

Anritsu Optical Module Test Solutions

MP2100A
BERTWave Series

Anritsu Optical Module Test Solutions

Anritsu Corporation
Marketing Division

Agenda

- ❑ Customer challenges
- ❑ Fewer failures and lower purchase costs
- ❑ Increased test throughput and revenue
- ❑ Lower production line

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- ❑ **Customer challenges**
- ❑ Fewer failures and lower purchase costs
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Customer Challenges

- ❑ Fewer failures and lower purchase costs
- ❑ Increased test throughput and revenue
- ❑ Lower production line costs

Anritsu's test solutions for optical modules solve your challenges.



**Optical Spectrum Analyzer
MS9740A**



**BERTWave
MP2100A Series
(EYE/Pulse scope
+ 10G BERT)**



**Signal Quality Analyzer
MP1800A Series
(High-speed parallel BERT)**

Test Solutions for Optical Modules



**BERTWave
MP2100A Series**

Measurement Solution:

- 10 Gbit/s BER tests, EYE/Pulse Scope tests

Features:

- All-in-one solution supporting BERT and Scope
- BERT expansion to 2 channels
- Fast remote control and high-speed eye mask tests
- Compact design (180-mm depth)



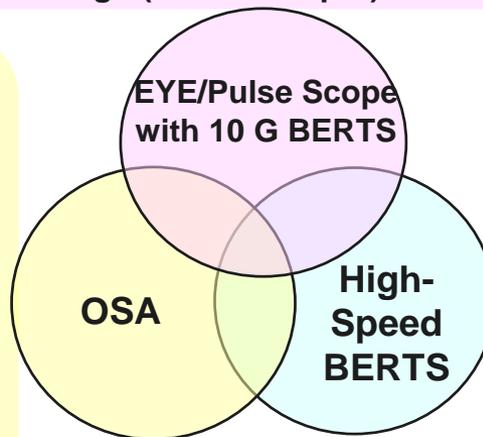
**Optical Spectrum
Analyzer MS9740A**

Measurement solution:

- Optical active device evaluation, WDM analysis, EDFA analysis

Features:

- Industrial-fast measurement:
 - Sweep time 0.2 s/5 nm
- Application oriented 7 analysis functions
 - DFB-LD, FP-LD, WDM, LD, LED, Opt-amp, PMD
- High performance:
 - Wide dynamic range >58 dB
 - Minimum RBW: 30 pm



**Signal Quality
Analyzer
MP1800A Series**

Measurement solution:

- 10/25/40/56 Gbit/s device tests

Features:

- Wideband BERT: 0.1 to 56 Gbit/s
- High-quality waveform
- Multichannel configuration
- Flexible upgradability
- Signal integrity tests, such as Bathtub tests

Agenda

- ❑ Customer challenges
- ❑ **Fewer failures and lower purchase costs**
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Fewer Failures and Lower Purchase Costs (1/6)

Anritsu's solutions improve product yields with:

- High-performance waveforms**
- High-accuracy and repeatable measurements**
- DUT margin**
- Worst-case condition tests**

- No drop in yields due to effect of test system.
- Assured product quality by testing under worst conditions.

Fewer Failures and Lower Purchase Costs (2/6)

High-performance waveforms



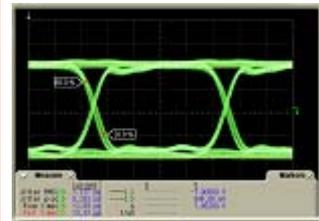
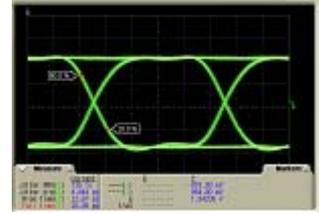
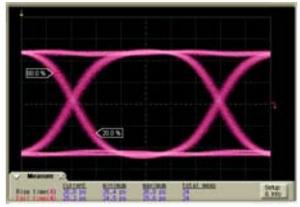
MP2100 Series



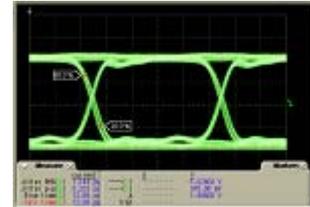
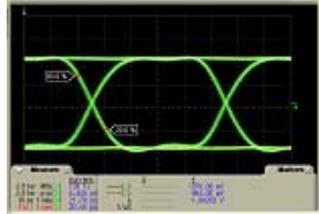
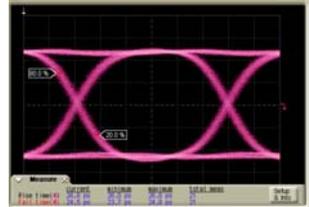
MP1800 Series

Competitor A

9.953 Gbit/s
PRBS 7



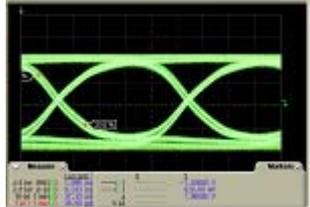
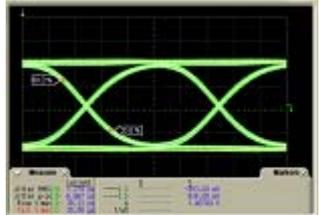
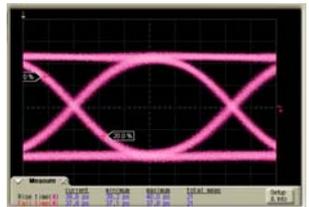
9.953 Gbit/s
PRBS 31



Modules without CDR, such as SFP+, are more affected by frequency characteristics with impaired waveform propagation

PRBS31 waveform fuzzy due to poor frequency characteristics.

Via BT filter
9.953 Gbit/s



Closed eye opening

→ worse yield

Narrow band + 2.5 Vpp option
MU181020A-001+011

Noise increases due to impedance mismatching.

Fewer Failures and Lower Purchase Costs (3/6)

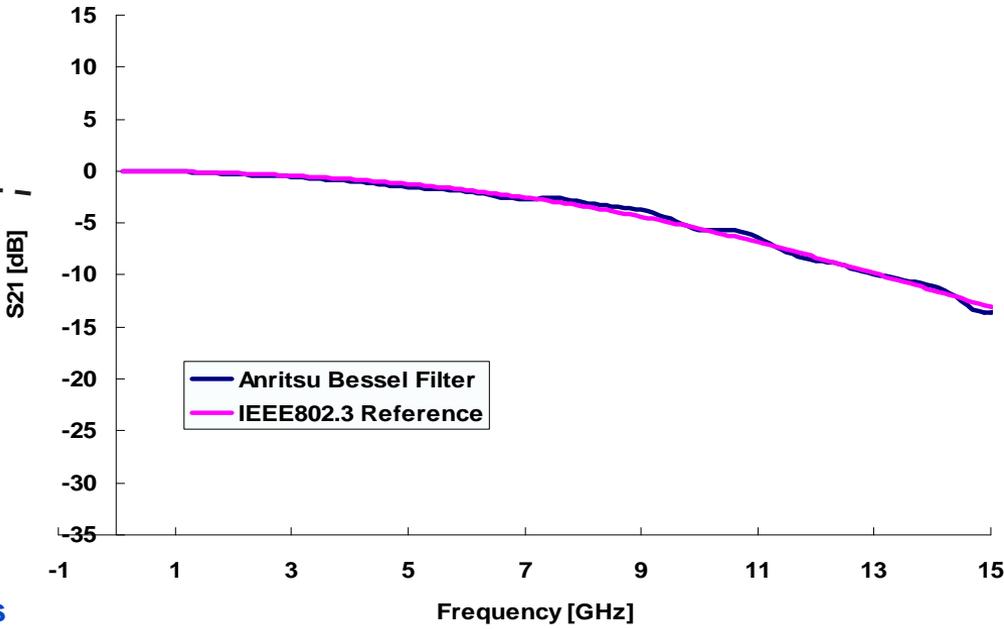
High-accuracy and repeatable measurements (ER/Mask)

Ideal Bessel Filter (Scope feature)

- Bessel filter with ideal frequency characteristics supports high-accuracy extinction ratio and mask measurements



Scope for MP2100 Series



Mismatched filter causes different Tr/Tf and 0/1 rail behavior.



As a result, ER and mask measurements are incorrect.

(Fc = 7.5 GHz) Frequency characteristics

Fewer Failures and Lower Purchase Costs (4/6)

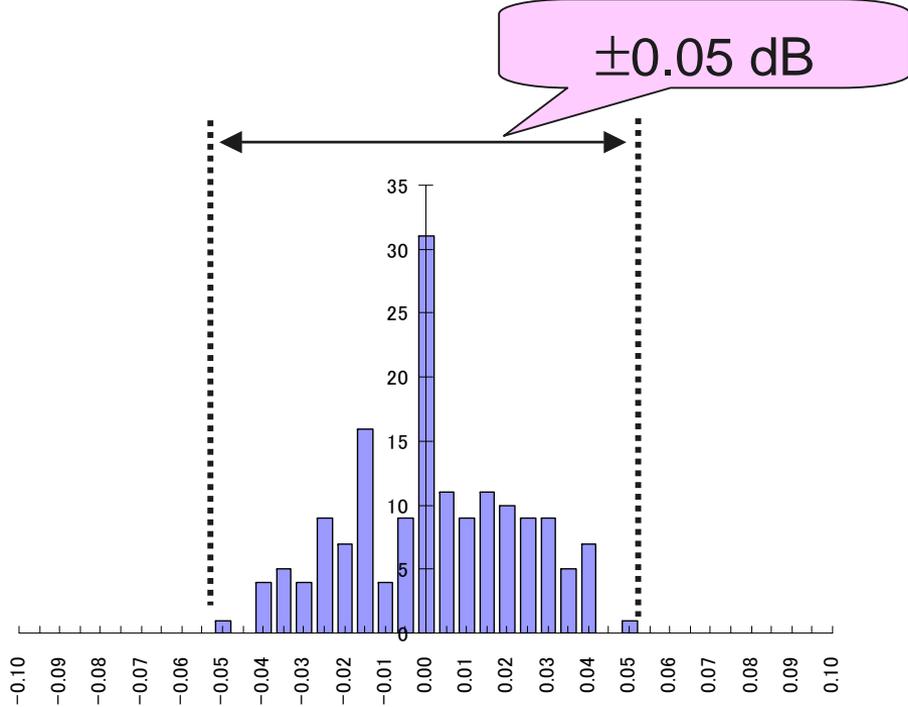
High-accuracy and repeatable measurements (ER)

High-accuracy Results

- ◆ Calibration using reference light source holds error to $< \pm 0.05$ dB (typ.)



Scope for MP2100 Series



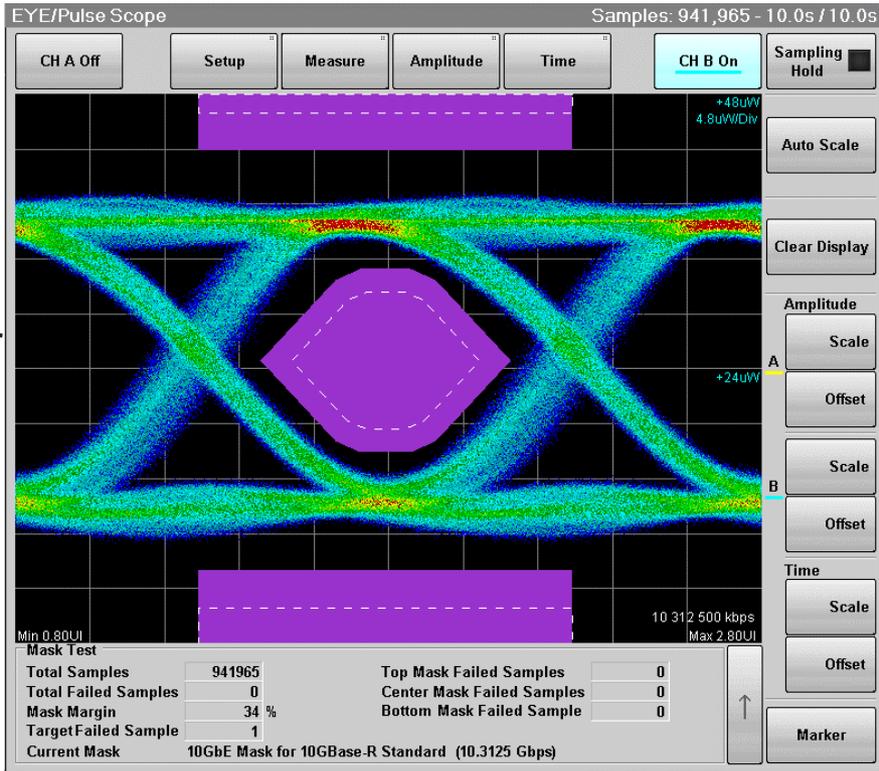
Fewer Failures and Lower Purchase Costs (5/6)

□ DUT Margin (Mask margin)

- Confirm product margin against standards to improve yields



Scope for MP2100 Series



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

Fewer Failures and Lower Purchase Costs (6/6)

Worst-case condition test (Crosstalk)



300-pin MSA



XFP MSA

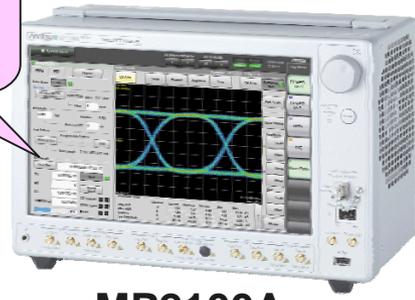
Higher module density causes **crosstalk**

MSA modules are getting smaller and higher density. And there are more new SFP+ modules.

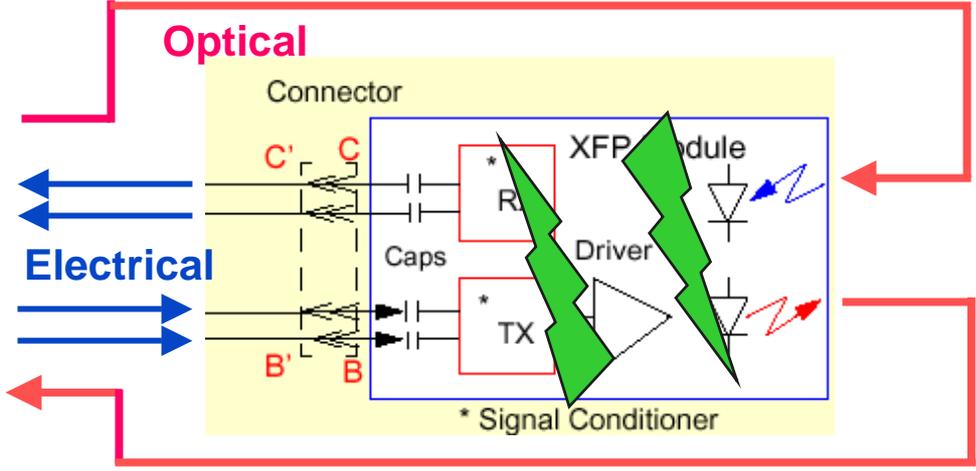
Crosstalk between Tx and Rx should be considered in such modules.

Anritsu's simple and effective test configuration for such modules is shown below.

- BER
- Mask



MP2100A
BERTWave



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- ❑ **Increased test throughput and revenue**
- ❑ Lower production line costs

Anritsu's solution increases test throughput and revenue

- ❑ High-speed measurements
- ❑ Multiple DUT tests and measurement of all items at once

Increased Test Throughput and Revenue (2/8)

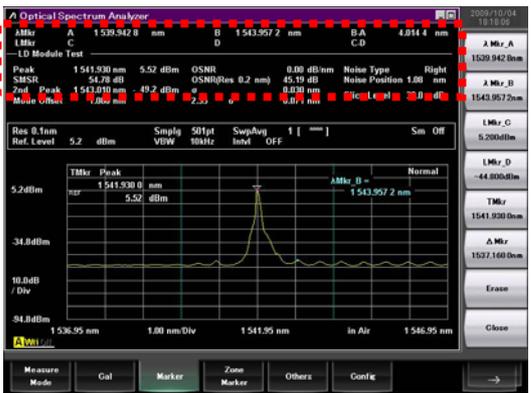
High-speed measurement (all items at once)

Displays all analysis results required for optical transceiver measurements on one screen.



MS9740A Optical Spectrum Analyzer

LD Module Test						
Peak	1 541.930 nm	5.52 dBm	OSNR	0.00 dB/nm	Noise Type	Right
SMSR	54.78 dB		OSNR(Res 0.2 nm)	45.19 dB	Noise Position	1.08 nm
2nd Peak	1 543.010 nm	- 49.2 dBm	σ	0.030 nm	Slice Level	30.0 dB
Mode Offset	1.080 nm		2.35 σ	0.071 nm		



➤ See everything on one screen!

- ✓ Center wavelength, level
- ✓ OSNR (actual measured value)
- ✓ OSNR (noise level per nm)
- ✓ SMSR
- ✓ Spectrum width

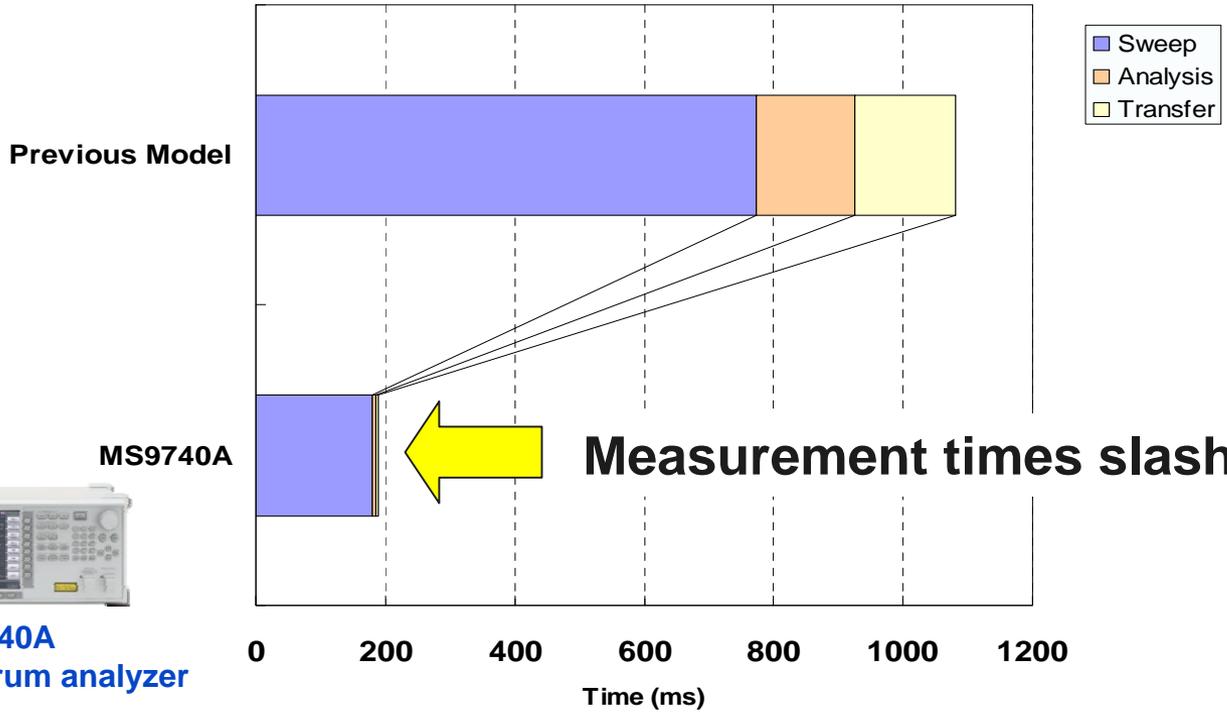
Increased Test Throughput and Revenue (3/8)

High-speed measurement (measurement to data transfer)

Fast measurement time from waveform sweeping to data transfer

Spectrum measurement at **0.2 s/5 nm** real-time sweeping

GPIB Interface, SMSR Measurement Time (DFB-LD), VBW=10 kHz,
Resolution: 0.1 nm, Sweep Width: 5 nm, Sampling Point: 501

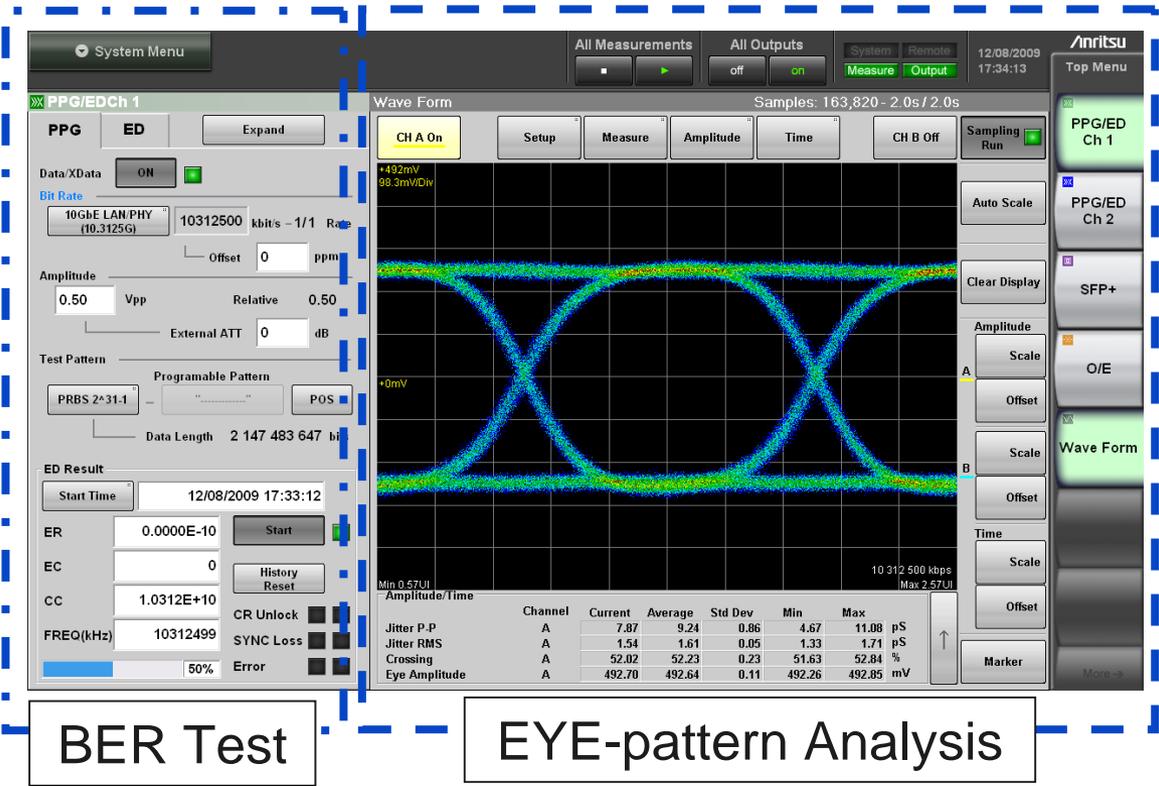


MS9740A
Optical spectrum analyzer

Increased Test Throughput and Revenue (4/8)

High-speed measurement (all items at once)

- All BER and EYE-pattern analysis results displayed on one screen without changing connections (Note)



(Note) With MP2100A

Increased Test Throughput and Revenue (5/8)

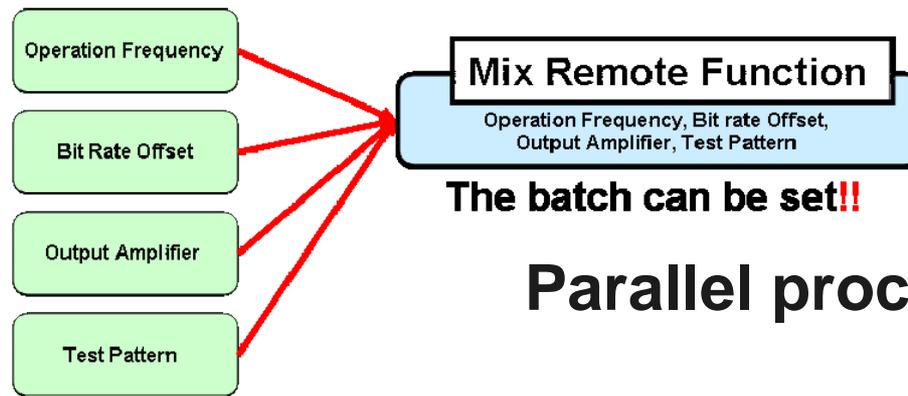
□ High-speed measurement (remote control)

◆ Mix Remote Function supports batch command setting

- 📁 Batch setting of commands cuts setting times
- 📁 Batch sending of 4 commands and internal parallel processing cuts setting times **by 75%**



MP2100 Series



Parallel processing

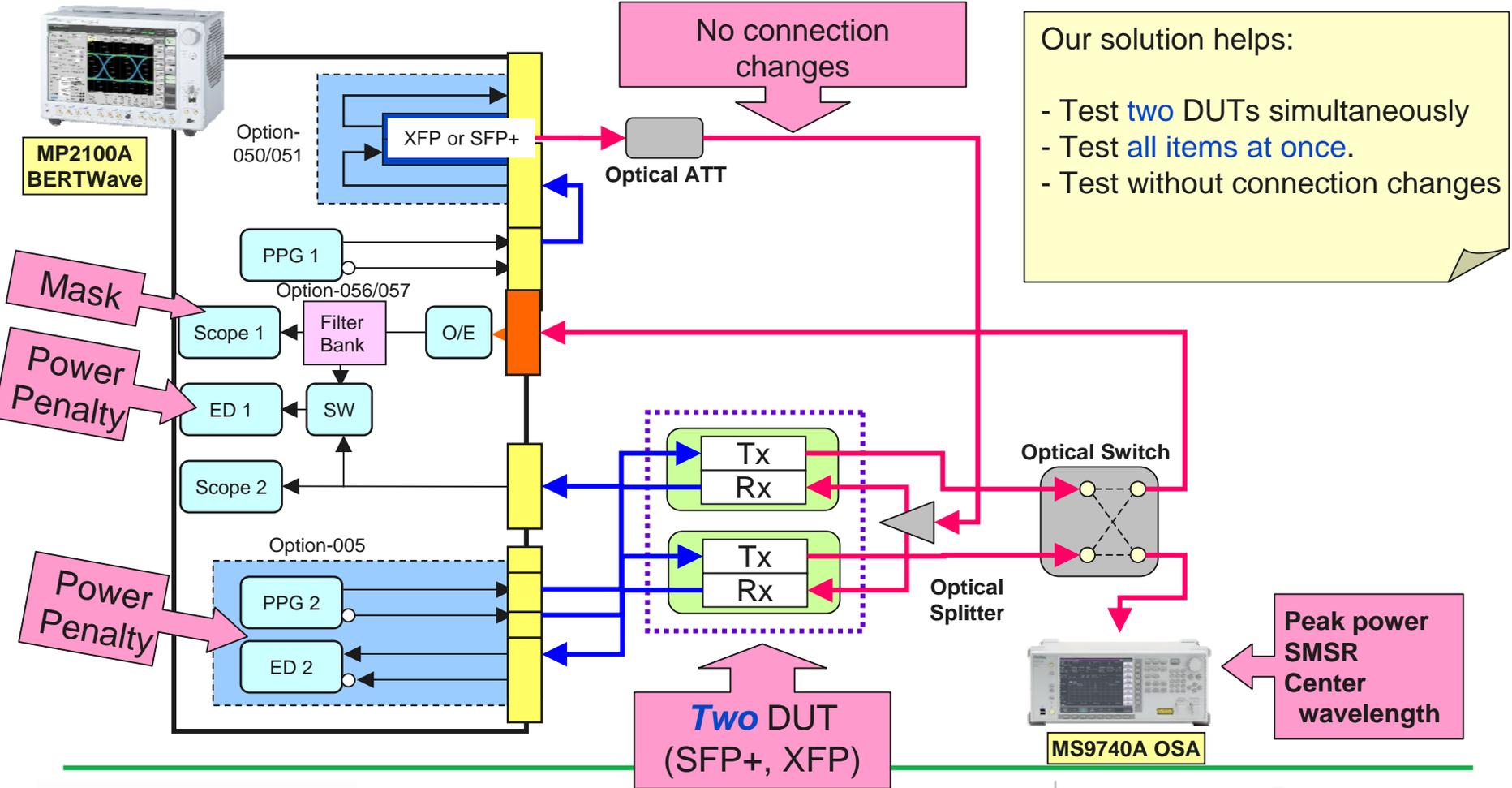
◆ Gating time: 10 ms

- 📁 ED BER results refreshed at 10-ms intervals (conventional: 100 ms)
- 📁 Cuts power penalty measurement times **by 90%** (Note)

(Note) Bit Rate: 10 Gbit/s, Detection Threshold: 1.0E-8

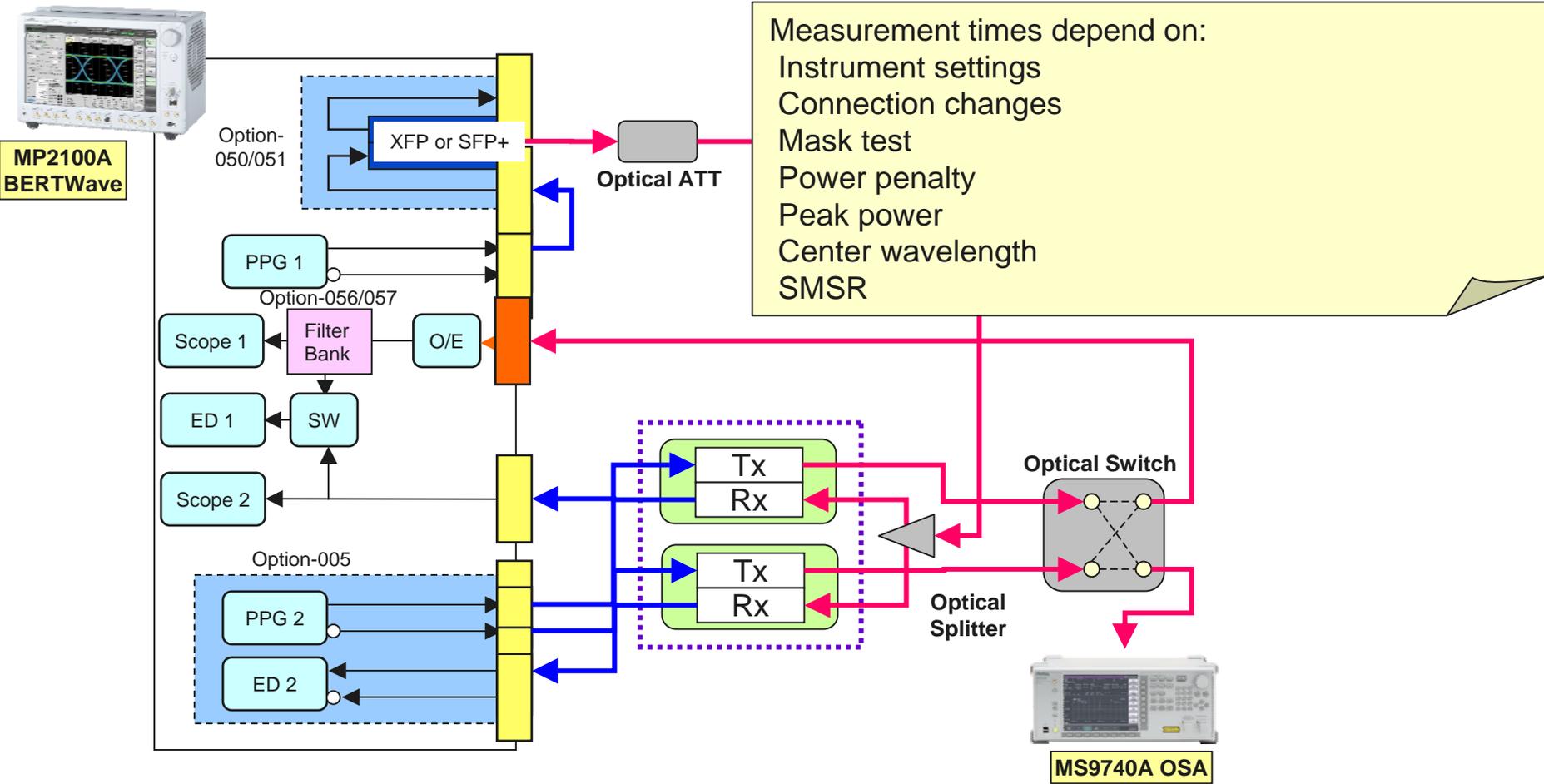
Increased Test Throughput and Revenue (6/8)

Multiple DUT tests and measurement of all items at once



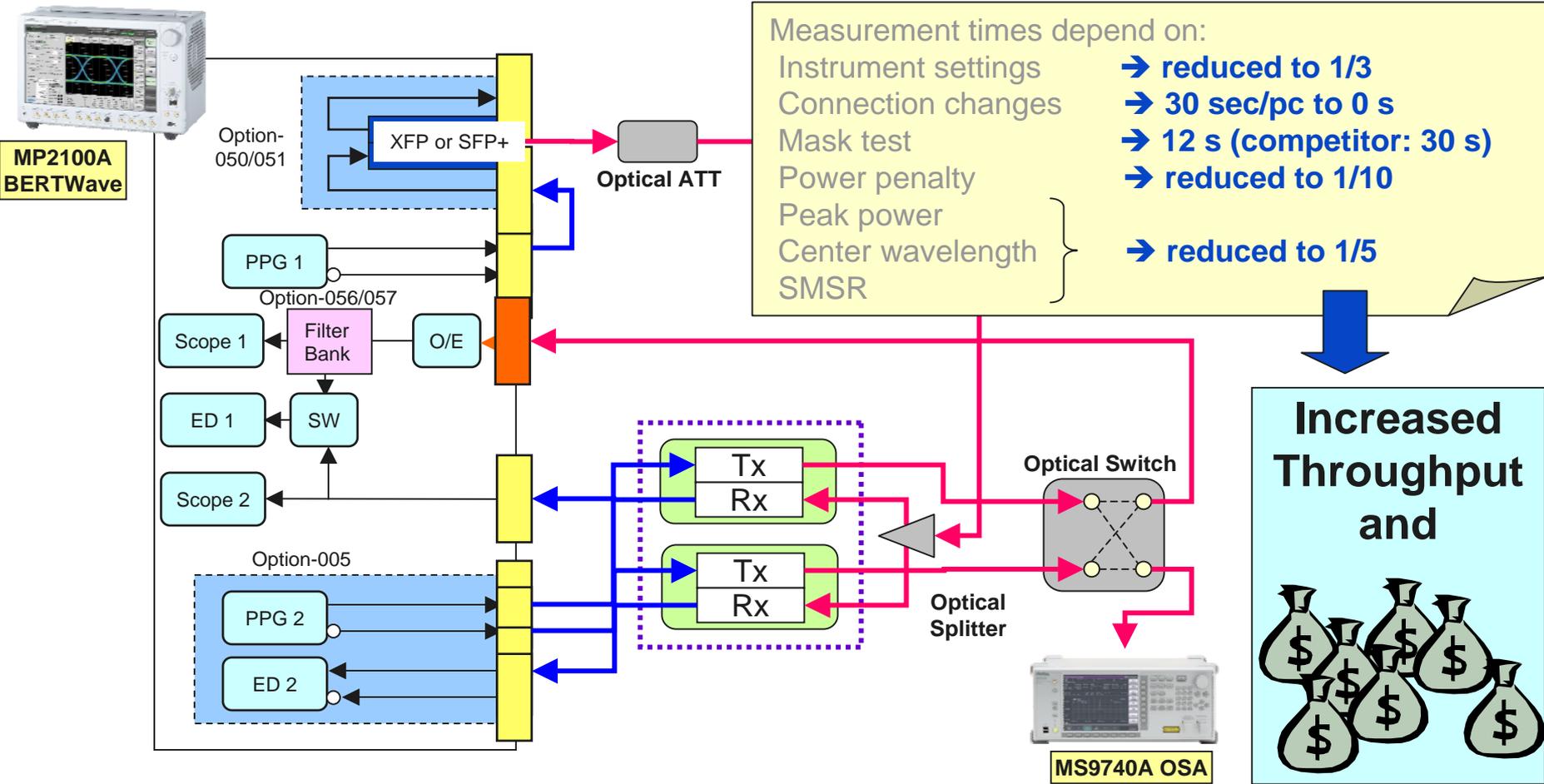
Increased Test Throughput and Revenue (7/8)

Multiple DUT tests and measurement of all items at once



Increased Test Throughput and Revenue (8/8)

Multiple DUT tests and measurement of all items at once



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- ❑ **Lower production line costs**

Lower Production Line Costs (1/3)

Anritsu's solutions cut production line costs

- ❑ **Cut instrument costs**
- ❑ **Cut control software replacement costs**

Lower Production Line Costs (2/3)

□ Cut instrument costs

- **Scope** (MP2100 series)

Save 34% of costs compared to competitor
(Filters, CDR + Optical/Electrical interface)



- **BERT** (MP2100 series)

Save 31% of costs compared to competitor
(10G 2ch BERT)

- **BERT + Scope** is not simple sum

Save 46% of costs for 1 Scope and 2-ch BERT!

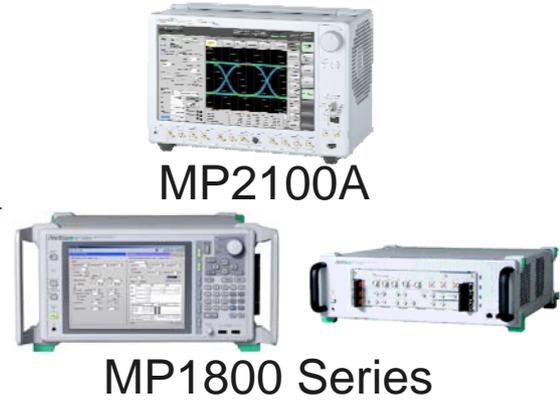
- Anritsu's proposed test configuration allows **simultaneous** testing of **multiple DUTs**, cutting costs and number of production lines.

Lower Production Line Costs (3/3)

❑ Cut control software replacement costs



- **Compatible with previous model remote control**
 - ➔ Easy upgrade to latest model



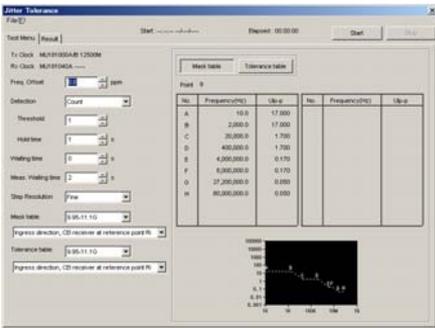
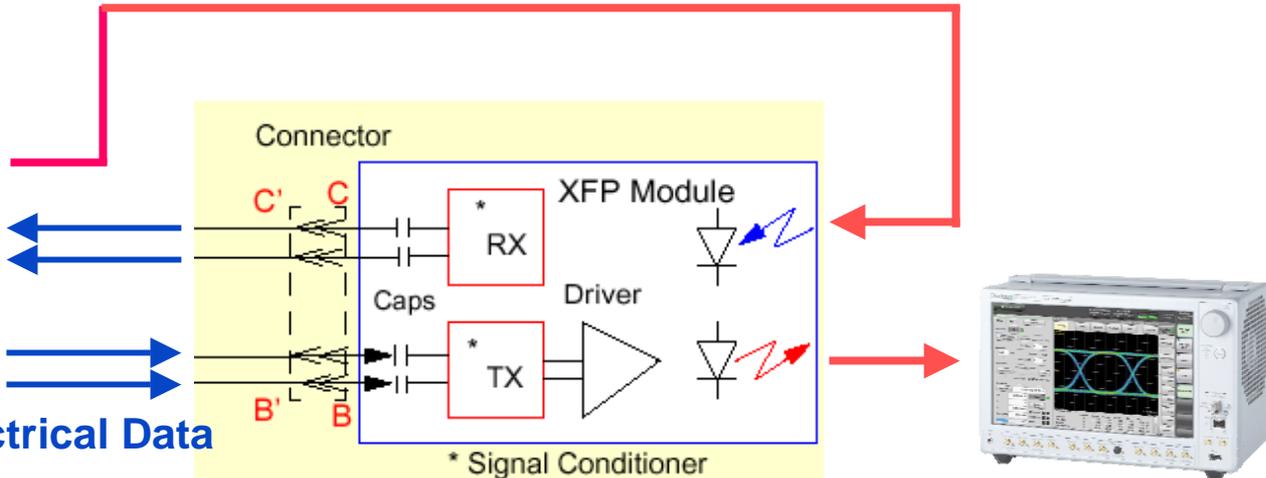
Appendix

Other Features (1/4)

**MP1800A
Signal Quality Analyzer**



Electrical Data



Save test times!

Two automatic measurements to cut measurement time:

- * **Jitter Tolerance** function for measuring Jitter Tolerance margin
- * **Jitter Sweep** function for Jitter Tolerance Go/No-go spec tests

MX180005A Jitter Application Software

Other Features (2/4)



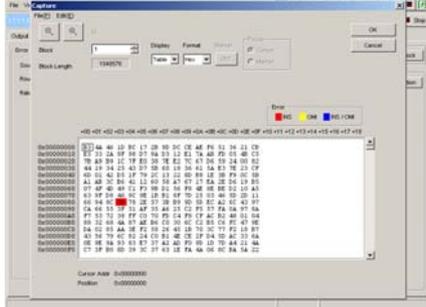
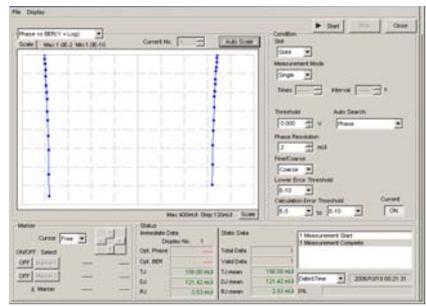
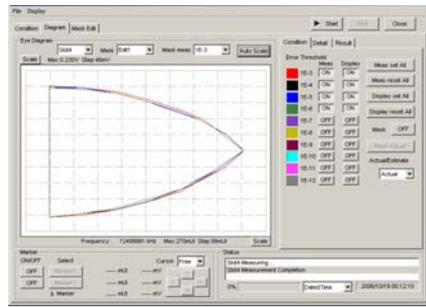
MP1800 supports versatile signal analysis functions

Eye Diagram

Bathtub/Q Measurement

Capture (128 Mbits max.)

ISI Analysis



DCA cannot display BER $<10^{-6}$
Estimate function also available for smaller BER measurements

Bathtub measurements for separate TJ/DJ/RJ
Q measurements to evaluate waveform

Capture data by error, pattern match, external trigger and manual trigger

Easy to recognize bit sequence causing error



Seven Application Modes

At evaluation of LD characteristics, analysis items and methods can be tailored to the spectrum, such as a single DFB-LD spectrum, multiple discrete-wavelength FP-LD, wideband LED, etc.

The MS9740A has seven modes (DFB-LD, FP-LD, LED, PMD, Opt Amp, WDM, LD Module) matching the measurement target.

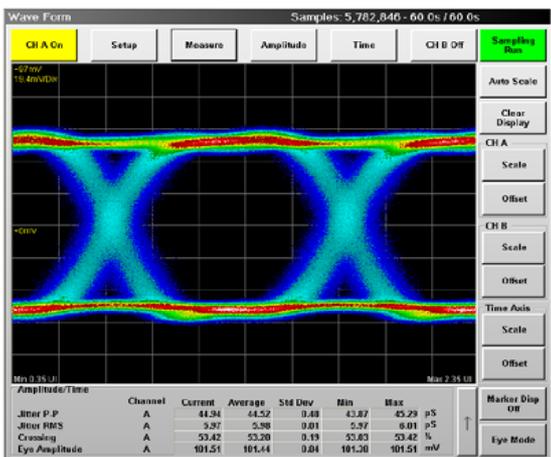
Test Target	
LD Module 	Evaluation of optical-transceiver characteristics
DFB-LD	Evaluation of single vertical-mode spectrum
FP-LD	Evaluation of multiple discrete-wavelength spectrum
LED	Evaluation of wideband light source spectrum
PMD	Evaluation of PMD characteristics of optical fiber
Opt. Amp	Evaluation of gain and NF characteristics of fiber amplifier (EDFA)
WDM	Evaluation of WDM signal spectrum for up to 300 wavelengths (channels)

Other Features (4/4)

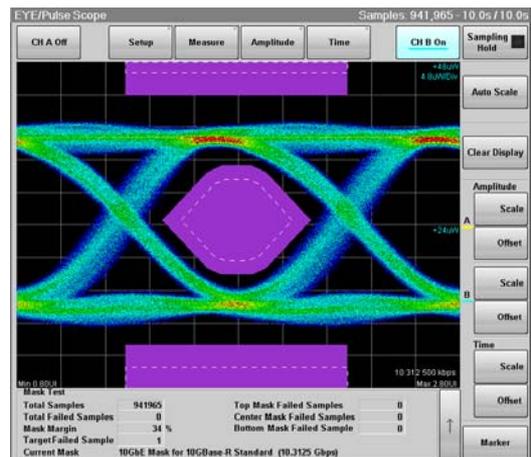
Application Tests

◆ EYE/Pulse Scope supports signal integrity analysis

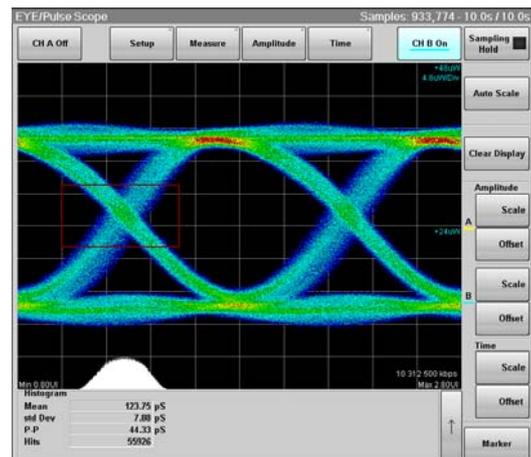
- Time/Amplitude Tests
- Mask Tests/Mask Margin Tests
- Histogram Tests



Time/Amplitude Test



Mask Test/Mask Margin Test



Histogram Test

Anritsu Corporation

5-1-1 Onna, Atsugi-shi, Kanagawa, 243-8555 Japan
Phone: +81-46-223-1111
Fax: +81-46-296-1238

• U.S.A.

Anritsu Company

1155 East Collins Blvd., Suite 100, Richardson,
TX 75081, U.S.A.
Toll Free: 1-800-267-4878
Phone: +1-972-644-1777
Fax: +1-972-671-1877

• Canada

Anritsu Electronics Ltd.

700 Silver Seven Road, Suite 120, Kanata,
Ontario K2V 1C3, Canada
Phone: +1-613-591-2003
Fax: +1-613-591-1006

• Brazil

Anritsu Eletrônica Ltda.

Praça Amadeu Amaral, 27 - 1 Andar
01327-010 - Bela Vista - São Paulo - SP - Brasil
Phone: +55-11-3283-2511
Fax: +55-11-3288-6940

• Mexico

Anritsu Company, S.A. de C.V.

Av. Ejército Nacional No. 579 Piso 9, Col. Granada
11520 México, D.F., México
Phone: +52-55-1101-2370
Fax: +52-55-5254-3147

• U.K.

Anritsu EMEA Ltd.

200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K.
Phone: +44-1582-433200
Fax: +44-1582-731303

• France

Anritsu S.A.

16/18 avenue du Québec-SILIC 720
91961 COURTABOEUF CEDEX, France
Phone: +33-1-60-92-15-50
Fax: +33-1-64-46-10-65

• Germany

Anritsu GmbH

Nemetschek Haus, Konrad-Zuse-Platz 1
81829 München, Germany
Phone: +49-89-442308-0
Fax: +49-89-442308-55

• Italy

Anritsu S.p.A.

Via Elio Vittorini 129, 00144 Roma, Italy
Phone: +39-6-509-9711
Fax: +39-6-502-2425

• Sweden

Anritsu AB

Borgarfjordsgatan 13, 164 40 KISTA, Sweden
Phone: +46-8-534-707-00
Fax: +46-8-534-707-30

• Finland

Anritsu AB (Finland)

Teknobulevardi 3-5, FI-01530 VANTAA, Finland
Phone: +358-20-741-8100
Fax: +358-20-741-8111

• Denmark

Anritsu A/S (for Service Assurance)

Anritsu AB (Denmark) (for Test & Measurement except Service Assurance)

Kirkebjerg Allé 90, DK-2605 Brøndby, Denmark
Phone: +45-7211-2200
Fax: +45-7211-2210

• Russia

Anritsu EMEA Ltd.

Representation Office in Russia

Tverskaya str. 16/2, bld. 1, 7th floor.
Russia, 125009, Moscow
Phone: +7-495-363-1694
Fax: +7-495-935-8962

• United Arab Emirates

Anritsu EMEA Ltd.

Dubai Liaison Office

P O Box 500413 - Dubai Internet City
Al Thuraya Building, Tower 1, Suit 701, 7th Floor
Dubai, United Arab Emirates
Phone: +971-4-3670352
Fax: +971-4-3688460

• Singapore

Anritsu Pte. Ltd.

60 Alexandra Terrace, #02-08, The Comtech (Lobby A)
Singapore 118502
Phone: +65-6282-2400
Fax: +65-6282-2533

• India

Anritsu Pte. Ltd.

India Branch Office

3rd Floor, Shri Lakshminarayan Niwas, #2726, 80 ft Road,
HAL 3rd Stage, Bangalore - 560 075, India
Phone: +91-80-4058-1300
Fax: +91-80-4058-1301

• P.R. China (Hong Kong)

Anritsu Company Ltd.

Units 4 & 5, 28th Floor, Greenfield Tower, Concordia Plaza,
No. 1 Science Museum Road, Tsim Sha Tsui East,
Kowloon, Hong Kong
Phone: +852-2301-4980
Fax: +852-2301-3545

• P.R. China (Beijing)

Anritsu Company Ltd.

Beijing Representative Office

Room 2008, Beijing Fortune Building,
No. 5, Dong-San-Huan Bei Road,
Chao-Yang District, Beijing 100004, P.R. China
Phone: +86-10-6590-9230
Fax: +86-10-6590-9235

• Korea

Anritsu Corporation, Ltd.

8F Hyunjuk Building, 832-41, Yeoksam Dong,
Kangnam-ku, Seoul, 135-080, Korea
Phone: +82-2-553-6603
Fax: +82-2-553-6604

• Australia

Anritsu Pty. Ltd.

Unit 21/270 Ferntree Gully Road, Notting Hill,
Victoria 3168, Australia
Phone: +61-3-9558-8177
Fax: +61-3-9558-8255

• Taiwan

Anritsu Company Inc.

7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan
Phone: +886-2-8751-1816
Fax: +886-2-8751-1817

Please Contact:

