MEMS Variable Optical Attenuators

MATT Series



Key Features

- Low polarization dependence
- Insensitive to vibration and electrostatic discharge (ESD)
- Extremely low wavelength dependence over C and/or L bands
- Mulitiple 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
- Passed monitored MIL-STD 883 (GR-1221) conditions vibration test (insensitive to 20 g peak acceleration)
- Passed MIL-STD 883 (500 V) ESD test conditions

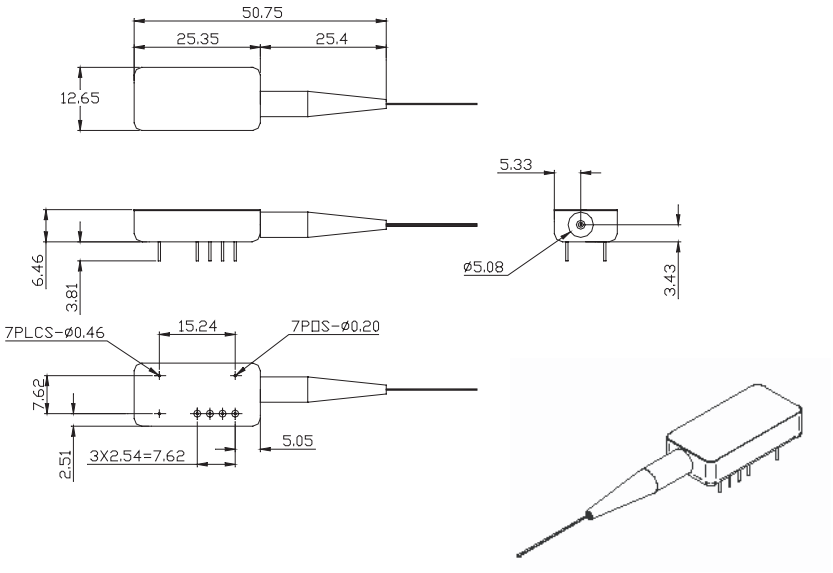
The JDSU Agile Optical Components family includes modulators, switches, attenuators and tunable filters. These products provide the basis for spectrally efficient DWDM transmission utilizing dispersion tolerant modulation, channel monitoring, wavelength switching, remote power control and dynamic channel selection. They support a wide range of flexible functionalities at lower operational expenses for the Agile Optical Network. In addition, we have a complete line of tunable lasers assemblies and sub-assemblies in our Agile Transmission Module family.

JDSU microelectromechanical systems variable optical attenuators (MATT) focus on key network optical power management applications. JDSU offers MEMS attenuators in normally open and normally closed states. The MATT series attenuators fully comply with Telcordia 1221 reliability program. Key features include a small size, low wavelength dependent loss (WDL), and high reliability. JDSU provides three different package options: DIL MATT, TO 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 which can be used to compensate the temperature dependent performance for accurate open loop operation.

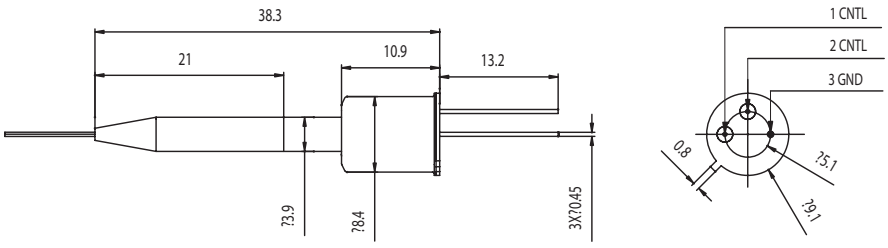
Dimensions Diagram: DIL MATT

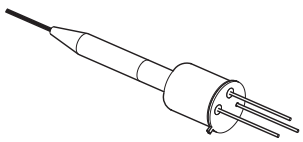
(Specifications in mm unless otherwise noted.)



Dimensions Diagram: TO MATT

(Specifications in mm unless otherwise noted.)

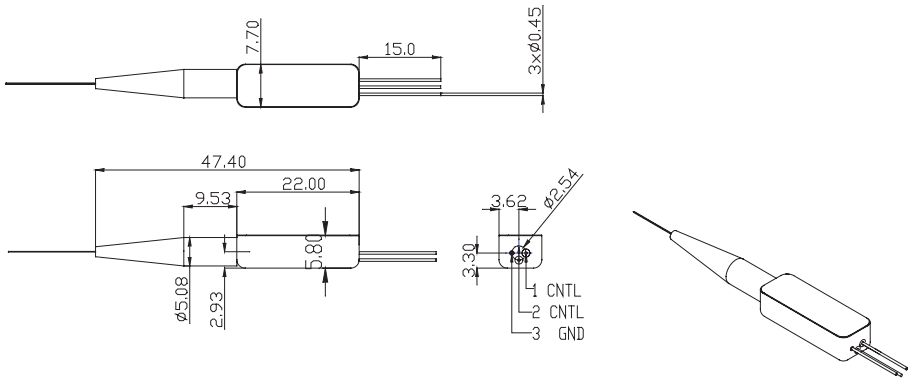




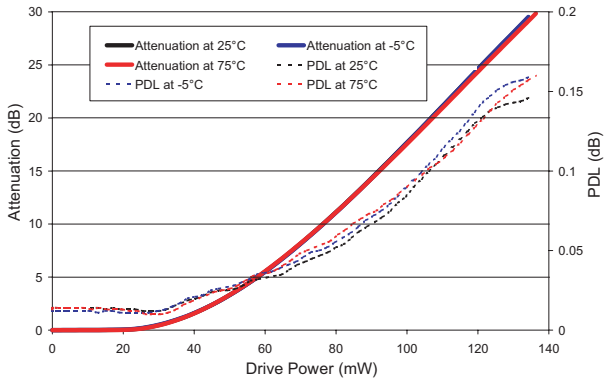
3

Dimensions Diagram: Micro MATT

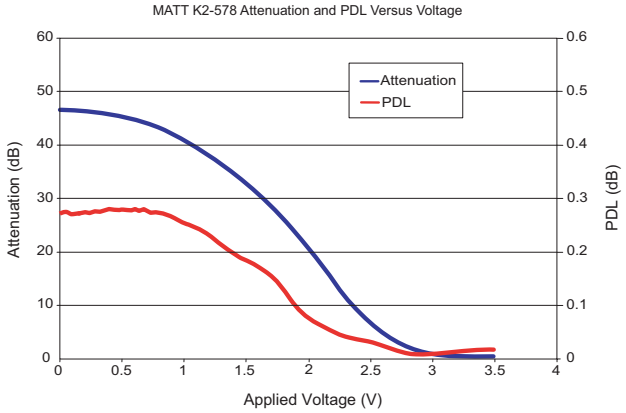
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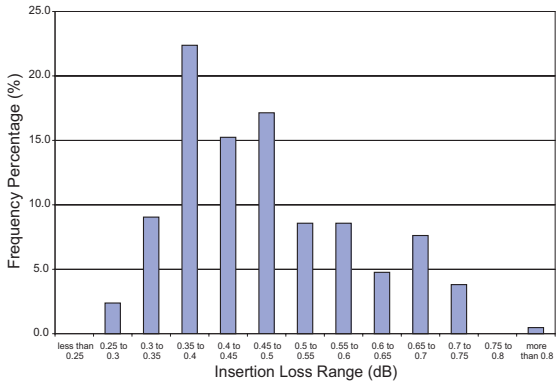
Typical attenuation and PDL profiles for the normally open VOA over -5 °C, 25 °C and 75 °C



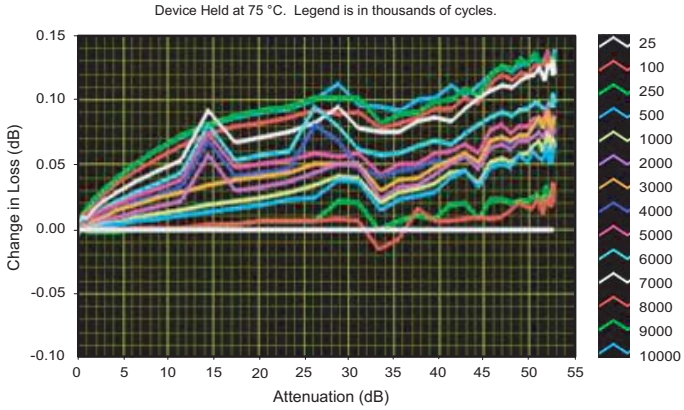
Typical attenuation and PDL profiles of the normally closed VOA



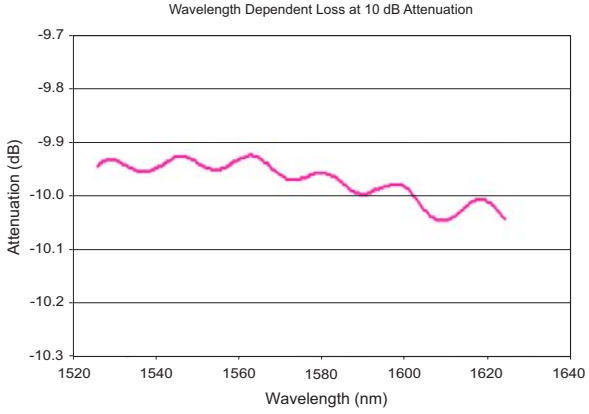
Typical insertion loss distribution data for normally open VOA



Typical robustness of the design — ~0.15 dB attenuation change after 10 million cycle dynamic load test on the normally closed VOA



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



5

Specifications

Parameter		Normally Open	Normally Closed
Recommended method of operation		Constant power	Constant voltage
Operating wavelength range			
C band		1525 to 1575 nm	1525 to 1575 nm
L band		1570 to 1610 nm	1570 to 1610 nm
Attenuation range		25 dB	40 dB
Insertion loss[1]			
BOL	Maximum	0.8 dB (0.5 dB typical)	0.9 dB (0.7 dB typical)
EOL	Maximum	1.0 dB	1.1 dB
Tuning speed[2]		20 ms	20 ms
Optical power handling		24 dBm	24 dBm
Wavelength dependence[3]			
Flatness	Maximum	0.3 dB (0.2 dB typical)	0.5 dB (0.3 dB typical)
Ripple	Maximum	0.15 dB (0.08 dB typical)	0.15 dB (0.08 dB typical)
Polarization dependence loss[1, 3]			
0 to 10 dB	Maximum	0.1 dB (0.06 dB typical)	0.1 dB (0.06 dB typical)
10 to 20 dB	Maximum	0.2 dB (0.12 dB typical)	0.2 dB (0.12 dB typical)
20 to 30 dB	Maximum	-	0.3 dB (0.22 dB typical)
Temperature dependence of attenuation[4]			
at IL	Maximum	±0.3 dB (<0.1 dB typical)	±0.3 dB (<0.1 dB typical)
at 10 dB	Maximum	±0.5 dB (±0.2 dB typical)	±1.2 dB (±0.5 dB typical)
at 20 dB	Maximum	±0.7 dB (±0.3 dB typical)	±1.2 dB (±0.5 dB typical)
at 30 dB	Maximum	-	±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		Clear	Clear
Output port		Red	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 1550nm.
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 JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at customer.service@jdsu.com.

Sample: MAT-0TDO210

MAT-0T □ □ **2** □ □

Code	Package
D	DIL MATT
M	Micro MATT
T	TO MATT

Code	State
C	Normally closed
O	Normally open

Code	Pigtail Length
1	1.0 meter

Code	Connector Type
0	No connector

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