

PBR-305 E-BERT

125Mbps~5Gbps Bit Error Rate Tester



Features

- **Wide bandwidth measurement rates between 125Mb/s ~ 5Gb/s**
- **Half-Rate SGMII reference clock output**
- **Versatility Patterns including PRBS, Fiber Channel pattern, K28.5, K28.7**
- **40 bits or 64 bits User Edit Pattern**
- **Easy to use, cost effective**
- **Double testing throughput**
- **Pass / Fail Testing**
- **Fully programming Labview Driver provided.**
- **Remote control interface of USB or RS232 and GPIB is optional.**

General Description

Phytrex Serial E-BERT is perfect for manufacturing test of optical and electrical devices operating at the wide bandwidth multi-data rates between 125 Mb/s ~ 5.0Gb/s.

Phytrex Serial E-BERT Transmitter could provides the variable patterns for PRBS7, PRBS23, PRBS31, K28.5, K28.7, Fiber Channel CJTPAT, Fiber Channel CRPAT, Fiber Channel CSPAT, D21.5 and programmable 40bit or 64bit user editable pattern. Error detector input has equipped with equalization circuit to compensate the high frequency loss due to the long cable or trace issue. The equalization circuit reduces low frequency gain but increase the ratio of high frequency gain to reduce the affects of ISI..

The receiver has a clock recovery unit built-in and synchronic loss of signal detect limit could be configurable from 1E-3 to 1E-9.

Internal re-timer mode is equipped inside the error detection side. The internal CDR will extract the clock signal from the incoming data ,then eliminates jitter and retransmits data signal

Phytrex Serial E-BERT could provide and SGMII output clock on for Gigabit Ethernet applications. This clock unit runs at half the selected data rate (e.g. 622.5MHz at 1.25Gb/s Gigabit Ethernet) and complies with SGMII levels.

Phytrex Serial E-BERT provides the stand alone

executable software which could be operated on the external PC and easy for operators. The software engineer could also use the dynamic link library or follow the instructions to edit the manufacturing software easily to control the Serial E-BERT.

The remote control interface generally provides the USB or RS232 serial port, and the GPIB interface could also be provided by options.

By using the two output channels and appropriate loop back settings, the user could enhance the throughput to double for the measurement testing.

Phytrex Serial E-BERT is with small form factor(option) to fit any bench or any automation setup.

User Interface and Measurement Function

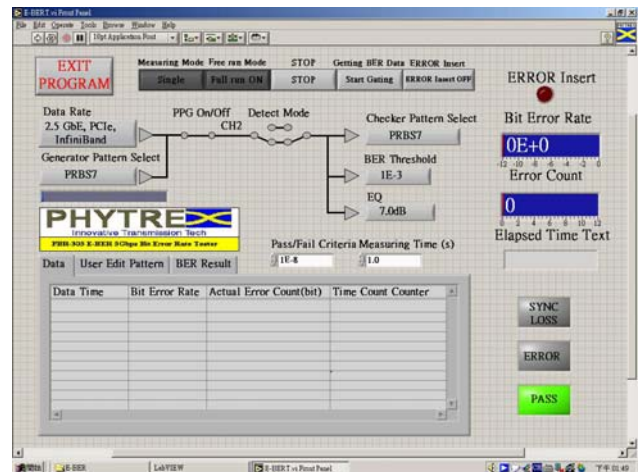


Figure 1: GUI Interface

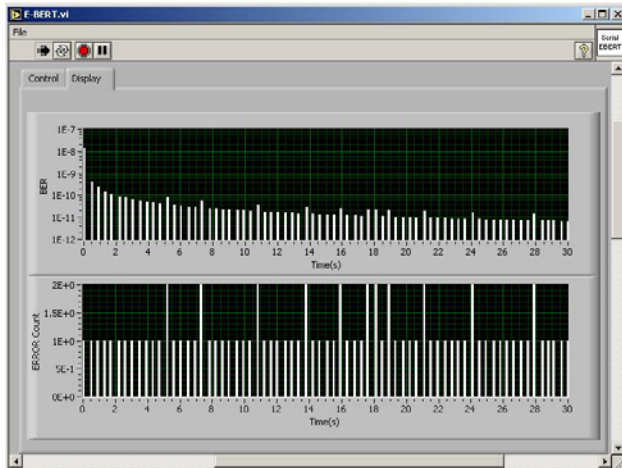


Figure 2 Error distribution Histogram

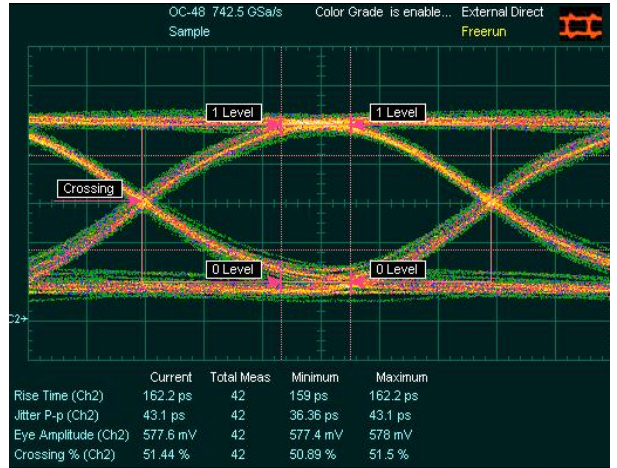


Figure 3: 2.5Gb/s Optical Signal

Burst Error Analysis

Phytrex Serial E-BERT shows the error distribution versus time with the strip histogram which provides the best way to monitor the burst error with strip chart to show the error ratio (count) over time, it can help user to understand the error performance and the error correlation for detail evaluation.

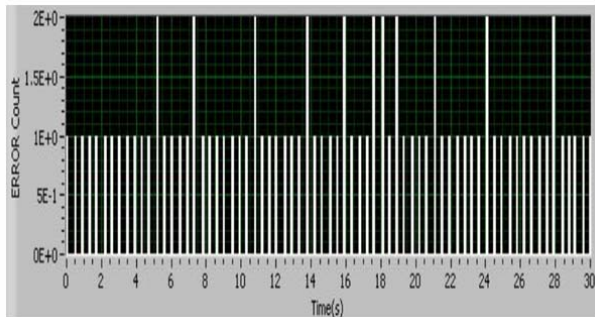


Figure 4: Error count distribution analysis

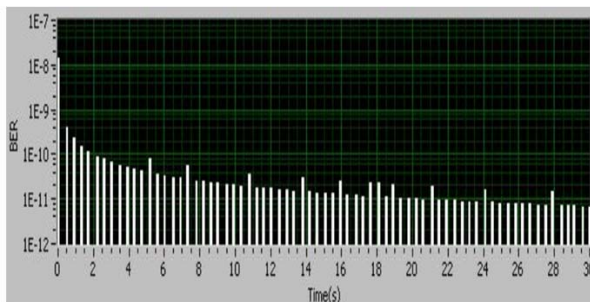


Figure 5: Error Ratio distribution

System Specifications

Data rate

The same data rate applies for pattern generator data output, and for error detector data in.

Fixed Standard Data rates

Fast Ethernet	125 Mb/s
Gigabit Ethernet x1	1.25 Gb/s
2.5GbE, Infiniband, or PCI Express	2.5 Gb/s
Infiniband x2 or PCI Express x2 (option)	5.0G b/s
ESCON/SBCON	200Mb/s
OC3/ STM-1	155.52 Mb/s
OC12/ STM-4	622.08 Mb/s
OC48/ STM-16	2.48832 Gb/s
OC48 with FEC	2.66606 Gb/s
F.C. x1	1.0625 Gb/s
F.C. x2	2.125 Gb/s
F.C. x4 (option)	4.25 Gb/s
Accuracy	± 50ppm

Wide band Data rates (Option)

Data Rate	100 Mb/s ~ 5.0 Gb/s
Resolution	1 Mb/s

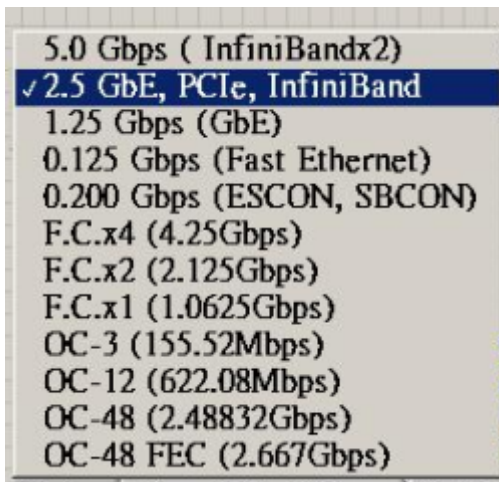


Figure 6: Data Rate Selection on GUI

Operating System

The executable software provided runs on

Windows 2000 or XP with NI run-time engine 7.1 or higher, and controlled via USB or RS232 interface.

Pattern Generator

Pattern

The following patterns are supported:

PRBS: 2⁷-1, 2²³-1, 2³¹-1.

Data pattern: K28.5, K28.7, Fiber Channel CJT, CR, CS pattern, D21.5 (alternative pattern).

User Edit Pattern: 40 bit or 64 bit editable pattern.

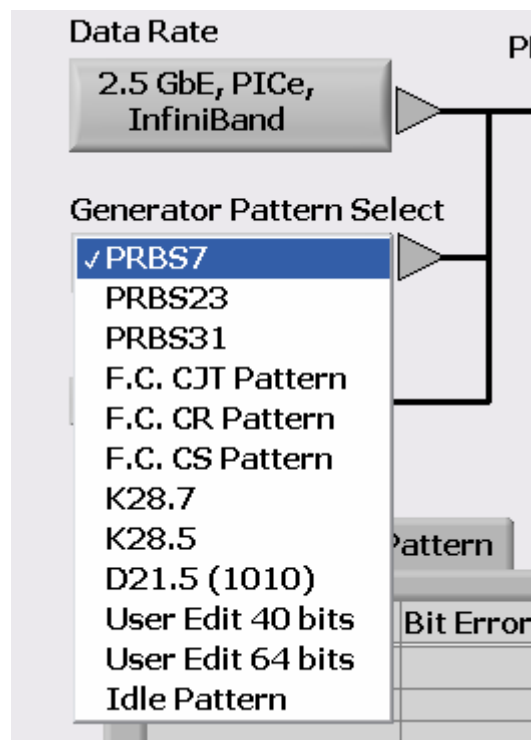


Figure 7: Test Pattern selection on GUI

Generator electrical output

There are two differential electrical output is provided on the front panel.

Electrical Specification

Data Output	Output Type	Differential, AC-coupled, external 100Ω differential terminated or single-ended 50Ω.
	Amplitude	>250mVpp Single Ended
	Rise/Fall Time	Typ. <80 ps (20%~80%)
	Jitter p-p	Typ. <30ps, Max. <0.21UI
Clock	Frequency	Half Rate Clock
Output	Amplitude	CML level , >300mV (diff.)
Connector		SMA front panel

Trigger Output

A single-ended electrical trigger output is provided on the front panel.

Output type	Single ended
Impedance	50Ω nominal, AC-coupled
Amplitude	CML level.
Connector	SMA front panel

SGMII Clock Output (Half Rate Clock)

Phytrex Serial E-BERT could provide and SGMII output clock on for Gigabit Ethernet applications. This clock unit runs at half the selected data rate (e.g. 622.5MHz at 1.25Gb/s Gigabit Ethernet) and complies with SGMII levels. The half clock output is differential output and provided on the front panel.

Auxiliary Output

The E-BERT could provide the synchronized signal to enable the laser output for ONU module measurement application. User can adjust the width and delay through the Software.

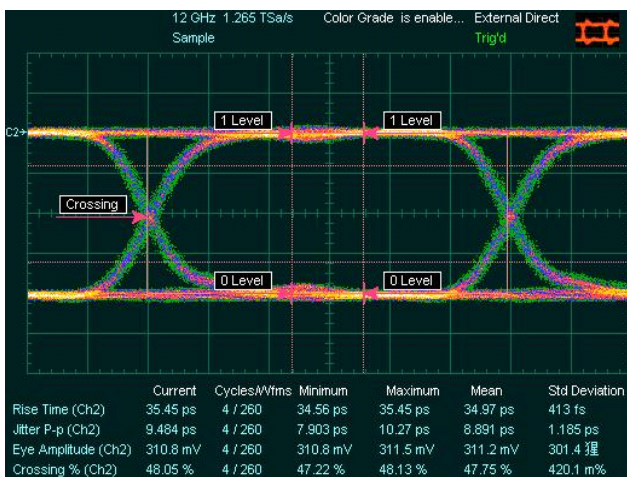


Figure 8: Clean output signal. 4.25Gb/s @ PRBS 7

Pattern generator key features

- Available for from 125Mb/s to 5Gb/s pattern generator with error detector
- Differential output for data and clock
- Transitions time < 80ps
- Low pattern jitter < 30ps pp (typical)
- Half rate clock reference output
- Versatile patterns for variable applications
- Auxiliary output for ONU measurement (option)

Error Detector Input

There are two differential electrical input provided on the front panel. The maximum input amplitude is 1Vpp for single-ended and 2Vpp for differential input.

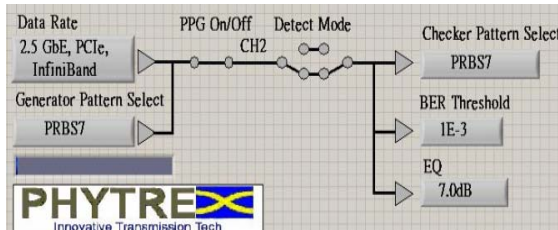


Figure 9: Error Detection Channel selection

Pattern

The pattern detect function can support the following type of patterns

PRBS: 2⁷-1, 2²³-1, 2³¹-1.

Data pattern: K28.5, K28.7, Fiber Channel CJT, CR, CS pattern, D21.5 (alternative pattern).

User edit pattern: 40 bit or 64 bit editable pattern.

Input Equalizer

The PBR-305 serial E-BERT provides 8 level equalization gains (0dB, 0.5dB, 4dB, 5dB, 7dB, 8dB, 12dB and 17dB) to Compensate the ISI affect by long cable or trace on PCB, customer also can made the error rate compensation though the correlation between the standard reference equipments .

Error detector key features

- **Differential inputs**
- **Built-In CDR for specified data rate with half rate clock out**
- **Burst Error strip distribution versus time**

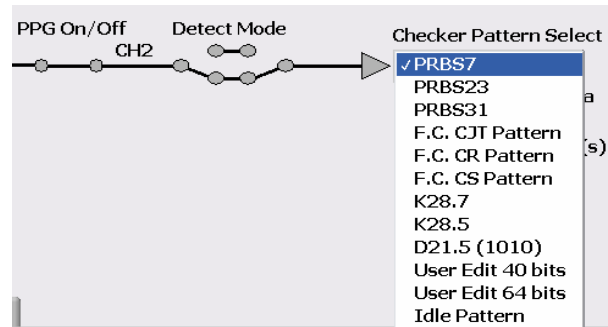


Figure 10: Error Detection Pattern selection

Electrical Specification

Input Type	Differential, AC-coupled, external 100Ω differential terminated or single-ended 50Ω .
Input Swing	100mV to 1200mV
Sensitivity	100mV (typically)
Synchronization	Automatically on level and pattern
Clock mode	Internal CDR
Connector	SMA front panel

Testing Configuration –Double Testing Throughput

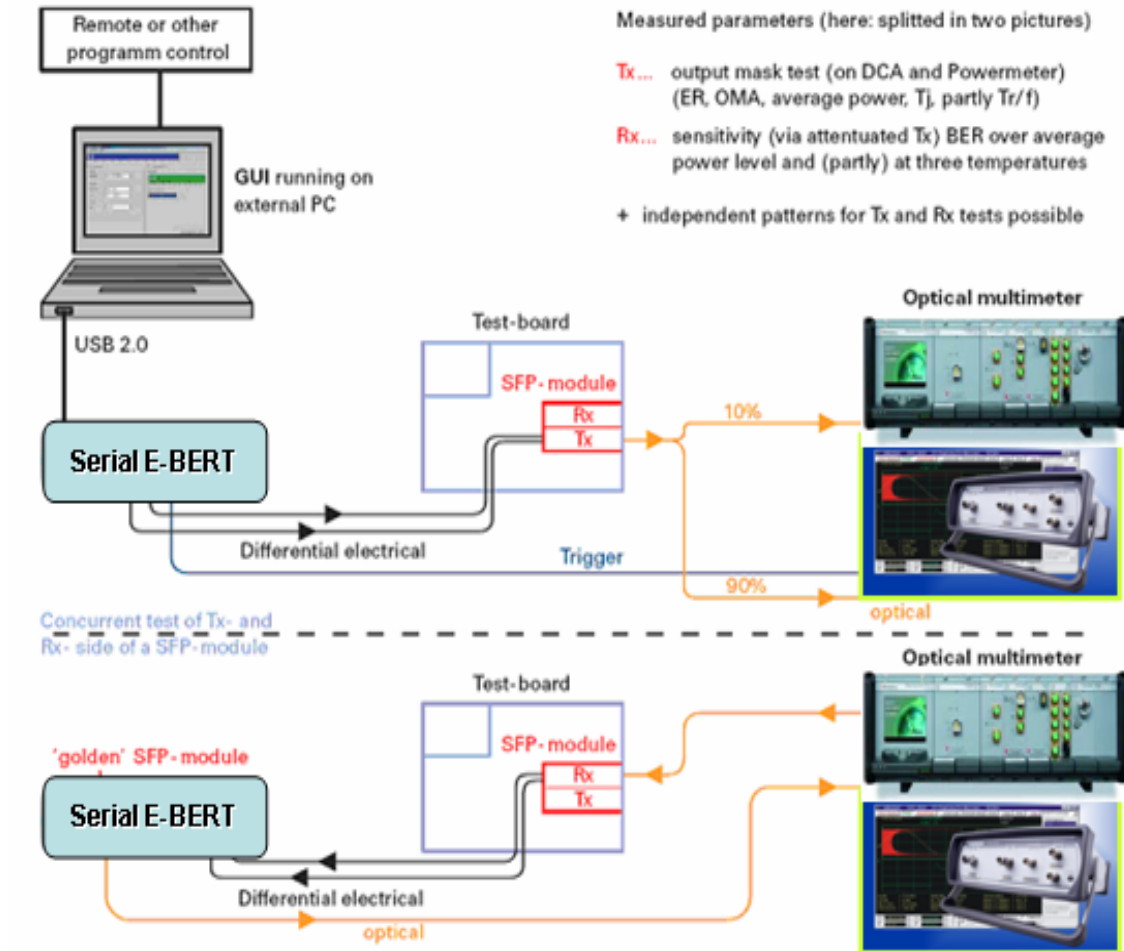


Figure 11: Optical SFP TRX connection block diagram

Electrostatic Discharge



The device can be damaged by ESD. Phytrex recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures may adversely reliability of device.

General Configuration

Power Supply	110V to 240V, 50~60Hz
Power Consumption	50 VA maximum
Operating Temperature	10 °C ~ 40 °C
Storage Temperature	0 °C ~ 70 °C
Software OS	Windows 2000 or XP
Control Interface	USB or RS232, GPIB (Option)
Language	C, C++, VB, LabVIEW. (dynamic link library and NI run-time engine provided for different language)
Dimension	(L)475mm X (W)350mm X (H)160mm
Net Weight	< 6Kgw
Warm Up	10 min
Warranty	1 year

Order Information

Model No.	Description (Standard Configuration / Accessories)
PBR-305	125Mb/s to 2.67Gb/s Bit Error Rate Tester with USB/RS232 control interface -Standard accessories- Control Software / Operation Manual / Technical Specification AC Power Cord / USB Patch Cord
OPT-E01	Option Upgrade to 5Gb/s (Fixed Data Rate)
OPT-E02	Auxiliary output for ONU measurement
OPT-E03	GPIB (IEEE 488) Remote control Interface
OPT-E04	Extend to 3 years warranty
OPT-E05	Upgrade to 8.5Gb/s ~ 11.3Gb/s
FDS-520B	Relative Product Wide Bandwidth Digital Sampling Oscilloscope