OVERVIEW
The sx series are miniature opto-mechanical switches for fiber optic communication systems and submodules. The switch is available in latching variants, with 1x1, 2x1, 2x2, The switch offers smallest size, ease of integration and the established reliability of Sercalo’s MEMS components. The package is one of the smallest in the industry. It is optimized for low cost production while maintaining high reliability. The component meets Telcordia 1221 reliability standards.

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

APPLICATIONS
- Protection Switching
- Reconfiguration
- Optical Subsystems
- Array integration

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**DESCRIPTION**

In the 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. The miniature SX switch is available as latching variant where a bistable suspension mechanism keeps the last selected state in power off. The non-latching type (i.e. SXNA) is not recommended for new designs.

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 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.

**TECHNICAL SPECIFICATIONS** *(for multi mode fibres*)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switch</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wavelength Range</td>
<td>nm</td>
<td>700</td>
<td></td>
<td>1700</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>dB</td>
<td>0.4</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>Crosstalk</td>
<td>dB</td>
<td>60</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>Return Loss</td>
<td>dB</td>
<td>40</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Polarisation Dependent Loss</td>
<td>dB</td>
<td>0.03</td>
<td></td>
<td>0.07</td>
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<tr>
<td>Repeatability</td>
<td>dB</td>
<td></td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td>Switching Time</td>
<td>ms</td>
<td></td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Durability</td>
<td>cycles</td>
<td></td>
<td></td>
<td>10^9</td>
</tr>
<tr>
<td><strong>Integrated Driver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply Voltage Vcc (pin 1)</td>
<td>V</td>
<td>3.2</td>
<td></td>
<td>5.25</td>
</tr>
<tr>
<td>Current Consumption Icc (pin 1)</td>
<td>mA</td>
<td>1</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Logic Level Low (pins 3, 4)</td>
<td>V</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic Level High (pins 3, 4)</td>
<td>V</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection Pulse Width</td>
<td>ms</td>
<td>10</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td><strong>Package</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>°C</td>
<td>0</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>°C</td>
<td>-40</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>Size (L x W x H) – for single</td>
<td>mm</td>
<td>23.2x10.1x6.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1value @ 25 °C, without connectors. 2for constant temperature and polarisation.

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>SX</th>
<th>L</th>
<th>A</th>
<th>1x2</th>
<th>50</th>
<th>N</th>
<th>10</th>
</tr>
</thead>
</table>

- **Switch type**
  - SXLA = latching
  - SXNA = non-latching

- **Variants**
  - 2x2
  - 1x2 (no port 4)
  - 1x1 (no ports 4, 2)

- **Fibre type**
  - 9 = SMF28
  - X = bend insensitive fiber
  - B = bare fiber
  - 62 = MM 62

- **Sleeve type**
  - N = Loose Tube
  - 03 = 30 cm
  - 10 = 100 cm

- **pigtail length**
  - 03 = 30 cm

- **Port No & Connector type**
  - NC or _ = no connector
  - FP= FC-PC
  - FA=FC-APC (narrow key)
  - LP=LC-PC
Insertion loss distribution in SL2x2 switches

Insertion Loss [dB]

Number of measurements

-10 0 10 20 30 40 50 60 70 80 90 100 110

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

Insertion Loss [dB]

Wavelength [nm]

Figure 3: Pin layout SXLA2x2 latching

Figure 4: Pin layout SXLA2x1 latching

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 SXLA2x2 latching

Figure 4: Pin layout SXLA2x1 latching

Figure 5: Electrical Schematic Diagram

MEMS Device

DC-DC converter

HV switch

V_{DC} = 5 V

GND

CR select

BR select

TTL or CMOS logic

-50 V

Figure 5: Electrical Schematic Diagram