IQS-8115 Transport Blazer

SONET/SDH TEST MODULE

SPEC SHEET

Combines advanced SONET, SDH, DSn, PDH test functions in a single unit

KEY FEATURES

- DS0/E0 to OC-48/STM-16 testing in a single module
- Supports SONET, SDH, DSn and PDH
- SmartMode automatic signal structure discovery with real-time simultaneous monitoring of all discovered STS/AU and user-selected VT/TU channels
- Intuitive, feature-rich user interface with available automated test scripting and multi-user remote management capabilities

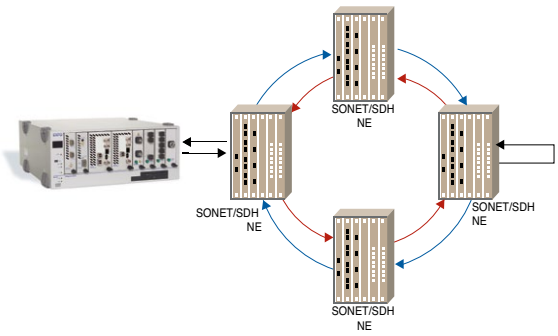
PLATFORM COMPATIBILITY

Platform
IQS-600

ADVANCED SONET/SDH TESTING

EXFO's IQS-8115 Transport Blazer test module combines advanced DSn/PDH and SONET/SDH test functions in a single unit, eliminating the need for multiple, purpose-built test platforms for the testing of T1/E1 to OC-48/STM-16 circuits or network elements. The extensive list of DSn, SONET, PDH and SDH features available on the IQS-8115 Transport Blazer allows users to perform a wide range of tests from simple bit-error-rate (BER) analysis to more advanced characterization. These functions include:

- Mixed and bulk payload generation and analysis from 64 kbit/s to 2.5 Gbit/s
- High-order mappings: STS-1/3c/12c/48c and AU-3/AU-4/AU-4-4c/16c
- Low-order mappings: VT1.5/2/6, TU-11/12/2/3
- Section, line, high-order (HO) and low-order (LO) path overhead manipulation and monitoring
- Section, line, high-order and low-order path alarm/error generation and monitoring
- High-order and low-order pointer generation and monitoring
- Performance monitoring: G.821, G.826, G.828, G.829, M.2100, M.2101
- Frequency analysis and power measurement
- Frequency offset generation
- Automatic protection switching and service disruption time measurements
- Round-trip delay measurements
- DS1/DS3 auto detection of line code, framing and test pattern
- Dual DS1/DS3 receiver testing
- Independent transmitter and receiver testing
- Through mode analysis
- Programmable error/alarm injection
- DS1 FDL
- DS1 loopcodes and NI/CSU loopback emulation
- Fractional T1/E1 testing
- DS3 FEAC
- Tandem connection monitoring

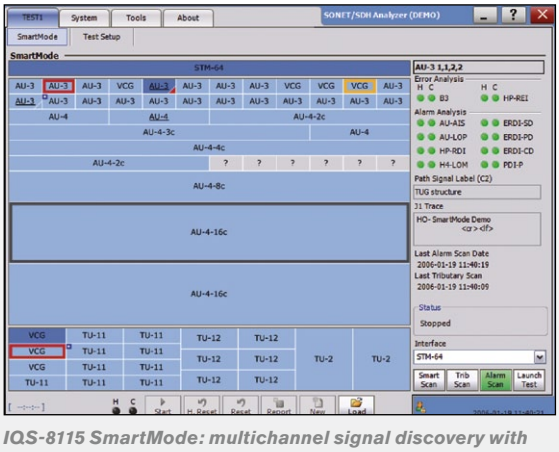


Housed in the IQS-600 platform, the IQS-8115 module enables advanced SONET/SDH characterization of systems/components.

SmartMode: Real-Time Signal Structure Discovery and Monitoring

EXFO's IQS-8115 Transport Blazer supports a unique feature called SmartMode. This provides users with full visibility of all high-order (STS/AU) and low-order (VT/TU) mixed mappings within the incoming SONET/SDH test signal.

SmartMode automatically discovers the signal structure of the OC-n/STM-n line, including mixed mappings. In addition to this in-depth multichannel visibility, SmartMode performs real-time monitoring of all discovered high-order paths and user selected low-order paths simultaneously, providing users with the industry's most powerful SONET/SDH multichannel monitoring and troubleshooting solution. Real-time monitoring allows users to easily isolate network faults, saving valuable time and minimizing service disruption. SmartMode also provides one-touch test case start, allowing users to quickly configure a desired test path.



IQS-8115 SmartMode: multichannel signal discovery with real-time alarm scan (shown in the IQS-600 user interface).

UNSURPASSED CONFIGURATION AND OPERATIONAL FLEXIBILITY

The IQS-8115 Transport Blazer module is supported on EXFO's lab/manufacturing test platform, the IQS-600 Integrated Qualification System, which provides users with an all-in-one solution supporting a mix of Transport Blazer modules, Packet Blazer modules (IQS-8510G 10 Gigabit Ethernet, IQS-8510B Ethernet) and optical-layer test modules, making it the industry's first truly integrated lab/manufacturing testing platform. The resulting modularity enables users to upgrade their test system according to their specific requirements.

The IQS-8115 module is compatible with EXFO's powerful lab/manufacturing platform, the IQS-600 Integrated Qualification System.

Remote Management

Through its optional Visual Guardian Lite™ management software, the IQS-8115 Transport Blazer module allows you to perform remote testing and data analysis, as well as remote monitoring via standard Ethernet.

Automated Test Scripting

The IQS-8115 Transport Blazer supports two methods for automated test scripting. First, by using industry-based SCPI commands, and second, by using a built-in macro recorder that facilitates the recording of test actions and allows to automatically create test scripts. These test scripts can be used as the basis for larger automation routines that can be created in any .NET environment. Alternatively, LabVIEW can be used if graphical programming is preferred.

Test Logger and Reporting

EXFO's IQS-8115 Transport Blazer module supports a detailed test logger and test reporting tools, enabling users to view any errors/alarms that occurred during the test interval, which can then be used for post-processing of results.

Test Logger

ID	Date/Time	Data Path	Event	Duration	Count	Rate
1	00:00:00	TEST 1	StartEvent			
2	00:00:04	Bantam [1]/DS1	AlarmAis	00:00:14		
3	00:00:18	Bantam [1]/DS1	ErrorCrc6	00:00:01	1	1.63E-07
4	00:00:22	Bantam [1]/DS1	AlarmAis	00:00:09		
5	00:00:31	Bantam [1]/DS1	ErrorCrc6	00:00:01	13	1.14E-06
6	00:00:31	Bantam [1]/DS1/Pattern	AlarmLss	00:00:01		
7	00:00:34	Bantam [1]	AlarmLos	00:00:04		
8	00:00:38	Bantam [1]	ErrorBpv	00:00:01	1	1.90E-08
9	00:00:40	Bantam [1]	ErrorBpv	00:00:01	1	3.60E-08
10	00:00:40	Bantam [1]/DS1	ErrorCrc6	00:00:01	1	7.50E-07
11	00:00:40	Bantam [1]/DS1/Pattern	ErrorBitError	00:00:01	1	5.43E-08
12	00:00:50	Bantam [1]/DS1/Pattern	ErrorBitError	00:00:01	352935	1.04E-02
13	00:00:51	Bantam [1]/DS1/Pattern	AlarmLss	00:00:04		

Test logger: a detailed, time-stamped list of all events occurring during test execution.

ELECTRICAL INTERFACES

The following section provides detailed information on all supported electrical interfaces.

ELECTRICAL INTERFACES

	DS1	E1/2M		E2/8M	E3/34M	DS3/45M	STS-1e/STM-0e/52M	E4/140M	STS-3e/STM-1e/155M	
Tx Pulse Amplitude	2.4 to 3.6 V	3.0 V	2.37 V	2.37 V	1.0 ± 0.1 V	0.36 to 0.85 V		1.0 ± 0.1 Vpp	0.5 V	
Tx Pulse Mask	GR-499 Figure 9.5	G.703 Figure 15	G.703 Figure 15	G.703 Figure 16	G.703 Figure 17	**DS-3** GR-499 Figure 9-8	**45M** G.703 Figure 14	G.703 Figure 18/19	**STS-3e** GR-253 Figure 4-12, 4-13, 4-14	**STM-1e/155M** G.703 Figure 4-14/22, 23
Tx LBO Preamplification	Power dBdsx +0.6 dBdsx (0-133 ft) +1.2 dBdsx (133-266 ft) +1.8 dBdsx (266-399 ft) +2.4 dBdsx (399-533 ft) +3.0 dBdsx (533-655 ft)					0 to 225 ft 225 to 450 ft	0 to 225 ft 225 to 450 ft		0 to 225 ft	
Cable Simulation	Power dBdsx −22.5 dBdsx −15.0 dBdsx −7.5 dBdsx 0 dBdsx					450 to 900 (927) ft	450 to 900 (927) ft			
Rx Level Sensitivity	For 772 kHz: TERM: ≤ 26 dB (cable loss only) at 0 dBdsx Tx DSX-MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only) Note: measurement units = dBdsx	For 1024 kHz: TERM: ≤ 6 dB (cable loss only) MON: ≤ 25 dB (20 dB resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only) Note: measurement units = dBm	For 1024 kHz: TERM: ≤ 6 dB (cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only) Note: measurement units = dBm	For 4224 kHz: TERM: ≤ 6 dB (cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Note: measurement units = dBm	For 17.184 MHz TERM: ≤ 12 dB (coaxial cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Note: measurement units = dBm	For 22.368 MHz: TERM: ≤ 10 dB (cable loss only) DSX-MON: ≤ 26.5 dB (21.5 dB resistive loss + cable loss ≤ 5 dB) Note: measurement units = dBm	For 25.92 MHz: TERM: ≤ 10 dB (cable loss only) MON: ≤ 25 dB (20 dB resistive loss + cable loss ≤ 5 dB) Note: measurement units = dBm	For 70 MHz: TERM: ≤ 12 dB (coaxial cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Note: measurement units = dBm	For 78 MHz: TERM: ≤ 12.7 dB (coaxial cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Note: measurement units = dBm	
Transmit Bit Rate	1.544 Mbit/s ± 4.6 ppm	2.048 Mbit/s ± 4.6 ppm	2.048 Mbit/s ± 4.6 ppm	8.448 Mbit/s ± 4.6 ppm	34.368 Mbit/s ± 4.6 ppm	44.736 Mbit/s ± 4.6 ppm	51.84 Mbit/s ± 4.6 ppm	139.264 Mbit/s ± 4.6 ppm	155.52 Mbit/s ± 4.6 ppm	
Receive Bit Rate	1.544 Mbit/s ± 140 ppm	2.048 Mbit/s ± 100ppm	2.048 Mbit/s ± 100ppm	8.448 Mbit/s ± 100 ppm	34.368 Mbit/s ± 100 ppm	44.736 Mbit/s ± 100 ppm	51.84 Mbit/s ± 100 ppm	139.264 Mbit/s ± 100 ppm	155.52 Mbit/s ± 100 ppm	
Measurement Accuracy (uncertainty) Frequency (ppm) Electrical power (db)	± 4.6 DSX range: ± 1.0 DSX-MON range: ± 2.0	± 4.6 NORMAL: ± 1.0 MONITOR: ± 2.0	± 4.6 NORMAL: ± 1.0 MONITOR: ± 2.0	± 4.6 NORMAL: ± 1.0 MONITOR: ± 2.0	± 4.6 NORMAL: ±1.0 MONITOR: ±2.0	± 4.6 DSX range: ± 1.0 DSX-MON range: ±2.0	± 4.6 DSX range: ± 1.0 DSX-MON range: ±2.0	± 4.6 NORMAL: ±1.0 MONITOR: ±2.0	± 4.6 NORMAL: ± 1.0 MONITOR: ±2.0	
Peak-to-Peak Voltage	±10 % down to 500 mVpp	±10% down to 500 mVpp	±10% down to 500 mVpp	±10% down to 400 mVpp	±10% down to 200 mVpp	±10% down to 200 mVpp	±10% down to 200 mVpp	±10% down to 200 mVpp	±10% down to 200 mVpp	
Frequency Offset Generation	1.544 Mbit/s ± 140 ppm	2.048 Mbit/s ± 70 ppm	2.048 Mbit/s ± 70 ppm	8.448 Mbit/s ± 50 ppm	34.368 Mbit/s ± 50 ppm	44.736 Mbit/s ± 50 ppm	51.84 Mbit/s ± 50 ppm	139.264 Mbit/s ± 50 ppm	155.52 Mbit/s ± 50 ppm	
Intrinsic Jitter (Tx)	ANSI T1.403 section 6.3 GR-499 section 7.3	G.823 section 5.1	G.823 section 5.1	G.823 section 5.1	G.823 section 5.1 G.751 section 2.3	GR-449 section 7.3 (categories I and II)	GR-253 section 5.6.2.2 (category II)	G.823 section 5.1	G.825 section 5.1 GR-253 section 5.6.2.2	
Input Jitter Tolerance	AT&T PUB 62411 GR-499 section 7.3	G.823 section 7.1	G.823 section 7.1	G.823 section 7.1	G.823 section 7.1	GR-449 section 7.3 (categories I and II)	GR-253 section 5.6.2.2 (category II)	G.823 section 7.1 G.751 section 3.3	G.825 section 5.2 GR-253 section 5.6.2.3	
Line Coding	AMI and B8ZS	AMI and HDB3	AMI and HDB3	HDB3	HDB3	B3ZS	B3ZS	CMI	CMI	
Input Impedance (Resistive Termination)	100 Ω ± 5%, balanced	120 Ω ± 5%, balanced	75 Ω ± 5%, unbalanced	75 Ω ± 5%, unbalanced	75 Ω ± 5%, unbalanced	75 Ω ±5%, unbalanced	75 Ω ±5%, unbalanced	75 Ω ± 10%, unbalanced	75 Ω ± 5%, unbalanced	
Connector Type	BANTAM and RJ-48C	BANTAM and RJ-48C	BNC	BNC	BNC	BNC	BNC	BNC	BNC	

SYNCHRONIZATION INTERFACES

	External Clock DS1/1.5M	External Clock E1/2M	External Clock E1/2M	2 MHz (Trigger)
Tx Pulse Amplitude	2.4 to 3.6 V	3.0 V	2.37 V	0.75 to 1.5 V
Tx Pulse Mask	GR-499 figure 9.5	G.703 figure 15	G.703 figure 15	G.703 figure 20
Tx LBO Preamplification	Typical power dBdsx +0.6 dBdsx (0-133 ft) +1.2 dBdsx (133-266 ft) +1.8 dBdsx (266-399 ft) +2.4 dBdsx (399-533 ft) +3.0 dBdsx (533-655 ft)			
Rx Level Sensivity	TERM: ≤ 6 dB (cable loss only) (at 772 kHz for T1) DSX-MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only)	TERM: = ≤ 6 dB (cable loss only) MON: ≤ 26 dB (20 dB resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only)	TERM: = ≤ 6 dB (cable loss only) MON: ≤ 26 dB (resistive loss + cable loss ≤ 6 dB) Bridge: ≤ 6 dB (cable loss only)	≤ 6 dB (cable loss only)
Transmission Bit Rate	1.544 Mbit/s ± 4.6 ppm	2.048 Mbit/s ± 4.6 ppm	2.048 Mbit/s ± 4.6 ppm	
Reception Bit Rate	1.544 Mbit/s ± 50 ppm	2.048 Mbit/s ± 50 ppm	2.048 Mbit/s ± 50 ppm	
Intrinsic Jitter (Tx)	ANSI T1.403 section 6.3 GR-499 section 7.3	G.823 section 6.1	G.823 section 6.1	G.703 table 11
Input Jitter Tolerance	AT&T PUB 62411 GR-499 SECTION 7.3	G.823 section 7.2 G.813	G.823 section 7.2 G.813	
Line Coding	AMI and B8ZS	AMI and HDB3	AMI and HDB3	
Input Impedance (Resistive Termination)	75 Ω ± 5%, unbalanced	75 Ω ± 5%, unbalanced	75 Ω ± 5%, unbalanced	75 Ω ± 5%, unbalanced
Connector Type	BNC [a]	BNC [a]	BNC	BNC

Note

a. Adaptation cable required for BANTAM.

OPTICAL INTERFACES

The following section provides detailed information on all supported optical interfaces.

OPTICAL INTERFACES

	OC-3/STM-1				OC-12/STM-4				OC-48/STM-16			
	15 km; 1310 nm	40 km; 1310 nm	40 km; 1550 nm	80 km; 1550 nm	15 km; 1310 nm	40 km; 1310 nm	40 km; 1550 nm	80 km; 1550 nm	15 km; 1310 nm	40 km; 1310 nm	40 km; 1550 nm	80 km; 1550 nm
Level Tx	–5 to 0 dBm	–2 to 3 dBm	–5 to 0 dBm	–2 to 3 dBm	–5 to 0 dBm	–2 to 3 dBm	–5 to 0 dBm	–2 to 3 dBm	–5 to 0 dBm	–2 to 3 dBm	–5 to 0 dBm	–2 to 3 dBm
Rx level sensitivity	–18 to 0 dBm	–27 to –9 dBm	–18 to 0 dBm	–28 to –9 dBm	–18 to 0 dBm	–27 to –9 dBm	–18 to 0 dBm	–28 to –9 dBm	–18 to 0 dBm	–27 to –9 dBm	–18 to 0 dBm	–28 to –9 dBm
Transmit bit rate	155.52 Mbit/s ± 4.6 ppm				622.08 Mbit/s ± 4.6 ppm				2.48832 Gbit/s ± 4.6 ppm			
Receive bit rate	155.52 Mbit/s ± 100 ppm				622.08 Mbit/s ± 100 ppm				2.48832 Gbit/s ± 100 ppm			
Operational wavelength range	1260 to 1360 nm		1430 to 1580 nm		1274 to 1356 nm	1280 to 1335 nm	1430 to 1580 nm	1480 to 1580 nm	1260 to 1360 nm	1280 to 1335 nm	1430 to 1580 nm	1500 to 1580 nm
Spectral width	< 1 nm (–20 dB from center)				< 1 nm (–20 dB from center)				< 1 nm (–20 dB from center)			
Frequency offset generation	±50 ppm				±50 ppm				±50 ppm			
Measurement accuracy (uncertainty) Frequency Optical power	±4.6 ppm ±2 dB											
Maximum Rx before damage[a]	3 dB				3 dB				3 dB			
Jitter compliance	G.957 (SDH) GR-253 (SONET) G.958 (SDH)				GR-253 (SONET) G.958 (SDH)				GR-253 (SONET) G.958 (SDH)			
Line coding	NRZ				NRZ				NRZ			
Eye safety	SFP/XFP transceivers comply with IEC 60825 and 21 CFR 1040.10 (except for deviations pursuant to Laser Notice No. 50, dated July 2001), for Class 1 or 1M lasers.											
Connector[b]	Dual LC				Dual LC				Dual LC			
Transceiver type	SFP				SFP				SFP			

Notes

a. In order not to exceed the maximum receiver power level, an attenuator must be used.

b. SFP compliance: The IQS-8115 selected SFP shall meet the requirements stated in the “Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)”. The IQS-8115 selected SFP shall also meet the requirements stated in the “Specification for Diagnostic Monitoring Interface for Optical Xcvrs”.

FUNCTIONAL SPECIFICATIONS

SONET AND DSn		SDH AND PDH	
Optical interfaces	OC-3, OC-12, OC-48	**Optical interfaces**	STM-1, STM-4, STM-16
Available wavelengths (nm)	1310, 1550	Available wavelengths (nm)	1310, 1550
Electrical interfaces	DS1, DS3, STS-1e, STS-3e	**Electrical interfaces** [a]	1.5M (DS1), 2M (E1), 8M (E2), 34M (E3), 45M (DS3), 140M (E4), STM-0e, STM-1e
DS1 framing	Unframed, SF, ESF	2M framing	Unframed, PCM30, PCM31, PCM30 CRC-4, PCM31 CRC-4
DS3 framing	Unframed, M13, C-bit parity	8M, 34M, 140M framing	Unframed, framed
Clocking	Internal, loop-timed, external (BITS), inter-module	Clocking	Internal, loop-timed, external (MTS/SETS), 2 MHz, inter-module
Mappings		**Mappings**	
VT1.5	Bulk, DS1	TU-11-AU-3, TU-11-AU-4	Bulk, 1.5M
VT2	Bulk, E1	TU-12-AU-3, TU-12-AU-4	Bulk, 2M
VT6	Bulk	TU-3-AU-4	Bulk, 34M, 45M
STS-1	Bulk, DS3	TU-2-AU-3, TU-2-AU-4	Bulk
STS-3c STS-12c/48c	Bulk, E4 Bulk	AU-4 AU-4-4c/16c	Bulk, 140M Bulk
SONET overhead analysis and manipulation	A1, A2, J0, E1, F1, D1-D12, K1, K2, S1, M0, E2, J1, C2, G1, F2, H4, Z3, Z4, Z5, N1, N2, Z6, Z7	SDH overhead analysis and manipulation	A1, A2, J0, E1, F1, D1-D12, K1, K2, S1, M0, E2, J1, C2, G1, F2, F3, K3, N1, N2, K4, H4
Error insertion		**Error insertion**	
DS1	Framing bit, BPV, CRC-6, bit error	E1 (2M)	FAS, CV, CRC-4, E-bit, bit error
DS3	BPV, C-bit, F-bit, P-bit, FEBE, bit error	E2 (8M), E3 (34M), E4 (140M)	FAS, CV, bit error
STS-1e, STS-3e	Section BIP (B1), line BIP (B2), path BIP (B3), BIP-2, REI-L, REI-P, REI-V, BPV, FAS, bit error	STM-0e, STM-1e	RS-BIP (B1), MS-BIP (B2), HP-BIP (B3), MS-REI, HP-REI, LP-BIP-2, LP-REI, CV, FAS, bit error
OC-3, OC-12, OC-48	Section BIP (B1), line BIP (B2), path BIP (B3), BIP-2, REI-L, REI-P, REI-V, bit error	STM-1, STM-4, STM-16	RS-BIP (B1), MS-BIP (B2), HP-BIP (B3), MS-REI, HP-REI, LP-BIP-2, LP-REI, bit error
Error measurement		**Error measurement**	
DS1	Framing bit, BPV, CRC-6, bit error	E1 (2M)	FAS, CV, CRC-4, E-bit, bit error
DS3	BPV, C-bit, F-bit, P-bit, FEBE, bit error	E2 (8M), E3 (34M), E4 (140M)	FAS, CV, bit error
STS-1e, STS-3e	Section BIP (B1), line BIP (B2), path BIP (B3), BIP-2, REI-L, REI-P, REI-V, BPV, FAS, bit error	STM-0e, STM-1e	RS-BIP (B1), MS-BIP (B2), HP-BIP (B3), MS-REI, HP-REI, LP-BIP-2, LP-REI, CV, FAS, bit error
OC-3, OC-12, OC-48	Section BIP (B1), line BIP (B2), path BIP (B3), BIP-2, REI-L, REI-P, REI-V, bit error	STM-1, STM-4, STM-16	RS-BIP (B1), MS-BIP (B2), HP-BIP (B3), MS-REI, HP-REI, LP-BIP-2, LP-REI, bit error
Alarm insertion		**Alarm insertion**	
DS1	LOS, RAI, AIS, OOF, pattern loss	E1 (2M)	LOS, LOS Mframe, LOS CRC Mframe, LOF, AIS, TS16 AIS, RAI, RAI Mframe, pattern loss
DS3	LOS, RDI, AIS, OOF, DS3 idle, pattern loss	E2 (8M), E3 (34M), E4 (140M)	LOS, LOF, RAI, AIS, pattern loss
STS-1e, STS-3e, OC-3, OC-12, OC-48	LOS, LOF, SEF, AIS-L, RDI-L, AIS-P, LOP-P, LOM, PDI-P, RDI-P, ERDI-PCD, ERDI-PPD, ERDI-PSD, UNEQ-P, AIS-V, LOP-V, RDI-V, ERDI-VCD, ERDI-VPD, ERDI-VSD, RFI-V, UNEQ-V, pattern loss	STM-0e, STM-1e, STM-1, STM-4, STM-16	LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, H4-LOM, HP-PDI, ERDI-PSD, ERDI-PCD, ERDI-PPD, HP-UNEQ, TU-AIS, LP-RFI, LP-RDI, ERDI-VCD, ERDI-VPD, ERDI-VSD, LP-RFI, LP-UNEQ, pattern loss
Alarm detection		**Alarm detection**	
DS1	LOS, loss of clock (LOC), RAI, AIS, OOF, pattern loss	E1 (2M)	LOS, LOS Mframe, LOS CRC Mframe, LOC, LOF, AIS, TS16 AIS, RAI, RAI Mframe, pattern loss
DS3	LOS, LOC, RDI, AIS, OOF, DS3 idle, pattern loss	E2 (8M), E3 (34M), E4 (140M)	LOS, LOC, LOF, RAI, AIS, pattern loss
STS-1e, STS-3e OC-3, OC-12, OC-48	LOS, LOC, LOF, SEF, TIM-S, AIS-L, RDI-L, AIS-P, LOP-P, LOM, PDI-P, RDI-P, ERDI-PCD, ERDI-PPD, ERDI-PSD, PLM/SLM-P, UNEQ-P, TIM-P, AIS-V, LOP-V, RDI-V, ERDI-VCD, ERDI-VPD, ERDI-VSD, RFI-V, UNEQ-V, TIM-V, PLM/SLM-V, pattern loss	STM-0e, STM-1e STM-1, STM-4, STM-16	LOS, LOF, LOC, OOF, RS-TIM, MS-AIS, MS-RDI, AU-AIS, AU-LOP, H4-LOM, HP-RDI, ERDI-PSD, ERDI-PCD, ERDI-PPD, HP-PLM/ SLM, HP-UNEQ, HP-TIM, TU-AIS, LP-RFI, LP-RDI, ERDI-VCD, ERDI-VPD, ERDI-VSD, LP-RFI, LP-UNEQ, LP-TIM, LP-PLM/SLM, pattern loss

Frequency alarm on all supported interfaces.

Note

a. 1.5M (DS1) and 45M (DS3) interfaces discribed under SONET and DSn column.

FUNCTIONAL SPECIFICATIONS

SONET AND DSN		SDH AND PDH	
Patterns		**Patterns**	
DS0	2E9-1, 2E11-1, 2E20-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 3-in-24, 32 bit programmable (inverted or non-inverted), bit errors	E0 (64K)	2E9-1, 2E11-1, 2E20-1, 1010, 1100, 1111, 0000, 1-in-8, 1-in-16, 3-in-24, 32 bit programmable (inverted or non-inverted), bit errors
DS1	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, QRSS, 1-in-8, 1-in-16, 3-in-24, 32 bit programmable (inverted or non-inverted), T1-DALY, 55-Octet, bit errors	E1 (2M)	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 3-in-24, 32 bit programmable (inverted or non-inverted), bit errors
DS3	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, QRSS, 1-in-8, 1-in-16, 3-in-24, 32 bit programmable (inverted or non-inverted), bit errors	E2 (8M), E3 (34M), E4 (140M)	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 3-in-24 [a], 32 bit programmable (inverted or non-inverted), bit errors
VT1.5/2/6	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, QRSS, 1-in-8, 1-in-16, 32 bit programmable (inverted or non-inverted), bit errors	TU-11/12/2/3	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 32 bit programmable (inverted or non-inverted), bit errors
STS-1, STS-3c/12c/48c	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 32 bit programmable (inverted or non-inverted), bit errors	AU-3/AU-4/AU-4c/16c	2E9-1, 2E11-1, 2E15-1, 2E20-1, 2E23-1, 2E31-1, 1100, 1010, 1111, 0000, 1-in-8, 1-in-16, 32 bit programmable (inverted or non-inverted), bit errors

Pattern loss and bit error generation and analysis supported on all patterns.

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS

Power measurements	Supports power measurements, displayed in dBm (dBdsx for DS1), for optical and electrical interfaces.
Frequency measurements	Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency), displayed in ppm and bit/s (bps), for optical and electrical interfaces.
Frequency offset generation	Supports offsetting the clock of the transmitted signal on a selected interface to exercise clock recovery circuitry on network elements.
Dual DSn receivers	Supports two DS1 or DS3 receivers, allowing users to simultaneously monitor two directions of a circuit under test in parallel, resulting in quick isolation of the source of errors.
Performance monitoring The following ITU-T recommendations, and corresponding performance monitoring parameters, are supported on the IQS-8115.	
ITU-T recommendation G.821 G.826 G.828 G.829 M.2100 M.2101	Performance monitoring statistics ES, EFS, EC, SES, UAS, ESR, SESR, DM ES, EFS, EB, SES, BBE, UAS, ERS, SESR, BBER ES, EFS, EB, SES, BBE, SEP, UAS, ESR, SESR, BBER, SEPI ES, EFS, EB, SES, BBE, UAS, ESR, SESR, BBER ES, SES, UAS, ESR, SESR ES, SES, BBE, UAS, ESR, SESR, BBER
Pointer adjustment and analysis Generation and analysis of HO/AU and LO/TU pointer adjustments as per GR-253, and ITU-T G.703	
Generation › Pointer increment and decrement › Pointer jump with or without NDF › Pointer value	Analysis › Pointer increments › Pointer decrements › Pointer jumps (NDF, no NDF) › Pointer value and cumulative offset
Programmable error/alarm injection	Ability to inject errors/alarms in the following modes: Manual, Constant Rate, Burst, Periodic Burst and Continuous.
Service disruption time (SDT) measurements	The service disruption time test tool measures the time during which there is a disruption of service due to the network switching from the active channels to the backup channels. User-selectable triggers: All supported alarms and errors. Measurements: last disruption, shortest disruption, longest disruption, average disruption, total disruption, and service disruption count.
Round-trip delay (RTD) measurements	The round-trip delay test tool measures the time required for a bit to travel from the IQS-8115 transmitter back to its receiver after crossing a far-end loopback. Measurements are supported on all supported IQS-8115 interfaces and mappings. Measurements: last RTD time, minimum, maximum, average, measurement count (no. of successful RTD tests), failed measurement count.
APS message control and monitoring	Ability to monitor and set up automatic protection switching messages (K1/K2 byte of SONET/SDH overhead).
Synchronization status	Ability to monitor and set up synchronization status messages (S1 byte of SONET/SDH overhead).
Signal label control and monitoring	Ability to monitor and set up payload signal labels (C2, V5 byte of SONET/SDH overhead).
Through mode	Ability to perform Through mode analysis of any incoming electrical (DSn, PDH) and optical line (OC-3/12/48, STM-1/4/16).
M13 mux/demux	Ability to multiplex/demultiplex a DS1 signal into/from a DS3 signal. (Note: E1 to DS3 mux/demux available with G.747 software option.)
DS1 FDL	Support for DS1 Facility Data Link testing.
DS1 loopcodes	Support for generation of DS1 in-band loopcodes with the availability of up to 10 pairs of user-defined loopcodes.

Note

a. Not supported for E4 (140M).

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS

NI/CSU loopback emulation	Ability to respond to DS1 in-band/out-of-band loopcodes.
DS3 FEAC	Support for DS3 far-end alarms and looopback codewords.
DS1/DS3 auto detection	Ability to automatically detect DS1/DS3 line coding, framing and test pattern
Tandem connection monitoring (TCM) [a]	Tandem connection monitoring (TCM), option 2 [b] is used to monitor the performance of a subsection of a SONET/SDH path routed via different network providers. The IQS-8115 supports transmitting and receiving alarms and errors on a TCM link; also, transmission and monitoring of the tandem connection (TC) trace can be generated to verify the connection between TCM equipment. Error generation: TC-IEC, TC-BIP, TC-REI, OEI Error analysis: TC-IEC, TC-REI, OEI, TC-VIOL Alarm generation: TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS Alarm analysis: TC-TIM, TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS

ADDITIONAL FEATURES

Scripting	Wide range of SCPI commands powerful enough to provide repeatable testing of complex configuration, yet simple enough to create a STS-1e test in as little as eight SCPI commands. The IQS-8105 also includes an intuitive macro recorder enabling users to easily record test actions and automatically create test scripts in VB.Net.
Reports	Supports generation of test reports in .html, .csv, .txt, .pdf formats. Contents or reports are customizable by the user.
Power-up and restore	In the event of a power failure to the unit, the active test configuration and test logger are saved and restored upon bootup.
Store and load configurations	Ability to store and load test configurations to/from non-volatile memory.
Alarm hierarchy	Alarms are displayed according to a hierarchy based on root cause. Secondary effects are not displayed. This hierarchy serves to facilitate alarm analysis.
Configurable test views	This allows users to customize their test views; i.e., to dynamically insert or remove test tabs/windows, in addition to creating new test windows, so as to accurately match their testing needs.
Configurable test timer	Provides the ability for a user to set pre-defined test start and stop times.
Remote control	Available with Windows-based remote management software known as Visual Guardian Lite (optional software package). This allows users to remotely monitor and control the IQS-8105 module via standard Ethernet connection.

SPECIFICATIONS

IQS-8115	
SONET/SDH 155 Mbit/s, 622 Mbit/s and 2.5 Gbit/s	
Analyzer module supporting up to OC-48/STM-16 optical rates, as well as electrical DSn/PDH interfaces	
Test Interfaces	
SONET: STS-1e, STS-3e, OC-3, OC-12, OC-48	
SDH: STM-0e, STM-1e, STM-1, STM-4, STM-16	
DSn: DS1, DS3, Dual DS1 Rx, Dual DS3 Rx	
PDH: E1, E2, E3, E4	

GENERAL SPECIFICATIONS

Temperature		
operating	0 °C to 40 °C	(32 °F to 104 °F)
storage	–40 °C to 60 °C	(–40 °F to 140 °F)
Size (H x W x D)	125 mm x 76 mm x 282 mm	(4 15/16 in x 3 in x 11 1/8 in)
Weight (without transceiver)	0.9 kg	(2.0 lb)

Notes

a. HOP and LOP supported.

b. G.707 option 2.

ORDERING INFORMATION

IQS-8115-XX-XX-XX-XX

Test options [a]
SONET = SONET-BASE-SW
SDH = SDH-BASE-SW
SONET-SDH = Combined SONET/SDH

Rate options [a]
155 = 155 Mbit/s (OC-3/STM-1) [d]
622 = 622 Mbit/s (OC-12/STM-4)
2.5G = 2.5 Gbit/s (OC-48/STM-16)

Options [a]
G.747 [b]
DS1-FDL
DUAL-RX
DS3-FEAC
TCM = Tandem connection monitoring
SMART_MODE

Test options
00 = Without SFP modules
8190 = SFP modules 155 Mbit/s to 2.7 Gbit/s at 1310 nm, 15 km
8191 = SFP modules 155 Mbit/s to 2.7 Gbit/s at 1310 nm, 40 km
8192 = SFP modules 155 Mbit/s to 2.7 Gbit/s at 1550 nm, 80 km
8193 = SFP modules 155 Mbit/s to 2.7 Gbit/s at 1550 nm, 40 km
8194 = SFP modules 155/622 Mbit/s at 1310 nm, 15 km [c, e]
8195 = SFP modules 155/622 Mbit/s at 1310 nm, 40 km [c, e]
8196 = SFP modules 155/622 Mbit/s at 1550 nm, 80 km [c, e]

Example: IQS-8115-SONET-155-622-8194-DUAL-RX

Notes

a. Enables E1/2M in DS3/45M analysis and generation, as per ITU-T G.747 recommendation.

b. Multiple options can be purchased to suit the required test application.

c. For 8194, 8195, 8196 optical interface specifications, please contact your local EXFO representative.

d. Always included.

EXFO Headquarters > Tel.: +1 418 683-0211 | Toll-free: +1 800 663-3936 (USA and Canada) | Fax: +1 418 683-2170 | info@EXFO.com | **www.EXFO.com**

EXFO serves over 2000 customers in more than 100 countries. To find your local office contact details, please go to **www.EXFO.com/contact**.

SPIQS8115.7AN

Printed in Canada 13/06