

# Free-Space Acousto-Optic Modulator/Shifter

40MHz, 1310 to 1620 nm, 5mm aperture



DATASHEET

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## Features

- Low Loss
- Low Cost
- High Speed

## Applications

- Heterodyne Interferometry & Vibrometry
- Laser Plasma Diagnostics
- Distributed Acoustic and Fiber Optic Sensing
- Laser Mode-Locking and Q-Switching
- Coherent Optical Communications & Testing



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Rev 07/07/26

The AOMS series fiberoptic acousto-optic modulators enable high-speed optical intensity modulation optimized for the 1310 -1620 nm wavelength range. Built with high-purity TeO<sub>2</sub> crystal, they feature low insertion loss, a high damage threshold, and fast switching. When driven at their resonance frequency, the device satisfies the Bragg diffraction condition, deflecting light at a specific angle (first order). Intensity is controlled by varying the RF drive amplitude (0–5 V via SMA input). The modulator inherently introduces a positive frequency shift, with negative shift versions available upon request. It operates over a narrow wavelength range, with output angle dependent on the input wavelength. A matching driver is available.

The AOMS rise/fall time is directly related to the optical beam diameter, following the relation  $\text{Rise Time} \approx D / v$ , where D is the laser beam diameter in the acoustic propagation direction and v is the acoustic velocity in the AOM crystal. Therefore, reducing the beam size increases modulation speed and bandwidth.

## Specifications

Parameter	Min	Typical	Max	Unit
Center Wavelength	1310		1620	nm
Wavelength Bandwidth		±30		nm
Optical Aperture		5		mm
Acoustic Frequency		40		MHz
Modulation Bandwidth <sup>[1]</sup>			15	MHz
Wavelength Shift	-40		+40	MHz
Deflection Angle		10		mrad
Rise/Fall Time <sup>[2]</sup>		25	50	ns
Diffraction Efficiency	75		85	%
Return Loss	40			dB
Optical Damage Threshold	> 450nm < 450nm	0.5 5	2 20	MW/cm <sup>2</sup>
Average Optical Power		1	20	W
Peak Pulse Optical Power			30	kW
Input Impedance		5		Ω
RF Power		2.5	4.5	W
Electrical Interface		SMA		
Ultrasonic Velocity		4200		m/s
Operating Temperature	-30		65	°C
Storage Temperature	-45		85	°C

### Note:

[1]. It is approximately proportional to the driving frequency and inversely to the aperture size.

[2]. 90/10 optical intensity changes

**Warning:** The device need to be mounted on a heat sink or on a metal frame

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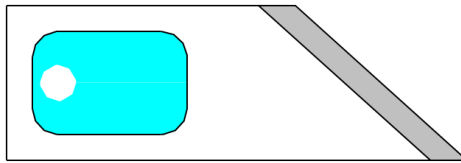
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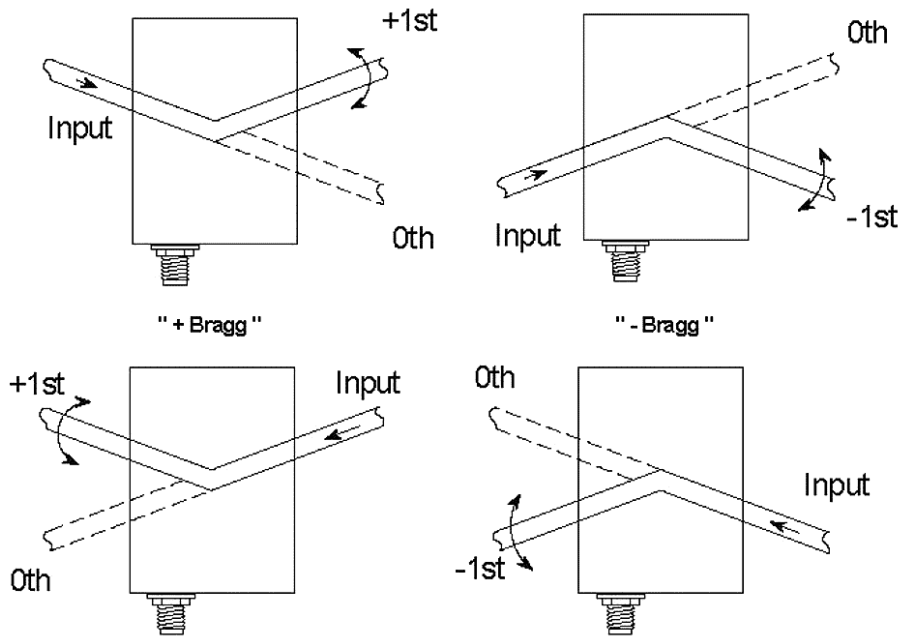


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### Laser Beam Passthrough Arrangement



Typical AOM Aperture Geometry- Rectangle



Possible laser beam input and output arrangements

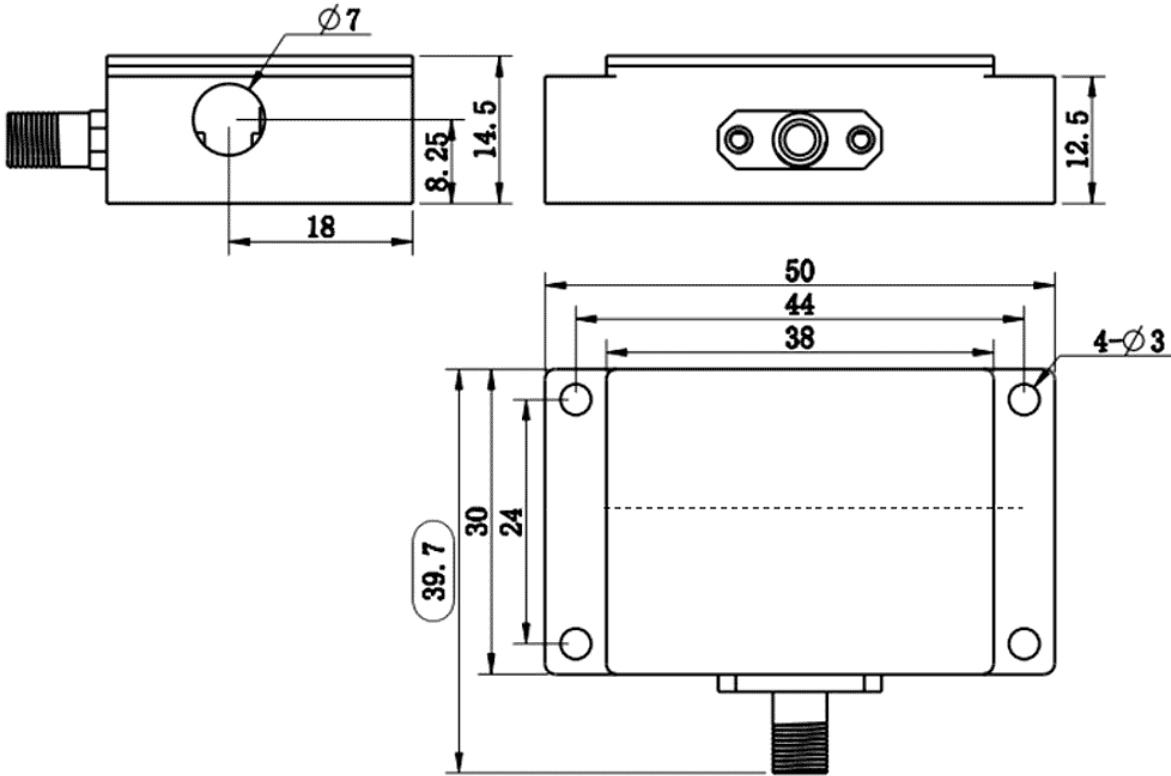
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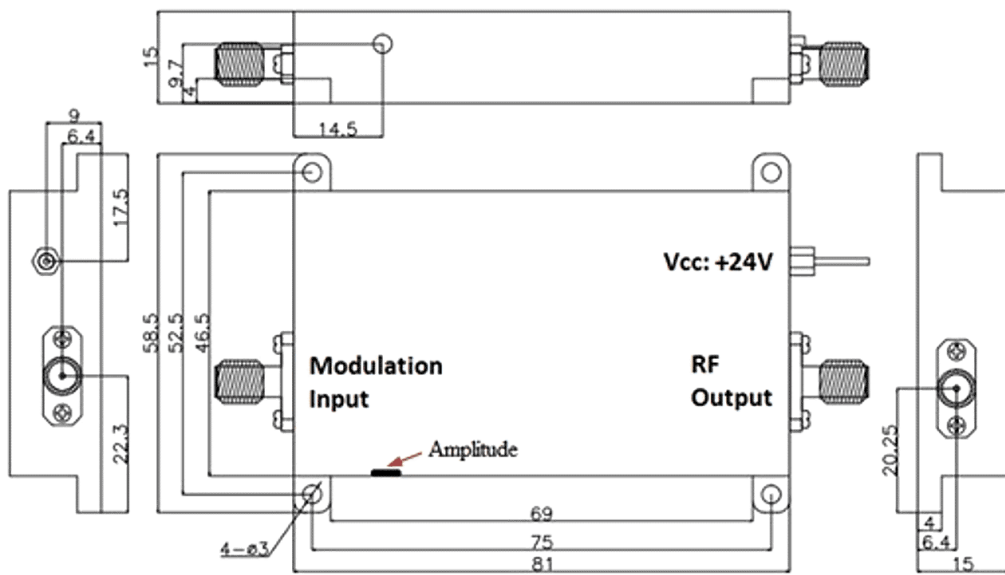


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### Mechanical Dimensions (mm)



AOM



AOM Driver

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

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### Electrical Connection

Connect the device to the driver via the SMA connections

### Ordering Information (Part Number)

Prefix	Type	Wavelength	Aperture	Frequency	Driver	Polarization
<b>AOMS-</b>	TeO2 = 11 Special = 00	1260-1650 nm = 003 950-1160 nm = 001 630-860 nm = 007 470-560 nm = 005 1800-2000 nm = 002 <b>Special = 000</b>	2.0mm = 4 Special = 0	40MHz = 4	No = 2 Yes = 1	Polarized = 1 Random = 2

\* Order separately.

Red means special order

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### Application Notes

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- **Driver cannot run without a load**  
Acousto-optic device and its driver work at high frequency. If AOMD is powered on without load, like an acoustic-optic modulator, then it will be damaged.
- **Heatsink**  
Modulator and its driver will be heated up under work condition. Heatsink or big piece of metal plate is strongly recommended for driver installation. High temperature will cause damage to driver.
- **Warm-up**  
10-30 minutes warm-up is needed for stable output power of AOMD.

### Operation Manual

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1. Connect the driver to +24V using the provided cable but do not turn the power on.  
**Note:** Applying the wrong polarity will burn the driver.  
**Note:** Powering the driver without the load will damage the driver.
2. Connect the driver OUTPUT to the acousto-optic device via the two SMAs.
3. Turn on the +24V power
4. Input TTL control signal to the Modulation connection port

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## Operation Instruction/Manual

### 1. Laser wavelength

An acousto-optic modulator is wavelength sensitive, i.e., a narrow-band device. The wavelength of input laser beam must match the nominal wavelength of modulator. Any wavelength deviation of input laser beam will cause significant increase of insertion loss.

### 2. Optical fiber connection

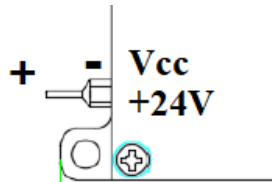
All connectors need to be properly cleaned and make sure connector type matches.

### 3. RF Output connection

Use the provided SMA cable to connect the 'RF Output' of driver to acousto-optic modulator.

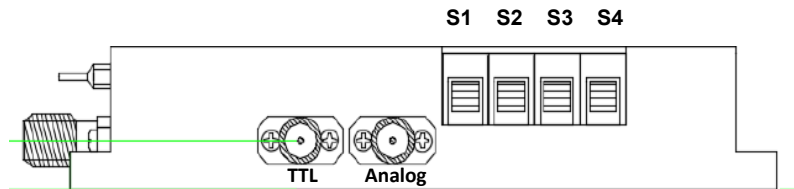
### 4. Power supply connection

Connect the 'Vcc +24V' and the negative plate of driver to a power supply. **Incorrect connection to positive and negative electrodes will cause severe damage of driver and modulator**



### 5. Analog modulation mode

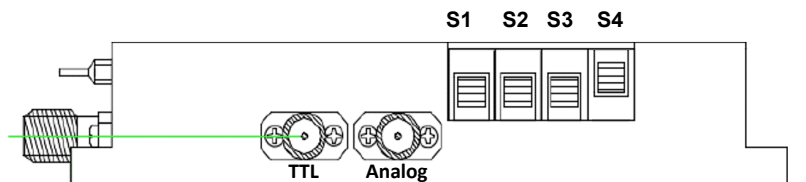
- Put all in the down position as shown below.



- Connect the analog control to the Analog. The driver will work with an analog response.

### 6. Digital TTL modulation mode

- Pull S4 in the up position and the rest of switches in the down position as shown below.



- Connect the TTL control to the TTL input. The driver will work with sharp on/off TTL response.

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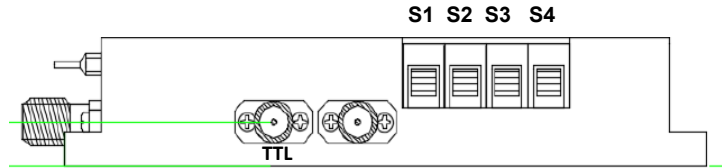


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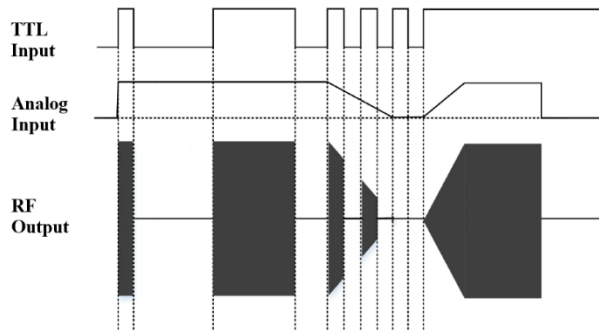
### Operation Instruction/Manual

#### 7. Digital/Analog modulation mode

- The driver has a digital/analog modulation mode in which the RF output is control by both digital TTL and analog inputs.
- Put all switches in the low position as shown below



- Connect TTL signal into the TTL SMA port, and connect a 0-5V analog input to the Analog SMA port.
- The 'TTL' port of the driver is optimized for sharp on/off response that is triggered by standard TTL input signal. In this operation mode the Analog port provides amplitude control of the TTL response. The relationship is illustrated below. The RF output sharp on/off is controlled by the TTL input and its magnitude is controlled by the Analog input level.



#### 8. Mode control summary

A group of 4 switches are used for control of driver's working mode.

Switch #	Position	Working Mode
S1	Up	TTL high level to enable RF output
	Down	TTL low level to enable RF output
S2	Up	TTL input disabled, block RF output
	Down	TTL input enabled, RF output depends on TTL & analog inputs
S3	Up	0 ~ 5V input range of analog modulation
	Down	0 ~ 1V input range of analog modulation (recommended)
S4	Up	Analog input disabled
	Down	Analog input enabled

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### 9. Adjustment of driver output power

**Warning:** The RF output power of driver has been matched with acousto-optic device in factory. Please DO NOT adjust it unless necessary.

When the RF output power of driver has to be adjusted a flat-head screw driver can be used to turn the small knob masked as 'AM' located on the side of driver. Turn it clockwise to increase power, and counterclockwise to decrease power.

## Application Notes

- **Output impedance**  
50Ω
- **Driver cannot run without a load or with its output shorted.**  
Acousto-optic device and its driver work at high frequency. If driver is powered on when there is no load connected to it, such as an acoustic-optic modulator, then it will be damaged.  
A shorted output connection will also cause damage of driver.
- **Heatsink for driver**  
The driver will be heated up in work condition. A heatsink or a big piece of metal plate is strongly recommended for driver installation. High temperature will cause damage to driver.
- **Ensure driver is well grounded to achieve desired performance.**
- **Use caution when handle optical fibers.**
- **Always cover connectors with caps when they are unplugged**