

MINIATURE MEMS VARIABLE OPTICAL ATTENUATOR

OVERVIEW

The **sercalo** vxa series are miniature opto-mechanical variable optical attenuators (VOA) for fiber optic communication systems and submodules. The non-latching attenuator allows for the continuous adjustment of the attenuation with a 0 – 5 V control voltage. The highly reliable attenuation mechanism is based on a micromechanical shutter and features below 2 ms response time and below 1 dB insertion loss. The VOA is available in single and dual variants and normally open or normally closed designs.

The plastic package is one of the smallest in the industry. It is optimized for low cost production while maintaining highest reliability comparable to a solid state device. The component is designed to meet Telcordia 1221 quality standards.

FEATURES

- 23 x 10 x 6 mm size
- low cost
- very fast
- 0-5 V control
- single or dual channel

APPLICATIONS

- Power management in DWDM transceivers
- Amplifier Gain Control
- Optical Subsystems
- Array integration

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DESCRIPTION

The **Sercalo** vxa variable optical attenuators are composed of an optical subsystem and an electrical driver interface. The optical attenuation is set by a silicon MEMS chip, on which a mirror can be moved in and out of the optical path by electrostatic actuation.

The internal driver interface converts the applied 5 V supply into a negative bias voltage and a positive high voltage. The positive voltage powers an operational amplifier. The attenuation is set by a 0-5 V input signal. This input signal is connected to the non inverting input of the operational amplifier which drives the electrostatic actuator of the MEMS variable optical attenuator (*Figure 7*). This high voltage design of the MEMS chip results in a fast, robust and vibration insensitive attenuator.

The VXA attenuators are available in single channel and dual channel variants. The standard VXA attenuator achieves minimum insertion loss at 0 V input voltage.

The VXAxOF variant is normally closed, i.e. at 0 V the attenuation is maximum and is reduced with increasing input voltage.

TECHNICAL SPECIFICATIONS

| | Unit | Min | Typ | Max |
|---|--------|------|-------------------|------------------|
| VOA | | | | |
| Wavelength Range | nm | 1240 | | 1640 |
| Insertion Loss | dB | | 0.6 | 1.0 |
| Maximum Attenuation | dB | 30 | | |
| Backreflection | dB | | 45 | 35 |
| Polarisation Dependent Loss at 10 dB | dB | | 0.3 | 0.7 |
| Polarisation Dependent Loss at 20 dB | dB | | 0.6 | 1.5 |
| Spectral Flatness 1530-1570 nm at 10 dB | dB | | 0.2 | 0.5 |
| Spectral Flatness 1530-1570 nm at 20 dB | dB | | 0.5 | 1.2 |
| Repeatability | dB | | | 0.2 ¹ |
| Response Time | ms | | | 20 |
| Durability | cycles | | no wear out | |
| Package | | | | |
| Voltage | V | 4 | 5 | 5.25 |
| Power Consumption | mW | | 75 | 200 |
| Operation Temperature | °C | 0 | | 70 |
| Storage Temperature | °C | -40 | | 70 |
| Size (L x W x H) | mm | | 23.2 x 10.1 x 5.9 | |

¹ for constant polarisation and temperature.

ORDERING INFORMATION

VXA - 1 - 9 N - A30

VOA type

- = normally open
of = normally closed

Number of VOAs

1 = single
2 = dual

Fibre type

9 = SMF28

Fibre sleeve type

N = loose tube 0.9mm
B = bare fibre 0.25mm

Dynamic Range

A30 = > 30 dB
A40 = > 40 dB

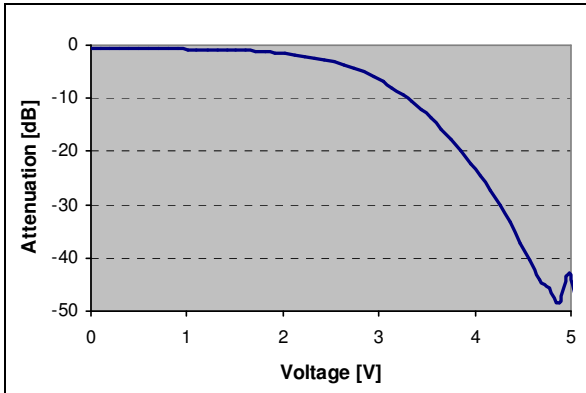


Figure 1: Voltage attenuation curve of VX A1

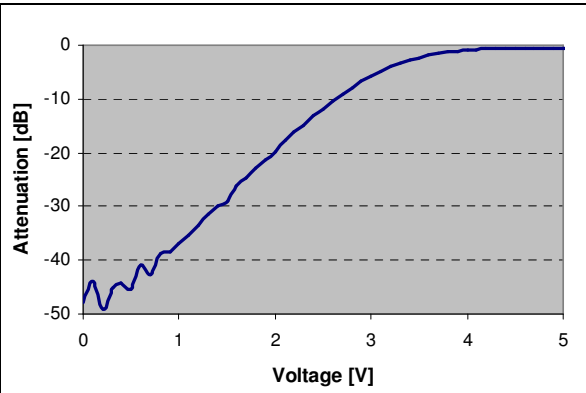


Figure 2: Voltage attenuation curve of VX A10F

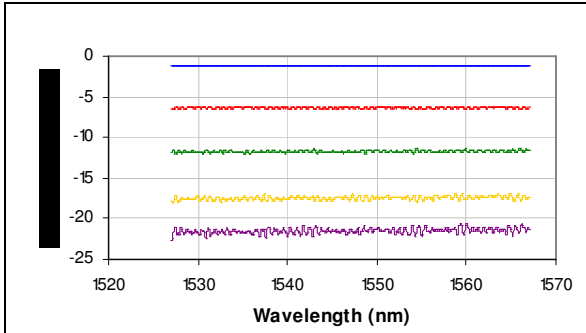


Figure 3: Wavelength Flatness of attenuation

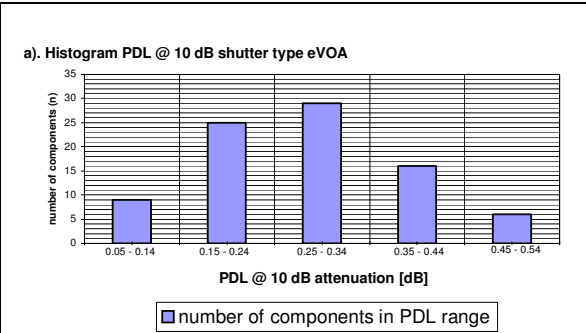


Figure 4: PDL distribution at 10 dB attenuation

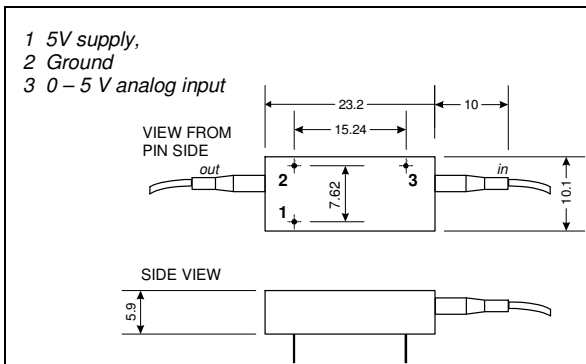


Figure 5: VX A-1: mechanical outline

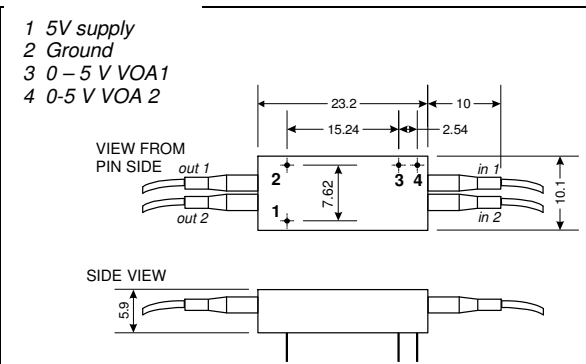


Figure 6: VX A-2: mechanical outline

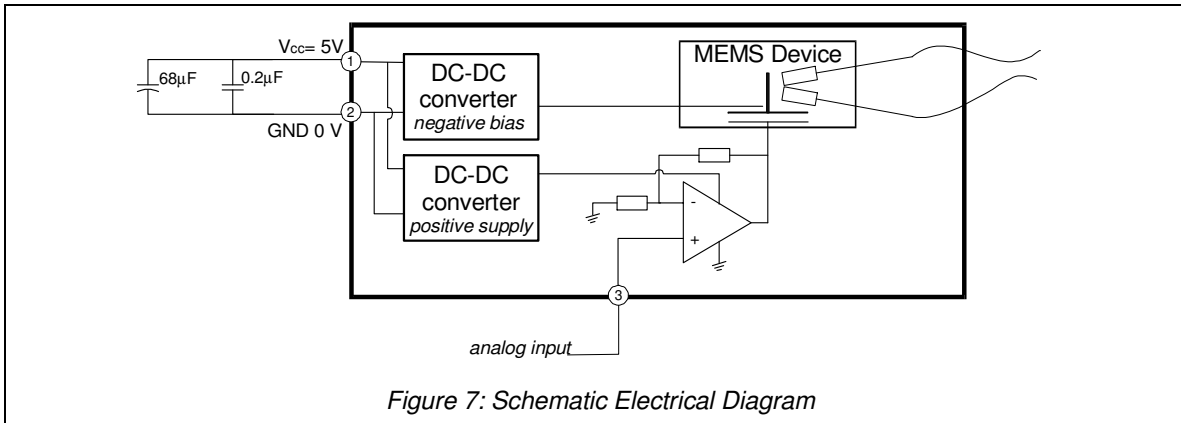


Figure 7: Schematic Electrical Diagram