

# LightBend™ 1x4 High Power Fiber Optic Switch

(SM, MM, PM, up to 10W, Bidirectional)

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DATASHEET

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## Applications

- Channel Blocking
- Configurable Add/Drop
- System Monitoring
- Instrumentation

## Features

- Unmatched Low Cost
- Low Optical Distortions
- High Isolation
- High Reliability
- Epoxy-Free Optical Path

The LB 1x4 Series fiber optic switch connects optical channels by redirecting an incoming optical signal into a selected output fiber. This is achieved by using a patent pending opto-mechanical configuration activated via an electrical control signal. Latching operation preserves the selected optical path after the drive signal has been removed. The switch has integrated electrical position sensors, and the new material based advanced design significantly reduces moving part position sensitivity, offering unprecedented high stability as well as an unmatched low cost. Electronic driver is available for this series of switches.

## Specifications

| Parameter                            |              | Min                            | Typical | Max    | Unit |
|--------------------------------------|--------------|--------------------------------|---------|--------|------|
| Operation Wavelength                 |              | 850, 980, 1060, 1310, 1550     |         |        | nm   |
| Insertion Loss <sup>[1]</sup>        |              |                                | 0.7     | 1.1    | dB   |
| Extinction Ratio <sup>[1]</sup> (PM) |              | 18                             |         |        | dB   |
| Polarization Dependent Loss (SM, PM) |              |                                |         | 0.1    | dB   |
| Return Loss <sup>[1]</sup>           | SM, PM       | 50                             |         |        | dB   |
|                                      | MM           | 35                             |         |        | dB   |
| Cross Talk <sup>[1]</sup>            | SM, PM       | 50                             |         |        | dB   |
|                                      | MM           | 35                             |         |        | dB   |
| Switching Time                       |              |                                | 3       | 10     | ms   |
| Repeatability                        |              |                                |         | ± 0.05 | dB   |
| Operating Voltage                    |              | 4.5                            | 5       | 6      | VDC  |
| Operating Current <sup>[2]</sup>     | Latching     |                                |         | 26     | mA   |
|                                      | Non-Latching |                                |         | 36     | mA   |
| Voltage Pulse Width (Latching)       |              |                                | 20      |        | ms   |
| Switching Type                       |              | Latching / Non-Latching        |         |        |      |
| Operating Temperature                |              | -5                             |         | 70     | °C   |
| Storage Temperature                  |              | -40                            |         | 85     | °C   |
| Optical Power Handling               | Standard     |                                | 300     | 500    | mW   |
|                                      | High Power   |                                | 5       | 10     | W    |
| Fiber Type                           | SM, MM       | SMF-28, MM 50/125, MM 62.5/125 |         |        |      |
|                                      | PM           | Panda PM 250                   |         |        |      |

### Notes:

[1]. Exclude connectors. @1550nm, for shorter wavelength the loss is higher.

[2]. Tested at 5VDC for each coil actuation.

[3]. Measure at Light Source CPR<14 dB.

**Warning:** This device must use the reference circuit to driver otherwise it is unstable



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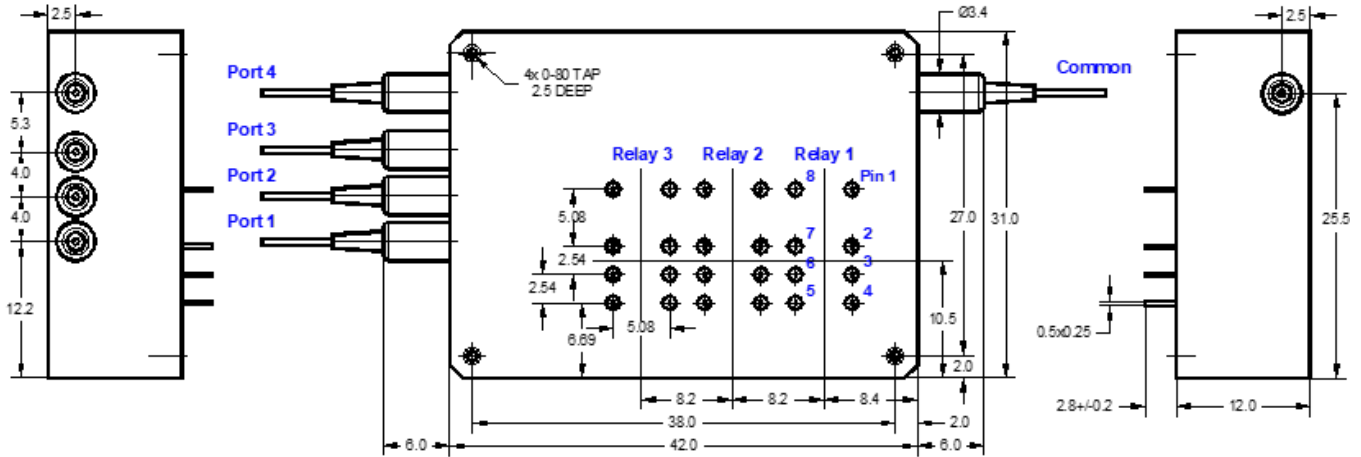
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### Mechanical Dimensions (Unit: mm)



\*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

## Electrical Driving Requirements

Agiltron offers a computer control kit with TTL and RS232 interfaces and Windows™ GUI

The load is a resistive coil which is activated by applying 5V (draw ~ 40mA). However, the current flow direction must be correct otherwise it will cancel the permanent magnet inside causing instability. We strongly recommend to use the reference circuit to avoid major issues. We offer pushbutton elevation driver for verifications or convenient income inspection.

### Latching Type

| Optical Path    | Relay         | Electrical Drive |       | Status Sensor |         |         |         |
|-----------------|---------------|------------------|-------|---------------|---------|---------|---------|
|                 |               | Pin 1            | Pin 8 | Pin 2-3       | Pin 3-4 | Pin 5-6 | Pin 6-7 |
| Common → Port 1 | Relay 1       | 5V               | 0     | Open          | Close   | Close   | Open    |
|                 | Relay 2, 3    | N/A              | N/A   |               |         |         |         |
| Common → Port 2 | Relay 1       | 0                | 5V    | Close         | Open    | Open    | Close   |
|                 | Relay 2       | 5V               | 0     | Open          | Close   | Close   | Open    |
|                 | Relay 3       | N/A              | N/A   |               |         |         |         |
| Common → Port 3 | Relay 1, 2    | 0                | 5V    | Close         | Open    | Open    | Close   |
|                 | Relay 3       | 5V               | 0     | Open          | Close   | Close   | Open    |
| Common → Port 4 | Relay 1, 2, 3 | 0                | 5V    | Close         | Open    | Open    | Close   |

### Non-Latching Type

| Optical Path    | Relay         | Electrical Drive |       | Status Sensor |         |         |         |
|-----------------|---------------|------------------|-------|---------------|---------|---------|---------|
|                 |               | Pin 1            | Pin 8 | Pin 2-3       | Pin 3-4 | Pin 5-6 | Pin 6-7 |
| Common → Port 1 | Relay 1       | 5V               | 0     | Open          | Close   | Close   | Open    |
|                 | Relay 2, 3    | No Power         |       | Close         | Open    | Open    | Close   |
| Common → Port 2 | Relay 2       | 5V               | 0     | Open          | Close   | Close   | Open    |
|                 | Relay 1, 3    | No Power         |       | Close         | Open    | Open    | Close   |
| Common → Port 3 | Relay 3       | 5V               | 0     | Open          | Close   | Close   | Open    |
|                 | Relay 1, 2    | No Power         |       | Close         | Open    | Open    | Close   |
| Common → Port 4 | Relay 1, 2, 3 | No Power         |       | Close         | Open    | Open    | Close   |

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### Ordering Information (Part Number)

| Prefix                      | Type         | Wavelength  | Switch           | Power       | Fiber Type      | Fiber Cover    | Fiber Length | Connector <sup>[3]</sup> |
|-----------------------------|--------------|-------------|------------------|-------------|-----------------|----------------|--------------|--------------------------|
| <b>LBHP-</b> <sup>[1]</sup> | 1x2 = 12     | 1060 = 1    | Latching = 1     | 5W = 4      | SMF-28 = 1      | Bare fiber = 1 | 0.25m=1      | None=1                   |
| <b>LBPH-</b> <sup>[2]</sup> | 1x3 = 13     | 1310 = 3    | Non-latching = 2 | 10W = 5     | MM 50/125 = 5   | 900um tube = 3 | 0.5m=2       | FC/PC=2                  |
|                             | 1x4 = 14     | 1550 = 5    | Special = 0      | Special = 0 | MM 62.5/125 = 6 | Special = 0    | 1.0m=3       | FC/APC=3                 |
|                             | 4x1 = 41     | 780 = 7     |                  |             | PM1550 = B      |                | Special=0    | SC/PC=4                  |
|                             | Special = 00 | 850 = 8     |                  |             | PM1310 = D      |                |              | SC/APC=5                 |
|                             |              | 980 = 9     |                  |             | PM980 = E       |                |              | ST/PC=6                  |
|                             |              | Special = 0 |                  |             | PM850 = F       |                |              | LC/PC = 7                |
|                             |              |             |                  |             | Special = 0     |                |              | Duplex LC/PC = 8         |
|                             |              |             |                  |             |                 |                |              | LC/UPC = U               |
|                             |              |             |                  |             |                 |                |              | Special=0                |

[1]. **LBHP-**: LightBend 1x4 High Power Switch.

[2]. **LBPH-**: LightBend 1x4 PM High Power Switch.

[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

#### Note:

- ☐ PM1550 fiber works well for 1310nm

#### Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

#### Fiber Cleanliness

Fibers with smaller core diameters (<5 µm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

#### Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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