

# LightBend™ 1x1, 1x2, 2x2 Bypass Multimode Fiber Optic Switch

(Bidirectional)

(Protected by U.S. patent 6823102 and pending patents)



The LB 1x1, 1x2, 2x2 Bypass Multimode Fiberoptic switch is a highly integrated single device. Based on an Agiltron's pending patent, the switch is designed especially for protection and restoration applications. The switch is activated by a 5V pulse between two states and latching operation preserves the selected optical path after the drive signal has been removed. The switch has integrated electrical contact based position sensors. The proprietary simple design significantly reduces moving part position sensitivity, offering unprecedented high stability as well as unmatched low cost. Electronic driver is available for this series of switches. The switch is bidirectional.

We offer tight-bend-fiber version, which reduces the minimum bending radius from normal 15 mm to 7 mm. This feature enables smaller overall foot print.

## Features

- Low Optical Distortions
- 8 Ports Integration
- High Isolation
- High Reliability
- Fail-Safe Latching
- Epoxy-Free Optical Path
- Low Cost

## Applications

- Protection
- Instrumentation

## Specifications

Parameter		Min	Typical	Max	Unit
Wavelength	Single Band	780±20, 850±20, 1060±20, 1310±30, 1550±30			nm
	Dual Band	850 / 1310			
Insertion Loss <sup>[1], [2]</sup>			0.6	0.9	dB
Wavelength Dependent Loss				0.25	dB
Cross Talk <sup>[1], [2]</sup>		35			dB
Return Loss <sup>[1], [2]</sup>		35			dB
Switching Time			3	10	ms
Repeatability				± 0.02	dB
Durability		10 <sup>7</sup>			cycle
Operating Optical Power			300	500	mW
Operating Voltage		4.5	5	6	V
Operating Current			30	60	mA
Switch Type		Latching / Non-Latching			
Operating Temperature		0		70	°C
Storage Temperature		-40		85	°C
Fiber Type		MM 62.5/125 or MM 50/125			

**Notes:**

- [1]. Within operating temperature and with light source CPR <14 dB.
- [2]. Excluding Connectors.

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

**Legal notices:** All product information is believed to be accurate and is subject to change without notice. Information contained herein shall legally bind Agiltron only if it is specifically incorporated into the terms and conditions of a sales agreement. Some specific combinations of options may not be available. The user assumes all risks and liability whatsoever in connection with the use of a product or its application.

Rev 01/03/24

# LightBend™ 1x1, 1x2, 2x2 Bypass Multimode Fiber Optic Switch



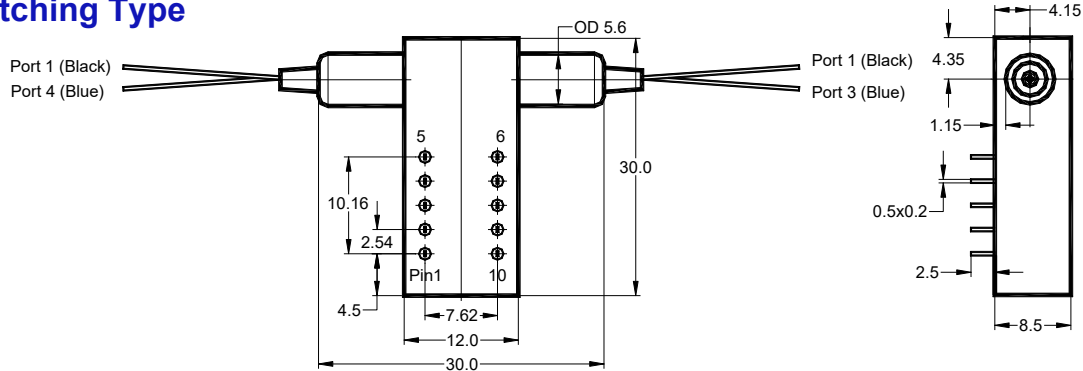
(Bidirectional)

(Protected by U.S. patent 6823102 and pending patents)

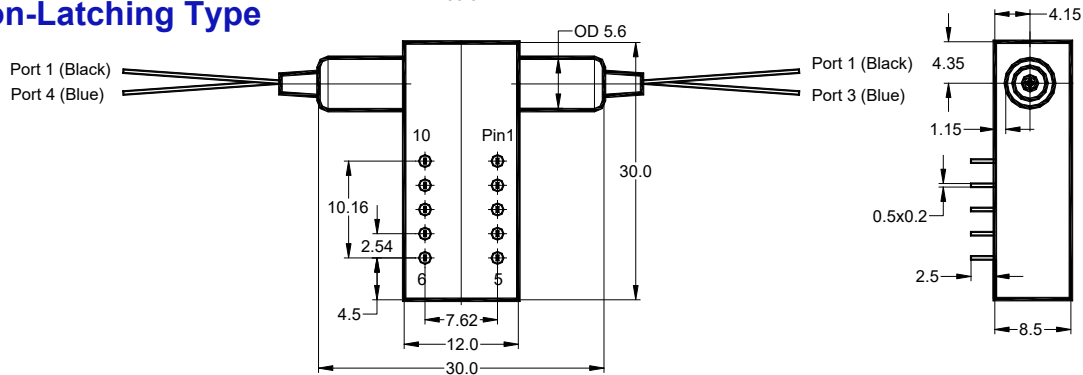
## DATASHEET

### Mechanical Dimensions (mm)

#### Latching Type



#### Non-Latching Type



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

### Electrical Connector Configurations

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 - Single Coil

**Application Note:** Applying a constant driving voltage increases stability. The switches can also be driven by a pulse mode using Agiltron recommended circuit for energy saving.

##### LB 1x2 MM Switch

Optical Path	Electric Drive				Status Sensor			
	Pin 1	Pin 10	Pin 5	Pin 6	Pin 2-3	Pin 3-4	Pin 7-8	Pin 8-9
Port 1 → Port 2	0	5V	N/A	N/A	Close	Open	Open	Close
Port 1 → Port 3	5V	0	N/A	N/A	Open	Close	Close	Open

##### LB 2x2 Bypass MM Switch

Optical Path	Electric Drive				Status Sensor			
	Pin1	Pin10	Pin 5	Pin 6	Pin 2-3	Pin 3-4	Pin 7-8	Pin 8-9
Port 1 → Port 2 Port 4 → Port 3	0	5V	N/A	N/A	Close	Open	Open	Close
Port 1 → Port 3	5V	0	N/A	N/A	Open	Close	Close	Open

#### Non-Latching Type

##### LB 1x2 MM Switch

Optical Path	Electric Drive				Status Sensor			
	Pin 1	Pin 10	Pin 5	Pin 6	Pin 2-3	Pin 3-4	Pin 7-8	Pin 8-9
Port 1 → Port 2	5V	0	N/A	N/A	Open	Close	Close	Open
Port 1 → Port 3	No Power		N/A	N/A	Close	Open	Open	Close

##### LB 2x2 Bypass MM Switch

Optical Path	Electric Drive				Status Sensor			
	Pin1	Pin10	Pin 5	Pin 6	Pin 2-3	Pin 3-4	Pin 7-8	Pin 8-9
Port 1 → Port 2 Port 4 → Port 3	5V	0	N/A	N/A	Open	Close	Close	Open
Port 1 → Port 3	No Power		N/A	N/A	Close	Open	Open	Close

# LightBend™ 1x1, 1x2, 2x2 Bypass Multimode Fiber Optic Switch

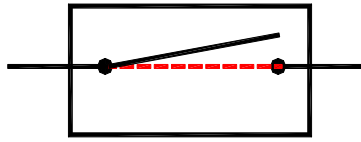


(Bidirectional)

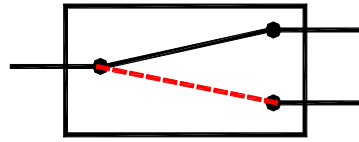
(Protected by U.S. patent 6823102 and pending patents)

## DATASHEET

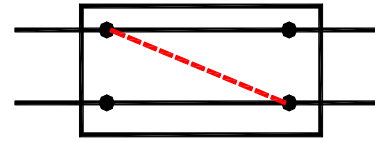
### Functional Diagram



LB 1x1 MM Switch



LB 1x2 MM Switch



LB 2x2 MM Bypass Switch

### Ordering Information (Part Number)

Prefix	Type	Wavelength	Switch	Package	Fiber Type	Fiber Cover	Fiber Length	Connector <sup>[3]</sup>
<b>LBSW-</b>	1x1 Latching = 11 1x1 N/O <sup>[1]</sup> = 1O 1x1 N/C <sup>[2]</sup> = 1C 1x2 = 12 2x1 = 21 2x2 Bypass = 2B Special = 00	1060 = 1 C+L = 2 1310 = 3 1550 = 5 650 = 6 780 = 7 850 = 8 1310 & 1550 = 9 850 & 1310 = A Special = 0	Latching Type Single Coil = 2 Non-latching = 3 Special = 0	Standard = 1 Special = 0	MM 50/125 = 5 MM 62.5/125 = 6 Special = 0	Bare fiber = 1 900µm tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None=1 FC/PC=2 FC/APC=3 SC/PC=4 SC/APC=5 ST/PC=6 LC/PC = 7 Duplex LC/PC = 8 LC/UPC = U Special = 0

[1]. **N/O**: LB 1x1 MM Non-Latching Switch, **N**ormally **O**pen.

[2]. **N/C**: LB 1x1 MM Non-Latching Switch, **N**ormally **C**lose.

[3]. The connector cannot be installed directly onto bare fiber, as it 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 can remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SM28 fiber and decreases further with smaller core fibers.

#### 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.

# LightBend™ 1x1, 1x2, 2x2 Bypass Multimode Fiber Optic Switch



(Bidirectional)

(Protected by U.S. patent 6823102 and pending patents)

## DATASHEET

### Driver Reference Design

