Fiber In-Line Phase Shifter/Time Delay

Non-fiber stretch, up to 100π or 80 μm, 400nm to 2600nm, piezoelectric

DATASHEET

Return to the Webpage

The Piezoelectric Fiber Phase Shifter (PIPS) provides variable optical phase shift or time delay of up to 100 μm. It is based on a patent-pending technology that separates a pair of precisely aligned optical fibers using a piezoelectric actuator. This approach eliminates the poor reliability and non-repeatable behavior associated with traditional fiber-stretching phase shifters, delivering high reliability, high repeatability, fast response, and low insertion loss, while preserving polarization and mode field integrity. The device is compatible with common fiber types, including single-mode (SM), polarization-maintaining (PM), and large-mode-area (LMA) fibers. A compact driver is available for device mounting, providing 0–5 V control with modulation frequencies up to 5 kHz; control is via an SMA input, and power is supplied by 12 V DC. Designed for fast, continuous operation, the PIPS achieves large phase excursions near mechanical resonance, reducing required drive power for applications demanding strong phase modulation. Each unit is fully tested and calibrated prior to shipment, resulting in a robust and cost-effective solution for precision fiber-optic phase shifting. For high-speed operation, the unit requires a heat sink.

Features

- Large Phase Shift
- High Reliability
- Low Insertion Loss
- Compact Size
- High Optical Power Handling

Applications

- Fiber Sensor
- Fiber Interferometer
- Fiber Laser
- Instrumentation

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	400		2650	nm
Insertion Loss [1]	0.1	0.5	0.8	dB
Polarization Mode Dispersion			0.05	ps
Polarization Extinction Ratio (PM)	18		29	dB
Return Loss	65			dB
Response Time Rise/Fall	30			μs
Thermal Drift		0.1	0.3	%/°C
Operating Optical Power		0.5	1	W
Operation Frequency	DC	0.2	5	kHz
Resonance Frequency		35		kHz
Residual Amplitude Modulation			0.02	dB
Phase Change [2]	0	8	40	π
Time Delay [2]	0	7	80	μm
Control Voltage [2]	0	20	100	V
Capacitance of Piezo	2	5	12	nF
Operating Temperature	0 ~ 60			°C
Storage Temperature	-40 ~ 85			°C

Notes:

[1]. Excluding connectors. Connectors ad 0.3dB.

[2]. @1550nm. Warning: Do not apply a voltage exceeding 100V, as this may damage the device.

RoHS COMPLIANT

Rev 06/19/26

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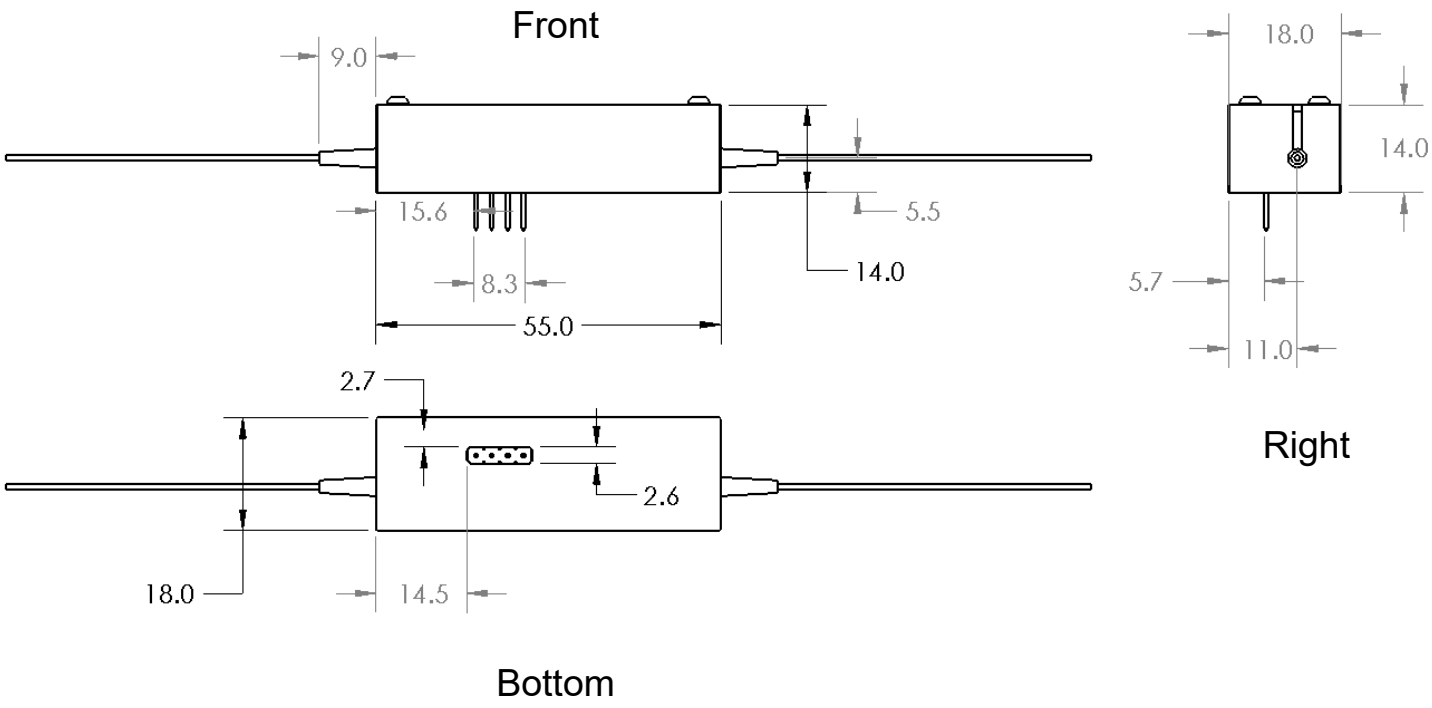
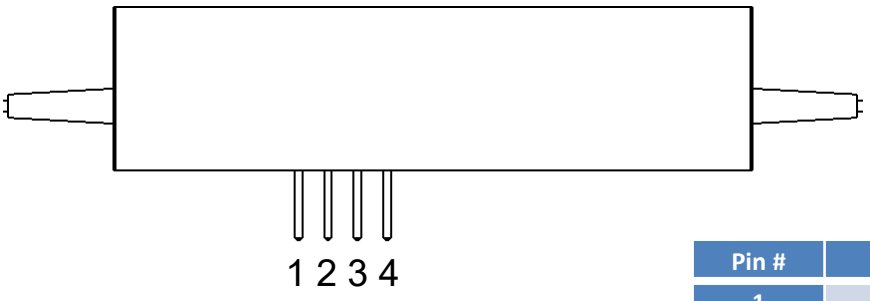
Mechanical Dimensions (mm)



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

Electrical Driver Pin Definition



Pin #	Connection
1	+
2	No connection
3	No Connection
4	-

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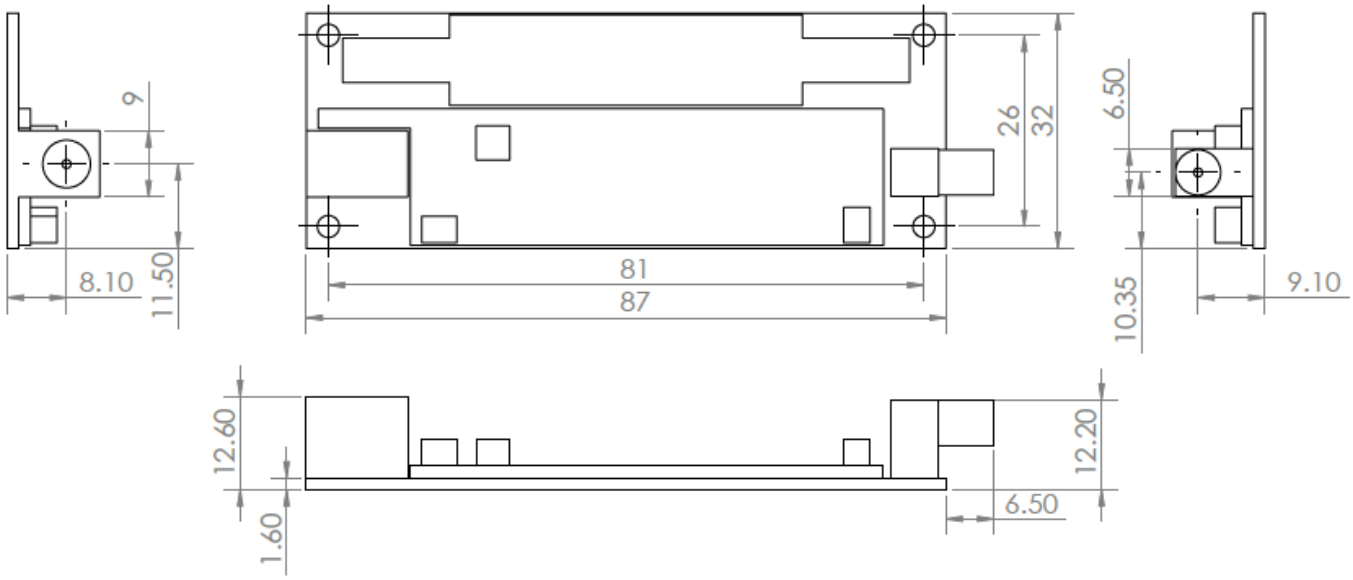
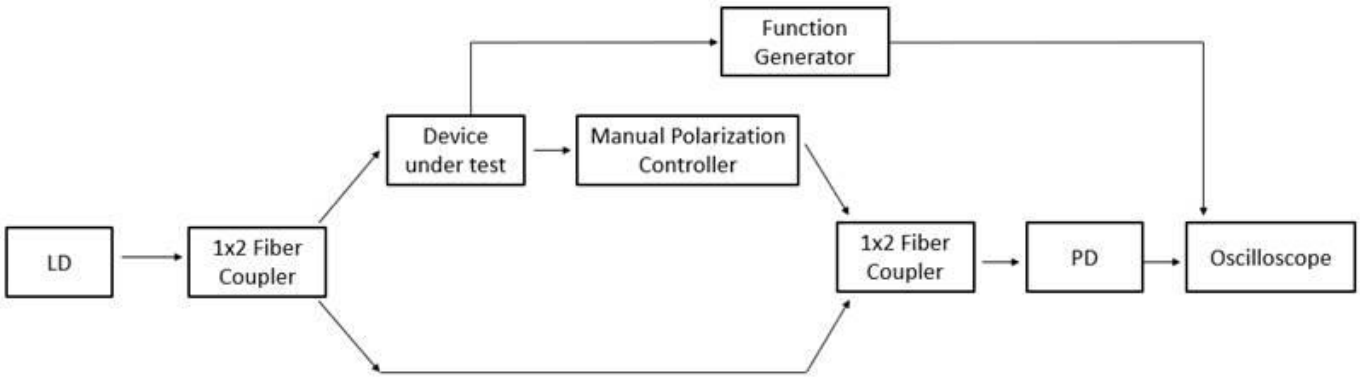
Module Dimensions (mm) with Driver PCB and Regular Power NSVS



20kHz Driver (87mm x 32mm)

Typical Test Set-Up (For PM version all components must be PM fiber



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Ordering Information (Part Number)

	☐	☐	☐	☐☐	☐	☐	☐	☐
Prefix	**Phase Delay [0]**	**Test Wavelength**	**Driver**	**Fiber Type**	**PER**	**Fiber Cover [1]**	**Fiber Length**	**Connector [2] [4]**
PIPS-	15 π = 1 25 π = 2 40 π = 5 100 π = A Special = 0	360 nm = A 430 nm = B 488 nm = 4 532 nm = 5 630 nm = 6 780 nm = 7 850 nm = 8 980 nm = 9 1060 nm = 1 1310 nm = 3 1550 nm = C 2000 nm = 2 2.3-4.1 µm = F	Component = 1 Mounted on driver = 2 Module = 3 Benchtop = 4 Special = 0	***Select Below***	Non = 1 18dB = 2 22dB = 3 29dB = 4	0.9mm Tube = 1 Bare Fiber = 2 Special = 0	0.25m = 1 0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 LC/PC = L Special = 0

Notes:

[0]. @1550nm

[1]. Bare fiber can not put on connectors due to its fragility

[2]. Regular fiber connector has PER ~22dB. Connector with PER >27 dB is available using special process

[3]. Benchtop is a protected Turnkey system including a power supply with 100-240 ACV input

[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.

Fiber Type Selection Table:

01	**SMF-28**	34	**PM1550**	71	**MM 50/125µm**
02	**SMF-28e**	35	**PM1950**	72	**MM 62.5µm**
03	**Corning XB**	36	**PM1310**	73	**105/125µm**
04	**SM450**	37	**PM400**	74	**FG105LCA**
05	**SM1950**	38	**PM480**	75	**FG50LGA**
06	**SM600**	39	**PM630**	76	**STP 50/125**
07	**780HP**	40	**PM850**	77	**IRZS23**
08	**SM800**	41	**PM980**	78	**IRZS32**
09	**SM980**	42	**PM780**		
10	**Hi1060**	43			
11	**SM400**	44	**PM405**		
12		45	**PM460**		
13		46			

Driver PCB ($790 extra)

The Piezoelectric Driver is a PCB designed to mount the Fiber Phase Shifter (PIPS). It features an SMA analog control input capable of modulation speeds up to 1 kHz. The applied voltage is adjustable from 10 to 120 V via a resistance potentiometer on the PCB. A wall-pluggable 12V DC power supply is included. Enclosure is also available at extra.

Warning: do not touch the PCB at any time to void static damage and unpleasant electrical shock.

Operation Instructions – With Driver

1. Connect the optical fibers to the designated input/output ports.
2. Plug in the supplied DC power supply.
3. Apply a 0–5 V control signal to the SMA connector to operate the device.
4. The unit is fully tested before shipment and will function upon proper connection.
5. Do not adjust any PCB settings — doing so may permanently damage the piezoelectric actuator.
6. Do not touch the PCB directly by hand, as this may damage sensitive semiconductor components. For laboratory use, we recommend ordering the benchtop version with protective enclosure.

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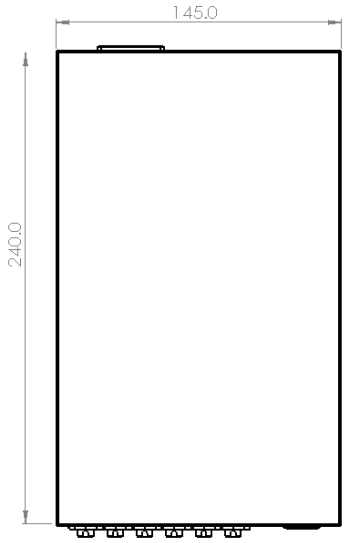
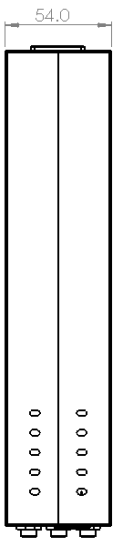
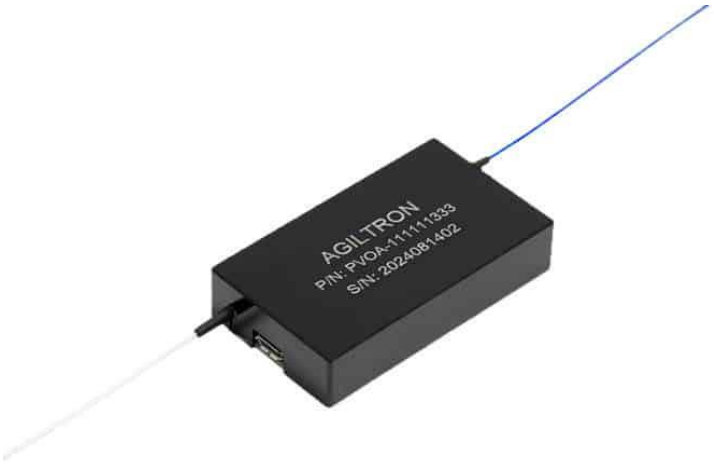
Benchtop: Plug-Play 100-240VAC, USB ($1490 extra)





Module: Plug-Play with Wall Pluggable DC Power Supply (included) ($690 extra)



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