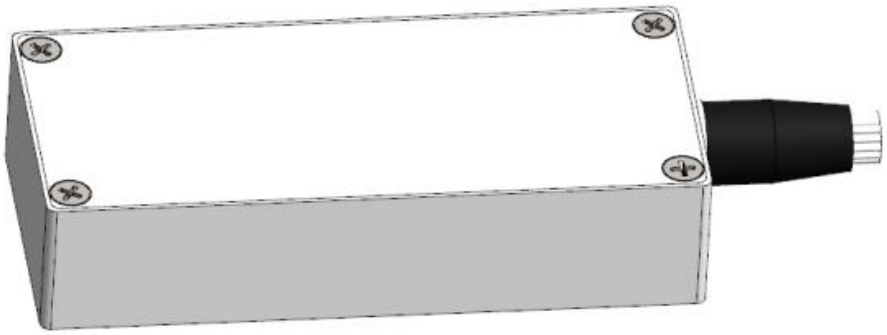
MEMS Optical Switch Module



Product Description

This model of optical switch module (hereinafter referred to as MEMS optical switch) is a module product with multi-channel optical path switching function. The MEMS optical switch product is an optical switch manufactured using the electrostatically driven micro-mirror scheme, featuring small size, fast response speed and stable performance, and can be widely used in various optical communication and testing systems.

Product features

Strong anti-interference ability and small signal attenuation amplitude.

Part Number

MP-IP-YFMS-1xN

Application area

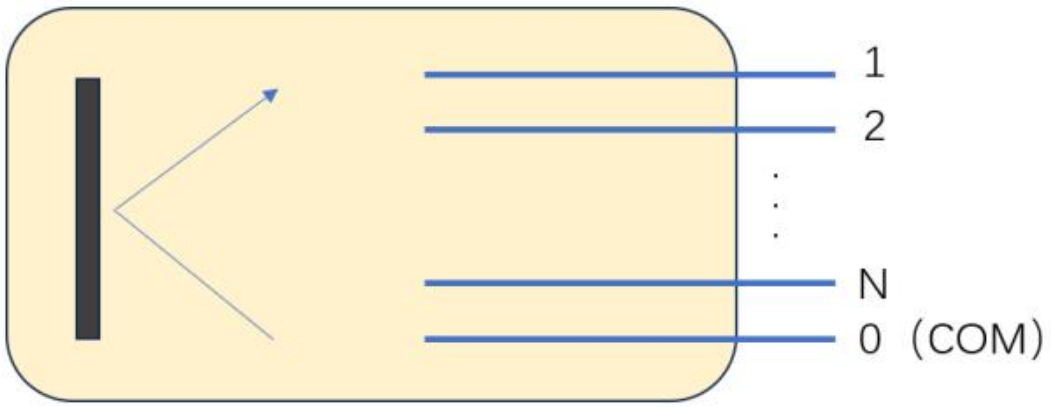
Fiber Optic Sensing Networks | Defense and Aerospace | Test and Measurement

Core parameters

Operating Wavelength	Channel Crosstalk	Switching Time
SM:1260-1650nm	SM≥45dB	≤15ms

General Parameters

Optical Schematic Diagram



Figuer1. Optical Schematic Diagram

Performance Parameters

Parameters	Unit	SM									MM				
Number of Channels	CH	2	4	8	12	16	24	36	48	64	2	4	8	12	16
Wavelength Range	nm	1260-1650									850 ±30 / 1310 ±30				
Test Wavelength	nm	1310 or 1550									850 or 1310				
Loss (Max)	dB	0.6	0.8	1.2	1.2	1.2	1.6	2.0	2.5	2.8	0.6	0.8	1.2	1.2	1.2
Temperature-Dependent Loss	dB	⩽0.3													
Polarization-Dependent Loss	dB	⩽0.2													
Return Loss	dB	⩾50									⩾30				
Crosstalk	dB	⩾45									⩾30				
Repeatability	dB	⩽0.05													
Switching Time	ms	⩽15													
Service Life	Cycle	$\geqslant 10^9$													
Input Optical Power	mW	⩽500													

Drive Voltage	V	5
Power Consumption	mW	⩽350
Operating Temperature	℃	-5~70
Storage Temperature	℃	-40~85
Dimensions	mm	68x30x14±0.2
Working Mode		TTL/UART
Note: 1 Test at room temperature and SOP. 2 Excluding connectors, 0.2dB for one pair connectors. 3 IL is for single-band, Dual-band adds 0.3dB		

Table 1. Performance Specification Parameters

Electrical Characteristics

Serial Number	Parameter	Unit	Min	Typ	Max
1	Supply Voltage	V	3	/	13
2	Digital I/O Logic High Level	V	2.0	3.3	3.6
3	Digital I/O Logic Low Level	V	0	0.5	0.8

Mechanical Dimensions (Unit: mm)

4 ⩽ N ⩽ 16 (0.9mm fiber optic protective sleeve):

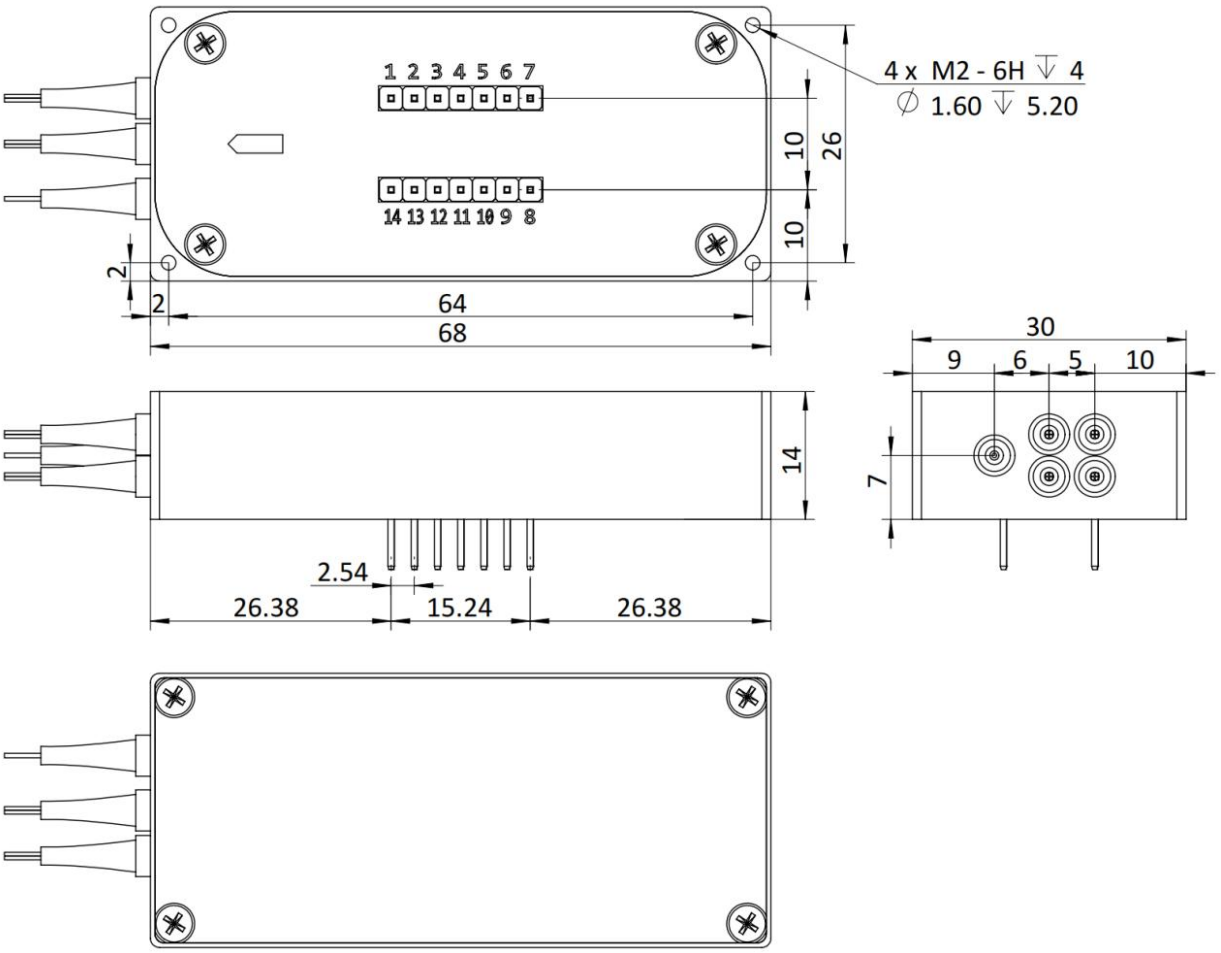


Figure 2 Mechanical Dimensions Drawing (4 ⩽ N ⩽ 16)

16 < N ⩽ 24 (0.9mm fiber optic protective sleeve) or N ⩽ 64 (bare fiber):

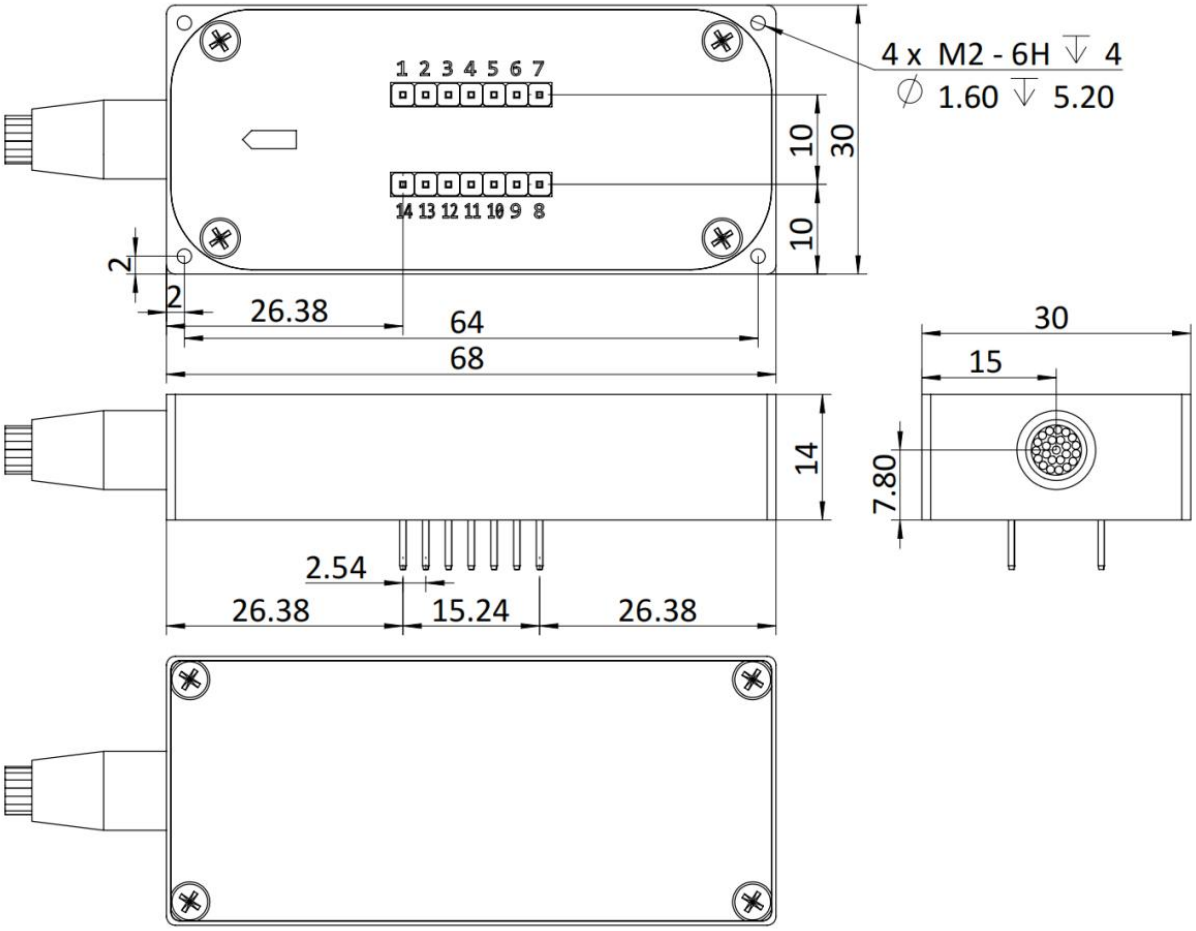


Figure 3. Mechanical Dimensions Drawing (16 ⩽ N ⩽ 24)

24 < N ≤ 48 (0.9mm fiber optic protective sleeve):

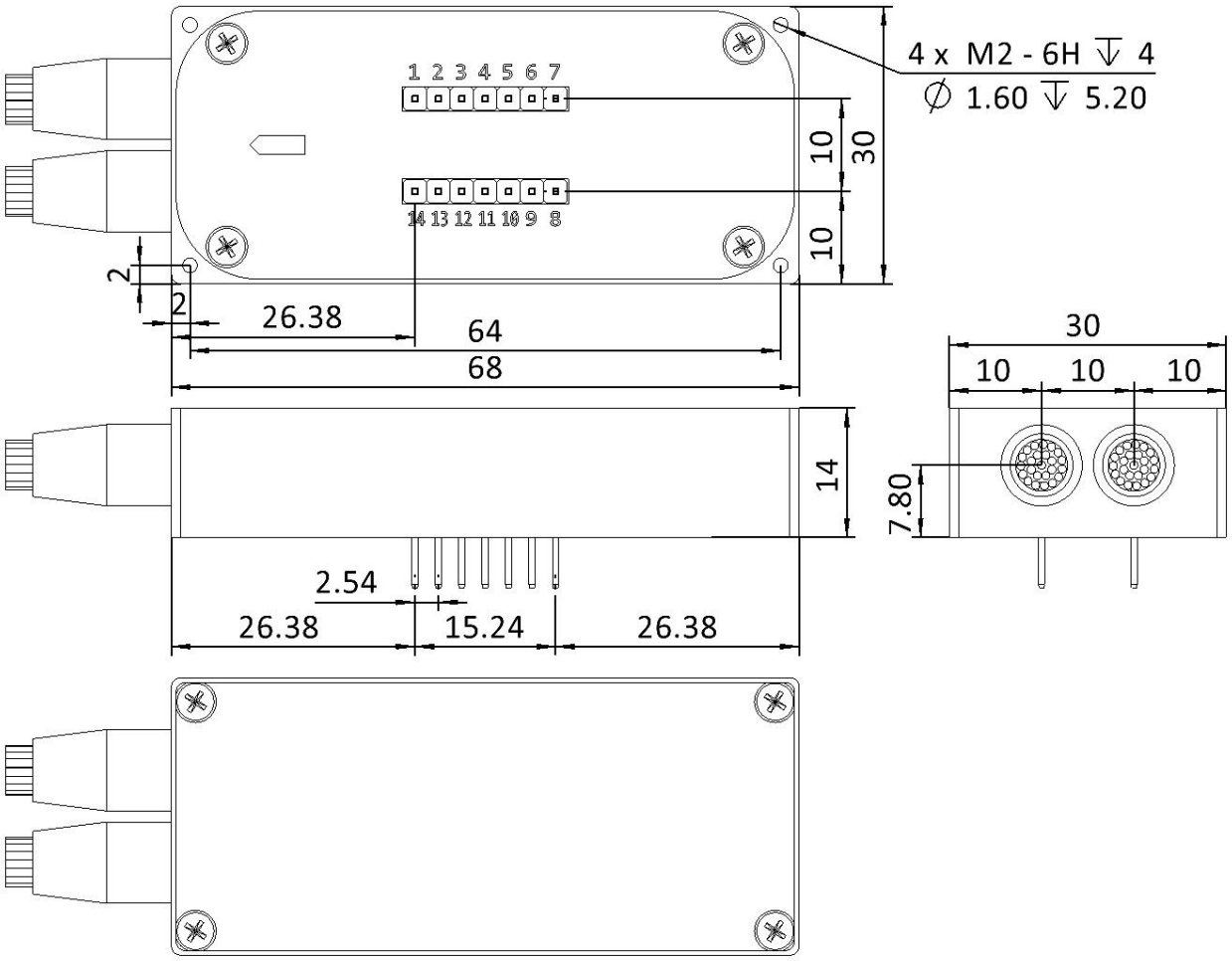


Figure 4. Mechanical Dimensions Drawing (24 < N ≤ 48)

Pin Definition

Pin Number	Pin Definition	Pin Type	Level Standard	Function Description
1	VCC	Power IN	/	DC 5V, positive power input
2	/RESET	IN	LVTTL	Reset, active low, pulse width ⩾ 0.5ms
3	/STROBE1	IN	LVTTL	TTL strobe: active on falling edge
4	RX	IN	LVTTL	Serial port receive
5	TX	OUT	LVTTL	Serial port transmit
6	GND	/	/	Signal ground
7	AGND	Power IN	/	Power ground/analog ground
8	NC	/	/	Forbidden electrical connection
9	D02	IN	LVTTL	TTL input: data bit D0 input
10	D12	IN	LVTTL	TTL input: data bit D1 input

11	D22	IN	LVTTL	TTL input: data bit D2 input
12	D32	IN	LVTTL	TTL input: data bit D3 input
13	D42	IN	LVTTL	TTL input: data bit D4 input
14	D52	IN	LVTTL	TTL input: data bit D5 input
1.LVTTL strobe signal/STROBE: Defaults to high level; the falling edge triggers the parallel input data of LVTTL inputs D0~D5. 2.LVTTL input signals/D0-D5: Default to low level; the corresponding relationship between pins and channels is detailed in Table 4.				

Table 3. Module Pin Definitions

Data Bit Switching Logic Table

Channel1	D5	D4	D3	D2	D1	D0
COM1	0	0	0	0	0	0
COM2	0	0	0	0	0	1
COM3	0	0	0	0	1	0
COM4	0	0	0	0	1	1

COM5	0	0	0	1	0	0
COM6	0	0	0	1	0	1
COM7	0	0	0	1	1	0
COM8	0	0	0	1	1	1
COM9	0	0	1	0	0	0
COM10	0	0	1	0	0	1
...	...	...	...	...	...	...
COM64	1	1	1	1	1	1
During use, the TTL control pins should be configured according to the actual number of optical paths.						

Table 4. Correspondence Table between TTL Control Pins and Channels

Description of Communication Methods

Communication Mode	UART
Baud Rate	115200bps, 8 data bits, 1 stop bit, no parity bit.
Command Encoding Format	ASCII

Table 5. Description of Communication Methods

Overview of User Communication Command Set

Command 1	Function Description	Return Information after Success 2	Remark Description
	Switch to channel x		x is the channel number (0 ⩽ x ⩽ chnNum4)
	Query current channel		x is the channel number (0 ⩽ x ⩽ chnNum4)
	Query number of channels		x is the number of module channels (0 ⩽ x ⩽ chnNum4)
	Query module SN		"a…z" is the module SN number
	Query module PN		"a…z" is the module PN number

1.All communication commands contain no space symbols, and all symbols are English symbols; please use uppercase letters. 2.For more "return information" and operation examples, see Tables 8 to 10. 3.Both the "CHN:x" command and LVTTL parallel port triggering can independently control channel switching. When x is 0, the module optical path resets. 4."chnNum" is the maximum number of channels of the optical switch module.

Table 6. Communication Command Set

Operation Instructions

LVTTL Parallel Digital I/O Control

The corresponding relationship between the level of LVTTL control pins and channels is shown in Table 4. During use, the LVTTL control pins should be configured according to the actual number of optical paths of the optical switch.

Time Characteristics:

Parameter	Minimum Value	Unit	Description
T1	1	ms	Minimum / GATE high time
T2	15	ms	Optical path switching time
T3	100	us	TTL_DATA setup time
T4	2	ms	TTL_DATA hold time

Table 7. LVTTL Control Time Characteristics

The logic control diagram is as follows:

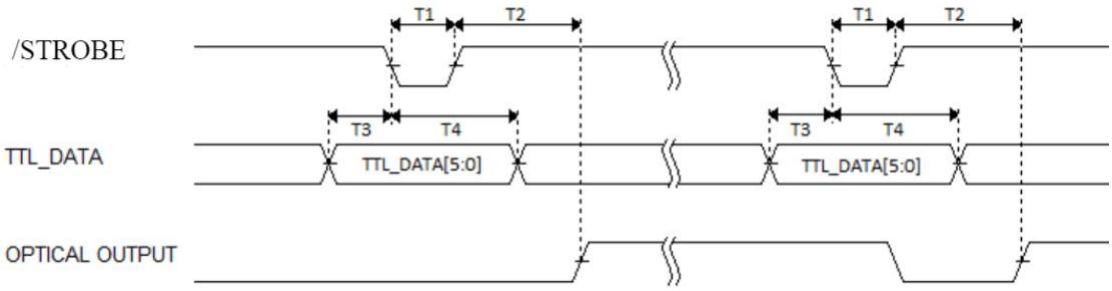


Figure 5. TTL Control Timing Diagram

1. Serial Port Control

1.1. For the definition of each pin of the module, see Table 3.

1.2. Connect the power cord. After power-on, the module is in a reset state with no output.

1.3. Control method:

1.3.1. Connect the serial communication line:

1.3.2. Serial port settings: 115200 baud rate, 8 data bits, 1 stop bit, no parity.

1.3.3. Input module commands as needed, and the commands will return information.

Detailed Explanation of Command Set

1.Detailed Explanation of User Communication

Command Set Switching and Querying Channel Commands

Command	Return Information	Explanation
		The module has been switched to channel x. (0 < x ⩽ chnNum)
		Information returned when x is 0: the module stops outputting.
		The optical switch module initialization is not ready.
		The input channel number exceeds the range of the number of channels.
		The command is incorrect.
		The module returns the number of the current working channel.
		The module has no output.
		The command is incorrect.

Note: 1. chnNumis the maximum number of channels of the mod
Eg: 1.The user enters "CHN:15" in the serial port assistant, the module switches to COM15 channel, and the serial port assistant returns "CHN:15". 2.The user enters "CHN:7".

Command for querying the number of channels:

Command	Return Information	Description
		The module returns the number of channels, where x is the number of channels.
		The command is incorrect.
Eg: 1. Assuming it is a 1x16 module, when the user enters "NUM:16".		

Query the SN number of the module:

Command	Return Information	Description
		"a…z" is the SN number of the module.
		The command is incorrect.
Eg: 1.Assuming the SN number of the module is "2024111", when the user enters "MSN:2024111".		

Query the PN number of the module:

Command	Return Information	Description
		"a…z" is the PN number of the module.
		The command is incorrect.
Eg: 1.Assuming the PN number of the module is "2024111", when the user enters "<MPN?>" in the serial port assistant, the serial port assistant will return "MPN:2024111".		

Note: This module can only execute one command at a time. Usually, you need to wait for the module to return the corresponding information before entering the next command.

Ordering info

MP-YFMS-A-B-C-D-E-F

A	B	C	D	E	F
Channel	Fiber Type	Test Wavelength	Tube Type	Fiber Length	Connector

1x4：1x4 1x8：1x8 1x12：1x12 1x16：1x16 1x24：1x24 1x36：1x36 1x48：1x48 1x64：1x64	SM:G657A2 M5：MM，50/125 M6：MM，62.5/125 X：Others	850：850nm 1310：1310nm 1550：1550nm 1315：1310nm&1550nm X：Others	250：250um 900：900um X: Others	05：0.5±5cm 10：1.0m±5cm X：Others	OO：None FC：FC/PC FA：FC/APC SC：SC/PC SA：SC/APC LC：LC/PC LA：LC/APC X：Others