MEMS Quad 1x16 Fiber Optical Switches

1260-1625nm, Crosstalk up to 70dB, Bidirectional, SM28, 3 year warranty

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The MEMS Quad 1x16 Fiber Optical Switch is based on a reflecting silicon mirror that directs light from an input fiber to the requested output fiber among the 16 output fibers. The difference in light path length between each state is small. The switch is bidirectional. The matrix switch is truly independent, with little hit interferences during the switching. The module integrated four 1x16 in a compact metal casing. It contains a PCB with control electronics powered by 5VDC. TTL control interface is standard. USB or RS232 with GUI is achieved through an optional adapting board that comes with a wall pluggable power supply and a computer interface cable. The module is in compliance with RoHS, CE, and GR-1073 standards. The package is rugged, with optical and electrical interface connectors on the box.

Applications

- Network
- Data Storage
- Sensor System
- Instrument

Features

- Crosstalk up to 70dB
- Compact
- Low Cost
- High Reliability

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	1260		1625	nm
Insertion Loss [1]		1.4	1.6	dB
Cross Talk, On/Off	50			dB
Return Loss [3]	45		50	dB
Repeatability	0.03		0.1	dB
Polarization Dependent Loss			0.2	dB
Wavelength Dependent Loss [4]			0.3	dB
Temperature Dependent Loss			0.3	dB
Switching Time		5	30	ms
Optical Power Handling		300	400	mW
Life Time	10^{10}			cycle
Operating Temperature	-20		70	°C
Storage Temperature	-40		80	°C
Operation Humidity			90	%RH
Storage Humidity			95	%RH
Power Supply	0		5	VDC
Power Consumption			2	W
Fiber Type		G657A2		
Fiber Connect Type	MU adapter x 4 pcs		MPO adapter x 8 pcs	

Notes:

[1]: measured without connectors @1550nm ±30nm, 23°C: each connector adds 0.3dB. 0.6dB for 1x16,

[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 08/21/24

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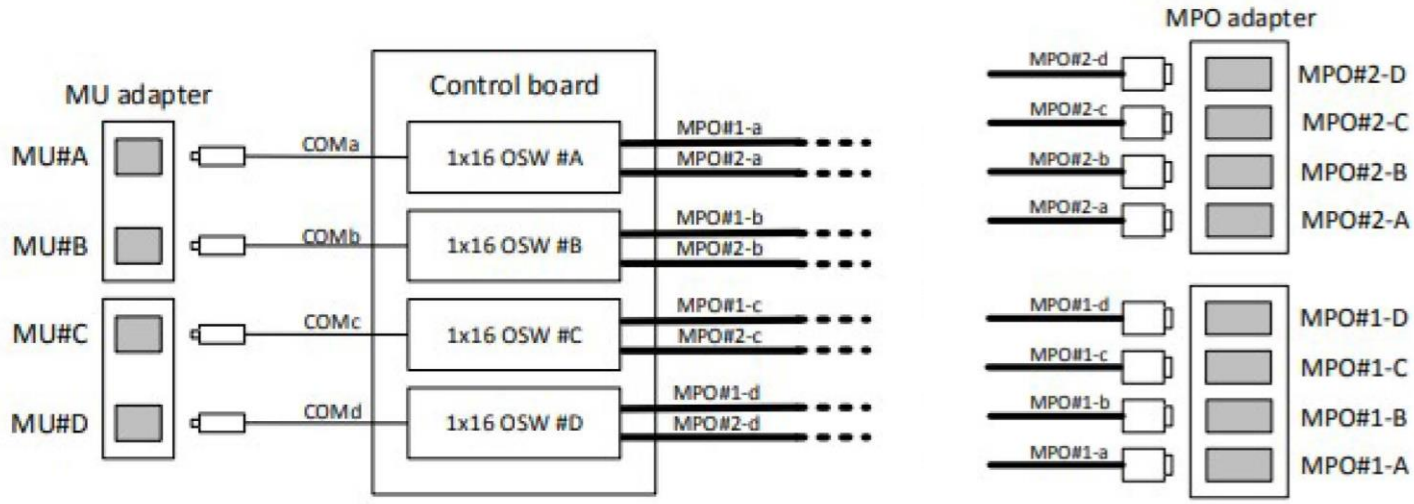
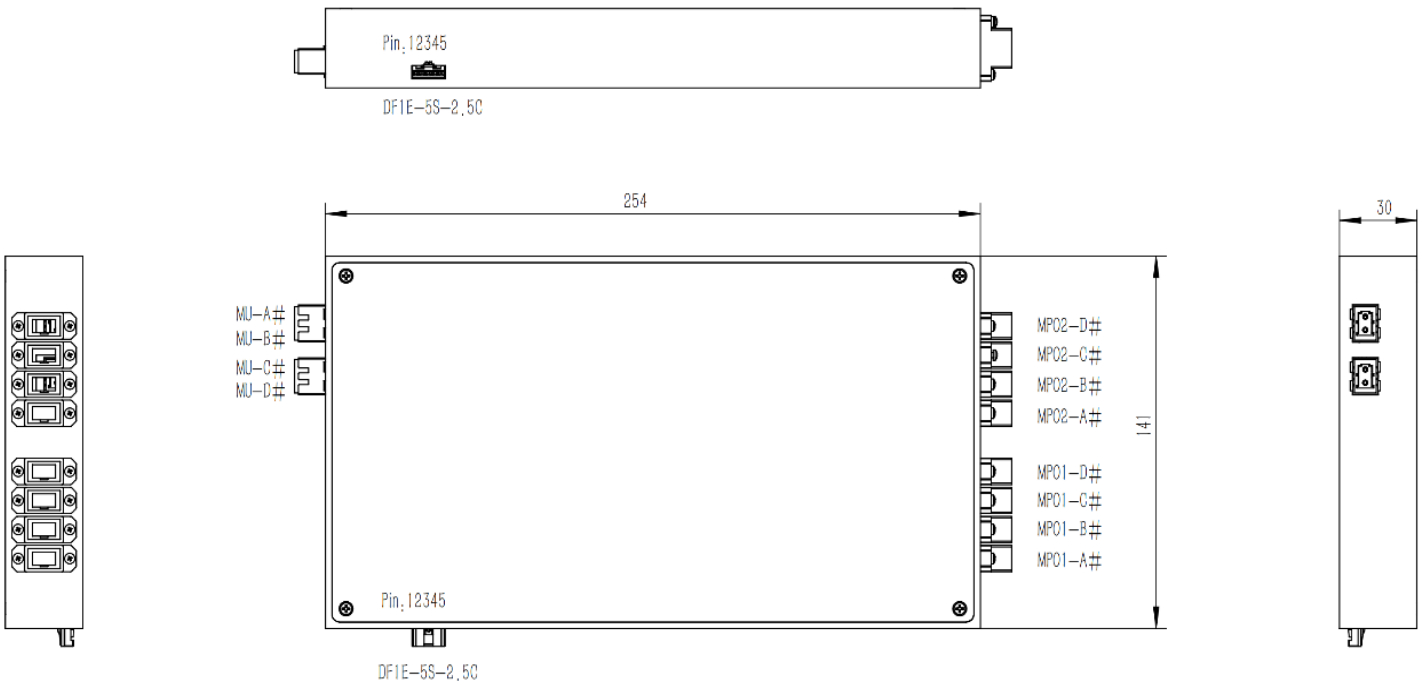
Optical Path Diagram



Mechanical Dimensions (mm)



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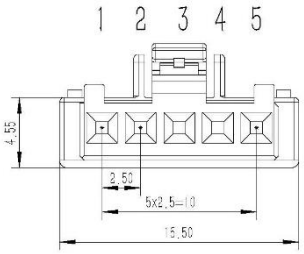
Electrical Driving Pin Definition



Pin	Name	Function	Level
1	VCC	Power Supply	5.0±5% V
2	GND	Ground	0
3	I2C Clock[1]	I/O	LVTTL
4	I2C Data[1]	I/O	LVTTL
5	Reset[2]	I	LVTTL

I2C

- Bus

I²C Bus Specifications	Minimum	Typical	Maximum
I²C Clock Frequency	10kHz	100kHz	100kHz
Capacitive Loading			400pF

- Address

1	1	1	0	0	0	0	R/W

Communication Protocol

- Command

FLAG1	LEN	RES	CMD	DATA	SUM
2 Byte	1 Byte	1 Byte	1 Byte		1 Byte

FLAG1: 0xEFEF
LEN: Total number of bytes from RES to SUM
RES: 0xFF
SUM: Checksum, SUM=FLAG+LEN+RES+CMD+DATA

- Response

FLAG2	LEN	RES	RESP	DATA	SUM
2 Byte	1 Byte	1 Byte	1 Byte		1 Byte

FLAG2: 0xEDFA
LEN: Total number of bytes from RES to SUM
RES: 0xFF
SUM: Checksum, SUM=FLAG+LEN+RES+ RESP+DATA

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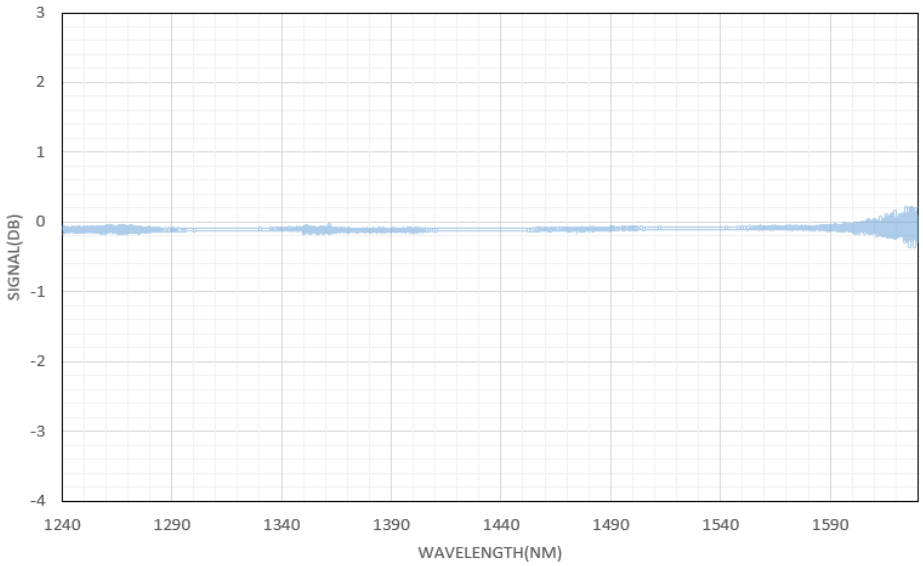
Typical Insertion Loss vs Wavelength (1240-1630nm)



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Ordering Information

	0416	☐	☐	☐	☐	☐	☐	☐
Prefix	**Configuration**	**Wavelength**	**Control**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**	**Enclosure**
MSWJ-		1240-1630nm = 1 1550nm = 5 1310nm = 3 1310/1550nm = B 850nm = 8 850/1310 = C 1060nm = 6	TTL = 1 USB = 2 RS232 = 3 I2C = 5 Special = 0	SM28 = 1 50/125 = 2 Hi1060 = 3 PM1550 = 5 Special = 0	Bare fiber = 1 900um 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/UPC = U Special = 0	None = 1 Benchtop = B

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.

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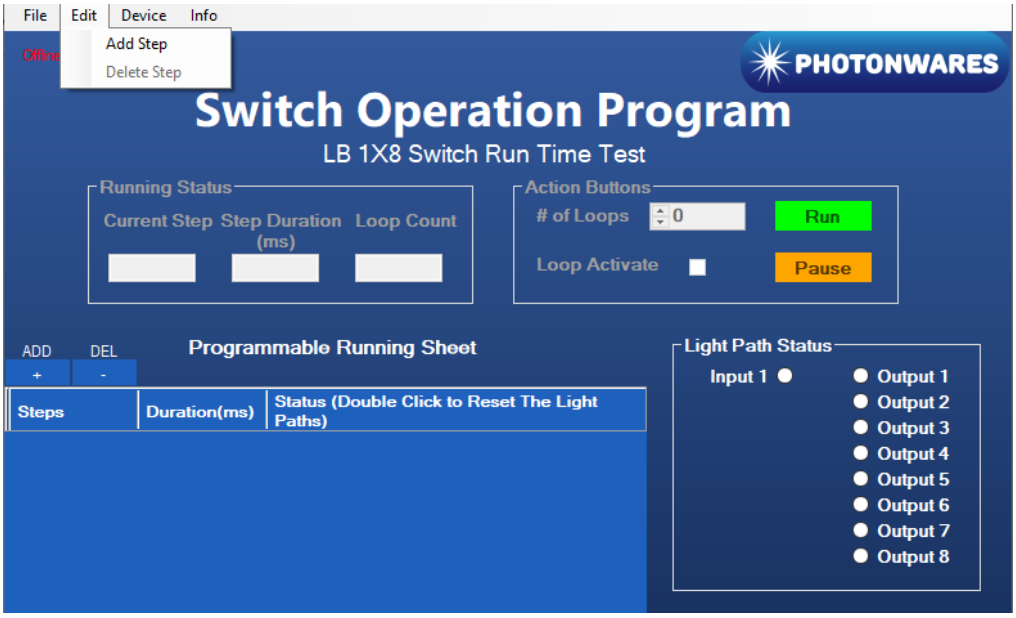
USB Control/ GUI

We provide an adapting PCB for USB (Virtual COM) control 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 an accompanied 5V wall pluggable power supply.

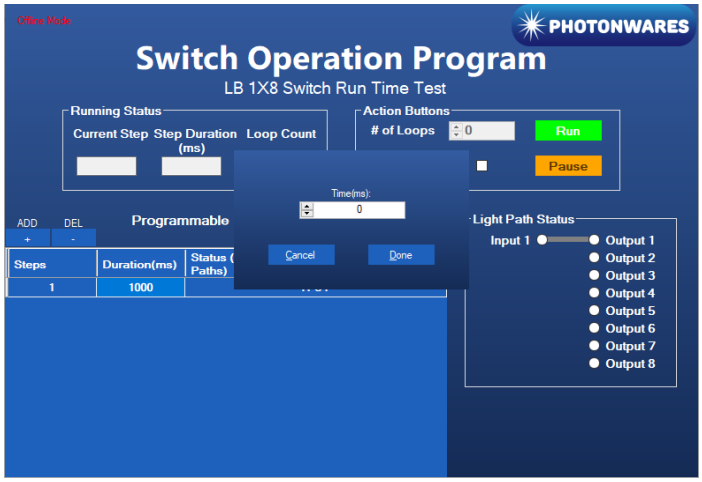
- **Create and edit testing time sequence**

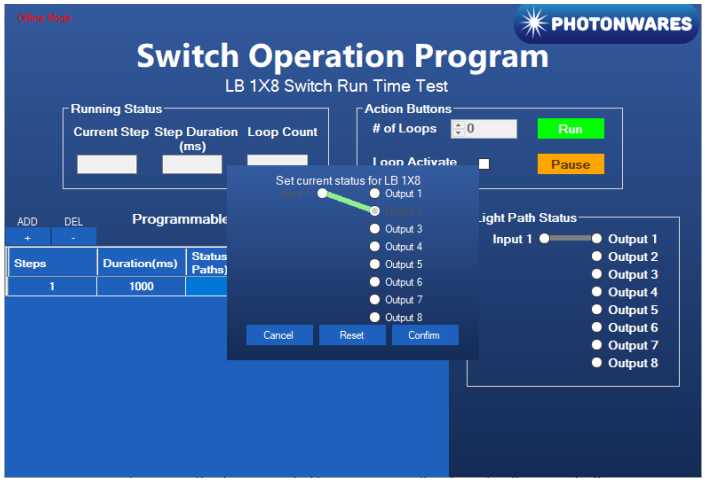
Add step: Click the "Add Step" button in the menu strip or click the "+(ADD)" button would both add a step to the Programmable Running Sheet.

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.





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Command List

Set Channel for switch x						
Command	FLAG1	LEN	RES	CMD	DATA	SUM
	0xEFEF	0x06	0xFF	0x0D	3 bytes	SUM
	Byte 1 = switch index, from 1 to 4 Byte 2~3 = channel = (Byte_2<<8) + Byte_3					
Response	FLAG2	LEN	RES	RESP	DATA	SUM
	0xEDFA	0x04	0xFF	0x0D	1 byte	SUM
	Result = 0xEE		Success			
	Result = 0xEF		Fail			

Get Channel for switch x						
Command	FLAG1	LEN	RES	CMD	DATA	SUM
	0xEFEF	0x04	0xFF	0x0E	1 byte	SUM
	DATA = switch index, from 1 to 4					
Response	FLAG2	LEN	RES	RESP	DATA	SUM
	0xEDFA	0x05	0xFF	0x0E	2 bytes	SUM
	DATA = Channel = (Byte_1<<8) + Byte_2					

Read Module Information						
Command	FLAG1	LEN	RES	CMD	DATA	SUM
	0xEFEF	0x03	0xFF	0x01		SUM
Response	FLAG2	LEN	RES	RESP	DATA	SUM
	0xEDFA	0x27	0xFF	0x01	36 bytes	SUM

Item	Bytes	Type	Note
Vendor Code	10	ASCII	
Reserved	10	ASCII	Information about the channel and the type
Hardware Version	2	Hex	X.Y (X—byte0 Y—byte1)
Firmware Version	2	Hex	X.Y (X—byte0 Y—byte1)
Production Date	4	Hex	YYYY—MM—DD YYYY—byte0 byte1 MM—byte2 DD—byte3
Serial Number	8	ASCII	

Reset Module					
Command	FLAG1	RES	CMD	DATA	SUM
	0xEFEF	0xFF	0x03		SUM
Response	FLAG2	RES	RESP	DATA	SUM
	0xEDFA	0xFF	0x03		SUM