# SM Fiber Optical Switches

## Single-Mode Fibers, VIS-NIR Spectrum, TTL Version

# User Manual

# 1×N Single-Mode (SM) Fiber Optical Switches



## FEATURES

✓ Low Insertion Loss and High Reliability

✓ Parallel Interface (TTL)

✓ Modularized Design

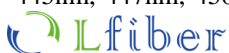✓ Functions of Breakdown Self-checking and Alarm Warning

## APPLICATIONS

➢ Optical Signal Switching and Routing

➢ Optical Network Monitoring

➢ Testing of Fiber Optic Component

➢ OTDR Testing

| Specifications of the Single-Mode (SM) Fiber Switches | |
|---|---|
| Number of Channels (N) | 1×N (N ≤ 16) or other channel counts on request |
| Fiber Type | Single-mode fibers |
| Insertion Loss (dB) | ≤ 2.0 dB @ 430-670 nm<br>≤ 1.5 dB @ 780-1250 nm<br>≤ 1.0 dB @ 1260-1590 nm<br>≤ 1.5 dB @ 1600-2000 nm |
| Operating Wavelength Range (nm) | 405-2000 nm on request |
| Testing Wavelength (nm) | 405, 450, 480, 532, 650, 780, 850, 980, 1310, 1490, 1550, 1625, 1650, etc. |
| Return Loss (dB) | ≥ 50 |
| Crosstalk (dB) | ≥ 70 |
| Wavelength Dependent Loss (dB) | ≤ 0.25 |
| Temperature Dependent Loss (dB) | ≤ 0.25 |
| Repeatability (dB) | ≤ 0.02 |
| Lifetime (cycles) | ≥ $10^7$ |
| Switching Time (ms) | ≤ 8 (adjacent channel) |
| Power Handling (mW) | ≤ 500 |
| Power Supply | 5V / 500mA |
| Control Mode | TTL |
| Connector | FC, LC, SC, ST, MPO, etc. |
| Operating Temperature (℃) | -20 to +70 |
| Storage Temperature (℃) | -40 to +85 |
| Dimension (mm) | 80 × 40 × 32 mm (Channel Amount ≤ 8)<br>135 × 64 × 32 mm (Channel Amount ≤ 16) |

Notes:

1. For requests please see the ordering information section and specify the number of channels, operating wavelengths, control mode, connector types, etc.

2. Typically, the operating wavelengths of the single-mode (SM) fiber switches include, but are not limited to, 405nm, 444nm, 445nm, 447nm, 450nm, 454nm, 457nm, 460nm, 462nm, 465nm, 470nm, 473nm, 480nm, 484nm, 488nm, 490nm, 491nm,

501nm, 505nm, 509nm, 510nm, 514nm, 515nm, 520nm, 522nm, 523nm, 526nm, 530nm, 532nm, 540nm, 543nm, 550nm, 552nm, 555nm, 556nm, 561nm, 577nm, 588nm, 589nm, 593.5nm, 594nm, 600nm, 604nm, 607nm, 612nm, 622nm, 627nm, 630nm, 632nm, 633nm, 635nm, 637nm, 638nm, 640nm, 642nm, 647nm, 650nm, 655nm, 656nm, 660nm, 665nm, 666nm, 670nm, 671nm, 680nm, 685nm, 688nm, 689nm, 690nm, 698nm, 705nm, 721nm, 730nm, 750nm, 760nm, 770nm, 780nm, 785nm, 786nm, 790nm, 793nm, 795nm, 800nm, 808nm, 810nm, 825nm, 830nm, 835nm, 845nm, 850nm, 852nm, 860nm, 879nm, 880nm, 885nm, 905nm, 914nm, 915nm, 930nm, 935nm, 938nm, 940nm, 946nm, 960nm, 965nm, 975nm, 976nm, 980nm, 1030nm, 1035nm, 1040nm, 1047nm, 1053nm, 1055nm, 1060nm, 1064nm, 1080nm, 1085nm, 1105nm, 1112nm, 1120nm, 1122nm, 1177nm, 1208nm, 1268nm, 1275nm, 1300nm, 1310nm, 1313nm, 1319nm, 1320nm, 1342nm, 1380nm, 1392nm, 1410nm, 1413nm, 1444nm, 1450nm, 1470nm, 1475nm, 1480nm, 1490nm, 1528nm, 1532nm, 1540nm, 1550nm, 1558nm, 1560nm, 1565nm, 1570nm, 1573nm, 1590nm, 1600nm, 1605nm, 1610nm, 1625nm, 1645nm, 1700nm, 1710nm, 1720nm, 1750nm, 1850nm, 1870nm, 1900nm, 1910nm, 1920nm, 1940nm, 1950nm, 1990nm, 2000nm, etc.

3. Standard port/channel counts of the SM fiber optical switches: 1x2, 1x4, 1x8, 1x16, 1x24, 1x32, 1x48, 1x64, 1x128, etc. Other channel counts are also available on request.

4. Lfiber's SM fiber switches are customizable and the specifications are subject to change without notice.

5. For product customization or special requirements, please contact our sales representative.

## Pin Configurations of the Single-Mode (SM) Fiber Switches

### ZH connector (1.5mm Pitch, 9 Pin) or DB-9 Male Connector

| Pin No. | I / O | Signal | Descriptions |
|---|---|---|---|
| 1 | Input | D0 | |
| 2 | Input | D1 | D0-D3 represent channel selection Bit0-Bit3; D0 is low; D3 is high. |
| 3 | Input | D2 | |
| 4 | Input | D3 | |
| 5 | Input | RESET | TTL, Low level reset to channel 0. High level means channel selection bits are effective. |
| 6 | Out | READY | TTL, Ready (High = not ready, Low = ready) |
| 7 | Out | ERROR | TTL, Error OR Failure , (High = error, Low = no error) |
| 8 | Power | GND | Ground |
| 9 | Power | VCC | 5.0±5% VDC Power Supply (max 500mA) |

## Channel Selection Table of the Single-Mode (SM) Fiber Switches

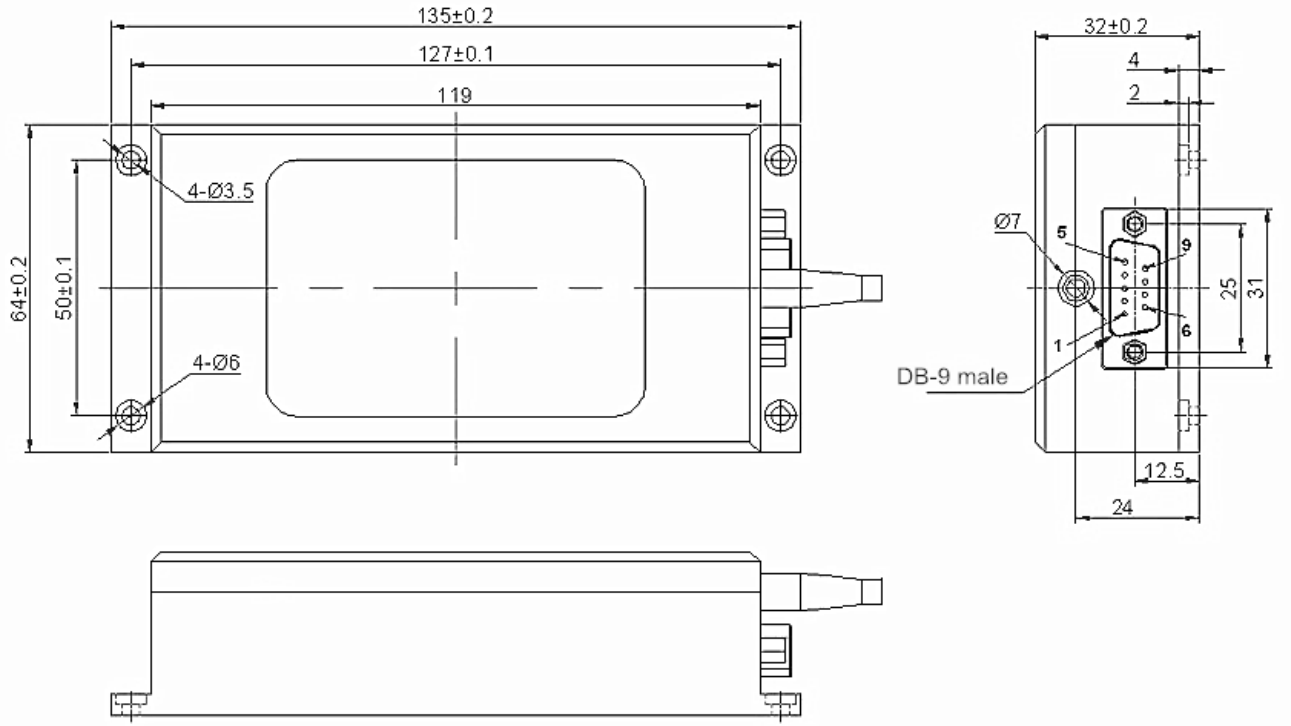| Channel | D0 | D1 | D2 | D3 | RESET |
|---|---|---|---|---|---|
| COM-0 | x | x | x | x | 0 |
| COM-1 | 0 | 0 | 0 | 0 | 1 |
| COM-2 | 1 | 0 | 0 | 0 | 1 |
| COM-3 | 0 | 1 | 0 | 0 | 1 |
| ... | ... | ... | ... | ... | 1 |
| COM-14 | 1 | 0 | 1 | 1 | 1 |
| COM-15 | 0 | 1 | 1 | 1 | 1 |
| COM-16 | 1 | 1 | 1 | 1 | 1 |

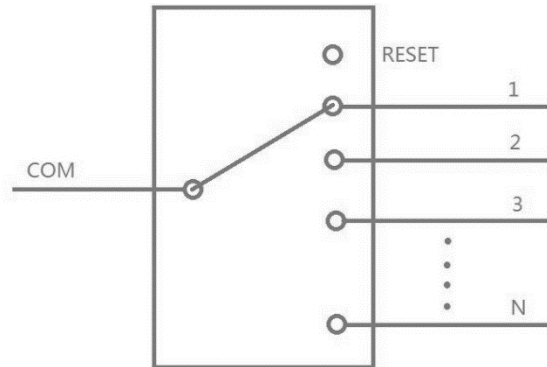# Dimension of the Single-Mode (SM) Fiber Switches
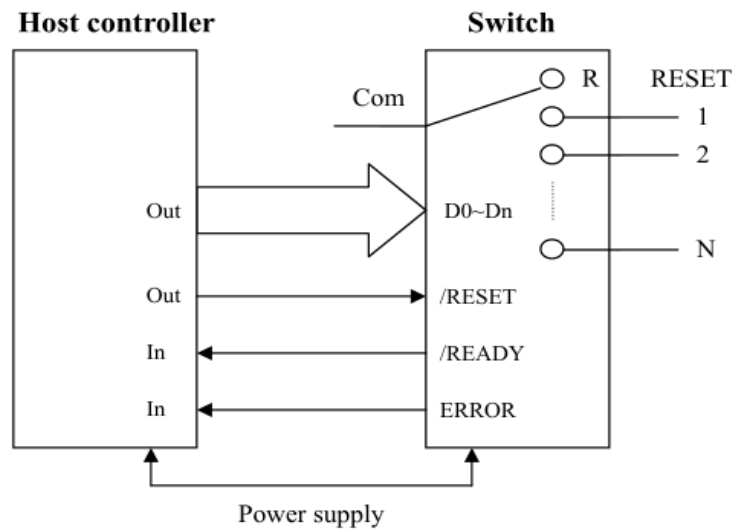
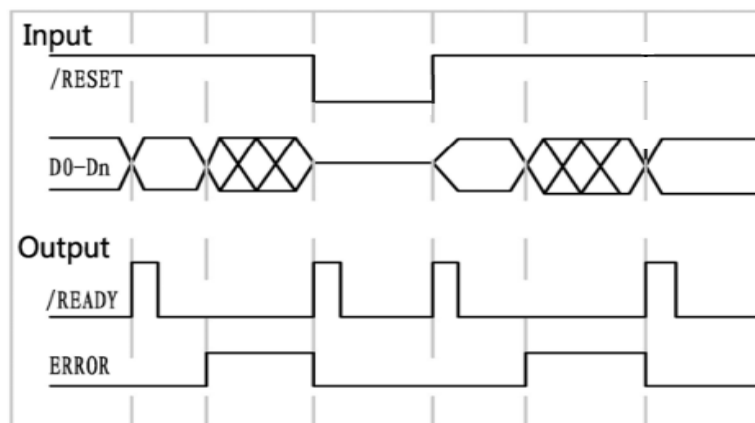## Channel Amount (N) ≤ 8
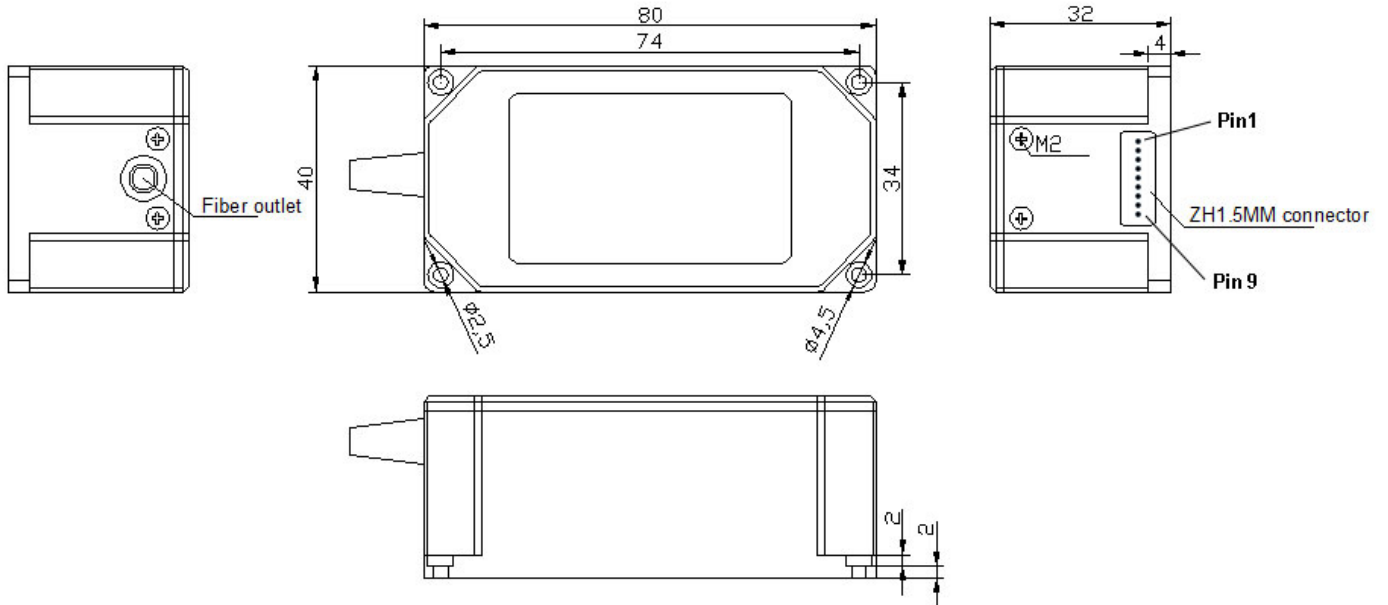
## Channel Amount (N) ≤ 16

## Optical Route of the Single-Mode (SM) Fiber Switches



## Control Chart of the Single-Mode (SM) Fiber Switches



## Timing Diagram of the Single-Mode (SM) Fiber Switches

## Operating Instructions

(1) Lfiber's single-mode (SM) fiber switches have TTL/CMOS parallel interface. To distinguish from each other, there is a mark of a number for each of the connectors. The switches are bidirectional in operation.

(2) The SM fiber switches can be controlled via TTL/CMOS parallel interface with a DB-9 connector. See the Pin Specifications and Control Chart to set the connection correctly before operations.

(3) When supply power to the switch, it will reset the 0 channel. When /READY and ERROR signals become low, the switch is ready for the data or the reset signal.

(4) Channel Selection: Set /READY signal high and then connect the data lines to select the channel. Whenever the data exceed N (the max channel of the switch), the ERROR signal becomes high, until a correct data occurred or RESET signal is given. The SM fiber switches will monitor the data lines, and switch to the position specified by the data lines.

(5) Reset Operation: Set /RESET signal low, and the device will switch to the open position. /READY and ERROR signals become low after reset operation. Never try to keep /RESET signal low all the time otherwise the SM fiber switches will repeat the reset operation until the signal goes high. The low level on the /RESET pin should not exceed 20ms.

(6) The /READY signal keeps high when the SM fiber switches are in operation (switching) and it becomes low after operations. The ERROR signal keeps high when an invalid data appears on the data line and it becomes low after reset operation or input a valid data. To understand the device's operation situation, the /READY and ERROR signal should be monitored although D0~D3 data lines are enough for the simplest application.

| Ordering Information for the Single-Mode (SM) Fiber Switches | | | | | | |
|---|---|---|---|---|---|---|
| | Number of Channels | Operating Wavelength | Fiber Type | Control Mode | Pigtail Length | Connector |
| | 1×2 | 444 nm | Single-mode fiber | TTL | 0.50 m | None |
| | 1×4 | 450 nm | | | 1.00 m | LC/UPC |
| | 1×8 | 460 nm | | | 1.50 m | LC/APC |
| | 1×16 | 532 nm | | | Custom … | SC/UPC |
| | Custom … | 630 / 632 / 633 nm | | | | SC/APC |
| | | 635 / 637 nm | | | | FC/UPC |
| | | 650 nm | | | | FC/APC |
| | | 780 nm | | | | MPO Male |
| | | 793 nm | | | | MPO Female |
| | | 830 nm | | | | Custom … |
| Single-Mode Fiber Switches | | 835 nm | | | | |
| | | 850 nm | | | | |
| | | 905 nm | | | | |
| | | 915 nm | | | | |
| | | 935 nm | | | | |
| | | 940 nm | | | | |
| | | 980 nm | | | | |
| | | 1064 nm | | | | |
| | | 1080 nm | | | | |
| | | 1300 nm | | | | |
| | | 1310 nm | | | | |
| | | 1450 nm | | | | |
| | | 2000 nm | | | | |
| | | Custom … | | | | |

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