



Acousto-optic Modulators

Free-Space STM Series

Fiber-Coupled STFM Series



2023 V2

For customized projects please Contact us:

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Acousto-optic Modulators

An external cavity device that modulates the intensity of the laser

Acousto-optic modulators (AOM) are generally used outside the laser cavity to change the intensity of the incoming laser (amplitude-modulated AM). This can be simple ON/OFF modulation for quick switching or variable level modulation to achieve intensity modulation. The modulation mode is determined by the type of RF driver and can be digital (ON/OFF) or analog (sinusoidal, square wave, linear, random...).

Generally, the RF driver of AOM adopts fixed frequency, the key parameter of the AOM is the rise/fall time, which defines the achievable “speed” or amplitude modulation bandwidth of the modulation. The rise/fall time is proportional to the beam diameter inside the modulator. Therefore, the diameter of the incident laser beam must be controlled in order to obtain a fast rise time. The AOM can be used as a shutter (cyclic switch at a set frequency) or as a variable attenuator (dynamically controlling the intensity of the transmitted light). Laser modulation is achieved by controlling the sound wave in the acousto-optic crystal caused by radio frequency.

SIMTRUM offers a series of free-space (up to 24 channels in a single channel) and fiber-coupled (bias-preserving and non-bias-preserving) AOM with a frequency range of up to 300 MHz and a rise as low as 6 ns. We provide AOM-matched series of RF drivers you can choose the corresponding RF driver according to the product specification.



AO Free-Space Modulators



AO Fiber-Coupled Modulators

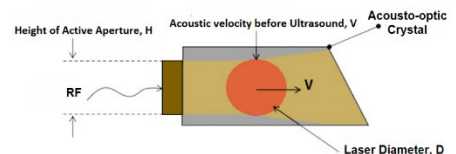
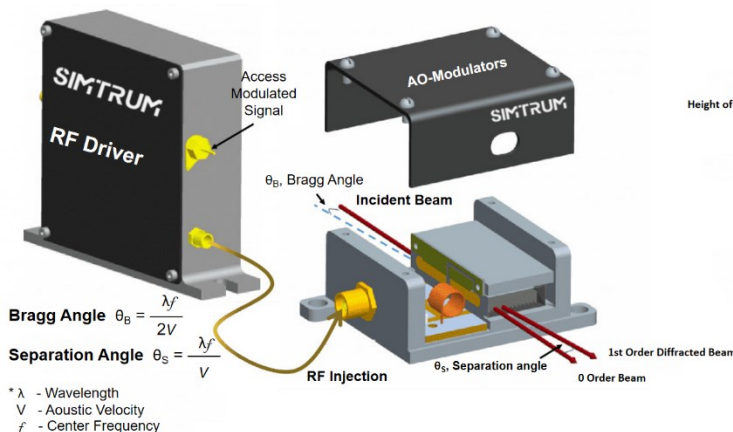
Applications – Free-space

- Intensity modulation
- Laser radar
- Laser switch
- Chopper
- Laser precision machining

Applications – Fiber-coupled

- Industrial lasers
- Sensing
- Scientific research
- Telecommunications
- Quantum technology

Principle of Operation



For the Gaussian beam, the laser rise time can be approximated by

$$\tau = 0.65 \frac{d}{V}$$

* $d = 1/e^2$ Laser beam diameter
 * $V =$ Acoustic Velocity

AO Free-Space Modulators

Ordering Information

	<u>Fc</u>		<u>Active aperture</u>		<u>Wavelength</u>
STM0001 - GL	XXX	-	XXX	-	XXX
27.12 MHz	027	4 mm	040	9.4 um	9400
40.68 MHz	041	6 mm	060	10.6 um	10600
80 MHz	080	8 mm	080		

AO Free-Space Modulators Specifications

General Specifications	
Interaction Material	Crystalline Quartz / Tellurium Dioxide / Germanium
Acoustic Mode	Longitudinal
Operating Wavelength	266 nm ~ 10.6 um
Polarization	Linear, parallel to base
Transmission	> 93% ~ 99.6%
Active Aperture	0.5 ~ 8.0 mm
Center Frequency (Fc)	40.68 ~ 200 MHz
RF Bandwidth (RB)	5 ~ 15 MHz
Diffraction Efficiency @RB	> 80% ~ 85%
RF Power	2 ~ 80 W (Max)
Input Impedance	50Ω Nominal
VSWR @Fc	< 1.2:1 / < 3:1
RF Connector	SMA-F / BNC-F
Cooling	Conduction-cooled / Water-cooled
Shell Material	Aluminum alloy 6063

AO Free-Space Modulators Model Guide

Product Code	Wavelength	Active Aperture	Operating Frequency	Transmission	Diffraction Efficiency	Optical Material	Cooling
STM0012-QL200-035-266	266 nm	3.5 mm	200 MHz	>99%	> 85%	Crystalline quartz	Conduction-cooled
STM0011-QL110-060-343	343 nm	6.0 mm	110 MHz	>99%	> 85%	Crystalline quartz	Water-cooled
STM0009-QL170-060-355	355 nm	6.0 mm	170 MHz	>93%	> 85%	Crystalline quartz	Water-cooled
STM0006-QL110-030-532	532 nm	3.0 mm	110 MHz	>99%	> 85%	Crystalline quartz	Conduction-cooled
STM0010-TL080-020-450-900	450-900 nm	2.0 mm	80 MHz	>95%	> 85%	Tellurium dioxide	Conduction-cooled
STM0015-QL100-030-800	800 nm	3.0 mm	100 MHz	>99.6%	> 85%	Crystalline quartz	Conduction-cooled
STM0005-TL080-005-1045	1045 nm	0.5 mm	80 MHz	>99.6%	> 85%	Tellurium dioxide	Conduction-cooled
STM0007-QL068-030-1064	1064 nm	3.0 mm	68 MHz	>93%	> 85%	Crystalline quartz	Conduction-cooled
STM0008-GL041-060-9600	9.6 um	6.0 mm	40.68 MHz	>93%	> 80%	Germanium	Water-cooled
STM0013-GL041-080-9600	9.6 um	8.0 mm	40.68 MHz	>93%	> 80%	Germanium	Water-cooled
STM0001-GL041-080-10600	10.6 um	8.0 mm	40.68 MHz	>93%	> 80%	Germanium	Water-cooled

AO Fiber-Coupled Modulators

Ordering Information

	<u>Fc</u>		<u>Fiber type</u>		<u>Wavelength</u>
STFM0001 - TL	XXX	-	XXX	-	XXX
80 MHz	080	HI 1060	P01	1064 nm	1064
100 MHz	120	PM1550XP	P02	1550 nm	1550
200 MHz	200				

AO Fiber-Coupled Modulators Specifications

General Specifications	
Interaction Material	Tellurium Dioxide
Acoustic Mode	Longitudinal
Operating Wavelength	780 ~ 1550 nm
Fiber Type	780-HP / PM780 / PM980 / PM1550XP
Average Optical Power Handling	1 W
Center Frequency (Fc)	40 ~ 300 MHz
RF Bandwidth (RB)	5 ~ 15 MHz
Fiber Length	> 0.8 m
Fiber Termination	Bare Fiber
RF Power	2 ~ 2.5 W (Max)
Input Impedance	50Ω Nominal
VSWR @Fc	< 1.2:1
RF Connector	SMA-F
Cooling	Conduction-cooled
Shell Material	Aluminum alloy 6063

AO Fiber-Coupled Modulators Model Guide

Product Code	Wavelength	Operating Frequency	Fiber Type	Rise Time	Insertion Loss
STFM0010-TL080-P16-780	780 nm	80 MHz	PM780	≤ 50 ns	≤ 3 dB
STFM0011-TL200-P16-780	780 nm	200 MHz	PM780	≤ 50 ns	≤ 3 dB
STFM0018-TL200-F23-910-940	910- 940 nm	200 MHz	780-HP	≤ 10 ns	≤ 3.5 dB
STFM0017-TL200-P07-1030	1030 nm	200 MHz	PM980	≤ 10 ns	≤ 2.5 dB
STFM0005-TL200-P07-1064	1064 nm	200 MHz	PM980	≤ 10 ns	≤ 2.5 dB
STFM0008-TL250-P01-1064	1064 nm	250 MHz	PM980	≤ 8 ns	≤ 2.5 dB
STFM0009-TL300-P01-1064	1064 nm	300 MHz	PM980	≤ 6 ns	≤ 3 dB
STFM0001-TL040-P02-1550	1550 nm	40 MHz	PM1550XP	≤ 60 ns	≤ 2.5 dB
STFM0013-TL080-P02-1550	1550 nm	80 MHz	PM1550XP	≤ 60 ns	≤ 2.5 dB
STFM0007-TL200-P03-1550	1550 nm	200 MHz	PM1550XP	≤ 10 ns	≤ 3 dB