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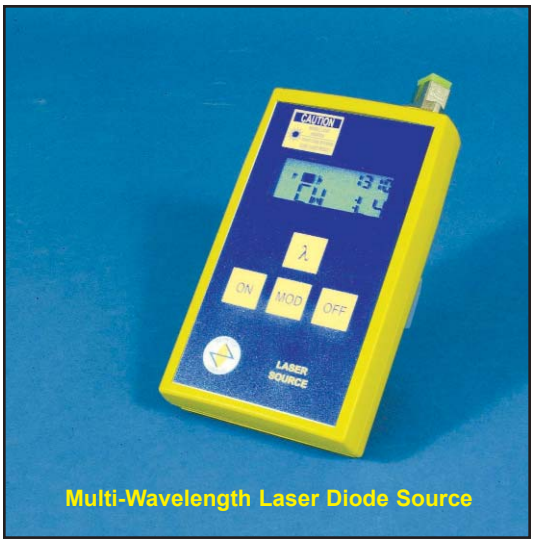
LASER DIODE SOURCE – FIBER OPTIC (SINGLE OR MULTI-WAVELENGTH)

Features:

- Single or multi-wavelength sources available
- Continuous wave (CW) and waveform modulation
- Wide range of connector receptacles available
- Optional output power adjustment
- Polarization-maintaining, singlemode, or multimode versions available
- Low battery indicator
- Rugged and compact design
- Low cost
- User selectable auto turn off mode

Applications:

- Insertion loss measurement and attenuation measurement
- Fiber identification using internal modulated mode
- Splicing and connectorization testing
- End-to-end short link testing
- FTTX/PON
- Quality Assurance



Multi-Wavelength Laser Diode Source

Single Wavelength Laser Diode Source with Patchcord

Product Description:

OZ Optics produces Fiber Optic Laser Diode Sources in a variety of wavelengths. The receptacle-style sources are offered with a wide range of receptacles, while the pigtail-style sources offer the choice of polarization maintaining, singlemode, or multi-mode fiber output. Each source has a low battery indicator on the front panel.

In general, OZ Optics uses polarization maintaining fibers based on the PANDA fiber structure when building polarization maintaining components and patchcords. However OZ Optics can construct devices using other PM fiber structures. We do carry some alternative fiber types in stock, so please contact our sales department for availability. If necessary, we are willing to use customer supplied fibers to build devices.

The standard source provides continuous waveform output. It can also be pulse modulated internally at 270 Hz, 1 kHz and 2 kHz.

As an option, OZ Optics can include a blocking-style optical attenuator to adjust the output power for the FOSS-01 and FOSS-11 models. This method of power control does not affect the spectral properties of the laser diode output. The FOSS-2N allows the user to select one of four preset power levels via the keypad.

OZ Optics recommends angled connectors for improved stability. For 1300nm and 1550nm wavelengths, an isolator can be added for improved stability. OZ Optics also manufactures the Highly Stable Laser Diode Source (**HIFOSS**), which includes a temperature controller and an isolator. See the **Highly Stable Laser Diode Source** data sheet for more information on this product.

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Bar Code	Part Number	Description
Receptacle style, single wavelength source and accessories		
7805	FOSS-01-3A-9/125-1310-S-1	Fiber Optic Laser Diode Source with 1310 nm wavelength, 1 mW output, for 9/125µm core/cladding singlemode fiber, with angled FC/PC receptacle.
7806	FOSS-01-3A-9/125-1550-S-1	Fiber Optic Laser Diode Source with 1550 nm wavelength, 1 mW output, for 9/125µm core/cladding singlemode fiber, with angled FC/PC receptacle.
2834	FOSS-01-3S-4/125-635-S-1	Fiber Optic Laser Diode Source with 635 nm wavelength, 1 mW output, for 4/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
5454	FOSS-01-3S-4/125-650-S-1	Fiber Optic Laser Diode Source with 650 nm wavelength, 1 mW output, for 4/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
2834	FOSS-01-3S-4/125-670-S-1	Fiber Optic Laser Diode Source with 670 nm wavelength, 1 mW output, for 4/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
5455	FOSS-01-3S-5/125-780-S-1	Fiber Optic Laser Diode Source with 780 nm wavelength, 1 mW output, for 5/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
7562	FOSS-01-3S-5/125-810-S-1	Fiber Optic Laser Diode Source with 810 nm wavelength, 1 mW output, for 5/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
7564	FOSS-01-3S-5/125-850-S-1	Fiber Optic Laser Diode Source with 850 nm wavelength, 1 mW output, for 5/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
8570	FOSS-01-3S-6/125-980-S-1	Fiber Optic Laser Diode Source with 980 nm wavelength, 1 mW output, for 6/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
2835	FOSS-01-3S-9/125-1310-S-1	Fiber Optic Laser Diode Source with 1310 nm wavelength, 1 mW output, for 9/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
2836	FOSS-01-3S-9/125-1550-S-1	Fiber Optic Laser Diode Source with 1550 nm wavelength, 1 mW output, for 9/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
7808	FOSS-01-3S-9/125-1310-S-1-ISOL	Fiber Optic Laser Diode Source with 1310 nm wavelength, 1 mW output and isolator, for 9/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
12242	FOSS-01-3S-9/125-1550-S-1-ISOL	Fiber Optic Laser Diode Source with 1550 nm wavelength, 1 mW output and isolator, for 9/125µm core/cladding singlemode fiber, with super FC/PC receptacle.
8402	AC-9VDC-NA	Universal 110/220 VAC to 9VDC power supply adaptor for North America (for FOSS-01 and FOSS-11).
8403	AC-9VDC-EU	Universal 110/220 VAC to 9VDC power supply adaptor for Europe (for FOSS-01 and FOSS-11).
8404	AC-9VDC-UK	Universal 110/220 VAC to 9VDC power supply adaptor for UK (for FOSS-01 and FOSS-11).
Pigtail style, single wavelength source		
8772	FOSS-11-4/125-635-S-1-3S-3-1	Pigtail-style Fiber Optic Laser Diode Source with 635 nm wavelength, 1 mW output. Fiber is singlemode, 4/125µm core/cladding, 3 mm OD Kevlar reinforced PVC cable, 1 m long, with super FC/PC connector.
8611	FOSS-11-9/125-1310-S-1-3S-3-1	Pigtail-style Fiber Optic Laser Diode Source with 1310 nm wavelength, 1 mW output. Fiber is singlemode, 9/125µm core/cladding, 3 mm OD Kevlar reinforced PVC cable, 1 m long, with super FC/PC connector.
8614	FOSS-11-9/125-1550-S-1-3S-3-1	Pigtail-style Fiber Optic Laser Diode Source with 1550 nm wavelength, 1 mW output. Fiber is singlemode, 9/125µm core/cladding, 3 mm OD Kevlar reinforced PVC cable, 1 m long, with super FC/PC connector.
Receptacle style, multi wavelength source		
22953	FOSS-22-SC-9/125-1310/1550-S-0.2	Dual Wavelength Fiber Optic Laser Diode Source with 1310 and 1550 nm wavelengths, 0.2 mW output, for 9/125µm core/cladding singlemode fiber with SC receptacle.
24031	FOSS-22-3S-9/125-1310/1550-S-0.2	Dual Wavelength Fiber Optic Laser Diode Source with 1310 and 1550 nm wavelengths, 0.2 mW output, for 9/125µm core/cladding singlemode fiber with FC/PC receptacle.
24032	FOSS-21-3S-9/125-1550-S-0.9	Single Wavelength Fiber Optic Laser Diode Source with 1550 nm wavelength, 0.9 mW output, for 9/125µm core/cladding singlemode fiber with FC/PC receptacle.
24058	BC1	Optional AC adaptor and battery recharger for AA NiMH batteries. Two AA batteries included. For use with North American and European style plugs.

Standard Product Specifications:

Parameter	Specifications	
Model	**FOSS-2N**	**FOSS-01 and FOSS-11**
Available wavelengths[1] For single wavelength - without isolator For single wavelength - with isolator For multi-wavelength - without isolator	 532, 635, 655, 670, 685, 780, 810, 830, 850, 980, 1064, 1310, 1490, 1550, 1625 nm 1310, 1550 nm 1310, 1490, 1550, 1625 nm	
Wavelength accuracy[2]	± 5 nm for 635 to 685 nm ± 15 nm for 780 to 1064 nm ± 20 nm for 1310 to 1625 nm	
Linewidth[2,3]	1.5 nm (Typical for 1550 nm)	
Available receptacles	Super, Ultra and angled NTT-FC/PC, SC, angled SC, AT&T-ST, LC, MU, 2.5 mm ID Universal, and 1.25 mm ID Universal	
Optical power[4]	0.8 to 1 mW (Standard, depending on wavelength and laser class)	
Optical power stability[5] Without isolator With isolator	 ± 0.05 dB (Typical) ± 0.025 dB (Typical)	
Internal modulation	CW, 270 Hz, 1 kHz and 2 kHz square wave	
Power supply	Two AA alkaline batteries. Optional universal 110/220 V AC/DC adapter[7]	9 V alkaline battery. Optional universal 110/220 V AC/DC adapter[7]
Dimensions (W x L x H)[6]	76 x 127 x 25.4 mm (3 x 5 x 1 in.)	72 x 110 x 25 mm (2.75 x 4.6 x 1 in.)
Temperature Range Operating Storage	 -10 to +50 °C -20 to +60 °C	 -10 to +50 °C -30 to +60 °C, at 95% humidity, non-condensing
Weight (including batteries)	225 g (0.5 lb.)	200 g (0.45 lb.)
Laser classification based on IEC 60825-1	Class 1	Class 1, 2 or 3b

Note:
[1]Typical wavelengths shown. For other wavelengths, please contact OZ Optics.
[2]Depends on Laser diode specification.
[3]For narrow linewidth, please contact OZ Optics.
[4]Higher power is available upon request. Please contact OZ Optics.
[5]Over 6 hours, at 23 °C, after 30 minutes warm up, tested at 1550 nm with super FC/PC receptacle, 9/125 singlemode fiber.
[6]Dimensions and weight may change for special order. Does not include pouch and connectors.
[7]See Standard Parts for universal 110/220 V AC/DC adapter.

Ordering Examples For Standard Parts:

1. A customer needs a 1550 nm laser diode source, with 1 mW output power, 9/125 µm core/cladding singlemode fiber with a super FC/PC receptacle. He wants an AC adaptor for North America as well.

Bar Code	Part Number	Description
2836	FOSS-01-3S-9/125-1550-S-1	Fiber Optic Laser Diode Source with 1550 nm wavelength, 1 mW output, for 9/125 core/cladding, singlemode fiber, with super FC/PC receptacle.
8402	AC-9VDC-NA	Universal 110/220 VAC to 9 VDC power supply adaptor, for North America.

2. A customer wants a pigtail style 635 nm laser diode source, with 1mW output power . Fiber is 4/125 um core/cladding, singlemode, 3 mm OD Kevlar reinforced PVC cable, 1 meter long with super FC/PC connector.

Bar Code	Part Number	Description
8772	FOSS-11-4/125-635-S-1-3S-3-1	Pigtail-style Fiber Optic Laser Diode Source with 635 nm wavelength, 1 mW output. Fiber is singlemode, 4/125 core/cladding, 3 mm OD Kevlar reinforced PVC cable, 1 m long, with super FC/PC connector.

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 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 is the wavelength required for the laser diode source?
2. What is required maximum output power of the laser diode source?
3. What type of fiber are you using? (SMF, MMF or PMF)
4. What model source do you need? If Receptacle style, what type? If Pigtail style, what it the fiber length, Jacket OD and connector type?

Receptacle Style FOSS[1]

FOSS-01-X-a/b-W- F-1(-BL[2]) (-ISOL[3])

X = Receptacle or connector code:[4]
- 3S = Standard, Super, or Ultra NTT-FC/PC
- 3A = Angled NTT-FC/PC
- SC = SC
- SCA = Angled SC
- 8 = AT&T-ST
- LC = LC
- MU = MU
- 1.25U=Universal Receptacle for 1.25mm OD ferrule (LC, MU, etc.)
- 2.5U=Universal Receptacle for 2.5mm OD ferrule (FC, ST, SC, etc.)

F =
- M = Multimode
- S = Singlemode
- P = Polarization Maintaining

W = Wavelength, in nm: 635, 650, 670, 685, 780, 810, 830, 850, 980, 1064, 1310, 1480, 1550,1625

a/b[4] = Fiber core/cladding size, in µm
- 9/125 for 1300/1550nm corning SMF-28 singlemode fiber
- 8/125 for 1550nm PANDA style PM fiber
- 7/125 for 1300nm PANDA style PM fiber

Pigtail Style FOSS[1]

FOSS-11-a/b-W-F-1-X-JD-L(-BL[2]) (-ISOL[3])

a/b[4] = Fiber core/cladding size, in µm
- 9/125 for 1300/1550nm corning SMF-28 singlemode fiber
- 8/125 for 1550nm PANDA style PM fiber
- 7/125 for 1300nm PANDA style PM fiber

W =Wavelength, in nm: 635, 650, 670, 685, 780, 810, 830, 850, 980, 1064, 1310, 1480, 1550, 1625

F = Fiber type
- M = Multimode
- S = Singlemode
- P = Polarization Maintaining

L = Fiber length, in meters

JD = Fiber jacket type:[4]
- 1 = 900 µm OD Hytrel jacket
- 3 = 3 mm OD Kevlar reinforced PVC cable

X = Receptacle or connector code:[4]
- 3S = Super NTT-FC/PC
- 3U = Ultra NTT-FC/PC
- 3A = Angled NTT-FC/PC
- SC = SC
- SCA = Angled SC
- 8 = AT&T-ST
- LC = LC
- MU = MU

Note:

1 Standard unit. For Highly Stable Laser Diode Source (**HIFOSS**), which includes TE cooler and an isolator, please see the Highly Stable Laser Diode Source data sheet.

2 Add **-BL** to the part number to add blocking style attenuator to the FOSS.

3 Add **-ISOL** to the part number to add an isolator (1310nm or 1550nm only. For other wavelengths, order HIFOSS with isolator and TE cooler).

4 See Standard Tables data sheet for fiber sizes, jacket sizes, and other connectors.

Description

Single/Multiwavelength Receptacle Style Laser Diode Source

Part Number

FOSS-2N-X-a/b-W-F-P

N = Number of channels:
- 1 = Single Wavelength Source
- 2 = Dual Wavelength Source
- 3 = Triple Wavelength Source

X = Connector type:
- 3S = Standard, Super, or Ultra NTT-FC/PC
- 3A = Angled NTT-FC/PC
- SC = SC
- SCA = Angled SC
- 8 = AT&T-ST
- LC = LC
- MU = MU
- 1.25U = Universal receptacle for 1.25 mm OD ferrule (LC, MU, etc.)
- 2.5U = Universal receptacle for 2.5 mm OD ferrule (FC, ST, SC, etc.)

a/b = Fiber core/cladding size in µm:
- 9/125 for 1300/1500 nm singlemode fiber.
- 8/125 for 1550 nm PANDA style PM fiber.
- 7/125 for 1300 nm PANDA style PM fiber

(See tables 1 to 5 in the Standard Tables data sheet for other values)

W = Wavelength, in nm:

For single wavelength sources, the standard wavelengths are: 532, 635, 655, 670, 685, 780, 810, 830, 850, 980, 1064, 1310, 1490, 1550, and 1625 nm. For other wavelengths, please contact OZ Optics Ltd.

For multi-wavelength sources, the options are: 1310, 1490, 1550, and 1625 nm. For multi-wavelength sources, specify each wavelength separated by a "/" (Example 1310/1550). Some combinations of wavelengths may not be available.

F = Fiber type:
- M = Multimode
- S = Singlemode
- P = Polarization Maintaining - Only available for single wavelength option.

P = Output Power in mW:

(0.2 mW, 0.5 mW and 0.9 mW are standard for infrared wavelengths.)

Ordering Examples For Custom Parts:

A customer needs a 1550 nm laser diode source, with 1mW output power and isolator, for 9/125 µm core/cladding singlemode fiber with super FC/PC receptacle. He wants the output power to be adjustable.

Part Number	Description
FOSS-01-3S-9/125-1550-S-1-BL-ISOL	Fiber Optic Stable Laser Diode Source with 1550 nm wavelengths, 1 mW output, isolator and blocking attenuator, for 9/125 µm core/cladding singlemode fiber with super FC/PC receptacle.

Ordering Examples for Custom Parts:

A customer needs to verify the integrity of an optical network using 9/125 SM fiber at 1310, 1480, and 1550 nm. The network uses FC connectors. The customer would like to carry out the tests using 0.5 mW sources. He can do this by ordering the following part:

Part Number	Description
FOSS-23-3S-9/125-1310/1490/1550-S-0.5	Triple Wavelength Fiber Optic Laser Diode Source with 1310, 1490, and 1550 nm wavelengths, 0.5 mW output, for 9/125 µm core/cladding SM fiber with FC receptacle. Uses 2 AA batteries or optional AC adapter.

Frequently Asked Questions (FAQs):

Q: What's the maximum output power of the **FOSS**?
A: Maximum output power is 1 mW for the standard **FOSS** depending on the wavelength and laser classification. Powers up to 4 mW can be built on special request, depending on customer requirements. For output power higher than 4mW, a Highly Stable Laser Diode Source should be ordered. Contact OZ Optics for details. .

Q: Why is a modulated signal desirable?
A: By modulating a light signal, it is easy for detection circuitry to detect the signal even in the presence of high background signals or noise.

Q: Can a polarization-maintaining fiber pigtail **FOSS** be used to check the polarization extinction ratio of a polarization-maintaining fiber?
A: No, a **PFOSS** with a rotator is required. Please see the Polarization Fiber Optic Stable Source (**PFOSS**) data sheet.

Q: Why is the jacket type important in a pigtail style **FOSS**?
A: The jacket protects the fiber. 3 mm OD Kevlar reinforced PVC cable is thick and strong. 900 µm OD Hytrel jacket is thin and easy to be coiled to fit into a small space.

Q: What affects the source stability?
A: Temperature changes and backreflection from the fiber are the two main factors that affect the source stability. A thermo-electric (TE) cooler increases the stability by maintaining the laser diode at a stable temperature. The instability caused by backreflections can be reduced by using angled (APC) connectors, or removed completely by using an isolator. Please see the Highly Stable Laser Diode Source (**HIFOSS**) data sheet for details.

Q: Are the diodes used in your sources DFB diodes?
A: Normally we use standard Fabry-Perot (FP) cavity laser diodes. Distributed Feed Back (DFB) laser diodes provide narrow linewidths and improved side band suppression. They can be provided as an option. However they are more expensive and not available for all wave lengths.

Q: I purchased a 1550 nm source from OZ Optics, but my spectrum analyzer says it is actually a 1544 nm source. Why?
A: While the nominal wavelength of the source is 1550 nm, in fact the tolerance at this wavelength is ±20 nm. This is due to variations in the manufacture of commercial laser diodes. OZ Optics can provide sources for a specific wavelength, but only at additional cost.

Q: Do you offer 1.25mm and 2.5mm 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

Application Notes:

The OZ Optics Fiber Optic Laser Diode Source (**FOSS**) is a hand-held, low-cost, portable device. It is ideal for field use, as well as for laboratory research applications. The **FOSS** laser source series offers excellent stability and portability for accurate fiber optic testing and other applications. The device is configured with one of many different wavelengths, optional adjustable output power, and the choice of many connector types. The **FOSS** incorporates several built-in modulation features to satisfy almost any laser source requirement.

Insertion loss measurement and attenuation measurement:
When used with an optical power meter, the **FOSS** laser source provides an inexpensive alternative to high-priced loss test sets. The **FOSS** can be substituted for terminal equipment in the central office or head-end to provide stable output for loss measurement.

For singlemode applications, such as telecom or CATV environments, the **FOSS** can be coupled with an optical power meter to form a test kit that performs optical loss tests at 1310 or 1550 nm.

Visually optimizing splices and connectors:
Optical splices, especially the mechanical type of splice, are often visible when light from a visible **FOSS** is transmitted through the fiber. An improperly made splice looses light at the joint between the two fibers. When there is a clear or translucent area near the splice, use the visible FOSS to optimize the splice. The light from the **FOSS** is visible; therefore, the splice loss can be seen while the fiber is pushed, pulled, or rotated to reduce the loss. When the escaping visible light is minimized, the loss is minimized.

Fiber identification using internal modulated mode:
The visible **FOSS** can also be used to find fiber that is broken or to trace a path of a fiber from one end to another, through many connections. Visible signs of damage, such as a broken reel, can easily be seen. In the modulation mode, the **FOSS** applies, for example, a 2 kHz tone into the fiber. An optical identifier, to isolate specific fibers in a bundle prior to splicing or rerouting without interrupting service, can detect this signal.

Easy to use:
To trace fiber with a visible **FOSS**, connect the fiber to be traced to the output connector of the unit. The red light output is visible at the other end of the fiber. This application is used to easily find a particular fiber within a multi-fiber cable bundle during installation.

To test for continuity, attach the fiber to be tested to a visible **FOSS**. If the light is visible at the far end, the fiber is not damaged.

Application Notes (continued):

Choosing CW or modulation mode:
Unlike many other fiber optic laser diode sources, the OZ Optics **FOSS** features a choice of continuous wave or modulated output. To change the mode, simply press the mode key on the front panel to select 270 Hz modulation. Press the mode key again to select the 1 kHz or 2 kHz modulation setting. The default state is CW mode when the device is powered on.

Maintenance:
To ensure the best performance of the **FOSS**, some simple maintenance is required.

Cleaning the connector:
A clean output connector ensures that good connections are made between the **FOSS** and the fiber under test. Failure to clean connectors can cause permanent damage to both the fiber end and the connector of the **FOSS**. When the output light appears circular by projecting against a piece of white paper with a visible source, or on an IR viewing card with an infrared source, with little or no scattering, the connector is clean. If the light is not approximately circular, clean the connector with compressed air or a fresh lint-free tissue and alcohol.

Changing the batteries:
The **FOSS** can use AC/DC power or battery power. The indicator on the front panel shows when laser power is active. A low battery condition is also indicated to the user. Continued operation with a weak battery can cause the laser output to become unstable, and eventually the unit shuts off.

Auto Turn Off Mode:
The FOSS is equipped with an auto turn-off feature, which will turn the unit off after a preset time. This feature can be disabled by the user.

Using Bare Fibers
A common application is to connect a fiber without any connector (bare fiber) to either another fiber or to a source or meter that contains a fiber stub. In these applications the best approach is to use a intermediate patchcord, with the appropriate connector on one end, and a bare fiber on the other end. The end with the connector is attached to the source or meter, and the bare fiber end is connected to the bare fiber on the device to be tested. Both fibers are first stripped, cleaned and cleaved and then spliced together. This can be done with a fusion splicer, or alternatively, a simple mechanical splice (OZ Bar Code #1933) can be used. Each fiber end is first dabbed into index matching gel (GEL-01, OZ Bar Code 2861) to act as a lubricant. One end is inserted about half way into the splice, while the other end is pushed in until it butts against the first fiber. Losses are typically less than 1dB, and the parts can be reused.