Fiber-Fiber™
Large Core No-Gap Compact Fiber Optical Switch
(up to 0.5 mm diameter, ultra-broadband UV-IR, 1x1, 1x2, 1x3, bidirectional)

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

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Return to the Webpage

The LCFF Series fiber optic switch provides exceptional performance with ultra-broadband coverage from UV to IR, low optical loss, minimal temperature dependence, high on/off ratio, vibration insensitivity, and compact size. It connects optical channels through direct fiber-to-fiber coupling, where the light path is continuous with index-matching liquid filling the tiny gap between the coupling fibers, eliminating unwanted surface reflection issues. Channel switching is activated via an electrical relay, and the latching operation preserves the selected optical path after the electrical power is removed. The switch is bidirectional and conveniently controllable by a 4.5V signal. The LCFF Series switch accommodates large-core fibers ranging from 0.2 to 0.4mm in diameter, with transmission characteristics identical to fiber. The platform is robust, insensitive to temperature and vibration, and available in compact configurations of 1x1, 1x2, 1x3, and 1x4. For 1xN applications, a larger format is available.

This switch uses a specially formulated index-matching liquid that does not generate fluorescent. The liquid fills a gap of less than 5 µm.

Applications

- Sensor System
- Spectrometer
- Instrumentation

Features

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

Specifications

Parameter		Min	Typical	Max	Unit
Operating Wavelength		300		2600	nm
Insertion Loss [1]	1x1		0.5	1.0	dB
	1x2		0.8	1.2	
	1x3		1	1.8	
Polarization Depended Loss				0.1	dB
Wavelength Dependent Loss			0.05	0.1	dB
Cross Talk [1]		35	45	50	dB
Return Loss [1]		35			dB
Rise/Fall Time			15	30	ms
Repetition Rate				1	Hz
Repeatability				± 0.05	dB
Durability		10^8			Cycles
Optical Power Handling		1	2	3	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]. Excluding Connectors. Measure @ Light source CPR<14 dB.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Rev 10/21/24

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Mechanical Dimensions (mm)

*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

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	Dual 1x1	1x2	Pin 1	Pin 2	Pin 3	Pin 4 - 5	Pin 6 - 7
Status I	Port 1 → 1'	Port 1 → 1' Port 2 → 2'	Port 1 → 1'	0	5V Pulse	NC	Open	Open
Status II	Dark	Dark	Port 1 → 2'	0	NC	5V Pulse	Close	Close

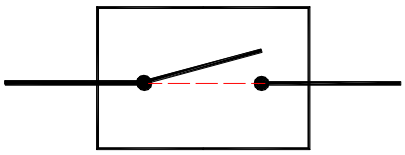
[1]. Typical Pulse width is 50 ms.
[2]. We can provide 3V or other Driving voltage switches, please call sales.
[3]. NC: No electric Connection.

Non-Latching Type

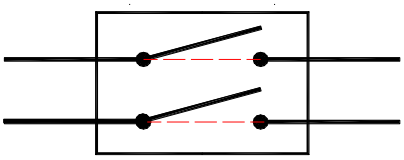
Status	OpticalPath					Electric Drive			Status Sensor	
	1x1 Transparent	1x1 Dark	Dual 1x1 Transparent	Dual 1x1 Dark	1x2	Pin 1	Pin 2	Pin 3	Pin 4 - 5	Pin 6 - 7
Status I	Port 1 → 1'	Dark	Port 1 → 1' Port 2 → 2'	Dark	Port 1 → 1'	0	NC	NC	Open	Open
Status II	Dark	Port 1 → 1'	Dark	Port 1 → 1' Port 2 → 2'	Port 1 → 2'	0	5V	NC	Close	Close

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

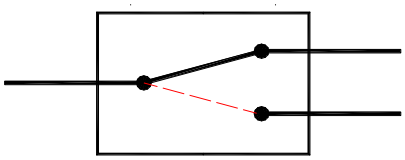
Functional Diagram



1x1



Dual 1x1



1x2

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Ordering Information

	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Configuration**	**Test Wavelength [1]**	**Type**	**Package**	**Driver**	**Fiber Core Size**	**Fiber Cover**	**Fiber Length**	**Connector**
LCFF-	1x1 = 1 1x2 = 2 1x3 = 3	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	Non = 1 TTL = 2 USB = 3 RS232 = 4	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 3mm jacket = 3 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	None = 1 FC/PC = 2 SMA = 3 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.

Red –Special Order

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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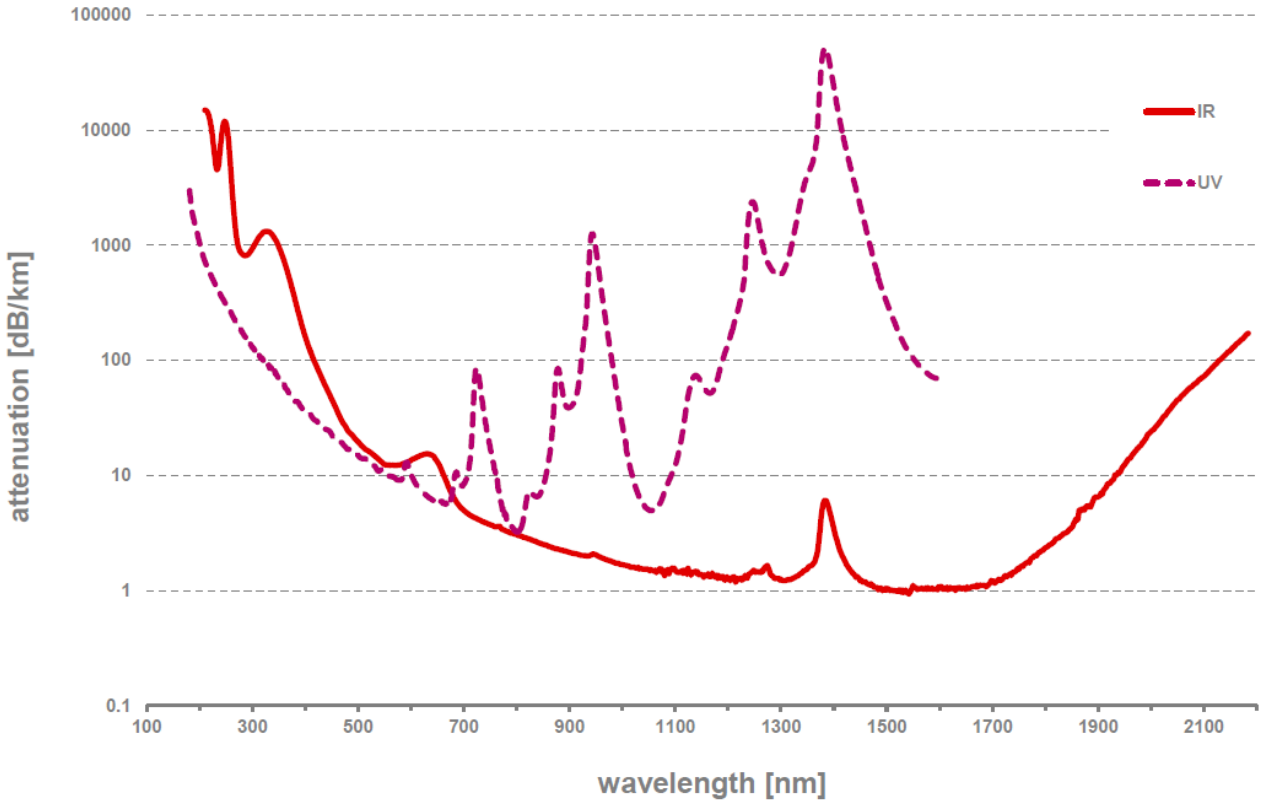
Typical Fiber Transmissions



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