MTS/T-BERD 8000 Platform

Optical Spectrum Analyzer Modules

MTS/T-BERD platform

Key Features

- **In-band capability for true OSNR measurements in ROADM and 40G networks**
- **Ultra-high optical resolution**
- **Industry-leading wavelength accuracy guaranteed over instruments lifetime**
- **Future-proof signal analysis for data rates of 40/100G, and next-generation modulation formats**
- **Channel drop function for single channel isolation and tunable filter applications.**
- **PMD test option based on fixed analyzer method.**

Applications

- **Commissioning and maintenance of current and next generation DWDM systems**
- **Provisioning and maintenance of ROADM networks**
- **Installation and maintenance of CWDM networks**
- **Testing of 40G and 100G networks**
- **Spectral testing of optical components**

Full-band, high-performance Optical Spectrum Analyzers for testing optical systems and components

Targeted at providing advanced test solutions, the OSA-150, OSA-180 and the OSA-500 are the next generation of JDSU's DWDM analyzer modules.

A new monochromator design provides ultra high optical resolution, and outstanding wavelength accuracy in a small and rugged OSA module, offering the best field solution for testing DWDM and CWDM networks during installation, maintenance and trouble shooting.

The JDSU OSA modules differentiate by the optical measurement resolution and are graded into three classes:

- The OSA-150 is JDSU's basic OSA with an optical resolution of 100 pm to measure CWDM and DWDM networks with moderate channel spacing of 100 GHz to CWDM.
- The high resolution OSA-18x DWDM analyzers are suited for testing DWDM networks with tight channel spacing down to 50GHz. In addition the OSA-181 provides a unique channel drop function to isolate single DWDM channels from the spectrum.
- The ultra high resolution OSA-500 and OSA-500R have an industry leading resolution bandwidth of 35 pm for measurements in ultra DWDM networks with channel spacing down to 25 Hz.
  The OSA-500R is equipped additionally with a new technique to measure the true OSNR in ROADM systems and 40G systems.

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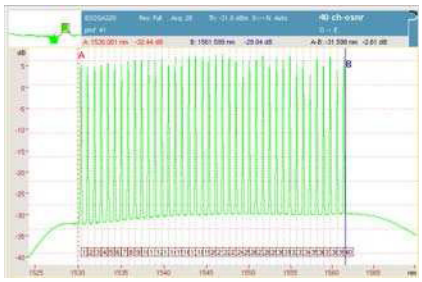
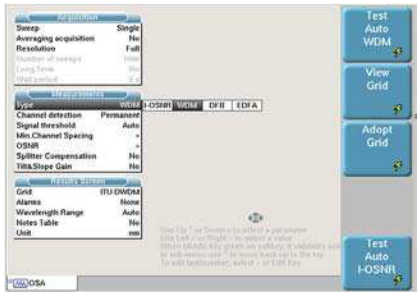


40 channel DWDM system

Advanced optical performance

JDSU's OSA family combines outstanding wavelength accuracy, high dynamic range and an ultra-high resolution. All instruments are equipped with an internal wavelength reference for online calibration without requiring disruption of in-progress measurements. The internal wavelength calibrator is based on a physical constant reference that guarantees unsurpassed wavelength accuracy over the instrument's lifetime without the need of external recalibration (JDSU patents), saving recalibration cost.



Instrument setup

One-step system qualification

One-button auto-testing guarantees that technicians need no special training to carry out a DWDM test, making JDSU's instruments suitable for both novice and expert technicians. An Auto-Test mode automatically identifies WDM channels, selects the appropriate wavelength range, and provides auto scaling and system qualification according to pre-defined parameters.

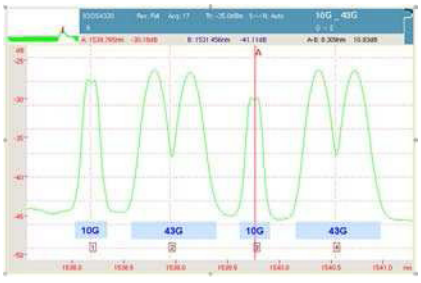
Graphical and tabular display showing pass/fail indicators and out-of-range values

Flexible measurement capability

In-depth analysis, featuring statistical evaluation, and automatic storage capabilities, is provided. This allows for DWDM system performance verification, including the variation of optical system parameters (wavelength, power, and OSNR) as well as a series of measurements over a defined period of time. Resulting reports are provided with average, minimum, maximum, and standard deviation values of the measured parameters over time.

Powerful pass/fail link manager

Graphical and tabular display formats can be selected to assist in the installation, verification, and troubleshooting of multi-channel DWDM systems. Built-in test functions deliver automatic pass/fail evaluations based on pre-defined alarms, saving time and providing technicians with a quick and intuitive overview of the complete set of results.



Precise and correct detection of new modulation formats

Measurement of signals at high data rates and new modulation formats

Data rates at 10 Gbps or higher have a larger optical bandwidth than the resolution bandwidth of an OSA, and with new modulation formats like duobinary (DB), differential phase shift keying (DPSK) or quadratur phase shift keying (QPSK), the spectral shape of a signal will change from one peak to multiple peaks. Regular OSAs will no longer correctly measure the central wavelength and the total signal power of such transmission signals.

JDSU OSAs are prepared for these scenarios as they have a new signal analysis for accurate measurement of total channel power and center wavelength of modulated signals. All results will be presented in the WDM table.

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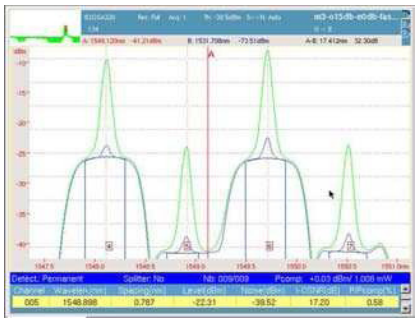
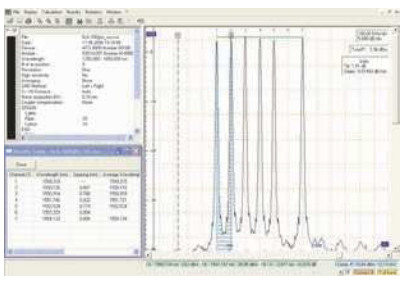


In-band noise measurement of optical channels passing different routes in a ROADM network

EDFA test application

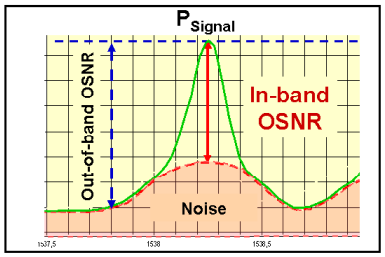
Drift analysis



Offline ana sis OFS-100

New in-band OSNR measurement technique

In ROADM networks the noise floor in between optical channels is suppressed by the optical filters inside the ROADMs. In systems transmitting ultra high data rates like 40G/100G at tight channel spacing of 50 GHz, the modulation bandwidth is larger than the channel bandwidth thus leading to overlapping spectra. Both effects make conventional OSNR measurement based on the IEC interpolation method unreliable.



The OSA-500R is JDSUs second generation of optical spectrum analyzers performing the in-band OSNR A new optical polarization splitting (OPS) method (patent pending) is used to suppress the transmission signal and to get access to the noise value inside the optical channel for measuring the true in-band OSNR. The only viable solution for any test scenarios, whatever the ROADM filter types, data rate or modulation formats.

Built-in test applications

Test applications for optical amplifiers (EDFA) and laser sources (DFB) facilitate network component verification.

Drift measurements

For optical performance monitoring it is essential to measure the key parameters over time. The built-in drift test application provides the result of power, wavelength and OSNR over a customer definable time frame in a graphical and numerical format. Drift measurements are important in CWDM networks with uncooled laser, which have a typical wavelength of 0.1 nm/°C.

PMD test options

With the PMD option, the OSA can measure the differential group delay (DGD) for PMD characterization of optical fibers and systems. The measurement is based on the fixed analyzer method (TIA/EIA FOTP-113) together with a broadband source and a variable polarizer.

Channel isolation (drop) and dual-port options

A unique channel isolation option is provided to extract a single DWDM channel from the entire spectrum for further analysis with a SONET/SDH or Ethernet analyzer at data rates up to 12.5 Gbps. The built-in tracking function provides wavelength locking to the peak of the selected channel in order to avoid channel frequency drift problems during long-term measurements. The dual-port option (JDSU patents) provides simultaneous measurement of two optical signals, measuring the input and output of an optical amplifier at the same time, for example.

Advanced analysis solution

JDSU's OFS-100 Optical FiberTrace Software is a PC-based software application within a true Microsoft Windows environment, offering post-analysis capabilities and the generation of detailed, professional OSA reports.

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Specifications

Full-band WDM analyzer OSA-150

Operating modes

	WDM, Drift

Spectral measurement ranges

Wavelength range	1250 to 1650 nm
Measurement samples	120,000
No. of optical channels	256
Wavelength calibration (1)	internal, online.
Wavelength accuracy (2)	± 100 pm
Readout resolution	1 pm
Resolution bandwidth (FWHM) (2)	100 pm

Power measurement ranges

Dynamic range (3)	–60 to +15 dBm
Absolute accuracy(2, 4)	± 0.6 dB
Total safe power	+23 dBm
Readout resolution	0.01 dB
Scanning time (full band) (C-band)	<5 s <1 s

Optical rejection ratio (ORR) (2)

at ± 25 GHz (± 0.2 nm)	not specified
at ± 50 GHz (± 0.4 nm)	40 dBc
at ± 100 GHz (± 0.8 nm)	>43 dBc

Full band DWDM Analyzer OSA-180 / OSA-181

Operating modes

	WDM, Drift, DFB, LED, FPL, EDFA

Spectral measurement ranges

Wavelength range	1250 to 1650 nm
Measurement samples	120,000
No. of optical channels	256
Wavelength calibration (1)	internal, online.
Wavelength accuracy (2)	typ. ± 20 pm
Readout resolution	1 pm
Resolution bandwidth (FWHM) (2)	typ. 70 pm

Power measurement ranges

Dynamic range (3)	–65 to +23 dBm
Absolute accuracy(2, 4)	typ. ± 0.5 dB
Linearity (5)	± 0.1 dB
Total safe power	+23 dBm
Readout resolution	0.01 dB
Scanning time (full band) (C-band)	<5 s <1 s

Optical rejection ratio (ORR) (2)

at ± 25 GHz (± 0.2 nm)	typ. 35 dBc
at ± 50 GHz (± 0.4 nm)	typ. 45 dBc

Channel drop option (OSA-181 only)

Wavelength range	1300 to 1650 nm
Data rates	up to 12.5 Gbps
Spectral filter bandwidth	>20 GHz
Insertion loss(6)	typ. <12 dB
Tracking mode	Auto wavelength control

High Perf. DWDM Analyzer OSA-500 / OSA-500R

Operating modes

	WDM, Drift, DFB, LED, FPL, EDFA In-band OSNR (OSA-500R only)

Spectral measurement ranges

Wavelength range	1250 to 1650 nm
Measurement samples	120,000
No. of optical channels	256
Wavelength calibration(1)	internal, online.
Wavelength accuracy (2)	typ. ± 10 pm
Readout resolution	1 pm
Resolution bandwidth (FWHM) (3)	typ. 35 pm

Power measurement ranges

Dynamic range (3)	–70 to +20 dBm
Absolute accuracy(2, 4)	typ. ± 0.5 dB
Linearity (5)	± 0.1 dB
Total safe power (12)	+23 dBm
Readout resolution	0.01 dB
Scanning time (full band) (C-band)	<5 s <1 s

Optical rejection ratio (ORR) (2, 10)

at ± 25 GHz (± 0.2 nm)	typ. 45 dBc
at ± 50 GHz (± 0.4 nm)	typ. 50 dBc

In-band OSNR(10) (OSA-500R only)

I-OSNR dynamic range	up to >30 dB
PMD tolerance (7)	up to 25 ps
Measurement accuracy(8)	typ. ± 0.5 dB
Data signals	up to 100 Gbps
Measurement time(9)	<2 min

(1) Built-in, physical constant wavelength calibrator, needs no re-calibration
(2) Typical for 1520 to 1565 nm at 18° to 28 °C
(3) Max. power per channel +15 dBm
(4) At –10 dBm, including PDL
(5) –45 dBm to +10 dBm, at 23 °C
(6) 1520 to 1620 nm at 23 °C
(7) For data rates up to 10 Gbps
(8) For OSNR ≤ 25 dB and PMD <25 ps
For data rates of ≥ 40 Gbps
with ≥ 100 GHz ch- spacing typically ± 1 dB
(9) Fast mode, independent of no of channels
(10) only valid for OSA-500R
(11) For OSA-500R ORR is reduced by 3 dB
(12) +20 dBm for OSA-500R

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Specifications

General specifications

Display modes

Graph, WDM table, graph and table

Optical ports (physical contact interfaces)

Input port	SM
Output port (drop port OSA-181)	SM
Optical return loss	>35 dB
Interface	Universal connectors/PC
Optical adapters	FC, SC, ST, LC, DIN

Temperature

Operating	+5 to +50 °C / 41 to 122 °F
Storage	–20 to +60 °C / -4 to 140 °F

Weight (module only)

OSA-150/18x/500	2.2 kg / 4.6 lbs

Size (module only)

OSA-150/18x/500	50 x 250 x 305 mm / 20 x 98 x 120 in

OSA modules

OSA Selection Guide

A comprehensive portfolio to better match your application requirements.

		Application					
Instrument class	**Technology Ch-spacing**	**CWDM 20 nm**	**DWDM 100 GHz**	**DWDM 50 GHz**	**UDWDM 25 GHz**	**Channel drop**	**ROADM in-band OSNR**
Basic OSA	OSA-150	X	X	–	–	–	–
High resolution OSA	OSA-180	X	X	X	–	–	–
	OSA-181	X	X	X	–	X	–
Ultra high resolution OSA	OSA-500	X	X	X	X	–	–
	OSA-500R	X	X	X	X	–	X

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Ordering information for Full-band DWDM analyzers

Basic OSAs

2281/91.15	OSA-150

High-resolution OSAs

2281/91.18	OSA-180
2281/91.22	OSA-181, with channel drop 12.5G

Ultra-high resolution OSAs

2281/91.51	OSA-500, high performance DWDM OSA
2281/91.55	OSA-500R, high performance DWDM & ROADM OSA

PMD test option *(for OSA-18x/500/500R)*

2281/91.11	PMD test kit includes PMD evaluation SW plus
2279/31	OBS-55, Optical Broadband Source plus
2271/01	OVP-15, Optical Variable Polarizer

Application software

EOFS100	Optical fiber trace software for post-analysis
EOFS200	Optical fiber trace software for cable acceptance report generation

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