

# USB4™ and Thunderbolt™ 3 Receiver Test Solution

Signal Quality Analyzer-R MP1900A

USB Type-C® connectors are being installed as interfaces in various digital devices, such as smartphones and tablet PCs, to speed-up transmission of large-volume video and data files. The USB Type-C connector supports 20 Gbit/s performance defined by the USB 3.2 specification, which can now be extended to 40 Gbit/s over a USB Type-C connector by implementing the USB4™ specification.

Due to the 40 Gbit/s speed of USB4 and Thunderbolt 3, the Electrical test places heavy emphasis on the Tr/Tf and intrinsic jitter performance of the test signal source, because measurement-system noise and jitter cannot be ignored. Additionally, like previous USB and Thunderbolt tests, to assure accurate measurement of device receiver sensitivity, the test is performed by calibrating the test signal according to the minimum input performance defined by the receiver standards. Automation of the BERT and oscilloscope combination is necessary to minimize the workload of signal calibration and to optimize test reproducibility.

The Signal Quality Analyzer-R MP1900A is a high-performance BERT supporting not only USB and Thunderbolt tests, but also receiver tests of high-speed computing and data communications interfaces, such as PCIe and 400 GbE/800 GbE. Combining this USB4 and Thunderbolt 3 test solution with the high-quality data output performance required by receiver tests and the automation software, facilitates high-reproducibility measurements and reduces test workload burdens.

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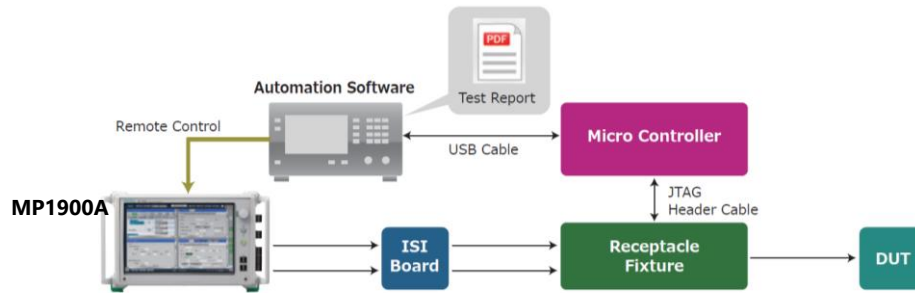
[Supported Applications]

USB 3.2/USB 4, Thunderbolt 3, PCIe Gen3/Gen4/Gen5, 400 GbE/800 GbE

## Features

- **Wideband operation from 2.4 Gbit/s to 21 Gbit/s with expansion to 32.1 Gbit/s without hardware upgrade**  
Same configuration supports receiver tests of USB Type-C interfaces (USB 3.2, USB4, Thunderbolt 3) and easy future support for PCIe Gen5 (32 GT/s)
- **Combination with automation software supports oscilloscope from main makers**  
Simplifies complex test procedures and reduces work burden by using own oscilloscope
- **High-performance multichannel BERT with high-quality output waveforms (12-ps Tr/Tf, 115-fs rms Intrinsic Jitter) and high-input sensitivity (15 mV EH)**  
Supports higher-reproducibility receiver tests

## Test Setup



### MP1900A BERT Typical Configuration

Model Name	Item	Specification
MU195020A · 21G/32G bit/s SI PPG	Bit rate	2.4 Gbit/s to 21 Gbit/s 2.4 Gbit/s to 32.1Gbit/s (with MU195020A-001 extension)
	No. of Channels	1 or 2
	Output Amplitude	0.2 Vp-p to 2.6 Vp-p (Differential)
	Emphasis Taps	10 Taps (MU195020A-011)
	Tr/Tf (20% to 80%)	12 ps (typical)
	Random Jitter	115 fs rms (typical)
MU195040A · 21G/32G bit/s SI ED*	Bit Rate	2.4 Gbit/s to 21 Gbit/s 2.4 Gbit/s to 32.1Gbit/s (with MU195040A-001 extension)
	Input Sensitivity	15 mV (28.1 Gbit/s, NRZ (Eye Height))
	CTLE	Peak Frequency: 14, 80, 4 GHz; Gain: 0 to -12 dB

### Recommended Configuration

Model	Name	Qty	Remarks
MP1900A	Signal Quality Analyzer-R	1	
MU181000B	12.5 GHz 4 Port Synthesizer	1	
MU181500B	Jitter Modulation Source	1	
MU195020A	21G/32G bit/s SI PPG	1	
MU195020A-010	1ch Data Output	1	
MU195020A-011	1ch 10Tap Emphasis	1	
MU195050A	Noise Generator	1	
MU195040A*	21G/32G bit/s SI ED	1	
MU195040A-010*	1ch ED	1	
MU195040A-011*	1ch CTLE	1	
MU195040A-022*	Clock Recovery	1	
MX183000A-PL001*	Jitter Tolerance Test	1	
MX183000A-PL022*	USB Link Training	1	
J1551A	Coaxial Skew Matched Cable (0.8 m)	3	
K261	DC Block	2	
-	K-SMP Adapter	4	Recommend part equivalent to Rosenberge 02K119-K00E3
-	ISI Channel	1	Recommend part equivalent to Tektronix BSA12500
-	USB4/Thunderbolt 3 Test Fixture/uController	1	Purchase from Wilder Technology
USB31CET*	USB 3.1 USB (10 GT/s) Type-C Electrical Test Fixture Kit	1	Purchase from USB-IF website

\*These items are required only for USB3.2 test. USB4 and TBT3 don't need them.

### Automation Software

Model	Supported Oscilloscopes
QPHY-USB4-TX-RX (Teledyne LeCroy)	Teledyne LeCroy
USB4: GRL-USB4-RXA (Granite River Labs) Thunderbolt3: GRL-TBT3-RXA	Keysight