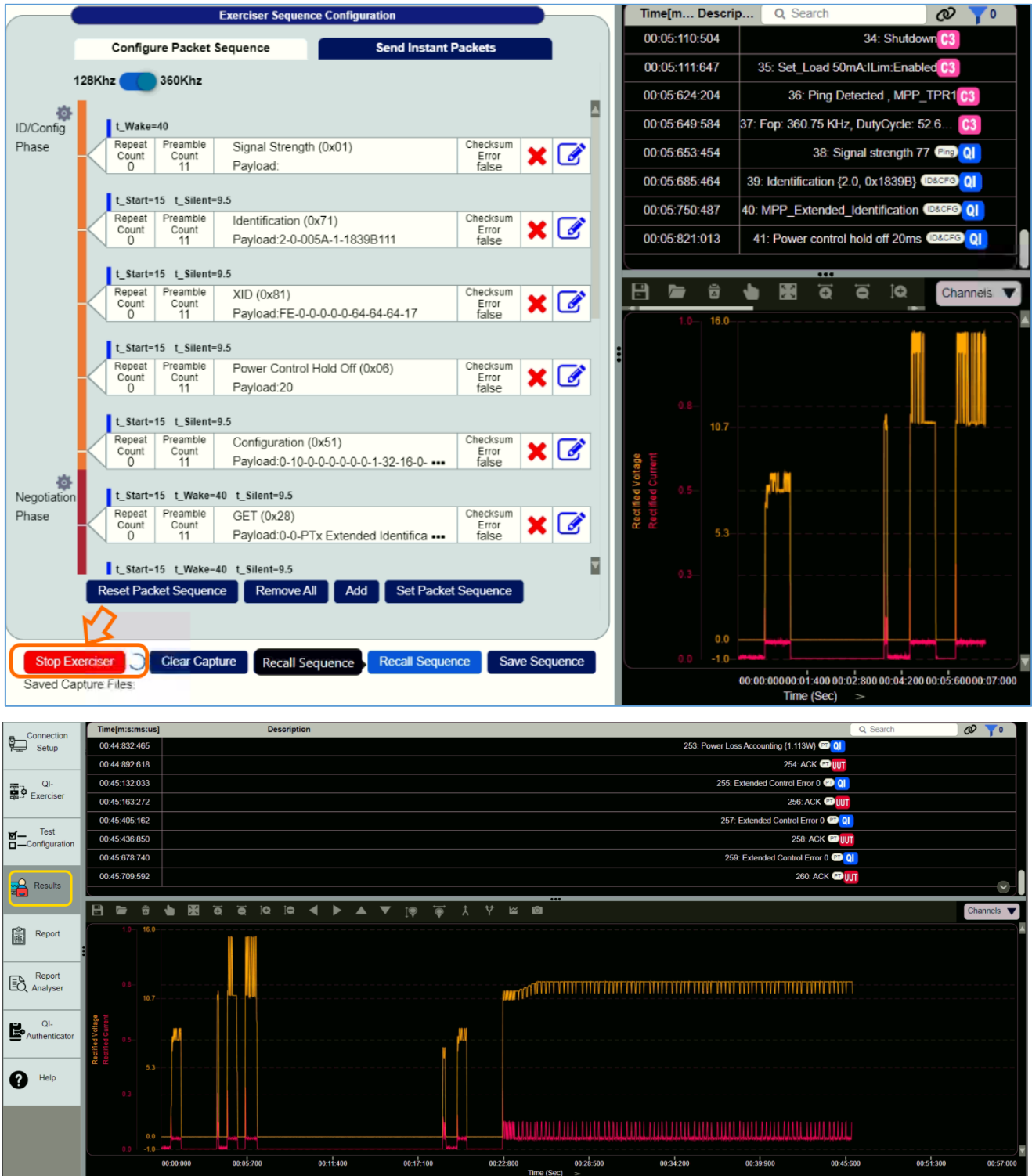


FIGURE 8.18: START RUNNING PACKET SIMULATION TEST SEQUENCE

- When the test run has completed, the results will automatically be saved to the following location— C:\GRL\GRL-C3-MP-TPR\Report\.

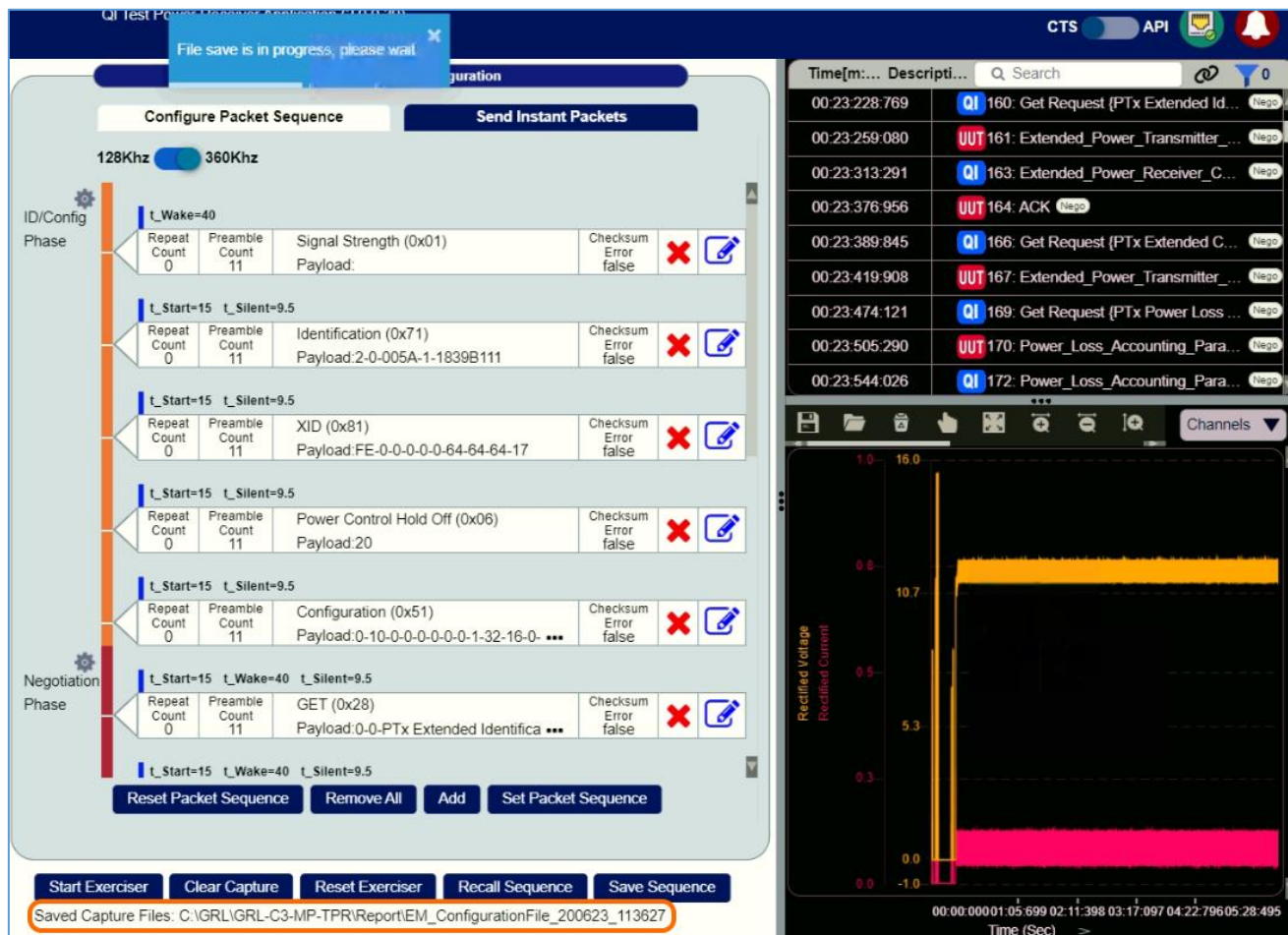


FIGURE 8.19: PACKET SIMULATION TEST SEQUENCE COMPLETED AND SAVED RESULTS PATH

5. You can use the following buttons to manage the Packet simulation test sequence:



FIGURE 8.20: MANAGE PACKET SIMULATION TEST SEQUENCE

- **Start Exerciser:** Click on the **Start Exerciser** button to start or repeat the test execution/simulation for the configured Packets. To terminate the test run, click on the **Stop Exerciser** button.
- **Clear Capture:** Click on the **Clear Capture** button to remove existing test run details and signal trace acquisition.
- **Reset Exerciser:** Click on the **Reset Exerciser** button to return all Packet configurations to default values.
- **Recall Sequence:** Click on the **Recall Sequence** button to load and apply information from a saved Packet configuration file.
- **Save Sequence:** Click on the **Save Sequence** button to save the current Packet configuration to a file in the "C:\GRL\GRL-C3-MP-TPR\Report\" directory. See example below:



FIGURE 8.21: EXAMPLE OF SAVED CONFIGURATION FILE PATH

8.2 Test Configuration

The GRL-C3-MP-TPR application *Test Configuration* screen allows the user to select which set of tests is run on the DUT, set up test parameters, run selected tests and generate test reports.

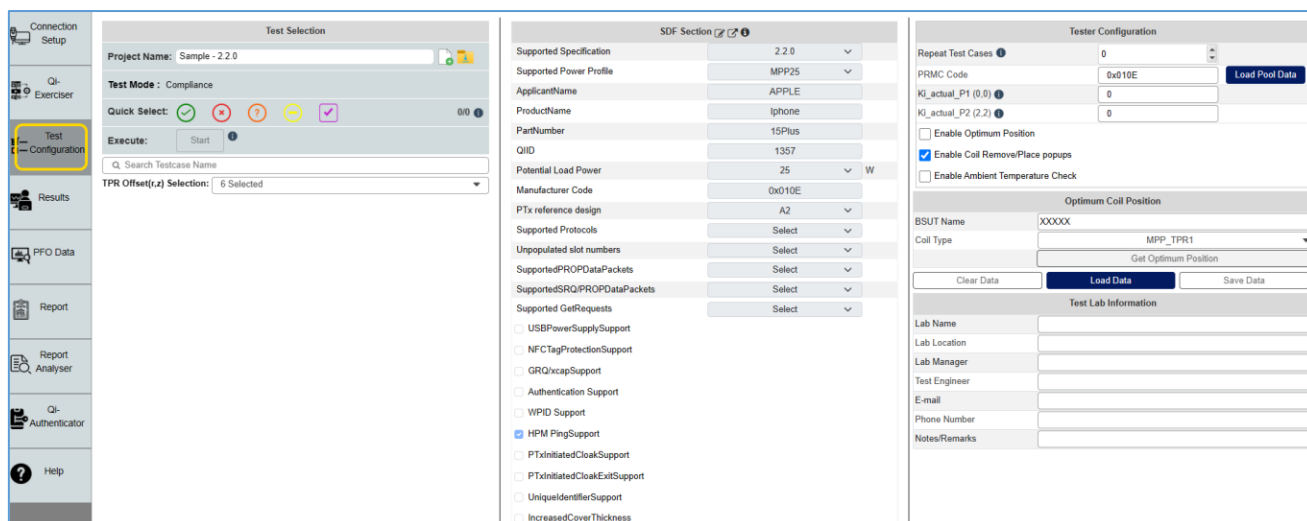
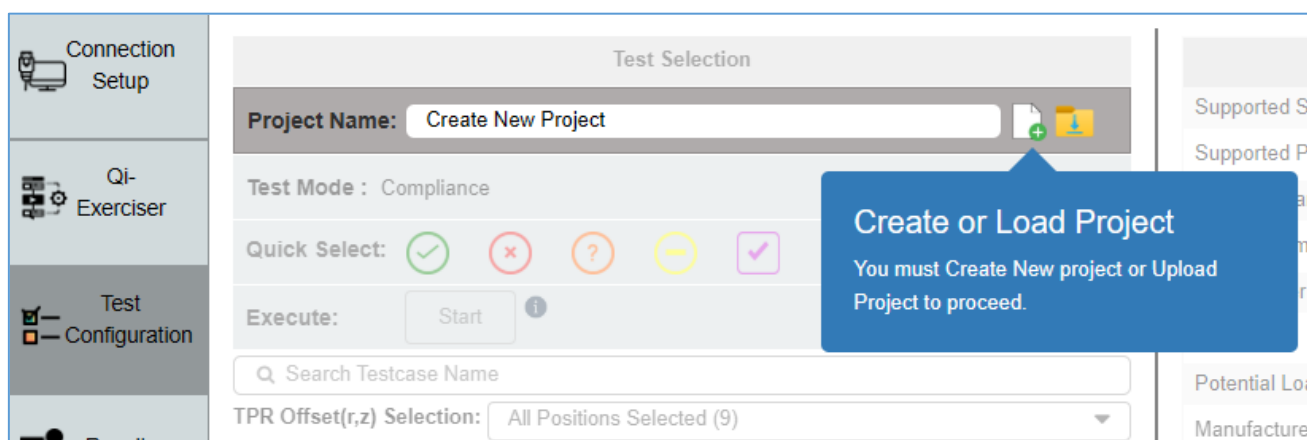


FIGURE 8.22: TEST CONFIGURATION SCREEN

Prior to accessing the test configuration, the user first needs to create a new project or upload an existing project that was saved previously, as described in the following sections.



8.2.1 Create New Test Project

The following procedure describes how to create a new test project:

1. Click on **Create New Project** as indicated in Figure 8.23 below.

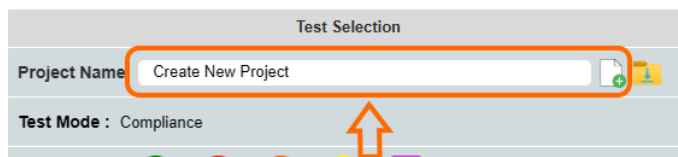


FIGURE 8.23: CREATE NEW PROJECT— #1

2. Set the following:

- a) Enter the **Project Name** (allowed up to 15 letters and special characters) and select the **Test Mode** as “Compliance” or “Pre-Compliance”.

Note: Select the “Compliance” test mode if the eSDF (Electronic Self Declaration Form) file of the DUT is available. If the eSDF is not available, select the “Pre-Compliance” test mode.

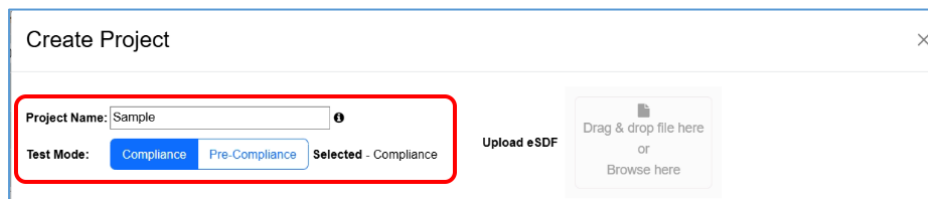


FIGURE 8.24: CREATE NEW PROJECT— #2

- b) If the **“Compliance”** Test Mode is selected, **upload** the **eSDF** file of the DUT by dragging and dropping the file into the panel on the right or clicking on the panel to select the file from the system. Then click on the **Create Project** button at the bottom.

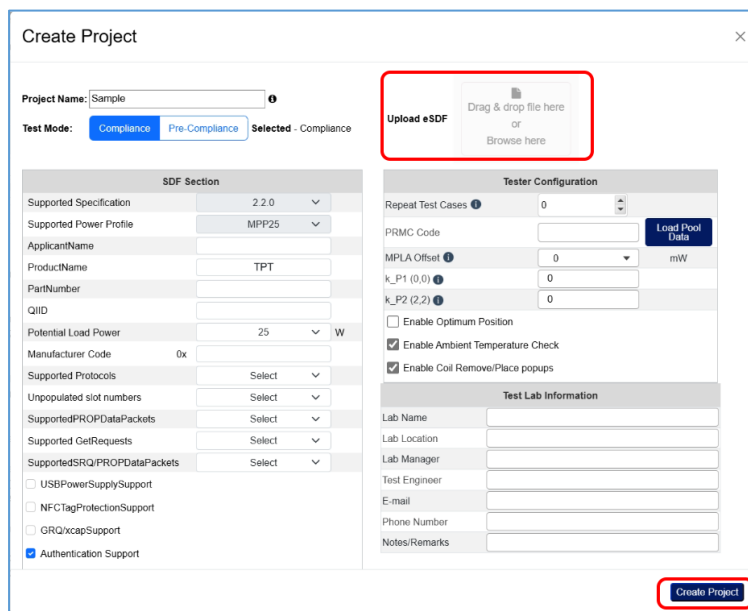


FIGURE 8.25: CREATE NEW PROJECT— #3

- c) If the **“Pre-Compliance”** Test Mode is selected, select to either upload the eSDF of the DUT (if available) or generate a default eSDF (**Get Default ESDF**) by clicking on the respective checkboxes.
- i. If the **“Get Default ESDF”** checkbox is selected, select the **Power Profile** and **Supported Specification** of the DUT.

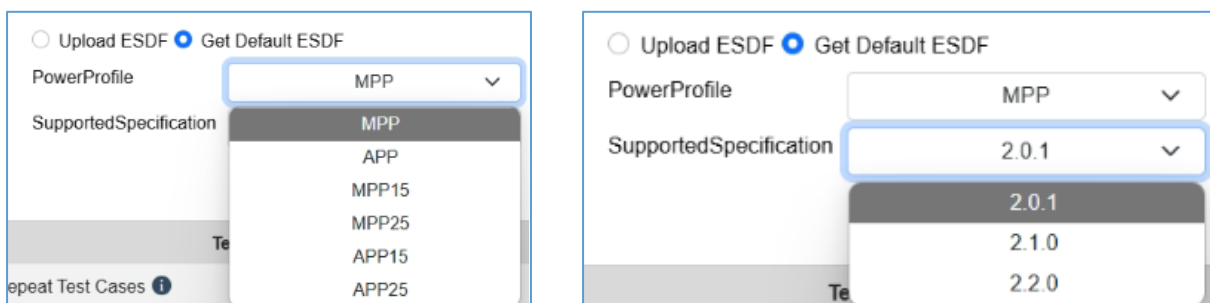


FIGURE 8.26: CREATE NEW PROJECT— #4

- ii. After selecting the power profile and supported specification, click on the **Get Default ESDF** button. In the SDF Section, Tester Configuration and Test Lab Information panels, configure the following parameters:

Note: Some parameters may change based on the selected power profile and specification.

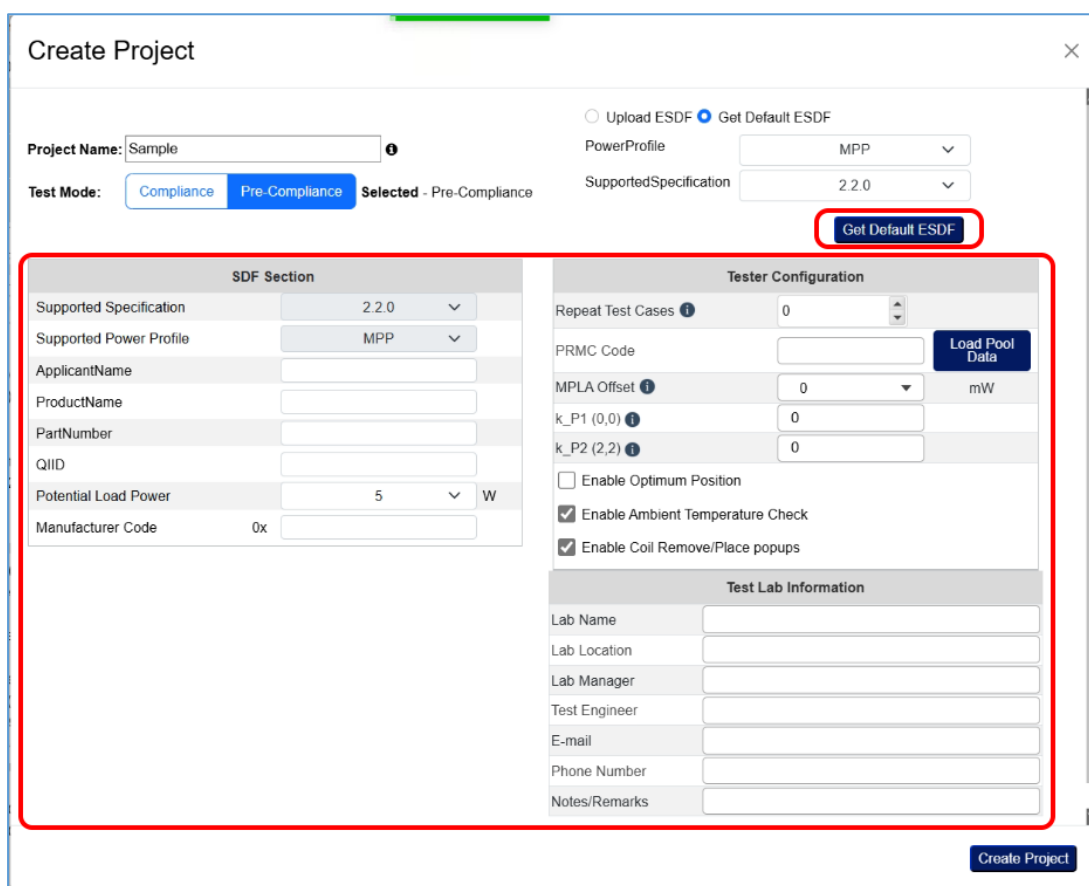


FIGURE 8.27: CREATE NEW PROJECT— #5

SDF Section:

- **Supported Specification & Supported Power Profile:** These are similar to the “Power Profile” and “Supported Specification” drop-down fields as selected above.
- **Applicant Name & Product Name & Part Number:** Enter the name of the test lab personnel and name and part number of the DUT respectively.
- **Qi ID:** Enter the Qi certified ID number of the DUT.
- **Potential Load Power:** Select the maximum power up to 25W as supported by the DUT.
- **Manufacturer Code:** Enter the manufacturer code/part number of the DUT.
- **PTx Reference Design:** Select the reference design type of the PTx DUT.
- **Supported Protocols:** Select the “Extended Protocol” if the DUT supports the Extended Power Profile (EPP).
- **Unpopulated Slot Numbers:** Select any DUT slot(s) which are not occupied.
- **Supported PROP Data Packets:** Select any proprietary Packets as supported by the DUT.
- **Supported SRQ/PROP Data Packets:** Select any SRQ proprietary Packets as supported by the DUT.
- **Supported Get Requests:** Enable the PTx DUT to send a GET request for the “6-PTx Charge Status” packets if supported by the PTx.
- **USB Power Supply Support:** Select this checkbox if the DUT supports USB power.
- **NFC Tag Protection Support:** Select this checkbox if the DUT supports NFC tag protection against any counterfeiting or unauthorized access.
- **GRQ/xcap Support:** Select this checkbox if the DUT supports GRQ or XCAP Packets.
- **Authentication Support:** Select this checkbox if the DUT supports the Qi Authentication requirements.
- **WPID Support:** Select this checkbox if the DUT supports WP-ID (optional receiver ID for the Qi wireless charging standard).
- **HPM Ping Support:** Select this checkbox if the DUT supports the High Power Mode (HPM) ping.
- **PTx Initiated Cloak Support:** Select this checkbox to enable cloak to be sent by the PTx DUT.
- **PTx Initiated Cloak Exit Support:** Select this checkbox to enable cloak exit to be sent by the PTx DUT.
- **Unique Identifier Support:** Select this checkbox if the DUT comes with the Unique Device Identifier ID.
- **Increased Cover Thickness:** Select this checkbox if the DUT has a thicker cover than standard.

Tester Configuration:

- **Repeat Test Cases:** Select the number of times to repeat running selected tests.
- **PRMC Code:** Set the Power Receiver Manufacturer Code (PRMC) ID of the MPP TPR.
- **Load Pool Data:** This function allows you to use different power receiver manufacturer codes (PRMC's) other than the GRL-C3-MP-TPR's own power receiver manufacturer code (PRMC) in order to obtain expected test results. Click on the "Load Pool Data" button to load an existing data file and this will enable PRMC codes to be assigned randomly for each test case when running multiple tests.
- **Ki_P1 (0,0) & Ki_P2 (2,2):** Set the inductive coupling factor, Ki, to be calculated in the PRx at the P1 (0,0) position and P2 (2,2) positions respectively.
- **Enable Optimum Position:** Select this checkbox to enable the TPR coil to be placed at an optimized position on the Interface Surface of the DUT for testing. Note: The Optimum Coil Positioning data is required for this feature.
- **Enable Ambient Temperature Check:** Select this checkbox to enable ambient temperature to be monitored during testing.
- **Enable Coil Remove/Place popups:** Select this checkbox to allow removal of coils or placement of device accessories during testing.

Test Lab Information:

- The "Test Lab Information" panel allows the user to enter information relevant to the lab specifics used for running tests. Once tests have completed, the test report can be viewed in the Report screen (see Section 8.3).

After configuring the above parameters, click on the **Create Project** button.

3. The new project will be created with the provided Project Name and Test Mode as shown in the Figure 8.28 example below. The user can now proceed with the test configuration.

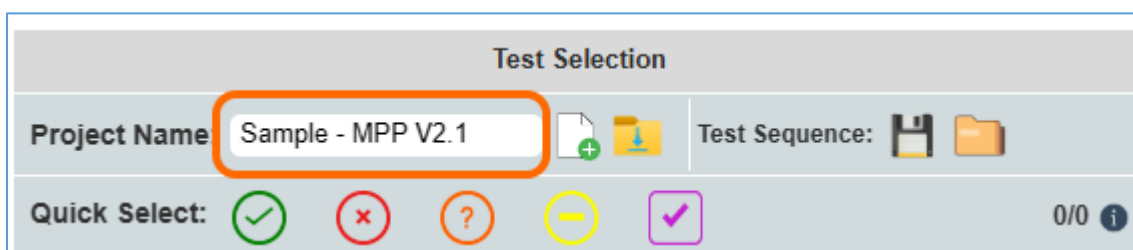


FIGURE 8.28: CREATE NEW PROJECT— #6

8.2.2 Upload Existing Saved Test Project

The following procedure describes how to upload an existing test project that was saved previously:

1. Click on the **Upload Project** icon as indicated in Figure 8.29 below.

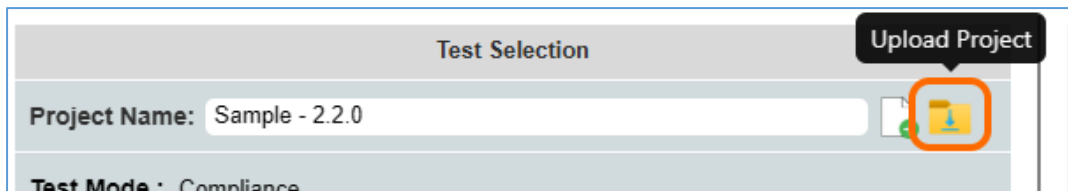


FIGURE 8.29: UPLOAD PROJECT— #1

2. If the required project file (.gproj file) was saved in the local file directory, select that project file under “Local File” as shown in Figure 8.30 below.

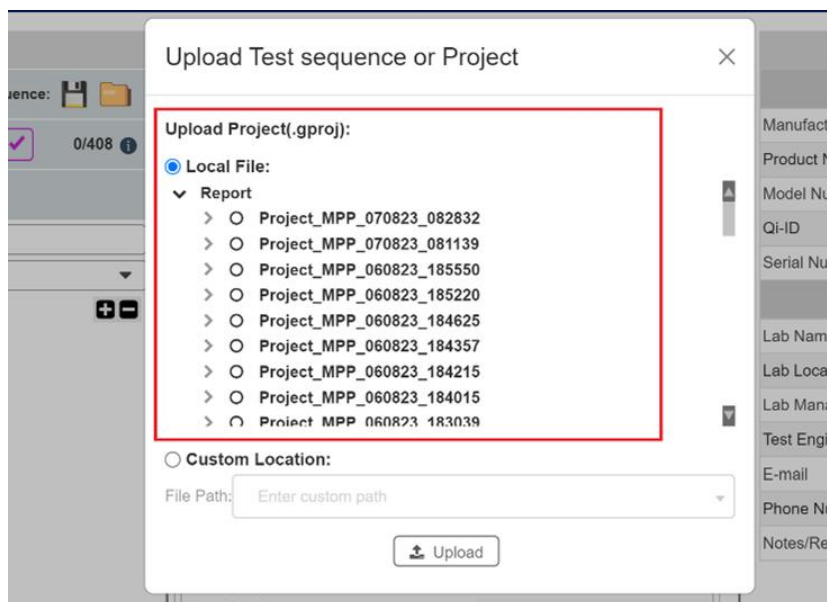


FIGURE 8.30: UPLOAD PROJECT— #2

3. If the required .gproj file was saved in another location other than the local file directory, select **Custom Location** and enter the project file path, for example, “C:\GRL\GRL-C3-MP-TPR\Report\Apple_MPP_100823_084915\Run1\ReferenceData\MPP_Run1_TestBackup.gproj”.

Note: Make sure to provide the project file name (MPP_Run1_TestBackup.gproj) in the path.

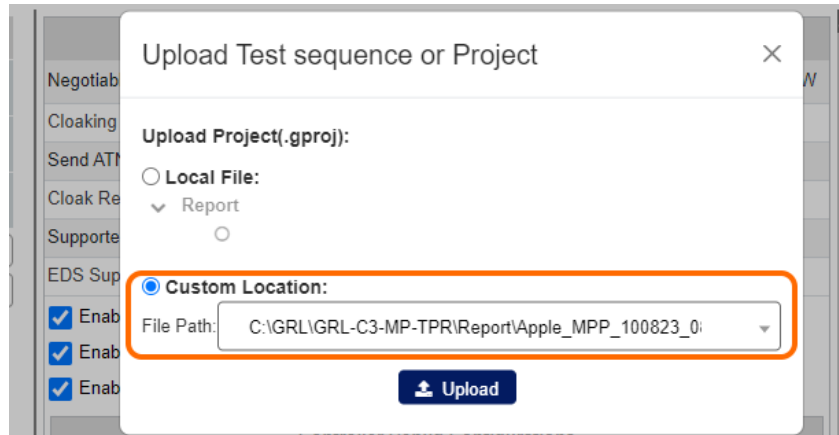


FIGURE 8.31: UPLOAD PROJECT— #3

4. Click on the **Upload** button and the selected project file will be loaded as shown in the Figure 8.32 example below. The user can now proceed to access/configure the project.

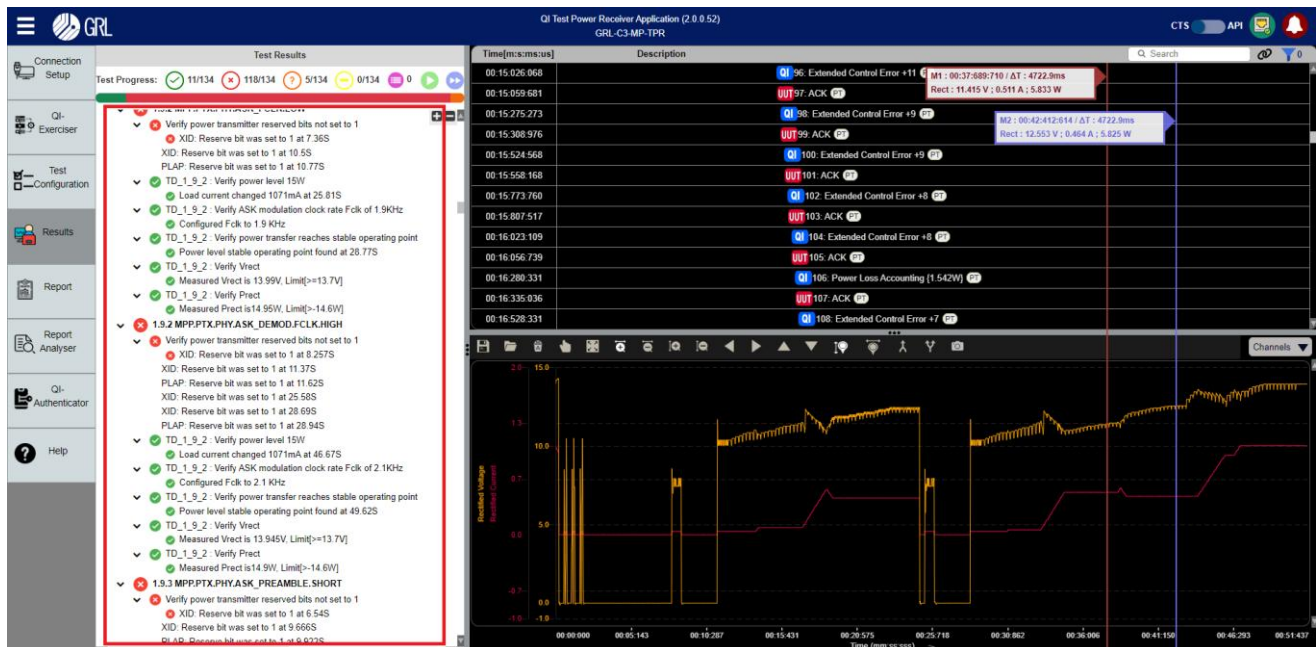


FIGURE 8.32: UPLOAD PROJECT— #4

8.2.3 Test Configuration

Before running any tests, make sure to configure the following main categories:

- SDF Section
- Tester Configuration
- Optimum Coil Position

8.2.3.1 SDF (Self Declaration Form) Section

SDF Section   	
Supported Specification	2.2.0 
Supported Power Profile	MPP25 
ApplicantName	
ProductName	TPT
PartNumber	
QIID	
Potential Load Power	25  W
Manufacturer Code	0x
Supported Protocols	Select 
Unpopulated slot numbers	Select 
SupportedPROPDataPackets	Select 
Supported GetRequests	Select 
SupportedSRQ/PROPDataPackets	Select 
☐ USBPowerSupplySupport ☐ NFCTagProtectionSupport ☐ GRQ/xcapSupport ☒ Authentication Support ☐ WPID Support ☒ 128k HPM PingSupport ☐ PTxInitiatedCloakSupport ☐ PTxInitiatedCloakExitSupport ☐ UniqueIdentifierSupport ☐ IncreasedCoverThickness	

FIGURE 8.33: DUT SELF DECLARATION FORM MANAGEMENT

When creating a new project, once the user has uploaded the eSDF file or created a default eSDF file, the SDF Section will be auto populated with the eSDF data read from the respective eSDF file. The user can edit or export the eSDF data by clicking on   respectively.

To edit the eSDF data, click on  and the following pop-up window will allow the user to make the required edits. Once done, click on the **Update** button to apply the changes.

Project Configuration

SDF Section

Supported Specification2.2.0
Supported Power ProfileMPP25
ApplicantName
ProductNameTPT
PartNumber
QIID
Potential Load Power25W
Manufacturer Code0x
Supported ProtocolsSelect
Unpopulated slot numbersSelect
SupportedPROPDataPacketsSelect
Supported GetRequestsSelect
SupportedSRQ/PROPDataPacketsSelect
☐ USBPowerSupplySupport
☐ NFC_TagProtectionSupport
☐ GRQ/xcapSupport
☒ Authentication Support
☐ WPID Support
☒ 128k HPM PingSupport
☐ PTxInitiatedCloakSupport

Tester Configuration

Repeat Test Cases0
PRMC Code
Load Pool Data
MPLA Offset0mW
k_P1 (0,0)0
k_P2 (2,2)0
☐ Enable Optimum Position
☒ Enable Ambient Temperature Check
☒ Enable Coil Remove/Place popups

Test Lab Information

Lab Name
Lab Location
Lab Manager
Test Engineer
E-mail
Phone Number
Notes/Remarks

Update

To export the eSDF data, click on  to save the data to a JSON file in the system.

8.2.3.2 NOTAL Test Case Selection

Notal Testcase

☐ 240703-1 MPP.PTX.POW.VRECT.CONTROL
☐ 240718-1 MPP.PTX.PHY.FSK.MOD.TC3

FIGURE 8.34: NOTAL TEST CASE SELECTION

*Note: The NOTAL test case selection is only applicable for the **MPP V2.0.1 Certification** and **MPP Power Profile**.*

To access the NOTAL test case selection panel, click on “Create New Project” and select Certification as “2.0.1” and Power Profile as “MPP”. To apply the notal changes in test execution for MPP V2.0.1 certification, select the checkbox for the respective NOTAL test case and its corresponding tests as highlighted in Figure 8.35 below.

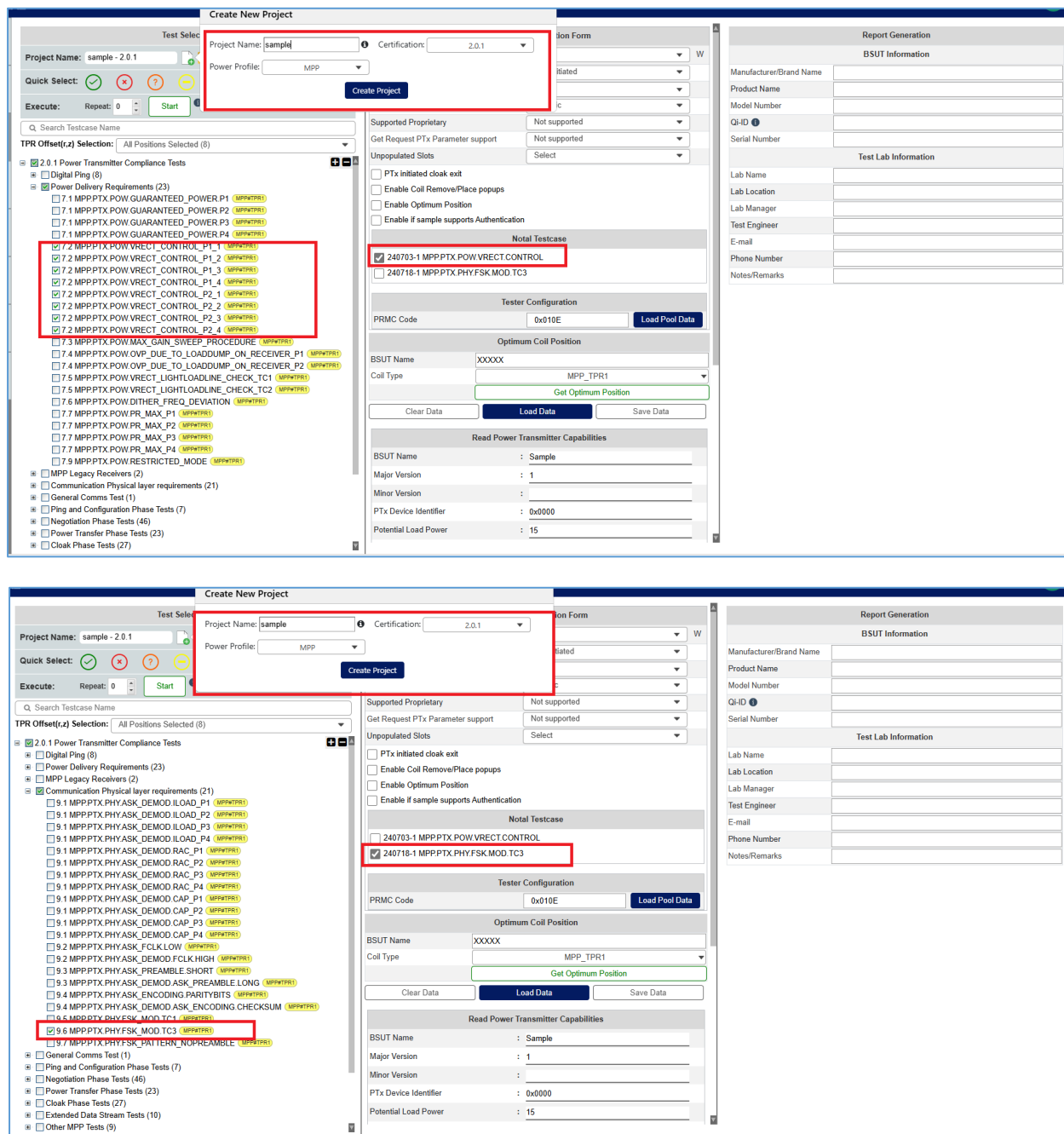


FIGURE 8.35: SELECT NOTAL TEST CASES

- **240703-1 MPP.PTX.POW.VRECT.CONTROL:** Select this checkbox to apply the NOTAL changes in MPP V2.0.1 test execution for the 7.2 MPP.PTX.POW.VRECT_CONTROL tests.
- **240718-1 MPP.PTX.PHY.FSK.MOD.TC3:** Select this checkbox to apply the NOTAL changes in MPP V2.0.1 test execution for the 9.6 MPP.PTX.PHY.FSK_MOD.TC3 tests.

8.2.3.3 Tester Configuration

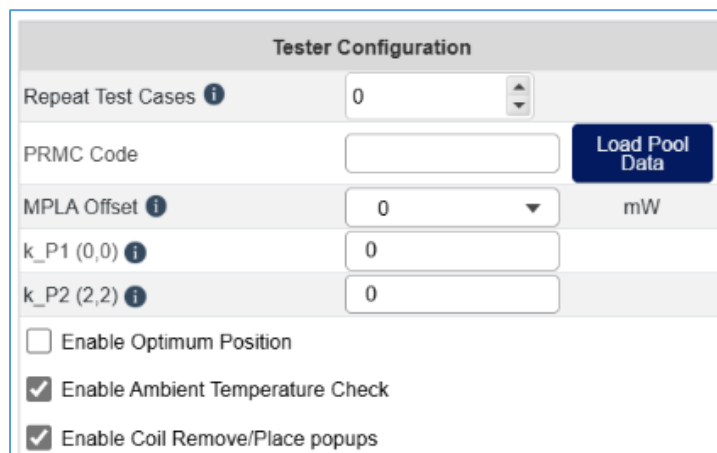


FIGURE 8.36: CONFIGURE TESTER

- **Repeat Test Cases:** Select the number of times to repeat running selected tests.
- **PRMC Code:** Set the Power Receiver Manufacturer Code (PRMC) ID of the MPP TPR.
- **Load Pool Data:** This function allows you to use different power receiver manufacturer codes (PRMC's) other than the GRL-C3-MP-TPR's own power receiver manufacturer code (PRMC) in order to obtain expected test results. Click on the "Load Pool Data" button to load an existing data file and this will enable PRMC codes to be assigned randomly for each test case when running multiple tests.

Note: The PRMC_pool data is available in the WPC website.

 220601_prmc_pool_ch5rsdk (1)	10-01-2023 10:30	Microsoft Excel Co...	1 KB
 GRL_REPORT (27)	28-12-2022 13:27	File folder	
 GRL_REPORT (27)(1)	28-12-2022 13:27	File folder	

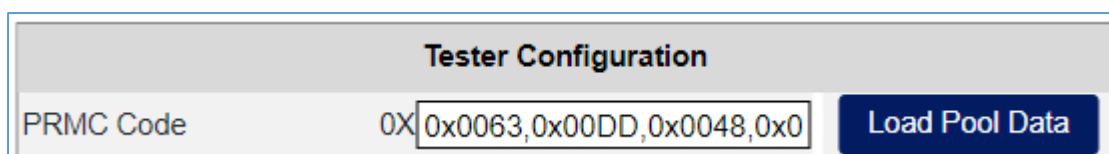


FIGURE 8.37: LOAD PRMC CODE FROM SELECTED POOL DATA FILE

- **Ki_actual_P1 (0,0) & Ki_actual_P2 (2,2):** Set the actual inductive coupling factor, Ki (between 0.4 to 0.96) to be calculated in the PRx at the P1 (0,0) position and P2 (2,2) positions respectively.
- **Enable Optimum Position:** Select this checkbox to enable the TPR coil to be placed at an optimized position on the Interface Surface of the DUT for testing. *Note: The Optimum Coil Positioning data is required for this feature.*
- **Enable Coil Remove/Place popups:** Select this checkbox to allow removal of coils or placement of device accessories during testing.

- **Enable Ambient Temperature Check:** Select this checkbox to enable ambient temperature to be monitored during testing.

8.2.3.4 Optimum Coil Position

Optimum Coil Position	
BSUT Name	XXXXX
Coil Type	MPP_TPR1
Get Optimum Position	
Clear Data	Load Data
Save Data	

FIGURE 8.38: CONFIGURATION FOR OPTIMUM COIL POSITION

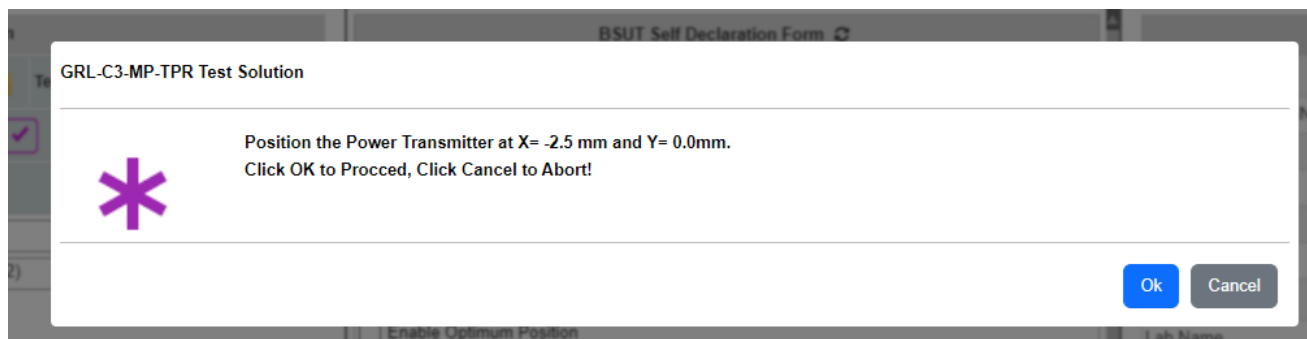
- **BSUT Name:** Set the name of the DUT (BSUT) for the coil positioning test.
- **Coil Type:** Select the type of TPR coil assembly to be positioned on the Interface Surface of the DUT such that the DUT can achieve the maximum signal strength value.
- **Get Optimum Position:** Click on the Get Optimum Position button to start the coil positioning test once the TPR coil is placed on the Interface Surface of the DUT. During this process, adjust the coil in various positions on the DUT surface to obtain the maximum signal strength value. When the test has completed, the results will be displayed below this button. The *Results* screen will also display the results/details of the test case that is running in real-time as shown in the example below:



FIGURE 8.39: OPTIMUM COIL POSITION TEST EXECUTION EXAMPLE

Refer to the following procedure on how to perform the coil positioning test using the Get Optimum Coil feature.

- i. Once the **Get Optimum Position** button is clicked, the following pop-up instructions will appear. Position the DUT according to the X and Y parameters as mentioned to obtain the maximum signal strength value in the optimum position. Once done, click **Ok** to proceed with the test.



Below is an example of the positioning tool with TPR coil and DUT:

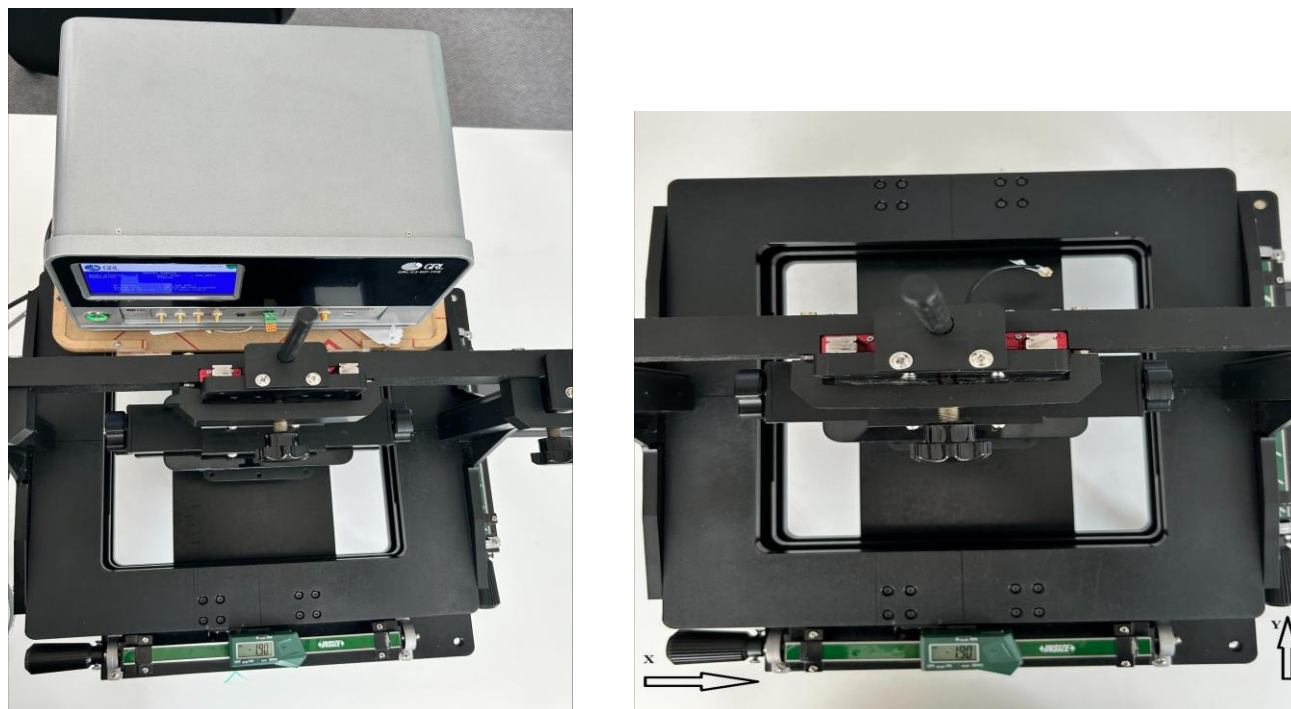
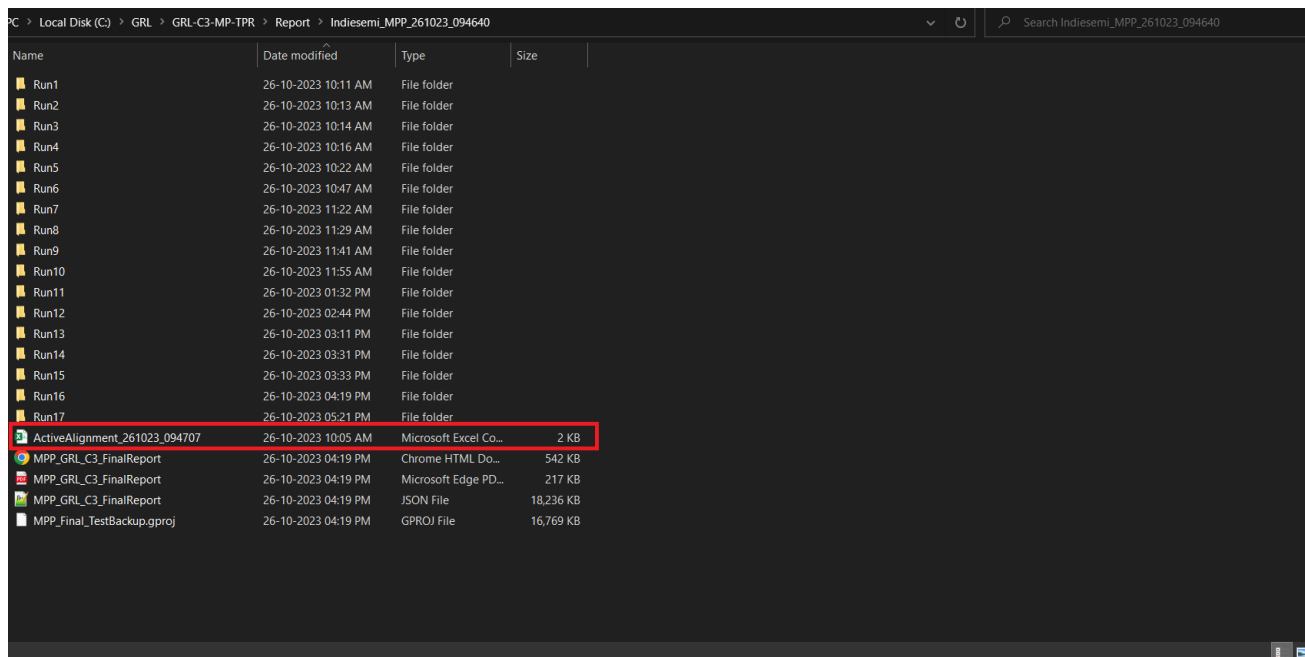


FIGURE 8.40: POSITIONING TOOL AND DUT FOR OPTIMUM COIL POSITION TEST EXAMPLE

- ii. The GRL-C3-MP-TPR application will record all the test measurements and update the values in the following file directory— **"C:\GRL\GRL-C3-MP-TPR\Report\Sample\ActiveAlignment.xlsx"**.



	a	b	c	AxisCenter
X-Axis	2.5128	9.7394	92.3365	-1.9
Y-Axis	1.4232	3.4366	79.8147	-1.2
Step 5. Find SS value at final AxisCenter (X and Y) Positions				
Signal Strength Value: 53				

FIGURE 8.41: DIRECTORY OF TEST MEASUREMENTS AND UPDATED VALUES EXAMPLE

- iii. The trace file will be available in the following directory— ***“C:\GRL\GRL-C3-MP-TPR\SignalFiles\GetCoilOptimumPosition.grltrace”***.

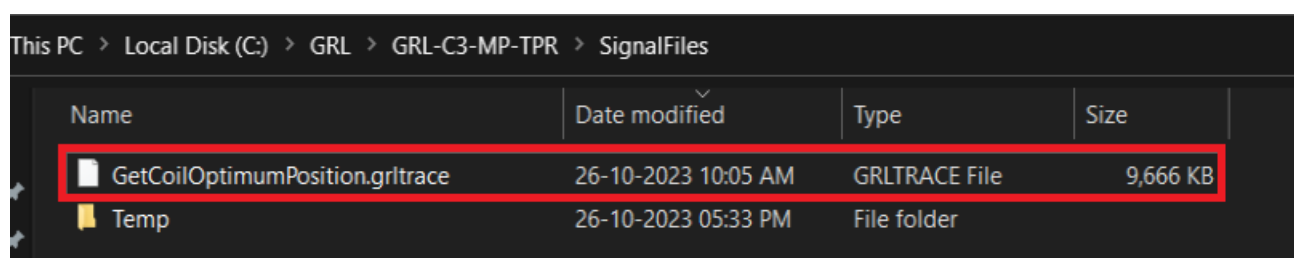


FIGURE 8.42: DIRECTORY OF TRACE FILE EXAMPLE

- **Clear Data:** Click on the Clear Data button to clear existing test results or details.
- **Load Data:** Click on the Load Data button to load and use data from a saved configuration file.
- **Save Data:** Click on the Save Data button to save the current configuration to a file.

8.2.4 Test Selection

The tests available to be run are shown on the “Test Selection” panel.

8.2.4.1 Select Tests

Individual tests are grouped together based on their definition in a specific version of specification. Selecting a group will cause all tests in that group to be selected. Selecting individual tests within a group will lead to just those individual tests to be selected.

Tests that comply with all or certain combination of positions (based on the TPR offset (r,z) positioning) can be selected by clicking on the drop-down menu:

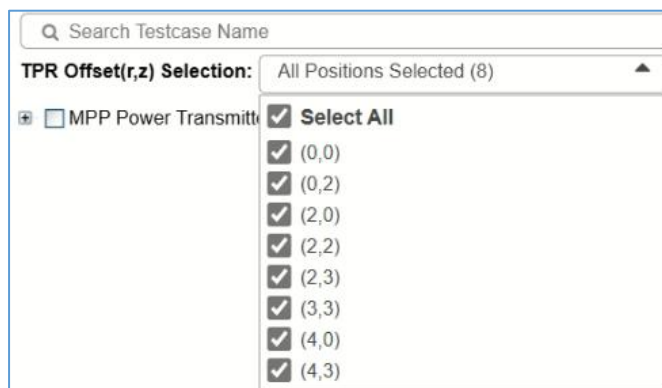


FIGURE 8.43: SELECT TESTS BASED ON TPR OFFSET (R,Z) POSITIONS FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE

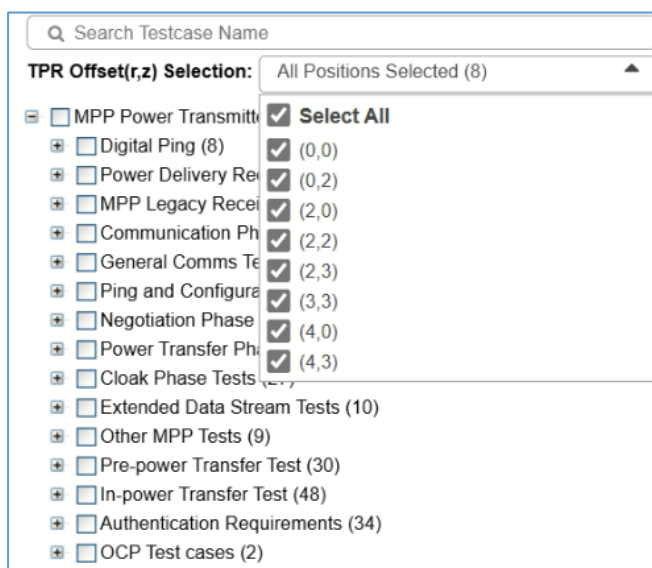


FIGURE 8.44: SELECT TESTS BASED ON TPR OFFSET (R,Z) POSITIONS FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE

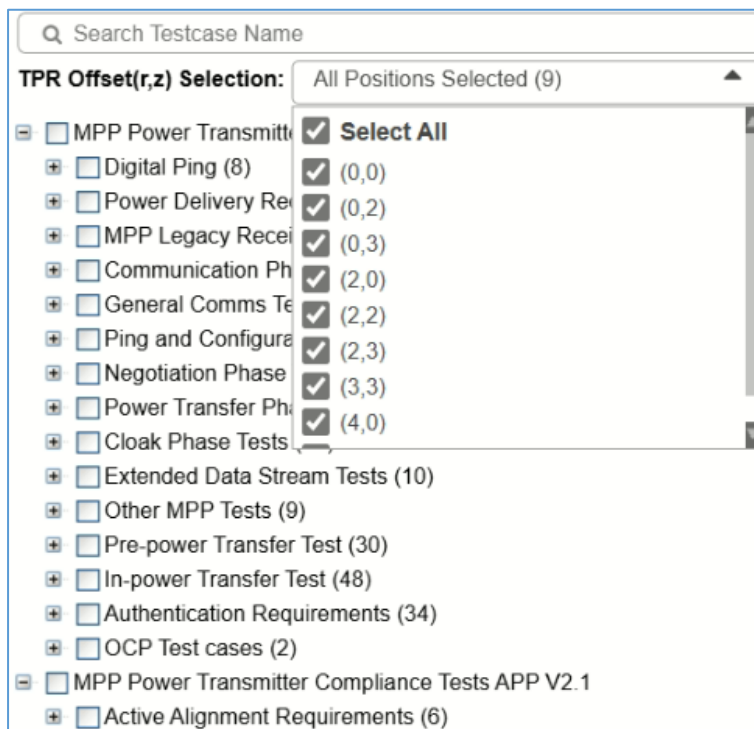


FIGURE 8.45: SELECT TESTS BASED ON TPR OFFSET (R,Z) POSITIONS FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE

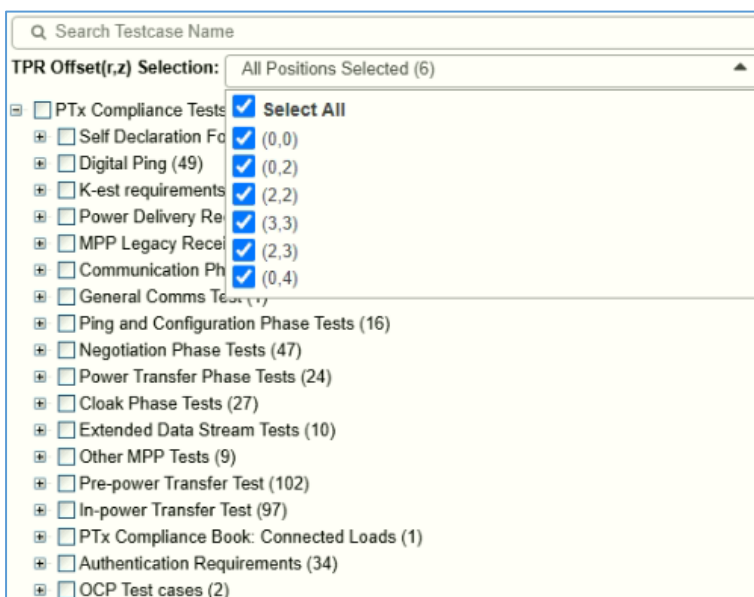


FIGURE 8.46: SELECT TESTS BASED ON TPR OFFSET (R,Z) POSITIONS FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE

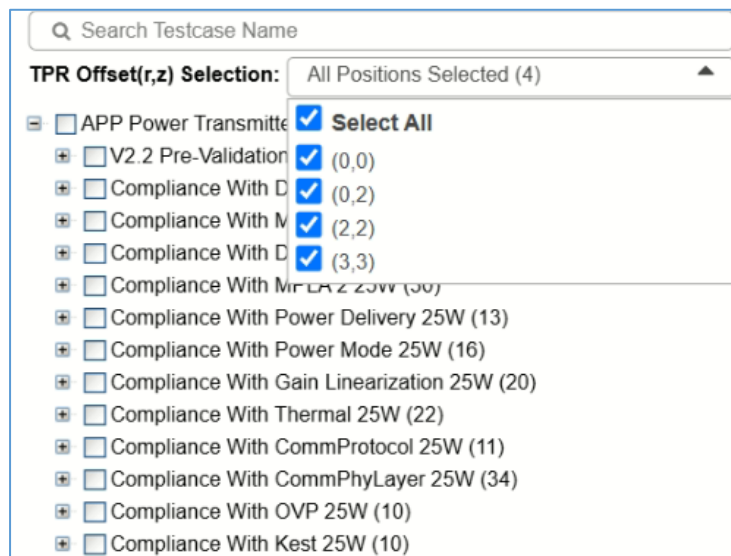


FIGURE 8.47: SELECT TESTS BASED ON TPR OFFSET (R,Z) POSITIONS FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE

Note: For a detailed listing of all the tests and test methodology, please refer to the specification documents referenced in Section 1.

8.2.4.1.1 For MPP V2.0.1 Certification & MPP Power Profile, select from the following tests based on TPR offset (r,z) positioning:

8.2.4.1.1.1 All Positions

Run the compliance tests for all positions of DUT placement.

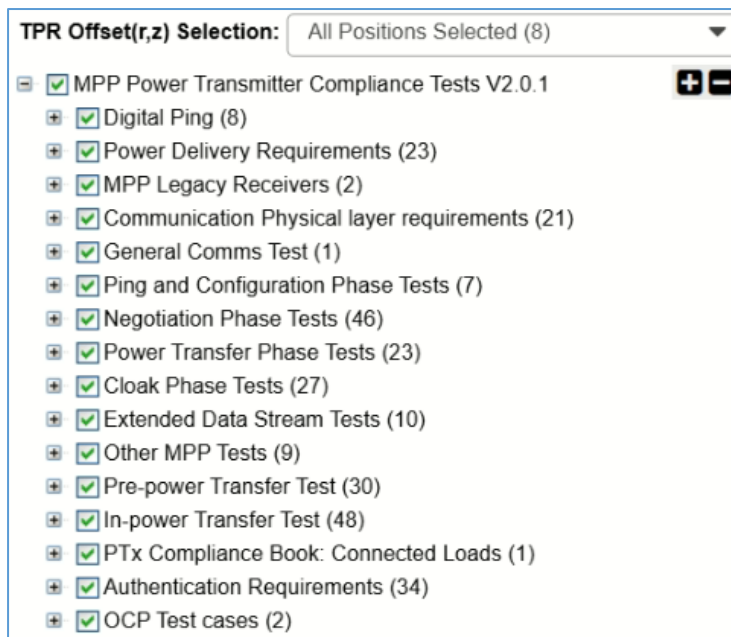
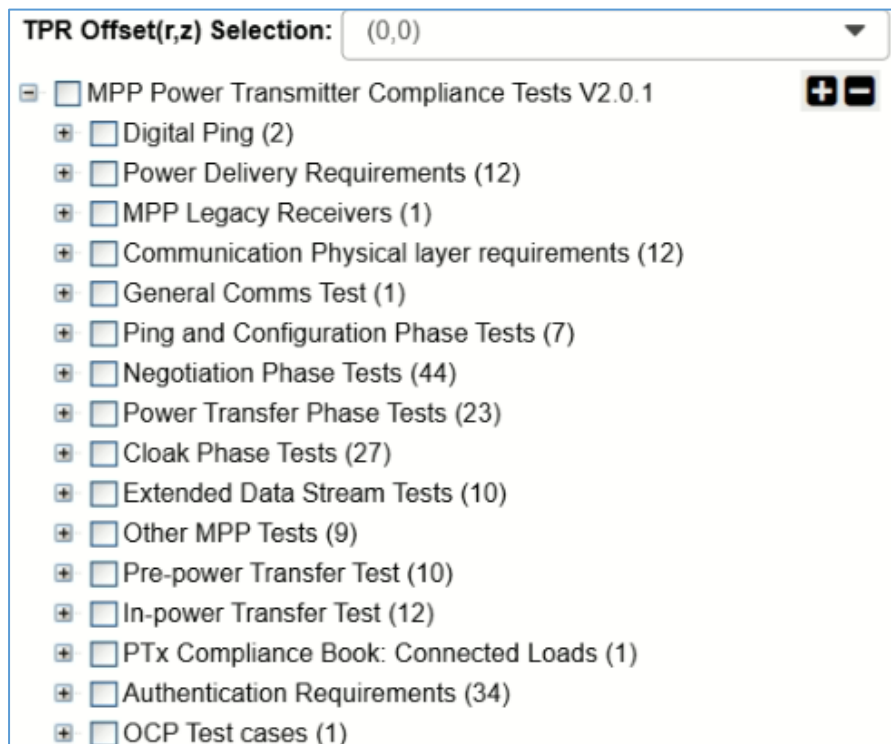


FIGURE 8.48: TEST SELECTION FOR ALL POSITIONS (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.2 (0,0) Position

Run compliance tests for the (0,0) position of DUT placement.



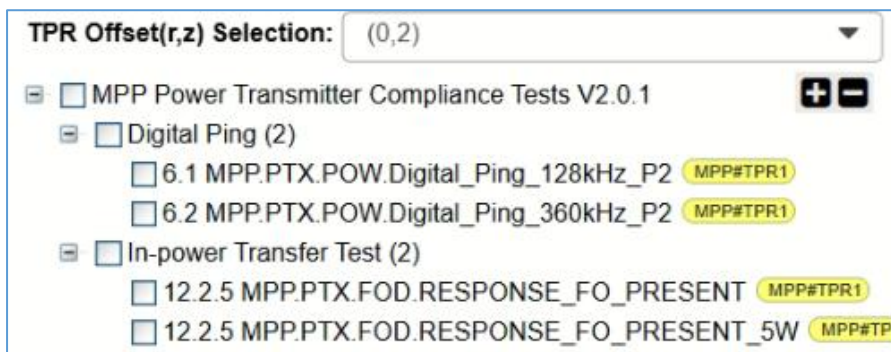
TPR Offset(r,z) Selection: (0,0)

- ☐ MPP Power Transmitter Compliance Tests V2.0.1
- ☐ Digital Ping (2)
- ☐ Power Delivery Requirements (12)
- ☐ MPP Legacy Receivers (1)
- ☐ Communication Physical layer requirements (12)
- ☐ General Comms Test (1)
- ☐ Ping and Configuration Phase Tests (7)
- ☐ Negotiation Phase Tests (44)
- ☐ Power Transfer Phase Tests (23)
- ☐ Cloak Phase Tests (27)
- ☐ Extended Data Stream Tests (10)
- ☐ Other MPP Tests (9)
- ☐ Pre-power Transfer Test (10)
- ☐ In-power Transfer Test (12)
- ☐ PTx Compliance Book: Connected Loads (1)
- ☐ Authentication Requirements (34)
- ☐ OCP Test cases (1)

FIGURE 8.49: TEST SELECTION FOR (0,0) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.3 (0,2) Position

Run the compliance tests for the (0,2) position of DUT placement.



TPR Offset(r,z) Selection: (0,2)

- ☐ MPP Power Transmitter Compliance Tests V2.0.1
 - ☐ Digital Ping (2)
 - ☐ 6.1 MPP.PTX.POW.Digital_Ping_128kHz_P2 MPP#TPR1
 - ☐ 6.2 MPP.PTX.POW.Digital_Ping_360kHz_P2 MPP#TPR1
 - ☐ In-power Transfer Test (2)
 - ☐ 12.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT MPP#TPR1
 - ☐ 12.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT_5W MPP#TP

FIGURE 8.50: TEST SELECTION FOR (0,2) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.4 (2,0) Position

Run compliance tests for the (2,0) position of DUT placement.

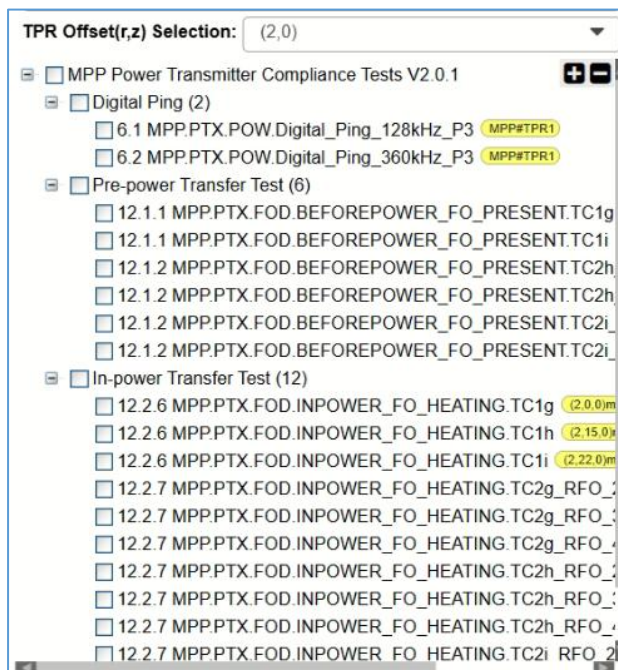


FIGURE 8.51: TEST SELECTION FOR (2,0) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.5 (2,2) Position

Run compliance tests for the (2,2) position of DUT placement.

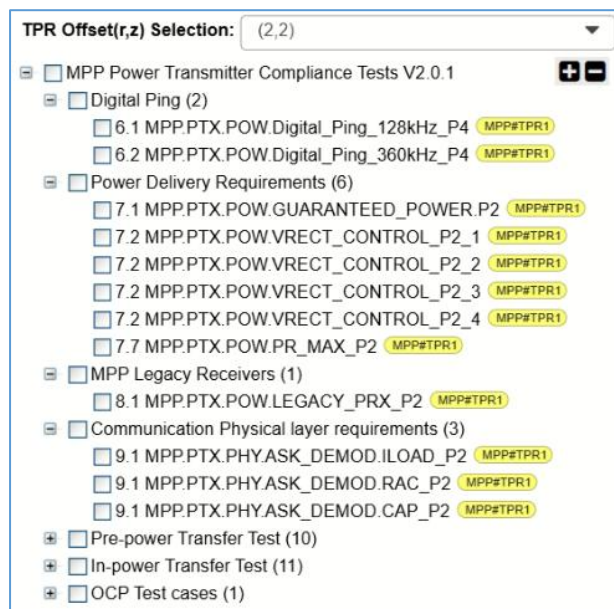


FIGURE 8.52: TEST SELECTION FOR (2,2) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.6 (2,3) Position

Run compliance tests for the (2,3) position of DUT placement.

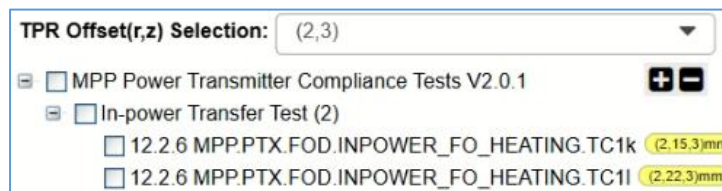


FIGURE 8.53: TEST SELECTION FOR (2,3) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.7 (3,3) Position

Run compliance tests for the (3,3) position of DUT placement.

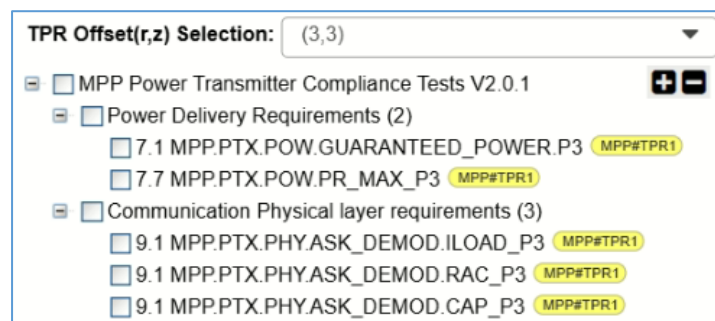


FIGURE 8.54: TEST SELECTION FOR (3,3) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.8 (4,0) Position

Run compliance tests for the (4,0) position of DUT placement.

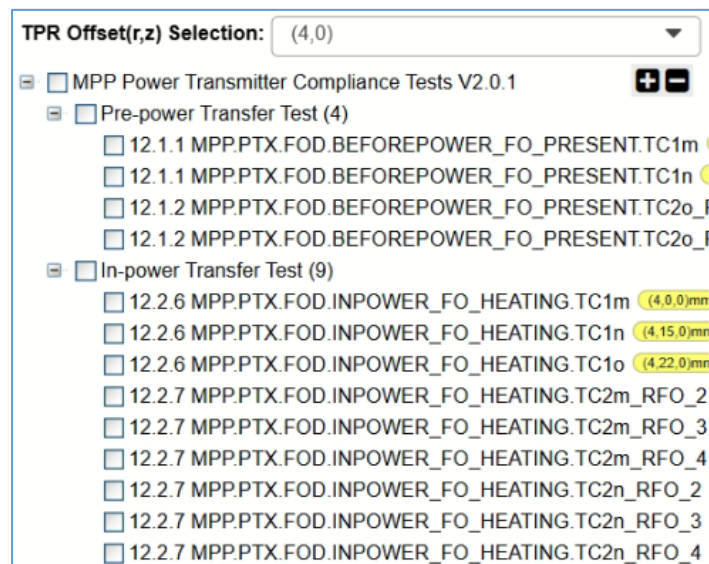
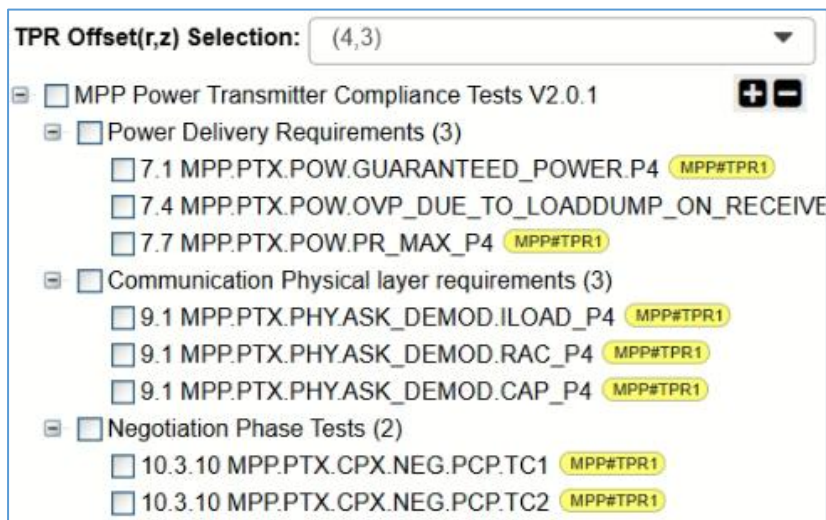


FIGURE 8.55: TEST SELECTION FOR (4,0) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.1.9 (4,3) Position

Run compliance tests for the (4,3) position of DUT placement.



TPR Offset(r,z) Selection: (4,3)

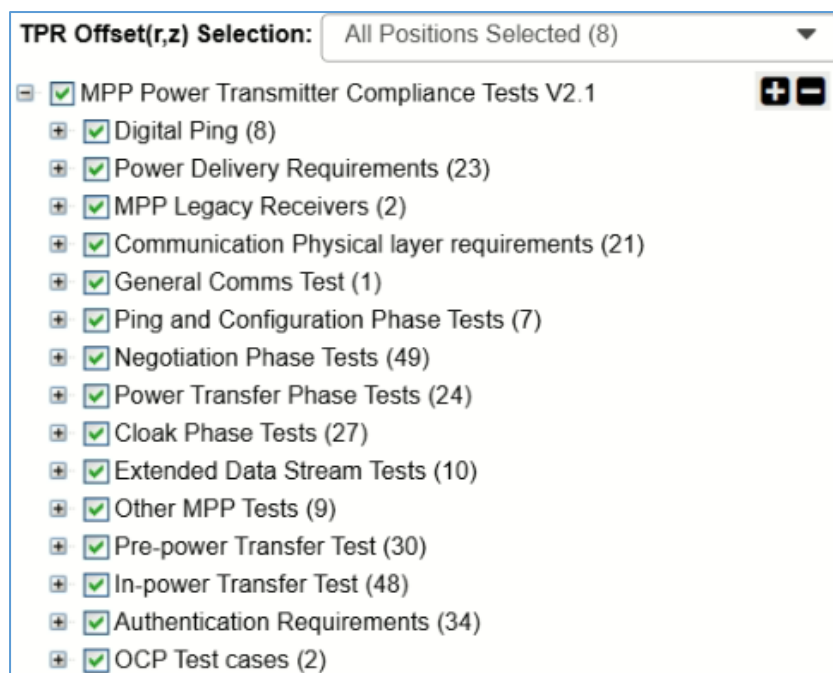
- ☐ MPP Power Transmitter Compliance Tests V2.0.1
 - ☐ Power Delivery Requirements (3)
 - ☐ 7.1 MPP.PTX.POW.GUARANTEED_POWER.P4 MPP#TPR1
 - ☐ 7.4 MPP.PTX.POW.OVP_DUE_TO_LOADDUMP_ON_RECEIVE
 - ☐ 7.7 MPP.PTX.POW.PR_MAX_P4 MPP#TPR1
 - ☐ Communication Physical layer requirements (3)
 - ☐ 9.1 MPP.PTX.PHY.ASK_DEMOD.ILOAD_P4 MPP#TPR1
 - ☐ 9.1 MPP.PTX.PHY.ASK_DEMOD.RAC_P4 MPP#TPR1
 - ☐ 9.1 MPP.PTX.PHY.ASK_DEMOD.CAP_P4 MPP#TPR1
 - ☐ Negotiation Phase Tests (2)
 - ☐ 10.3.10 MPP.PTX.CPX.NEG.PCP.TC1 MPP#TPR1
 - ☐ 10.3.10 MPP.PTX.CPX.NEG.PCP.TC2 MPP#TPR1

FIGURE 8.56: TEST SELECTION FOR (4,3) POSITION (FOR MPP V2.0.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2 For MPP V2.1 Certification & MPP Power Profile, select from the following tests based on TPR offset (r,z) positioning:

8.2.4.1.2.1 All Positions

Run the compliance tests for all positions of DUT placement.



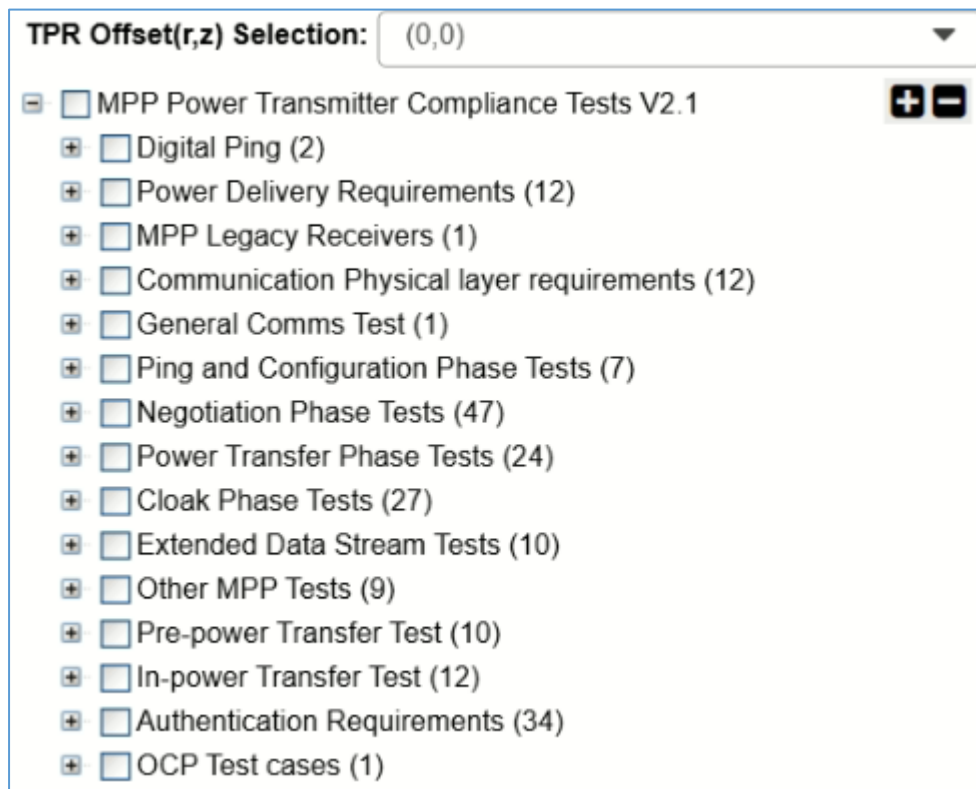
TPR Offset(r,z) Selection: All Positions Selected (8)

- ☒ MPP Power Transmitter Compliance Tests V2.1
 - ☒ Digital Ping (8)
 - ☒ Power Delivery Requirements (23)
 - ☒ MPP Legacy Receivers (2)
 - ☒ Communication Physical layer requirements (21)
 - ☒ General Comms Test (1)
 - ☒ Ping and Configuration Phase Tests (7)
 - ☒ Negotiation Phase Tests (49)
 - ☒ Power Transfer Phase Tests (24)
 - ☒ Cloak Phase Tests (27)
 - ☒ Extended Data Stream Tests (10)
 - ☒ Other MPP Tests (9)
 - ☒ Pre-power Transfer Test (30)
 - ☒ In-power Transfer Test (48)
 - ☒ Authentication Requirements (34)
 - ☒ OCP Test cases (2)

FIGURE 8.57: TEST SELECTION FOR ALL POSITIONS (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.2 (0,0) Position

Run compliance tests for the (0,0) position of DUT placement.



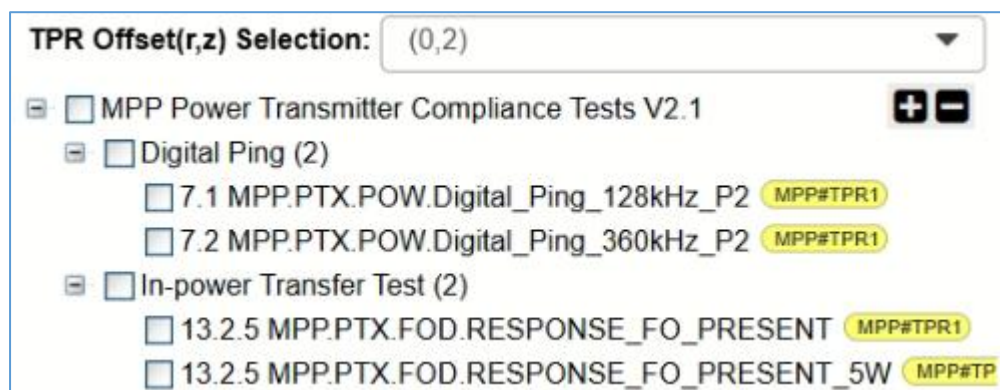
TPR Offset(r,z) Selection: (0,0)

- ☐ MPP Power Transmitter Compliance Tests V2.1
- ☐ Digital Ping (2)
- ☐ Power Delivery Requirements (12)
- ☐ MPP Legacy Receivers (1)
- ☐ Communication Physical layer requirements (12)
- ☐ General Comms Test (1)
- ☐ Ping and Configuration Phase Tests (7)
- ☐ Negotiation Phase Tests (47)
- ☐ Power Transfer Phase Tests (24)
- ☐ Cloak Phase Tests (27)
- ☐ Extended Data Stream Tests (10)
- ☐ Other MPP Tests (9)
- ☐ Pre-power Transfer Test (10)
- ☐ In-power Transfer Test (12)
- ☐ Authentication Requirements (34)
- ☐ OCP Test cases (1)

FIGURE 8.58: TEST SELECTION FOR (0,0) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.3 (0,2) Position

Run the compliance tests for the (0,2) position of DUT placement.



TPR Offset(r,z) Selection: (0,2)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Digital Ping (2)
 - ☐ 7.1 MPP.PTX.POW.Digital_Ping_128kHz_P2 MPP#TPR1
 - ☐ 7.2 MPP.PTX.POW.Digital_Ping_360kHz_P2 MPP#TPR1
 - ☐ In-power Transfer Test (2)
 - ☐ 13.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT MPP#TPR1
 - ☐ 13.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT_5W MPP#TPR1

FIGURE 8.59: TEST SELECTION FOR (0,2) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.4 (2,0) Position

Run compliance tests for the (2,0) position of DUT placement.

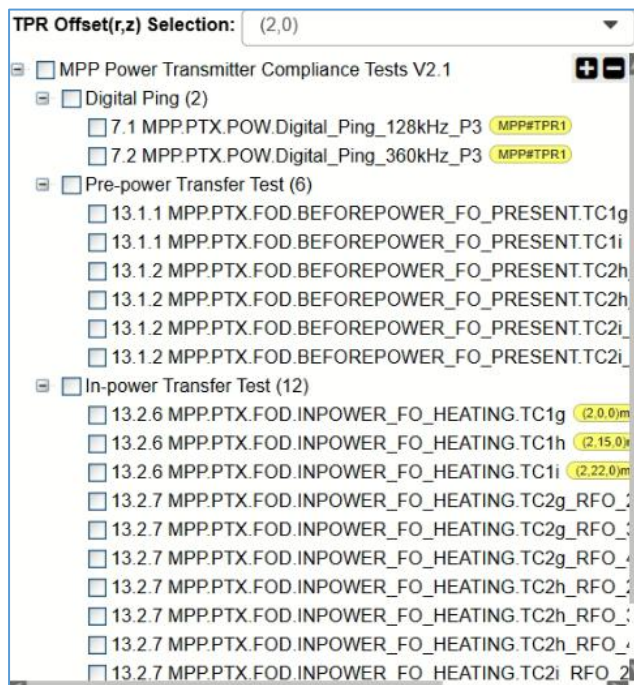


FIGURE 8.60: TEST SELECTION FOR (2,0) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.5 (2,2) Position

Run compliance tests for the (2,2) position of DUT placement.

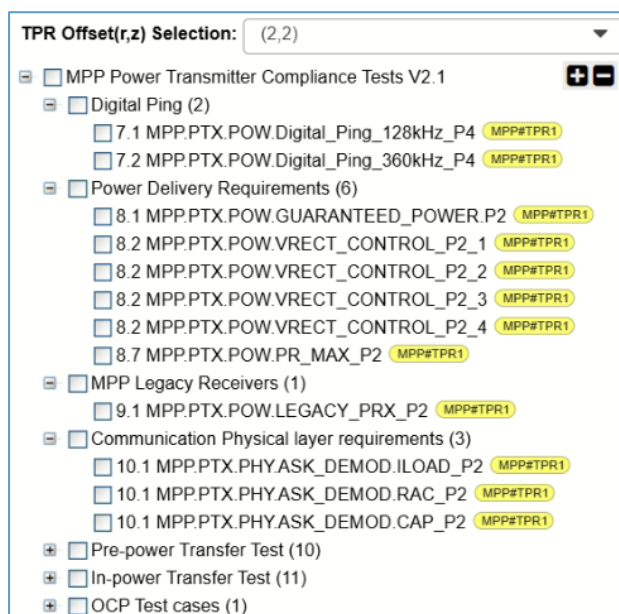


FIGURE 8.61: TEST SELECTION FOR (2,2) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.6 (2,3) Position

Run compliance tests for the (2,3) position of DUT placement.

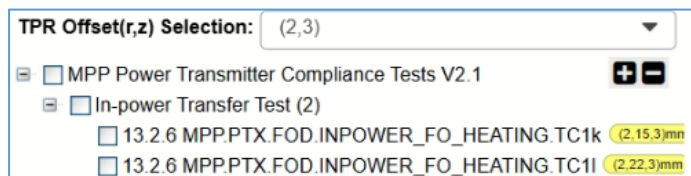


FIGURE 8.62: TEST SELECTION FOR (2,3) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.7 (3,3) Position

Run compliance tests for the (3,3) position of DUT placement.

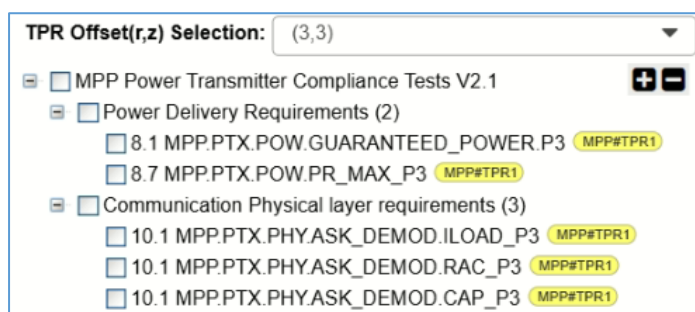


FIGURE 8.63: TEST SELECTION FOR (3,3) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.8 (4,0) Position

Run compliance tests for the (4,0) position of DUT placement.

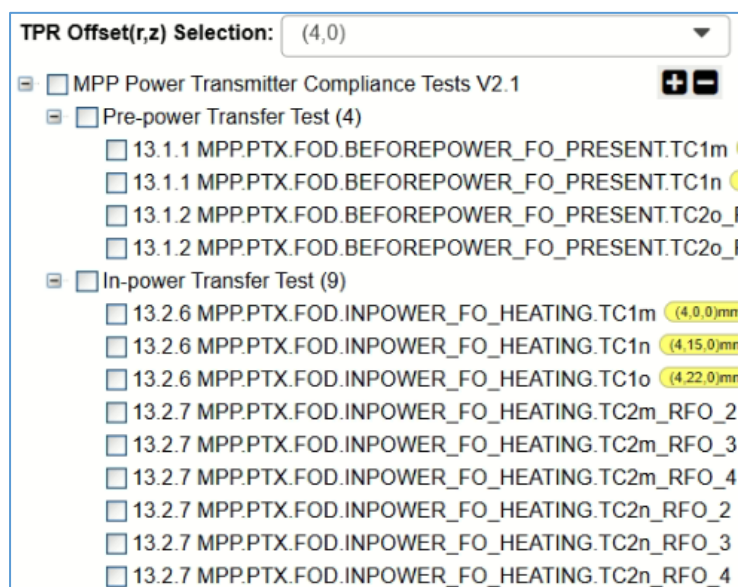


FIGURE 8.64: TEST SELECTION FOR (4,0) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.2.9 (4,3) Position

Run compliance tests for the (4,3) position of DUT placement.

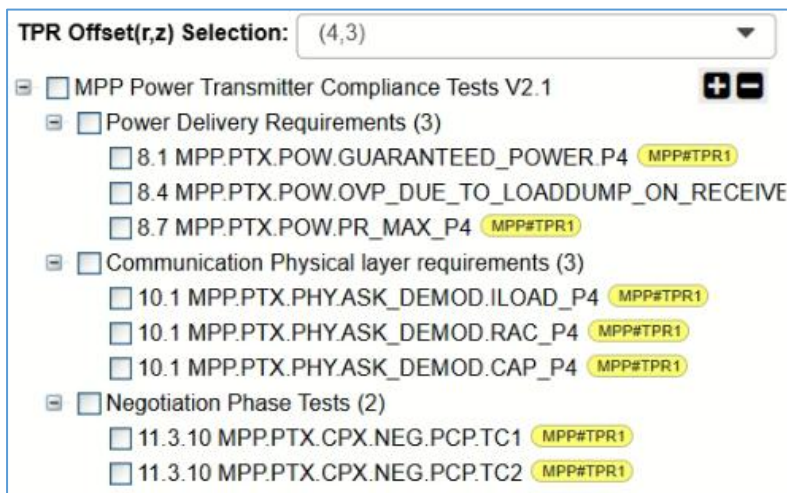


FIGURE 8.65: TEST SELECTION FOR (4,3) POSITION (FOR MPP V2.1 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.3 For MPP V2.1 Certification & APP Power Profile, select from the following tests based on TPR offset (r,z) positioning:

8.2.4.1.3.1 All Positions

Run the compliance tests for all positions of DUT placement.

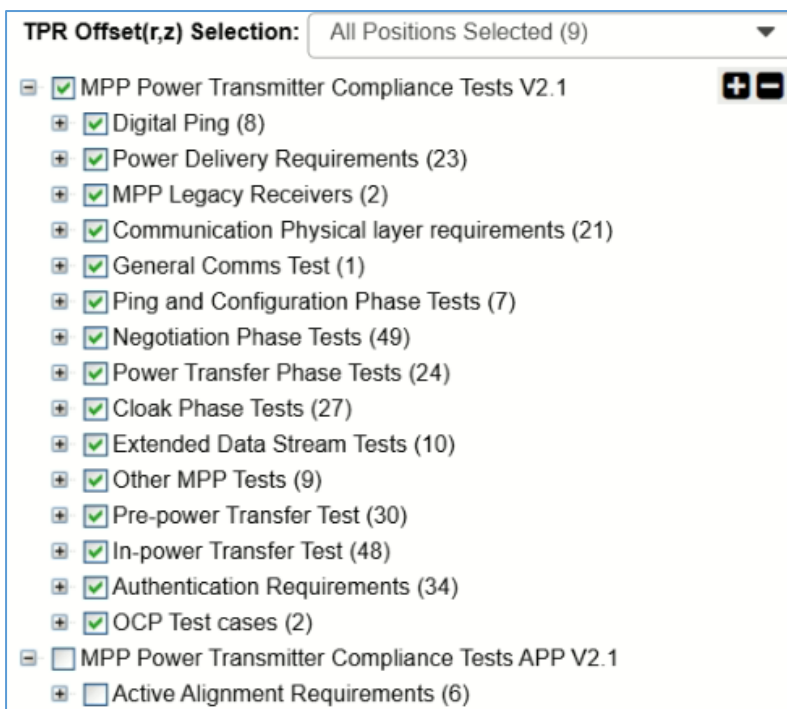
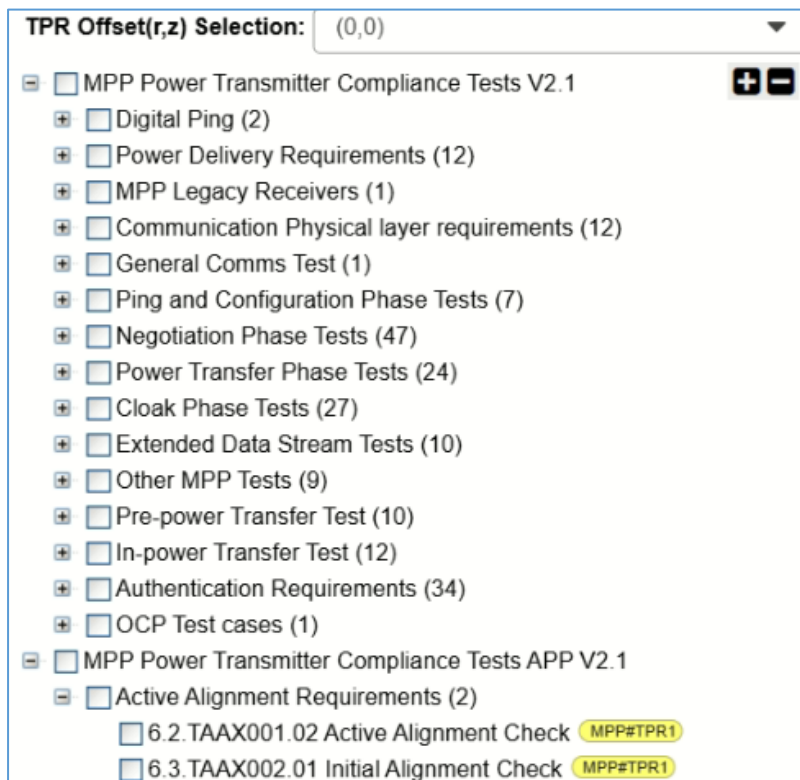


FIGURE 8.66: TEST SELECTION FOR ALL POSITIONS (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.2 (0,0) Position

Run compliance tests for the (0,0) position of DUT placement.



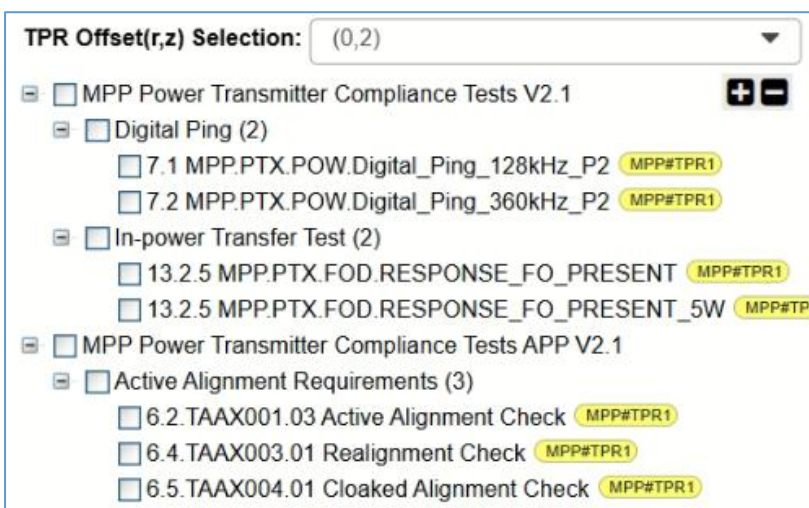
TPR Offset(r,z) Selection: (0,0)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Digital Ping (2)
 - ☐ Power Delivery Requirements (12)
 - ☐ MPP Legacy Receivers (1)
 - ☐ Communication Physical layer requirements (12)
 - ☐ General Comms Test (1)
 - ☐ Ping and Configuration Phase Tests (7)
 - ☐ Negotiation Phase Tests (47)
 - ☐ Power Transfer Phase Tests (24)
 - ☐ Cloak Phase Tests (27)
 - ☐ Extended Data Stream Tests (10)
 - ☐ Other MPP Tests (9)
 - ☐ Pre-power Transfer Test (10)
 - ☐ In-power Transfer Test (12)
 - ☐ Authentication Requirements (34)
 - ☐ OCP Test cases (1)
- ☐ MPP Power Transmitter Compliance Tests APP V2.1
 - ☐ Active Alignment Requirements (2)
 - ☐ 6.2.TAAX001.02 Active Alignment Check MPP#TPR1
 - ☐ 6.3.TAAX002.01 Initial Alignment Check MPP#TPR1

FIGURE 8.67: TEST SELECTION FOR (0,0) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.3 (0,2) Position

Run the compliance tests for the (0,2) position of DUT placement.



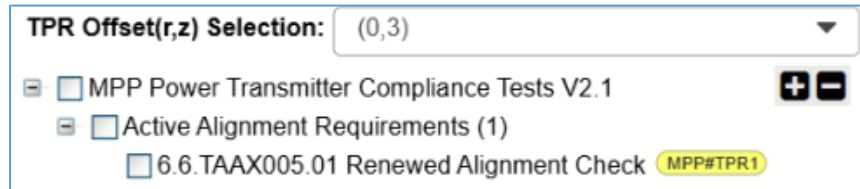
TPR Offset(r,z) Selection: (0,2)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Digital Ping (2)
 - ☐ 7.1 MPP.PTX.POW.Digital_Ping_128kHz_P2 MPP#TPR1
 - ☐ 7.2 MPP.PTX.POW.Digital_Ping_360kHz_P2 MPP#TPR1
 - ☐ In-power Transfer Test (2)
 - ☐ 13.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT MPP#TPR1
 - ☐ 13.2.5 MPP.PTX.FOD.RESPONSE_FO_PRESENT_5W MPP#TP
- ☐ MPP Power Transmitter Compliance Tests APP V2.1
 - ☐ Active Alignment Requirements (3)
 - ☐ 6.2.TAAX001.03 Active Alignment Check MPP#TPR1
 - ☐ 6.4.TAAX003.01 Realignment Check MPP#TPR1
 - ☐ 6.5.TAAX004.01 Cloaked Alignment Check MPP#TPR1

FIGURE 8.68: TEST SELECTION FOR (0,2) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.4 (0,3) Position

Run compliance tests for the (0,3) position of DUT placement.



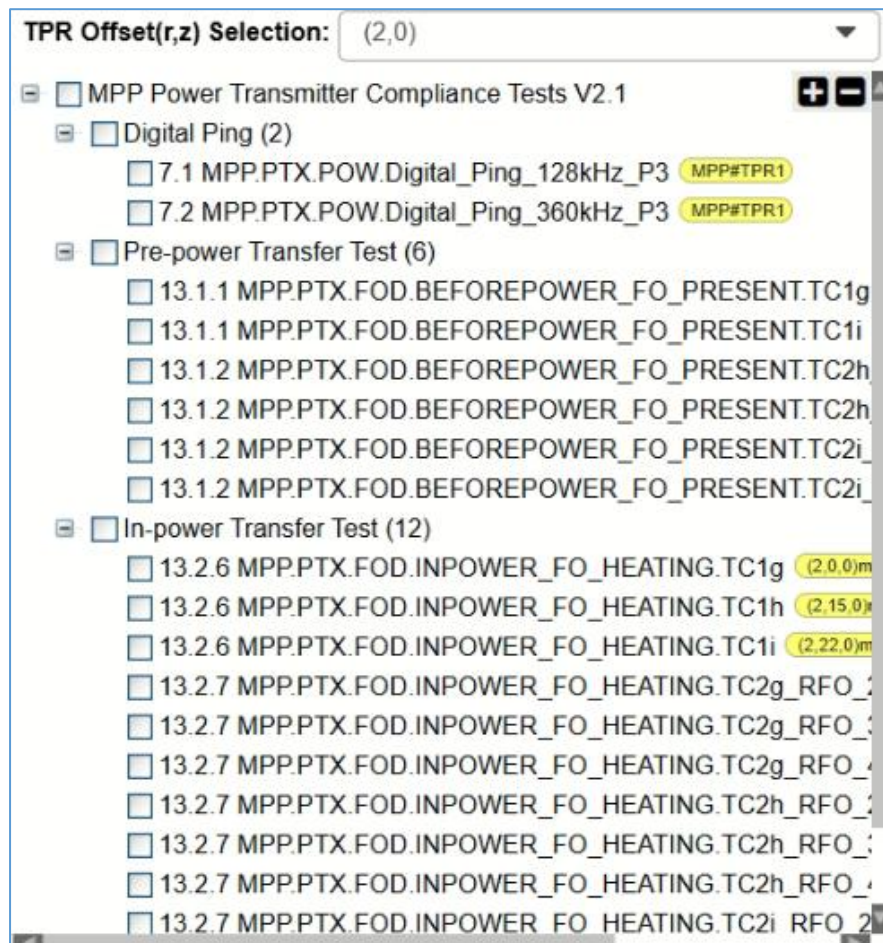
TPR Offset(r,z) Selection: (0,3)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Active Alignment Requirements (1)
 - ☐ 6.6.TAAX005.01 Renewed Alignment Check (MPP#TPR1)

FIGURE 8.69: TEST SELECTION FOR (0,3) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.5 (2,0) Position

Run compliance tests for the (2,0) position of DUT placement.



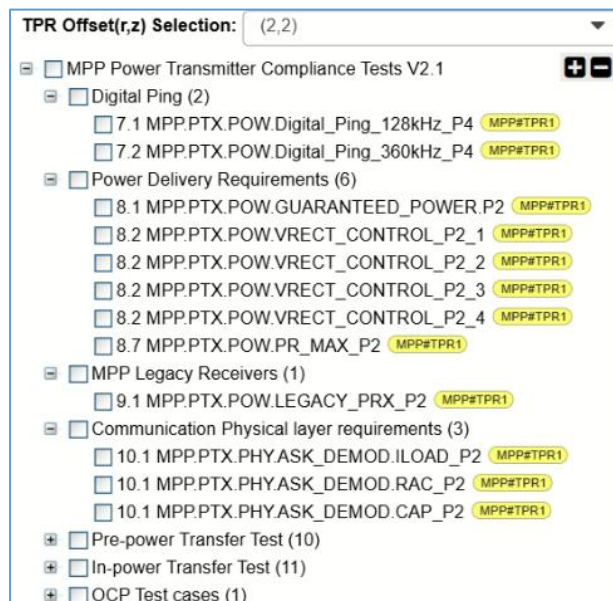
TPR Offset(r,z) Selection: (2,0)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Digital Ping (2)
 - ☐ 7.1 MPP.PTX.POW.Digital_Ping_128kHz_P3 (MPP#TPR1)
 - ☐ 7.2 MPP.PTX.POW.Digital_Ping_360kHz_P3 (MPP#TPR1)
 - ☐ Pre-power Transfer Test (6)
 - ☐ 13.1.1 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC1g
 - ☐ 13.1.1 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC1i
 - ☐ 13.1.2 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC2h
 - ☐ 13.1.2 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC2i
 - ☐ 13.1.2 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC2i
 - ☐ In-power Transfer Test (12)
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1g (2,0,0)m
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1h (2,15,0)m
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1i (2,22,0)m
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2g_RFO_2
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2g_RFO_3
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2g_RFO_4
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2h_RFO_2
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2h_RFO_3
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2h_RFO_4
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2i_RFO_2

FIGURE 8.70: TEST SELECTION FOR (2,0) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.6 (2,2) Position

Run compliance tests for the (2,2) position of DUT placement.



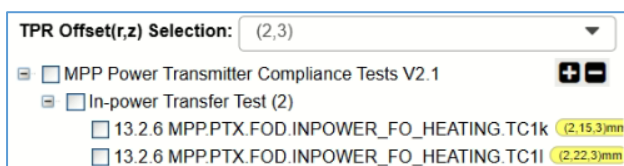
TPR Offset(r,z) Selection: (2,2)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Digital Ping (2)
 - ☐ 7.1 MPP.PTX.POW.Digital_Ping_128kHz_P4 MPP#TPR1
 - ☐ 7.2 MPP.PTX.POW.Digital_Ping_360kHz_P4 MPP#TPR1
 - ☐ Power Delivery Requirements (6)
 - ☐ 8.1 MPP.PTX.POW.GUARANTEED_POWER.P2 MPP#TPR1
 - ☐ 8.2 MPP.PTX.POW.VRECT_CONTROL_P2_1 MPP#TPR1
 - ☐ 8.2 MPP.PTX.POW.VRECT_CONTROL_P2_2 MPP#TPR1
 - ☐ 8.2 MPP.PTX.POW.VRECT_CONTROL_P2_3 MPP#TPR1
 - ☐ 8.2 MPP.PTX.POW.VRECT_CONTROL_P2_4 MPP#TPR1
 - ☐ 8.7 MPP.PTX.POW.PR_MAX_P2 MPP#TPR1
 - ☐ MPP Legacy Receivers (1)
 - ☐ 9.1 MPP.PTX.POW.LEGACY_PRX_P2 MPP#TPR1
 - ☐ Communication Physical layer requirements (3)
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.ILOAD_P2 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.RAC_P2 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.CAP_P2 MPP#TPR1
 - ☐ Pre-power Transfer Test (10)
 - ☐ In-power Transfer Test (11)
 - ☐ OCP Test cases (1)

FIGURE 8.71: TEST SELECTION FOR (2,2) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.7 (2,3) Position

Run compliance tests for the (2,3) position of DUT placement.



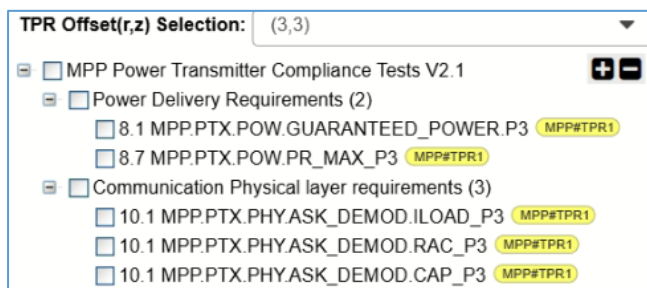
TPR Offset(r,z) Selection: (2,3)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ In-power Transfer Test (2)
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1k (2.15.3)mm
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1l (2.22.3)mm

FIGURE 8.72: TEST SELECTION FOR (2,3) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.8 (3,3) Position

Run compliance tests for the (3,3) position of DUT placement.



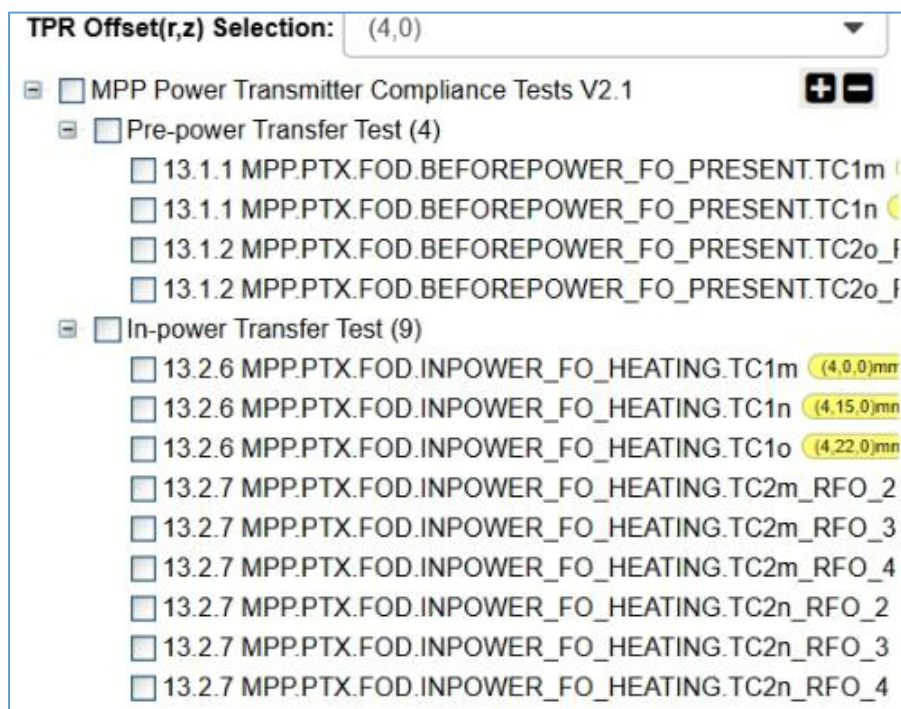
TPR Offset(r,z) Selection: (3,3)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Power Delivery Requirements (2)
 - ☐ 8.1 MPP.PTX.POW.GUARANTEED_POWER.P3 MPP#TPR1
 - ☐ 8.7 MPP.PTX.POW.PR_MAX_P3 MPP#TPR1
 - ☐ Communication Physical layer requirements (3)
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.ILOAD_P3 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.RAC_P3 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.CAP_P3 MPP#TPR1
 - ☐ Pre-power Transfer Test (10)
 - ☐ In-power Transfer Test (11)
 - ☐ OCP Test cases (1)

FIGURE 8.73: TEST SELECTION FOR (3,3) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.9 (4,0) Position

Run compliance tests for the (4,0) position of DUT placement.



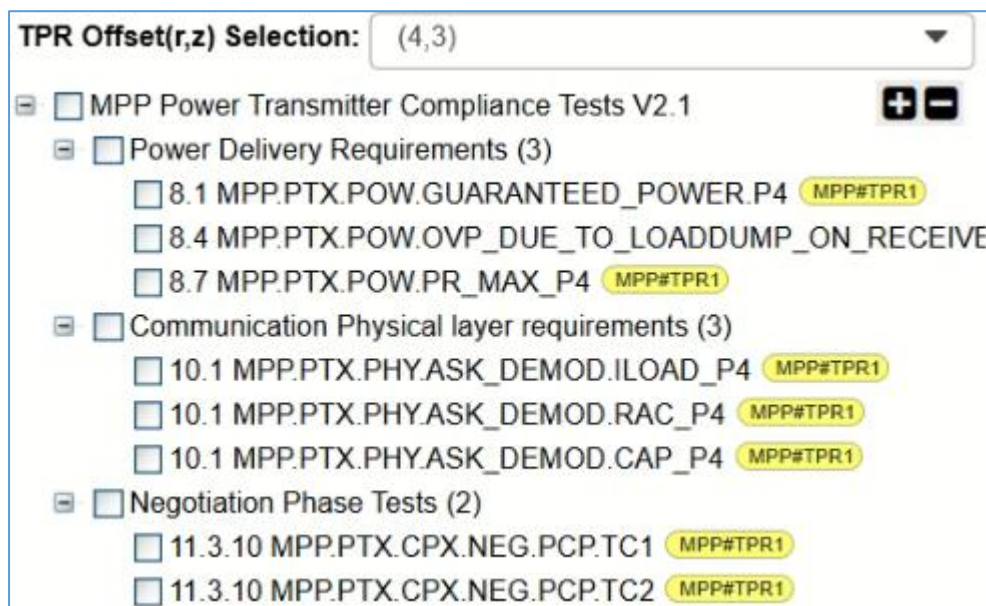
TPR Offset(r,z) Selection: (4,0)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Pre-power Transfer Test (4)
 - ☐ 13.1.1 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC1m
 - ☐ 13.1.1 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC1n
 - ☐ 13.1.2 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC2o_f
 - ☐ 13.1.2 MPP.PTX.FOD.BEFOREPOWER_FO_PRESENT.TC2o_f
 - ☐ In-power Transfer Test (9)
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1m (4,0)mm
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1n (4,15)mm
 - ☐ 13.2.6 MPP.PTX.FOD.INPOWER_FO_HEATING.TC1o (4,22)mm
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2m_RFO_2
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2m_RFO_3
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2m_RFO_4
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2n_RFO_2
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2n_RFO_3
 - ☐ 13.2.7 MPP.PTX.FOD.INPOWER_FO_HEATING.TC2n_RFO_4

FIGURE 8.74: TEST SELECTION FOR (4,0) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.3.10 (4,3) Position

Run compliance tests for the (4,3) position of DUT placement.



TPR Offset(r,z) Selection: (4,3)

- ☐ MPP Power Transmitter Compliance Tests V2.1
 - ☐ Power Delivery Requirements (3)
 - ☐ 8.1 MPP.PTX.POW.GUARANTEED_POWER_P4 MPP#TPR1
 - ☐ 8.4 MPP.PTX.POW.OVP_DUE_TO_LOADDUMP_ON_RECEIVE
 - ☐ 8.7 MPP.PTX.POW.PR_MAX_P4 MPP#TPR1
 - ☐ Communication Physical layer requirements (3)
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.ILOAD_P4 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.RAC_P4 MPP#TPR1
 - ☐ 10.1 MPP.PTX.PHY.ASK_DEMOD.CAP_P4 MPP#TPR1
 - ☐ Negotiation Phase Tests (2)
 - ☐ 11.3.10 MPP.PTX.CPX.NEG.PCPTC1 MPP#TPR1
 - ☐ 11.3.10 MPP.PTX.CPX.NEG.PCPTC2 MPP#TPR1

FIGURE 8.75: TEST SELECTION FOR (4,3) POSITION (FOR MPP V2.1 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.4 For MPP V2.2 Certification & MPP Power Profile, select from the following tests based on TPR offset (r,z) positioning:

8.2.4.1.4.1 All Positions

Run the compliance tests for all positions of DUT placement.

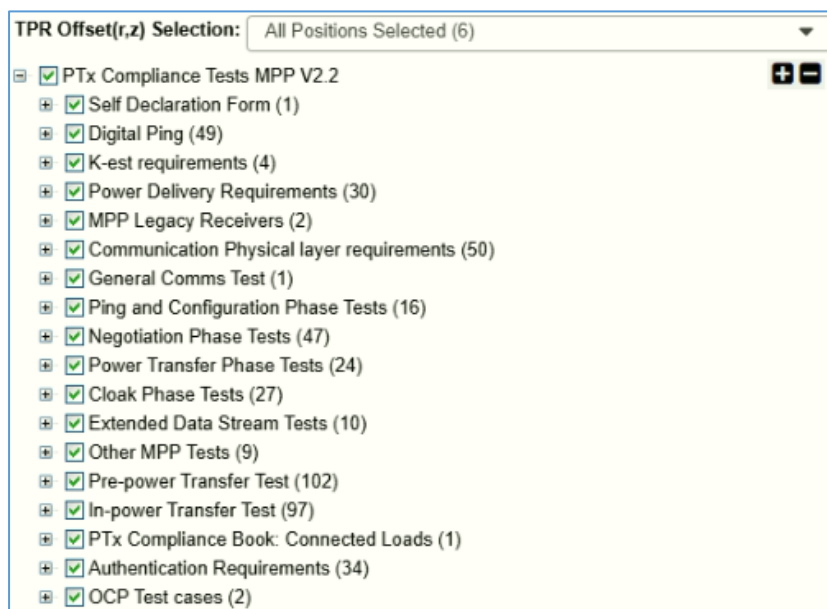


FIGURE 8.76: TEST SELECTION FOR ALL POSITIONS (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.2 (0,0) Position

Run compliance tests for the (0,0) position of DUT placement.

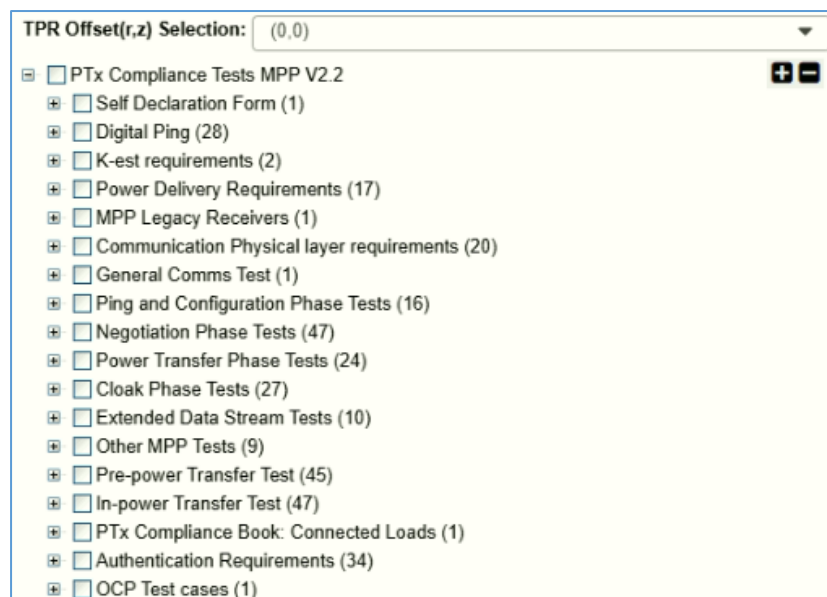


FIGURE 8.77: TEST SELECTION FOR (0,0) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.3 (0,2) Position

Run the compliance tests for the (0,2) position of DUT placement.

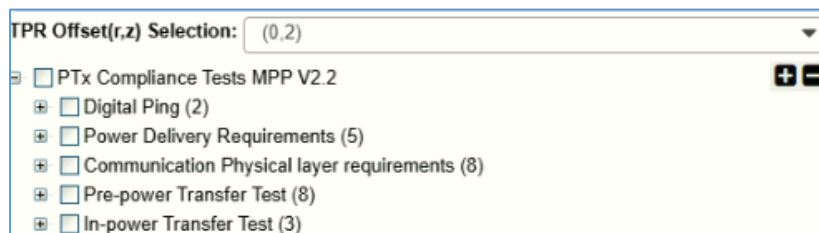


FIGURE 8.78: TEST SELECTION FOR (0,2) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.4 (2,2) Position

Run compliance tests for the (2,2) position of DUT placement.

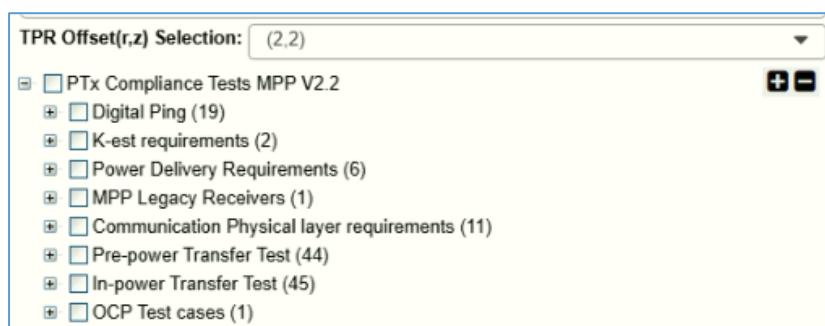


FIGURE 8.79: TEST SELECTION FOR (2,2) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.5 (3,3) Position

Run compliance tests for the (3,3) position of DUT placement.

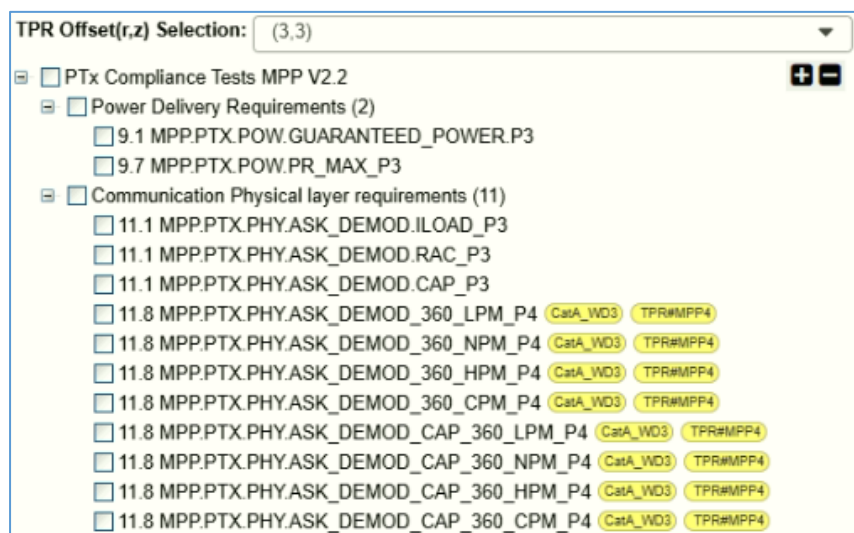


FIGURE 8.80: TEST SELECTION FOR (3,3) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.6 (2,3) Position

Run compliance tests for the (2,3) position of DUT placement.

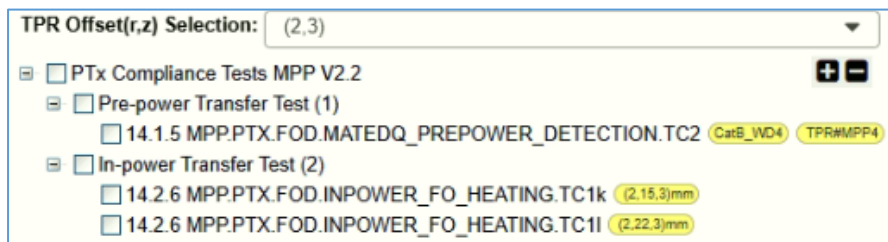


FIGURE 8.81: TEST SELECTION FOR (2,3) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.4.7 (0,4) Position

Run compliance tests for the (0,4) position of DUT placement.

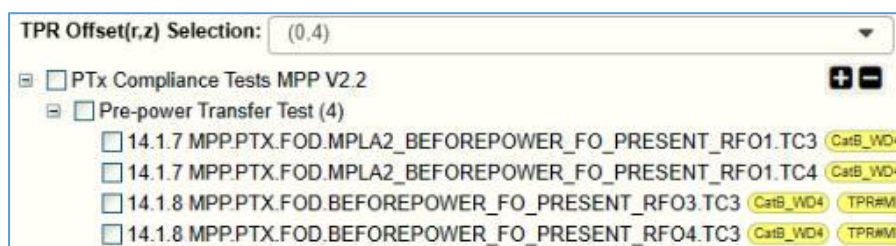


FIGURE 8.82: TEST SELECTION FOR (0,4) POSITION (FOR MPP V2.2 CERTIFICATION & MPP POWER PROFILE)

8.2.4.1.5 For MPP V2.2 Certification & APP Power Profile, select from the following tests based on TPR offset (r,z) positioning:

8.2.4.1.5.1 All Positions

Run the compliance tests for all positions of DUT placement.

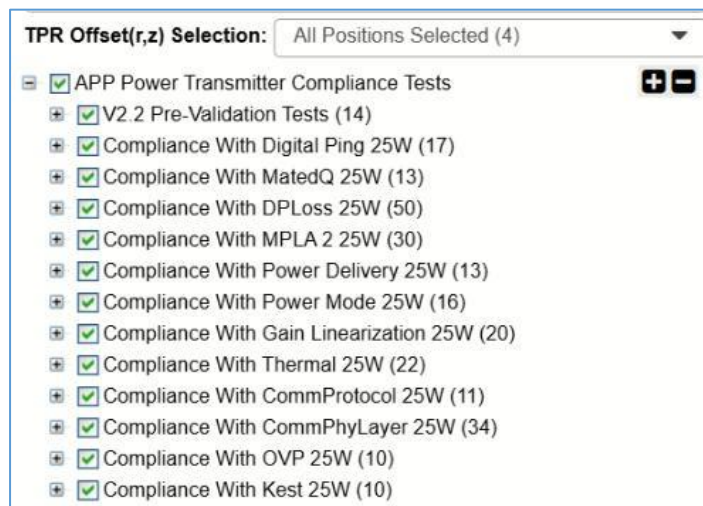
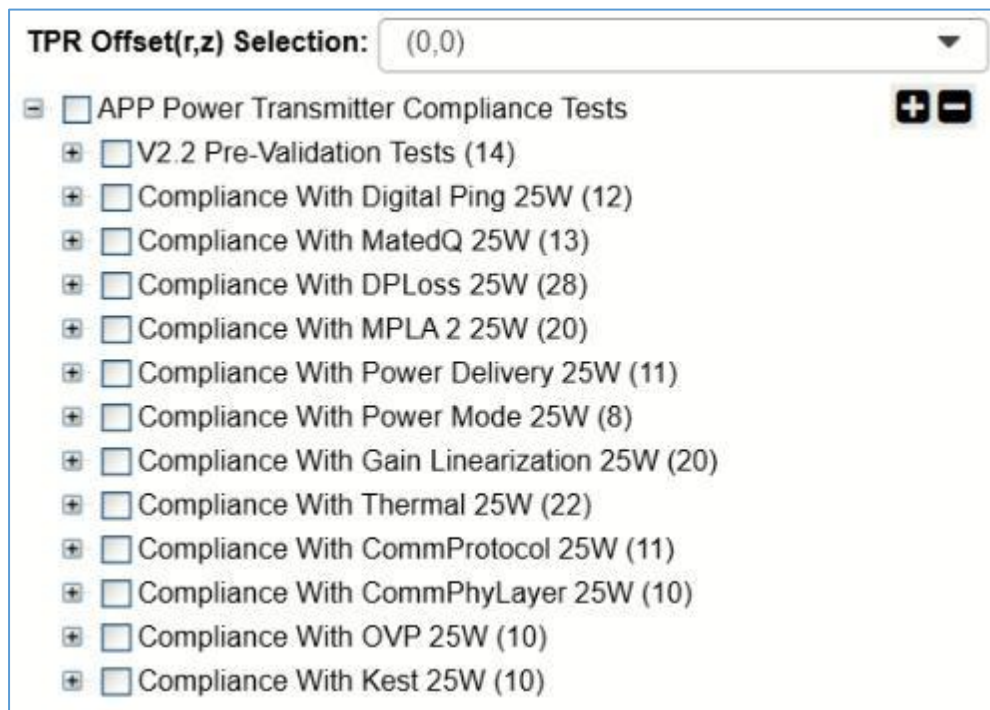


FIGURE 8.83: TEST SELECTION FOR ALL POSITIONS (FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.5.2 (0,0) Position

Run compliance tests for the (0,0) position of DUT placement.



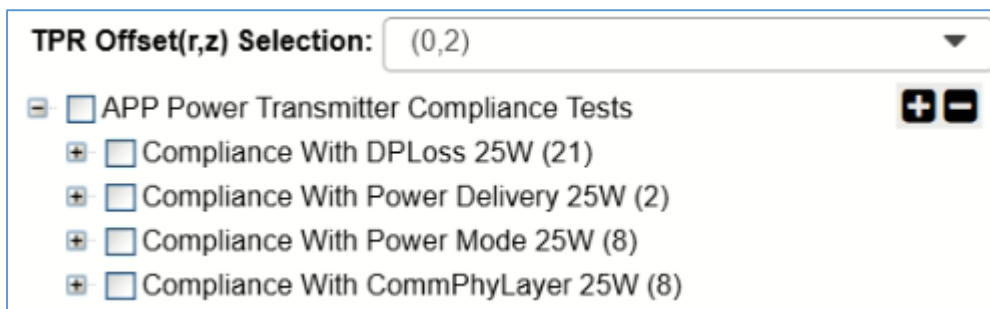
TPR Offset(r,z) Selection: (0,0)

- ☐ APP Power Transmitter Compliance Tests
 - ☐ V2.2 Pre-Validation Tests (14)
 - ☐ Compliance With Digital Ping 25W (12)
 - ☐ Compliance With MatedQ 25W (13)
 - ☐ Compliance With DPLoss 25W (28)
 - ☐ Compliance With MPLA 2 25W (20)
 - ☐ Compliance With Power Delivery 25W (11)
 - ☐ Compliance With Power Mode 25W (8)
 - ☐ Compliance With Gain Linearization 25W (20)
 - ☐ Compliance With Thermal 25W (22)
 - ☐ Compliance With CommProtocol 25W (11)
 - ☐ Compliance With CommPhyLayer 25W (10)
 - ☐ Compliance With OVP 25W (10)
 - ☐ Compliance With Kest 25W (10)

FIGURE 8.84: TEST SELECTION FOR (0,0) POSITION (FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.5.3 (0,2) Position

Run the compliance tests for the (0,2) position of DUT placement.



TPR Offset(r,z) Selection: (0,2)

- ☐ APP Power Transmitter Compliance Tests
 - ☐ Compliance With DPLoss 25W (21)
 - ☐ Compliance With Power Delivery 25W (2)
 - ☐ Compliance With Power Mode 25W (8)
 - ☐ Compliance With CommPhyLayer 25W (8)

FIGURE 8.85: TEST SELECTION FOR (0,2) POSITION (FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.5.4 (2,2) Position

Run compliance tests for the (2,2) position of DUT placement.

TPR Offset(r,z) Selection: (2,2) ▼

☐ APP Power Transmitter Compliance Tests + -

☐ Compliance With Digital Ping 25W (5)

☐ 12.1 MPP.PTX.POW_Digital_Ping_128kHz_HPM1_P2 MPP#TPR1

☐ 12.3 MPP.PTX.POW_Digital_Ping_360kHz_TC_3_P3 MPP#TPR1

☐ 12.3 MPP.PTX.POW_Digital_Ping_360kHz_TC_3_P4 MPP#TPR1

☐ 12.4 MPP.PTX.POW_Cloak_Ping_360kHz_TC_4_P3 MPP#TPR1

☐ 12.4 MPP.PTX.POW_Cloak_Ping_360kHz_TC_4_P4 MPP#TPR1

☐ Compliance With DPLoss 25W (1)

☐ 3.9 MPP.PTX.FOD.25W_RESPONSE_VALID_DEVICE_TC2_P2

☐ Compliance With MPLA 2 25W (10)

☐ Compliance With CommPhyLayer 25W (8)

FIGURE 8.86: TEST SELECTION FOR (2,2) POSITION (FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE)

8.2.4.1.5.5 (3,3) Position

Run compliance tests for the (3,3) position of DUT placement.

TPR Offset(r,z) Selection: (3,3) ▼

☐ APP Power Transmitter Compliance Tests + -

☐ Compliance With CommPhyLayer 25W (8)

☐ 6.1 MPP.PTX.25W_COMM_PHYLAYER_LPM_CAP_TC_1_P4 M

☐ 6.2 MPP.PTX.25W_COMM_PHYLAYER_LPM_REAL_TC_2_P4

☐ 6.3 MPP.PTX.25W_COMM_PHYLAYER_NPM_CAP_TC_3_P4 M

☐ 6.4 MPP.PTX.25W_COMM_PHYLAYER_NPM_REAL_TC_4_P4

☐ 6.5 MPP.PTX.25W_COMM_PHYLAYER_HPM_CAP_TC_5_P4 M

☐ 6.6 MPP.PTX.25W_COMM_PHYLAYER_HPM_REAL_TC_6_P4

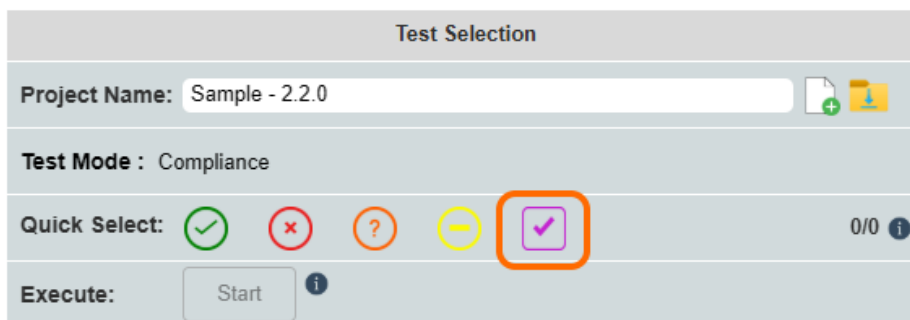
☐ 6.7 MPP.PTX.25W_COMM_PHYLAYER_CPM_CAP_TC_7_P4 M

☐ 6.8 MPP.PTX.25W_COMM_PHYLAYER_CPM_REAL_TC_8_P4

FIGURE 8.87: TEST SELECTION FOR (3,3) POSITION (FOR MPP V2.2 CERTIFICATION & APP POWER PROFILE)

8.2.4.2 Manage Test Selection

You can click on the  icon to select all the test cases in the list.



8.2.5 Report Generation

The “Test Lab Information” panel allows full reports to be created after running a set of tests.

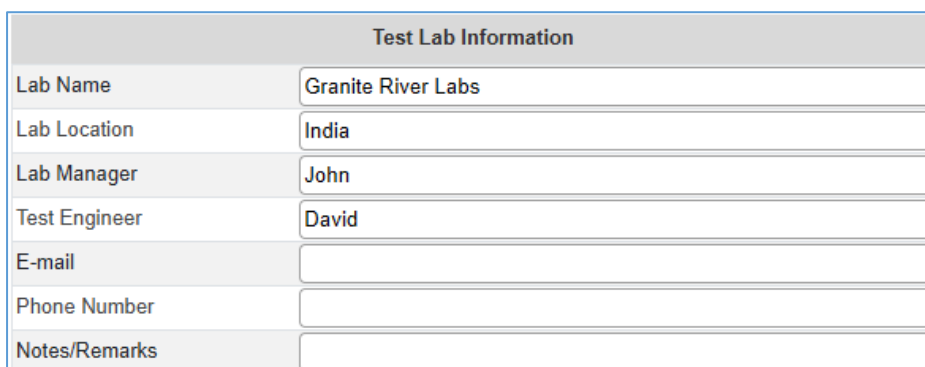


FIGURE 8.88: REPORT GENERATION PANEL

The “Test Lab Information” panel allows the user to enter information relevant to the lab specifics used for running tests. Once tests have completed, the test report can be viewed in the Report screen (see Section 8.3).

8.2.6 Run Tests

Once the desired test cases have been selected, they can be run by clicking on the **Start** button. Click on this button (**Stop**) again to terminate the test run.

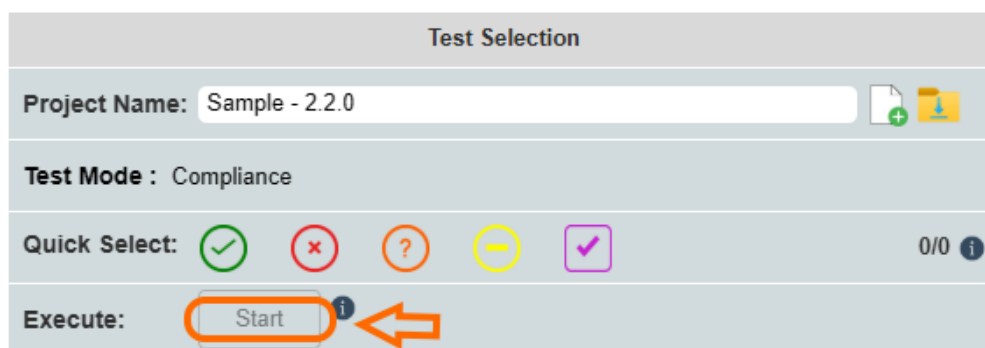


FIGURE 8.89: RUN TESTS

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



FIGURE 8.90: RESULTS SCREEN – TEST RUN IN PROGRESS

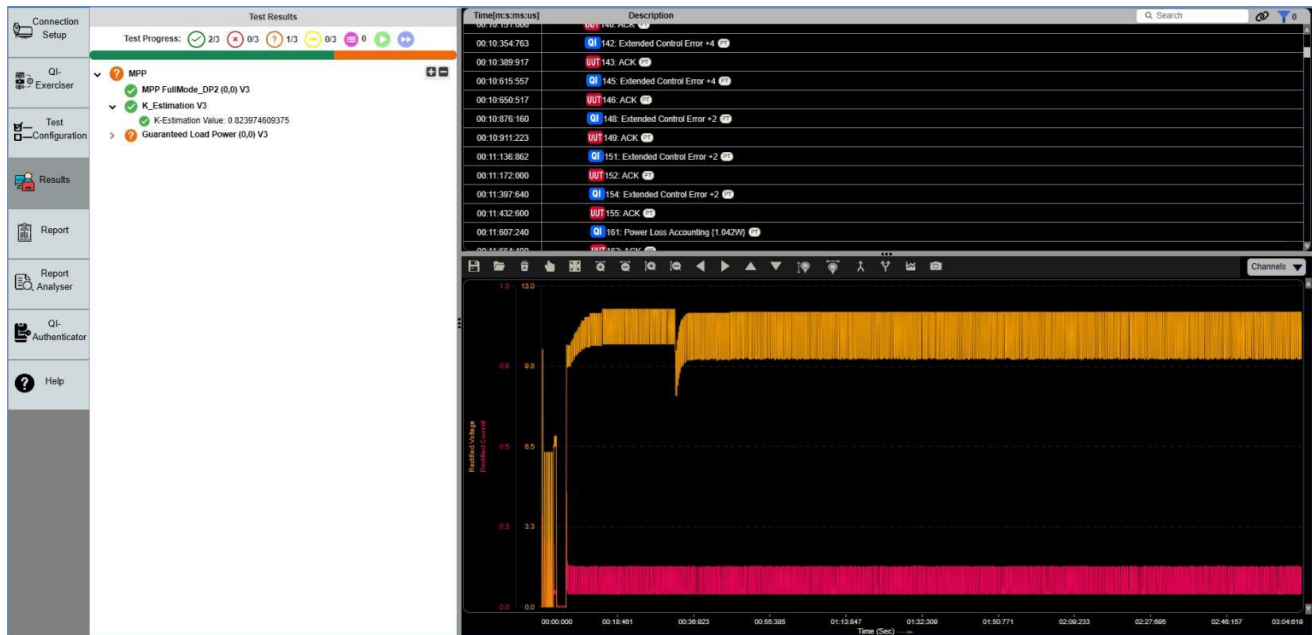


FIGURE 8.91: RESULTS SCREEN – TEST RUN COMPLETED

While tests are running, several pop-up messages will appear to guide the user through the test run. The Test Results panel will display the pass/fail/inconclusive/incomplete 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 Packet communications exchange protocol and waveform displays next to the Test Results panel 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 measurement channels on the trace plot, select the “Channels” drop down option and click/unclick on the checkbox(s) of the desired channels.

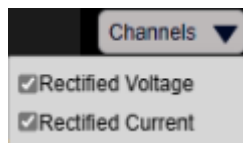


FIGURE 8.92: SELECT MEASUREMENT CHANNELS EXAMPLE

When the Packet communications exchange protocol is running, click on the **Stop Test Case Execution** button  under the Test Results panel at any time to end or pause the process respectively. To skip a test case that is currently running to the next test case, click on the **Skip Current Running Test Case** button . To select specific test cases in the test sequence, click on the  icon. To quickly navigate to the test case that is currently running, click on the **Scroll To Current Test** button .

Test results and configuration of any test run will automatically be saved to a JSON file in the Report folder of your PC’s local file path.

To view a specific portion of the Packet communications exchange, click on the “Filter”  drop down to filter out the communications list by selecting the available options:

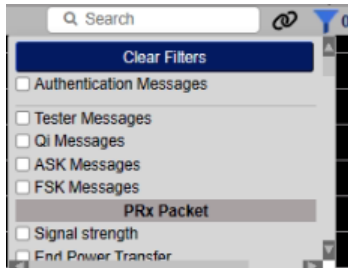


FIGURE 8.93: FILTER PACKET COMMUNICATIONS OPTIONS

To enable syncing of the Packet timings, click on the  icon and vice versa.

The common plot specific buttons can be used to control the trace view as desired which includes panning, merge/unmerge, fit and zooming in/out of the trace plots. You can use your mouse cursor to hover on top of each plot specific button to view the description of each button function.



FIGURE 8.94: TRACE PLOT CONTROL BUTTONS

The  buttons in particular can be selected to enable cursors for a test/subtest which lets you turn on/off vertical and horizontal markers at certain areas of the plot. You can also click on a test/subtest to navigate to the exact time stamp and packet details of the plot.

When the testing is complete, the screen displays all the data gathered during the testing process. Select the **Save trace file**  button to save the trace plot to a .trace (grltrace) file or a CSV file, as shown in the example below.

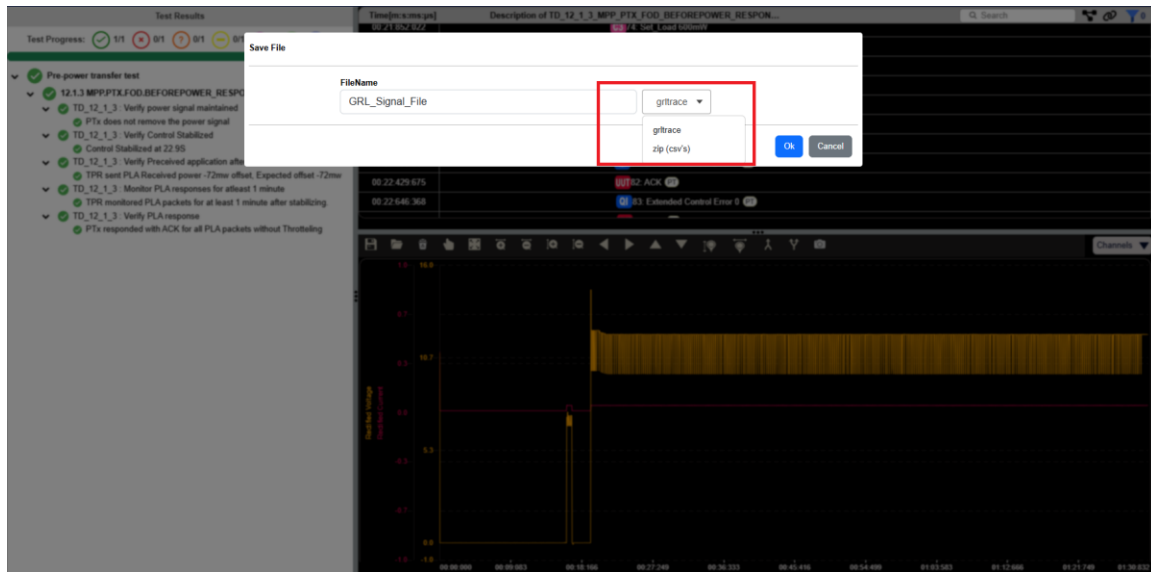


FIGURE 8.95: SAVE TRACE PLOT AFTER TEST RUN COMPLETION

Select the **Load trace file**  button to open and use an existing saved trace file.

You can then also return to the *Test Configuration* screen to filter out the test selection list for those tests with Pass/Fail/Inconclusive/Incomplete status. This allows you to

easily determine the status of each test using the respective icons under the Test Selection panel.



8.3 Test Report View

After running a set of tests, the GRL-C3-MP-TPR application *Report* screen allows full reports to be created:



GRL-QI-C3 Compliance Test Report

BSUT Information

Manufacturer	
Product Name	
Model Number	
QI ID	
Serial Number	

Test Information

Test Lab	
Test Location	
Test Manager	
Test Engineer	
Email ID	
Phone Number	
Remarks	
Date and Time	26-04-2023 15:33:33

Controller and Instrument Information

Parameter	Value
GRL-C3 Software Version	2.0.0.33
GRL-C3 Firmware Version	4.0.0.24
GRL-C3 HW ELoad Version	0
BSUT Name	
Next Calibration Date	Thursday, March 14, 2024
Board Calibration	Calibration Failed
Serial Number	GRLC3-2023023
Selected Power Profile	HPP
BSUT Profile	HPP
Transmitter Type	
Potential Power	5
PRHC Code	0u010E
BDI Code	0u0013235
Testing Mode	CTS Mode
Check for SSYMAX	True
Internal Measurements	True

FIGURE 8.96: REPORT SCREEN

If the report is not displayed when accessing the Report screen, click on the **View Report** button **View Report** at the top of screen to refresh the report view.

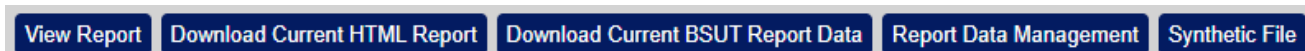
The content of the generated reports can consist of one or more of:

- **Configuration** – The product configuration information for the DUT.
- **Packet List** – A list of all the packets exchanged during testing.
- **Test Results** – The individual test Pass / Fail results.
- **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 (Figure 8.98) below.

The buttons at the top of the Report screen perform the following functions:



View Report **Download Current HTML Report** **Download Current BSUT Report Data** **Report Data Management** **Synthetic File**

FIGURE 8.97: REPORT MANAGEMENT FUNCTIONS

- **View Report** – Click on the View Report button at any time you want to jump to the beginning of the report or refresh the report view.
- **Download Current HTML Report** – Click on the Download Current HTML Report button to save the test report in the HTML format.

- **Download Current BSUT Report Data** – Click on the Download Current DUT Report Data button to save all the result information to a ZIP folder.
- **Report Data Management** – Click on the Report Data Management button to access other test reports including from previous test runs. This allows you to delete or save the reports as desired from the database.
- **Synthetic File** – Click on the Synthetic File button to access test reports for the Eye diagram data from the Physical Layer Magnetic and Phase tests in the CSV format.

[View Report](#)
[Download Current HTML Report](#)
[Download Current BSUT Report Data](#)
[Report Data Management](#)
[Synthetic File](#)

Controller and Instrument Information

Parameter	Value
GRL-C3 Software Version	2.0.0.33
GRL-C3 Firmware Version	4.0.0.24
GRL-C3 HW ELoad Version	0
BSUT Name	
Next Calibration Date	Thursday, March 14, 2024
Board Calibration	Calibration Failed
Serial Number	GRLC3-2023023
Selected Power Profile	MPP
BSUT Profile	MPP
Transmitter Type	
Potential Power	5
PRHC Code	0x010E
BDI Code	0x30313235
Testing Mode	CTS Mode
Check for SSV/MAK	True
Internal Measurements	True
Enable Pop-ups	False

Compliance Test Summary

Total TestCases	Selected TestCases Count	Pass Count	Fail Count	Inconclusive Count	Not Run Count
-1	3	2	0	1	0

Result Summary

Sl No	Test ID	Test Name	Test Result
1	MPP FullMode_DP2 (0,0) V3	MPP FullMode_DP2 (0,0) V3	PASS
2	K_Estimation V3	K_Estimation V3	PASS
3	Guaranteed Load Power (0,0) V3	Guaranteed Load Power (0,0) V3	INCONCLUSIVE

Detailed Compliance Test Result

Test Status	Test Description
PASS	1. MPP FullMode_DP2 (0,0) V3
PASS	2. K_Estimation V3
INCONCLUSIVE	3. Guaranteed Load Power (0,0) V3 K_Estimation Value: 0.823974609375 Response message was not found for XCE packet at 52.275, verify sequence and rerun Response message was not found for PLA packet at 85.765, verify sequence and rerun Final max load was not found, verify setup and rerun

FIGURE 8.98: SCROLL DOWN TO VIEW FULL REPORT

8.4 JSON Report Analyzer

The GRL-C3-MP-TPR application *Report Analyzer* screen allows the user to view, configure and manage report logs in the JSON file format. The JSON report log will be automatically generated after completion of a test run.

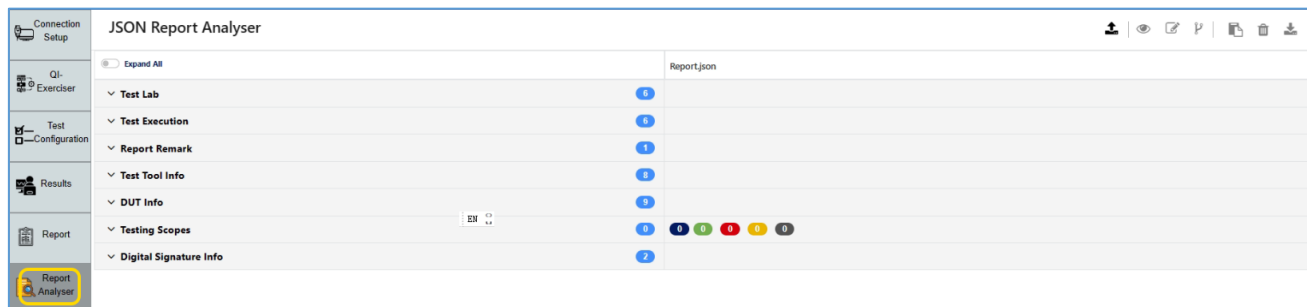


FIGURE 8.99: JSON REPORT ANALYZER SCREEN

The JSON Report Analyzer screen will display the results and configuration log of the most recent test run as shown in the Figure 8.99 example above.

8.4.1 Expand Data Fields in JSON Report

The report log has multiple fields that the user can expand to view data under each field.

To expand all fields, slide the  toggle button as shown in the Figure 8.100 example below.

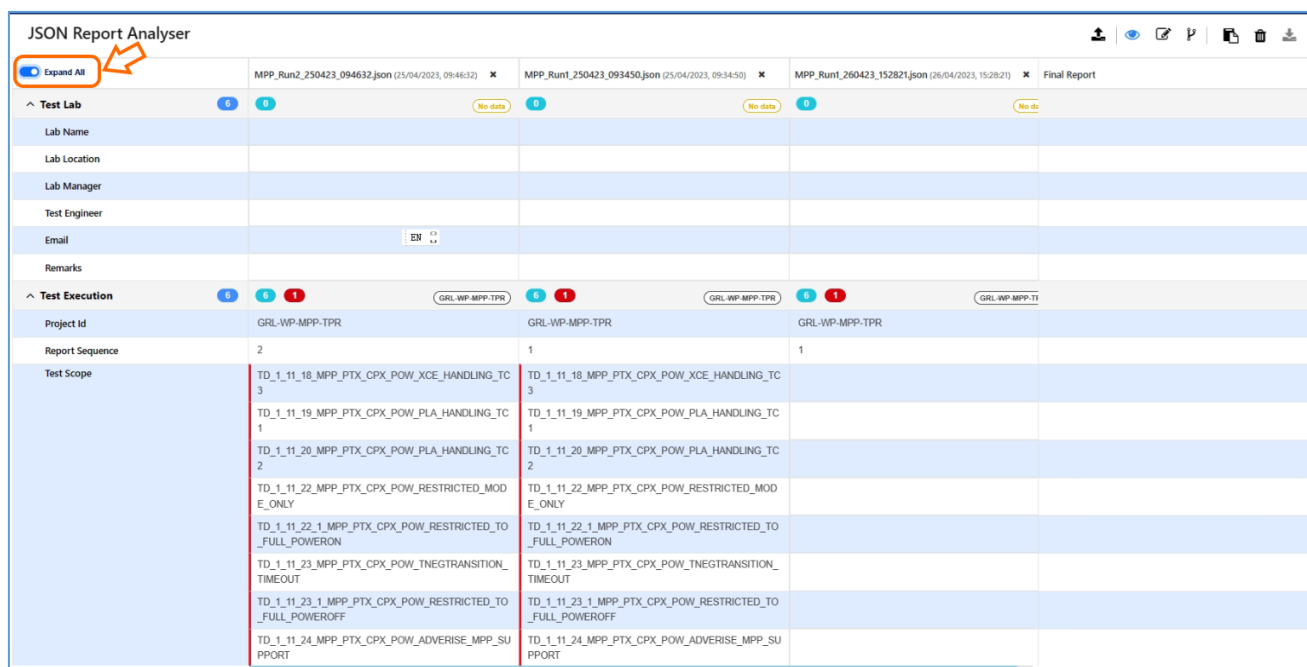


FIGURE 8.100: EXPAND ALL DATA FIELDS EXAMPLE

To expand only a certain field, just click on the drop-down arrow of the respective field to view the data under that field only.

8.4.2 JSON Report Data Fields Definition

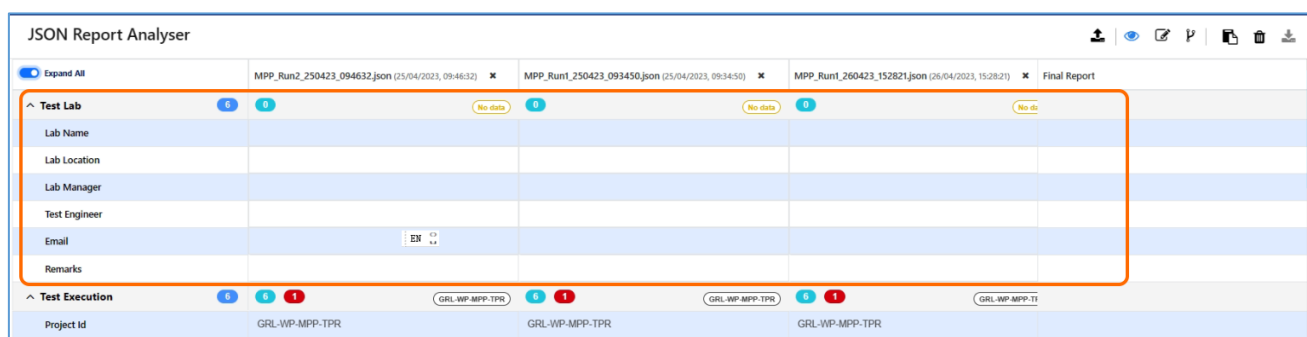
The data fields in the JSON report log are based on the test configuration made by the user in *Section 8.2, Test Configuration*. Each of these data fields can be defined as follows:

8.4.2.1 Test Lab Field

Under the Test Lab field, the user can view details of the test laboratory used to run the test cases which includes the following:

- Lab Name: Name of the test laboratory.
- Lab Location: Location of the test laboratory.
- Lab Manager: Name of the personnel in charge of the test laboratory.
- Test Engineer: Name of the engineer running the tests.
- Email: E-mail contact of the personnel to be reached in regard to the test run.
- Remarks: Any remarks made on the test run.

See example in Figure 8.101 below.



JSON Report Analyser					
Expand All					
MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) ×					
MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) ×					
MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) ×					
Final Report					
Test Lab					
Lab Name	No data				
Lab Location	No data				
Lab Manager	No data				
Test Engineer	No data				
Email	EN				
Remarks					
Test Execution					
Project Id	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TI	

FIGURE 8.101: TEST LAB DATA FIELD

8.4.2.2 Test Execution Field

Under the Test Execution field, the user can view details of the test run and related information. These include the following:

- Project ID: Name of the test project.
- Report Sequence: Sequence in which is the test report was created.
- Test Scope: List of test cases that have been run.
- Test Result: Aggregate of the overall test results (% pass, fail, etc.).
- Creation Time: Time when the test report was created.
- Spec Version: Version of the Qi specification that the test cases referred to.

See example in Figure 8.102 below.

JSON Report Analyser

Expand All

Test LAD

MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) No data

MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) No data

MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) No data

Final Report

Test Execution

Project Id	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TI
Report Sequence	2	1	1	
Test Scope	TD_1_11_18_MPP_PTX_CPX_POW_XCE_HANDLING_TC_3 TD_1_11_19_MPP_PTX_CPX_PC_HANDLING_TC_1 TD_1_11_20_MPP_PTX_CPX_POW_PLA_HANDLING_TC_2 TD_1_11_22_MPP_PTX_CPX_POW_RESTRICTED_MODE_ONLY TD_1_11_22_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWERON TD_1_11_23_MPP_PTX_CPX_POW_TNEGTRANSITION_TIMEOUT TD_1_11_23_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWEROFF TD_1_11_24_MPP_PTX_CPX_POW_ADVERTISE_MPP_SU_PPORT TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_001 TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_002 TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_003 TD_1_11_25_MPP_PTX_CPX_POW_RENEGOTIATION TD_1_11_26_UPDATE	TD_1_11_18_MPP_PTX_CPX_POW_XCE_HANDLING_TC_3 TD_1_11_19_MPP_PTX_CPX_POW_PLA_HANDLING_TC_1 TD_1_11_20_MPP_PTX_CPX_POW_PLA_HANDLING_TC_2 TD_1_11_22_MPP_PTX_CPX_POW_RESTRICTED_MODE_ONLY TD_1_11_22_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWERON TD_1_11_23_MPP_PTX_CPX_POW_TNEGTRANSITION_TIMEOUT TD_1_11_23_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWEROFF TD_1_11_24_MPP_PTX_CPX_POW_ADVERTISE_MPP_SU_PPORT TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_001 TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_002 TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_003 TD_1_11_25_MPP_PTX_CPX_POW_RENEGOTIATION TD_1_11_26_UPDATE		
		TD_1_11_17_MPP_PTX_CPX_POW_XCE_HANDLING_TC		

FIGURE 8.102: TEST EXECUTION DATA FIELD

8.4.2.3 Report Remark Field

Under the Report Remark field, the user can view remarks of the test run that have been added to the test report. See example in Figure 8.103 below.

Note: Report Remark is the only data field that can be edited by the user. Refer to Section 8.4.4 on how to edit the data field.

JSON Report Analyser

Expand All

Test LAD

MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) No data

MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) No data

MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) No data

Final Report

Test Execution

Report Remark

Project Id	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TI
Report Remark	None	None	None

Test Tool Info

FW 4.0.0.24 SW 2.0.0.33 Calibration Expired

FW 4.0.0.24 SW 2.0.0.33 Calibration Expired

FW 4.0.0.24 SW 2.0.0.33 Calibration Expired

FIGURE 8.103: REPORT REMARK DATA FIELD

8.4.2.4 Test Tool Info Field

Under the Test Tool Info field, the user can view details of the tester hardware used for testing (e.g., GRL-C3-MP-TPR). These include the following:

- Test Tool Manufacturer: Manufacturer of the tester hardware.
- Model Name: Tester hardware model.
- Serial Number: Serial number of the tester hardware.
- Last Calibration Date: When the tester hardware was last calibrated.
- Is Calibrated: Whether or not the tester hardware has been calibrated.

- Software / Firmware / Hardware Version: Software, firmware & hardware version numbers of the tester hardware.

See example in Figure 8.104 below.

JSON Report Analyser				
☒ Expand All	MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) ✕	MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) ✕	MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) ✕	Final Report
Test Lab	6	0	No data	0
Test Execution	6	0	1	No data
Report Remark	1	1	1	1
Test Tool Info	6	0	0	0
Test Tool Manufacturer	Granite River Labs	Granite River Labs	Granite River Labs	Granite River Labs
Model Name	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR	GRL-WP-MPP-TPR
Serial Number	GRLC3-2023023	GRLC3-2023023	GRLC3-2023023	GRLC3-2023023
Last CalibrationDate	2024-03-14	2024-03-14	2024-03-14	2024-03-14
Is Calibrated	✕	✕	✕	✕
Software Version	2.0.0.33	2.0.0.33	2.0.0.33	2.0.0.33
Firmware Version	4.0.0.24	4.0.0.24	4.0.0.24	4.0.0.24
Hardware Version	E-0	E-0	E-0	E-0
DUT Info	9	5	5	5

FIGURE 8.104: TEST TOOL INFO DATA FIELD

8.4.2.5 DUT Info Field

Under the DUT Info field, the user can find details of the device under test, which include the following:

- DUT Type: DUT type of either power transmitter or receiver.
- Brand Name: Brand of the DUT.
- Product Name: Vendor-defined name of the DUT.
- Qi-ID: Qi identification of the DUT.
- Serial Number: Serial number of the DUT.
- Power Profile: Power profile of either “BPP” (Baseline Power Profile), “EPP” (Extended Power Profile) or “EPP5” (Extended Power Profile 5) as supported by the DUT.
- Specification Supported: Qi specification as supported by the DUT.
- Base Station Details: Capabilities of the Base Station under test DUT.
- Mobile Device Info: Capabilities of the Mobile Device under test DUT.

See example in Figure 8.105 below.

JSON Report Analyser

Expand All

MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) × MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) × MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) × Final Report

DUT Info		MPP		PTx		MPP		PTx	
DUT Type	PTx	PTx	PTx	PTx	PTx	PTx	PTx	PTx	PTx
Brand Name									
Product Name									
QI ID									
Serial Number	EN								
Power Profile	MPP	MPP	MPP	MPP	MPP	MPP	MPP	MPP	MPP
Specification Supported	1.2.4	1.2.4	1.2.4	1.2.4	1.2.4	1.2.4	1.2.4	1.2.4	1.2.4
Base Station Details	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000	Manufacturing Code 0x0000
	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -	Transmitter Type -
	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5	Potential Load Power 5
	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖	Is WPID Supported ✖
	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖	Is Authentication Supported ✖
	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖	Is Simultaneous Incoming and Outgoing Supported ✖
	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖	Is Out of BandCommunication Supported ✖
	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -	Max Transport Layer Buffer Size -
	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖	Is Non Resonance Sensitive ✖
	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -	Supported Prop Data -
	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -	Srq Prop -
	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -	Adc Prop -

FIGURE 8.105: DUT INFO DATA FIELD

8.4.2.6 Testing Scopes Field

Under the Testing Scopes field, the user can view the list of executed test cases with their respective results, overall test results and the option to view details of each test case. See example in Figure 8.106 below.

JSON Report Analyser

Expand All

MPP_Run1_260423_153323.json (26/04/2023, 15:33:23) ×

Test Lab	6	0	No data
Test Execution	6	0	GRL-WP-MPP-TPR
Report Remark	1	0	No data
Test Tool Info	6	0	FW:4.0.0.24 SW:2.0.0.32 Calibration Expired
DUT Info	9	5	QI 1.2.4 MPP PTx
Testing Scopes	3	3 2 0 1 0	Overall Results
MPP_FullMode_DP2_V3	Pass		
K_Estimation_V3	Pass		
Guaranteed_Load_Power_0_0_V3	Inconclusive		Results
Digital Signature Info	2	2	View Details

FIGURE 8.106: TESTING SCOPES DATA FIELD

To view details of a test case, click on the View Details icon  of the respective test case. This will display the signal trace plot along with the Packet transaction log for the test case. An example is shown in Figure 8.107 below.

Also see Section 8.4.3, Load Multiple JSON Report Files for more details when loading and comparing between multiple JSON files.

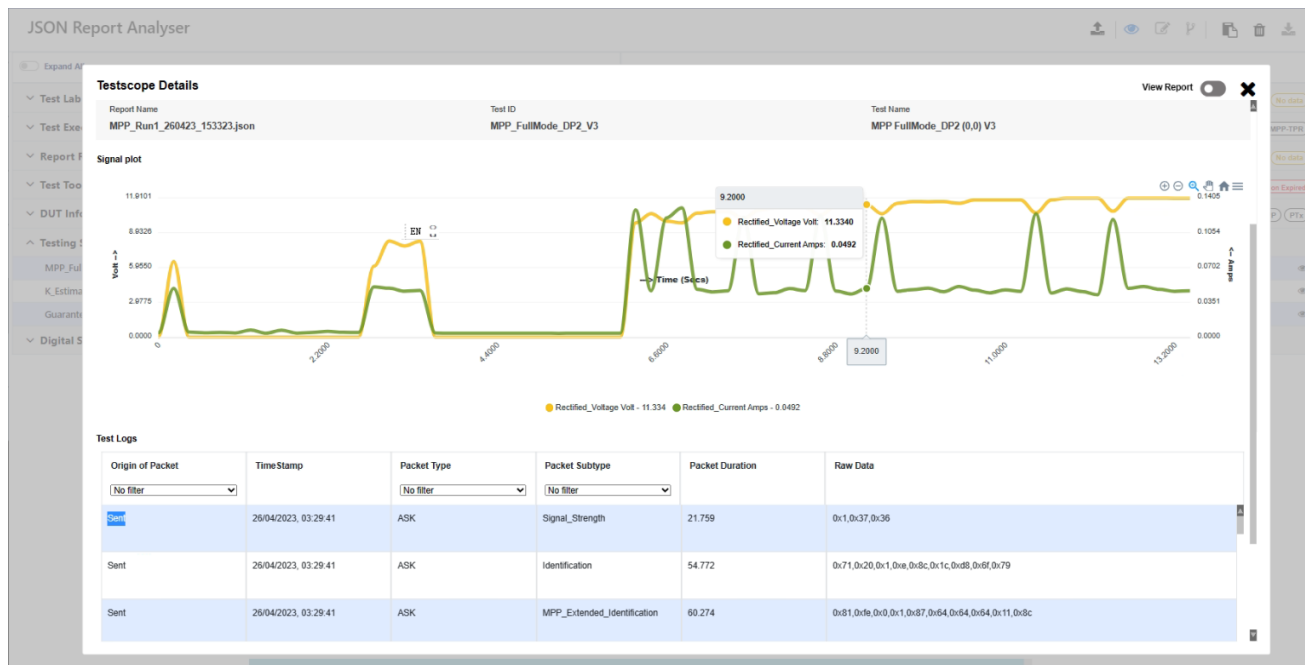


FIGURE 8.107: VIEW TEST CASE DETAILS

8.4.2.7 Digital Signature Info Field

Under the Digital Signature Info field, the user can find the Encrypted Hash 256 Bits algorithm and Test tool public key of the Qi DUT.

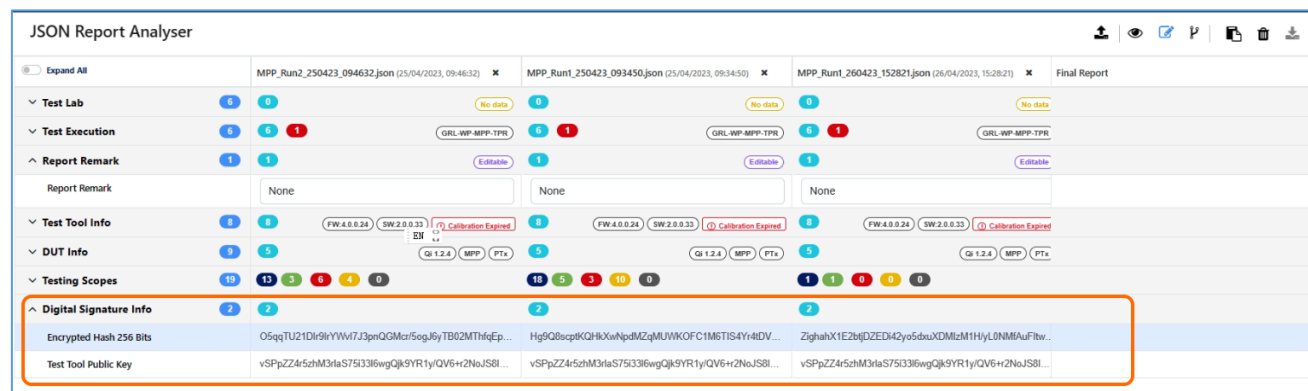


FIGURE 8.108: DIGITAL SIGNATURE INFO DATA FIELD

8.4.3 Load Multiple JSON Report Files

The user can load multiple JSON reports from existing JSON files and compare the results. To load the JSON report files, follow the steps below.

1. Click on the Upload icon  at the top right of the *JSON Report Analyzer* screen as shown in Figure 8.109 below.

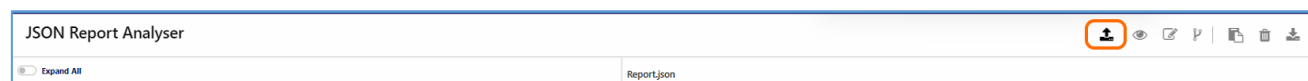


FIGURE 8.109: UPLOAD JSON REPORT ICON

- The following pop-up window will appear as shown in Figure 8.110. The “Local File” panel on the left will show the list of all JSON report files that have been generated from previous test runs and stored in the default file location. The user can select one or more of these files and click on the **Upload** button on the bottom right of the window.

Alternatively, the user can drag and drop JSON files from the list on to the “Drag and drop” box on the right and then click on the **Upload** button.

If the required JSON files are stored in another directory other than the default file location, click on the “Drag and drop” box to browse for the files. After selecting the required JSON files, click on the **Upload** button.

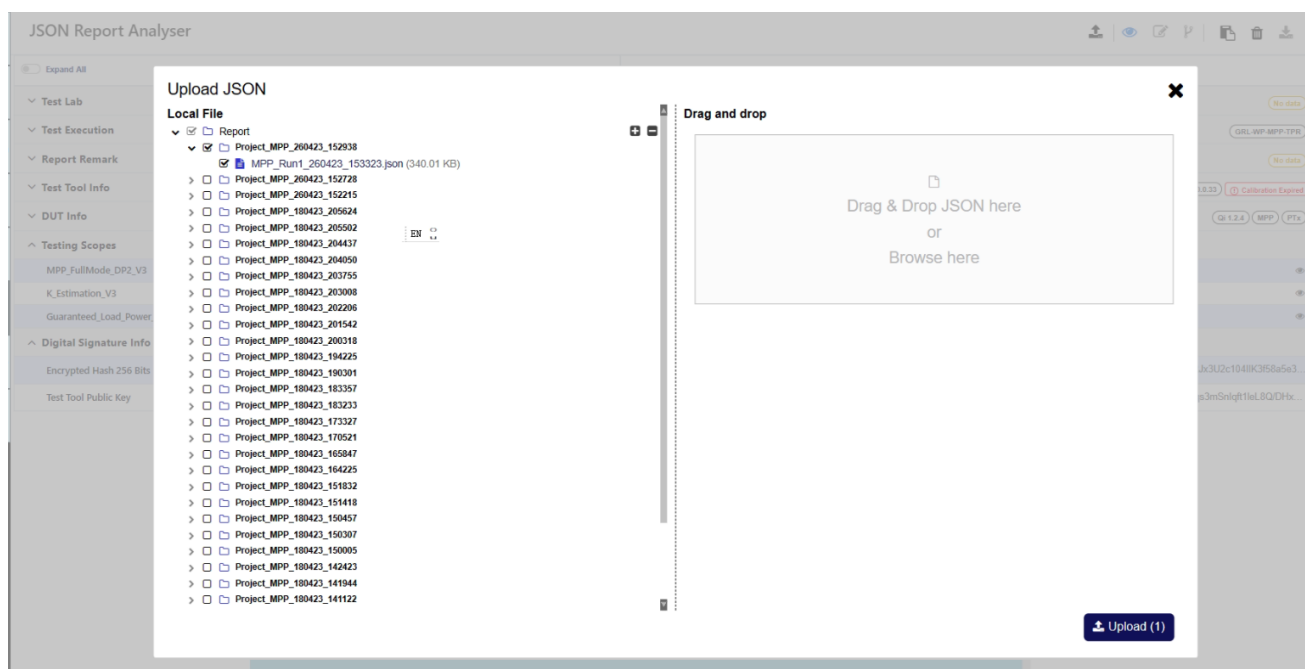


FIGURE 8.110: SELECT JSON FILES TO UPLOAD

- After clicking on the **Upload** button, the selected JSON files will be loaded on to the *JSON Report Analyzer* screen as shown in the example in Figure 8.111 below.



FIGURE 8.111: JSON FILES LOADED ON SCREEN EXAMPLE

8.4.3.1 Compare Multiple JSON Report Files Results

When expanding the Testing Scopes data field (as described in Section 8.4.2.6) and clicking on the View Details icon  of the respective test case, the user can slide the **Compare Reports** toggle button  to compare the results between the loaded JSON files.

In the example in Figure 8.112 below, the user can select any of the loaded JSON files (as indicated by “1” and “2”) to view and compare the results for a particular test case.

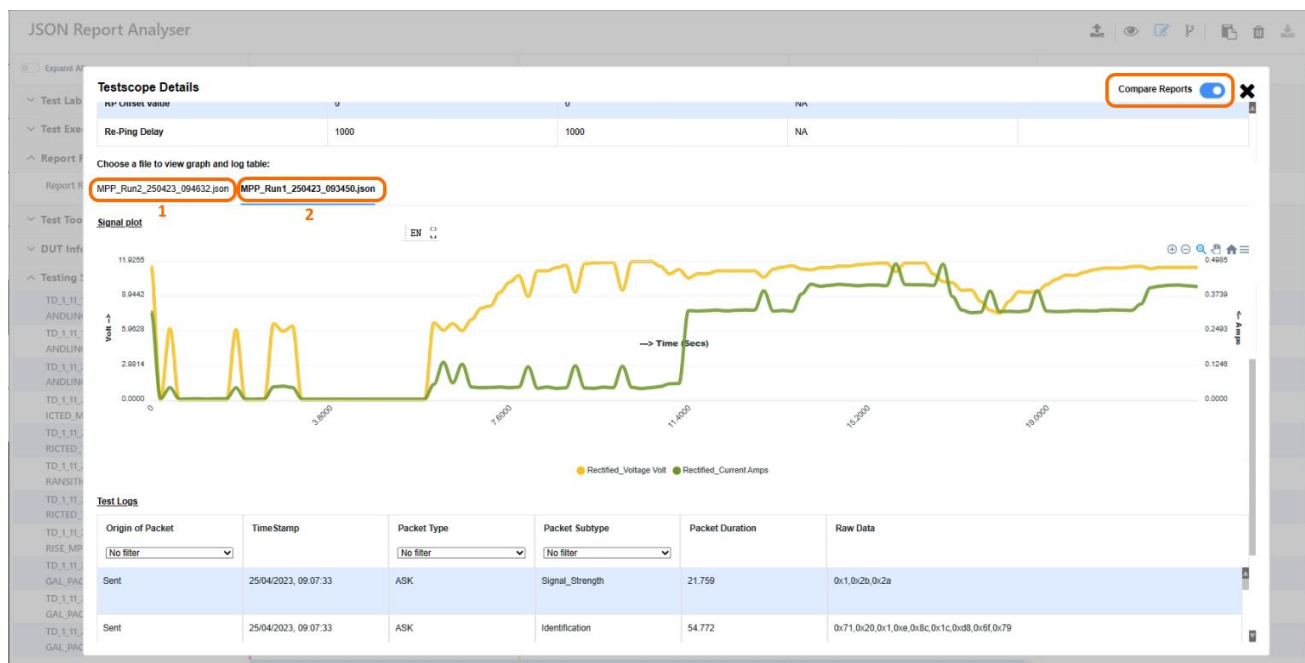


FIGURE 8.112: SELECT AND COMPARE MULTIPLE JSON FILES RESULTS

8.4.4 Manage JSON Reports

Use the following icons  on the top right of the *JSON Report Analyser* screen to configure and manage the JSON reports.

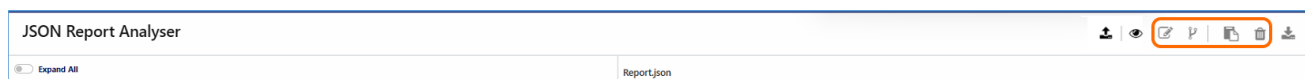


FIGURE 8.113: MANAGE JSON REPORT ICONS

-  – Click on this icon to edit the JSON report. *Note: Only the Report Remark field can be edited (refer Section 8.4.2.3, Report Remark Field).*
-  – Click on this icon to merge two or more JSON reports (refer Section 8.4.5 below).
-  – Click on this icon to view a summary of the JSON report. An example is as shown in Figure 8.118 below which displays the number of test cases with their respective test run results for each JSON report.

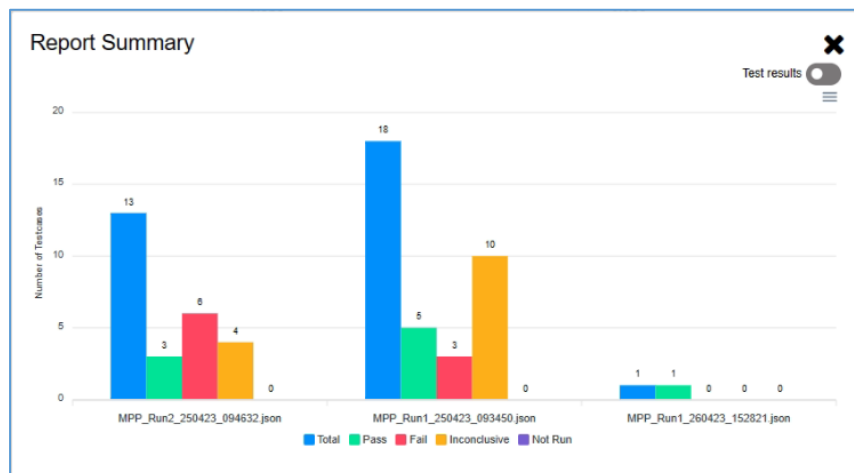


FIGURE 8.114: JSON REPORT TEST RESULTS SUMMARY EXAMPLE

The user can also switch to view the cumulative results for the test cases of each JSON report by sliding the “Test Results” toggle button to .

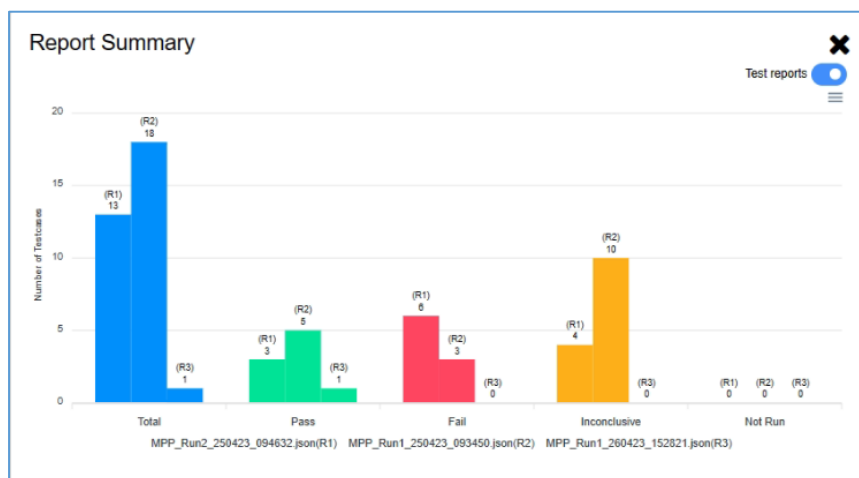


FIGURE 8.115: JSON REPORT TEST REPORTS SUMMARY EXAMPLE

The user can download/save the report summary to an SVG, PNG or CSV file by clicking on  and selecting the file type as shown in Figure 8.116 below. The user can find the saved report file in the Downloads folder.

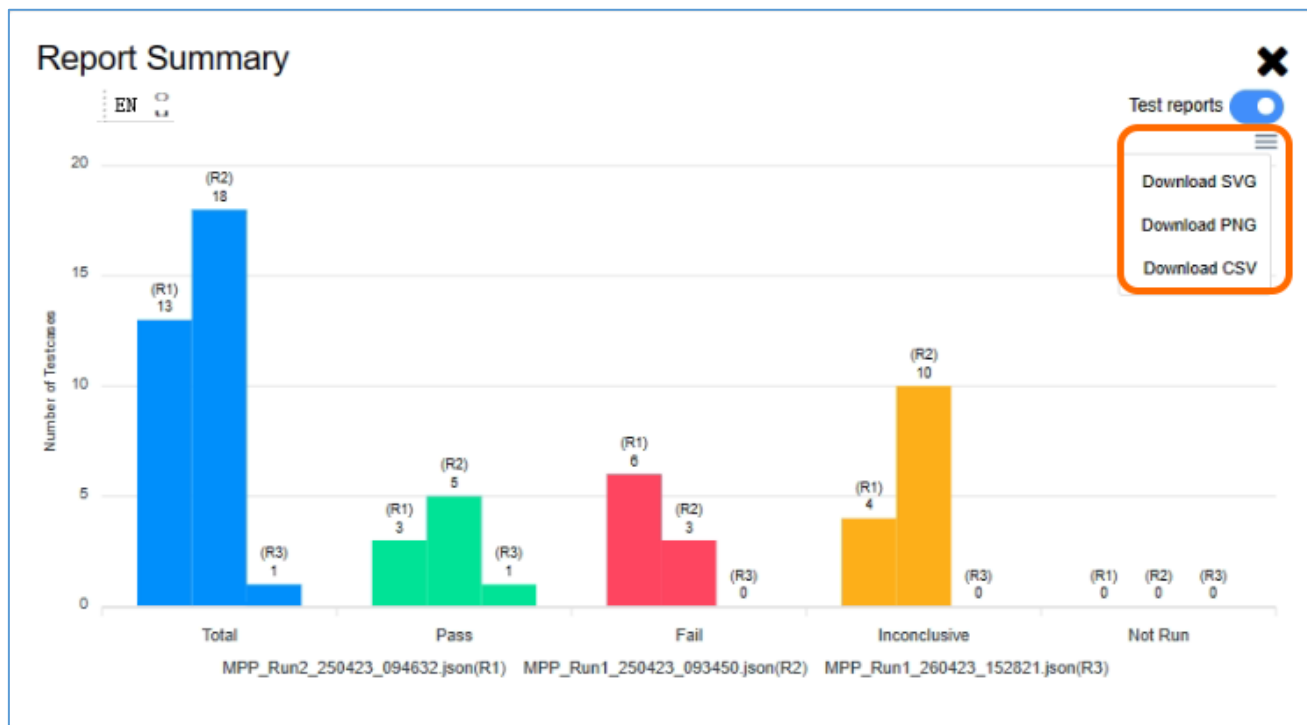


FIGURE 8.116: JSON REPORT TEST REPORTS SUMMARY EXAMPLE

- – Click on this icon to delete the JSON report.

8.4.5 Merge Results of Multiple JSON Report Files

After loading two or more JSON report files, the user can merge the results of these files into one report as required. Follow the instructions below:

1. Click on the Merge icon as shown in Figure 8.117.



FIGURE 8.117: MERGE ICON

2. Then click on the Testing Scopes data field and select the test results from JSON Report #1, JSON Report #2 and JSON Report #3 as indicated in the Figure 8.118 example below. The selected test results will be reflected under “Final Report” as merged results.

JSON Report Analyser

JSON Report #1: MPP_Run2_250423_094632.json (25/04/2023, 09:46:32) | JSON Report #2: MPP_Run1_250423_093450.json (25/04/2023, 09:34:50) | JSON Report #3: MPP_Run1_260423_152821.json (26/04/2023, 15:28:21) | Final Report

Testing Scopes

Test Scope	JSON Report #1	JSON Report #2	JSON Report #3	Merged Results
TD_1_11_18_MPP_PTX_CPX_POW_XCE_H ANDUNG_TC3	Fail	Fail	Fail	Fail
TD_1_11_19_MPP_PTX_CPX_POW_PLA_H ANDUNG_TC1	Inconclusive	Inconclusive	Inconclusive	Inconclusive
TD_1_11_20_MPP_PTX_CPX_POW_PLA_H ANDUNG_TC2	Inconclusive	Inconclusive	Inconclusive	Inconclusive
TD_1_11_22_MPP_PTX_CPX_POW_RESTRICTED_MODE_ONLY	Pass	Inconclusive	Pass	Pass
TD_1_11_22_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWERON	Inconclusive	Inconclusive	Inconclusive	Inconclusive
TD_1_11_23_MPP_PTX_CPX_POW_TNEGTRANSITION_TIMEOUT	Fail	Inconclusive	Inconclusive	Inconclusive
TD_1_11_23_1_MPP_PTX_CPX_POW_RESTRICTED_TO_FULL_POWEROFF	Pass	Inconclusive	Pass	Pass
TD_1_11_24_MPP_PTX_CPX_POW_ADVERISE_MPP_SUPPORT	Pass	Inconclusive	Pass	Pass
TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_001	Fail	Inconclusive	Inconclusive	Inconclusive
TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_002	Fail	Fail	Fail	Fail
TD_1_11_24_1_MPP_PTX_CPX_POW_ILLEGAL_PACKET_003	Fail	Fail	Fail	Fail
TD_1_11_25_MPP_PTX_CPX_POW_RENEGOTIATION	Fail	Inconclusive	Inconclusive	Inconclusive
TD_1_11_26_UPDATE	Inconclusive	Inconclusive	Inconclusive	Inconclusive
TD_1_11_17_MPP_PTX_CPX_POW_XCE_H ANDUNG_TC1		Pass	Pass	Pass
TD_1_11_17_MPP_PTX_CPX_POW_XCE_H ANDUNG_TC4		Pass	Pass	Pass
TD_1_11_17_1_MPP_PTX_CPX_POW_XCE_HANDLING_TC2		Pass	Pass	Pass

FIGURE 8.118: MERGED TEST RESULTS FROM MULTIPLE JSON REPORT FILES

3. If the user wants to delete certain results in the final merged report, click on the Delete icon  for the respective result. The user can also delete all merged results by selecting “Remove All”.

8.4.6 Download/Export JSON Reports

The user can download the JSON reports or export the reports to HTML or PDF files using the following steps:

1. Click on the Download icon  at the top right of the JSON Report Analyzer screen as shown in Figure 8.119 below.
2. Select “JSON” to download/save the reports as JSON files, or select “HTML” and “PDF” to export the reports to HTML and PDF files respectively. Otherwise select “All” to save the reports in all of these three file formats.
3. Then, click on the **Export** button. The user can find the exported/downloaded report files in the Downloads folder.

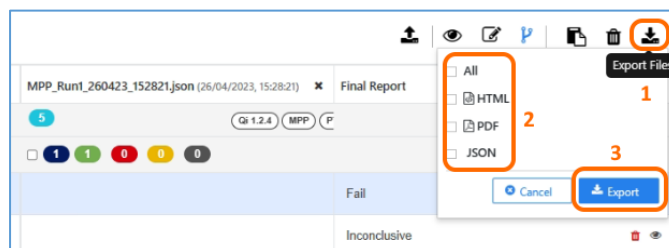


FIGURE 8.119: DOWNLOAD/EXPORT JSON REPORT FILES

8.5 Usage of Qi-Authenticator

Follow the procedure below to verify the certificate data using Qi-Authenticator.

1. Load any authentication test case as shown in the example in Figure 8.120 below.

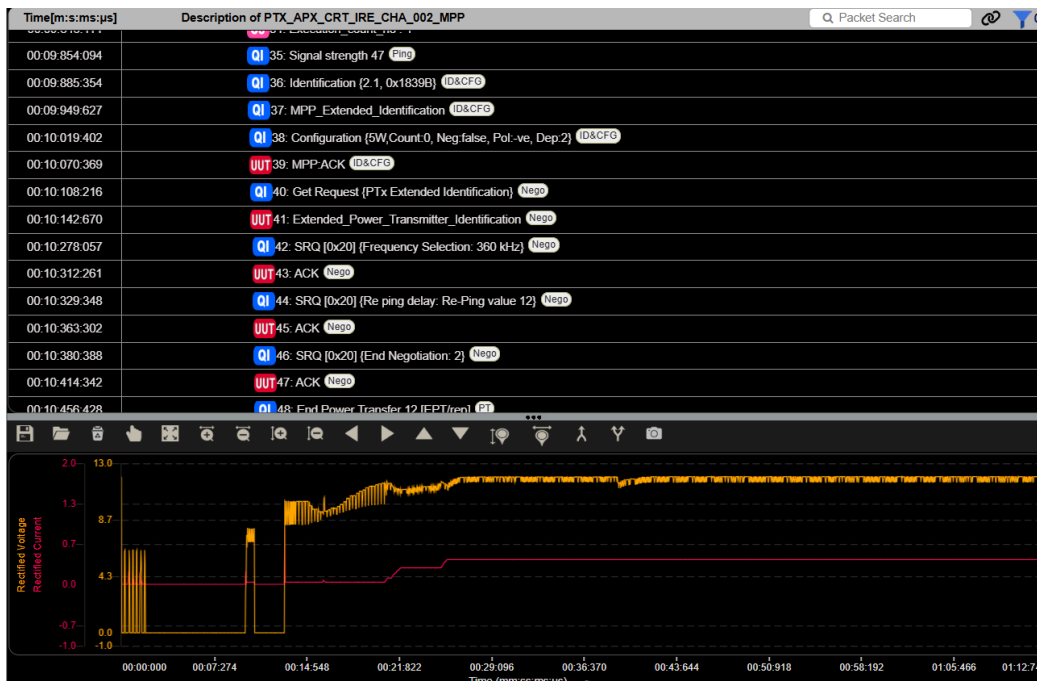


FIGURE 8.120: LOAD AUTHENTICATION TEST CASE

2. Click on the filter icon at the top right of the screen as shown in Figure 8.121 below.

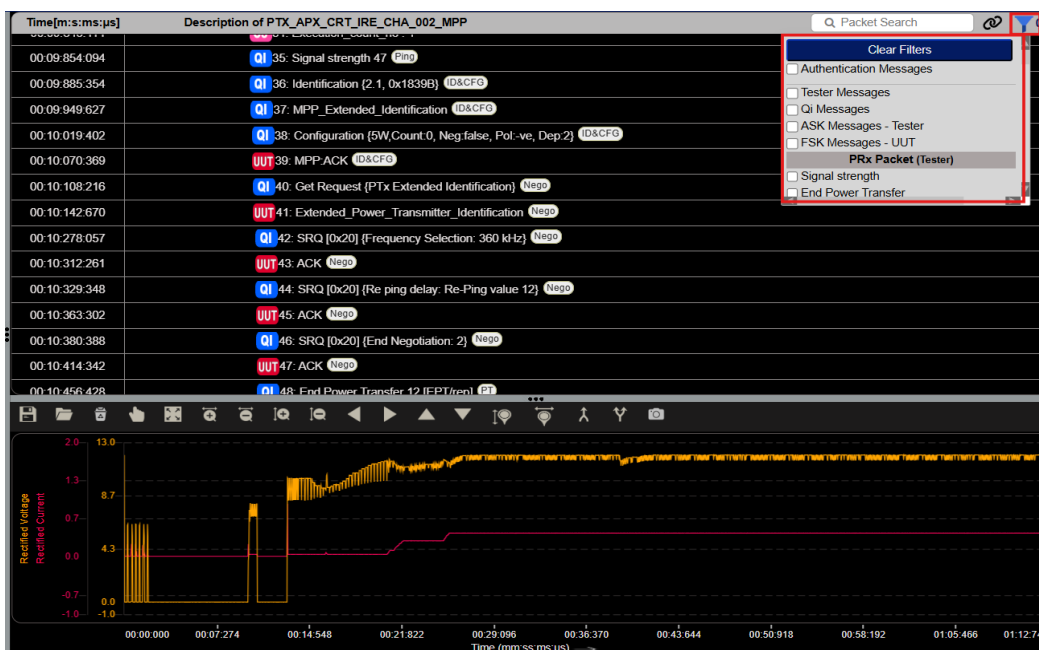


FIGURE 8.121: CLICK ON FILTER ICON

3. Select the **Authentication Messages** checkbox from the available options as shown in Figure 8.122 below.

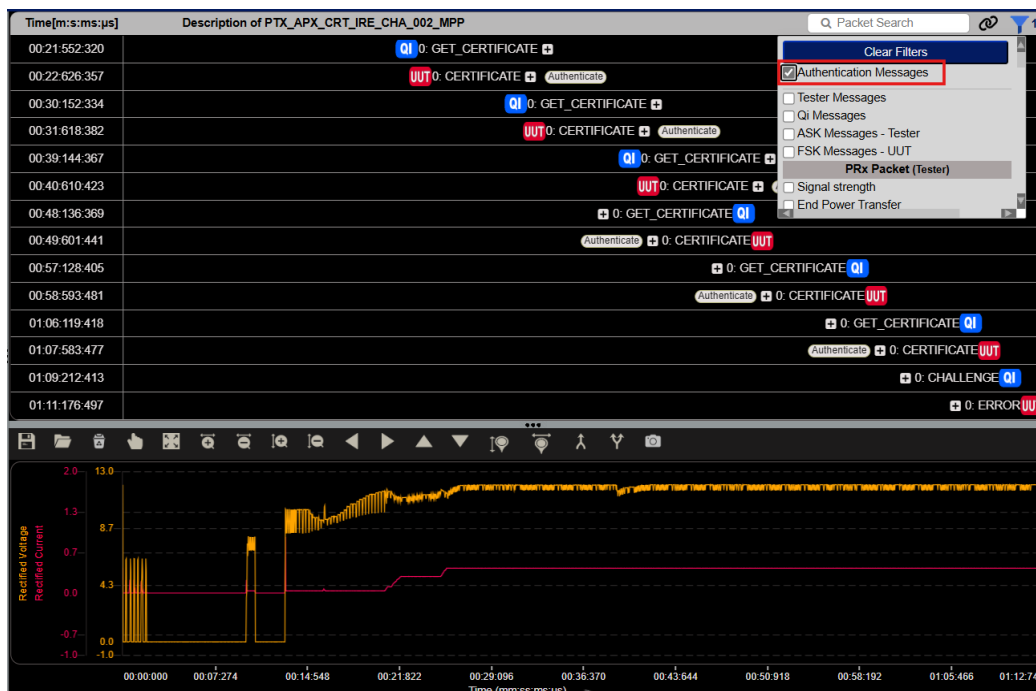


FIGURE 8.122: SELECT AUTHENTICATION MESSAGES CHECKBOX

4. Click on the **Authenticate** button beside the last certificate sent by the PTx as shown in the example in Figure 8.123 below.

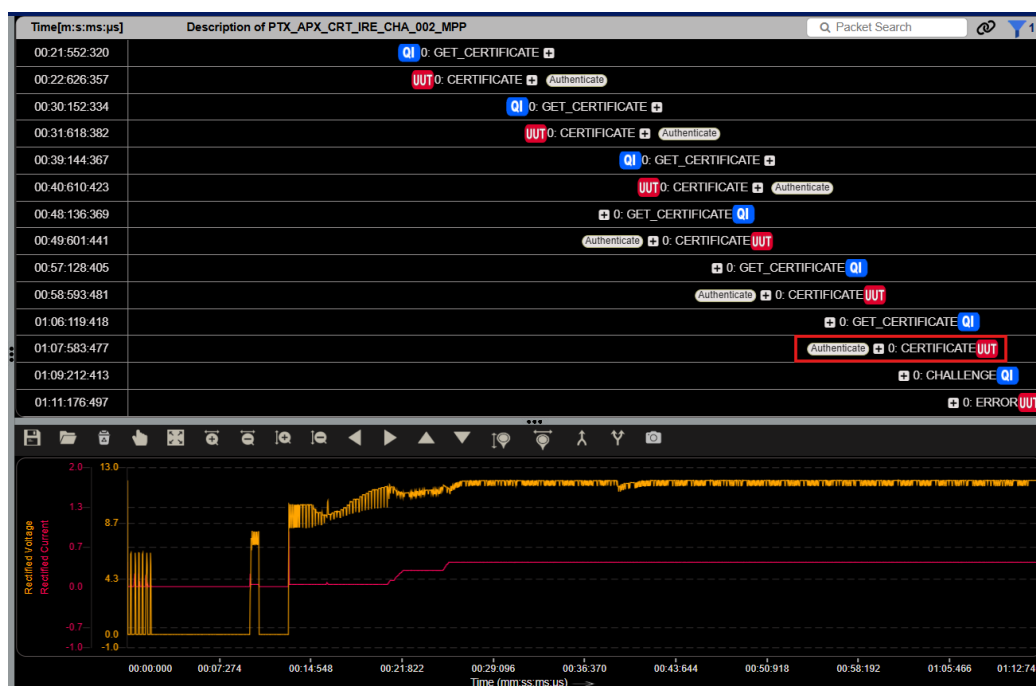


FIGURE 8.123: CLICK ON AUTHENTICATE BUTTON

- The GRL-C3-MP-TPR application will redirect to the Qi-Authenticator screen as shown in Figure 8.124 below.

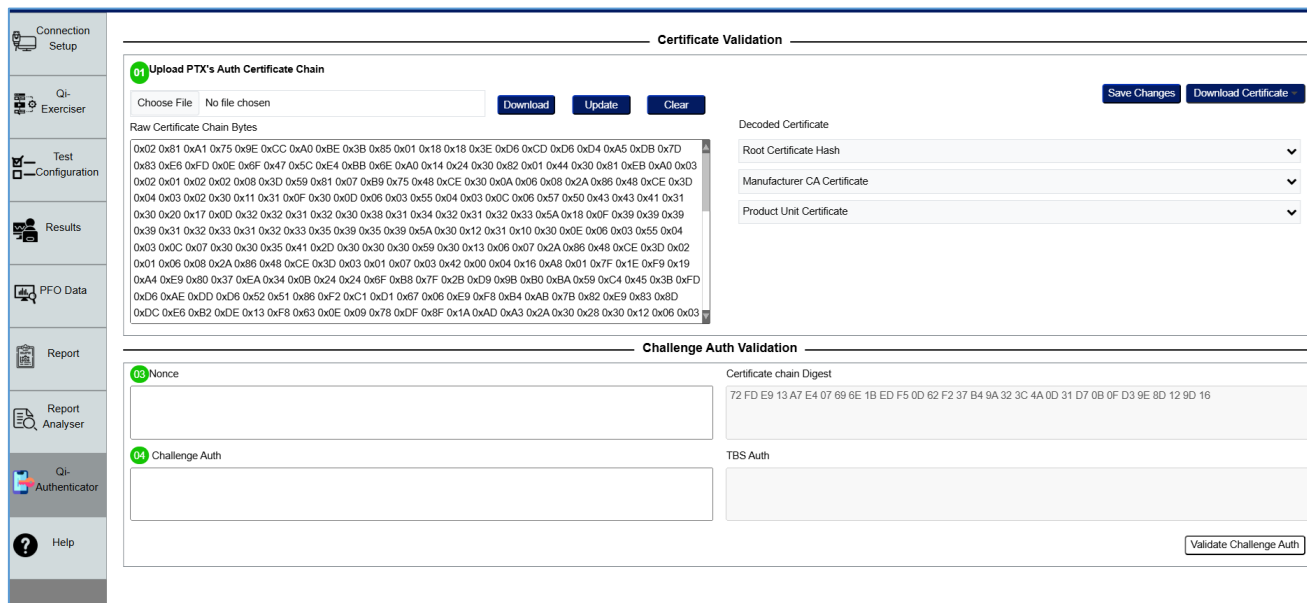


FIGURE 8.124: QI-AUTHENTICATOR SCREEN

Note: The above procedure is also applicable for Challenge Auth Validation.

9 GRL-C3-MP-TPR Information and Help

The GRL-C3-MP-TPR application *Help* screen allows the user to view the current version of the GRL-C3-MP-TPR application as well as a brief description of the GRL-C3-MP-TPR tester hardware. The user can also access customer support or download debug logs using the links provided.

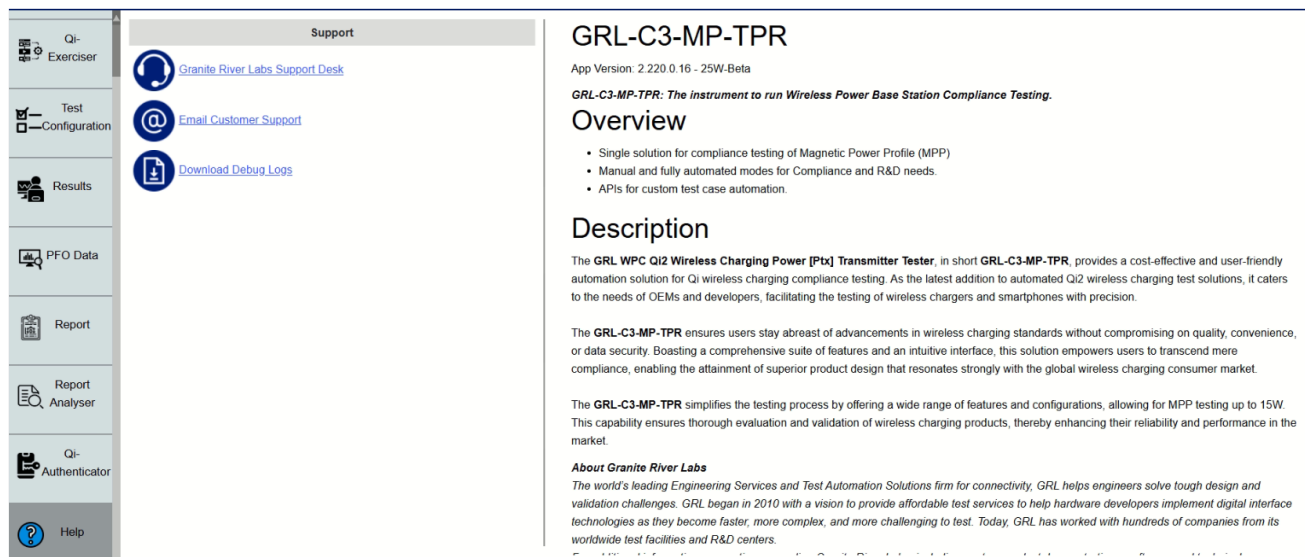


FIGURE 9.1: HELP SCREEN

10 Appendix A: Compliance Thermal Test Execution Using Thermal Puck

Follow the steps below to set up the thermal puck to perform compliance thermal testing.

1. Connect the ThermoMux to the Host PC using the USB cable.
2. Connect the ambient temperature data logger to Channel 1 of the ThermoMux as shown in Figure 10.1 below.



FIGURE 10.1: CONNECT AMBIENT TEMPERATURE DATA LOGGER TO CHANNEL 1 OF THERMOMUX

3. Connect the thermal puck's connector to Channel 2 of the ThermoMux as shown in Figure 10.2 below.



FIGURE 10.2: CONNECT THERMAL PUCK'S CONNECTOR TO CHANNEL 2 OF THERMOMUX

4. Place the thermal puck on the TPR coil, ensuring that the thermocouple is properly connected to the coil and the puck's glass surface is facing upward as shown in Figure 10.3 below.



FIGURE 10.3: PLACE THERMAL PUCK ON TPR COIL

5. Place the PTx DUT on the glass surface of the thermal puck, ensuring the TPR coil is correctly mated with the PTx DUT as shown in Figure 10.4 below.



FIGURE 10.4: PLACE PTx DUT ON GLASS SURFACE OF THERMAL PUCK

6. Perform the compliance thermal test as guided by following the respective pop-up instructions.

11 Appendix B: FAQ's on LQK Measurements with GRL-C3-MP-LCR-JIG

1. Question:

Where to find the reference video on the LQK measurement process?

Answer:

Refer to <https://youtu.be/0o3l04mXHnw?si=qSmxklt0Wrig8ELp> to understand how the entire LQK measurement process is carried out.

2. Question:

How to calibrate the LCR meter, and how to ensure that it is properly calibrated?

Answer:

After completing the calibration process, the final step involves performing the OPEN and SHORT measurements.

Once the SHORT calibration is done, do not remove the cap connected to the SMB wire. Then, check the values displayed on the LCR meter. If the Ls (inductance) value is in pico henries (pH) and the Rs (resistance) value is in micro ohms ($\mu\Omega$), we can confirm that the calibration has been completed correctly.



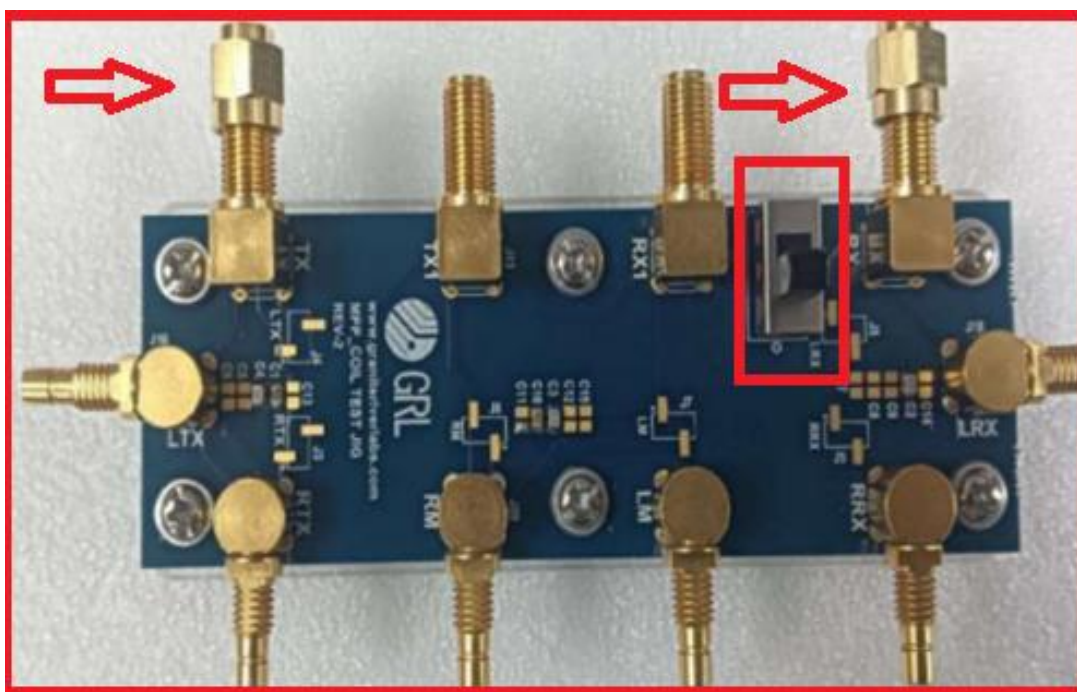
3. **Question:**

What are the jig measurement precautions and how should the jig connection be set up?

Answer:

Before measuring the jig values, connect 0-ohm terminators to both TX and RX ports of the jig, as indicated in the image below.

Ensure that the jig slider switch is turned off throughout the LQK measurement process. If the jig does not have a switch, you may ignore this step.


4. **Question:**

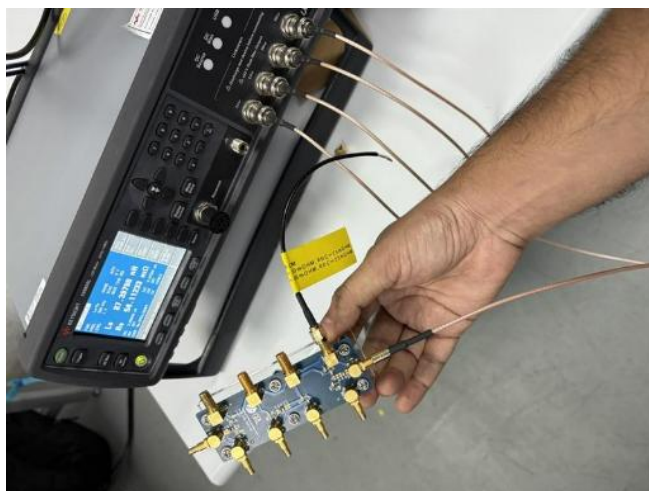
What are Steps 3a, 4a, 9a and 10a, and how are these values measured?

Answer:

If the Tx coil does not have any external leads, for example, in the case of a GRL Platform Solutions Tx coil where the wire is directly connected to the coil, you can simply connect the Tx coil cable wire to the jig and measure L_txl and R_txl. Record these values under Step 3a.

For example, when connecting the Rx coil cable to the test jig — if you connect the SMB wire to the LRX port — only the Ls (inductance) value from the LCR meter should be considered.

Do not consider the Rs (resistance) value in this case.



Note: For the GRL Platform Solutions coil cable values, there is no need to measure them manually, as GRL Platform Solutions has already measured and documented these values in the calibration report.

For example, if you have an Rx device, you must use a GRL Platform Solutions Tx coil. In such cases, the coil number will be printed on the back of the GRL Platform Solutions Tx coil. Using this coil number, the corresponding calibration report should be opened, and the pre-measured values from GRL Platform Solutions should be noted in Step 3a.

For instance, if you are using coil 'GRL-MP1-2024655', then you will need to record the corresponding values for 360 kHz and 128 kHz from the calibration report in Step 3a.

Coil Cable+LCR JIG Parasitic Measurements			
Coil Type	Parameter	Measured @360kHz	Measured @128kHz
ID: GRL-C3-TPT-MP1	L_{tx1} (nH)	60+21=81	62+22=84
Sl. No.: GRL-MP1-2024655	R_{tx1} (mΩ)	35+20=55	30+21=51

STEP 3a Measure the ATU's TPT cable at 360k, enter values in this step.				
Variable	Description	Unit	360 kHz	Corrected
L _{tx1}	Inductance of the TPT coil loads (ATU cable)	nH	81.000	0.081
R _{tx1}	AC resistance of the TPT coil loads (ATU cable)	mΩ	55.000	0.055

STEP 9a Measure the ATU's TPT cable at 128k, enter values in this step.				
Variable	Description	Unit	128 kHz	Corrected
L _{tx1}	Inductance of the TPT coil loads (ATU cable)	nH	84.000	0.084
R _{tx1}	AC resistance of the TPT coil loads (ATU cable)	mΩ	51.000	0.051

For GRL Platform Solutions cables, you can refer to the calibration report to obtain the cable values for the GRL Platform Solutions Tx and Rx coils. These values should be recorded in Steps 3a, 9a and Steps 4a, 10a of the sheet.

If you are a Tx or Rx vendor and do not have the cable values, connect your cable to the jig the same way it is done for the GRL Platform Solutions coils. Measure the values and enter them into the sheet accordingly.

Note: When connecting the cable wire, ensure that the other end of the cable is shorted during the measurement.

5. **Question:**

What are Steps 3b, 4b, 9b and 10b, and how should these values be filled in?

Answer:

If an external bridge wire is connected along with the coil, the first wire needs to be measured separately by connecting it to the jig.

After obtaining the measured value, subtract the previously measured jig value from it.

For example:

If the first wire gives a reading of 80, and the jig measurement (already noted in the sheet) is 24, then the actual value to be recorded is:

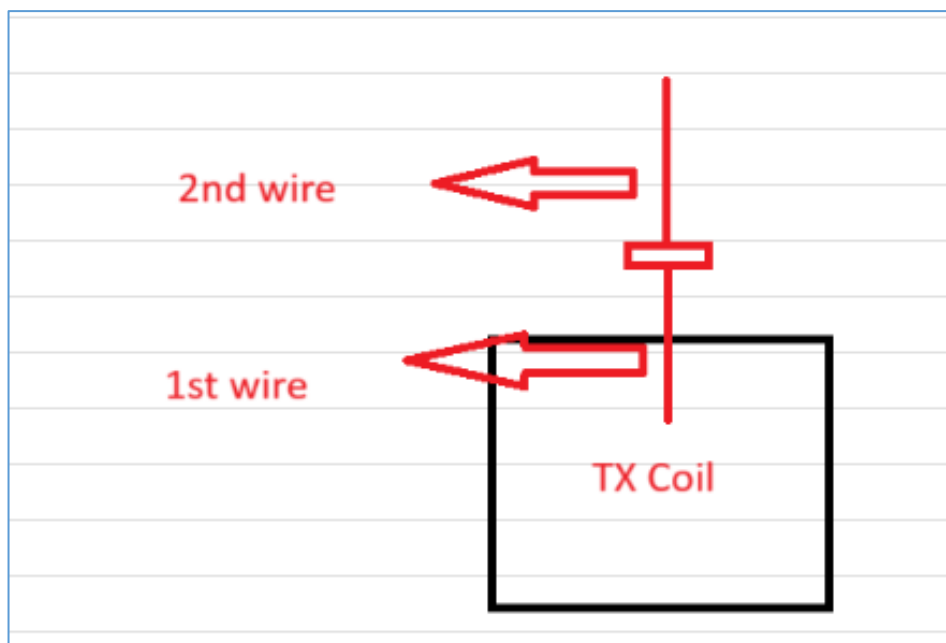
$$80 - 24 = 56$$

The resulting value (56) — whether it is L_rxl2 or R_rxl2 — should be updated under Step 3b, 9b, 4b or 10b, based on the type of coil measured.

For example, after noting the L_rxl2 value, you need to measure the R_rxl2 value in the same way and record it in the R_rxl2 field.

STEP 3b Enter TPR vendor's coil lead values for 360k in this step.					
TPR	Variable	Description	Unit	360 kHz	Corrected
internal coil conn.	L_rxl2	Inductance of the TPR coil leads (TPR internal)	nH	56.0000	0.0560
	R_rxl2	AC resistance of the TPR coil leads (TPR internal)	mΩ		0.0000

Note: If there is no additional lead, you can ignore these steps — it is not required to fill in Steps 3b, 9b, 4b and 10b.



7. **Question:**
In the WPC LQK spreadsheet, is it allowed to edit fields such as units or formulas?

Answer:

Ensure that no part of the WPC LQK spreadsheet is modified except the yellow highlighted input boxes, where the readings are typically entered.

Modifying other areas, such as units, formulas, or protected cells can affect the overall calculations and may lead to incorrect results throughout the sheet.

END_OF_DOCUMENT