MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

DATASHEET

Return to the Webpage

The MEMS NxM Fiber Optical Switch utilizes a reflecting silicon mirror to direct light from an input fiber from any of the N fibers to a requested output fiber among the M output fibers. This design, based on bending single crystal arms that do not fatigue or wear out, ensures high reliability and longevity in switching operations. The light path length difference between states is minimal, and the switch supports bidirectional functionality. Available in single mode, polarization maintaining, and multi-mode, the matrix switch operates independently with minimal interference during switching, supporting configurations up to 160 combinations. The switch is available as a standalone component and mounted on a PCB with control electronics powered by 5VDC. Standard control interfaces include TTL for components and USB or RS232 with GUI for PCB-mounted versions, which come with a wall-pluggable power supply and a computer interface cable, making it suitable for telecommunications, data centers, and advanced laboratory applications.

Applications

- Network
- Data Storage
- Sensor System
- Instrument

Features

- Compact
- Low Cost
- High Reliability

Specifications

Parameter		Min	Typical	Max	Unit
Wavelength	SM	780		1625	nm
	MM	850		1450	
Insertion Loss [1]	4x4		1.4	1.6	dB
	8x8		1.6	1.8	
	12x12		1.9	2	
	32x32		2.4	2.6	
	64x64		2.6	3.0	
Cross Talk, On/Off	4x4	50			dB
	8x8	50			
	12x12	45			
	32x32	45			
	64x62	45			
Return Loss [3]		45		50	dB
Repeatability		0.03		0.1	dB
Polarization Dependent Loss (SM)				0.2	dB
Polarization Dependent Loss (PM)		16	18	30	dB
Wavelength Dependent Loss [4]				0.3	dB
Temperature Dependent Loss				0.3	dB
Switching Time			10	30	ms
Optical Power Handling			300	500	mW
Life Time		10^{10}			cycle
Operating Temperature		-20		70	°C
Storage Temperature		-40		80	°C
Power Supply		0		5	VDC
Power Consumption				10	W

Notes:

[1]: SM @1550nm, measured without connectors @CWL ±30nm, 23°C: each connector adds 0.3dB. 0.7dB for 8 ch, 1dB for 12 ch, 1.2dB for 24 ch., 1.4dB for 32 ch., 1.5dB for 48 ch, 1.6 dB for 64 ch. Shorter wavelength has higher loss.

[2]: 30dB for multimode fiber, 45dB for >single mode 24 ch., 50dB for < single mode 16 ch.

[3]: 30dB for multimode fiber, 50dB for single mode

[4]: @CWL ±30nm, 23°C

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Rev 09/05/24

P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

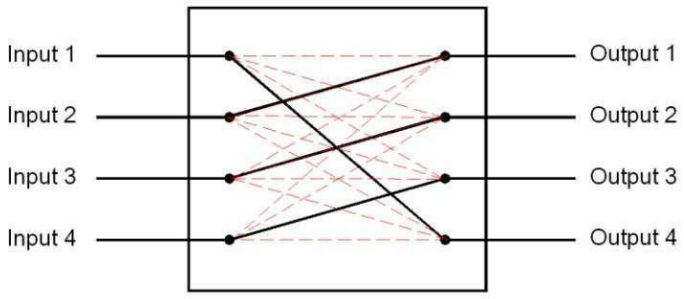
MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

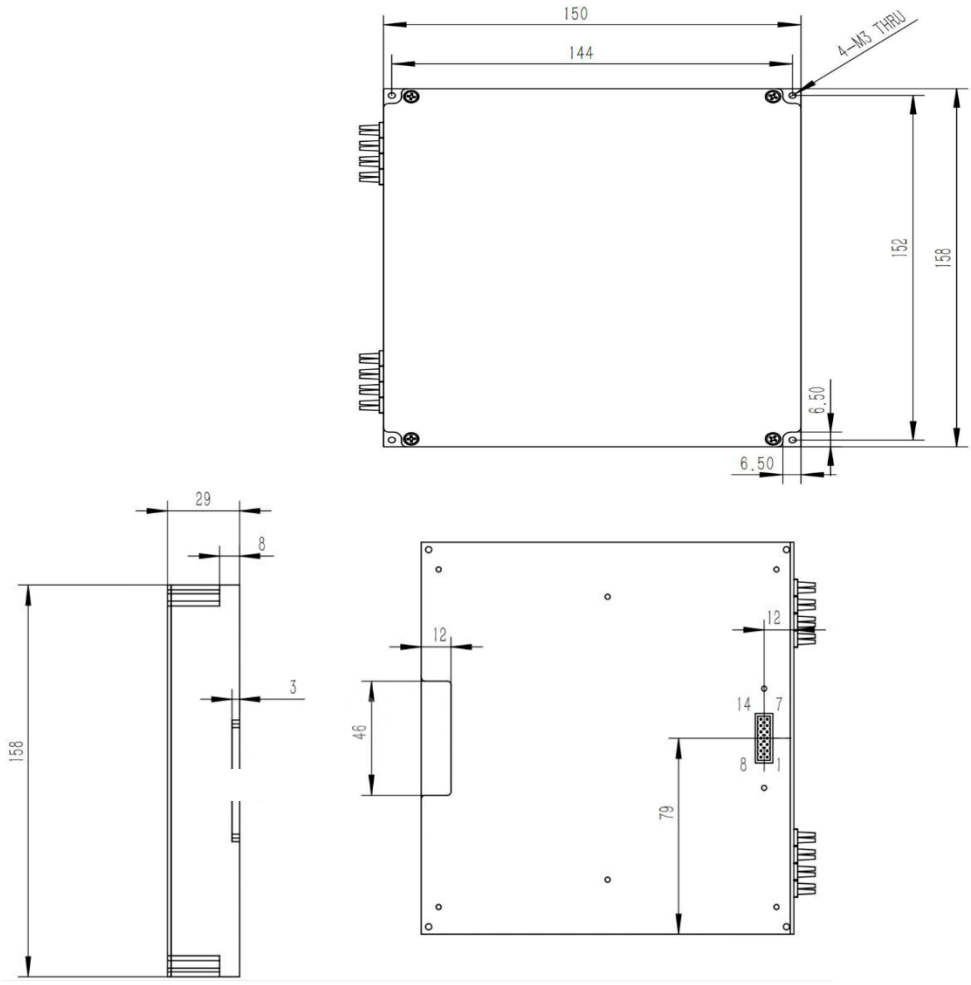
DATASHEET

Optical Path Diagram

Switchable fiber loops in series



Mechanical Dimensions (mm)

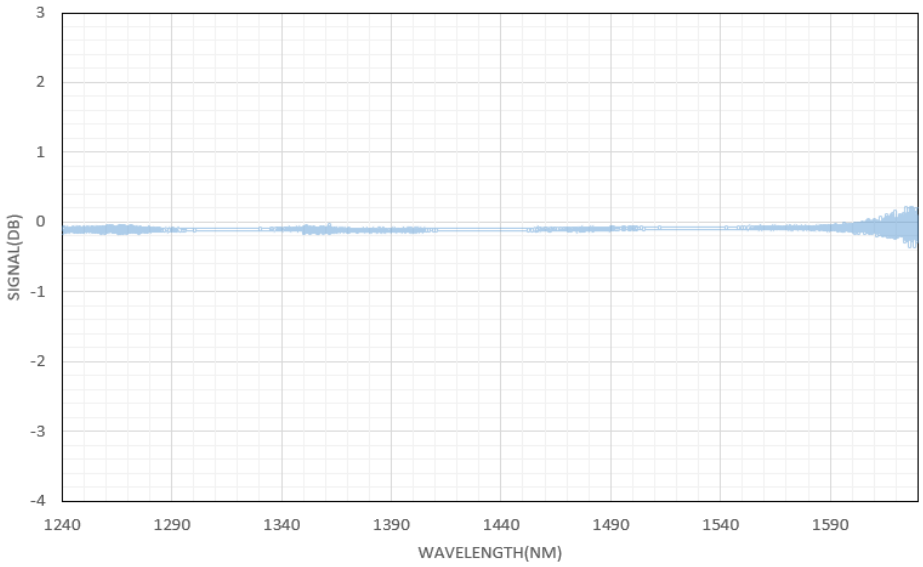


MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

DATASHEET

Typical Insertion Loss vs Wavelength (1240-1630nm)



P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

DATASHEET

Ordering Information

	☐☐☐☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Configuration**	**Wavelength**	**Driver***	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**	**On/Off**	**ER**
MSWM-	4x4 = 0404 8x8 = 0808 12x12 = 1212 16x16 = 1616 24x24 = 2424 32x32 = 3232 48x48 = 4848 64x64 = 6464 ...	1240-1680nm = 1 1550nm = 5 1310nm = 3 1310/1550nm = B 850nm = 8 760-1360nm = C 1060nm = 6 980nm = 9 780nm = 7 1950nm = D 895nm = E Special = 0	UART = U RS232/TTL = 2 USB/TTL = 1 Special = 0	SM28 = 1 50/125 = 2 Hi1060 = 3 PM1550 = 4 62.5/125 = 5 SM600 = 6 SM1950 = 9 SM800 = 8 Hi780 = 7 PM850 = E PM980 = F PM1310 = D Special = 0	Bare fiber = 1 0.9mm 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 SC/UPC = S ST/PC = 6 LC/PC = 7 MTP = 9 LC/APC = A LC/UPC = U Special = 0	Regular = 1 SM70dB = 2 MM50dB = 3	Regular = 1 23 = 2 29 = 3

* The component has UART control.
We provide driving PCB to mount the switch
Driver Part Number: **SWDR-MEMSNXM11**

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.

MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

DATASHEET

USB/TTL Driver Description

The MSWH MEMS NXM Driver is compatible with MEMS NxM switches (Up to 64 ports). It has three control modes: Onboard Switch; TTL; USB (Virtual COM) with a user-friendly GUI Windows™ program supporting UART commands. It is intended for convenient laboratory use or switch performance evaluation. The unit has a mini USB connector with a USB-to-MicroUSB cable. It can be powered by 5V USB cable and USB power supply or via onboard 5V-GND holes.

Mechanical Dimension

Manual Operation Instruction

- **Power the Board**

The unit can be powered up via 5V USB power supply.

- **Onboard Switch Control**

Onboard DIP-6 switch is available for quick TTL function test and fast manual control. After setting the DIP-6 switch, press the STROBE button to change the channel of MEMS 1xN switch.

MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

DATASHEET

TTL Operation Instruction

- **TTL Interface Definition**

Name	Direction	Description
5V	Power	The driver board can also be powered up via these two holes.
GND	Ground	
D0-D5	Input	6 Pin TTL
STR	Input	STROBE, Send a pulse to set the switch channel
RST	Input	RESET, Send a pulse to reset switch status
BUSY	Output	Logic HIGH when the device is busy
ALARM	Output	Logic HIGH when the device meets error when booting/ high temperature

CH	D5	D4	D3	D2	D1	D0
1	0	0	0	0	0	0
2	0	0	0	0	0	1
3	0	0	0	0	1	0
.						
64	1	1	1	1	1	1

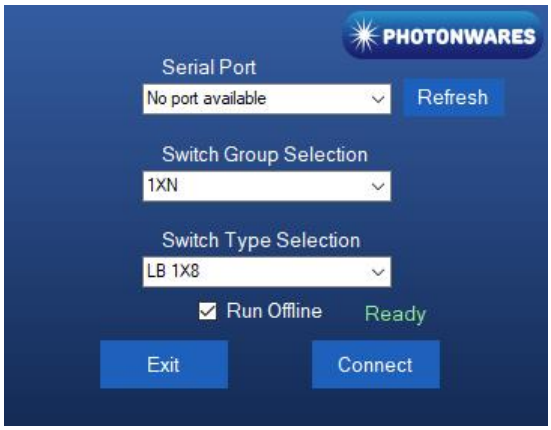
Computer Graphic Software User Guide

- **Install the Program**

Click on setup.exe for the automatic installation, which should be provided with the product.

- **Run the Program**

Run the “Switch Operation Program.exe” and the program will open the configuration window. Select the correct Switch Group and select the specific Switch Type. Then click the “Connect” button and the program will establish the connection between PC and board.



MEMS NxM Fiber Optical Switches

780-1625nm, up to 70dB On/Off, up to 30dB PER, SM, PM, MM, bidirectional

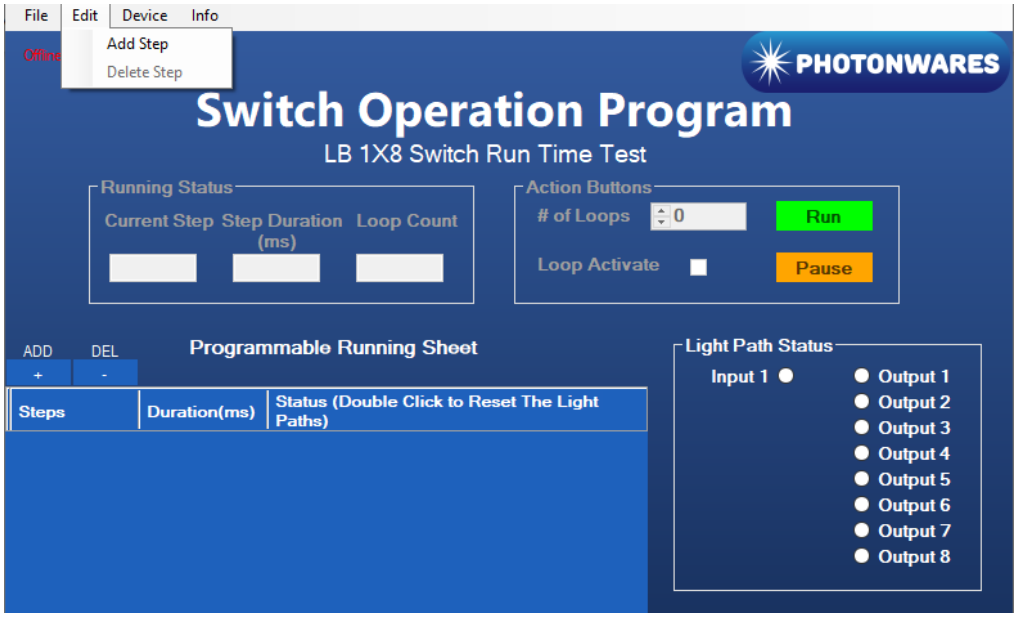
DATASHEET

TTL Operation Instruction

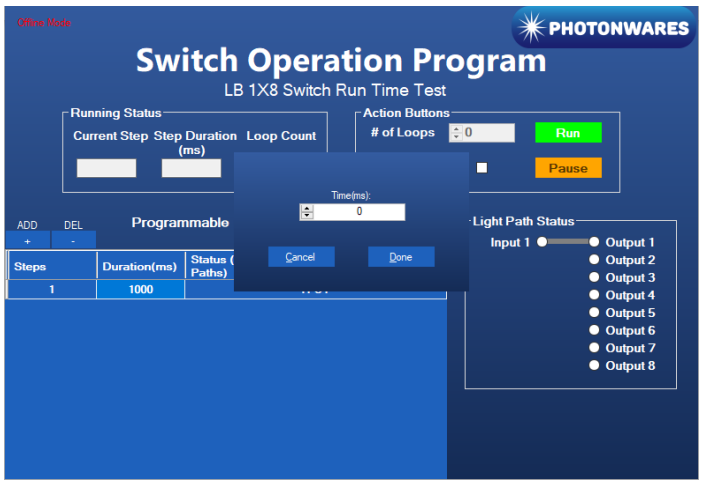
- **Create and edit testing time sequence**

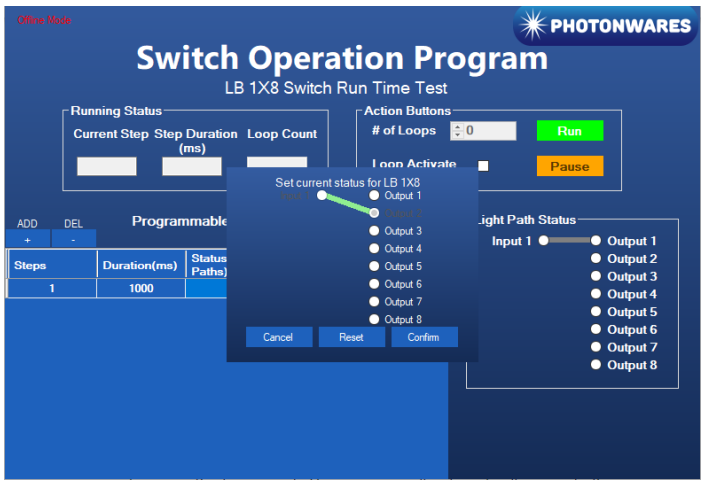
Add step: Click the “Add Step” button in the menu strip or click the “+(ADD)” button would both add a step to the Programmable Running Sheet.

Delete step: Click the “Delete Step” button in the menu strip or click the “-(DEL)” button would both delete a step in the Programmable Running Sheet.



Edit step: There are two things that you can modify for one step. One is the light path, and the other is the duration for each step. Double click the cell that you want to modify, and the program will allow you to modify the setting.





Command List

- **Command in Serial**

The serial communication should be set in **115200 baud rate, none parity, 8 data bits, 1 stop bits**.

Command in **ASCII**:

1. Check PN of device:
CMD: *PN<cr>
RTN: <cr><lf>AB.CD.EFGH<cr><lf>

2. Check SN of device:
CMD: *SN<cr>
RTN: <cr><lf>ABCDEFGHIJ<cr><lf>

3. Set Channel:
CMD: *SWABC<cr>
RTN: <cr><lf>CHAN:ABC<cr><lf>

Example: *SW001<cr> RTN: <cr><lf>CHAN:001<cr><lf>

Note: <cr> is 0x0C in HEX, \n in ASCII