

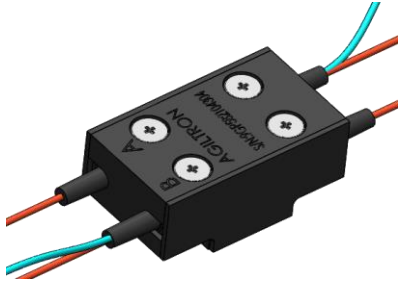
Fiber-Fiber™ Optical Switch Dual 1x2

(SM, PM, MM, Broadband, Bidirectional)



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Features

- Low Optical Distortions
- High Isolation
- High Reliability
- Fail-Safe Latching
- Vibration Resistant
- Unmatched Low Cost

Applications

- Protection
- Instrumentation

The FF Series fiber optic switch connects optical channels by direct fiber to fiber connection via a micro-mechanical auto-alignment platform and activated via an electrical relay. The advanced design significantly increase the performance, offering unprecedented low optical loss, little wavelength dependence with no coatings, high power handling, as well as low cost. Latching operation preserves the selected optical path after the driver signal has been removed. The switch has integrated electrical position sensors. The switch is bidirectional and conveniently controllable by 4.5V 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. The FF switches provide performance for special fiber no other technology can match.

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 .

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	200		2500	nm
Insertion Loss ^[1]		0.2	0.4	dB
Wavelength Dependent Loss			0.01	dB
Polarization Dependent Loss			0.05	dB
Polarization Extinction Ratio ^[2]	18			dB
Return Loss	50			dB
	35 ^[3]			dB
Cross Talk	50 ^{[3]/65 ^[5]}		75	dB
Rise/Fall Time (Low Speed)	5		120 ^[6]	ms
Rise/Fall Time (High Speed)	1		15 ^[7]	ms
Repeatability			± 0.02	dB
Durability	10^8			cycles
Operating Optical Power ^[6]		0.5 ^[4]	0.5 ^[3]	W
Operating Voltage	4.5		5	VDC
Operating Current (Latching/Non-Latching)		30	60	mA
Switching Type		Latching / Non-Latching		
Operating Temperature	-40		80	$^{\circ}\text{C}$
Storage Temperature	-50		90	$^{\circ}\text{C}$

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
- [4]. For MFD $\geq 6\mu\text{m}$ core fiber
- [5]. For SM or PM fiber
- [6]. For PM type, other also can use this configuration
- [7]. For SM, MM type

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Rev 10/21/24

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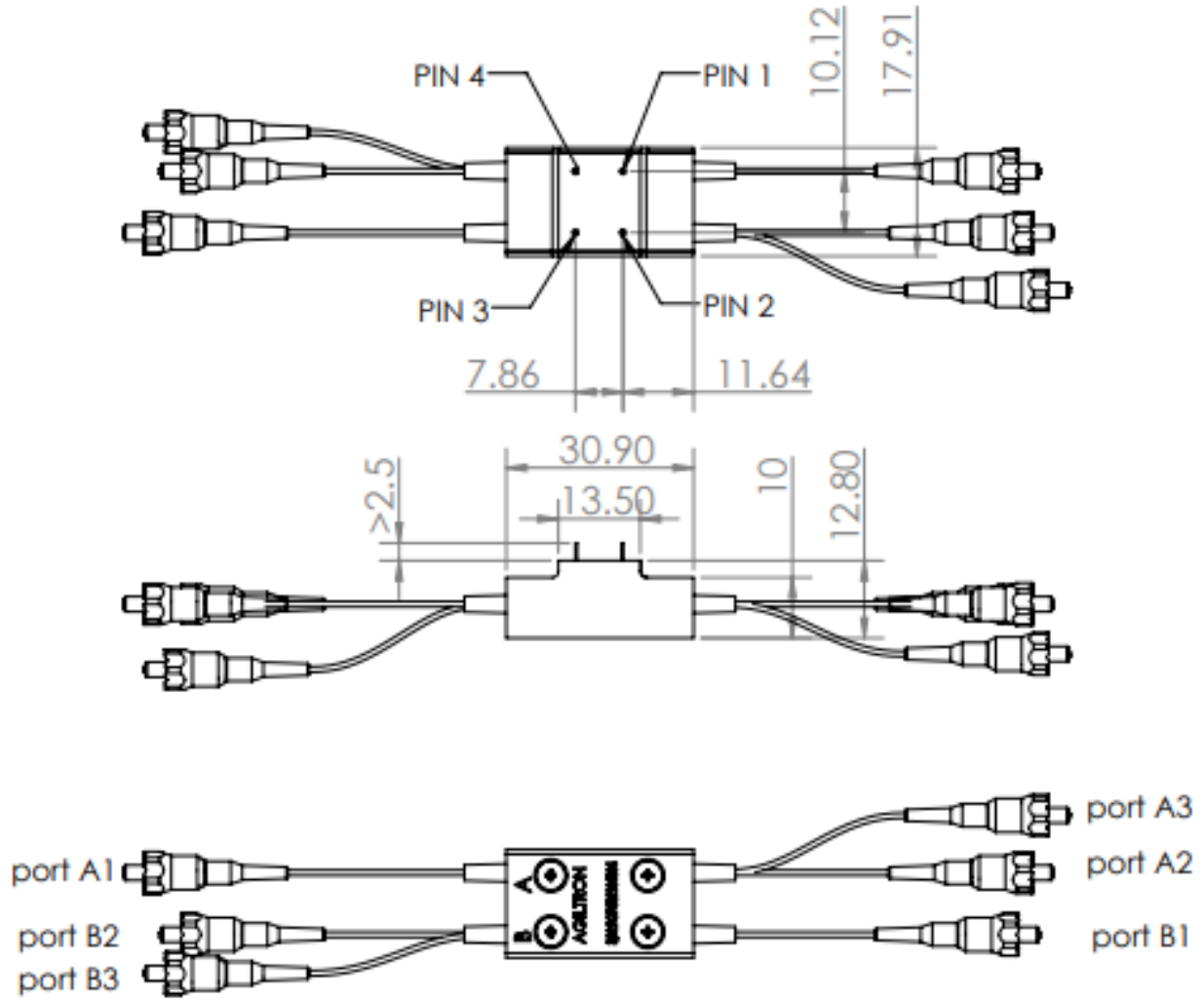
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Mechanical Dimensions (mm)

Pin1&Pin4 are only used to fix the product and have no electrical function



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

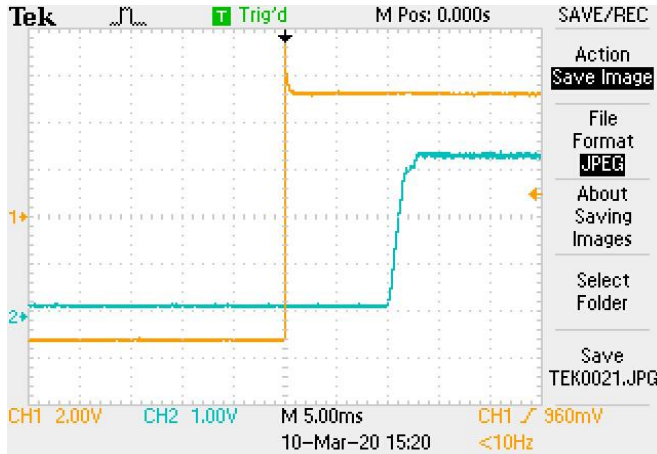
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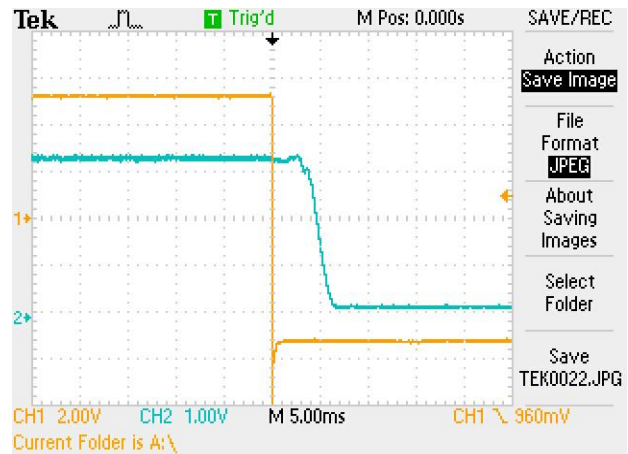


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Response Speed



Rise



Fall

Electrical Connector Configurations

Important Note: The device must be driven by the reference circuit. Otherwise, it is not stable. This is because the device contains a permanent magnet inside; thus current must flow in the correct direction to counter the magnet field.

The load is a resistive coil which is activated by applying 4.5V (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. The switch can withstand 5V which may reduce its durability.

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.

Optical Path	Electric Drive	
	Pin 2	Pin 3
Port A1 → Port A2	4.5V	0V
Port B1 → Port B3		
Port A1 → Port A3	0V	4.5V
Port B1 → Port B2		

Non-Latching Type

Optical Path	Electric Drive	
	Pin 2	Pin 3
Port A1 → Port A2	No power	No power
Port B1 → Port B3		
Port A1 → Port A3	0V	4.5V
Port B1 → Port B2		

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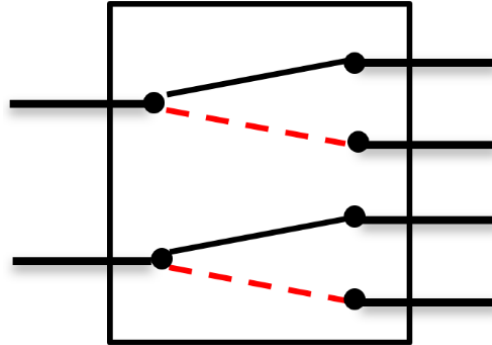
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Functional Diagram

Dual 1x2 switch



Ordering Information

Prefix	Type	Switch	Tested Wavelength	Fiber Type	Fiber Cover	Fiber Length	Connector
FFSW-	Dual 1x2 = 42 Special = 00	Latching = 2 Non-latching = 3	488 = 4 532 = 5 630 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 Special = 0	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

NOTE:

☐ **PM1550** fiber works well for **1310nm**

Fiber Type Selection Table:

01	SMF-28	34	PM1550	71	MM 50/125µm
02	SMF-28e	35	PM1950	72	MM 62.5µm
03	Corning XB	36	PM1310	73	105/125µm
04	SM450	37	PM400	74	FG105LCA
05	SM1950	38	PM480	75	FG50LGA
06	SM600	39	PM630	76	STP 50/125
07	Hi780	40	PM850		
08	SM800	41	PM980		
09	SM980	42	PM780		
10	Hi1060	43			
11	SM400	44	PM405		
12		45	PM460		
13		46			

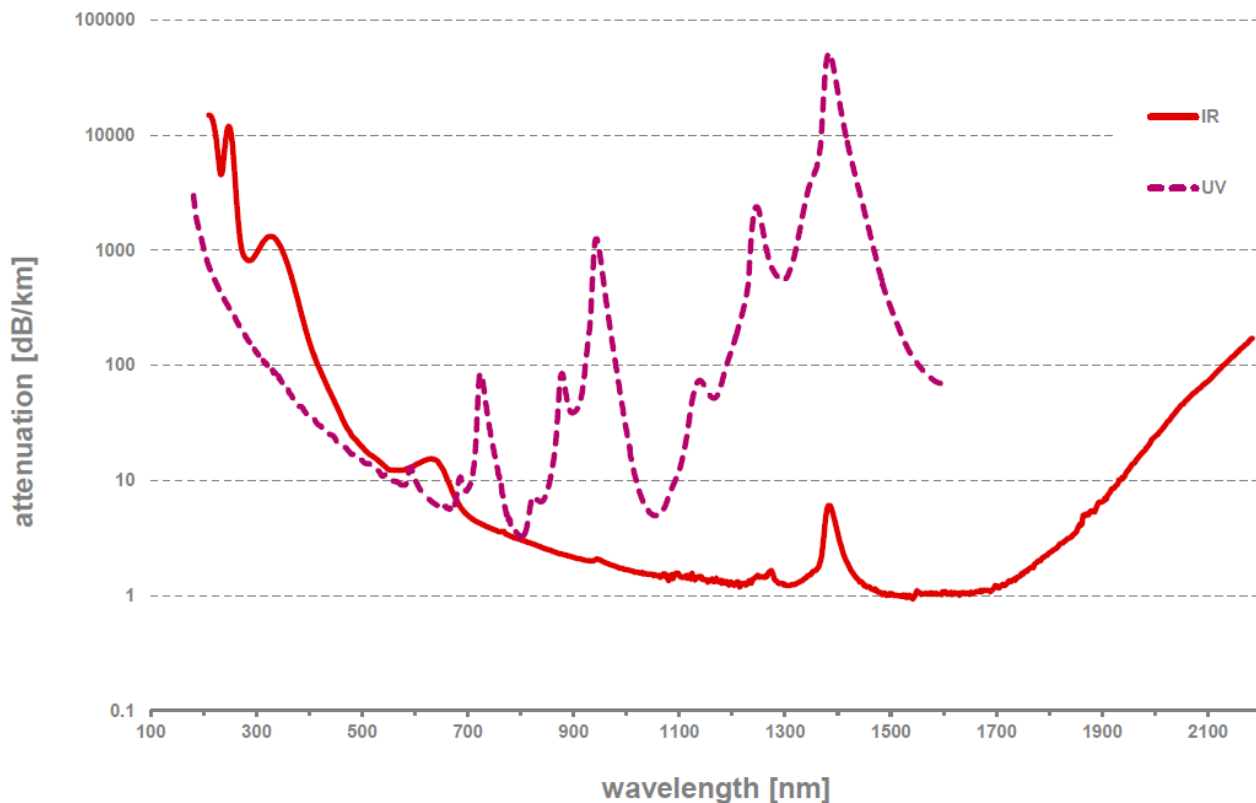
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Typical Fiber Transmissions



Application Notes

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 handling by expanding the core side at the fiber ends.

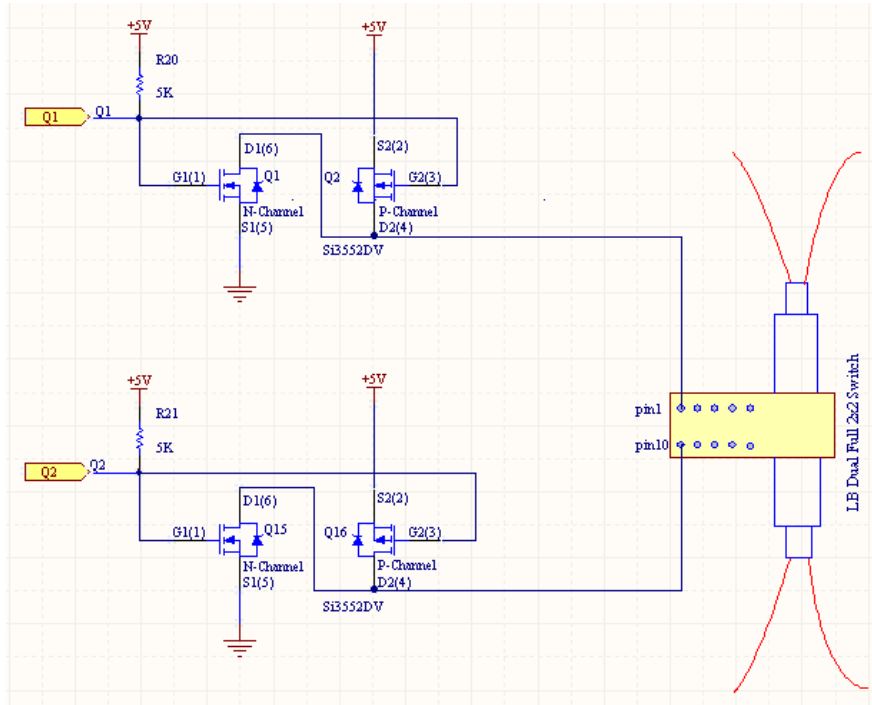
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Driver Reference Design



Optical Power Handling vs Wavelength For Single-Mode Fibers

