

## MTS/T-BERD 8000 PLATFORM

### Optical Spectrum Analyzer Modules



MTS/T-BERD platform

#### Applications

- Provisioning and maintenance of ROADMs networks
- Commissioning of DWDM systems
- Maintenance and trouble shooting of DWDM systems
- Installation and maintenance of CWDM networks
- Spectral testing of optical components

#### Key Features

- New optical design for field applications 50% reduction in size and weight
- OSA-320 for true OSNR measurements in ROADMs networks
- Full spectral range of 1250 to 1650 nm for DWDM and CWDM testing
- High-resolution monochromator design for testing ultra dense WDM systems
- Outstanding wavelength accuracy with a lifetime guarantee based on an internal reference
- Future-proof signal analysis for data rates of 40G and 100G, and next-generation modulation formats
- Channel drop function for single channel isolation and tunable filter applications.
- Built-in test applications for optical component testing of DFBs and optical amplifiers
- Easy-to-use one-button operation with auto pass/fail analysis
- PMD test option based on fixed analyzer method

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

Targeted at providing advanced test solutions, the OSA-180 is the next generation of JDSUs DWDM analyzer modules. A new monochromator design provides high optical selectivity, and outstanding wavelength accuracy at significantly reduced size and weight offering the best field solution for testing DWDM and CWDM networks during installation, maintenance and trouble shooting.

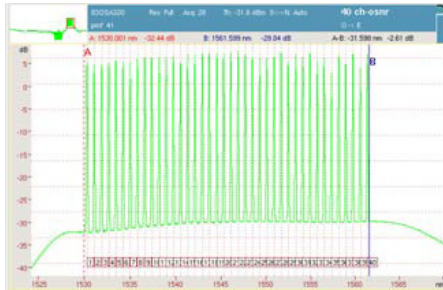
JDSU's OSA-300, OSA-301, OSA-302, and OSA-303 are high performance DWDM analyzer modules in the family of grating-based spectrum analyzers that are designed for ultra dense WDM applications (UDWDM) with high channel counts and tight channel spacing.

The OSA-320 is an in-band DWDM analyzer with a new technique to measure the true OSNR inside the optical channel of an Agile Optical Network (AON) with optical add-drop filters or ROADMs.



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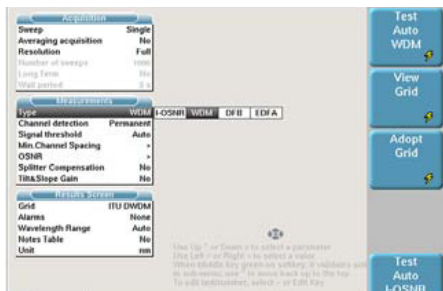
### Optical Spectrum Analyzer Modules



40 channel DWDM system

#### Advanced optical performance

JDSU's OSA modules offer the full wavelength range of 1250 nm to 1650 nm for DWDM and CWDM (metro) applications, combining outstanding wavelength accuracy and high dynamic range. All instruments are equipped with an internal wavelength reference for on-line 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.



14 channel ROADM network, with 12 channels blocked and 2 channels passing

#### Easy to use

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.

#### Flexible measurement capability

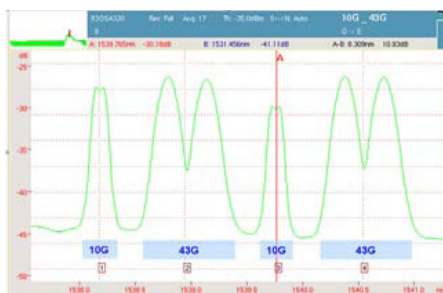
In-depth analysis, featuring statistical evaluation, and automatic storage capabilities, is provided. This allows for DWDM system performance verification, including the variation of optical system parameters (wavelength, power, and OSNR) as well as a series of measurements over a defined period of time.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



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

#### 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.



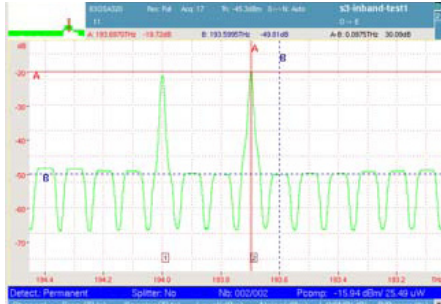
New modulation formats

#### Measurement of signals at high data rates & new modulation formats

Data rates at 10Gbps or higher have a larger optical bandwidth than the resolution bandwidth of an OSA, and with new modulation formats 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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### Optical Spectrum Analyzer Modules



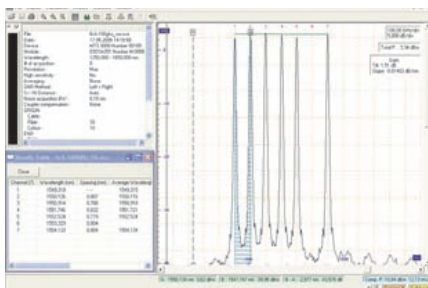
14 channel ROAD network, with 12 channels blocked and 2 channels passing



EDFA test application



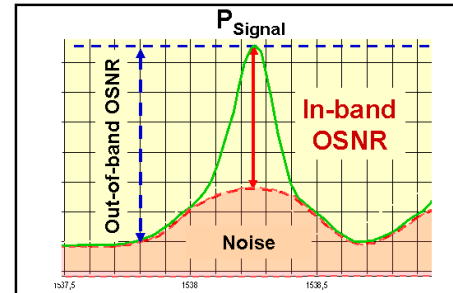
Long-term monitoring: wavelength



Offline analysis OFS-100

### New in-band OSNR measurement technique

In ROAD networks each optical channel may traverse different routes, optical amplifiers, and add-drop filters resulting in different OSNR for each channel. Due to optical filtering the noise floor in between optical channels is suppressed, therefore conventional OSA measurements based on the interpolation OSNR method are unreliable, as they will indicate out-of-band OSNR values that are too high – up to 10 dB above the true OSNR.



JDSU's OSA-320 follows a new optical polarization splitting (OPS) method (patent pending) which enables to suppress the transmission signal and to get access to the noise value inside the optical channel for measuring the true in-band OSNR.

### 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.

## MTS/T-BERD 8000 PLATFORM

### Optical Spectrum Analyzer Modules

#### Specifications

##### Full-band DWDM analyzer OSA-180

<b>Modes</b>	
Operating modes	WDM, DFB, EDFA testing, Drift
Display modes	Graph (trace + overview); WDM table and graph + table
<b>Spectral measurement ranges</b>	
Wavelength range	1250 to 1650 nm
Measurement samples	120,000
No. of optical channels	512
Wavelength calibration (1)	internal, online
Wavelength accuracy (2)	± 0.020 nm
Readout resolution	0.001 nm
Resolution bandwidth (FWHM) (3)	0.070 nm
<b>Power measurement ranges</b>	
Dynamic range (4)	-65 to +23 dBm
Noise floor RMS (with averaging) (3)	-65 dBm
Absolute accuracy (3, 5)	± 0.5 dB
Linearity (6)	± 0.1 dB
Readout resolution	0.01 dB
Scanning time (1250 to 1650 nm) (7)	<5 s
<b>Optical rejection ratio (ORR) (3)</b>	
at ± 25 GHz (± 0.2 nm)	35 dBc
at ± 50 GHz (± 0.4 nm)	45 dBc
PDL (3)	± 0.2 dB
Flatness (3)	± 0.25 dB
<b>Optical ports (physical contact interfaces)</b>	
Input port	SM
Interface	Universal connectors
Optical return loss	>35 dB
Total safe power	+23 dBm

##### High-performance DWDM analyzer OSA-300, OSA-301, OSA-303

<b>Modes</b>	
Operating modes	WDM, DFB, EDFA testing, Drift
Display modes	Graph (trace + overview); WDM table and graph + table
<b>Spectral measurement ranges</b>	
Wavelength range	1250 to 1650 nm
Measurement samples	40,000
No. of optical channels	512
Wavelength calibration (1)	internal, online.
Wavelength accuracy (2)	± 0.010 nm
Readout resolution	0.001 nm
Resolution bandwidth (FWHM)	(3) 0.060 nm
<b>Power measurement ranges</b>	
Dynamic range (4)	-75 to +23 dBm
Noise floor RMS (with averaging) (3)	-75 dBm
Absolute accuracy(3, 5)	± 0.4 dB
Linearity (6)	± 0.05 dB
Readout resolution	0.01 dB
Scanning time (1250 to 1650 nm) (7)	<1.5 s
<b>Optical rejection ratio (ORR) (3)</b>	
at ± 25 GHz (± 0.2 nm)	>45 dBc
at ± 50 GHz (± 0.4 nm)	>48 dBc
PDL (3)	± 0.1 dB
Flatness (3)	± 0.2 dB
<b>Channel drop option (OSA-301/303)</b>	
Wavelength range	1250 to 1650 nm
Data rates	up to 12.5 Gb/s
Spectral filter bandwidth	0.175 nm
Insertion loss	<10 dB
Tracking mode	auto wavelength control
<b>Optical ports (physical contact interfaces)</b>	
Input port	SM
Output port (drop port)	OSA-301/303
Interface	SM
Optical return loss	universal
Optical return loss	>35 dB
Total safe power	+23 dBm

##### In-band DWDM analyzer OSA-320

<b>Modes</b>	
Operating modes	In-band OSNR, WDM, DFB, EDFA testing, Drift
Display modes	Graph (trace/overview); WDM table and graph + table
<b>Spectral measurement ranges</b>	
Wavelength range	1250 to 1650 nm
Measurement samples	40,000
No. of optical channels	512
Wavelength calibration (1)	internal, online.
Wavelength accuracy (2)	± 0.010 nm
Readout resolution	0.001 nm
Resolution bandwidth (FWHM) (3)	0.060 nm
<b>Power measurement ranges</b>	
Dynamic range (4)	-70 to +20 dBm
Noise floor RMS (with averaging)(3)	-70 dBm
Absolute accuracy(3, 5)	± 0.6 dB
Linearity (6)	± 0.05 dB
Readout resolution	0.01 dB
Scanning time (1250 to 1650 nm) (7)	1.5 s
Optical rejection ratio (ORR)(3)	
at ± 25 GHz (± 0.2 nm)	45 dBc
at ± 50 GHz (± 0.4 nm)	48 dBc
PDL (3)	± 0.2 dB
<b>In-band OSNR measurement mode</b>	
OSNR dynamic range	up to >30 dB
PMD tolerance (8)	up to 50 ps
Measurement accuracy(9)	± 0.5 dB
Data signals	up to 100 Gbps
Measurement time(10)	<2 min
<b>Optical ports (physical contact interfaces)</b>	
Input port	SM
Interface	universal
Optical return loss	>35 dB
Total safe power	+20 dBm

(1) Built-in, physical constant wavelength calibrator, needs no re-calibration  
 (2) Typical at 1550 to 1565 nm at 23 °C  
 (3) Typical at 1520 to 1565 nm at 18 to 28 °C  
 (4) Max. power

(5) At -10 dBm  
 (6) -45 dBm to +10 dBm, at 23 °C  
 (7) WDM mode full span 400 nm

(8) For data rates up to 10 Gbps  
 (9) For data rates ≥ 40 Gbps, typically ± 1 dB  
 (10) Fast mode, independent of no. of channels

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### Optical Spectrum Analyzer Modules

#### Specifications

#### General specifications

##### Temperature

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

##### Weight (module only )

OSA-180	2.2 kg / 4.6 lbs
OSA-30x	2.5 kg / 5.6 lbs
OSA-320	4.4 kg / 9.2 lbs

##### Size (module only )

OSA-180	50 x 250 x 305 mm / 20 x 98 x 120 in
OSA-30x	100 x 250 x 305 mm /40 x 98 x 120 in
OSA-320	150 x 250 x 305 mm / 60 x 98 x 120 in

#### OSA Selection Guide

A comprehensive portfolio to better match your application requirements.

Product	Applications
OSA-320	ROADM system turn-up, verification and maintenance Measurement of true in-band OSNR in ROADM based networks
OSA-300	DWDM system turn-up, verification, and maintenance Component qualification (DFB, FP, LED, or EDFA) Channel isolation (drop) option Very high ORR values
OSA-301/303	DWDM maintenance and trouble shooting
OSA-180	DWDM/CWDM system turn-up, verification, and maintenance Network element verification (EDFA) High ORR values

## MTS/T-BERD 8000 PLATFORM

### Optical Spectrum Analyzer Modules

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#### Ordering information

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##### Full-band DWDM analyzers

2281/91.18            OSA-180

##### High-performance DWDM analyzers

2281/91.31            OSA-300 single port

2281/91.32            OSA-301 single port with drop

2281/91.34            OSA-303 dual port with drop

##### In-band DWDM analyzer for ROADM networks

2281/91.35            OSA-320 in-band DWDM analyzer

##### Optical connectors

Standard single mode

FC/PC, SC, ST, DIN, LC

##### PMD test option

2281/91.11            PMD test kit includes PMD evaluation software 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