Product Brochure

Anritsu envision:ensure

MP1800A Series

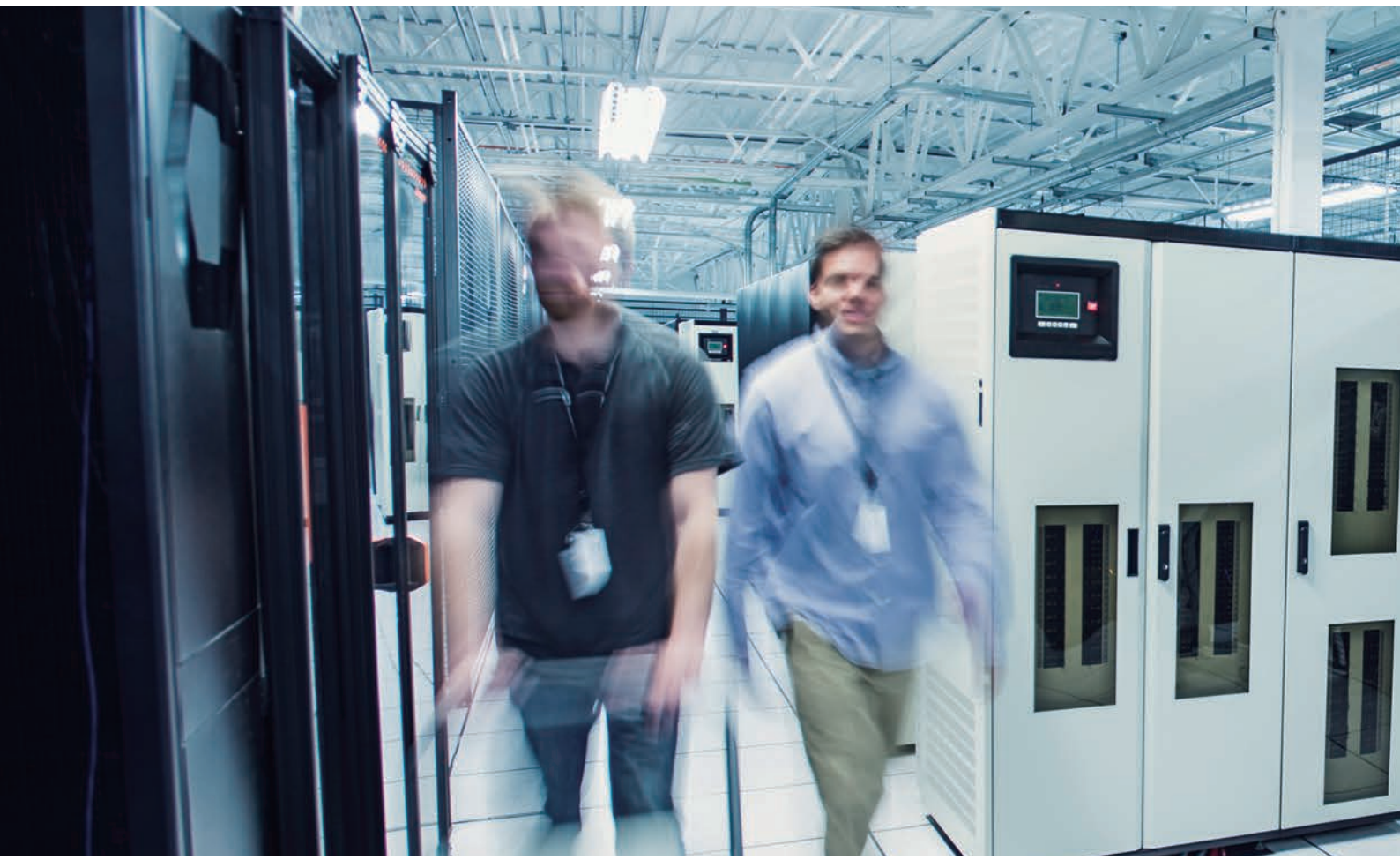
High-Speed Serial Data Test Solution

MX183000A

Test Target: All Serial IF

High-Speed Serial Data Test Solution

100G Ethernet　PCI express　USB　Thunderbolt



MP1800A Series — For Evaluating Both Internal and External Digital Equipment Interfaces

Digital equipment interfaces are becoming faster as well as adopting serial data transmissions to handle the large data volumes required by the spread of cloud computing applications and transmission of high-resolution graphics such as 4k/8k. Large-capacity interfaces such as PCI Express, USB, Thunderbolt, etc., used by digital equipment are being upgraded to faster PCI Express 4.0 (16 GT/s), USB3.1 Gen2 (10 Gbit/s), Thunderbolt (20 Gbit/s), etc. In addition, these interfaces are also becoming multi-channel and support for multiple interfaces in a single unit is also required, which necessitates assured signal integrity for each interface.

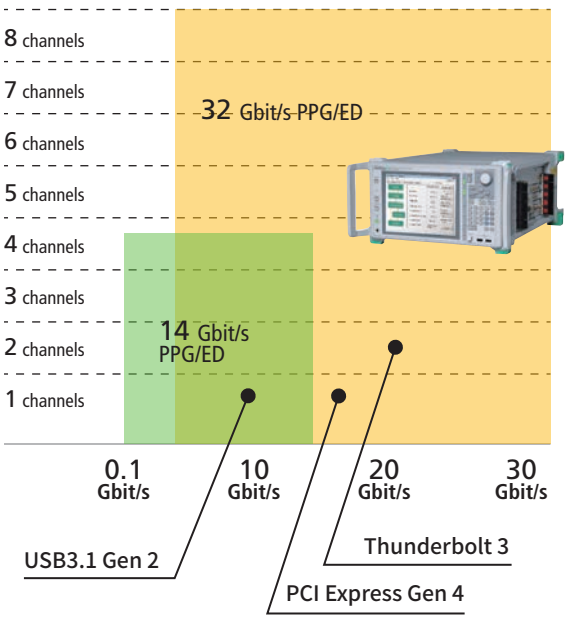
The MP1800A series is a total measurement solution for assuring standards compliance of high-speed digital interfaces such as PCI Express, USB, Thunderbolt, etc., at every stage from development through to mass production, and cutting the time for verifying Jitter test margins.

THUNDERBOLT™

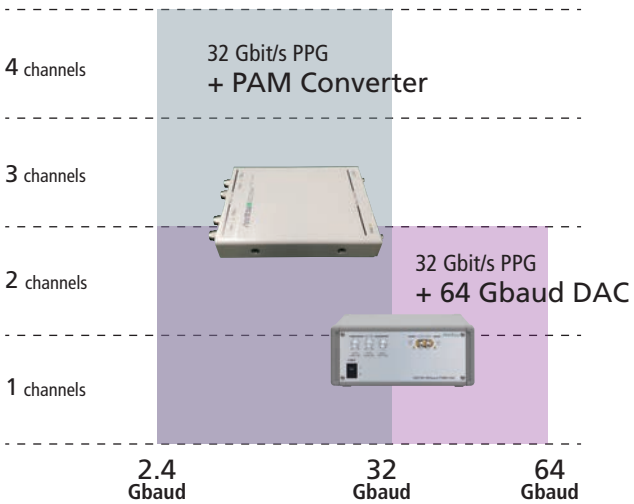
MP1800A SQA Series

Supports automatic and multi-channel BER and Jitter measurements of equipment external and internal interfaces interfaces

Multi-channel NRZ solutions

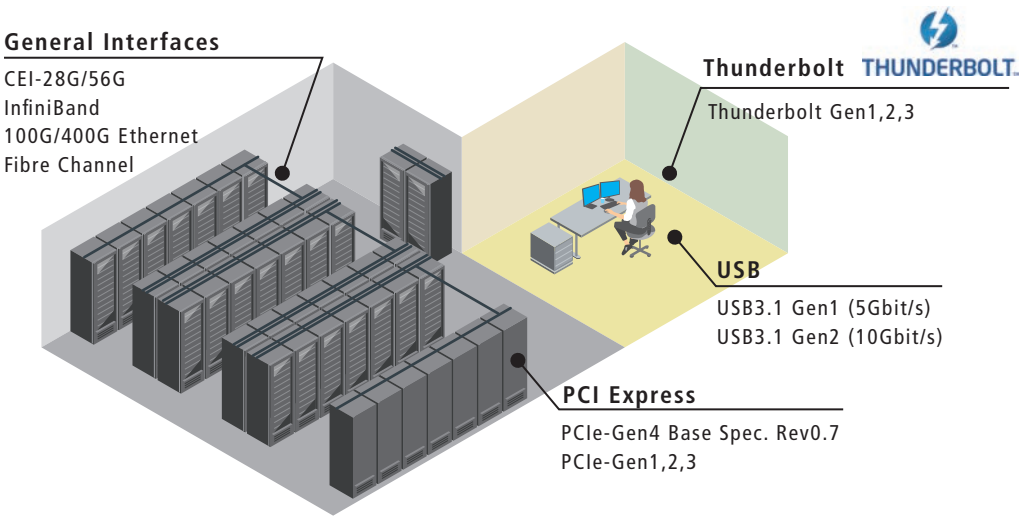


Multi-channel PAM4 solutions



The Signal Quality Analyzer MP1800A is a modular type bit error rate tester (BERT).
It has a built-in pulse pattern generator (PPG) for outputting high-quality, wideband multi-channel NRZ signals at 2.4 to 32.1Gbit/s, an error detector (ED) with high input sensitivity, and a Jitter modulation source supporting Jitter Tolerance tests; it supports PAM4 modulation and is ideal for evaluating transmissions of external interfaces such as next-generation Ethernet.
In addition, when used in combination with the High-Speed Serial-data Test Software MX183000A and GRL Corporation's automation software, it supports high-efficiency design verification of high-speed PCI Express, USB, and Thunderbolt receivers.
Anritsu's MP1800A series is a one-stop solution for evaluating high-speed, multi-channel, NRZ/PAM4 digital equipment internal and external interfaces. It is ideal for configuring automatic measurement systems with high reproducibility to shorten design verification times.

Target Applications



Supports Calibration of Stressed Signals, Device Status Transition using Link Sequence, Jitter Tolerance Tests

Calibration of stressed signal* → **Transition DUT state to Loopback** → **Stressed Receiver Testing**

MX183000A Software

Calibration of stressed signal*	Transition DUT state to Loopback	Stressed Receiver Testing
Stressed Signal Calibration*	USB Link Sequence Generation Function PCI Express Link Sequence Generation Function	Stressed Signal Input Test Function Jitter Tolerance Test Auto-receiver Test Function

MP1800A Hardware

Up to 32 Gbit/s, 8ch	High Quality Signal	Jitter Emphasis

MP1800A Standalone:

Multi-channel BER Measurements
High-quality PPG/
High-input-sensitivity ED
PAM4 BER Measurements

Jitter Tolerance Test
SJ/RJ/BUJ Injection
Low-rate estimated BER measurement

Thunderbolt 3 Receiver Test
Stressed Signal Calibration and
Stressed Signal Input Test

USB Link Sequence Generation
Transition to Loopback mode

Stressed Signal Calibration
PCI Express Link Sequence Generation
Transition to Loopback Mode
Pass/Fail evaluation using BER measurement

Various Applications

Supports internal and external interfaces, such as Ethernet, PCI Express, as well as USB3.1/Thunderbolt via USB Type-C connector and cables.
Supports injection of various Jitter types and CM/DM into low-Intrinsic-Jitter and low-distortion Data signals, as well as Emphasis and ISI control and generation of various test signals

Communications Check and Jitter Measurement Functions

Generates Link Sequence required by PCI Express and USB receiver tests for transitioning device to Loopback status, and supports signal integrity tests such as Jitter Tolerance tests

Automatic Calibration and Measurement

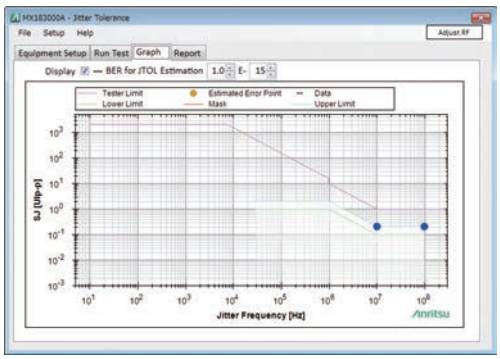
Supports all-in-one automatic measurement from calibration of stressed input signal to testing to shorten design verification period

*: Supported by GRL Corporation Automation Software

Installing this application software in the MP1800A series supports generation of Link Sequence patterns required for evaluation opf PCI Express and USB devices and Jitter Tolerance tests. The MX183000A can be used for SERDES IC Jitter Tolerance tests as well as for tests of digital equipment internal and external interfaces by generating the Link Sequence required for evaluation of devices supporting next-generation PCI Express and USB standards.

Jitter Tolerance Test Function (MX183000A Option-PL001)

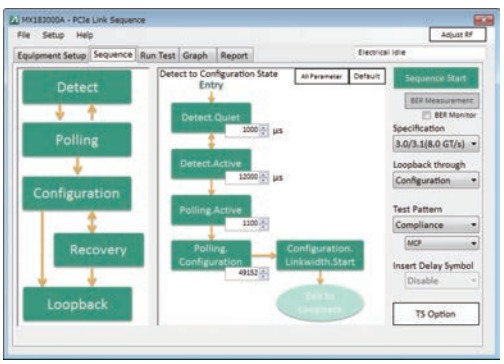
- Supports versatile Jitter Tolerance measurements
- Injects SJ/RJ/BUJ for PHY device Jitter Tolerance tests
- Supports Mask measurements for various standards
- Shortens measurement time using low-error-rate (1E-12, 1E-15, etc.) estimation function
- Uses Binary, Upward, Downward, and Binary + Linear capture methods to measure tolerance points dependent on device characteristics



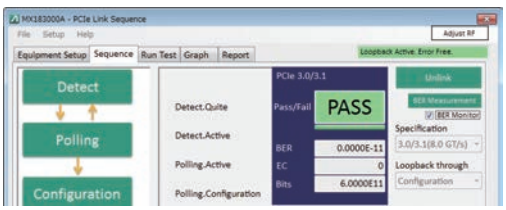
Low-Rate Estimated BER Measurement

PCI Express Link Sequence Generation Function (MX183000A Option-PL011)

- Uses training sequence generation to set PCI Express 1.0/1.1, 2.0, 3.0/3.1, 4.0 devices to Loopback state
- Injects SJ/RJ for PHY device Jitter Tolerance tests
- Automates Pass/Fail evaluation of devices transitioned to Loopback state
- Generates 8B/10B, 128B/130B, Scramble, SKIP Insertion



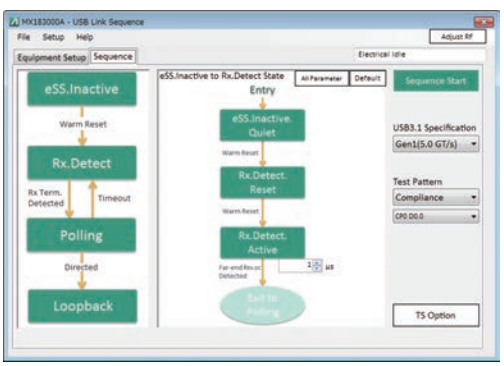
LTSSM Parameter Setting Screen



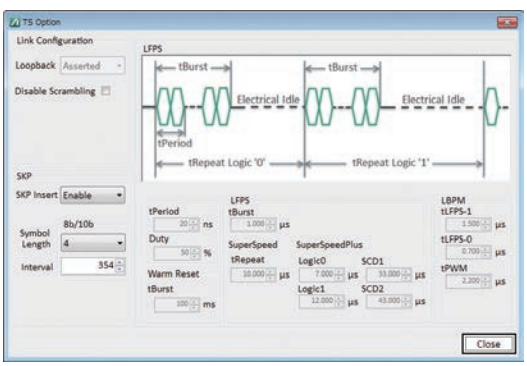
Pass/Fail Screen

USB Link Sequence Generation Function (MX183000A Option-PL012)

- Sets Link Sequence sequence, type, and test pattern, and transitions to Loopback mode for evaluating USB3.1 Gen1, Gen 2 devices
- Injects SJ/RJ for PHY device Jitter Tolerance tests
- Generates 8B/10B, 128B/132B, Scramble, SKIP Insertion, LFPS
- BER measurement



Link Sequence Setting Screen



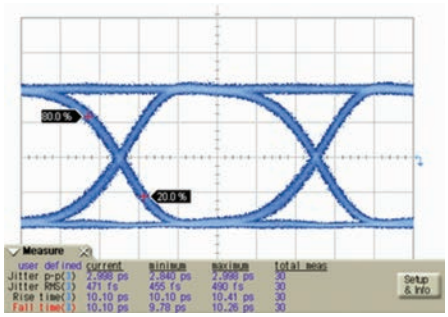
LFPS Setting Screen

Low-jitter, High-quality Waveform

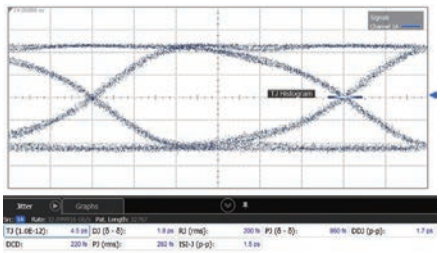
The PPG module supports low-jitter and high-quality waveforms. The output amplitude can be customized to application needs.

Low-jitter: RJ 300 fs rms (typ.)
Total RMS Jitter 700 fs rms (typ.)

High amplitude:0.5 Vp-p to 3.5 Vp-p
[MU183020A-013/023, MU183021A-013]



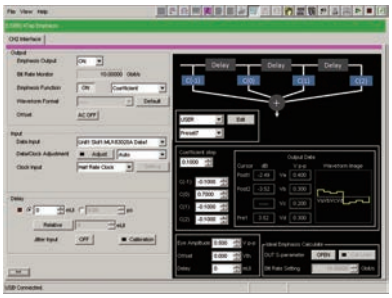
Output Waveform at 28 Gbit/s, 3.5 Vp-p (MU183020A-013) using Sampling oscilloscope with 70 GHz bandwidth

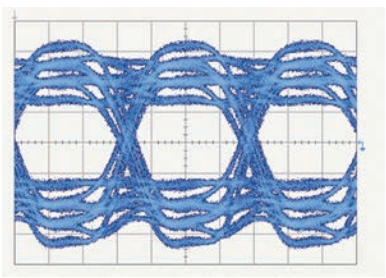


28 Gbit/s, PPG Intrinsic TJ (1E-12) = 4.5 psp-p, RJ rms = 200 fs
Nominal measured data.
Using Sampling Oscilloscope with 50 GHz bandwidth and <100 fs rms intrinsic jitter.

4Tap Emphasis

Combined use with the 4Tap Emphasis MP1825B supports generation of pre-emphasis 2- and 3-tap signals for standards up to 32.1 Gbit/s as well as 4-tap signals. The effect of pre-emphasis and de-emphasis can be confirmed accurately because each tap can be changed independently.
Since the MP1825B can be installed as a remote head for the MP1800A close to the Device Under Test (DUT), the shorter cables keeping signal quality high. Accurate Jitter Tolerance tests corrected using pre-emphasis signals are supported by the transparent input data and clock jitter.



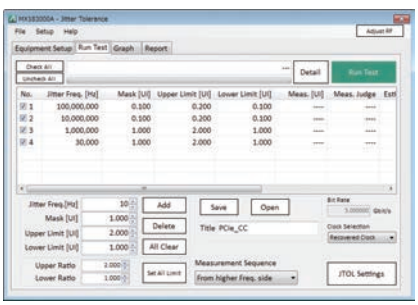


Waveform with PRBS31 Test Pattern

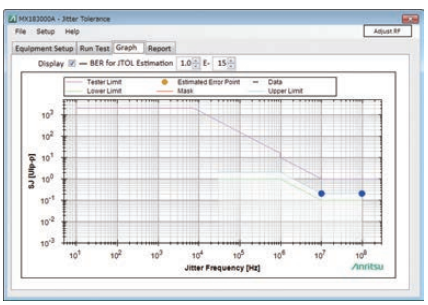
SJ, RJ, BUJ, SSC and Half Period Jitter (F/2 Jitter) Generation

The Jitter Modulation Source MU181500B generates wide-amplitude SJ up to 1 UI at a Jitter Frequency of 250 MHz and a maximum 2000 UI, ensuring sufficient margin for receiver Jitter Tolerance tests. Additionally, the Intrinsic Jitter of 275 fs rms (nom.)* is extremely low, not only when Jitter modulation is OFF but also when 0 UI is set at Jitter modulation ON, ensuring accurate measurements even at low Jitter amplitudes. The combination of low intrinsic jitter waveform with excellent jitter transparency supports high-accuracy Jitter Tolerance tests. Moreover, simultaneous injection of RJ, BUJ and SSC as well as dual SJ for two-tone supports various Jitter Tolerance tests. Additionally, the High-Speed Serial Data Test Software MX183000A supports multi-mask tables as well as easy mask editing to support next-generation standards.

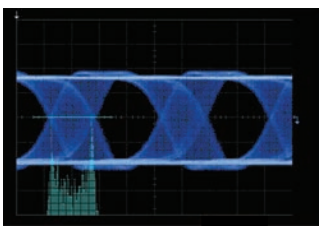
*: Phase noise measurement with using Spectrum Analyzer and 1010...repetition signal.



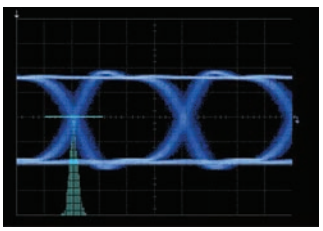
Jitter Tolerance Setting Screen



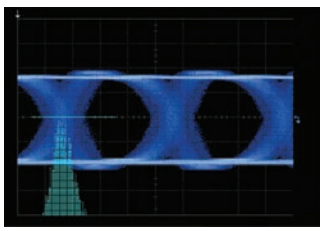
Jitter Tolerance Graph Tab



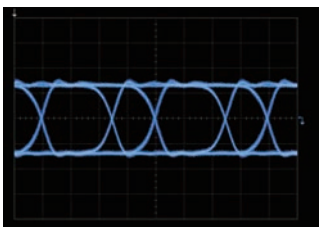
Sinusoidal Jitter (SJ)



Random Jitter (RJ)



Bounded Uncorrelated Jitter (BUJ)



Half Period Jitter (F/2 Jitter)

GRL Automated Test Solution Series

The Granite River Labs (GRL) software packages for the Signal Quality Analyzer MP1800A automate receiver tests for high-speed serial- bus interfaces. These software packages control the MP1800A noise generation signal source, variable ISI channel, and real-time oscilloscope to automate the complex calibration for high-speed serial-bus receiver tests and Jitter Tolerance test, cutting the testing burden for engineers.

GRL Application Software

Supported Standard	Name
PCI Express 4.0	GRL-PCIE4-BASE-RXA
USB 3.1	GRL-USB31-RXA
Thunderbolt 3	GRL-TBT3-RXA

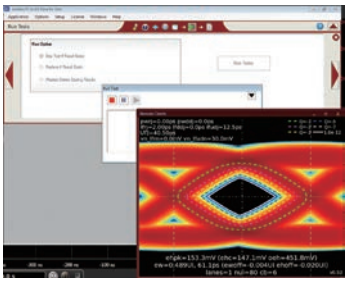
Features

- Controls each measuring instrument to simplify Eye Opening calibration, measurement conditions settings, and test execution
- Calibrates test signal with high reproducibility and executes receiver test
- Automates standards-compliant Jitter and amplitude Pass/Fail evaluations

PCI Express Gen4 Base Spec Receiver Test GRL-PCIE4-BASE-RXA

Automates measurement of PCIe-Gen4 Rev 0.5 devices.





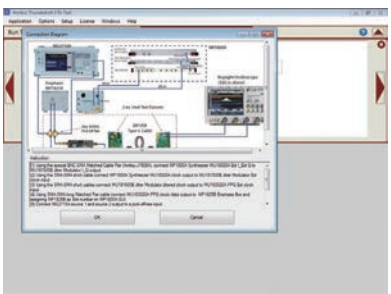
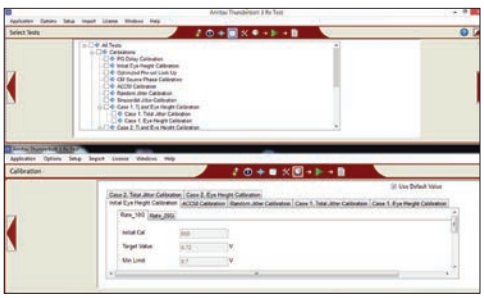
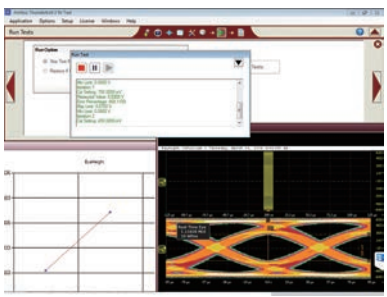
Calibration Setting and Measurement Screens

GRL-USB31-RXA

Automates USB3.1 Gen1/Gen2 device measurements

Thunderbolt 3 Receiver Test GRL-TBT3-RXA

Automatic measurement of CTS-compliant Thunderbolt devices

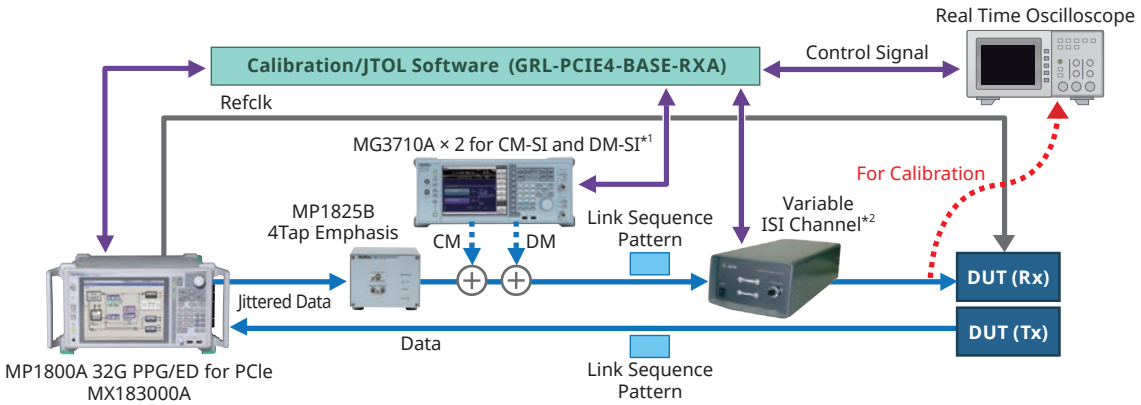




Calibration Setting and Measurement Screens

⁎ The GRL-PCIE4-BASE-RXA, GRL-TBT3-RXA and GRL-USB31-RXA software are Granite River Labs products.

High-Speed Serial Data Test Solution MX183000A Application Examples

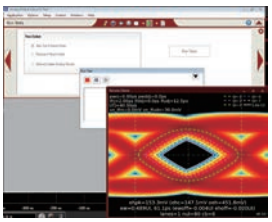
PCI Express Device Evaluation Setup



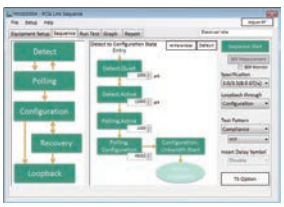
*1: The MG3710A is used at common mode noise and differential mode noise loads.
*2: The Variable ISI Channel is used at the ISI (Inter Symbol Interference) load test.

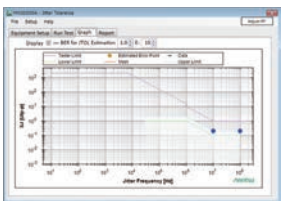
Required Functions

- Loopback State Setting Function
- Jitter Tolerance Function
- Automated Receiver Test Function



Automated Stressed Rx Eye Calibration with Seasim





PCIe Link Sequence Generate Screen

Measurement Item	Supported Software
Stressed Signal Calibration	GRL-PCIE4-BASE-RXA (PCI Express 4.0 Rx Base Spec)
Transition to Loopback State	MX183000A (Option PL011)
Jitter Tolerance Test	MX183000A (Option PL011, Jitter Tolerance Margin Measurement) GRL-PCIE4-BASE-RXA (Pass/Fail Evaluation)

Supported Standards: PCI Express (1.x/2.0/3.x/4.0)

DUT	Link Sequence Generation	Jitter Tolerance Test
When both Common Clock Architecture and DUT Loopback data SSC OFF	Supported	Supported
When both Common Clock Architecture and DUT Loopback data not SSC OFF	Not supported	Not supported

Link Sequence Generation

The Link status required for measurement can be configured automatically using the MX183000A and options.

- Controls status of PCI Express Rev 1.x/2.0/3.x/4.0 devices and evaluates Logical Sub Block

Jitter Tolerance Tests

- SJ/RJ required for evaluating PCI Express 4.0 devices can be impressed to support PHY device Jitter tolerance tests.
- Device margins can be verified using low-rate BER estimates.
- Measurement results can be saved as HTML or CSV format reports.

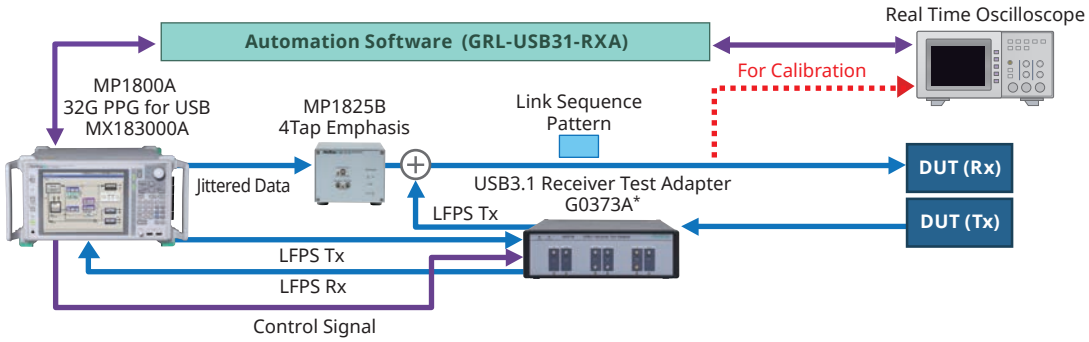
Receiver Test

Calibration and the Jitter Tolerance test can both be automated using the GRL-PCIE4-BASE-RXA software. Automation helps cut design verification times.

* The GRL-PCIE4-BASE-RXA software is a Granite River Labs product.

High-Speed Serial Data Test Solution MX183000A Application Examples

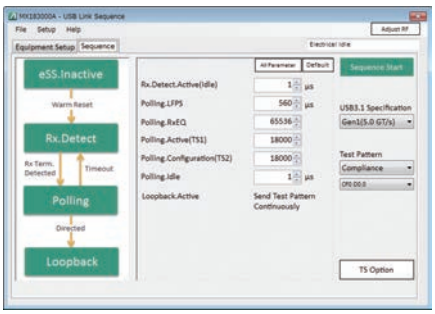
USB Device Evaluation Setup



*: G0373A is used for LFPS (Low Frequency Periodic Signal) generation and BER measurement.

Required Functions

- Loopback State Setting Function
- Jitter Tolerance Function
- Automatic Receiver Test Function



USB Link Sequence Setting Screen

Measurement Item	Supported Software
Stressed Signal Calibration	GRL-USB31-RXA
Transition to Loopback State	MX183000A (Option PL012)
Jitter Tolerance Test	MX183000A (Option PL012), GRL-USB31-RXA

Supported Standards: USB (3.0/3.1 Gen1 and Gen2)

DUT	Link Sequence Generation	Jitter Tolerance Test
Host Device	Supported	Supported

Link Sequence Generation

The Link status required for measurement can be configured automatically using the MX183000A and options.

- The test mode can be transitioned to the Loopback mode required for evaluating USB3.1 Gen1 and Gen2 devices. (MX183000A-PL012)

BER Measurements

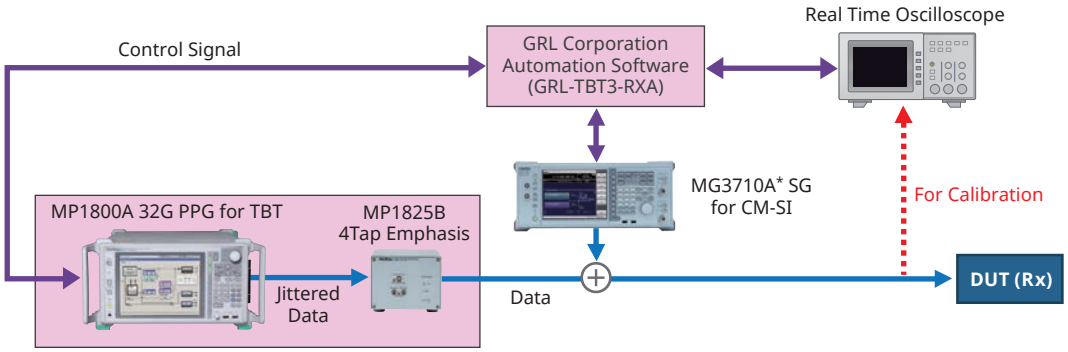
The BER of USB3.1 Gen1 and Gen2 devices can be measured from the Link status probability.

Receiver Test

Calibration and the Jitter Tolerance test can both be automated using the GRL-USB31-RXA. Automation helps cut design verification times.

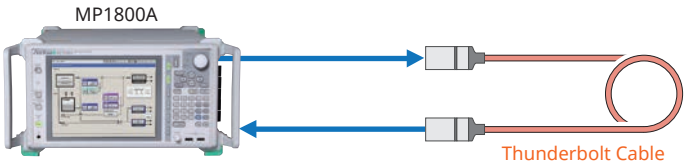
High-Speed Serial Data Test Solution MX183000A Application Examples

Thunderbolt Device Evaluation Setup



*: The MG3710A is used at common mode noise loads.

Thunderbolt Cable Evaluation Setup



Required Functions

- 20 Gbit/s PPG
- Stressed Signal Calibration Function
- Jitter Tolerance Function

Anritsu MP1800A is recognized to recommended test equipment for Thunderbolt Compliance Test.

Measurement Item	Supported Software
Stressed Signal Calibration	GRL-TBT3-RXA (Thunderbolt 3)
Jitter Tolerance Test	GRL-TBT3-RXA (Pass/Fail) Evaluation

Supported Standards: Thunderbolt (2/3)

DUT	Jitter Tolerance Test
Host Device	Supported

Supports Thunderbolt 3

Supports Thunderbolt 3 specified bit rates (20G)

Stressed Signal Calibration

GRL Automation Software supports automatic stressed signal calibration as specified by Thunderbolt 3 (USB Type-C Thunderbolt Alternate Mode Electrical Host/Device Compliance Test Specification).

Stressed Signal Input Test

- Supports Rx BER measurements required by Host/Device compliance test
- Supports automatic Rx test using Tenlira scripts
- Supports automatic Pass/Fail measurement for Rx stressed signal tests

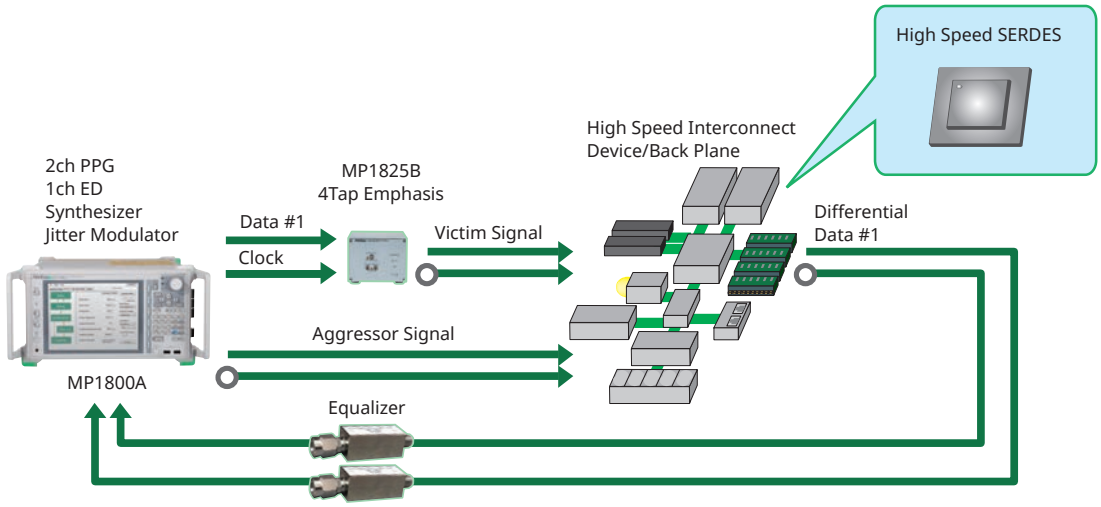
Receiver Test

Calibration and the Jitter Tolerance test can both be automated using the GRL-TBT3-RXA software. Automation helps cut design verification times.

* The GRL-PCIE4-BASE-RXA and GRL-TBT3-RXA software are Granite River Labs products.

High-Speed Serial Data Test Solution MX183000A Application Examples

30 Gbit/s Band Ultrafast Interconnect Evaluation



Required Test Items

- 32.1 Gbit/s Multi-channel signal generation
- Jitter Tolerance test
- Emphasis efficiency check
- Crosstalk test

Multi-channel

Along with support for multi-channels, the bit rate of devices such as back planes of high-performance servers is becoming increasingly faster. The MP1800A supports generating both the Victim signal with controlling Emphasis and the Aggressor signal for crosstalk testing simultaneously. The MP1800A offers multi-channel measurements for TRx devices such as Transceiver, SERDES and Clock Data Recovery (CDR).

Skew and Crosstalk Effect Check

Processing high speed digital signals requires both logic tests and actual equipment tests. The MP1800A supports both pattern synchronization and phase adjustment functions, permitting easy tests of Rx device skew tolerance and crosstalk effects.

Jitter Tolerance Test

Jitter Tolerance tests supporting various standards can be run by simultaneously impressing SJ (2 tone), RJ, BUJ, and SSC up to 32.1 Gbit/s using the MX183000A-PL001 and MU185000B Jitter modulation sources.
The Eye opening of signals passing through the back-plane is degraded by loss in the board traces. Due to its high input sensitivity, the MU183040B High Sensitivity Error Detector (ED) can receive data signals with low amplitude and a closed Eye-opening. Moreover, installing the Clock Recovery option supports jitter tolerance measurements of SERDES with different Tx and Rx clocks.

Verifying Emphasis Effect

The MP1825B 4Tap Emphasis is a 4 taps pre-emphasis converter for bit rates up to 32.1 Gbit/s; it supports easy changes to the pre-emphasis waveform amplitude, offset, amplitude of each taps, etc., for effective evaluation of the characteristics of high-speed interfaces below 10 Gbit/s, such as PCIe, USB, and Backplane Ethernet requiring pre-emphasis signals, as well as InfiniBand 26G-IB-EDR, CEI-28G-VSR, 32G FC, etc., in the 30 Gbit/s band.

Software

Model/Name		PCI Express			USB			Thunderbolt	
		Calibration	Link Sequence Generation	Jitter Tolerance Test	Calibration	Link Sequence Generation	Jitter Tolerance Test	Calibration	Jitter Tolerance Test
MX183000A-PL001	Jitter Tolerance Test								
MX183000A-PL011	PCIe Link Sequence		✓	✓*1					
MX183000A-PL012	USB Link Sequence					✓	✓		
GRL-PCIE4-BASE-RXA		✓		✓*2					
GRL-USB31-RXA					✓		✓*2		
GRL-TBT3-RXA								✓	✓*2

*1: Jitter Tolerance Margin measurement
*2: Pass/Fail Evaluation

On Using VISA*3

For customers with MP1800A

The National Instruments™ (NI hereafter) NI-VISA*4 software must be installed to use the MX183000A (this product hereafter). We recommend using NI-VISA saved on the product USB memory stick.
Customers may only use NI-VISA saved on the product memory stick. NI-VISA on the memory stick may not be used for other applications with other products.
When uninstalling this product from the controller PC, etc., also uninstall NI-VISA from the USB memory.

For customers with MT1810A

The National Instruments™ (NI hereafter) NI-VISA*2 software must be installed to use the MX183000A (this product hereafter).
Customers must provide their own copy of NI-VISA.
Since the MT1810A has no built-in NI licensed hardware, NI-VISA is not bundled with the MT1810A.

*3: Abbreviation for Virtual Instrument Software Architecture. This is I/O software for remote control of measuring instruments via GPIB, Ethernet and USB interfaces.
*4: NI-VISA was developed by National Instruments for VXI Plug&Play Alliance standards compliant I/O interfaces.
National Instruments™, NI™, and NI-VISA™ are registered trademarks of National Instruments Corporation.

Configurations

Model	Name	PCI Express	USB	Thunderbolt
MP1800A	Signal Quality Analyzer	1	1	1
MP1800A-002	LAN	1	1	1
MP1800A-007	OS Upgrade to Windows 7	1	1	1
MP1800A-015	4-Slot for PPG and/or ED	1	1	1
MP1800A-032	32 Gbit/s PPG and/or ED Support	1	1	1
MU181000B	12.5 GHz 4port Synthesizer	1	1	1
MU181000B-001	Jitter Modulation	1		(1)
MU181500B	Jitter Modulation Source	1	1	1
MU183020A	28G/32G bit/s PPG	1	1	1
MU183020A-012	1ch 2 V Data Output	1	1	1
MU183020A-030	1ch Data Delay	1	1	1
MU183040B	28G/32G bit/s ED	1		
MU183040B-010	1ch ED	1		
MU183040B-022	2.4G to 28.1G bit/s Clock Recovery	1		
MP1825B	4Tap Emphasis	1	1	1
MP1825B-002	28 Gbit/s Operation	1	1	1
MG3710A*5	Vector Signal Generator	1 or 2*8		1
MG3710A-002	High Stability Reference Oscillator	1 or 2		1
MG3710A-029	OS Upgrade to Windows 7	1 or 2		1
MG3710A-036	1stRF 100 kHz to 6 GHz	1 or 2		1
MG3710A-041	High Power Extension for 1stRF	1 or 2		1
MG3710A-066	2ndRF 100 kHz to 6 GHz	1 or 2		1
MG3710A-071	High Power Extension for 2ndRF	1 or 2		1
MX183000A-PL011	PCIe Link Sequence	1		
MX183000A-PL012	USB Link Sequence		1	
CLE1000 Variable ISI Channel (ARTEK Corp.)*6		1		
G0373A*7	USB3.1 Receiver Test Adapter		1	

*5: For generating either common mode noise or differential mode noise
*6: For ISI load test
*7: For generating LFPS Signal/BER measurement
*8: Two units required when simultaneously injecting both differential and common mode noise. Also requires two copies of GRL-PCIE4-BASE-RXA.

High-Speed Serial Data Test Solution MX183000A List of Application Parts

PCI Express Configuration (J1722A)

Model	Name	Qty.
J1398A	N-SMA ADAPTOR	4
K241C	Splitter	2
41KC-3	Fixed Attenuator 3 dB	2
41KC-6	Fixed Attenuator 6 dB	2
41KC-20	Fixed Attenuator 20 dB	2
J1510A	Pick OFF Tee	2
J1625A	Coaxial Cable, 1 m (SMA connector)	6
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)	2
J1715A	Coaxial Skew Match Cable (0.1 m, SMP-J, SMA-J)	4
K261	DC Block	2

USB Configuration (J1721A)

Model	Name	Qty.
J1510A	Pick OFF Tee	2
J1625A	Coaxial Cable, 1 m (SMA connector)	3
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)	2
J1624A	Coaxial Cable 0.3 m (SMA Connector)	2

Compliance Test Component Set (J1724A)

Model	Name	Qty.
J1398A	N-SMA ADAPTOR	4
41KC-3	Fixed Attenuator 3 dB	2
41KC-6	Fixed Attenuator 6 dB	2
41KC-20	Fixed Attenuator 20 dB	2
K241C	Splitter	2
J1510A	Pick OFF Tee	2
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)	2
J1625A	Coaxial Cable, 1 m (SMA connector)	6
J1715A	Coaxial Skew Match Cable (0.1 m, SMP-J, SMA-J)	4
K261	DC Block	2
J1624A	Coaxial Cable 0.3 m (SMA Connector)	2

USB Measurement Kit (Z1927A)

Model	Name	Qty.
K250	Bias T	2
J1510A	Pick OFF Tee	3
BX02-0476-00	2 dB ATT	1
BX03-0476-00	3 dB ATT	1
BX04-0476-00	4 dB ATT	1
J1359A	Coaxial Adapter (K-P, K-J, SMA)	1
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)	1
J1624A	Coaxial Cable 0.3 m (SMA Connector)	1
J1625A	Coaxial Cable, 1 m (SMA connector)	3
J1632A	Terminator (SMA)	1

Thunderbolt Configuration (J1723A)

Model	Name	Qty.
J1398A	N-SMA ADAPTOR	2
41KC-6	Fixed Attenuator 6 dB	2
1510A	Pick OFF Tee	2
J1625A	Coaxial Cable, 1 m (SMA connector)	2
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)	2
J1715A	Coaxial Skew Match Cable (0.1 m, SMP-J, SMA-J)	2
K261	DC Block	2

Operation Conditions

Install Destination	MP1800A or PC
PC Specifications	OS: English or Japanese Windows 7 Professional/Enterprise/Ultimate CPU: 1 GHz min. Memory: 1 GB min. (for Windows 7, 32-bit) 2 GB min. (for Windows 7, 64-bit) Hard Disk: Free space 2 GB min. Remote Interface: Ethernet (10BASE-T, 100BASE-TX) Display: Resolution 800 × 600 min., 32-bit color
Control Target	MP1800A or MT1810A Required Options: MP1800A-02 LAN, MP1800A-07 OS Upgrade Windows 7 (MP1800A only), MP1800A-32 32 Gbit/s PPG/ED Support Controlled Units: 3 units max. Version: MX180000A Installer Version 8.02.00 or later

Sequence Tab (PCIe: MX183000A-PL011)

Sequence (Start/Stop/Unlink)	Sends sequence set at Editor; sends test pattern continuously after sending Link Sequence
BER Measurement	Starts BER measurement when clicking button after sending sequence
BER Monitor	OFF/ON
LTSSM State	Detect, Polling, Configuration, Recovery, Loopback
Specification	1.0/1.1(2.5 GT/s), 2.0(5 GT/s), 3.0/3.1(8 GT/s), 4.0(16 GT/s)
Loopback through	Configuration/Recovery
Test Pattern	Compliance/PRBS
Compliance	MCP/CP
PRBS	PRBS7, PRBS9, PRBS10, PRBS11, PRBS15, PRBS20, PRBS23, PRBS31
Inset Delay Symbol	Disable/Enable
Rev1.0/1.1 Configuration	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Loopback.Entry) 1 to 1000000, 1 steps
Rev2.0 Configuration	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Loopback.Entry (2.5G), Loopback.Entry (Electrical Idle), Loopback.Entry (5G)) 1 to 1000000, 1 steps
Rev2.0 Recovery	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Configuration Linkwidth.Start, Configuration Linkwidth.Accept, Configuration Lane.Wait, Configuration Lane.Accept, Configuration Complete, Configuration Idle, Recovery RcvrLock, Recovery RcvrCfg (EQTS2), Recovery Speed, Recovery RcvrLock, Recovery RcvrCfg (TS2), Loopback.Entry (5G)) 1 to 1000000, 1 steps
Rev3.0/3.1 Configuration	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Loopback.Entry (2.5G), Loopback.Entry (Electrical Idle), Loopback.Entry (8G)) 1 to 1000000, 1 steps
Rev3.0/3.1 Recovery	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Configuration Linkwidth.Start, Configuration. Linkwidth.Accept, Configuration Lane.Wait, Configuration Lane.Accept, Configuration Complete, Configuration Idle, Recovery RcvrLock, Recovery RcvrCfg (EQTS2), Recovery Speed (8G), Recovery RcvrLock, Recovery Equalization Phase1, Recovery RcvrLock, Recovery RcvrCfg (TS2), Loopback.Entry (8G)) 1 to 1000000, 1 steps
Rev4.0 Recovery: MX183000A-PL011	(Detect.Quite, Detect.Active, Polling.Active, Polling.Configuration, Configuration Linkwidth.Start, Configuration. Linkwidth.Accept, Configuration Lane.Wait, Configuration Lane.Accept, Configuration Complete, Configuration Idle, Recovery RcvrLock, Recovery RcvrCfg (EQTS2), Recovery Speed(8G), Recovery RcvrLock, Recovery Equalization Phase1, Recovery RcvrLock, Recovery RcvrCfg (TS2), Recovery Idle, Recovery RcvrLock, Recovery RcvrCfg (EQTS2), Recovery Speed (16G), Recovery RcvrLock, Recovery Equalization Phase1, Recovery RcvrLock, Recovery RcvrCfg (TS2), Loopback.Entry (16G)) 1 to 1000000, 1 steps

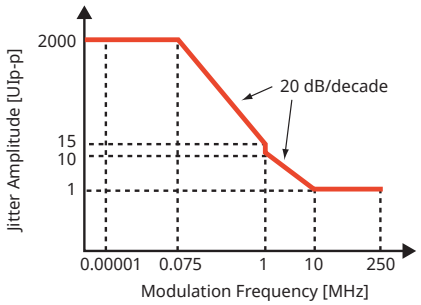
TS Option	TS Parameter FTS, Link Number, Lane Number: 0 to 255, 1 steps Full Swing, Low Frequency: 12 to 63, 1 steps SRIS: Disable Disable Scrambling: OFF/ON Reset EIEOS Interval: Disable/Enable
SKP	SKP Insert: Enable/Disable SKP Length (128b/130b): 8 to 24 Symbol, 4 steps SKP Length (8b/10b): COM + 1 to 5, 1 steps SKP Interval (128b/130b): 187 to 750, 1 steps SKP Interval (8b/10b): 768 to 3076, 2 steps
Send TS	Polling.Active: TS1/EQTS1 Loopback.Ectry: TS1/EQTS1
Rev3.x/Rev4.0 Preset	Downstream Preset(DE, PS [dB]): P7 : –6.0, 3.5 Preset Hint: –6 dB Precursor, Cursor, Postcursor: 0 Upstream Usepreset: Preset Preset(DE, PS [dB]): P7 : –6.0, 3.5 Preset Hint: –6 dB Precursor, Cursor, Postcursor: 0

Sequence Tab (USB: MX183000A-PL012)

LTSSM State	eSS.Inactive, Rx.Detect, Polling, Loopback
USB3.1 Specification	Gen1 (5.0 Gbit/s), Gen2 (10.0 Gbit/s)
Test Pattern	Compliance/USER
CPx	Gen1: CP0 D0.0, CP1 D10.2, CP2 D24.3, CP3 K28.5, CP4 LFPS, CP5 K28.7*, CP6 K28.7* Gen2: CP9
Gen1	Rx.Detect.Active (Idle), Polling.RxEQ, Polling.Active (TS1), Polling.Configuration (TS2), Polling.Idle 1 to 1000000, 1 steps Polling.LFPS 100 to 1000000, 10 steps
Gen2	Rx.Detect.Active (Idle), Polling.RxEQ, Polling.Active (TS1), Polling.Configuration (TS2), Polling.Idle 1 to 1000000, 1 steps Polling.LFPS (SCD1) 162 to 1000000, 1 steps Polling.LFPSPlus(SCD2) 172 to 1000000, 1 steps Polling.PortMatch (PHY Capability LBPM), Polling.PortConfig (PHY Ready LBPM) 2 to 1000000, 1 steps
Option	Loopback: Asserted Disable Scrambling: OFF/ON
SKP	SKP Insert: Enable/Disable Symbol Length (128b/132b): 8 to 40, 2 steps Symbol Length (8b/10b): 2 to 6, 2 steps SKP Interval (128b/132b): 20 to 80, 1 steps SKP Interval (8b/10b): 176 to 708, 2 steps tPeriod: 20 ns Duty: 50%
WarmReset	tBurst: 100 ms
LFPS	tBurst: 1.000 µs
SuperSpeed	tRepeat: 10.000 µs
SuperSpeedPlus	Logic0: 7.000 µs Logic1: 12.000 µs SCD1: 33.000 µs SCD2: 43.000 µs
LBPM	tLFPS-1: 1.500 µs tLFPS-0: 0.700 µs tPWM: 2.200 µs

*: The actual output de-emphasis setting is not changed even when selecting CP5 and CP6.

Run Test Tab (MX183000A-PL001)

Run Test/Stop Test	Starts and stop Jitter Tolerance Test
Jitter Tolerance Table	JTOL Measurement Point Setting Sets measured SJ modulation frequency and Pass/Fail modulation degree (UI), and set search modulation range Jitter Frequency Setting Range Sets each of Jitter Freq. [Hz], Mask [UI], Upper Limit [UI], Lower Limit [UI], Upper Ratio, Lower Ratio Setting range depends on Jitter modulation source MU181500B Jitter Amplitude Setting Range  As in above table. However, the Jitter frequency and amplitude that can be measured change according to the controller and MU181500B clock frequency setting. Set All Limit The Jitter Tolerance Table Upper Limit and Lower Limit values are reset at the ratio corresponding to the value set at Mask. The reset ratio is set at Upper Ratio and Lower Ratio. Upper Ratio: 1.000 to 1000, 0.001 steps Lower Ratio: 0.001 to 1.000, 0.001 steps Measurement Sequence: From higher Freq. side, From lower Freq. side
JTOL Setting	Detection Unit: Error Rate, Error Count, Estimate Error Threshold: 1E–3 to 1E-12, E–1 steps Error Count: 0 to 10000000, 1 steps BER for JTOL Estimation: 1.0E–20 to 9.9E–9
Auto Search	OFF/FINE/COARSE
Search	Direction Search: Binary, Downwards Linear, Downwards Log, Upwards Linear, Upwards Log, Binary + Linear Step: At Downwards/Upwards Linear selection Jitter Freq. ≤ 100 kHz 0.001 to 2000.000 0.001 steps 100k < Jitter Freq.≤ 1 MHz 0.001 to 200.000 0.001 steps 1M < Jitter Freq.≤ 10 MHz 0.001 to 15.000 0.001 steps 10 MHz < Jitter Freq. 0.001 to 1.000 0.001 steps Ratio: At Downwards/Upwards Log selection Jitter Freq.≤ 100 kHz, 100k < Jitter Freq.≤ 1 MHz, 1M < Jitter Freq.≤ 10 MHz, 10 MHz < Jitter Freq. 0.01 to 1.00 0.01 steps
Timer [sec.]	Waiting, Setting: 1 to 99 s, 1 s steps Gating: 1 to 86400 s, 1 s steps

Graph Tab (MX183000A-PL001)

Display	OFF/ON
BER for JTOL Estimation	1.0E–20 to 9.9E–9, 0.1 steps, E–1 steps

Report Tab (MX183000A-PL001)

Make HTML/Make CSV	Displays Jitter Tolerance results as HTML or CSV

High-Speed Serial Data Test Solution MX183000A Related Instruments

Signal Quality Analyzer MP1800A Series

0.1 Gbit/s to 32 Gbit/s

Compact, High-Performance BER Tester for Measurements from 0.1 Gbit/s to 32 Gbit/s

- Evaluates 100 GbE optical modules, 32G FC, InfiniBand EDR, 100G, DP-QPSK, and PAM signals
- Uses PPG synchronization function to support Jitter, crosstalk, skew, and emphasis tests required by faster, multi-channel interconnects market
- Uses 3.5 Vp-p high-amplitude waveforms and variable crossover point function for EML direct-drive evaluations

The MP1800A is ideal for PHY-layer evaluations of optical modules and high-speed devices from 0.1 Gbit/s to 32.1 Gbit/s. Additionally, when used in combination with a 56G/64 Gbit/s MUX/DEMUX, it supports BER tests up to 64.2 Gbit/s. The plug-in module design accommodates a selection of various modules and options for a customized configuration meeting every application requirement.

4Tap Emphasis MP1825B

1 Gbit/s to 14.1 Gbit/s, 1 Gbit/s to 32.1 Gbit/s

Evaluates Serial Interface Characteristics using Pre-Emphasis Signal

- Supports Pre-emphasis for up to 4 taps
- Provides two operating frequencies (14.1 Gbit/s and 32.1 Gbit/s)
- Supports Jitter transparency
- Supports small remote-head operation

The MP1825B is a compact 4Tap Pre-Emphasis supporting bit rates up to 32.1 Gbit/s; it is ideal for evaluating the characteristics of many high-speed interfaces, such as PCI Express, USB, backplane Ethernet, InfiniBand EDR, CEI-28G-VSR, 32G FC, etc., requiring pre-emphasis signals, because it can easily change the pre-emphasis waveform amplitude, offset, and amplitude for each tap. It plays a key role in accurate evaluation of high-speed interconnects by compensating for attenuation of the signal level as it passes through the PCB, or by compensating for a degraded Eye opening with high-speed Tr/Tf.

High-Speed Serial Data Test Solution MX183000A Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names. The actual name of the item may differ from the Order Name.

Model/Order No.	Name
	Main Frame
MP1800A	Signal Quality Analyzer
MP1825B*	4Tap Emphasis
MG3710A	Vector Signal Generator
	Options
MP1800A-001	GPIB
MP1800A-002	LAN
MP1800A-007	OS Upgrade to Windows 7
MP1800A-015	4-Slot for PPG and/or ED
MP1800A-032	32 Gbit/s PPG and/or ED Support
MP1825B-002*1	28 Gbit/s Operation
MG3710A-002	High Stability Reference Oscillator
MG3710A-029	OS Upgrade to Windows 7
MG3710A-036	1stRF 100 kHz to 6 GHz
MG3710A-041	High Power Extension for 1stRF
MG3710A-066	2ndRF 100 kHz to 6 GHz
MG3710A-071	High Power Extension for 2ndRF
	Module
MU181000B	12.5 GHz 4port Synthesizer
MU181500B	Jitter Modulation Source
MU183020A	28G/32G bit/s PPG
MU183040B	28G/32G bit/s High Sensitivity ED
	Module Options
MU181000B-001	Jitter Modulation
MU183020A-012	1ch 2 V Data Output
MU183020A-030	1ch Data Delay
MU183040B-010	1ch ED
MU183040B-022	2.4G to 28.1G bit/s Clock Recovery
	Software
MX183000A	High-Speed Serial Data Test Software
	Software Options
MX183000A-PL001	Jitter Tolerance Test
MX183000A-PL011	PCIe Link Sequence
MX183000A-PL012	USB Link Sequence

Model/Order No.	Name
	Optional Accessories
W3813AE	MX183000A Operation Manual
41KC-3	Fixed Attenuator 3 dB
41KC-6	Fixed Attenuator 6 dB
41KC-20	Fixed Attenuator 20 dB
J1343A	Coaxial Cable 1.0 m (SMA, DC to 18 GHz)
J1349A	Coaxial Cable 0.3 m (SMA, DC to 18 GHz)
J1359A	Coaxial Adapter (K-P, K-J, SMA)
J1398A	N-SMA ADAPTOR
J1508A	BNC-SMA Connector Cable (30 cm)
J1510A	Pick OFF Tee
J1551A	Coaxial Skew Match Cable (0.8 m, K connector)
J1615A	Coaxial Cable Set (Jitter-PPG-Emphasis)
J1627A	GND Connection Cable
J1624A	Coaxial Cable 0.3 m (SMA Connector)
J1625A	Coaxial Cable 1 m (SMA Connector)
J1632A	Terminator (SMA)
J1715A	Coaxial Skew Match Cable (0.1M, SMP-J, SMA-J)
K220B	Coaxial Adapter
K241C	Power Splitter
K261	DC Block
K250	Bias T
Z1927A	USB Measurement Kit
J1721A	USB Measurement Component Set
J1722A	PCIe Measurement Component Set
J1723A	TBT Measurement Component Set
J1724A	Compliance Test Component Set
G0373A*2	USB3.1 Receiver Test Adapter
G0374A*2	64Gbaud PAM4 DAC

∗1: MP1825B is not RoHS compliant.
∗2: The warranty period shall be 1 year under normal use.
Repair by exchange for new during the warranty period shall be limited to one instance.
Repair using new spare parts shall be charged after the warranty period has expired.

Moreover, Anritsu Corporation will deem this warranty void when:

- When new spare parts can no longer be easily obtained when more than 5 years have elapsed after manufacture.

Anritsu envision : ensure

Specifications are subject to change without notice.

• United States
Anritsu Company
1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• Canada
Anritsu Electronics Ltd.
700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• Brazil
Anritsu Eletronica Ltda.
Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - Sao Paulo - SP
Brazil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico
Anritsu Company, S.A. de C.V.
Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• United Kingdom
Anritsu EMEA Ltd.
200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France
Anritsu S.A.
12 avenue du Québec, Bâtiment Iris 1- Silic 612,
91140 VILLEBON SUR YVETTE, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• Germany
Anritsu GmbH
Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy
Anritsu S.r.l.
Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• Sweden
Anritsu AB
Kistagången 20B, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• Finland
Anritsu AB
Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• Denmark
Anritsu A/S
Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• Russia
Anritsu EMEA Ltd.
Representation Office in Russia
Tverskaya str. 16/2, bld. 1, 7th floor.
Moscow, 125009, Russia
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• Spain
Anritsu EMEA Ltd.
Representation Office in Spain
Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 5
28046, Madrid, Spain
Phone: +34-915-726-761
Fax: +34-915-726-621

• United Arab Emirates
Anritsu EMEA Ltd.
Dubai Liaison Office
902, Aurora Tower,
P O Box: 500311- Dubai Internet City
Dubai, United Arab Emirates
Phone: +971-4-3758479
Fax: +971-4-4249036

• India
Anritsu India Private Limited
2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,
Indiranagar, 100ft Road, Bangalore - 560038, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• Singapore
Anritsu Pte. Ltd.
11 Chang Charn Road, #04-01, Shriro House
Singapore 159640
Phone: +65-6282-2400
Fax: +65-6282-2533

• P.R. China (Shanghai)
Anritsu (China) Co., Ltd.
Room 2701-2705, Tower A,
New Caohejing International Business Center
No. 391 Gui Ping Road Shanghai, 200233, P.R. China
Phone: +86-21-6237-0898
Fax: +86-21-6237-0899

• P.R. China (Hong Kong)
Anritsu Company Ltd.
Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong, P.R. China
Phone: +852-2301-4980
Fax: +852-2301-3545

• Japan
Anritsu Corporation
8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan
Phone: +81-46-296-6509
Fax: +81-46-225-8359

• Korea
Anritsu Corporation, Ltd.
5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si,
Gyeonggi-do, 13494 Korea
Phone: +82-31-696-7750
Fax: +82-31-696-7751

• Australia
Anritsu Pty. Ltd.
Unit 20, 21-35 Ricketts Road,
Mount Waverley, Victoria 3149, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan
Anritsu Company Inc.
7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

1607

Printed on Recycled Paper

Printed in Japan 28/OCT/2016 ddcm/CDT Catalog No. MX183000A-E-A-1-(1.00)