ParBERT 81250 Parallel Bit Error Ratio Test Platform

E4810A 3.35Gb/s 850nm Optical-Electrical Generator Module
E4811A 3.35Gb/s 850nm Optical-Electrical Analyzer Module

ParBERT Platform gains optical

Features & Benefits

· 21 Mb/s upto 3.35 Gb/s covers today's hot new devices

· Optical or electrical stimulus and response allow real-world tests of electrical-electrical, optical-electrical, and optical-optical devices

· Modular format allows you to configure a test system that meets your test needs and budget

· Comprehensive measurement software provides powerful insight for R&D and pass-fail testing for manufacturing

Applications

· Testing of transceiver modules used in switches and routers for very short reach networks

· Parallel testing of multichannel E/O - O/Es

Agilent Technologies

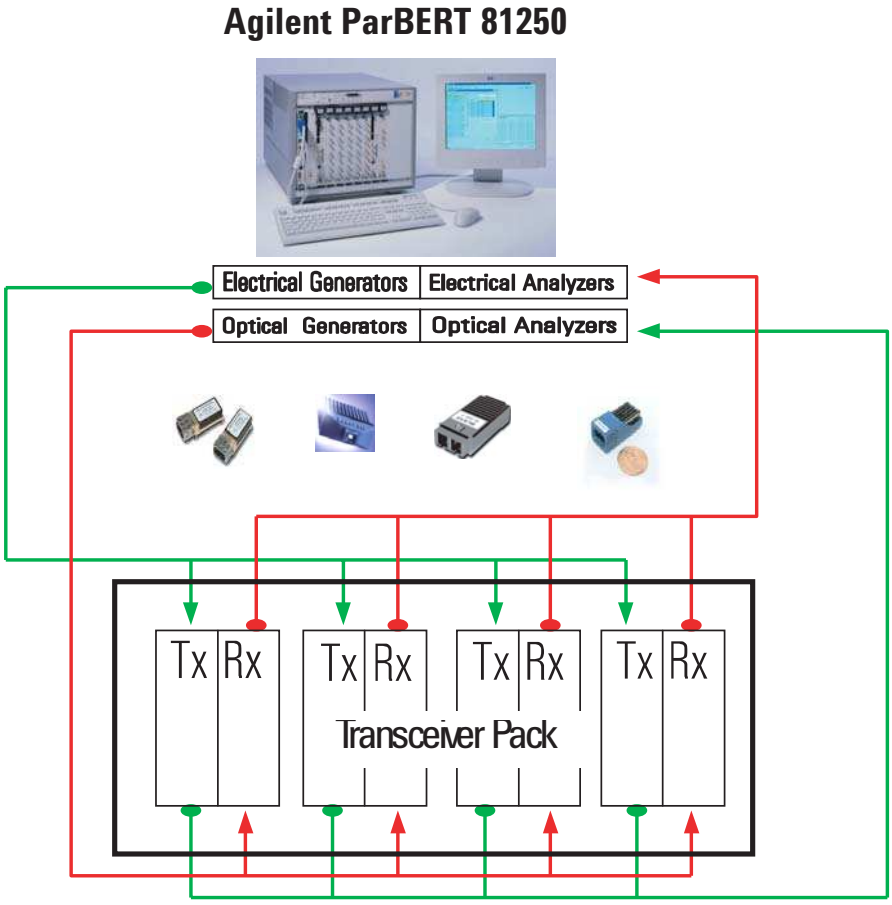
Introduction

The E4810A 3.35 Gb/s Optical-Electrical Generator and E4811A 3.35 Gb/s Optical-Electrical Analyzer expand the power of the ParBERT 81250 Parallel Bit Error Ratio Test Platform to help you meet the challenges of testing today's 850nm electro-optical devices.

Powerful new optical additions to the automatic measurements suite compliment sophisticated hardware capabilities, so you can make the tests you need to make easily, quickly, and confidently.

If you need to test electro-optical transmitter or receiver devices, then this mixture of new and old capabilities could help you improve the quality of the devices you ship while reducing test time and cost of test equipment.

The ParBERT 81250 Platform is intended to help your organization make the tests it needs to make in a cost effective manner by allowing you to configure a multi-project test system with just enough test capability and cost.



Features

Agilent's E4810A can output complex 850nm multimode optical bit patterns with rates from 21 Mb/s upto 3.35 Gb/s. In addition to variable bit rate, you can also set the optical output power levels and channel-to-channel delay between modules.

If you combine these optical pattern generators with electrical analyzers, you can stimulate and analyze optical-to-electrical converters.

Agilent's E4811A can analyze complex 850nm multimode optical bit patterns with rates from 21 Mb/s upto 3.35 Gb/s. Additionally, you can analyze One-Zero Power Level, Extinction Ratio, Q-Factor, Signal-to-Noise, and Modulation.

Stimulate your electrical-to-optical converters with electrical generators and analyze the optical outputs with the new optical analyzer on one or many channels - in parallel, in order to save time and money.

These new modules support all of the proven ParBERT 81250 Platform capabilities such as - user configurable modular hardware and software, internal and external input mixed-rate clocking with subrates and integral rate multiplication, PRBS/PRWS upto 2^{31}-1, user defined and mixed patterns, individually settable differential/single-ended electrical inputs and outputs, user friendly Windows NT/2000 operating system which supports LAN and GP-IB programming and 1 year warranty.

E4810A 3.35G Optical-Electrical Generator

E4811A 3.35G Optical-Electrical Analyzer

Figure 3: The E4810A 3.35G Optical-Electrical Generator and the E4811A 3.35G Optical-Electrical Analyzer

Product Description

The Agilent E4810A and E4811A are single-slot, C-Size VXI modules.

Optical and Electrical Measurement Results Provided:

- clock-out to data out (setup & hold time)
- skew between outputs
- delay at optimum sample point
- phase margin
- jitter
- pass/fail results

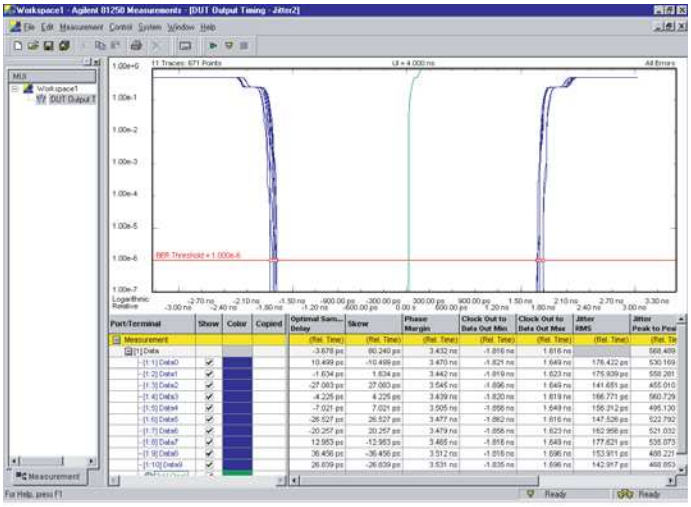


Figure 4: DUT Output Measurement

Optical and Electrical Characterize the following:

- Eye Opening (optical power or voltage vs timing)
- Optimum sample point
- Influence of transition times

Measurement Results Provided:

- Graphical Iso BER
- Cursors for waveform analysis
- One-Zero Level
- Extinction Ratio
- Q Factor
- Power - average, modulation,
- Signal-to-Noise Ratio

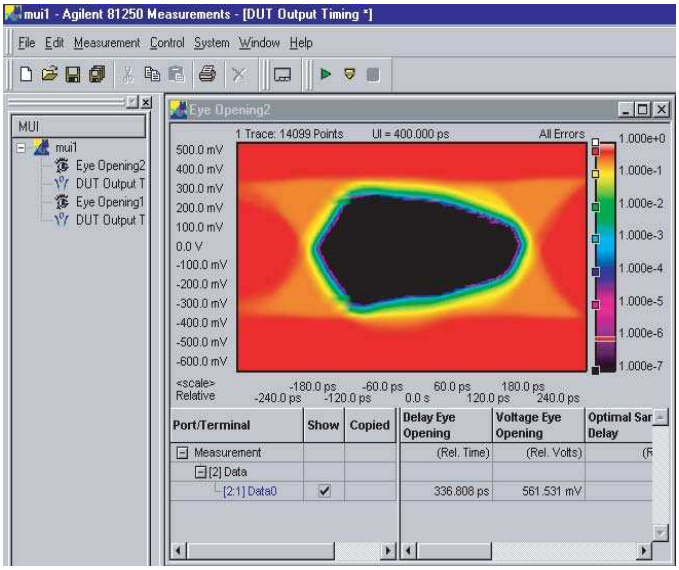


Figure 5: DUT Output timing

Fast Eye Mask - fast *pass-fail* testing of multiple devices in manufacturing

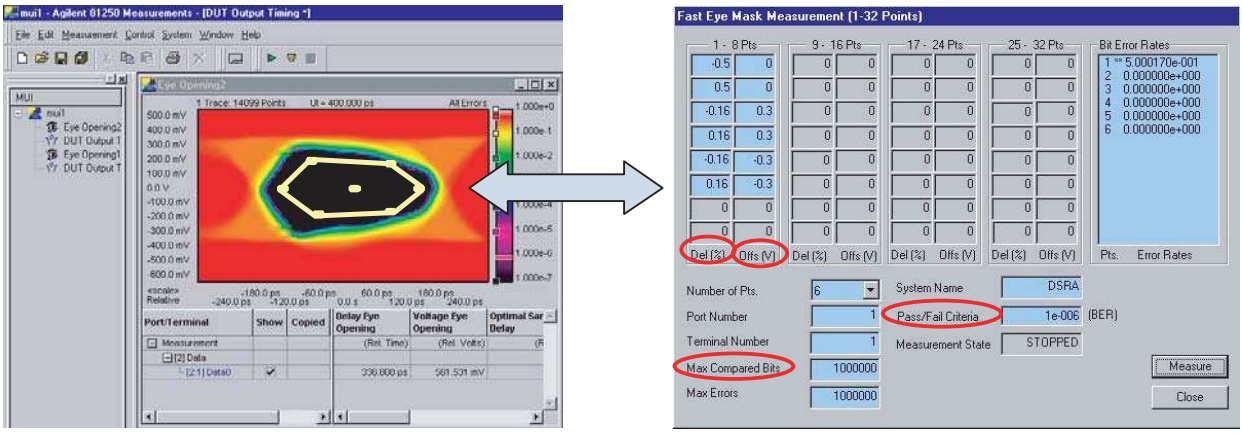
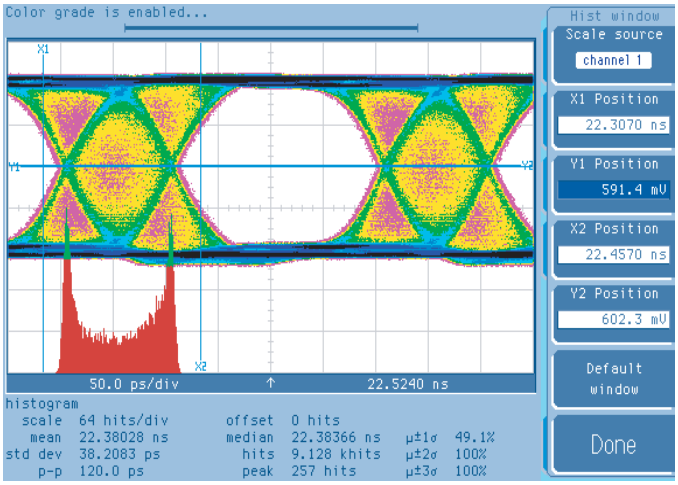


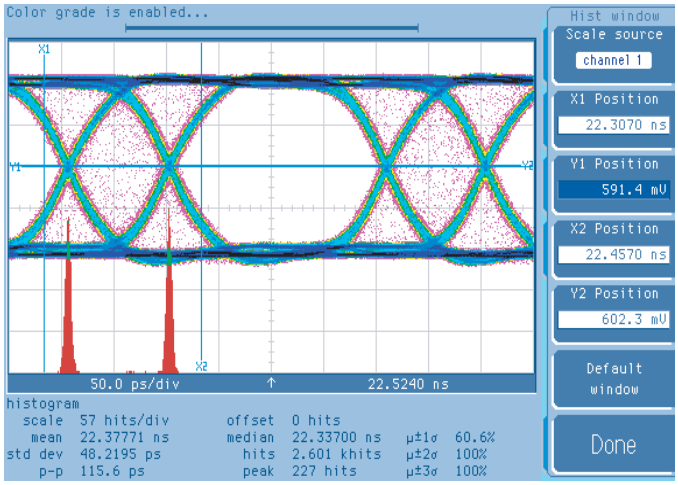
Figure 6: Fast eye Mask

Add analog delay modulation to optical output signals - DC to 200 MHz

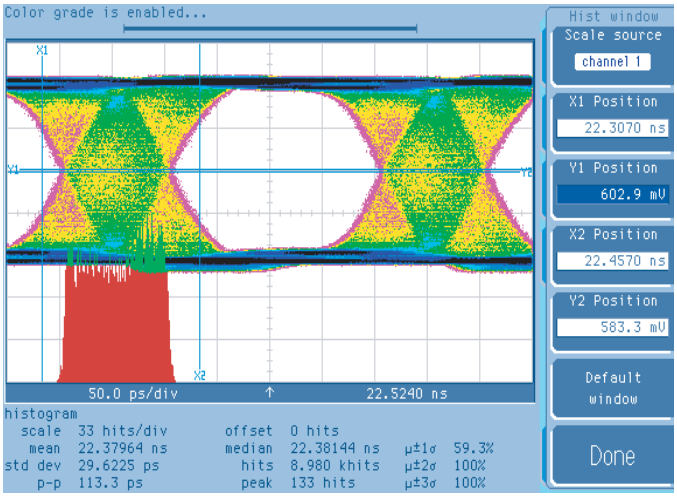
Delay modulated with Sine-Wave



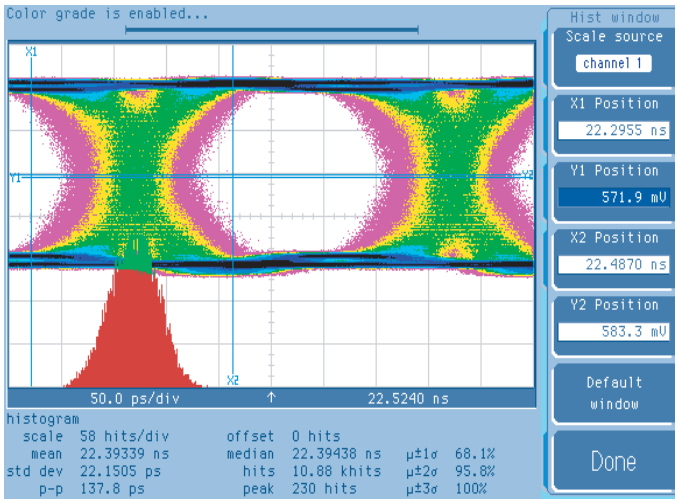
Delay modulated with Rectangle-Wave



Delay modulated with Triangle-Wave



Delay modulated with Noise-Generator



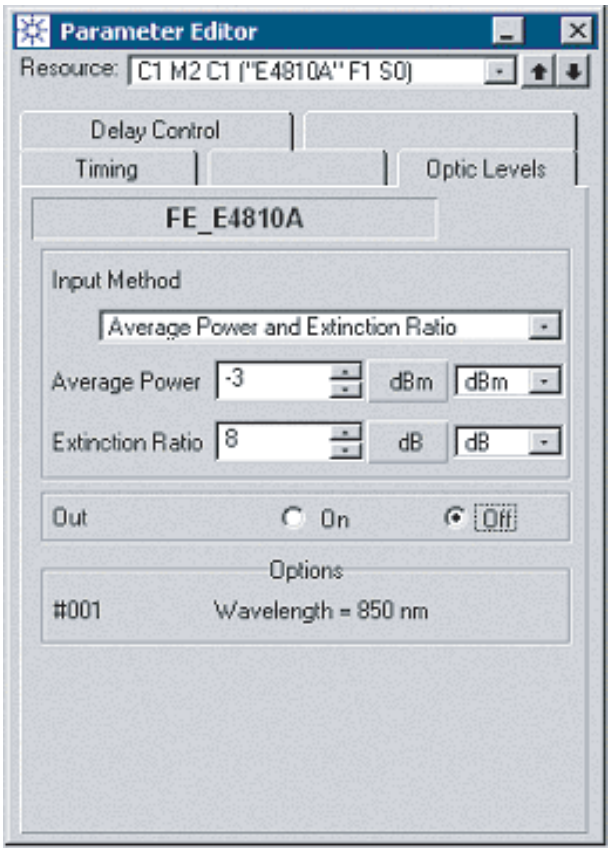
E4810A Option 001 Optical Generator Specifications ***

PARAMETERS	
Output Wavelength	830-860 nm, 850 nm typ
Data Rate (NRZ format)	21 Mb/s up to 3.35 Gbt/s
Memory Depth 20%-80%	16 Mbits per channel
Transition Time	<100 ps **
Maximum Output Power Level	10 dB Extinction Ration on -3 dBm average
Average Output Power Level	> -3 dBm
Output Power Setting Modes	P1 and P0 Extinction Ratio & Average Modulation & Average
Extinction Ratio Range, Resolution, Accuracy	5 to 10 dB *, 0.5 dB, ± 1 dB
Total Jitter (p-p)	<40 ps **
Connectors	Electrical: SMA Female Optical: Straight; 50/125 µm; user Selectable connector interface

(*) Valid for: 125 MHz, AP= -3 dBm, ambient Temperature 20-35°C

(**) Valid for: PRBS 2^{31}, 3.35 Gb/s, AP=-3 dBm, ER=10 dB, ambient Temperature 20-35°C

(***) Specifications apply to -3 dBm average power

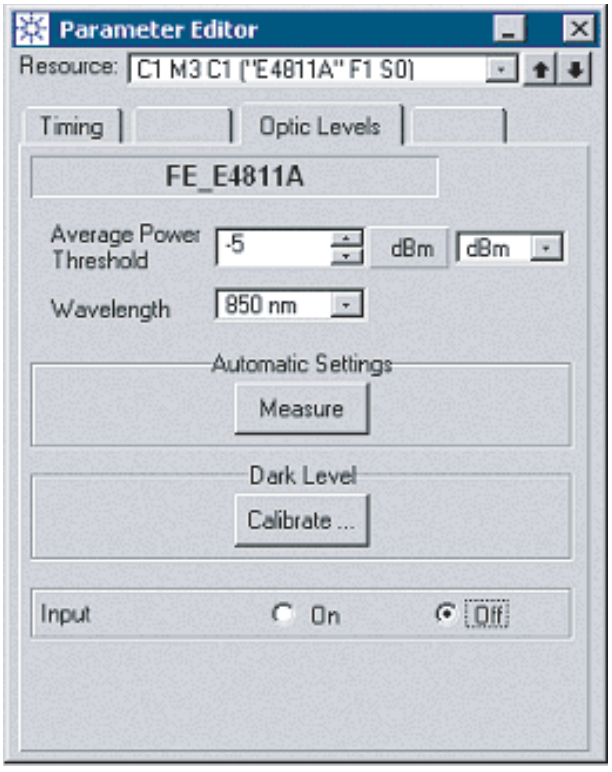


E4811A Option 001 Optical Analyzer Specifications

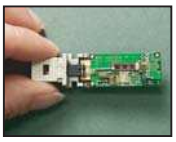
PARAMETERS		
Optical channel Bandwidth	> 4.5 GHz typical	
Wavelength Range	750 nm - 1650 nm	
Calibrated Wavelength:	850 nm	
Sensitivity (smallest average power for mask test)	-9 dBm	**1**
Sensitivity (smallest average power for BER test)	-10 dBm	**1**
Threshold accuracy	±10% ± 10µW typical	**2**
1 dB compression power limit	2 dBm typical	**3**
Maximum non-destructive Average Input Power	3 dBm	**4, 5**
Maximum non-destructive Peak Input Power	6 dBm	**6**
Data Rate	21 Mb/s - 3.35 Gb/s	
Data formats	NRZ	
Memory Depth	16 Mbits per channel	
Total Jitter (p-p)	< 40 ps	**7**
Connectors	Electrical: SMA Female Optical: Straight; 50/125 µm User selectable connector interface	
Analog band pass filters	External applicable	

1 valid for: PRBS2^{31}-1, 3.35 Gb/s, ER=6 dB
2 valid in the power range from-10dBm to -3dBm
3 above this power limit the input signal is compressed more than 1dB due to saturation effects
4 assuming balanced pattern
5 valid for continuous input power, for a 60 ms transient average the limit is 12 dBm
6 valid for continuous input power, for a 60 ms transient peak the limit is 15 dBm
7 valid for: PRBS2^{31}, 3.35 Gb/s, ER=6 dB AP=-3dBm

Calibration options for 1310nm and 1550nm are available to order as E4811A option 002 and option 003. Please contact your local Agilent representative for details.



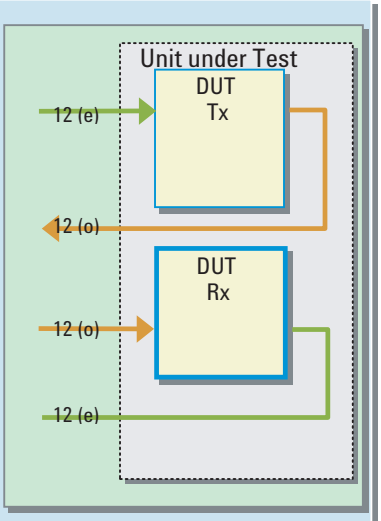
Application Examples

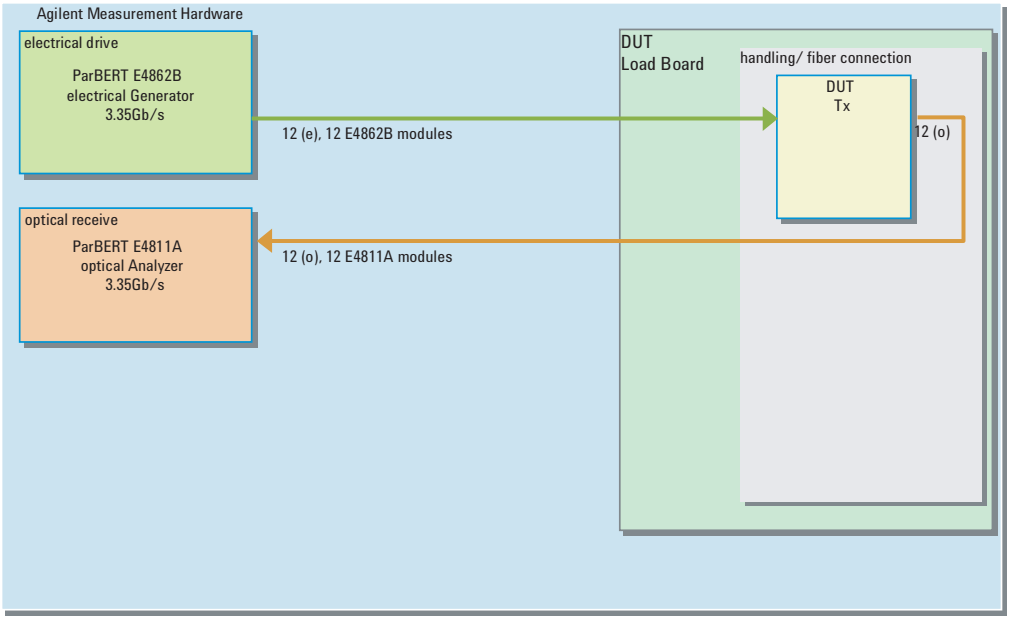


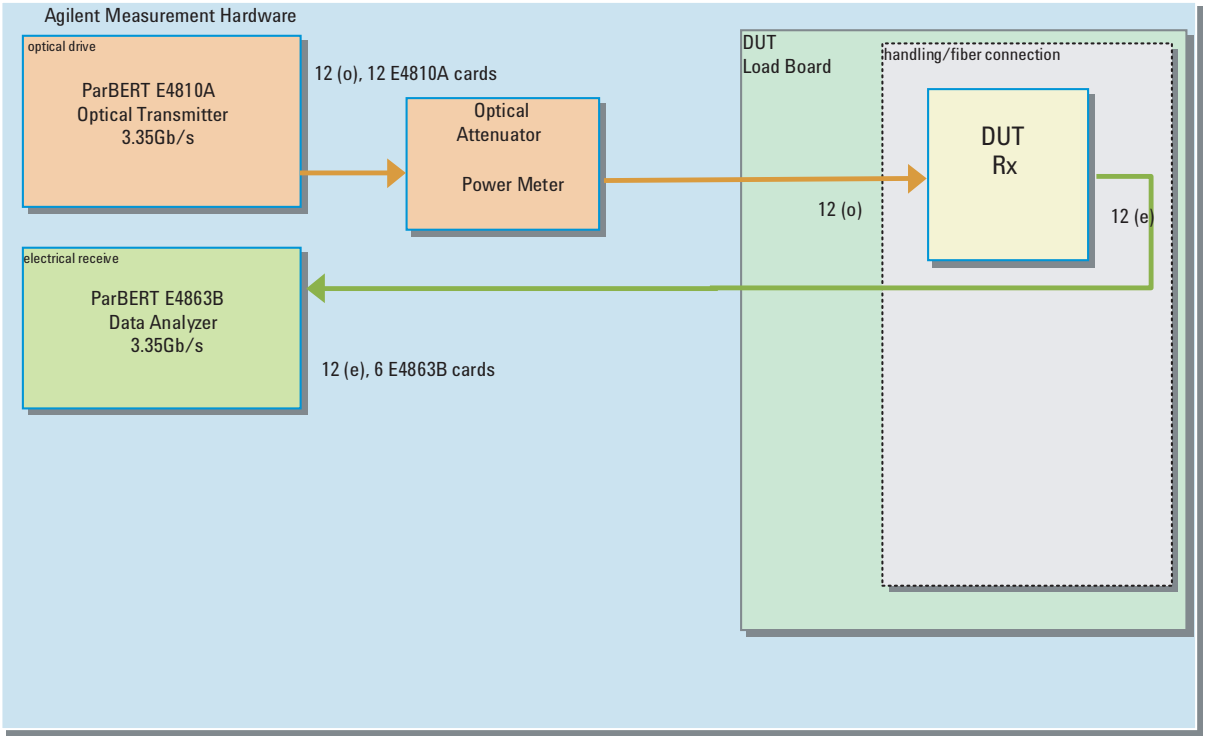
Module Test (after Burn-In):

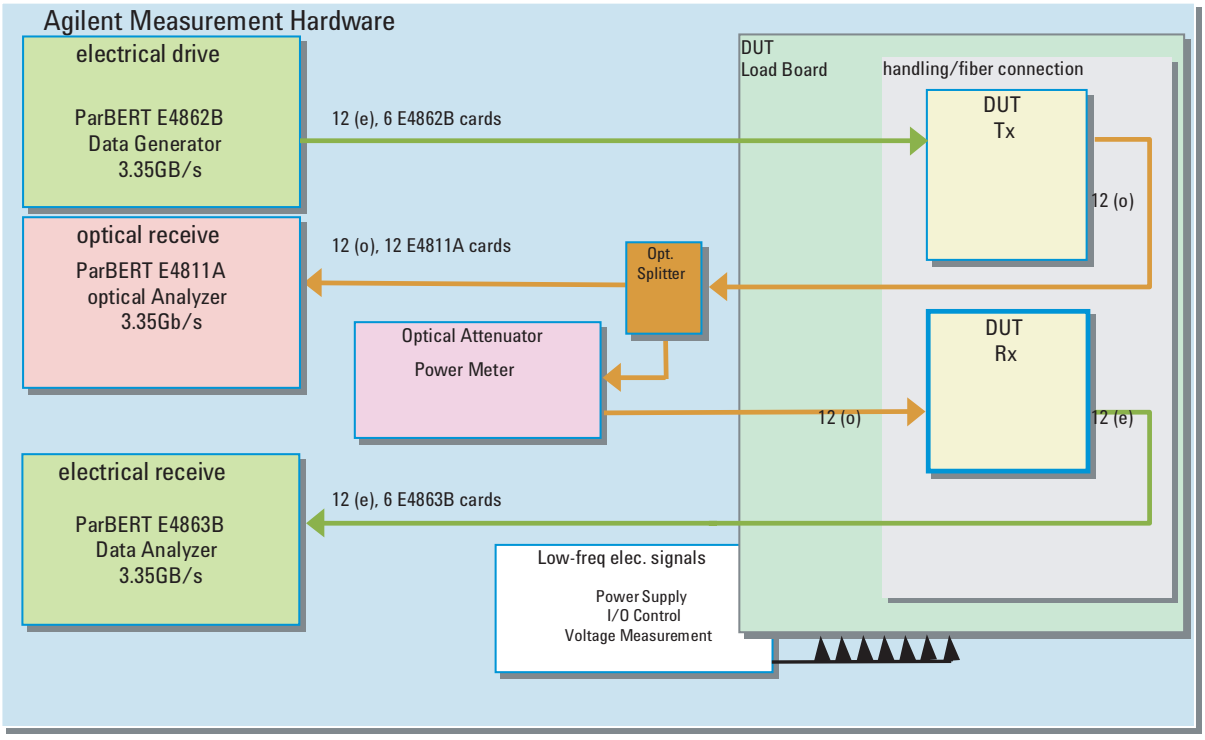
TX: Power, Control, Eye-Diagram Adjustment
Jitter, Extinction Ratio, Optical Power
RX: Power, Control, Channel Sensitivity
(BER)

Test Issues:
1. Reduce TX test Time
2. Reduce RX Test Time
3. Low cost of test equipment
4. Test equipment lead time
5. Test floor automation & DUT handling
6. Fiber usage






Agilent Measurement Hardware
optical drive
ParBERT E4810A
Optical Transmitter
3.35Gb/s
12 (o), 12 E4810A cards
Optical
Attenuator
Power Meter
DUT
Load Board
handling/fiber connection
DUT
Rx
12 (o)
12 (e)
electrical receive
ParBERT E4863B
Data Analyzer
3.35Gb/s
12 (e), 6 E4863B cards


Agilent Measurement Hardware
electrical drive
ParBERT E4862B
Data Generator
3.35GB/s
12 (e), 6 E4862B cards
DUT
Load Board
handling/fiber connection
DUT
Tx
12 (o)
optical receive
ParBERT E4811A
optical Analyzer
3.35Gb/s
12 (o), 12 E4811A cards
Opt.
Splitter
Optical Attenuator
Power Meter
DUT
Rx
12 (o)
12 (e)
electrical receive
ParBERT E4863B
Data Analyzer
3.35GB/s
12 (e), 6 E4863B cards
Low-freq elec. signals
Power Supply
I/O Control
Voltage Measurement

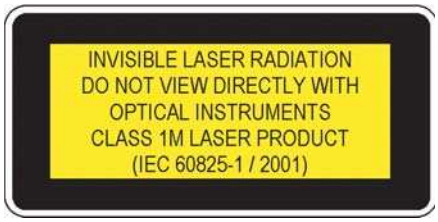
Optical-Electrical Generator and Analyzer Ordering Information

Model	Description
E4810A	3.35G Optical Electrical Generator - Must select option 001
Option 001	Optical Output 850 nm
	Must Select an Optical Connector Option
E4811A	3.35G Optical-Electrical Analyzer - Must select option 001
Option 001	Optical Input calibrated at 850 nm
	Must Select an Optical Connector Option
Optical Connector Options	
81000AI	Diamond HMS-10 Connector Interface
81000FI	FC/PC/SPC Connector Interface
81000GI	DIN Connector Interface
81000VI	ST Connector Interface
81000KI	SC Connector Interface
Note: E4808A High Performance Clock Module is required with E4810A and E4811A	

Related Literature	Pub. Number
Agilent ParBERT 81250 Parallel Bit Error Ratio Tester Product Overview	5968-9188E
Agilent ParBERT 81250 43.2G Product Overview	5988-3020EN

For more information, please visit us at:
www.agilent.com/find/parbert

All laser sources specified by this data sheet are classified as Class 1M according to IEC 60825-1 (2001).
All laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26



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