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 it’s 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**

- **Bit Rate**: 8 Gbit/s to 56.2 Gbit/s
- **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)
  - >56.2 Gbit/s, (MP1861A-011)
- **Intrinsic Jitter**<sup>1</sup>: 200 fs rms (typ.)
- **Half-Period Jitter**: ±20 steps

### MP1862A

**56G/64 Gbit/s DEMUX**

- **Bit Rate**: 8 Gbit/s to 56.2 Gbit/s
- **No. of Channels**: 1ch, sync up to 4ch in parallel using connection with MP1800A
- **Sensitivity**: 25 mV (typ.), ≤40 mVp-p (Eye height, PRBS31, Single-ended)

### MU181500B

**Jitter Modulation Source**

- **Jitter Injection**<sup>2</sup> Range/Step @ Jitter modulation frequency
  - **SJ**: 0 to 2000 Ulp-p/0.002 Ul @ fm 10 Hz to 100 kHz
    - 0 to 16 Ulp-p/0.002 Ul @ fm 1001 MHz to 1 MHz
    - 0 to 1 Ulp-p/0.002 Ul @ fm 10.01 MHz to 250 MHz
  - **RJ**: 0 to 0.5 Ulp-p/0.002 Ul @ fm 10 Hz to 1 GHz
    - Built-in HPF: 10 MHz, 20 MHz, Thru
    - Built-in LPF: 100 MHz, Thru
  - **BUJ**: 0 to 5300 ppm/1 ppm @ BJ Rate 12.5 Gbps max.
    - Built-in LPF: 50, 100, 200, 300, 500 MHz, Thru
  - **SSC**: 0 to 50 Ulp-p/0.002 Ul @ fm 10 Hz to 1 MHz
    - 0 to 10 Ulp-p/0.002 Ul @ fm 100.1 MHz to 10 MHz
    - 0 to 0.55 Ulp-p/0.002 Ul @ fm 10.01 MHz to 250 MHz
  - **SJ2**: 0 to 50 Ulp-p/0.002 Ul @ fm 10 Hz to 1 MHz
    - 0 to 10 Ulp-p/0.002 Ul @ fm 100.1 MHz to 10 MHz
    - 0 to 0.55 Ulp-p/0.002 Ul @ fm 10.01 MHz to 250 MHz
  - **External Jitter modulation range**: 10 kHz to 1 GHz

### System Jitter Tolerance

- **Typical value at 56.2 Gbit/s**
  - Jitter Amplitude [Ul-p]
    - Modulation Frequency [MHz]

### Ordering Information

<table>
<thead>
<tr>
<th>Model/Order No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1861A</td>
<td>56G/64 Gbit/s MUX</td>
</tr>
<tr>
<td>MP1861A-001</td>
<td>64 Gbit/s Extension</td>
</tr>
<tr>
<td>MP1861A-011</td>
<td>Data Output (0.5 to 2.5 Vp-p)</td>
</tr>
<tr>
<td>MP1861A-013</td>
<td>Data Output (0.5 to 3.5 Vp-p)</td>
</tr>
<tr>
<td>MP1861A-030</td>
<td>Variable Data Delay</td>
</tr>
<tr>
<td>MP1862A</td>
<td>56G/64 Gbit/s DEMUX</td>
</tr>
<tr>
<td>MP1862A-001</td>
<td>64 Gbit/s Extension</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model/Order No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP1800A</td>
<td>Signal Quality Analyzer</td>
</tr>
<tr>
<td>MU183020A</td>
<td>28G/32G bit/s PPG</td>
</tr>
<tr>
<td>MU183040B</td>
<td>28G/32G bit/s ED</td>
</tr>
<tr>
<td>MP181500B</td>
<td>Jitter Modulation Source</td>
</tr>
<tr>
<td>MU181000A</td>
<td>12.5 GHz Synthesizer</td>
</tr>
<tr>
<td>MX181500A</td>
<td>Jitter/Noise Tolerance Test Software</td>
</tr>
<tr>
<td>J1646A&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Passive Equalizer 6 dB (V-connector)</td>
</tr>
</tbody>
</table>

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

<sup>2</sup>: 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).

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

<sup>4</sup>: Refer to MP1800A_56GEQ-E-A-2 for Equalizer details.