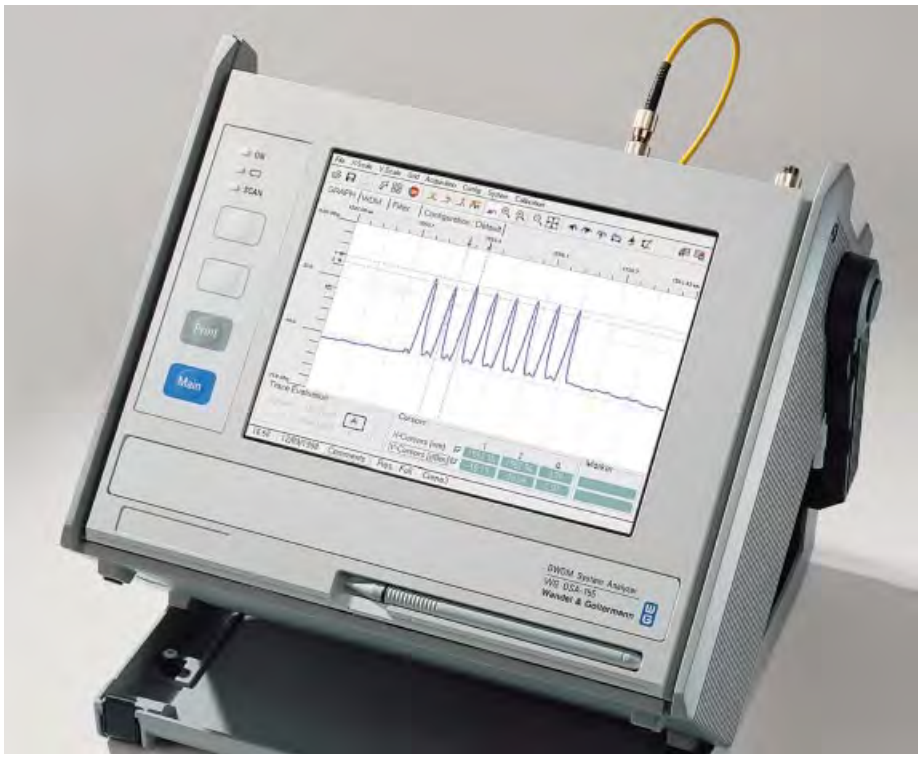
Acterna OSA-155
DWDM System Analyzer



- *Analyzer for DWDM systems with channel spacings of 50 GHz/0.4 nm and higher*
- *Fast and complete DWDM system analysis based on accurate wavelength, power and S/N ratio measurements*
- *Internal λ-reference guarantees high wavelength measurement accuracy*
- *Drop capability for single WDM channels (monitor output) enables subsequent analysis using any SDH/SONET transmission analyzer (e.g. ANT-20 Advanced Network Tester)*
- *Easy carrier power alignment and troubleshooting through spectral analysis*
- *Wide input power range enables high channel power applications*
- *Remote operation/testing via modem or LAN (TCP/IP)*
- *Ideal for DWDM system installation, maintenance & troubleshooting: rugged and portable (9 kg/19.6 lb)*
- *Comprehensive instrument powering: internal battery, external battery connection and AC line*
- *Easy and intuitive touchscreen operation*
- *Integration into monitoring/ surveillance systems*
- *Interchangeable adapter system for interconnectivity with all common optical connectors*

Spectrum and WDM parameter analysis in range 1450 nm to 1650 nm for applications on DWDM systems

The OSA-155 DWDM System Analyzer is a field-ready optical spectrum analyzer offering measurements of wavelength, power and optical SNR on the different carriers of multiwavelength signals in the range 1500 to 1620 nm with up to 50 GHz/ 0.4 nm spacing. With a maximum channel power of +15 dBm, up to 32 channels can be measured and displayed in a WDM table list. More than 32 channels (up to 256) can be measured simultaneously with reduced channel power. In the extended wavelength range 1450 to 1650 nm, measurements of the optical supervisory channels (OSC) are possible.
Measured results are presented either as complete spectral analysis graphics or as a WDM table, listing all DWDM carriers with their relevant parameters. The measured results are displayed on a large 10.4″ TFT color LCD with touchscreen capability.

Because the instrument is intended for field service during installation, maintenance and troubleshooting, mechanical ruggedness and battery operation were important considerations in the design of the instrument. The weight of the instrument does not exceed 9 kg/19.6 lb including the battery.

Interfaces are provided for output of measured results to an external printer (V.24/RS-232 serial and Centronics parallel) and for remote operation, diagnosis and monitoring via modem or LAN (TCP/IP). In conjunction with the CATS Test Case library, remote control via V.24/ RS-232 or IEEE 488/IEC 625 becomes fully automatic.

The PC-based instrument concept with the Microsoft® Windows™ operating system allows storage of results in a database using standard PC software, e.g. Excel™. The OSA-155 provides hard and floppy disk drives for storing data and downloading instrument software upgrades.

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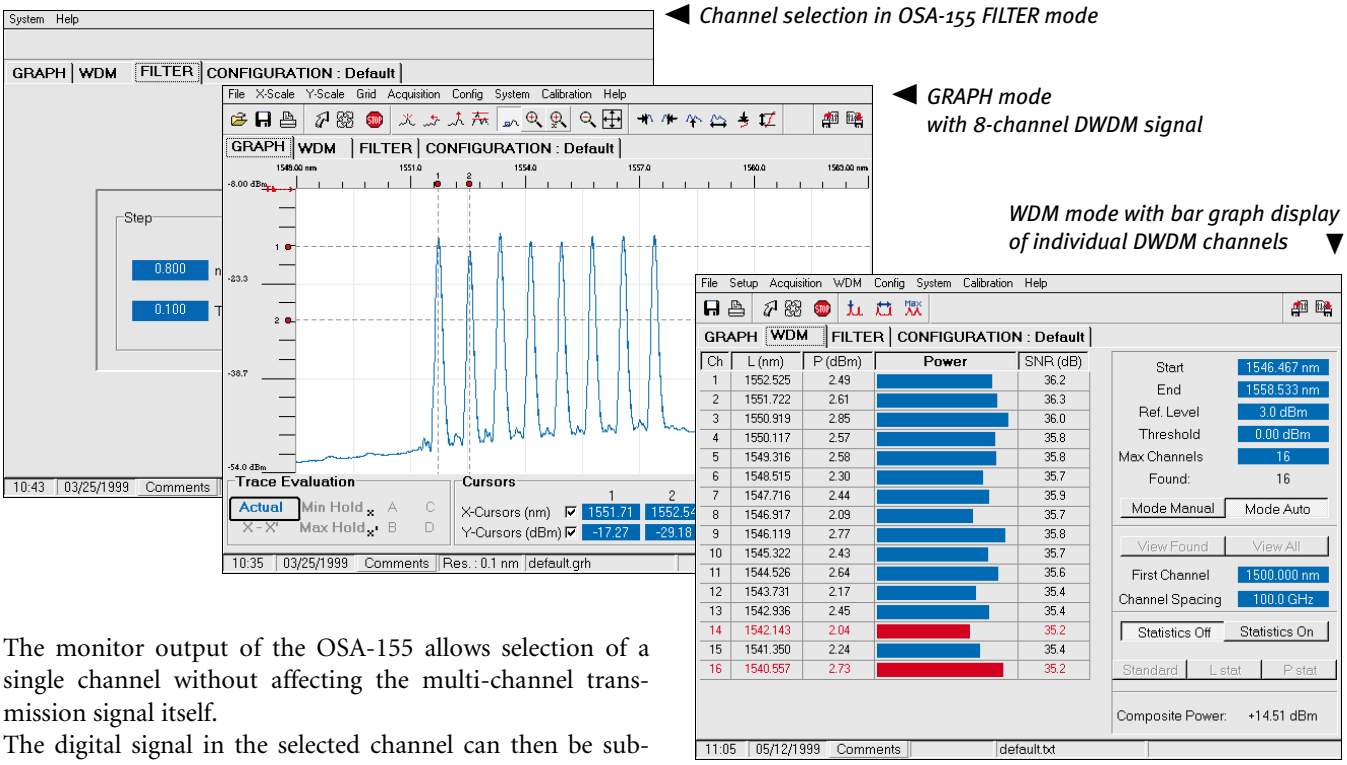


◀ *Channel selection in OSA-155 FILTER mode*

◀ *GRAPH mode with 8-channel DWDM signal*

WDM mode with bar graph display of individual DWDM channels ▼

The monitor output of the OSA-155 allows selection of a single channel without affecting the multi-channel transmission signal itself.
The digital signal in the selected channel can then be subjected to error analysis with the aid of a bit error analyzer (e.g. ANT-20) equipped with an optical input.

Test engineering for field operations

Besides being powered from the normal AC line, the OSA-155 can also run intermittently for up to four hours from batteries. The batteries are rechargeable and easily replaced. It is also possible to supply power from an automobile battery via the DC input. This feature is very useful when the instrument is part of a monitoring or surveillance system, since the OSA-155 automatically switches to battery power if the AC power supply fails.
Even when fitted with batteries, the OSA-155 only weighs about 9 kg, so it is a truly portable device. The optical module is particularly insensitive to knocks and vibration, making it ideal for field operations.

Determining power level difference

The maximum power level difference in the transmitted DWDM channels that are above a freely selectable threshold value can be determined simply and precisely with a single keystroke using the “Power Difference” function.

Determining the total power level

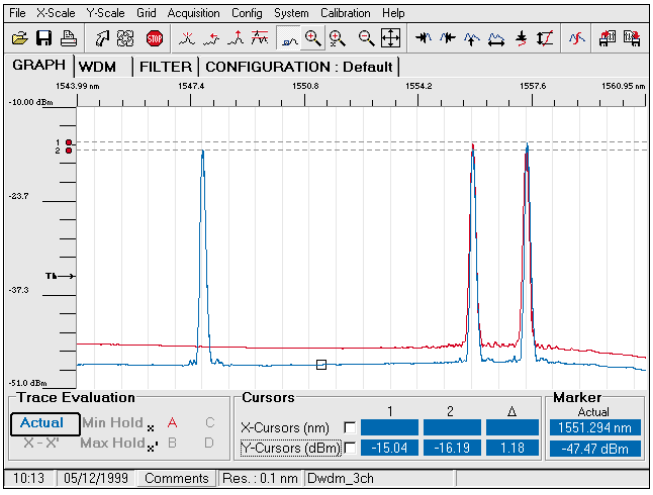
A simple keystroke in GRAPH mode is all that is needed to display the total power level for the recorded signal spectrum. The transmitted power level of individual system channels including the superimposed interference spectrum (ASE) of optical amplifiers can thus be determined quickly and easily for any wavelength range.

DWDM system analysis

Three operating modes are provided for analyzing DWDM systems: GRAPH, WDM and FILTER.

GRAPH mode

The measurement data is displayed as a trace (DWDM spectrum) in GRAPH mode. It is also possible to store reference traces and display a difference result.
This operating mode is particularly suitable for rapid troubleshooting. Each measurement and every minimum, maximum or difference trace can be archived as a complete trace data set in GRAPH mode. These saved data are independent of the current device configuration, so they can be evaluated off line just like an individual measurement using any configuration.



Comparison of current trace with reference trace A in GRAPH mode

Reference trace memories A through D

Archived traces can be loaded into one of the four trace memories A, B, C or D and displayed without overwriting the current trace.
This allows you to compare on-line traces from the same system that were recorded under different conditions, or to evaluate them off line.

Displaying a difference trace

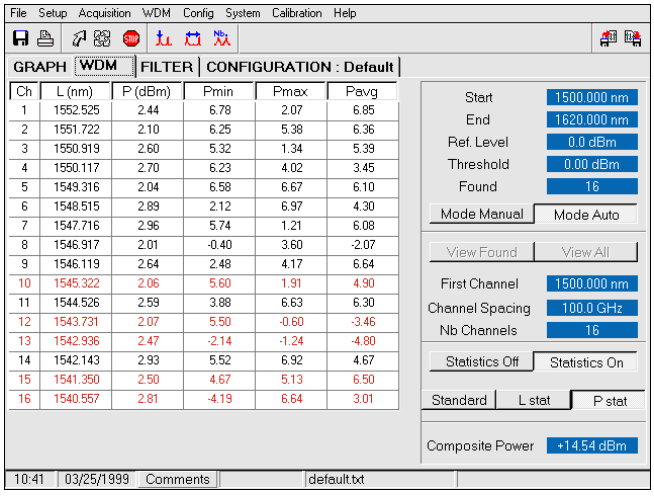
The differences between two measurements can be determined quickly and easily by direct determination of the difference trace.

WDM mode

Measurements are analyzed numerically in WDM mode. The results are shown in tables, either following the automatic identification of the DWDM channels or in accordance with a pre-selected DWDM channel grid. In addition, a bar graph display clearly indicates the level of the individual carriers, which means that minimum levels can be checked quickly when making individual measurements.
The OSNR values are calculated on line for each DWDM channel. Faulty channels can be identified immediately, since levels below the threshold are shown in a different color.
Statistical functions provide support for long-term measurements. These functions, e.g. mean, maximum, minimum and current deviation from the mean, can be applied to level or wavelength/frequency data.
Tables can be saved directly as text files and further processed using the usual standard software tools.

Minimum level and minimum OSNR

All channels that meet specified minimum level and minimum OSNR values can be displayed quickly and clearly in WDM mode. A sample measurement is made first, to determine the parameters for the evaluation. After this, a complete fiber bundle can be tested using the same settings.



Statistical functions provide support for long-term measurements in WDM mode

Composite Power Function

In DWDM systems, the total power of the carriers present is of interest in addition to the power level transmitted in each channel. In contrast with the determination of total power levels in GRAPH mode, on line calculation of the so-called composite power means that the total power of all the system channels that are displayed can be read off directly in WDM mode.

Filter operation

FILTER mode is available on instruments that are equipped with a monitor output. It is used to select one DWDM channel from the entire spectrum. This channel can then be analyzed at the digital signal level using a SDH/SONET tester equipped with optical interfaces, e.g. ANT-20. In other words, a single channel in a multiple carrier system can quickly and simply be selectively analyzed for bit errors, frame errors and alarms, and jitter measurements can also be made.

Selecting wavelength / frequency

The monochromator of the OSA-155 can be set to a fixed wavelength or frequency in order to select a single channel from the WDM spectrum. The monochromator has an optical bandwidth (FWHM) of less than 0.1 nm. The monitor output is activated as soon as Filter mode is selected.
The signal at the indicated wavelength/frequency is output with an attenuation of typically 5 dB from the monitor output of the OSA-155.

Remote operation

The remote operation feature makes it possible to operate an OSA-155 from any Windows PC via a dial-up modem link or an Ethernet LAN.
Once the link has been established, the remote OSA-155 is operated using the mouse or keyboard just as if it were directly in front of the operator.

File transfer

Files can be transferred and copied from the OSA-155 to the PC quickly and reliably.

Remote printout

Print jobs can be routed from the remote OSA-155 to a local printer.
The remote operation software sets the controlling PC as the “Viewer” and the remote OSA-155 as the “Host”.

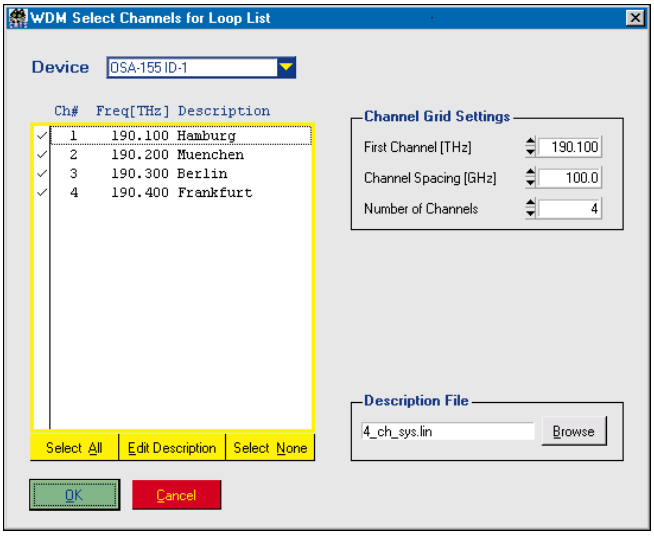
Test automation with CATS DWDM software

Setting up, starting and evaluating various measurements manually using the OSA-155 and ANT-20 can be very time consuming. Automation of individual measurement processes is therefore advantageous.

To do this, the CATS DWDM Test Automation Software is simply loaded in to the ANT-20 to control the entire measurement process.

All the relevant parameters for each measurement can be pre-set by the user, so it is possible to tailor a test sequence to a particular situation without any special programming knowledge being required.

The CATS DWDM Software runs directly on the ANT-20's built-in PC, controlling all the necessary ANT-20 and OSA-155 functions. The OSA-155 is controlled from the ANT-20 via the RS 232 interface or the GPIB. A complete record of the test including a pass/fail assessment is available as soon as the measurement sequence is completed.



Fully automatic channel selection with CATS DWDM

Specifications OSA-155

Operating modes

SPECTRUM
Full-spectrum graphic display with zoom, cursor and marker capabilities

WDM SYSTEM
Tabular (16-channel scrolling) display of wavelength, optical power, OSNR and parameter deviations

PREFILTER
Monitor output for further channel signal analysis (bit errors, jitter/wander, pointers, etc.)

Measurement ranges

Wavelength[1] . . . . . 1450 to 1650 nm/182 to 206 THz
Channel power (@ ≤ 32 channels) . . . . . −60 to +15 dBm
Optical signal-to-noise ratio, OSNR[2]
@ ±0.2 nm/±25 GHz . . . . . 34 dB (typ.)
@ ±0.4 nm/±50 GHz . . . . . >35 dB (40 dB typ.)
@ ±0.8 nm/±100 GHz . . . . . >40 dB (45 dB typ.)
Sweep time (λ range selectable)
Range 1500 to 1620 nm . . . . . 2 seconds
Range 1450 to 1650 nm . . . . . <4 seconds
No. of simultaneous channels . . . . . up to 256

Wavelength/frequency measurement

Readout resolution . . . . . 0.005 nm/0.6 GHz
Optical bandwidth (FWHM)[3] . . . . . 0.1 nm ±10 pm
Measurement accuracy
(after internal calibration) . . . . . ±0.04 nm/±5 GHz
Repeatability . . . . . ±5 pm (10 min, typ.)

Power measurement

Readout resolution . . . . . 0.01 dB
Measurement accuracy[4] . . . . . ±0.5 dB
Linearity[5] . . . . . ±0.1 dB
Flatness . . . . . ±0.2 dB (typ.)
Polarization dependence[6] . . . . . ±0.05 dB
Noise floor . . . . . <−70 dBm
Repeatability . . . . . ±0.1 dB (10 min, typ.)

Optical input (physical contact interface)

Return loss . . . . . ≥35 dB
Max. allowable total power level . . . . . +30 dBm
Fiber type . . . . . single mode 9/125 µm
Optical connector
Interchangeable conn. system . . . . . FC, SC, DIN, etc.

Monitor output (optional)

for modulated carriers up to 10 Gbit/s[7]
Insertion loss between input
and monitor output . . . . . 5 dB (typ.)
(valid at selected wavelength)
Optical bandwidth . . . . . 80 pm ±10 pm

Screen

10.4″ TFT color display, 256 colors with touchscreen operation
Resolution . . . . . 640 × 480 pixels (VGA)

Built-in computer

CPU . . . . . Pentium™ PC
RAM . . . . . 16 MB
Floppy disk drive . . . . . 3.5″, 1.44 MB
Built-in hard disk . . . . . 1.2 GB (minimum)

Remote OSA-155 operation

This option allows operation of the OSA-155 from a Windows™ PC from any remote location via modem or LAN card.

Interfaces

External printer . . . . . parallel (Centronics)
Remote control . . . . . serial (RS-232/V.24)
and optional . . . . . GPIB (PCMCIA)
Others . . . . . keyboard, mouse, monitor, PCMCIA (2×)

General specifications

Power supply

Batteries (rechargeable, exchangeable, 2 packs) . . . . . NiMH
Operating time . . . . . 2 h (typ.)
DC voltage . . . . . 12.6 to 26 V
AC line voltage . . . . . 88 to 264 V

Ambient temperature

Nominal range of use . . . . . +5 to +40 °C
Transport . . . . . −20 to +70 °C
Storage . . . . . −20 to +60 °C

Dimensions (w × h × d) in mm

(without cover) . . . . . 350 × 280 × 150

Weight . . . . . approx. 9 kg/19.6 lb (incl. batteries)

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1) All following specifications are valid for wavelength range 1500 to 1620 nm/ 185 to 200 THz; for the full wavelength range the instrument has slightly reduced performance
2) In a 0.1 nm equivalent bandwidth, single carrier measurement
3) Calibrated and displayed for 0.1, 0.2, 0.5, and 1 nm
4) For channel power −30 to +5 dBm, bandwidth 0.1 nm, temperature range +10 to +35 °C
5) For channel power −30 to +5 dBm
6) Valid at 1550 nm; ±0.05 dB in range 1550 ±50 nm; add further ±0.05 dB for verson BN 2260/04
7) Test point conditions at 10 Gbit/s: Chromatic dispersion is compensated to better ±10 ps

Ordering information OSA-155

OSA-155 without Monitor Output	BN 2260/03
OSA-155 with Monitor Output	BN 2260/04
Included with OSA-155: 2 battery packs	

Options

Calibration report	BN 2260/90.01
Long-term Monitoring Software	BN 2260/90.09
Remote control GPIB (PCMCIA)	BN 2260/90.03
Remote operation via modem	BN 3035/95.30
Remote operation via LAN (TCP/IP)	BN 3035/95.31

Accessories

CATS DWDM Test Automation Software	BN 3045/93.43
Test adaptors for optical input/monitor output	BN 2060/00.xx
Soft carrying case	BN 3020/00.11
Carrying case with rollers	BN 0960/00.07
Storage case for optical measuring accessories	BN 2126/30
External keyboard (English/US)	BN 3035/92.04
Spare battery pack	BN 2260/90.04

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