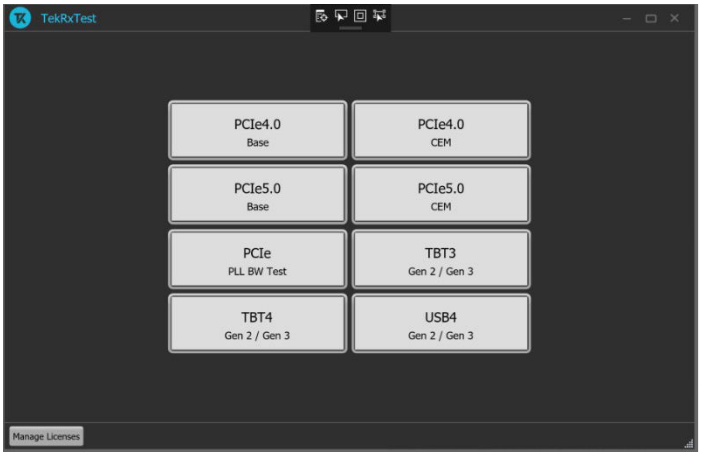
Tektronix USB4

Receiver Test Suite Datasheet



Improve accuracy and precision of USB4 Receiver Calibration (TP3' and TP3) and Tests with Tektronix automation software. The software removes the complexity of receiver testing with a step-by-step user interface, that has been designed by industry leaders engaged in the standards bodies to drive the latest specifications to maturity. Industry engagement ensures our software will evolve in step with the technology. Achieving the correct balance of simplicity and user control, has been at the forefront of the design team to ensure your device can complete the correctly calibrated stress and perform efficiently with optimized PHY settings.

Applications

USB4 (10 Gbps and 20 Gbps)

- One click option to complete entire calibration in both TP3' and TP3
- Option to view summary after key calibration steps
- Table or Eye Diagram view in Input Eye Diagram and Stressed Eye Calibration
- Option to perform manual calibration in Input Eye Diagram and Stressed Eye Calibration
- Automatic Insertion Loss calculation in TP3
- Detailed report with Eye Diagram
- Option to choose analysis tool between DPOJET and Sigtest
- Option to resume partially complete calibrations

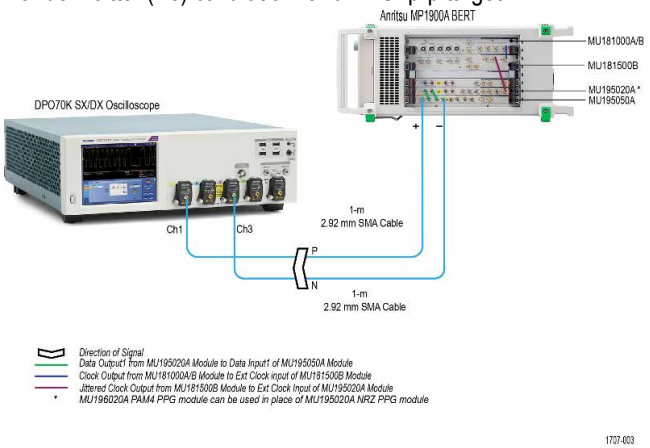
TP3' Calibration

The TP3' is mandatory for all devices to ensure tolerances are met at the defined reference plane. Tektronix USB4 Receiver Test wizard will guide the user through all the necessary steps as per the specification requirements to ensure future calibration steps complete with ease.

Some of the test parameters are used in TP3 calibration that is needed to complete the stressed eye tests.

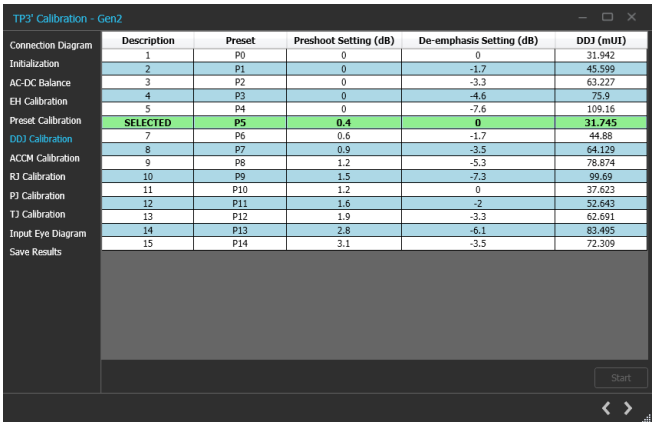
TP3' Calibration Highlights

- Signal validation, skew correction, and channel polarity check as part of equipment initialization
- Option to perform entire TP3' calibration in one click!
- AC-DC voltage difference minimization using De-emphasis
- Parallel Preshoot and De-emphasis calibration with summary
- Preset selection with minimum Data Dependent Jitter (DDJ)
- Input eye height calibration for 700 mV p-p (Differential)
- AC-common mode noise calibration for 100 mV p-p target at 400 MHz sinusoidal frequency
- Random Jitter (RJ) calibration for 0.14 UI p-p target

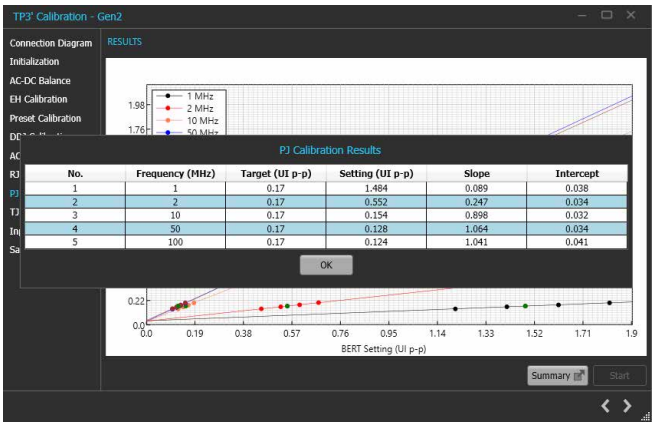


DDJ and PJ calibration

- Perform automated DDJ calibration for all preset combinations to find least DDJ
- Perform automated PJ calibration with 0.17 UI p-p target for 1, 2, 10, 50, and 100 MHz
- Separate linear curves for each PJ frequency
- Option to view calibration summary for each frequency



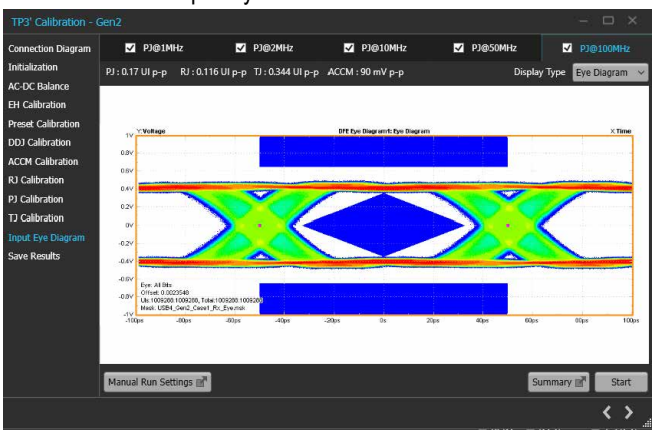
DDJ calibration



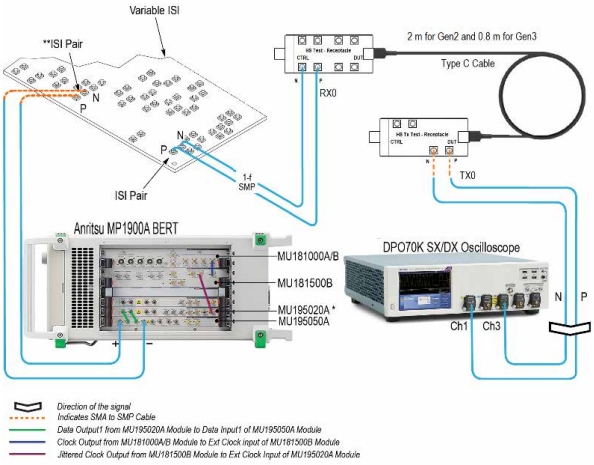
PJ calibration

Input Eye Diagram

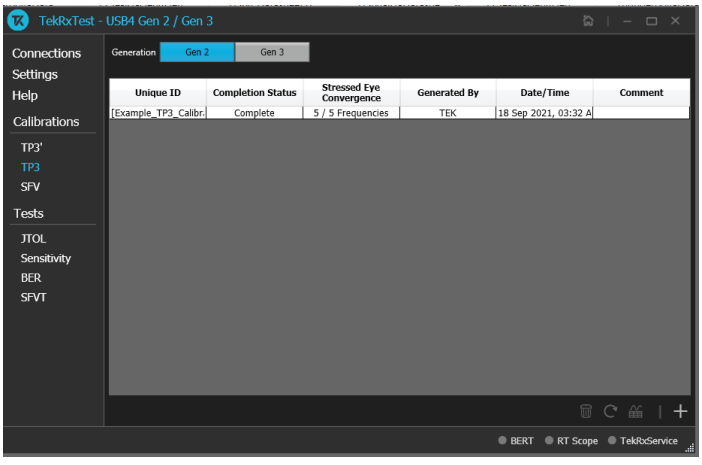
- Automated procedure for Input Eye Diagram for each PJ frequency
- Option to re-run calibration for selected frequencies
- Ability to verify results for customized settings
- Option to change Display Type - Table or Eye Diagram
- Summary with calibrated amplitude, eye height and eye width details for each frequency



TP3 Calibration



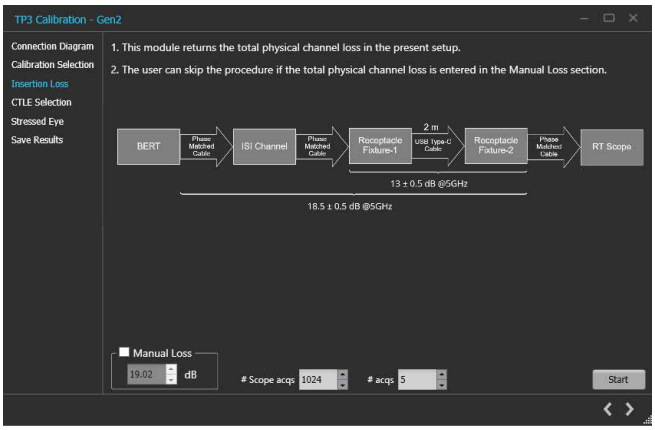
Setup Diagram



TP3 calibration view

Insertion Loss

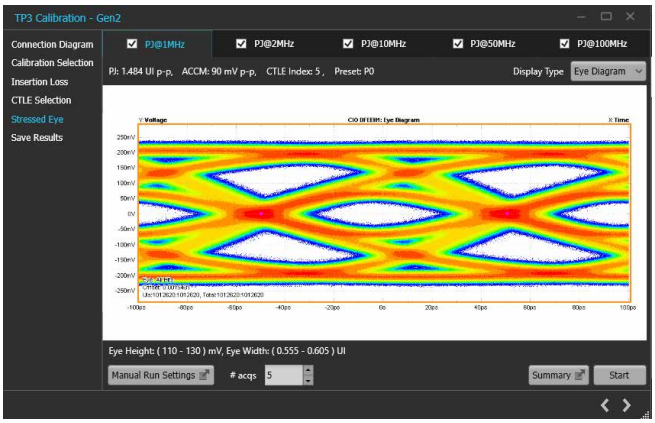
- Automated procedure to compute total physical channel loss
- Block diagram displaying the signal path



TP3 Insertion Loss

TP3 Stressed Eye calibration

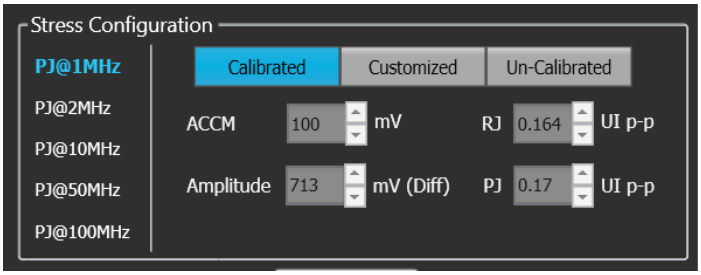
- Eye diagram for each PJ frequency
- Option to change Display Type - Table or Eye Diagram
- Summary with calibrated amplitude, stress, eye height, and eye width details for each frequency
- Option to re-run calibration for chosen frequencies
- Ability to verify results for customized settings



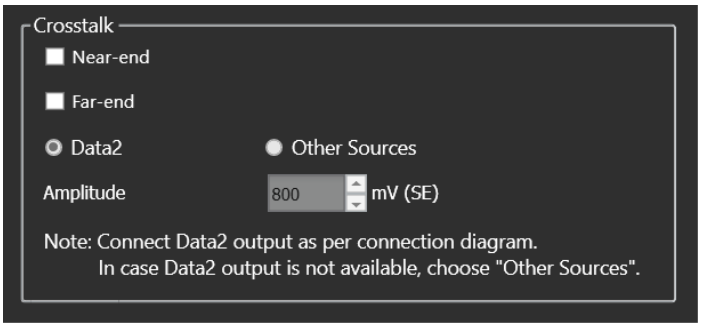
TP3 Stressed Eye calibration

USB4 receiver tests

- Option to select TP3'/TP3 calibration file to run Rx Test
- Option to select calibrated, uncalibrated, and customized stresses for each frequency
- Far-End Crosstalk feature in JTOL test and Sensitivity test
- Near-End Crosstalk feature in all tests
- Log-Log and Semi-Log charts in JTOL and Sensitivity test
- Option to configure Electrical Test Tool (ETT)
- User-defined BER Execution time to run the test
- Search algorithms for JTOL and Sensitivity tests - Linear, Binary, and Log



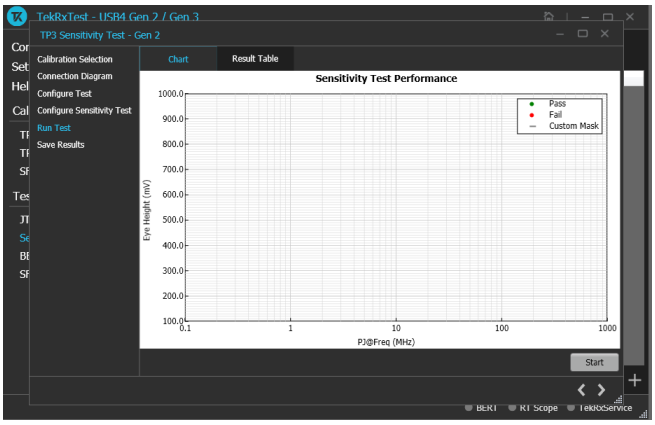
Stress configuration



Crosstalk

Sensitivity test highlights

- Test performance shown in chart and table format
- Performance margin for every PJ frequency shown

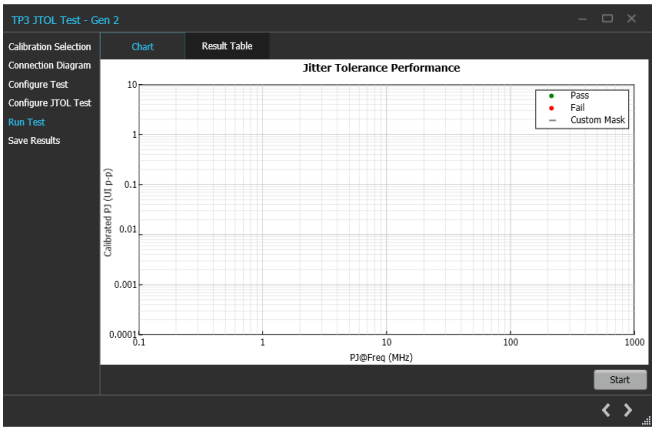


Test performance

JTOL tests

Easy configuration and tun of JTOL tests.

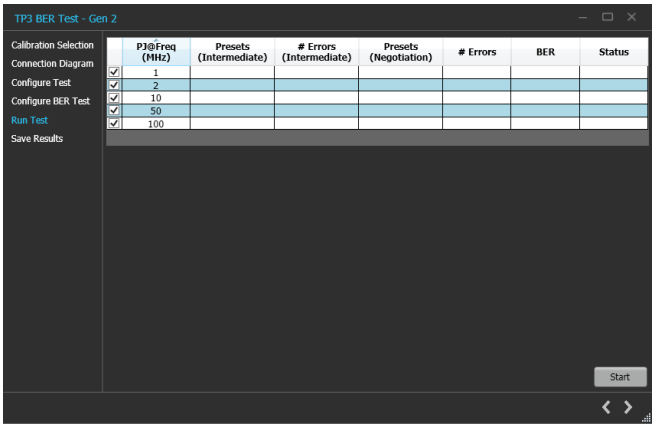
- Test performance shown in chart and table format
- Performance margin for every PJ frequency shown

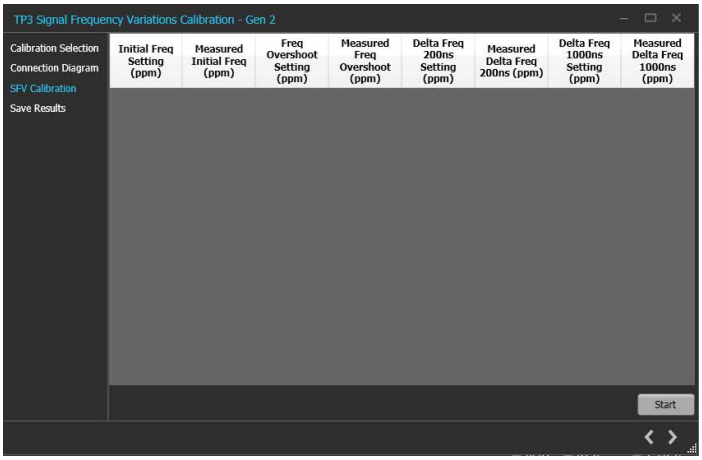


JTOL test results

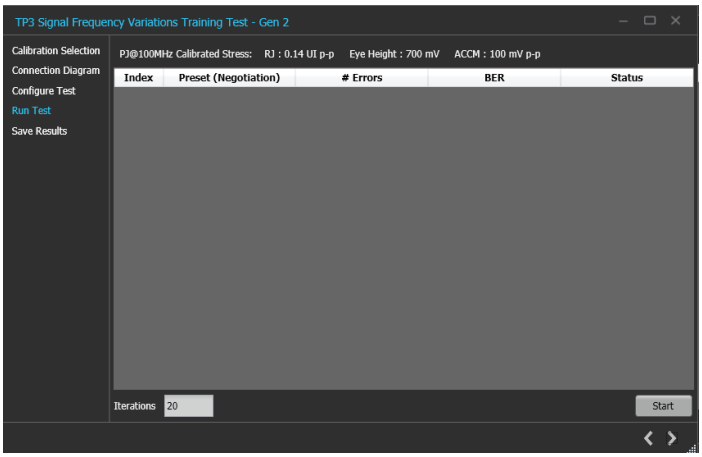
BER tests

- Test performance shown in table format
- Performance margin for every PJ frequency shown
- Test can be done for all PJ Freq - 1, 2, 10, 50, and 100 MHz.





Signal Frequency Variations calibration



Signal Frequency Variations Training test

Signal Frequency Variations Calibration and tests

- Calibration of SSC parameters at TP3' or TP3
- Ability to perform tests at TP3' or TP3 with calibrated SSC parameters
- Results summarized in tabular form for calibration and tests

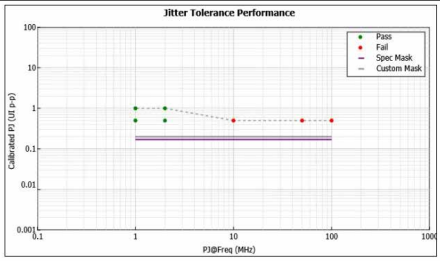
Results and Reports

- Detailed report of each calibration and test with summary
- Reporting includes TP3' / TP3 calibration results appended to test results

Test Configuration	
JTOL Test	Test Duration: 1000 s
	Search Alogrithm: UpLog
	Link #: SingleLane , Lane #: Zero
	BER Measurement Pattern: PRBS31
	Initial Preset: P5
	DUT Type: Receptacle
	TigerLake: Enabled
	SwapLane: None
	Tested Port: 0
	Near-end Crosstalk: Disabled
	Far-end Crosstalk: Disabled

PJ@Freq (MHz)	Stress Type	RJ (UI p-p)	Amplitude (mV)	ACCM (mV)
1	Calibrated	0.212	718	100
2	Calibrated	0.176	718	100
10	Calibrated	0.176	718	100
50	Calibrated	0.192	718	100
100	Calibrated	0.14	718	100

JTOL Test Result



Index	PJ@Freq (MHz)	PJ Setting (UI p-p)	Calibrated PJ (UI p-p)	Errors	Status
1	1.00	0.500	5.100	0	Pass
2	1.00	1.000	10.594	0	Pass
3	2.00	0.500	1.866	0	Pass
4	2.00	1.000	3.858	0	Pass
5	10.00	0.500	0.530	877	Fail
6	50.00	0.500	0.446	1,257	Fail
7	100.00	0.500	0.436	11	Fail

End of Report

Test Configuration	
BER Test	SSC Profile: Triangular, Down Spread
	SSC Deviation: 5400 ppm
	SSC Frequency: 36000 Hz
	Test Duration: 5 s
	Link: Dual Lane, Tested Lane: 0
	BER Measurement Pattern: PRBS31
	Initial Preset: P0
	DUT Type: All
	TigerLake: Disabled
	Swap Lane: None
	Tested Port: 1
	Near-end Crosstalk: Enabled

Stress Configuration

PJ@Freq (MHz)	Stress Type	RJ (UI p-p)	PJ (UI p-p)	Eye Height (mV)(Diff)	ACCM (mV p-p)
1	Calibrated	0.212	0.17	706	100
2	Calibrated	0.224	0.17	700	100
10	Calibrated	0.204	0.17	706	100
50	Calibrated	0.24	0.17	706	100
100	Calibrated	0.14	0.222	706	100

BER Test Results

PJ@Freq (MHz)	Presets (Intermediate)	# Errors (Intermediate)	Presets (Negotiation)	# Errors	BER	Status
1	P12 P12 P12 P12	0 0 0 0	P12	0	0	Pass
2	P12 P12 P12 P12	0 0 0 0	P12	0	0	Pass
10	P12 P12 P12 P12	0 0 0 0	P12	0	0	Pass
50	P12 P12 P12 P12	0 0 0 0	P12	0	0	Pass
100	P12 P12 P12 P12	0 0 0 0	P12	0	0	Pass

End of Report

Ordering information

Required equipment and accessories

Equipment	Vendor	Type	R/O	Qty	Description
MP1900A	Anritsu	Equipment	Required	1	20 Gb/s, BERT configuration available upon request
DPO72304SX or DPO72304DX or Oscilloscope of higher bandwidth	Tektronix	Equipment	Required	1	Tektronix Real time Oscilloscope Bandwidth ≥21 GHz, ≥2-channel oscilloscope
CIO – DPOJET plugin	Tektronix	Software	Required	1	Pre-requisite option for USB4
DIA-DPOJET Advanced option	Tektronix	Software	Required	1	Pre-requisite option for USB4
SDLA64	Tektronix	Software	Required	1	Pre-requisite option for USB4
PMCABLE1M	Tektronix	Accessory	Required	3	Precision Phase Matched Cable Pair, 1 m
640-0961-000	Wilder	Equipment	Required	1	USB4 controller and fixture (USB4-TPA-UC-K)
ST2643	Fairview Microwave	Accessory	Required	4	SMP terminators
SM8852	Fairview Microwave	Accessory	Required	6	2.92 mm (female) to SMP (female) Cable or Adapter
PCIe Gen4 ISI Fixture	PCI-SIG	Accessory	Required	1	This will be replaced when an approved version is made available by USB-IF
0.8 m and 2 m USB Type-C cables	Any USB-IF approved cable	Accessory	Required	1 each	USB Type C Cables
RXSW-NLP-USB4 or	Tektronix	Software	Required	1	License; USB4 Receiver automation software for Tektronix scopes and Anritsu BERT; Perpetual; Node-Locked
RXSW-NL1-USB4 or					License; USB4 Receiver automation software for Tektronix scopes and Anritsu BERT; 1 year subscription; Node-Locked
RXSW-FLP-USB4 or					License; USB4 Receiver automation software for Tektronix scopes and Anritsu BERT; Perpetual; Floating
RXSW-FL1-USB4					License; USB4 Receiver automation software for Tektronix scopes and Anritsu BERT; 1 year subscription; Floating

Host system software requirements	Microsoft Windows 10

Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.

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