

# LightBend™

## 4x4 Series Fiber Optic Switch

(Bidirectional. SM, MM, PM, SM High power, MM High Power, PM High power)

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

### Product Description

The LightBend 4x4 Series fiber optic switch connects optical channels by redirecting any of four incoming optical signals into any of four output fibers. This is achieved using a patent pending opto-mechanical configuration and activated via an electrical control signal. Latching operation preserves the selected optical path after the drive signal has been removed. This new material-based advanced design significantly reduces moving part position sensitivity, offering unprecedented high stability as well as an unmatched low cost. The LB 4x4 series Switch can be made of a variety of fibers, including SM, MM, PM fibers, in standard or high-power version. Electronic Driver is available for this series of switches. The LightBend 4x4 series switch is bidirectional.

### Features

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

### Performance Specifications

LB 4x4 Series Switch <sup>[1]</sup>		Min	Typical	Max	Unit
Operation Wavelength		780, 850, 980, 1060, 1310, 1550			nm
Insertion Loss			1.2	2.0	dB
Wavelength Dependent Loss			0.15	0.25	dB
PDL	SM			0.15	dB
Extinction Ratio	PM	18	25		dB
Cross Talk	SM, PM	50	55		dB
	MM	35	50		dB
Return Loss	SM, PM	50	55		dB
	MM	35	45		dB
Switching Time			4	10	ms
Repeatability				±0.05	dB
Operating Voltage		4.5	5	6	VDC
Operating Current			30	60	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		3	5 <sup>[3]</sup>	W
Fiber Type	SM	SMF-28, or equivalent			
	MM	MM 50/125, MM 62.5/125, or equivalent			
	PM	Panda 250 PM, 400 PM, or equivalent			

[1]. Excluding connectors.  
 [2]. For LB Multimode series switch, Light source CPR<14 dB.  
 [3]. Continuous operation, for pulse operation call.

### Applications

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



Revised on 06/30/22

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

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### Electrical Driving Requirement

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

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.

No	Optical Path	Connector Pin No.																													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	I1→O1, I2→O2, I3→O3, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
2	I1→O1, I2→O2, I3→O4, I4→O3	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
3	I1→O1, I2→O3, I3→O4, I4→O2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
4	I1→O1, I2→O3, I3→O2, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
5	I1→O1, I2→O4, I3→O3, I4→O2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
6	I1→O1, I2→O4, I3→O2, I4→O3	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
7	I1→O2, I2→O1, I3→O3, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
8	I1→O2, I2→O1, I3→O4, I4→O3	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
9	I1→O2, I2→O3, I3→O1, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
10	I1→O2, I2→O3, I3→O4, I4→O1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
11	I1→O2, I2→O4, I3→O1, I4→O3	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
12	I1→O2, I2→O4, I3→O3, I4→O1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
13	I1→O3, I2→O2, I3→O1, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
14	I1→O3, I2→O2, I3→O4, I4→O1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
15	I1→O3, I2→O1, I3→O2, I4→O4	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
16	I1→O3, I2→O1, I3→O4, I4→O2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
17	I1→O3, I2→O4, I3→O2, I4→O1	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
18	I1→O3, I2→O4, I3→O1, I4→O2	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-
19	I1→O4, I2→O3, I3→O2, I4→O1	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
20	I1→O4, I2→O3, I3→O1, I4→O2	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
21	I1→O4, I2→O2, I3→O3, I4→O1	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
22	I1→O4, I2→O2, I3→O1, I4→O3	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
23	I1→O4, I2→O1, I3→O2, I4→O3	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+
24	I1→O4, I2→O1, I3→O3, I4→O2	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+

[1]. \*+ is 4.5 - 6 V pulse, Typical is 5 V pulse. [2]. \*- is Ground. [3]. The blank space means no electronic connection.

#### Non-Latching Type

No	Optical Path	Connector Pin No.																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	I1→O1, I2→O2, I3→O3, I4→O4																															
2	I1→O1, I2→O2, I3→O4, I4→O3																															
3	I1→O1, I2→O3, I3→O4, I4→O2																															
4	I1→O1, I2→O3, I3→O2, I4→O4																															
5	I1→O1, I2→O4, I3→O3, I4→O2																															
6	I1→O1, I2→O4, I3→O2, I4→O3																															
7	I1→O2, I2→O1, I3→O3, I4→O4																															
8	I1→O2, I2→O1, I3→O4, I4→O3																															
9	I1→O2, I2→O3, I3→O1, I4→O4																															
10	I1→O2, I2→O3, I3→O4, I4→O1																															
11	I1→O2, I2→O4, I3→O1, I4→O3																															
12	I1→O2, I2→O4, I3→O3, I4→O1																															
13	I1→O3, I2→O2, I3→O1, I4→O4																															
14	I1→O3, I2→O2, I3→O4, I4→O1																															
15	I1→O3, I2→O1, I3→O2, I4→O4																															
16	I1→O3, I2→O1, I3→O4, I4→O2																															
17	I1→O3, I2→O4, I3→O2, I4→O1																															
18	I1→O3, I2→O4, I3→O1, I4→O2																															
19	I1→O4, I2→O3, I3→O2, I4→O1																															
20	I1→O4, I2→O3, I3→O1, I4→O2																															
21	I1→O4, I2→O2, I3→O3, I4→O1																															
22	I1→O4, I2→O2, I3→O1, I4→O3																															
23	I1→O4, I2→O1, I3→O2, I4→O3																															
24	I1→O4, I2→O1, I3→O3, I4→O2																															

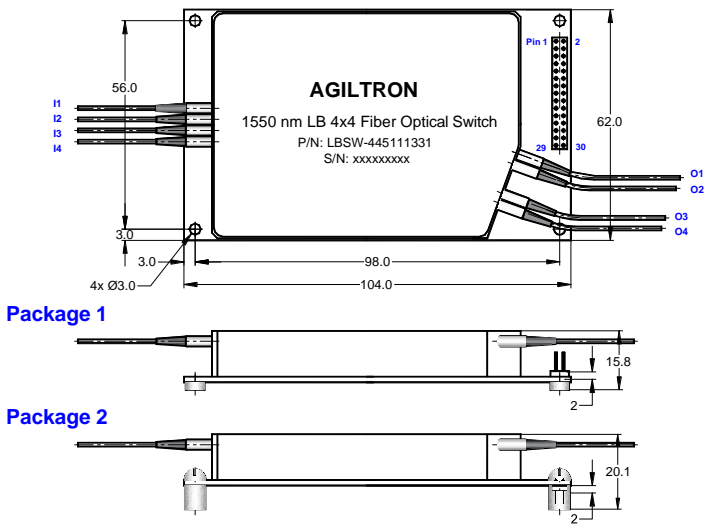
[1]. \*+ is 4.5 - 6 VDC, Typical is 5 VDC. [2]. \*- is Ground. [3]. The blank space means no electronic connection.



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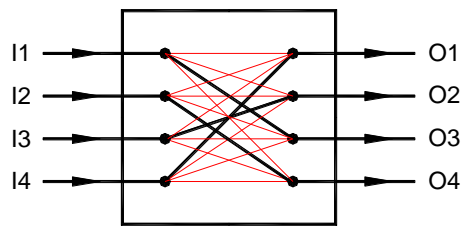
## 4x4 Series Fiber Optic Switch

### Mechanical Dimensions (Unit: mm)



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

### Functional Diagram



LB 4x4 Series Switch

### Ordering Information

Type	Wavelength	Switch	Package	Fiber Type	Fiber Length	Connector
LBSW <sup>[1]</sup>	4x4=44 1060=1	Latching=1	Package 1=1	SMF-28=1	Bare fiber=1	None=1
LBPM <sup>[2]</sup>	4x3=43 1310=3	Non-latching=2	Package 2=2	MM 50/125=5	900 um loose tube=3	FC/PC=2
LBHP <sup>[3]</sup>	4x2=42 1550=5		With Driver=3	MM 62.5/125=6	Special= 0	SC/APC=3
LBPH <sup>[4]</sup>	3x3=33 780=7		Special=0	Panda 400 PM=A		SC/APC=4
	3x2=32 850 =8			Panda 250 PM=B		SC/APC=5
	Special=00 980=9			Special=0		ST/PC=6
	Special=0					LC=7
						Duplex LC=8
						Special=0

[1]. LBSW: LightBend 4x4 Switch.  
 [2]. LBPM: LightBend 4x4 PM Switch.  
 [3]. LBHP: LightBend 4x4 High Power Switch.  
 [4]. LBPH: LightBend 4x4 PM High Power Switch.



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## Driver Reference Design

