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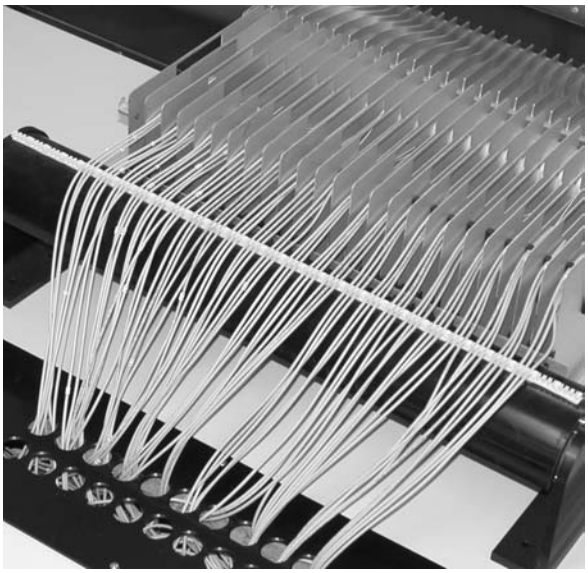
Find the *VIAVI Solutions / JDSU OWB10002* at our website: *Click HERE*

Environmental Test Systems

In order to be incorporated into modules and transmission systems, fiberoptic manufacturers will need to show that their devices meet the relevant standards for performance and reliability. Standards vary, reliability is obviously more of an issue in a submarine cable application than in a central office location, but some element of testing over an extended temperature and humidity range will be required.

All standards require that a representative number of samples of the product be subjected to a program of environmental challenges, high and low temperature storage, temperature cycling etc. An environmental testing program might consist of 3 to 6 stages of temperature/humidity challenges. The device characteristics are required to be measured before and after each stage and in some cases continuously or at intervals during the stage. Removing all the devices from the environmental chamber for optical measurements on a desktop instrument is simply not practical. It is this in situ measurement requirement that the JDS Uniphase Environmental Test Systems have been designed for. For practical help on setting-up an environmental test program, see www.passivetesting.com.

Our Environmental Test Systems are integrated automated test facilities intended for long-term reliability testing of optical components under environmental stress conditions, such as those called for in Telcordia specification GR-326-CORE, GR-1209-CORE and GR-1221-CORE. Components under test are subjected to a range of environmental conditions in a test chamber, usually over a period of many weeks. Chamber conditions are logged at specified time intervals during the environmental challenges, and the required parameters for each Device Under Test (DUT) are measured. User selected parameters are calculated from these responses and logged, along with the time and environmental data.



Key Features & Benefits

Up to 170 device channels

Unattended long term operation

Very high repeatability

Measures parameters required in Telcordia GR-326-CORE, GR-1209-CORE, GR-1221-CORE

Tests all classes of passive optical components (broadband to DWDM)

Ultra-low return loss (65 dB) option

Designed by, and tested on the world's most demanding customers -ourselves

PDL measurement option

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At the core of the Environmental Measurement Systems is a pair of high quality JDS Uniphase programmable switches (1xN configuration); recognized as the best in the business, the switches feature a repeatability of ± 0.003 dB.

These switches, combined with the appropriate source and monitoring hardware plus dedicated software, create fully automated turnkey measurement facilities. An optional polarization controller is installed when polarization dependent loss (PDL) measurements are required A personal computer (supplied) is used to set up the tests, control the measurements and monitor the results. The systems were designed to meet in house JDS Uniphase needs and so have been thoroughly tested by the most demanding of customers !

Two forms of Environmental Monitoring systems can be configured. The Optical Component Environmental Test System (OCETS) suitable for measurements on wideband devices such as splitters, isolators, switches, connectors, jumpers, cable assemblies etc. and a high wavelength resolution SWS-EMA version suitable for all types of DWDM devices, including interleavers couplers, etalons etc. Both systems will fully characterize all required parameters of their respective devices.

The OCETS system can, by addition of a Swept Wavelength System, be converted into the SWS-EMA. In this way, a system bought for the reliability measurement of relatively simple wideband components can be upgraded to a system for the measurement of more complex devices needing high wavelength resolution. Once upgraded the hybrid Environmental Monitoring Systems can easily be switched between the two functions. Both systems route test signals to and from the DUT with JDS Uniphase SC series switches. Such an upgrade would utilize the existing OCETS SC series switch array with a separate dedicated software application package for high wavelength resolution measurements.



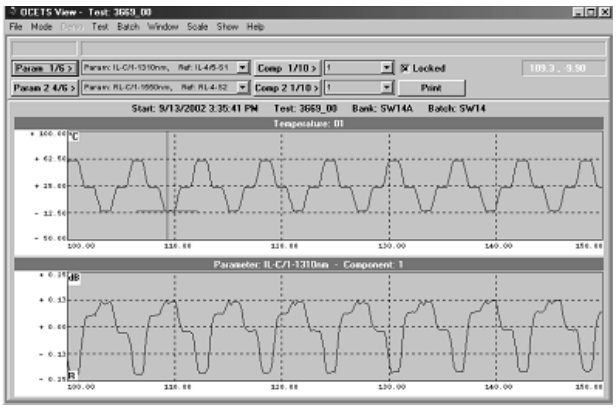
OCETS

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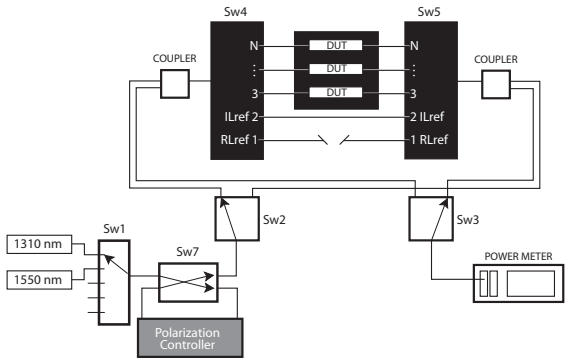
Optical Component Environmental Test System (OCETS)

The OCETS system uses a combination of up to 3 internal Fabry-Perot lasers, a BBS/filter or an external source. The light from any of these can be routed to either end of each DUT in turn. The power meter measures either the insertion loss through the DUTs, in either direction, or the backreflection from either end. A polarization controller option can be added to enable polarization dependent loss (PDL) to be measured. The OCETS software co-ordinates the switches, so that for each batch of DUTs a line created in the "batch file" will define any combination of wavelength, direction and parameter choices. Software flexibility is built in and multiple lines in the file can be defined to run any number of tests at any of the installed wavelengths on the batch of components; multiple batches are defined when differing sets of tests are required.

A second and subsequent test can be added for additional sets of DUTs, up to the switch capacity limit, while the first test is running. In this way, an environmental chamber running a long term damp heat test on a first prototype for example, could evaluate the performance of product improvements by installing later devices in the chamber and configuring a second test to run with the same conditions and measurements.



OCETS Software



Bidirectional Test Configuration

Key Features & Benefits

Automated long-duration testing capability

Bi-directional testing

Multi-channel operation

Multi-wavelength versatility

CWDM testing with BBS / Filter or TLS (optional)

PDL Measurement capability

Multi-test capability, add more tests whilst initial test runs

Compatibility with all major environmental chambers

High repeatability

Ultra-low Return Loss to - 65 dB (optional)

Complies to CE requirements plus UL3101-1 and CAN/CSA-C22.2 No. 1010.1

Safety

Complies to FDA requirements for Class I Lasers CFR 21 1040.10.

CLASS 1
LASER PRODUCT

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Swept Wavelength System - Environmental Monitoring Option (SWS-EMA)

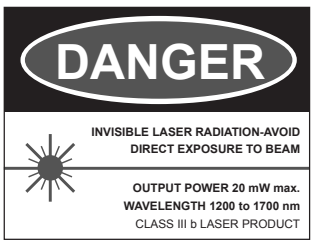
This Reliability test system combines the excellent repeatability and reliability of JDS Uniphase switches with the high wavelength resolution and stability of the Swept Wavelength System (SWS). The SWS uses a tunable laser, which is tracked by the system's Source Optics Module (SOM) as it smoothly sweeps at 20 nm/s across the band. The receiver, which is synchronized to the wavelength meter, records the power passed by each DUT in turn at 3 pm intervals. Two levels of power referencing ensure that short and long term optical power fluctuations or drift do not compromise the measurements.

A polarization controller can be added to enable PDL measurements to be made by Mueller Matrix calculation.



Safety

The laser source fo r the Source Optics Module (SWS20002-A) is a class 1 laser per FDA standard 21CFR 1040.1. The Tunable Laser Source (SWS17101 and SWS18108) is a class 3b laser per FDA standard 21CFR1040.1)



Key Features & Benefits

Automated long-duration testing capability

Multi-channel operation - up to 170 channels

C/L and S-band range, existing C and L-band SWS transmitters can be used

Very high wavelength resolution - 1 pm

High wavelength accuracy ± 2 pm

High repeatability

PDL measurement capability

Ideally suited to multi-channel DWDM devices

User flagged if device fails pre-set criteria

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In the test set up, each output for each device is given a name. Assigned to that name are the switch connections and a specification file describing the measurements required and the acceptance limits for that output. Complete flexibility is afforded with this scheme, any output of any device can have different properties, and be measured in different ways with different acceptance limits.

Each Device Output Port Set-up Includes:

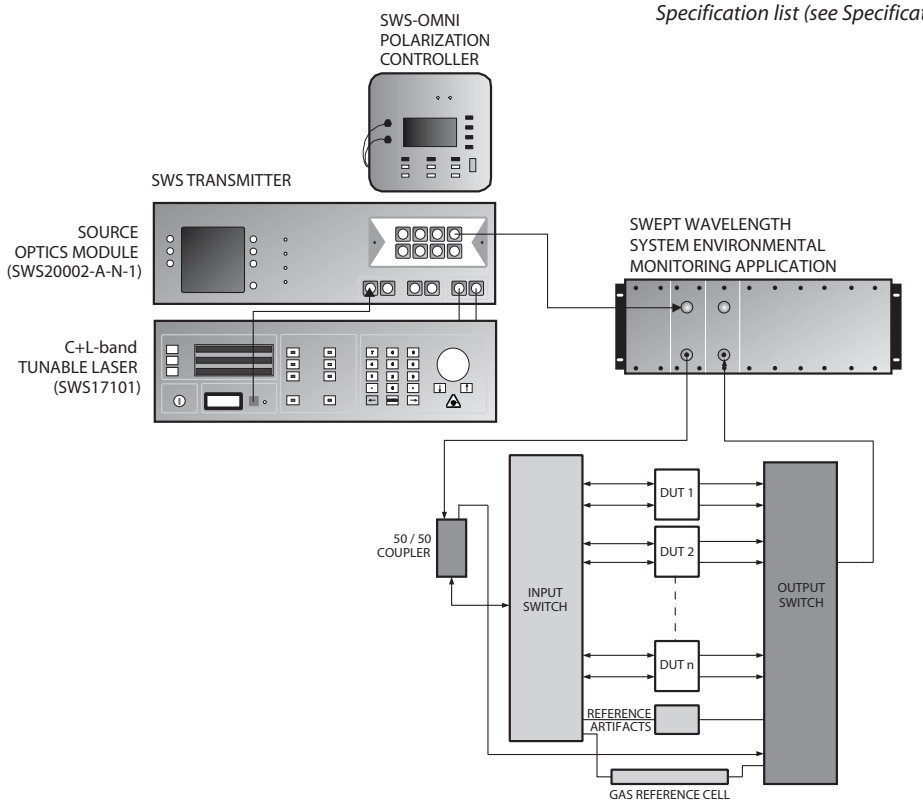
Output description - name for this port i.e.: Through channel, Drop, ITU 191.95

Connection to optical switches - which switch channels is device connected to

Type of trace, parameters to be calculated i.e. BandPass, BandStop, Etalon

Channel set-up (Center Frequency, FSR)

Specification list (see Specification Manager)



Swept Wavelength System Environmental Monitoring Application

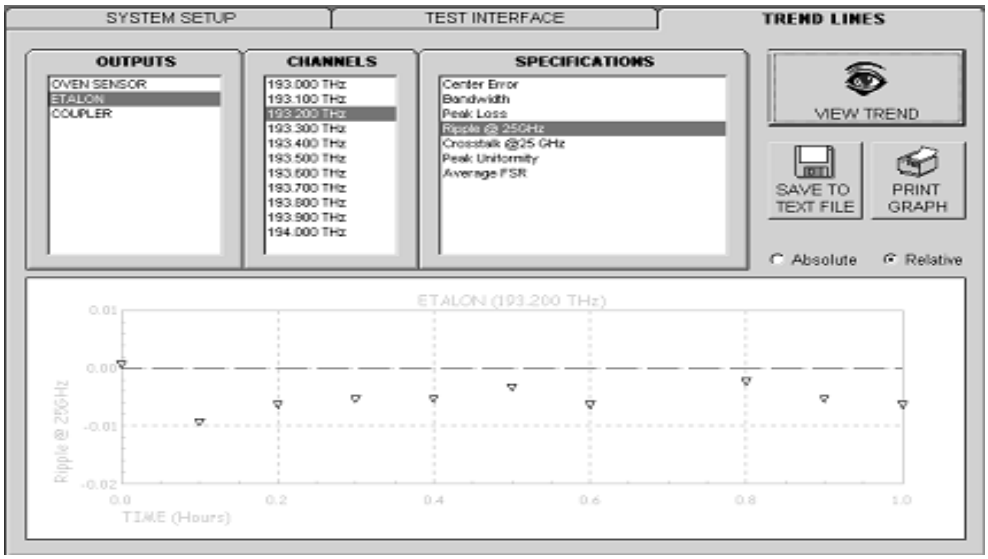
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The Specification Manager is used to create one or more custom specification lists for the test to be undertaken. The user selects appropriate specifications from a master list, and can additionally customize any specification for the test. The DUTs tested might have the same specification or different specification, and might be used for the different outputs of different devices.

Each of the available measurement parameters (see list) can be modified to suit user needs, the name can be adapted to suit local conventions, Pass/Fail criteria can be defined, wavelength or frequency, units can be chosen.

Available Measurement Parameters:

- *Actual center wavelength*
- *Offset of center wavelength from ITU*
- *Bandwidth at xdB threshold*
- *Effective bandwidth*
- *Insertion loss - at actual center or on ITU*
- *Flatness across passband*
- *Ripple across passband*
- *Crosstalk - left, right or total*
- *PDL - at actual center or on ITU*
- *Average FSR for interleaver*
- *Uniformity of interleaver bands*



Typical Output View Showing Trend with Time

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Specifications

Optical Component Environmental Test System (OCETS)

PARAMETERS	SINGLE-MODE	MULTIMODE
Fiber type	9/125 µm fiber, standard 3 mm jacket	50/125 µm or 62.5/125 µm fiber, standard 3 mm jacket
Insertion loss repeatability	± 0.04 dB over 100 hours	± 0.04 dB over 100 hours
Insertion loss dynamic range	> 75 dB	> 55 dB
Return loss repeatability	± 0.5 dB up to 55 dB over 100 hours[1] ± 1 dB up to 65 dB over 100 hours[2]	± 0.5 dB up to 30 dB over 100 hours[1]
Polarization repeatablity	± 0.08 dB over 100 hours with fusion splices joining SW4 and SW5 and minimum system configuration	NA
Measurement timing	IL/RL < 2 s/measurement High RL, PDL < 5 s/measurement	IL/RL < 2 s/measurement
Sources available (up to 3 internal, 2 external)	1310, 1480, 1550, 1625, 1650 ± 10nm Fabry-Perot Laser	850, 1310, 1550 ± 20nm LED
Optical power at DUT	> - 10 dBm	> - 25 dBm
Source stability at 23° C	± 0.01 dB for 20 min ± 1 dB for 2000 h	± 2 nm center wavelength for 2000 h
Options	Broadband source and tunable filter source Ultra-high return loss (-65 dB) certification	
GENERAL		
Number of channels	Up to 170	
Switch lifetime	> 10 million cycles	
Equipment warm-up time	4 hours, can be left on indefinitly with no adverse effects	
Electrical	220 V AC, 50 Hz and 100 V AC, 60 Hz	
Computer control	PC supplied National Instruments[3] GPIB controller board installed OCETS software and environmental chamber driver installed Print out to any Windows printer Data file format compatible with Windows-based spreadsheets	
Mechanical configuration	The equipment, excluding the computer, is installed in a single full height, 19-inch(48.26cm) rack W x H x D = 22 x 72 x 36 inch Accessibility to lasers and power meter for periodic calibration Rack fans, replaceable air filter The computer can be located on a table at a maximum distance of 5 m from the equipment rack	
Operating temperature	15-30 °C range. Maximum variation range during a test: 3 °C	
Operating humidity	0-80% RH range. Maximum variation range during a test: 15 % RH	

1. Valid for 5 m pigtails with no connectors, FC/APC, or SC/APC connectors. For longer pigtails and /or other connector types, contact JDS Uniphase for specifications.
2. High backreflection version for pigtails up to 5 m or APC connectors.
3. National Instruments is a registered trademark of the National Instruments Corporation.

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Specifications

Swept Wavelength System Environmental Monitoring Option

SYSTEM PERFORMANCE		SINGLE OUTPUT SOURCE OPTICS MODULE
Wavelength range		1520–1630 nm CL-band 1420–1530 nm S-band
Absolute wavelength accuracy		± 2 pm
Measurement resolution		1 pm
Maximum number of device channels		170 input, 170 output
Minimum test interval		6 min
Minimum test duration		1 h
Loss measurement repeatability[1] includes polarization state averaged IL		± 0.05 dB (0–25 dB device insertion loss) ± 0.10 dB (25–45 dB device insertion loss)
Loss measurement resolution		0.01 dB
Return loss measurement range		55 dB
PDL measurement repeatability[1,2]		± 0.02 dB (0–20 dB device insertion loss)
PDL measurement resolution		0.01 dB
Maximum slope resolution		10 dB/pm (0–30 dB device insertion loss)
Measurement time	IL mode	10 s per device port (any measurement)
	PDL mode	40 s per device port (any measurement)
Scan speed		20 nm/s

1. System monitors changes (with respect to initial conditions) in IL and PDL during environmental challenges.
2. Using SWS15107-A PDL, optimized Detector Modules.

On-line References

http://telecom-info.telcordia.com/site-cgi/ido/index.html

www.passivetesting.com

www.jdsu.com/instrumentation

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