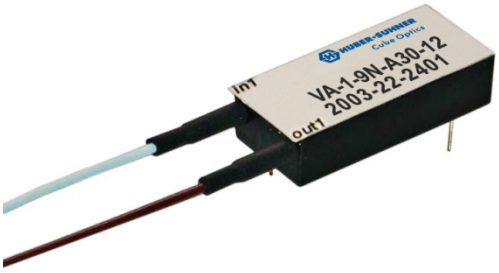
# MEMS-SWITCH Cube

HUBER+SUHNER

## variable optical attenuator (single or dual channel)

## Description

- Miniature Opto-Mechanical Variable Optical Attenuator (VOA) for fiber optic communication systems and sub-modules
- Allows continuous adjustment of the attenuation within a range of 0-30dB
- Highly reliable attenuation mechanism based on MEMS technology featuring below 20 ms response time and below 1.0 dB insertion loss
- Optimized for low cost production while maintaining high reliability
- Available in single or dual channel variants
- Fast, robust and vibration insensitive attenuator
- The component is designed to meet Telcordia 1221 quality standards




## Features

- Miniature size
- Low PDL
- High speed
- Adjustable precise attenuation within a low operating voltage
- Single or dual channel

## Applications

- Power management in DWDM networks
- Amplifier gain control
- Optical subsystems
- Array integration

## Ordering Information

| VA | - | 1 | - | 9 | N | - | A30 | - | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|

**VOA type**
- = normally open

**Number of VOAs**
1 = single
2 = dual

**Fiber type**
9 = SMF28

**Fiber sleeve type**
N = lose tube 900 µm
B = bare fiber 250 µm

**Dynamic Range**
A30 = > 30 dB
A40 = > 40 dB

**Connector in/out**

| | | |
|---|---|---|
| none | = | 0 |
| SC/PC | = | 1 |
| FC/PC | = | 2 |
| SC/APC * | = | 3 |
| FC/APC * | = | 4 |
| LC/PC | = | 5 |
| MU/PC | = | 6 |
| E2000 | = | 7 |
| E20000/HRL * | = | 8 |
| ST/PC | = | 9 |

* 8° angular polishing

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## Technical Specifications

| | Unit | Min | Typ | Max |
|---|---|---|---|---|
| **Optical Specifications** | | | | |
| Wavelength Range | nm | 1240 | | 1640 |
| Insertion Loss[1] | dB | | 0.35 | 1.0[2] |
| Maximum Attenuation | dB | 30 | | |
| Maximum input power | mW | | | 130 |
| Back reflection | dB | | 55 | 50 |
| Polarisation Dependent Loss at 10 dB | dB | | 0.08 | 0.15 |
| Polarisation Dependent Loss at 20 dB | dB | | 0.13 | 0.25[3] |
| Wavelength dependent loss at 10 dB[4] | dB | | 0.2 | 0.5 |
| Wavelength dependent loss at 20 dB[4] | dB | | 0.5 | 1.2 |
| Temperature dependent loss at 1 dB | dB | | | 0.4 |
| Temperature dependent loss at 10 dB | dB | | | 2 |
| Temperature dependent loss at 20 dB | dB | | | 4 |
| Repeatability | dB | | | 0.3[5] |
| Response Time | ms | | | 20 |
| Durability | cycles | | no wear out | |
| **Electronic Specifications** | | | | |
| Voltage | V | 4 | 5 | 5.25 |
| Power Consumption | mW | | 5 | 30 |
| Operation Temperature | °C | 0 | | 70 |
| Storage Temperature | °C | -40 | | 70 |

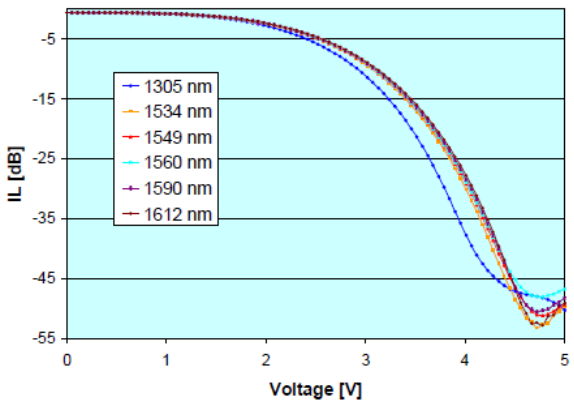


Figure 1: Voltage attenuation curve

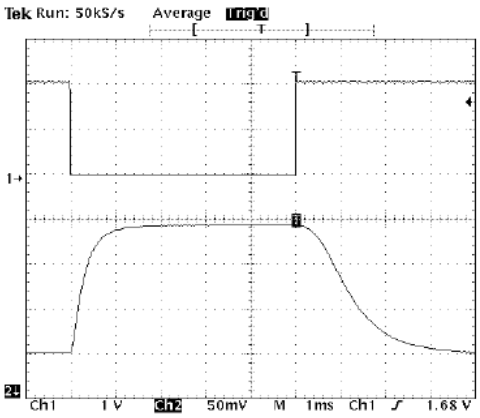


Figure 2: response time to a 1 to 3 V step

[1] *in an idle state. Minimum insertion loss at 0 V input voltage. When power is removed the insertion loss is roughly 0.5 dB higher than the minimum insertion loss (at 0 V when power is on).*
[2] *without connectors*
[3] *for dual variant 0,35 dB max @ 20 dB*
[4] *between 1530 -1570nm*
[5] *for constant polarisation and temperature*

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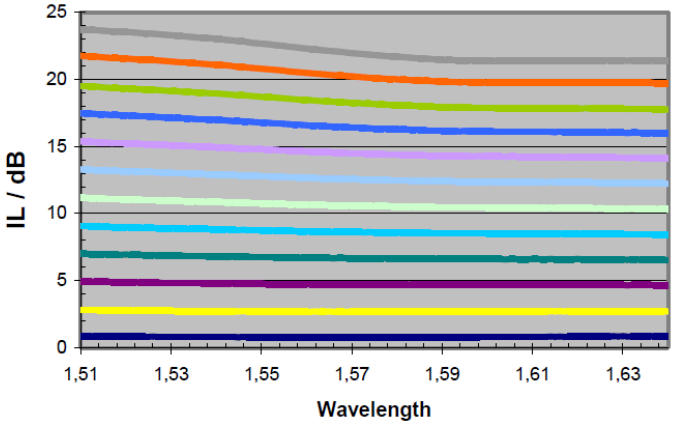


Figure 3: Wavelength Flatness of attenuation

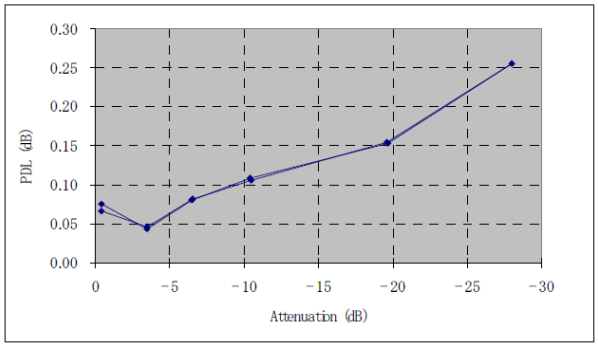


Figure 4: PDL as a function of attenuation

**Contact Pins:**
*Length: 4 +/- 1mm*
*Diameter: 0.45 –0.5 mm*
*Centering: 0.2 mm*
*1: Supply +5 V*
*2: Ground*
*3: Signal in 0-5 V*

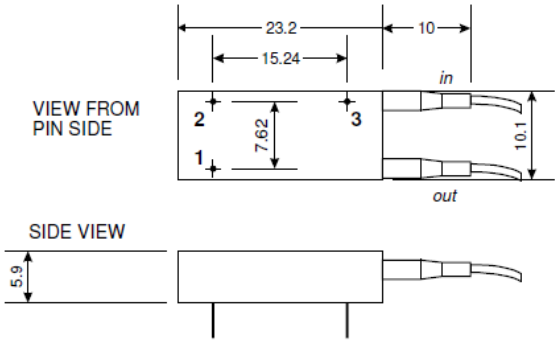


Figure 5: VA-1: Mechanical outline

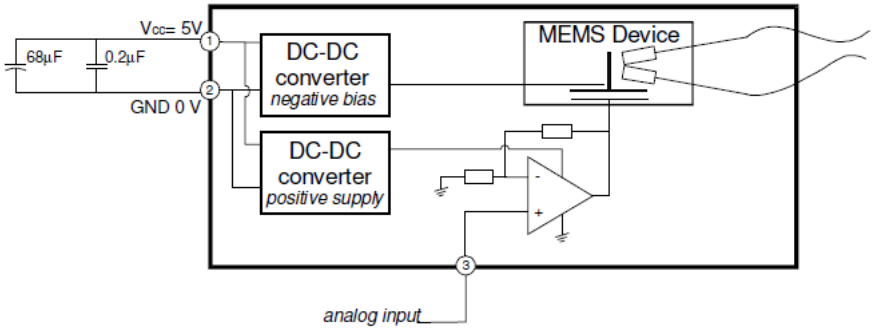


Figure 6: Schematic Electrical Diagram

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