

Fiber Coupled Acousto-Optic Modulator/Shifter

Fast Response

(10ns rise/fall, 400 to 2300nm, 200MHz, all fiber types) (patent pending)



DATASHEET

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Features

- Low optical Loss
- High Power
- Low Cost
- Stable
- All Fiber Compatible

Applications

- Fiber Lasers
- Pulse Picker
- Sensor

The AOMF Series Fiberoptic Acousto-Optic Modulators deliver high-speed optical intensity modulation and wavelength shifting with superior performance. Based on a proprietary patent-pending design, they feature low insertion loss (~1.2 dB), high extinction ratio (>62dB), high polarization extinction ratio (>30dB), low power consumption, and high optical power handling up to 10 W — unmatched by other vendors. The AOMF operates by acoustically generating an optical grating inside the crystal using a side-mounted piezo actuator driven at its resonance frequency for maximum efficiency. As light passes through the crystal, it is diffracted by the grating, with maximum intensity at the Bragg-aligned exit angle. The driving electronics modulate the acoustic amplitude, controlling the optical attenuation. Response speed is determined by the resonance frequency, with available options at 80 MHz and 200 MHz; the achievable modulation bandwidth is below the resonance frequency. The AOMF supports a wide wavelength range from 350 nm to 2400 nm, is compatible with all fiber types, and offers competitive cost. The device operates in a normally opaque state and becomes transparent under Bragg diffraction conditions, which occur over a narrow wavelength band where diffraction efficiency is maximized. It inherently produces a positive frequency shift, with negative shift options available upon request. The AOMF design features fiber optic collimators aligned to an acousto-optic crystal, with no epoxy in the optical path, ensuring maximum stability and long-term reliability.

Specifications

Parameter		Min	Typical	Max	Unit
Center Wavelength		450	1550	2300	nm
Wavelength Bandwidth			± 20		nm
Acoustic Frequency			200		MHz
Modulation Bandwidth		DC	80	120	MHz
Wavelength Shift			± 200		MHz
RF Control Resolution		1			MHz
Rise/Fall Time ^[3]	Type A	10		15	ns
	Type B	25		30	
Insertion Loss ^[1]	(1060~1550nm) Type A		4	5.3	dB
	(1060~1550nm) Type B		2.5	4	
	(450nm~980nm) Type A		3.5	5	
	(450nm~980nm) Type B		3	4	
Polarization Dependent Loss			0.2	0.5	dB
Extinction Ratio (On/Off) ^[2]		50	55	65	dB
Return Loss		40			dB
Polarization Extinction (PM)		19	20	32	dB
Average Optical Power			0.5	20	W
Input Impedance			50		Ω
RF Power ^[4]			2.5	3.5	W
Ultrasonic Velocity			4200		m/s
Electrical Interface			SMA		
Operating Temperature		-35		65	°C
Storage Temperature		-45		85	°C
Weight			26		g

Notes:

[1]. Without connector. Each connector typically adds 0.2-0.3dB, RL increases by 5dB, and ER reduces by 2dB. **Type A** is the standard version. **Type B** is specially made to lower loss. The PM connector key is aligned with the slow axis as a default.

[2]. For Single Mode only, multimode reduces depend on mode filled ratio.

[3]. (10%-90%).

[4]. The device is designed to be operated at 2.5W and meet the spec, but can handle a maximum of 3.5W with sufficient cooling

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](#):

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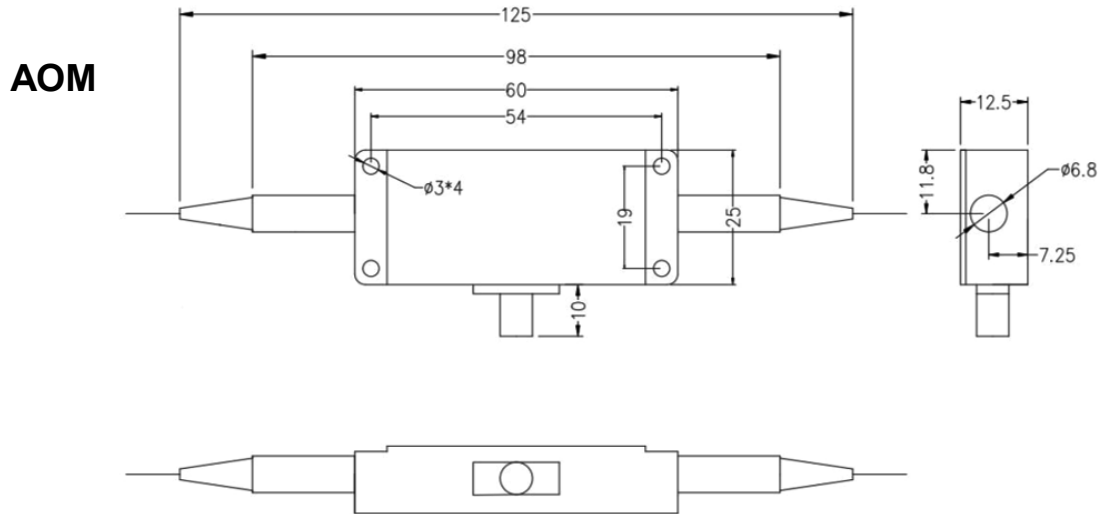
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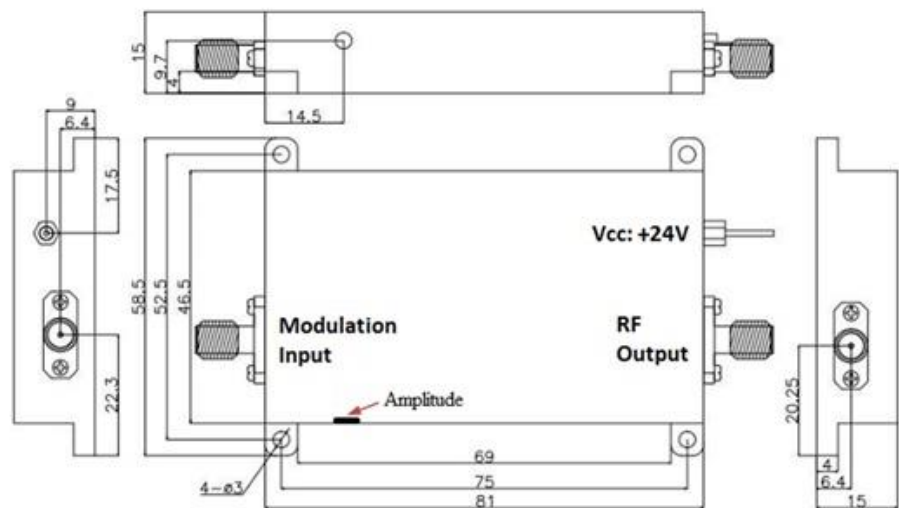
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Mechanical Dimensions (mm)

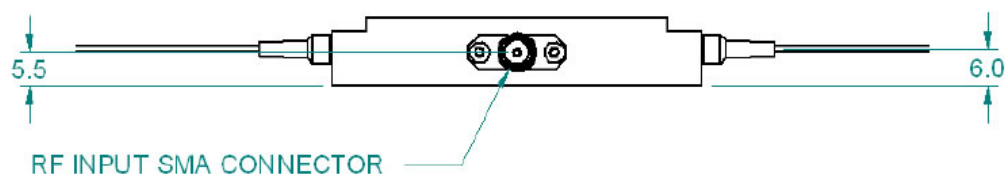


AOM Driver



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

Electrical/Computer Connection



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Ordering Information

Prefix	Type	Wavelength	Configure	Optical Power	Fiber Type	Fiber Cover	Fiber Length	Connector	PER ^[1]
AOMF-	Special = 0	1060nm = 1 1550nm = 5 1310nm = 3 980nm = 9 850nm = 8 780nm = 7 630nm = 6 530nm = F 450nm = 4 2000 nm = 2 Special = 0	Type A = 1 Type B = 2	0.5W = 1 5W = 2 10W = 3 20W = 4 30W = 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 5W FC/PC = H 10W FC/PC = A	Non = 1 20dB = 2 30dB = 3

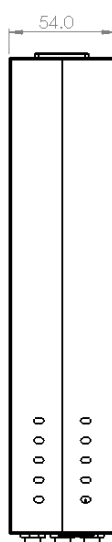
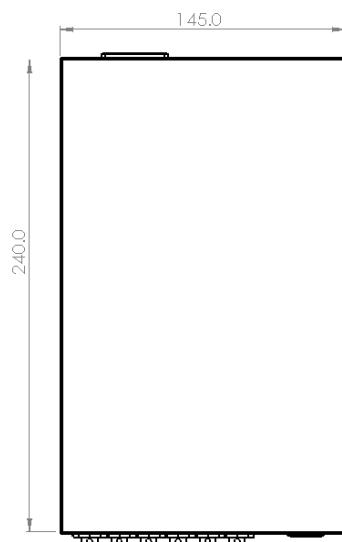
[1]. Polarization extinction ratio only for PM fiber

Marked in red on special order

Fiber Type Selection Table:

01	SMF-28	34	PM1550	71	MM 50/125µm
02		35	PM1950	72	MM 62.5µm
03		36	PM1310	73	
04	SM450	37	PM400	74	
05	SM1950	38	PM480	75	
06	SM600	39	PM630	76	
07	780HP	40	PM850		
08	SM800	41	PM980		
09	SM980	42	PM780		
10	Hi1060	43			
11	SM400	44	PM405		
12		45	PM460		
		46	PM1060L		

Benchtop Box Mechanical Dimension



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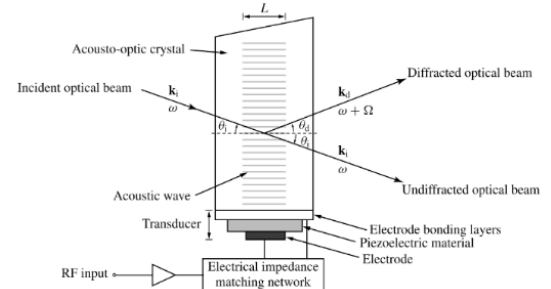


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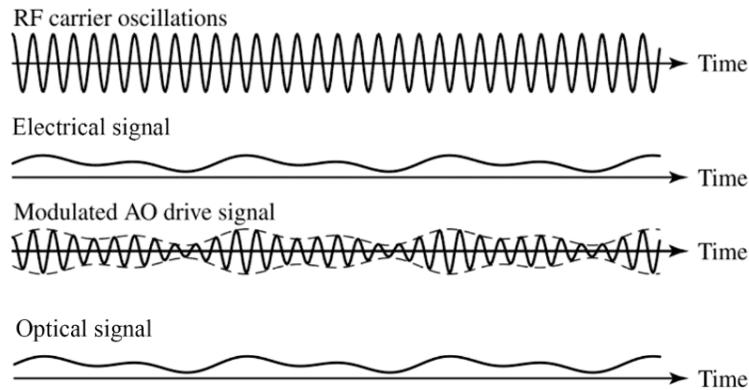
Acoustic Frequency

The operation of an acousto-optic modulator is based on the Bragg diffraction generated by an acoustic wave (traveling refractive grating) inside a crystal, as shown below. The **Acoustic Frequency** is fixed for each device. A RF voltage of the acoustic frequency is applied to the piezoelectric actuator attached to the crystal generating the acoustic wave. The higher the frequency, the higher the cost to make and higher the power consumption.



Modulation Bandwidth

An optical intensity modulator can be achieved by a driving circuitry in which the acoustic intensity inside the crystal varies with an input modulation signal. A typical acoustic driver output is shown below: a RF Input electrical signal modulates the intensity profile of the carrier oscillations (acoustic frequency), resulting in a modulated driving signal, which leads to an output optical intensity similar to the RF input. The acoustic frequency intrinsically determines the rise/fall of the optical modulation. The Modulation Bandwidth is proportional to the acoustic frequency. The optical response can be optimized to certain extend via the driving circuit such as digital or analog.



Optical Wavelength Shift

Due to an energy exchange, all acoustic optical devices apply a frequency shift to the diffracted output beams. These optical wavelength shifts are very small and proportional to the acoustic frequency. Depending on the selected Bragg angle, these devices will either up-shift or down-shift the laser light by the frequency of the applied RF signal.

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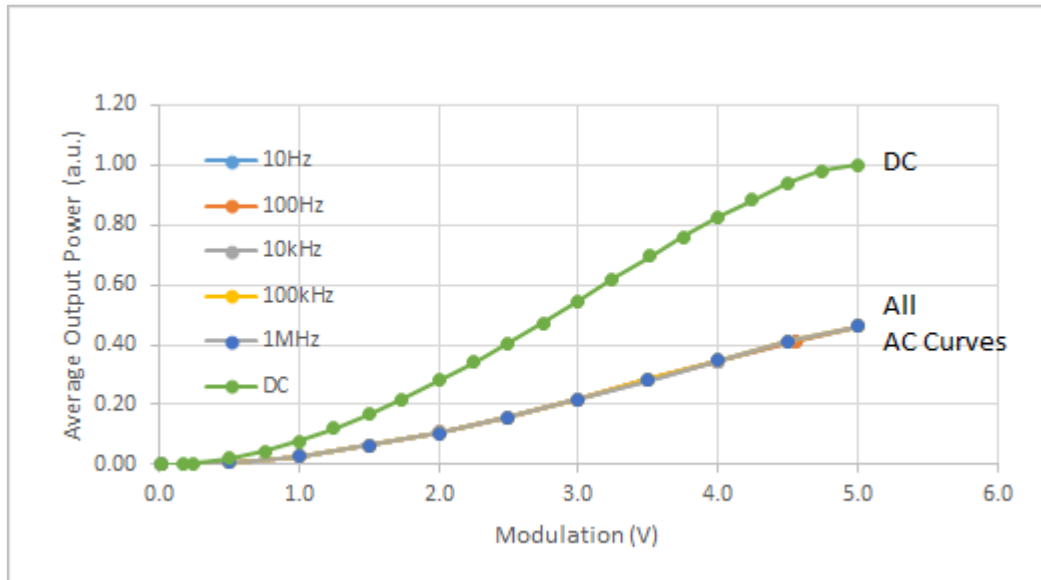
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Typical Attenuation vs Control Signal for 200MHz AOM



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