

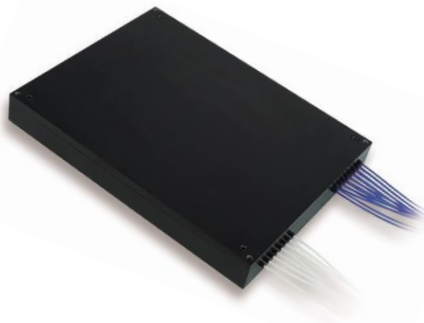
MEMS Quad 1x16 Fiber Optical Switches



1260-1625nm, Bidirectional, SM28, 3 year warranty

DATASHEET

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Applications

- Network
- Data Storage
- Sensor System
- Instrument

Features

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

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](#):

The MEMS Quad 1×16 Fiber Optical Switch is a compact module integrating four 1×16 switches operating simultaneously. It features minimal light path length differences between states, ensuring low switching disturbance. The switch is fully bidirectional, with minimal hit interference during operation. It includes a PCB with control electronics powered by 5 VDC, and a standard TTL control interface. Optional USB or RS232 control with a GUI is available through an adapter board, which comes with a wall-pluggable power supply and computer interface cable. The module is compliant with RoHS, CE, and GR-1073 standards, and is housed in a rugged package with integrated optical and electrical connectors.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	1260		1625	nm
Testing Wavelength		850/1310		nm
Insertion Loss ^[1]		1.4	1.6	dB
Insertion Loss (with connector) ^[2]			≤ 1.4	dB
Cross Talk On/Off Ratio	50			dB
Return Loss ^[4]	30			dB
Repeatability ^[5]			0.03	dB
Polarization Dependent Loss			0.15	dB
Wavelength Dependent Loss ^[6]			0.3	dB
Temperature Dependent Loss			0.3	dB
Switching Time		5	30	ms
Response Time			20	ms
ESD Level (HBM)	500			V
Optical Power Handling		300	500	mW
Life Time	10 ⁹			cycle
Drive Voltage			5~12	V
Operating Temperature	-5		70	°C
Storage Temperature	-40		85	°C
Operation Humidity	5		95	%RH
Storage Humidity			95	%RH
Power Supply	0		5	VDC
Power Consumption			2	W
Fiber Length/Tolerance (without connector)		1.0 ± 0.05		m
Fiber Type	OM1 (62.5/125), 0.9mm loose tube			
Fiber Connect Type	MU adapter x 4 pcs MPO adapter x 8 pcs			
Connector	FC/APC (Senko)			
Control Type	TTL(Parallel /Serial Port Compatibility) The four switches are controlled on the same channel			

Notes:

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

[2]: The loss is based on the test results at 23°C.

[3]: 30dB for multimode fiber, 45dB for >single mode 24 ch., 50dB for < single mode 16 ch.

[4]: 30dB for multimode fiber, 50dB for single mode

[5]: Repeatability is defined after 100 cycles

[6] @CWL ±30nm, 23°C

* The light source is VCSEL.

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Rev 08/11/25

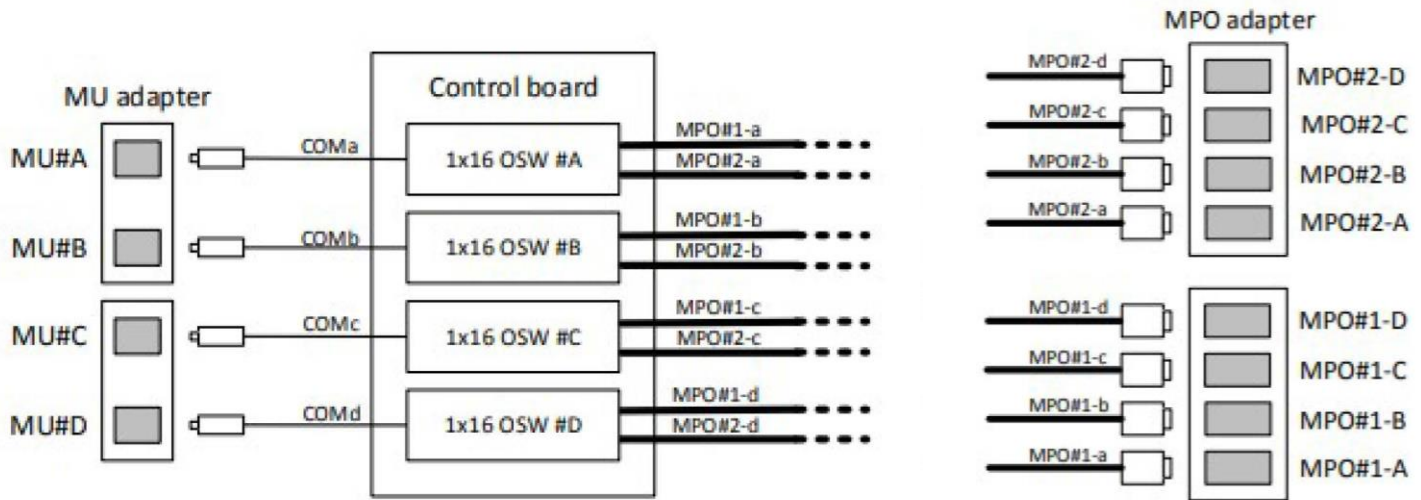
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Optical Path Diagram



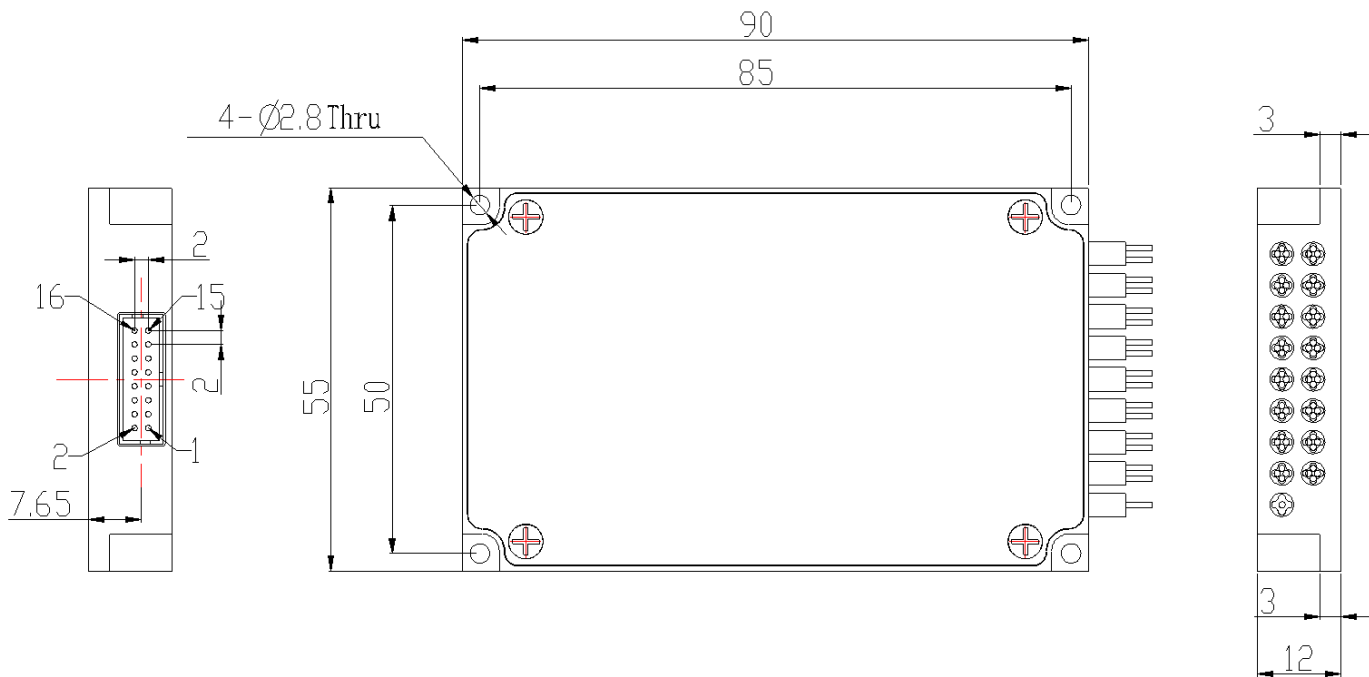
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Mechanical Dimensions (mm)



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Pin Definition

Pin number	Pin Assignment	Signal Type	Description
1	D0	Input	Data bit (D0) (low-order)
2	D5	Input	Data bit (D5)
3	VCC	Power	Power Supply (DC 5V,1.0A)
4	D7	Input	Data bit (D7) (high-order)
5	D6	Input	Data bit (D6)
6	GND	Power	GND
7	D4	Input	Data bit (D4)
8	D1	Input	Data bit (D1)
9	TXD	Output	Data Transmit (TTL Level)
10	RXD	Input	Data Receive (TTL Level)
11	D2	Input	Data bit (D2)
12	D3	Input	Data bit (D3)
13	/BUSY	Output	Low level means ready to reset or receiving data
14	/ALARM	Output	High level means running error
15	/STROBE	Input	Falling edge execution data bit
16	/RESET	Input	Low level reset to channel 0

Note: Molex 87833-1620 is used for the electrical interfaces of this modules and it is recommended to use Molex 87568-1694 for customer connectors.

UART program control instruction description

This module can receive control signals through the UART interface to enable automated measurements or real-time monitoring.

- (1). This module can only execute one instruction at a time. Typically, the next instruction can be entered only after the program returns the corresponding value.
- (2). Please use capital letters.
- (3). In practical operation, the angle brackets "<" and ">" are used as the start and end delimiters respectively.
- (4). Instruction error returns <ER>.

Program Control Instruction Set

Order	Describe	Example
<RESET>	Restart module	Successful return: <RESET_OK>
<RESTORE>	Reset	Successful return: <RESET_OK>
<INFO_?>	Query module information	Return successfully: <MEMS-MM-1X16_VER1.00_SN01234567890_08.04.00051> Indicates MEMS-MM-1X16 module, version 1.00, SN number 01234567890, product number 08.04.00051;
<BAUD_x>	Set or query the serial port baud rate 1.x is 1~9, indicating baud rate 2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600, 115200 respectively Successful return: <BAUD_x_OK> 2. Send <BAUD_?> to query the baud rate	Send: <BAUD_5> Successful return: <BAUD_5_OK> Set the device serial port baud rate to 19200 The configuration will take effect after saving and rebooting!
<OSW_M_x>	Working mode selection x: Values 0, 1, ?, 0 indicates data bit control switching, 1 indicates UART control switching, ? indicates query working mode; Successful return: <OSW_M_x_OK>	Send: <OSW_M_1> Successful return: <OSW_M_1_OK> Indicates that the module is set to UART control switching; Send: <OSW_M_?> Successful return: <OSW_M_1> Indicates that the module is UART controlled switching;
<OSW_01_SW_xxx>	Set current channel xxx: The value is 000~256, 000 means 0 channel, 256 means 256 channel; Successful return: <OSW_01_SW_xxx_OK> Note: In data bit control switching mode, Send: <OSW_01_SW_xxx> Return: <OSW_M_ER>	Send: <OSW_01_SW_002> Successful return: <OSW_01_SW_002_OK> Indicates switching to channel 2;
<OSW_A_?>	Query channel status Successful return: <OSW_A_Optical switch channel>	Return: <OSW_A_001> Indicates that the optical switch is 1 channel;
<SAVE_ALL>	Save configuration Successful return: <SAVE_ALL_OK>	Save the configuration, such as saving the channel status.

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Data Bit Switching Logic Table

/RESET	D7	D6	D5	D4	D2	D1	D0	Channel
0	X	X	X	X	X	X	X	0
1	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	1	2
	0	0	0	0	0	1	0	3

	0	0	0	1	1	1	1	24

Factory default configuration

Project	Factory Default Configuration	Remark
Serial port baud rate	115200	8 data bits, 1 stop bit, no parity.
Operating mode	UART control switching	
Working channel	When UART control is switched, the working channel is channel 1; When data bit control switches, the working channel is determined by the data bit;	When switching the UART control, the module preserves the optical path state that was saved during configuration even after power is disconnected and reconnected.

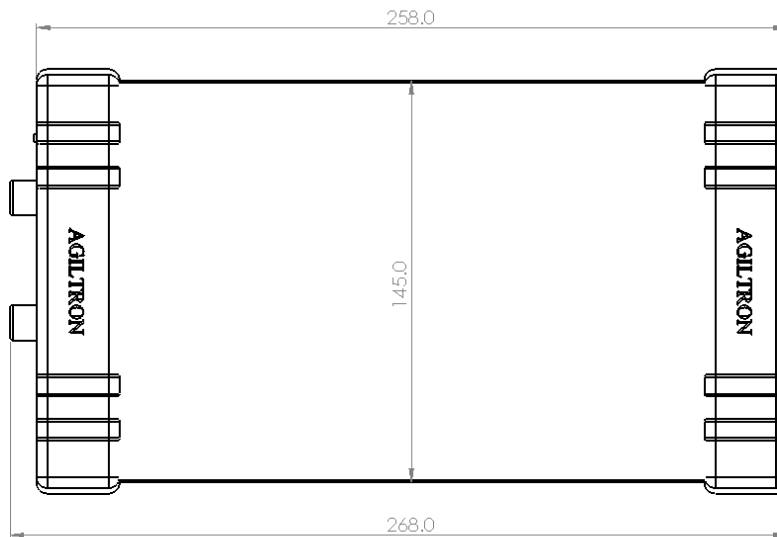
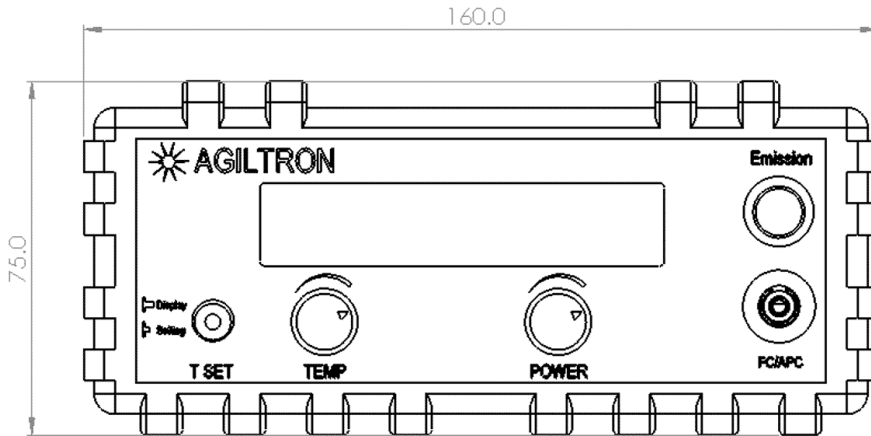
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Mechanical Dimension (mm) -- Benchtop



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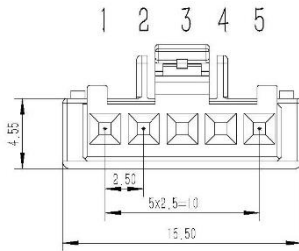
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Electrical Driving Pin Definition



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

I ² C Bus Specifications	Minimum	Typical	Maximum
I ² C Clock Frequency	10kHz	100kHz	100kHz
Capacitive Loading			400pF

Address	1	1	1	0	0	0	0	R/W
	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

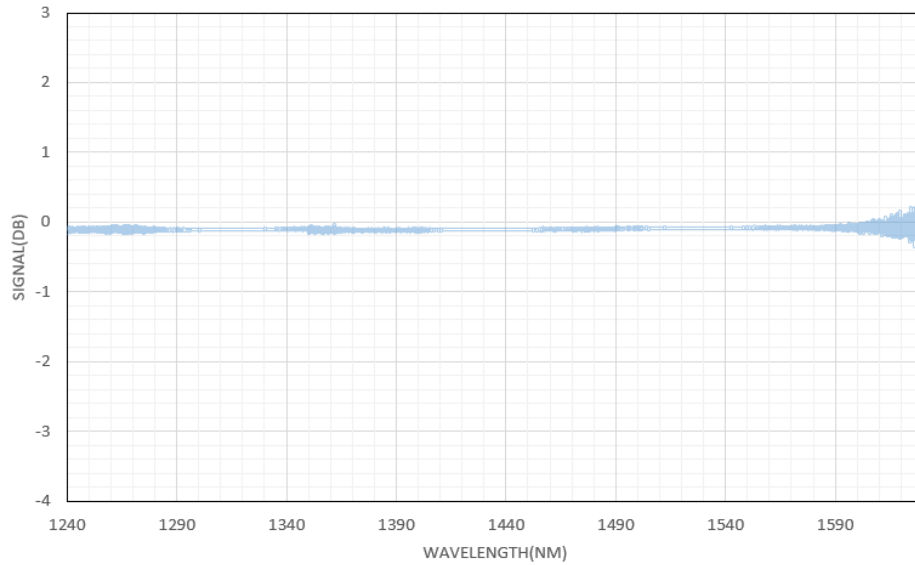
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Typical Insertion Loss vs Wavelength (1240-1630nm)



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Ordering Information

Prefix	Configuration	Wavelength	Control	Fiber Type	Fiber Cover	Fiber Length	Connector	Enclosure
MSWJ-		1240-1630nm = 1 1550nm = 5 1310nm = 3 1310/1550nm = B 850nm = 8 850/1310nm = C 1060nm = 6	TTL = 1 USB = 2 RS232 = 3 I2C = 5 Special = 0	SM28 = 1 50/125 = 2 105/125 = A 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 = 5 ST/PC = 6 LC/PC = 7 MTP = 9 LC/UPC = U MPO = Y 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 handling by expanding the core side at the fiber ends.

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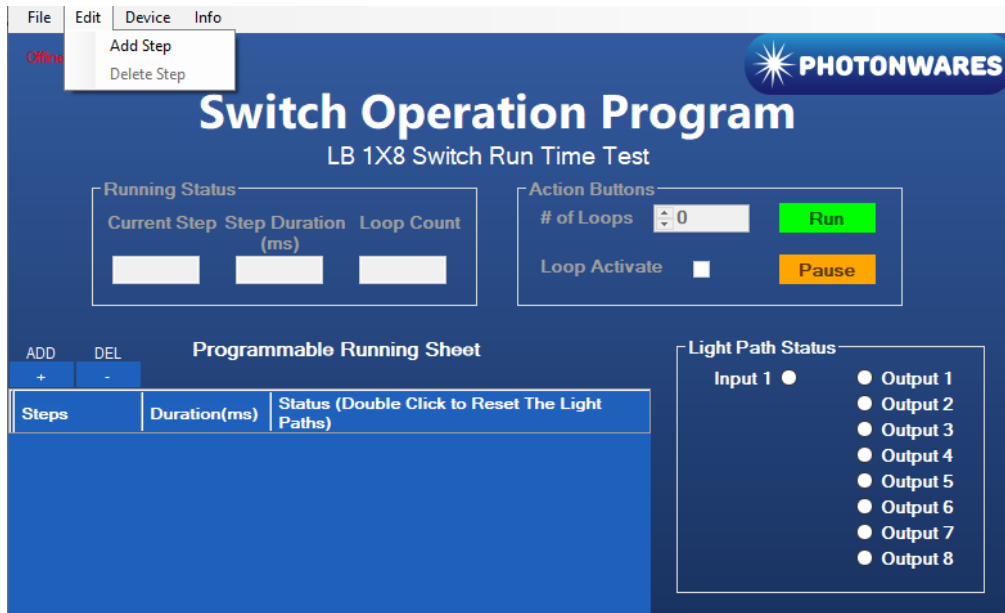
USB Control/ GUI

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.

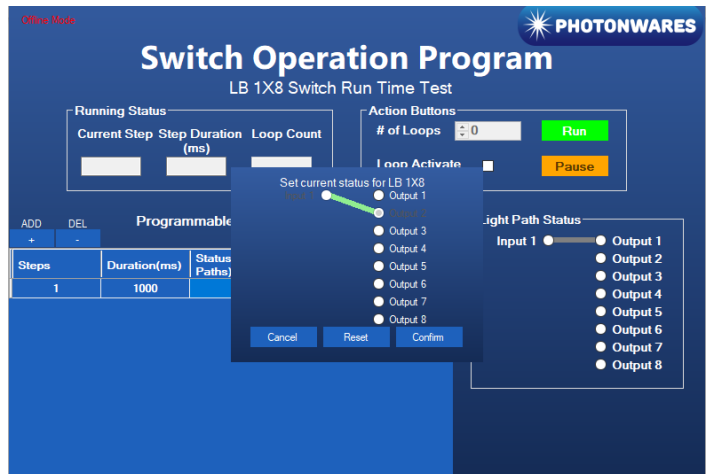
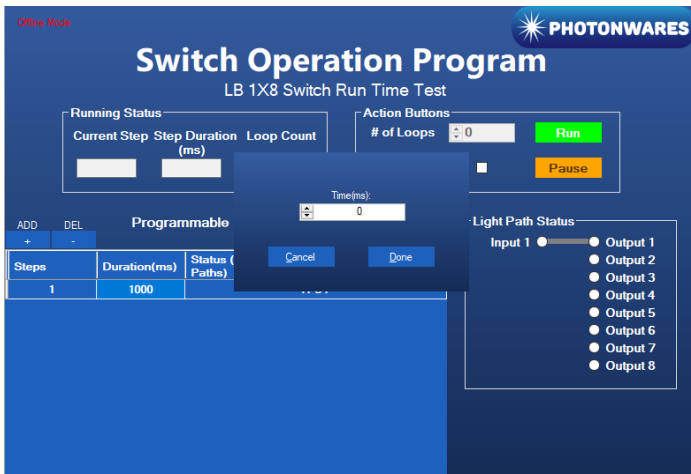
• Create and edit testing time sequence

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	