

GRL-USB-PD-C2-EPR

GRL Platform Solutions USB Type-C® Power Delivery Tester and Analyzer – EPR

An all-in-one USB Power Delivery 3.2 solution

Overview

As the emerging universal standard for connectivity, USB Type-C® power everything from smartphones, to laptops, and high-power peripherals. The connector's versatile ability to deliver data, video, and power has made it the go-to choice for designers across various industries, providing a dependable compliance testing solution for reliable interoperability.

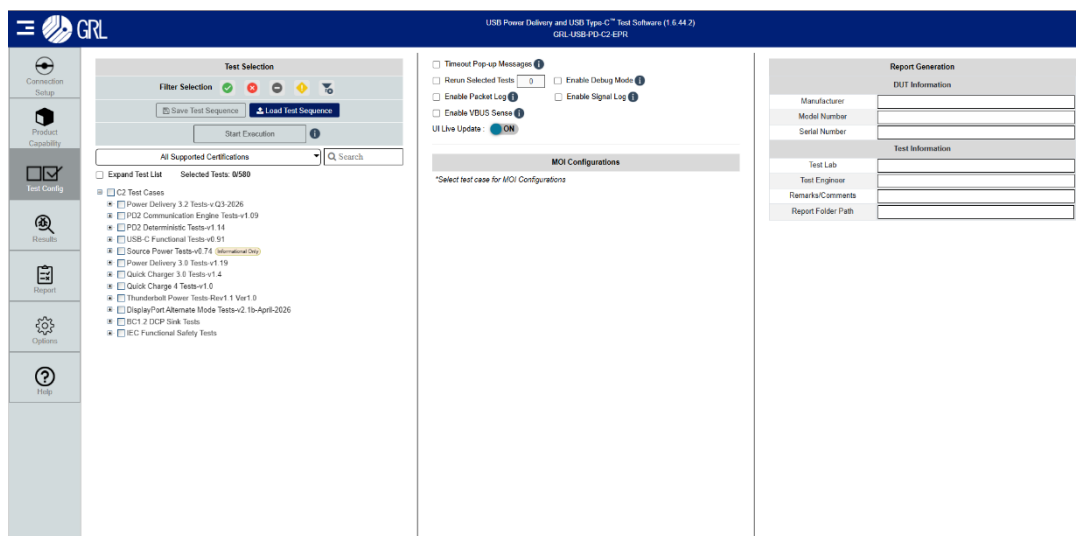
Every function needed for USB Power Delivery (USB PD) testing is contained within the GRL-USB-PD-C2-EPR (C2-EPR), an all-in-one, fully automated platform that requires no external equipment. Tailored for USB PD 3.2, this state-of-the-art tester and analyzer offers rigorous compliance and performance testing for devices up to 240W at the push of a button.



Key Features

The C2-EPR versatile tester enables the execution of a comprehensive range of tests without requiring USB Type-C® power delivery system designers to learn multiple test tools:

- USB PD compliance testing
- USB Type-C® functional testing
- DisplayPort Alt Mode testing
- Qualcomm Quick Charge testing
- Thunderbolt power testing
- IEC 62368-1 functional safety conformance testing
- IEC 62380-1-3 USB PD and Type-C® cables and connector testing.



Designed to simplify USB PD compliance testing across all categories, offering comprehensive test capabilities for power supplies, hubs/docks, battery packs, USB Type-C® cables, and portable battery-powered devices such as smartphones and laptops.

Comprehensive Power Delivery Testing

Supports up to 240W of power and is fully compatible with USB PD Version 3.2 while accommodating both the Extended Power Range (EPR) and Standard Power Range (SPR). Additionally, the C2-EPR features dual ports for shared power validation, enabling efficient testing of multi-port power delivery scenarios—all within a single, compact device.



Exclusive Cable IR Drop Compensation Technique

Accurately executing power and voltage drop testing at 240W with maximum current can be challenging, as even minor cable IR drops may cause failures and adversely affect your device's performance.

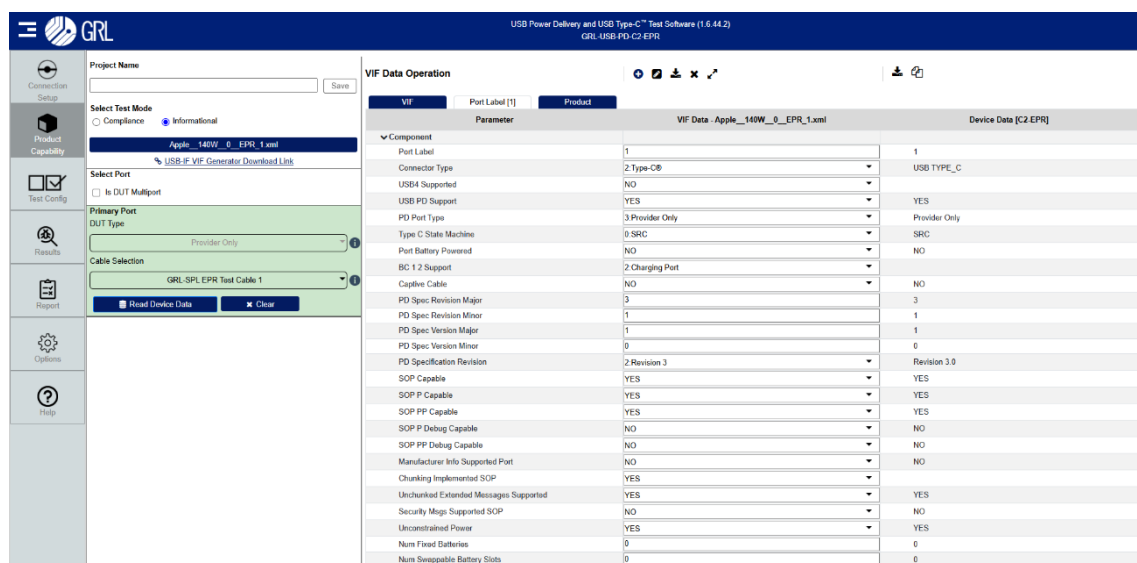
Using a first-of-its-kind, hardware-integrated cable IR drop compensation technique, the C2-EPR ensures precise measurement accuracy and effortless IR drop management when paired with GRL Platform Solutions' specially designed cables. With unmatched reliability and performance, the C2-EPR is setting a new benchmark for USB PD testing.



VIF Generation, Comparison and Editing

Creating a Vendor Information File (VIF) for compliance testing can be complex and time-consuming. The C2-EPR solution streamlines this mandatory process with an intuitive platform that thoroughly analyzes device capabilities to generate precise VIF files.

Complete with editing features, this comprehensive solution transforms a challenging process into a seamless and efficient experience, paving the way for smooth USB-IF compliance testing.

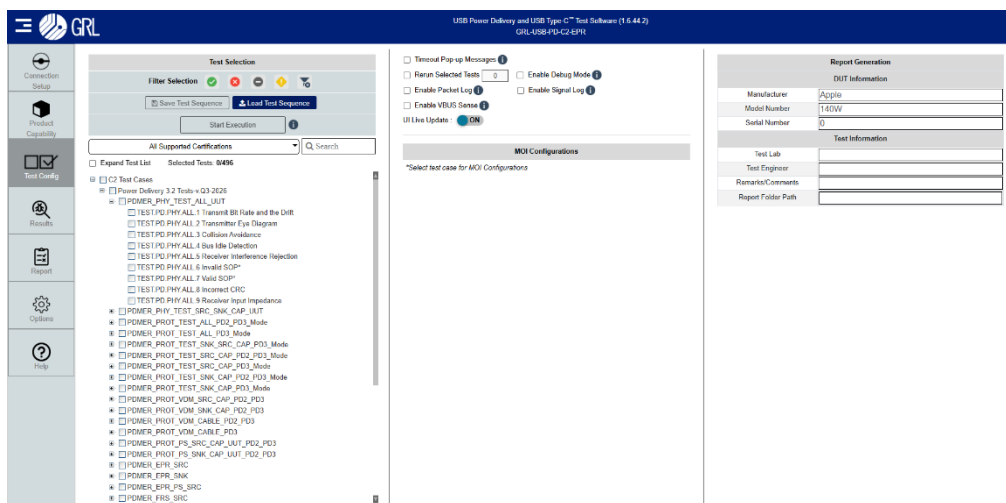


Component	VIF Data - Apple_140W_0_EPR_1.xml	Device Data [C2-EPR]
Port Label	1	1
Connector Type	2 Type-CB	USB TYPE_C
USB4 Supported	NO	
USB PD Supported	YES	YES
PD Port Type	3 Provider Only	Provider Only
Type C State Machine	0 SRC	SRC
Port Battery Powered	NO	NO
BC 1.2 Support	2 Charging Port	
Captive Cable	NO	NO
PD Spec Revision Major	3	3
PD Spec Revision Minor	1	1
PD Spec Version Major	1	1
PD Spec Version Minor	0	0
PD Specification Revision	2 Revision 3	Revision 3.0
SOP Capable	YES	YES
SOP P Capable	YES	YES
SOP PP Capable	YES	YES
SOP P Debug Capable	NO	NO
SOP PP Debug Capable	NO	NO
Manufacturer Info Supported Port	NO	NO
Chunked Implemented SOP	YES	
Unchunked Extended Messages Supported	YES	YES
Security Mgrs Supported SOP	NO	NO
Unconstrained Power	YES	YES
Num Fixed Batteries	0	0
Num Swappable Battery Slots	0	0

Effortless Fully Automated Compliance Testing

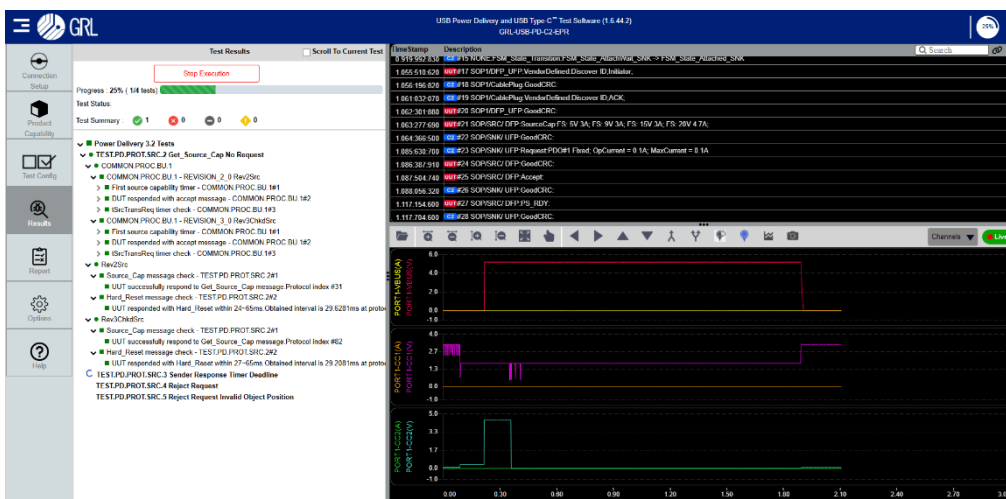
The C2-EPR solution interface adapts according to device type and specification requirements, with powerful automation to ensure a seamless and efficient compliance testing experience.

- Search tests by name or MOI type for quick access.
- Easily filter, select, and execute singular or multiple tests for execution as per certification type.
- Run comprehensive regression tests with pre-defined run count and efficiently gather detailed results.
- Filter and select test cases by status—Pass, Fail, Warning, or Not Run—and re-run specific tests with ease.



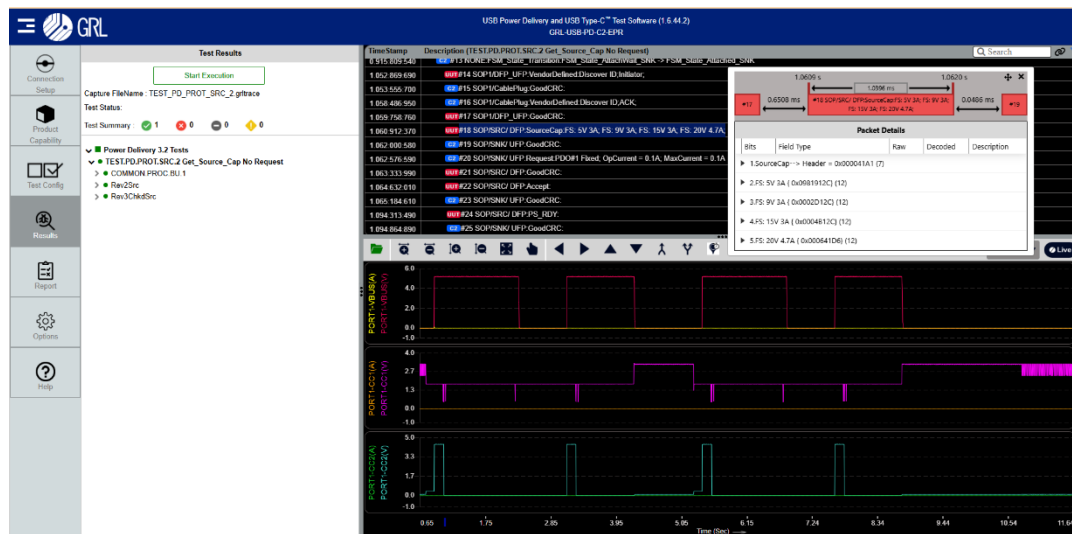
Precise Test Execution with Full Traceability to Compliance Test MOI

Each test is precisely executed in accordance with the compliance test specification's Method of Implementation (MOI). Every step of the automation process is fully traceable, offering in-depth insights into the test execution. The solution provides accurate links to offline traces, including voltage, current, timing, and protocol data, delivering a detailed understanding of how the Device Under Test (DUT) performed against the compliance criteria.



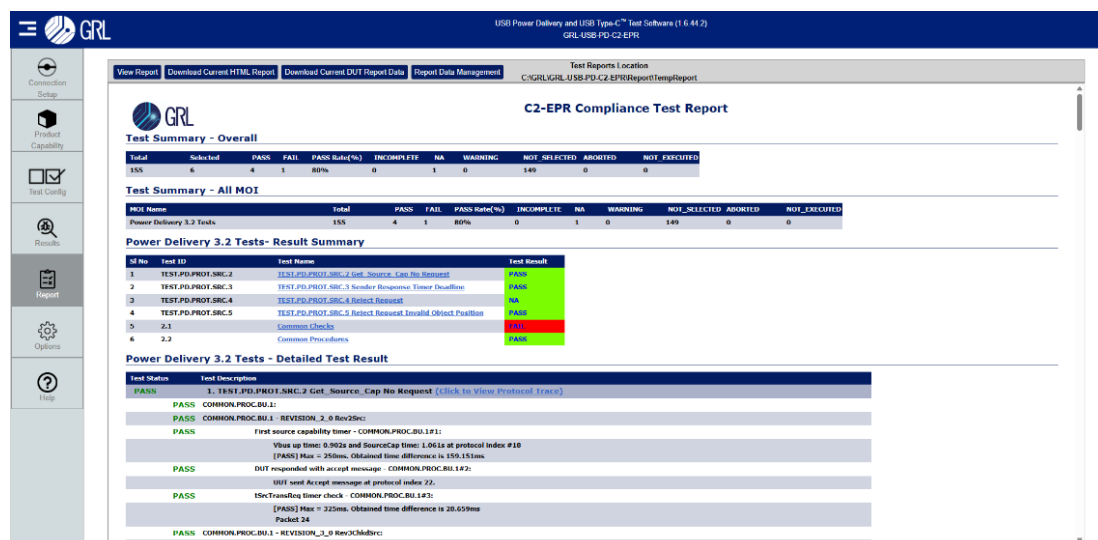
Advanced Protocol and Trace Viewer for Enhanced Analysis and Debugging

Integrate timing, protocol, voltage, current, and power data into a unified, user-friendly interface with the protocol and trace viewer, complete with traceability links to specific test cases. Tailored for efficient analysis and debugging, the C2-EPR offers advanced tools like Zoom, Pan, Split, Cursors, and Fit functions to facilitate precise diagnostics and issue resolution. The offline, freely distributable viewer fosters seamless collaboration with teams and partners, enabling effective troubleshooting and problem-solving across boundaries.



Comprehensive USB PD Compliance Testing

Automate USB PD compliance testing for a wide range of devices using the all-in-one C2-EPR solution, including power bricks, smartphones, laptops, hubs, and cables. Supports both Standard Power Range (SPR) and Extended Power Range (EPR), ensuring versatility across all power levels. Approved by USB-IF for official compliance testing, combines powerful debug and analysis features for the ultimate USB PD test tool.



C2-EPR Compliance Test Report

Test Summary - Overall

Total	Subtotal	PASS	FAIL	PASS Rate(%)	INCOMPLETE	NA	WARNING	NOT SELECTED	ABORTED	NOT EXECUTED
155	4	1	0	100%	0	1	0	149	0	0

Test Summary - All MOI

MOI Name	Total	PASS	FAIL	PASS Rate(%)	INCOMPLETE	NA	WARNING	NOT SELECTED	ABORTED	NOT EXECUTED
Power Delivery 3.2 Tests	155	4	1	100%	0	1	0	149	0	0

Power Delivery 3.2 Tests - Result Summary

ID No	Test ID	Test Name	Test Result
1	TEST_PD_PROT_SRC_2	TEST_PD_PROT_SRC_2 Get_Source_Cap No Request	PASS
2	TEST_PD_PROT_SRC_3	TEST_PD_PROT_SRC_3 Transfer_Response_Timer_Deadline	PASS
3	TEST_PD_PROT_SRC_4	TEST_PD_PROT_SRC_4 Retract_Request	NA
4	TEST_PD_PROT_SRC_5	TEST_PD_PROT_SRC_5 Retract_Request_Invalid_Object_Position	PASS
5	2.1	Common Checks	FAIL
6	2.2	Common Procedures	PASS

Power Delivery 3.2 Tests - Detailed Test Result

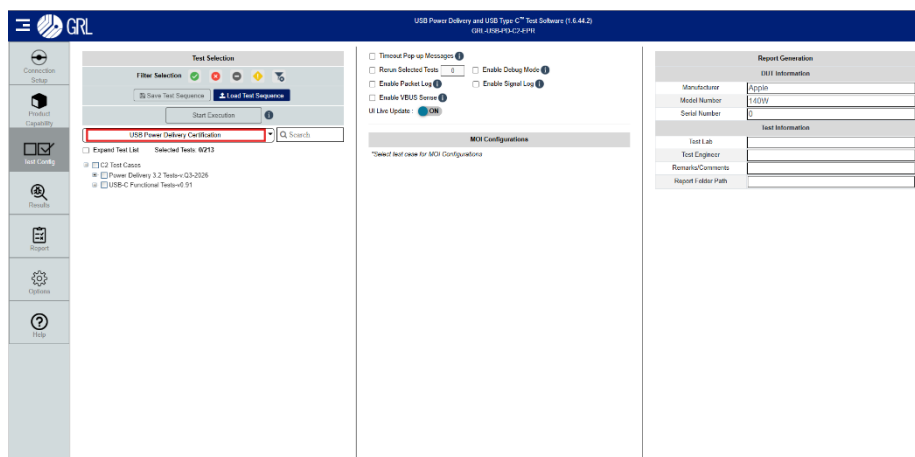
Test Status	Test Description
PASS	1. TEST_PD_PROT_SRC_2 Get_Source_Cap No Request (Click to View Protocol Trace)
PASS	COMMON.PROC.BU.1:
PASS	COMMON.PROC.BU.1 - REVISION_2.0 Rev2Src
PASS	First source capability timer - COMMON.PROC.BU.1#1:
PASS	Vbus up time: 0.902s and SourceCap time: 1.061s at protocol index #10 (PASS) Max = 255ms. Obtained time difference is 159.15ms
PASS	DUT responded with accept message - COMMON.PROC.BU.1#2:
PASS	DUT sent Accept message at protocol index 22.
PASS	tsctransReq timer check - COMMON.PROC.BU.1#3:
PASS	(PASS) Max = 225ms. Obtained time difference is 28.65ms
PASS	Packet 34
PASS	COMMON.PROC.BU.1 - REVISION_3.0 Rev3Mdrcc

USB Type-C® Functional Compliance Testing

The USB-IF certified C2-EPR rigorously validates critical Type-C® features including plug orientation detection, power and data role switching, VCONN operation, active cable identification, and state transitions according to compliance specifications.

With advanced debugging capabilities, precise traceability, and automated test execution, the C2-EPR delivers unmatched accuracy and efficiency for ensuring compliance with USB Type-C® standards.

No additional data path testing is required for USB Power Bricks. However, devices with data paths require an external device to meet additional test requirements and ensure complete data functionality evaluation.

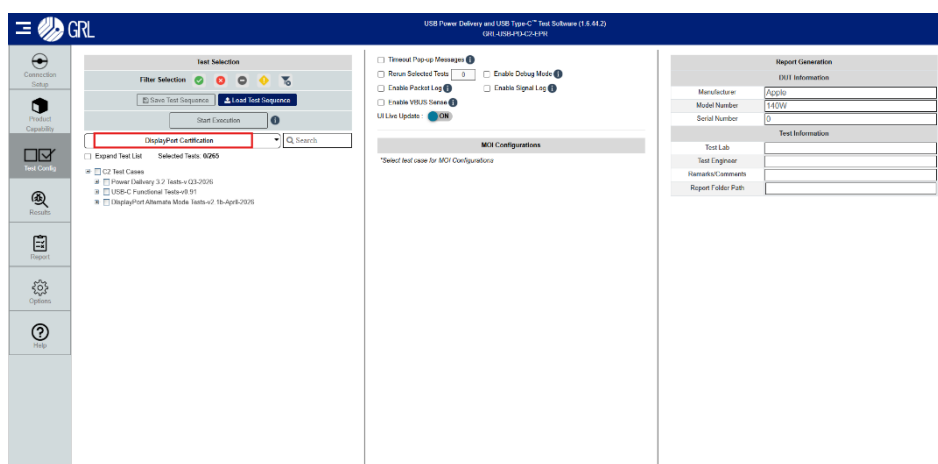


DisplayPort Alternate Mode Testing on USB Type-C®

USB Type-C® is a versatile connector that supports power delivery, data transfer, and display transmission through Alternate Mode.

By supporting validation of DisplayPort Alternate Mode on USB Type-C® Protocol Converters, Source devices, and Sink devices, the C2-EPR offers a complete solution for USB PD and DisplayPort Alternate Mode compliance testing.

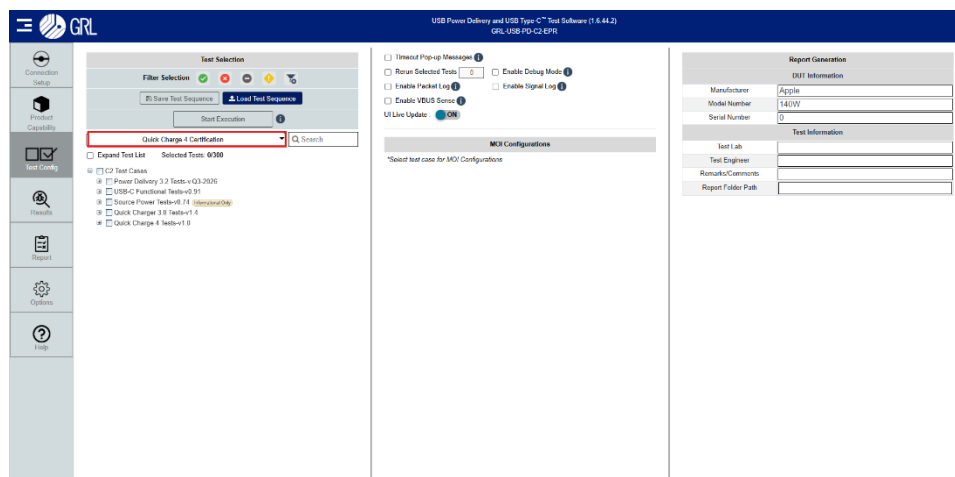
The C2-EPR also tests critical parameters such as VBUS, VCONN, cable orientation, and Alt Mode entry/exit procedures, ensuring seamless functionality and full compliance with USB Type-C® Power Delivery and DisplayPort Alternate Mode standards.



Industry's Exclusive Qualcomm Quick Charge Compliance Solution

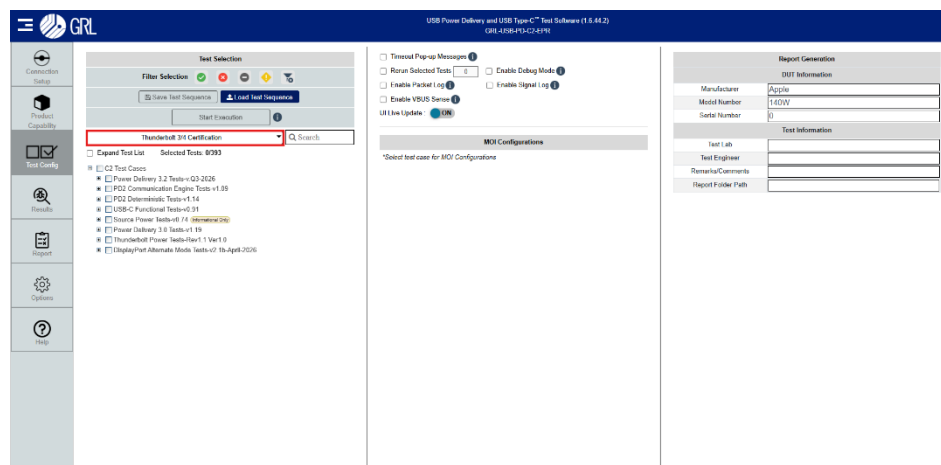
As the only industry-approved solution for Qualcomm Quick Charge compliance testing, the C2-EPR sets the benchmark for accuracy and reliability by providing comprehensive validation for legacy Quick Charge 2.0, Quick Charge 3.0, QC4, QC4+, and QC5 Source and Sink devices. The platform ensures consistent performance and full adherence to Qualcomm standards, while supporting key Quick Charge features such as dynamic voltage scaling, intelligent thermal management, and backward compatibility with legacy charging protocols.

With its advanced testing capabilities, the C2-EPR enables precise measurement of power delivery efficiency, seamless protocol negotiation, and robust verification of fast-charging technology, ensuring device compatibility and user safety – making the solution an indispensable tool for validating Qualcomm Quick Charge implementations for a diverse range of devices.



Thunderbolt Power Compliance Testing

The C2-EPR delivers precise Thunderbolt power validation, providing accurate VCONN and VBUS power measurements through the innovative Cable IR Drop Compensation. Simultaneously test two Thunderbolt ports and even combine two C2-EPR units to efficiently test up to four Thunderbolt ports in a single Device Under Test (DUT) using the internal synchronization functionality. This unique capability makes the C2-EPR an essential tool for comprehensive and scalable Thunderbolt power performance testing.



IEC 62368-1 Functional Safety Conformance

The C2-EPR is designed to validate the stringent functional safety requirements of IEC 62368-1 for USB Type-C® devices, which operate at high power levels (exceeding 100W) and utilize advanced communication protocols.

Guarantee reliable device performance under both standard and adverse conditions by identifying and mitigating risks such as message corruption, delays, loss, unauthorized data exchange, and device miscommunication. These critical tests are vital to safeguarding against hazards like fire, electric shock, or device failure.

Additionally, the C2-EPR supports manufacturers in achieving EU RED conformance by providing detailed test reports and self-test kits. Its comprehensive functionality and ensures USB Type-C® device adherence to global safety and regulatory conformance standards.

Comprehensive IEC 62680 Conformance Testing

Provides complete conformance testing for the IEC 62680 standards, including IEC 62680-2 for USB PD protocols, and IEC 62680-3 for USB Type-C® interface specification requirements.

Validate all the essential testing features for full alignment with the EU Common Charger Directive, ensuring compliance and generating detailed reports and documentation to demonstrate product adherence to IEC 62680 standards as required by EU legislation.

Reporting and Collaborative Offline Analysis

Generates detailed reports in CSV, HTML, and PDF formats for flexibility in documentation and review. Each test execution includes a comprehensive trace file, enabling in-depth offline analysis and efficient debugging. Simplify collaboration across the board through easy sharing of reports and trace files.

APIs and Custom Test Case Development

Address unique testing needs through Python and C# APIs and create custom test cases beyond standard compliance testing. These APIs enable seamless integration of the C2-EPR into automation workflows and environments, maximizing the value and flexibility of your investment. Comes with a comprehensive library of sample test cases and detailed documentation for a clear starting point to customization.

Specifications

Supported Specifications

Features	Supported Standards
USB Power Delivery	USB PD 3.2
DisplayPort	DisplayPort Compliance Testing
Thunderbolt	Thunderbolt Power Testing
Quick Charge	QC 2.0/3.0/4/4+/5

Host PC Requirements

Parameters	Requirements
Browser	Latest 64-bit version of Chrome
Display Resolution	Minimum 720p for optimal viewing
Operating System	Windows 10 and 11
RAM	4GB or more
HDD Memory	50GB or more

Interface Specifications

Parameters	Specifications
Front Panel Controls	Port 1: • USB Type-C® Port –1 • V_bus Sense – 1 Number Port 2: • USB Type-C® Port – 1 • V-BUS Sense – 1 Number Extended port for expansion – 1 Trigger out – 1
Input Voltage	90V to 250V AC
Power	Maximum 3KW
Host Connection	Ethernet
Firmware update	USB Type-B

Electrical Specifications

Parameters	Requirements
V_BUS Voltage Range	2.5V to 54V
V_BUS Current	Max 7A
VCONN Voltage Range	2V to 5.5V
VCONN Current	Max 2A
CC Line Sample Rate	5 MSPS
VBUS Sample Rate	Max 1MSPS
VCONN Sample Rate	Max 1MSPS

Dimensions and Weight

Parameters	Specifications
Dimension (W x L x H)	516mm x 223mm x 393mm
Weight	15 kg (33 lb)
Feature	Side handles for handling

Ordering Information

For a formal quote and pricing, contact info@grlps.com

Model Number	Description
GRL-USB-PD-C2-EPR	USB Power Delivery 3.2 Solution



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