

FTB-8510B Packet Blazer

ETHERNET TEST MODULE



EXFO Connect
Compatible



MEF
METRO ETHERNET FORUM

EtherSAM

EXFO Connect
Compatible



Feature(s) of this product is/are protected by one or more of patent appl. US 2012/0307666 A1 and equivalents in other countries.

Fully integrated test solution for performance assessment of Ethernet transport networks

KEY FEATURES

Complete EtherSAM (ITU-T Y.1564) test suite, the new standard for turning up and troubleshooting mobile backhaul and business Ethernet services

Throughput, back-to-back, latency and frame loss measurements as per RFC 2544 (bidirectional results)

Multistream generation and analysis, allowing quality of service (QoS) verification through VLAN and ToS/DSCP prioritization testing

True wire-speed, stateful TCP throughput based on RFC 6349 for undisputable SLA enforcement for Ethernet services

IPTV testing and analysis

Up to 1 Gbit/s full-line-rate data capturing and decoding

Complete Carrier Ethernet services portfolio: PBB-TE (MAC-in-MAC), MPLS, MPLS-TP, 802.3ah and IPv4/IPv6

1x and 2x Fibre Channel testing

EXFO Connect-compatible: automated asset management; data goes through the cloud and into a dynamic database

PLATFORM COMPATIBILITY



Platform
FTB-500



Compact Platform
FTB-200



ASSESSING ETHERNET SERVICE PERFORMANCE

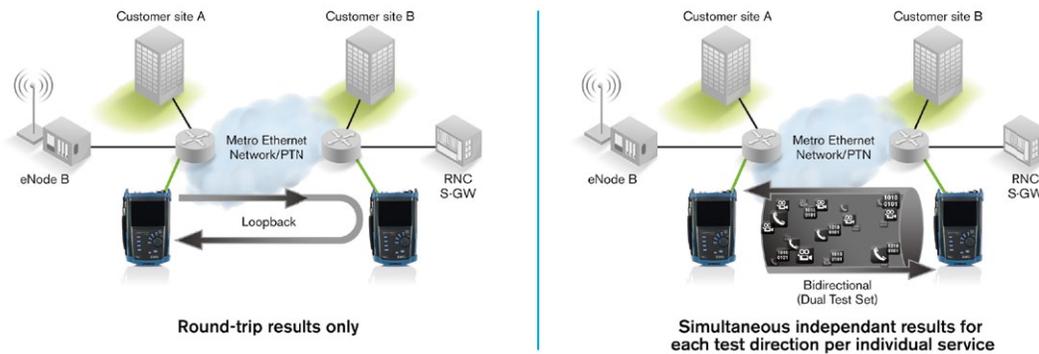
EXFO's FTB-8510B Packet Blazer™ brings performance assurance to Ethernet-based services. Its wide range of test functionalities provides all the necessary measurement tools for verifying service-level agreements (SLA) between service providers and their customers. This module is the ideal tool for turning-up and troubleshooting Ethernet-based mobile backhaul, commercial and wholesale services. Combined with its rack-mounted remote test unit counterpart, the RTU-310 and the FTB-800 NetBlazer Series, the FTB-8510B simplifies and speeds up the deployment of Ethernet services.

ETHERSAM: THE NEW STANDARD IN ETHERNET TESTING

ITU-T Y.1564 is the new standard for turning up and troubleshooting Carrier Ethernet services. This methodology is completely adapted to today's Ethernet services especially mobile backhaul and commercial services. It is also significantly faster, therefore saving time and resources while optimizing QoS.

The FTB-8510B can perform the EtherSAM (Y.1564) test suite for 10/100/1000M interfaces, at all frame sizes and at full line rate.

EXFO's EtherSAM approach proves even more powerful as it executes the complete ITU-T Y.1564 test suite bidirectionally. Key SLA parameters are measured independently in each test direction, thus providing 100% first-time-right service activation—the highest level of confidence in service testing.



RFC 2544 TEST SUITE

The FTB-8510B Packet Blazer can perform the RFC 2544 test suite for 10/100/1000M interfaces at all frame sizes and at full line rate, allowing the provider to certify that the circuit is efficient and error-free at 100% utilization. More importantly, when in dual test set mode, the Packet Blazer allows bidirectional testing, providing independent RFC 2544 test results for each direction (local to remote and remote to local) simultaneously. This is especially important when testing Ethernet services as traffic from each direction often takes different paths in the network. Performance results can therefore vary depending on the direction.

The Packet Blazer supports automated RFC 2544 testing, including throughput, latency, burst (back-to-back) and frame loss. Since everything is automated, it is easy for field technicians to obtain accurate, efficient measurements and results with a clear pass/fail indication. The Packet Blazer also generates SLA reports that can be given to customers and used for future reference.



Testing can be performed end-to-end or end-to-core, depending on the SLA. Remote testing is also possible.

EFFICIENT TESTING LEADS TO RELIABLE PERFORMANCE

EXacTCP

The transmission control protocol (TCP) provides the integrity and assurance that the data packets transmitted by one host are reliably received at the destination. Applications such as hypertext transfer protocol (HTTP), e-mail or file transfer protocol (FTP) rely on TCP as their delivery assurance mechanism.

Customers deploying such applications expect not only physical and link level SLAs from their service providers, but assurance that their TCP traffic requirements will be supported across the network. ExacTCP, the TCP throughput feature for the FTB-8510B, which is based on RFC 6349, provides accurate measurements of TCP metrics, such as throughput, roundtrip time (RTT) and optimal window size.

MPLS, MPLS-TP and PBB-TE: Carrier Ethernet Transport Solution Testing

As technologically-sophisticated business and residential consumers continue to drive demand for premium, bandwidth-hungry and quality-dependent services, such as voice and video, service providers worldwide are evolving their transport infrastructures to support them. No longer is an all-IP core sufficient.

Ethernet tunneling technologies such as Provider Backbone Bridge-Traffic Engineering or PBB-TE (also referred to as PBT) and transport MPLS address these requirements. These technologies enable connection-oriented Ethernet, providing carriers with a means of offering scalable, reliable and resilient Ethernet services. The PBB-TE and MPLS options on the FTB-8510B Packet Blazer offer service providers a comprehensive field tool to efficiently qualify Ethernet services from end-to-end, validating metro and core tunneling technologies.

Ethernet Advanced Troubleshooting

The FTB-8510B provides a number of advanced features essential for in-depth troubleshooting in the event of network failures or impairments. The advanced filtering option allows the user to configure up to ten filters each with up to four operands, which will be applied to the received Ethernet traffic. Detailed statistics are available for each configured filter providing the user with the critical information required to pinpoint specific problems. Furthermore, the FTB-8510B supports a traffic scan feature that allows quick identification and monitoring of VLAN and MPLS flows on the network. This can help clearly identify top bandwidth users.

The FTB-8510B also supports full-line-rate data capturing and decoding. This key troubleshooting tool enables field technicians to easily identify complex network issues. The comprehensive capture feature includes the capacity to configure filters and triggers to quickly zero-in on network events.

IPTV Testing and Analysis

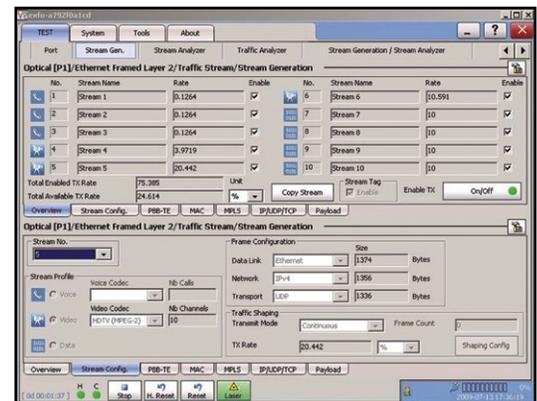
The IPTV software option, available on the FTB-8510B, leverages the current frame-analysis engine, to deliver high-performance measurements and provide users with over 45 different IPTV metrics and statistics in a powerful portable test platform. The key features and capabilities provided with this software option include RFC 4445 media delivery index (MDI)*, TR 101 290 priority 1 metrics, in addition to program clock reference jitter, IGMP support, stream rate and bandwidth utilization on 100 simultaneous MPEG-2, MPEG-4 or VC-1 streams. Usability features include user-configurable alarm thresholds for MDI and other selected metrics, enabling customizable test sequences as well as an auto-stream detection capability that automatically discovers valid IPTV streams within the Ethernet layer. Moreover, stream IP addresses can be linked to a user-definable stream name through an alias table typically containing the name of the broadcast channel.

The combination of the portable FTB-500 platform and the FTB-8510B Packet Blazer with the IPTV software option offers service providers the most effective tool to quickly and efficiently test and monitor IPTV streams over their network. For more information on the FTB-8510B Packet Blazer IPTV option, please refer to the IPTV Test Option specification sheet.

EtherBERT™

Ethernet is increasingly carried across a variety of layer 1 media over longer distances. This creates a growing need for the certification of Ethernet transport on a bit-per-bit basis, which can be done using bit-error-rate testing (BERT).

BERT uses a pseudo-random binary sequence (PRBS) encapsulated into an Ethernet frame, making it possible to go from a frame-based error measurement to a bit-error-rate measurement. This provides the bit-per-bit error count accuracy required for acceptance testing of physical-medium transport systems. BERT-over-Ethernet should usually be used when Ethernet is carried transparently over layer 1 media, in cases such as Ethernet over DWDM, CWDM or dark fiber.



Multistream bandwidth profiles.

Stream	Throughput (Mbps)	Frame Loss (%)	Max Jitter (ms)	Max Latency (ms)	Out-Of-Sequence (%)	Total Throughput
1	1.104	0.000	< 0.015	< 0.015	0.000	734.136
2	1.104	0.000	< 0.015	< 0.015	0.000	
3	1.104	0.000	< 0.015	< 0.015	0.000	
4	20.15	0.000	< 0.015	< 0.015	0.000	
5	201.466	0.000	< 0.015	< 0.015	0.000	
6	104.399	0.000	< 0.015	< 0.015	0.000	
7	92.758	0.000	< 0.015	< 0.015	0.000	
8	96.242	0.000	< 0.015	< 0.015	0.000	
9	98.084	0.000	< 0.015	< 0.015	0.000	
10	98.7	0.000	< 0.015	< 0.015	0.000	

Statistics for each stream.

Ethernet QoS Measurements

Data services are making a significant shift toward supporting a variety of applications on the same network. Multiservice offerings such as triple-play services have fuelled the need for QoS testing to ensure the condition and reliability of each service and fully qualify SLA parameters. The FTB-8510B Packet Blazer allows service providers to simultaneously simulate and qualify different applications through its multistream application. The user has the capability to configure up to ten streams with different Ethernet and IP QoS parameters such as VLAN ID (802.1Q), VLAN Priority (802.1p), VLAN stacking (802.1ad Q-in-Q), ToS and DSCP. Specific stream profiles to transmit VoIP, video and data can be selected for each stream. Throughput, latency, frame loss and packet jitter (RFC 3393) measurements are also available simultaneously for each stream, allowing fast and in-depth qualification of all SLA criteria.

* The MDI feature of the IPTV software option is not available in the USA.

FIBRE CHANNEL NETWORK INTEGRITY TESTING

EXFO's FTB-8510B Packet Blazer module also supports comprehensive Fibre Channel testing.

Interfaces

This module supports the following Fibre Channel interfaces:

INTERFACE	RATE
1x	1.0625 Gbit/s
2x	2.125 Gbit/s

Applications

Since most storage area networks cover large distances and Fibre Channel has stringent performance attributes that must be respected, testing at each phase of network deployment is imperative to ensure appropriate service levels. EXFO's FTB-8510B Fibre Channel option provides full wire-speed traffic generation at FC-0, FC-1 and FC-2 logical layers, allowing BER testing for link integrity measurements. Latency, buffer-to-buffer credit measurements for optimization, and login capabilities are also supported.

Buffer-to-Buffer Credit Estimation

Buffer-to-buffer credits are part of the flow control engine for Fibre Channel connections. This is a crucial configuration parameter for optimal network performance. Usually, network administrators calculate the value by taking the traveled distance and the data rate into consideration. However, since latency issues are not considered, poor accuracy is to be expected. The FTB-8510B module is capable of estimating buffer-to-buffer credit values with respect to latency by calculating the distance according to the round-trip latency time.

Latency

Transmission of frames in a network is not instantaneous and is subject to multiple delays caused by the propagation delay in the fiber and by processing time inside each piece of network equipment. Latency is the total accumulation of delays between two endpoints. Some applications such as VoIP, video and storage area networks are very sensitive to excess latency. It is therefore critical for service providers to properly characterize network latency when offering Fibre Channel services. From the latency measurement that they perform, the FTB-8510B Packet Blazer estimates buffer-to-buffer credit value requirements.

EXFO Connect

EXFO | Connect

AUTOMATED ASSET MANAGEMENT. PUSH TEST DATA IN THE CLOUD. GET CONNECTED.

EXFO Connect pushes and stores test equipment and test data content automatically in the cloud, allowing you to streamline test operation from build-out to maintenance.

EXpert Test Tools on the FTB-200 Platform

EXpert Test Tools is a series of platform-based software testing tools that enhance the value of the FTB-200 platform, providing additional testing capabilities without the need for additional modules or units.

EXPERT TEST TOOLS

EXpert VoIP TEST TOOLS

EXpert VoIP generates a voice-over-IP call directly from the test platform to validate performance during service turn-up and troubleshooting.

- Supports a wide range of signaling protocols, including SIP, SCCP, H.248/Megaco and H.323
- Supports MOS and R-factor quality metrics
- Simplifies testing with configurable pass/fail thresholds and RTP metrics

EXpert IP TEST TOOLS

EXpert IP integrates six commonly used datacom test tools into one platform-based application to ensure that field technicians are prepared for a wide range of testing needs.

- Rapidly performs debugging sequences with VLAN scan and LAN discovery
- Validates end-to-end ping and traceroute
- Verifies FTP performance and HTTP availability

EXpert IPTV TEST TOOLS

This powerful IPTV quality assessment solution enables set-top-box emulation and passive monitoring of IPTV streams, allowing quick and easy pass/fail verification of IPTV installations.

- Real-time video preview
- Analyzes up to 10 video streams
- Comprehensive QoS and QoE metrics including MOS score

ETHERNET INTERFACES

OPTICAL INTERFACES					
Optical interfaces	Two ports at 100M and GigE				
Available wavelengths (nm)	850, 1310 and 1550				
	100Base-FX	100Base-LX	1000Base-SX	1000Base-LX	1000Base-ZX
Wavelength (nm)	1310	1310	850	1310	1550
Tx level (dBm)	-20 to -15	-15 to -8	-9 to -3	-9.5 to -3	0 to 5
Rx level sensitivity (dBm)	-31	-28	-20	-22	-22
Maximum reach	2 km	15 km	550 m	10 km	80 km
Transmission bit rate (Gbit/s)	0.125	0.125	1.25	1.25	1.25
Reception bit rate (Gbit/s)	0.125	0.125	1.25	1.25	1.25
Tx operational wavelength range (nm)	1280 to 1380	1261 to 1360	830 to 860	1270 to 1360	1540 to 1570
Measurement accuracy (uncertainty)					
Frequency (ppm)	±4.6	±4.6	±4.6	±4.6	±4.6
Optical power (dB)	±2	±2	±2	±2	±2
Maximum Rx before damage (dBm)	3	3	6	6	6
Jitter compliance	ANSI X3.166	IEEE 802.3	IEEE 802.3	IEEE 802.3	—
Ethernet classification	ANSI X3.166	IEEE 802.3	IEEE 802.3	IEEE 802.3	—
Laser type	LED	FP	VCSEL	FP	DFB
Eye safety	Class 1	Class 1	Class 1	Class 1	Class 1
Connector	LC	LC	LC	LC	LC
Transceiver type	SFP	SFP	SFP	SFP	SFP

ELECTRICAL INTERFACES			
Electrical interfaces	Two ports 10/100BaseT half/full duplex, 1000BaseT ^a full duplex. Straight/crossover cable selection.		
	10Base-T	100Base-T	1000Base-T
Tx bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Tx accuracy (uncertainty) (ppm)	±100	±100	±100
Rx bit rate	10 Mbit/s	125 Mbit/s	1 Gbit/s
Rx measurement accuracy (uncertainty) (ppm)	±4.6	±4.6	±4.6
Duplex mode	Half and full duplex	Half and full duplex	Full duplex
Jitter compliance	IEEE 802.3	IEEE 802.3	IEEE 802.3
Connector	RJ-45	RJ-45	RJ-45
Maximum reach (m)	100	100	100

Note

a. Available as a software option.

ETHERNET FUNCTIONAL SPECIFICATIONS

TESTING	
EtherSAM (ITU-T Y.1564)	Capability to perform the service configuration test, including the ramp and burst tests, and service performance test as per ITU-T Y.1564. Tests can be performed to a loopback or dual test set mode for bidirectional results.
RFC 2544	Throughput, back-to-back, frame loss and latency measurements according to RFC 2544 (bidirectional). Frame size: RFC-defined sizes, user-configurable (bidirectional).
BERT	Unframed. Layer 1 to layer 4 with or without VLAN Q-in-Q.
Patterns (BERT)	PRBS 2E9-1, PRBS 2E11-1, PRBS 2E15-1, PRBS 2E20-1, PRBS 2E23-1, PRBS 2E31-1, CRPAT, CSPAT, CJTPAT, Short CRTPAT, Long CRTPAT and up to 10 user patterns. Capability to invert patterns.
Error insertion (BERT)	FCS, bit and symbol.
Error measurement	Jabber/giant, runt, undersize, oversize, FCS, symbol, idle, carrier sense, alignment, collision, late collision, excessive collision, UDP, TCP and IP header checksum.
Error measurement (BERT)	Bit error, symbol error, idle error, bit mismatch 0, bit mismatch 1, performance monitoring (G.821 and G.826).
Alarm insertion (BERT)	LOS, pattern loss.
Alarm detection	LOS, link down, pattern loss, no traffic.
Service disruption time measurement (BERT)	Defect or No Traffic mode. Disruption time statistics include shortest, longest, last, average, total and count.
Multistream generation	Capability to transmit up to ten streams. Configuration parameters are: packet size, transmission mode (N-Frames, Burst, N-Burst, Ramp, N-Ramp and Continuous), MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TTL, UDP/TCP source/destination port and payload. Selectable predefined stream profiles for voice, video and data streams. VoIP codecs (G.711, G.723, G.729), video (MPEG-2 SDTV, MPEG-2 HDTV, MPEG-4 HDTV).
Multistream analysis	Capability to analyze packet jitter, latency, throughput, frame loss and out-of-sequence per-stream statistics.
VLAN stacking (Q-in-Q)	Capability to generate streams with up to three layers of VLAN (including IEEE802.1ad Q-in-Q tagged VLAN) and to filter received traffic by VLAN ID or VLAN priority at any of the stacked VLAN layers.
PBB-TE ^a	Capability to generate and analyze streams with PBB-TE data traffic including configuration of B-MAC (source and destination), B-VLAN and I-tag (as per 802.1ah) and to filter received traffic by any of these fields.
MPLS ^a	Capability to generate and analyze streams with up to two layers of MPLS labels and to filter received traffic by MPLS label or COS.
IPv6 ^a	Capability to perform BERT, RFC 2544, traffic generation and analysis and Smart Loopback tests over IPv6. Ping, traceroute, neighbor discovery and stateless auto-configuration.
Traffic filtering	Capability to analyze the incoming traffic and provide statistics according to a set of up to ten configurable filters. Filters can be configured for MAC source/destination address, VLAN ID, VLAN priority, IP source/destination address, ToS field, DSCP field, TCP source/destination port and UDP source/destination port. VLAN filtering can be applied to any of the stacked VLAN layers.
Ethernet statistics	Multicast, broadcast, unicast, N-unicast, pause frame, frame size distribution, bandwidth, utilization, frame rate, frame loss, out-of-sequence frames, in-sequence frames.
Packet jitter statistics	Delay variation statistics (ms) – min., max., last, average, jitter measurement estimate.
Flow control injection	Packet pause time.
Flow control statistics	Pause time, last pause time, max. pause time, min. pause time, paused frames, abort frames, frames Tx, frames Rx.
Advanced auto-negotiation	Capability to auto-negotiate the rate, duplex and flow control capabilities with another Ethernet port. Configurable auto-negotiation parameters. Display of link partner capabilities. Fault injection: offline, link failure, auto-negotiation error.
Advanced filtering ^a	Capability to enhance the filters with up to four fields each, that can be combined with AND/OR/NOT operations. A mask is also provided for each field value to allow for wildcards. Complete statistics are gathered for each defined filter.
Through mode ^a	Capability to test in Through/Pass Through mode.
Data capture ^a	Capability to perform 10/100/1000M full-line-rate data capture and decode. Capability to configure detailed capture filters and triggers as well as capture slicing parameters.
Traffic scan ^a	Capability to scan incoming live traffic and auto-discover all VLAN/VLAN Priority and MPLS ID/COS flows. Capability to provide statistics for each flow including frame count and bandwidth.

Note

a. Available as a software option.

ETHERNET FUNCTIONAL SPECIFICATIONS (CONT'D)

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS	
Power measurement	Supports optical power measurement, displayed in dBm.
Frequency measurement	Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).
Frequency offset measurement	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Frequency offset generation	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Dual test set	Performs end-to-end, bidirectional performance testing (as required by leading standards bodies)—remote Packet Blazer controlled via the LAN connection under test.
DHCP client	Capability to connect to a DHCP server to obtain its IP address and subnet mask for connecting on to the network.
Smart Loopback	Capability to return traffic to the local unit by swapping packet overhead up to layer 4 of the OSI stack.
TCP throughput measurements ^a	Capability to evaluate TCP throughput and to provide performance results and statistics: window size with corresponding throughput, number of transmitted and re-transmitted segments, round-trip time.
IPTV testing and analysis ^{a, b}	Capability to measure and auto-discover 100 IPTV streams and provide IPTV statistics on a per stream basis: MDI (RFC 4445), PCR jitter (TR 101 290 priority 1) transmission rate, instantaneous rate, percentage of utilization, virtual buffer size, UDP/IP port number, packet size and packet count, threshold alarm reporting and alias table. Also supports IGMPv2.
802.3ah OAM testing ^a	Capability to test Ethernet OAM as per IEEE 802.3ah including connection establishment, OAM protocol statistics and loopback control.
IP tools	Capability to perform ping and traceroute functions.

ADDITIONAL FEATURES	
Expert mode	Ability to set thresholds in RFC 2544 and BERT mode to provide a pass/fail status.
Scripting ^b	The built-in Visual Basic .NET scripting engine and embedded macrorecorder provide a simple means of automating test cases and routines. Embedded scripting routines provide a powerful means of creating advanced test scripts.
Event logger	Supports logging of test results, and the ability to print, export (to a file) or export the information contained in the logging tool.
Power up and restore	In the event of a power failure to the unit, the active test configuration and results are saved and restored upon bootup.
Save and load configuration	Ability to store and load test configurations to/from non-volatile memory.
Configurable test views ^b	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.
Report generation	Ability to generate test reports in the following user-selectable formats: .pdf, .html, .txt and .csv.
Screen capturing	Capability to gather a snap-shot of the screen for future use.
Logger printing ^c	Capability to send logger messages to a supported local printer.
Graph	Allows to graphically display the test statistics of the performance (RFC 2544) and frame analysis tests.
Configurable test timer	Allows the user to set a specific start and stop time for tests.
Remote control	Remote control through Visual Guardian Lite software or VNC.
Test favorites	Capability to select and load from predefined or user-modified test configurations.

Notes

- a. Available as a software option.
- b. Available on the FTB-500 and IQS-600 platforms only.
- c. Available on the FTB-200 platform only.

FIBRE CHANNEL INTERFACES

FC-1X/2X			
Wavelength (nm)	850	1310	1550
Tx level (dBm)	-9 to -3	-9.5 to -3	0 to 5
Rx level sensitivity (dBm)	-18 at FC-2X -20 at FC-1X	-21 at FC-2X -22 at FC-1X	-21 at FC-2X -22 at FC-1X
Maximum reach	550 m on 50/125 µm MMF at FC-1X 300 m on 50/125 µm MMF at FC-2X 300 m on 62.5/125 µm MMF at FC-1X 150 m on 62.5/125 µm MMF at FC-2X	10 km	80 km
Transmission bit rate (Gbit/s)	1.0625 to 2.125	1.0625 to 2.125	1.0625 to 2.125
Reception bit rate (Gbit/s)	1.0625 to 2.125	1.0625 to 2.125	1.0625 to 2.125
Tx operational wavelength range (nm)	830 to 860	1270 to 1360	1540 to 1570
Measurement accuracy (uncertainty) frequency (ppm) optical power (dB)	±4.6 ±2	±4.6 ±2	±4.6 ±2
Maximum Rx before damage (dBm)	6	6	6
Jitter compliance	ANSI FC-PI-2	ANSI FC-PI-2	ANSI FC-PI-2
FC classification	ANSI FC-PI-2	ANSI FC-PI-2	ANSI FC-PI-2
Laser type	VCSEL	Fabry-Perot	DFB
Eye safety	Class 1	Class 1	Class 1
Connector	LC	LC	LC
Transceiver type	SFP	SFP	SFP

FIBRE CHANNEL FUNCTIONAL SPECIFICATIONS

TESTING (1X AND 2X)	
BERT	Unframed, framed FC-1, framed FC-2.
Patterns (BERT)	PRBS 2E31-1, 2E23-1, 2E20-1, 2E15-1, 2E11-1, 2E9-1 CSPAT, CRPAT, CJTPAT, and 10 user-defined 32 bits patterns.
Error insertion	Bit error, symbol error, oversize error, CRC error, undersize error.
Error measurement	Bit error, symbol error, oversize error, CRC error, undersize error, performance management (G.821 and G.826).
Alarm insertion	LOS, pattern loss, link down.
Alarm detection	LOS, pattern loss, link down.
Buffer-to-buffer credit testing	Buffer-to-buffer credit estimation based on latency.
Latency	Round-trip latency measurement.

ADDITIONAL TEST AND MEASUREMENT FUNCTIONS (1X AND 2X)	
Power measurement	Support optical power measurement, displayed in dBm.
Frequency measurement	Supports clock frequency measurements (i.e., received frequency and deviation of the input signal clock from nominal frequency).
Frequency offset measurement	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm
Frequency offset generation	
Range	±120 ppm
Resolution	1 ppm
Accuracy (uncertainty)	±4.6 ppm

GENERAL SPECIFICATIONS		
Size (H x W x D)	96 mm x 25 mm x 280 mm	(3 3/4 in x 1 in x 11 in)
Weight (without transceivers)	0.5 kg	(1.1 lb)
Temperature operating	0 °C to 40 °C	(32 °F to 104 °F)
storing	-40 °C to 60 °C	(-40 °F to 140 °F)

ORDERING INFORMATION

MODULE

FTB-85XX-XX

Model

FTB-8510B^a
 FTB-8510B-1^b
 FTB-8510B-2^c

Other options

00 = Without other options
 100 optical = 100 Mbit/s optical capability on both ports
 TCP = TCP throughput measurement
 IPTV_MON = IPTV testing and analysis (10 streams)
 IPTV_MaxStream = IPTV testing and analysis (100 streams)
 802.3ah OAM = 802.3ah OAM testing
 PBB-TE = PBB-TE testing
 MPLS = MPLS testing
 FC = 1x and 2X Fibre Channel option
 Adv_filtering = Advanced filtering capabilities
 IPv6 = IPv6 testing capabilities
 ETH-THRU = Through mode testing^d
 EtherSAM = EtherSAM (ITU-T Y.1564) testing capabilities
 Data_Capture = Data capture and decode capabilities
 TRAFFIC-SCAN = VLAN/MPLS traffic scan

Example: FTB-8510B-2-100 optical

TRANSCEIVER

FTB-8590 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC
 850 nm, LC, MMF, < 500 m reach

FTB-8591 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC
 1310 nm, LC, 10 km reach

FTB-8592 = SFP mutirate optical transceiver module: Rates: GigE/FC/2FC
 1550 nm, LC, 90 km reach

FTB-85910 = 100Base-FX (1310 nm) MM, LC connectors; optical SFP transceiver
 module for FTB-8510B Packet Blazer^e

FTB-85911 = 100Base-LX (1310 nm) SM, LC connectors; optical SFP transceiver
 module for FTB-8510B Packet Blazer^e

Notes

- Provides 2x 10/100 BaseT ports.
- Provides 2x 10/100 BaseT ports and 1x GigE port.
- Provides 2x 10/100 BaseT ports and 2x GigE ports.
- Requires FTB-8510-2 configuration.
- Available with 100 optical option.

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