



# MAP Variable Optical Attenuator

## (mVOA-C1)

The Multiple Application Platform (MAP) Variable Optical Attenuator (mVOA-C1) is a stepper motor and filter-based attenuator that delivers metrology-grade attenuation performance in the industry's most compact modular package.

With more than 20 years of leadership in high-performance attenuators for lab and manufacturing applications, the mVOA-C1, now in its 5th generation, is available in single, dual, and/or quad configurations. Also, it works in all MAP-200 platforms, including the new two-slot MAP-220.

The MAP-200 is the first photonic layer lab and manufacturing platform that complies with LAN Extensions for Instrumentation (LXI) by conforming to the required physical attributes, Ethernet connectivity, and interchangeable virtual instrument (IVI) drivers. The optimized MAP-200 platform's industry-leading density and maximum configurability meets specific application requirements within the smallest footprint.

### Chassis Flexibility

Leveraging the modularity of the MAP-200 chassis system, the mVOA-C1 can be deployed in several configurations and in many different environments.

For the basic lab bench, a single VOA module can be deployed in a compact MAP-220C LightDirect chassis. This simple two-slot solution is ideal for situations that require simplicity, a local touch screen GUI, and lab portability. When fast, simple, and accurate measurements are necessary, it eliminates the need to use inferior handheld tools or to control the device from a PC. The second slot is ideal for flexibly deploying power meters or optical switches. The MAP-220C can be easily rack-mounted in an automated test environment that requires one to eight VOAs.

Larger, automated production projects require moving up to the MAP-230B or MAP-280. The MAP-280 can fit up to 32 VOAs in just 3U of rack height. All VOAs can be controlled through a simple, common GUI or remote control interface.



Figure 1. Deployed in the MAP-280 chassis, the Quad mVOA-C1 delivers up to 32 VOA channels in just 3U of equipment rack space.

\*1, 2, or 4 attenuators per module deliver the highest density on the market

### Key Benefits

- Ultra low insertion loss (<0.9 dB) and outstanding spectral uniformity minimize loss budget utilization
- Fastest transition speed and settling time in its class reduces testing time
- User-configurable at time of order (fiber type, density, built-in options, high power option)
- Optional built-in power monitor provides comprehensive closed-loop power control settings
- Optional higher power capability can withstand up to 2W input power for single-mode fiber (500 mW for multimode fiber)

### Key Features

- High accuracy and high repeatability reduces measurement uncertainty
- Flat spectral response reduces wavelength-dependent uncertainty in CWDM and DWDM multi-wavelength applications
- Low backreflection reduces instabilities due to reflected light
- Optional built-in wavelength calibrated power meter reduces uncertainty by reducing external connections
- High input power capability for EDFA testing and multi-wavelength applications

### Applications

- Transmitter dispersion, eye mask, and receiver sensitivity testing
- EDFA noise figure and gain flatness testing
- Power meter calibration
- Loss simulation

### Safety Information

- Complies with CE, CSA/UL/IEC61010-1, plus LXI class C requirements when installed in a MAP chassis

The MAP variable optical attenuator is a hot-pluggable cassette designed for use within the MAP, which is a general-purpose high-density test and measurement platform for lab or production environments. Up to 16 independently controlled attenuators can be installed in a single MAP chassis.

**LightDirect Family**

The MVOA-C1 is a member of MAP-200 LightDirect family of basic fiber optic test tools. LightDirect modules can be deployed in all available MAP chassis systems, including the MAP-220C 2-slot benchtop chassis. The MAP-220C is ideal for bench use or small automated test projects and features a local touch screen as well as Ethernet or GPIB automation. The second slot is ideal for an optical power meter or variable optical attenuators. The MAP-230B (3-slot) or MAP-280 (8-slot) is ideal for large deployments and is the most compact optical test solution on the market.

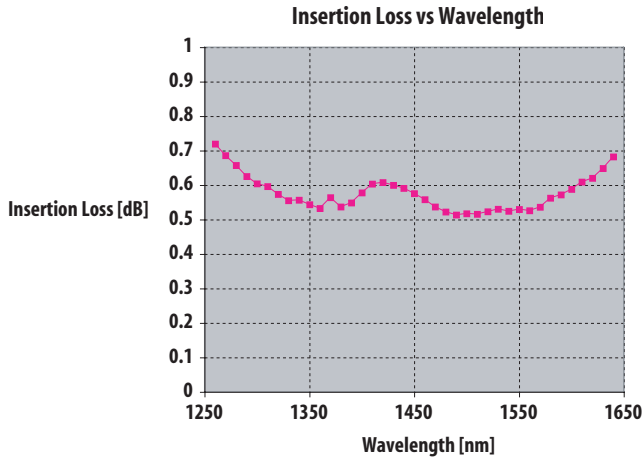


Figure 2. Example of insertion loss of the MAP variable optical attenuator with single-mode fiber

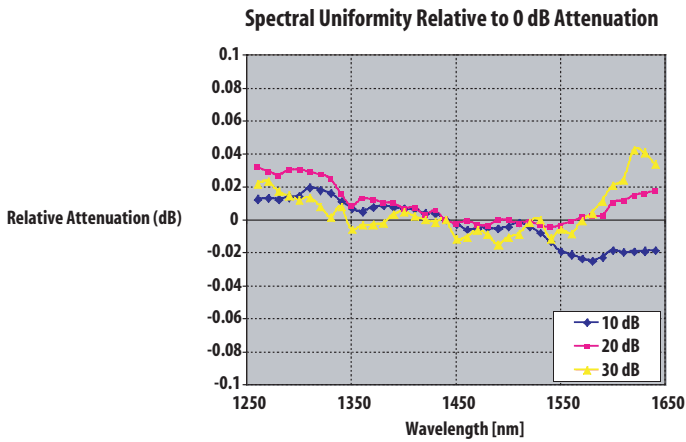
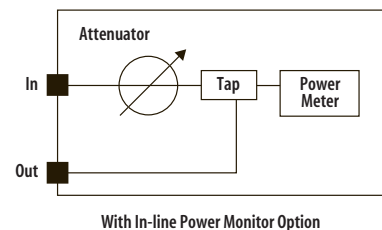
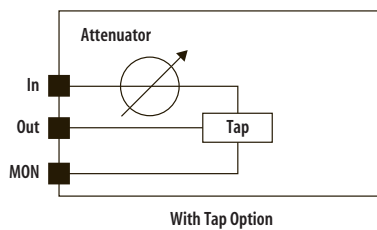
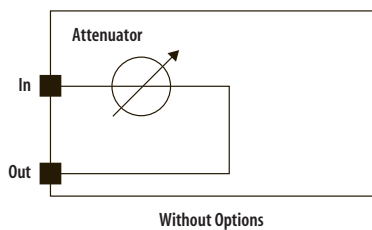


Figure 3. Example of spectral uniformity relative to 0 dB attenuation



## Specifications

| Parameter  | Single-Mode                                 |                           | Multimode                       |                           |
|--|---|---------------------------|---------------------------------|---------------------------|
|  | Standard                                    | With Output Power Monitor | Standard                        | With Output Power Monitor |
| Insertion loss at 0 dB <sup>1,2,3,4</sup>                              | ≤0.9 dB<br>(≤1.5 dB tap option)             | ≤1.5 dB                   | ≤1.5 dB<br>(≤2.4 dB tap option) | ≤2.4 dB                   |
| Polarization-dependent loss <sup>5</sup>                               | ≤0.08 dB<br>(≤0.15 dB tap option)           | ≤0.15 dB                  | N/A                             |                           |
| Return loss <sup>1,2,6</sup>   | ≥55 dB                                      |                           | ≥45 dB                          |                           |
| Maximum input power <sup>9</sup><br>(standard power/high-power option) | +23 dBm/+33 dBm                             |                           | +23 dBm/+27 dBm                 |                           |
| Wavelength range   | 1260 to 1650 nm                             |                           | 750 to 1350 nm                  |                           |
| Attenuation range <sup>1,2</sup>                                       | 70 dB                                       |                           | 65 dB                           |                           |
| Shutter isolation  | ≥80 dB                                      |                           | ≥75 dB                          |                           |
| Attenuation flatness <sup>8,10</sup>                                   | ±0.04 dB                                    |                           | N/A                             |                           |
| Attenuation slew rate  | ≥25 dB/s                                    |                           | ≥20 dB/s                        |                           |
| Relative attenuation uncertainty <sup>1,2,3,7,10,11,13</sup>           | ±0.1 dB                                     |                           |                                 |                           |
| Attenuation repeatability <sup>3,7,11,13</sup>                         | ±0.01 dB                                    |                           |                                 |                           |
| Attenuation resolution <sup>14</sup>                                   | 0.001 dB                                    |                           |                                 |                           |
| Attenuation settling time  | ≤55 ms                                      |                           |                                 |                           |
| Closed-loop power range <sup>1,2</sup>                                 | N/A   | +11 to -49 dBm            | N/A                             | +5 to -40 dBm             |
| Power monitor linearity <sup>1,2,3,10</sup>                            | N/A   | ±0.03 dB                  | N/A                             | ±0.03 dB                  |
| Power setting repeatability <sup>1,2,10</sup>                          | N/A   | ±0.015 dB                 | N/A                             | ±0.015 dB                 |
| Power setting resolution   | N/A   | 0.001 dB                  | N/A                             | 0.001 dB                  |
| Warm-up time   | 30 min                                      |                           |                                 |                           |
| Calibration period   | 3 years                                     |                           |                                 |                           |
| Operating temperature  | 0 to 50°C                                   |                           |                                 |                           |
| Storage temperature  | -30 to 60°C                                 |                           |                                 |                           |
| Operating humidity   | 15 to 80% RH, 0 to 40°C noncondensing       |                           |                                 |                           |
| Dimensions (W x H x D)   | 4.1 x 13.3 x 37.0 cm                        |                           |                                 |                           |
| Weight   | 1.1 kg (single)/1.3 kg (dual)/1.7 kg (quad) |                           |                                 |                           |

1. At both 1550 ±15 nm and 1310 ±15 nm for single-mode.
2. At both 850 ±15 nm and 1310 ±15 nm for multimode.
3. +23/-5°C only.
4. Excludes connectors, add 0.2 dB typically for connectors.
5. For 0 to 25 dB.
6. Return loss excludes connectors.
7. For range of 0 to 45 dB.
8. For range of 0 to 30 dB over 1480 to 1640 nm.
9. Input to output port only.
10. For light with DOP <5%.
11. For low-coherence laser source (>500 MHz).
12. Consecutive measurements.
13. Relative to 0 dB position.
14. 0 to 65 dB for single-mode, 0 to 50 dB for multimode.

### 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.

The MAP variable optical attenuators are defined by selecting the necessary options from the product configurator in the table below. Select one option from each of the three categories (base, fiber type, and connector type options).

| Description   | Product Number |
|---|----------------|
| <b>Base Single-Mode Option</b>                              |                |
| Single VOA, std. power, no options, single-mode fiber       | MVOA-C1SS0S    |
| Single VOA, std. power, 5% output tap, single-mode fiber    | MVOA-C1SS1S    |
| Single VOA, std. power, internal monitor, single-mode fiber | MVOA-C1SSMS    |
| Single VOA, high power, no options, single-mode fiber       | MVOA-C1SH0S    |
| Single VOA, high power, internal monitor, single-mode fiber | MVOA-C1SHMS    |
| Dual VOA, std. power, no options, single-mode fiber         | MVOA-C1DS0S    |
| Dual VOA, std. power, 5% output tap, single-mode fiber      | MVOA-C1DS1S    |
| Dual VOA, std. power, internal monitor, single-mode fiber   | MVOA-C1DSMS    |
| Dual VOA, high power, no options, single-mode fiber         | MVOA-C1DH0S    |
| Dual VOA, high power, internal monitor, single-mode fiber   | MVOA-C1DHMS    |
| Quad VOA, std. power, no options, single-mode fiber         | MVOA-C1QS0S    |
| Quad VOA, std. power, 5% output tap, single-mode fiber      | MVOA-C1QS1S    |
| Quad VOA, std. power, internal monitor, single-mode fiber   | MVOA-C1QSMS    |
| <b>Fiber Type (Mandatory Option)</b>                        |                |
| 9/125 single-mode fiber                                     | M100           |
| <b>Connector Type (Mandatory Option)</b>                    |                |
| FC/PC   | MFP            |
| FC/APC  | MFA            |
| SC/PC   | MSC            |
| SC/APC  | MSU            |
| LC/PC   | MLC            |
| LC/APC  | MLU            |

| Description   | Product Number |
|---|----------------|
| <b>Base Multimode Option</b>                              |                |
| Single VOA, std. power, no options, multimode fiber       | MVOA-C1SS0M    |
| Single VOA, std. power, internal monitor, multimode fiber | MVOA-C1SSMM    |
| Single VOA, high power, no options, multimode fiber       | MVOA-C1SH0M    |
| Single VOA, high power, internal monitor, multimode fiber | MVOA-C1SHMM    |
| Dual VOA, std. power, no options, multimode fiber         | MVOA-C1DS0M    |
| Dual VOA, std. power, internal monitor, multimode fiber   | MVOA-C1DSMM    |
| Dual VOA, high power, no options, multimode fiber         | MVOA-C1DH0M    |
| Dual VOA, high power, internal monitor, multimode fiber   | MVOA-C1DHMM    |
| Quad VOA, std. power, no options, multimode fiber         | MVOA-C1QS0M    |
| Quad VOA, std. power, internal monitor, multimode fiber   | MVOA-C1QSMM    |
| <b>Fiber Type (Mandatory Option)</b>                      |                |
| 50/125 OM3 multimode fiber                                | M101           |
| 62.5/125 OM1 multimode fiber                              | M102           |
| <b>Connector Type (Mandatory Option)</b>                  |                |
| FC/PC   | MFP            |
| FC/APC  | MFA            |
| SC/PC   | MSC            |
| LC/PC   | MLC            |

UL is a registered trademark of Underwriters Laboratories Inc.



**North America**  
**Latin America**  
**Asia Pacific**  
**EMEA**

Toll Free: 1 855 ASK-JDSU  
 Tel: +1 954 688 5660  
 Tel: +852 2892 0990  
 Tel: +49 7121 86 2222

(1 855 275-5378)  
 Fax: +1 954 345 4668  
 Fax: +852 2892 0770  
 Fax: +49 7121 86 1222