WDM900 Lightwave Test Set

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Applications

- Cellular/Mobile Backhaul Networks
- Metro Ethernet Access Networks
- Central Office and Head Ends
- CATV/Broadband Backbone Networks
- Metro Core Networks

Features

- AFL Health Meter summarizes DWDM channel performance in less than 2 seconds
- AFL Detail Display provides one-touch diagnosis of any performance issue
- Automatic compensation for monitor tap ratio
- On-screen messages guide first time users
- World's only comprehensive, hand-held DWDM test set
- IEC 61280-2-9 OSNR measurement
- Meets stringent GR-2952-CORE mechanical design criteria

The WDM900 Lightwave Test Set is a rugged, portable and easy-to-use automatic system that simplifies in-service testing of DWDM-based access networks. Within just seconds of connecting to the network, WDM900 users know which channels need attention and exactly what action is required.

The WDM900 acquires the network signal, measures the characteristics of each DWDM channel present and determines which signals satisfy user-defined limits for channel power, wavelength deviation, optical signal-to-noise ratio and other indications of network and signal integrity. The revolutionary AFL Health Meter graphically summarizes network performance via an easy to interpret color-coded indicator for each channel. Simply touching a non-conforming channel launches the AFL Channel Detail display, which shows graphically and numerically how measured attributes compare to the acceptance criteria.

Users will appreciate the many WDM900 features designed to make them more efficient. For example, conventional test equipment requires users to manually scale measurements to compensate for monitor port attenuation. The WDM900 eliminates this task with automatic monitor port compensation. The WDM900 displays warning messages when input channel power or total power exceed the allowable dynamic range and reminds user to use the input attenuator accessories provided standard with each instrument. A comprehensive reporting application provides one-touch capture and reporting capabilities. Reports are easily managed using time stamps, report titles, keywords/keyword search and tagging. Reports are easily exported in .pdf and .csv formats via off-the-shelf USB memory sticks.





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The WDM900 is engineered to thrive under the harsh conditions found in central offices, head ends, network nodes and outside plant. Its highly integrated solid state design features no moving parts for reduced service and repair costs and its internal wavelength reference and temperature-stabilized circuitry eliminate long warm-up periods and accuracy drift induced by sudden temperature and humidity changes. The optical path of the WDM900 is hermetically-sealed to resist the dust, dirt and contamination typically found in the field. The WDM900 is packaged in a proven rugged housing that withstands rigorous military-grade drop testing. Internal optical components are Telcordia GR-1221 rated.

The WDM900 features a high contrast 6.5 in color display. It weighs just 5.2 lb and its shock absorbing case occupies only 7.5 x 10.5×2.75 in. Its Li-ion battery will power it for over 8 hours on a single charge.

Everything you need to quickly and easily perform DWDM In-service Tests on Cellular Backhaul, Metro Ethernet, Optical Wavelength Services and Broadband Triple-play Backbones.

For more information, visit http://www.aflglobal.com/go/NOYES

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The WDM900 Health Meter Display

The Health Meter display is the heart of the WDM900. In less than two seconds, it condenses hundreds of channel measurements into a color-coded display where green channels pass all performance criteria, red channels fail at least one performance criteria and yellow channels have one or more parameters that are marginal. The patent-pending Health Meter display enables even first-time users to understand which DWDM channels require attention.

The WDM900 Health Meter also informs the user about the number of channels and the channel spacing present, the number of unhealthy channels and the total power level of the composite DWDM signal.

Channels are presented on a display whose x-axis can be configured to show wavelength, frequency or channel numbers. The WDM900 supports industry-standard ITU numbering plans as well as user defined plans.

Convenient touchscreen controls enable WDM900 users to navigate to configuration menus, to other measurement screens, to capture test results into memory and to organize, generate and share test reports.

The WDM900 Channel Details Display

By simply touching any channel on the Health Meter display, the user launches the Channel Details display and is provided with the details of the channel under test and its performance measurements. Centered in the display is a color coded region whose width and center line correspond to the nominal ITU channel. Channel slots for neighboring channels are also indicated. Users can navigate from one channel to the next with on-screen "Jump to Failures" buttons and hardware navigation keys. The Channel Details display shows total channel power (), the actual center of the channel and the deviation of the center of the channel from the ideal ITU channel. It also shows the peak channel power (), the actual peak frequency or wavelength and the deviation of the peak from the ideal ITU channel. OSNR results indicate the overall quality of the transmission channel.

A spectral plot allows users to confirm the presence of modulation and a C-band spectral display provides users with helpful reference information.

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Capturing Test Results

With a single press of the "Capture" button, users store all acquired measurement data in the WDM900 memory. Because the stored results include all raw data, they may be recalled from memory, reviewed and be used to produce test reports.

Stored measurement results are displayed on a carousel viewer and users can use gestures or hard keys to navigate stored records.

Powerful keyword tagging and filtering capabilities simplify the management of stored measurements.



WDM900 - Reports Viewer					
>	Report Name	Date	Time	Format 🔽	
>	Granite Mountain Base Station 12 August 2013.PDF	8/12/2013	4:07 PM	PDF	
	Metro West Business Park 12 August 2013.PDF	8/12/2013	4:10 PM	PDF	
>	Stormy Peak Base Station_2013-08-12_16-08-28_1.PDF	8/12/2013	4:08 PM	PDF	
	Mesa Verde Base Station_2013-08-12_16-09-05_63.PDF	8/12/2013	4:09 PM	PDF	
	+ <	â l	E>		
	Add Share	Delete	Rename		

Test Report Generator

he WDM900 Test Report Generator enables users to produce comprehensive reports containing test data, graphs and pass/fail results via a menu driven input panel. Reports may be defined in .pdf and .csv formats and are easily shared by exporting to USB memory sticks.





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We know that no two DWDM networks are alike and have designed the WDM900 to enable you to test each of your networks and display your results as you see fit. This includes being able to tailor the measurements to incorporate unique combinations of channel spacing, data rates, channel health factors, channel numbers, optical link budgets and link lengths, presence of optical

Display Units, Spectral Range and Channel Numbering Plans

monitoring ports and premises equipment ratings.

The WDM900 "Graph" menu tab allows users to choose how information is presented. The factory default settings use ITU channel numbers for the horizontal display axis but users can opt to use wavelength or frequency instead.

Similarly, the factory default settings show the entire input spectrum of the WDM900 but should users wish to restrict the display to a subset of the spectrum or channel plan, they can do so with the spectral range settings.

The factory default Channel Numbering Plan for the WDM900 is based on the ITU G.694.1 standard. That standard defines the center wavelength/frequency for ITU channels. It does not, however, define a specific channel numbering scheme. The WDM900 implements the channel numbering practice employed by the leading optical networking equipment vendors and is illustrated in Figure 1.

Should a WDM900 user wish to use a custom channel numbering plan, they may define a new numbering plan using the Channel Mapping menu settings.

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Channel Health Factors and Pass/Fail Thresholds

The WDM900 "Health" menu tab allows user to define the performance criteria to be used for the automatic pass/fail analysis. Users can define performance criteria for minimum channel power, minimum OSNR as well as high and low composite power warnings.

Simplifying Measurements with Optical Taps

It is a common practice to incorporate optical taps in DWDM networks to provide a convenient place to connect test equipment without interfering with customer traffic. Optical taps split the signal into a pass-thru output and a monitor output. Optical taps are specified by the power split ratio or the attenuation between the input and the monitor output. Typical monitor port specifications are illustrated below.

SPLIT RATIO	PASS-THRU INSERTION LOSS	MONITOR PORT INSERTION LOSS
90:10	-0.8 dB	-12dB
80:20	-1.3 dB	-8 dB
70:30	-2.0 dB	-6.1 dB
50:50	-3.7 dB	-3.7 dB

When test equipment is connected to a monitoring port, measurements are made on only the fraction of power diverted to the test gear. Measurements such as power level, for example, must be scaled to provide a true reading of the network power.

The WDM900 includes the capability automatically scale monitor port power readings to obtain network power. Users simple enter the split ratio or insertion loss of the measurement port and the WDM900 converts the monitor port reading to the actual network power level.



WDM900 - Health Meter # Channels Double-tap to Zoom Channel Health Tap channel for details Double-tap to Zoom Channel Health Tap channel for details Health Potential Measurement Error. At least 1 channel exceeds -4.0 dBm. 31 32 33 34 55 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 Channel Number Pause Capture Records Reports Options

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WDM900 - Health Meter	¥					
# Channels # Unhealthy Ch Spacing 8 0 100.00 GHz	Test Point 5.00 % Total Power 8.11 dBm					
Optical Input Power Exceeds +21 dBm!						
**** Remove Optical Input immediately to avoid permanent damage ***						
Please use an attenuator to rea	duce input power					
Pause Capture Records	Reports Options					

WDM900 - Health Meter # Channels Double-tap to Zoom Channel Health Health Health J 233 34 35 36 37 38 39 40 41 42 43 444 54 64 74 84 950 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 Channel Munder Pause Capture Records Records Records Records Reports Options

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WDM900 Input Ratings

Like all precise optical measurement equipment, the WDM900 has both an absolute maximum input rating and a specified maximum input rating.

The absolute maximum input rating defines the safe operating area for the WDM900 and is equal to a composite input power level of +21 dBM. Exceeding the absolute maximum input rating can permanently damage the WDM900.

The composite input power level can be broached by one very strong channel or by many lower power signals whose total power exceeds +21 dBm. This difficult-to-understand concept is illustrated as the red line in the figure below. The WDM900 monitors the composite power level of its input and, no matter how many channels are present, warns users when the safe operating region is violated.



The specified maximum input rating defines the operating area for which the rated measurement specification applies. Though no damage to the WDM900 is caused by exceeding this rating, measurement accuracy may affected in doing so. In the case of the WDM900, the specified maximum input rating is any combination of conditions in which any single channel has a power level equal than -4.0 dBm and in which the composite input level reaches +9.0 dBm. This complicated concept is illustrated in the figure above as the red line. The WDM900 warns users when the specified maximum input rating has been reached or exceeded.

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Test and Inspection

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Specifications ^a

OPTICAL					
Absolute Maximum Input Power	+21 dBm				
Usable Channel Spacing (Hardware only)	25 GHz				
Usable Channel Spacing (Application)	100 GHz				
Optical Return Loss	30 dB				
Adjacent Channel Rejection Ratio ORR@50 GHz	48 dB				
Noise Floor (typical)	-74 dBm				
WAVELENGTH MEASUREMEN	Гь				
Measurement Range	1527.99 nm to 1568.77 nm 196.2 THz to 191.1 THz Channel 62 to Channel 11, Channel 31 = 1552.52 nm				
Measurement Accuracy	±0.16 nm				
Measurement Resolution	0.008 nm				
Scan Time	<2 seconds				
POWER MEASUREMENT ^b					
Measurement Range	-45 dBm to -4 dBm				
Measurement Accuracy	±1.0 dB				
Measurement Resolution	0.1 dB				
Measurement Repeatability	±0.1 dB				
OSNR MEASUREMENT ^b					
Measurement Type	IEC 61280-2-9				
Measurement Range @ 100 GHz	28 dB				
Measurement Accuracy	±2.0 dB				
Measurement Repeatability	±0.75 dB				
PHYSICAL					
Weight (with battery)	<2.3 kg (<5 lb)				
Dimensions	19.05 X 26.92 x 6.98 cm (7.5 X 10.6 X 2.75 in)				

ENVIRONMENTAL RESILIENCE						
Dust Resistance	Hermetically-sealed Light Path					
Shock Resistance, Intended Use	GR-2952-CORE, O4-14: 30 in drop onto					
	hard surface, base					
Vibration Resistance	GR-2952-CORE, R4-15 10 Hz to					
	500 Hz @1.5 g on 3 principal axes					
Operating Environment	GR-2952-CORE, R4-19: 0°C (@ uncontrolled humidity) to 50°C (@ 95% relative humidity)					
Non-Operating Environment	GR-2952-CORE, R4-18: modified to -30°C (@ uncontrolled humidity) to 60°C (@ 95% relative humidity)					
Electromagnetic Emissions	GR-2952-CORE, R4-21 & GR-1089-CORE and EN 5510					
Electromagnetic Susceptibility	GR-2952-CORE, R4-22 and GR-1089-CORE and EN 61000-4-6					
OTHER CHARACTERISTICS						
Display	6.5 in (diagonal), Color TFT/LCD, Transreflective					
Touchscreen	Resistive technology, unaffected by moisture					
	and water droplets					
Connectivity	Two USB 2.0 Host Ports					
	Dre USB 2.0 Client Port					
	IFFE 802.11 $b/g/n$ (hardware only)					
	Bluetooth 2.0 (hardware only)					
DATA STORAGE						
Internal Memory	4 GB Flash					
External Memory	Removable USB Flash Drive					
BATTERY						
Туре	18 V, Li-ion					
Capacity	8 hours minimum					
AC Adapter	Universal 100 V – 240 VAC					

Notes:

a. All specifications valid at 23°C \pm 2°C (73.4°F \pm 3.6°F) unless otherwise specified.

b. Input Channel \leq -4 dBm, total composite input <9 dBm.

Ordering Information

MODEL	DESCRIPTION	AFL NO.
DWDM Access Network Test Kit	Includes WDM900 Lightwave Test Set configured for C-band operation and SC, FC and LC test port adapters, SC, FC	WDM9-2C00
	and LC Input Attenuators, (2) One-Click Cleaners, AC adapter, quick reference guide and soft carry case	



International Sales and Service Contact Information

Available at www.AFLglobal.com/NOYES/Contacts