

# USB4™ Transmitter, Compliance, and Debug Solution

## Opt. USB4 Application Datasheet

The Tektronix USB4<sup>1</sup> Compliance and Debug solutions provide 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 v1.0. Tektronix DPO/MSO70000SX/DX Series Oscilloscope (bandwidth ≥ 23 GHz) supports the Tektronix USB4 Compliance and Debug solutions.



Tektronix USB4 Transmitter Compliance Solution

### Key features

- Tektronix USB4 Compliance and Debug solution provide a comprehensive toolset for the USB4™ Gen2 (10 Gbps) and Gen3 (20 Gbps) verification, characterization, debug, and compliance testing.
- Tektronix USB4 solution<sup>2</sup> is compliant with the USB4™ Specification Ver1.0 and USB4™ Router Assembly Electrical Compliance Test Specification Rev 1.0.
- Tektronix DPOJET-USB4 Plug-in solution with setup files and MOI assists the root cause analysis.
- Tektronix USB4 solution supports the SigTest (USB-IF Analysis Tool).
- Tektronix USB4 solution supports the Wilder Technologies USB4 Controller and USB4 Electrical Test Tool (ETT).
- Tektronix Serial Data Link Analysis (SDLA) tool supports the De-embedding, Embedding, Equalization (CTLE+DFE), and Custom Channel Characterization.

- The TekExpress USB4 Signal Validation feature validates the compliance pattern to ensure the accuracy of the results.
- The TekExpress USB4 Pre-Recorded Mode supports the offline analysis and baseline for future specification changes.
- The TekExpress USB4 Automatic DUT Control mode captures all the compliance test patterns. So the USB4 Transmitter testing completes without user intervention.
- Tektronix USB4 Automatic DUT Control supports both USB4 Discrete and Integrated (SoC) products.
- Complete both Lane 0 and Lane 1 Transmitter test without flipping the USB Type-C® connector or USB4 High-Speed fixture.
- Quickly validate test results with comprehensive reporting that details test margins, pass/fail results, and plots in PDF, MHT, and CSV formats.



Tektronix USB4 debug solution

### Applications

#### USB transmitter testing

- USB4 Silicon Testing: Host, Device, and Hub
- USB4 Peripheral Testing: Host, Device, and Hub
- Manufacturing testing

<sup>1</sup> USB Type-C®, and USB4™ are trademarks of the Universal Serial Bus Implementers Forum (USB-IF)

<sup>2</sup> USB-IF approved the Tektronix oscilloscopes (SX and DX series) for the USB4 testing. Approval for the automation software is pending.



## Specifications

### High-Speed electrical tests supported in Tektronix USB4 solution

Test	Speed		Pattern	Test Point	
	Gen2 (10 Gbps)	Gen3 (20 Gbps)		TP2	TP3
Transmitter Preset Calibration	✓	✓	PRBS15	✓	
Transmitter Equalization	✓	✓	SQ128	✓	
Minimum Unit Interval	✓	✓	PRBS31	✓	
SSC Down Spread Range	✓	✓		✓	
SSC Down Spread Rate	✓	✓		✓	
SSC Phase Deviation	✓	✓		✓	
SSC Slew Rate	✓	✓		✓	
Rise/Fall Time	✓	✓		SQ128	✓
Total Jitter (TJ)	✓	✓	PRBS15	✓	✓
Uncorrelated Jitter (UJ)	✓	✓		✓	✓
Uncorrelated Deterministic Jitter (UDJ)	✓	✓		✓	✓
Data Dependent Jitter (DDJ)	✓	✓		✓	✓
Low-Frequency UDJ (LF UDJ)	✓	✓		✓	
DCD (Even-Odd Jitter)	✓	✓		✓	
Eye Diagram	✓	✓		PRBS31	✓
AC Common Mode	✓	✓	PRBS31	✓	
Electrical Idle Voltage	✓	✓	Idle	✓	

## Ordering information

### TekExpress USB 4 Transmitter Compliance and Debug Solution

<b>DPO/MSO7000SX/DX</b> <sup>3</sup>	Tektronix DPO (Digital Phosphor Oscilloscope) or MSO (Mixed Signal Oscilloscope) Oscilloscopes – 23 GHz and above with DPOJET (DJA) and SDLA64 installed
<b>DPO/MSO7000SX/DX Opt. USB4</b> <sup>4</sup>	TekExpress USB4 Tx Compliance and DPOJET: USB4 Tx/Rx Measurement Plugin Solution (Requires Opt. CIO, DJA, SDLA64)
<b>DPO-UP USB4</b> <sup>4</sup>	TekExpress USB4 Tx Compliance and DPOJET: USB4 Tx/Rx Measurement Plugin Solution (Requires Opt. CIO, DJA, SDLA)
<b>DPOFL-USB4</b> <sup>4</sup>	TekExpress USB4 Tx Compliance and DPOJET: USB4 Tx/Rx Measurement Plugin Solution (Requires Opt. CIO, DJA, SDLA64); Floating
<b>DPOFT-USB4</b> <sup>4</sup>	TekExpress USB4 Tx Compliance and DPOJET: USB4 Tx/Rx Measurement Plugin Solution (Requires Opt. CIO, DJA, SDLA64); Floating Trial

### Recommended USB4 Controller, High-Speed test fixture, and accessories

Item	Vendor	Quantity
USB4 Controller and High-Speed Test Fixtures: USB4-TPA-UC-K	Wilder Technologies	1
SMP(F) to 2.92mm(F) Adapter: SM8852	Fairview Microwave	Min 4
[Optional] SMP Terminators: ST2643	Fairview Microwave	4
PMCABLE1M Phase Matched SMA cable set	Tektronix	2

### Oscilloscope and software prerequisite requirements

<b>Operating System</b>	DPO/MSO7000SX/DX with Microsoft Windows 10 OS
<b>DUT Control Tool</b>	The USB4 Electrical Test Tool (ETT) v 0.9.9 (or above) should be available on the oscilloscope. The USB4 ETT is available on the USB-IF Test Tools site <a href="http://www.usb.org/document-library/usb4ett">www.usb.org/document-library/usb4ett</a> .
<b>Controller Driver and Software</b>	Wilder Technologies USB4 Controller Driver and Software should be available on the oscilloscope. Contact Wilder Technologies for software support.
<b>Matlab Runtime</b>	Install the Matlab Runtime v R2019b(9.7) on the oscilloscope to run the USB4 SigTest tool. You can download the installable from <a href="http://www.mathworks.com/products/compiler/matlab-runtime.html">www.mathworks.com/products/compiler/matlab-runtime.html</a> .
<b>SigTest Tool</b>	Copy the SigTest executable on the oscilloscope. You can download the installable from <a href="http://www.usb.org/document-library/usb4-sigtest">www.usb.org/document-library/usb4-sigtest</a> .

<sup>3</sup> Required items: Opt DJA and Opt SDLA64. Optional items: Opt 10XL and DPO7AFP.

<sup>4</sup> Requires Opt. CIO, DJA, and SDLA64, and ≥ 23 GHz oscilloscope.

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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](http://www.tek.com).

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