

Acousto High Speed Fiber Optical Switches

1x2, 20MHz Rate, 15ns Rise/Fall, 400-2000 nm, Bidirectional



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The AFOS series fiber optic switch provides exceptionally high-speed switching up to 20 MHz with rise and fall times as short as 15 ns. The switching is bidirectional and controlled by an external TTL signal. The device offers low insertion loss ~0.7dB from Port 1 to Port 2 at the zeroth diffraction order (without TTL applied), and approximately 1.5 dB when switching from Port 1 to Port 3 at the first diffraction order (with TTL applied). The isolation between Ports 2 and 3 is approximately 12 dB. The AFOS supports optical power levels up to 10 W and operates across a 350 – 2400 nm wavelength range, compatible with all fiber types. Due to its Bragg-diffraction-based design, it functions within a narrow wavelength band, which can be optimized for any selected wavelength. The device inherently introduces a positive frequency shift corresponding to the acoustic driving frequency. The optical assembly uses fiber collimators aligned to an acousto-optic crystal, with no epoxy in the optical path to ensure maximum thermal stability and long-term reliability. The rise and fall times of the acousto-optic modulator are determined solely by the laser beam diameter, providing predictable and repeatable performance.

Features

- Fiber Optically Pigtailed
- 1x2 and 2x1 Configurations
- Compact Size and Rack Mount
- Solid-state: No Moving Parts
- Nanosecond Speed Response: ~200 ns
- Low Insertion Loss
- Low Power Consumption
- High Reliability, Environmentally Stable
- 9/125 μ m Single-Mode (SM) Fiber
- Custom Configurations Available

Applications

- Sensor
- Test & Measurement
- Optical Network
- Field Projects in Fiber Optics System
- OEM Designs

Specifications

Parameter		Min	Typical	Max	Unit
Center Wavelength		450	1550	2300	nm
Wavelength Bandwidth			± 30		nm
Acoustic Frequency (always applied)			80		MHz
Modulation Bandwidth		DC		19	MHz
Wavelength Shift			80		MHz
Switch Control Input		0		5	V
Insertion Loss Port 1-Port2 ^[1]	(1030~1550nm)	0.5	0.8	1	dB
	(450~980nm)	0.8	1	1.2	dB
Insertion Loss Port 1-Port 3 ^[1]	(1030~1550nm)	0.8	1.4	2.5	dB
	(450~980nm)	1.2	2	3	dB
Polarization Dependent Loss			0.2	0.5	dB
Extinction Ratio Port 1-Port 2 (On/Off) ^[2]		50	55	65	dB
Extinction Ratio Port 1-Port 3 (On/Off) ^[2]		18	25	30	dB
Crosstalk Port 2-Port 3 ^[2]		10	12	15	dB
Rise/Fall Time ^[3]		15		55	ns
Return Loss ^[4]		45	50	55	dB
Polarization Extinction (PM)		18	20	25	dB
Average Optical Power ^[5]			0.5	20	W
Input Impedance			50		Ω
RF Power			2.5	3.5	W
Electrical Interface		SMA			
Operating Temperature		-10		65	°C
Storage Temperature		-45		85	°C
Weight			26		g

Notes:

- [1]. Without connector. Each connector typically adds 0.2-0.3dB, RL increase by 5dB, and ER reduces by 2dB. **1dB is for 80MHz 80ns rise/fall with special order**
PM connector key is aligned to the slow axis as a default.
Insertion Loss refers to output - input at ON state. Other wavelength band the loss may be higher
- [2]. refers to output power ratio between ON/OFF states
- [3]. (10%-90%). The rise/fall and bandwidth are related to the beam size, small beam has higher insertion loss. In another word, fast response with larger bandwidth will add insertion loss
- [5]. @1550nm. For shorter wavelength the power handling is reduced due to smaller core size. Higher power version is available by expand the beam inside the fiber tip.

Warning: This is an OEM module designed for system integration. Do not touch the PCB by hand. The electrical static can kill the chips even without a power plug-in. Unpleasant electrical shock may also be felt. For laboratory use, please buy a Turnkey system.

Rev 10/28/25

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Fiber Port Layout



Mechanical Dimensions (mm) of 1x1 Switches

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

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Ordering Information

Prefix	Type	Wavelength ^[0]	Driver	Optical Power	Fiber Type	Fiber Cover	Fiber Length	Connector	PER ^[2]	Benchtop ^[3]
AFOS-	80MHz = L Special = 0	1060nm = 1 1550nm = 5 1310nm = 3 980 nm = 9 850 nm = 8 780 nm = 7 630 nm = 6 530 nm = A 450 nm = 4 2000nm = 2 Special = 0	Non = 1 Yes = 2	Regular = 1 0.5W = 2 1W = 3 5W = 4 10W = 5	Select fiber below	0.9mm tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 5WFC/PC = H 10WFC/PC = A	Non = 1 18dB = 2 20dB = 3 25dB = 4 29dB = 5	Non = 1 Yes = 2

[0]. Using Special =0 to provide the wavelength not list on the table

[1]. Without connector, each connector add 0.3dB. For 1310-1550nm. Short wavelength and >1900nm, the loss is higher. The default version is optimized for low loss with rise/fall times under 55 ns. Version A is tuned for faster response but with higher loss, while Version B offers moderate rise/fall times with more loss than the default.

[2]. Polarization extinction ratio only for PM fiber

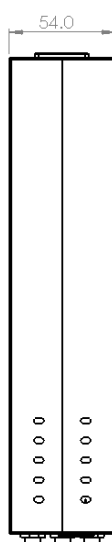
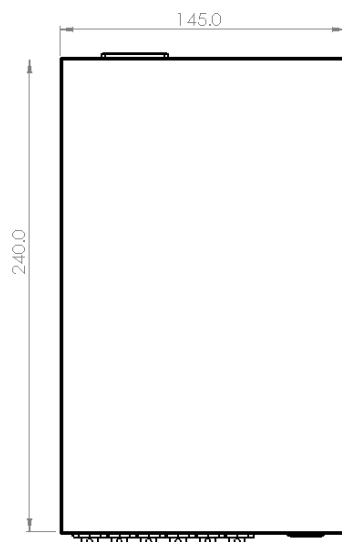
[3]. The benchtop is a plug-play unit integrated with the switch, driver, and power supply.
Front Panel: SMA 0-5V electrical control input port. Fiber input and output ports with standard FC/APC connectors. Back Panel: 100-240 VAC power input for global compatibility and a Power switch for easy on/off control.

Marked in red on special order

Fiber Type Selection Table:

1	SMF-28	A	PM1550
2		B	PM1950
3		C	PM1310
4	SM450	D	PM460
5	SM1950	E	PM480
6	SM600	F	PM630
7	780HP	G	PM850
8	SM800	H	PM980
9	SM980	I	PM780
0	Hi1060	J	PM460
11	SM400	K	PM405
12			

Benchtop Box Mechanical Dimension



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Setup Instructions

- Connect a laser with a wavelength matched to the specified part number to the fiber input.
- Connect the switch to the accompanying driver using the provided cable.
- Connect a DC power supply to the driver (refer to the AOM driver datasheet for detailed specifications).
- Connect the control signal to the SMA input port.
- The fiber optical output switching between port 2 and 3 and repetition rate will vary according to the electrical control signal.

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 ($<5\ \mu\text{m}$) 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.

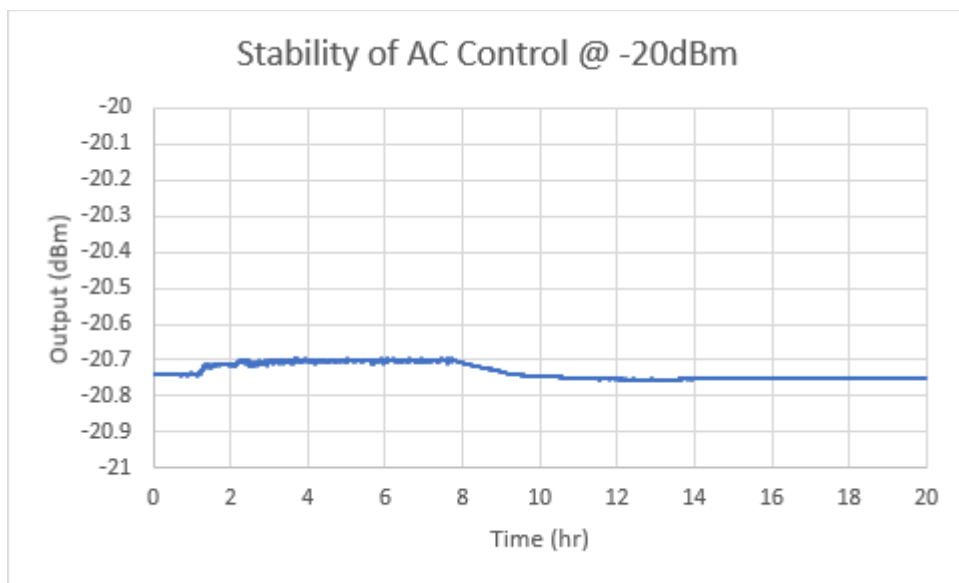
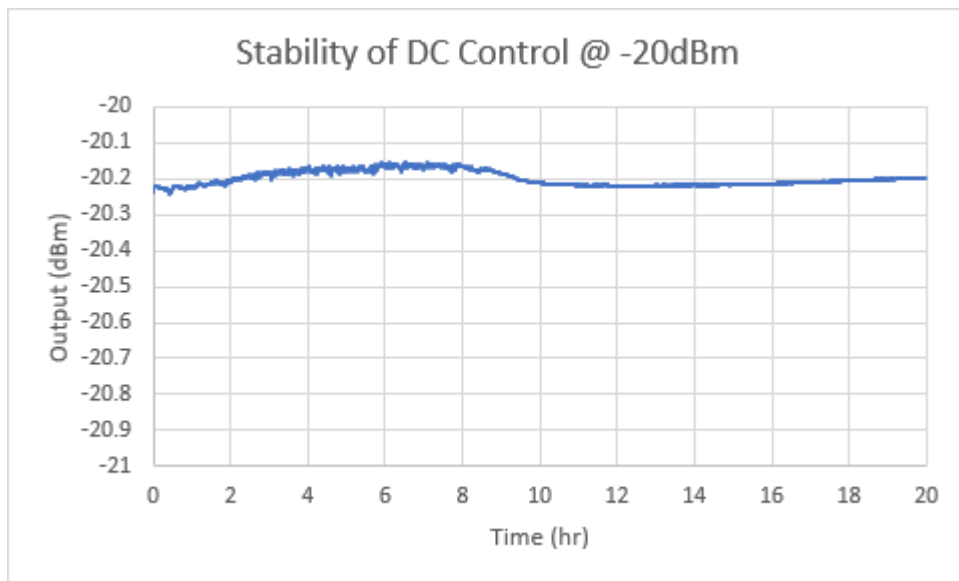
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Typical Stability (@ -20dBm with DC and 1kHz AC control. Fluctuation < 0.1dB)



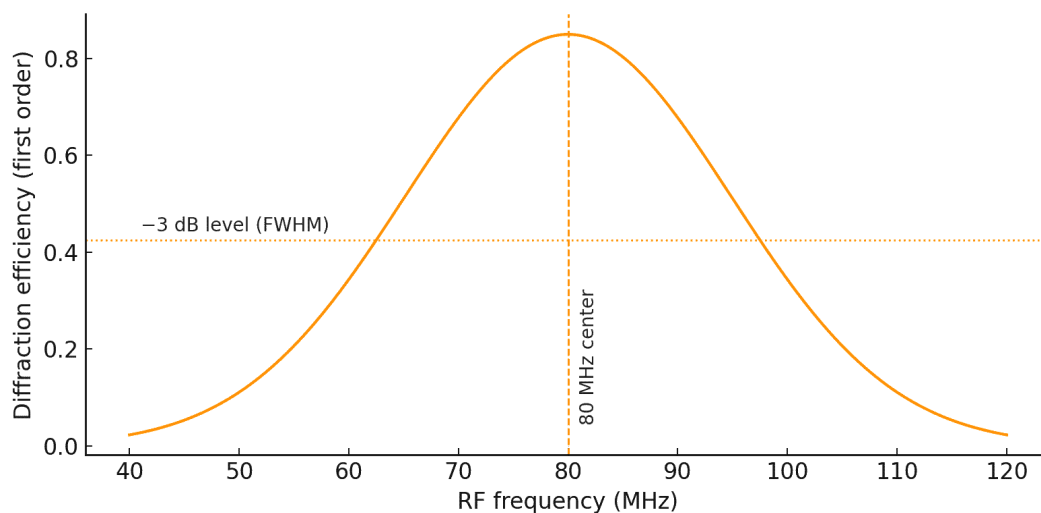
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Representative AOM Diffraction Efficiency vs RF Frequency (center 80MHz, ~35MHz 3dB bandwidth)



Optical Power Handling vs Wavelength for Standard SM Fibers

