

MP1595A

40G SDH/SONET Analyzer

MP1595A 40G SDH/SONET Analyzer Product Introduction

31 May 2007

Anritsu Corporation
IP Network Measurement Division

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What is MP1595A?

- With the rapid spread of high-speed broadband networks offering triple-play services, FMC, etc., core networks are moving to 40G. Anritsu's MP1595A is a next-generation 40G SDH/SONET analyzer that builds on **Anritsu's broad experience in SDH/SONET analyzer technologies**. It is an all-in-one solution supporting all measurements required for evaluation of 40G SDH/SONET/OTN networks and equipment.
- Supports new 40G I/F while keeping familiar GUI and operability of popular MP1590B for 10G SDH/SONET/OTN equipment



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What is MP1595A?

- ◆ 1-Box Analyzer for **STM-256/OC-768, OTU-3**
- ◆ SDH/SONET/PDH/DSn/OTN support **from 1.5Mbit/s to 10.7Gbit/s**
- ◆ **Error and alarm insertion/detection and in-service monitoring**
- ◆ **Jitter and Wander** Configurations Available



MP1595A 40G SDH/SONET Analyzer

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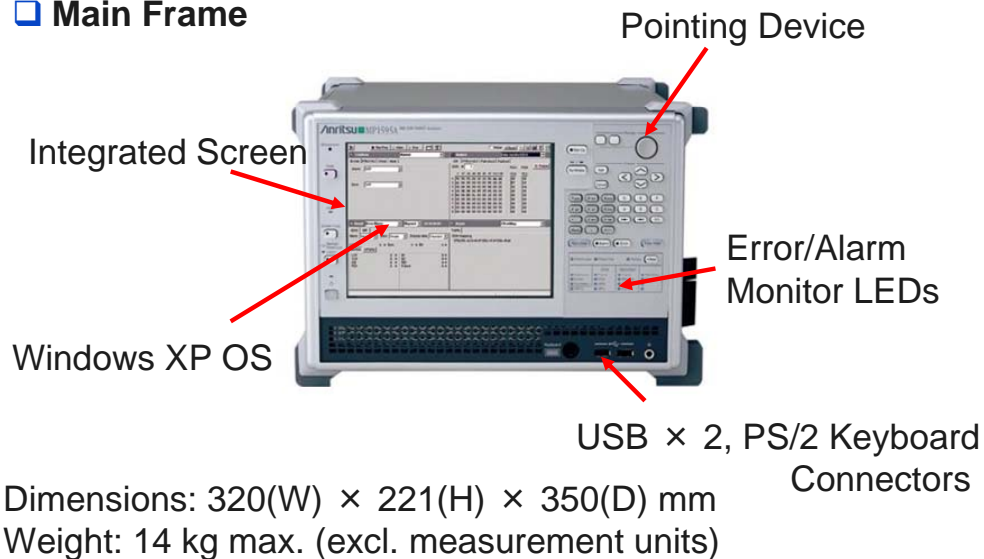
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Outline

□ Main Frame



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Outline

Supported Bit Rates

1.5 Mbit/s – 43 Gbit/s

- SDH/SONET: STM-0/STS-1 to STM-256/STS-768
- OTN: OTU1/OTU2/OTU3
- PDH: E1/E2/E3/E4
- DSn: DS1/DS3
- Non Frame: Setting supported for all above bit rates

Mapping (40/43G)

40G

- VC4*256c/STS768c, VC4*64c/STS192c, VC4*16c/STS48c, VC4*4c/STS12c
- Supports Low Order mapping in combination with MU150100A

43G

- OTU3, ODTU23

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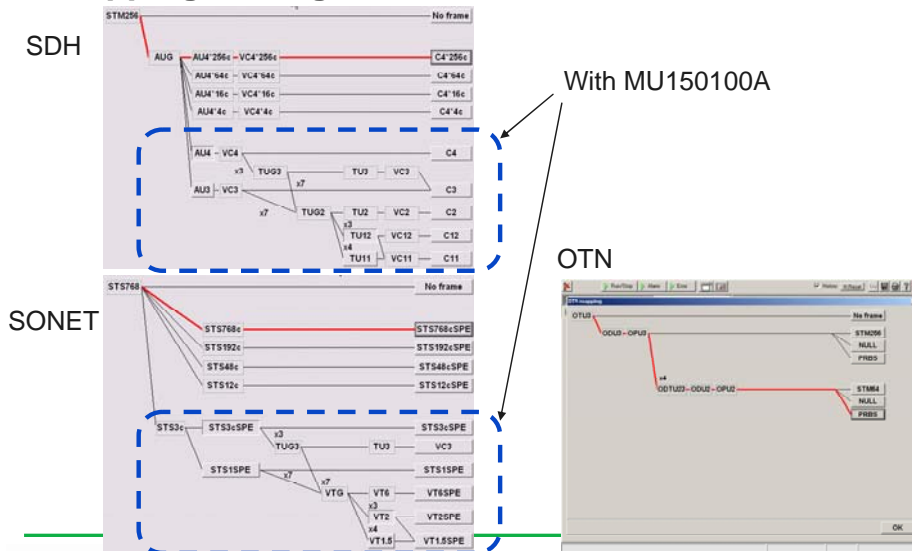
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Outline

Mapping Setting Screens



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Main Applications

- Error/Alarm insertion and detection
- Monitoring
- APS Measurement
- Frame memory/capture
- Through mode
- Delay time measurement



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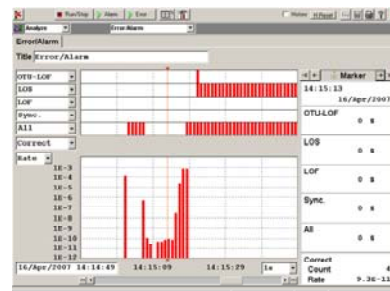
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Application Examples (1/7)

- Error/Alarm Insertion
 - ◆ Inserts **Errors**, such as **FAS, BIP-8, and B1/B2/B3**, as well as **Alarms**, such as **LOF, LOM, AIS**
 - ◆ Supports **selection of various insertion timings**, such as Rate, Alternative, Single, Burst, All, and Frame
 - ◆ Specifies error bit insertion position for B1/B2/B3, and BIP-2 errors

- Error/Alarm Detection
 - ◆ Count and Rate results at Result screen
 - ◆ Monitor generation history at Monitor screen



Error Alarm Monitor Screen

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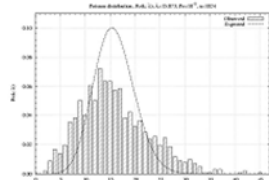
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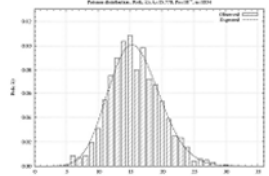
Application Examples (2/7)

Insert ITU-T O.182-compliant Random Errors

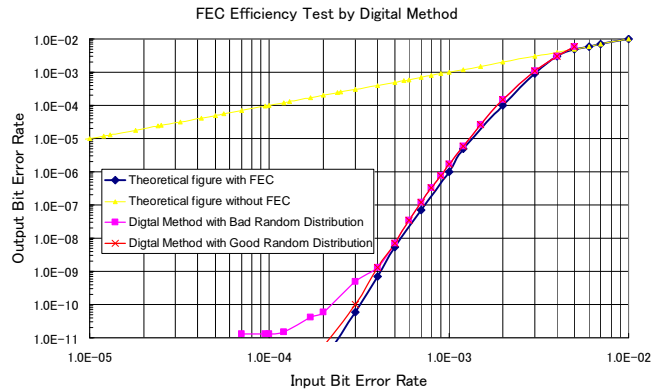
- ◆ Evaluates FEC efficiency using **ITU-T O.182-compliant error signal (errors fitting Poisson distribution)**



Bad Random Distribution



Good Random Distribution



Error Correction Curves

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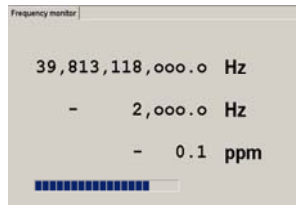
Application Examples (3/7)

Monitoring Functions

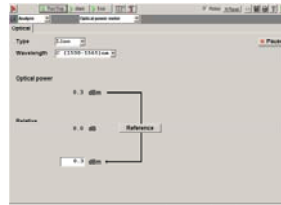
- ◆ Full Line of Versatile Functions for Network Monitoring

- ☑ Error/Alarm monitor
- ☑ Frequency monitor
- ☑ Optical Input level monitor
- ☑ Pointer monitor
- ☑ OH Monitor

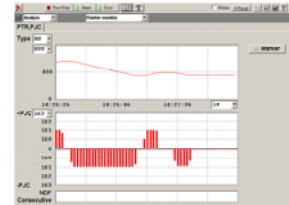
- ◆ Error/Alarm and Pointer Monitors Displayed as Graphical Log



Frequency



Optical Input Level



Pointer

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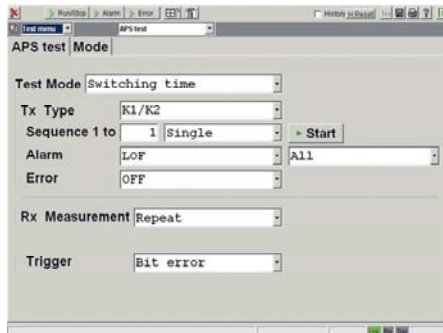
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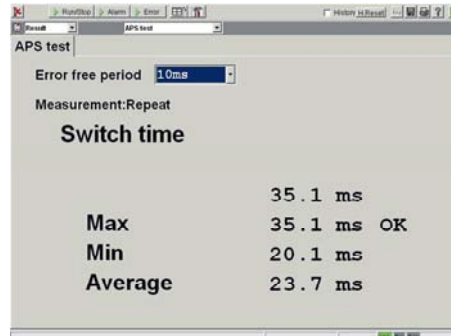
Application Examples (4/7)

□ APS (Automatic Protection Switch) Measurement

- ◆ Measures equipment circuit switching time with 0.1-ms resolution using any Error/Alarm as trigger



APS Measurement Setting Screen



APS Measurement Results Screen

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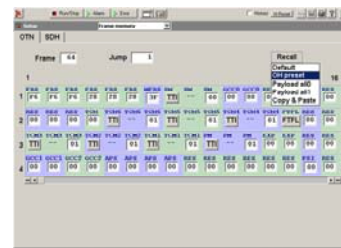
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Application Examples (5/7)

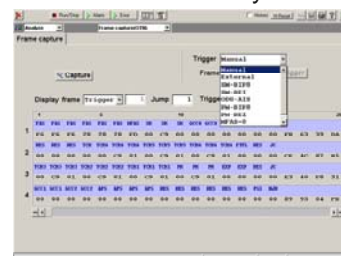
□ Frame Memory/Capture Function (MU150140A-10)

OPTION

- ◆ Demonstrates usefulness when collecting fault data to reproduce problem
- ◆ Frame Memory Function
 - ☑ Set all bytes except B1, B2, HP-B3/B3-P, and Pointer
 - ☑ Set max. of 16 STM-256/STS-768 frames
 - ☑ Set max. of 256 OTU3 frames
- ◆ Frame Capture Function
 - ☑ Set any Error/Alarm as trigger
 - ☑ Capture max. of 16 STM-256/STS-768 frames
 - ☑ Capture max. of 256 OTU3 frames



Frame Memory画面



Frame Capture Screen

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Application Examples (6/7)

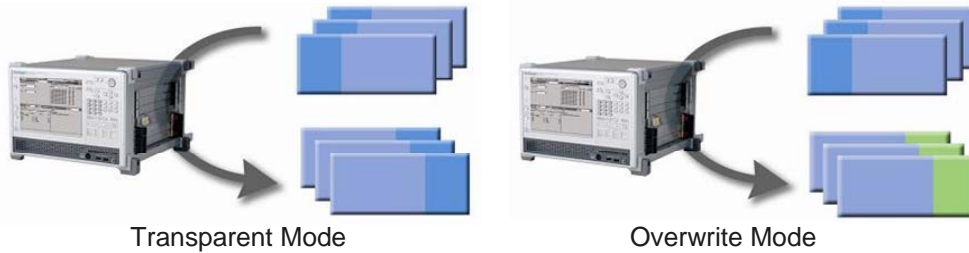
□ Through Mode Functions

◆ Transparent Mode

- ☑ Monitors circuit quality by outputting looped-back received signal
- ☑ **Emulates actual circuit** by inputting random errors

◆ OH Overwrite Mode

- ☑ Overwrites OH part of received signal with OH specified at MP1595A and outputs signal
- ☑ Inserts various Errors/Alarms into in-service circuit



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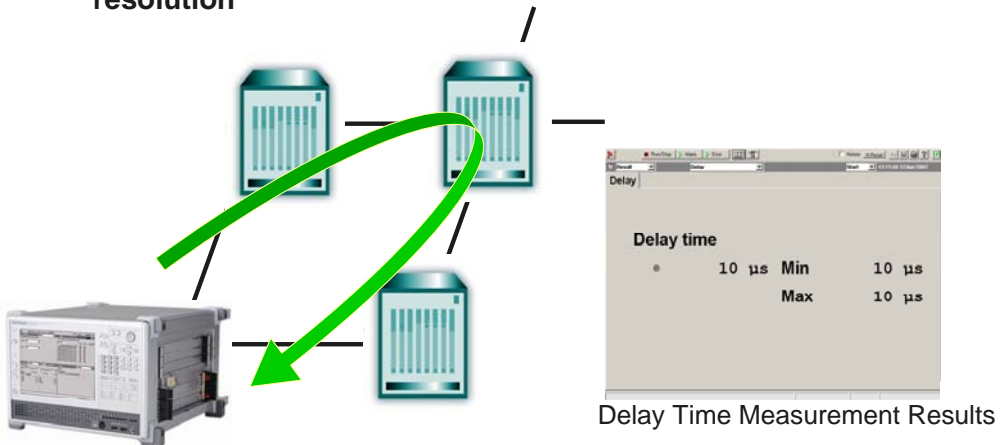
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Application Examples (7/7)

□ Delay Time Measurement

- ◆ Supports measurement of network transmission delays with μs resolution



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Other Applications

- OH BERTS Test
- OH Sequence Capture Function
- Pointer Generation Functions
 - ◆ NDF, \pm Justification, Increment, Decrement
- Path Trace Function

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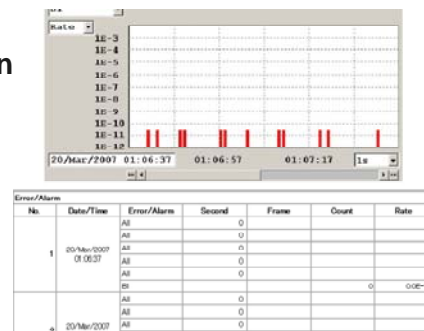
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Convenient Functions

- Report Function
 - ◆ Outputs settings and results in HTML format



- Remote GUI
 - ◆ Remote operation from PC via LAN using same GUI as main frame



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Modules (1/2)

❑ MU150140A 40G Unit

- ◆ 40/43G PPG/ED Unit
- ◆ Installed in Slots 5 and 6
- ◆ Required for 40/43G measurements



MU150140A

❑ MU150141A 40G Optical Unit MU150141B 40/43G Optical Unit

- ◆ 40/43G Optical I/F Unit
- ◆ Installed in Slot 4
- ◆ At least one required for 40G measurements
- ◆ MU150141B required for 43G measurement



MU150141A/B

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Modules (2/2)

❑ MU150100A 10G/10.7G Unit

- ◆ 1.5 Mbit/s to 10.7 Gbit/s Unit
- ◆ Installed in Slots 1 and 2
- ◆ Required for measurement at less than 10.7G and when using Low Order Mapping at 40G
- ◆ Add/Drop function is disable.



❑ MU150135A 10/10.7G Optical Unit

- ◆ 10/10.7G Optical I/F Unit
- ◆ Installed in Slot 3
- ◆ Required when using 10/10.7G optical I/F at MU150100A
- ◆ Requires XFP sold separately



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Module Composition

☐ Main Module Composition

40G Optical		40/43G Optical		Multi Bit Rate	
1		1		1	
2		2		2	MU150100A
3		3		3	MU150135A
4	MU150141A	4	MU150141B	4	MU150141B
5	MU150140A	5	MU150140A	5	MU150140A
6		6		6	

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Options/Software

☐ Main Frame Options

- ◆ MP1595A-01 RS-232C
- ◆ MP1595A-02 GPIB
- ◆ MP1595A-03 LAN

☐ Module Options

- ◆ MU150140A-05 OTU3
- ◆ MU150140A-06 ODTU23 (requires MU150140A-05 sold separately)
- ◆ MU150140A-10 Frame Memory/Capture (40/43G)

☐ Software

- ◆ MX159501A 40G SDH/SONET Analyzer Control Software

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Anritsu's 40G Jitter Solution

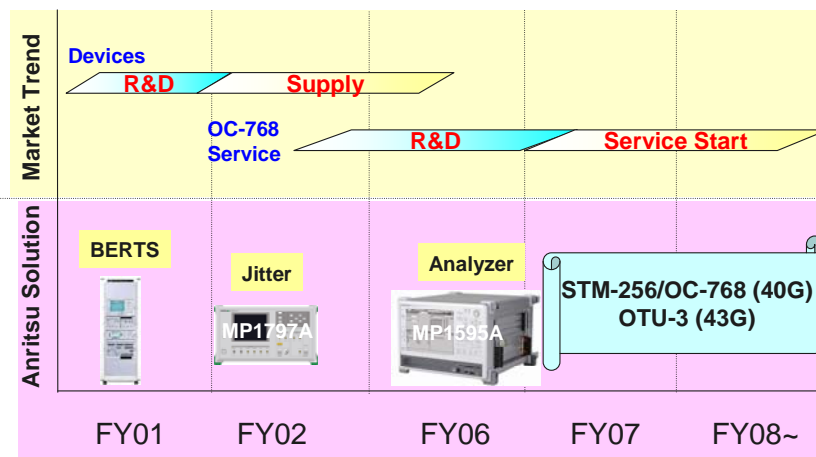
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Anritsu 40G Test Solution



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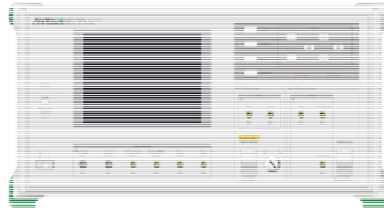
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Anritsu 40G Jitter Solution

The MP1797A 40G Jitter Analyzer meets latest ITU-T recommendations(O.172/O.173) for 40G jitter measurement

- ◆ O.172 : Jitter and Wander measurement (SDH/SONET)
- ◆ O.173 : Jitter and Wander measurement (OTN)



MP1797A Jitter Analyzer

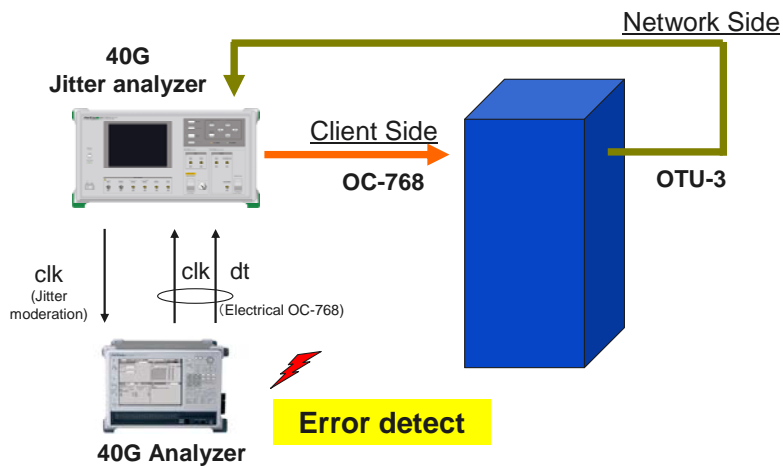
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Jitter Tolerance Measurement



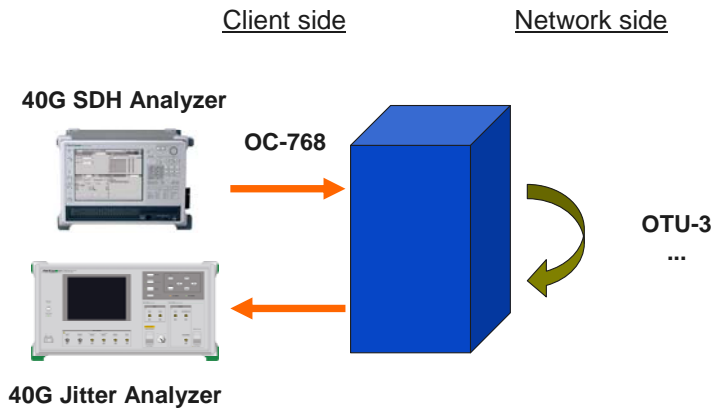
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Jitter Generation Measurement



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Anritsu Strength

1. Industry standard 40G jitter analyzer

- ◆ Established and provided 40G jitter technique 5 years ago
- ◆ Sales results to 7 companies including two major companies of North America
- ◆ Positive participation in standardization activity

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Anritsu Strength

2. Flexible Electrical Interface

- ❑ Evaluation of Serdes and module with non-NRZ such as Duo-Binary
- ❑ Any interface combination
 - ◆ Optical – Optical
 - ◆ Electrical – Electrical
 - ◆ Electrical – Optical
 - ◆ Optical – Electrical

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Anritsu Strength

3. Industry leading technical performance

- ◆ Lowest intrinsic jitter
- ◆ Greatest dynamic range for more accurate jitter transfer measurements
- ◆ Widest optical input range
- ◆ Widest frequency offset
- ◆ Most mature jitter product with years of experience

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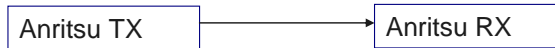
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Actual Performance

Intrinsic Jitter Measured By Loop-back

Bit Rate	Anritsu
40G	50 mUI
43G	60 mUI



- ❑ Allows for most accurate DUT measurements

Actual Performance

Dynamic Range for Transfer Measurement

	Anritsu
Up to 320MHz	60 dB

- ❑ ITU specification for DUT transfer: 38dB at 320MHz
- ❑ Test equipment is required to have ≥ 45 dB dynamic range to support repeatable DUT measurement
- ❑ High dynamic range provides greater DUT margin

Actual Performance

Input Optical Power

	Anritsu
Power Range	-10 to 0 dBm

Measurement Range:

- Wide optical input range
- Easy to connect to DUT

Flatness:

- No power dependency in the wide range from -10 dBm to 0 dBm

Actual Performance

Frequency Offset

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Offset Range	+/- 100 ppm

- Wide frequency range allows stressing and determining margins of DUT beyond minimum specifications



**Thank you
very much**

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