G800GE OSFP 800GE Layer 1 BERT and KP4 FEC Multiport Test System

Preliminary

Spend Less Time Finding Problems and More Time Solving Them

Challenge: Finding Problems Faster and Earlier in the 800GE Development Cycle

800 Gigabit Ethernet (GE) technologies based on the 112Gb electrical lane signaling rates have exponentially increased the level of complexity for the development of stable port electronics in all networking devices. Now, the challenge has become characterizing and quantifying the actual bit error ratio (BER) and forward error correction (FEC) performance of silicon devices, application-specific integrated circuits (ASICs), optical transceivers, fiber and copper interconnects, and the port electronics of switches and routers. Identifying 800GE, 400GE, 200GE, and 100GE, with their BER and FEC performance problems quickly is critical as answers are complex and time-consuming to solve.

Solution: A Simplified, Affordable BERT and FEC Test System

Keysight's G800GE OSFP test system makes the challenge of qualifying BER, FEC symbol error correction performance and line rate packet traffic stress testing on 800GE electronic devices easier and affordable. Whether validating chips, optical transceivers, or the port electronics of networking equipment, the G800GE OSFP is a purpose-built BERT and FEC test system with 112Gb electrical lane signaling per port that gives you the ability to find a problem in minutes, not hours. It shows a system-level view of the BER and FEC performance of all the lanes and on the ports, as required, all at once, in real time.

Highlights

- Validate the BER performance of high-port-count devices with 2-ports of the G800GE 800GE BERT, FEC and packet blast capabilities with Keysight's KiOS multi-port browser application

- Find problems faster with KiOS browser-based single page application (SPA), system-view of all the BERT, FEC, and packet statistics of all the lanes or ports with 1x800GE, 2x400GE, 4x200GE and 8x100GE speed support

- Measure full line rate BER, FEC performance in minutes, not hours— evaluate new optical transceivers and silicon devices BER at all Ethernet speeds simultaneously by using the patented Enhanced BERT option (that is, BERT inferred FEC)

- Perform long-duration (timed tests) and stress tests by using Keysight's KP4 FEC symbol bit error density distribution analysis—excellent for catching bursty errors that occur over time

- Simplify connection of the G800GE to Keysight's M8040A high-performance BERT analyzer for FEC-aware physical layer test

- Connect a module compliance board or to your device eval board by using the G800GE electrical coaxial cabling system

G800GE 2-port OSFP

G800GE 1-port OSFP, 1 Coaxial Tx/Rx

G800GE OSFP 800GE 2-port BERT and FEC Layer 1-2 Test Systems

KEYSIGHT TECHNOLOGIES

The G800GE OSFP is a compact BERT and FEC symbol error correction performance benchtop test system. It may be installed on a rackmount as required. The chassis is provided with the Layer 1 BERT and FEC 800GE test software, KiOS. The KiOS single-page application (SPA) uses the Google Chrome browser implementation and makes set up so easy and fast, you can start testing and generating PASS/FAIL test reports using your tolerance and limits within minutes.

G800GE OSFP chassis are available in two models:

- 2-port, 800GE Layer-1 BERT and FEC OSFP test system (941-0082)
- 1-port, 800GE Layer-1 BERT and FEC OSFP with 1-port of coaxial Tx/Rx cable interface test system (941-0083)
    - The 941-0083 is recommended for use with the Keysight M8040A BERT Analyzer
- Both models include support for 1x800GE, 2x400GE, 4x200GE and 8x100GE Ethernet speeds. No additional option purchase is necessary for complete Ethernet speed support

The RS-544 (KP4) FEC symbol error correction test capability is included with the chassis. It simplifies FEC lanes testing, just as easily as Layer 1 BERT. Keysight's FEC codeword bit-error density distribution analysis (the FEC tail) shows the symbol error performance, the FEC margin, and many other advanced measurements. It is an excellent system to use to perform long-duration and stress tests. It simply cannot be made any easier to use.

The new patented Enhanced BERT option with BERT-inferred FEC analysis provides your development teams test capabilities to quickly pinpoint problems and to validate and qualify excellent or poor BER and FEC symbol error correction performance on a given device.

Innovation on the G800GE did not stop at the Enhanced BERT option, the G800GE offers a FEC Trigger and Capture option. This feature provides deep insight into exactly where in a FEC codeword the bit errors are located. You can set the error thresholds and logic as to how many and what type of bit-errors or FEC symbol errors you want to capture. Then, a graphics capture display shows you where the bit errors occurred in a structured and organized manner.

Pay as You Grow—All options are Field Upgradeable

G800GE OSFP upgrades extend the reuse of the chassis system and improves your ROI. The ability to upgrade G800GE OSFP to have it grow with your test needs is quick and easy. You can field-upgrade any G800GE OSFP chassis with the following options:

- Enhanced BERT with BERT-inferred FEC-a powerful analysis tool

- FEC Codeword Trigger and Capture-shows where the bit errors occur in the captured FEC codeword

- Synchronize to the Keysight M8040A BERT test system-allows the G800GE to be synchronize

These options greatly enhance the built-in BERT and FEC test features.

The G800GE OSFP can be upgraded in the field to support interconnection and synchronization with Keysight's M8040A high-performance BERT analyzer. The combined system is a symbol striped FEC-aware physical layer BER tester for 112G electrical lanes. It is a solution for 800GE characterization, stress, and conformance tests, and to perform physical layer channel stress and impairment of a channel. Additionally, advanced tests such as TDECQ and optical receiver stress testing (ORST) may

be performed for optical transceivers in conjunction with various Keysight layer 1 instruments such as a real-time oscilloscope, a DCA, and other equipment and accessories depending on the application.

Module and Host Compliance electrical breakout boards make it easy to connect the G800GE coaxial cable interface to development systems or to test chips on development boards and optical transceiver development hardware.

Mix and match whatever upgrades you require, whenever you need them. You are no longer stuck with a dedicated piece of hardware with no hope of extending its capabilities. With G800GE OSFP, you have the critical return on investment (ROI) for today's and tomorrow's test needs.

Key Features

- The G800GE is an excellent test platform for 800GE communications devices, optical transceivers, and networking hardware ports that use the 8x112Gb electrical interface with PAM4 encoding that is IEEE 802.3ck compliant.
- Built-in Ethernet speed support for: 1x800GE, 2x400GE, 4x200GE and 8x100GE for BER, FEC symbol error correction performance and line rate packet blast measurements.
- Built-in RS(544,514) also known as KP4 FEC test capability:
  - FEC symbol error distribution analysis with a comprehensive set of FEC corrected and uncorrected count and rate statistics including BER statistics for FEC analysis
  - Extensive per-port and per-lane FEC statistics for all supported speeds: 1x800GE, 2x400GE, 4x200GE and 8x100GE
  - Advanced measurements such as pre-FEC BER and frame loss ratio (FLR)
- A highly intuitive, fast, and efficient web-browser-driven UI supported by Google Chrome. It makes BER and FEC testing truly fast and simple.
- A REST API for scripting is installed with the KiOS software on the chassis.
- The Layer 1 BERT can send PRBS31Q and PRBS13Q patterns. It can transmit SSPRQ100 patterns however that requires the Enhanced BERT options and a Keysight real-time oscilloscope or DCA. It generates per-lane BER measurements with a broad array of additional statistics.
- Hardware Clock IN and Clock OUT interface to receive a clock in from an external device, or it can output the internal clock from the G800GE test system.
- +/- 50 PPM line frequency adjustment that is applied to all enabled ports across the G800GE test system.
- Support for optical transceiver that have 112Gb electrical lane interfaces.
- Host to Module support provides default and user-selectable Tx host equalization controls with user adjustable custom settings for all lanes, or on any individual lane.
- Common Management Interface Specification (CMIS) support for v3.0 and v4.0, user selectable, or use the version auto-detection feature; CMIS is for optical transceivers. It enables the ability to read and write the management registers of the transceiver.
- Option for enhanced BERT and BERT-inferred FEC measurement capability. Evaluate new optical transceivers based on 112G electrical lane interfaces BER at all Ethernet speeds simultaneously with the patented Enhanced BERT option:
  - Factory installed and field upgrade options requires KiOS 4,0 as the minimum software
  - In-depth analysis of mismatched PAM4 multi-level signal errors,

- ○ SSPRQ100 pattern generation for 100G lane applications (requires a Keysight real-time oscilloscope or DCA)
  - ○ BERT Inferred FEC for faster analysis of FEC over all Ethernet speeds
  - ○ A threshold bit-error tool to expose difficult-to-find bursty errors in PRBSQ patterns.
- Option for FEC Codeword Trigger and Capture
  - ○ Shows where the bit errors occurred in the captured FEC codeword in a color-coded graphics display
  - ○ User-defined trigger thresholds to set bit error minimum and maximum for the FEC codeword capture with logic-driven condition settings (that is, ≤, ≥, AND)
  - ○ User can specify bit error range, or the FEC symbol error range, or trigger on uncorrectable errors only using logic-driven conditional settings
- Option to support interconnection and synchronization with Keysight's M8040A High Performance BERT analyzer; the combined system is a symbol striped FEC-aware physical layer BER and FEC-aware tester
- For all options, see the Ordering Information section of this data sheet

Chassis Hardware Specifications

Product Description	G800GE OSFP 2-ports of the OSFP Interface	G800GE OSFP 1-port of the OSFP interface, 1-port coaxial Tx/Rx
Chassis Physical and Electrical Specifications		
Part Numbers	941-0082	941-0083
Physical Interfaces	2-ports of the OSFP MSA form factor	1-port of the OSFP MSA form factor with 1-port of coaxial electrical Tx/Rx interface cable system
Chassis Configurations	2-port desktop chassis system. May be set up as a rackmount, 2 RU	
Chassis Connector Systems	Power ON/OFF button 1 LED per port Clock IN / OUT: 2 SMA female connectors Trigger IN / OUT: 2 SMA female connectors 4 USB: (2) USB 2.0 (2) USB 3.0 compatible ports 1 RJ45: 1000/100/10Mbps Ethernet management port 1 Display Port, supports a maximum resolution of 4096 x 2304 @60Hz	
Chassis Clock IN – Electrical Specifications	Frequency: 166.015625 MHz +/- 50 PPM 50-ohm termination Minimum = 0.5 Vpk-pk = 0.18 Vrms (sine) Maximum = 3.0 Vpk-pk = 1.06 Vrms (sine)	

Product Description	G800GE OSFP 2-ports of the OSFP Interface	G800GE OSFP 1-port of the OSFP interface, 1-port coaxial Tx/Rx
Chassis Clock OUT – Electrical Specifications	Frequency: 166.015625 MHz +/- 50 PPM HCSL, 50-ohm VOH > 0.55 V, VOL < 0.15 V, Swing > 0.55 V	
Hardware Trigger IN / OUT – Electrical Specifications	Trigger In: 50-ohm termination; Minimum = -1.0 V, Maximum = +4.0 V, Swing > 0.2 V Trigger Out: HCSL, 50 ohm; VOH > 0.55 V, VOL < 0.15 V, Swing > 0.55 V	
Chassis System Electrical Power	Operates on 100-240VAC, 50/60Hz: ◦ 8 Amps on 100-125VAC ◦ 4 Amps on single phase, 200-240VAC G800GE OSFP chassis is shipped with (1 each) 100-125VAC North American power cord. Options for international shipments are selected at the time of order placement.	
Chassis System Dimensions	13.2" (D) x 17.4" (W) x 3.65" (H) 335mm (D) x 442mm (W) x 92.65mm (H)	
Chassis System Weights	Hardware only: 21.75 lbs. (9.87 kg) Shipping: 30.49 lbs. (13.83 kg) Includes rackmount slides, cable support bracket, power cord, accessories, and packaging	
Temperature (Ambient Air)	Operating: 41°F to 95°F (5°C to 35°C) Storage: 41°F to 122°F (5°C to 50°C)	
Humidity (Ambient Air)	Operating: 0% to 80%, non-condensing Storage: 0% to 80%, non-condensing	
Regulatory Compliance Specifications	IEC 60950-1, UL 60950-1, CSA C22.2 No.60950-1, IEC 62368-1, UL 62368-1, CSA 62368-1, CE (LVD, EMC, RoHS), EN/IEC 55032, EN/IEC 55024, CFR 47, FCC Part 15B, ICES-003, AS/NZ CISPR 32/24, KN32/35	

Application Support

G800GE OSFP
Browser Support: The G800GE chassis and features are supported on the Google Chrome cross-platform browser. It is recommended to upgrade to the latest version for the browser. Other browsers such as Firefox, Safari, Internet Explorer, and Microsoft Edge may function at a sub-optimal experience. **KiOS**: Operating system software for the G800GE Layer 1 BERT and FEC test 800GE wire-rate signal generation and measurement analysis with optional support for Forward Error Correction measurement, and synchronization with the Keysight M8040A High Performance BERT analyzer for physical layer applications. **REST API:** Support for overall test automation, managing the chassis, ports, logs, CMIS, license, test plans, configuring tests, and accessing and gathering BERT and FEC measurement and statistics

Python library: KiPY is a Python library that enables REST calls to KiOS on the G800GE to allow use of a Python script to do the same things you do from the GUI, such as changing system settings, viewing stats, and reading and writing CMIS registers

Ordering Information

G800GE OSFP and OSFP-COAX Chassis Systems

941-0082

Ixia, G800GE OSFP, 800GE, 2-port OSFP Layer 1 BERT and FEC test and measurement system, fixed chassis (941-0082) that includes the latest version of the KiOS software. Chassis includes the 1x800GE, 2x400GE, 4x200GE, and 8x100GE speed support and Forward Error Correction measurement capability.

941-0083

Ixia, G800GE OSFP-COAX, 800GE, 1-port OSFP, 1-port electrical coax breakout, Layer 1 BERT and FEC test and measurement system, fixed chassis (941-0083) that includes the latest version of the KiOS software. Chassis includes the 1x800GE, 2x400GE, 4x200GE, and 8x100GE speed support and Forward Error Correction measurement capability.

G800GE Chassis Enhanced BERT Options

905-1102

Ixia, G800GE, Option, FACTORY INSTALLED, Enhanced BERT, FEC trigger and capture option for the G800GE Layer 1 BERT and FEC test systems. This option provides in-depth analysis of BERT Inferred FEC for faster analysis of FEC over all Ethernet speeds: 1x800GE, 2x400GE, 4x200GE, 8x100GE and SSPRQ100 pattern generation for 100Gb/s lane applications. It also includes the FEC trigger and capture feature for 2x400, 4x200GE, 8x100GE to provide the ability to capture FEC data across any FEC lane meeting the criteria set by the user. An external trigger can be enabled. This entire option is applied to all ports on a single G800GE Layer 1 BERT and FEC test system.

905-1103

Ixia, G800GE, Option, FIELD UPGRADE, Enhanced BERT, FEC trigger and capture option for the G800GE Layer 1 BERT and FEC test systems. This option provides in-depth analysis of BERT Inferred FEC for faster analysis of FEC over all Ethernet speeds: 1x800GE, 2x400GE, 4x200GE, 8x100GE and SSPRQ100 pattern generation for 100Gb/s lane applications. It also includes the FEC trigger and capture feature for 2x400, 4x200GE, 8x100GE to provide the ability to capture FEC data across any FEC lane meeting the criteria set by the user. An external trigger can be enabled. This entire option is applied to all ports on a single G800GE Layer 1 BERT and FEC test system.

G800GE Chassis Options to Synchronize to the M8040A BERT Analyzer

905-1090

Ixia, G800GE, Option, FACTORY INSTALLED. Synchronize to Keysight bit-error rate tester (BERT) and trigger to external Keysight UXR real-time oscilloscope equipment, FEC trigger and capture option for the G800GE 800GE Layer 1 BERT and FEC test systems. This entire option is applied to a single G800GE test system to allow it to connect to a single external Keysight equipment at a time.

905-1091

Ixia, G800GE, Option, FIELD UPGRADE. Synchronize to Keysight bit-error rate tester (BERT) and trigger to external Keysight UXR real-time oscilloscope equipment, FEC trigger and capture option for the G800GE 800GE Layer 1 BERT and FEC test systems. This entire option is applied to a single G800GE test system to allow it to connect to a single external Keysight equipment at a time.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

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