MEMS Ultra-Mini 1x2 Reflection Fiber Optical Switch

Non-Latching Type, SM & MM: 1x1, 1x2

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The MEMS Series Ultra-Mini 1x2 Reflective Fiber Optical Switch connects optical channels by redirecting incoming optical signals into selected output fibers. This is achieved by using a proprietary thermal activated micro-mirror, moving-in and -out optical paths, uniquely featuring high stability over wide temperature range without compensation, small size and very long life cycle. The ultra-mini Reflective switches are configured in 1x1 and 1x2 with single or multimode fibers. The Ultra-Mini switches are Telcordia standards GR1221 qualified.

Agiltron provides customized design and modular assemblies to meet control and integration applications.

Features

- High Reliability
- Direct DC drive
- Ultra Small
- Intrinsic tolerance to ESD

Specifications

Parameter		Min	Typical	Max	Unit
Operation Wavelength	Single Mode	1260~1360 and / or 1510~1610			nm
	Multimode	810~890 and/or 1260/1360			
Insertion Loss [1], [2]			0.6	1.0 / 1.2 [3]	dB
Polarization Dependent Loss (SM)				0.1	dB
Return Loss [1]	Single Mode	50			dB
	Multimode	35			
Cross Talk On-Off Ratio [1]	Single Mode	50			dB
	Multimode	35			
Switching Time			10		ms
Repeatability				±0.05	dB
Repetition Rate				20	Hz
Durability		10^9			Cycle
Switching Type		Non-Latching			
Optical Power Handling (CW)			300	500	mW
Operating Temperature [4]		-5		+70	°C
Storage Temperature		-40		+85	°C
Fiber Type	Single Mode	SMF-28 or equivalent			
	Multimode	MM 50/125, MM 62.5/125 or equivalent			

Notes:

[1]. Excluding connectors.
[2]. Multimode IL measured @ Light Source CPR < 14dB.
[3]. Dual band, Broad band.
[4]. Lower temperature version is available, please call us.

RoHS COMPLIANT

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]:

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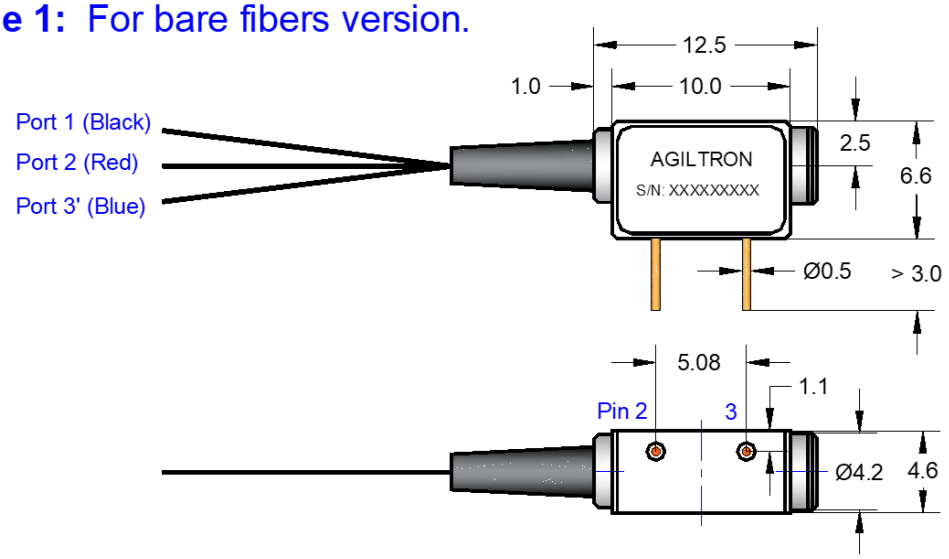
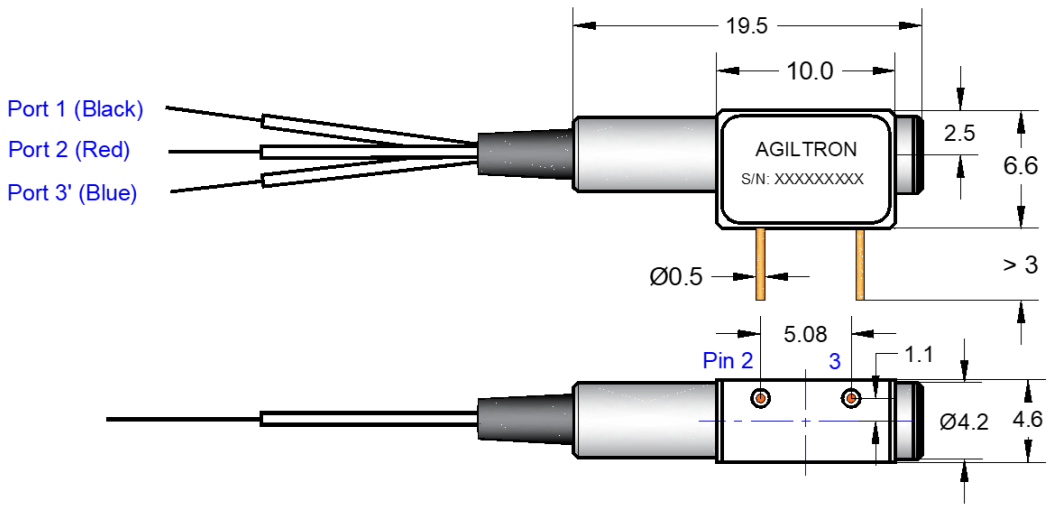
Mechanical Dimensions (mm)

Package 1: For bare fibers version.



Package 2: For 900 um loose tube version.



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Electrical Driving Requirements

Status	Switch Type			Pin No.	
	1x1 (Normally Transparent)	1X1 (Normally opaque)	1x2	Pin 2	Pin 3
Status 1	Bright	Dark	Port 1 → 2	0	0
Status 2	Dark	Bright	Port 1 → 3	0	+V [2]

[1]. NC: No electronic Connection. [2]. +V: 3.8 ~ 4.5 VDC, Typical is 4.0 VDC. [3]. Power Consumption is about 170 mW.

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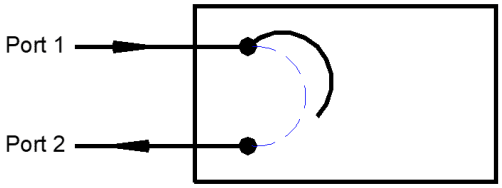
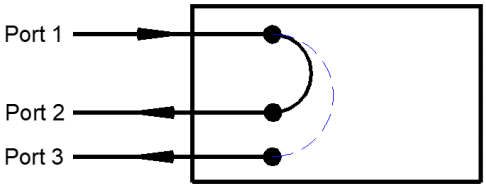
Mechanical Dimensions (mm)



1x1 Reflection



1x2 Reflection

Ordering Information (Part Number)

	☐☐	☐	2	1	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Configuration**	**Package**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector[4]**
MIRS- [1]	1x1 N/T [2] = 1T 1x1 N/D [3] = 1D 1x2 = 12	1060 nm = 1 1310 nm = 3 1550 nm = 5 780 nm = 7 850 nm = 8 1310/1550 nm = 9 850/1310 nm = A 1260~1620 nm = B Special = 0	Non-latching = 2	Standard = 1	SMF-28 = 1 MM 50/125 = 2 MM 62.5/125 = 6 Special = 0	Bare fiber = 1 900 um 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 ST/PC = 6 LC/PC = 7 Duplex LC/PC = 8 LC/APC = A LC/UPC = U Special = 0

[1]. **MIRS**: **M**EMS Ultra-M**I**ni **R**eflective **S**witch.
[2]. **N/T**: 1x1 Switch, **N**ormally **T**ransparence.
[3]. **N/D**: 1x1 Switch, **N**ormally **D**ark.
[4]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

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.

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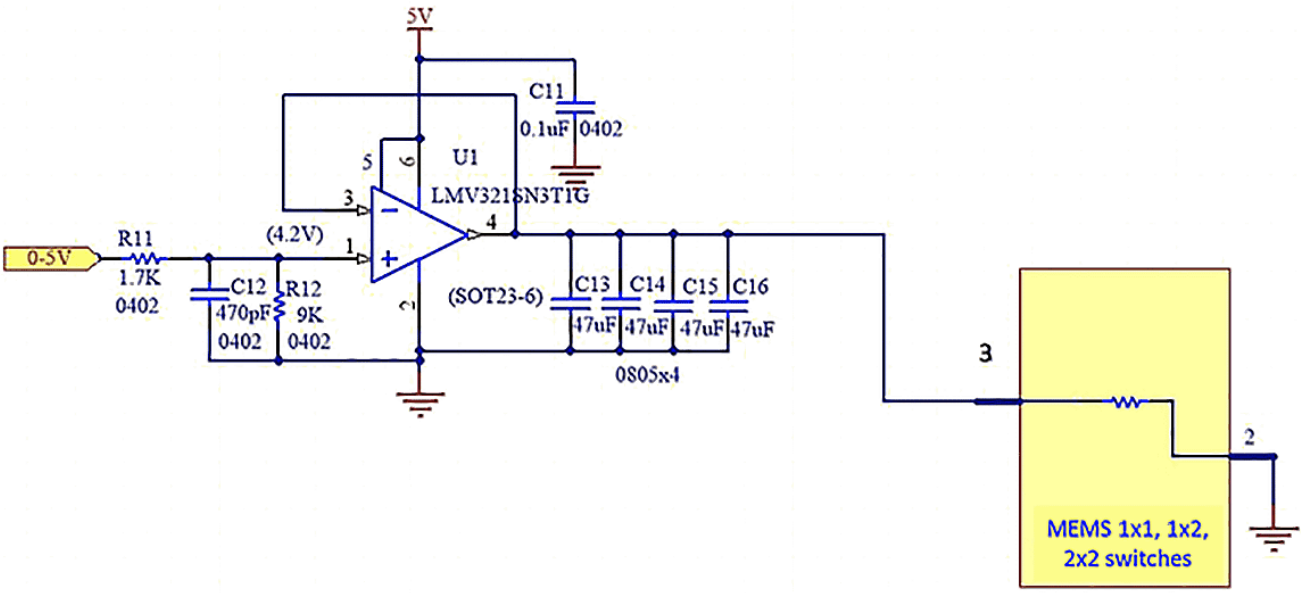
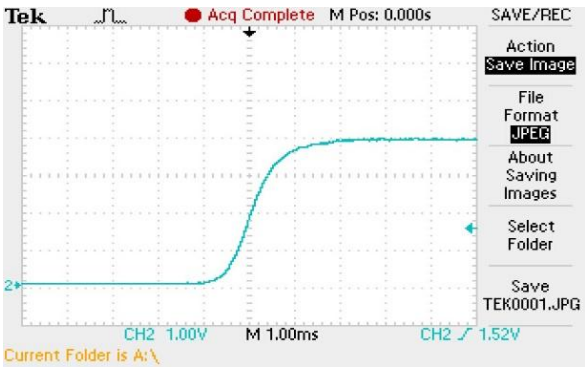
Recommendation Control Circuit

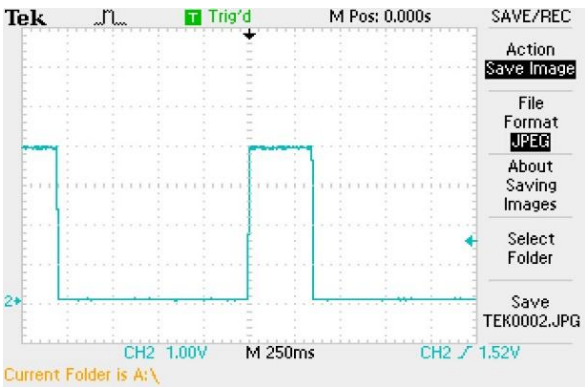


MEMS 1X1 Switch Response Time Test Report



Switch Time (Rise): 1.64 ms

Switch Time (Fall): 5.4 ms



Working at 1 Hz

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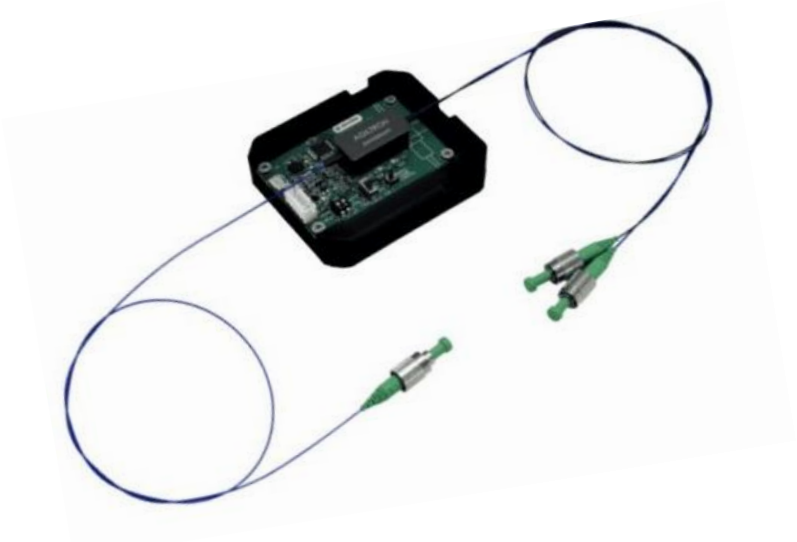
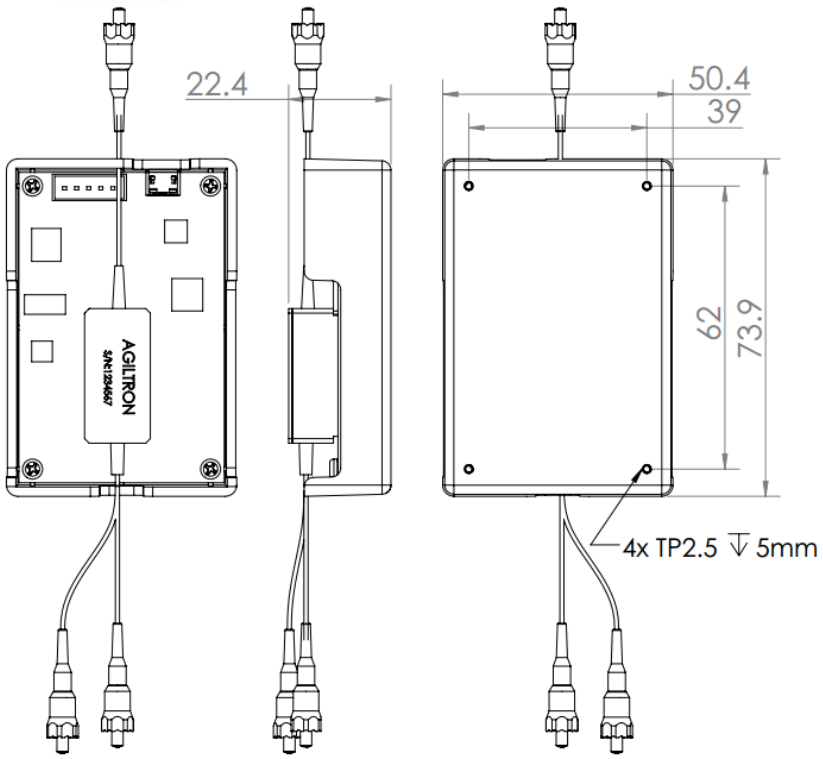
Mini Driver, Push-Button, USB, TTL, 5V Power Supply Included





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Optical Switch Evaluation Kit

Push Button/USB, 1x2/2x2 PCB and GUI

(US patent 8,666,218 and other patents pending)

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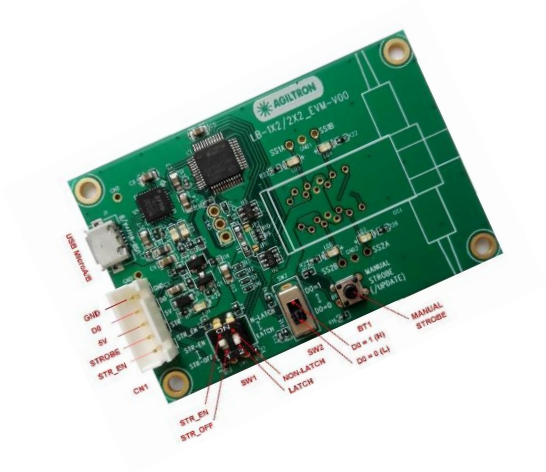
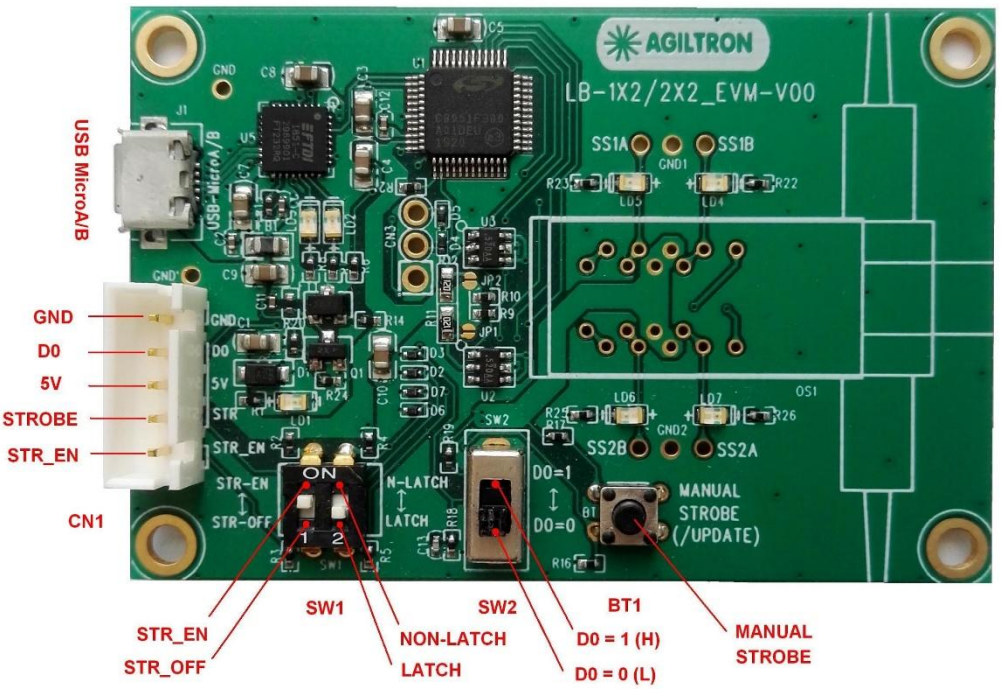


The SW-DR-5 evaluation kit is compatible with LightBend™, Fiber-Fiber™, MEMS, and CrystaLatch™ 1x2/2x2 switches. It has three control modes: manual push button; TTL; USB with a user-friendly GUI Windows™ program. It is intended for convenient laboratory use or switch performance evaluation. The unit has a mini USB connector and a 5-PIN connector. It can be powered by the mini USB connector to a computer or an accompanying cellphone 5V wall plug power supply. It is a cost-effective solution for ease of using our switches. Command code is also provided for customer modification.

Features

- USB Interface
- Push Button
- TTL
- GUI
- Power Supply



Compatibility

- CrystaLatch™ 1x2/2x2
- LightBend™ 1x2/2x2
- MEMS 1x2/2x2
- Fiber-Fiber™ 1x2/2x2

Electrical Specifications

Parameter	Min	Typical	Max	Unit
Operating Temperature	-10		70	°C
Storage Temperature	-40		85	°C
Power Voltage DC	4.9	5	5.2	V

Warning: Control Signal >5.5V Will Damage the Board

Warning: **This device must use the reference circuit to driver otherwise it is unstable.**

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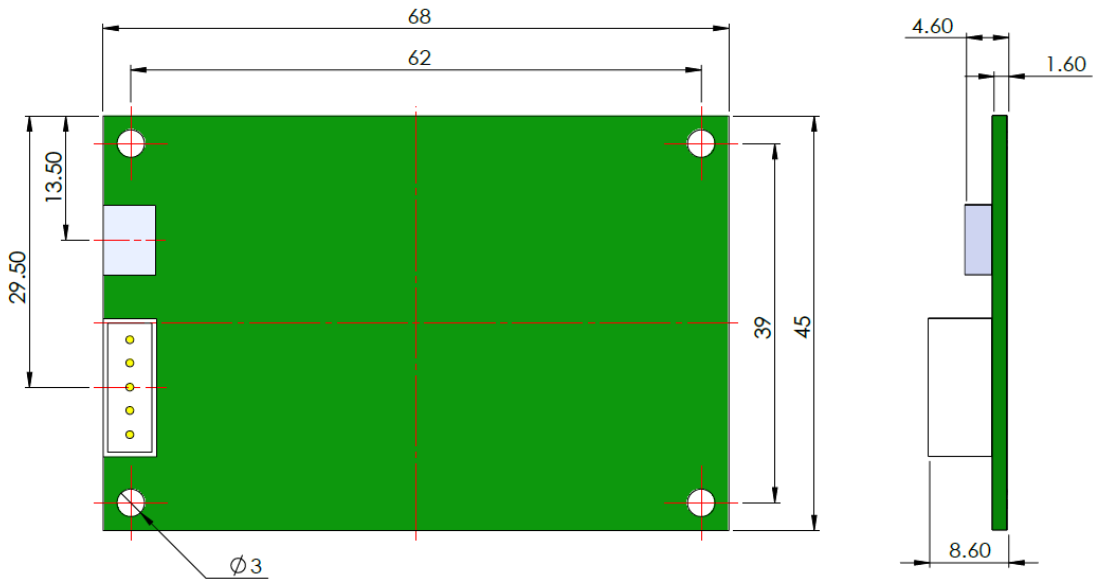
Mechanical Footprint Dimensions (Unit: mm)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Manual Operation Instruction

- **Power the Board**

The unit can be powered up via the Micro USB port connecting to a computer or a cellphone wall plug power supply.

- **Manual Push Button Control**

When using Manual Push Button Control, SW1-1 should be set to **STR_EN**.

Once the board is powered (LED on), the unit can be easily controlled by pushing the **STROBE** button, the light path will be changed accordingly.

TTL Operation Instruction

- **Power the Board**

The unit can be powered up via the Micro USB port connecting to a computer or a cellphone wall plug power supply.

- **TTL Control**

When using TTL Control, SW1-1 should be set to **STR_OFF**.

The unit can be controlled by a standard TTL Signal. Sending a **HIGH** voltage (>3.5V <5V) to the **D0** pin in the 5 pin connector, and the light path will change. Sending a **LOW** voltage (0-0.8V) to the **D0** pin in the 5 pin connector light path will change again.

Computer Graphic Software User Guide

- **Install the Program**

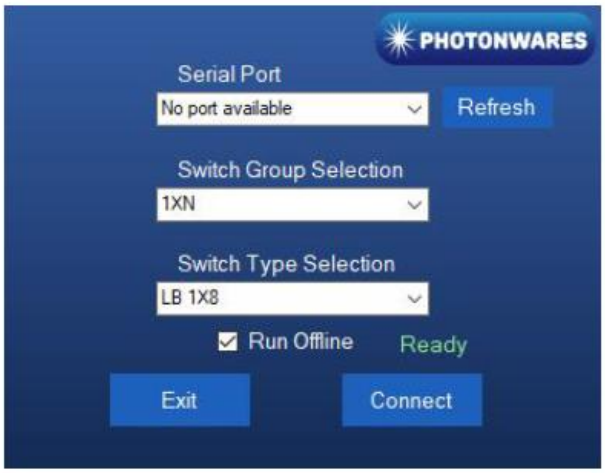
Click on ***setup.exe*** for the automatic installation, which should be provided with the product.

- **Power and Connect the Board**

Use the Micro-USB to USB cable to connect the board with the PC with software installed. Remember to set SW1-1 to **STR_EN**.

- **Run the Program**

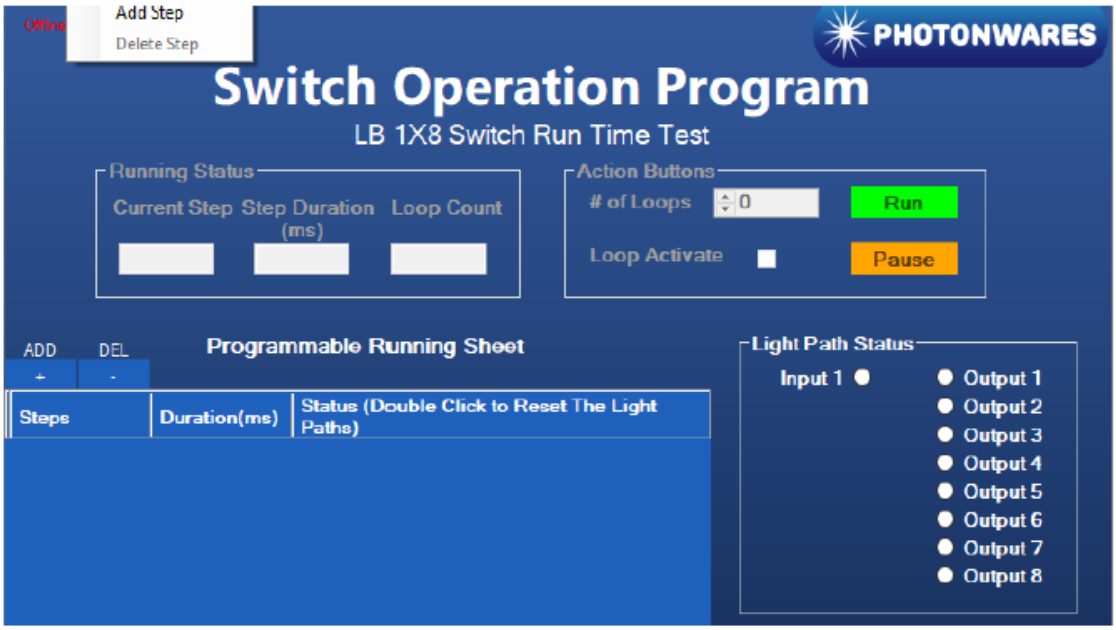
Run the "***Switch Operation Program.exe***" and the program will open the configuration window. Select the correct Switch Group and select the specific Switch Type. Then click the "Connect" button and the program will establish the connection between PC and board.



- **Create and edit testing time sequence**

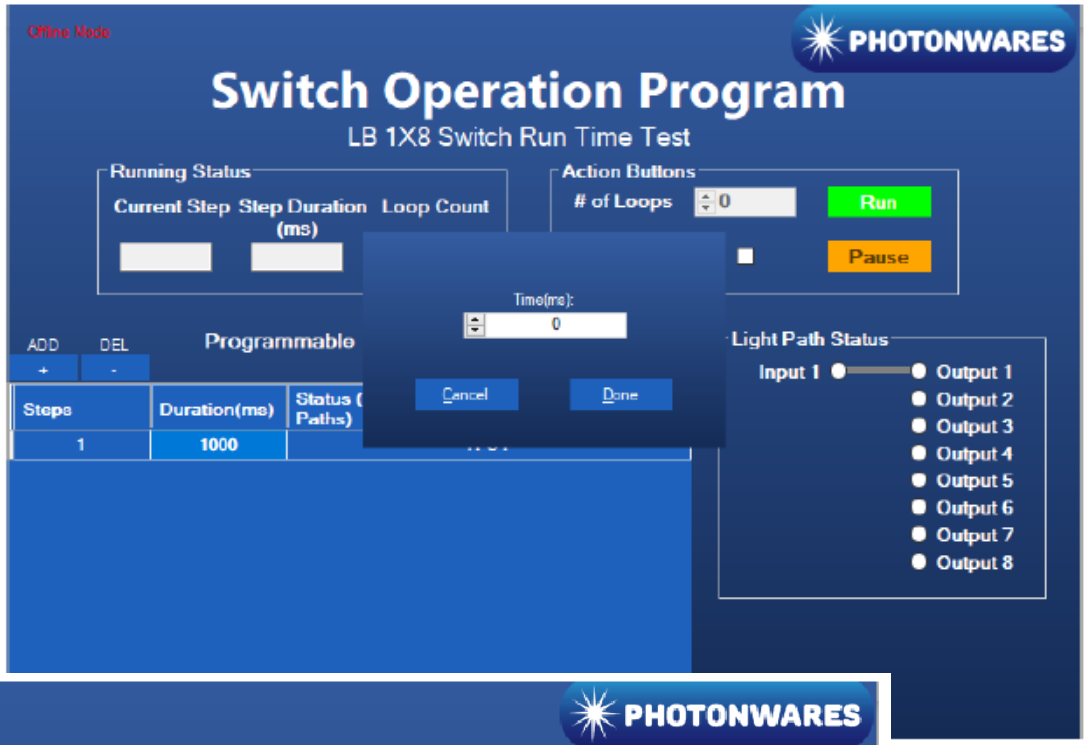
Add step: Click the "Add Step" button in the menu strip or click the "+(ADD)" button would both add a step to the Programable Running Sheet.

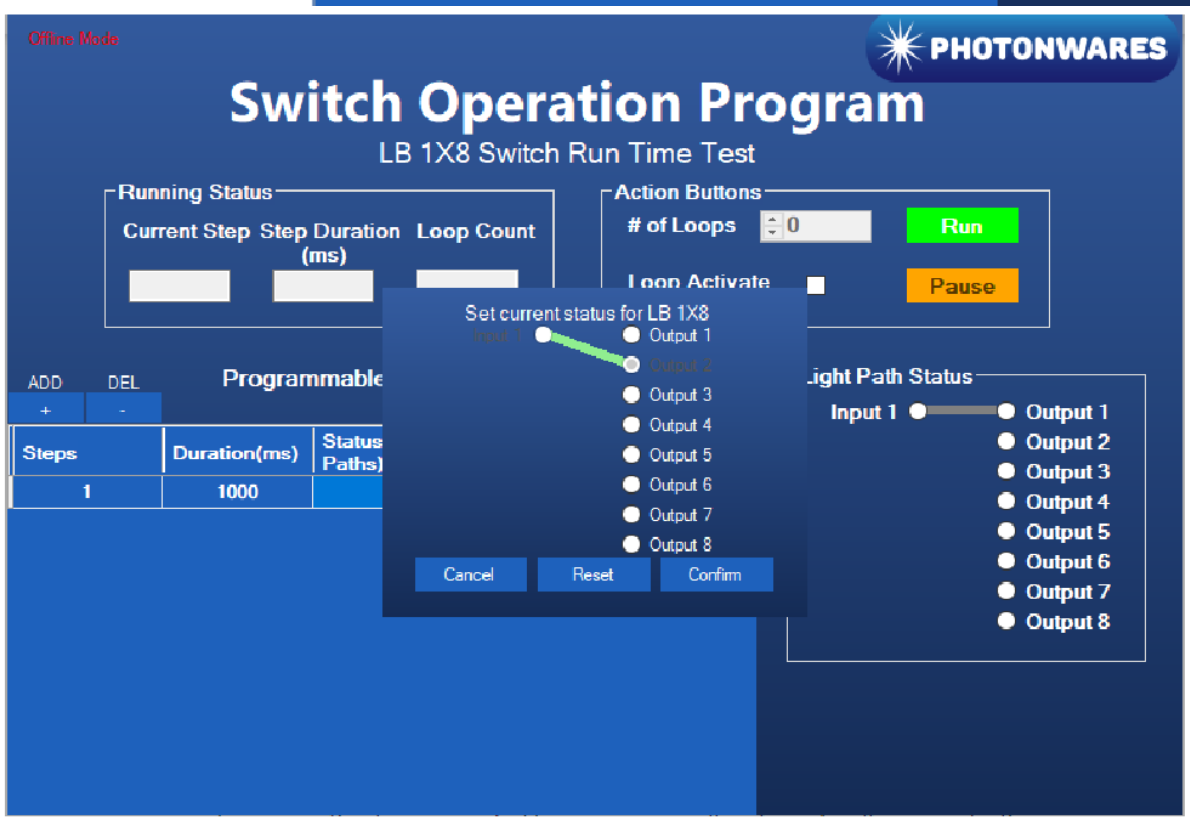
Delete step: Click the "Delete Step" button in the menu strip or click the "-(DEL)" button would both delete a step in the Programmable Running Sheet.



Computer Graphic Software User Guide (continue)

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.





Optical Switch Evaluation Kit

Push Button/USB, 1x2/2x2 PCB and GUI

(US patent 8,666,218 and other patents pending)

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Computer Interface Options

The USB interface working as a Virtual COM port which is compatible with LabView, Matlab. We provide **LabView** and **Matlab** interface software at extra cost.

A Windows GUI and UART command list will be provided for test and software development.

Command List

Command in Serial

The serial communication should be set in **9600 baud rate, none parity, 8 data bits, 1 stop bits.**

```
0x01 0x12 0x00 0x01 ---- Switch to status 1
0x01 0x12 0x00 0x02 ---- Switch to status 2
```

In **Matlab,**

Example code as below:

```
s=serialport("COM1", 9600, "Timeout", 5);
Write(s, [1, 18, 0, 1], "uint8");                    for status 1
Write(s, [1, 18, 0, 2], "uint8");                    for status 2
```

Ordering Information (Part Number)

	1 1	1 1	☐	1	☐☐	1
Prefix	**Configuration ***	**Function**	**Pluggable pins**		**Switch Type**	**Control Mode ****
SWDR-	1x2 2x2 Dual 2x2 Dual 1x1		No (solder) = 1 Yes = 2		CL = 11 FF = 12 MEMS Non-Latch = 13 MEMS Latch (built-in driver) = 14 MEMS Latch (non built-in driver) = 18 MEMS R Dual = 19 LB = 15 LB Latch = 16	USB TTL Push Button

* Any 'Configuration' from the list. Please contact our sales office for your needs (1x2, 2x2, Dual 2x2, Dual 1x1)
** Any 'Control Mode' from the list. Please contact our sales office for your needs (USB, TTL, Push Button)

Note:

- ❑ This driver is intended mounted with specific switches, tuned, and tested prior to shipping. It is not designed to be sold separately.
- ❑ Pluggable Pins are for temporary making contacts between the PCB and the optical switches. This function adds $120