

Tektronix USB4v2 Test Solution

Receiver Test Suite Datasheet



Product overview

USB4 version 2.0 (USB4v2) makes a major upgrade in high-speed interconnect technology, using the foundation of USB4 and Thunderbolt 3/4. It introduces new capabilities, supports data transfer rates up to 120 Gbps while staying compatible with existing USB and Thunderbolt protocols.

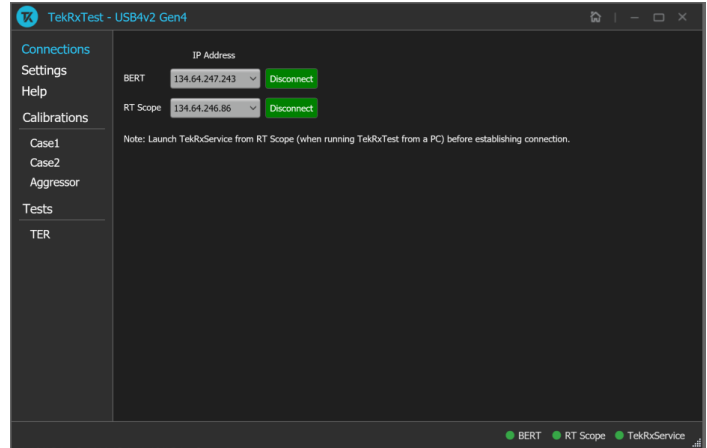
The Tektronix USB4v2 Receiver testing software improves the accuracy and precision of USB4 Receiver calibration (TP3') and testing. It simplifies the receiver testing through a step-by-step user interface designed by industry leaders. Our active industry engagement ensures that our software evolves with the technology. The design team focuses on balancing simplicity and user control, to ensure your device can complete correctly calibrated stress tests and perform efficiently with optimized Physical Layer (PHY) settings.

Applications

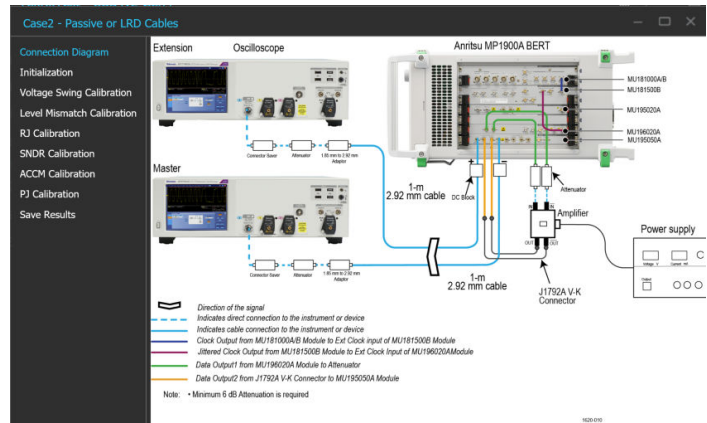
USB4v2

The key features of the USB4v2 receiver software are:

- Single-click operation to complete both Case 1 and Case 2 calibration routines at TP3'
- Displays summary after key calibration steps
- Removes oscilloscope intrinsic noise for better measurement accuracy
- Performs automated calibration for key steps
- Intelligence to converge target value of Signal to Noise Ratio (SNDR) which is very sensitive to Differential Mode Interference (DMI)
- Generates detailed report with eye diagram
- Resume incomplete calibrations
- Supports Trit Error Ratio (TER) test for both symmetric and asymmetric mode



USB4v2 TekRx main page



Case 2 calibration main page

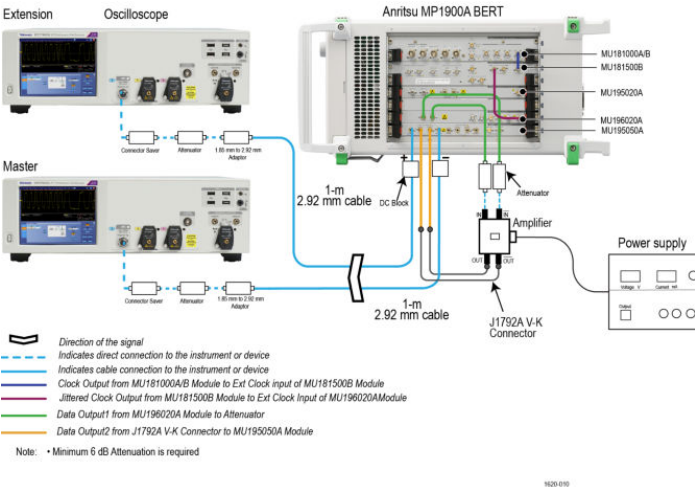
TP3' calibration

The TP3' calibration is mandatory for all devices to meet the required tolerances at the defined reference plane. The Tektronix USB4 Receiver Test Wizard guides the user through all the necessary steps as per the specifications, to ensure future calibration complete smoothly.

TP3' calibration highlights

- Signal validation and skew correction during equipment initialization
- Single-click option to perform the full TP3' calibration sequence
- Calibrate amplitude, level mismatch, and AC common mode
- Perform Sinusoidal Jitter (SJ) calibration at frequencies 1, 2, 10, 50, and 100 MHz
- Perform Random Jitter (RJ) calibration
- Perform SNDR calibration by adjusting DMI

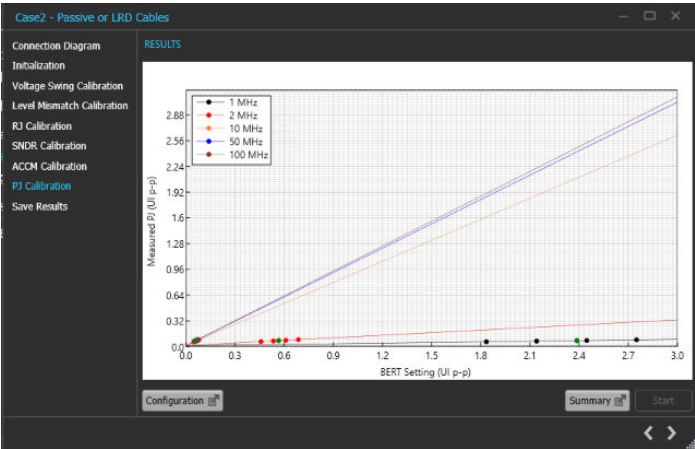
- Removes oscilloscope intrinsic noise while calculating SNDR
- Validate target value for all calibrations



Case 2 connection diagram

PJ calibration

- Perform automated Periodic Jitter (PJ) calibration for 1, 2, 10, 50, and 100 MHz
- Generate separate linear response curves for each PJ frequency
- View a detailed calibration summary for each PJ frequency



PJ calibration

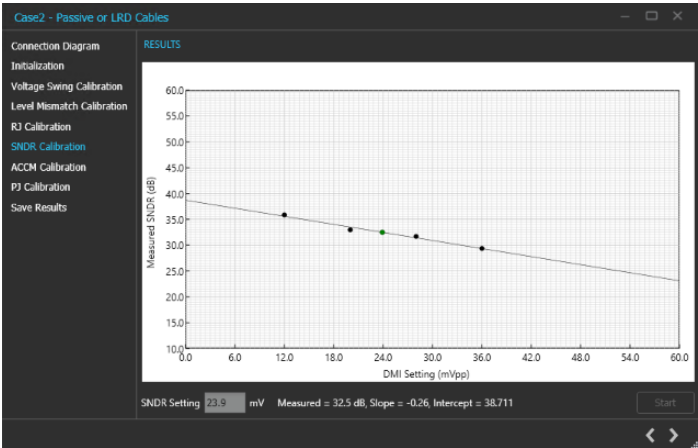
PJ Calibration Results						
No.	Frequency (MHz)	Target (UI p-p)	Setting (UI p-p)	Slope	Intercept	Measured (UI p-p)
1	1	0.075	2.386	0.026	0.013	0.0748
2	2	0.075	0.566	0.106	0.015	0.0744
3	10	0.075	0.07	0.871	0.015	0.0761
4	50	0.075	0.062	1.009	0.013	0.0743
5	100	0.075	0.06	1.03	0.014	0.0761

PJ calibration results

SNDR calibration

- Perform automated SNDR calibration

- Remove Oscilloscope noise captured during calibration for accurate results



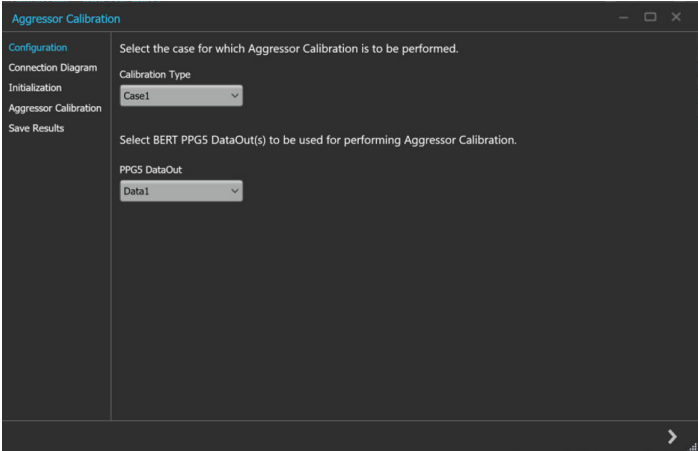
SNDR calibration page

Aggressor Calibration for BER Testing

To simulate near-end crosstalk conditions during Trit Error Ration (TER) testing, perform aggressor calibration.

Aggressor calibration supports the following:

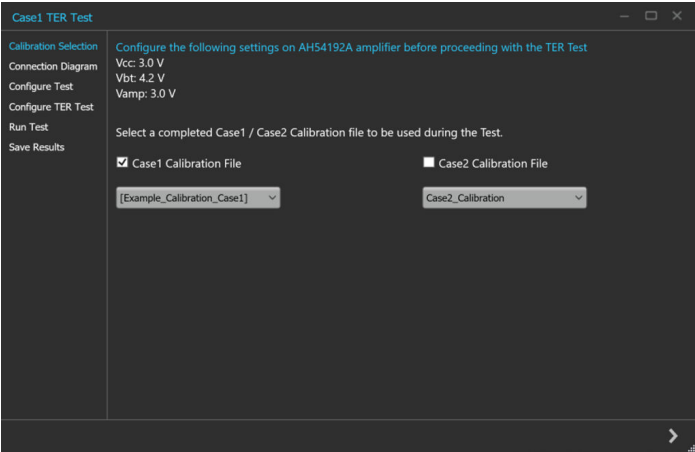
- Case 1 and Case 2 calibration modes
- 1-channel and 2-channel Pulse Pattern Generator (PPG) setups



Aggressor calibration main page

USB4 receiver tests

- Select TP3' and aggressor calibration files to run Receiver (Rx) tests
- Enable near-end crosstalk simulation across all test scenarios
- Configure the Electrical Test Tool (ETT)
- Run tests manually for greater control and flexibility
- Define custom BER test duration
- View test results in a structured, tabular format
- Display performance margins for each PJ frequency
- Execute tests across all PJ frequencies: 1, 2, 10, 50, and 100 MHz



TER test page

Results and reports

- Generates a comprehensive report for each calibration, including a summary
- Includes detailed TP3' calibration results alongside receiver (Rx) test data

<div><div>Tektronix</div><div>USB4v2 Gen4 Receiver Calibration Report</div><div>Case2 (Passive or LRD Cables) Calibration Results</div></div>	
Details	
Unique ID	Case2_Calibration
Date/Time	12 June 2025, 12:20 PM
Generated By	Tektronix
Additional Comments	
No Comments	
Test Equipment	
BERT	ANRITSU, MP1900A, 6261788378
BERT FW Version	10.04.02
Rx Test SW Version	6.4.4.79
RT Scope	TEKTRONIX, DPO77002SX, B322415
RT Scope FW Version	10.14.0 Build 15
TekRxService Version	3.0.0.57
Host PC TekRxService Version	3.0.0.57
Analysis Tool	SigTest
Calibration Summary	
Case2 Calibration	Unique ID: Case2_Calibration
	Voltage Swing Setting: 270 mV (Nominal - 820.0 mV, Measured - 813.7 mV)
	Level Mismatch Setting: 48.7 % (Nominal - 0.975, Measured - 0.976)
	RJ Setting: 0.124 UI p-p (Nominal - 0.0085 UI RMS, Measured - 0.0079 UI RMS)
	SNDR Setting: 23.7 dB (Nominal - 32.5 dB, Measured - 32.4 dB)
	ACCM Setting: 72 mV (Nominal - 100.0 mV, Measured - 100.1 mV)
	PJ Calibration was performed for 5 frequencies (Nominal - 0.075 UI p-p)

Case 2 calibration report

Tektronix®							
USB4v2 Gen4 Receiver Test Report							
TER at Case2 Test Results							
Details							
Unique ID	TER_Test_Case2_Report						
Date/Time	13 June 2025, 12:46 PM						
Generated By	Tektronix						
Additional Comments							
No Comments							
Test Equipment							
BERT	ANRITSU, MP1900A, 6261788378						
BERT FW Version	10.04.02						
Rx Test SW Version	6.4.4.59						
RT Scope	TEKTRONIX, DPO77002SX, B322415						
RT Scope FW Version	10.14.0 Build 15						
TekRxService Version	3.0.0.57						
Calibration Summary							
Case2 Calibration	Unique ID: Case2_Calibration						
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	ACCM Setting: 72 mV (Nominal - 100.0 mV, Measured - 100.1 mV)						
	PJ Calibration was performed for 5 frequencies (Nominal - 0.075 UI p-p)						
Test Configuration							
TER Test	SSC Profile: Triangular, Down Spread						
	SSC Deviation: 3000 ppm						
	SSC Offset: 0 ppm						
	SSC Frequency: 32000 Hz						
	ETT Configuration: Manual						
Stress Configuration							
PJ@Freq (MHz)	Stress Type	Voltage Swing (mV)	Level Mismatch (%)	RJ (UI rms)	SNDR (dB)	ACCM (mV p-p)	PJ (UI p-p)
1	Calibrated	820	0.975	0.0085	32.5	100	0.075
2	Calibrated	820	0.975	0.0085	32.5	100	0.075
10	Calibrated	820	0.975	0.0085	32.5	100	0.075
50	Calibrated	820	0.975	0.0085	32.5	100	0.075
100	Calibrated	820	0.975	0.0085	32.5	100	0.075
TER Test Results							
PJ@Freq (MHz)	TER					Status	
1	1E-09					Pass	
2	2E-08					Fail	
10	2E-09					Pass	
50	1.2E-06					Fail	
100	5E-09					Pass	
End of Report							

TER test report

Ordering information

Hardware requirements

Equipment	Vendor	Type	Required/ Optional (R/O)	Quantity	Description
MP1900A	Anritsu	Equipment	Required	1	BERT
DPS75004SX or DPS75904SX or DPS77004SX	Tektronix	Equipment	Required	1	Tektronix real time Dual Stack 50 GHz SX oscilloscope
PMCABLE1M	Tektronix	Accessory	Required	4	Precision Phase Matched Cable Pair, 1 m
PMCABLE0.5M	Tektronix	Accessory	Required	6	Precision Phase Matched Cable Pair, 0.5 m
K261	Anritsu	Accessory	Required	2	DC block
J1789A	Anritsu	Accessory	Required	2	40-cm coaxial cable, V connector
41VA-6	Anritsu	Accessory	Required	4	6-dB attenuator (V-V)
41VA-10	Anritsu	Accessory	Required	2	10-dB attenuator (V-V)
AH54192A	Anritsu	Equipment	Required	1	Differential Linear Amplifier
34VKF50	Anritsu	Accessory	Required	2	Fixed Adapter (V-M, K-F)
AH54192A-01	Anritsu	Equipment	Required	1	Power supply
USB4v2 Microcontroller	Wilder	Equipment	Required	1	Wilder USB4 Micro-Controller Test Module with USB cable
Receptacle test fixture	Wilder	Equipment	Required	1	Wilder USB4 Plug and receptacle test fixtures
PCB Fixture	Wilder	Equipment	Required	1	For additional channel loss
Type A-B connector	Wilder	Accessory	Required	1	USB type A-B cables
Type C-C connector	Wilder	Accessory	Required	1	USB type C cables

Software requirements

Option	Description
RXSW-NLP-USB42	License; USB4v2 Receiver automation software for TEK oscilloscopes and Anritsu BERT; Node-Locked Permanent
RXSW-FLP-USB42	License; USB4v2 Receiver automation software for TEK oscilloscopes and Anritsu BERT; Floating Permanent
RXSW-NL1-USB4v2	License; USB4v2 Receive automation software for TEK oscilloscopes and Anritsu BERT; 1 year subscription; Node-Locked
RXSW-FL1-USB4v2	License; USB4v2 Receive automation software for TEK oscilloscopes and Anritsu BERT; 1 year subscription; Floating

Host system requirements: Windows 10 v22H2 or above

Tektronix is registered to ISO 9001:2015 and ISO 14001:2015.

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.



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