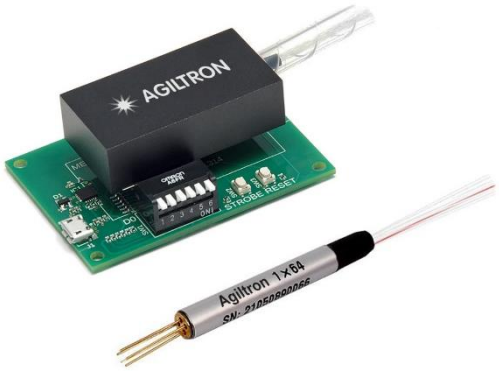
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Return to the Webpage



The MEMS 1xN Fiber Optical Switch utilizes a reflecting silicon mirror to direct light from an input fiber to the requested output fiber among the N 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 that can be used as Nx1. Available in single mode, polarization maintaining, and multi-mode. 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 them suitable for telecommunications, data centers, and advanced laboratory applications.

Applications

- Network
- Data Storage
- Sensor System
- Instrument

Features

- Up to 380 Channels
- Crosstalk up to 70dB
- 780 to 2100nm
- SM, PM
- Compact
- Low Cost
- Bidirectional
- High Reliability

Specifications

Parameter		Min	Typical	Max	Unit
Wavelength		750		2200	nm
Wavelength Range			± 30		nm
Insertion Loss [1]		0.7		1.6	dB
	<32 Channel	0.4	0.7	0.9	dB
	>32 Channel	1	1.3	1.6	
Cross Talk [2]	SM	55	60	70	dB
	MM	30	45	50	
Return Loss [3]	SM	50	50	55	-dB
	MM	30	30	35	
Repeatability		0.03		0.05	dB
Polarization Dependent Loss (SM)			0.05	0.1	dB
Polarization Extinction Ratio (PM)		18	23	29	dB
Wavelength Dependent Loss [2]				0.3	dB
Temperature Dependent Loss				0.2	dB
Switching Time			5	10	ms
Actuation			No-latching		
Optical Power Handling				500	mW
Life Time		10^{10}			cycle
Operating Temperature		-5		70	°C
Storage Temperature		-40		80	°C
Power Supply		0		5	VDC
Operation Current				500	mA
Digital Logic High		3.3		5	VDC
Power Consumption				100	mW

Notes:

[1]: measured at 1550nm without connectors @CWL ±30nm, 23°C: other wavelength may be larger but less than 2dB. Each connector adds 0.3dB.
At 750nm, the loss is about 3dB for 1x8

[2]: @CWL ±30nm, 23°C

[3]: measured without connectors. With FC/ACP single mode fiber RL~60dB, and multimode fiber <40dB

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 08/11/25

© Photonwares Corporation

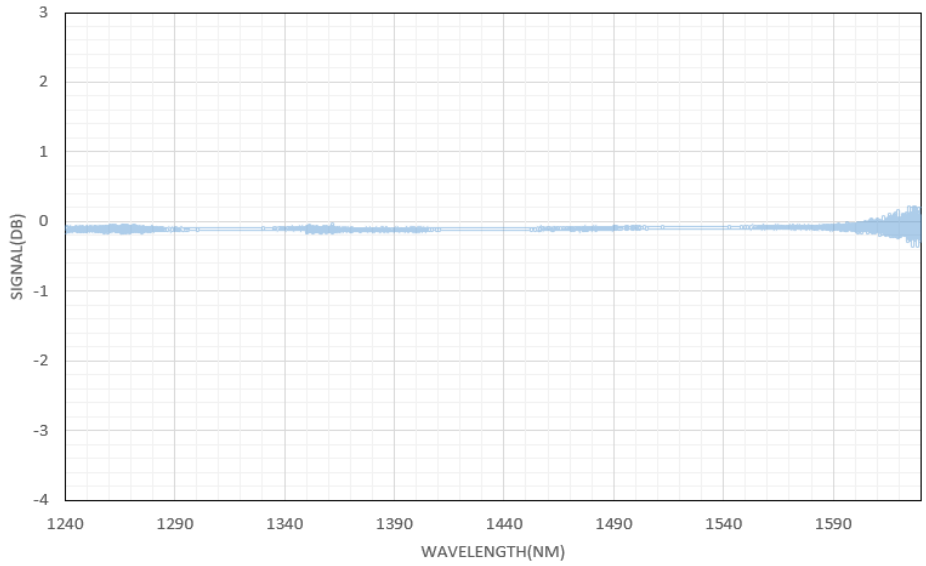
P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Typical Insertion Loss vs Wavelength (1240-1630nm)



The oscillations at the long wavelength end is due to low light SLED source intensity

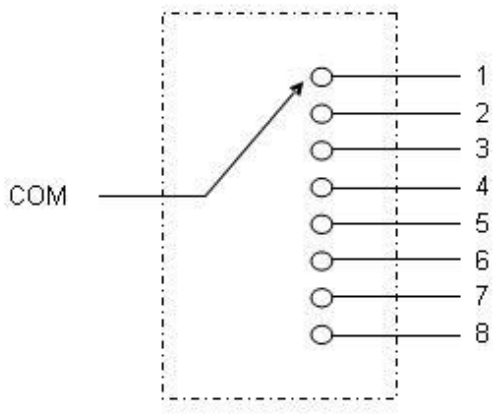
P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

MEMS 1xN Fiber Optical Switch

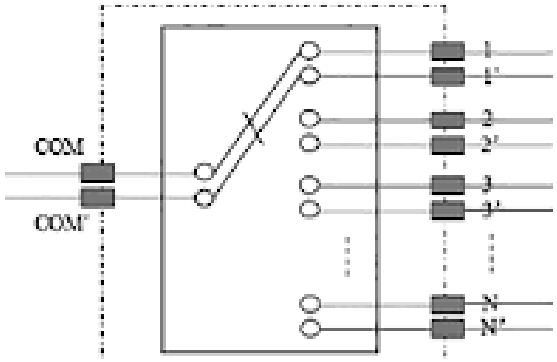
N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Optical Path Diagram



- 1x8



- Duplex 1xN

Three Package Formats

- Device (with calibration table)

- Mounted on TTL PCB with PINS

- Mounted on USB/RS232/TTL PCB with Power Supply

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

MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Ordering Information

	☐☐☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Configuration**	**Wavelength [1]**	**Driver [2]**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**	**On/Off**	**PER**	**Enclosure**
MSWH-	1x4 = AA4 1x6 = AA6 1x8 = AA8 1x12 = A12 ... 1x64 = A64 ... 1x256 = 256 ... 1x380 = 380	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	USB/TTL = 1 RS232/TTL = 2 TTL (O type) = T I2C (O) = C UART = A Non (bare) = N Special = 0	SM28 = 1 50/125 = 2 Hi1060 = 3 PM1550 = 4 62.5/125 = 5 105/125 = A 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 MPO = Y Special = 0	Regular = 1 SM/PM>62dB =2 MM>50dB = 3	Non = N Regular =1 23 = 2 29 = 3	None = 1 Benchtop = B Rack = R

[1]. Selections of 5, 3, B are the same device as 1, Selection 8 and C are the same device, but test at different wavelength with extra cost.

[2]. Selections 1 and 2 are mounted on plug-play drivers: Driver Part Number: **SWDR-S1XN2D5VSUSB/TTL.** Driver Part Number: **SWDR-S1XN2D5VSRS232/TTL**

Selections T, C , and A are mount on PCB with specific pin definition

Selection Non is bare switch comes with a look-up position voltage table.

Note:

- **PM1550** fiber works well for **1310nm**

Application Notes

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.

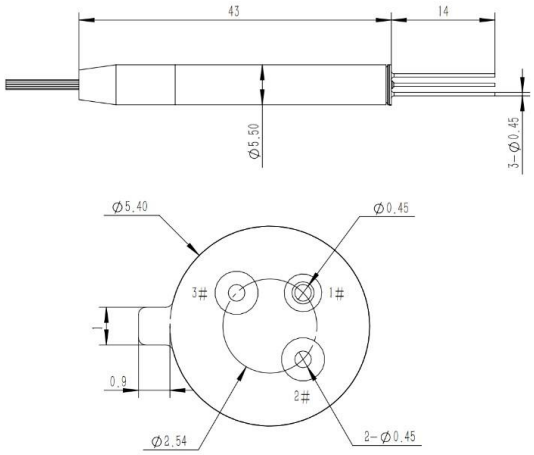
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

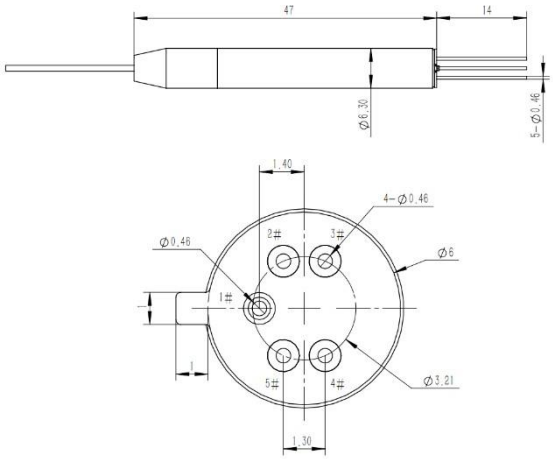
Dimension (mm) Bare Components (A Type)

1xN, N<16



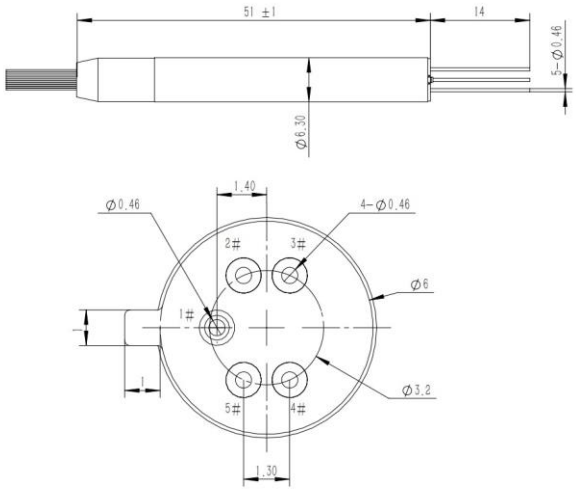
Pin number	Description
1	GND
2	Axis Y
3	Axis X

1xN, 16<N<32



Pin number	Description
1	GND
2	Axis X+
3	Axis Y-
4	Axis X-
5	Axis Y+

1xN, 32<N<64



Pin number	Description
1	GND
2	Axis X+
3	Axis Y-
4	Axis X-
5	Axis Y+

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

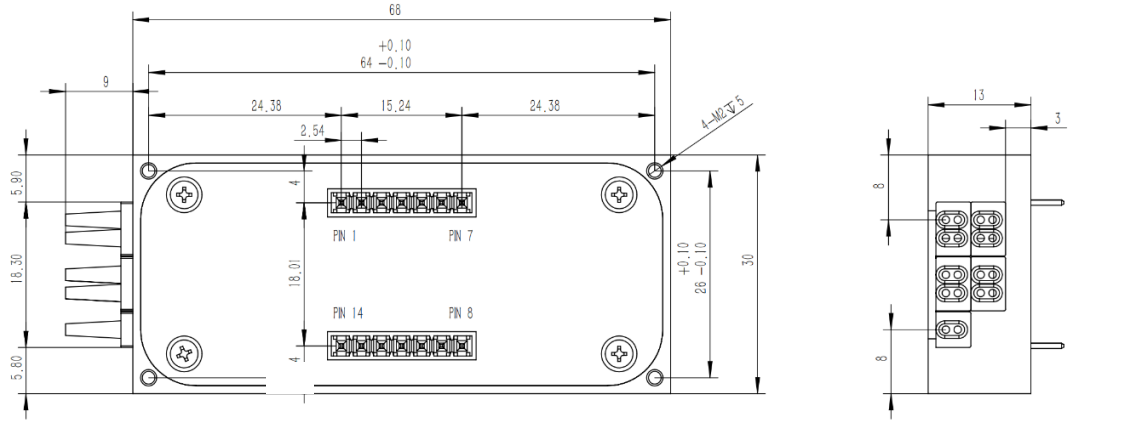
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

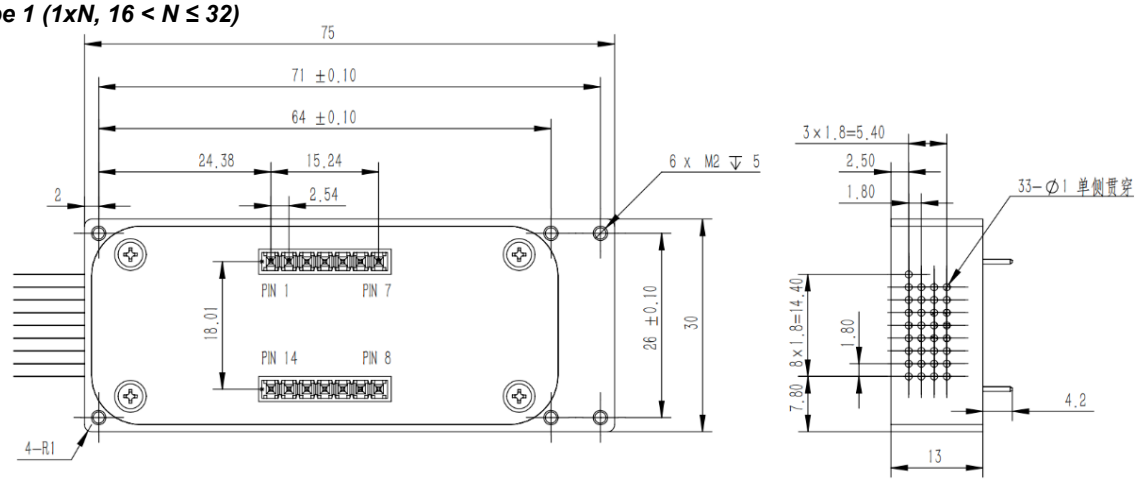
DATASHEET

Dimension (mm) Type A Mounted on PCB for Selection A

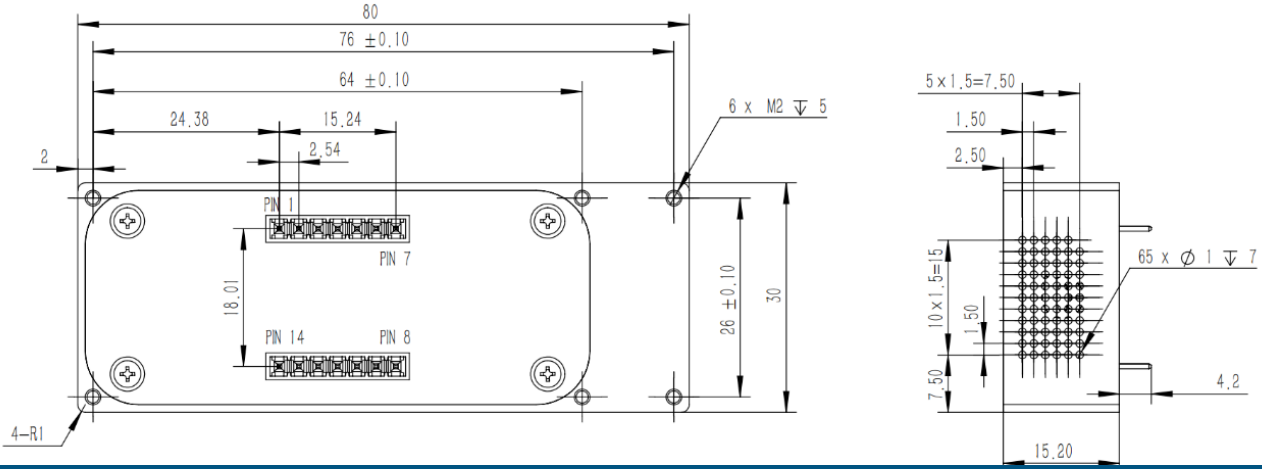
Module Type 1 (1xN, 2 < N ≤ 16)



Module Type 1 (1xN, 16 < N ≤ 32)



Module Type 1 (1xN, 48 ≤ N ≤ 64)



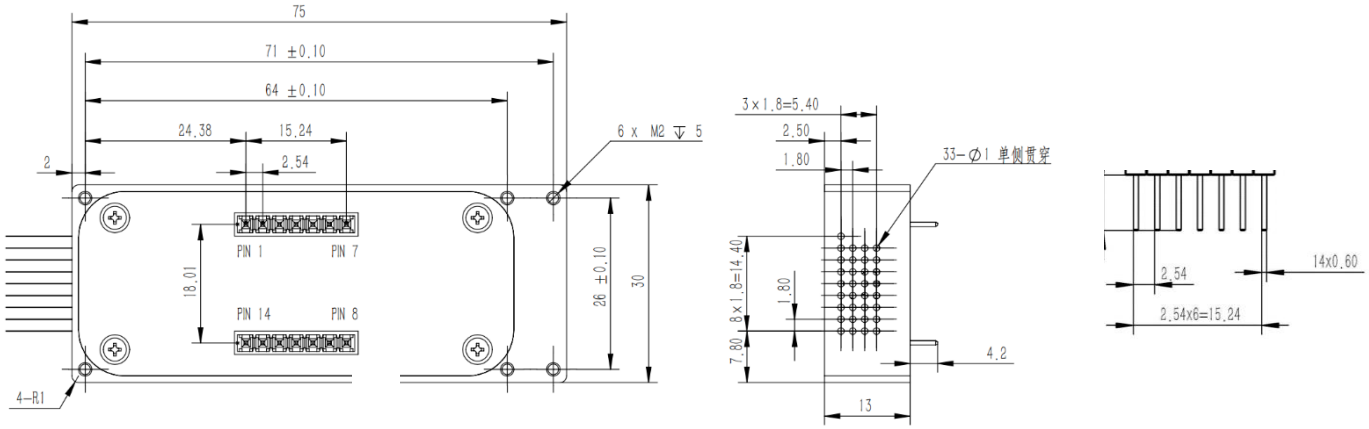
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

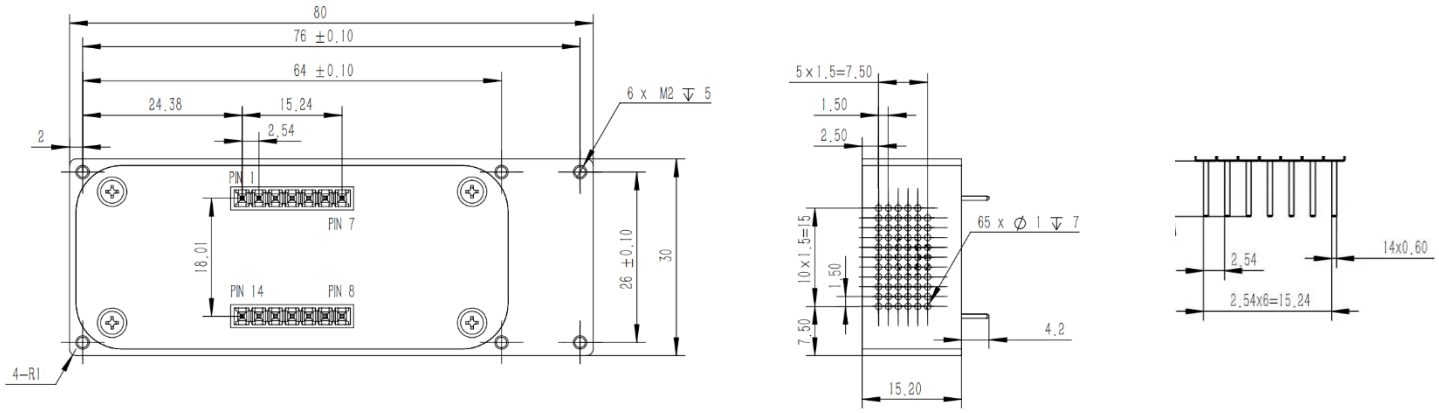
DATASHEET

Dimension (mm) Type O Mounted on PCB for Selection T and C

Module Type 1 (1xN, 2 < N ≤ 32)



Module Type 1 (1xN, 48 ≤ N ≤ 64)



PIN Definition

Pin	Type	Description	Input/Output	Remark
1	D0	Parallel Data Interface 0	Input	TTL (H level default)
2	D3	Parallel Data Interface 3	Input	TTL (H level default)
3	D4	Parallel Data Interface 4	Input	TTL(H level default)
4	VIN	Power Input	Input	DC 5V~12V
5	GND	GND	Input	
6	D5	Parallel Data Interface 5	Input	TTL (H level default)
7	D2	Parallel Data Interface 2	Input	TTL (H level default)
8	TX	Serial port send	Output	TTL
9	RX	Serial port receive	Input	TTL
10	D1	Parallel Data Interface 1	Input	TTL
11	BUSY	Busy signal, high level indicates busy	Output	TTL
12	ALARM	Alarm signal, high level indicates high temperature or Initial Abnormal	Output	TTL
13	STROBE	Signal of parallel port selection, falling edge is effective	Input	TTL (H level default)
14	RESET	Hardware reset, low level effective	Input	TTL

MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Electronic PINs Definition

UART Definition (Default)

Pin	Name	Description	Input / Output	Level
1	NC		No connect	
2	VCC	+(5.0±5%) V Power Supply Max 150mA	Power supply	
3	I/O	Reserved		LVTTL
4	GND	Power supply ground		
5	I/O	Reserved		LVTTL
6	TXD	UART serial data output	Output	LVTTL
7	RXD	UART serial data output	Input	LVTTL
8	I/O	Reserved		LVTTL
9	I/O	Reserved		LVTTL
10	I/O	Reserved		LVTTL
11	Case GND	Case ground		
12	I/O	Reserved		LVTTL
13	I/O	Reserved		LVTTL
14	RESET	Reset, low active, the pulse width needs 4ms	Input	LVTTL

UART & Parallel Definition (Optional)

Pin	Name	Description	Input / Output	Level
1	NC		No connect	
2	VCC	+(5.0±5%) V Power Supply Max 150mA	Power supply	
3	STROBE	Falling edge active	Input	LVTTL
4	GND	Power supply ground		
5	D0		Input	LVTTL
6	TXD	UART serial data output	Output	LVTTL
7	RXD	UART serial data output	Input	LVTTL
8	D4		Input	LVTTL
9	D2		Input	LVTTL
10	DONE	Switch done, active low	Output	LVTTL
11	Case GND	Case ground		
12	D1		Input	LVTTL
13	D3		Input	LVTTL
14	RESET	Reset, low active, the pulse width needs 4ms	Input	LVTTL

IIC Definition (Optional)

Pin	Name	Description	Input / Output	Level
1	NC		No connect	
2	VCC	+(5.0±5%) V Power Supply Max 150mA	Power supply	
3	I/O	Reserved		LVTTL
4	GND	Power supply ground		
5	I/O	Reserved		LVTTL
6	I2C Data [1]	I2C interface Data	I/O	LVTTL
7	I2C Clock [1]	I2C interface Clock	I/O	LVTTL
8	I/O	Reserved		LVTTL
9	I/O	Reserved		LVTTL
10	I/O	Reserved		LVTTL
11	Case GND	Case ground		
12	I/O	Reserved		LVTTL
13	I/O	Reserved		LVTTL
14	RESET	Reset, low active, the pulse width needs 4ms	Input	LVTTL

Notes:

[1]. Please pull up 4.75k resistor to 3.3V in the module;

[2]. Please pull up 4.75k resistor to 3.3V on mother board;

[3]. Please pull up 4.75k resistor to 3.3V in the module. A negative pulse ≥1ms.

UART Control Setting

Baud Rate: 115200
Start Bits: 1
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Parallel Digital I/O Control

TTL control can only be used for optical switches with up to 32 channels with 5 TTL control pins (D0~ D4).

Channel	D4	D3	D2	D1	D0
CH1	0	0	0	0	0
CH2	0	0	0	0	1
CH3	0	0	0	1	0
CH4	0	0	0	1	1
...	...	...	...	...	...
CH8	0	0	1	1	1
CH16	0	1	1	1	1
CH32	1	1	1	1	1

Notes:

When optical switch is 1x8，D3 and D4 is not used. Similarly for other 1xN.

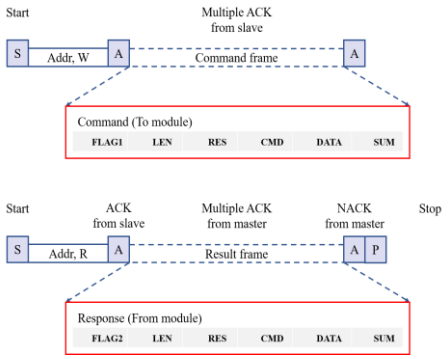
I2C Bus

I²C bus specifications	Minimum	Typical	Maximum
I²C Clock frequency	10kHz	100kHz	100kHz
Capacitive loading			400pF

The list shows the commands, which are sent to module, and the response from the module.

I2C address:

1	1	1	0	0	0	0	R/W



Communication Protocol

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	LEN	RES	CMD	DATA	SUM
	0xEFEF	0x03	0xFF	0x03		SUM
Response	FLAG2	LEN	RES	RESP	DATA	SUM
	0xEDFA	0x03	0xFF	0x03		SUM

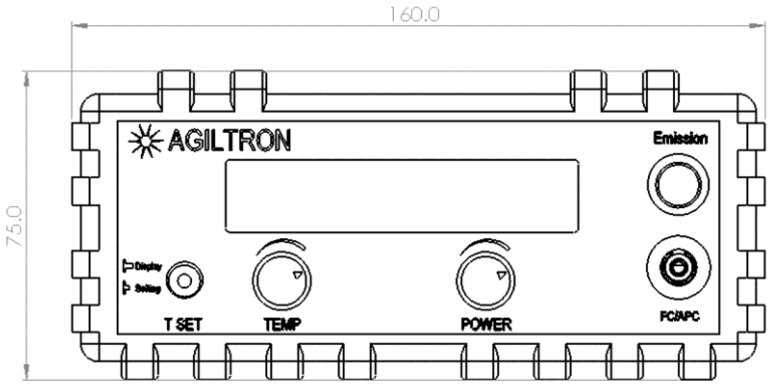
P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

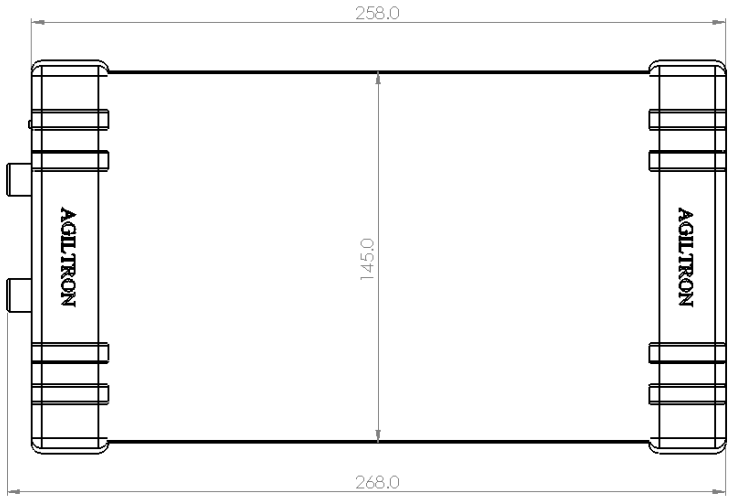
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Mechanical Dimension (mm) -- Benchtop





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

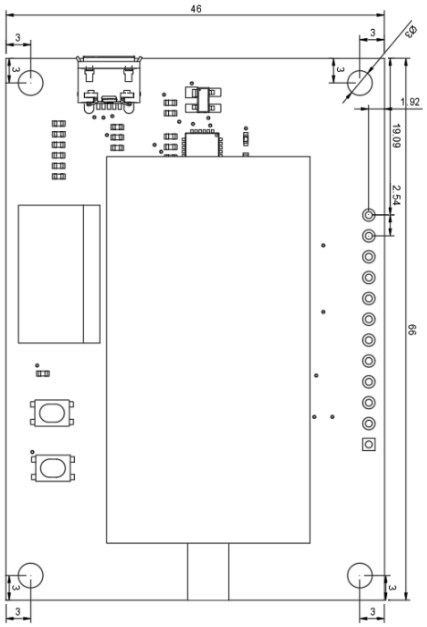
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

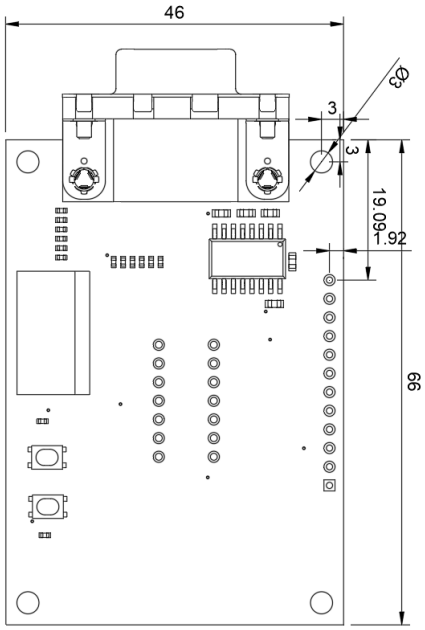
DATASHEET

PCB Driver Dimension (mm) 1x64

1xN, 2<N≤64 on USB/ TTL PCB



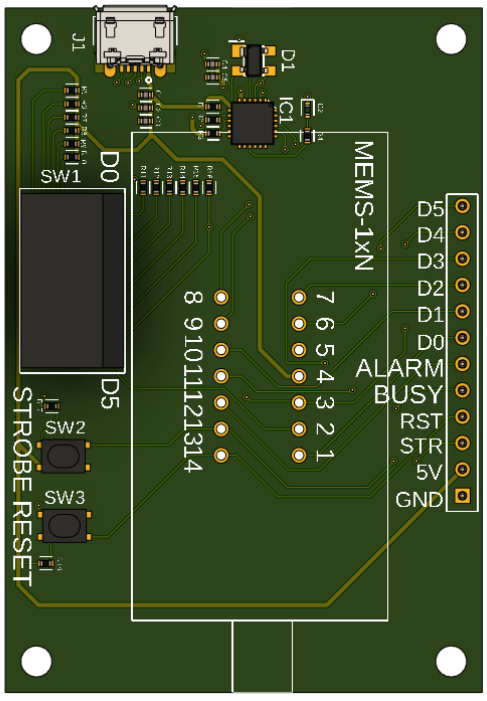
1xN, 2<N≤64 on RS232/TTL PCB



Interface Definition (1x64)

Name	Direction	Description
5V	Power	The driver board can also be powered up via these two holes.
GND	Ground	
D0-D5	Input	6 Plip Switches
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 indicates 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



MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

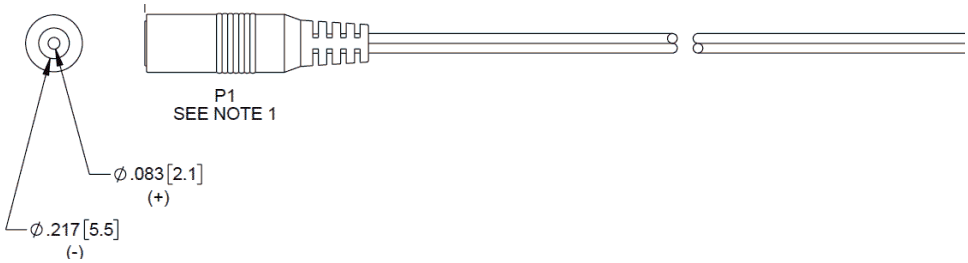
Driver Power Cord

DC Power Cable, 5.5mm/2.1mm Female To Open, 2-Foot

The DC power cable with a 5.5mm/2.1mm female to open connector configuration. Our 2-foot long DC cable assembly is used in numerous small devices from household appliances and devices to network extenders and switches. This DC power cable is suitable for device manufacturing, network wiring, industry, telecom, office installation, DC power adapters, AC power cords, switches and extenders, USB cables, and power to small device applications. Our 2-foot power cables have a center-positive connector.

NOTES:

1. MATERIAL: CABLE: 22 AWG, 2 CONDUCTORS, PVC JACKET OD: .071 X .142 ±.006 [1.8 X 3.6 ±0.15]
2. MARKING: AWM 2468 80°C 300V 22AWG*2C VW-1 P1 PLUG: DC ø 5.5 X 2.1 mm FEMALE, NICKEL PLATED
3. REGULATORY COMPLIANCE: EU RoHS DIRECTIVE (MOST RECENT RELEASED VERSION).



Driver Description

The MSWH MEMS 1xN Driver (Up to 164 ports) has three control modes: (1) USB/TTL (Virtual COM) with a user-friendly GUI Windows™ program supporting UART commands. The unit has a mini USB connector with a USB-to-MicroUSB cable. It can be powered by a 5V USB cable and USB power supply or via onboard 5V-GND holes. (2) RS232/TTL with a user-friendly GUI Windows™ program supporting UART commands. The unit has an RS232 connector. As shown below the switches are mounted on these driver PCBs and tested prior to shipping. This makes integration or performance evaluation easy. (3) The switches can also be mounted directly onto the customer PCB with 14 pins, following detailed instructions. This approach requires customers to have circuit design experience.

Manual Onboard Operation Instruction

- **Power the Board**

Power up the unit via 5V USB power supply which is included in the shipping box

- **Onboard Push Button Switch Control**

Tun on the DIP-6 switch for manual control. After setting the DIP-6 switch, press the STROBE (Switch2) button to change the channel of MEMS 1xN switch. Press the Reset (Switch3) button to go back to the original no light output position.

Manual Remote Operation Instruction

- **Power the Board**

Power up the unit via 5V USB power supply which is included in the shipping box

- **Making Remote Switch Control Connection**

For STROBE, y connect a momentary switch between STR pin and 5V pin.
For RESET, a momentary switch between RST and GND pin.

MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

DATASHEET

Command List (we provide service to write LabVIEW and python for customer integration)

- **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

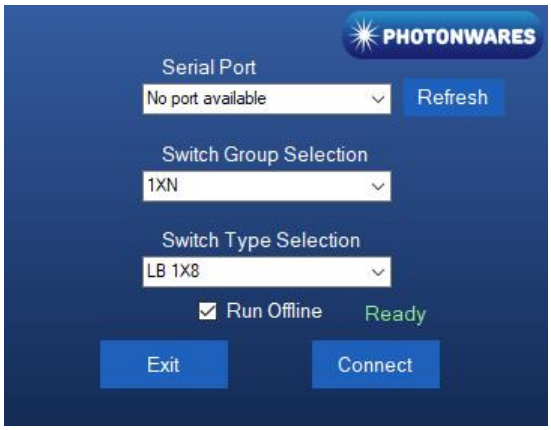
GUI User Guide

- **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.



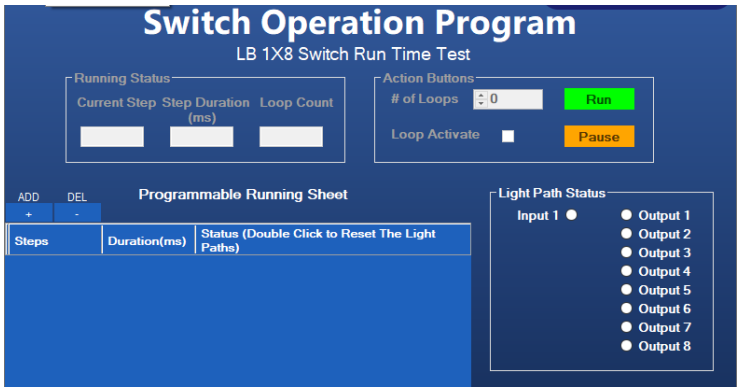
MEMS 1xN Fiber Optical Switch

N up to 256 ports, Crosstalk up to 70dB, Bidirectional, USB, RS232, I2C, TTL, UART

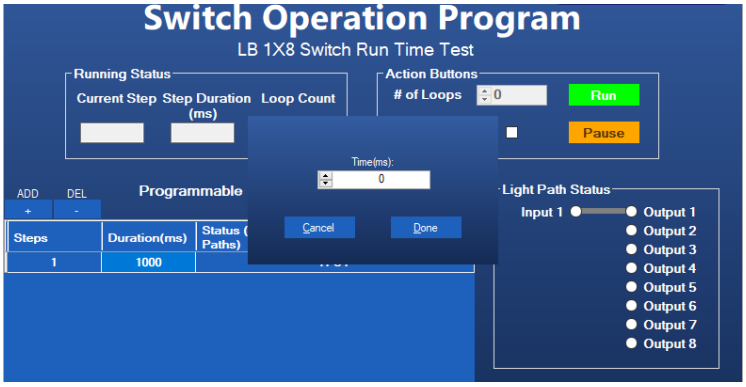
DATASHEET

Operation Instruction

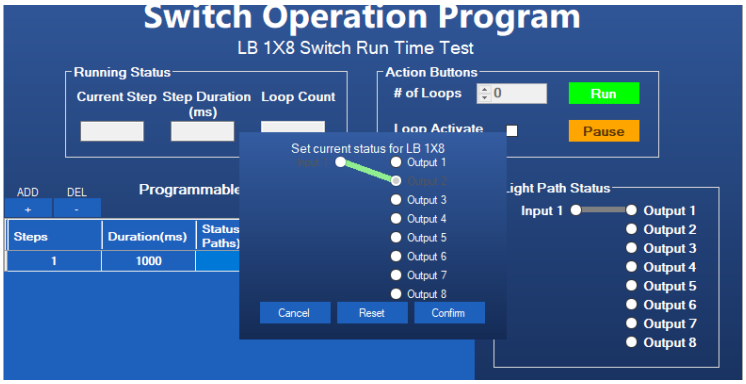
1. Add Step: Click the “Add Step” button in the menu strip or click the “+(ADD)” button to add a step to the Programmable Running Sheet.



2. Input Duration: Click the “Duration” button in the Programmable Running Sheet. Input time duration in ms.



3. Input Lightpath : Click the “Status” button in the Programmable Running Sheet. Select and input lightpath.



4. Add Another Step: The above process can be repeated to create a sequential running receipt.
5. 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.
6. 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.
7. Running: The entered receipt can be running repletely in loops. Enter loop number in the “Action Button”. Click “Run” to start the switching receipt. The process can be paused by clicking “Pause” or stopped by clicking “Run”
7. Display: All aspects of the switch action in the Programmable Running Sheet will be displayed by boxes, color, and visual lines.

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