



OZ Optics

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HIGHLY STABLE POLARIZED SOURCE

Features:

- Polarization extinction ratios, up to 40 dB
- Temperature controlled stable sources with isolators
- Excellent stability, long lifetime
- Wide range of available wavelengths 400-2050 nm
- Wide range of connector receptacles
- Optional high power versions
- Optional output power adjustment
- Offered with either diode lasers or super luminescent diodes
- Optional motorized rotator with sub-degree resolution

Applications:

- Extinction ratio measurements
- Polarization Dependent Loss (PDL) Measurements
- Interferometry
- Product manufacture and quality control

Product Description:

OZ Optics produces Highly Stable Polarized Fiber Optic Sources (**HIPFOSS**) in a variety of wavelengths. These sources feature exceptional power and wavelength stability while providing light polarized by as much as over 40 dB. This is achieved by thermally stabilizing the laser diode source, including an isolator to block any feedback from parasitic reflections, and utilizing optics that are rigorously tested for optical quality. The end result is a source that is ideal for precise measurements. Selecting a super luminescent diode instead of a laser diode can also improve the stability of the polarization reading.

HIPFOSS sources incorporate a rotatable polarizer, allowing one to set the polarization axis to any desired angle (Motorized version features a resolution of 0.1 degree). The polarization axis is carefully referenced against the keyway on the connector receptacle, allowing you to have confidence that your alignment is optimized. Motorized versions (**MHIPFOSS**) are configured with a motorized rotor controlled via an external touch screen with a dedicated Graphical User Interface (GUI).

As an option, the source can be built with a blocking style attenuator to manually control the output intensity. Unlike electrical methods of power control, this method does not affect the spectral properties of the laser diode output. Thus you can be sure that your measurements will be as repeatable as possible.

Accessories include master reference patchcords for confirming the performance of the source, and power cords for regions outside of North America. Extinction Ratio Meters are also available for measuring the output polarization from a fiber. See the data sheet titled *Polarization Extinction Ratio Meters* for further details.

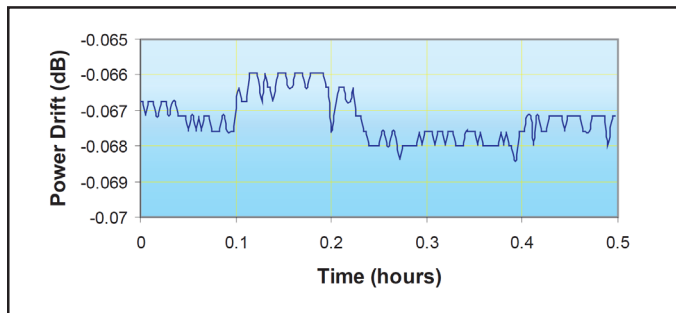


Figure 1. Short Term Stability of 1550 nm HIPFOSS

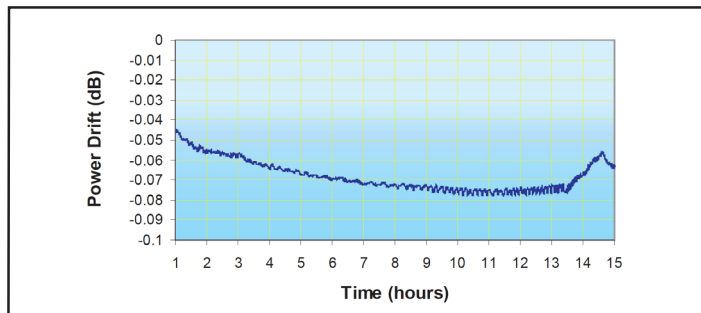


Figure 2. Long Term Stability of 1550 nm HIPFOSS

Ordering Information For Standard Parts:

Bar Code	Part Number	Description
13351	HIPFOSS-02-3-1550-1-ER=40	1550 nm, 1 mW Highly Stable Polarized Fiber Optic Source with a Super/Ultra FC receptacle, rotatable polarizer, achieving over 40 dB extinction ratio
13511	HIPFOSS-02-3A-1550-1-ER=40	1550 nm, 1 mW Highly Stable Polarized Fiber Optic Source with an angled FC receptacle, rotatable polarizer, and achieving over 40 dB extinction ratio
13510	HIPFOSS-02-3-1310-1-ER=40	1310 nm, 1 mW Highly Stable Polarized Fiber Optic Source with a Super/Ultra FC receptacle, rotatable polarizer, achieving over 40 dB extinction ratio
13512	HIPFOSS-02-3A-1310-1-ER=40	1310 nm, 1 mW Highly Stable Polarized Fiber Optic Source with an angled FC receptacle, rotatable polarizer, achieving over 40 dB extinction ratios
13386	PMJ-3A3A-1550-8/125-1-1-1-ER=30-G	Master reference patchcord, angle FC/PC to angle FC/PC, 8/125 um PM 1550 nm fiber, 0.9 mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis, ER = 30 dB minimum
13390	PMJ-3U3U-1550-8/125-1-1-1-ER=30-G	Master reference patchcord, Ultra FC/PC to Ultra FC/PC, 8/125 um PM 1550 nm fiber, 0.9 mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis, ER = 30 dB minimum

Standard Product Specifications¹:

Laser Type ²	Fabry-Perot laser diode all wavelengths
Nominal Peak Wavelength Accuracy ³	± 20 nm
Polarization Extinction Ratio	> 30 dB Standard. > 35 dB, > 40 dB available for wavelengths 980 nm, 1064 nm & 1290 nm -1625 nm
Output Power ⁴	1 mW
Polarizer Type	Rotable thin film polarizer
Spectral Bandwidth ⁵	< 5 nm
Short Term Stability ⁶	±0.005 dB
Long Term Stability ⁷	±0.05 dB
Power variation induced by rotatable polarizer ⁸	< 0.25 dB
Input Voltage	Universal 110/220 Volt AC 50/60 Hertz
Dimensions (LxWxH)	260 x 209 x 90 mm (10.2" x 8.2" x 3.5")
Weight	3 Kg (6.75 lb)
Operating Temperature	0 to 40°C
Storage Temperature	-20 to 60°C
Relative Humidity	< 90% RH non condensing

Note:

¹ Reference condition: 23°C ambient temperature after 30 minutes warm-up period

² SLD lasers are also available as a custom order for certain wavelengths

³ Depends on laser diode manufacturer and temperature operation

⁴ Higher power version available as a custom order

⁵ Measured at Full Width Half Maximum

⁶ 15 minutes at constant temperature and after 30 minutes warm-up period

⁷ 6 hours at constant temperature and after 30 minutes warm-up period

⁸ Power variation induced by rotatable polarizer applied only to 1310 nm and 1550 nm wavelength. At shorter wavelength, the power variation induced by rotatable polarizer can be up to 1.2 dB, due to the smaller core diameter

Motorized Rotator Standard Specifications¹

Performance	
Travel	360° Continuous ²
Bidirectional Repeatability ³	0.05°
Homing Repeatability	0.1°
Bidirectional Accuracy ⁴	0.4°
Backlash	0.013°
Encoder Resolution	143360 counts/360° typical (0.0025°/count)
Minimum Incremental Motion	0.05°
Axis Wobble ⁵	0.014°
Maximum Total Load ⁶	50 g
Minimum Lifetime ⁷	>600 000 Revolutions (100 km)

Note:

¹ Performance specifications with a load of 64 g and a moment of inertia of 6600 g·mm

² A duty cycle of 15 sec running should be followed by 20 sec cooling down. A shorter running time requires a shorter cool down time.

³ Maximum difference between clockwise and counter clockwise movement to the same position

⁴ Maximum deviation from true

⁵ Maximum deviation from the center of rotation

⁶ Must be centered in the mount.

⁷ This rotation stage is not designed for continuous operation

Electrical	
Motor Type	Resonant Piezo
DC Voltage Input	4.5 to 5.5 V
Current Consumption	800 mA typical
Standby Current Consumption	50 mA typical

Communications	
Bus	TTL RS232
Speed	9600 baud
Data Length (1 Stop Bit, No Parity)	8 bit
Protocol Data Format	ASCII HEX

Ordering Examples For Standard Parts:

A European fiber optic manufacturer wants to qualify their polarization maintaining jumpers at 1550 nm and 1310 nm. To ensure that their patchcords performance can exceed 30 dB, they want a source whose performance exceeds 40 dB. All their fibers have FC/APC connectors. They need to order these following parts::

Bar Code	Part Number	Description
13512	HIPFOSS-02-3A-1310-1-ER=40	1550 nm, 1 mW Polarized Fiber Optics Source with a Super/Ultra FC/PC receptacle and rotatable polarizer achieving up to 40 dB extinction ratio
13511	HIPFOSS-02-3A-1550-1-ER=40	1550 nm, 1 mW Highly Stable Polarized Fiber Optic Source with an angled FC receptacle, rotatable polarizer, and achieving over 40 dB extinction ratio
11998	ER-100-1290/1650-ER=40	Fiber Optic Polarization Extinction Ratio Meter for individual wavelengths from 1290 nm to 1650 nm. ER = 40 dB (See Extinction Ratio meter data sheets)
13441	ER-23A-1290/1650-ER=40	Angled FC Removable Receptacle for ER Meter adapted for wavelengths from 1290 nm to 1650 nm. ER = 40 dB (See Extinction Ratio meter data sheets)
13386	PMJ-3A3A-1550-8/125-1-1-1-ER=30-G	Master patchcord, angled FC/PC to angled FC/PC, 8/125 um PM 1550 nm fiber, 0.9 mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis ER = 30 dB minimum
13383	PMJ-3A3A-1300-7/125-1-1-1-ER=30-G	Master patchcord, angled FC/PC to angled FC/PC, 7/125 um PM 1300 nm fiber, 0.9 mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis, ER = 30 dB minimum
2737	POWER CORD - EUROPE	European power cords (Order one for each source and meter)

Ordering Information For Custom Parts:

OZ Optics welcomes the opportunity to provide custom designed products to meet your application needs. As with most manufacturers, customized products do take additional effort so please expect some differences in the pricing compared to our standard parts list. In particular, we will need additional time to prepare a comprehensive quotation, and lead times will be longer than normal. In most cases non-recurring engineering (NRE) charges, lot charges, and a 1 piece minimum order will be necessary. These points will be carefully explained in your quotation, so your decision will be as well informed as possible. We strongly recommend buying our standard products.

Questionnaire For Custom Parts:

1. What wavelength source do you need?
2. What type of connector are you using?
3. How much power do you need into the fiber?
4. What is the minimum extinction ratio needed for your application?
5. Do you want optional power control via a blocking attenuator?
6. Do you need any accessories or have other special requirements?
7. Do you need any other polarization test equipment?

Receptacle Style HIPFOSS: **HIPFOSS-02-X-W-P(-ER=YY)(-LD)**

X = Connector code:

3 = Standard, Super or Ultra NTT-FC/PC receptacle
 3A = Angled NTT- FC/PC
 SC = SC
 SCA = Angled SC
 8 = AT&T-ST
 MU = MU type connector
 LC = LC type connector
 1.25U = Universal Receptacle for 1.25 mm OD connector ferrules (LC, MU)
 2.5U = Universal Receptacle for 2.5 mm OD connector ferrules (ST, FC, SC)

W = Wavelength in nm: 635, 650, 685, 780, 830, 850, 980, 1064, 1310,1480,1550,1625, 2050

LD = Laser diode type.

Add SLD for SLD type.

None for Fabry-Perot type.

YY = Extinction ratio. Add this only for ER > 30 dB. Specify 35 or 40 dB. If not specified, the extinction ratio is greater than or equal to 30 dB. ER = 35 dB or 40 dB is only available for 980 nm, 1064 nm, 1290-1625 nm.

P = Output power, in mW

**Receptacle Style
Motorized HIPFOSS:**

MHIPFOSS-02-X-W-P(-ER=YY)(-LD)

X = Connector code:

3 = Standard, Super or Ultra NTT-FC/PC receptacle
3A = Angled NTT- FC/PC
SC = SC
SCA = Angled SC
8 = AT&T-ST
MU = MU type connector
LC = LC type connector
1.25U = Universal Receptacle for 1.25 mm OD
connector ferrules (LC, MU)
2.5U = Universal Receptacle for 2.5 mm OD
connector ferrules (ST, FC, SC)

LD = Laser diode type.

Add SLD for SLD type.

None for Fabry-Perot type.

YY = Extinction ratio. Add this only for
ER > 30 dB. Specify 35 or 40 dB. If not
specified, the extinction ratio is greater
than or equal to 30 dB. ER = 35 dB or
40 dB is only available for 980 nm,
1064 nm, 1290-1625 nm.

P= Output power, in mW

W = Wavelength in nm: 635, 650, 685, 780, 830, 850, 980,
1064, 1310,1480,1550,1625, 2050

Notes:

1. For Standard Polarized Fiber Optic Sources (**PFOSS**) refer to the Polarized Fiber Optic Source data sheet.
2. Add **-BL** to the part number to have blocking style attenuator added for optional power control.

Ordering Information For Custom Parts:

A European manufacturer of fiber optic circulators wants to test the extinction ratio of their polarization maintaining jumpers at 980 nm prior to pigtailling them to their integrated waveguides. They need to order the following parts:

Bar Code	Part Number	Description
N/A	HIPFOSS-02-3A-980-10-BL-ER=40	980 nm, 10 mW Highly Stable Polarized Fiber Optic Source with an angled FC receptacle, rotatable polarizer, achieving over 40 dB extinction ratio. BL=blocking style attenuator
19489	ER-100-980/1060-ER=40	Fiber Optic Polarization Extinction Ratio Meter without receptacle for wavelengths from 850 to 1650 nm. With 40 dB ER across 980 to 1060 nm and ER = 35 dB elsewhere
19488	ER-23A-980/1060-ER=40	Angle FC removable receptacle for ER Meter achieving up to 40 dB extinction ratio for wavelengths from 980 nm to 1060 nm
17411	PMJ-3A3A-1060-6/125-3-1-1-ER=30-G	Master PM patchcord, 1 meter long, 3 mm OD jacketed, 6/125 um 1060 nm PM fiber, terminated with FC/APC connectors on both ends which are pre-aligned and locked to PM slow axis. ER = 30 dB on best effort basis

Frequently Asked Questions (FAQs):

Q: What's the maximum output power of the HIPFOSS?

A: Maximum output power is 1 mW for the standard HIPFOSS. Powers up to 10 mW are offered for some wavelengths, depending on the customers requirements.

Q: Can I use a HIPFOSS with an unterminated (bare) fiber?

A: Yes, by using a bare fiber adaptor, such as the BARE-03-126 (BC#1816). The application notes below explains how. See the Bare Fiber Adaptor data sheet for details.

Q: Do you offer 1.25 mm and 2.5 mm ID universal adaptors for your sources?

A: We can, but we do not recommend them. Universal adaptors do not have a retaining mechanism, so the fiber can fall out if you do not hold it in place. In addition, the lack of a retaining mechanism will cause the coupled power from the source to be unstable. Universal receptacles can be used in applications where you are not concerned with the power stability, such as visible sources for fault location, or PFOSS or HIPFOSS polarized sources for PM fiber patchcords.

Q: Can a HIPFOSS with an FC/PC receptacle be used with a fiber with an FC/APC connector?

A: Yes, although you can expect the output intensity to be only about 30% of what is obtained with the correct connector/receptacle combination.

Q: Does OZ Optics use DFB laser diodes in their sources?

A: The standard models use a Fabry-Perot (FP) laser diode. Distributed Feedback (DFB) laser diodes feature single wavelength output. These diodes are available as an option. However they are more expensive, and are not offered at all wavelengths.

Q: I ordered a 1550 nm HIPFOSS, but when I measured the wavelength, it was actually 1534 nm. Why?

A: The commercial laser diodes used in the HIPFOSS are nominally the rated wavelength, but variations between diodes mean there may be up to ± 20 nm variation in the actual wavelength for a particular unit. Sources can be selected for a particular wavelength, but at additional cost.

Q: I purchased a source with a receptacle for FC/APC connectors, and I am using a patchcord with an FC/APC connector on the end, but I still don't seem to get the same power as listed on your test report. Why?

A: Not all APC connectors are the same. The angle at which they are polished can vary by ± 0.5 degrees. The radius at which they are polished can vary from 5 to 12mm. The tip of the connector may be cone shaped, or have straight side walls. Because of these variations, the position of the fiber core within the receptacle may vary from fiber to fiber. This will in turn reduce your coupling efficiency.

Q: Does OZ Optics provide sources using super luminescent diodes?

A: Yes we can offer the super luminescent diodes (SLD) in our PFOSS products. The broad wavelength bandwidth of 10 to 25 nm at Full Width Half Maximum (FWHM) will allow a more stable ER value in comparison to PM sources using Fabry-Perot or DFB laser diodes. Units built with SLDs are however more expensive and lead-time to produce them is longer.

Application Notes:

Using Bare Fibers With PFOSS And HIPFOSS Sources

In many applications it is necessary to connect fibers that do not have a connector attached (bare fiber) to an optical source. With the receptacle style polarized sources the easiest way to do this is with an FC bare fiber adapter (Part number BARE-03-126, Bar Code #1816), or our magnetic style FC bare fiber adaptor Part number BARE-03-127-M, Bar Code #44190). These adaptors are essentially an inexpensive way to temporarily put an FC connector onto the end of a fiber. For more details refer to our Bare fiber adaptors datasheet: https://www.ozoptics.com/ALLNEW_PDF/DTS0003.pdf

To use a bare fiber adapter, one strips, cleans and cleaves the fiber end to be tested, and inserts it into the rear of the adapter. The fiber is pushed in until it is flush with the end of the ferrule, and then a clamp holds the fiber in place. The fiber can then be inserted into the receptacle like a standard FC connector.

Using this technique, expect coupling efficiencies to be somewhat lower. Often coupling efficiencies are only 25% of the optimum value, although this depends somewhat on the skill of the operator. This should not affect extinction ratio measurements. Also, since the fiber is not aligned with respect to the key on the connector, the polarization angle from the source may have to be adjusted to line it up with the fiber.

Finally, never use a bare fiber adaptor to connect one fiber to another fiber, or to connect a fiber to a source or detector that has a fiber stub inside. Doing so will likely scratch or damage the fiber inside the source or detector, leading to expensive repairs.



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