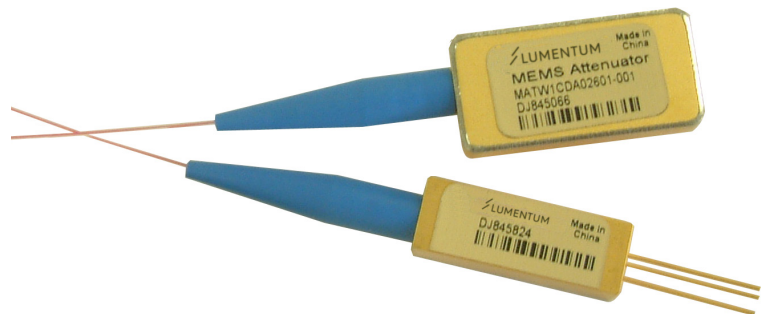


MEMS Variable Optical Attenuators

MATT Series



The Lumentum agile optical components family includes modulators, switches, attenuators and tunable filters. These products provide the basis for spectrally efficient DWDM transmission utilizing dispersion tolerant modulation, channel monitoring, wavelength switching, remote power control and dynamic channel selection. They support a wide range of flexible functionalities at lower operational expenses for the agile optical network (AON). In addition, Lumentum offers a complete line of tunable lasers assemblies and subassemblies in our agile transmission module family.

Lumentum microelectromechanical systems (MEMS) variable optical attenuators (MATT) focus on key network optical power management applications. Lumentum offers MEMS attenuators in normally open and normally closed states. The MATT series attenuators fully comply with the Telcordia 1221 reliability program. Key features include small size, low wavelength dependent loss (WDL), and high reliability. Lumentum provides three package options: DIL MATT and Micro MATT.

The MEMS attenuator design achieves highly repeatable optical attenuation over C and/or L bands through a thermally-actuated reflective vane that intercepts light. Applied power/voltage actuates the vane and translates in and out of the light beam. In a closed-loop mode with constantly applied electrical power/voltage, the MEMS attenuator achieves excellent performance over a wide temperature range and in a variety of environmental conditions. DIL MATTs include an internal temperature sensor of which can be used to compensate for the temperature dependent performance of accurate open-loop operation.

Key Features

- Low polarization dependence
- Insensitive to vibration and electrostatic discharge (ESD)
- Extremely low wavelength dependence over C and/or L bands
- Multiple devices easily packaged into common housing
- Available in both normally open and normally closed states
- Available in three different packages

Applications

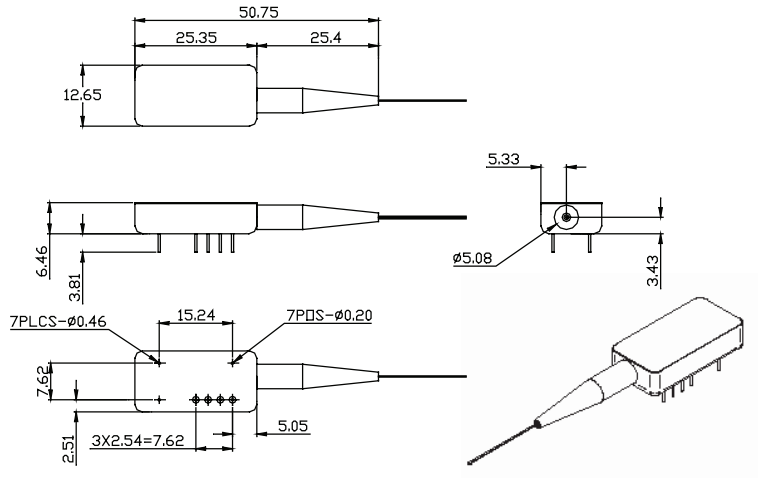
- Power equalization in multi-channel, optically amplified networks
- Gain-tilt control in erbium doped fiber amplifiers (EDFAs)
- Power control into narrowband wavelength division multiplexers (WDMs) and configurable networks
- Photoreceiver trimming
- Receiver protection/switch during transmitter turn-ons

Compliance

- Telcordia 1209 and 1221
- MIL-STD 883 (GR-1221) conditions vibration test (insensitive to 20 g peak acceleration)
- MIL-STD 883 (500 V) ESD test conditions

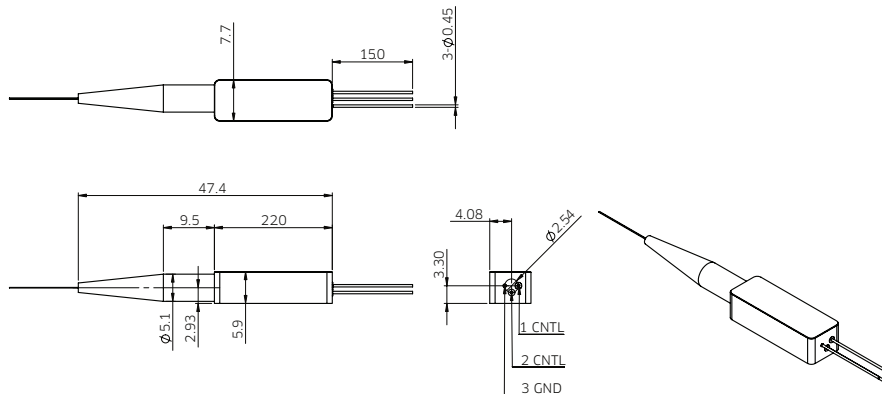
Dimensions Diagram: DIL MATT

(Specifications in mm unless otherwise noted.)

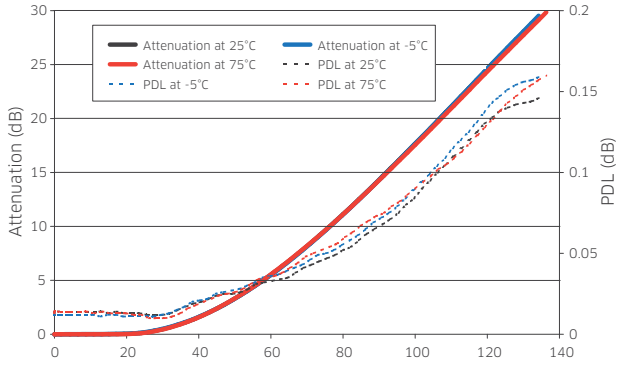


Dimensions Diagram: Micro MATT

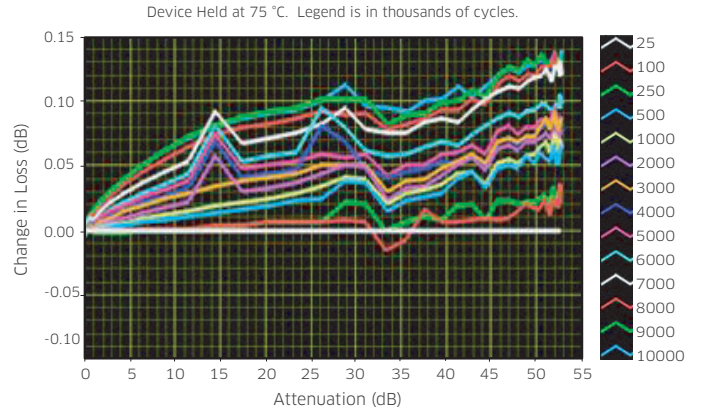
(Specifications in mm unless otherwise noted.)



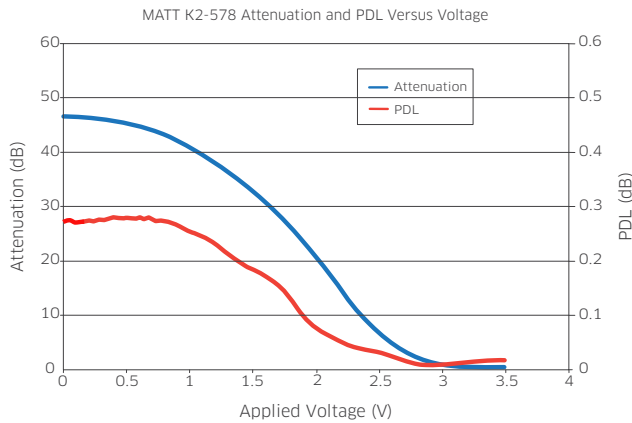
Typical attenuation and PDL profiles for the normally open VOA over -5°C, 25°C and 75°C



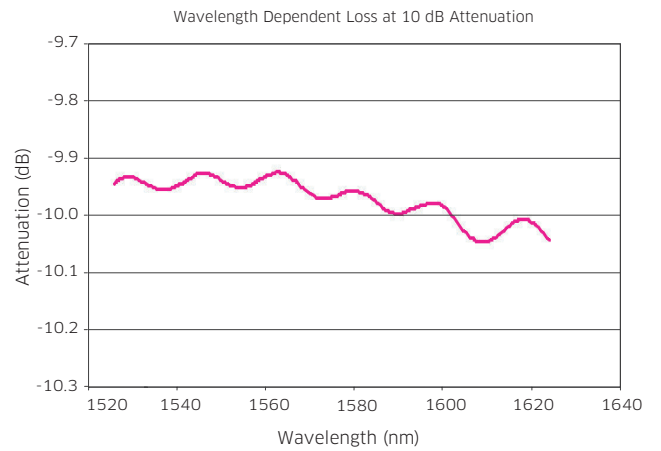
Typical robustness of the design $\frac{1}{4}$ ~0.15 dB attenuation change after 10 million cycle dynamic load test on the normally closed VOA



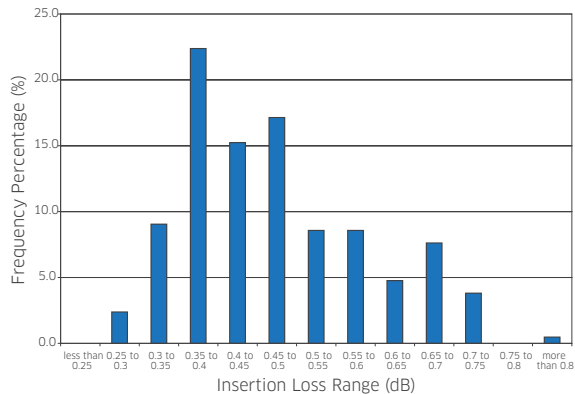
Typical attenuation and PDL profiles of the normally closed VOA



Typical averaged wavelength dependence variation across C and L bands at ~10 dB attenuation setting



Typical insertion loss distribution data for normally open VOA



Specifications

Parameter		Normally Open	Normally Closed
Recommended method of operation		Constant power	Constant voltage
Operating wavelength range C band L band		1525 to 1575 nm 1570 to 1610 nm	1525 to 1575 nm 1570 to 1610 nm
Attenuation range		25 dB	40 dB
Insertion loss ¹ BOL EOL	Maximum Maximum	0.8 dB (0.5 dB typical) 1.0 dB	0.9 dB (0.7 dB typical) 1.1 dB
Tuning speed ²		20 ms	20 ms
Optical power handling		24 dBm	24 dBm
Wavelength dependence ³ Flatness Ripple	Maximum Maximum	0.3 dB (0.2 dB typical) 0.15 dB (0.08 dB typical)	0.5 dB (0.2 dB typical) 0.15 dB (0.08 dB typical)
Polarization dependence loss ^{1,3} 0 to 10 dB 10 to 20 dB 20 to 30 dB	Maximum Maximum Maximum	0.1 dB (0.06 dB typical) 0.2 dB (0.12 dB typical) —	0.1 dB (0.06 dB typical) 0.2 dB (0.12 dB typical) 0.3 dB (0.22 dB typical)
Temperature dependence of attenuation ⁴ at IL at 10 dB at 20 dB at 30 dB	Maximum Maximum Maximum Maximum	±0.3 dB (<0.1 dB typical) ±0.5 dB (±0.2 dB typical) ±0.7 dB (±0.3 dB typical) —	±0.3 dB (<0.1 dB typical) ±1.2 dB (±0.5 dB typical) ±1.2 dB (±0.5 dB typical) ±1.2 dB (±0.5 dB typical)
Repeatability	Maximum	0.1 dB	0.1 dB
Return loss ¹	Minimum	50 dB	45 dB
Drive voltage ²	Maximum	6 V DC	5 V DC
Device resistance	Maximum	240 Ω	200 Ω
Peak power consumption ²		150 mW (120 mW typical)	150 mW (120 mW typical)
Fiber type		9/125/250 Corning SMF-28	9/125/250 Corning SMF-28
Fiber marking Input port Output port		Clear Red	Clear Red
Operating temperature		-5 to 75°C	-5 to 75°C
Reliability qualification		Telcordia 1209 and 1221	Telcordia 1209 and 1221

1.Excluding connectors.

2.For full dynamic range.

3. Over 0-20 dB attenuation for normally open, 0-30 dB attenuation for normally closed, at 1550 nm.

4. Relative to 23±3°C; under constant drive power for normally open; under constant drive voltage for normally closed.

Ordering Information

For more information on this or other products and their availability, please contact your local Lumentum account manager or Lumentum directly at customer.service@lumentum.com.

Sample: MAT-OTDQ210

MAT-OT		<input type="checkbox"/>	<input type="checkbox"/>	2	<input type="checkbox"/>	<input type="checkbox"/>	
Code	Package	Code	State	Code	Pigtail Length	Code	Connector Type
D	DIL MATT	C	Normally closed	1	1.0 meter	0	No connector
M	Micro MATT	O	Normally open				

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