Sintec Optronics

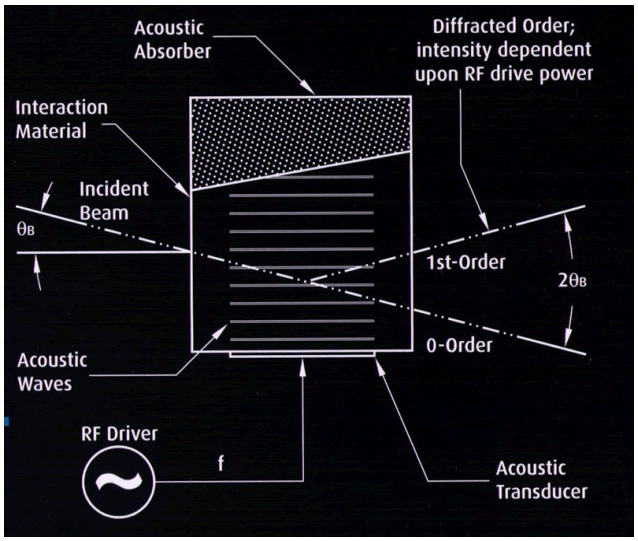
Acousto-Optic Modulators

By virtue of having no moving parts our acousto-optic devices are able to amplitude modulate a laser beam at very high speed. For example modulation bandwidths in excess of 50MHz are readily achievable. These Acousto-optical devices have different applications like beam deflection, frequency shifting of the input beam, modulation, pulse-picking, cavity dumping, Q-switching, Tunable filtering. All these devices essentially use the same physics as described below, and then optimised for their specific application.

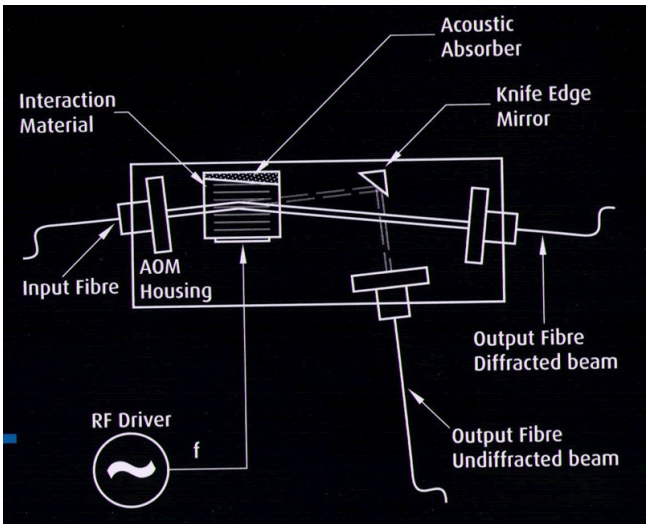
In an acousto-optic modulator (AOM) a laser beam is caused to interact with a high frequency ultrasonic sound wave inside an optically polished block of crystal or glass (the interaction medium). By carefully orientating the laser with respect to the sound waves the beam can be made to reflect off the acoustic wavefronts (Bragg diffraction). Therefore, when the sound field is present the beam is deflected and when it is absent the beam passes through undeviated. By switching the sound field on and off very rapidly the deflected beam appears and disappears in response (digital modulation). By varying the amplitude of the acoustic waves the intensity of the deflected beam can similarly be modulated (analogue modulation).

It is usual to choose the deflected beam as the one that is used in the optical system because it can be switched on and off with high extinction ratio (typically >40dB) and intensity can be varied from zero to more that 85% of the incident beam. The rate at which the beam can be modulated is governed by the time it takes the acoustic wavefronts to traverse the laser beam, which depends on the beam diameter and the acoustic velocity in the interaction medium.

The sound waves are generated by a transducer, usually a thin wafer of lithium niobate, that is bonded onto the interaction medium using a highly efficient cold-weld metallic bonding process. When a high frequency electrical signal is applied to the transducer it vibrates, generating the acoustic wave. The signal is derived from an RF driver, which generates a high frequency carrier that is itself modulated by an analogue or digital input signal.

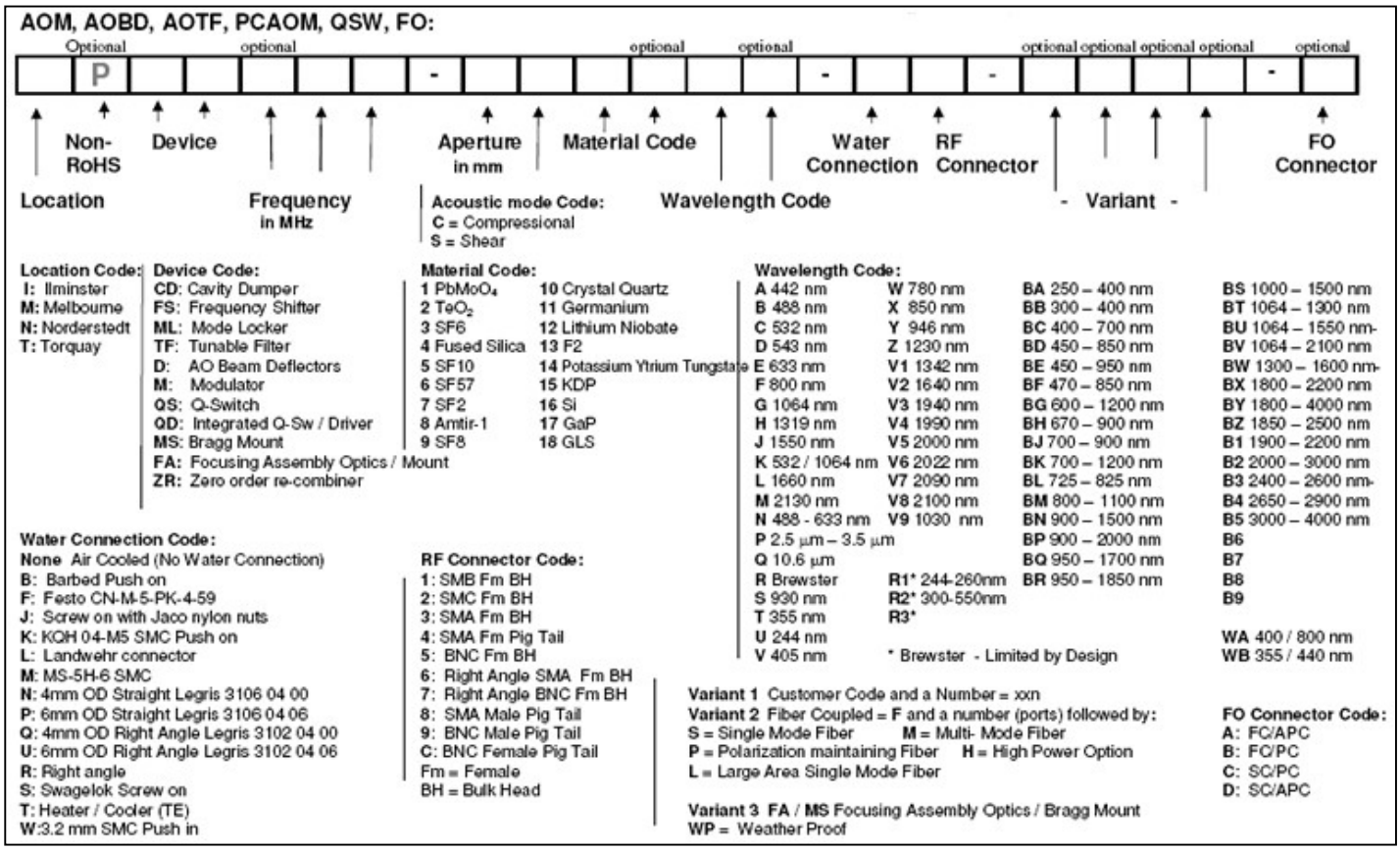


AO Modulator Cell Schematic



Fiber-coupled AO Modulator Cell Schematic

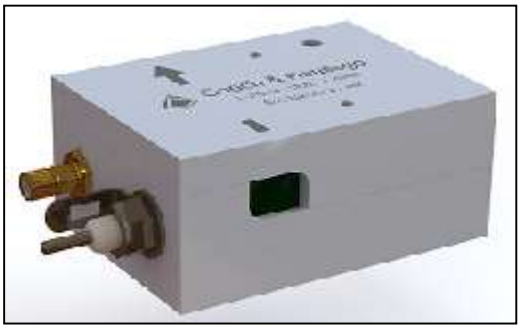
Principal applications for AO modulators are pre-press (putting image and text data onto films or plates as part of the printing process), laser imaging and displays, switching in telecom fibres, instrumentation and research.



1. Free-space Acousto-optical Modulators

1.1 STG Series Free-space AOMs

We offer a wide range of standard AO Modulators, for digital or analogue intensity modulation of laser beams.



Their main specifications are as follows:

- Wavelength Range: 240nm to 2100nm
- Drive Frequencies: 20MHz to 350MHz
- Optical Rise-Times: Down to 5ns
- Modulation Bandwidths: Up to 100MHz
- Interaction Materials: Tellurium Dioxide, Lead Molybdate, Fused Silica, Crystal Quartz, halcogenide Glass, Flint Glass.

An RF Driver provides the electronic signal operating the AO Modulator. With a digital driver, an external TTL signal enables rapid on and off switching of the optical beam. Alternatively an anologue driver enables a variable intensity output, typically from 0% to 85% of the input beam.

The maximum modulation bandwidth, or optical rise-time, is a function of the acoustic transit time across the optical beam. Therefore, for the highest speeds it is often necessary to focus the optical beam down to a small spot inside the modulator.

Our standard AOMs are listed below. *Updated 2016*

Model	Wave length	Rise/ Fall time	Active Aperture	Operating Frequency	Optical Material
I-M110-4C19R19-3-GH93	193-266nm	110ns/mm	4mm	110MHz	Fused Silica
AOMO 3200-1220	257nm	10ns	0.25mm	200MHz	Crystalline Quartz
I-M110-3C10BB-3-GH27	300-400nm	113ns/mm	3mm	110MHz	Crystalline Quartz
I-M110-3C10T-3-GH72	355nm	113ns/mm	3mm	110MHz	Crystalline Quartz
I-M80-6.5C10T-4-GH60	355 nm	113 ns/mm	6.5 mm	80 MHz	Crystalline quartz
I-M110-2C10B6-3-GH26	400-540 nm	113 ns/mm	2 mm	110 MHz	Crystalline quartz

AOMO 3200-121	515-633nm	153 ns/mm	0.32nm	200MHz	Tellurium Dioxide
AOMO 3200-120	442-488nm	153 ns/mm	0.45mm	200MHz	Tellurium Dioxide
AOMO 3110-121	442-488nm	153 ns/mm	0.6mm	110MHz	Tellurium Dioxide
AOMO 3080-125	415-900nm	153 ns/mm	2mm	80MHz	Tellurium Dioxide
AOMO 3100-125	440-850nm	153 ns/mm	1.5mm	100MHz	Tellurium Dioxide
AOMO 3200-1214	470-690nm	159 ns/mm	2.5mm'L' X1.5mm'H'	200MHz	Tellurium Dioxide
AOMO 3350-125	440-850nm	153 ns/mm	1.5mm	350MHz	Tellurium Dioxide
AOMO 3110-120	440-850nm	153 ns/mm	0.6mm	110MHz	Tellurium Dioxide
AOMO 3080-120	440-850nm	153 ns/mm	1mm	80MHz	Tellurium Dioxide
AOMO 3350-120	488-532nm	153 ns/mm	0.1mm	350MHz	Tellurium Dioxide
AOMO 3350-197	473-685nm		2mm'L'x0.15'H'	350MHz	Tellurium Dioxide
AOMO 3200-124	780-850nm	113 ns/mm	0.32mm	200MHz	Tellurium Dioxide
AOMO 3080-122	780-850nm	153 ns/mm	1mm	80MHz	Tellurium Dioxide
AOMO 3200-1113	870-1250nm	153 ns/mm	0.1mm	200MHz	Tellurium Dioxide
I-M041-2.5C10G-4-GH50	1030-1064nm	113 ns/mm	2.5 mm	40.68 MHz	Crystalline Quartz
I-M080-2C10G-4-AM3	1030-1064nm	113ns/mm	2mm	80MHz	Crystalline Quartz
I-M080-4C10G-4-GH60	1030-1064nm	113 ns/mm	4 mm	80 MHz	Crystalline quartz
I-M068-5C10G-U5-GH100	1030-1064nm	113 ns/mm	5 mm	68 MHz	Crystalline quartz
I-M041-2.5C10G-4-GH50	1030-1064nm	113ns/mm	2.5mm	40.68MHz	Crystalline quartz
AOMO 3110-197	1030-1090nm	153 ns/mm	1.25mm	110MHz	Tellurium dioxide
AOMO 3080-194	1060 nm	153 ns/mm	1.75 mm	80 MHz	Tellurium dioxide
AOMO 3120-193 (97-03248-04)	1064nm	73 ns/mm	2.5x0.6mm	120MHz	Tellurium dioxide
AOMO/AOFS 3165-1	1300-1550 nm	153 ns/mm	0.6 mm	165 MHz	Tellurium dioxide
I-M040-2C8J-3-GH84	1550 nm	260 ns/mm	2 mm	40 MHz	AMTIR
I-M041-3C2V5-4-IS8	2000 nm	153 ns/mm	3 mm	40.68 MHz	Tellurium dioxide
I-M041-1.4C10V5-4-GH49	1900-2100 nm	113 ns/mm	1.4 mm	40.68 MHz	Crystalline quartz
I-M040-2C8B1-3-GH84	1900-2100 nm	260 ns/mm	2 mm	40 MHz	AMTIR
AOMO 3080-1980 (97-03250-01)	2000nm	73 ns	2.5x0.5mm	80 MHz	Tellurium dioxide
I-M0XX-XC11B76-P5-GH105	5.5µm	120 ns/mm	up to 9.6 mm	40.68 - 60 MHz	Germanium
I-M050-10C11V49-P5-GH77	5.5 µm	120 ns/mm	7.0, 9.6 mm	50 MHz	Germanium
I-M050-10C11V41-P3-GH75	9.4 µm	120 ns/mm	9.6 mm	40/60 MHz	Germanium
I-M041-xxC11xxx-P5-GH77	9.4/10.6 µm	120 ns/mm	7.0, 9.6 mm	40.68 MHz	Germanium
I-M041-XXC11XXX-P5-GH77	10.6/9.4 µm	120 ns/mm	up to 9.6 mm	40.68 MHz	Germanium

Our **old AOM models** are listed in the below table. These old models may or may not be in stock or obsolete and no longer produced. Please check with our sales regarding the availability of the below models.

Model	Description	Driver
I-FS040-1.5C2E-1-ME1 (FS040-2E-ME1)	630-690nm, 40MHz, 4x2mm aperture	Integrated RF driver
I-FS040-1.5S2E-1-ME1 (FS040-2E-ME1)	630-690nm, 40MHz, 4x2mm aperture	Integrated RF driver
I-FS040-2C2E-3-OL3 (FS040-2E-OL3)	633-680nm, 40MHz, 2x4mm aperture	
I-FS040-2S2E-1-GH38	630-67nm,40MHz, 2.0mm aperture, 15VDC power	Integrated RF driver
FS040-2C-AR1	532nm, 40MHz, 1.5mm aperture,	Integrated RF driver
FS040-2E-AR1	630-690nm, 40MHz, 1.5mm aperture,	Integrated RF driver
I-M041-7C11Q-P5-GH77	10.6um wavelength, 40.68MHz, 120ns/mm rise time, 7mm active aperture, transmission >96.5%, max RF power 100W	HP041-125ADG-A10
I-FS080-2C2G-3-LV1 (M080-2G-LV1)	High efficiency AO Modulator for lasers where fast modulation is not critical, RF 0.5W	A35080 N21080-1DM, N21080-1AM
I-FS080-3S2E-1-GH39	633nm, 80MHz up-shift, 3mm aperture	
I-M080-2.5C10G-4-GH25	400-540nm,110MHz, 113ns/mm rise time, 2.5mm aperture, RF<5W	A35080 N31080-5DM, N31080-5AM

I-FS110-2C2B8-3-GH2 (M110-2B/F-GH2)	480-800nm, 150ns risetime, 110MHz, 2mm aperture, RF<2W	A35110, N21110-2AM, N21110-2DM
I-M110-2C10B6-3-GH26 (M110-10UV-OR1)	351 to 364nm, 110MHz, 110ns rise-time, Crystal Quartz for high power handling, RF 3W	A35110 N31110-3DM, N31110-3AM
I-M110-2C10B6-3-GH26	400-540nm, 110MHz, 113ns/mm rise time, 2mm aperture, RF <5W	A35110 N31110-5DM, N31110-5AM
I-M110-2.5C10B6-3-GH26	400-540nm, 110MHz, 113ns/mm rise time, 2.5mm aperture, high damage threshold, RF<5W	A35110 N31110-5DM, N31110-5AM
I-M110-3C10B6-3-GH27	300-400nm, 110MHz, 113ns/mm rise time, 2.5mm aperture, high damage threshold, RF<3W	
I-M110-3C10B6-3-GH27 (M110-10C-TR7)	AO Modulator for wavelength 514 to 532nm, high damage threshold , RF 5W	A35110 N31110-5DM, N31110-5AM
I-M120-0.7C2G-GH42	1064nm, 120MHz, 153ns/mm rise time, 700um aperture, RF<3W	
I-M150-0.4C2G-GH42	1064nm, 150MHz, 153ns/mm rise time, 400um aperture, RF<2W	
I-M200-0.75C2G-3-SO8	1064nm, 200MHz, 153ns/mm rise time, 0.75mm aperture, RF<3W	
12038-3-BR-TE	SiO2, used for various wavelength, 38MHz, aperture 2mm, deflection 6.75mrad, RF 1W	11038-1ML
12038-3-TE	SiO2, 1064nm wavelength, 38MHz, aperture 3mm, deflection, 6.75mrad, RF 1W	11038-1ML
12041-3-BR-TE	SiO2, used for various wavelength, 41MHz, aperture 2mm, deflection 7.3mrad, RF 1W	11041-1ML
12041-3-TE	SiO2, 1064nm wavelength, 41MHz, aperture 3mm, deflection 7.3mrad, RF 1.2W	11041-1ML
12050-3-BR-TE	SiO2, used for various wavelength, 50MHz, aperture 2mm, deflection 8.9mrad, RF 1W	11050-1ML
12050-3-TE	SiO2, 1064nm wavelength, 50MHz, aperture 3mm, deflection 8.9mrad, RF 1.2W	11050-1ML
12080-3-BR-TE	SiO2, used for various wavelength, 80MHz, aperture 2mm, deflection 14.2mrad, RF 1W	11080-1ML
12080-3-TE	SiO2, 1064nm wavelength, 80MHz, aperture 3mm, deflection 14.2mrad, RF 1.2W	11080-1ML
13389-BR	SiO2, used for various wavelength, 389MHz, aperture 60um, deflection 41mrad, RF 0.5W	64389-SYN-9.5-X
15180-1.06-LTD-GAP	GaP, 1.06um wavelength, 180MHz, aperture 0.3mm, deflection 28.7mrad, RF 1.7W	
15210	TeO2, 440-850nm wavelength, 210MHz, aperture 0.2mm, deflection 31mrad, RF1W	21210-1xx
15210-FOA/71002	TeO2, 440-850nm wavelength, 210MHz, aperture 0.2mm, deflection 31mrad, RF1W	21210-1xx
15210-FOA	TeO2, 440-850nm wavelength, 210MHz, aperture 0.2mm, deflection 31mrad, RF1W	21210-1xx
15260	TeO2, 440-850nm wavelength, 260MHz, aperture 0.2mm, deflection 39mrad, RF0.7W	21260-.7xx
15260-FOA/71002	TeO2, 440-850nm wavelength, 260MHz, aperture 0.2mm, deflection 39mrad, RF1W	21260-1xx
15260-FOA	TeO2, 440-850nm wavelength, 260MHz, aperture 0.2mm, deflection 39mrad, RF1W	21260-1xx
17389-1.06-LTD-GaP	GaP, 1.06um wavelength, 389MHz, aperture 0.15mm, deflection 62mrad, RF 1W	11389-5AM, 64389.5-SYN-9.5-X
17389-.93	TeO2, 700-1064nm wavelength, 389MHz, aperture 70um, deflection 73mrad, RF 0.7W	11389-5AM, 64389.5-SYN-9.5-X

17389-.93-FOA	TeO2, 700-1064nm wavelength, 389MHz, aperture 70um, deflection 73mrad, RF 0.7W	11389-5AM, 64389.5-SYN-9.5-X
17440	TeO2, 440-850nm wavelength, 440MHz, aperture 90um, deflection 65mrad, RF 0.8W	11440-.8Ax
17440-FOA	TeO2, 440-850nm wavelength, 440MHz, aperture 90um, deflection 65mrad, RF 0.8W	11440-.8Ax
23080-1-LTD	TeO2, 440-850nm wavelength, 80MHz, aperture 1mm, 150 ns / mm rise time, deflection 11.88mrad, RF 1W	21080-1xx
23080-1-.85-LTD	TeO2, 700-1000nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 16mrad, RF 1W	21080-1xx
23080-1-1.06-LTD	TeO2, 1064nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 20mrad, RF<1.25W	21080-1xx
23080-1-1.06/1.3-LTD	TeO2, 1.06-1.3um wavelength, 80MHz, aperture 1mm, 155ns/mm rise time, deflection 24.4mrad @ 1.3um, 20mrad @ 1.06um, RF<2W @ 1.3um, <1.2W @ 1.06um	21080-1xx
23080-1-1.3-LTD	TeO2, 1300nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 25mrad, RF<1.25W	21080-1xx
23080-1-1.55-LTD	TeO2, 1550nm wavelength, 80MHz, 1mm aperture, 150ns/mm rise time, deflection 29mrad, RF<2W	21080-2xx
23080-2-LTD	TeO2, 440-850nm wavelength, 80MHz, aperture 2mm, 150ns/mm rise time, deflection 11.88mrad @ 633nm, RF 1W	21080-1xx
23080-2-.85-LTD	TeO2, 700-1000nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 15mrad @ 850nm, RF<2W	21080-2xx
23080-2-1.06-LTD	TeO2, 1064nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 20mrad, RF<2W	21080-2xx
23080-2-1.3-LTD	TeO2, 1300nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 24.4mrad, RF<3.2W	21080-3xx
23080-2-1.55-LTD	TeO2, 1550nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 29mrad @ 1550nm, RF<3.2W	21080-3xx
23080-3-LTD	TeO2, 440-850nm wavelength, 80MHz, aperture 3mm, 150ns/mm risetime, deflection 11.88mrad @ 633nm, RF<1.2W	21080-1.2xx
23080-3-.85-LTD	TeO2, 700-1000nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 16mard @ 850nm, RF 2W	21080-2xx
23080-3-1.06-LTD	TeO2, 1064nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 20mard, RF<2W	21080-2xx
23080-3-1.3-LTD	TeO2, 1300nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 24.4mard, RF<4W	21080-4xx
23110-.5	TeO2, 440-850nm wavelength, 110MHz, 0.5mm aperture, 150ns/mm risetime, deflection 16.3mard @ 633nm, RF<1W	21110-1xx
23110-1-LTD	TeO2, 440-850nm wavelength, 110MHz, 1mm aperture, 150ns/mm risetime, deflection 16.34mard @ 633nm, RF<1W	21110-1xx
24080-1	SF6, 440-850nm wavelength, 80MHz, 1mm aperture, 185ns/mm risetime, deflection 14.4mrad @ 633nm, RF<1W	21080-1xx
26035-2-1.55-LTD	AMTIR, 1300-1600nm wavelength, 35MHz, 2mm aperture, 260ns/mm risetime, deflection 20.6mard @ 1550nm, RF<0.5W	21035-0.5xx
26055-1-1.55-LTD	AMTIR, 1300-1600nm wavelength, 55MHz, 1mm aperture, 260ns/mm risetime, deflection 32.4mard @ 1550nm, RF<0.5W	21055-0.5xx
35085-.5	Fused Silica, 400-540nm wavelength, 85MHz, 0.5mm aperture, 110ns/mm risetime, deflection 5mrad @ 514nm, RF<6W	31085-6xx
35085-0.5-350	Fused silicon, 300-400nm wavelength, 85MHz, aperture 0.5mm, 110ns/mm risetime, deflection 5mrad@350nm, RF<6W	31085-6xx
35085-3	Fused silicon, 400-540nm wavelength, 85MHz, aperture 3mm, 110ns/mm risetime, deflection 5mrad @ 488nm, RF 6W	31085-6xx

35085-3-350	Fused silicon, 300-400nm wavelength, 85MHz, aperture 3mm, 110ns/mm risetime, deflection 5mrad @ 350nm, RF 3W	31085-6xx
35110-2-244	KrF grade fused silica, 244nm wavelength, 110MHz, aperture 2mm, deflection 4.5mrad, RF 2W	21110-2xx
35110-2-244-BR	KrF grade fused silica, 244-260nm wavelength, 110MHz, aperture 2mm, deflection 4.5mrad @ 244nm, RF 4W	31110-4xx
35110-3-244-BR-KRF	KrF grade fused silica, 244-260nm, Brewster window, 110MHz, aperture 2mm, deflection 4.5mrad @ 244nm, RF 4W	31110-4xx
35210-BR/71004	Fused silica, 300-700nm wavelength, 210MHz, aperture 0.13mm, deflection 17mrad, RF 6W	31210-6xx
35210-BR	Fused silica, 300-700nm wavelength, 210MHz, aperture 0.13mm, deflection 17mrad, RF 6W	31210-6xx
35250-.2-.53-XQ	Crystal quartz, 532nm wavelength, 250MHz, aperture 0.2mm, deflection 23mrad, RF 6W	31250-6xx
37027-3	Ge, 10.6um wavelength, 27.12MHz, aperture 3mm, deflection 52mard, RF 30W	39027-30DSA05
37027-5	Ge, 10.6um wavelength, 27.12MHz, aperture 5mm, deflection 52mrad, RF 30W	39027-35DSA05
37027-8-10.6	Ge, 10.6um wavelength, 27.12MHz, aperture 8mm, deflection 52mard, RF 50W	39027???
37040-5	Ge, 10.6um wavelength, 40MHz, aperture 5mm, deflection 78mard, RF 35W	39040-35DSA05-A
37041-8-4.5	Ge, 4-5um wavelength, 40.68MHz, aperture 8mm, deflection 33mard, RF 15W	39040-35DSA05-A???
47040-5-.7-RA	TeO2, 655-850nm wavelength, 40MHz, aperture 5mm, deflection 47mrad, RF<0.6W	
48060-8/4-1.0-COL	TeO2, 800-1200nm wavelength, 54-84MHz, aperture 8x2mm, deflection 23mrad, RF<100mW	
MFS030-3S2C-5-6.5DEG	TeO2, 532nm, 30MHz, 3mm aperture, 1us/mm risetime, deflection 24mrad, RF<0.2W	MLP030-1DC MLP030-1AC-A1 (Former 21xxx-Yzz)
MFS030-3S2E-5-6.5DEG	TeO2, 633nm, 30MHz, 3mm aperture, 1us/mm risetime, deflection 28mrad, RF<0.8W	MLP030-1DC MLP030-1AC-A1 (Former 21xxx-Yzz)
MFS040-35/13S2C-3	TeO2, 532nm, 40MHz, 35x13mm aperture, 1us/mm risetime, deflection 34.4mrad, RF<1.2W	
MFS050-3S2C-5-6.5DEG	TeO2, 532nm, 50MHz, 3mm aperture, 1us/mm risetime, deflection 40mrad, RF<0.5W	
MFS050-5S2E-5-6.5DEG	TeO2, 633nm, 50MHz, 5mm aperture, 1us/mm risetime, deflection 48mrad, RF<1.5W	MLP050-1.5DC MLP050-1.5AC-A1 (Former 21xxx-Yzz)
MFS080-35/5S2C-3	TeO2, 532nm, 80MHz, 35x5mm aperture, 1us/mm risetime, deflection 68.9mrad, RF<4W	
MFS100-2C4BB-5	Fused Silica, 300-400nm, 80-120MHz, 2mm aperture, □□deflection 2.4mrad @ 355nm, 6mrad @ 100MHz @ 355nm, RF<6W	
MFS150-.2C17J-3-F2P-A-GH		MLP150-2AC-A1 (Former 21xxx-Yzz)
MFS160-5/13S2C-3	TeO2, 532nm, 160MHz, 5x13mm aperture, 1us/mm risetime, deflection 138mrad, RF<2W	
MFS400-.2C2V13-5	TeO2, 650nm, 350-450MHz, 0.2mm aperture, □□deflection 15.2mrad, deflection 61mrad @ 400MHz, RF<1W	
MFS500-.2C2B26-5	TeO2, 490-500nm, 450-550MHz, 0.2mm aperture, □□deflection 11.6mrad @ 495nm, deflection 58mrad @ 495nm @ 500MHz, RF<0.8W	
MM027-3C11B40-S5-30W		31027-6DM
MM040-5C11B38-5		31040-6DM

MM200-.2C17B34-5	GaP, 1.06-1.7um, 200MHz, 0.2mm aperture, deflection 31.8mrad @ 1.06um, 51mrad @ 1.7um @ 500MHz, RF<2W	
MPP389-.15C17G-C-FOA	GaP, 1.06um, 389MHz, 150um aperture, deflection 62mrad, RF<2.5W with duty cycle <20% & RF on duration <200nsec	
MTF096-2S2B43-3-1ST/-1ST	TeO2, 1.5-1.6um, 52.5-56.1MHz, 2mm aperture, deflection 7.4degree, RF<4W	
MTF096-2S2B43-3-1ST/-1ST-1.2	TeO2, 1.5-1.6um, 92.53-98.89MHz, 2mm aperture, resolution 2.5nm, deflection 7.4degree, RF<4W	
MTF096-2S2B43-3-1ST/-1ST-2.5	TeO2, 1.5-1.6um, 92.53-98.89MHz, 2mm aperture, resolution 2.5nm, deflection 7.4degree, RF<4W	
I-M041-xxC11xxx-P5-GH77	Germanium, 9.4um or 10.6um, 40.68MHz, up to 9.6mm aperture, RF power 120W	HP041-125ADG-A10
I-M041-10C11Q-P5-SY1	Monocrystaline Germanium, 10.6um, 40.68MHz, 6-8mm aperture, RF power 100W	A25041-x-5/600-s4k7u
I-M080-2C10G-4-AM3	Crystal Quartz, 1030-1064nm, 80MHz, 2mm aperture, Linear polarisation, Compressional, 85% diffraction efficiency, RF power 15W	
I-M080-2.5C10G-4-AM3	Crystal Quartz, 1030-1064nm, 80MHz, 2.5mm aperture, Linear polarisation, Compressional, 80% diffraction efficiency, RF power 15W	
97-03388-03R1 (5080-296)	Crystal Quartz, 1064nm, 80MHz, 1.5mm aperture, Linear polarisation, Compressional, 80% diffraction efficiency, RF power 20W	
97-03388-02R2 (5041-296)	Crystal Quartz, 1064nm, 40.68MHz, 1.5mm aperture, Linear polarisation, Compressional, 80% diffraction efficiency, RF power 20W	

1.2 STBR Series Free Space AOM

The STBR series free space Acousto-Optic Modulator (AOM) with RF driver is used to vary and control laser beam intensity. It is electronically programmable using a microprocessor connected to the RF driver unit. The RF driver features all the necessary components to drive the modulator with analog or digital input control. Our free space AO products are housed in environmentally stable packages. They offer superior resistance to humidity and temperature, and are suitable for laboratory as well as various OEM applications and instrumentations

Model #	Spectral Range (nm)	Rise Time (ns)	Active Aperture (mm)	Modulation Bandwidth (MHz)	DE (%)
STBR -TEM-85-2	380-1600	280	2.0	2	80
STBR -TEM-85-10	380-1600	55	1.0	10	80
STBR-TEM-110-25	380-1600	22	0.5	25	80
STBR-TEM-200-50	380-1600	10	0.3	50	70
STBR-TEM-400-100	380-1600	5.5	0.075	100	50
STBR-TEM-800-200	380-1600	3	0.05	200	35
STBR-AMM-27-2	1000-2500	300	1	1.8	>80
STBR-AMM-80-4	1000-2500	160	1	4	>80
STBR-AMM-100-8	1000-2500	68	0.3	8	>80
STBR-FQM-80-2	200-1300	195	1.6	2.8	70
STBR-FQM-80-20	200-1300	30	1	18	70
STBR-FQM-200-40	200-1300	14	0.3	40	70
STBR-GEM-40-4	2000-11,000	125	1.5	5	70
STBR-GEM-40-4-4500/4mm	2000-5000	155	4.0	5	70-75
STBR-GPM-200-50	600-1600	11	0.3	50	>75
GPM-400-100	600-1600	5.1	0.1	108	>65

GPM-800-200	600-1600	2.6	0.05	217	>40
GPM-1600-400	600-1600	1.4	0.025	400	>25
IPM-200-26	1000-1600	21	0.3	26	60
IPM-400-100	1000-1600	5	0.075	100	50

For the associated RF drivers, please refer to “RF Drivers for STBR series”

2. “Fiber-Q” Fiber-coupled Modulators

2.1 STG Series Fiber-coupled AOMs

Fiber-coupled acousto-optic modulators (FCAOM) offer an elegant and robust solution for amplitude modulation of fiber lasers, allowing direct control of the timing, intensity, and temporal shape of the laser output. Our Fiber-Q modulators offer high extinction ratio, low insertion loss, and excellent stability in both polarization maintaining (PM) and non-PM formats at modulation frequencies up to 80 MHz for visible and infrared wavelengths. Built for reliability, the Fiber-Q series of products features a rugged hermetic design in a compact, low-profile package, ideal for ease of integration into all-fiber and OEM systems, including medical laser systems.

Each Fiber-Q acousto-optic modulator requires an RF driver to generate the RF signal creating the acoustic wave within the embedded AO crystal. Modulation of the beam through the Fiber-Q will depend upon the frequency and intensity of the applied RF signal.

Fiber-coupled acousto-optic modulators (FCAOM) were initially developed to modulate the intensity of light contained in fibers without having to break the fiber to install a free-space acousto-optic modulator (AOM). Traditionally, modulation in fiber lasers was achieved using a master oscillator power amplifier (MOPA). The MOPA limited the pulse shapes that could be created, and required a separate semiconductor seed laser system. Direct integration of a fiber optic acousto-optic modulator is a far simpler approach, and allows the optical path to remain closed for better power handling and reliability, in addition to lower loss.

A fiber-coupled acousto-optic modulator (FCAOM) can directly control the temporal characteristics of the active output from a fiber laser, offering a wider variety of pulse shapes. As a byproduct of the acousto-optic effect, light passing through the 1st order diffraction mode of a fiber-coupled modulator also experiences a frequency shift and beam deflection. This allows our Fiber-Q products to be used for more than just modulation, resulting in applications outside the laser such as optical heterodyne interferometry. The recent addition of visible Fiber-Q products will also enable more compact all-fiber instrument designs in biomedical applications such as microscopy and flow cytometry.

Today, we offer a line of fiber optic acousto-optic modulators designed for low insertion loss, high extinction ratio, and excellent return loss. Typical optical performance for the Fiber-Q series includes:

Insertion loss: as low as 2 dB, depending on model
Extinction ratio: 50 dB
Return loss: 40 dB
Polarization extinction ratio: 20 dB (for polarization-maintaining models)

We have leveraged our expertise in telecommunication component design to create a line of highly reliable fiber optic modulators, adapting our processes and designs to handle high optical power and the challenges of precision fiber alignment. We grow our own tellurium dioxide (TeO2) crystals in-house, polishing and performing all stages of fabrication to achieve low scatter and rigorous quality standards throughout the manufacturing process. This ensures consistently high reliability, high laser damage threshold and high optical performance.

We continue to lead the market in the development of fiber-coupled modulators, offering the first devices for visible wavelengths from 397 nm to 780 nm to meet the needs of sensing and quantum technology applications. Our fast switch rate Fiber-Q devices enable efficient, high speed optical pulse picking at infrared wavelengths for all-fiber laser systems. Most devices are also offered in 3-port configurations.

In addition to our standard line of Fiber-Q modulators, we customize, design, and manufacture in volume for OEM needs. Furthermore, our technical support team works with our customers to identify the best RF driver for the application, taking into consideration the type of modulation required (digital or analog) as well as any specific pulse shaping needs.

We offer a wide range of standard fibre-coupled AOMs with the following characteristics: -

- Wavelengths: 1064nm, 1310nm or 1550nm
- Drive Frequencies: 40MHz, 80MHz or 100MHz, 110MHz, 150MHz, 200MHz
- Optical Rise-Times: as low as 10ns
- Materials: Tellurium Dioxide & Chalcogenide Glass
- Options: Single mode, polarisation maintaining and multimode, with or without connectors. Available in two, three or four fibre package configurations.

Description of Part Number: **T-M150-0.4C2G-3-F2S:**
M = Modulator
150 = Drive frequency in MHz
2 = Tellurium Dioxide (interaction material)
F2 = 2 port fibre-coupled
S or P = Single Mode or Polarisation Maintaining.

Our standard FCAOMs are listed below.

Model	Description	Optical Power handling	Wave length	Rise/ Fall time	Operating Frequency
STG-S-M200-0.4C2A-3-F2P STG-S-M200-0.4C2A-3-F2S	Non-hermetic, PM/SM		450 nm	25 ns	200 MHz
STG-S200-0.4C2N-3-F2P	Non-hermetic, PM		450, 532, 633, 780 nm	25 ns	200 MHz
STG-S-M200-0.4C2C-3-F2P, STG-S-M200-0.4C2C-3-F2S	Non-hermetic, PM/SM		532 nm	25 ns	200 MHz
STG-S-M200-0.4C2E-3-F2P, STG-S-M200-0.4C2E-3-F2S	PM/SM		633 nm	25 ns	200 MHz
STG-S-M150-0.4C2G-3-F2S	Non-hermetic, SM, HI1060		1060 nm	30 ns	150 MHz
STG-S-M200-0.1C2G-3-F2S	Non-hermetic, SM		1060 nm	10 ns	200 MHz
STG-T-M150-0.5C2W-3-F2S	Non-hermetic, SM		780 nm	30 ns	150 MHz
STG-T-M150-0.5C2W-3-F2P	Non-hermetic, PM		780 nm	30 ns	150 MHz
STG-T-M150-0.4C2G-3-F2S	Hermetic,	5W average	1060nm	30ns	150MHz
STG-T-M200-0.1C2G-3-F2S	Hermetic, SM,	1W average	1060nm	10ns	200MHz
STG-T-M200-0.1C2G-3-F2P	Hermetic, PM,	1W average	1060nm	10ns	200MHz
STG-T-M200-0.1C2G-3-F2P	Hermetic PM		1060 nm	10 ns	200 MHz
STG-T-M200-0.1C2G-3-F2S	Hermetic SM HI1060	1W average	1060nm	10ns	200MHz
STG-T-M260-0.1C2G-3-F2P	Hermetic, PM		1060 nm	6 ns	260 MHz
STG-T-M300-0.1C2G-3-F2S	HI1060	0.5W average	1060nm	6 ns	300MHz
STG-T-M300-0.1C2G-3-F2P	Fujikura PM1550	1W average	1060 nm	6 ns	300Mhz
STG-T-M150-0.4C2G-3-F2P	Hermetic, Fujikura PM980 (SM98-PS-U25A)	5W average	1060nm	30ns	150MHz
STG-T-M200-0.1C2J-3-F2P	Hermetic, Fujikura PM1550 (SM15-PS-U25A)	1W average	1550nm	10ns	200MHz
STG-T-M200-0.1C2J-3-F2S	Hermetic, SMF28	1W average	1550nm	10ns	200MHz
STG-T-M110-0.2C2J-3-F2S	Hermetic, SMF28	1W average	1550nm	25ns	110MHz
STG-T-M110-0.2C2J-3-F2P	Hermetic, Fujikura PM1550 (SM15-PS-U25A)	1W average	1550nm	25ns	110MHz
STG-T-M080-0.4C2J-3-F2S	Hermetic, SMF28	1W average	1550nm	35ns	80MHz
STG-T-M080-0.4C2J-3-F2S	Hermetic, PM	1W average	1550nm	35ns	80MHz
STG-T-M080-0.4C2J-3-F2P	Hermetic, Fujikura PM1550 (SM15-PS-U25A)	1W average	1550nm	35ns	80MHz
STG-T-M040-0.5C8J-3-F2S	SMF28	1W average	1550nm	70-100ns	40MHz

STG-T-M080-0.5C8J-3-F2S	Hermetic, Low power consumption	1W average	1550nm	70-100ns	80MHz
STG-T-M080-0.5C8J-3-F2P	Hermetic, Polarisation Maintaining, Low power consumption	1W average	1550nm	70-100ns	80MHz
STG-T-M040-0.5C8J-3-F2P	Polarisation Maintaining,	1W average	1550nm	70-100ns	40MHz
STG-T-M080-0.3C2Z-3-F2S	Nufern SM1950	5W average	2000nm	70-100ns	80MHz
STG-T-M080-0.3C2Z-3-F2P	Nufern PM1950	5W average	2000nm	70-100ns	80MHz
STG-T-M250-0.3C16Z-3-F2P	Nufern PM-GDF	1W average	2000nm	20ns	250MHz

The drivers to be used in the above items are 1xxxAF-AINA-3.0 HCR and 1xxxAF-DINA-3.0 HCR

Our **old FCAOM models** are listed in the below table. These old models may or may not be in stock or obsolete and no longer produced. Please check with our sales regarding the availability of the below models.

Model	Description	Driver
T-M040-0.5C8H-3-F2S	1310nm (1285~1325nm), RF frequency 40MHz, average optical power handling ≤1W, SMF (SingleMode Fibre)	MLP040-0.4DC MLP040-0.4AC-A1 MLP040-0.4DS2 MLP040-0.4AS2-A1
T-M040-0.5C8J-3-F2S	1550nm (1530~1565nm), RF frequency 40MHz, average optical power handling ≤1W, SMF (SMF28)	MLP040-0.4DC MLP040-0.4AC-A1 MLP040-0.4DS2 MLP040-0.4AS2-A1
T-M040-0.5C8J-3-F2P	1550nm (1530~1565nm), RF frequency 40MHz, average optical power handling ≤1W, PMF (Fujikura PM1550)	MLP040-0.4DC MLP040-0.4AC-A1 MLP040-0.4DS2 MLP040-0.4AS2-A1
T-M080-0.4C2J-3-F2P	1550nm, RF frequency 80MHz & RF power ≤3W, average optical power handling 1W, fiber Fujikura PM1550 (SM15-PSU25A), no connector	1080AF-AINA-3.0 HCR 1080AF-DINA-3.0 HCR
T-M080-0.4C2J-3-F2S	1550nm, RF frequency 80MHz & RF power ≤3W, average optical power handling 1W, fiber SMF28), no connector	1080AF-AINA-3.0 HCR 1080AF-DINA-3.0 HCR
T-M150-0.4C2G-3-F2P	1060nm, RF frequency 150MHz & RF power ≤2W, average optical power handling 5W, fiber Fujikura PM980 (SM98-PS-U25A)), no connector	1150AF-AINA-3.0 HCR 1150AF-DINA-3.0 HCR
T-M150-0.4C2G-3-F2S	1060nm, RF frequency 150MHz & RF power ≤2W, average optical power handling 5W, fiber HI1060), no connector	1200AF-AINA-3.0 HCR 1200AF-DINA-3.0 HCR
T-M200-0.1C2J-3-F2P	1550nm, RF frequency 200MHz & RF power ≤3W, average optical power handling 1W, fiber Fujikura PM1550 (SM15-PSU25A)), no connector	1200AF-AINA-3.0 HCR 1200AF-DINA-3.0 HCR
T-M200-0.1C2J-3-F2S	1550nm, RF frequency 200MHz & RF power ≤3W, average optical power handling 1W, fiber SMF-28), no connector	1200AF-AINA-3.0 HCR 1200AF-DINA-3.0 HCR
T-M200-0.1C2G-3-F2P	1060nm, RF frequency 200MHz & power 3W, average optical power handling 1W, fiber Fujikura PM980 (SM98-PS-U25A)), no connector	1200AF-AINA-3.0 HCR 1200AF-DINA-3.0 HCR
T-M200-0.1C2G-3-F2S	1060nm, RF frequency 200MHz & RF power ≤3W, average optical power handling 1W, fiber SMF-28), no connector	1200AF-AINA-3.0 HCR 1200AF-DINA-3.0 HCR
I-FS060-2F-F2P	852nm, RF frequency 60MHz & RF power ≤1W, PM fiber 2m	
MM065-1C2V5-5-F2XY-Z	TeO2, 2um, 65MHz, random, rise time 75ns, RF ≤4W, single mode fiber 9/125 or PM fiber 8/125	31065-4xx
MM065-1C2V12-5-F2XY-Z	TeO2, 1.95um, 65MHz, random, rise time 100ns, RF ≤4W, single mode fiber 9/125 or PM fiber 8/125	31065-4xx
MFS150-.2C17J-3-F2P-X-GH	GaP, 1.55um, 150MHz, 10ns risetime, RF<2W, PM fiber 8/125	
15200-.2-1.55-LTD-GaP-FO	Gap, 1.55um wavelength, linear polorisation, rise/fall time 10ns, 8/125 PM fiber, 200MHz, RF 2W	21200-2xx
15200-.2-1.06-LTD-GaP-FO-GH	Gap, 1.06um wavelength, linear polorisation, rise/fall time 10ns, 6/125 PM fiber, 200MHz, RF 2W	21200-2xx
23050-1-1.95-LTD-FO-2HP-PM-CSF	TeO2, 1950nm wavelength, 50MHz, linear polarized, 100ns risetime, PM fiber GDF 10/130um, 0.15/0.46NA, RF<4W	
23080-1-.85-LTD-FO	TeO2, 850nm wavelength,80MHz, random, 50ns risetime, single mode or PM fiber 5/125, RF<1W	
23080-1-1.06-LTD-FO	TeO2, 1060nm, 80MHz, random, risetime 50ns, single mode fiber 6/125 (PM 6/125 optional), <0.5W @ 1060nm, Used external to laser cavity, RF <1.25W	21080-1xx

23080-1-1.06-LTD-FO-HP	TeO2, 1060nm, 80MHz, random, risetime 50ns, single mode fiber 6/125 (PM 6/125 optional), <2W @ 1060nm, Used external to laser cavity, RF <1.25W	21080-1xx
23080-1-1.06-LTD-FO-2HP	TeO2, 1060nm, 80MHz, random, risetime 50ns, single mode fiber 6/125 (PM 6/125 optional), <2W @ 1060nm, may be used internal to laser cavity), RF <1.25W	21080-1xx
23080-1-1.3-LTD-FO	TeO2, 1300nm, 80MHz, random, risetime 50ns, single mode fiber 9/125 (PM 8/125 optional), RF <1.5W	21080-2xx
23080-1-1.55-LTD-FO	TeO2, 1520-1570nm, 80MHz, random, risetime 50ns, single mode fiber 9/125, RF <2W	21080-2xx
26035-2-1.3-LTD-FO	AMTIR, 1300nm, 35MHz, random, risetime 100ns, single mode fiber 9/125 (PM 8/125 optional), RF <0.5W	21035-0.4xx
26035-2-1.55-LTD-FO	AMTIR, 1520-1570nm (1570-1620nm optional), 35MHz, random, risetime 100ns, single mode fiber 9/125 (PM 8/125 optional), RF <0.5W	21035-0.4xx
26050-1-1.55-LTD-FO	AMTIR, 1520-1570nm (1570-1620nm optional), 50MHz, random, risetime 100ns, single mode fiber 9/125 (PM 8/125 optional), RF <0.5W	21050-0.4xx
26055-1-1.55-LTD-FO	AMTIR, 1520-1570nm (1570-1620nm optional), 55MHz, random, risetime 100ns, single mode fiber 9/125, 3 ports, RF <1W	21055-0.4xx
26055-1-1.55-LTD-3FO	AMTIR, 1550nm, 55MHz, random, risetime 100ns, single mode fiber 9/125, 3 ports, RF <1W	21055-0.4xx
26055-1-1.55-LTD-4FO	AMTIR, 1550nm, 55MHz, random, risetime 100ns, single mode fiber 9/125, 4 ports, RF <0.5W	21055-0.4xx
47040-2-.63-6.5DEG-LTD-FO-PM	TeO2, 633nm, 40MHz, linear polarized, 440ns risetime, PM fiber 4/125, 1 meter long, RF<0.5W	21040-0.4xx
54035-1.55-.5AS-FO	AMTIR, 1520-1570nm (1570-1620nm optional), 35MHz, random, risetime 100ns, single mode fiber 9/125, 1, 2, 3 or 4 channels	Driver integrated
54055-1.55-.5DS-3FO	AMTIR, 1550nm, 55MHz, random, risetime 100ns, single mode fiber 9/125, 3 ports	Driver integrated
54080-1.55-2DS	TeO2, 1520-1570nm (1570-1620nm optional), 80MHz, random, risetime 50ns, single mode fiber 9/125, 1, 2, 3 or 4 channels	Driver integrated

Remark:

- xx in the driver model (such as 21200-2xx) may be DM, AM, DS or AS
- Standard connector is FC/PC (not applicable for T-M080, T-M150 and T-M200 series). We also commonly supply the following options: FC/APC, SC/PC & SC/APC. (Remark: 1. FC = Named as “Frank Charlie”, screw-in type metal plug connector; 2. SC = Named as “Sam Charlie”, square type plastic connector. 3. PC = Polished Connector, usually with Return Loss (RL) > 40dB (min) [eg. FC/PC, SC/PC]; 4. APC = 8 deg Angled-Polished Connector, usually with RL > 50dB (min) [eg. FC/APC, SC/APC])

2.2 STBR Series Fiber Coupled AOM

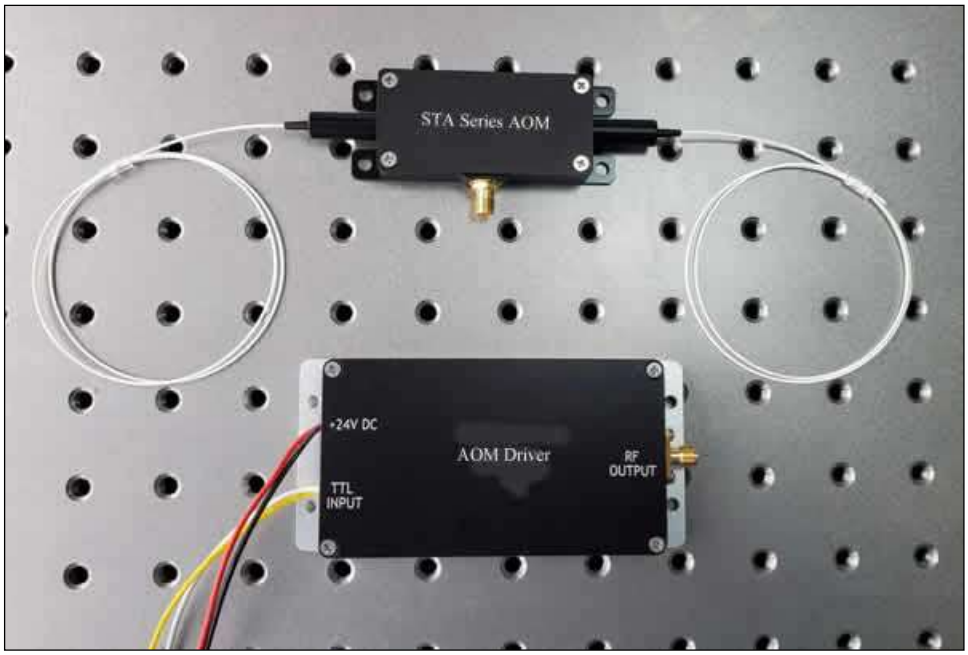
General specs

Switching time (nsec)	<100
ON/OFF Extinction (dB)	>50
Back Reflection (dB)	<-50
Insertion Loss (dB)	< 2.5
Wavelengths (nm)	380-2100nm
Low Electric Power Consumption (dBm)	<23
Operating Wavelength Range (nm)	>60

Model #	Wavelength (nm)	Center Frequency (MHz)	Rise Time (ns)	Modulation Bandwidth (MHz)	Fiber Type
STBR-TEM-110-10-55-2FP	380-1600	110	55	10	SM or PM
STBR-TEM-200-25-20-2FP	380-1600	200	20	25	
STBR-TEM-250-50-10-2FP	380-1600	250	10	50	
STBR-TEM-500-100-5-2FP	380-1600	500	5	100	
STBR-IPM-200-25-20-2FP	1000-2100	200	20	25	
STBR-IPM-500-100-5-2FP	1000-2100	500	5	100	
STBR-AMM-55-8-70-2FP	1000-2500	55	70	8	
STBR-AMM-100-20-25-2FP	1000-2500	100	25	20	

For associated RF drivers, please refer to “RF Drivers for STBR series”

2.3 STA Series Fiber-coupled AOMs



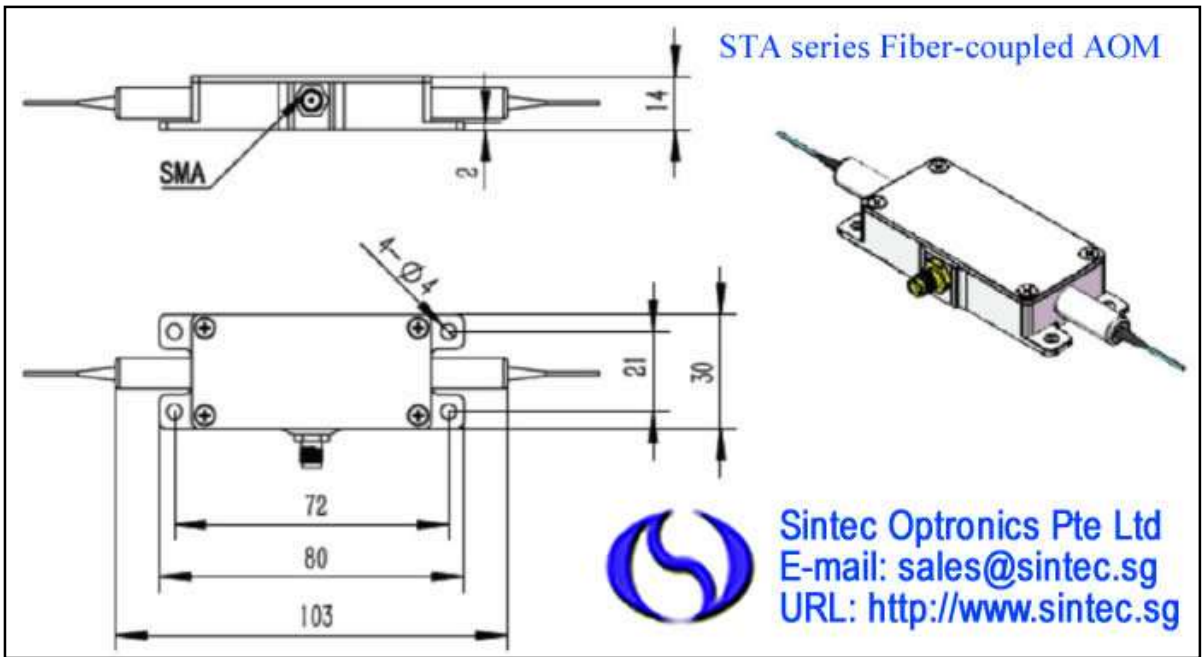
Parameter	Unit	
Wavelength	nm	1064
Frequency	MHz	100
Average optical power handling:	W	5
Diffraction efficiency (Free - space AOM)		≥85%
Coupling efficiency (Fiber - AOM)		≥75%
Insertion Loss	dB	< 1.2
Transmission		>99.0%
Return Loss	dB	> 45
Fiber type		NUFERN 10/125
Fiber length	cm	>60
Fiber termination		Bare fiber
VSWR @120MHz		<1.3:1
RF connectors		SMA
RF power	W	2.0
Storage temperature	℃	- 20 to +70
Dimension	mm	103x30x14

Ordering Information: STA-WWW-FFF-TTT-JJJ-LLL

- STA means STA series fiber-coupled AOM;
- WWW means laser wavelength such as 1064nm, 1550nm, 2000nm etc;
- FFF means driving frequency such as 100, 120, 150, 200MHz etc;
- TTT means fiber types such as L06 (6/125 type), L09 (9/125 fiber, L10 (12/125 DCF fiber), L12 (12/125 DCF fiber), P06 (PM98 fiber), P10 (PM10/125 DCF fiber) etc;

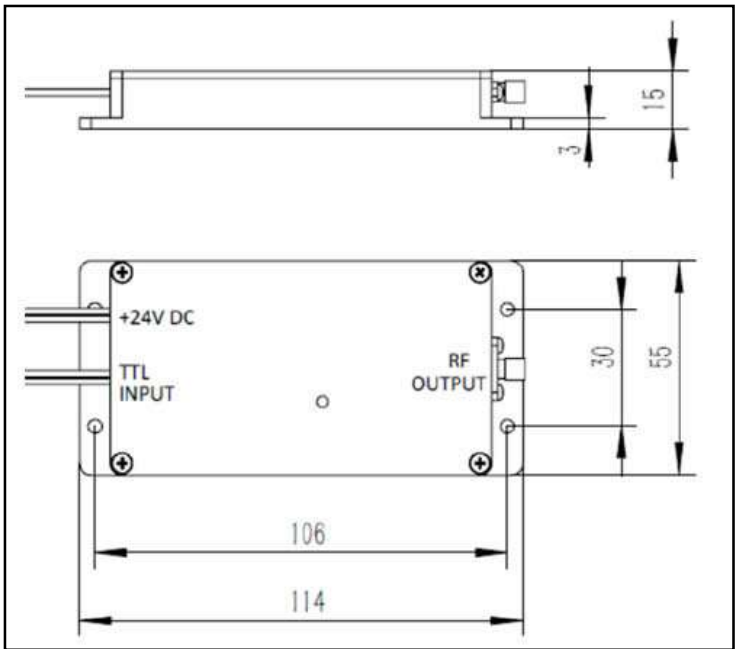
- JJJ means fiber jacket type on IN/OUT such as B (bare fiber), L (900um loose fiber), C (3nm loose cable) etc; LLL means fiber length in meter.

Example: STA-1064-100-L10-B-1.



RF Driver for STA Series Fiber-coupled AOMs

Frequency	100 MHz
Operating voltage	24
Control signal mode	TTL
High - level output voltage	> 25V
High - level peak jumping voltage	< 1V
RF power	2.0 ± 0.2 W
Time delay range	60ns – 600ns
Rise - time adjustable range	50ns - 500ns
Dimension	114x55x15mm



3. Multi-channel Modulators

Acousto-optic multi-channel modulators (AOMC) allow multiple beams to be modulated or deflected independently by integrating an array of transducers with a single acousto-optic crystal. Our proprietary optical and electrical designs minimize crosstalk, allowing concurrent operation of up to 48 channels for modulation, and up to 8 channels for beam deflection. Our AOMCs are known for their reliable operation and high performance.

Multi-channel modulators have parallel beams as input, each beam independently controlled by a different transducer to modulate its intensity. Multi-channel modulators are most often used for high speed applications like micromachining and direct-write lithography, as each beam can be modulated independently.

These devices can also be used to increase throughput when writing large media by writing multiple beams at the same time. Our multi-channel modulators equal the performance available with our single channel modulators, and can be customized for large aperture applications as well as high speed, small aperture applications.
A multi-channel beam deflector however, generates multiple diffracted beams from a single input beam at specific locations by simultaneously applying multiple frequencies to a single transducer. Each individual channel is a deflector that can either scan the beam or produce multiple spots. This makes it possible to create a two-dimensional grid. For example, if a four channel beam deflector were configured so that each channel diffracted three spots, the result would be a 4x3 grid.

High laser damage threshold is achieved using low-scatter materials. These are inspected to rigorous quality standards. We grow our own tellurium dioxide and source high quality fused silica and crystalline quartz to ensure low insertion loss and excellent optical power handling.

Our standard models are below:

Model	Wavelength	Number of Channels	Rise/Fall Time	Active Aperture	Operating Frequency	Optical Material
AOMC 220-4	350-365 nm	4	16 ns	0.24 mm	190-250 MHz	Crystalline quartz
AOMC 125-24	350-365 nm	24	23 ns	0.5 mm	125 MHz	Crystalline quartz
AOMC 3160-8	364 nm	8	21 ns	0.18 mm	160 MHz	Fused silica
AOMC 300-5	413 nm	5	10 ns	0.2 mm	300 MHz	Crystalline quartz
AOMC 220-5	413 nm	5	16 ns	0.24 mm	220 MHz	Crystalline quartz
AOMC 3350-6	350-850 nm	6	30 ns	0.33 mm	350 MHz	Tellurium dioxide

Detailed Specifications of AOMs

1. Free-space Acousto-Optic Modulators (AOMs)

1.1 AO Modulator M080-2G-LV1

• High efficiency (95% typical)
• Low drive power (0.3W typical)
• Compact
• Easy to align

Description
The M080-2G-LV1 is a compact AO Modulator specifically designed for extra-cavity modulation of Nd:YAG/Nd:YVO4 lasers where fast modulation is not critical.

Rise times down to 10µs are readily achievable, together with excellent efficiency, typically > 95% for a well-collimated laser beam.

The relatively wide field of view means that good efficiency is achieved for more divergent beams.

Specification
Interaction Material: TeO2
Wavelength: 1064nm
Anti-Reflection Coating: < 0.3% per surface
Polarisation Alignment: ±5°
Frequency: 80MHz
Input Impedance: 50Ω
Acoustic Mode: Slow Shear
Active Aperture: 2.0 x 5.0mm
Clear Aperture: 4.0 x 5.0mm (min)
Recommended Beam Diameter: 1mm
Input Polarisation: Linear - vertical to base
Diffracted Beam Polarisation: Linear - rotated by 90° wrt input
Diffraction Efficiency: > 90%
RF Connector: SMA Female
RF Power: 0.5W
RF Driver Model No.: A36080, N21080-1DM or N21080-1AM

1.2 AO Modulator M111-10C-TR7

• 514 to 532 nm
• High damage threshold
• 111MHz drive frequency

Description
An acousto-optic modulator ideal for use with frequency doubled DPSS lasers. Manufactured in Crystal Quartz for improved thermal management and efficiency, this modulator combines high quality optical finishing with in house anti-reflection coatings to provide high extinction ratio and optimised throughput.

Alternative wavelengths, apertures or package designs are available.

Specification
Interaction Material: Crystal Quartz
Wavelength: 514 to 532nm
Anti-Reflection Coating: < 0.3% per surface

Transmission: > 99.5%
Polarisation: Linear, vertical to base
Extinction Ratio (1st order on / off) > 55dB
Damage Threshold: > 50KW/cm2 (Average)
> 500MW/cm2 (Peak)
Frequency: 111MHz
VSWR: < 1.2:1 (50Ω input impedance)
Active Aperture: 2.0mm
Diffraction Efficiency: > 85%
Rise-Time / Fall-Time: 110ns / mm
Separation Angle: 9.6mrad at 515nm
RF Power: < 5.0W
RF Driver Model No.: A35111, N31111-5DM, N31111-5AM

1.3 AO Modulator M080-2B/F-GH2

• 480 to 800nm
• 80MHz drive frequency
• Up to 2mm beam diameter

Description
A general purpose acousto-optic modulator for use is in the visible or near infra-red spectral regions. It's broadband anti-reflection coatings and large active aperture make it the ideal choice for cost-effective amplitude modulation of a wide range of low-power gas and diode lasers.

Available for the visible (B/E) and near infra-red (F), with active apertures of 2mm, laser beams with diameters ranging from 0.5 to 2mm may be modulated at moderate speed with high efficiency. For faster modulation, please refer to our extensive range of other AO modulators.

Specification
Interaction Material: Tellurium Dioxide
Wavelength: 480 to 800nm
Anti-Reflection Coating: < 0.5% per surface
Transmission: > 95%
Polarisation: Any
Frequency: 80MHz
VSWR: < 1.2:1 (50Ω input impedance)
Active Aperture: 2mm
Rise-Time / Fall-Time: 155ns/mm
Diffracted Beam Ellipticity: < 5% typical
Diffraction Efficiency: > 85% typical
RF Power: < 2W

Driver Selection:
A36080,
Digital Modulation: N21080-2DM
Analogue Modulation: N21080-2AM

1.4 AO Modulator M250-2x-xx

• 488, 532 and 633nm
• 250MHz drive frequency
• 10ns rise-time

Description
An acousto-optic modulator combining high efficiency and fast switching speed, is suitable for use with visible wavelength lasers. This AOM features excellent extinction ratio, superb diffraction efficiency even at maximum modulation rates and minimal optical beam quality distortion.

Options include a choice of mounting and pivot holes, RF connectors and aperture dimensions. Alternative models in lead molybdate or for other wavelengths are available.

Specification
Interaction Material: Tellurium Dioxide
Acoustic Mode: Isotropic, compressional
Wavelength M250-2B-P2: 488nm, < 20mW
M250-2C-ES1: 532nm, < 20mW
M250-2E-O2: 633nm
Anti-Reflection Coating: < 0.2% per surface
Transmission: > 97%
Polarisation: Linear, vertical to base
Frequency: 250MHz
VSWR: < 1.2:1 (50Ω input impedance)
Active Aperture: 0.4mm
Separation Angle: 28 to 37mrad, wavelength dependant
RF Power: < 1.5W

Performance with a 65µm diameter, linearly polarised beam:
Rise-Time / Fall-Time: 10ns
Modulation Bandwidth: 50MHz
Diffracted Beam Ellipticity: < 10%
Diffraction Efficiency: > 85%

Driver Selection
A36250, N21250-2AM, N21250-2DM

1.5 AO Modulator M350-2x

• 488nm, 532nm and 633nm
• 350MHz drive frequency
• 5ns rise-time

Description
A high bandwidth acousto-optic modulator is for use in the visible RGB spectral region. Using specially selected top-grade tellurium dioxide and with our renowned quality manufacturing processes, this modulator provides fast switching capability at low RF drive powers.

Available in three models, one each for red, green and blue, high efficiency coupled with excellent transmitted beam quality make it particularly suited to electronic pre-press applications.

Specification
Interaction Material: Tellurium Dioxide
Acoustic Mode: Isotropic, compressional
Wavelength M350-2B: 488nm, < 20mW
M350-2C: 532nm, < 20mW
M350-2E: 633nm
Anti-Reflection Coating: < 0.2% per surface
Transmission: > 97%
Polarisation: Linear, vertical to base
Frequency: 350MHz
VSWR: < 1.2:1 (50Ω input impedance)
Active Aperture: 0.15mm
Separation Angle: 40 to 52mrad, wavelength dependant
RF Power: < 2W
Performance with a 30µm diameter, linearly polarised beam:
Rise-Time / Fall-Time: 5ns
Modulation Bandwidth: 100MHz
Diffracted Beam Ellipticity: < 15%
Diffraction Efficiency: > 80%
Driver Selection: Analogue / Digital Modulation: A35350

1.6 AO Modulator M111-2J-AV1

• 1520 to 1630nm
• 111MHz drive frequency
• 60ns rise-time

Description
A free-space acousto-optic modulator appropriate for use either intra-cavity or extacavity, for example to Q-Switch or modulate erbium doped fibre lasers.

Broadband anti-reflection coatings, combined with top grade tellurium dioxide, guarantee excellent throughput and beam quality. Special design and high quality manufacturing processes result in superior efficiency with excellent extinction ratio.

Specification
Interaction Material: Tellurium Dioxide
Acoustic Mode: Isotropic, compressional
Wavelength: 1520nm to 1630nm
Transmission: > 97%
Damage Threshold: >10MW/cm2 Pulsed, >50KW/cm2 CW
Polarisation: Any
Frequency: 111MHz
VSWR: < 1·2:1 (50Ω Input Impedance)
Active Aperture: 0.65mm
Separation Angle: 39 to 43mrad, wavelength dependant
RF Power: 3·5W
Operating Temperature: +10 to +60ºC
Storage Temperature: - 15 to +65ºC

M111-2J-AV1

Performance with a 400µm diameter, linearly polarised beam:
Rise-Time / Fall-Time: 61ns
Modulation Bandwidth: 8.2MHz
Extinction Ratio: > 40dB
Diffracted Beam Ellipticity: < 20%
Diffraction Efficiency: > 85%

Driver Selection
A35111, N31111-3.5DM or N31111-3.5AM

1.7 AO Modulator M110-10UV-OR1

• 351, 355 & 364nm
• High damage threshold
• 110MHz drive frequency

Description
An acousto-optic modulator ideal for use with 355nm frequency tripled Nd:YAG and Nd:YVO4 or 351nm / 364nm Argon lasers.


M111-10UV-OR1

Manufactured in Crystal Quartz for improved thermal management & efficiency. This modulator combines high quality optical finishing with in house anti-reflection coatings to provide high extinction ratio and optimised throughput.

Alternative wavelengths, apertures or package designs are available. Please don't hesitate to contact us with your specific requirements.

Specification

Interaction Material: Crystal Quartz
Wavelength: 351 to 364nm
Anti-Reflection Coating: < 0.3% per surface at 355nm
< 0.5% per surface at 351 to 364nm
Transmission: > 99% at 355nm
> 98.6% at 351 to 364nm
Polarisation: Linear, vertical to base
Extinction Ratio (1st order on / off) > 55dB
Damage Threshold: > 50KW/cm2 (Average)
> 500MW/cm2 (Peak)
Frequency: 110MHz
VSWR: < 1.2:1 (50Ω input impedance)
Active Aperture: 3.0mm
Diffraction Efficiency: > 85%
Rise-Time / Fall-Time: 110ns / mm
Separation Angle: 6.5mrad at 355nm
RF Power: < 3.0W

Driver Selection
A35111, N31111-3DM or N31111-3AM

1.8 AO Modulator M200-4A-GH11

• 380 to 430nm AO modulation
• 200MHz drive frequency
• 10ns rise-time

Description
An acousto-optic modulator suitable for use with frequency doubled Ti:Sapphire lasers.

Manufactured in fused silica and with our superior high damage threshold anti-reflection coatings this modulator provides extremely fast digital or analogue switching, coupled with an ultra-high extinction ratio and optimised throughput.

Specification
Interaction Material: Fused Silica
Acoustic Mode: Isotropic, compressional
Wavelength: 380 to 430nm
Polarisation: Linear, vertical to base
Anti-Reflection Coating: < 0.5% per surface
Transmission: > 98.5%
Extinction Ratio (1st order on/off): > 55dB
Frequency: 200MHz
Active Aperture: 0.20mm
Input Impedance: 50Ω
Maximum RF Power Requirement: 2.5W
Operating Temperature: +10 to +60°C
Storage Temperature: -15 to +70°C

Performance characteristics at 405nm:
Beam Diameter: 90µm
Rise-Time (10-90%): 10ns
Modulation Bandwidth (3dB): 50MHz
Diffracted Beam Ellipticity: < 15%
Separation Angle: 13.5mrad
Diffraction Efficiency: > 80%
RF Power: 2W

Driver Selection
A35200, N21200-2AM or N21200-2DM

1.9 AO Modulator M200-4B/E-LD5

• High intensity RGB modulation
• 200MHz drive frequency
• 10ns rise-time

Description
An acousto-optic modulator for use with high intensity RGB lasers, ideally suited for laser display and reprographic applications.

Manufactured in fused silica and with our superior high damage threshold anti-reflection coatings this modulator provides extremely fast digital or analogue switching in the RGB range, coupled with an ultra-high extinction ratio and optimised throughput.

Specification
Device: AO Modulator
Interaction Medium: Fused Silica
Acoustic Mode: Isotropic, compressional
Operational Wavelength: RGB (446nm, 532nm, 628nm)
Polarisation: Linear, vertical to base
Laser Power Maximum: > 100W
Optical Faces: 1deg wedged
AR coating reflectivity: ≤ 0·5% per surface
Transmission: > 97%
Extinction Ratio (1st order on/off) : > 55dB
RF Drive Frequency: 200MHz
Active Aperture: 0.2mm
Diffraction Efficiency: > 70% (typically 75%) at 75um beam diameter
Rise-Time: 10ns at 532nm, 90um beam diameter
Input Impedance: 50Ω
Maximum RF Drive Power: 6W
Operating Temperature: +10 to +60°C
Storage Temperature: -15 to +70°C

M200-4B/E-LD5

Wavelength:	**446nm**	**532nm**	**628nm**
Beam Diameter:	90µm	90µm	120µm
Rise-Time (10-90%):	10ns	10ns	13.5ns
Modulation Bandwidth (3dB):	50MHz	50MHz	37MHz
Diffracted Beam Ellipticity:	16%	21%	17%
Separation Angle:	15mrad	18mrad	21mrad
Diffraction Efficiency:	> 80%	> 80%	> 80%
RF Power:	3W	4W	5.5W

Driver Selection
N31200-6DM, N31200-6AM

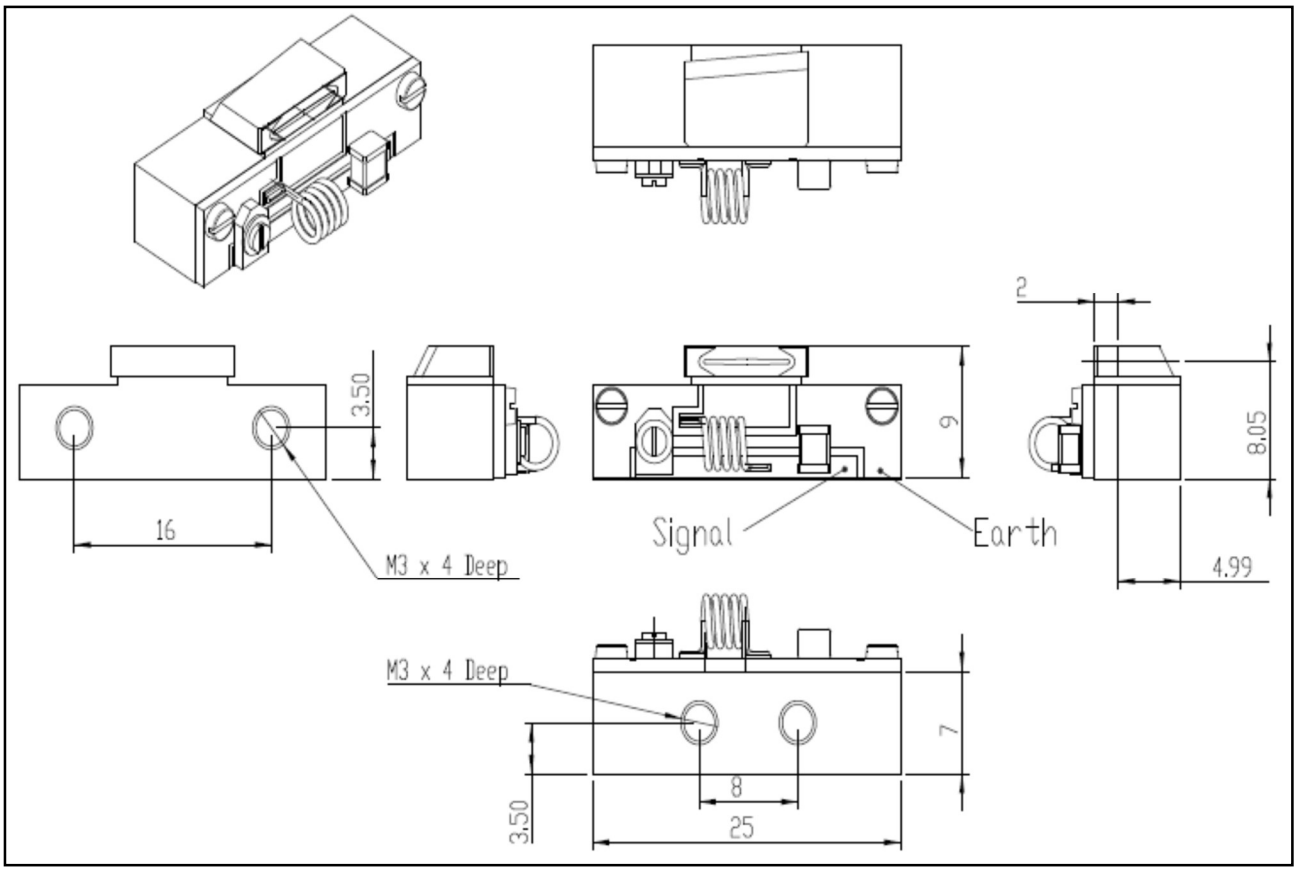
1.10 M080-2B/F-GH2

Device	AO Modulator
Interaction Material	Tellurium Dioxide
RF Frequency	80MHz
Wavelength	480 - 800nm
AR Coating Reflectivity	≤ 0.5% /surface
Transmission	≥ 95%
Input Polarisation	Any
Active Aperture	2.0mm
Diffraction Efficiency	≥ 85%
Risetime	155ns / mm
RF Input Impedance	50Ω
RF Drive Power	< 2W (wavelength dependent)
RF Connector	SMA Female

Driver	N21080-2AM or N21080-2DM or A36080

1.11 I-M150-0.4C2G-GH42

Device	AO Modulator
Interaction Material	Tellurium Dioxide
Wavelength	1064nm
Damage Threshold	> 50MW/cm2 (Pulsed)
RF Frequency	150MHz
AR Coating Reflectivity	≤ 0.2% /surface
Transmission	≥ 99.6%
Input Polarisation	Random
Active Aperture	0.4mm
Recommended Beam Diameter	0.2mm
Diffraction Efficiency	≥ 85%
Separation Angle	37.5mrad
Risetime (10% - 90%)	153ns / mm
RF Input Impedance	50Ω
Max. RF Drive Power	2W

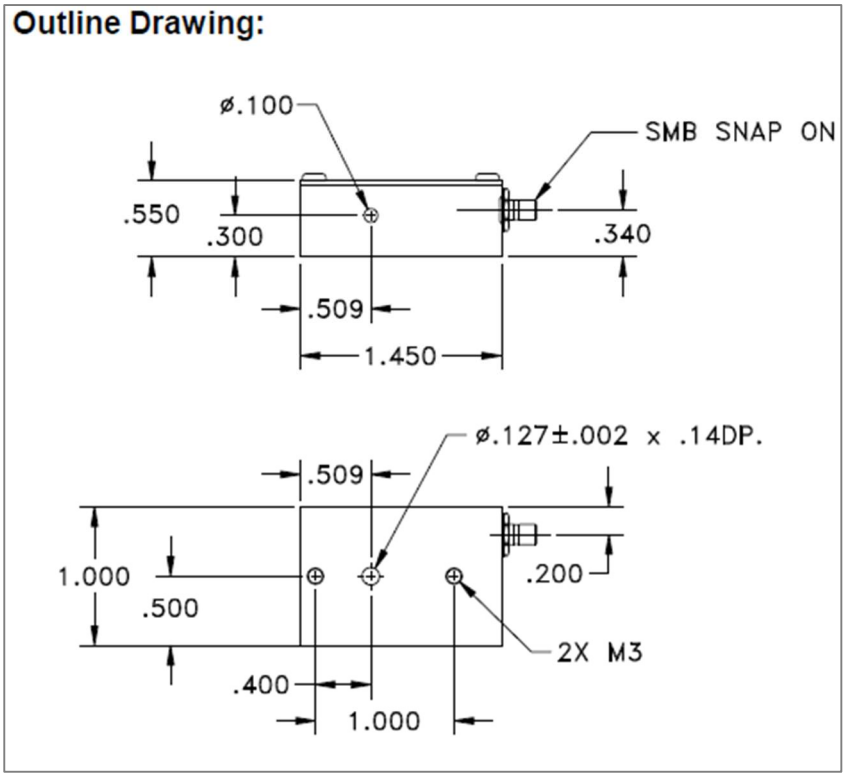


AOMO 3350-197

Device	AO Modulator
Interaction Material	Tellurium Dioxide
Acoustic Velocity	4.2mm/us
Active Aperture	2mm'L' X 0.15mm'H'
Center Frequency (Fc)	350MHz
RF Bandwidth	150MHz @ -10dB Return Loss
Input Impedance	50 Ohms Nominal
VSWR @ Fc	1.3:1 Max
Wavelength	473-685nm
Insertion Loss	4% Max
Reflectivity per Surface	1% Max
Anti-Reflection Coating	MIL-C-48497
Optical Power Density	<50W/mm^2
Contrast Ratio	1500:1 Min
Polarisation	Linear, 90deg to Mounting Plane
Damage Threshold	> 50MW/cm2 (Pulsed)
Operational RF power	0.63W (@473nm)
	0.90W (@532nm)
	1.00W (@632nm)
	1.00W (@660nm)
	1.00W (@685nm)
Rise Time (nsec)	9nsec

**Maximum RF Power is 1.00 Watts. Diffraction Efficiency measured at 1.00 Watt. RF power and 633nm

Outline Drawing:

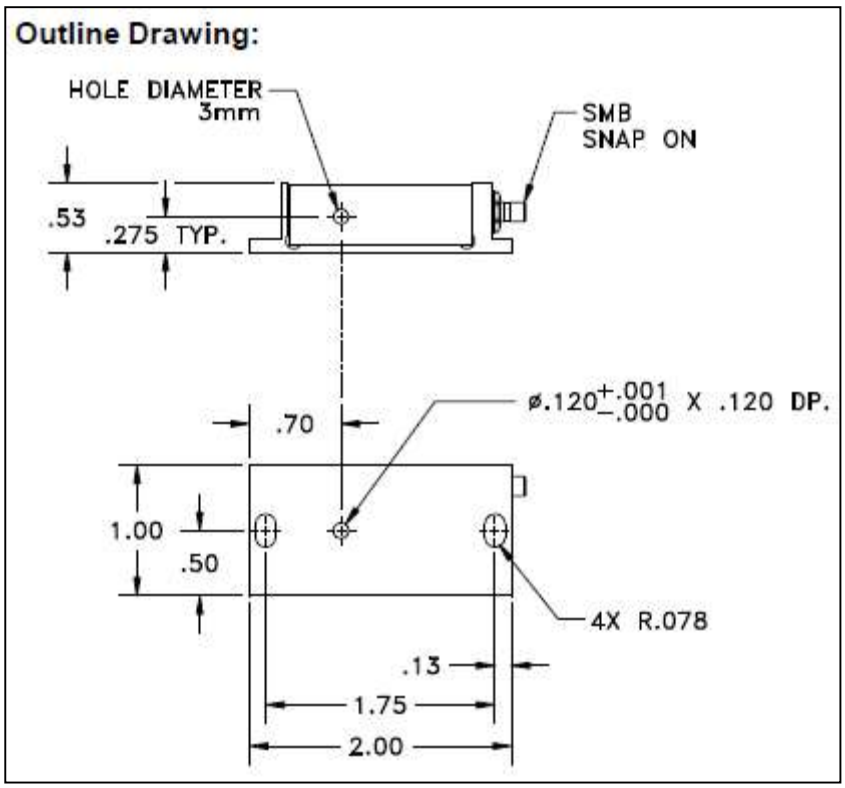


AOMO 3350-120

Device	AO Modulator
Interaction Material	Tellurium Dioxide
Acoustic Velocity	4.2mm/us
Active Aperture	2mm'L' X 0.1mm'H'
Center Frequency (Fc)	350MHz
RF Bandwidth	150MHz @ -10dB Return Loss

Input Impedance	50 Ohms Nominal
VSWR @ Fc	1.3:1 Max
Wavelength	440-532nm
Insertion Loss	4% Max
Reflectivity per Surface	1% Max
Anti-Reflection Coating	MIL-C-48497
Optical Power Density	<50W/mm^2
Contrast Ratio	1500:1 Min
Polarisation	Linear, 90deg to Mounting Plane
Damage Threshold	> 50MW/cm2 (Pulsed)
Operational RF power	1 W
Rise Time (nsec)	6nsec

Outline Drawing:



2. Fiber-coupled Acousto-Optic modulators (AOMs)

2.1 Fiber-Q

Gooch & Housego specialises in providing optical components for high power fibre laser and amplifier systems. In-house control of critical manufacturing processes, from crystalline material selection and orientation, cutting, polishing and AR coating through to fibre coupling, ensure our components are of the highest optical quality.

The 'Fibre-Q' Acousto-Optic Modulator is designed for use in pulsed fibre laser amplifier systems. In addition to the standard product shown, custom configurations are available for specialized applications.

Ordering Code:
Explanation: T-M150-0.4C2G-3-F2S (Modulator, 150MHz, 0.4mm active aperture, compressional mode, Tellurium Dioxide, 1064nm, SMA female bulk head connector, 2 fibre, single mode (Hi1060)

Key Features:
_ Low insertion loss
_ Compact, low profile package
_ Rugged hermetic design
_ Stable performance
_ Custom configurations available

General Specifications:

Model	**T-M040-0.5C8H-3-F2S**	**T-M040-0.5C8J-3-F2S**
Interaction material:	Amtir-1	Amtir-1
Wavelength:	1310 (other wavelengths available on request)	1550 (other wavelengths available on request)
Average optical power handling:	1W	1W
Peak (pulse) optical power handling:	1kW typical (dependent on pulse width)	1kW typical (dependent on pulse width)
Insertion loss:	< 2.5dB	< 2.5dB
Return loss: Extinction ratio (1st order on / off)	> 40dB (>50dB version available on request) > 50dB	> 40dB (>50dB version available on request) > 50dB
Rise-time / fall-time:	70ns	70ns
Frequency:	40MHz	40MHz
VSWR:	< 1.3:1	< 1.3:1
Input impedance:	50Ω	50Ω
RF power:	< 0.4W	< 0.4W
Frequency shift:	40MHz (up-shift)	40MHz (up-shift)
Fibre type:	SMF28 (900µm black sleeving, 1.5m length)	SMF28 (900µm black sleeving, 1.5m length)
Fibre termination:	Bare fibre	Bare fibre
Application	Sensing (heterodyne interferometry) Intensity modulation	Sensing (heterodyne interferometry) Intensity modulation

Model	T-M040-0.5C8J-3-F2P	T-M080-0.4C2J-3-F2P
Interaction material:	Amtir-1	TeO2
Wavelength:	1550 (other wavelengths available on request)	1550 (other wavelengths available on request)
Average optical power handling:	1W	1W
Peak (pulse) optical power handling:	1kW	30kW typical (dependent on pulse width)
Insertion loss:	< 2.5dB	<3dB
Return loss: Extinction ratio (1st order on/off)	> 40dB (>50dB version available on request) > 50dB	> 40dB (>50dB version available on request) > 50dB

Rise-time / fall-time:	70ns	35ns
Frequency:	40MHz	80MHz
VSWR:	< 1.3:1	< 1.2:1
Input impedance:	50Ω	50Ω
RF power:	< 0.4W	< 3.0W
Frequency shift:	40MHz (up-shift)	80MHz (up-shift)
Fibre type:	PM1550(SM15-PS-U25A, 900um PVDF sleeving, 1.5m length)	PM1550(SM15-PS-U25A, 900um PVDF sleeving, 1.5m length)
Fibre termination:	FC/APC	Bare fibre
Application	Sensing (heterodyne interferometry) Intensity modulation	Sensing (heterodyne interferometry) Intensity modulation, Pulse picking

Model	**T-M080-0.4C2J-3-F2S**	**T-M150-0.4C2G-3-F2S**
Interaction material:	TeO2	TeO2
Wavelength:	1550nm (other wavelengths available on request)	1060nm (other wavelengths available on request)
Average optical power handling:	1W	5W
Peak (pulse) optical power handling:	30kW typical (dependent on pulse width)	30kW typical (dependent on pulse width)
Insertion loss:	<3dB	<2dB
Return loss: Extinction ratio (1st order on/off)	> 40dB (>50dB version available on request) > 50dB	> 40dB (>50dB version available on request) > 50dB
Rise-time / fall-time:	35ns	30ns
Frequency:	80MHz	150MHz
VSWR:	< 1.2:1	< 1.2:1
Input impedance:	50Ω	50Ω
RF power:	< 3.0W	<2W
Frequency shift:	80MHz (up-shift)	150MHz upshift
Fibre type:	SMF28(900um black sleeving, 1.5m length)	Nufern FUD 3583 10/125 NA 0.08, 900um black sleeving, 1.5m length
Fibre termination:	Bare fibre	Bare fibre
Application	Sensing (heterodyne interferometry) Intensity modulation, Pulse picking	Fibre laser, Fibre amplifier Pulse picker

Model	**T-M150-0.4C2G-3-F2P**	**T-M200-0.1C2J-3-F2S**
Interaction material:	TeO2	TeO2
Wavelength:	1060nm (other wavelengths available on request)	1550nm (other wavelengths available on request)
Average optical power handling:	5W	1W
Peak (pulse) optical power handling:	30kW typical (dependent on pulse width)	100uJ, based on 10ns pulse
Insertion loss:	<2.5dB	<6dB
Return loss: Extinction ratio (1st order on/off)	> 40dB (>50dB version available on request) > 50dB	> 40dB (>50dB version available on request) > 50dB
Rise-time / fall-time:	30ns	10ns
Frequency:	150MHz	200MHz
VSWR:	< 1.2:1	< 1.5:1
Input impedance:	50Ω	50Ω
RF power:	<2W	<3W
Frequency shift:	150MHz upshift	200MHz upshift
Fibre type:	Fujikura PM980 (SM98-PS-U25A) 900um black sleeving, 1.5m length	SMF28(900um black sleeving, 1.5m length)
Fibre termination:	Bare fibre	Bare fibre
Application	Fibre laser, Fibre amplifier, Pulse picker	Fibre laser, Pulse picker, Optical sensing

Model	**T-M200-0.1C2J-3-F2P**	**T-M200-0.1C2G-3-F2S**
Interaction material:	TeO2	TeO2
Wavelength:	1550nm (other wavelengths available on request)	1060nm (other wavelengths available on request)
Average optical power handling:	1W	1W
Peak (pulse) optical power handling:	100uJ, based on 10ns pulse	1kW typical (dependent on pulse width)
Insertion loss:	<6dB	<4dB
Return loss: Extinction ratio (1st order on/off)	> 40dB (>50dB version available on request) > 50dB	> 40dB (>50dB version available on request) > 50dB
Rise-time / fall-time:	10ns	10ns
Frequency:	200MHz	200MHz
VSWR:	< 1.5:1	< 1.5:1
Input impedance:	50Ω	50Ω
RF power:	<3W	<2.5W
Frequency shift:	200MHz upshift	200MHz upshift
Fibre type:	Fujikura PM1550 (SM15-PS-U25A) 900um black sleeving, 1.5m length	HI1060(900um PVDF sleeving, 1.5m length)
Fibre termination:	Bare fibre	Bare fibre
Application	Fibre laser, Pulse picker, Optical sensing	Fibre laser, Pulse picker, Optical sensing

Model	**T-M200-0.1C2G-3-F2P**	**FS060-2F-F2P**
Interaction material:	TeO2	TeO2
Wavelength:	1060nm (other wavelengths available on request)	852nm
Average optical power handling:	1W	>25mW
Peak (pulse) optical power handling:	1kW typical (dependent on pulse width)	
Insertion loss:	<4dB	<3dB
Return loss: Extinction ratio (1st order on/off)	> 40dB (>50dB version available on request) > 50dB	>40dB
Rise-time / fall-time:	10ns	
Frequency:	200MHz	60MHz
VSWR:	< 1.5:1	
Input impedance:	50Ω	50Ω
RF power:	<3W	<1W
Frequency shift:	200MHz upshift	
Fibre type:	Fujikura PM980 (SM98-PS-U25A) 900um black sleeving, 1.5m length	PM fiber 2m length
Fibre termination:	Bare fibre	SMA Female
Application	Fibre laser, Pulse picker, Optical sensing	

2.1 Fiber-coupled AOM

Model	**MM065-1C2V5-5-F2XY-Z**	**MM065-1C2V12-5-F2XY-Z**
Interaction material:	TeO2	TeO2
Acousto mode	Longitudinal	Longitudinal
Wavelength:	2um	1.95um
Window configuration	AR coated	AR coated
Insertion loss:	<3.5dB	<3.5dB
Contrast ratio	> 40dB	> 40dB
Rise-time / fall-time:	75ns	100ns
Frequency:	65MHz	65MHz
VSWR:	< 1.2:1	< 1.2:1
Input impedance:	50Ω	50Ω

RF power:	<4W	<4W
Fibre type:	9/125 single mode, 1meter long: X=S 8/125 polarization maintaining: X=P	9/125 single mode, 1meter long: X=S 8/125 polarization maintaining: X=P
Fibre termination:	FC/PC, SC/PC, FC/APC, SC/APC	FC/PC, SC/PC, FC/APC, SC/APC

Model	**MFS150-.2C17J-3-F2P-X-GH**	**15200-.2-1.55-LTD-GaP-FO**
Interaction material:	GaP	GaP
Acousto mode	Longitudinal	Longitudinal
Wavelength:	1.55um	1.55um
Window configuration	AR coated	AR coated
Insertion loss:	<3.5dB	<3.5dB
Contrast ratio	> 35dB	> 35dB
Rise-time / fall-time:	10ns	10ns
Frequency:	150MHz	200MHz
VSWR:	< 1.5:1	< 1.5:1
Input impedance:	50Ω	50Ω
RF power:	<2W	<2W
Fibre type:	8/125, polarization maintaining fiber, 1 meter long	8/125, polarization maintaining fiber, 1 meter long
Fibre termination:	FC/PC, SC/PC, FC/APC, SC/APC	FC/PC, SC/PC, FC/APC, SC/APC

Model	**23050-1-1.95-LTD-FO-2HP-PM-CSF**	
Interaction material:	TeO2	
Acousto mode	Longitudinal	
Wavelength:	1950um	
Window configuration	AR coated	
Optical power	<2W average/CW	
Back reflection	-30dB	
Insertion loss:	<3.5dB	
Contrast ratio	> 40dB	
Rise-time / fall-time:	100ns	
Frequency:	50MHz	
VSWR:	< 1.2:1	
Input impedance:	50Ω	
RF power:	<4W	
Fibre type:	Polarization Maintaining GDF, 10/130 um 0.15/0.46 NA	
Fibre termination:	FC/PC	

3 Free Space AOMs

Model	**I-FS040-1.5C2E-1-ME1 (FS040-2E-ME1)**	**I-FS040-1.5S2E-1-ME1 (FS040-2E-ME1)**
Interactive Material	TeO2	TeO2
Acoustic Mode	Anisotropic, slow shear	Anisotropic, slow shear
Operating Wavelength	630-690nm	630-690nm
AR coating reflectivity	<0.2% per surface	<0.2% per surface
Transmission	>95 %	>95 %
Frequency shift	40 MHz	40 MHz
Frequency drift /°C	<±10ppm	<±10ppm
Clear aperture	4x2 (horizontal x vertical)	4x2 (horizontal x vertical)
Active aperture	1.5 mm (vertical)	1.5 mm (vertical)
Input polarization	Linear, horizontal with respect to housing base	Linear, horizontal with respect to housing base
Output polarization(1st order diffracted)	Linear, vertical with respect to housing base	Linear, vertical with respect to housing base
0/1st order polarization extinction	>100:1	>100:1
0/1st order beam symmetry	Symmetry to the left and right of straight through direction ±0.5°	Symmetry to the left and right of straight through direction ±0.5°
Angle between 0/1st order	2.4° at 655nm	2.4° at 655nm
Supply voltage	15VDC (±10%)	15VDC (±10%)
Power consumption	<1.5W	<1.5W
VSWR	<1.2:1	<1.2:1
Max diffraction efficiency	>90%	>90%
Reference RF output	10MHz sine-wave voltage of 0.5 to 1V peak to peak	10MHz sine-wave voltage of 0.5 to 1V peak to peak
RF driver	Integrated	Integrated

Model	**I-FS040-2C2E-3-OL3 (FS040-2E-OL3)**	**I-FS040-2S2E-1-GH38**
Interactive Material	TeO2	TeO2
Acoustic Mode	Anisotropic, slow shear	
Operating Wavelength	630-680nm	630-670nm
AR coating reflectivity	<0.2% per surface	<0.2% per surface
Transmission	>99.5 %	>95 %
Frequency shift	40 MHz	40 MHz (up-shift)
Clear aperture	2.5x4mm (vertical x horizontal)	2x4mm (vertical x horizontal)
Active aperture	2x4 mm (vertical x horizontal)	2mm (vertical)
Input polarization	Linear, horizontal with respect to housing base	Linear and horizontal with respect housing
Output polarization(1st order diffracted)	Linear, vertical with respect to housing base	Linear and orthogonal to input and 0 order beams
0/1st order polarization extinction	>100:1	>100:1
Angle between 0/1st order	>2°	<2 mrad with respect to straight through direction
VSWR	<1.2:1	< 1.2:1
Max diffraction efficiency	>90%	>90%
RF power	100mW	Integrated driver

Model	**FS040-2C-AR1**	**FS040-2E-AR1**
Interactive Material	TeO2	TeO2
Acoustic Mode	Anisotropic, slow shear	Anisotropic, slow shear
Operating Wavelength	532nm	630-690nm
AR coating reflectivity	<0.2% per surface	<0.3% per surface
Transmission	>95% @ 532nm	>95 % @ 633nm
Frequency shift	40 MHz	40 MHz (up-shift)

Clear aperture	2x4mm (vertical x horizontal)	2x4mm (vertical x horizontal)
Active aperture	1.5mm (vertical)	1.5mm (vertical)
Input polarization	Linear and horizontal with respect housing	Linear and horizontal with respect housing
Output polarization(1st order diffracted)	Linear and orthogonal to input	Linear and orthogonal to input and 0 order beams
0/1st order polarization extinction	>100:1	>100:1
0/1st order beam symmetry	Symmetrical to the left and right of the straight through direction ±0.5°	Symmetrical to the left and right of the straight through direction ±0.5°
Vertical angle of deflection	<2mard with respect to straight through	<2mard with respect to straight through
Angle between input beam and housing	90°±1°	90°±1°
Max diffraction efficiency	>90% @ 532nm	>90% @ 635nm
Supply voltage	+5VDC (±10%)	+5VDC (±10%)
Power supply connection	Lead-through filter	Lead-through filter
RF input connector	SMB bulkhead jack	SMB bulkhead jack
RF input	40MHz sine-wave voltage of 0.5 to 1Vpp	40MHz sine-wave voltage of 0.5 to 1Vpp

Model	**I-M041-2.5C10G-4-GH50**	**I-M041-8C10G-B5-PI23**
Interactive Material	Crystal Quartz	Crystal Quartz
Operating Wavelength	1030-1064nm	1064nm
Damage threshold	>1GW/cm2	> 1GW/cm2
AR coating reflectivity	<0.3% per surface	< 0.2% per surface
Transmission	>99.4%	> 99.6%
Frequency shift	40.68 MHz	40.68MHz
Optical polarization	Linear, vertical to base	Linear, vertical to base
Active aperture	2.5mm	8.0mm
Acoustic mode	Compressional	Compressional
Separation angle	7.6mrad	
Rise-time (10-90%)	113ns/mm	113ns/mm
0/1st order beam symmetry	Symmetrical to the left and right of the straight through direction ±0.5°	CW power handling: > 500KW/cm2
Diffraction efficiency	>85%	> 75% @ ~45W RF power
Max RF power	20W	50W
Cooling	Conduction	Water (de-ionised)

Model	**I-FS080-2C2G-3-LV1 (M080-2G-LV1)**	**I-FS080-3S2E-1-GH39**
Interactive Material	TeO2	TeO2
Wavelength	1064nm	633nm
AR coating reflectivity	<0.2% per surface	<0.2%
Transmission	>99.5%	>95% @ 633nm
Frequency shift	80 MHz	80MHz (up-shift)
VSWR	<1.2:1	<1.2:1
Active aperture	2mm	3.0mm (vertical)
Clear aperture	4mm	4x3.0mm
Recommended beam diameter	1mm	-
Input polarization	Linear, vertical with respect to house base	Linear and horizontal with respect housing
Output polarization	Linear, horizontal (rotated by 90º to input)	Linear and orthogonal to input and zero beams
Angle between 0/1st order	6.45º	< 2 mrad with respect to straight through direction
Diffraction efficiency	>90% (typically >95%)	>90%
RF power	0.5W	≥90% (based on recommended beam diameter)

Model	**I-M080-2.5C10G-4-GH25**	**I-FS110-2C2B8-3-GH2 (M110-2B/F-GH2)**
Interactive Material	Crystal Quartz	TeO2
Wavelength	1064nm	480-800nm
AR coating reflectivity	<0.2% per surface	0.2% per surface
Transmission	>99.6%	>95%
Frequency shift	80 MHz	110MHz
Optical polarization	Linear, vertical to base	Any
Active aperture	2.5mm	2mm
Acoustic mode	Compressional	Compressional
Rise-time (10-90%)	113ns/mm	155ns/mm
Diffraction efficiency	≥80%	>85%
RF power	15W (max)	<2W (wavelength dependent)

Model	**I-M110-2C10B6-3-GH26 (M110-10UV-GH27)**	**I-M110-2.5C10B6-3-GH26**
Interactive Material	Crystal Quartz	Crystal Quartz
Wavelength	400-540nm	400-540nm
AR coating reflectivity	<0.5% per surface	0.5% per surface
Damage threshold	>500MW/cm2 (pulsed)	>500MW/cm2 (pulsed)
Transmission	>99.0%	>99.0%
Frequency shift	110 MHz	110MHz
Optical polarization	Linear, vertical to base	Linear, vertical to base
Active aperture	2.0mm	2.5mm
Acoustic mode	Compressional	Compressional
Rise-time (10-90%)	113ns/mm	113ns/mm
Diffraction efficiency	≥85%	>80%
RF power	<5W	<5W

Model	**I-M110-3C10BB-3-GH27 (M110-10UV-GH27)**	**I-M110-3C10B6-3-GH26**
Interactive Material	Crystal Quartz	Crystal Quartz
Wavelength	300-400nm	400-540nm
AR coating reflectivity	<0.5% per surface	0.5% per surface
Damage threshold	>500MW/cm2 (pulsed)	>500MW/cm2 (pulsed)
Transmission	>99.0%	>99.0%
Frequency shift	110 MHz	110MHz
Optical polarization	Linear, vertical to base	Linear, vertical to base
Active aperture	3.0mm	3.0mm
Acoustic mode	Compressional	Compressional
Rise-time (10-90%)	113ns/mm	113ns/mm
Separation angle	6.8mrad at 355nm	10.2mrad at 532nm
Diffraction efficiency	≥85%	>80%
RF power	<3W	<5W

Model	**I-M120-0.7C2G-GH42**	**I-M150-0.4C2G-GH42**	**I-M200-0.75C2G-3-SO8**
Interactive Material	TeO2	TeO2	TeO2
Wavelength	1064nm	1064nm	1064nm
AR coating reflectivity	<0.2% per surface	<0.2% per surface	<0.3% per surface
Damage threshold	>50MW/cm2 (pulsed)	>50MW/cm2 (pulsed)	>50MW/cm2 (pulsed)
Transmission	>99.5%	>99.6%	>99.4%
Frequency shift	120 MHz	150 MHz	200 MHz
Optical polarization	Random	Random	Linear, vertical with respect to base
Active aperture	700um	400um	750um
Recommended beam dia.	400um	200um	400um
Rise-time (10-90%)	153ns/mm	153ns/mm	153ns/mm

Separation angle	30mrad	37.5mrad	50mrad
Diffraction efficiency	≥85%	>85%	>85%
RF power	3W (at <50% duty cycle)	2W	3W

Model	**3080-120**				**3080-122**			
Interactive Material	TeO2				TeO2			
Acoustic Velocity	4.2mm/us				4.2mm/us			
Active Aperture	2.5mmLx1.0mmH				2.5mmLx1.0mmH			
Center Frequency	80MHz				80MHz			
RF Bandwidth	20MHz @ -10dB Return Loss				20MHz @ -10dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.3:1 Max			
Wavelength	442-633nm				780-850nm			
Insertion Loss	4% Max				3% Max			
Reflectivity per Surface	1% Max				0.25% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	250W/mm2				250W/mm2			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	442	488	515	633	830			
Saturation RF power (W)	0.27	0.33	0.36	0.55	1			
Bragg angle (mrad)	4.2	4.6	4.9	6	7.9			
Beam separation (mrad)	8.4	9.2	9.8	12	15.8			
Performance vs beam dia								
Beam diameter(um)	200	300	500		200	250	500	
At wavelength (nm)	633	633	633		830	830	830	
Diffraction efficiency (%)	80	83	85		70	80	85	
Rise time (nsec)	34	49	80		34	41	80	
Modulation bandwidth	15.9 10	10.6 5	6.3 1		15.9 15	12.65 10	6.3 1	

Model	**3080-125**				**3100-125**			
Interactive Material	TeO2				TeO2			
Acoustic Velocity	4.2mm/us				4.2mm/us			
Active Aperture	2.5mmLx2.0mmH				2.5mmLx1.5mmH			
Center Frequency	80MHz				100MHz			
RF Bandwidth	25MHz @ -9dB Return Loss				25MHz @ -10dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.3:1 Max			
Wavelength	442-633nm				470-690nm			
Insertion Loss	5% Max				4% Max			
Reflectivity per Surface	1% Max				1% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	250W/mm2				250W/mm2			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	515	633			470	532	633	690
Saturation RF power (W)	0.65	1.0			0.4	0.6	0.9	1.1
Bragg angle (mrad)	4.9	6			5.6	6.3	7.5	8.2
Beam separation (mrad)	9.8	12			11.2	12.6	15	16.4
Performance vs beam dia								
Beam diameter(um)	125	200	400		1000	1000	1000	1000
At wavelength (nm)	633	633	633		470	532	633	690
Diffraction efficiency (%)	65	80	90		85	85	85	85
Rise time (nsec)	23	34	65		159	159	159	159
Modulation bandwidth	20	12	6					

Model	**3110-120**				**3110-121**			
Interactive Material	TeO2				TeO2			
Acoustic Velocity	4.2mm/us				4.2mm/us			
Active Aperture	2.5mmLx0.6mmH				2.5mmLx0.6mmH			
Center Frequency	110MHz				110MHz			
RF Bandwidth	24MHz @ -10dB Return Loss				24MHz @ -10dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.3:1 Max			
Wavelength	442-633nm				442-488nm			
Insertion Loss	4% Max				3% Max			
Reflectivity per Surface	1% Max				1% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	250W/mm2				250W/mm2			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	442	488	515	633	488			
Saturation RF power (W)	0.29	0.39	0.43	0.65	0.4			
Bragg angle (mrad)	5.8	6.4	6.7	8.3	6.4			
Beam separation (mrad)	11.6	12.8	13.4	16.6	12.8			
Performance vs beam dia								
Beam diameter(um)	113	130	200	500	100	150	200	
At wavelength (nm)	633	633	633	633	488	488	488	
Diffraction efficiency (%)	70	75	80	83	70	75	80	
Rise time (nsec)	25	28	39	86	18	25	33	
Modulation bandwidth	28 20	24 10	15.8 5	6.3 1	28 20	24 9	15.8 5	

Model	**3110-197**	**3120-120**
Interactive Material	TeO2	TeO2
Acoustic Velocity	4.2mm/us	4.2mm/us
Active Aperture	2.5mmLx1.25mmH	2.5mmLx0.6mmH
Center Frequency	110MHz	120MHz
RF Bandwidth	15MHz @ -10dB Return Loss	15MHz @ -10dB Return Loss
Input Impedance	50 Ohms Nominal	50 Ohms Nominal
VSWR @ Fc	1.3:1 Max	1.3:1 Max
Wavelength	1047-1060nm	1064nm
Insertion Loss	4% Max	2% Max
Reflectivity per Surface	0.5% Max	0.5% Max
Anti-Reflection Coating	MIL-C-48497	MIL-C-48497
Optical Power Density	10MW/cm2	10MW/cm2
Contrast Ratio	1000:1 Min	1000:1 Min
Polarization	90° to mounting plate	Random
Performance vs wavelength		
Wavelength(nm)	1060	1060
Saturation RF power (W)	2.5	2.0
Bragg angle (mrad)	13.9	15.2
Beam separation (mrad)	27.8	30.4
Performance vs beam dia		
Beam diameter(um)	1100	375
At wavelength (nm)	1060	1064
Diffraction efficiency (%)	90	80
Rise time (nsec)	200	73
Modulation bandwidth	3	4.5
Beam ellipticity	NA	NA

Model	**3120-121**	**3200-120**

Interactive Material	TeO2				TeO2		
Acoustic Velocity	4.2mm/us				4.2mm/us		
Active Aperture	2.5mmLx0.6mmH				2.5mmLx0.45mmH		
Center Frequency	120MHz				200MHz		
RF Bandwidth	15MHz @ -10dB Return Loss				50MHz @ -10dB Return Loss		
Input Impedance	50 Ohms Nominal				50 Ohms Nominal		
VSWR @ Fc	1.3:1 Max				1.3:1 Max		
Wavelength	1064nm				442-488nm		
Insertion Loss	2% Max				5% Max		
Reflectivity per Surface	0.5% Max				1% Max		
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497		
Optical Power Density	10MW/cm2				250W/mm2		
Contrast Ratio	1000:1 Min				1000:1 Min		
Polarization	Random				90° to mounting plate		
Performance vs wavelength							
Wavelength(nm)	1064				442	488	
Saturation RF power (W)	2.0				0.53	0.65	
Bragg angle (mrad)	15.2				10.5	11.6	
Beam separation (mrad)	30.4				21	23.2	
Performance vs beam dia							
Beam diameter(um)	375				60	80	100	120
At wavelength (nm)	1064				488	488	488	488
Diffraction efficiency (%)	80				70	75	80	80
Rise time (nsec)	73				13	16	19	23
Modulation bandwidth	4.5				52	40	31	26.5
Beam ellipticity	NA				15	8	4	2

Model	**3200-121**				**3200-124**			
Interactive Material	TeO2				TeO2			
Acoustic Velocity	4.2mm/us				4.2mm/us			
Active Aperture	2.5mmLx0.32mmH				2.5mmLx0.32mmH			
Center Frequency	200MHz				200MHz			
RF Bandwidth	50MHz @ -9dB Return Loss				50MHz @ -10dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.3:1 Max			
Wavelength	515-633nm				780-850nm			
Insertion Loss	4% Max				3% Max			
Reflectivity per Surface	1% Max				1% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	250W/mm2				250W/mm2			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	515	633			830			
Saturation RF power (W)	0.7	1.0			2.0			
Bragg angle (mrad)	12.3	15.1			19.8			
Beam separation (mrad)	24.6	30.2			39.6			
Performance vs beam dia								
Beam diameter(um)	60	80	100	120	150			
At wavelength (nm)	633	633	633	633	830			
Diffraction efficiency (%)	70	75	80	80	70			
Rise time (nsec)	14	17	20	23	29			
Modulation bandwidth	52 15	40 8	31 4	26.5 2	21.0			
Beam ellipticity	NA	NA	NA	NA	10			

Model	**3200-125**	**3200-126**
Interactive Material	TeO2	TeO2
Acoustic Velocity	4.2mm/us	4.2mm/us

Active Aperture	2.5mmLx1.5mmH				2.5mmLx0.32mmH			
Center Frequency	200MHz				200MHz			
RF Bandwidth	50MHz @ -10dB Return Loss				50MHz @ -9dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.3:1 Max			
Wavelength	470-690nm				532nm			
Insertion Loss	4% Max				4% Max			
Reflectivity per Surface	1% Max				1% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	250W/mm2				250W/mm2			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	470	532	633	690	532			
Saturation RF power (W)	0.4	0.6	0.9	1.1	0.7			
Bragg angle (mrad)	11.2	12.7	15.1	16.4	12.7			
Beam separation (mrad)	22.4	25.4	30.2	32.8	25.4			
Performance vs beam dia								
Beam diameter(um)	1000	1000	1000	1000	60			
At wavelength (nm)	470	532	633	690	532			
Diffraction efficiency (%)	85	85	85	85	75			
Rise time (nsec)	159	159	159	159	13			

Model	**3200-1113**				**3200-1220**			
Interactive Material	TeO2				Crystalline quartz			
Acoustic Velocity	4.2mm/us				5.74mm/us			
Active Aperture	1mmLx0.1mmH				2.5mmLx0.25mmH			
Center Frequency	200MHz				200MHz			
RF Bandwidth	90MHz @ -10dB Return Loss				100MHz @ -5dB Return Loss			
Input Impedance	50 Ohms Nominal				50 Ohms Nominal			
VSWR @ Fc	1.3:1 Max				1.5:1 Max			
Wavelength	1047-1060nm				257nm			
Insertion Loss	4% Max				5% Max			
Reflectivity per Surface	0.5% Max				1% Max			
Anti-Reflection Coating	MIL-C-48497				MIL-C-48497			
Optical Power Density	50MW/cm2				NA			
Contrast Ratio	1000:1 Min				1000:1 Min			
Polarization	90° to mounting plate				90° to mounting plate			
Performance vs wavelength								
Wavelength(nm)	1060				257			
Saturation RF power (W)	2.5				1			
Bragg angle (mrad)	25.2				4.5			
Beam separation (mrad)	50.4				9			
Performance vs beam dia								
Beam diameter(um)	50	65			70			
At wavelength (nm)	1060	1060			257			
Diffraction efficiency (%)	75	80			75			
Rise time (nsec)	10	12			10			
Loss modulation	80%				NA			

Model	**12038-3-TE**	**12038-3-BR-TE**
Interactive Material	SiO2	SiO2
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	1.06 µm	Used for Various λ (Specifications shown for 1.06 µm
Window Configuration	AR "V" Coated	Brewster
Static Transmission	>99 %	>99 %
Operating Frequency	38 MHz + 150 KHz	38 MHz + 182 KHz
Mode spacing	300 KHz Typical	364 KHz Typical

Mode Bandwidth -3dB	10 KHz approximate	10 KHz approximate
Average Loss Modulation	15 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation	10 % minimum with Linear Polarization Light, Perpendicular to Acoustic Propagation
Acoustic Aperture Size (in air)	3 mm	2 mm
Deflection Angle	6.75 mrad	6.75 mrad @ 1.06 µm
RF Power Level	<1.2 watt	<1 watt
Impedance	50 ohms @ Resonant Frequency	50 ohms @ Resonant Frequency
VSWR	<1.5:1 @ Resonant Frequency	<1.5:1 @ Resonant Frequency
Package:	53A2198	53A3890
Recommended Driver:	11038-1ML	11038-1ML

Model	**12041-3-BR-TE**	**12041-3-TE**
Interactive Material	SiO2	SiO2
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specification shown for 1.06 µm	1.06 µm
Window Configuration	Brewster	AR "V" Coated
Static Transmission	>99 %	>99%
Operating Frequency	41 MHz + 182 KHz	41 MHz + 150 KHz
Mode spacing	364 KHz Typical	300 KHz Typical
Mode Bandwidth -3dB		10 KHz approximate
Average Loss Modulation	10 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation	15 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation
Acoustic Aperture Size (in air)	2 mm	3 mm
Deflection Angle	7.3 mrad @ 1.06 µm	7.3 mrad
RF Power Level	<1 watt	<1.2 watt
Impedance	50 ohms @ Resonant Frequency	50 ohms @ Resonant Frequency
VSWR	<1.5:1 @ Resonant Frequency	<1.5:1 @ Resonant Frequency
Package:	53A3890	53A2198
Recommended Driver:	11041-1ML	11041-1ML

Model	**12050-3-BR-TE**	**12050-3-TE**
Interactive Material	SiO2	SiO2
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications shown for 1.06 µm	1.06 µm
Window Configuration	Brewster	AR "V" Coated
Static Transmission	>99 %	>99%
Operating Frequency	50 MHz + 182 KHz	50 MHz + 150 KHz
Mode spacing	364 KHz Typical	300 KHz Typical
Mode Bandwidth -3dB	10 KHz approximate	10 KHz approximate
Average Loss Modulation	6.5 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation	10 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation
Acoustic Aperture Size (in air)	2 mm	3 mm
Deflection Angle	8.9 mrad @ 1.06 µm	8.9 mrad
RF Power Level	<1 watt	<1.2 watt
Impedance	50 ohms @ Resonant Frequency	50 ohms @ Resonant Frequency
VSWR	<1.5:1 @ Resonant Frequency	<1.5:1 @ Resonant Frequency
Package:	53A3890	53A2198
Recommended Driver:	11050-1ML	11050-1ML

Model	**12080-3-BR-TE**	**12080-3-TE**
Interactive Material	SiO2	SiO2
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications shown for 1.06 µm	1.06 µm

Window Configuration	Brewster	AR "V" Coated
Static Transmission	>99 %	>99 %
Operating Frequency	80 MHz + 182 KHz	80 MHz + 150 KHz
Mode spacing	364 KHz Typical	300 KHz Typical
Mode Bandwidth -3dB	10 KHz approximate	10 KHz approximate
Average Loss Modulation	6.5 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation	10 % minimum with Linear Polarized Light, Perpendicular to Acoustic Propagation
Acoustic Aperture Size (in air)	2 mm	3 mm
Deflection Angle	14.2 mrad @ 1.06 µm	14.2 mrad
RF Power Level	<1 watt	<1.2 watt
Impedance	50 ohms @ Resonant Frequency	50 ohms @ Resonant Frequency
VSWR	<1.5:1 @ Resonant Frequency	<1.5:1 @ Resonant Frequency
Package:	53A3890	53A2198
Recommended Driver:	11080-1ML	11080-1ML

Model	**13389-BR**	**15180-1.06-LTD-GAP**
Interactive Material	SiO2	GaP
Acoustic Mode	longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications shown for 633 nm	1.06 µm
Window Configuration	Brewster, λ/10 over acoustic aperture	AR “V” coated
Static Transmission	>99 %	>90%
Operating Frequency	389 MHz	180 MHz
Diffraction Efficiency	>5.5 % @ 500 mW	>70%
Light Polarization	Linear, Perpendicular to Acoustic Propagation	Linear, horizontal
Acoustic Aperture Size	60 µm in air	300 µm
Rise Time	<6 ns	10 nsec*
Optical Waist Size to achieve Rise Time	44 µm	100 microns
Deflection Angle	41 mrad @ 633 nm	28.7 mrads
RF Power Level Average	500 mW	1.7 Watts
RF Power Level Peak	10 Watts peak, 5 % duty cycle with 10 ns pulse	
Impedance	50 Ohms	50 Ohms nominal
VSWR	<1.5:1 @ 389MHz, <6:1 @ 299, 479 MHz	<1.5:1 at 180 MHz
Package:	53A5314	53B0624
Recommended Drivers:	64389-SYN-9.5-X	

Model	**15210**	**15210-FOA / 71002**	**15210-FOA**
Interactive Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440 – 850 nm	440 – 850 nm	440 – 850 nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	> 95 %	>95 %	>95 %
Operating Frequency	210 MHz	210 MHz	210 MHz
Diffraction Efficiency	> 70 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization	>70 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization	>70 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization
Acoustic Aperture Size	0.2 mm	0.2 mm	0.2 mm
Rise Time	< 10 nsec	<10 nsec	< 10 nsec

Optical Waist Size to achieve Rise Time	55 µm	55 µm	55 µm
Deflection Angle	31 mrad @ 633 nm	31 mrad @ 633 nm	31 mrad @ 633 nm
RF Power Level	< 1 Watt	< 1 Watt	< 1 Watt
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms nominal
VSWR	< 1.5:1 @ 210 MHz	< 1.5:1 @ 210 MHz	<1.5:1 @ 210 MHz
Package:	53B0504	53D00314	53B0957
Recommended Drivers:	Analog Driver System: 21210-1AS Analog Driver Module: 21210-1AM Digital Driver System: 21210-1DS Digital Driver Module: 21210-1DM		

Model	**15260**	**15260-FOA/71002**	**15260-FOA**
Interactive Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440 – 850 nm	440 – 850 nm	440 – 850 nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	>95 %	>95 %	>95 %
Operating Frequency	260 MHz	260 MHz	260 MHz
Diffraction Efficiency	>70 % @ 633nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization	>70 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization	>70 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation or with Random Polarization
Acoustic Aperture Size	0.2 mm	0.2 mm	0.2 mm
Rise Time	<10 ns	<10 nsec	<10 nsec
Optical Waist Size to achieve Rise Time	55 um	0.055 mm	55 um
Deflection Angle	39 mrad @ 633nm	39 mrad @ 633 nm	39 mrad @ 633 nm
RF Power Level	700 mW	< 1 Watt	< 1 Watt
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms nominal
VSWR	1.5:1 @ 260MHz	1.5:1 @ 260 MHz	1.5:1 @ 260 MHz
Package:	53B0504	53D0314	
FOA Modulator Package:		53B0957	53B0957
Recommended Drivers:	21260-.7AS 21260-.7AM 21260-.7DS 21260-.7DM	Analog Driver System: 21260-1AS Analog Driver Module: 21260-1AM Digital Driver System: 21260-1DS Digital Driver Module: 21260-1DM	

Model	**17389-1.06-LTD-GaP**	**17389-.93**	**17389-.93-FOA**
Interaction Material	GaP	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	1.06 µm	700 –1064 nm	700 –1064 nm
Window Configuration	AR “V” coating	AR Coated	AR Coated
Static Transmission	>90%	>95 %	>95%
Operating Frequency	389 MHz	389 MHz	389 MHz
Diffraction Efficiency	56% minimum with linear polarized light parallel to acoustic propagation	>70 % @ 800 nm with Linear, Polarization Perpendicular to Acoustic Propagation. >60 % @ 800 nm with Random Polarization.	>70% @ 800 nm with Linear, Polarization Perpendicular to Acoustic Propagation >60% @ 800 nm with Random Polarization
Acoustic Aperture Size (in air)	150 µm	70 um	70 um
Rise Time	4 nsec minimum	<7 nsec	<7 nsec

Extinction Ratio *	>20dB for neighboring pulses, >27dB for subsequent pulses @ <80MHz pulse rep rate	>20dB for neighboring pulses, >27dB for subsequent pulses @ <80MHz pulse rep rate	>20dB for neighboring pulses, >27dB for subsequent pulses @ <80MHz pulse rep rate
Optical Waist Size To Achieve Rise Time	40 µm	35 um	35um
Deflection Angle	62 mrad	73 mrad @ 800 nm	73mrad @ 800nm
RF Power Level	2.5 watts peak, <1 watt aver.	< 700 mW Average/ 5 Watts Peak 10 % max duty cycle with 10 nsec pulse.	< 700 mW Average/ 5 Watts Peak 10% max duty cycle with 10nsec pulse.
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms nominal
VSWR	<1.5:1 @ 389 MHz	<1.5:1 @ 389 MHz	< 1.5:1 @ 389 MHz
Package	53B00624TO1	53B0504	53B0499
Recommended Drivers:	Non - Synchronous Driver: 11389-5AM Synchronous Driver: 64389.5-SYN-9.5-X		

Model	**17440**	**17440-FOA**
Interaction Material	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	440-850nm	440-850m
Window Configuration	AR coated	AR coated
Static Transmission	>95%	>95%
Operating Frequency	440 MHz	440 MHz
Diffraction Efficiency	>60 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation. >50 % @ 633 nm with Random Polarization	>60 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation. >50 % @ 633 nm with random polarization.
Acoustic Aperture Size (in air)	90 µm	90 µm
Rise Time	4 ns	4 ns
Optical Waist Size To Achieve Rise Time	19 µm	19 µm
Deflection Angle	65 mrad @ 633nm	65 mrad @ 633nm
RF Power Level	800mW nominal	800mW
Impedance	50 Ohms nominal	50 Ohms nominal
VSWR	<1.5:1 @ 440 MHz	<1.5:1 @ 440 MHz

Model	**23080-1-LTD**	**23080-1-.85-LTD**	**23080-1-1.06-LTD**
Interaction Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440-850nm	700-1000nm	1064nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥95%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	≥85 % @ 633 nm with linear polarization, perpendicular to acoustic propagation or random polarization	>60 % @ 633 nm with Linear, Polarization Perpendicular to Acoustic Propagation. >50 % @ 633 nm with random polarization.	>75 % With Linear Polarization, Perpendicular to Acoustic Propagation >70 % With Random Polarization
Acoustic Aperture Size	1mm	1mm	1mm
Rise Time	150ns/mm	150ns/mm	150ns/mm
Deflection Angle	11.89 mrad @ 633nm	16 mrad @ 850nm	20 mrad
RF Power Level	≤1W	1W	1.25W
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz

Model	**23080-1-1.06/1.3-LTD**	**23080-1-1.3-LTD**	**23080-1-1.55-LTD**
Interaction Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	1.06-1.3um	1300nm	1550nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥97%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	>75% with linear polarization perpendicular to acoustic propagation >70% with random polarization	>75 % With Linear Polarization, Perpendicular to Acoustic Propagation >70 % With Random Polarization	>60 % with light Polarized Linear, Perpendicular to Acoustic Propagation >55 % with light Random Polarization
Acoustic Aperture Size	1mm	1mm	1mm
Rise Time	155ns/mm	150ns/mm	150ns/mm
Deflection Angle	24.44 mrad @ 1.3um 20mrad @ 1.06um	25 mrad	29 mrad
RF Power Level	<2W @ 1.3um <1.2W @ 1.06um	<1.25W	<2W
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz

Model	**23080-2-LTD**	**23080-2-.85-LTD**	**23080-2-1.06-LTD**
Interaction Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440-850nm	1300nm	1064nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥95%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	>85 % @ 633 nm, Linear polarization, perpendicular to acoustic propagation or random	>70 % With Linear Polarization, Perpendicular to Acoustic Propagation >65 % With Random Polarization	>75 % with light Polarized Linear, Perpendicular to Acoustic Propagation >70 % with light Random Polarization
Acoustic Aperture Size	2mm	2mm	2mm
Rise Time	150ns/mm	150ns/mm	150ns/mm
Deflection Angle	11.89mrad @ 633 nm	16 mrad @ 850nm	20 mrad
RF Power Level	<1W	<2W	<2W
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz

Model	**23080-2-1.3-LTD**	**23080-2-1.55-LTD**	**23080-3-LTD**
Interaction Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	1330nm	1550nm	440-850nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥97%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	>75 % with linear polarization, perpendicular to acoustic propagation >70% with random polarization	>50% With light Polarization linear, Perpendicular to Acoustic Propagation >45 % With Random Polarization	>85 % @ 633 nm, Linear Polarization, Perpendicular to Acoustic Propagation or Random
Acoustic Aperture Size	2mm	2mm	3mm
Rise Time	150ns/mm	150ns/mm	150ns/mm
Deflection Angle	24.4 mrad	29 mrad	11.89 mrad @ 633nm
RF Power Level	<3.2W	<4W	<1.2W

Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz

Model	23080-3-.85-LTD	23080-3-1.06-LTD	23080-3-1.3-LTD
Interaction Material	TeO2	TeO2	TeO2
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	700-1000nm	1064nm	1330nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥97%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	>70 % with linear polarization, perpendicular to acoustic propagation >65% with random polarization	>70% With linear Polarization, Perpendicular to Acoustic Propagation >65 % With Random Polarization	>75% With linear Polarization, Perpendicular to Acoustic Propagation >70 % With Random Polarization
Acoustic Aperture Size	3mm	3mm	3mm
Rise Time	150ns/mm	150ns/mm	150ns/mm
Deflection Angle	16 mrad @ 850nm	20 mrad	24.4 mrad
RF Power Level	<2W	<2W	<4W
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz	<1.2:1 @ 80 MHz

Model	**23110-.5**	**23110-1-LTD**	**24080-1**
Interaction Material	TeO2	TeO2	SF6
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440-850nm	440-850nm	440-850nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	≥95%	>95%	>97%
Operating Frequency	110 MHz	110 MHz	80 MHz
Diffraction Efficiency	>90% @ 633nm With linear Polarization, Perpendicular to Acoustic Propagation or with Random Polarization	>85% @ 633nm With linear Polarization, Perpendicular to Acoustic Propagation or Random	65% @ 633nm with random polarization
Acoustic Aperture Size	0.5mm	1mm	1mm
Rise Time	150ns/mm	150ns/mm	185ns/mm
Deflection Angle	16.3 mrad @ 633nm	16.34 mrad @ 633nm	14.4 mrad @ 633nm
RF Power Level	1W	1W	1W
Impedance	50 Ohms nominal	50 Ohms nominal	50 Ohms
VSWR	<1.2:1 @ 110 MHz	<1.2:1 @ 110 MHz	<1.2:1 @ 80 MHz

Model	**26035-2-1.55-LTD**	**26055-1-1.55-LTD**
Interaction Material	AMTIR	AMTIR
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	1300-1600nm	1300-1600nm
Window Configuration	AR coated	AR coated
Static Transmission	≥97%	≥97%
Operating Frequency	35 MHz	55 MHz
Diffraction Efficiency	>85%	>85%
Light polarization	Random	Random
Optical power density	<50kW/cm2	<50kW/cm2
Acoustic Aperture Size	2mm	1mm
Rise Time	260ns/mm	260ns/mm
Deflection Angle	20.6 mrad @ 1550nm	32.4 mrad @ 1550nm
RF Power Level	<0.5W	<0.5W
Impedance	50 Ohms nominal	50 Ohms nominal
VSWR	<1.2:1 @ 35 MHz	<1.2:1 @ 35 MHz

Recommended driver (Analog, Digital Module, System)	21035-0.5AS 21035-0.5AM 21035-0.5DS 21035-0.5DM	21055-0.5AS 21055-0.5AM 21055-0.5DS 21055-0.5DM

Model	**35085-0.5-350**	**35085-3-350**
Interactive Material	Fused Silica	Fused Silica
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	300 to 400 nm	300 to 400 nm
Window Configuration	AR Coated	AR Coated
Static Transmission	>99 %	>99 %
Operating Frequency	85 MHz	85 MHz
Diffraction Efficiency	>85 %	85 % @ 350 nm
Light Polarization	Linear, Perpendicular to acoustic propagation	Linear, Perpendicular to Acoustic Propagation
Acoustic Aperture	0.5 mm	3 mm
Rise Time	110 nsec/mm beam diameter	110 ns / mm Beam Diameter
Deflection Angle	5 mrad @ 350 nm	5 mrad @ 350 nm
RF Power Level	< 6 Watts	3 Watts
Impedance	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 85 MHz	<1.2:1 @ 85 MHz
Package:	53B1428	53B1428
Recommended driver (Analog, Digital Module, System)	31085-6AS 31085-6AM 31085-6DS 31085-6DM	31085-6AS 31085-6AM 31085-6DS 31085-6DM

Model	35085-0.5	35085-3
Interactive Material	Fused Silica	Fused Silica
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	400 to 540 nm	400 to 540 nm
Window Configuration	AR Coated	AR Coated
Static Transmission	>99 %	>98 % @ 488 nm
Operating Frequency	85 MHz	85 MHz
Diffraction Efficiency	>85 % With Linear Polarized Light, Perpendicular to acoustic propagation	>85 % @ 488 nm With Light Polarized Linear, Perpendicular to Acoustic Propagation.
Acoustic Aperture Size	0.5 mm	3 mm
Rise Time	110 nsec/mm beam diameter	110 ns / mm Beam Diameter
Deflection Angle	5 mrad @ 514 nm	6.9 mrad @ 488 nm
RF Power Level	< 6 Watts	< 6 Watts @ 488 nm
Impedance	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 85 MHz	<1.2:1 @ 85 MHz
Package:	53B1428	53B1428
Recommended driver (Analog, Digital Module, System)	31085-6AS 31085-6AM 31085-6DS 31085-6DM	31085-6AS 31085-6AM 31085-6DS 31085-6DM

Model	**35110-2-244**	**35110-2-244-BR**	**35110-3-244-BR-KrF**
Interactive Material	KrF Grade Fused Silica	KrF Grade Fused Silica	KrF Grade Fused Silica
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	244 nm	244-260 nm	244-260 nm
Window Configuration	AR Coated	Brewster	Brewster
Static Transmission	>97 %	>99 %	>99 %
Operating Frequency	110 MHz	110 MHz	110 MHz
Diffraction Efficiency	>70% With Linear Polarized Light,	>70% With Linear Polarized Light,	>70% With Linear Polarized Light,

	Perpendicular to acoustic propagation	Perpendicular to acoustic propagation	Perpendicular to acoustic propagation
Acoustic Aperture Size	2 mm	2 mm	2 mm
Rise Time	110 nsec/mm	110 nsec/mm	110 nsec/mm
Deflection Angle	4.5 mrad	4.5 mrad @ 244nm	4.5 mrad @ 244nm
RF Power Level	< 2 Watts	< 4 Watts	< 4 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 110 MHz	<1.2:1 @ 110 MHz	<1.5:1 @ 95-125 MHz
Package:	53B2921	53D1634	53D3926
Recommended driver (Analog, Digital Module, System)	21110-2AS 21110-2AM 21110-2DS 21110-2DM	31110-4AS 31110-4AM 31110-4DS 31110-4DM	31110-4AS 31110-4AM 31110-4DS 31110-4DM

Model	**35210-BR / 71004**	**35210-BR**
Interactive Material	Fused Silica	Fused Silica
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	300 to 700 nm	300 to 700 nm
Window Configuration	Brewster	Brewster
Static Transmission	>99 % @ 488 nm	98 % @ 488 nm
Operating Frequency	210 MHz	210 MHz
Diffraction Efficiency	>70 % @ 488 nm	>70 % @ 488 nm
Light Polarization	Linear, Perpendicular to acoustic propagation	Linear, Perpendicular to acoustic propagation
Acoustic Aperture Size (in air)	0.13 mm	0.13 mm
Rise Time	<15 ns	<15 ns
Optical Waist Size to achieve Rise Time	0.1 mm	0.1 mm
Deflection Angle	17 mrad @488 nm	17 mrad @ 488 nm
RF Power Level	6 Watts	6 Watts
Impedance	50 Ohms	50 Ohms
VSWR	<1.5:1 @ 210 MHz	<1.5:1 @ 210 MHz
Package Assembly: Mount, Optics and Modulator:	53D0307	
Package:	53B3408	53B3408
Recommended Driver:	Analog System Driver: 31210-6AS Analog Module Driver: 31210-6AM Digital System Driver: 31210-6DS Digital Module Driver: 31210-6DM	

Model	**35110-2-244**	**35250-.2-.53-XQ**
Interactive Material	KrF Grade Fused Silica	Crystal Quartz
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	244 nm	532 nm
Window Configuration	AR Coated	AR Coated
Static Transmission	>97 %	>99 %
Operating Frequency	110 MHz	250 MHz
Diffraction Efficiency	70 % With Linear Polarized Light Perpendicular to Acoustic Propagation	>70 %
Light Polarization		Linear, Perpendicular
Acoustic Aperture Size	2 mm	0.2 mm
Rise Time	110 ns / mm beam diameter	10 ns
Optical Waist Size to achieve Rise Time		0.09 mm
Deflection Angle	4.5 mrad	23 mrad
RF Power Level	<2 Watts	6 Watts
Impedance	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 110 MHz	<1.5:1 - 170 to 330 MHz
Package:	53B2921	53B1354
Recommended Driver:	21110-2AS 21110-2AM	31250-6AS 31250-6AM

	21110-2DS 21110-2DM	31250-6DS 31250-6DM

Model	**37027-3**	**37027-5**	**37027-8-10.6**
Interactive Material	Ge	Ge	Ge
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	10.6um	10.6um	10.6um
Optical power density	5Watt/mm2 max	5Watt/mm2 max	5Watt/mm2 max
Window Configuration	AR Coated	AR Coated	AR “V” Coated
Static Transmission	85 %	85 %	85 %
Operating Frequency	27.12 MHz	27.12 MHz	27.12 MHz
Diffraction Efficiency	>85%	>75%	>75%
Light Polarization	Linear, Parallel to acoustic propagation	Linear, Parallel to acoustic propagation	Linear, Parallel to acoustic propagation
Acoustic Aperture Size	3 mm	5 mm	8 mm
Rise Time	120 ns / mm	120 ns / mm	120 ns / mm
Deflection Angle	52 mrad @ 10.6um	52 mrad @ 10.6um	52 mrad @ 10.6um
RF Power Level	30 Watts	30 Watts	50 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 27.12 MHz	<1.2:1 @ 27.12 MHz	<1.2:1 @ 27.12 MHz
Package:	53B2220	53B2220	53B2220
Recommended Driver:	39027-30-DSA05	39027-35-DSA05	39027-50-DSA05

Model	**37040-5**	**37041-8-4.5**
Interactive Material	Ge	Ge
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	10.6um	4-5um
Optical power density	5Watt/mm2 max	
Window Configuration	AR Coated	AR Coated
Static Transmission	85 %	85 %
Operating Frequency	40 MHz	40.68 MHz
Diffraction Efficiency	>85%	>80% with Linear polarized light, Parallel to acoustic propagation
Light Polarization	Linear, Parallel to acoustic propagation	
Acoustic Aperture Size	5 mm	8 mm
Rise Time	120 ns / mm	120 ns / mm
Deflection Angle	78 mrad @ 10.6um	33 mrad @ 4.5um
RF Power Level	35 Watts	15 Watts
Impedance	50 Ohms	50 Ohms
VSWR	<1.2:1 @ 40 MHz	<1.2:1 @ 40.68 MHz
Package:	53B2220	53B2220
Recommended Driver:	39027-35-DSA05	39027-30-DSA05

Model	**47040-5-.7-RA**	**48060-8/4-1.0-COL**
Interactive Material	TeO2	TeO2
Acoustic Mode	Shear	Shear
Operating Wavelength	655-850nm	800-1200nm
Window Configuration	AR Coated	AR Coated
Static Transmission	95 %	95 %
Operating Frequency	40 MHz	84MHz @ 800nm, 74MHz @ 900nm 65.7MHz @ 1000nm, 60MHz @ 1100nm, 54MHz @ 1200nm
Diffraction Efficiency	>50% with Linear polarized light, Parallel to acoustic propagation	>85% with Linear polarized light, perpendicular to acoustic propagation
Acoustic Aperture Size	5 mm	8x2 mm
Rise Time	1us / mm	
Resolution		<1nm (best offer)
Deflection Angle	47 mrad	23 mrad (with respect to incident beam)

RF Power Level	0.6 Watts	100 mWatts
Impedance	50 Ohms	50 Ohms
VSWR	<1.2:1	<1.5:1 over bandwidth
Package:	53B3570	53B00337

Model	**MFS030-3S2C-5-6.5DEG**	**MFS030-3S2E-5-6.5DEG**	**MFS040-35/13S2C-3**
Interactive Material	TeO2	TeO2	TeO2
Acoustic Mode	Shear	Shear	Shear
Operating Wavelength	532nm	633nm	532nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	95 %	95 %	95 %
Operating Frequency	30 MHz	30 MHz	40 MHz
Diffraction Efficiency	>85% with linear polarization, parallel to acoustic propagation	>85% with linear polarization, perpendicular to acoustic propagation for up shift and parallel to acoustic propagation for down shift	>85% with linear polarization, random
Acoustic Aperture Size	3 mm	3 mm	35mm(H)x13mm(along acoustic propagation direction)
Rise Time	1us / mm	1us / mm	1us / mm
Deflection Angle	24 mrad	28 mrad	34.4 mrad
RF Power Level	<0.2 Watts	<0.8 Watts	<1.2 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<1.2:1	<1.2:1	<1.2:1
Package:	53B2024	53B2024	53A3286T04

Model	MFS050-3S2C-5-6.5DEG	MFS050-5S2E-5-6.5DEG	MFS080-35/5S2C-3
Interactive Material	TeO2	TeO2	TeO2
Acoustic Mode	Shear	Shear	Shear
Operating Wavelength	532nm	633nm	532nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	95 %	95 %	95 %
Operating Frequency	50 MHz	50 MHz	80 MHz
Diffraction Efficiency	>85% with linear polarization, parallel to acoustic propagation	>85% with linear polarization, perpendicular to acoustic propagation for up shift and parallel to acoustic propagation for down shift	>50% with linear polarization, random
Acoustic Aperture Size	3 mm	5 mm	35mm(H)x5mm(along acoustic propagation direction)
Rise Time	1us / mm	1us / mm	1us / mm
Deflection Angle	40 mrad	48 mrad	68.9 mrad
RF Power Level	<0.5 Watts	<1.5 Watts	<4 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<1.2:1	<1.2:1	<1.2:1
Package:	53B2024	53B2024	53A3286T04

Model	**MFS100-2C4BB-5**	**MFS160-5/13S2C-3**	**MFS400-.2C2V13-5**
Interactive Material	Fused Silica	TeO2	TeO2
Acoustic Mode	Longitudinal	Shear	Longitudinal
Operating Wavelength	300-400nm	532nm	650nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	95 %	95 %	95 %

Operating Frequency	80-120 MHz	160 MHz	350-450 MHz
Intensity Variation	<1.5dB		
Diffraction Efficiency	>85%, midband with linear polarization, perpendicular to acoustic propagation	>50% with linear polarization, random	>50%, midband with linear polarization, perpendicular to acoustic propagation
Acoustic Aperture Size	2 mm	5mm(H)x13mm(along acoustic propagation direction)	0.2mm
Recommended beam diameter			100um
□□Deflection Angle	2.4mrad @ 355nm	1us / mm for rise-time	15.2mrad
Deflection Angle	6 mrad @ 100MHz @ 355nm	138mrad	61mrad @ 400MHz
RF Power Level	<6 Watts	<2 Watts	<1 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<1.2:1 across bandwidth	<1.2:1	<1.2:1 across bandwidth
Package:	53B1428	53A3286T04	53B0504

Model	**MFS500-.2C2B26-5**	**MM200-.2C17B34-5**	**MPP389-.15C17G-C-FOA**
Interactive Material	TeO2	GaP	GaP
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	490-500nm	1.06-1.7um	1060nm
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	95 %	>75% @ 1.06um >80% @ 1.7um	75 %
Operating Frequency	450-550 MHz	200 MHz	389 MHz
Intensity Variation	<1.25dB		
Diffraction Efficiency	>65%, Midband with linear polarization, perpendicular to acoustic propagation	>55%@1.7um, >80% @ 1.06um with linear polarization, parallel to acoustic propagation	>56% @ 2.5W peak, >40% @ 1W CW with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	0.2 mm	0.2mm	0.15mm
Recommended beam diameter	100um		
Optical waist size to achieve rise time		100um to achieve 10ns rise-time	40um to achieve 4ns rise-time
□□Deflection Angle	11.6mrad @ 495nm		15.2mrad
Deflection Angle	58mrad @ 500MHz @ 495nm	138mrad @ 1.06um 51mrad @ 1.7um	62mrad @ 400MHz
RF Power Level	<0.8 Watts	<2 Watts	<2.5W with duty cycle limited to <20% with RF on duration <200ns <1 Watts average
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<2:1 across bandwidth	<1.5:1	<1.5:1
Package:	53B0504	53B0624T01	53B4475

Model	MTF096-2S2B43-3-1ST/-1ST	MTF096-2S2B43-3-1ST/-1ST-1.2	MTF096-2S2B43-3-1ST/-1ST-2.5
Interactive Material	TeO2	TeO2	TeO2
Acoustic Mode	Shear wave	Shear wave	Shear wave
Operating Wavelength	1.5-1.6um	1.5-1.6um	1.5-1.6um
Window Configuration	AR Coated	AR Coated	AR Coated
Static Transmission	95 %	95 %	95 %
Operating Frequency	70.7MHz @ 1.5um 65.0MHz @ 1.51um	98.89MHz @ 1.5um 98.21 MHz @ 1.51um	98.89MHz @ 1.5um 98.21 MHz @ 1.51um

	60.2MHz @ 1.52um 56.1MHz @ 1.53um 52.5MHz @ 1.54um 49.3MHz @ 1.55um 46.5MHz @ 1.56um 44.0MHz @ 1.57um 41.8MHz @ 1.58um 39.7MHz @ 1.59um 37.9MHz @ 1.6um	97.54MHz @ 1.52um 96.89MHz @ 1.53um 96.24MHz @ 1.54um 95.60MHz @ 1.55um 94.97MHz @ 1.56um 94.34MHz @ 1.57um 93.73MHz @ 1.58um 93.12MHz @ 1.59um 92.53MHz @ 1.6um	97.54MHz @ 1.52um 96.89MHz @ 1.53um 96.24MHz @ 1.54um 95.60MHz @ 1.55um 94.97MHz @ 1.56um 94.34MHz @ 1.57um 93.73MHz @ 1.58um 93.12MHz @ 1.59um 92.53MHz @ 1.6um
Diffraction Efficiency	>80%(both order combined) with random polarization	>80%(both order combined) with random polarization	>40%(both order combined) with random polarization
Input beam divergence	<5 deg solid angle	<5 deg solid angle	<8 deg solid angle
Acoustic Aperture Size	2 mm	2 mm	2 mm
Resolution	<1.2nm	<1.2nm	<2.5nm
Deflection Angle(with respect to input beam)	7.4 degree nominal	7.4 degree nominal	7.4 degree nominal
Angular speed	<0.15degree	<0.15degree	<0.15degree
RF Power Level	<4 Watts	<4 Watts	<3 Watts
Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR	<2:1 over bandwidth	<1.5:1	<1.5:1
Package:	53B2965	53B2965	53B2965

Model	I-M041-XXC11XX-P5-GH771	I-M041-10C11Q-P5-SY1	
Interactive Material	Germanium	Monocrystalline Germanium	
Operating Wavelength	9.4um or 10.6um	10.6um	
Damage threshold	>15W/mm2	<=5W/mm2	
AR coating reflectivity	<0.2% per surface	<=0.5% per surface	
Transmission	>96.5%	>=95%	
Acoustic Frequency	40.68MHz	40.68MHz	
Optical polarization	Linear, Horizontal (parallel to base)	Linear, horizontal (parallel to base)	
Active aperture	Up to 9.6mm	10mm	
Acoustic mode	Compressional		
Rise-time (10-90%)	120ns/mm		
Diffraction efficiency	>=90%	>=90%	
Max RF power	120W	100W	

Model	I-M080-2C10G-4-AM3	I-M080-2.5C10G-4-AM3	
Interactive Material	Crystal Quartz	Crystal Quartz	
Operating Wavelength	1030-1064nm	1030-1064nm	
Damage threshold	>1GW/cm2	>1GW/cm2	
AR coating reflectivity	<0.3% per surface	<0.3% per surface	
Transmission	>99.4%	>99.4%	
Acoustic Frequency	80MHz	80MHz	
VSWR	<1.2:1 at 0dBm	<1.2:1 at 0dBm	
Optical polarization	Linear (vertical to base)	Linear (vertical to base)	
Active aperture	2mm	2.5mm	
Acoustic mode	Compressional	Compressional	
Separation angle	14.9mrad	14.9mrad	
Rise-time (10-90%)	113ns/mm	113ns/mm	
Diffraction efficiency	>85% at 15W RF	>80% at 15W RF	
Max RF power	15W	15W	
Housing	Aluminium	Aluminium	
Cooling	Conduction	Conduction	

Model	97-03388-03R1 (5080-296)	97-03388-02R2 (5041-296)
Interactive Material	Crystal Quartz	Crystal Quartz
Operating Wavelength	1064nm	1064nm
Damage threshold	>500MW/cm2	>500MW/cm2
AR coating reflectivity	<0.2% per surface	<0.2% per surface
Transmission	>99.6%	>99.6%
Acoustic Frequency	80MHz	40.48MHz
VSWR	<1.2:1	<1.2:1, 50Ohm
Optical polarization	Random or linear (vertical to base)	Random or linear (vertical to base)
Active aperture	1.5mm	1.5mm
Acoustic mode	Compressional	Compressional
Separation angle	14.8mrad	7.6mrad
Rise-time (10-90%)	113ns/mm	113ns/mm
Diffraction efficiency	>85% (vertical/linear polarization)) >70% (Random/linear polarization)	>85% (vertical/linear polarization)) >70% (Random/linear polarization)
Max RF power	20W	20W
Housing	97-03388	97-03388