

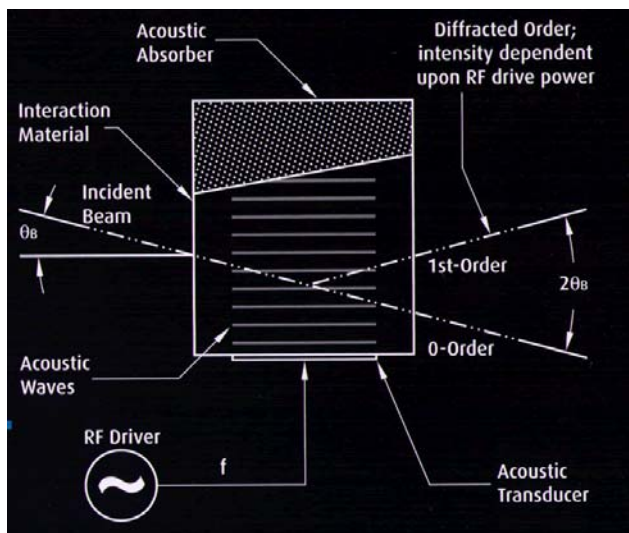
Acousto-Optic Modulators

By virtue of having no moving parts our acousto-optic modulators (AOMs) are able to amplitude modulate a laser beam at very high speed. For example modulation bandwidths in excess of 50MHz are readily achievable.

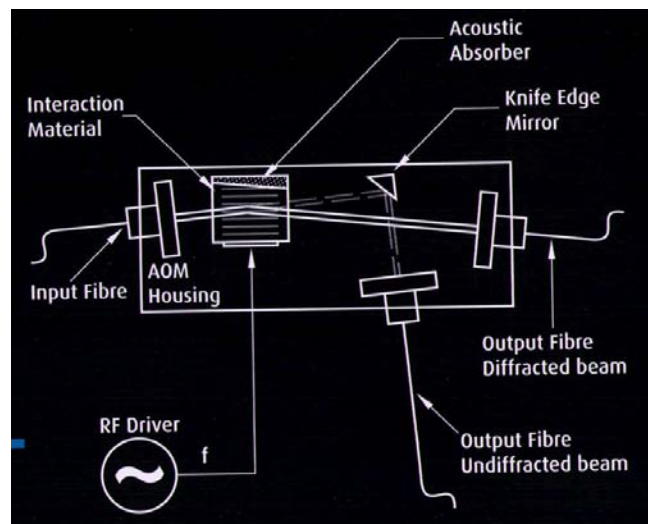
In an AOM a laser beam is caused to interact with a high frequency ultrasonic sound wave inside an optically polished block of crystal or glass (the interaction medium). By carefully orientating the laser with respect to the sound waves the beam can be made to reflect off the acoustic wavefronts (Bragg 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 than 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.

AOM, AOBD, AOTF, PCAOM, QSW, FO:

Optional		optional		optional		optional		optional		optional		optional		optional																		
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	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑																	
	Non-RoHS	Device			Aperture in mm	Material Code			Water Connection	RF Connector					FO Connector																	
Location	Frequency in MHz				Acoustic mode Code: C = Compressional S = Shear		Wavelength Code				- Variant -																					
Location Code: I: Ilminster M: Melbourne N: Norderstedt T: Torquay	Device Code: CD: Cavity Dumper FS: Frequency Shifter ML: Mode Locker TF: Tunable Filter D: AO Beam Deflectors M: Modulator QS: Q-Switch QD: Integrated Q-Sw / Driver MS: Bragg Mount FA: Focusing Assembly Optics / Mount ZR: Zero order re-combiner				Material Code: 1 PbMoO ₄ 10 Crystal Quartz 2 TeO ₂ 11 Germanium 3 SF6 12 Lithium Niobate 4 Fused Silica 13 F2 5 SF10 14 Potassium Yttrium Tungstate 6 SF57 15 KDP 7 SF2 16 Si 8 Amtrir-1 17 GaP 9 SF8 18 GLS				Wavelength Code: A 442 nm W 780 nm BA 250 – 400 nm BS 1000 – 1500 nm B 488 nm X 850 nm BB 300 – 400 nm BT 1064 – 1300 nm C 532 nm Y 946 nm BC 400 – 700 nm BU 1064 – 1550 nm D 543 nm Z 1230 nm BD 450 – 850 nm BV 1064 – 2100 nm E 633 nm V1 1342 nm BE 450 – 950 nm BW 1300 – 1600 nm F 800 nm V2 1640 nm BF 470 – 850 nm BX 1800 – 2200 nm G 1064 nm V3 1940 nm BG 600 – 1200 nm BY 1800 – 4000 nm H 1319 nm V4 1990 nm BH 670 – 900 nm BZ 1850 – 2500 nm J 1550 nm V5 2000 nm BJ 700 – 900 nm B1 1900 – 2200 nm K 532 / 1064 nm V6 2022 nm BK 700 – 1200 nm B2 2000 – 3000 nm L 1660 nm V7 2090 nm BL 725 – 825 nm B3 2400 – 2600 nm M 2130 nm V8 2100 nm BM 800 – 1100 nm B4 2650 – 2900 nm N 488 - 633 nm V9 1030 nm BN 900 – 1500 nm B5 3000 – 4000 nm P 2.5 μm – 3.5 μm Q 10.6 μm BP 900 – 2000 nm B6 Q 10.6 μm R Brewster R1* 244-260nm BQ 950 – 1700 nm B7 S 930 nm R2* 300-550nm BR 950 – 1850 nm B8 T 355 nm R3* B9 U 244 nm * Brewster - Limited by Design V 405 nm				Water Connection Code: None Air Cooled (No Water Connection) B: Barbed Push on F: Festo CN-M-5-PK-4-59 J: Screw on with Jaco nylon nuts K: KOH 04-M5 SMC Push on L: Landwehr connector M: MS-5H-6 SMC N: 4mm OD Straight Legris 3106 04 00 P: 6mm OD Straight Legris 3106 04 06 Q: 4mm OD Right Angle Legris 3102 04 00 U: 6mm OD Right Angle Legris 3102 04 06 R: Right angle S: Swagelok Screw on T: Heater / Cooler (TE) W: 3.2 mm SMC Push in				RF Connector Code: 1: SMB Fm BH 2: SMC Fm BH 3: SMA Fm BH 4: SMA Fm Pig Tail 5: BNC Fm BH 6: Right Angle SMA Fm BH 7: Right Angle BNC Fm BH 8: SMA Male Pig Tail 9: BNC Male Pig Tail C: BNC Female Pig Tail Fm = Female BH = Bulk Head				Variant 1 Customer Code and a Number = xxn Variant 2 Fiber Coupled = F and a number (ports) followed by: S = Single Mode Fiber M = Multi- Mode Fiber P = Polarization maintaining Fiber H = High Power Option L = Large Area Single Mode Fiber				Variant 3 FA / MS Focusing Assembly Optics / Bragg Mount WP = Weather Proof				FO Connector Code: A: FC/APC B: FC/PC C: SC/PC D: SC/APC			

1. Free-space Acousto-optical Modulators

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 analogue 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.

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-M041-2.5C10G-4-GH50	1030-1064nm, 40.68MHz, 113ns/mm rise time, 2.5mm aperture, RF<20W	
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,	21210-1xx

	deflection 31mrad, RF1W	
15210-FOA	TeO ₂ , 440-850nm wavelength, 210MHz, aperture 0.2mm, deflection 31mrad, RF1W	21210-1xx
15260	TeO ₂ , 440-850nm wavelength, 260MHz, aperture 0.2mm, deflection 39mrad, RF0.7W	21260-.7xx
15260-FOA/71002	TeO ₂ , 440-850nm wavelength, 260MHz, aperture 0.2mm, deflection 39mrad, RF1W	21260-1xx
15260-FOA	TeO ₂ , 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	TeO ₂ , 700-1064nm wavelength, 389MHz, aperture 70um, deflection 73mrad, RF 0.7W	11389-5AM, 64389.5-SYN-9.5-X
17389-.93-FOA	TeO ₂ , 700-1064nm wavelength, 389MHz, aperture 70um, deflection 73mrad, RF 0.7W	11389-5AM, 64389.5-SYN-9.5-X
17440	TeO ₂ , 440-850nm wavelength, 440MHz, aperture 90um, deflection 65mrad, RF 0.8W	11440-.8Ax
17440-FOA	TeO ₂ , 440-850nm wavelength, 440MHz, aperture 90um, deflection 65mrad, RF 0.8W	11440-.8Ax
23080-1-LTD	TeO ₂ , 440-850nm wavelength, 80MHz, aperture 1mm, 150 ns / mm rise time, deflection 11.88mrad, RF 1W	21080-1xx
23080-1-.85-LTD	TeO ₂ , 700-1000nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 16mrad, RF 1W	21080-1xx
23080-1-1.06-LTD	TeO ₂ , 1064nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 20mrad, RF<1.25W	21080-1xx
23080-1-1.06/1.3-LTD	TeO ₂ , 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	TeO ₂ , 1300nm wavelength, 80MHz, aperture 1mm, 150ns/mm rise time, deflection 25mrad, RF<1.25W	21080-1xx
23080-1-1.55-LTD	TeO ₂ , 1550nm wavelength, 80MHz, 1mm aperture, 150ns/mm rise time, deflection 29mrad, RF<2W	21080-2xx
23080-2-LTD	TeO ₂ , 440-850nm wavelength, 80MHz, aperture 2mm, 150ns/mm rise time, deflection 11.88mrad @ 633nm, RF 1W	21080-1xx
23080-2-.85-LTD	TeO ₂ , 700-1000nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 15mrad @ 850nm, RF<2W	21080-2xx
23080-2-1.06-LTD	TeO ₂ , 1064nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 20mrad, RF<2W	21080-2xx
23080-2-1.3-LTD	TeO ₂ , 1300nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 24.4mrad, RF<3.2W	21080-3xx
23080-2-1.55-LTD	TeO ₂ , 1550nm wavelength, 80MHz, 2mm aperture, 150ns/mm rise time, deflection 29mrad @ 1550nm, RF<3.2W	21080-3xx
23080-3-LTD	TeO ₂ , 440-850nm wavelength, 80MHz, aperture 3mm, 150ns/mm risetime, deflection 11.88mrad @ 633nm, RF<1.2W	21080-1.2xx
23080-3-.85-LTD	TeO ₂ , 700-1000nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 16mrad @ 850nm, RF 2W	21080-2xx
23080-3-1.06-LTD	TeO ₂ , 1064nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 20mrad, RF<2W	21080-2xx
23080-3-1.3-LTD	TeO ₂ , 1300nm wavelength, 80MHz, 3mm aperture, 150ns/mm risetime, deflection 24.4mrad, RF<4W	21080-4xx
23110-.5	TeO ₂ , 440-850nm wavelength, 110MHz, 0.5mm aperture, 150ns/mm risetime, deflection 16.3mrad @ 633nm, RF<1W	21110-1xx
23110-1-LTD	TeO ₂ , 440-850nm wavelength, 110MHz, 1mm aperture, 150ns/mm risetime, deflection 16.34mrad @ 633nm,	21110-1xx

	RF<1W	
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 20.6mrad @ 1550nm, RF<0.5W	21035-0.5xx
26055-1-1.55-LTD	AMTIR, 1300-1600nm wavelength, 55MHz, 1mm aperture, 260ns/mm risetime, deflection 32.4mrad @ 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 52mrad, 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 52mrad, RF 50W	39027???
37040-5	Ge, 10.6um wavelength, 40MHz, aperture 5mm, deflection 78mrad, RF 35W	39040-35DSA05-A
37041-8-4.5	Ge, 4-5um wavelength, 40.68MHz, aperture 8mm, deflection 33mrad, 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	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 532nm, 160MHz, 5x13mm aperture, 1us/mm risetime, deflection 138mrad, RF<2W	
MFS400-.2C2V13-5	TeO ₂ , 650nm, 350-450MHz, 0.2mm aperture, deflection 15.2mrad, deflection 61mrad @ 400MHz, RF<1W	
MFS500-.2C2B26-5	TeO ₂ , 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	TeO ₂ , 1.5-1.6um, 52.5-56.1MHz, 2mm aperture, deflection 7.4degree, RF<4W	
MTF096-2S2B43-3-1ST/-1ST-1.2	TeO ₂ , 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	TeO ₂ , 1.5-1.6um, 92.53-98.89MHz, 2mm aperture, resolution 2.5nm, deflection 7.4degree, RF<4W	
I-M041-xxC11xxx-P5-GH771	Germanium, 9.4um or 10.6um, 40.68MHz, up to 9.6mm aperture, RF power 120W	HP041-125ADG-A10
I-M041-10C11Q-P5-SY1	Monocrystalline 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	

2. Fiber-coupled Acousto-optical Modulators

Our standard fibre-coupled AOMs (FCAOM) are listed below. If you would like to see a detailed technical data sheet just go on the relevant model number. If you do not see a device that meets your requirements please contact one of our engineers. We manufacture application-specific AOMs and would be pleased to design one that meets your needs.

The devices listed are aimed at fibre-optic telecommunications applications but we can also offer fibre-coupled versions of our standard AOMs, if required. If you are considering a non-standard device, or are just not sure which of the listed devices would suit you best, you may find it useful to email us with your questions.

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

- Wavelengths: 1310nm or 1550nm



- Drive Frequencies: 40MHz, 80MHz or 110MHz
- 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.

Model	Description	Driver
T-M040-0.5C8H-3-F2S	1310nm (1285~1325nm), RF frequency 40MHz, average optical power handling $\leq 1W$, 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 $\leq 1W$, 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 $\leq 1W$, 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 $\leq 3W$, 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 $\leq 3W$, 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 $\leq 2W$, 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 $\leq 2W$, 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 $\leq 3W$, 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 $\leq 3W$, 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 $\leq 3W$, 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 $\leq 1W$, PM fiber 2m	
MM065-1C2V5-5-F2XY-Z	TeO ₂ , 2um, 65MHz, random, rise time 75ns, RF $\leq 4W$, single mode fiber 9/125 or PM fiber 8/125	31065-4xx
MM065-1C2V12-5-F2XY-Z	TeO ₂ , 1.95um, 65MHz, random, rise time 100ns, RF $\leq 4W$, 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 polarisation, 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 polarisation, rise/fall time 10ns, 6/125 PM fiber, 200MHz, RF 2W	21200-2xx

23050-1-1.95-LTD-FO-2HP-PM-CSF	TeO ₂ , 1950nm wavelength, 50MHz, linear polarized, 100ns risetime, PM fiber GDF 10/130um, 0.15/0.46NA, RF<4W	
23080-1-.85-LTD-FO	TeO ₂ , 850nm wavelength, 80MHz, random, 50ns risetime, single mode or PM fiber 5/125, RF<1W	
23080-1-1.06-LTD-FO	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 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	TeO ₂ , 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])

AOMB 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
AOMBTEM-110-10-55-2FP	380-1600	110	55	10	SM or PM
AOMBTEM-200-25-20-2FP	380-1600	200	20	25	
AOMBTEM-250-50-10-2FP	380-1600	250	10	50	
AOMBTEM-500-100-5-2FP	380-1600	500	5	100	
AOMBIPM-200-25-20-2FP	1000-2100	200	20	25	
AOMBIPM-500-100-5-2FP	1000-2100	500	5	100	
AOMBAMM-55-8-70-2FP	1000-2500	55	70	8	
AOMBAMM-100-20-25-2FP	1000-2500	100	25	20	

RF Drivers for AOMB Series Fiber-coupled AOM

Model	AOMBD-FFA-XX0B1-FY	AOMBD-FFA-XX-B2-FY
Output Frequency	XX MHz (compatible with the AO device	
Frequency control	Quartz crystal referenced phase locked loop	
Frequency Accuracy	0.015	
Harmonic Content (dBc)	<=-20	
Frequency Stability	0.0015% minimum after 15 minute warmup	
Output power	Power is optimised for peak efficiency with supplied AO device	
Output protection	Power amplifiers used will tolerate an infinite VSWR without damage. Rated power is available only when a proper RF load is connected	
Rise/Fall Time	To match AOM requirements	
Modulation Type	Analog amplitude modulation	TTL compatible
Modulation Rate	To match AOM requirements	
Modulation Input	50 ohm 0-1V	330ohm; 0-5V
Operating Power	90-250 VAC, 50-60Hz, 55 W max	
Enclosure	The unit will be packaged in a 190mm (7.5inch) wide by 90mm (4inch) high by 220,, (8,75inch) deep instrument case. The rear panel heat sink increases the depth to 240mm(9.75inches) maximum. The size is exclusive of connectors	
Environmental	Nominal Lab conditions: Max temperature is +35 degC. The unit is not seals against moisture or condensing humidity	

AOMR Series Fiber Coupled AOM

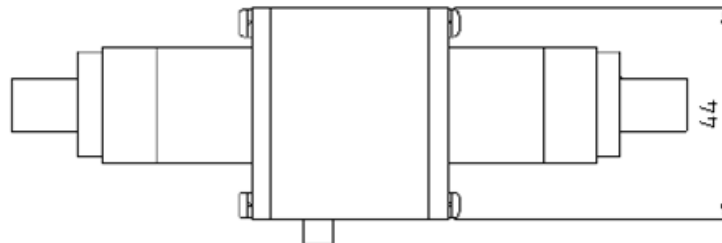
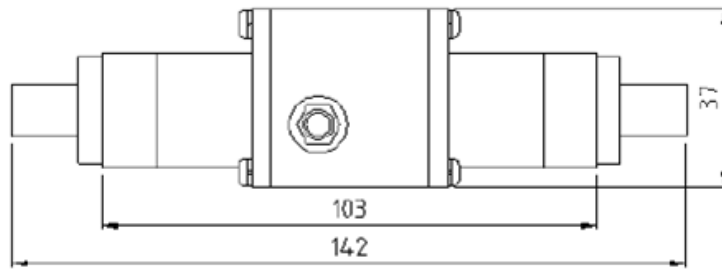


Part Number	AOMR-80	AOMR-120
Interactive Material	TeO ₂	TeO ₂
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	1064nm	1064nm
Operating Frequency	80MHz	120MHz
Fiber Type	Single mode Hi 1060, 0.5m long	Single mode 10/125, 0.5m long
Insertion Loss	<2.0dB	<2.0dB
On/off Contrast Ratio	>40dB	>40dB
Throughout Laser Power	>3W CW (>5kW pulsed)	>3W CW (>5kW pulsed)
Light Polarization	Random	Random
RF Power Level	>1.5W	>2W
Impedance	50 Ohm	50 Ohm
VSWR	<1.2:1@ 80MHz	<1.2:1@ 120MHz
Mechanical Dimensions	142mm×44mm×37mm	139mm×56.5mm×25.5mm
RF Driver	AOMD-80-1.5	AOMR-120-2

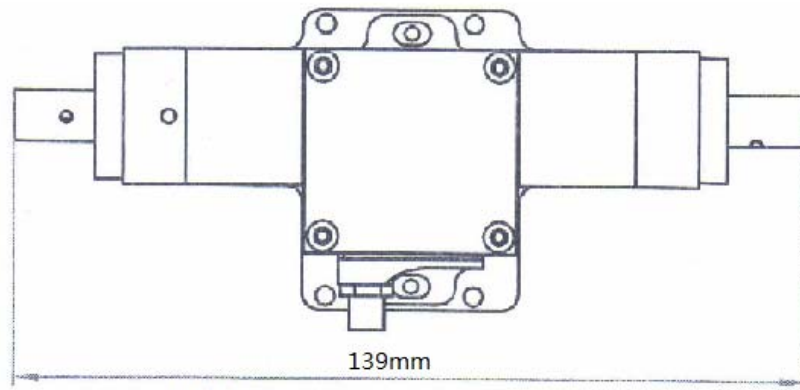
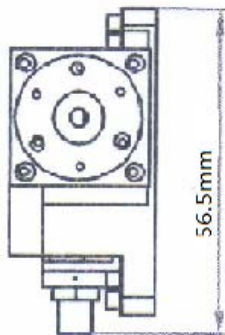
RF Driver for AOMR Series Fiber Coupled AOM

Model	AOMD-80-1.5	AOMD-120-2
AOM	AOMR-80	AOMR-120
Output Frequency	80.000 MHz + 0.01% Quartz Stabilized	120.000 MHz + 0.01% Quartz Stabilized
Spurious Levels	-50 dBc Maximum	-50 dBc Maximum
Harmonic Distortion	-15 dBc Maximum	-15 dBc Maximum
Modulation Input	TTL, High Level: Full RF Power, Low Level: Minimum RF Power	TTL, High Level: Full RF Power, Low Level: Minimum RF Power
Extinction Ratio	50 dB Minimum	50 dB Minimum
RF Rise	200ns Maximum, PRF: 10 to 90 %	200ns Maximum, PRF: 10 to 90 %
Fall Time	20 ns Maximum, PRF: 90 to 10 %	20 ns Maximum, PRF: 90 to 10 %
RF Output Power	>1.5 Watts, Factory Set for Optimum Performance	>2 Watts, Factory Set for Optimum Performance
Output Impedance	50 Ohms Nominal	50 Ohms Nominal
Supply Voltage	+ 24 VDC±0.5 Volt	+ 24 VDC±0.5 Volt
Supply Current	1 Amp Maximum	1.5 Amp Maximum
Mechanical Dimensions	114mm×58mm×30mm	114mm×58mm×30mm
MAXIMUM RATINGS:		
Supply Voltage	+ 28 Volts	+ 28 Volts
Power Output	No DC Feedback Allowed	No DC Feedback Allowed
Case Temperature*	+ 55° C	+ 55° C
*The Driver Must Be Attached to an Adequate Heatsink.		
CONNECTORS & MECHANICAL:		
RF Output Connector	SMA Female	SMA Female
Modulation Input connector	Wire	Wire
Power Supply connections	Wire	Wire

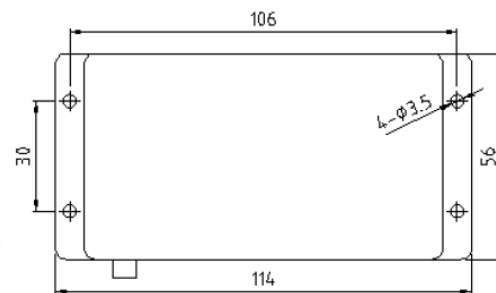
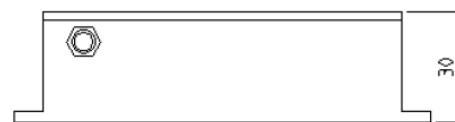
Dimensions:



AOMR-80



AOMR-120



AOMM Series Fiber Coupled AOM



Specifications:

Parameters	Unit	AOMM-①-②-③-④-⑤		
Central wavelength	nm	1064	1550	2000
Wavelength range	nm	±5	±5	±5
Typ. Insertion loss	dB	1.2	2.0	2.0
Max insertion loss	dB	1.5	3.0	3.0
Min isolation	dB	50	50	50
Min return loss	dB	50	50	50
Optical power CW	W	2	5	10
Min polarization extinction ratio	dB	20 (PM fiber)	20 (PM fiber)	20 (PM fiber)
Peak power	kW	10	10	10
RF power	W	2	2	2
RF frequency	MHz	35/40/60/80/100/120/150/200		
VSWR	MHz	<1.2:1 (50ohm)		
Tensile load	N	5		
Fiber type	/	9/125, 10/125, 15/130, 20/130 or others		
Fiber length	m	1		
Operating temperature	°C	5-50		

Ordering code:

AOMM-①-②-③-④-⑤

①: Wavelength in nm, 1064, 1550, 2000

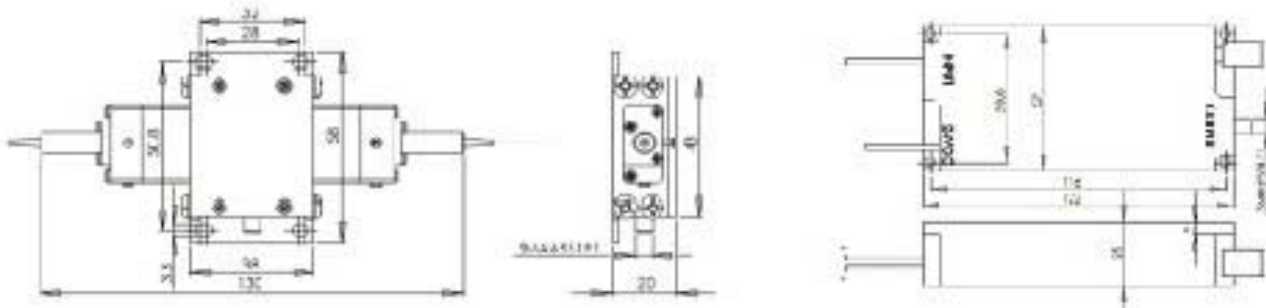
②: Frequency in MHz, 35, 40, 60, 80, 100, 120, 150, 200

③: Fiber type, L06-6/125, L09-9/125, L10-10/125 DCF, L12-12/125 DCF, P06-PM98, P09-PM1550, P10-PM10/125 DCF, S-Specify

④: Fiber jacket on In&Out, B-Bare fiber, L-900um loose fiber, C-3mm loose fiber, S-Specify

⑤: Fiber length: 10-1.0m

Dimensions:



3. AOM Drivers

	31xxx-yyAM 31xxx-yyDM	MLPxxx-yAC MLPxxx-yAS MLPxxx-yDC MLPxxx-yDS (21xxx-yAM 21xxx-yDM)	1xxxAF-AINA-y HCR 1xxxAF-DINA-y HCR (A35xxx-S-1/50-p4k7u)	A36xxx
RF power, W	2-20W	0.4, 1 or 2W	0~5W (Analogue)	2W
RF frequency, MHz	24-260	27-300	80, 100, 110, 150, 200, 250, 300, 350	
Max. modulation frequency, MHz			<1/3 carrier frequency and <50MHz	
Input modulation	Analogue or digital		Analogue and digital	

Description of N series drivers:

xxx = a fixed frequency of between 27 and 300 MHz crystal controlled.
y = 0.4, 1, or 2 Watts output (N21 series), 2-20W adjustable output (N31 series)
D = Digital Modulation or **A** = Analogue Modulation
M = OEM Module

Description of A35xxx and A36xxx series drivers:

- Low profile housing
- Various standard frequencies, other frequencies from 80 to 350 MHz available
- Analogue and digital modulation
- EMC-safe design, power stage and control circuits separately grounded, entirely shielded
- Supply voltage 24VDC

Type	RF Power [W]	Standard Frequencies [MHz]								RF on/off ratio guaranteed at any RF output level
		80	100	110	150	200	250	300	350	
		<i>080</i>	<i>100</i>	<i>110</i>	<i>150</i>	<i>200</i>	<i>250</i>	<i>300</i>	<i>350</i>	
A36 ___	2	✓	✓	✓	✓	✓	✓	✓	✓	TBD
A35 ___	5	✓	✓	✓	✓	✓	✓	✓	✓	≥ 65 dB

4. Connector Set for A35xxx & A36xxx series AOM Driver

This accessory provides the connection of the analogue and digital modulations interface as well as the power connection for the A35xxx and A36xxx AOM driver series.

It comprises the fully shield plug and 1 meter pigtailed. The RF connecting cable between the RF driver and the AOM is not included.

Ordering Code : 508A00169

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 10 μ s 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: $\pm 5^\circ$
 Frequency: 80MHz
 Input Impedance: 50 Ω
 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.

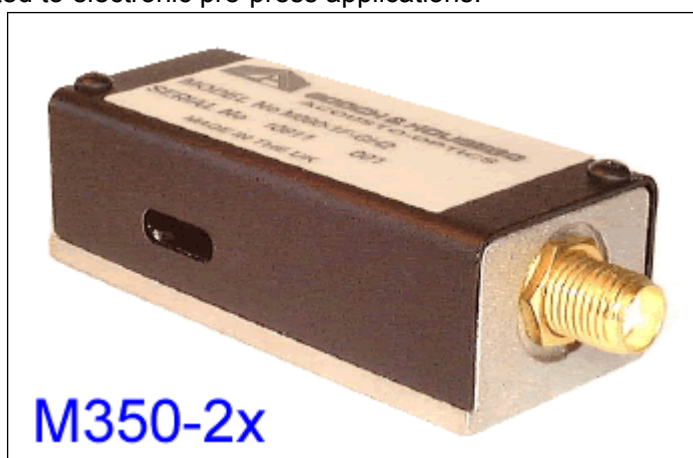
Available in three models, one each for red, green and blue, high efficiency coupled with excellent transmitted beam quality make it particularly suited to electronic pre-press applications.

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 +60°C
Storage Temperature: - 15 to +65°C



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

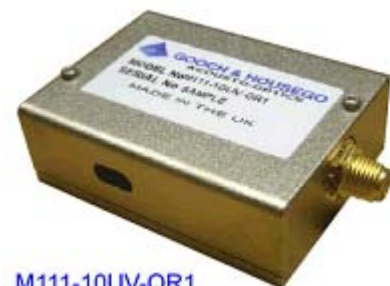
A35111, N31111-3.5DM or N31111-3.5AM

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.



M110-10UV-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



M200-4A-GH11

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: $\leq 0.5\%$ 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: 50 Ω
 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:	90 μ m	90 μ m	120 μ m
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

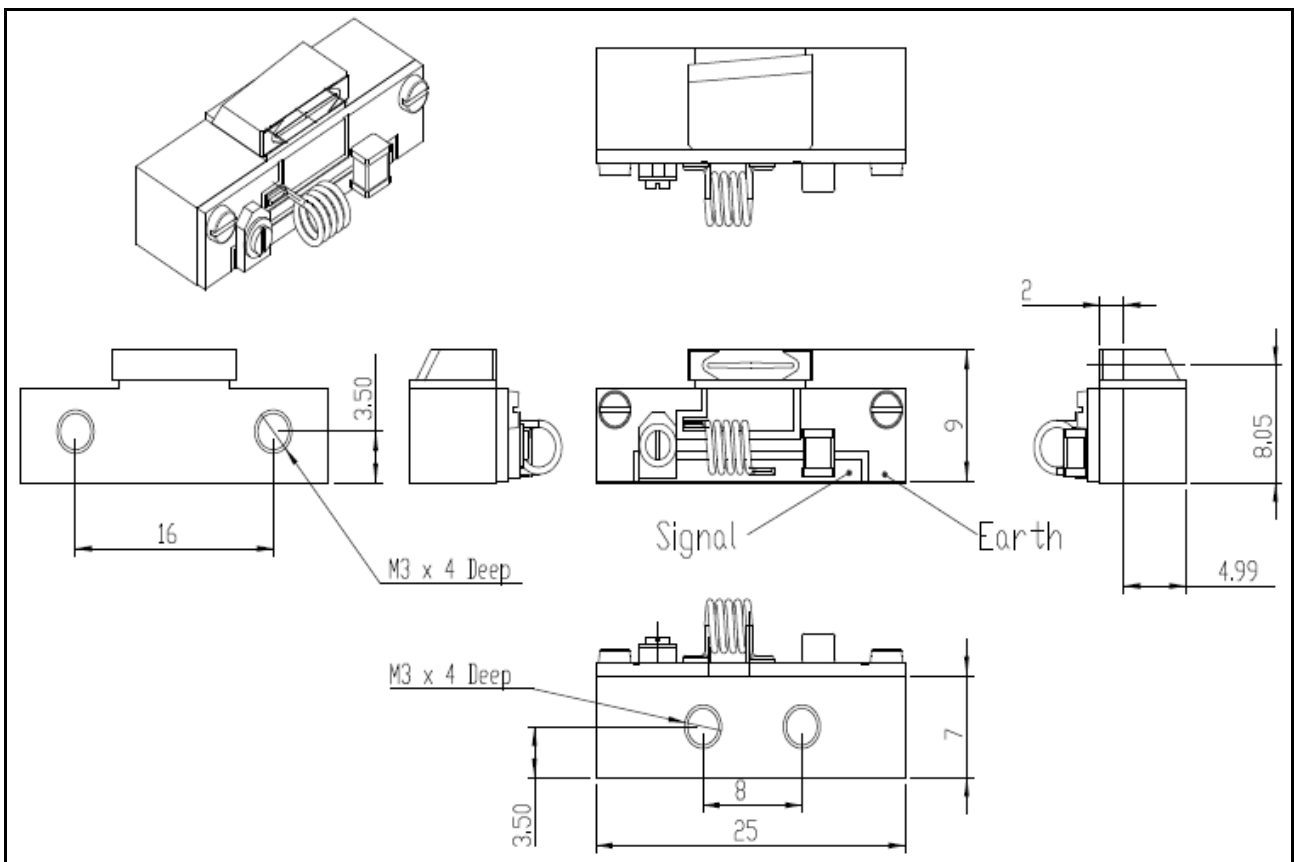
1.10 M080-2B/F-GH2

Device	AO Modulator
Interaction Material	Tellurium Dioxide
RF Frequency	80MHz
Wavelength	480 - 800nm
AR Coating Reflectivity	$\leq 0.5\%$ /surface
Transmission	$\geq 95\%$
Input Polarisation	Any
Active Aperture	2.0mm
Diffraction Efficiency	$\geq 85\%$
Risetime	155ns / mm
RF Input Impedance	50 Ω

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/cm ² (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



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.

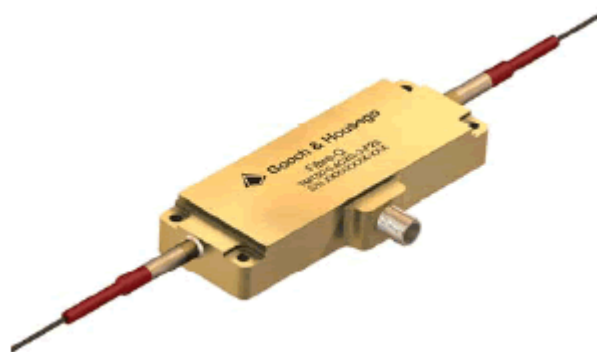
The 'Fibre-Q' Acousto-Optic Modulator is designed for use in pulsed fibre laser amplifier systems. In addition to the standard product shown, custom configurations are available for specialized applications.

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:	TeO ₂	TeO ₂
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:	TeO ₂	TeO ₂
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:	TeO ₂	TeO ₂
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:	TeO ₂	TeO ₂
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:	TeO ₂	TeO ₂
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:	TeO ₂	
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	TeO ₂	TeO ₂
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	TeO ₂	TeO ₂
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	TeO ₂	TeO ₂
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 $\pm 0.5^\circ$	Symmetrical to the left and right of the straight through direction $\pm 0.5^\circ$
Vertical angle of deflection	<2mrad with respect to straight through	<2mrad with respect to straight through
Angle between input beam and housing	$90^\circ \pm 1^\circ$	$90^\circ \pm 1^\circ$
Max diffraction efficiency	>90% @ 532nm	>90% @ 635nm
Supply voltage	+5VDC ($\pm 10\%$)	+5VDC ($\pm 10\%$)
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/cm ²	> 1GW/cm ²
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 $\pm 0.5^\circ$	CW power handling: > 500KW/cm ²
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	TeO ₂	TeO ₂
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 90° to input)	Linear and orthogonal to input and zero beams
Angle between 0/1st order	6.45°	< 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	TeO ₂
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/cm ² (pulsed)	>500MW/cm ² (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/cm ² (pulsed)	>500MW/cm ² (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	TeO ₂	TeO ₂	TeO ₂
Wavelength	1064nm	1064nm	1064nm
AR coating reflectivity	<0.2% per surface	<0.2% per surface	<0.3% per surface
Damage threshold	>50MW/cm ² (pulsed)	>50MW/cm ² (pulsed)	>50MW/cm ² (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	TeO ₂				TeO ₂			
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/mm ²				250W/mm ²			
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	TeO ₂				TeO ₂			
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/mm ²				250W/mm ²			
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	24	15.8	6.3	28	24	15.8	
	20	10	5	1	20	9	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			
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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	40	31	26.5	21.0			
	15	8	4	2				
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/mm ²				250W/mm ²			
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	TeO ₂				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/cm ²				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	SiO ₂	SiO ₂
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 μ m
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	SiO ₂	SiO ₂
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specification shown for 1.06 μ m	1.06 μ m
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 μ m	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	SiO ₂	SiO ₂
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications shown for 1.06 μ m	1.06 μ m
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 μ m	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	SiO ₂	SiO ₂
Acoustic Mode	Longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications	1.06 μ m

	shown for 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	SiO ₂	GaP
Acoustic Mode	longitudinal	Longitudinal
Operating Wavelength	Used for Various λ Specifications shown for 633 nm	1.06 μm
Window Configuration	Brewster, $\lambda/10$ 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 mrad
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	TeO ₂	TeO ₂	TeO ₂
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 μ m	55 μ m	55 μ m
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	TeO ₂	TeO ₂	TeO ₂
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 μ m	0.055 mm	55 μ m
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	TeO ₂	TeO ₂
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	1.06 μ m	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 μ m	70 μ m	70 μ m

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 μ m	35 μ m	35 μ m
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	TeO ₂	TeO ₂
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 μ m	90 μ m
Rise Time	4 ns	4 ns
Optical Waist Size To Achieve Rise Time	19 μ m	19 μ m
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	TeO ₂	TeO ₂	TeO ₂
Acoustic Mode	Longitudinal	Longitudinal	Longitudinal
Operating Wavelength	440-850nm	700-1000nm	1064nm
Window Configuration	AR coated	AR coated	AR coated
Static Transmission	\geq 95%	>97%	>97%
Operating Frequency	80 MHz	80 MHz	80 MHz
Diffraction Efficiency	\geq 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	\leq 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	TeO ₂	TeO ₂	TeO ₂
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	TeO ₂	TeO ₂	TeO ₂
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	TeO ₂	TeO ₂	TeO ₂
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, Perpendicular to acoustic propagation	>70% With Linear Polarized Light, Perpendicular to acoustic propagation	>70% With Linear Polarized Light, 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 21110-2DS 21110-2DM	31250-6AS 31250-6AM 31250-6DS 31250-6DM
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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/mm ² max	5Watt/mm ² max	5Watt/mm ² 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/mm ² 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	TeO ₂	TeO ₂
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 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	98.89MHz @ 1.5um 98.21 MHz @ 1.51um 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	98.89MHz @ 1.5um 98.21 MHz @ 1.51um 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/mm ²	<=5W/mm ²	
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/cm ²	>1GW/cm ²	
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	

Acousto Optical Deflectors

An AO Deflector is a device that will scan an optical beam over a range of angles or accurately control the output angle of the beam. By altering the RF drive frequency to the Deflector, the deflection angle, i.e. the angle through which the diffracted beam is deviated, can be varied.

Effective AO Deflector design is complex, and involves choices of acousto-optic materials and the appropriate acoustic-mode depending upon the application. Commonly, resolution is the most important parameter for a deflector. However, high resolution generally comes at the expense of other parameters such as access time and efficiency. Thus it is important to effectively trade off the various performance requirements.

Gooch & Housego's strong team of scientists and engineers are available to assist you in selecting one of our standard products or providing a custom solution.

Typical applications include; Photolithography, laser tweezers, optical scanning, optical inspection and digital imaging.

Model	Brief Description	Recommended Driver
45035-3-6.5DEG-1.06	TeO ₂ , 1064nm wavelength, 25-45MHz, 3mm aperture, 32mrad deflection, 90 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 64025-45-2ASVCO-1 64025-45-2AMVCO
45035-3-6.5DEG-1.06-XY	TeO ₂ , 1064nm, 25-45MHz, 3mm aperture, 32mrad deflection, 90 spots resolution, 2W RF	64020-200-2ADSDFS-A-2 64020-200-2ADMDFS-A (2X) 64025-45-2ASVCO-2 64025-45-2AMVCO (2X)
45035-5-6.5DEG-1.06	TeO ₂ , 1064nm, 25-45MHz, 5mm aperture, 56mrad deflection, 150 spots resolution, 4W RF	64020-200-4ADSDFS-A 64020-200-4ADMDFS-A 64025-45-4ASVCO-1 64025-45-4AMVCO
45035-5-6.5DEG-1.06-XY	TeO ₂ , 1064nm, 25-45MHz, 5mm aperture, 56mrad deflection, 150 spots resolution, 4W RF	64020-200-4ADSDFS-A-2 64020-200-4ADMDFS-A (x2) 64025-45-4ASVCO-2 64025-45-4AMVCO (x2)
45050-5-6.5DEG-.8	TeO ₂ , 780-850nm, 35-65MHz, 5mm aperture, 65mrad deflection, 225 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21035-65-2ASVCO-1 21035-65-2AMVCO
45050-5-6.5DEG-.8-XY	TeO ₂ , 780-850nm, 35-65MHz, 5mm aperture, 65mrad deflection, 225 spots resolution, 2W RF	64020-200-2ADSDFS-A-2 64020-200-2ADMDFS-A (x2) 21035-65-2ASVCO-2 21035-65-2AMVCO (x2)
45050-6-.83	TeO ₂ , 780-850nm, 35-65MHz, 6mm aperture, 68mrad deflection, 291 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 64035-65-2ASVCO-1 64035-65-2AMVCO
45070-5-6.5DEG-.63	TeO ₂ , 633nm, 50-90MHz, 5mm aperture, 67mrad deflection, 300 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21050-90-2ASVCO 21050-90-2AMVCO
45070-5-6.5DEG-.63-XY	TeO ₂ , 633nm, 50-90MHz, 5mm aperture, 67mrad deflection, 300 spots resolution, 2W RF	64020-200-2ADSDFS-A-2 64020-200-2ADMDFS-A (2x) 64050-90-2ASVCO-2 64050-90-2AMVCO (2x)
45070-6	TeO ₂ , 633-850nm, 50-90MHz, 6mm aperture, 72mrad deflection, 388 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 64050-90-2ASVCO-1 64040-90-2AMVCO
45100-5-6.5DEG-.51	TeO ₂ , 440-530nm, 75-125MHz, 5mm	64020-200-2ADSDFS-A

	aperture, 78mrad deflection, 375 spots resolution, 2W RF	64020-200-2ADMDFS-A 64075-125-2ASVCO-1 64075-125-2AMVCO
45100-5-6.5DEG-.51-XY	TeO ₂ , 440-530nm, 75-125MHz, 5mm aperture, 78mrad deflection, 375 spots resolution, 2W RF	64020-200-2ADSDFS-A-2 64020-200-2ADMDFS-A (X2) 64075-125-2ASVCO-2 64075-125-2AMVCO (x2)
45100-6	TeO ₂ , 440-530nm, 75-125MHz, 6mm aperture, 87mrad deflection, 485 spots resolution, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 64075-125-2ASVCO-1 64075-125-2AMVCO
45125-2/10-.355	Crystal Quartz, 355nm, 100-150MHz, 2x10mm aperture, 7.7mrad deflection, 60 spots resolution, 4W RF	64090-150-7ASVCO 64090-150-7AMVCO
46080-1/4-LTD	TeO ₂ , 450-800nm, 60-100MHz, 1x4mm aperture, 14.6mrad deflection, 2W RF	64020-200-1ADSDFS-A 64020-200-1ADMDFS-A 21060-100-1ASVCO 21060-100-1AMVCO
46080-1-1.06-LTD	TeO ₂ , 1064nm, 70-90MHz, 1mm aperture, 20mrad deflection, 1.5W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-2ASVCO 21065-95-2AMVCO
46080-1-.85-LTD	TeO ₂ , 700-1100nm, 70-90MHz, 1mm aperture, 16mrad deflection, 1W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-1ASVCO 21065-95-1AMVCO
46080-1-LTD	TeO ₂ , 450-800nm, 60-100MHz, 1x4mm aperture, 14.6mrad deflection, 1W RF	64020-200-1ADSDFS-A 64020-200-1ADMDFS-A 21060-100-1ASVCO 21060-100-1AMVCO
46080-2-1.06-LTD	TeO ₂ , 1064nm, 70-90MHz, 2mm aperture, 20mrad deflection, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-2ASVCO 21065-95-2AMVCO
46080-2-.85-LTD	TeO ₂ , 700-1100nm, 65-95MHz, 2mm aperture, 16mrad deflection, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-1ASVCO 21065-95-1AMVCO
46080-2-LTD	TeO ₂ , 450-800nm, 60-100MHz, 2mm aperture, 14.6mrad deflection, 1.25W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21060-100-2ASVCO 21060-100-2AMVCO
46080-3-1.06-LTD	TeO ₂ , 1064nm, 60-90MHz, 3mm aperture, 20mrad deflection, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-2ASVCO 21065-95-2AMVCO
46080-3-.85-LTD	TeO ₂ , 700-1100nm, 65-95MHz, 3mm aperture, 16mrad deflection, 2W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21065-95-2ASVCO 21065-95-2AMVCO
46080-3-LTD	TeO ₂ , 450-800nm, 60-100MHz, 3x4mm aperture, 14.6mrad deflection, 1.5W RF	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A 21060-100-2ASVCO 21060-100-2AMVCO
46110-1-LTD	TeO ₂ , 470-850nm, 90-130MHz, 1mm aperture, 16.3mrad deflection, 2W RF	
46300-0.2/2-.36	Fused silica, 360nm, 225-375MHz, 0.2x2mm aperture, 18mrad deflection, 50 spots resolution, 3W RF	64200-380-5ASVCO 64200-380-5AMVCO
451000-GaP	GaP, 800-850nm, 750-1250MHz, 0.15x2mm aperture, 124mrad	

	deflection, 0.25W RF	
451000L	LiNbO ₃ , 820nm, 750-1250MHz, 0.1x2.6mm aperture, 200 spots resolution, 124mrad deflection, 0.5mW RF	
451500G	GaP, 820nm, 1500MHz, 0.07x1.33mm aperture, 112 spots resolution, 184mrad deflection, 100mW RF	
D040-2G-BG2	TeO ₂ , 1064nm, 30-50MHz, 2x5mm aperture, 3W RF	
D075-2EF-KW1	TeO ₂ , 630-780nm, 50-100MHz, 3x10mm aperture, 3W RF	
D225-1B-OI1	Lead Molybdate, 488nm, 150-300MHz, 0.5mm x 28mm aperture, 1160 spots resolution, 20mrad deflection, 1.5W RF	

Drivers for the Standard AO Deflection Systems / 1D and 2 D

Select the driver, which corresponds to the required frequency and RF drive power for the AO Deflector or Bragg Cell selected. Then select the method of control: VCO (Voltage Controlled Oscillator) or DFS (Digital frequency Synthesizer) and the type of package (Rack Mount System Box or OEM Module). The system box typically requires power of 100 to 240 Volts, 47 to 63 Hz AC. The OEM module requires you to supply DC power, + 15 Volts, and -5 Volts typically, at the required current to power the unit.

The new 64040-150-0.8ADSDFS-8X1 is an eight channel, frequency synthesized driver with the signals combined as one output for use with an Acousto-Optic Beam Deflector (AOBD). The Driver allows independent analog and digital (blanking) control of up to eight beams of light. The frequency and power for each channel can be selected from presets stored in internal memory or setup through the top panel keypad, the RS-232, or the USB. Internal memory contains a factory default setup and up to 16 user stored configurations.

45035-3-6.5DEG-1.06

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	1064 nm
Window Configuration	AR Coated
Static Transmission	> 97 %
Operating Frequency	25 to 45 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	> 65 % Midband with Linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	3 mm
Process Time	4.5 μ s
Resolution (T.BW product)	90 spots with no less than 50 μ s scan time and full illumination of the aperture
Δ Deflection Angle	32 mrad
Deflection Angle	56 mrad @ 35 MHz
RF Power Level	2 watts
Impedance	50 ohms
VSWR	< 2:1 across band
Package	53B2024
Recommended Drivers	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 64025-45-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 64025-45-2AMVCO

45035-3-6.5DEG-1.06-XY

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	1064 nm
Window Configuration	AR Coated

Static Transmission	> 97 %
Operating Frequency	25 to 45 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	> 65 % mid-band per device with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	3 mm
Process Time	4.5 μ s
Resolution (T.BW product)	90 spots with no less than 50 μ s scan time and full illumination of the aperture
Δ Deflection Angle	32 mrad
Deflection Angle	56 mrad @ 35 MHz
RF Power Level	< 2 watts
Impedance	50 ohms
VSWR	< 2:1 across band
Package 72003	53D1970
Recommended Drivers	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A-2 Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A (2X) Analog System Voltage Controlled Oscillator: 64025-45-2ASVCO-2 Analog Module Voltage Controlled Oscillator: 64025-45-2AMVCO (2X)

45035-5-6.5DEG-1.06

Interactive Material	TeO ₂
Acoustic Mode	Shear wave
Operating Wavelength	1064 nm
Window Configuration	AR Coated
Static Transmission	> 97 %
Operating Frequency	25-45 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	> 60 % Midband with linear polarization, parallel to acoustic propagation
Active Aperture	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	150 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	32 mrad (25 - 45 MHz)
Deflection angle	56 mrad @ 35 MHz
RF power level	4 watts
Impedance	50 ohms nominal
VSWR	< 2:1 across band
Package	53B2024
Recommended Drivers	Analog System Digital Frequency Synthesizer: 64020-200-4ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-4ADMDFS-A Analog System Voltage Controlled Oscillator: 64025-45-4ASVCO-1 Analog Module Voltage Controlled Oscillator: 64025-45-4AMVCO

45035-5-6.5DEG-1.06-XY

Interaction Material	TeO ₂
Acoustic Mode	Shear
Operating Wavelength	1064 nm
Window Configuration	AR Coated
Static Transmission	> 98%
Operating Frequency	25-45 MHz
Intensity Variation	2 dB
Diffraction Efficiency	\geq 65 % mid-band per device with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	150 spots with no less than 60 μ s scan time and full illumination of the aperture
Acoustic Velocity	66 mm / μ s

Δ Deflection Angle	32 mrad
Deflection Angle	56 mrad @ 35 MHz
RF Power Level	4 watt max
Impedance	50 ohms
VSWR	< 2:1
Package	53D1970
Recommended Drivers	Analog synthesized driver system: 64020-200-4ADSDFS-A-2 Analog synthesized driver modules: 64020-200-4ADMDFS-A (x2) Analog System Voltage Controlled Oscillator: 64025-45-4ASVCO-2 Analog Module Voltage Controlled Oscillator: 64025-45-4AMVCO (x2)

45050-5-6.5DEG-.8

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	780 to 850 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	35 to 65 MHz.
Intensity Variation	2 dB
Diffraction Efficiency	> 70 % Midband with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	5mm
Process Time	7.5 μ s
Resolution (T.BW product)	225 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	39 mrad @ 850 nm
Deflection Angle	65 mrad @ 50MHz, 850 nm
RF Power Level	2 watts maximum
Impedance	50 ohms
VSWR	< 2:1 across band
Package	53B2024
Recommended Driver	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21035-65-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 21035-65-2AMVCO

45050-5-6.5DEG-.8-XY

Interactive Material	TeO ₂
Acoustic Mode	Shear
Operating Wavelength	780 to 850 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	35 to 65 MHz.
Intensity Variation	2 dB
Diffraction Efficiency	> 70 % mid-band per device with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	225 spots with no less than 60 μ s scan time and full illumination of the aperture
Acoustic Velocity	0.66 mm/ μ s
Δ Deflection Angle	39 mrad @ 850 nm
Deflection Angle	5 mrad @ 50 MHz, 850 nm
RF Power Level	2 watts max
Impedance	50 ohms
VSWR	< 2:1
Package	53D1970
Recommended Drivers	Analog synthesized driver system: 64020-200-2ADSDFS-A-2 Analog synthesized driver modules: 64020-200-2ADMDFS-A (x2) Analog System Voltage Controlled Oscillator: 21035-65-2ASVCO-2

	Analog Module Voltage Controlled Oscillator: 21035-65-2AMVCO (x2)
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45050-6-.83

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	780 to 850 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	35 to 65 MHz.
Diffraction Efficiency	> 60 % Midband with polarization circular or linear
Intensity Variation	< 2.5 dB
Acoustic Aperture Size	6 mm
Processing Time	9.7 μ s
Resolution (T.BW. product)	291 spots with no less than 70 μ s scan time and full illumination of the aperture
Δ Deflection Angle	41 mrad @ 850 nm
Deflection Angle	68 mrad @ 50MHz, 850 nm
RF Power Level	2 watts
Impedance	50 ohms
VSWR	<2.5:1 Across Bandwidth
Package:	53B2024
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 64035-65-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 64035-65-2AMVCO

45070-5-6.5DEG-.63

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	633 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	50 to 90 MHz.
Diffraction Efficiency	> 70% Midband with polarization, parallel to acoustic propagation
Intensity Variation	< 2 dB
Acoustic Aperture Size	5mm
Processing Time	7.5 μ s
Resolution (T.BW. product)	300 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	38mrad @ 633 nm
Deflection Angle	67mrad @ 633 nm
RF Power Level	2 watts
Impedance	50 ohms
VSWR	<2:1 Across Bandwidth
Package:	53B2024
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21050-90-2ASVCO Analog Module Voltage Controlled Oscillator: 21050-90-2AMVCO

45070-5-6.5DEG-.63-XY

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	633 nm
Window Configuration	AR Coated
Static Transmission	> 98 %
Operating Frequency	50 to 90 MHz.
Intensity Variation	2 dB
Diffraction Efficiency	> 55 % Midband per Device with linear polarization, parallel to acoustic

	propagation
Acoustic Aperture Size	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	300 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	38 mrad @ 633 nm
Deflection Angle	67 mrad @ 633 nm
RF Power Level	2 watt maximum per Device
Impedance	50 ohms
VSWR	< 2:1 across band
Package:	53B2024
Recommended Driver:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A-2 Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A (2x) Analog System Voltage Controlled Oscillator: 64050-90-2ASVCO-2 Analog Module Voltage Controlled Oscillator: 64050-90-2AMVCO (2x)

45070-6

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	633 to 850 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	50 to 90 MHz
Diffraction Efficiency	> 60 % Midband with polarization circular or linear
Intensity Variation	< 2.5 dB
Acoustic Aperture Size	6 mm
Processing Time	9.7 μ s
Resolution (T.BW. product)	388 spots with no less than 70 μ s scan time and full illumination of the aperture
Deflection Angle	72 mrad @ 633 nm
Δ Deflection Angle	41 mrad @ 633 nm
RF Power Level	2 watts
Impedance	50 ohms
VSWR	< 2.5:1 Across Bandwidth
Package:	53B2024
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 64050-90-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 64040-90-2AMVCO

45100-5-6.5DEG-.51

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	440 to 530 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	75 to 125 MHz.
Intensity Variation	2 dB
Diffraction Efficiency	> 70 % Midband with linear polarization, parallel to acoustic propagation
Acoustic Aperture Size	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	375 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	39 mrad @ 514 nm
Deflection Angle	78 mrad @ 100 MHz, 514 nm
RF Power Level	2 watt maximum
Impedance	50 ohms
VSWR	< 2:1 across band

Package:	53B2024
Recommended Driver:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 64075-125-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 64075-125-2AMVCO

45100-5-6.5DEG-.51-XY

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	440 to 530 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	75 to 125 MHz.
Intensity Variation	2 dB
Diffraction Efficiency	>70 % Midband per Device
Light Polarization	Linear, parallel to acoustic propagation
Acoustic Aperture Size	5 mm
Process Time	7.5 μ s
Resolution (T.BW product)	375 spots with no less than 60 μ s scan time and full illumination of the aperture
Δ Deflection Angle	39 mrad @ 514 nm
Deflection Angle	78 mrad @ 100 MHz, 514 nm
RF Power Level	2 watt maximum per Device
Impedance	50 ohms
VSWR	< 2:1 across band
Package:	53D1970
Recommended Driver:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A-2 Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A (X2) Analog System Voltage Controlled Oscillator: 64075-125-2ASVCO-2 Analog Module Voltage Controlled Oscillator: 64075-125-2AMVCO (x2)

45100-6

Interactive Material	TeO ₂
Acoustic Mode	Shear Wave
Operating Wavelength	440 to 530 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	75 to 125 MHz
Intensity Variation	3 dB
Diffraction Efficiency	> 60 % Midband with polarization circular or linear
Acoustic Aperture Size	6 mm
Processing Time	9.7 μ s
Resolution (T.BW. product)	485 spots with no less than 70 μ s scan time and full illumination of the aperture
Deflection Angle	87 mrad @ 530 nm, @ 100 MHz
Δ Deflection Angle	41 mrad @ 530 nm
RF Power Level	2 watts
Impedance	50 ohms
VSWR	< 2.5:1 Across Bandwidth
Package:	53B2024
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 64075-125-2ASVCO-1 Analog Module Voltage Controlled Oscillator: 64075-125-2AMVCO

45125-2/10-.355

Interactive Material	Crystal Quartz
Acoustic Mode	Longitudinal

Operating Wavelength	355nm
Window Configuration	AR Coated
Static Transmission	> 97 %
Operating Frequency	100 to 150 MHz
Intensity Variation	<1 dB
Diffraction Efficiency	> 75 %, midband
Light Polarization	Linear, perpendicular to acoustic propagation
Acoustic Aperture Size	2x10mm
Processing Time	1.25us with 7.2mm beam size in acoustic direction
Resolution (T.BW. product)	60 spots
Deflection Angle	7.7mrad @ 125MHz
Δ Deflection Angle	3mrad
RF Power Level	4 watts
Impedance	50 ohms
VSWR	< 1.5:1 Across Bandwidth
Package:	53B1289
Recommended Drivers:	Analog System Voltage Controlled Oscillator: 64090-150-7ASVCO Analog Module Voltage Controlled Oscillator: 64090-150-7AMVCO

46080-1/4-LTD

Interactive Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	450-800nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	60 to 100 MHz
Intensity Variation	<2 dB across the bandwidth
Diffraction Efficiency	>80%, midband with linear polarized light, perpendicular to acoustic propagation or with random polarized light
Acoustic Aperture Size	1mm high x 4mm in acoustic direction
Rise Time	150ns/mm beam dia
Δ Deflection Angle	7.3mrad @ 780nm, 4.5mrad @ 488nm
Deflection Angle	14.6 mrad @ 780nm @ 80MHz, 9.1mrad @ 488nm @ 80MHz
RF Power Level	<1 watts @ 780nm
Impedance	50 ohms
VSWR	< 2:1 Across Bandwidth
Package:	53B0624TO1
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-1ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-1ADMDFS-A Analog System Voltage Controlled Oscillator: 21060-100-1ASVCO Analog Module Voltage Controlled Oscillator: 21060-100-1AMVCO

46080-1-1.06-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	1.06 μ m
Window Configuration	AR coated
Static Transmission	>97%
Operating Frequency	70-90 MHz
Intensity Variation	< 2.5 dB across bandwidth
Diffraction Efficiency (midband)	> 75 % midband with linear polarization, perpendicular to acoustic propagation, > 70 % midband with random polarization.
Acoustic Aperture Size	1.0 mm
Rise Time	150 nsec/mm beam diameter
Δ Deflection Angle	7.5 mrad
Deflection Angle	20 mrad @ 80 MHz
RF Power Level	< 1.5 watts
Impedance	50 ohms nominal

VSWR	< 1.5:1 across bandwidth
Package	53B0624 T01
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-2ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-2AMVCO

46080-1-.85-LTD

Interactive Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	700 to 1100 nm
Window Configuration	AR Coated
Static Transmission	>95 %
Operating Frequency	65–95 MHz
Intensity Variation	< 1.5 dB @ 780 nm
Diffraction Efficiency (midband)	> 70 % midband with linear polarization, perpendicular to acoustic propagation, > 65 % midband with random polarization.
Acoustic Aperture Size	1 mm
Rise Time	150 nsec/mm beam dia.
Δ Deflection Angle	4 mrad @
Deflection Angle	16 mrad @ 80 MHz and 850 nm
RF Power Level	< 1 watt @ 850 nm
Impedance	50 ohms nominal
VSWR	< 1.5:1 over bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-1ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-1AMVCO

46080-1-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	450-800 nm
Window Configuration	AR coated
Static Transmission	>95 %
Operating Frequency	60-100 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	>80 % midband with linear polarized light perpendicular to acoustic propagation or with random polarized light
Acoustic Aperture Size	1 x 4mm
Rise Time	150 ns / mm beam dia.
Δ Deflection Angle	7.3 mrad @ 780 nm; 4.5 mrad @ 488 nm
Deflection Angle	14.6 mrad @ 780 nm @ 80 MHz; 9.1 mrad @ 488 nm @ 80 MHz
RF Power Level	< 1 watt @ 780 nm
Impedance	50 Ω nominal
VSWR	<2:1 across bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-1ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-1ADMDFS-A Analog System Voltage Controlled Oscillator: 21060-100-1ASVCO Analog Module Voltage Controlled Oscillator: 21060-100-1AMVCO

46080-2-1.06-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	1064 nm
Static Transmission	> 97 %
Window Configuration	AR coated

Operating Frequency	70-90 MHz
Intensity Variation	< 2.5 dB across bandwidth
Diffraction Efficiency (midband)	> 75 % midband with linear polarization, perpendicular to acoustic propagation, > 70 % midband with random polarization.
Acoustic Aperture Size	2 mm
Rise Time	150 ns/mm beam dia.
Δ Deflection Angle	7.5 mrad
Deflection Angle	20 mrad
RF Power Level	< 2 watts
Impedance	50 ohms nominal
VSWR	<1.5:1 across bandwidth
Package	53B0624 TO2
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-2ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-2AMVCO

46080-2-.85-LTD

Interactive Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	700 to 1100 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	65–95 MHz
Intensity Variation	< 1.5 dB @ 780 nm
Diffraction Efficiency (midband)	> 70 % midband with linear polarization, perpendicular to acoustic propagation, > 65 % midband with random polarization.
Acoustic Aperture Size	2 mm
Rise Time	150 nsec/mm beam dia.
Δ Deflection Angle	4 mrad @ 850 nm
Deflection Angle	16 mrad @ 80 MHz and 850 nm
RF Power Level	< 2 watts @ 850 nm
Impedance	50 ohms nominal
VSWR	< 1.5:1 over bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-1ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-1AMVCO

46080-2-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	450-800 nm
Window Configuration	AR coated
Static Transmission	>95 %
Operating Frequency	60-100 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	>80 % midband with linear polarized light perpendicular to acoustic propagation or with random polarized light
Acoustic Aperture Size	2 mm
Rise Time	150 ns / mm beam dia.
Δ Deflection Angle	7.3 mrad @ 780 nm; 4.5 mrad @ 488 nm
Deflection Angle	14.6 mrad @ 780 nm @ 80 MHz; 9.1 mrad @ 488 nm @ 80 MHz
RF Power Level	< 1.25 watt @ 780 nm
Impedance	50 Ω nominal
VSWR	<2:1 across bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A

	Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21060-100-2ASVCO Analog Module Voltage Controlled Oscillator: 21060-100-2AMVCO
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46080-3-1.06-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	1064nm
Window Configuration	AR coated
Static Transmission	>97%
Operating Frequency	60-90 MHz
Intensity Variation	< 2.5 dB across bandwidth
Diffraction Efficiency	>70 % midband with linear polarization, perpendicular to acoustic propagation, >65% midband with random polarization.
Acoustic Aperture Size	3 mm
Rise Time	150 ns / mm beam dia.
Δ Deflection Angle	7.5mrad
Deflection Angle	20mrad
RF Power Level	<2watts
Impedance	50 Ω nominal
VSWR	<1.5:1 across bandwidth
Package	53B0624 TO2
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-2ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-2AMVCO

46080-3-.85-LTD

Interactive Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	700 to 1100 nm
Window Configuration	AR Coated
Static Transmission	> 95 %
Operating Frequency	65–95 MHz
Intensity Variation	< 1.5 dB @ 780 nm
Diffraction Efficiency (midband)	> 70 % midband with linear polarization, perpendicular to acoustic propagation, > 65 % midband with random polarization.
Acoustic Aperture Size	3 mm
Rise Time	150 nsec/mm beam dia.
Δ Deflection Angle	4 mrad @ 850 nm
Deflection Angle	16 mrad @ 80 MHz and 850 nm
RF Power Level	2 watts @ 850 nm
Impedance	50 ohms nominal
VSWR	< 1.5:1 over bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21065-95-2ASVCO Analog Module Voltage Controlled Oscillator: 21065-95-2AMVCO

46080-3-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	450-800 nm
Window Configuration	AR coated
Static Transmission	>95 %
Operating Frequency	60-100 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	>80 % midband with linear polarized light perpendicular to acoustic

	propagation or with random polarized light
Acoustic Aperture Size	3 x 4 mm
Rise Time	150 ns / mm beam dia.
Δ Deflection Angle	7.3 mrad @ 780 nm; 4.5 mrad @ 488 nm
Deflection Angle	14.6 mrad @ 780 nm @ 80 MHz; 9.1 mrad @ 488 nm @ 80 MHz
RF Power Level	< 1.5 watt @ 780 nm
Impedance	50 Ω nominal
VSWR	<2:1 across bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21060-100-2ASVCO Analog Module Voltage Controlled Oscillator: 21060-100-2AMVCO

46110-1-LTD

Interaction Material	TeO ₂
Acoustic Mode	Longitudinal
Operating Wavelength	470-850 nm
Window Configuration	AR coated
Operating Frequency	90-130 MHz
Intensity Variation	< 2 dB
Diffraction Efficiency	>85% midband with linear polarization perpendicular to acoustic propagation, >80% midband with random polarization
Acoustic Aperture Size	1mm
Rise Time	150 ns / mm beam dia.
Δ Deflection Angle	15.9 mrad @ 633nm
Deflection Angle	16.3 mrad @ 633nm
RF Power Level	< 1.25 watts
Impedance	50 Ω nominal
VSWR	<2:1 across bandwidth
Package	53B0624
Recommended Drivers:	Analog System Digital Frequency Synthesizer: 64020-200-2ADSDFS-A Analog Module Digital Frequency Synthesizer: 64020-200-2ADMDFS-A Analog System Voltage Controlled Oscillator: 21090-130-2ASVCO Analog Module Voltage Controlled Oscillator: 21090-130-2AMVCO

46300-0.2/2-.36

Interactive Material	Fused Silica
Acoustic Mode	Longitudinal
Operating Wavelength	360 nm
Window Configuration	AR coated
Static Transmission	>97%
Operating Frequency	225-375 MHz
Intensity Variation	<1 dB
Diffraction Efficiency	>70%, midband next to transducer, with linear polarized light perpendicular to acoustic propagation
Acoustic Aperture Size	0.2mm (H) x 2mm (near field distance along acoustic propagation direction)
Process Time	0.33 μ s with 2mm beam size in acoustic direction
Resolution (T.BW product)	50 spots
Δ Deflection Angle	9 mrad
Deflection Angle	18 mrad @ 300 MHz
RF Power Level	<3 watts
Impedance	50 ohms
VSWR	<2:1 across bandwidth
Package	53B1354
Recommended Drivers:	Analog System Voltage Controlled Oscillator: 64200-380-5ASVCO Analog Module Voltage Controlled Oscillator: 64200-380-5AMVCO

451000-GaP

Interaction Material	GaP
Acoustic Mode	Longitudinal
Operating Wavelength	800-850 nm
Window Configuration	AR coated
Static Transmission	80%
Operating Frequency	750-1250 MHz
Intensity Variation	3 dB
Diffraction Efficiency	5% per watt minimum midband with linear polarized light parallel to acoustic propagation
Acoustic Aperture Size	150 μ m x 2mm
Aperture Time	300 nsec
Optical Waist Height	80 μ m
Δ Deflection Angle	62 mrad @ 830 nm
Deflection Angle	124 mrad @ 830 nm
RF Power Level	<.25 Watts nominal can withstand 1 watt maximum
Impedance	50 Ohms nominal
VSWR	<3:1 across bandwidth
Package	53B0504

451000L

Interactive Material	LiNbO3
Acoustic Mode	Longitudinal
Operating Wavelength	820 nm
Window Configuration	AR Coated
Static Transmission	>95 %
Operating Frequency	750 to 1250 MHz
Diffraction Efficiency	1% / Watt minimum with light linear polarized, perpendicular to acoustic propagation.
Acoustic Aperture Size	100 μ m x 2.6 mm
Process Time	400 ns
Resolution (T.BW product)	200 spots
Deflection Angle	124 mrad @ 1000 MHz
Δ Deflection Angle	62 mrad
RF Power Level	< 0.5 mW average, 1 Watt peak with duty cycle of 5 % with pulse width , <1 ms.
Impedance	50 Ohms
VSWR	3:1 across band maximum
Package:	53B0504

451500G

Interactive Material	GaP
Acoustic Mode	Longitudinal
Operating Wavelength	820 nm
Window Configuration	AR Coated
Static Transmission	>95 %
Center Frequency	1500 MHz
Bandwidth	560 MHz
Diffraction Efficiency	5 % / Watt minimum with light polarized Linear parallel to acoustic propagation.
Acoustic Aperture Size	70 μ m X 1.33 mm
Process Time	0.2 us
Resolution (T.BW product)	112 spots
Δ Deflection Angle	69 mrad @ 820 nm
Deflection Angle	184 nm @ 820 nm
RF Power Level	<100 mW ave, 1 Watt peak @10 % duty < 1 ms pulse width.
Impedance	50 Ohms
VSWR	< 3 :1
Package:	53B0504

D040-2G-BG2

Interactive Material	TeO ₂
Operating Wavelength	1064 nm
Damage Threshold	100MW/cm ²
AR Coating Reflectivity	<0.2% per surface
Center RF Frequency (f ₀)	40MHz
Frequency Range	20 MHz
Acoustic Aperture	2mm X 5 mm
Length (optical direction)	32mm
Diffraction Efficiency	>80% @ f ₀ , >50% for 30MHz<f<50MHz
RF Power Level	~3W

D075-2EF-KW1

Interactive Material	TeO ₂
Acoustic Mode	Slow shear
Operating Wavelength	630-780 nm
RF Drive Frequency	50-100MHz
Optical Faces	AR Coated, R<0.5%
Acoustic Aperture	3.0m x 10 mm min (hxd)
Polarization	Linear, horizontal with respect to base
Resolution	750 resolvable spots (Rayleigh criterion)
Scan Angle range @630nm	~3° (2.9°-4.9°)
Access Time	16us
Diffraction Efficiency	>50%
Diffraction Efficiency Variation	<10% @ 633nm
RF Power Level	<3.0W

AO DeflectorD225-1B-OI1

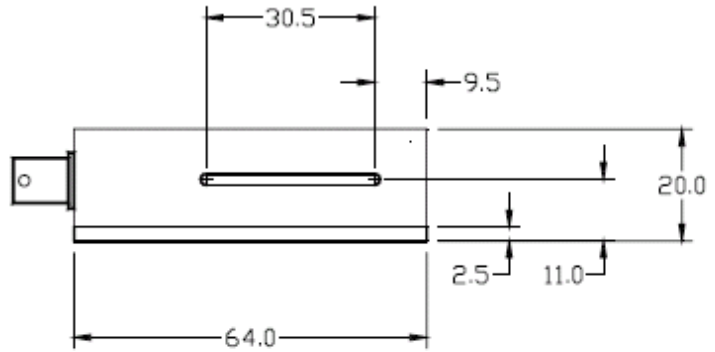
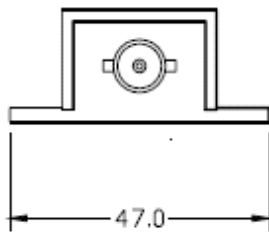
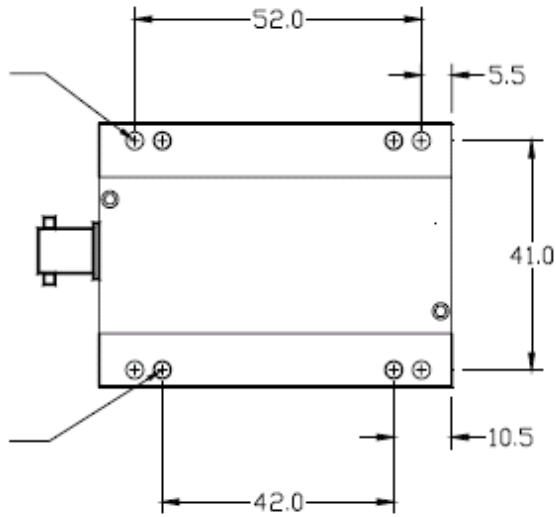
A high performance AO Deflector operating at 488nm, manufactured with superior flatness and parallelism of optical faces to yield minimal wavefront distortion. A scan angle of 20mrad with 1160 spots resolution (Rayleigh criteria) and 7.7μs access time make this device ideally suited for high resolution imaging and reprographic applications.

Interaction Material	Lead Molybdate
Acoustic Mode	Isotropic
Wavelength	488nm
Polarisation	Any
Anti-Reflection Coating	< 0.2% per surface
Transmission	> 93%
Frequency	150MHz to 300MHz
Active Aperture	0.5mm x 28mm
Scan Angle	20mrad
Access Time	7.7μs
Acoustic Velocity	3630m/s
Resolution (Rayleigh Criteria)	1160 spots
Diffraction Efficiency	> 50% (at centre of aperture)
RF Power	< 1.5W

D225-1B-011

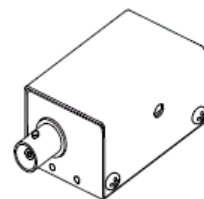
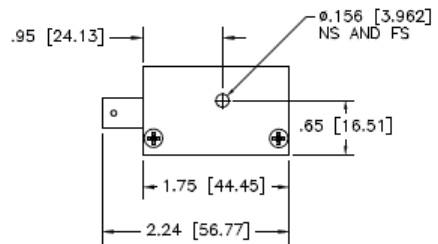
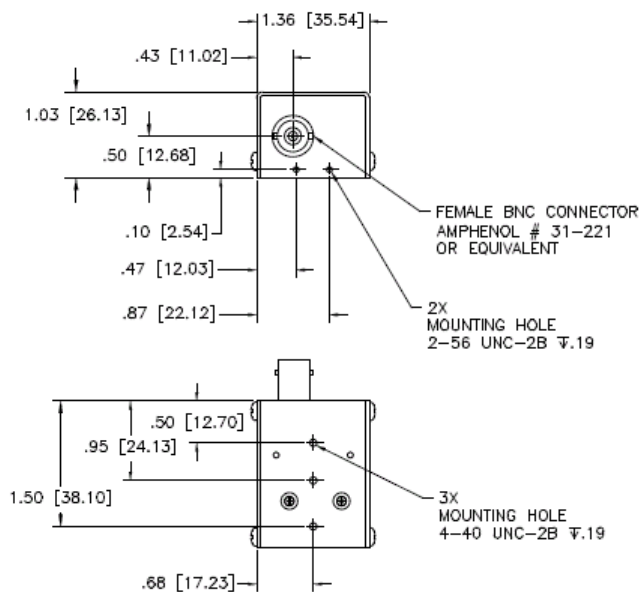
4 Mounting Holes
M3 clearance

4 Mounting Holes
M3 tapped



NOTES: UNLESS OTHERWISE SPECIFIED

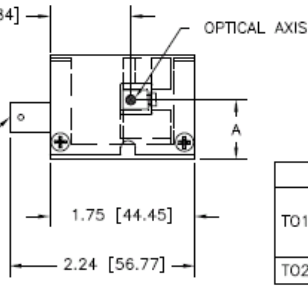
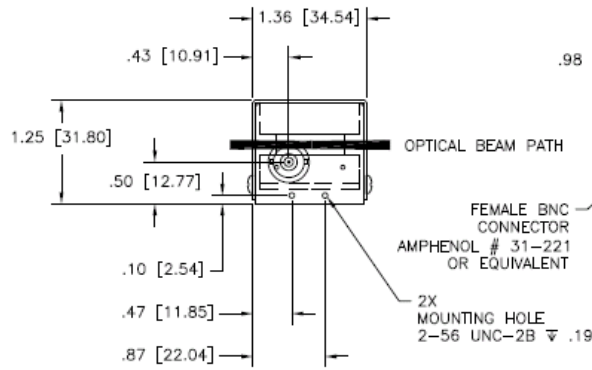
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	A		CHANGE PER ECO 58A15051	CR 2/04/03	PS 2/07/03



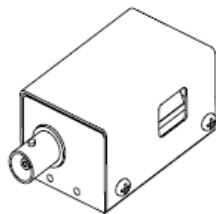
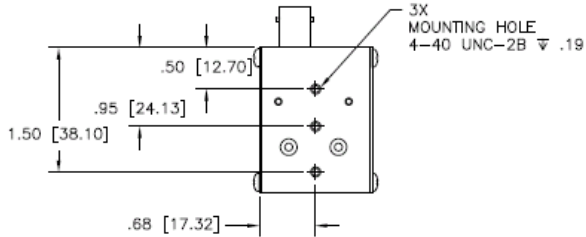
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NOTES: UNLESS OTHERWISE SPECIFIED

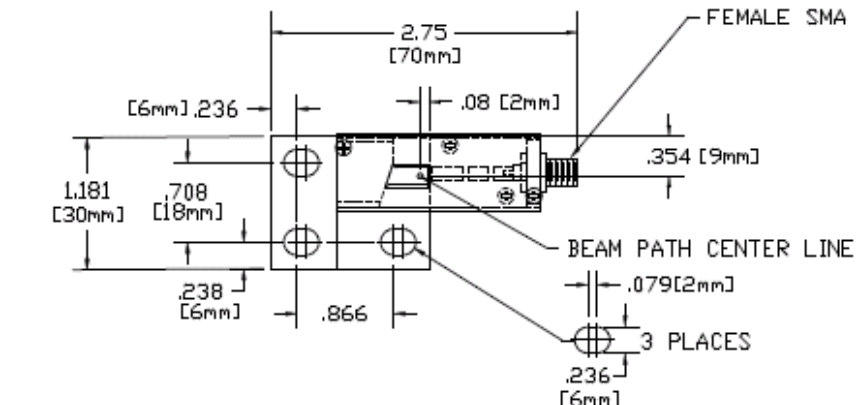
REVISIONS				
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	C	CHANGE PER ECO 58A15050	CR 2/05/03	PS 2/07/03



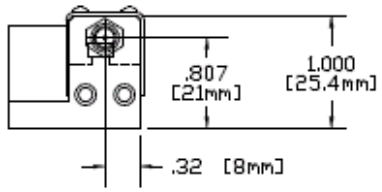
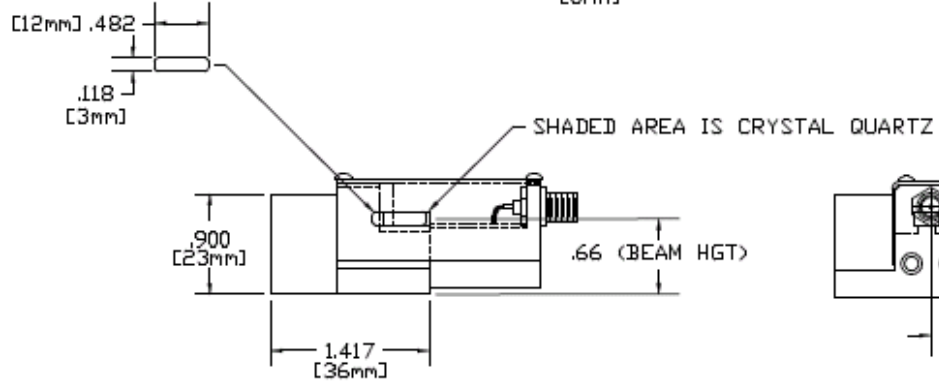
	DIM A	MODEL #
T01	.65 [16.51]	N23080-1-LTD N23080-2-LTD
T02	.71 [18.03]	N23080-3-LTD




**Package:
53B0624**



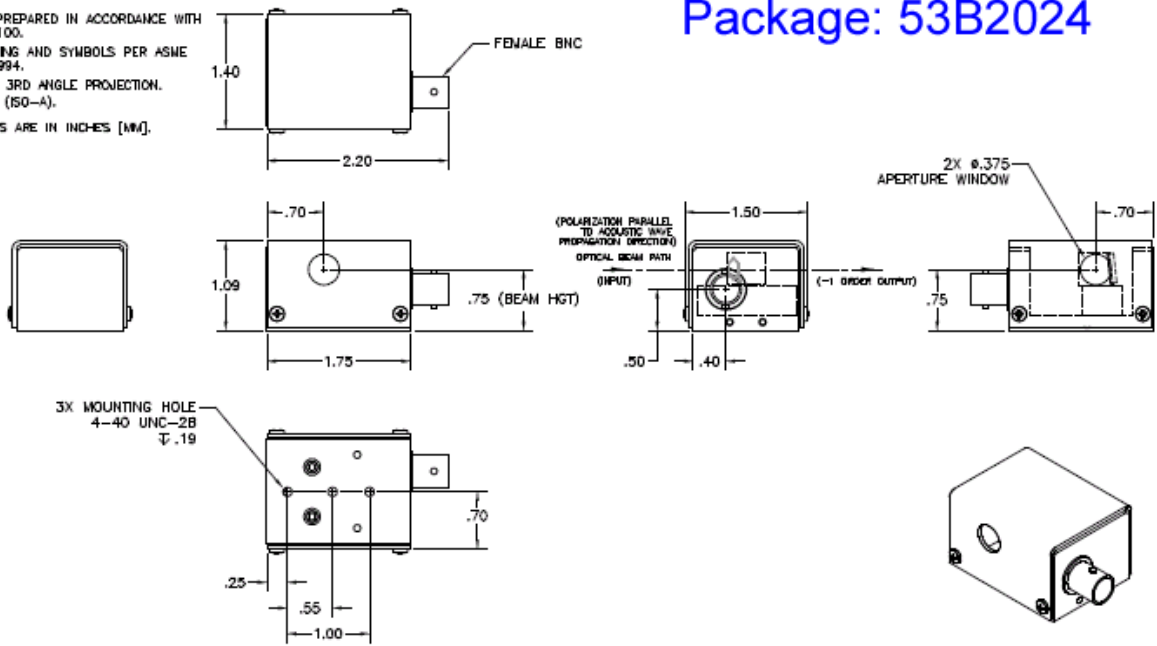
**Package:
53B1354**




NOTES: UNLESS OTHERWISE SPECIFIED

1. DRAWING PREPARED IN ACCORDANCE WITH MIL-STD-100.
2. DIMENSIONING AND SYMBOLS PER ASME Y14.5M-1994.
3. INTERPRET 3RD ANGLE PROJECTION.  (ISO-A).
4. DIMENSIONS ARE IN INCHES [MM].

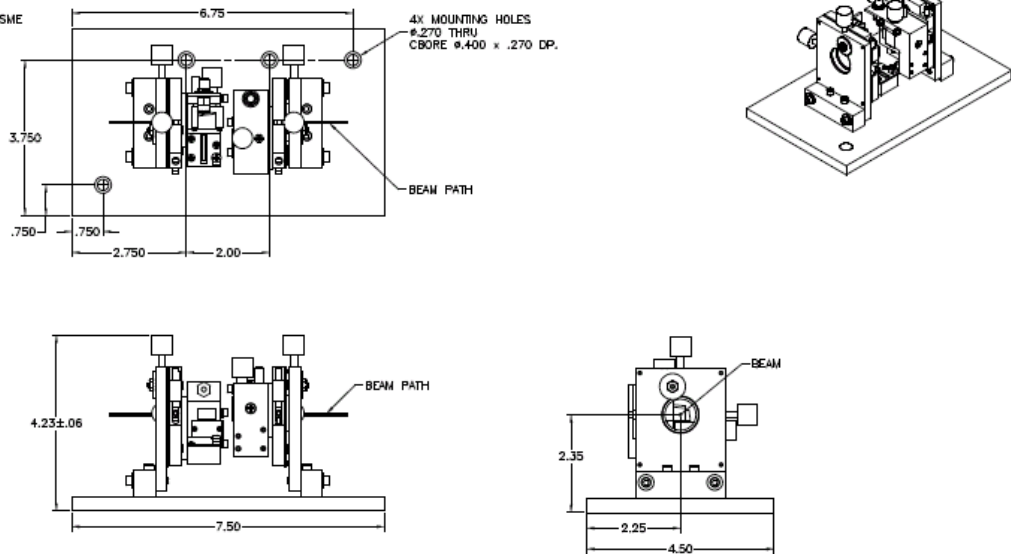
Package: 53B2024



NOTES: UNLESS OTHERWISE SPECIFIED

1. DRAWING PREPARED IN ACCORDANCE WITH MIL-STD-100.
2. INTERPRET 3RD ANGLE PROJECTION.  (ISO-A).
3. DIMENSIONING AND SYMBOLS PER ASME Y14.5M-1982.

Package 53D1970

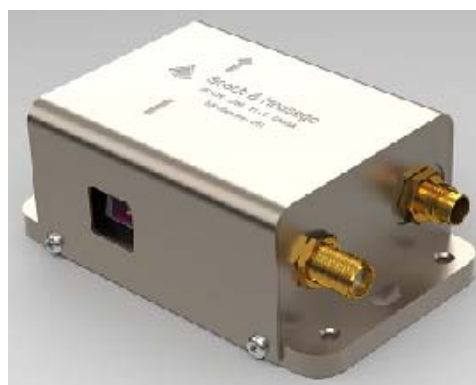
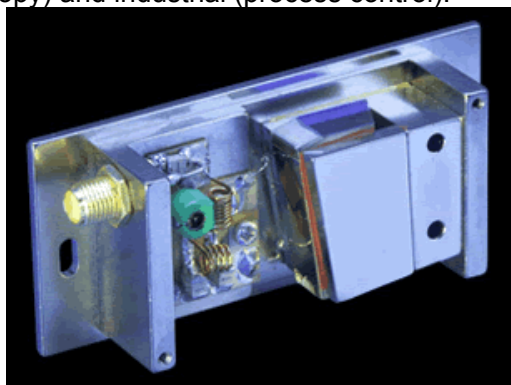


Tunable Filters

An acousto-optic tunable filter is a band-pass transmission filter, which exploits the acousto-optic interaction inside an anisotropic medium. AO Tunable Filters are generally fabricated in Tellurium Dioxide, operating within the visible to near/mid infra-red, and allows the user to select and transmit a single wavelength, or in some cases a selection of multiple discrete wavelengths from the incoming light. The centre of the pass-band may be selected simply by tuning the drive frequency.

Over a number of years we have maintained an ambitious development program which we believe has enabled us to enhance the general performance and increase the capabilities of AOTF technology. Our product range includes purpose designed solutions for illumination / excitation wavelength selection and multispectral / hyperspectral imaging, for which we also offer the latest DFS driver technology.

Typical applications include; Biomedical (confocal microscopy & hyperspectral imaging), Scientific (spectroscopy) and industrial (process control).



Model	Description	Driver
48032-4-3.5	TeO ₂ , 1.8-5um wavelength, aperture 4mm, deflection 2.7o, RF 5W	64020-200-5ADSDFS-A 64020-200-5ADMDFS-A
48055-2-1.7	TeO ₂ , 1.2-2.2um wavelength, aperture 2mm, deflection 2.71o, RF 1.5W	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A
48058-1-.55	TeO ₂ , 442-676nm wavelength, aperture 1mm, deflection 1.4o, RF 0.8W	Eight Channel: 64048-80-.1-8CH-16 64048-80-.1-8CH-16M Four Channel: 64048-80-.1-4CH-5 64048-80-.1-4CH-5M
48058-1-.55-WP	TeO ₂ , 442-676nm wavelength, aperture 1mm, deflection 1.4o, RF 0.8W	Eight Channel: 64048-80-.1-8CH-16 64048-80-.1-8CH-16M Four Channel: 64048-80-.1-4CH-5 64048-80-.1-4CH-5M
48058-2.5-.55	TeO ₂ , 442-676nm wavelength, aperture 2.5mm, deflection 1.4o, RF 0.8W	Eight Channel: 64048-80-.1-8CH-16 64048-80-.1-8CH-16M Four Channel: 64048-80-.1-4CH-5 64048-80-.1-4CH-5M
48058-2.5-.55-WP	TeO ₂ , 442-676nm wavelength, aperture 2.5mm, deflection 1.4o, RF 0.8W	Eight Channel: 64048-80-.1-8CH-16 64048-80-.1-8CH-16M Four Channel: 64048-80-.1-4CH-5 64048-80-.1-4CH-5M
48058-5-.55	TeO ₂ , 442-676nm wavelength, aperture 5mm, deflection 1.4o, RF 0.8W	Eight Channel: 64048-80-.1-8CH-16 64048-80-.1-8CH-16M Four Channel:

		64048-80-.1-4CH-5 64048-80-.1-4CH-5M
48060-8-4-1.0-COL	TeO ₂ , 800-1200nm wavelength, aperture 8x2mm, deflection 23mrad, RF<100mW	
48062-1-.55	TeO ₂ , 442-676nm wavelength, aperture 1mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
48062-1-.55-WP	TeO ₂ , 442-676nm wavelength, aperture 1mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
48062-2.5-.55	TeO ₂ , 442-676nm wavelength, aperture 2.5mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
48062-2.5-.55-WP	TeO ₂ , 442-676nm wavelength, aperture 2.5mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
48062-4.5-.55	TeO ₂ , 442-676nm wavelength, aperture 4.5mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
48062-4.5-.55-WP	TeO ₂ , 442-676nm wavelength, aperture 4.5mm, deflection 1.3o, RF 0.8W	Eight Channel: 64040-75-.1-8CH-16B 64040-75-.1-8CH-16MB Four Channel: 64040-75-.1-4CH-5 64040-75-.1-4CH-5M
TF515-230-4-5-VU1	TeO ₂ , 400-630nm wavelngth, aperture 5x5mm, beam separation 4 o, RF 2W	
TF525-250-6-3-GH19	TeO ₂ , 400-600nm wavelngth, aperture 3mm, beam separation 3 o	
TF525-250-6-6-GH57A	TeO ₂ , 400-650nm wavelngth, aperture 6mm, beam separation 3 o	64020-200-2ADMDFS-A 64020-200-2ADSDFS-A
TF527-245-6-3-GH18	TeO ₂ , 405-650nm wavelngth, aperture 3mm, beam separation 3 o	
TF527-245-6-3-GH19	TeO ₂ , 405-650nm wavelngth, aperture 3mm, beam separation 3 o	
TF600-300-6-3-GH19	TeO ₂ , 450-750nm wavelngth, aperture 3mm, beam separation 3 o	
TF640-325-2-12	TeO ₂ , 475-800nm wavelngth, aperture 12x12mm, RF 2W	
TF800-400-20-5-VU2	TeO ₂ , 600-1100nm wavelngth, aperture 6mm, RF ~2W	
TF850-500-8-6-GH58A	TeO ₂ , 475-800nm wavelngth, aperture 12x12mm, RF<1.5W	64020-200-2ADMDFS-A 64020-200-2ADSDFS-A
TF1450-500-2-F2S-SU6	TeO ₂ , 1.2-1.7um wavelngth, aperture 12x12mm, RF 2W	

TF1650-1100-9-3-GH30A	TeO ₂ , 1.1-2.2um wavelngth, aperture 3mm, RF 2.5W	
Model	48055-2-1.7	48058-5-55
Interactive Material	TeO ₂	TeO ₂
Acoustic Mode	Shear wave	Shear wave
Operating Wavelength	1.2-2.2um	442-676nm
Operating Frequency	40-70MHz	50-85MHz
Window Configuration	AR Coated	AR Coated
Static Transmission	>95%	>95%
Diffraction Efficiency	>80% @ 1.2um, >70% @ 2.2um	>80% per wavelength
Input Polarization	Linear, perpendicular to acoustic propagation	Linear, Vertical (Perpendicular to acoustic propagation)
Input Beam Divergence	6 Deg @ 1.2 um Solid Angle 7 Deg @ 1.7 um 8 Deg @ 2.2 um	<30 mrad (solid angle)
Acoustic Aperture size	< 2 mm	<5mm
Resolution	6 nm @ 1.2 um 10 nm @ 1.7 um 17 nm @ 2.2 um	3nm @ 476 nm 7.5nm @ 676 nm
Deflection angle with respect to incident beam	2.71°	1.4 degrees (wavelength insensitive)
RF Drive Power	1.5 watts	0.8 watt maximum
Impedance	50 ohms nominal	50 ohms nominal
VSWR	< 3:1 over bandwidth	< 2:1 over bandwidth
Package	53B02965	53B1827
Driver	64020-200-2ADSDFS-A 64020-200-2ADMDFS-A	64048-80-.1-8CH-16(8 channel) 64048-80-.1-8CH-16M(8 channel) 64048-80-.1-4CH-5(4 channel) 64048-80-.1-4CH-5M(4 channel)

Model	48060-8/4-1.0-COL	TF1450-500-3-F2x
Interactive Material	TeO ₂	TeO ₂
Acoustic Mode	Shear wave	Anisotropic, slow shear
Operating Wavelength	800-1200nm	1.2µm to 1.7µm
Operating Frequency	55-85MHz	60 to 85MHz
Window Configuration	AR Coated	AR coated
Static Transmission	>95%	
Diffraction Efficiency	>85% with linear polarized light perpendicular to acoustic propagation	Insertion Loss: < 3.0dB (for linearly polarised light) < 6.0dB (for unpolarised light)
Acoustic Aperture Size	8mm x 2 mm	
Resolution	<1nm (best effort)	3nm at 1300nm, 4.5nm at 1550nm
Acceptance Angle(solid)	>0.75mrad	
Deflection angle with respect to incident beam	23mrad nominal	
RF Drive Power	<100mW	2W
Impedance	50 ohms nominal	
VSWR	< 1.5:1 over bandwidth	
Package	53B00337	
Fiber Type		Single mode(2m), or Polarisation maintaining(multimode)
Fiber Connectors		FC / PC Seiko-Geiken(SMF), or Pig-tails for splicing, FC/APC(PMF)

Model	TF515-230-4-5-VU1	TF525-250-6-6-GH57A
Interactive Material	TeO ₂	TeO ₂
Acoustic Mode	Shear wave	Anisotropic

Operating Wavelength	400-630nm	400 - 650nm
Operating Frequency	67-134MHz	58 – 116MHz
Input Polarization	Linear, parallel to base	Linear, vertical with respect to base
Field of view	$\geq 6^\circ$	$\pm 2^\circ$
Spectral Resolution	<4nm @ 500nm	< 6nm at 525nm
Diffraction Efficiency	>90%	> 90% (95% typical)
Beam Separation	$\geq 4^\circ$	> 3°
RF Drive Power	Wavelength dependent ~2W	< 200mW / channel
Input Impedance	50 ohms	50 ohms
Acoustic Aperture	5mm x 5mm	6mm
Clear Aperture	6mm x 8mm	
Temperature	0°C<T<40°C	Conduction through base
Optical Surfaces	Output surface compensated for maximum pointing-stability of diffracted beam	AR coated

Model	TF527-245-6-3-GH18	TF527-245-6-3-GH18
Interactive Material	TeO ₂	TeO ₂
Acoustic Mode	Anisotropic	Anisotropic
Operating Wavelength	405-650nm	405-650nm
Operating Frequency	60-120MHz	60-120MHz
Input Polarization	Linear – Vertical with to base	Linear – Vertical with to base
Spectral Resolution	< 6nm @ 525nm	< 6nm @ 525nm
Beam Separation	$\geq 3^\circ$	$\geq 3^\circ$
RF Drive Power	2W (16 Channels)	2W (16 Channels)
Input Impedance	50 ohms	50 ohms
Active Aperture	3 mm	3 mm
Polarisation of diffracted order	Linear – Orthogonal to input	Linear – Orthogonal to input
Pointing-Stability of diffracted order	< $\pm 0.01^\circ$	< $\pm 0.01^\circ$
Cooling	TEC active cooling	Conduction through housing base

Model	TF640-325-2-12	TF527-245-6-3-GH18
Interactive Material	TeO ₂	TeO ₂
Operating Wavelength	475-800nm	600nm - 1 μ m
Operating Frequency	65-130MHz	42 - 80MHz
Input Polarization	Linear – Vertical with to base	Linear: Parallel to base
Polarization of diffracted order	Linear – Orthogonal to input	
Spectral Resolution	< 2nm @ 650nm	< 10nm at 800nm
Diffraction Efficiency	>90%	> 90%
Field of View	>1.4%	$\geq 6^\circ$
Active Aperture	12 x12 mm	5 x 5mm
Clear Aperture	13 x13 mm	6 x 8mm
Optical Surfaces	Output face compensated for optimum pointing-stability of diffracted beam	Output face compensated for maximum pointing-stability of diffracted beam
RF Drive Power	2W	Wavelength dependent ~2W Max

Model	TF850-500-8-6-GH58A	TF1650-1100-9-3-GH30A
Interactive Material	TeO ₂	TeO ₂ (Anisotropic)
Operating Wavelength	600 - 1100nm	1100nm - 2200nm
Operating Frequency	49 – 98MHz	45 to 95MHz
Spectral Resolution	~ 8nm at 850nm	3nm at 1300nm, 4.5nm at 1550nm
Active Aperture	6 mm	3mm
Input Polarization	Linear, vertical with respect to base	Linear – Vertical wrt to base
Polarization of diffracted order	Linear, orthogonal to input (90° rotated)	Linear – Orthogonal to input

Pointing stability of diffracted order	< $\pm 0.01^\circ$ typical	< $\pm 0.01^\circ$
Field of View	$\geq 2^\circ$	
Beam Separation	$\geq 4^\circ$	> 6°
Transmission	>95%	
Diffraction Efficiency	>90%	
RF Impedance	50 ohms	50 Ω
RF Drive Power	<1.5W	2W
Cooling	Conduction through base	Conduction through base