Fiber-Fiber™ 1x8 Fiber Optical Switch

(SM, PM, MM, Bidirectional)

The FF Series fiber optic switch connects optical channels by a micro-mechanical fiber to fiber auto-alignment platform and activated via an electrical relay. The advanced design significantly increase the performance, offering unprecedented low optical loss, broad wavelength operation with no coatings, high power handling, as well as an unmatched low cost. Latching operation preserves the selected optical path after the driver signal has been removed. The switch is bidirectional and conveniently controllable by 5V TTL.

Using no lens, the FF Series switch can accommodate all type of fibers, including SM. MM, PM, double cladding, bendable, large core, small core.

Lightpath in the device is bidirectional.

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

- Protection
- Instrumentation

Features

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

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	500		2000	nm
Insertion Loss [1]		1	1.2	dB
Wavelength Dependent Loss		0.05	0.1	dB
Polarization Dependent Loss			0.1	dB
Polarization Extinction Ratio [2]	18	25	27	
Return Loss		55		dB
		35 [3]		
Cross Talk		50		dB
Switching Time		15	20	ms
Repeatability			± 0.02	dB
Durability	10^7			Cycles
Repetition Rate			5	Hz
Operating Optical Power [2]			0.5	W
Operating Voltage	4	5	7	VDC
Operating Current (Latching/Non-Latching)		30	70	mA
Switching Type	Latching / Non-Latching			
Operating Temperature	-20 ~ 80			°C
Storage Temperature	-40 ~ 85			°C

Notes:

[1]. SM 28 fiber, Excluding Connectors. For MM fiber with laser CPR<14

[2]. For PM fiber only

[3]. For MM fiber with laser CPR<14

Rev 10/21/24

Mechanical Dimensions (mm)

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S/N:XXXXXXXXXX

130.1
137.4
145.4

88.4
86.9
77.3
67.6

18.9   42.5   20.2

12
6
5.1
22.9

Pin 1   0.6   2.5   Pin 14
0.6
44.2
51

AGILTRON
S/N:XXXXXXXXXX
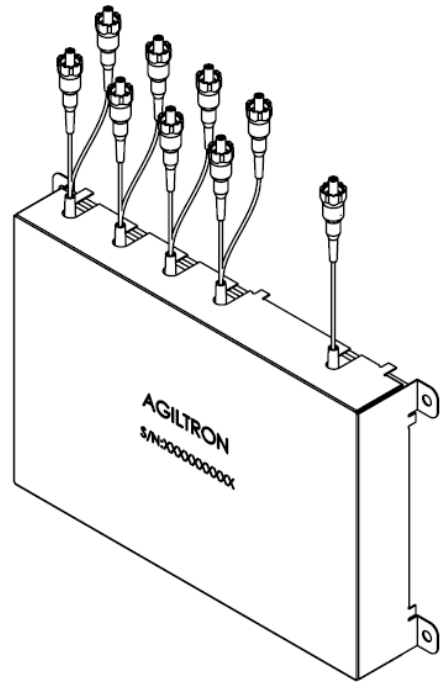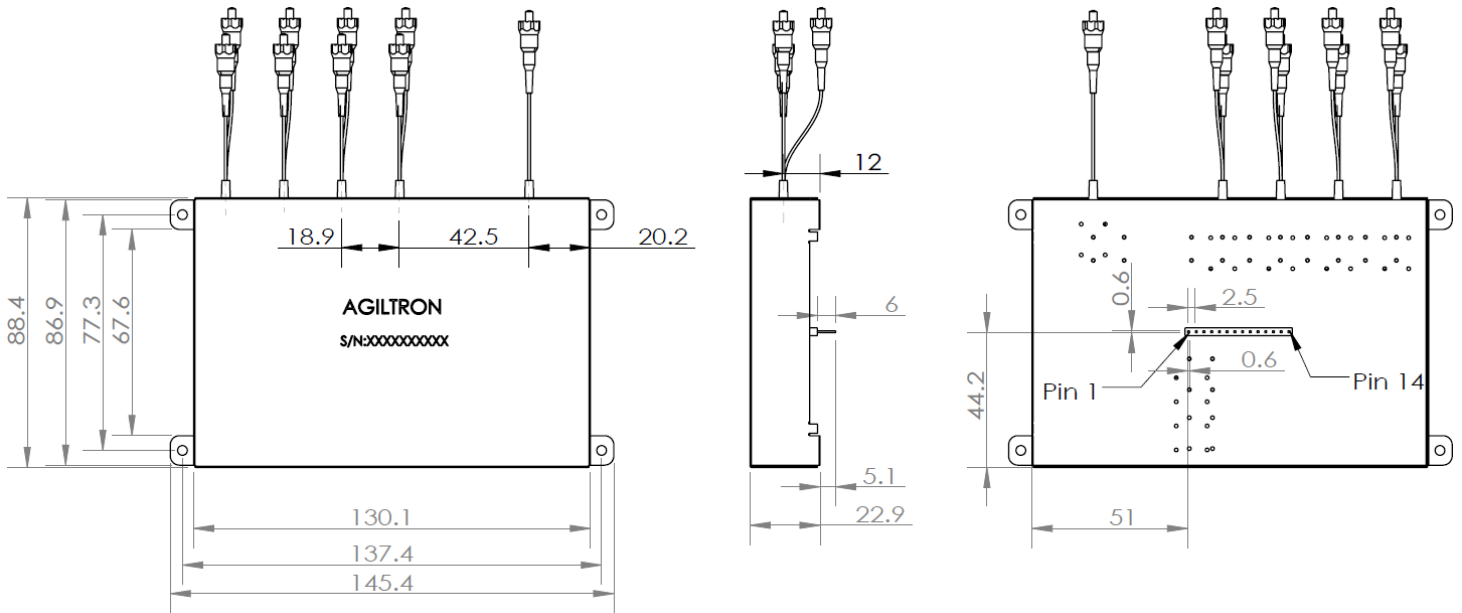
*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Electrical Connector Configurations

The load is a resistive coil which is activated by applying 4.5V (draw ~ 40mA). Applying a constant driving voltage increases stability. The switches can also be driven by a pulse mode using Agiltron recommended circuit for energy saving.

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

Optical Path	Switch 1		Switch 2		Switch 3		Switch 4		Switch 5		Switch 6		Switch 7	
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10	Pin 11	Pin 12	Pin 13	Pin 14
Port 1 → Port 2	L	H	L	H			L	H						
Port 1 → Port 3	L	H	L	H			H	L						
Port 1 → Port 4	L	H	H	L					L	H				
Port 1 → Port 5	L	H	H	L					H	L				
Port 1 → Port 6	H	L			L	H					L	H		
Port 1 → Port 7	H	L			L	H					H	L		
Port 1 → Port 8	H	L			H	L							L	H
Port 1 → Port 9	H	L			H	L							H	L

Notes:
   H – 4.5V
   L – 0V
   Empty – Don't care H or L

Non-Latching Type

Optical Path	Switch 1		Switch 2		Switch 3		Switch 4		Switch 5		Switch 6		Switch 7	
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10	Pin 11	Pin 12	Pin 13	Pin 14
Port 1 → Port 2	L	L	L	L			L	L						
Port 1 → Port 3	L	L	L	L			H	L						
Port 1 → Port 4	L	L	H	L					L	L				
Port 1 → Port 5	L	L	H	L					H	L				
Port 1 → Port 6	H	L			L	L					L	L		
Port 1 → Port 7	H	L			L	L					H	L		
Port 1 → Port 8	H	L			H	L							L	L
Port 1 → Port 9	H	L			H	L							H	L

Notes:
   H – 4.5V
   L – 0V
   Empty – Don't care H or L

Functional Diagram

Common

Port 1
Port 2
Port 3
Port 4
Port 5
Port 6
Port 7
Port 8
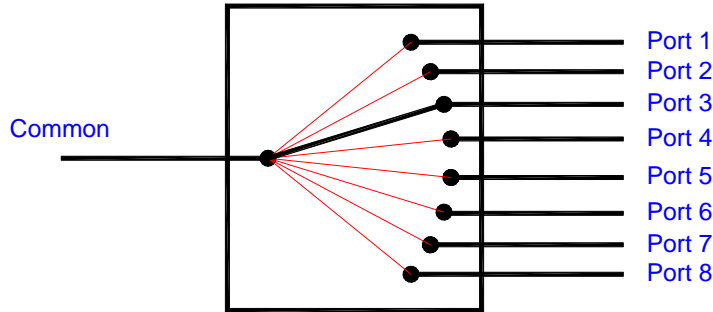
Manual Operation Instruction

Rise

Fall

Fiber-Fiber™ 1x8 Fiber Optical Switch

(SM, PM, MM, Bidirectional)

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Ordering Information

	□□	□	□	□□	□	□	□
Prefix	**Type**	**Switch**	**Tested Wavelength***	**Fiber type**	**Fiber Cover**	**Fiber Length**	**Connector**
FFSW-	1x8 = 18 Dual 1x8 = D8 Special = 00	Fast Latching (F) = 6 Fast Non-Latching (F) = 7 Slow Latching (S) = 2 Slow Non-Latching (S) = 3	488 = 4 532 = 5 630 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 2.3-4.1 μm = F 3.2-5.5 μm = G	Pick from below table	Bare fiber=1 900um tube=3 Special=0	0.25m=1 0.5m=2 1.0m=3 Special=0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 Duplex LC/PC = 8 MTP = 9 LC/APC = A LC/UPC = U Special=0

* The device is ultra-broadband limited by the fiber transmission. However, we only test at one selected wavelength to save cost. If customer needs to test at several wavelengths, the selection is **Special=0** with added cost.

Note:
- **PM1550** fiber works well for **1310nm**

Fiber Type Selection Table:

01	**SMF-28**	34	**PM1550**	71	**GIF 50/125 μm**
02	**SMF-28e**	35	**PM1950**	72	**GIF 62.5 μm**
03	**Corning XB**	36	**PM1310**	73	**105/125 μm**
04	**SM450**	37	**PM400**	74	**FG105LCA**
05	**SM1950**	38	**PM480**	75	**FG50LGA**
06	**SM600**	39	**PM630**	76	**STP 50/125**
07	**Hi780**	40	**PM850**	77	**IRZS23**
08	**SM800**	41	**PM980**	78	**IRZS32**
09	**Hi980**	42	**PM780**		
10	**Hi1060**	43	**PM350**		
11	**Draka BBE**	44			
12		45			
13		46			

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.
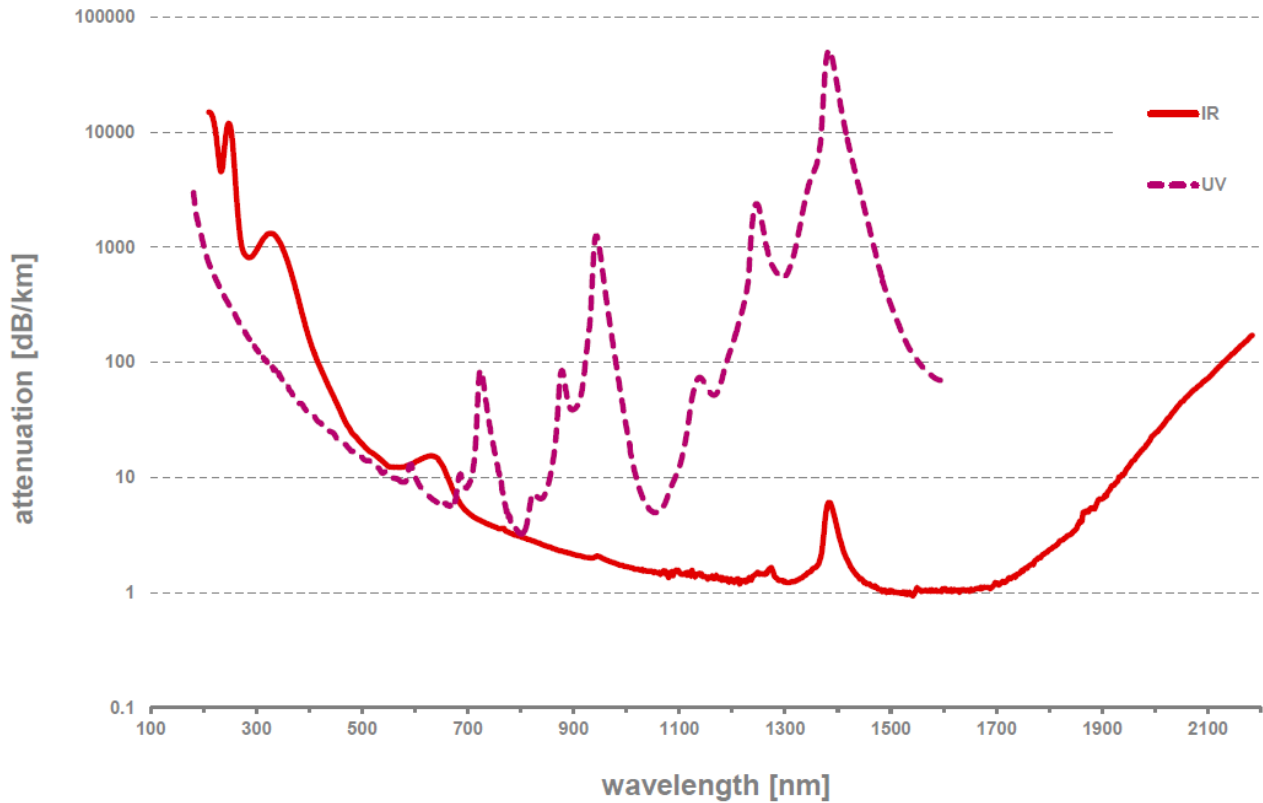
Typical Fiber Transmissions

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Driver Reference Design