



The Power of Precision in WDM Wavelength Testing

MULTI-WAVELENGTH METER

438 Series

Accurate, Reliable, and Fast WDM Wavelength Testing

Bristol Instruments, the leader in optical wavelength measurement instrumentation, offers a family of multi-wavelength meters for WDM test applications. The 438 Series Multi-Wavelength Meter combines proven Michelson interferometer-based technology with fast Fourier transform analysis in order to measure the wavelength, power, and OSNR of as many as 1000 discrete optical signals. With features such as high accuracy, fast measurement rate, straightforward operation, and rugged design, the model 438 provides the most precise, reliable, and efficient WDM wavelength testing to satisfy the needs of any manufacturing engineer.



KEY FEATURES

- Simultaneously measures wavelength and power of up to 1000 discrete optical signals.
- Optical wavelength measured to an accuracy as high as ± 0.3 pm.
- Continuous calibration with a built-in wavelength standard.
- Measurement confidence level of $\geq 99.7\%$.
- Traceable to NIST standards.
- Power measured to an accuracy of ± 0.5 dB.
- Automatically calculates OSNR to > 40 dB.
- Operation from 1000 to 1680 nm covers the important C, L, T, and O optical bands.
- Fastest measurement rate as high as 10 Hz for reduced testing times.
- High sensitivity of -40 dBm ($0.1 \mu\text{W}$) with automatic electronic gain control.
- Operates with CW and modulated signals.
- Convenient touch-screen display reports measurement data in a variety of formats.
- Interfacing via SCPI using USB, Ethernet, or GPIB.
- Rugged design for manufacturing environments.

It's Our Business to be Exact!

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SPECIFICATIONS

438 Series

MODEL	438A	438B
OPTICAL SIGNAL	CW and modulated	
WAVELENGTH		
Range	Option -001: 1270 – 1680 nm (179 – 236 THz)	Option -002: 1000 – 1680 nm (179 – 300 THz)
Accuracy ^{1, 2, 3}	± 0.2 parts per million (± 0.3 pm at 1550 nm)	± 0.65 parts per million (± 1.0 pm at 1550 nm)
Differential Accuracy ⁴	± 0.15 parts per million	± 0.5 parts per million
Minimum Resolvable Separation ^{3, 4}	10 GHz (equal power lines input)	
Repeatability ^{4, 5, 6}	± 0.03 parts per million (± 0.05 pm at 1550 nm)	± 0.1 parts per million (± 0.15 pm at 1550 nm)
Calibration	Continuous - built-in stabilized single-frequency HeNe laser	Continuous - built-in standard HeNe laser
Display Resolution	0.00001 nm	0.0001 nm
Units ⁷	nm, cm ⁻¹ , THz	
POWER		
Calibration Accuracy	± 0.5 dB (± 30 nm from 1064, 1310, and 1550 nm)	
Linearity ⁴	± 0.3 dB (1000 – 1600 nm), lines above -30 dBm	
Polarization Dependence	± 0.5 dB (1000 – 1600 nm)	
Display Resolution	0.01 dB	
Units	dBm, mW, μW	
SIGNAL-TO-NOISE RATIO ^{4, 8}	> 40 dB (100 averages), ≥ 100 GHz channel spacing > 35 dB (100 averages), ≥ 50 GHz channel spacing	
OPTICAL INPUT SIGNAL		
Sensitivity	Single line input Multiple lines input ⁴	
	-40 dBm (1270 – 1600 nm), -35 dBm (1000 – 1270 nm), -30 dBm (1600 – 1650 nm) 30 dB below total input power, but not less than single line input sensitivity	
Maximum Power	+10 dBm, sum of all lines input (displayed level), +18 dBm, sum of all lines input (safe level)	
Return Loss	35 dB (UPC connector), 50 dB (APC connector)	
Maximum Number of Lines ⁹	1000	
MEASUREMENT RATE (TIME) ¹⁰	Option -001: 10 Hz (0.1 s)	Option -002: 6 Hz (0.17 s)
MEASUREMENT MODES		
Data Mode	Single channel, list by wavelength table, list by power table	
Delta Mode	Difference of measured wavelengths from ITU grid values Difference of measured wavelengths and powers from user-defined reference channel	
Drift Mode	Difference between the measured maximum and minimum values of wavelength and power Difference between the measured current and start values of wavelength and power	
INPUTS/OUTPUTS		
Optical Input	9/125 μm single-mode fiber (FC/UPC or FC/APC)	
Instrument Interface	Library of commands (SCPI) via USB 2.0, Ethernet, and optional GPIB	
ENVIRONMENTAL ⁴		
Warm-Up Time	< 15 minutes	None
Temperature Pressure Humidity	+15°C to +30°C (-10°C to +70°C storage) 500 – 900 mm Hg ≤ 90% R.H. at + 40°C (no condensation)	
DIMENSIONS AND WEIGHT	3.5" x 17.0" x 15.0" (89 mm x 432 mm x 381 mm)	17 lbs (7.65 kg)
POWER REQUIREMENTS	90 - 264 VAC, 47 - 63 Hz, 80 VA max	
WARRANTY	5 years	

- (1) Defined as measurement uncertainty, or maximum wavelength error, with a confidence level of ≥ 99.7%.
- (2) Traceable to an NIST standard (SRM 2517a).
- (3) For multi-wavelength measurement, ≥ 20 GHz channel separation is required to achieve specified wavelength accuracy.
- (4) Characteristic performance, but non-warranted.
- (5) For 438A, standard deviation for a 10 minute measurement period.
- (6) For 438B, standard deviation for a 1 minute measurement period. Long-term measurement variations are < ± 0.4 ppm.
- (7) Data in units of nm and cm⁻¹ are given as vacuum values.
- (8) For lines above -25 dBm, 0.1 nm noise bandwidth.
- (9) OSNR is reduced as the number of lines is increased.
- (10) For single line input. Multiple lines input may reduce the measurement rate.



Bristol Instruments reserves the right to change the detail specifications as may be required to permit improvements in the design of its products. Specifications are subject to change without notice.