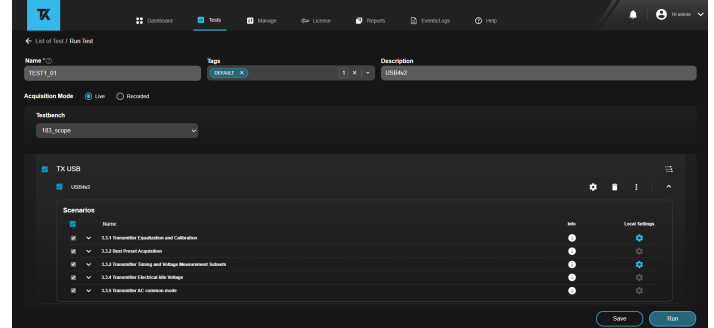
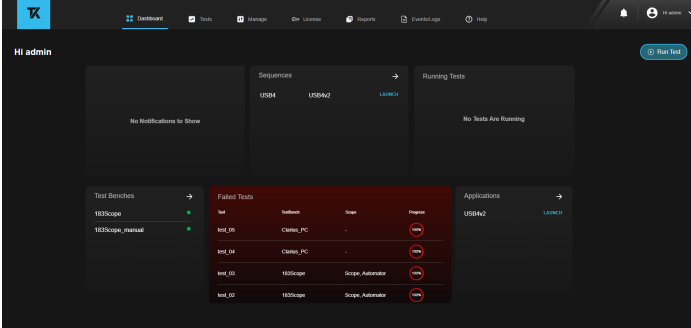


Clarius Compliance USB4v2 Tx Test and Debug Solution Datasheet



The Tektronix USB4v2 Compliance and Debug Solution provides an easy way to validate and characterize the emerging USB4 Router-Host, USB4 Router-Device, and USB4 Hubs as per the USB4 Electrical Compliance Test Specification v2.0. Tektronix DPO70000SX AT1 Oscilloscopes supports the Tektronix USB4v2 Compliance and Debug solution.

The Clarius compliance is a new-generation compliance test automation software platform that offers a range of features and benefits

- Higher asset utilization and faster test times - Disaggregated architecture to offload analysis from the oscilloscope.
- Easy workflow integration – Leverage REST API's and SDK for faster automation.
- Integrated data management for results, reports, and waveforms in the UI, along with a dashboard view.

Key features

- Comprehensive toolset for the USB4 Gen4 (40 Gbps) verification, characterization, debugging, and compliance testing.
- The USB4v2 application is compliant with the latest USB4v2 compliance test specification.
- Tektronix PAMJET-USB4v2 plug-in assists in root cause analysis.
- Measurements use the latest sigtest tool.
- Supports de-embedding, embedding, and custom channel characterizations.
- Signal validation feature validates the compliance pattern to ensure the accuracy of the results.
- Pre-recorded mode supports the offline analysis and baseline for future specification changes.
- DUT Automation supports the Wilder Technologies USB4v2 Controller and USB4v2 Electrical Test Tool (ETT).

Clarius Compliance USB4v2 test automation solution

USB4 transmitter test applications

- USB4v2 Silicon Testing: Host, Device, and Hub
- USB4v2 Peripheral Testing: Host, Device, and Hub
- Manufacturing testing

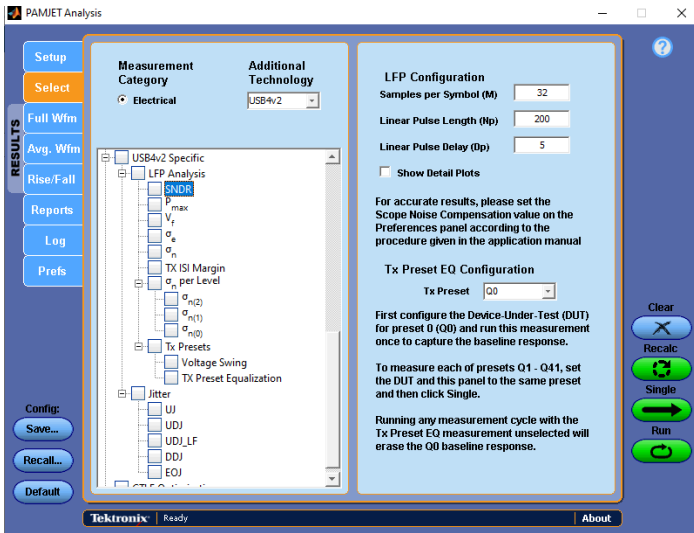
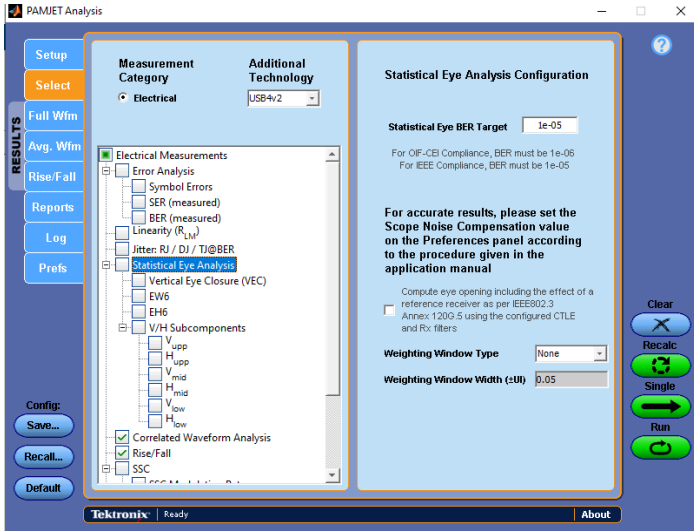
USB4v2 Gen4 enables data transfer rates of up to 40 Gbps through PAM3 signaling, which transmits 11 bits for every seven symbols at a symbol rate of 25.6 GBaud/sec. USB4v2 has the following modes.

USB4v2 modes

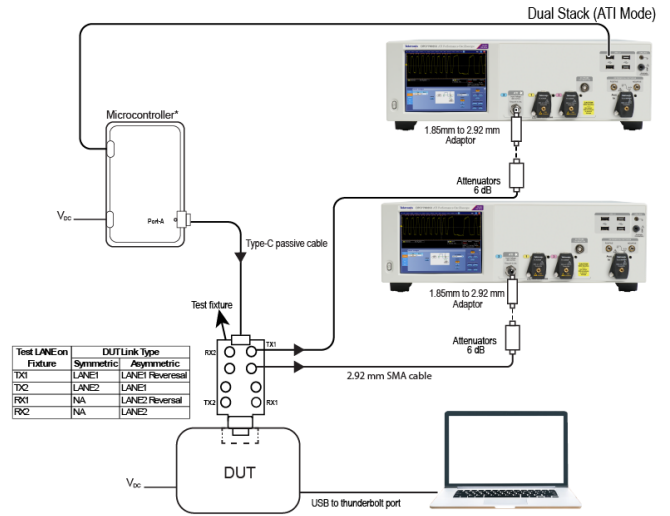
Modes	Data rates	Lanes
Asymmetric	120 Gbps	<ul style="list-style-type: none"> • Three Tx lanes • One Rx lane
Symmetric	80 Gbps	<ul style="list-style-type: none"> • Two Tx lanes • Two Rx lanes

PAMJET for USB4v2

Tektronix created a next-generation PAM tool named PAMJET, which is used for USB4v2 measurement. The PAMJET tool can configure the measurement and perform Bessel Thompson filtering, configure clock recovery, configure CTLE, and report the results. These built-in functions are specifically designed to aid USB4v2 testing.



Connection diagram



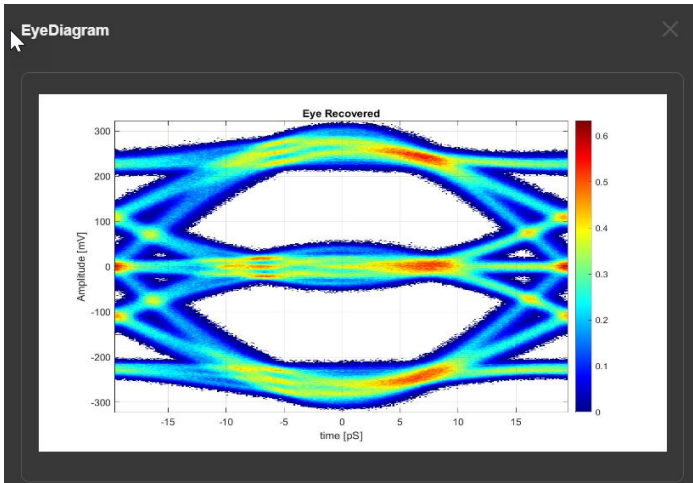
Note: * User can use microcontroller and other way to control the DUT.

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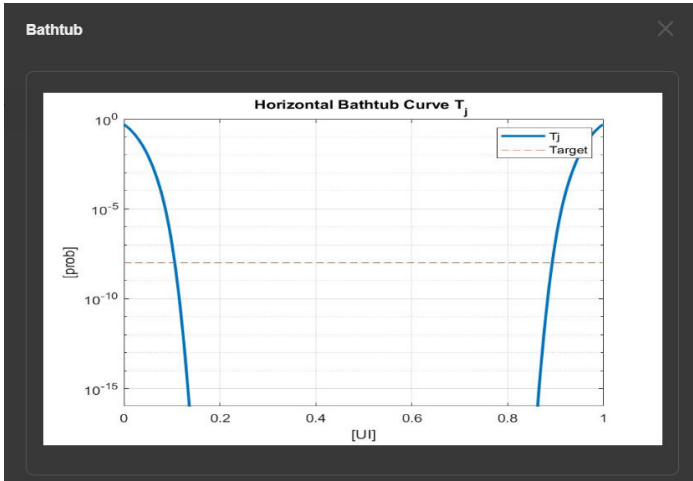
USB4v2 Transmitter connection diagram

PAMJET measurement list

Plots



USB4v2 Gen4 (40 Gbps) Eye diagram



USB4v2 Gen4 (40 Gbps) Bathtub diagram

Reports

Detailed test report for all the executed tests can be viewed and exported in .pdf and .csv formats.

Carius Compliance USB4v2 Tx Test Report						
Setup Information						
Test Name	txeq_live_check3	Scope Model Number	Master : DPO77002SX Extension : DPO77002SX			
DUT ID	DUT001	Scope Serial Number	Master : 8321860 Extension : 8321859			
Date and Time	2024-11-29 05:28:57.146	SPC: Factory Calibration	PASS, NA			
Overall Test Result	PASSED	Scope F/W Version	CF-91.1CT FW:10.14.0 Build 15			
Overall Execution Time	00:13:27	Carius Version	2.0.0-master.854			
Execution Mode	LIVE	App Version	2.0.0			
Lane Configuration	Symmetric	SigTest Version	0.95			
Test Mode	Compliance Mode	Test Point	Router Assembly TP2 Tx			
De-Skew Source	CH2	De-Skew Value	0 ps			
DUT Control	Automation	De-Embedding s4p File	FM1MCable.s4p			
ETT Tool Path	C:\USB4ETT\USB4V2\	ETT Tool Version	v2.0.0			
ATI Mode	Enabled	External Attenuator[dB]	6			
Universal Serial Bus 4 (USB4 S) Router Assembly Electrical Compliance Test Specification Version	v0.98 (draft under review)	Acquisitions Count	1			
DUT Port Number	7					
Lane1 Test Summary						
3.3.1 Transmitter Equalization and Calibration						
Best Preset						
Iteration	Measurement Details	Measured Value	Unit	Test Result	Low Limit	High Limit
1	Best Preset - P0	1.0	Ulp-p	INFO	NA	NA
Preset Calibration Table						
Iteration	Measurement Details	Measured Value	Unit	Test Result	Low Limit	High Limit
1	Preset 0 [DD]	1.0	Ulp-p	INFO	NA	NA
1	Preset 1 [DD]	1.0	Ulp-p	INFO	NA	NA
Transmitter Normalized Co-Efficient Table						
Iteration	Measurement Details	Measured Value	Test Result	Low Limit	High Limit	
1	Preset 0 [C1-2]	0.0	PASS	-0.015	0.015	
1	Preset 0 [C1-1]	0.0	PASS	-0.025	0.025	

USB4v2 Transmitter test report in PDF format

Specifications

High-Speed electrical tests supported in Tektronix USB4v2 solution

Test	Pattern	Test point
UI	PRTS7	TP2
Lane to lane skew		
Tx SNDR		
TX ISI margin		
TX-FFE equalization		
TX swing		
Tx pulse peak		
Tx level mismatch		
Common mode noise		
Tx swing when disabled		
Uncorrelated Jitter (UJ)		
Uncorrelated DJ (UDJ)		
UDJ@RT pass band (UDJ_LF)		
ODD_EVEN (DCD)		
SSC rate		
SSC down spread		
SSC slew rate		
SSC phase deviation		

Ordering information

Hardware requirements

Item	Description	Vendor	Quantity
Tektronix DPS75004SX/ DPS75904SX/ DPS77004SX	Dual Stack 50 GHz SX oscilloscope and above	Tektronix	1
Host PC/Laptop	Refer to System requirements .	-	-
Wilder USB4v2 controller	DUT controller	-	1
Wilder/Luxshare USB4v2 Plug Fixture	Fixture	-	1
SMA cable pair: 2.92 to 2.92 mm, straight, 1.5 ps matched, 1-meter	PMCABLE1M	Tektronix	2

System requirements

Prerequisites	Minimum requirements
Operating system	Windows 10 Enterprise and Pro (version 21H1 and above) or Windows 11 Enterprise and Pro (version 21H2 and above) Language: English (United States) only.
CPU cores	16
RAM	64 GB
Disk space	800 GB HDD/SSD of free disk space
Browser	Microsoft Edge (default) or Google Chrome
Additional software	<ul style="list-style-type: none"> • Python 3.12.x¹ • Download the USB4 SigTest Tool. • Install the 64 bit MATLAB runtime compiler. <ul style="list-style-type: none"> • Version R2024a (24.1) for SigTest version 0.95 • Version R2023a (9.14) for SigTest version 0.9

Software requirements

Compliance

Item	Description	Vendor	Quantity
Clarius USB4v2 Tx Compliance Test Application	Refer to USB4v2 license details .	Tektronix	1

Debug

Item	Description	Vendor	Quantity
PAM4 measurement analysis package for USB4v2 (requires Opt. PAMJET-E)	PAMUSB4v2	Tektronix	1
Serial Data Link Analysis Software	SDLA64	Tektronix	1

¹ Python installation is required for SDK and DUT control automator.

License options

License terms	License option	License type
Subscription	AT-USB4v2-TX-NS1	1 Year, Node-locked
	AT-USB4v2-TX-NS3	3 Years, Node-locked
	AT-USB4v2-TX-FS1	1 Year, Floating
	AT-USB4v2-TX-FS3	3 Years, Floating



Note: The license can be used for the duration of the subscription term.

License types:

- Node Locked: Tied to a specific computer.
- Floating: License can be moved from one computer to another to share between labs/geography.



Tektronix is ISO 14001:2015 and ISO 9001:2015 certified by DEKRA.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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