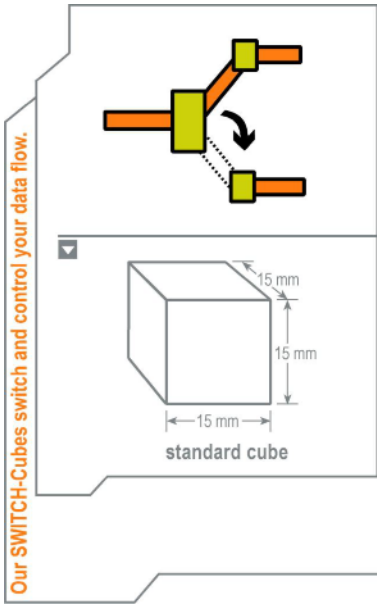
MEMS-SWITCH-Cubes
> single or dual VOA, for variable optical attenuation

Overview

The VA-series are miniature opto-mechanical variable optical attenuators (VOA) for fiber optic communication systems and sub-modules. 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. The plastic package is one of the smallest in the industry. It is optimized for low cost production while maintaining high 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 PDL
- very fast
- 0-5 V control
- single or dual channel

Applications

- Power management in DWDM transceivers
- Amplifier gain control
- Array integration and optical subsystems

Description

The Mems-Switches are 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 9). This high voltage design of the MEMS chip results a fast, robust and vibration insensitive attenuator. The VA attenuators are available in single channel and dual channel variants. The standard VA attenuator achieves 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). A future option will include a normally closed design, where the maximum attenuation is at 0 V. In this normally closed variant the attenuation decreases with increasing input voltage. Technology by Sercalo™.

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Technical Specifications				
	Unit	Min	Typ	Max
VOA				
Wavelength Range	nm	1240		1640
Insertion Loss	dB		0,4	0,9
Maximum Attenuation	dB	30		
Backreflection	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 [1]
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			0,02 [2]
Response Time	ms			2
Durability	cycles		no wear out	
Package				
Voltage	V	4	5	5,25
Power Consumption	mW		5	30
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 dual variant 0,35 dB max @ 20 dB
2 for constant temperature and polarisation

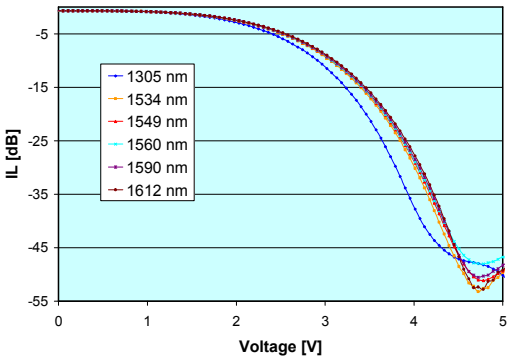

Figure 1: Voltage attenuation curve

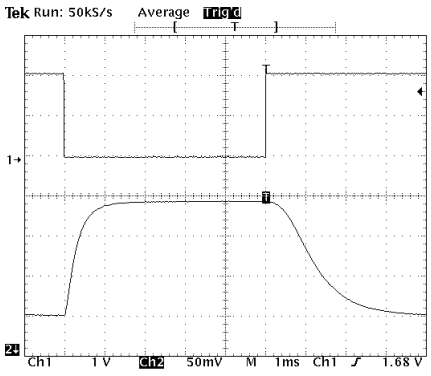

Figure 2: response time to a 1 to 3 V step

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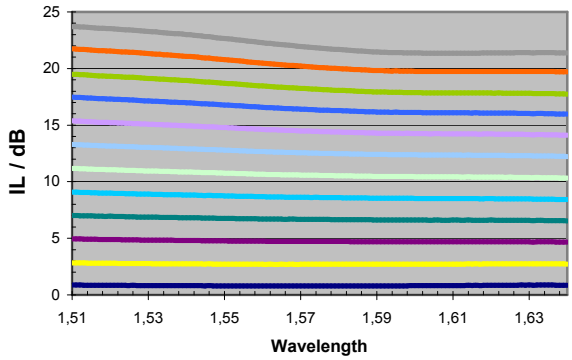

Figure 5: Wavelength Flatness of attenuation

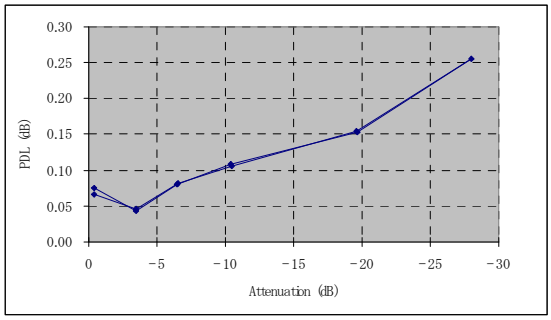

Figure 6: PDL as a function of attenuation

1 5V supply,
2 Ground
3 0 – 5 V analog input

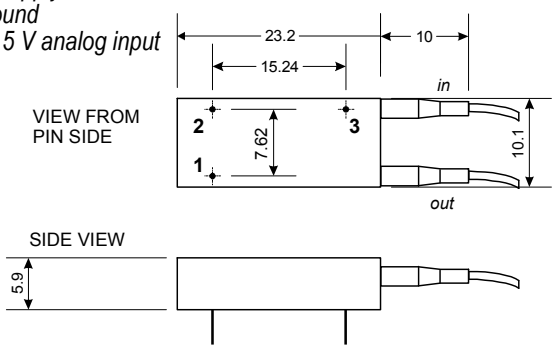

Figure 7: VA-1: mechanical outline

1 5V supply
2 Ground
3 0 – 5 V VOA1
4 0-5 V VOA 2

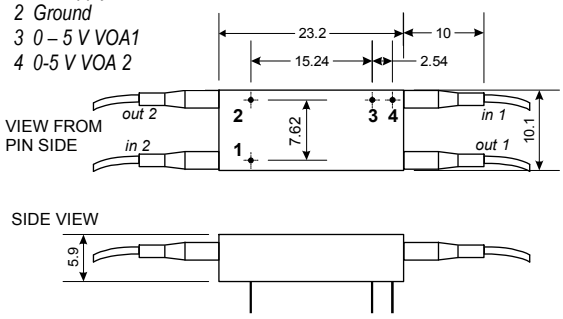

Figure 8: VA-2: mechanical outline

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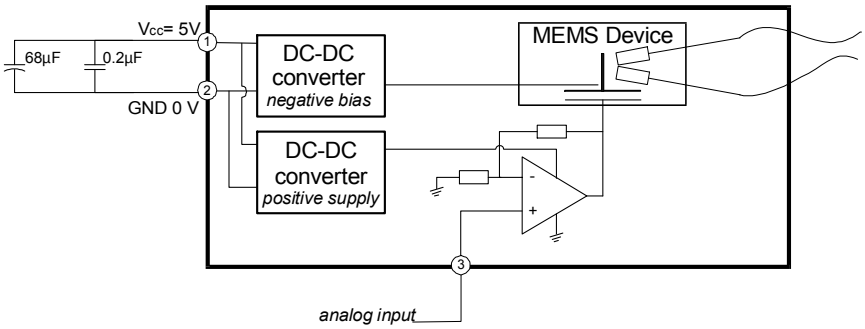

Figure 9: Schematic Electrical Diagram

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

Corporate Office:
Cube Optics AG
Robert-Koch-Strasse 30
55129 Mainz
Germany

Fon: +49-6131-69851-0
Fax: +49-6131-69851-79
e.mail: sales@cubeoptics.com

www.cubeoptics.com