Measu-
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Devices

VIAVI

LASER COMPONENTS

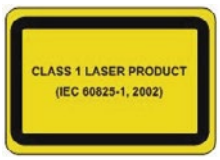
MAP Swept Wavelength System

(mSWS)

The new MAP-based Swept Wavelength System (mSWS-A2) is the next generation of an industry standard. More than 100 manufacturers around the world rely on the SWS to measure insertion loss (IL), polarization dependent loss (PDL), return loss (RL), and directivity as a function of wavelength in both research and development (R&D) and production environments. The new mSWS-A2 raises the bar on test speed, accuracy, and resolution, all while maintaining its patented distributed architecture to deliver the lowest-cost testing in the industry.

The mSWS System validates optical performance for the latest in optical components and modules including: colorless, directionless, contentionless (CDC) ROADMs, high-port-count wavelength switches, tunable filters, and circuit packs. Leveraging the capabilities of the current generation of SWS2000 tunable laser and source optics module (SOM), the new mSWS system now adds a next-generation measurement receiver based on the Viavi Solutions MAP-200 Photonics test platform.

With ±0.002 nm absolute wavelength accuracy over the entire 1520 to 1630 nm range, the mSWS maintains its full performance specifications at 100 nm/s, which is double that of earlier generations. New variable wavelength resolution functionality has been added that lets users select the resolution from an unprecedented 0.4 to 3 pm.



Key Benefits

- Complete C and L band characterization of high-port-count devices in less than 5 seconds at maximum dynamic range with unprecedented wavelength resolution
- Patented parallel test architecture dramatically increases manufacturing output at a fraction of your initial investment
- Lets you compete in Next-Gen CDC device manufacturing
- Cuts floor-space requirements in half compared to previous SWS generations
- Maximize production up-time with local service options

Applications

Perform optical component and module characterization using these devices in both R&D and manufacturing environments:

- ROADMs, wavelength-selective switches, wavelength blockers
- Optical circuit packs
- Dense-wavelength-division multiplexers (DWDM)
- Tunable filters, couplers, splitters, switches, attenuators, interleavers
- Microelectromechanical systems (MEMs) and waveguide devices
- Complies with IEC 61300-3-29 and IEC 61300-3-12

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With a dynamic range of >70 dB, the mSWS provides industry-leading performance combined with low cost of ownership. The patented distributed architecture supports up to eight separate, individually-controlled measurement stations per source laser. Often purchased initially as an R&D tool, its measurement station scalability lets customers flexibly transition the equipment from R&D to production.

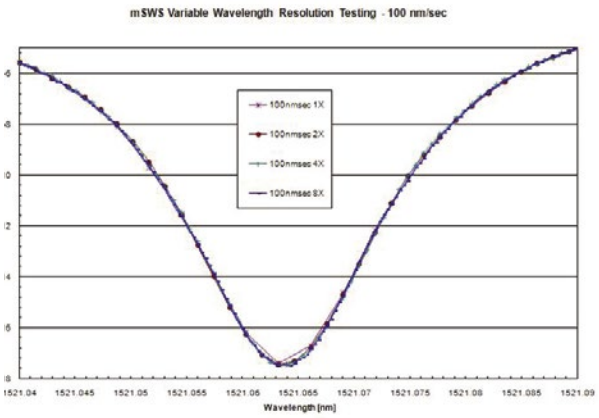

Figure 1. Example of ultra-high resolution where all data was collected at 100 nm/s sweep speed

Installed SWS2000 systems can be upgraded by adding new mSWS-A2-based measurement stations to maximize the benefit to existing SWS users within their existing capital infrastructure.

The SWS directly measures IL, PDL, and insertion loss as a function of wavelength and measures RL with the optional RL modules.

Figure 2. Example of mSWS interleaver scan

Using the raw IL and PDL data, the newly updated, easy-to-use application software's comprehensive set of analysis tools calculate these parameters relative to the measured peak, ITU grid, or user-defined grid:

- loss at peak
- center wavelength, from x dB threshold
- loss at center wavelength
- bandwidth at x dB threshold
- crosstalk, left/right, and cumulative
- flatness.

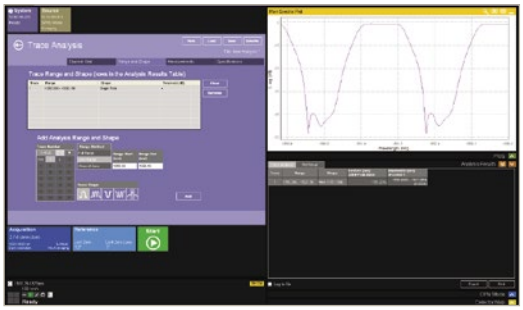

Figure 3. Improved software with easy-to-use analysis tools

The set of mSWS-A2 data link layers (DLLs) can be used to develop software for custom testing requirements. The DLLs function through the mSWS receiver hardware, allowing access to all SWS functionality. Using the supplied DLLs, users can develop applications in Visual Basic™, C, C++, or LabView environments.

With a 4-state polarization controller located within the SOM, PDL and average loss can be measured quickly as a function of wavelength. It can measure four polarization states at 0°, 90°, –45°, and circular polarization and uses the Mueller matrix analysis to accurately determine PDL at all wavelengths scanned.

Integrating the mSWS functions into the MAP-200 platform lets users access the full power of the MAP-200 application modules. Test systems can be automated with additional switches and laser sources. Fitting the MAP-200 with various connector inspection tools keeps dirty connectors from corrupting measurement results.

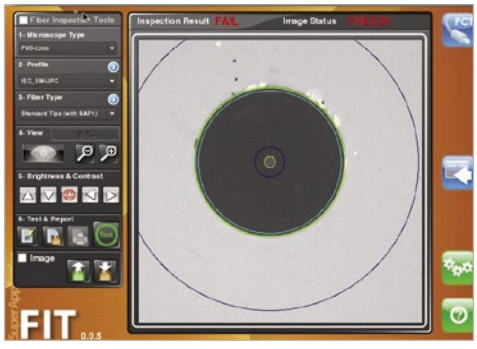

Figure 4. Connector Inspection interface

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Specifications

Parameter	Specification	
Wavelength		
Range	1520.086 to 1630 nm	
Accuracy	±2 pm absolute	
Resolution	User selectable at 3, 1.5, 0.75, or 0.4 pm	
Measurement Time (all channels are measured in parallel)		
SOM sweep rates	10, 20, 40, and 100 nm/s	
Sweep periods (s)[1]		
C band time		
10 nm/s	8	
20 nm/s	5.5	
40 nm/s	4	
100 nm/s	3	
C L band time		
10 nm/s	15	
20 nm/s	9	
40 nm/s	6	
100 nm/s	4	
Insertion Loss		
Measurement range[2]		
Stand-alone station	70 dB	
Distributed station	60 dB	
Noise[4] at 10 nm/sweep rate	0 to –20 dB	< ±0.005 dB
	–20 to –40 dB	< ±0.02 dB
	–40 to –50 dB	< ±0.05 dB
	–50 to –60 dB	< ±0.2 dB
Base uncertainty[3]	±0.03 dB	
Resolution	0.001 dB	
Maximum slope tracking at 10 nm/s	0 to –60 dB IL	>0.4 dB/pm

Parameter	Specification	
Return Loss		
Measurement range[5]	60 dB	
Noise[4] at 10 nm/s	0 to –20 dB	< ±0.02 dB
	–20 to –40 dB	< ±0.06 dB
	–40 to –50 dB	< ±0.2 dB
	–50 to –60 dB	< ±0.5 dB
PDL		
Measurement range[6]	50 dB	
Noise[4] at 10 nm/s	0 to –20 dB	< ±0.01 dB
	–20 to –40 dB	< ±0.04 dB
	–40 to –50 dB	< ±0.1 dB
Resolution	0.001 dB	

1. In continuous scanning mode with delay set to zero and direct Ethernet connection; high-channel-count systems will require several seconds of delay
2. For > 10 dBm to DUT
3. Total IL uncertainty before noise or slope error, assuming SOM to mSWS-A2RX receiver fiber static, FC/PC connector to mSWS-A2DM detector, and temperature within ±1°C
4. Noise value is 3 X standard deviation
5. Requires ORL utility cassette, which is used in conjunction with mSWS-A2DM and mSWS-A2RX cassettes
6. At –10 dBm to DUT and a sweep rate of 10 nm/s; measurement range reduced at higher speeds

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Ordering Information

mSWS Core System	
Description	**Part Number**
C+L band tunable laser	mSWS-A1SLS
Dual-output integrated source optic module (SOM)	mSWS-A2S0M
Four-output telemetry transmitter expansion module (SOM)	mSWS-A2TX
MAP-200 8-slot mainframe	MAP-280
mSWS quad detector module	mSWS-A2DM
mSWS telemetry receiver	mSWS-A2RX
ORL utility cassette	mUTL-A1000 with option MUTL-A150LR
PM fiber jumper for mSWS	mSWS-PMJ
mSWS Optional Equipment and Accessories	
Detector cap	AC900
FC detector adapter	AC901
ST detector adapter	AC102
SC detector adapter	AC903
LC detector adapter	AC918
Bare fiber adapter holder	AC120
Bare fiber adapter (requires AC120)	AC121
Power Cords (required)	Part Number
Australia/China power cord	CORD-AU
European power cord	CORD-EU
Japan power cord	CORD-JP
United Kingdom power cord	CORD-UK
United States power cord	CORD-US

Safety Information

Complies with CE requirements as well as UL3101.1 and CAN/CSA - C22.2 No. 1010.1. The laser source in the Source Optics Module (SWS20010) is Class 1. The Tunable Laser Source (SWS17101) is a Class 3B laser. Both the module and laser source are classified per IEC standard 60825-1(2002) and comply with 21CFR1040.10, except for deviations per Laser Notice No. 50, July 2001.

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