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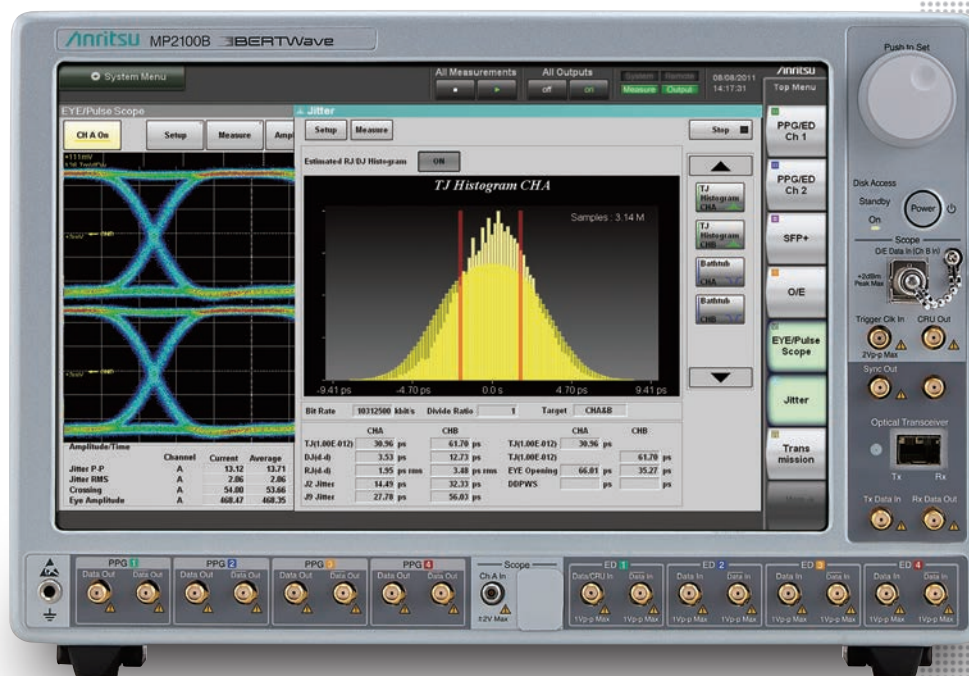
Jitter Analysis Software

MX210001A

Transmission Analysis Software

MX210002A

BERTWave MP2100B



Jitter Analysis Software MX210001A/Transmission Analysis Software MX210002A

All-in-One Simultaneous Waveform Simulation, Jitter Analysis, Eye Pattern Measurement and Eye Mask Test

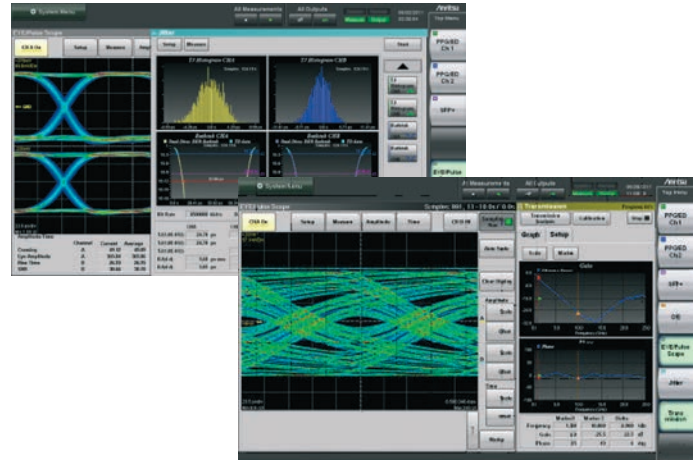
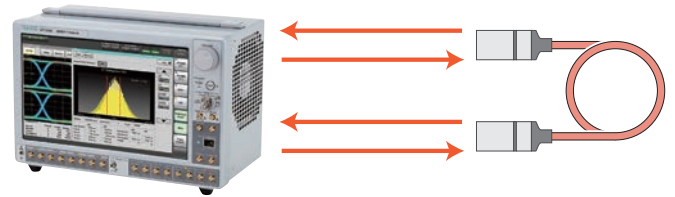
To meet rapid increases in data volumes, data centers are introducing high-speed interconnects, such as Active Optical Cable (AOC) and Direct Attach Cable (DAC), with transmission speeds faster than 10 Gbit/s between servers.

The Jitter Analysis Software MX210001A has a new, high-speed, jitter-analysis function supporting all-in-one measurements, such as simultaneous jitter analysis, and eye pattern measurement and eye mask test.

Moreover, the high-speed sampling increases measurement efficiency by cutting measurement time.

Adding the Transmission Analysis Software MX210002A to the BERTWave supports Tx analyses (S_{21} Gain, Phase), and waveform simulation (de-embedded) using linear equalizer, filter, and emphasis operations; simultaneous waveform sampling and simulation support simultaneous eye pattern measurement and eye mask test.

Furthermore, combined tracking with the MX210001A software permits simultaneous post-simulation waveform jitter analysis. These versatile functions provide the perfect environment for applications ranging from R&D to manufacturing of AOC and DAC.



Target Applications

- Fibre Channel, InfiniBand, USB, SAS/SATA, 10 GbE, 40 GbE, 100 GbE
- Active Optical Cable (AOC), Direct Attach Cable (DAC), SFP+, QSFP+, CFP/2, CXP
- Design Validation Test (DVT)

Jitter Analysis

- Bathtub Jitter Analysis
- Classify TJ into DJ, RJ, J2, J9, DDJ, DDPWS, DCD, ISI, and PJ
- Measure any signal, including PRBS31*1

*1: Histogram mode only

WDP Measurements

- WDP, TWDP, dWDP*2

*2: To compute the WDP, MATLAB R2010b by MathWorks purchase is required separately.

Transmission Analysis

- Measures transmission path and device S_{21} (Gain, Phase) characteristics*3
- Single-end and differential IF measurements*4

*3: MP2100B with PPG and sampling scope options

*4: MP2100B-001 with dual electrical interface option

Waveform Simulation

- Linear equalizer and filter
- Emphasis (4 taps max.)

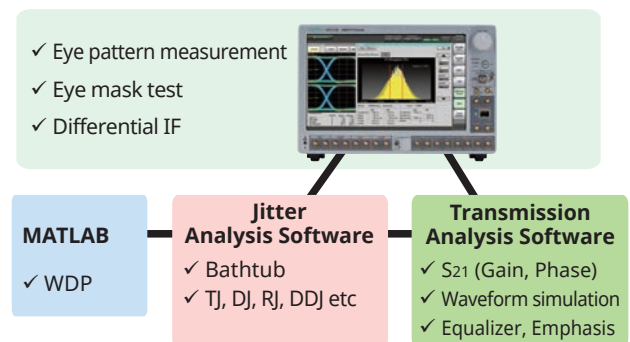
High-speed Measurements

- High-speed bathtub BER value (1.0e-18)
- High-speed sampling
- High-speed DDJ using high-speed triggering

Simultaneous Measurements

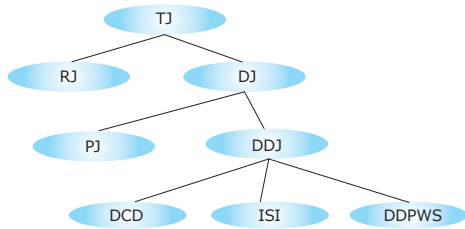
- Simultaneous two-channel jitter analysis*5
 - Simultaneous measurements of BER, Eye pattern, Eye mask, and Jitter with simulation waveforms
 - Jitter Analysis and Transmission Analysis software tracking
- *5: Supports jitter analysis only

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Jitter Analysis Software MX210001A

The ideal jitter analysis solution matching the application can be selected from either the histogram mode for measuring basic jitter analysis or the pattern search mode for detailed jitter analysis.



Histogram Mode

This mode supports basic jitter analysis for any signal (including PRBS31). Results are displayed as either bathtub jitter or a histogram calculated by the Dual Dirac model from the eye pattern. In addition, tact times are cut by simultaneous 2-channel jitter analysis, eye pattern, and eye mask test measurements.

Pattern Search Mode

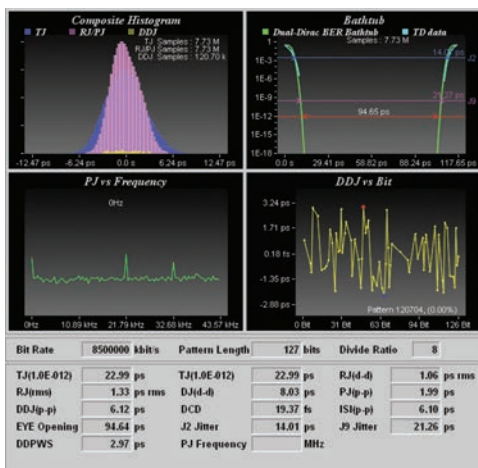
In addition to basic jitter components, this mode isolates more detailed jitter components for specific signals (up to PRBS15). Anritsu's unique triggering method supports faster DDJ measurements than conventional analyzers.

Analyses at both of Histogram and Pattern Search Mode

- TJ BER : Total Jitter at 1.0e-12
- DJdd : Deterministic Jitter (Dual Dirac model)
- RJdd : Random Jitter (Dual Dirac model)
- Tj at sBER : Total Jitter at specified BER
- Eye Opening : Horizontal Eye opening at specified BER
- J2 BER : Total Jitter at 2.5e-3
- J9 BER : Total Jitter at 2.5e-10

Analyses at Pattern Search Mode

- DDJ : Data Dependent Jitter vs. Bit
- DDPWS : Data Dependent Pulse Width Shrinking
- PJ : Periodic Jitter (support PJ frequency estimation)
- DCD : Duty Cycle Distortion
- ISI : Inter Symbol Interference



WDP Measurements

Combining the MX210001A with MATLAB supports WDP, TWDP and dWDP measurements for evaluating the waveform dispersion of specific signals.

Note: To compute the WDP, MATLAB R2010b by MathWorks purchase is required separately.

Transmission Analysis Software MX210002A

Waveform simulation with transmission analysis (S_{21} Gain, Phase) functions as well as linearity, filtering and emphasis calculation supports simultaneous waveform sampling and simulation. The eye pattern measurement and eye mask test functions can also be used simultaneously.

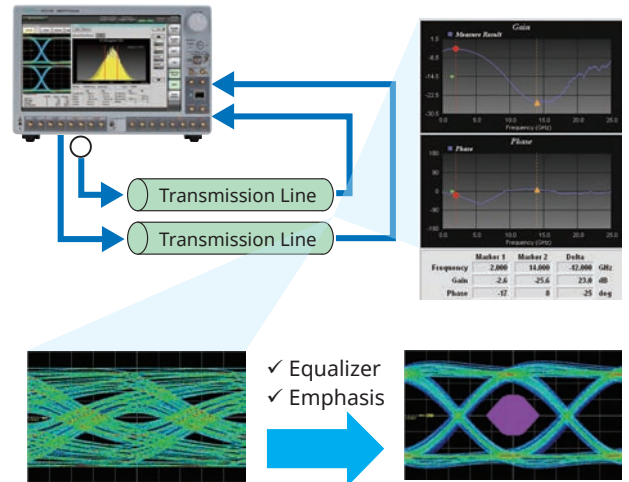
Transmission Analysis S_{21} (Gain, Phase)

BERTWave PPG and Eye/Pulse scope tracking supports measurement of transmission path and device S_{21} characteristics (Gain, Phase). S_{21} differentials are supported by the built-in differential interface.

Waveform Simulation

Waveform data can be sampled, linear-equalized, filtered, emphasized and displayed simultaneously. Various eye analyses, including eye pattern measurement (Tr/Tf, etc.), eye mask test, jitter analysis separation, etc., can be applied to the displayed eye waveform.

★: Data length equivalent to PRBS15

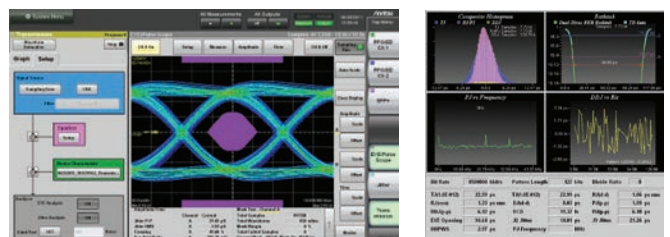


File Compatibility

Support for the S2P data file format makes it easy to use data captured by the Vector Network Analyzer as well as simulated characteristics data.

Tracking with Jitter Analysis Software

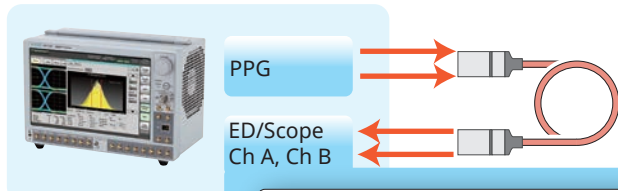
Tracking between the MX210001A and the MX210002A supports simulation of actual connection conditions, permitting simultaneous eye pattern measurement, eye mask test, jitter analysis, etc., measurements.



Applications

Active Optical Cable (AOC) Measurements

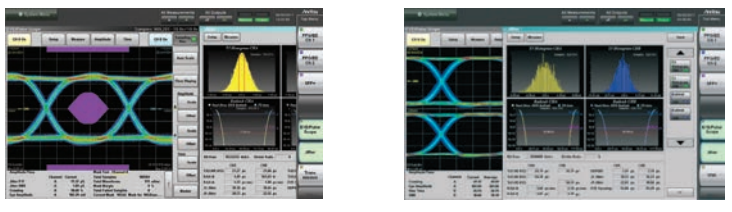
The MX210001A supports simultaneous jitter analysis, eye pattern measurement, and eye mask tests required by high-speed and multi-lane Active Optical Cables (AOC). Moreover, high-speed triggering supports fast DDJ measurements, reducing measurement times by 80%.



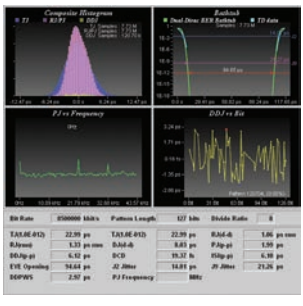
Active Optical Cable (AOC) required measurement items

- Eye pattern measurement
 - Tr/Tf, amplitude, etc.
- Eye mask tests
- Jitter analysis
 - TJ, DJ, RJ, DDJ measurements, DDPWS, etc.

• Simultaneous measurement

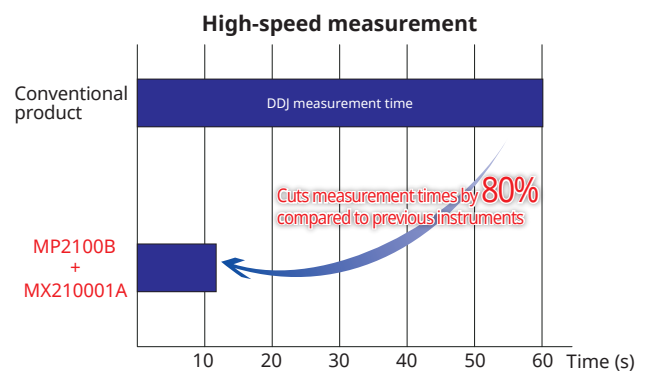
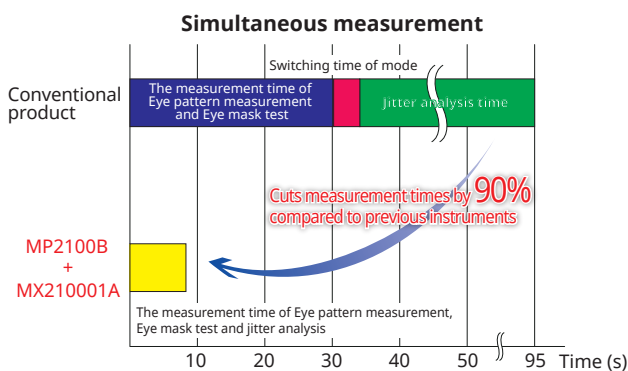


• The detailed jitter analysis



Bit Rate	200000 Mb/s	Pattern Length	127 bits	Slide Ratio	8
TAX:AE-RIS	22.50 ps	TAX:AE-RIS	22.50 ps	R:J:G:R	1.00 ps
R:J:G:R	1.33 ps	R:J:G:R	1.33 ps	P:J:G:R	1.33 ps
DDJ:G:R	1.33 ps	DDJ:G:R	1.33 ps	DDJ:G:R	1.33 ps
EYE Opening	14.68 ps	DDJ:G:R	14.68 ps	DDJ:G:R	21.20 ps
DDPWS	2.30 ps	P:J Frequency	800		

Simultaneous Eye pattern measurement, Eye mask test and jitter analysis

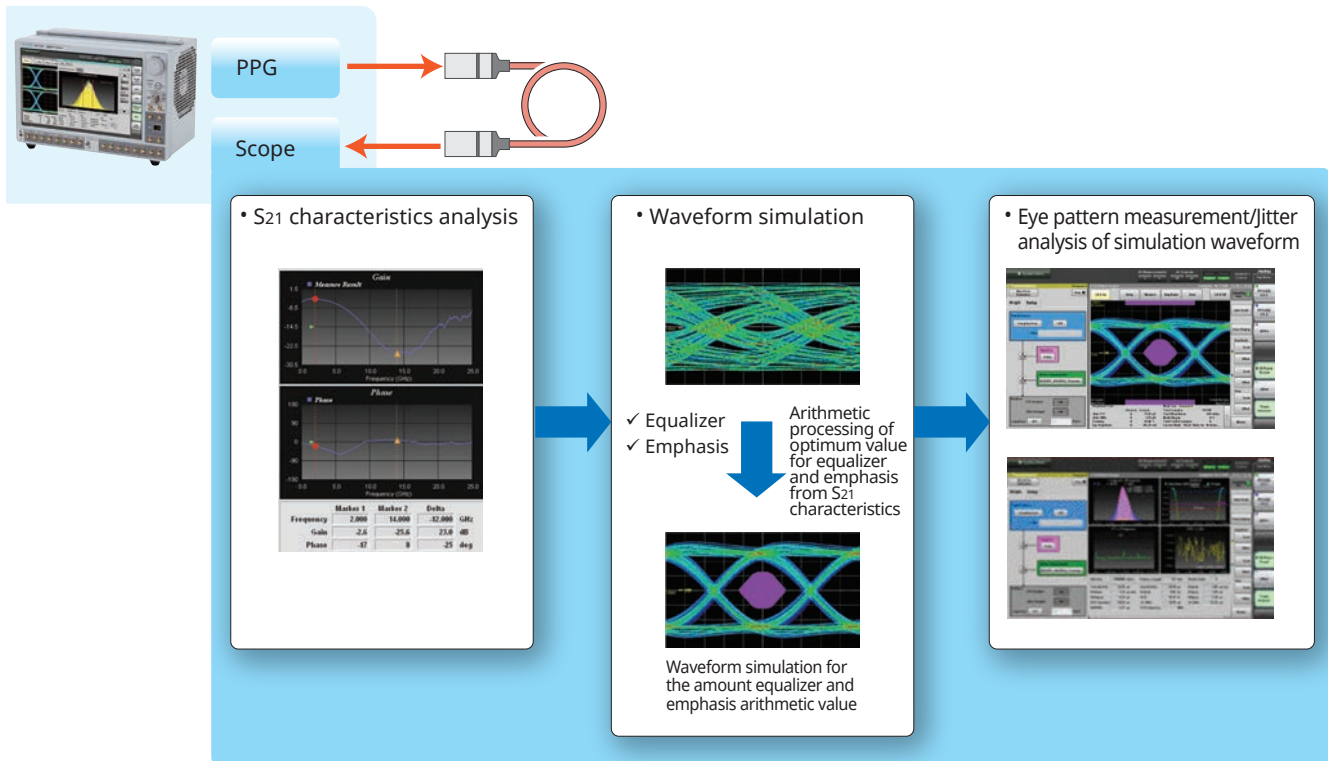


Typical values when capturing 10^6 samples at 10.3125 Gbit/s bit rate with PRBS15 test pattern at single-lane and back-to-back measurements

Applications

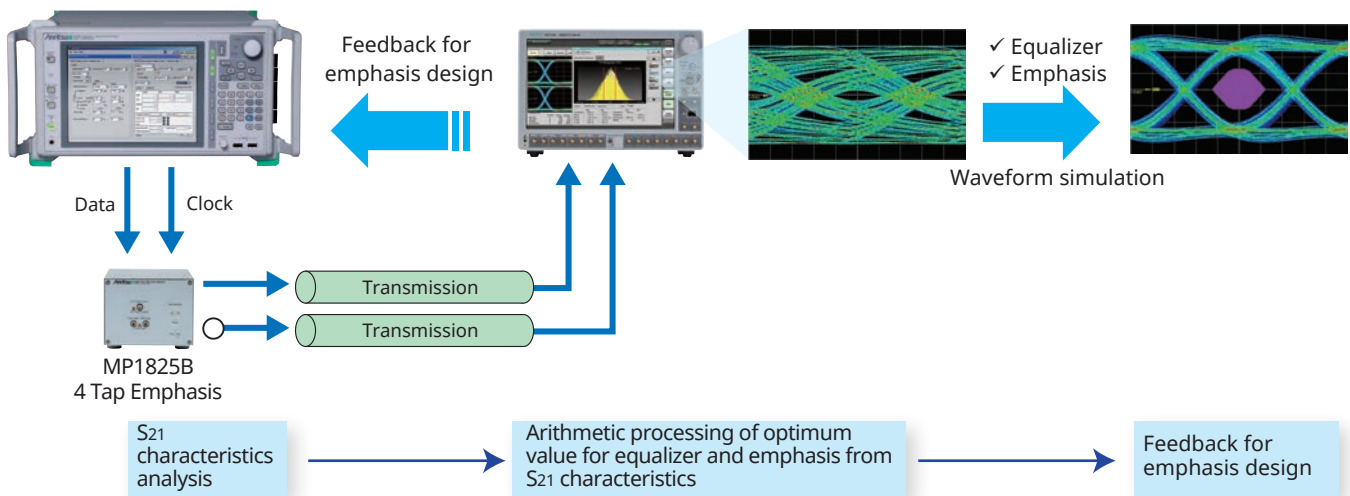
Direct Attach Cable (DAC) Measurements

The eye opening of passive cables like Direct Attach Cables (DAC) used for short connections between server racks, etc., can be assured using the equalizer built into the equipment Rx section. The MX210002A can be used to measure S_{21} (Gain, Phase) characteristics of these devices. Moreover, since waveforms with optimized equalizer, filter, and emphasis values can be predicted from these transmission characteristics, eye pattern measurement and eye mask test of simulated waveforms can be performed. In addition, combination with the MX210001A supports tests required for DAC manufacturing, such as eye pattern measurement and jitter analysis, in one unit.



Emphasis Effect Simulation

The same 4-tap emphasis as the 4 Tap Emphasis MP1825B can be set. The type of eye pattern resulting from equalization and emphasis correction of a waveform with an eye pattern degraded by transmission path loss, or analysis using on-the-spot waveform simulation to determine the required equalization or emphasis can be fed back into the emphasis design.



Jitter Analysis Software MX210001A/Transmission Analysis Software MX210002A

BERTWave MP2100B Selection Guide

Measurement Item	BERTWave MP2100B		Jitter Analysis Software MX210001A*1	Transmission Analysis Software MX210002A*1
	MP2100B-021	MP2100B-023		
Electrical Differential Measurement	✓			
Single-ended Electrical Measurement	✓	✓		
Optical Signal Measurement		✓		
Integrity of Signals Tests - Time and Amplitude Tests - Histogram Test - Eye Mask Test/Mask Margin Test	✓	✓		
Jitter Analysis			✓	
WDP Measurement			✓	
Transmission Analysis (S ₂₁ Gain, Phase)*2				✓
Waveform Simulation - Linear Equalizer/Filter, Emphasis Arithmetic				✓
Waveform Simulation + Jitter Analysis			✓	✓

*1: MX210001A and MX210002A operates on MP2100B-021 or MP2100B-023.

*2: Transmission analysis (S₂₁ Gain, Phase) operates on MP2100B-011/012/014 and MP2100B-021/023.

Jitter Analysis Software MX210001A/Transmission Analysis Software MX210002A

Specifications

Jitter Analysis Software MX210001A

Operating Conditions	Operates only when installed in MP2100B with correct license information The installer runs with V3.00.00 or later Other use conditions comply with MP2100B The WDP runs under MATLAB R2010b SP1									
Measurement Algorithm	Histogram mode, Pattern Search mode									
Histogram Mode										
Measurement Targets	Channel A, Channel B, Channel A&B, Differential signals (MP2100B-021)									
Measurement Items	TJ (1.0E-12), TJ (user defined)*, RJ (d-d), DJ (d-d), J2 jitter, J9 jitter, Eye opening*									
Measurement Graphs	TJ Histogram CHA, TJ Histogram CHB, Bathtub CHA, Bathtub CHB									
Pattern Search Mode										
Pattern Length	2 to 32768									
Measurement Targets	Channel A, Channel B, Differential signal (MP2100B-021)									
Measurement Items	TJ (1.0e-12), TJ (user defined)*, RJ (d-d), RJ (rms), DJ (d-d), PJ (p-p), DDJ (p-p), DCD, ISI (p-p), Eye opening*, J2 jitter, J9 jitter, DDPWS, PJ Frequency									
Measurement Graphs	TJ Histogram, RJ/PJ Histogram, DDJ Histogram, Composite histogram, DDJ vs. Bit, Bathtub, PJ vs. Frequency (Hz)									
PDJ Standard	Standard	HP0	HP1	HP1'	HP2	HP'	HP	LP	LP'	
PDJ Filter	STM-0	10	100	—	20 k	—	12 k	400 k	—	
	STM-1	10	500	—	65 k	—	12 k	1.3 M	500	
	STM-4	10	1 k	—	250 k	—	12 k	5 M	1 k	
	STM-16	10	5 k	—	1 M	—	12 k	20 M	5 k	
	STM-64	10	20 k	10 k	4 M	50 k	12 k	80 M	20 k	
	STM-256	—	80 k	20 k	16 M	—	—	320 M	—	
Measurement Edge Type	ALL, Rising, Falling									
Jitter Unit	UI, Time (Result of unit)									
WDP Measurement	Requires installation of MATLAB R2010b SP1 by MathWorks									
Measurement Targets	Channel A, Channel B									
Measurement Items	WDP, dWDP, TWDP, dTWDP, WDPc, dWDPc, TWDPc, dWDPc									
Signal Bit Rate	0.1 Gbit/s to 12.5 Gbit/s, 1-kbit/s steps									
Input Pattern	PRBS9, Variable									
Input Pattern Length	64 to 2048, 1 steps (input pattern variable)									

*: BER specified as TJ Measurement BER in setting items

Transmission Analysis Software MX210002A

Operating Conditions	Operates only when installed in MP2100B with correct license information The installer runs with V3.00.00 or later Other use conditions comply with MP2100B									
Measurement Mode	Transmission analysis, Waveform estimation									
Transmission Analysis*										
Measurement Items	Gain graph, Phase graph, Group delay graph (Phase graph and Group delay graph switching display)									
Gain Graph	Displays amplitude characteristics of transmission frequency characteristics									
Frequency Range	0.0 Hz to 25 GHz, 0.025-GHz steps									
Frequency Scale	0.5 GHz to 5.0 GHz/division, 0.1-GHz steps (max. frequency <25 GHz)									
Frequency Offset	0.0 Hz to 20.0 GHz, 0.5-GHz steps (max. frequency <25 GHz)									
Gain Scale	0.5 to 20.0 dB/division, 0.5-dB steps									
Gain Offset	-80.0 to +80.0 dB, 0.5-dB steps									
Phase Graph	Displays phase characteristics of transmission frequency characteristics									
Phase Scale	Degree: -180 to +180° Radian: -3.14 to +3.14									
Group Delay Graph	Displays group delay characteristic of transmission frequency characteristics. Group delay characteristic is set by relative delay.									
Group Delay Scale	1 to 1000 ps/division, 1-ps steps									
Group Delay Offset	-500 to +500 ps/division, 1-ps steps									
Phase Graph Unit	Degree, Radian									
Read Out Marker	Read Out Marker function									
Average	Displays average result/measurement (1 to 99 times, 1-time steps)									
Smoothing	Calculates moving average of measurement value (Enable, Disable switching display)									
Smoothing Factor	0.0 to 10.0%, 0.1% steps									
Calibration	Sets calibration information for basic transmission characteristics									
Waveform Estimation										
Equalizer Setting	Selects reflector, non-reflector at calculation									
Equalizer Type	Analog, Digital									
Emphasis Format	2Post/1Pre, 3Post, 1Post/1Pre, 2Post, 1Post									
Emphasis Tap	-10.0 to +10.0 dB, 0.1-dB steps									
Device Character	Reads S2P File									
Jitter Analysis	Displays estimated waveform calculation results at MX210001A (when MX210001A installed in MP2100B)									

*: Operates on MP2100B-021 or MP2100B-023

Ordering Information

Jitter Analysis Software MX210001A/Transmission Analysis Software MX210002A

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
MP2100B	Main frame BERTWave
MP2100B-021 MP2100B-023	Options Dual Electrical Receiver Optical/Single-ended Electrical Receiver
MX210001A MX210002A	Software Options Jitter Analysis Software Transmission Analysis Software
W3569AE W3571AE	Optional Accessories MX210001A Operation Manual MX210002A Operation Manual

Note: To compute the WDP, MATLAB R2010b by MathWorks purchase is required separately.



Specifications are subject to change without notice.

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