MINIATURE FIBER OPTIC MEMS SWITCH

OVERVIEW

The **sercalo** *sx* series are miniature opto-mechanical switches for fiber optic communication systems and submodules. The switch is available in latching or non-latching variants, with 1x1, 2x1, 2x2, The switch offers smallest size, ease of integration and the established solid state reliability of Sercalo's MEMS components.

FEATURES

- 23 x 10 x 6 mm size
- Low Cost
- TTL or CMOS logic
- latching
- 2x2, 2x1, 1x1 variants
- single or multimode fiber

APPLICATIONS

- Protection Switching
- Reconfiguration
- Optical Subsystems

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DESCRIPTION

In the **sercalo** sx switches the optical switching function is realised by a silicon MEMS chip, on which a mirror can be moved in and out of the optical path by electrostatic actuation. For new designs the SX switch is recommended in its latching variant where a bistable suspension mechanism keeps the last selected state in power off.

To operate the switch 5V and 0V are applied on pins 1 and 2, which are used by the internal DC-DC converter to supply a high voltage for the actuator control. CMOS or TTL logic levels on pins 3-4 control the electrostatic actuator.

To set the switch state in the *latching variant*, pin 3 respectively pin 4 are set to logic high (5V) for 20 ms and the corresponding switch state is selected. At rest pins 3 and 4 should be pulled to 0 V and must not be floating.

COSS STATE

BAR STATE
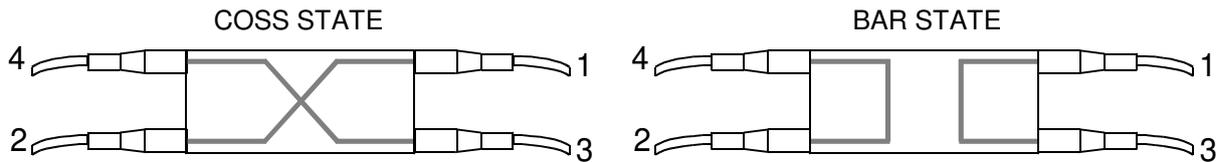
TECHNICAL SPECIFICATIONS *(for single mode fibres[1])*	Unit	Min	Typ	Max
Switch				
Wavelength Range[1]	nm	1240		1640
Insertion Loss[2]	dB		0.4	1.0
Crosstalk	dB		75	60
Return Loss	dB		55	50
Polarisation Dependent Loss	dB		0.03	0.07
Repeatability[3]	dB			0.002
Switching Time	ms		0.5	1
Durability	cycles		10^9	
Integrated Driver				
Supply Voltage *Vcc (pin 1)*	V	3.2	3.3 or 5	5.25
Current Consumption *Icc (pin 1)*	mA		1	45
Logic Level Low *(pins 3, 4)*	V			0.3
Logic Level High *(pins 3, 4)*	V	3.0		
Selection Pulse Width	ms	20	20	
Package				
Operation Temperature	°C	0		70
Storage Temperature	°C	-40		70
Size (L x W x H) – for single	mm		23.2 x 10.1 x 5.9	
Size (L x W x H) – for dual	mm		23.2 x 10.1 x 7.9	

[1] **for multimode**: range: 600 – 1700 nm; IL @ 1300 nm: <1.2 dB max; CT max: >40 dB; RL max: 35 dB; resp. time: <20ms.
[2]value @ 25 °C, without connectors. [3]for constant temperature and polarisation.

ORDERING INFORMATION

SX L T - 2x2 - 9 N

Switch type
L = latching
N = non-latching

Driver Type
T = TTL / CMOS

Variants
2X2
2X1 *(no port 4)*
1X1 *(no ports 4,2)*

Fibre type
9 = SMF28
50= MM 50
62= MM 62

Fibre pigtail type
N = loose tube 0.9mm
B = bare fibre 0.25mm

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Insertion loss distribution in SL2x2 switches

bar state: $\mu = 0.39$ $\sigma = 0.17$
cross state $\mu = 0.28$ $\sigma = 0.14$
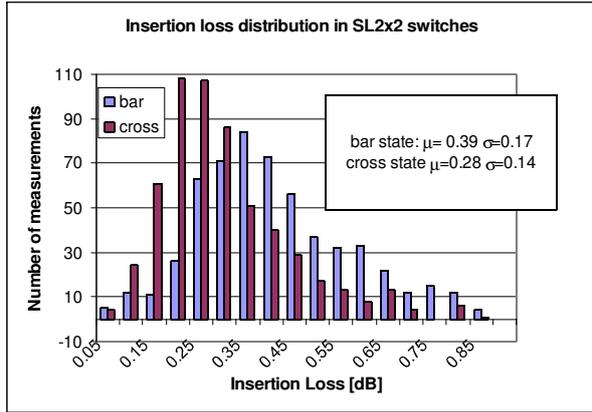
Figure 1: Insertion loss distribution
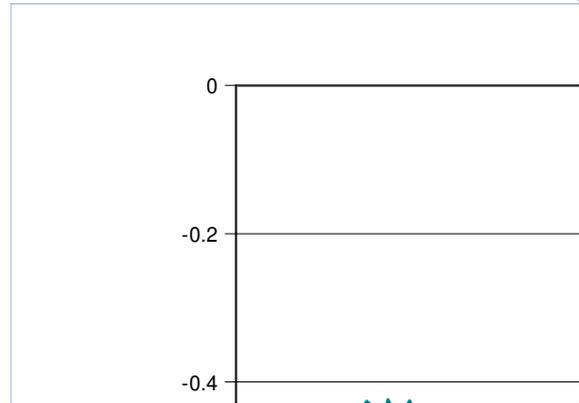
Figure 2: spectral response over temperature
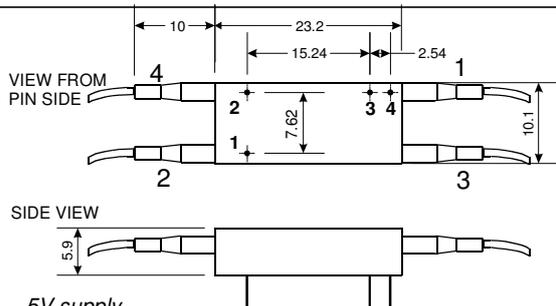
VIEW FROM PIN SIDE

10   23.2   15.24   2.54

7.62   10.1

SIDE VIEW

5.9

1   5V supply,
2   Ground
3   CR select, 5 V, 10 ms pulse sets cross state
4   BR select, 5 V, 10 ms pulse sets bar state

Figure 3: Pin layout SXLT2x2 latching
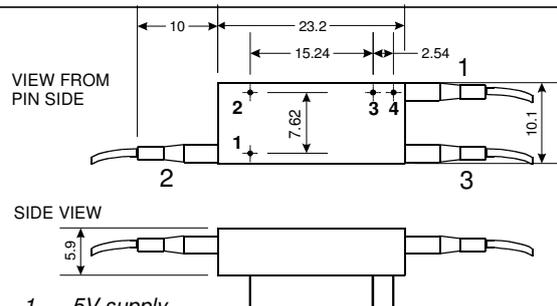
VIEW FROM PIN SIDE

10   23.2   15.24   2.54

7.62   10.1

SIDE VIEW

5.9

1   5V supply,
2   Ground
3   CR select, 5 V, 10 ms pulse sets cross state
4   BR select, 5 V, 10 ms pulse sets bar state

Figure 4: Pin layout SXLT2x1 latching

MEMS Device

$V_{cc} = 5V$ 1

GND   2

DC-DC converter

BR

CR

~50 V

HV switch

3   4

CR select   BR select

TTL or CMOS logic
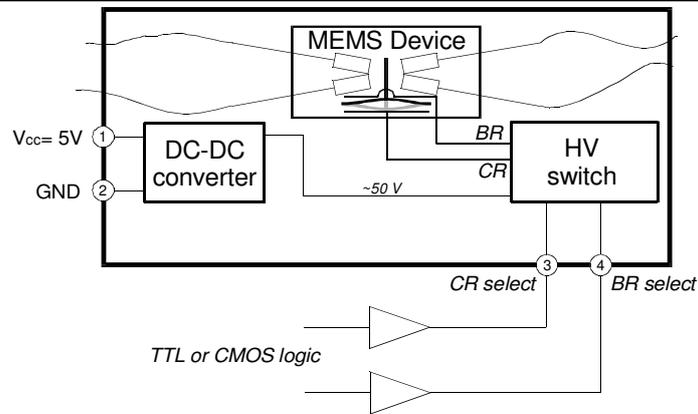
Figure 5: Electrical Schematic Diagram

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