Fiber Phase Shifter

Fiber interferometers, such as distributed acoustic sensors (DAS), often require a low loss, low-cost phase shifter or modulator to obtain the desired sensing signals. General Photonics’ 2nd generation all fiber phase shifter/modulator provides phase shifts up to $65\pi$ with a much lower half-wave voltage (~2 volts as compared with 10-20 volts for the 1st generation phase shifter) at frequencies from DC to 20 kHz. The all fiber construction results in low insertion loss and back reflection. In addition to fiber sensor systems, this compact device is ideal for fiber laser systems, fiber resonators, and fiber interferometers for precision phase tuning or phase modulation. Two different size packages are available to accommodate the bend diameter requirements of different fibers.

Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelengths</td>
<td>1550, 1310, 1060, or 780nm</td>
</tr>
<tr>
<td>Fiber Type</td>
<td>SM: 1310/1550nm: Corning ClearCurve ZBL or equiv. 1060nm: Corning HI1060 or equiv. 780nm: Nufern 780HP or equiv.</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>&lt;0.5 dB (at ac, excluding mode coupling loss and connectors)</td>
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<tr>
<td>Return Loss</td>
<td>&gt;58 dB without connectors</td>
</tr>
<tr>
<td>Total Phase Shift, @500Hz, Vpp=150V</td>
<td>&gt;65\pi (at 1550nm)</td>
</tr>
<tr>
<td>Half Wave Voltage (V&lt;sub&gt;0&lt;/sub&gt;)  @600Hz</td>
<td>2.5-4.5V typical (small frame) 0.7-1.5V typical (large frame)</td>
</tr>
<tr>
<td>Resonance Frequency</td>
<td>8-14kHz typical</td>
</tr>
<tr>
<td>V&lt;sub&gt;0&lt;/sub&gt; @resonance frequency</td>
<td>0.1-0.5V typical</td>
</tr>
<tr>
<td>PDL</td>
<td>SM: &lt;0.05 dB  PM: &lt;0.1 dB</td>
</tr>
<tr>
<td>PER</td>
<td>PM: &gt;18 dB with connectors</td>
</tr>
<tr>
<td>Residual Amplitude Modulation</td>
<td>±0.01 dB (at 1550nm)</td>
</tr>
<tr>
<td>Capacitance of Piezo</td>
<td>0.18\mu F</td>
</tr>
<tr>
<td>Maximum Applied Voltage</td>
<td>150V</td>
</tr>
<tr>
<td>Electrical Interface</td>
<td>Molex WM9131-ND or equivalent</td>
</tr>
<tr>
<td>Operation Temperature</td>
<td>0 to 50° C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40° to 85° C</td>
</tr>
<tr>
<td>Fiber Length (Internal)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>36 ± 2 cm (small frame) 93 ± 2 cm (large frame)</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Small frame: 35.0 (L) x 17.0 (W) x 10.0 (H) mm  Large frame: 45.0 (L) x 27.0 (W) x 11.0 (H) mm</td>
</tr>
</tbody>
</table>

Notes: Unless otherwise stated, specifications in this table are for devices without connectors at 23±5°C.

1. From edge of enclosure at input port to edge of enclosure at output port, not including boots or pigtails. Total fiber length including pigtails will be provided in test data for each FPS-002.

Applications:

- Fiber interferometers
- Fiber laser systems
- Fiber sensor systems

Features:

- All-fiber optical path
- Low half-wave voltage
- Large phase shift range
- Compact
- Low insertion loss
- Low residual amplitude modulation
- Low PDL
- Low cost
Typical Performance Data:

1550nm SM fiber (small frame)

1550nm PM fiber (large frame)
Dimensions:

Small Package

Large Package
Ordering Information:

Small Package
(available for 1310/1550 or 1060nm SM fiber)

Wavelength:
35 = 1310/1550nm
10 = 1060nm

Connector Type:
FC/PC, FC/APC
SC/PC, SC/APC
NC = no connectors
Others specify

Fiber Type:
SS = SM fiber

Large Package
(available for PM or 780nm SM fiber)

Wavelength:
15 = 1550nm (PM)
13 = 1310nm (PM)
10 = 1060nm (PM)
78 = 780nm, (SM)

Connector Type:
FC/PC, FC/APC
SC/PC, SC/APC
NC = no connectors
Others specify

Fiber Type:
SS = SM fiber
PP = PM fiber