T-BERD® 6000A
Compact Network Test Platform

Key Features

- **Compact, lightweight, and highly integrated platform**
- **Multi-layer network solution from physical to services layer**
- **Built-in VFL, power meter, LTS, ORL, and video inspection scope options**
- **Over 40 application modules available for physical test on single- and multimode fiber**
- **Multi-service capability allows Ethernet and SONET/SDH tests at the same physical test port**
- **Modular form factor enables field upgrade of test capabilities by adding or replacing PIMs and optics on multi-services application module**
- **Performs two independent Ethernet tests in parallel with dual-port chassis**

Applications

- Performs multimode and single-mode OTDR and optical loss test (bidirectional)
- Performs FTTx/PON and CWDM OTDR testing
- Performs 10G/10GE/40G fiber dispersion testing (PMD/CD/AP)
- Tests 10 GigE LAN- and WAN-PHY at 850, 1310, and 1550 nm
- Tests dual- and single-port 10 Mb/s to 1 GigE
- Tests SONET/SDH at OC-3/STM-1 through OC-192/STM-64 line rates
- Tests TCP/UDP at 10 Mb/s to 10 Gb/s with stateful emulation
- Tests IP Video at 10 Mb/s to 10 GigE line rates

The JDSU T-BERD 6000A is a highly integrated test platform designed for all phases of network lifecycle from the installation to the maintenance of fiber networks. It provides field service technicians with the highest levels of performance and upgradeability on the market today.
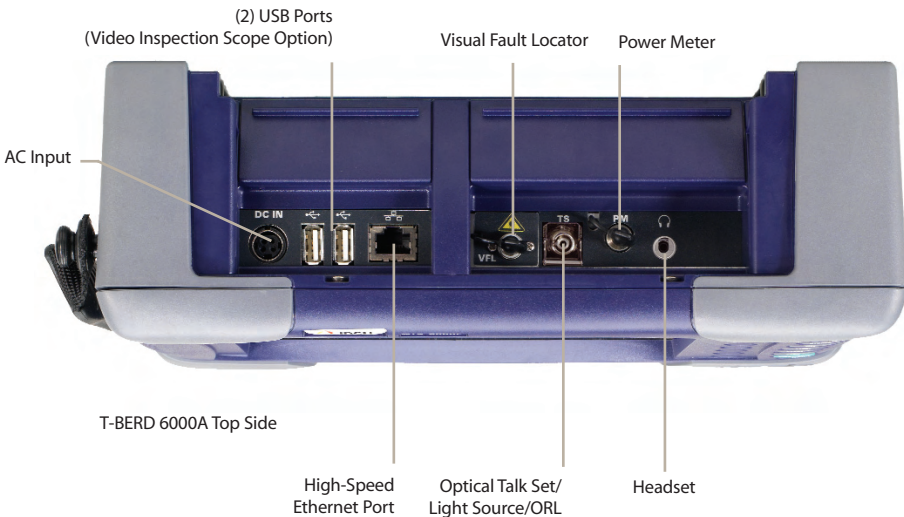
Modular in design, the T-BERD 6000A offers an extensive portfolio of test functionality with over forty different modules supporting a wide range of applications. The versatility of the T-BERD 6000A allows technicians to standardize using one type of test equipment and then introduce new testing capabilities in the field without incurring additional training and device costs.

With field applications for servicing Metro Core telecom networks, wireless/cable switch centers and backhaul networks, government telecommunications and network equipment manufacturer field installation and support groups, the Multi-Services Application and fiber optics modules are the latest innovation for the award-winning, industry-leading T-BERD family of test solutions.

A powerful user interface helps the technician quickly set up and evaluate tests as well as troubleshoot problems, reducing operational expense.

Ideal for Field Testing

The T-BERD 6000A is a highly integrated platform with a single module slot and extended internal memory, up to 1 gigabyte. The platform features an intuitive graphical user interface (GUI) shown on a large 8.4 inch transreflective touchscreen color display to improve viewing under any condition. The high-capacity Lithium-ion battery adds extended life. Other features include a video inspection scope (via USB port), and built-in optical test functions, such as a visual fault locator (VFL), power meter, optical return loss (ORL) and loss test sets (LTS). The T-BERD 6000A also offers a built-in optical talk set option for communicating and controlling remote units along the fiber, and it can transfer data fast using the USB or Ethernet port.

Microphone

(4) Molded Bumpers

(7) Soft Keys
(Context Sensitive)

8.4 in Indoor/Outdoor TFT Color
Display, Touchscreen

(5) Direct Access Keys
and Start/Stop

Navigation Key Pad

Removable High-Capacity
Li-Ion Battery (11-hour battery life)

T-BERD 6000A Front Panel

(2) USB Ports
(Video Inspection Scope Option)

Visual Fault Locator

Power Meter

AC Input

T-BERD 6000A Top Side

High-Speed
Ethernet Port

Optical Talk Set/
Light Source/ORL

Headset

3

Scalable, modular design with pluggable physical interface (PIMs) and small form-factor (SFPs/XFPs) modules

Overview of Multi-Services Applications

Ethernet, IP, TCP, and UDP Support

The Multi-Services Application Module supports 10 Mb/s to 10 GigE (local and wide area network physical layer [LAN-PHY and WAN-PHY]) testing to the Transmission Control Protocol (TCP)/UDP layer, ensuring that proven test methodologies for carrier-grade Ethernet services remain regardless of rate. Test capabilities range from testing bit error rate (BER) and verifying end-to-end connectivity to determining whether throughput, utilization, frame loss, packet jitter, and round-trip delay (RTD) characteristics meet service level agreements (SLAs).

VLAN, Q-in-Q, VPLS, and MPLS Tunneling Technologies

Various mechanism and tunneling technologies exist today that let providers effectively deliver carrier-grade Ethernet services across their networks, while maintaining a specified class of service (CoS). These technologies are grouped into two categories:

– Native Ethernet protocol extensions (IEEE-based)—Virtual LAN (VLAN) tags (often referred to as 802.1q/p) and Q-in-Q (often referred to as VLAN stacking or 802.1ad) techniques

– Encapsulations by Multi-Protocol Label Switching (MPLS) networks, which also come in Layer 2 (Virtual Private LAN Service, VPLS) and Layer 3 versions

The Multi-Services Application Module enables the installation and maintenance of these technologies.
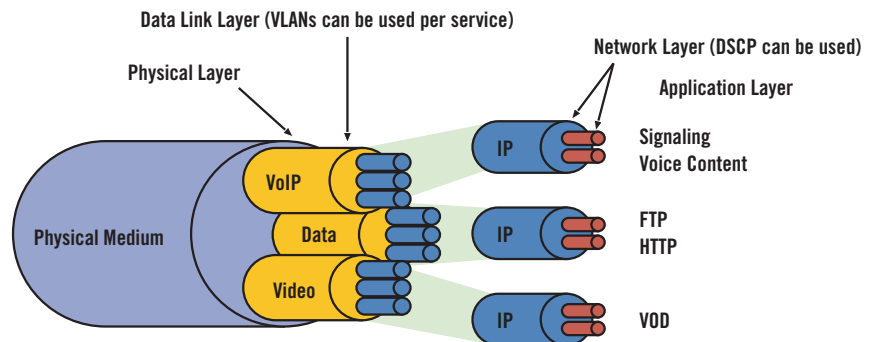
Figure 1 Example of CoS tagging structure for triple-play service delivery

Additional Ethernet and IPTV-Specific Test Features
Ethernet
– 10 Gb/s LAN/WAN Single-port

– 10 Mb/s to 1 Gb/s (electrical/optical) Single- and dual-port

– 850, 1310, and 1550 nm Wavelength

– PBB/PBT, Ethernet OAM, VLAN, Q-in-Q, VPLS, MPLS tunneling

– Layer 1 (L1) BER test

– Layer 2 (L2) Multiple streams, L2 transparency, and traffic generation[1]

– Layer 3 (L3) Multiple streams and traffic generation[2]

– Layer 4 TCP/UDP stateful emulation, traffic blasting

– FTP/HTTP/Telnet connectivity and Throughput test

– RFC2544

– Optical power measurement

– Cable diagnostics

IPTV
– 10 Mb/s to 10 GigE line rate test for IPTV

– Single program transport stream (SPTS)

– Multiple program transport stream (MPTS)

– Video Explorer: up to 512 SPTS and 32 MPTS

– Bandwidth, packet loss, packet jitter

– Video Analyzer up to 16 SPTS and 1 MPTS:

– PCR jitter, MDI (per RFC4445), continuity error bit, and error indicator bit

  - TR 101 290 priority 1 errors such as PID, PAT, and PMT

  - Loss distance and period errors (per RFC3357)

  - Results per transport stream, and per PID

  - Internet Group Management Protocol (IGMP) support

1 Constant, bursty, ramp, configurable source and destination address, frame format, type field (for Digital, Intel, Xerox [DIX]), frame length (including jumbo and undersized), VLAN tag, pause frames, payload, utilization percent
2 Configurable source and destination IP address, Domain Name Server (DNS) type, DNS server, transmit (TX) payload, type of service/differentiated services code point (TOS/DSCP), transistor-to-transistor logic (TTL), packet size length (34 to 1500 bytes), ping, trace route

Overview of Fiber Optic Applications

Compact and Highly Integrated

The versatility of the T-BERD 6000A allows it to address premises to long-haul networks comprising new technologies, such as various fiber networks (FTTx), remote optical add/drop multiplexers (ROADMs), and 40 G.

– Built-in VFL, laser source, power meter, LTS, talk set/data, and video inspection scope options (simultaneously)
– Bidirectional insertion loss (IL) and ORL capabilities combined in one module
– OTDR and chromatic dispersion (CD) capabilities combined in one module
– Polarization mode dispersion (PMD), wave division multiplexing (WDM), and attenuation profile (AP) capabilities combined in one module
– PMD, CD, and AP capabilities combined in one module

Wide Range of Test Applications

LAN/WAN Premises

– 10 GigE local area network (LAN) qualification
Solution: T-BERD 6000A with the unique universal SRL 850/1300/1310/1550/ 1625 nm OTDR Module

FTTx/Access Networks

– End-to-end connectivity on point-to-point networks, including sectionalized testing on a passive optical network (PON) (without a splitter)
Solution: T-BERD 6000A with the VSRe, SRe, MR OTDR module at 1310/1550 nm
– End-to-end connectivity on PONs, including splitter qualification
Solution: T-BERD 6000A with the MR, LR, or VLR at 1310/1490/1550 nm OTDR module
Add optional VFL, power meter, and video inspection scope
– In-service maintenance and troubleshooting without service disruption
Solution: T-BERD 6000A with the filtered LR OTDR module at 1625 nm

Metro/Core Networks

– End-to-end connectivity and fiber splice qualification
Solution: T-BERD 6000A with the MR, LR, or VLR at 1310/1550/1625 nm OTDR module
Add optional VFL, power meter, and video inspection scope

6

Ultralong-Haul Networks
– End-to-end connectivity and fiber splice qualification
Solution: T-BERD 6000A with the UHD OTDR module at 1310/1550/1625 nm
Dynamic range of 50 dB available at 1550 nm

10G/40G Fiber Characterization
– Characterize fiber in high-speed transmission systems for loss/dispersion
Solution: T-BERD 6000A with the PMD/CD/AP, ODTR, and OFI module

CWDM/DWDM
– Characterize fiber and prove suitability to carry multiple channels (water peak)
Solution: T-BERD 6000A with the VLR OTDR module at 1383 nm
Add the combined PMD/WDM/SA or CDWM OTDR module

Modular Platform
– New technologies developed in the future
Solution: T-BERD 6000A with the new JDSU field-upgradeable application module

Modular design

7

OTDR and IL/ORL Testing

Industry leader for dynamic range with 50 dB

A Wide Range of OTDR Modules

The JDSU OTDR plug-in module family provides a wide range of high-performance OTDRs. Over 40 field-interchangeable modules are compatible with the T-BERD 6000A for testing and troubleshooting any multimode or single-mode network. The OTDR family includes six lines of OTDRs featuring:

– New wavelengths to cover 1383 nm (CWDM) and 1490 nm (FTTx)

– Highest dynamic range up to 50 dB

– Shortest dead zones down to 0.5 m in multimode and 0.8 m in singlemode

Revolutionary 50 cm dead zone

– Fastest scan speed at 0.1 s in real-time mode

From Simple Fault Locator to Expert OTDR…

The **fault locator** boosts productivity in the field by providing:

– Fast detection

– Precise fault location

– One-button automation

– No specific settings required

– Distance, loss, and ORL measurements
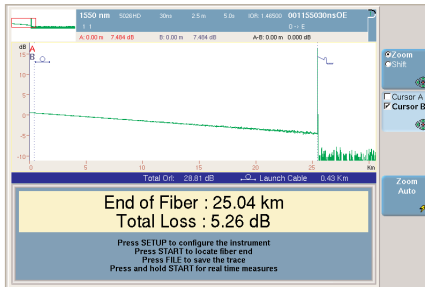
Figure 2 Fault locator mode

The **expert mode** offers high-level trace analysis possibilities, making your T-BERD 6000A platform a powerful instrument for commissioning and troubleshooting by offering:

- Manual settings (pulse, acquisition time, resolution, distance range)

- Manual addition and deletion of events

- Manual slopes, splices, and reflectances measurement

Unique to the market:
Fully automatic bidirectional
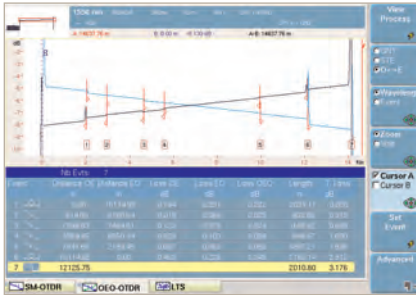*acquisition and analysis*

Figure 3 Bidirectional OTDR measurement

Ideal for End-to-End Commissioning

OTDR bidirectional testing is required to obtain true and accurate splice loss readings. JDSU has developed an innovative automatic bidirectional analysis function that is integrated directly into the T-BERD 6000A platform, saving at least 50 percent of the time required for traditional bidirectional analysis.

– Offers communication between two units via the link under test to set up the same optimized acquisition parameters

– Displays and saves automatic acquisitions in both directions on both units

– Eliminates operator error
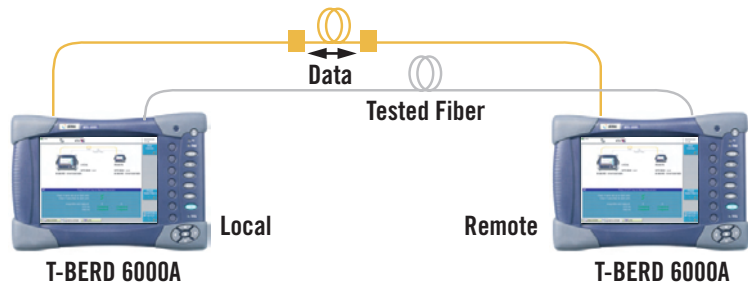
CWDM OTDR Modules

The CWDM OTDR module allows in-service OTDR measurements at International Telecommunications Union (ITU-T) G.694.2 CWDM wavelengths.

This solution was developed to help network operators and dark fiber providers characterize, maintain, and troubleshoot CWDM systems from short- to medium-haul fiber networks.
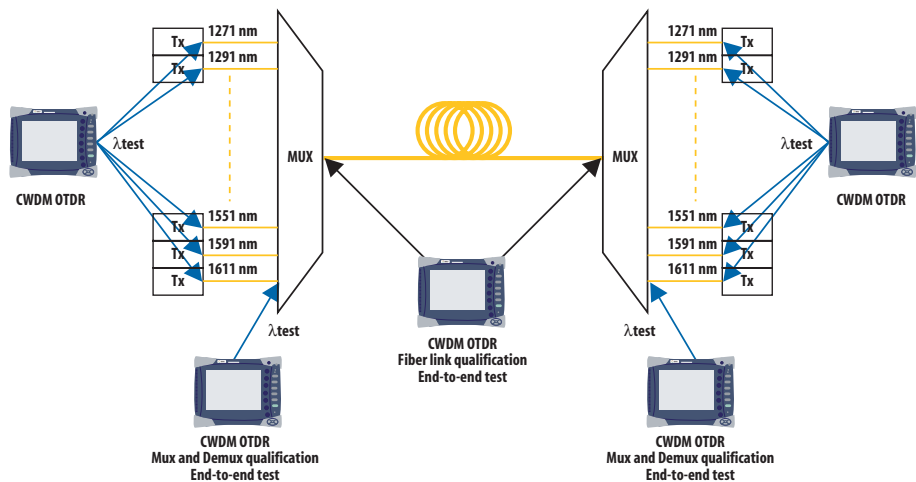

Figure 4 Qualification of a CWDM network

9

FTTx/PON In-Service Modules

To avoid interrupting customer traffic (in-service testing) of B/G/E-PON networks the filtered OTDR module performs an out-of-band test using 1625 nm wavelength.
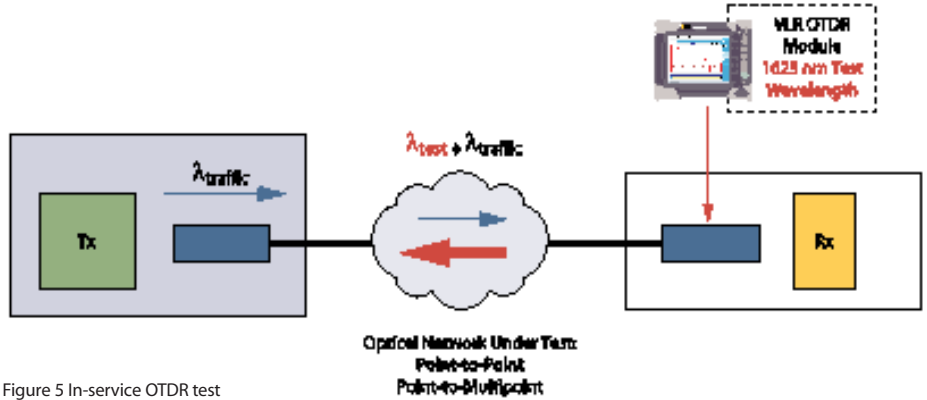

Figure 5 In-service OTDR test

Insertion Loss and Optical Return Loss Testing

– Measures bidirectional IL, ORL, and fiber length
– Offers one-button automated testing
– Choose three wavelengths from 1310, 1490, 1550, and 1625 nm
– Compatible with the OFI-2000 Multifunction Loss Test Set

CD, PMD, AP, and WDM Testing

The T-BERD 6000A enables CD and PMD measurements to identify fiber viability for very high-speed transmission systems. It also enables WDM and AP tests to validate the link compatibility with DWDM system implementation.
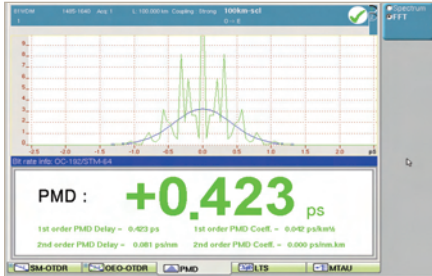
Polarization Mode Dispersion Testing

– Fast and accurately measures PMD delay, PMD coefficient, and second-order values
– Offers high dynamic range (up to 65 dB) dedicated for metropolitan, long haul, and very long haul fiber optic links
– Offers shock- and vibration-proof design (with no moving parts)
– Allows for measurement through multiple amplifiers
– Provides statistics and long-term monitoring
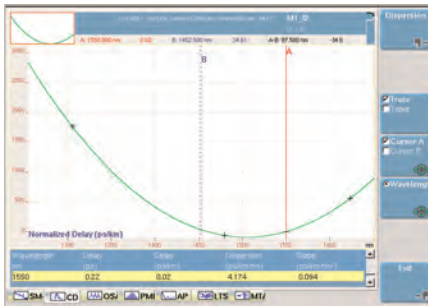
Chromatic Dispersion Testing - OTDR-Based Method

– Requires access to only one end of the fiber
– Offers dynamic range (up to 120 km) dedicated for any metropolitan fiber optic links
– Includes acquisition points around 1310, 1480, 1550, and 1625 nm for accurate CD from 1260 to 1650 nm
– Integrates a four-wavelength OTDR and light source
– Provides sectional analysis capability for troubleshooting
– Offers shock- and vibration-proof design (with no moving parts)

Chromatic Dispersion Testing - Phase-Shift Method

– Offers high dynamic range (up to 55 dB) dedicated for metropolitan, long haul, and very long haul fiber optic links
– Provides full wavelength range characterization (1260 to 1640 nm)
– Allows for measurement through multiple amplifiers
– Offers shock- and vibration-proof design (with no moving parts)
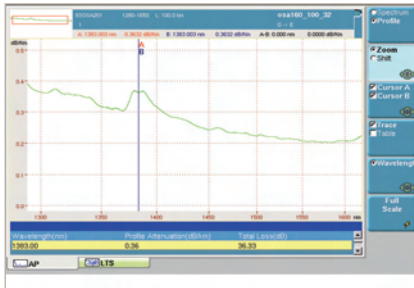
Attenuation Profile Testing

– Provides total loss and dB/km values for full band testing (1260 to 1640 nm)
– Allows CDWM and dense wavelength division multiplexing (DWDM) transmission band characterization
– Provides water peak (1383 nm area) characterization
– Offers shock- and vibration-proof design (with no moving parts)
– Combined with WDM and PMD functions or with CD and PMD functions

DWDM Maintenance Testing

– Measures channel level, power, and wavelength in the S, C, and L bands
– Provides the most compact DWDM test solution that measures optical signal-to-noise ratio (OSNR)
– Tests wavelengths from 1260 to 1640 nm or 1485 to 1640 nm
– Offers high wavelength accuracy
– Provides statistics and long-term monitoring
– Offers shock- and vibration-proof design (with no moving parts)

Options and Accessories

Greater Productivity with Communications

With limited telephone line and cell phone coverage during fiber testing, the T-BERD 6000A offers a built-in optical talk set option for permanent communication between test technicians. Near- and far-end technicians can communicate with each other, avoiding many of the testing mistakes that can prove costly if another truck roll is required to fix a problem.

For bidirectional testing that requires both the near- and far-end units to acquire data, the Data mode on the optional talk set synchronizes data acquisition for both units during OTDR testing and retrieves test results for pass/fail analysis.
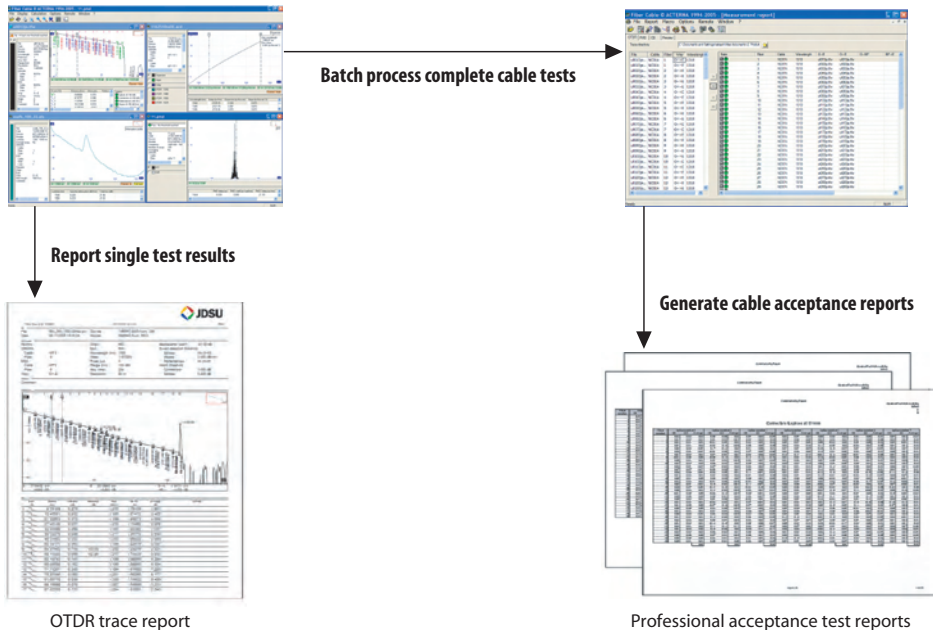
– Provides 45 dB optical talk set
– Provides file transfer capability through the fiber
– Provides remote control of the far-end unit
– Provides a talk set compatible with the OFI-2000 and with the OTS-55 Optical Talk Set stand-alone unit

Effective Test Report Generation

Transfer data and generate comprehensive reports using JDSU FiberTrace and FiberCable analysis software.

– Generate proof-of-performance reports with a high degree of customization
– Create dedicated tables for each test result (OTDR, CD, PMD, and ORL)
– Provides pass/fail indicators for quick analysis of problem areas
– Identifies macro bends and provides fault report summary

Multi-application post-analysis software

Batch process complete cable tests

Report single test results

Generate cable acceptance reports

OTDR trace report

Professional acceptance test reports

13

The T-BERD 6000A with the optional mouse, keyboard, battery, headset, AC/DC adapter charger, and video inspection scope
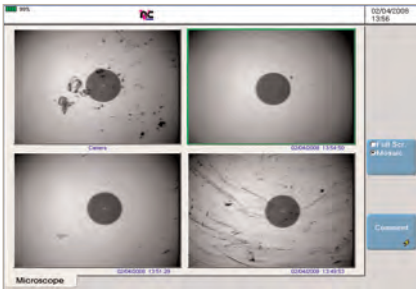
View clean and dirty fiber end faces with the connector inspection option.

T-BERD 8000 field-scalable optical test platform

Comprehensive Line of Accessories

A wide range of available accessories provide technicians with everything needed to benefit from the complete testing capabilities of the of the T-BERD 6000A.

Join the T-BERD Family of Optical Test Solutions

Based on the same graphical user interface (GUI) and file formats, the T-BERD 6000, T-BERD 6000A, and the T-BERD 8000 form a family of solutions for high-performance field testing. In addition, the fiber application plug-in modules are field interchangeable with the T-BERD 6000, T-BERD 6000A, and the T-BERD 8000, ensuring maximum flexibility and investment protection.

The T-BERD 6000A can house one plug-in module at a time. The T-BERD 6000A with the Multi-Services Application Module (MSAM) offers Ethernet and SONET/SDH testing at line rates from 10 Mb/s up to 10 Gb/s, as well as the ability to verify and troubleshoot higher-layer IP video, Layer 4 UDP/PCP, FTP, and HTTP.

The T-BERD 8000 can house multiple modules simultaneously, enabling the perform-ance of almost any combination of network test functions in a single unit. In addition, the T-BERD 8000 also offers:

– DWDM turn-up testing
– Dual-port optical spectrum analysis
– DWDM channel isolation for BERT analysis
– E1/T1 to 10G BERT analysis
– 10/100/1000/1G/10G Ethernet testing

T-BERD 4000
Multiple ServicesTest Platform

T-BERD 6000
Compact Optical Test Platform

T-BERD 6000A
Compact Network Test Platform

T-BERD 8000
Scalable Optical Test Platform

Specifications

General (Typical 25°C)

Display

Touchscreen, TFT color, 8.4 in, LCD 800 x 600, high visibility

Storage and I/O Interfaces

Internal memory	Minimum 1 GB

2x USB, 1x RJ45 Ethernet

Power Supply

Battery type	Standard removable Li-ion batteries
AC/DC adapter	Input 100-240 V, 50-60 Hz, Output 19 VDC/3.1 A
Operation time	Up to 11 hours with standard display, Telcordia GR-196-CORE (depending on the module)

Size and Weight

Mainframe with one plug-in module and battery	
(L x H x W)	285 x 195 x 93 mm
	(11.2 x 7.7 x 3.7 in)
Mainframe only (without battery and module)	
	2.4 kg (5.3 lb)
Mainframe with one plug-in module and battery	
	3.4 kg (7.5 lb)

Environmental

Operating temperature range (no options)	−20 to +50°C (−4 to 122°F)
Operating temperature range (all options)	0 to +40°C (32 to 104°F)
Storage temperature range	−20 to +60°C (−4 to 140°F)
Humidity, non-condensing	95%

Base Unit Optical Interfaces (optional)

Power Meter

Power level	+10 to −55 dBm
Calibrated wavelengths	850, 1310, and 1550 nm
Connector type	Universal push/pull (UPP)

Talk Set

Wavelength	1550 nm ±20 nm
Dynamic range	>45 dB range
Function	With data/file transfer
Laser safety	Class 1M laser
Connector type	Field interchangeable

Optical Return Loss

Selectable wavelength	1310/1550 nm
Measurement range	0 to 45 dB
Measurement uncertainty	±1 dB
Display resolution	0.01 dB

Visual Fault Locator (VFL)

Wavelength	635 nm ±15 nm
Output power level	<1 mW
Laser safety	Class 2 laser
Connector type	Universal push/pull (UPP)

Continuous Wave (CW) Light Source

Wavelengths (selection)	1310, 1550, and 1625 nm
Output power level	−3.5 dBm
Stability in 15 min	±0.02 dB
Stability in 8 hrs	±0.2 dB
Laser safety Class	1M laser
Connector type	Field interchangeable

Video Inspection Scope (via USB)

Magnification	250X and 400X, through the USB port

Ordering Information

Base Instrument

T-BERD 6000A platform with high visibility touchscreen color display and battery pack	ETB6000AT
VFL with 2.5 mm UPP	E80VFL
Optical talk set with UPP	E80TS
Optical power meter with UPP	EE80PM
Optical loss test set 1550/1625 nm with talk set	E8029LTSTS
Optical loss test set with talk set (1310/1550/1625 nm)	E8036LTSTS
Combined LTS and ORL with talk set (1310/1550 nm)	E8026LTSTSORL
Bidirectional OTDR acquisition option for single-mode module	E80bidir
Quick capture video microscope, 200x/400x with USB converter and 7 tips	EFSCOPE400

Accessories

Cigarette lighter power adapter	E80lighter
Additional high power Li-ion rechargeable battery	E60LIHP1

Application Software

Optical FiberTrace software (for post-analysis)	EOFS100
Optical FiberCable software (for acceptance report generation)	EOFS200

Optical connectors for the loss test set and Talk set options (connector must be of the same type)

Field replaceable connectors: EUNIPCFC, EUNIPCSC, EUNIPCST, EUNIPCDIN, EUNIPCLC, EUNIAPCFC, EUNIAPCSC, EUNIAPCST, EUNIAPCDIN, EUNIAPCLC

Please refer to the separate module data sheets for detailed specifications

Test & Measurement Regional Sales