Sampling oscilloscopes for signal waveform quality evaluation require a separate trigger clock signal synchronized with the data signal, but transmission equipment with built-in optical modules and 50G to 400G optical modules outputting PAM4 signals sometimes do not have a trigger signal. In this case, the trigger signal is generated from the data signal using clock recovery. This optional Clock Recovery Unit (CRU) can be installed in the BERTWave MP2110A Sampling Oscilloscope.

**Point 1**
Built-in clock recovery eliminates trigger clock

**Point 2**
Options combined as needed

**Point 3**
All optical modules measured with one unit

**Point 4**
4ch multi-channel measurement also supported

### Optical module and Optical transmission equipment

- SFP: 50G SR/FR/LR (PAM4)
  - 25G SR/LR (NRZ)

**MP2110A Optical Module Measurement Solution using Clock Recovery Options**

Two optional built-in clock recovery units are available according to the application. With both options installed, one unit can evaluate various types of optical modules without requiring a trigger signal. Moreover, multiple channels can be measured at once when used in combination with a 4ch oscilloscope.
Features

Excellent Operability at Lower Cost
Since this clock recovery is built-in, it offers excellent operability at a lower price. The space-saving design and reduced need for complex cable connections as well as the easy-to-use settings help cut initial capital costs.

Wide Range of High-Performance Applications
The following clock recovery unit options are available:

- Option 055: Supports newest 53 Gbaud PAM4 signals (106 Gbit/s)
- Option 054: Supports 26 Gbaud multimode signals

These options can be combined freely to configure a flexible test system matching the site requirements at optimum cost. When all options are installed, various types of 100/200/400 GbE optical modules can be evaluated without a trigger clock using one MP2110A unit.

In addition, combination with a 4ch oscilloscope supports all-at-once measurement using the recovered trigger signal to help cut evaluation times for multichannel optical modules.

High Performance
When using high-sensitivity modules, the impact of insertion loss on the data waveform is minimized by optimizing internal division ratios, demonstrating its usefulness when monitoring signal waveforms requiring high sensitivity. Additionally, there is no waveform degradation due to multimode splitting because Option 054 performs signal splitting for input to the CRU and oscilloscope using electrical signals after O/E conversion.

Target Applications
Evaluation of signal waveforms of optical modules and optical transmission equipment

- When unable to provide trigger signal: Transmission equipment and switches with no Clock output
- When unable to use trigger signal: When monitoring signal of PAM4 modules and after long-distance transmission; when trigger signal quality is poor, etc.

Typical Specifications

<table>
<thead>
<tr>
<th></th>
<th>Option 055</th>
<th>Option 054</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Format</td>
<td>NRZ, PAM4</td>
<td></td>
</tr>
<tr>
<td>Input</td>
<td>SMF 1260 nm to 1620 nm</td>
<td>SMF 1260 nm to 1650 nm<em>1, MMF 800 nm to 860 nm</em>1</td>
</tr>
<tr>
<td>Data Rate, Recovered Clock</td>
<td>25.5 Gbaud to 28.9 Gbaud, 1/4</td>
<td>25.5 Gbaud to 28.2 Gbaud, 1/2</td>
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<tr>
<td>Output Division Ratio</td>
<td>51 Gbaud to 58 Gbaud, 1/8</td>
<td></td>
</tr>
<tr>
<td>Input Sensitivity</td>
<td>Outer OMA 100 µW (typ.)</td>
<td>10 mVp-p (typ.)</td>
</tr>
<tr>
<td>Jitter</td>
<td>200 fs rms (typ.)</td>
<td>250 fs rms (typ.)</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>1.5 dB (typ.)</td>
<td>1.5 dB (typ.)</td>
</tr>
<tr>
<td>Loop Band</td>
<td>Select from 4 MHz, 10 MHz, and bit rate/1667</td>
<td></td>
</tr>
</tbody>
</table>

*1: O/E conversion can be used when oscilloscope channel B is an optical channel.

Ordering Information

Please specify the model, 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.

<table>
<thead>
<tr>
<th>Model</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MP2110A-054</td>
<td>Clock Recovery (Electrical/Optical)</td>
</tr>
<tr>
<td>MP2110A-055</td>
<td>26G/53Gbaud Clock Recovery (5M Optical)</td>
</tr>
<tr>
<td>MP2110A-154</td>
<td>Clock Recovery (Electrical/Optical) Retrofit</td>
</tr>
<tr>
<td>MP2110A-155</td>
<td>26G/53Gbaud Clock Recovery (5M Optical) Retrofit</td>
</tr>
</tbody>
</table>

* MP2110A-054 can be installed only when the Sampling Oscilloscope is installed.
* Retrofitting requires return to the Anritsu plant.