

56G/64G bit/s Jitter Tolerance Measurement Solution

Signal Quality Analyzer MP1800A Series

56G/64G bit/s MUX MP1861A, 56G/64G bit/s DEMUX MP1862A



Data centers are handling rapidly increasing traffic volumes as cloud computing services become more widespread. Consequently, new high-speed interface standards, such as 400 GbE, CEI-56G, etc., are being tested to speed-up communications between servers and network devices. Jitter Tolerance is a key index of receiver characteristics for PHY devices, such as SERDES, used by these high-speed interfaces.

Linking the 56G/64G bit/s MUX MP1861A and 56G/64G bit/s DEMUX MP1862A with an MP1800A Signal Quality Analyzer containing a PPG, ED, and Jitter Modulation source supports easy generation of serial NRZ data, and BER and Jitter Tolerance measurements at bit rates up to 64.2 Gbit/s.

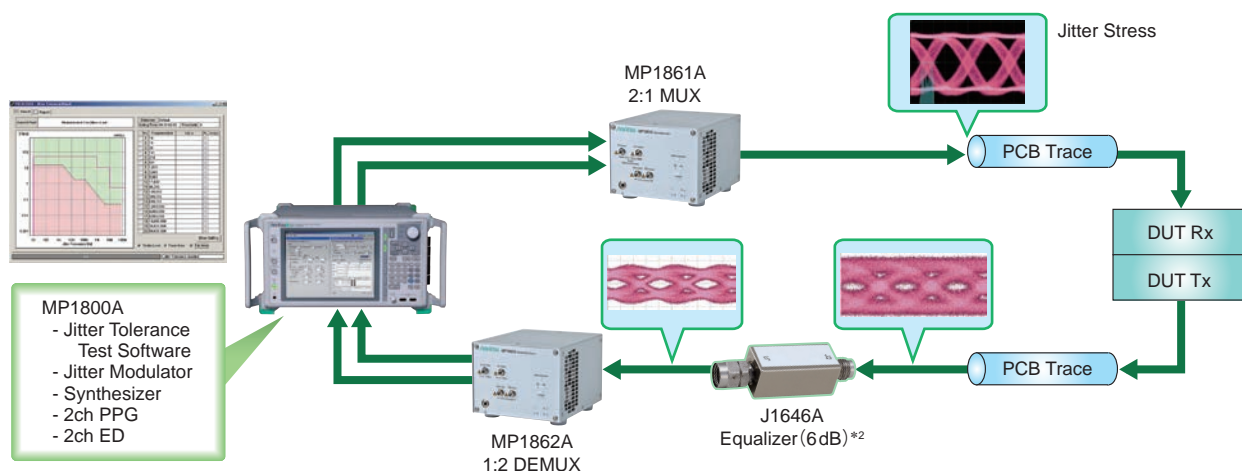
The tolerance to various Jitter types such as SJ, RJ, BUJ, SSC, Dual-Tone SJ, Half-Period Jitter (Even/Odd Jitter) can be measured, and Bathtub Jitter measurement is also supported in compliance with the latest standards, such as CEI-56G. With its MUX, DEMUX, PPG, ED, and Equalizer for Eye opening correction, plus automatic measurement software, Anritsu's MP1800A is the ideal total Jitter Tolerance measurement solution.

Target Applications

- High-Speed Backplanes and Cables: 400 GbE
- SERDES, CDR Chips: CEI-56G
- AOCs (Active Optical Cables): InfiniBand™ HDR (50G)
- Optical Transceiver Modules: CDFP Modules (400 GbE)

Features

- 2:1 MUX, 1:2 DEMUX Handheld size
- Maximum Bit Rate: 64.2 Gbit/s
- High Amplitude Output: 3.5 Vp-p (Max.)
- Low-Intrinsic-Jitter MUX: 200 fs rms (typ.)*1
- High-Sensitivity DEMUX: 25 mV (typ., single-ended, Eye height, PRBS $2^{31} - 1$, Mark ratio 1/2, 56.2 Gbit/s)
- Supports SJ, RJ, BUJ, SSC, Dual-Tone SJ, Half-Period Jitter (Even/Odd Jitter)
- Wide Amplitude SJ Generation: 0.55 UI @ fm 250 MHz (56.2 Gbit/s)



*1: Using sampling oscilloscope with <200 fs rms, excluding oscilloscope own intrinsic jitter.

*2: Refer to MP1800A_56GEQ-E-A-2 for Equalizer details.

Typical Specifications

MP1861A 56G/64 Gbit/s MUX	Date Output														
	Bit Rate	8 Gbit/s to 56.2 Gbit/s 8 Gbit/s to 64.2 Gbit/s (MP1861A-001)													
	No. of Channels	1ch, sync up to 4ch in parallel using connection with MP1800A													
	Amplitude	0.5 Vp-p to 2.5 Vp-p (≤ 56.2 Gbit/s, MP1861A-011) 1.0 Vp-p to 2.5 Vp-p (> 56.2 Gbit/s, MP1861A-011) 0.5 Vp-p to 3.5 Vp-p (≤ 56.2 Gbit/s, MP1861A-013) 1.0 Vp-p to 3.5 Vp-p (> 56.2 Gbit/s, MP1861A-013)													
	Intrinsic Jitter*1	200 fs rms (typ.)													
Half-Period Jitter	± 20 steps														
MP1862A 56G/64 Gbit/s DEMUX	Data Input														
	Bit Rate	8 Gbit/s to 56.2 Gbit/s 8 Gbit/s to 64.2 Gbit/s (MP1861A-001)													
	No. of Channels	1ch, sync up to 4ch in parallel using connection with MP1800A													
	Amplitude	0.125 Vp-p to 1.0 Vp-p													
Sensitivity	25 mV (typ.), ≤ 40 mVp-p (Eye height, PRBS31, Single-ended)														
MU181500B Jitter Modulation Source	Jitter Injection*2														
	SJ	Range/Step @ Jitter modulation frequency 0 to 2000 Ulp-p/0.002 UI @ fm 10 Hz to 100 kHz 0 to 200 Ulp-p/0.002 UI @ fm 100.1 kHz to 1 MHz 0 to 16 Ulp-p/0.002 UI @ fm 1.001 MHz to 10 MHz 0 to 1 Ulp-p/0.002 UI @ fm 10.01 MHz to 250 MHz													
	RJ	0 to 0.5 Ulp-p/0.002 UI @ fm 10 kHz to 1 GHz Built-in HPF: 10 MHz, 20 MHz, Thru Built-in LPF: 100 MHz, Thru													
	BUJ	0 to 0.5 Ulp-p/0.002 UI @ BUJ Rate 12.5 Gbps max. Built-in LPF: 50, 100, 200, 300, 500 MHz, Thru													
	SSC	0 to 5300 ppm/1 ppm @ fm 28 kHz to 37 kHz/1 Hz Down-Spread, Center-Spread or Up-Spread													
	SJ2*3 (Dual Tone SJ)	0 to 50 Ulp-p/0.002 UI @ fm 10 Hz to 1 MHz 0 to 10 Ulp-p/0.002 UI @ fm 100.1 MHz to 10 MHz 0 to 0.55 Ulp-p/0.002 UI @ fm 10.01 MHz to 250 MHz													
	External	Jitter modulation range: 10 kHz to 1 GHz													
MU183020A/21A 28G/32G bit/s PPG + MU183040B/41B 28G/32G bit/s ED + MP1861A 56G/64G bit/s MUX + MP1862A 56G/64G bit/s DEMUX	System Jitter Tolerance														
	<p>Typical value at 56.2 Gbit/s</p> <table border="1"> <caption>Data points from the Jitter Amplitude vs Modulation Frequency graph</caption> <thead> <tr> <th>Modulation Frequency [MHz]</th> <th>Jitter Amplitude [Ulp-p]</th> </tr> </thead> <tbody> <tr> <td>0.00001</td> <td>2000</td> </tr> <tr> <td>0.0075</td> <td>2000</td> </tr> <tr> <td>1</td> <td>15</td> </tr> <tr> <td>10</td> <td>0.55</td> </tr> <tr> <td>150</td> <td>0.55</td> </tr> <tr> <td>250</td> <td>0.55</td> </tr> </tbody> </table>		Modulation Frequency [MHz]	Jitter Amplitude [Ulp-p]	0.00001	2000	0.0075	2000	1	15	10	0.55	150	0.55	250
Modulation Frequency [MHz]	Jitter Amplitude [Ulp-p]														
0.00001	2000														
0.0075	2000														
1	15														
10	0.55														
150	0.55														
250	0.55														

*1: Using sampling oscilloscope with < 200 fs rms, excluding oscilloscope own intrinsic jitter.

*2: Jitter generation Range/Step varies according to set bit rate and Clock frequency. Here, the bit rate setting is 56 Gbit/s (14 GHz Clock frequency).
The BERT system Jitter Tolerance is limited by the PPG and ED.

*3: Requires Jitter Modulation MU181000A/B-001. Refer to the MP1800A Series catalog for details.

Ordering Information

Model/Order No.	Name
MP1861A	56G/64G bit/s MUX
MP1861A-001	64 Gbit/s Extension
MP1861A-011	Data Output (0.5 to 2.5 Vp-p)
MP1861A-013	Data Output (0.5 to 3.5 Vp-p)
MP1861A-030	Variable Data Delay
MP1862A	56G/64G bit/s DEMUX
MP1862A-001	64 Gbit/s Extension

Model/Order No.	Name
MP1800A	Signal Quality Analyzer
MU183020A	28G/32G bit/s PPG
MU183040B	28G/32G bit/s High Sensitivity ED
MU181500B	Jitter Modulation Source
MU181000A	12.5 GHz Synthesizer
MX181500A	Jitter/Noise Tolerance Test Software
J1646A*4	Passive Equalizer 6 dB (V-connector)

*4: Refer to MP1800A_56GEQ-E-A-2 for Equalizer details.