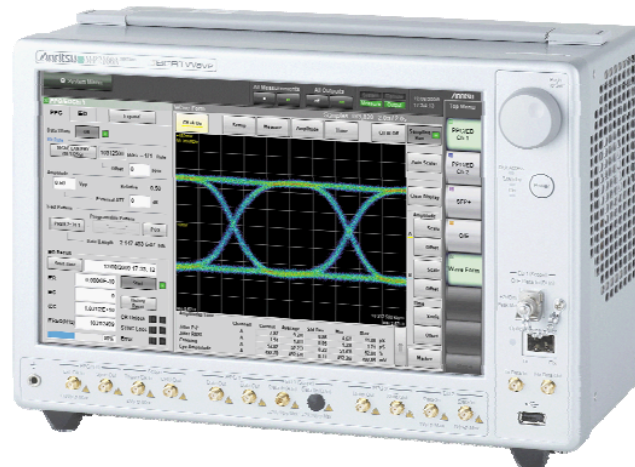


PPG/ED Bit Rate Expansion Option Low Pass Filter Option

MP2100A
BERTWave Series

**MP2100A BERTWave Series
PPG/ED Bit Rate Expansion Option
Low Pass Filter Option
New Software
New Function Introduction**

BERTWave



Anritsu Corporation

Contents

- Introduction
- Features
- Typical Waveform
- Summary

Introduction

~ Slim All-in-One Measurement for BERT and EYE/Pulse Scope ~

□ High Speed

◆ One unit supports BERT measurements and eye-pattern analysis

- No separate BERT and eye-pattern analyzer

◆ High-speed measurement cuts measurement times

- High-speed remote response supports **4x faster** measurement
- Cuts BERT measurement times by **30%** (BERT)
- Supports **three times faster 100K sample/s** high-speed sampling (Scope)

□ Compact and Lightweight

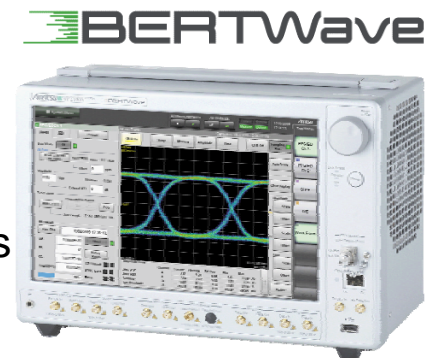
◆ Compact 18-cm design, weight <7 kg

- Small footprint saves benchtop space

□ Supports High Repeatability

◆ Supports ideal Bessel filters

- Supports high-repeatability at eye-pattern analysis



Features ~ PPG/ED Expansion Option ~

❑ Operation Frequency

- ◆ Supports key applications, such as 10 GbE and 5 G Infiniband

Supported bit rates and application examples (w/o Opt-090)

PPG Operation Bit Rate

8.5Gbit/s~11.32Gbit/s	✓8GFC ✓10GF C ✓10GF C FEC	✓10GbE ✓OC-192/STM-64 ✓OC-192/STM-64 FEC
4.25Gbit/s~5.66Gbit/s	✓4GFC	
2.125Gbit/s~2.83Gbit/s	✓2GFC ✓Infiniband	✓2GbE ✓OC-48/STM-16 ✓OTU-1
1.0625Gbit/s~1.415Gbit/s	✓1GbE ✓1GFC	
0.53125Gbit/s~0.7075Gbit/s	✓OC-12/STM-64	
0.265625Gbit/s~0.35375Gbit/s		
0.132812Gbit/s~0.176875Gbit/s	✓OC-3/STM-1	

Application samples

ED Operation Bit Rate

8.5Gbit/s~11.32Gbit/s	✓8GFC ✓10GF C ✓10GF C FEC	✓10GbE ✓OC-192/STM-64 ✓OC-192/STM-64 FEC
4.25Gbit/s~5.66Gbit/s	✓4GFC	

Application samples

Features ~ PPG/ED Expansion Option ~

❑ Wide Operation Frequency

◆ PPG/ED operation frequency (with Opt-090)

- BERT function supports 125 Mbit/s to 12.5 Gbit/s applications, such as OC-3/STM-1 and 10GFC.

Supported bit rates and application examples (w/ Opt-090)

PPG/ED Operation Bit Rate	Application samples	
8Gbit/s to 12.5Gbit/s	✓8GFC ✓10GFC ✓10GFC FEC	✓10GbE ✓OC-192/STM-64 ✓OC-192/STM-64 FEC
4Gbit/s to 6.25Gbit/s	✓CPRI/OBSAI ✓4GFC	
2Gbit/s to 3.125Gbit/s	✓CPRI/OBSAI ✓2GFC ✓Infiniband	✓2GbE ✓OC-48/STM-16 ✓OTU-1
1Gbit/s to 1.5625Gbit/s	✓1GbE ✓1GFC	
0.5Gbit/s to 0.78125Gbit/s	✓OC-12/STM-64	
0.25Gbit/s to 0.39625Gbit/s		
0.125Gbit/s to 0.195312Gbit/s	✓OC-3/STM-1	

Features ~ PPG/ED Expansion Option ~

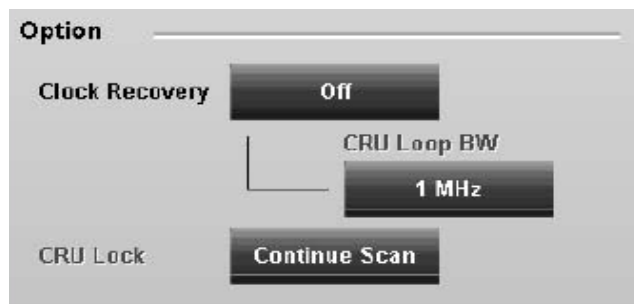
□ Clock Recovery

◆ ED Clock recovery function (standard function)

- 125 to 195.312 Gbit/s, 250 to 390.625 Mbit/s, 781.25 to 500 Mbit/s, 1 to 1.5625 Gbit/s, 2 to 3.125 Gbit/s, 4 to 6.25 Gbit/s, 8 to 12.5 Gbit/s
 - ✓ Data signal input without clock and BER analysis
- 4 to 6.25 Gbit/s, 8 to 12.5 Gbit/s
 - ✓ Supported as scope trigger

◆ Eye/Pulse Scope Clock recovery function

- 8.5 to 12.5 GHz, 0.1 to 2.7 GHz (Opt-055)
 - ✓ Supports evaluation of characteristics of long-distance transmissions and equipment without clock output
 - ✓ Variable loop band



Eye/Pulse Scope clock recovery setting screen

Eye/Pulse Scope clock recovery loop bandwidth

Bit rate		Loop bandwidth
8.5 to 12.5 GHz		1, 2, 4, 8 MHz
0.1 to 2.7 GHz	2488.32 MHz	490 kHz
	622 MHz	71 kHz
	156 MHz	23 kHz

Features ~ Low Pass Filter Option ~

□ Built-in Low Pass Filters

◆ Max. six types of LPF for every measurement application

LPF	Correspondence Spec.
156M	OC-3/STM-1 (155.52M)
622M	CPRI x1 (614.4M), OC-12/STM-4 (622.08M)
1.0G	FC (1.0625G)
1.2G	CPRI x2 (1.2288G), OC-24 (1.244G), GbE (1.25G)
2.1G	2GFC (2.125G)
2.5G	CPRI x4 (2.4576G), OC-48/STM-16 (2.488G), Infiniband Optical (2.5G), 2GbE (2.5G)
2.6G	OTU-1 (2.666G)
3.1G	CPRI x5 (3.072G), OBSAI RP3 x4 (3.072G), 10GBASE-LX4 (3.125G), 10GFC-LX4 (3.1875G)
4.2G	4GFC (4.25G)
5.0G	CPRI x8 (4.9515G), Infiniband optical x2 (5G)
6.2G	CPRI x10 (6.144G), XAUI Optical x2 (6.25G)
8.5G	8GFC (8.5G)
9.9G~10.3G	OC-192/STM-64 (9.953G), 10GbE WAN (9.953G), 10GbE LAN (10.312G), Infiniband optical x4 (10G)
10.5G~11.3G	10GFC (10.518G), 10GFC FEC (10.664G), OC-192/STM-64 FEC G.975 (10.664G) OTU-2 (10.709G), 10GbE FEC OTU1e (11.095G), 10GbE FEC OTU2e (11.316G)

□ Supports Wide Wavelength Range

◆ Supports wavelengths from 750 to 1650 nm

Features ~ New Software ~

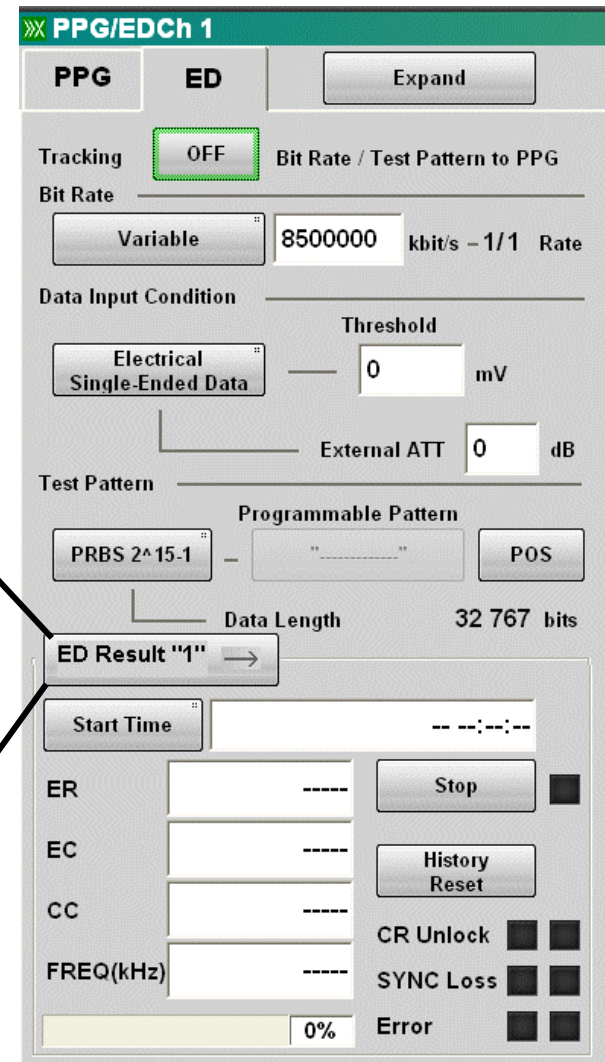
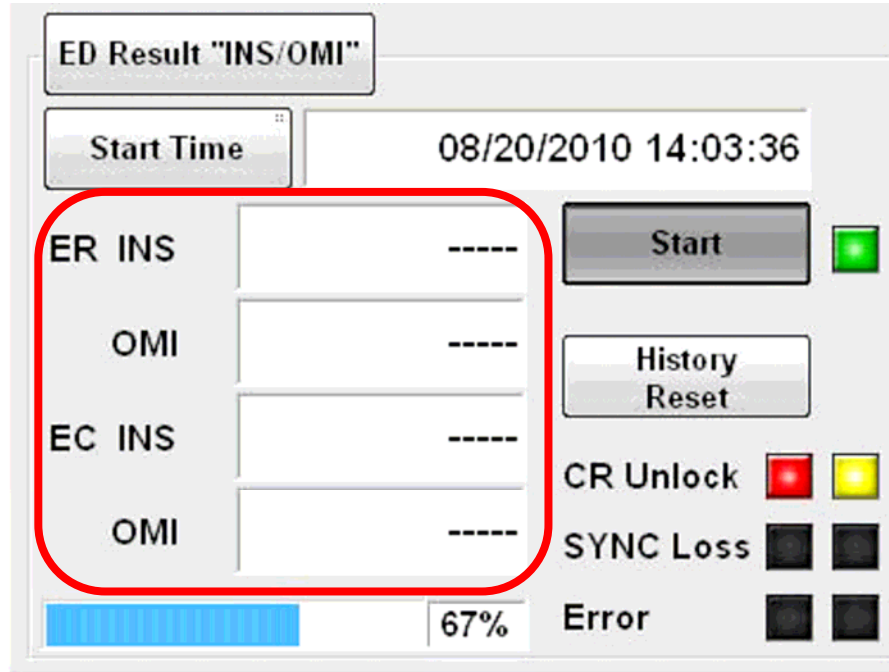
❑ Insertion/Omission Functions

◆ Measures bit error changes

➤ Insertion: 0 → 1 Conversion

➤ Emission: 1 → 0 Conversion

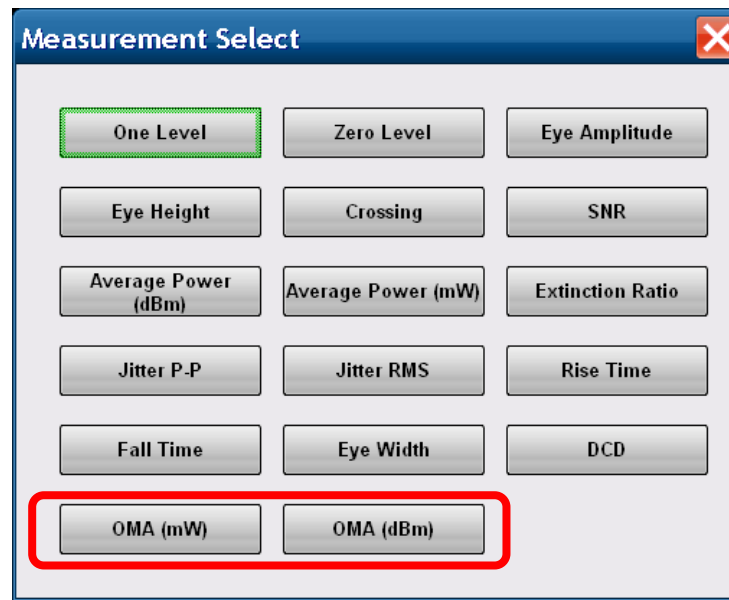
◆ Easy DUT threshold adjustment



Features ~ New Software ~

□ Application Tests

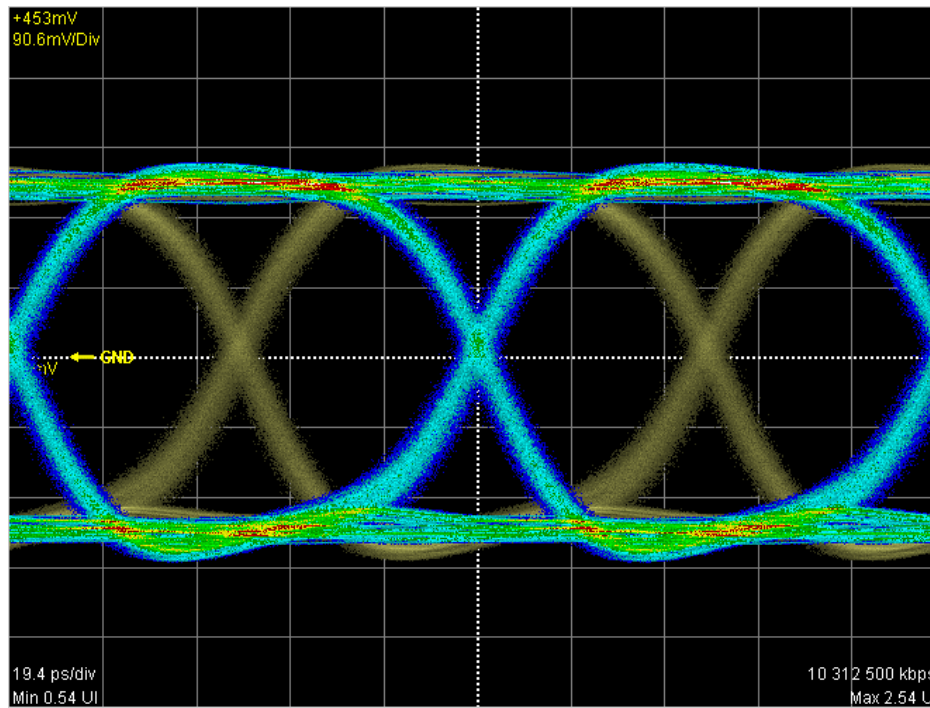
- ◆ Supports signalling integrity analysis with Eye/Pulse Scope
 - Time/Amplitude Test
 - ✓ Added OMA measurements
- ◆ Optical modulation amplitude measurement of level difference between levels 1 and 0



Features ~ New Software ~

□ Reference Trace Waveform

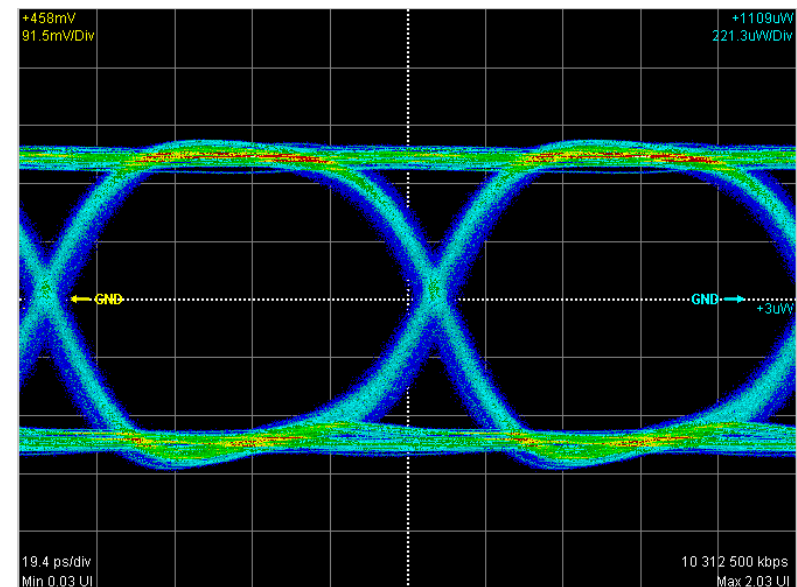
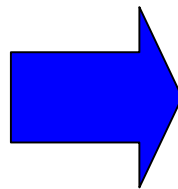
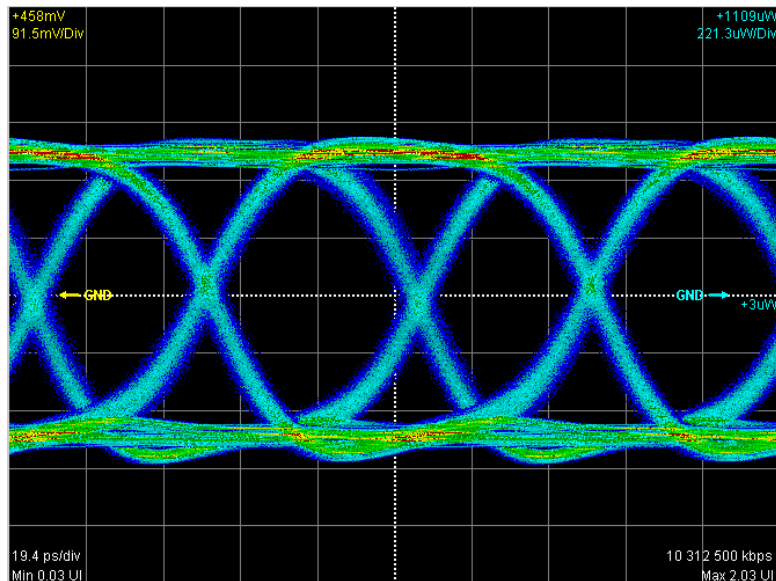
- ◆ Waveform data saving function supports comparison between saved data and measured waveform
- ◆ Visually identify phase and changes between standard and measured waveforms



Features ~ New Software ~

□ Waveform Position Adjustment

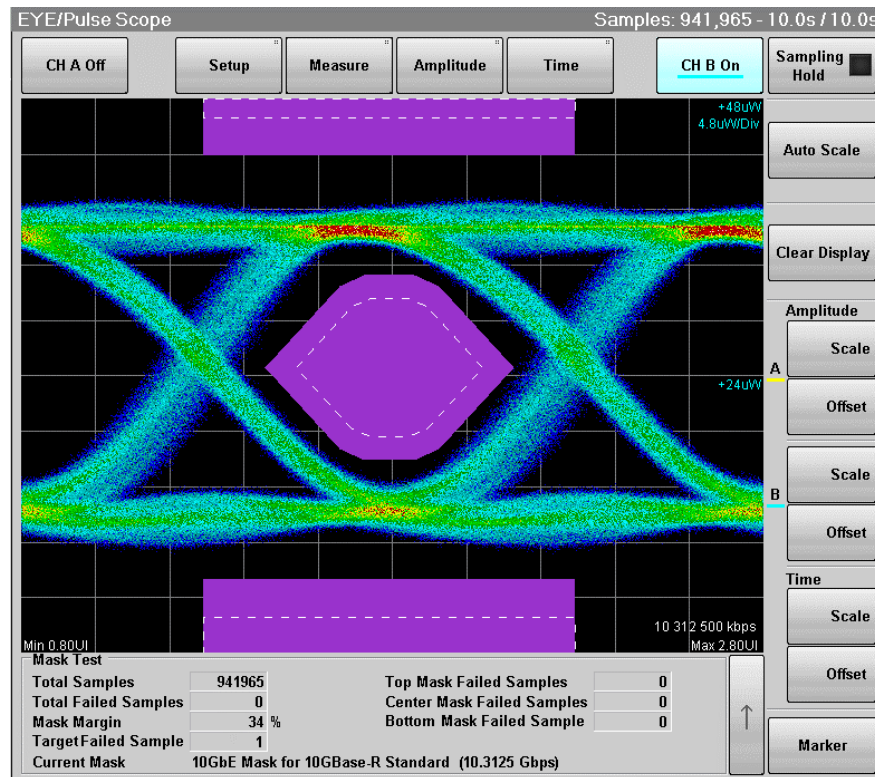
- ◆ Built-in skew function aligns phase between differential signal channels
- ◆ Measures differential signals accurately without delay



Features ~ New Software ~

□ Mask/Mask Margin Test

- ◆ Confirm product margin against standards to improve yield (Note.)
- ◆ Real-time mask margin measurements measures mask margin within 1 s after waveform input

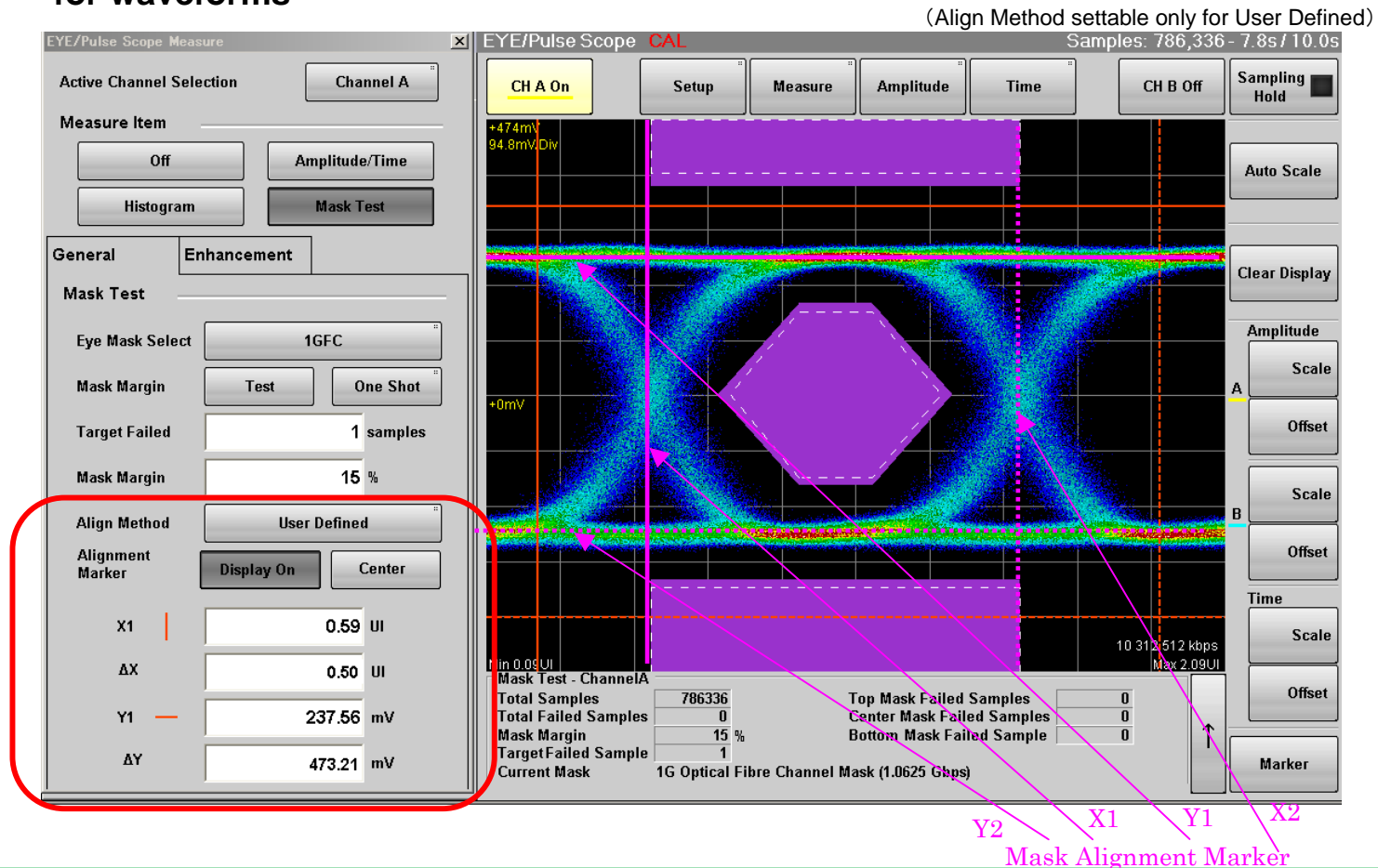


(Note) Bit Rate: 10.3125 Gbit/s, Test Pattern: PRBS31, back-to-back

Features ~ New Software ~

□ Mask Position Adjustment

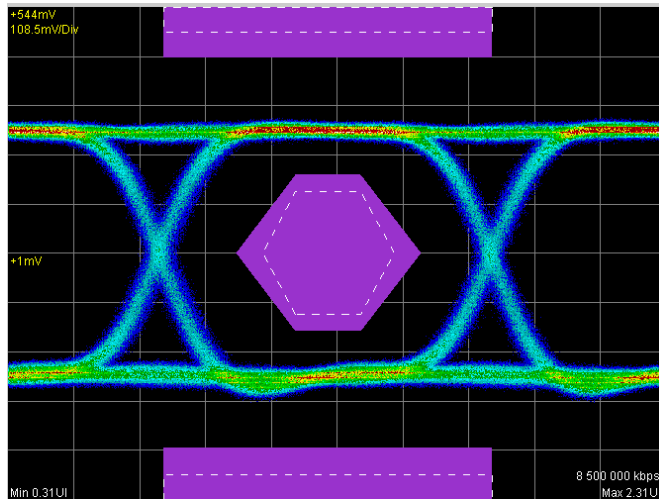
- ◆ Mask position adjusted automatically or manually
- ◆ Easy adjustment of waveforms without horizontal axis limits and threshold adjustment for waveforms



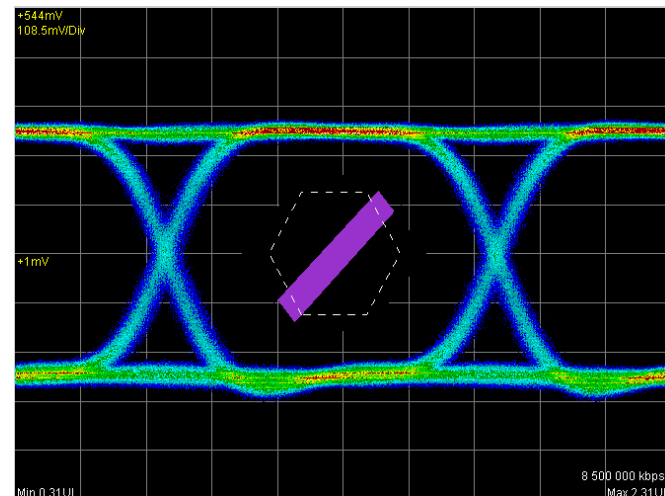
Features ~ New Software ~

□ Mask Area Change

- ◆ Change mask area for measurement
- ◆ Evaluate positions in open eye where mask margin maximum and minimum



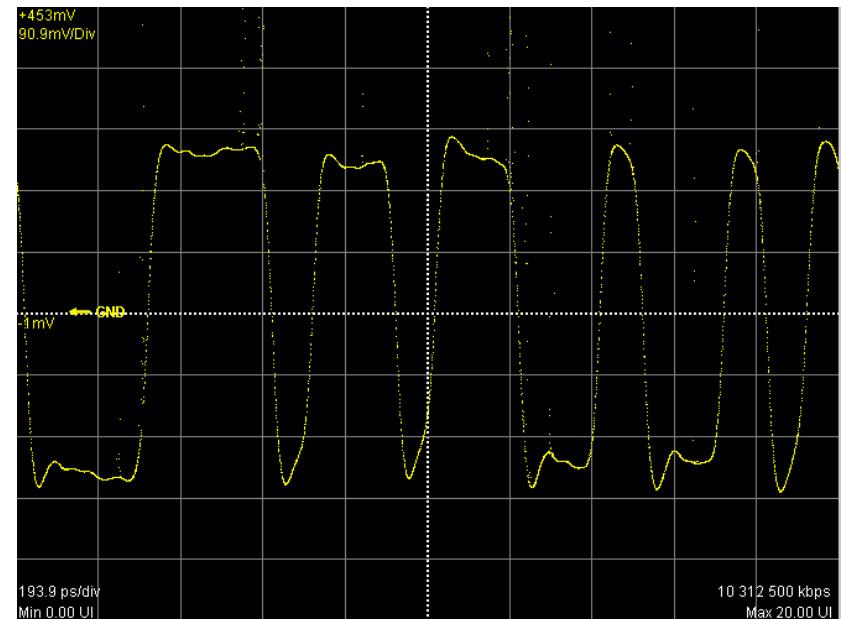
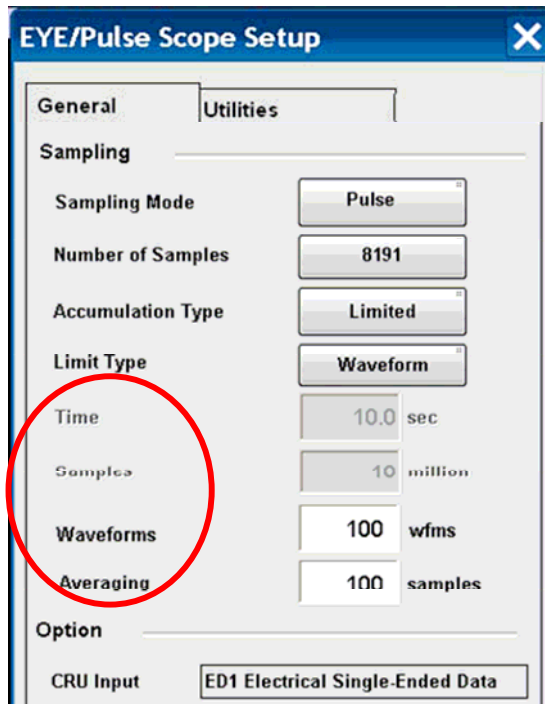
Mask Area Restriction Off



Mask Area Restriction On
(45 degrees, 0.1UI)

Features ~ New Software ~

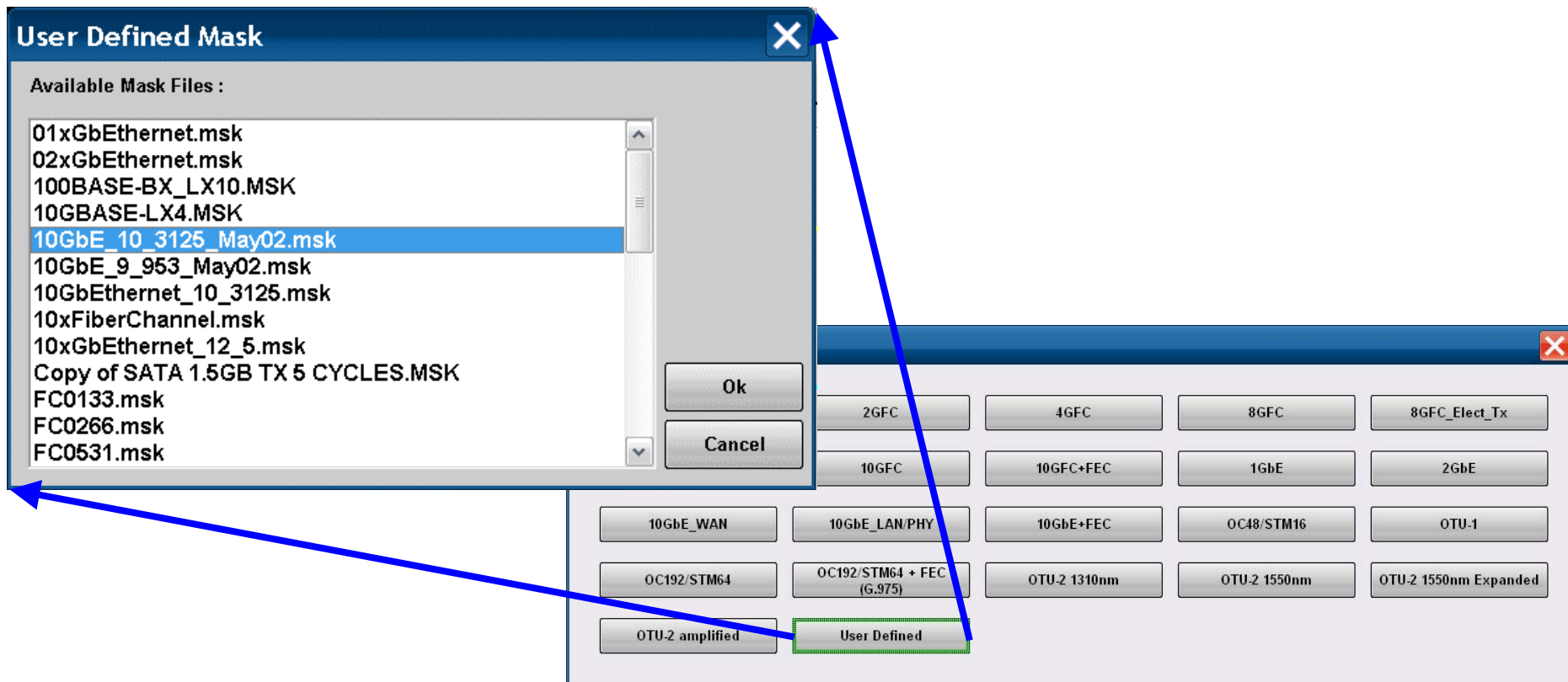
- ❑ **Built-in Multiple Sampling Completion Condition**
 - ◆ Select from time, number of samples, number of waveforms
- ❑ **Variable Pulse Waveform Average Processing Times**
 - ◆ The averaging processing count can be set at waveform measurement in the Pulse mode.
 - ◆ Averaging suppresses waveform noise.



Features ~ New Software ~

❑ Arbitrary Mask Creation

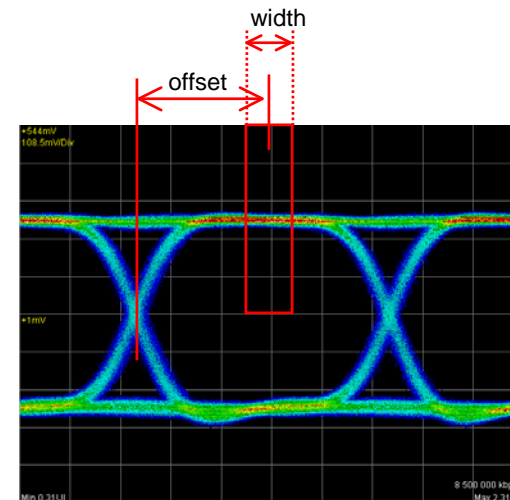
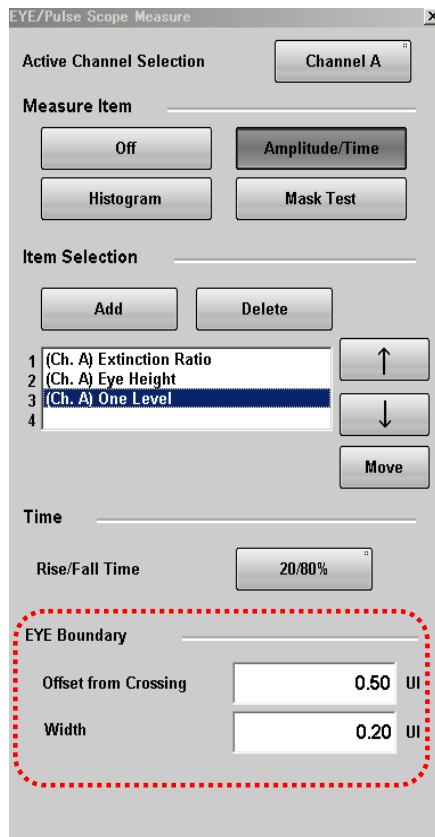
- ◆ User-defined mask files
- ◆ Quickly support new applications



Features ~ New Software ~

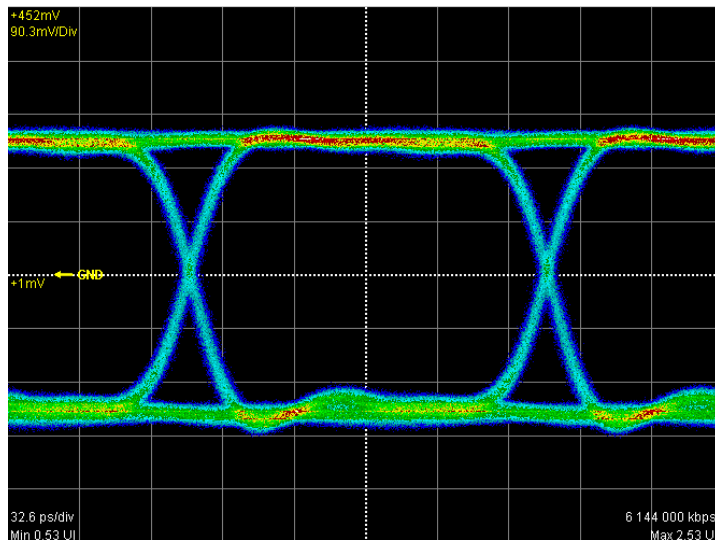
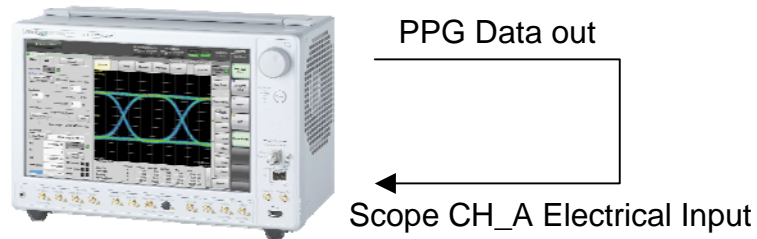
❑ Measurement Area Change for Levels 1 and 0

◆ Changes measurement area for waveform levels 1 and 0



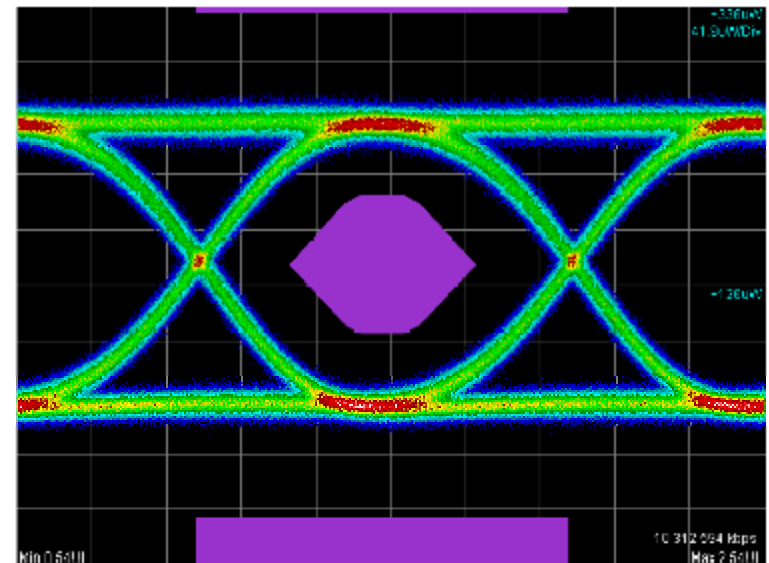
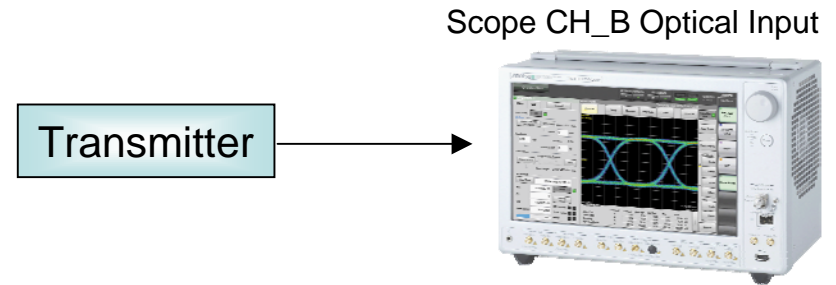
Typical Waveform

Electrical loopback



Bit rate: 6.144 Gbit/s, PRBS31, Amplitude: 0.5 Vp-p
PPG to ED/Scope Loopback

Filtered optical waveform



Bit rate: 10.3125 Gbit/s, PRBS31, Power: -6 dBm
External optical transmitter

Summary

- ❑ **Supports All Measurement Applications by Expanding PPG/ED from 125 Mbit/s to 12.5 Gbit/s**
- ❑ **Built-in LPF Bank**
- ❑ **All-in-one Unit Supporting Various Measurements**

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