Fiber Coupled Acoustic-Optic Modulator/Shifters

(400 to 2300nm, 80, 100, 200 MHz) (patent pending)

AGILTRON®

DATASHEET

BUY NOW

The AOMF series of fiberoptic acoustic modulator provides a solution for fast amplitude modulation of laser light transmitting through a fiber with a convenient 0-5V control signal. We offer unique features of low insertion loss <1dB, high optical power handling up to 50W, high on/off ratio >60dB, and high polarization extinction >30dB, as well as competitive cost. We produce devices with three resonance frequencies of 80MHz, 100MHz, and 200MHz having different rise/fall response time. The device is normally opaque and becomes transparent when the acoustic brag diffraction condition met. It intrinsically produces a positive wavelength frequency shift, although negative shift can be specially ordered. These modulators are often used in Lidar, pulsed fiber laser amplifier system and as a pulsed picker for short pulse, high repetition rate fiber lasers.

Features

- Low Loss
- Low Cost
- Stable

Applications

- Fiber Lasers
- Pulse Picker
- Sensor

Specifications

Parameter		Min	Typical	Max	Unit
Center Wavelength		450	1550	2300	nm
Wavelength Bandwidth			± 30		nm
Acoustic Frequency		80	120	200	MHz
Modulation Bandwidth	(80MHz)	DC		15	MHz
	(100MHz)	DC		25	
	(200MHz)	DC		45	
Wavelength Shift	(80MHz)		± 40		MHz
	(100MHz)		± 60		
	(200MHz)		± 200		
Insertion Loss [1]	(1030nm~1550nm)	1	1.5	4.5	dB
	(450nm~980nm)	1	3.5	5	dB
Polarization Dependent Loss			0.2	0.5	dB
Extinction Ratio (On/Off)		45	50	55	dB
Rise/Fall Time [2]	(80MHz)	25	50	100	ns
	(100MHz)	18	20	80	
	(200MHz)	8	10	30	
Return Loss		40			dB
Voltage Standing Wave Ratio			1.2:1		
Polarization Extinction (PM)		18	20	25	dB
Average Optical Power			0.5	20	W
Input Impedance			50		Ω
RF Power [3]			2.5	3.5	W
Electrical Interface			SMA		
Ultrasonic Velocity			4200		m/s
Operating Temperature		-10		65	ºC
Storage Temperature		-45		85	ºC

Note:

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.
2. (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.
3. 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

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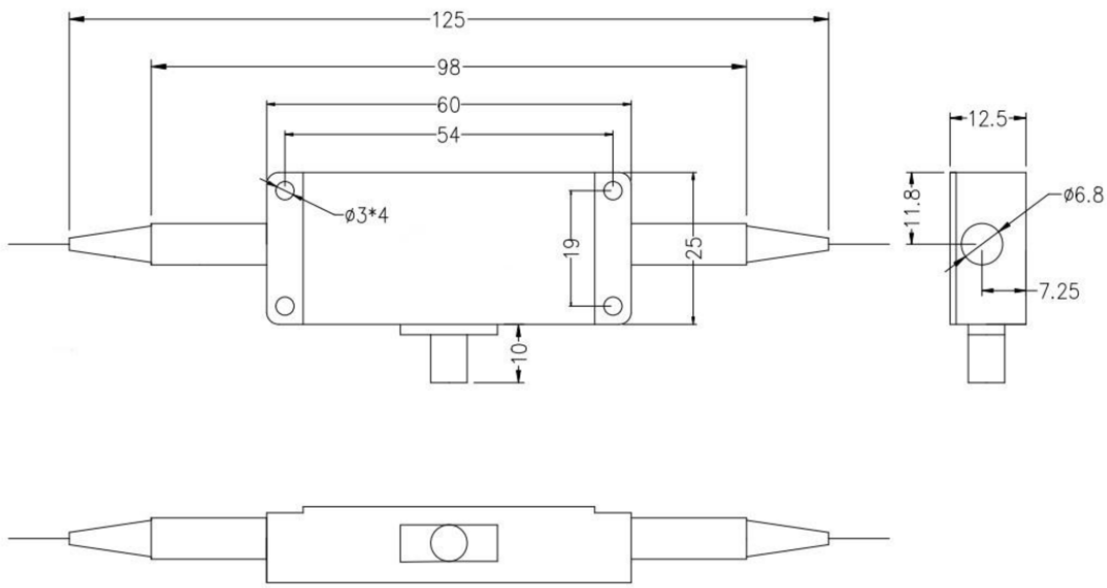
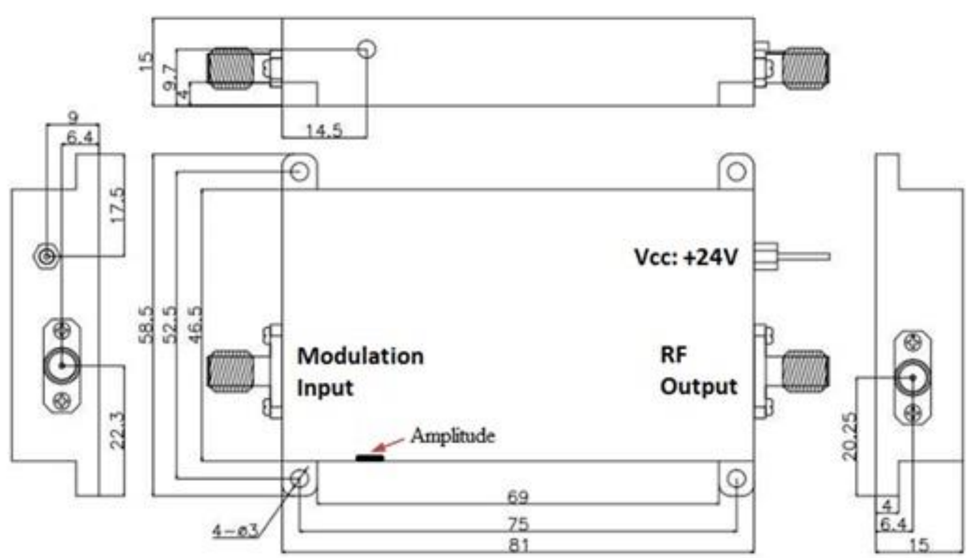
Mechanical Dimensions (mm)



AOM



AOM Driver

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

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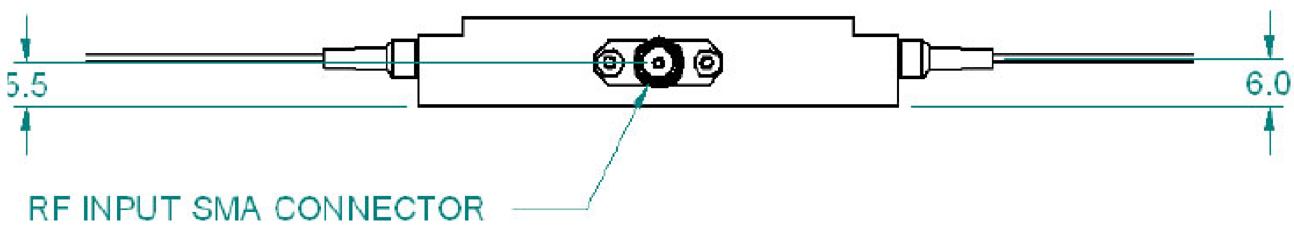
Electrical/Computer Connection



Ordering Information

	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Insertion [1]**	**Optical Power**	**Frequency**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**	**On/Off**	**ER [2]**
AOMF-	TeO_2 = 1 Special=0	1060nm = 1 1550nm = 5 1310nm = 3 980 nm = 9 630 nm = 6 750 nm = 7 530 nm = 5 450 nm = 4 2000nm = 2 Special = 0	2.5dB = 1 1.5dB = 2 1.0dB [3] = 3 3.5dB = 4 4.5dB =5	0.5W = 1 5W = 2 10W = 3 20W = 4 30W = 5	80MHz = 8 100MHz = 1 200MH = 2	SMF-28 = 1 PM1550 = 5 PM 980 = 3 Hi 1060 = G SM1950 = 6 PM1950 = 7 PM400 = A PM480 = B PM630 = C PM780 = D PM850 = E Hi 780 = F SM450 = H Special = 0	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 = 7 Special = 0	>50dB = 1 >60dB = 2	Non = 1 25dB = 2 30dB = 3

[1]. Without connector, each connector add 0.3dB. For 1310-1550nm. Short wavelength and >1900nm, the loss is higher
[2]. Polarization extinction ratio only for PM fiber
[3]. Only available for 80MHz, 1310 to 1640nm, SM

Marked in red on special order

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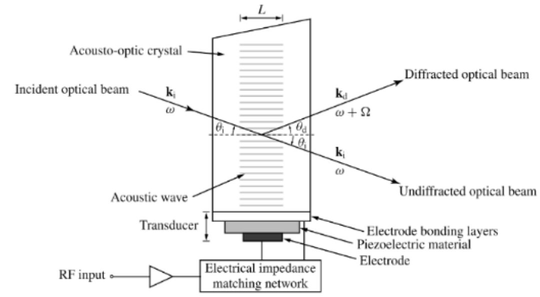
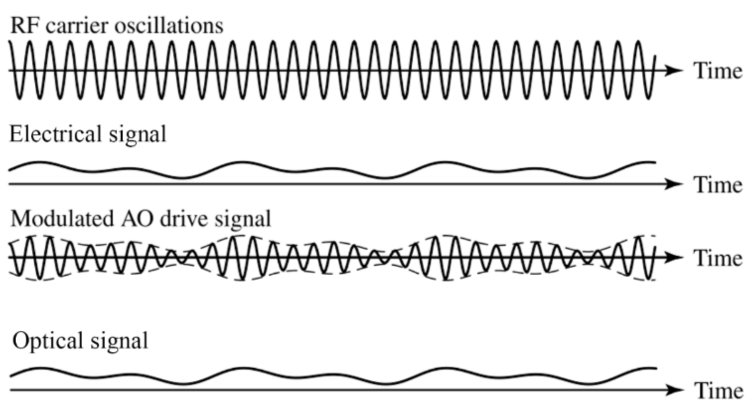
Acoustic Frequency

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 circuity 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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Deviation From Actuator Resonance

The piezoelectric actuator is operated at its mechanical resonance for high energy efficiency. When the driving frequency deviates from the actuator resonance, the diffraction efficacy reduces, leading to higher optical insertion loss.