FTB-8115
Transport Blazer

Fully integrated test solution supporting SONET/SDH test functions

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

Platform Compatibility

- FTB-200 Compact Platform
- FTB-500 Platform
Advanced SONET/SDH Access and Metro Testing

EXFO's FTB-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 commissioning or troubleshooting of T1/E1 to OC-48/STM-16 circuits. The extensive list of DSn, SONET, PDH and SDH features available on the FTB-8115 Transport Blazer allows users to perform a wide range of tests from simple bit-error-rate (BER) analysis to more advanced network characterization and troubleshooting. 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
- 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

SmartMode: Real-Time Signal Structure Discovery and Monitoring

EXFO's FTB-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.
Multiplatform Support and Versatility

The FTB-8115 Transport Blazer module is supported and interchangeable on the FTB-500 Platform or the FTB-200 Compact Platform. This cross-platform support provides users with added flexibility by enabling them to select the appropriate platform that suits their testing needs. EXFO is the first and only test solution provider to offer this versatility, delivering single to multi-application test solutions with the same hardware module, which in turn dramatically reduces capital expenditures.

Inserted in the FTB-200 Compact Platform, the FTB-8115 Transport Blazer module delivers SONET/SDH test functions in a small, lightweight platform, ideal for field technicians’ installation and commissioning needs. When combined with the FTB-200’s optional integrated high-precision power meter, visual fault locator and fiber scope, this solution provides all the critical test tools required for day-to-day activities, eliminating the need to carry and manage multiple test sets.

Unsurpassed Configuration and Operational Flexibility

Using the FTB-500 platform provides users with an all-in-one solution supporting a mix of SONET/SDH/OTN, Ethernet, Fibre Channel and optical-layer test modules, making it the industry’s first truly integrated network testing platform. This modularity enables users to upgrade their systems in the field according to their testing needs. This multiservice test platform is the ideal solution for field, central office and lab applications.

Remote Management

Through the optical Visual Guardian Lite™ management software, the FTB-8115 Transport Blazer module allows users to perform remote testing and data analysis, as well as remote monitoring via standard Ethernet or remote dial-up connections.

Automated Test Scripting

When configured for the FTB-500 platforms, the FTB-8115 Transport Blazer comes with a built-in macrorecorder, allowing users to easily record their test actions and automatically create test scripts. This also allows them to build standard test routines that can be easily accessed and run by field technicians with little or no manual intervention.

Test Logger and Reporting

EXFO’s FTB-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 or SLA conformance validation.
**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 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
- Validates 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
Electrical Interfaces

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

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>DS1</th>
<th>E1/2M</th>
<th>E2/3M</th>
<th>E3/4M</th>
<th>DS1/4M</th>
<th>STS-1e/STM-1e/52M</th>
<th>E4/14M</th>
<th>STS-3e/STM-3e/155M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit Bit Rate</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
</tr>
<tr>
<td>Receive Bit Rate</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
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<td>0.1536 Mbit/s ± 20 ppm</td>
<td>0.1536 Mbit/s ± 20 ppm</td>
</tr>
<tr>
<td>Measurement Accuracy</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
<td>± 1.0 µm</td>
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<tr>
<td>Electrical Power (dB)</td>
<td>≤ 6 dB (cable loss only)</td>
<td>≤ 6 dB (cable loss only)</td>
<td>≤ 6 dB (cable loss only)</td>
<td>≤ 6 dB (cable loss only)</td>
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<td>≤ 6 dB (cable loss only)</td>
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<td>≤ 6 dB (cable loss only)</td>
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<tr>
<td>Peak-to-Peak Voltage</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
<td>≤ 500 mV</td>
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<tr>
<td>Frequency Offset Generation</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
<td>≤ 500 kHz</td>
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<tr>
<td>Intrinsic Jitter (Tx)</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
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<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
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<td>≤ 1.0 ns</td>
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<tr>
<td>Input Jitter</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
<td>≤ 1.0 ns</td>
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<tr>
<td>Line Coding</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
<td>AM and BNC</td>
</tr>
<tr>
<td>Input Impedance (Resistive Termination)</td>
<td>100 ohms ± 5%</td>
<td>100 ohms ± 5%</td>
<td>100 ohms ± 5%</td>
<td>100 ohms ± 5%</td>
<td>100 ohms ± 5%</td>
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<td>100 ohms ± 5%</td>
<td>100 ohms ± 5%</td>
</tr>
<tr>
<td>Connector Type</td>
<td>BANTAM and RJ-44C</td>
<td>BANTAM and RJ-44C</td>
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<td>BANTAM and RJ-44C</td>
</tr>
</tbody>
</table>

Note
- a. Adaptation cable required for BANTAM.
## Optical Interfaces

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

<table>
<thead>
<tr>
<th>OC-3/STM-1</th>
<th>OC-12/STM-4</th>
<th>OC-48/STM-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 km; 1310 nm</td>
<td>15 km; 1310 nm</td>
<td>15 km; 1310 nm</td>
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<tr>
<td>40 km; 1310 nm</td>
<td>40 km; 1310 nm</td>
<td>80 km; 1550 nm</td>
</tr>
<tr>
<td>40 km; 1550 nm</td>
<td>80 km; 1550 nm</td>
<td>80 km; 1550 nm</td>
</tr>
</tbody>
</table>

**Level Tx**
- 155.52 Mbit/s ± 4.6 ppm
- 2.48832 Gbit/s ± 100 ppm

**Rx Level Sensitivity**
- 155.52 Mbit/s ± 4.6 ppm
- 2.48832 Gbit/s ± 100 ppm

**Transmit Bit Rate**
- 622.08 Mbit/s ± 4.6 ppm
- 2.48832 Gbit/s ± 100 ppm

**Receive Bit Rate**
- 622.08 Mbit/s ± 100 ppm
- 2.48832 Gbit/s ± 100 ppm

**Operational Wavelength Range**
- 1360 to 1360 nm
- 1430 to 1580 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 ( uncertainties)**
- ±4.6
- ±4.6
- ±4.6

**Maximum Rx before damage (dB)**
- ±3
- ±3
- ±3

**Jitter Compliance**
- G.957 (SDH)
- GR-253 (SONET)
- G.958 (SDH)
- G.957 (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**
- Dual LC
- Dual LC
- Dual LC

**Transceiver Type**
- SFP
- SFP
- SFP

### Notes

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

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

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FTB-8115
SONET/SDH Test Module
### Functional Specifications

#### SONET AND DSn

<table>
<thead>
<tr>
<th>Optical interfaces</th>
<th>SONET AnD DSn</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC-3, OC-12, OC-48</td>
<td>Optical interfaces</td>
</tr>
<tr>
<td>Available wavelengths (nm)</td>
<td>Available wavelengths (nm)</td>
</tr>
<tr>
<td>1310, 1550</td>
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</tbody>
</table>

#### Electrical interfaces

<table>
<thead>
<tr>
<th>DS1, DS3, STS-3c, STS-3e</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1, DS3, STS-3c, STS-3e</td>
</tr>
</tbody>
</table>

| 1.5M (DS1), 2M (E1), 8M (E2), 34M (E3), 45M (DS3), 140M (E4), STM-0e, STM-1e |
| 1.5M (DS1), 2M (E1), 8M (E2), 34M (E3), 45M (DS3), 140M (E4), STM-0e, STM-1e |

- 2M framing
- Unframed, PCM30, PCM31, PCM30 CRC-4, PCM31 CRC-4

<table>
<thead>
<tr>
<th>STM-0e, STM-1e</th>
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<tbody>
<tr>
<td>STM-0e, STM-1e</td>
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<table>
<thead>
<tr>
<th>Bit error</th>
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<tbody>
<tr>
<td>E1, E3 (34M), E4 (140M)</td>
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#### Clocking

<table>
<thead>
<tr>
<th>Internal, loop-externa, STM-0e, STM-1e</th>
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<tbody>
<tr>
<td>Internal, loop-externa, STM-0e, STM-1e</td>
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#### Optical interfaces

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<tr>
<th>Options</th>
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#### Electrical interfaces

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| 1.5M (DS1), 2M (E1), 8M (E2), 34M (E3), 45M (DS3), 140M (E4), STM-0e, STM-1e |
| 1.5M (DS1), 2M (E1), 8M (E2), 34M (E3), 45M (DS3), 140M (E4), STM-0e, STM-1e |

<table>
<thead>
<tr>
<th>Unframed, PCM30, PCM31, PCM30 CRC-4, PCM31 CRC-4</th>
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</thead>
<tbody>
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#### Mapping

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<tr>
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#### SONET and DSn

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#### Error insertion

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<tr>
<th>STM-1, STM-4, STM-16</th>
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#### Alarm insertion

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#### Alarm detection

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<th>STM-1, STM-4, STM-16</th>
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<tbody>
<tr>
<td>STM-1, STM-4, STM-16</td>
</tr>
</tbody>
</table>

#### Patterns

### Notes

- 1.5M (DS1) and 45M (DS3) interfaces described under SONET and DSn column.
- Not supported for E4 (140M).
ADDiTionAl FEATuRES
ADDiTionAl TEST AnD MEASuREMEnT FuncTionS

Alarm analysis: TC-TIM, TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS
Alarm generation: TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS
Error analysis: TC-IEC, TC-REI, OEI, TC-VIOL

Remote management software. This allows users to remotely monitor and control the FTB-8115 module via standard Ethernet connection.

Provides the ability for a user to set pre-defined test start and stop times.
Configurable test timer
This allows users to customize their test views; i.e., to dynamically insert or remove test tabs/windows, in addition to creating new test.
Configurable test views
User-selectable triggers: All supported alarms and errors.
Service disruption time (SDT) measurements
The service disruption time test tool measures the time required for a bit to travel from the FTB-8115 transmitter back to its receiver after crossing a far-end loopback. Measurements are supported on all supported FTB-8115 interfaces and mappings.

Round-trip delay (RTD) measurements
The round-trip delay test tool measures the time required for a bit to travel from the FTB-8115 transmitter back to its receiver after crossing a far-end loopback. Measurements are supported on all supported FTB-8115 interfaces and mappings.

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.
NI/CSU loopback emulation
Ability to respond to DS1 in-band/out-of-band loopcodes.
DS3 FEAC
Support for DS3 far-end alarms and loopback codewords.
DS1/DS3 auto detection
Ability to automatically detect DS1/DS3 line coding, framing and test pattern.
Tandem connection monitoring (TCM)*
Tandem connection monitoring (TCM); option 2, is used to monitor the performance of a subsection of a SONET/SDH path routed via different network providers. The FTB-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-BIP, OEI, TC-VOL
Alarm generation: TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS
Alarm analysis: TC-TIM, TC-RDI, TC-UNEQ, ODI, TC-LTC, TC-IAIS

Notes
a. HOP and LOP supported.
b. G.707 option 2.

Scripting
The built-in scripting engine and embedded macro-recorder provide a simple means of automating test cases and routines. Embedded scripting routines provide a powerful means of creating advanced test scripts. Available for the FTB-500 platform.

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
Remote management software. This allows users to remotely monitor and control the FTB-8115 module via standard Ethernet connection.
FTB-8115
SONET/SDH Test Module

**SPECIFICATIONS**

**FTB-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**

**FTB-8115**
Weight (without transceiver) 0.9 kg (2.0 lb)
Size (H x W x D) 98 mm x 51 mm x 288 mm
Temperature operating 0 °C to 40 °C (32 °F to 104 °F)
storage −40 °C to 60 °C (−40 °F to 140 °F)

**ORDERING INFORMATION**

**FTB-8115-XX-XX-XX-XX**

<table>
<thead>
<tr>
<th>Model</th>
<th>Test options</th>
<th>Rate options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

- **Options**
  - G.747
  - DS1-FDL
  - DS3-FEC
  - DUAL-RX
  - 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 to 1310 nm, 15 km
  - 8195 = SFP modules 155/622 Mbit/s to 1310 nm, 40 km
  - 8196 = SFP modules 155/622 Mbit/s to 1550 nm, 80 km

**Notes**
- a. Multiple options can be purchased to suit the required test application.
- c. Always included.
- d. Not available with 2.5 Gbit/s.

**Complementary Products**

**FTB-8080 Sync Analyzer**
The FTB-8080 Synch Analyzer is a comprehensive test solution for telecom network synchronization assurance, monitoring and troubleshooting applications. It offers a full range of wander and sync testing functionalities, including graphical display of TIE, MTIE and TDEV parameters, as well as comparison to ITU/ANSI/TS standards and user-definable masks. The companion Sync View software suite allows remote data retrieval and test case setup, eliminating the need to visit test sites during prolonged monitoring periods. The FTB-8080 can be used in conjunction with the FTB-8105, FTB-8115 and/or FTB-8120/8130 modules to provide wander measurements up to OC-192/STM-64 rates.


**FTB-8120/8130 Transport Blazer Next-Generation SONET/SDH Test Modules**
The FTB-8120 (2.5/2.7 Gbit/s) and FTB-8130 (10/10.7 Gbit/s) Transport Blazer test modules combine advanced DSn/PDH, SONET/SDH, next-generation SONET/SDH and optical transport network (OTN) test functions, eliminating the need for multiple purpose-built test platforms when commissioning or troubleshooting SONET/SDH, OTN and new data-aware SONET/SDH circuits. These modules offer DSO/E0 to OC-192/STM-64 testing in a single unit, and they perform Ethernet-over-SONET/SDH (EoS) testing via optional support for GFP, VCAT and LCAS. Thanks to the SmartMode functionality, they also enable signal structure discovery for rates of up to 20 Gbit/s, with simultaneous monitoring of all discovered STS/AU and user selected VT/TU channels.