

# High Power Large Core Fiber Shutter/Switch

(up to 15W, up to 1 mm diameter, ultra-broadband, 1x1, bidirectional)



(Protected by U.S. patent 6823102 and pending patents)

DATASHEET

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## Applications

- Protection
- Instrumentation

## Features

- Low Optical Distortions
- High Isolation
- High Reliability
- Fail-Safe Latching
- Epoxy-Free Optical Path
- Low Cost

The LFSH Series Fiber Optical Large Core Switch uniquely features high power handling up to 10W for large core fiber up to 1mm in diameter. It directly couples a pair of fibers and is activated via an electrical relay. The advanced design offers unmatched performances of ultra-broadband covering from 300 to 2400nm limited only by fiber intrinsic transmission, low optical loss, little wavelength dependence without coatings, high power handling, as well as low cost. The switch is bidirectional and conveniently controllable by 5V TTL. The latching operation preserves the selected optical path after the drive pulse has been removed, reducing power consumption. The switch has integrated electrical position sensors for verification. The switch is designed to be mounted onto a heat sink to dissipate the unwanted light.

## Specifications

Parameter	Min	Typical	Max	Unit
Operating Wavelength <sup>[1]</sup>	300		5000	nm
Insertion Loss <sup>[2]</sup>		0.5	1.2	dB
Polarization Depended Loss			0.1	dB
Wavelength Dependent Loss		0.05	0.3	dB
Cross Talk <sup>[2]</sup>	35			dB
Return Loss <sup>[2]</sup>	35			dB
Rise/Fall Time		3	8	ms
Repetition Rate			5	Hz
Repeatability			± 0.05	dB
Durability	10 <sup>8</sup>			Cycles
Optical Power Handling	10		20	W
Switching Type	Latching / Non-Latching			
Operating Temperature	-5		+60	°C
Storage Temperature	-40		+60	°C
Fiber Type	100, 200, 300, 400, 500, 600 Core, or equivalent			µm

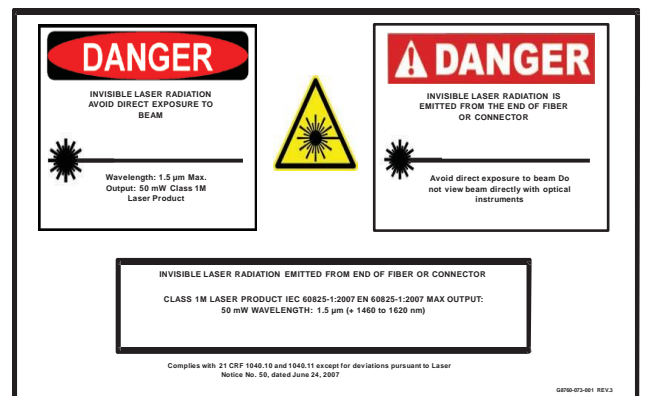
### Notes:

- [1]. The same transmission character as the fiber.  
 [2]. Defined as coupling loss minus fiber intrinsic loss. Measure @ Light source CPR<15 dB, 650nm. Excluding Connectors. For larger CPR and wavelengths out of the fiber transparent range loss may be higher

## Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5 µm. Maximum power = 30 mW.



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### Mechanical Dimensions (mm)

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

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### Electrical Connector Configurations

The load is a resistive coil which is activated by applying 5V (draw ~ 40mA). Agiltron offers a computer control kit with TTL and USB interfaces and Windows™ GUI. We also offer RS232 interface as an option – please contact Agiltron sales.

#### Latching Type – Single Coil

**Application Note:** Applying a constant driving voltage increases stability. The switches can also be driven by a pulse mode using Agiltron recommended circuit for energy saving.

Status	OpticalPath	Electric Drive			Status Sensor	
	1x1	Pin 1	Pin 2	Pin 3	Pin 4 - 5	Pin 6 - 7
Status I	Port 1 → 1'	0	5V Pulse	NC	Open	Open
Status II	Dark	0	NC	5V Pulse	Close	Close

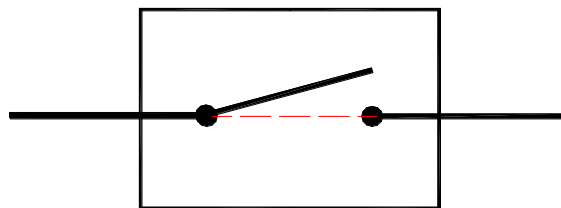
- [1]. Typical Pulse width is 50 ms.
- [2]. We can provide 3V or other Driving voltage switches, please call sales.
- [3]. NC: No electric Connection.

#### Non-Latching Type

Status	OpticalPath	Electric Drive			Status Sensor	
	1x1	Pin 1	Pin 2	Pin 3	Pin 4 - 5	Pin 6 - 7
Status I	Port 1 → 1'	0	NC	NC	Open	Open
Status II	Dark	0	5V	NC	Close	Close

- [1]. We can provide 3V or other Driving voltage switches, please call sales.
- [2]. NC: No electric Connection.

### Functional Diagram



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### Ordering Information

Prefix	Power	Test Wavelength <sup>[1]</sup>	Type	Package	Type	Fiber Core Size	Fiber Cover	Fiber Length	Connector
LFSH-	5 = 5 10 = 10 15 = 15 Special = 00	488 = 4 630 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = 5 2000 = 2 Special = 0	Latching = 1 Non-latching = 2 Special = 0	Standard = 1 Special = 0	Standard = 1 Special = 0	100 μm (NA0.22) = E 200 μm (NA0.22) = F 300 μm (NA0.22) = G 400 μm (NA0.22) = H 500 μm (NA0.22) = I 600 μm (NA0.22) = J Special = 0	Bare fiber = 1 2 mm Jacket = 2 900um tube = 3 3mm Jacket = 4 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 SMA = S Special = 0

[1]. The device is intrinsically ultra-broadband limited by the fiber's transmission. We only test at one selected wavelength to save cost. If a customer needs to test at several wavelengths, the selection is special =0 with added cost.

#### Fiber Core Alignment

Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

#### Fiber Cleanliness

Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

#### Maximum Optical Input Power

Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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### Typical Fiber Transmissions

