

MEMS Optical Switch Spec



MEMS optical switch 1X2 module

Specifications

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1. Module internal diagram



2. Performance Indicators

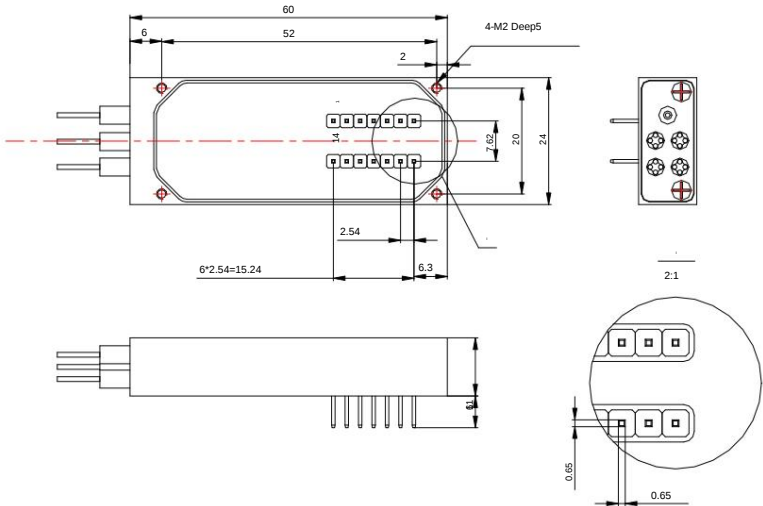
Fiber type,	MEMS-1X2-PM780-M2-09-10-FA
working	PM780
wavelength,	700-1100nm
test wavelength,	780nm
insertion loss,	≤1.2dB
extinction	≥18dB
ratio, return	≥50dB
loss,	≥50dB
crosstalk,	≤±0.05dB
repeatability, switching time	≤15ms
Switching times	≤10 ⁹ times
Fiber length	1.0m
Optical interface type	FC/APC (slow axis alignment, fast axis cutoff, polarization-preserving connector, no beam expansion)
Input optical power,	≤500 mW
operating voltage/current,	DC5V±10% / ≤50mA
operating	-10 ~ 70 °C
temperature,	-40 ~ 85 °C
storage temperature, module size.	60(L) x 24(W) x 11(H) ±0.2mm

Note: All parameters were tested under ambient temperature conditions.

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3. Module Dimension Diagram



4. Pin Definitions

Pin number	Pin definition	signal direction and type	Function Description
1	NC		Suspended
2	VCC	Power	Operating power supply: DC 5V, 0.2A
3	/STROBE Input		Low level executes data bits.
4	GND	Power	GND
5	D0	Input	Data bit D0 (lower bit)
6	D1	Input	Data bit D1
7	D2	Input	Data bit D2
8	D3	Input	Data bit D3 (high-order bit)
9	TXD	Output	Serial port data transmitter (LVTTTL level)
10	RXD	Input	Serial port data receiver (LVTTTL level)
11	GND	Power	GND
12	/BUSY	Output	Low level indicates readiness for reset or data reception.
13	MODE	Input	Low level data bit controls switching, high level UART control switching
14	/RESET Input		Low level resets to channel 0.

Remark:

- (1) The digital interface is TTL level.
- (2). Input control signal threshold level: High level: minimum 2V. Low level: maximum 0.8V.
- (3) When all input terminals of the device are not in use, they must be kept at a high level or GND to ensure that the device operates normally.

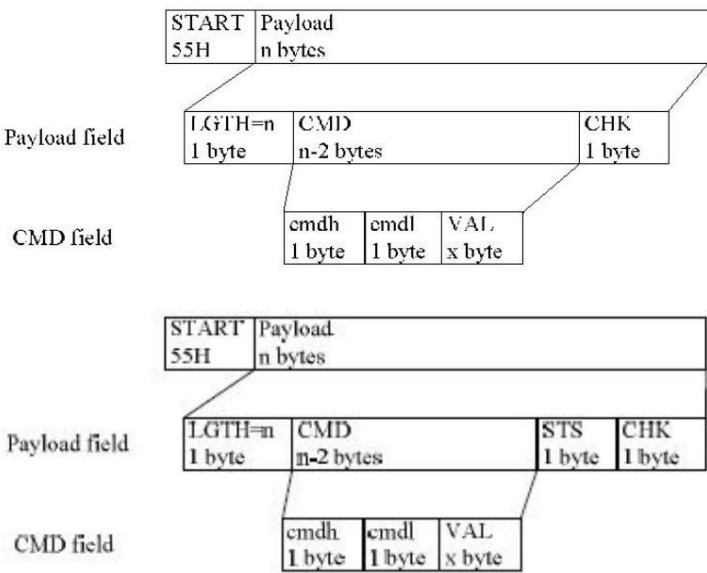
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5. Serial communication

5.1 Serial Port Protocol

Command/Response Format



Command format: <START><LGTH><cmdh><cmdl><VAL><CHK>

<START> Start byte, used for synchronization 0x55

The number of characters in the command response excluding the start byte, including <LGTH>.

<cmdh> Command or data, high byte

<cmdl> Command or data, low byte

<VAL> Command parameters (all parameters except those displaying ASCII values are in hexadecimal).

<CHK> Single byte verification

Corresponding format: <START><LGTH><cmdh><cmdl><VAL><STS><CHK>

<START> Start byte, used for synchronization 0x55

The number of characters in the command response excluding the start byte, including <LGTH>.

<cmdh> Command or data, high byte

<cmdl> Command or data, low byte

<VAL> command parameters

<STS> Command Execution Status Code

<CHK> Single byte verification

Remark:

1) The command execution status code <STS> can have the following values:

status codes	describe
0x00	The command was executed successfully.
0x01	Frame format error
0x02	Verification error
0x03	Command parameter error
0x04	Execution failed

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0x05	Execution timeout
0x06	Module not ready
0x07	Command error
0x08	Module without calibration data
...	

2) The <START> byte is used for synchronization. The module requires a 0x55 byte at the beginning of the command.

3) Verification calculation:

Send Check Byte = (LGTH $\bar{y}$ cmdh $\bar{y}$ cmdl $\bar{y}$ VAL)+1.

Return Check Byte = (LGTH $\bar{y}$ cmdh $\bar{y}$ cmdl $\bar{y}$ VAL $\bar{y}$ STS) +1.

For the above “ $\bar{y}$ ” is XOR.

4) In UART mode, the device must receive the 0x55h byte to initiate transmission. To avoid data loss, the device uses 0x55h as the frame header.

This means that 0x55 cannot be reused in a frame. Every 0x55h byte appearing in a frame must be replaced with two bytes of 0x56h. If the frame

If 0x56h appears in the data, it must be replaced with two bytes: 0x56h and 0x57h.

The data bytes are then replaced with...	
55h	56h 56h
56h	56h 57h

When performing a replacement, the checksum calculation uses the original data byte values.

For example:

Original data frame: 0x55, 0x05, 0x00, 0x02, 0x55, CHK

Sent data frame: 0x55, 0x06, 0x00, 0x02, 0x56, 0x56, CHK

Based on the bytes in the original data frame, the two frames will have the same CHK value. Except for the header byte, which is 0x55, no other bytes should appear in a single frame.

0x55, including the LGTH and CHK bytes.

For example:

Original bytes: 0x55 0x08 0x80 0x10 0x0 0x0 0xFF 0x33 0x55

Corrected bytes (these are sent to the UART): 0x55 0x08 0x80 0x10 0x0 0x0 0xFF 0x33 0x56 0x56

5) When a frame format error or command error occurs, the returned frame does not necessarily need to return command parameters.

Example: Returning a data frame in case of frame format error or command error: 0x55 0x05 0x00 0x00 STS CHK

5.2. Command List

code	describe	Remark
0x0001	Query Manufacturer ID	Send command parameters: 0 bytes Returned command parameters: 4 bytes
0x0002	Query module manufacturer name	Manufacturer name (maximum 16 bytes, padded with zeros) Send command parameters: 0 bytes Returns command parameters: 16 bytes (ASCII)
0x0003	Query module serial number	Module serial number sending command parameters: 0 bytes Returned command parameters: 8 bytes (ASCII)
0x0004	Query module firmware version	Module firmware version: 7 bytes, format: x.xxTxx. Where x.xxTxx is a 7-character ASCII string. Send command parameters: 0 bytes Returned command parameters: 7 bytes (ASCII)
0x0005	Query module hardware version: 7 bytes, format: x.XXTX, where x.XXTX	

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		This is a 7-character ASCII string. Send command parameters: 0 bytes Return command parameters: 7 bytes
0x0006	Query module production date	(ASCII) Module production date: 10 bytes format: xxxx xx xx (year-month-day separated by "-") Send command parameters: 0 bytes Return command parameters: 10 bytes (ASCII)
0x0007~0x0009		
0x0010	Set up the optical switch channel	Optical switch channel send command parameters: 1 byte (switch channel); return command parameters: 0 bytes. Optical switch channel range: 0~7 and 0xFF. 0 represents channel 1. 0xFF represents
0x0011	Query optical switch channel	channel 0. Optical switch channel send command parameters: 0 bytes; return command parameters: 1 byte (switch channel); switch channel range: 0~7 and 0xFF. 0 represents channel 1. 0xFF represents channel 0.
0x0012~0xffff		

Notes:

1) Optical switch channel values: 0~7 and 0xFF; the default value for errors is channel

0. 2) Command example:

Query manufacturer ID:

Send 0x550x040x000x010xCHK

Return 0x550x090x000x010xID_hh0xID_hl0xID_ll0xSTS0xCHK

Query module firmware version:

Send 0x550x040x000x040xCHK

Return 0x550x0c0x000x040xFW_maj0x2e0xFW_hh0xFW_hl0x540xFW_lh0xFW_ll0xSTS0xCHK

Set the optical switch channel:

Send 0x550x050x000x100xchannel0xCHK

Return 0x550x050x000x100xSTS0xCHK

Query the optical switch channel:

Send 0x550x040x000x110xCHK

Return 0x550x060x000x110xchannel0xSTS0xCHK

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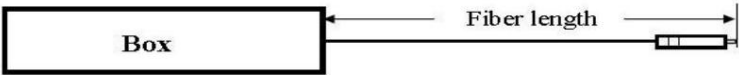
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6. Data bit switching logic table

/RESET	D3	D2	D1	D0	Channel
0	X	X	X	X	0
1	0	0	0	0	CH1
1	0	0	0	1	CH2

7. Definition of fiber optic length



Includes Boot and connector length

8. Factory default configuration

project	Factory default configuration	Remark
Serial port baud rate	115200	8 data bits, 1 stop bit, no parity check.