# 2x4 BYPASS OPTICAL SWITCH

## Product Description

Lightwave Link Inc. 2x4 Bypass optical switch with R15 Corning® ClearCurve® XB or equivalent Optical Fiber is designed for use in optical fiber communication networks and measurement instruments. The switch consists of two ports that selectively transmits, redirects, or blocks optical power in a fiber optic transmission line. The optical switch must be actuated to select or change between two states. Furthermore, for the Latching type, it only takes an electrical pulse width with duration ≧20msec to change the state. As a result, it consumes low electric energy to operate the optical switch. Lightwave Link Inc. 2x4 Bypass optical switch fully complies with RoHS Directive 2002/95/EC (2008/385/EC).

## Features

- Smallest Size
- Low Insertion Loss
- Fast Switching Speed
- PCB Mountable
- Available in Single Mode / Multi Mode
- RoHS Compliance

## Applications

- Optical network protection and restoration
- Optical network monitoring
- Reconfigurable add/drop multiplexers
- Transmission equipment protection
- Research and development
- Wavelength router

## Performance Specification

| Parameter | 9μm Core Single Mode | | | 50μm or 62.5μm   Core Multi Mode | | | Unit |
|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Wavelength Range [1] | | 1260~1630 | | | 850/1300 | | nm |
| Straight Insertion Loss [2] | | | 1.0 | | | 0.5 | dB |
| Bypass Insertion Loss [2] | | | 2.0 | | | 1.0 | dB |
| Return Loss | -50 | | | | | | dB |
| PDL | | | 0.1 | | | | d |
| WDL | | | 0.3 | | | | dB |
| Crosstalk | -80 | | | -80 | | | dB |
| Repeatability | | | ±0.1 | | | ±0.1 | dB |
| Switching Time [3] | | | 3.5 | | | 3.5 | ms |
| Absolute Optical Input Power | | | 500 | | | 500 | mW |
| Operating Current | | Latching:40±10% / Non-Latching: 28±10% | | | | | mA |
| Operating Voltage | 4.5 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | VDC |
| Power Consumption | | Latching: 200±10% / Non-Latching: 140±10% | | | | | mW |
| Switching Life Expectancy | $3x10^7$ | | | $3x10^7$ | | | Cycles |
| Operation Temperature-Normal | -5 | | 70 | -5 | | 70 | ℃ |
| Operation Temperature-Special | -20 | | 70 | -20 | | 70 | ℃ |
| Storage Temperature | -40 | | 85 | -40 | | 85 | ℃ |
| Operation Humidity | 5 | | 95 | 5 | | 95 | %RH |
| Storage Humidity | 5 | | 95 | 5 | | 95 | %RH |
| Dimension (H*W*L) | | 7.6 x 11 x 22.6 | | | | | mm |
| Ring Size | | Inner ring dimension ≥ 4 | | | | | cm |
| Weight [4] | | 10 | | | | | g |

1. Special wavelength would be upon request.

2. Optical parameters excluded connectors.

3. A minimum ≧ 20ms pulse is recommended for latching type of switch.

4. The product weight excluded optical connectors.
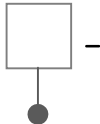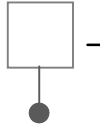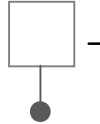
## Function Diagram
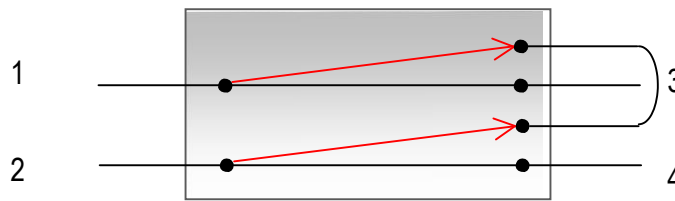


## Physical Dimension
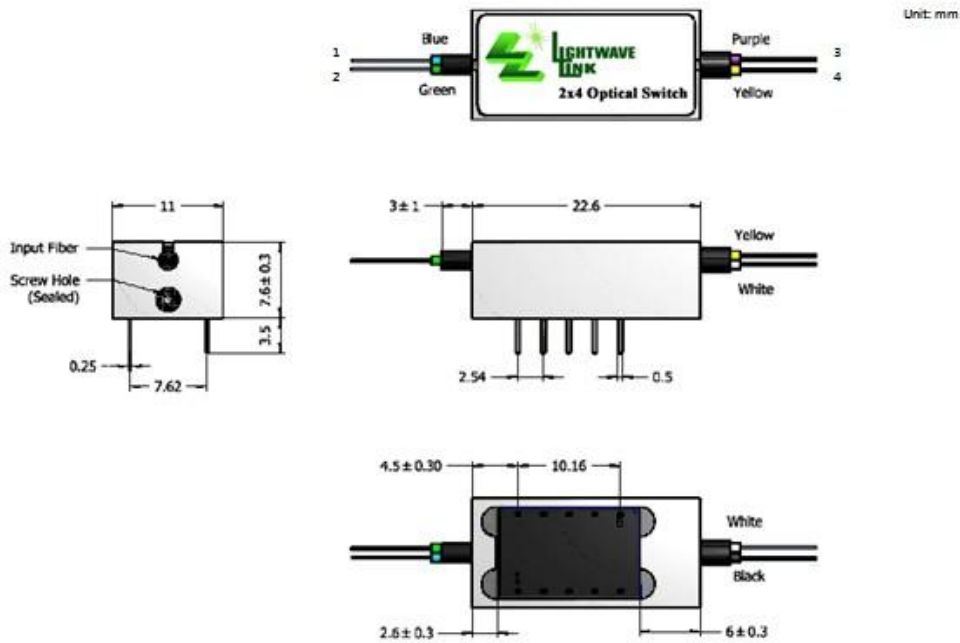


## PIN Description

| Pin Number | Latching Pin Function | Non-Latching Pin Function |
|---|---|---|
| 1 | Bypass activation terminal(+) | N/C |
| 2 | Straight Monitor | Straight Monitor |
| 3 | Monitor Common | Monitor Common |
| 4 | Bypass Monitor | Bypass Monitor |
| 5 | Bypass  activation  terminal(-) | Straight activation  terminal(+) |
| 6 | Straight  activation  terminal(-) | Straight  activation  terminal(-) |
| 7 | Bypass Monitor | Bypass Monitor |
| 8 | Monitor Common | Monitor Common |
| 9 | Straight Monitor | Straight Monitor |
| 10 | Straight activation terminal(+) | N/C |

## Operation of the Optical Switch

| Relay Type | PIN / OSW State | 1 | 5 | 6 | 10 | PIN Connection | Remark |
|---|---|---|---|---|---|---|---|
| Latching Type | 1←→2 | H | L | - | - | 3 , 4 pin closed ; 2 , 3 pin open<br>7 , 8 pin closed ; 8 , 9 pin open | Bypass |
| | 1←→3 | - | - | L | H | 2 , 3 pin closed ; 3 , 4 pin open<br>8 , 9 pin closed ; 7 , 8 pin open | Straight |
| | 2←→4 | - | - | L | H | 2 , 3 pin closed ; 3 , 4 pin open<br>8 , 9 pin closed ; 7 , 8 pin open | Straight |
| Non-Latching Type | 1←→2 | - | - | - | - | 3 , 4 pin closed ; 2 , 3 pin open<br>7 , 8 pin closed ; 8 , 9 pin open | Bypass (Default) |
| | 1←→3 | - | H | L | - | 2 , 3 pin closed ; 3 , 4 pin open<br>8 , 9 pin closed ; 7 , 8 pin open | Straight |
| | 2←→4 | - | H | L | - | 2 , 3 pin closed ; 3 , 4 pin open<br>8 , 9 pin closed ; 7 , 8 pin open | Straight |

## Ordering Information

FOBWE — 2 — 4 — ☐ — ☐ — ☐ — ☐

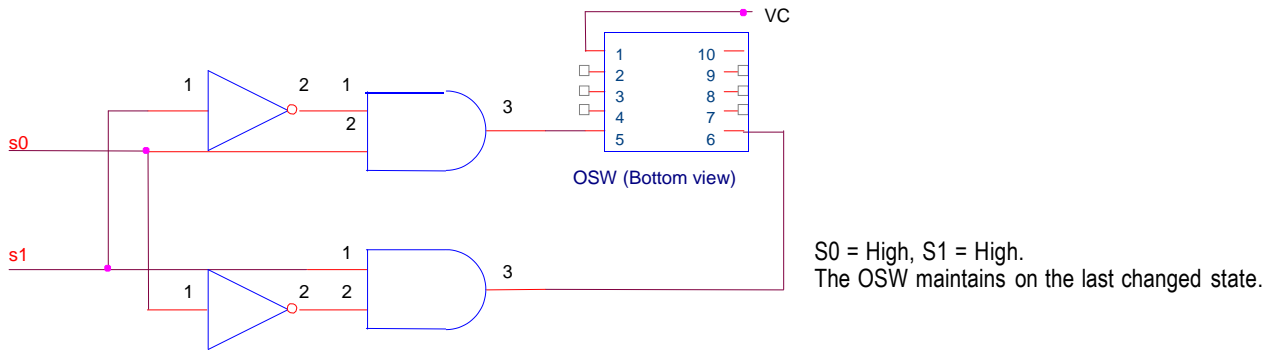| Product Version | Input | Output | Operation Function | Fiber Type | Fiber Cabling | Connector Type |
|---|---|---|---|---|---|---|
| | No. of Input | No. of Output | L: Latching<br>N: Non-Latching | 9: 9/125µm<br>50: 50/125µm<br>62: 62.5/125µm | B: Bare fiber<br>L: 900µm loose tube | 1: None 8: LC/PC<br>2: FC/PC 9: SC/UPC<br>3: FC/APC A: MT/RJ<br>4: SC/APC B: MU/UPC<br>5: SC/PC C: FC/UPC<br>6: MU/PC D: LC/APC<br>7: ST/PC E: LC/UPC |

## Application Circuitry for Latching Type

To provide sufficient power to switch, two application circuits using 2N2222 BJT and ULN2003 Darlington pair IC are showed below.
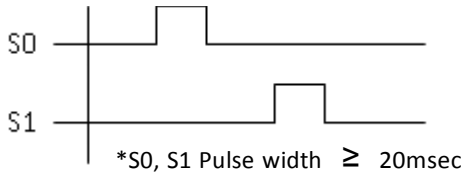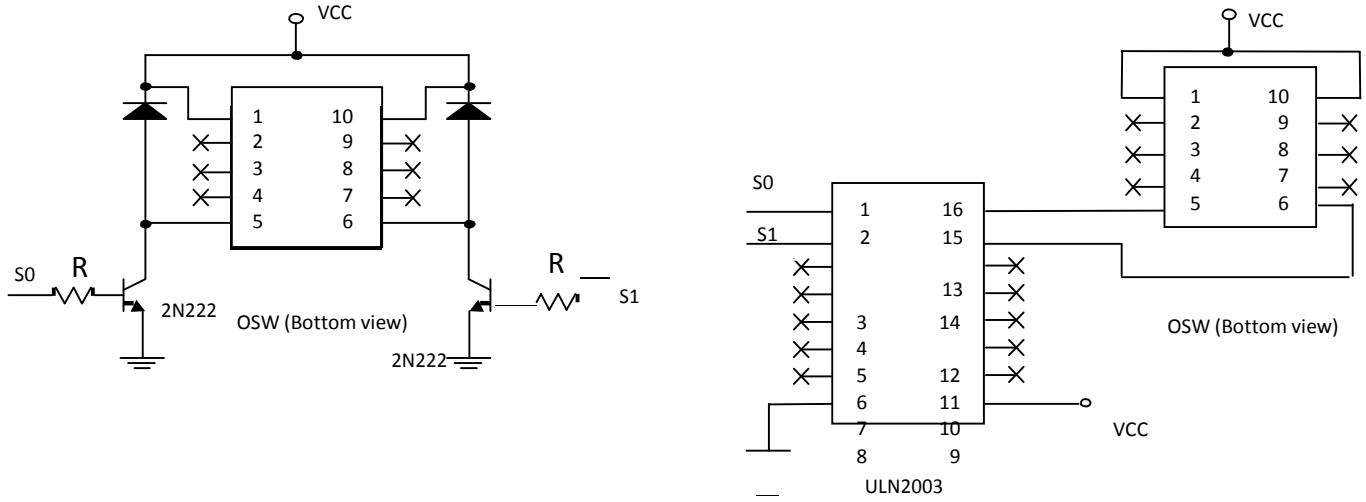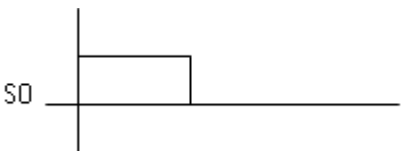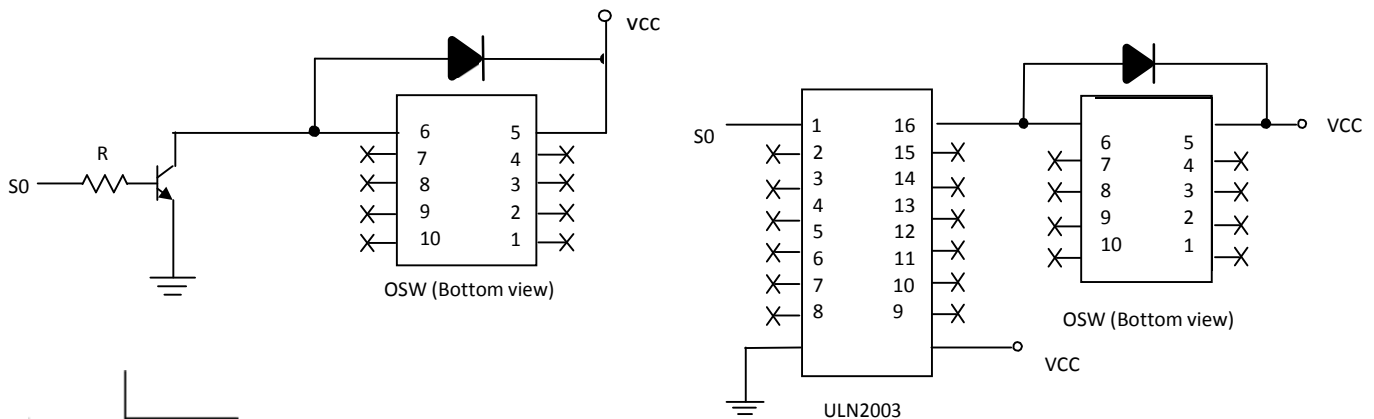


S0 = High, S1 = Low. To change the OSW state to ON state.
S0 = Low, S1 = High. To change the OSW state to OFF state.

*S0, S1 Pulse width $\geq$ 20msec

## The Recommend Circuitry for So and S1 Stand High Level Simultaneously



S0 = High, S1 = High.
The OSW maintains on the last changed state.

## Application Circuitry for Non-Latching Type

To provide sufficient power to switch, two application circuits using 2N2222 BJT and ULN2003 Darlington pair IC are showed below.



S0 = Low. To change the OSW state to default mode (Dual CH1).
S0 = High. To change the OSW state to Dual CH2.