



Acterna OSA-160/-161-/201

DWDM Spectrum Analyzer

As fiber networks expand rapidly with dense wavelength division multiplexing (DWDM) transport technologies, advanced test solutions that offer greater functionality to speed time to install and time to revenue are becoming a standard requirement. With long standing experience and knowledge in the field of digital and optical network testing, manufacturers and fiber network operators look to Acterna for industry leading optical spectrum analyzer (OSA) solutions.

Targeted at providing advanced test solutions for manufacturers and fiber network operators, the Acterna OSA-160/-161-/201 are field-ready OSAs that offer measurement of wavelength, power and optical signal to noise ratio (OSNR) on different carriers of multiwavelength signals from 1280 to 1650 nm. With the unique channel isolator function of the OSA-160/-161-/201 it is easy to separate individual DWDM channels from the entire spectrum.

The OSA-160/-161-/201 are the forerunners to a new family of DWDM spectrum analyzers. As the first dual-port DWDM analyzer, the OSA-201 enables simultaneous measurements at two different points in DWDM systems. In addition to the patented dual-port version, standard single-port OSA-160/-161 are also available. All instruments offer high test speed and internal wavelength calibration, which can be achieved without disruption to on-going measurements.

Installation, verification and maintenance

Graphical and tabular display formats can be selected to assist in the installation, verification and troubleshooting of multichannel DWDM systems within the 1280 to 1650 nm wavelength range. Built-in test functions deliver automatic PASS/FAIL evaluations based on predefined parameters.

Highlights

- Compact, field-portable solution based on ONT-30 mainframe
- Easy-to-use one-button operation – Fiber Optic Expert (FOX) mode
- Best-in-class built-in physical constant wavelength reference for online, interruption-free calibration
- Prefilter of specified channels (isolator mode) up to 10.7 Gbps for in-depth analysis
- Multiuser remote operation via internet browser
- Economic PMD solution for fiber network qualification

User friendly software

The user friendly, web-based interface of the OSA-160/-161-/201 facilitates direct or remote control of the tester through standard Web browsers. Test results are displayed on an integrated 12.1-inch TFT color touch screen and can be printed through the instrument's built-in parallel port.

Fox mode



The unrivalled Fiber Optic Expert (FOX) mode enables DWDM system evaluation at the touch of a button. FOX mode automatically identifies DWDM channels, selects the appropriate wavelength range and provides auto-scaling of system qualification against customers' preselected parameters.

Automated DWDM component testing

This intuitive software guides the user through test procedures for a variety of optical DWDM components.

The software includes templates for the following tests:

- EDFA (ISS method)
Noise figure, gain and amplified spontaneous emission (ASE) measurement
- Laser qualification
Side mode suppression ratio (SMSR), 3-dB and 20-dB bandwidth

Using the OSA-201 with its dual port capability guarantees unique, online, erbium doped fiber amplifier (EDFA) qualification in terms of simultaneous measurement of the input and output signal.

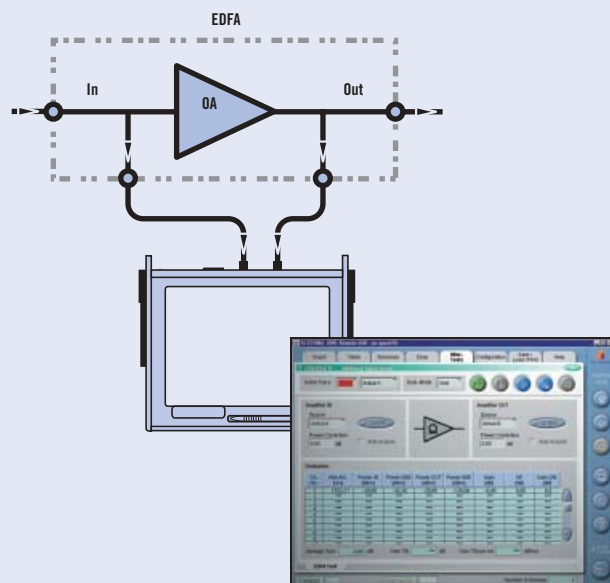
Long-term monitoring test application software

The long-term performance of DWDM systems is of critical importance, given the growing number of channels, increasingly faster transmission speeds per channel, and smaller spacing between channels. Equally, the ability to monitor the optical system parameters, channel wavelength, channel power, and OSNR, in addition to the digital signals is also imperative.

The long-term monitoring test application of the OSA-160/-161-/201, is a Microsoft Windows®-based program that runs on an external PC delivering long-term measurements of optical parameters during system commissioning and normal transmission operations. Particular test sequences can be started once the user has specified: the channels to be monitored, reference values for the optical parameters along with corresponding limit values and the time interval between individual measurements.



Summary screen with PASS/FAIL settings



OSA-201 dual port EDFA qualification

Complete system results are displayed in realtime via bar graphs in which the parameter of interest, that is, λ , P, or OSNR can be selected. Threshold violations in individual channels – including those affecting unshown parameters – are displayed. Behavior versus time (drift) results can also be presented. This is carried out on a per-channel basis by preselecting the channel and desired parameter. If a limit value is exceeded during measurement (FAIL condition), the entire spectrum is recorded to allow for later detailed analysis.

Channel isolation function

The unique channel isolation function is used to separate a DWDM channel from the entire spectrum. The channel can then be further analyzed with a Q-factor meter or a SONET/SDH analyzer at data rates up to 10.7 Gbps. The built-in tracking function provides wavelength locking to the peak of the selected channel to avoid channel frequency drift problems during long-term measurements.

Acterna PMD Test Kit for OSA-160/-161-/201

The PMD Test Kit is an option for an OSA-160/-161-/201 instrument that is designed to qualify fibers for high-speed transmissions of for example, 10 Gbps. The PMD Test Kit consists of analysis software, a broadband light source, and a variable polarizer. Fibers that are deployed for telecommunication purposes may have high polarization mode dispersion (PMD) values. If certain limits of PMD are exceeded, the bit error ratio will increase rapidly.

The kit, which is designed for field applications can be used to upgrade any OSA-160/-161-/201.

Acterna's PMD solution is based on the fixed analyzer method (ANSI/TIA/EIA/FOTP-113) and has been developed specifically for portable field applications. It is equivalent to the interferometric method (ANSI/TIA/EIA FOTP-124) and gives comparable results.

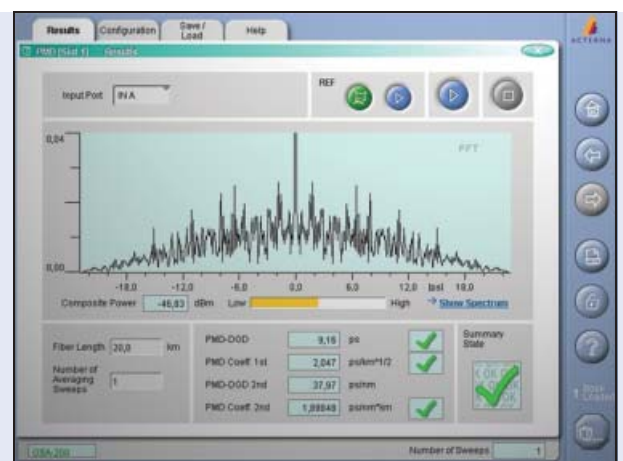
The Acterna PMD Test Kit comprises a polarized light source (OBS-15), polarizer (OVP-15), and evaluation software running on the OSA-160/-161-/201. For extended distance links, an ASE light source can be ordered. Existing OSA-160/-161-/201 can be upgraded with the PMD evaluation software.

Maximum PMD values allowed for digital signal transmission

Bit rate Gbps	Max. PMD (ps)	PMD coeff. of fiber for 400 km length (ps/√km)
2.5	40	< 2.0
10	10	< 0.5
40	2.5	< 0.125



Long-term monitoring of single channel vs. time



Fiber network qualification in terms of PMD

Specifications

Operating modes

Full-spectrum graphic display

Functions zoom/move, cursor/marker, channel-grid, multitrace, summary

FOX one button automode for evaluation of DWDM signal with PASS/FAIL indication

Sweep modes realtime, continuous, averaging

Graph mode Display of up to 4 traces with trace comparison and min/max Hold

Table Mode Simultaneously visible channels up to 22 channels

Display parameters channel no, wavelength, power, OSNR, statistics (Min, Max), label, channel status, history, pass/fail

Summary: WDM system evaluation mode

Evaluation of DWDM signals against customers' predefined parameters with indication of PASS/FAIL result.

Channel isolator (OSA-161/-201)

Channel isolator output for further signal analysis with BERT, Q-factor etc.

Wavelength range 1280 to 1650 nm

Data rates up to 10.7 Gbps

Spectral filter bandwidth typ. 200 pm

Insertion loss typ. 8 dB (input signal to channel isolator output)

Tracking mode Auto wavelength control

Network component testing

EDFA test for evaluation of optical amplifiers

Display parameters input/output noise (ASE), noise figure, gain per channel

Additional specifications

Optical ports (physical contact interfaces)

Input ports 2 x SM/1 x SM

Output port (ch-drop optional) 1 x SM

Interface Universal

Optical return loss typ. 35 dB

Maximum total safe power +23 dBm

Spectral measurement ranges

Number of optical channels 256

Wavelength range 1280 to 1650 nm

Wavelength calibration⁽¹⁾ internal, online

Wavelength accuracy⁽⁷⁾ ± 20 pm

Readout resolution 0.001 nm

Resolution bandwidth (FWHM)⁽²⁾ typ. 75 pm

Man. settable 0.1/0.2/0.3/0.4/0.5/1.0/2.0 nm

Power measurement ranges

Dynamic range (per ch power)⁽³⁾ -75 to +20 dBm

Noise floor RMS (with averaging)⁽²⁾ -75 dBm

Absolute accuracy^(2,5) ± 0.4 dB

Linearity⁽⁴⁾ ± 0.05 dB

Readout resolution 0.01 dB

Scanning time (1280 to 1650 nm)⁽⁶⁾ < 1.5 sec

Optical rejection ratio⁽²⁾

at ± 25 GHz (± 0.2 nm) > 35 dBc

at ± 50 GHz (± 0.4 nm) > 40 dBc

PDL⁽²⁾ ± 0.1 dB

Flatness⁽²⁾ ± 0.2 dB

Level reproducibility ± 0.05 dB

Further specifications

Power supply (nominal range of use)

AC line voltage 90 to 240 V

AC line frequency 50/60 Hz

Safety class to IEC 1010-1 class I

Ambient temperature

Nominal range of use 5 to +50°C/41 to 102°F

Storage and transport range -20 to +60°C/-4 to 140°F

Dimensions

(w x h x d) approx. 350 x 280 x 150 mm

approx. 13.8 x 11.0 x 5.9 in

Weight

approx. 10 kg/19.6 lb

Instrument operation

Interfaces

Parallel Port, Serial Port, Universal Serial Bus (for future use), PCMCIA port, Floppy disk drive, Ethernet (RJ-45), VGA connector

Save, Load, Export and Import

Current instrument settings and measurement results can be saved on internal HD for later loading. Settings can also be exported to floppy disk and imported into the same or alternative OSA-160/-161/-201.

Results can be exported to floppy disk for external report documentation or printouts.

Screen copy print

Printing of screen picture via the OSA-160/-161/-201 parallel port.

⁽¹⁾ Built in, physical constant wavelength calibrator, needs no recalibration

⁽²⁾ 18 to 28°C, 1520 to 1570 nm

⁽³⁾ Max. power per channel +15 dBm, max total power +20 dBm

⁽⁴⁾ -45 to +10 dBm, at 23°C

⁽⁵⁾ At -10 dBm

⁽⁶⁾ Full span 370 nm, 37000 measurement samples, incl. WDM-table analysis

⁽⁷⁾ at 1550 nm, at 23°C

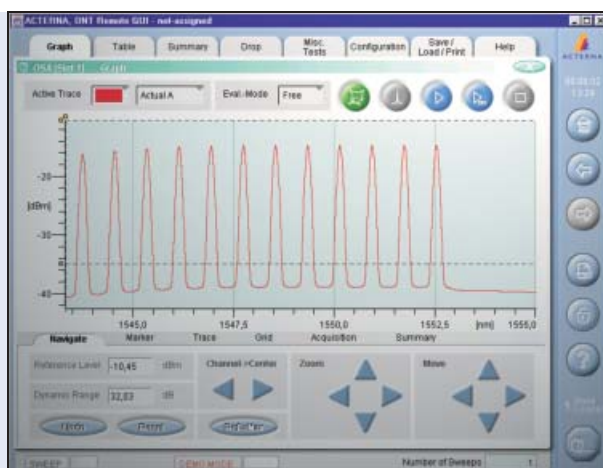
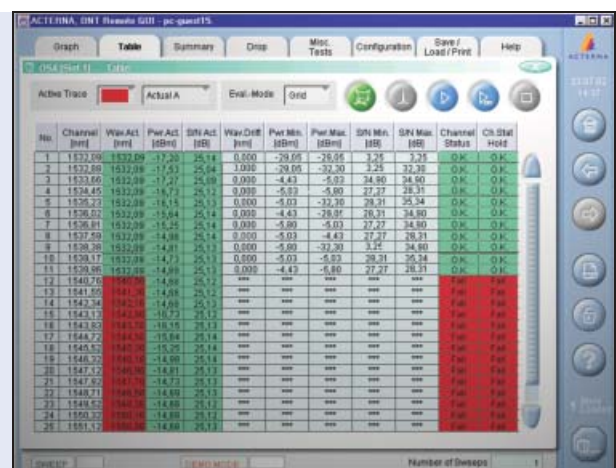


Table WDM analysis mode



Graph WDM spectral mode

Touch screen display

Color TFT screen 12.1 inch, 65536 colors
Resolution 800 x 600 pixels (SVGA standard)

Multuser remote via LAN (remote operation)

In a LAN environment, the OSA-160/-161-/201 can be operated interactively via TCP/IP and a standard browser. With its multuser capability, the OSA-160/-161-/201 offers flexible use of the instrument as it can be accessed by several users. The user interface is visible on local terminals and in parallel on the OSA-160/-161-/201. The OSA-160/-161-/201 also enables users to operate several instruments simultaneously from a single PC.

Remote control for test automation

The OSA-160/-161-/201 can be controlled via SCPI commands through the LAN, RS.232 or GPIB (by external RS.232/GPIB converter) interfaces.

Measurement parameters settable for test sequence with long-term monitoring software (option)

Optical parameters

Channel configuration up to 255 channels
(ITU-T G.692 grid allowed for)
Reference values for power and OSNR
Limit values for λ , power and OSNR

Measurement interval settings between

40 s and 999 hrs

Average measurement duration per test sequence

Without spectrum recording 15 s
With spectrum recording 25 s

File size

DWDM data (32 channels)
5.6 KB (first measurement)
2.5 KB (further measurements)
Spectrum data 10 KB (per spectrum recorded)

PMD Test Kit performance main specifications

Measurement range 0.2 to 50 ps
Dynamic range up to 35 dB
(optional up to 45 dB with ASE light source)
refer to order information
Fiber length to be measured up to 140 km
(up to 180 km with ASE light source)
Selectable settings for mode coupling
strong (for ordinary fibers)
weak (for polarization maintaining fibers
and most PMD standards)
Measurement time < 10 seconds

OBS-15 (broadband handheld light source)

Main specifications

Output level (for back reflection < 4%) > 0 dBm
Spectral power density between $\lambda_1 = 1520$ nm
and $\lambda_2 = 1620$ nm > -42 dBm/0.1 nm
Applicable fiber SMF 9/125 μ m (PC)
Optical connector FC, SC, DIN, etc.
(Interchangeable adapter system)

Power supply

Battery operation NiMH, type AA (rechargeable,
exchangeable, 2 pieces)
Operating time approx. 3.5 h

AC operation

(by means of SNT-92 AC/DC Adapter/Charger)
Nominal range of use 100 to 240 V, 50/60 Hz

Ambient conditions

Nominal range of use -10 to +40°C/14 to 104°F
Storage and transport -25 to +45°C/-12 to 114°F
Dimensions (w x h x d) approx. 95 x 46 x 195 mm
approx. 3.7 x 1.8 x 7.7 in

ASE Fiberwhite SP (for extended distance)

Erbium doped ASE broadband source

Main specifications

Output level > +11 dBm
Spectral power density between $\lambda_1 = 1530$ nm
and $\lambda_2 = 1565$ nm > -10 dBm/0.1 nm
Applicable fiber SMF 9/125 μ m (APC)
Optical connector FC

Power supply

AC operation 100 to 240 V, 50 to 60 Hz

Ambient conditions

Nominal range of use 0 to 50°C (+30 to 125°F)
Dimensions (w x h x d) approx. 235 x 180 x 325 mm
approx. 9.1 x 7.0 x 12.7 in

OVP-15 (Polarizer)

Applicable fiber SMF 9/125 μ m (PC)
Optical connector 2 x FC, SC, DIN, etc.
(Interchangeable adapter system)
Maximum allowable input power +23 dBm

Ambient conditions

Nominal range of use -5 to +45°C/23 to 114°F
Storage and transport -20 to +45°C/-4 to 114°F
Dimensions (w x h x d) approx. 95 x 49 x 195 mm
approx. 3.7 x 1.9 x 7.7 in



OBS-15: Broadband polarized light source for PMD measurement



OVP-15: Polarizer for PMD measurement

Ordering information

OSA-160 single port analyzer BN 2264/10

With mainframe ONT-30 browser-oriented GUI, internal browser, color TFT touch screen; Ethernet access; Floppy Disk Drive; VGA; Centronics and PCMCIA Interface; operating manual

OSA-161 single port analyzer with channel isolator BN 2264/13

The specifications are identical to OSA-160 single port analyzer but with additional channel isolator capability.

OSA-201 dual port analyzer with channel isolator BN 2264/14

The specifications are identical to OSA-161 single port analyzer with isolator, but with additional second measurement port enabling simultaneous measurements at 2 different points within DWDM systems.

PMD Test Kit BN 2264/91.11

Includes PMD evaluation software for OSA-160/-161-/201 (preinstalled, enabling code needed) and the following seven listed items.

OBS-15 Optical Broadband Source BN 2267/01

OVP-15 Optical Variable Polarizer BN 2271/01

NiMH batteries (two items) BN 2237/90.02

for OBS-15 (Mignon AA-Size)

SNT-92 AC/DC Adapter/Charger BN 2267/90.01

for OBS-15

Cleaning tape for optical connectors BN 2229/90.07

MT-2 Bag (for two optional handhelds and measuring accessories) BN 2126/01

Optical measuring adapters BN 2060/00.xx

(one adapter for OBS-15, two adapters for OVP-15)

PMD test for extended distance

The following three items are needed

ASE Fiberwhite broadband light source PH 1530/01

OVP-15 Optical Variable Polarizer BN 2271/01

PMD software for

OSA-160/-161-/201 BN 2264/91.10

Software options

Long-term monitoring software BN 2264/90.10
(for all optical parameters)

Optical Fiber DWDM software (DWDM analysis software) to be downloaded from the Internet free of charge

Calibration report

OSA-160/-161-/201 BN 2264/90.01

OBS-15 BN 2267/90.02

Optical measuring adapters⁽¹⁾

FC-PC (IEC 874-7, CECC 86 115-801) BN 2060/00.51

SC-PC (CECC 86 260, IEC 1754-4) BN 2060/00.58

ST (IEC 874-10, CECC BFO/2.5) BN 2060/00.32

DIN (IEC 61754-3) BN 2060/00.50

E-2000 (CECC 86275-801) BN 2060/00.53

Accessories⁽²⁾

Carrying case with rolls for OSA-160/-161-/201 BN 2264/90.02

External keyboard BN 3035/92.04

Storage case for optical measuring accessories (ABK-30) BN 2126/30

Optical connector cleaning tape BN 2229/90.07

⁽¹⁾ Additional optical adapters are available on request

⁽²⁾ Other accessories on request

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Acterna is the world's largest provider of test and management solutions for optical transport, access, and cable networks, and the second largest communications test company overall. Focused entirely on providing equipment, software, systems, and services, Acterna helps customers develop, install, manufacture, and maintain optical transport, access, cable, data/IP, and wireless networks.

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