



Optometrics

INFRARED AND LASER PRODUCTS

Molecular Laser Gratings (MLGratings)

Ruled Wire Grid Polarizers

Holographic Wire Grid Polarizers

Grazing Incidence Gratings

Gratings Ruled in Gold

FOR APPLICATIONS IN:

- Analytical Chemistry
- Physics
- Life Sciences
- Engineering
- Communications
- FTIR - Spectroscopy, Microscopy



Optometrics, a Division of Omega Optical Holdings, has, for more than forty years, designed and manufactured optical components and instruments for university, industrial and government laboratories and the OEM markets. Standard laser components include high damage threshold original and replicated gratings for molecular lasers (ML Gratings), holographic grazing incidence gratings for dye lasers, wire grid polarizers ruled in zinc selenide or calcium fluoride and holographic wire grid polarizers on ZnSe, CaF₂, BaF₂, KRS-5 and Ge.

FACILITIES

Optometrics' facility in Ayer, Massachusetts contains space for offices, engineering, R&D and production. Equipment that support our broad range of capabilities includes:

- Four metal vacuum coating systems;
- Three thin-film soft coated filter vacuum coating systems;
- Two Ion-Assisted Deposition hard coat vacuum coating systems;
- Three grating ruling engines;
- Production holographic laboratory;
- R&D holographic laboratory;
- Full replication and lamination facilities;
- Full assembly, alignment and test facilities;
- Full complement of test equipment for spectral testing from the UV to the Far Infrared, for mechanical and latness testing, for humidity and environmental testing;
- Extensive marking, packaging and bar coding equipment and capabilities

PRODUCTS

Gratings

Originals and Replicated, Ruled and Holographic; Grazing Incidence, Echelles, Telecom and Transmission Gratings

Beamsplitters

Reflecting/Transmitting Beamsplitters

Filters

Soft Coated, Near Ultraviolet, Visible, Near Infrared, and Laser Line Filters

Infrared & Laser Products

Laser Gratings, Holographic Wire Grid Polarizers

Monochromators

Mini-Chrom Monochromators

Systems & Accessories

Plus specialized packaging, bar coding and Kanban stocking arrangements for all OEM customers.

GOALS

Optometrics goal is to provide advanced optical components and systems for use in wavelength selection applications in:

- Analytical Chemistry
- Life Sciences
- Telecom Applications
- Physics
- Semiconductor
- Space Sciences
- Aerospace & Defense

and other applications where high quality optics are key.

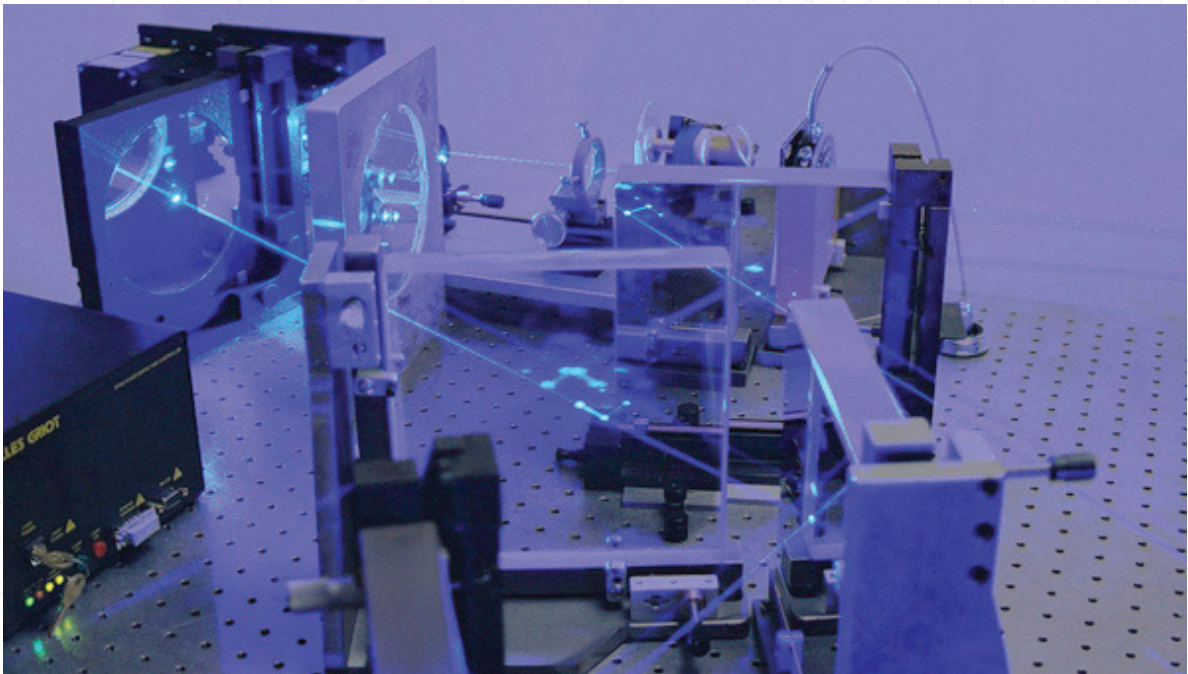
In order to accomplish this, the Company has assembled state-of-the-art facilities and people to produce:

- Diffraction gratings: ruled & holographic, original & replicated, reflection and transmission
- Interference filters
- Laser gratings & products
- Monochromators & accessories
- Wire grid polarizers: ruled & holographic

OEM SERVICES

Optometrics caters, in particular, to the needs of its OEM customers by offering special services such as:

- Kanban stocking arrangements
- Custom packaging programs
- Bar coding capabilities
- Code names for complete confidentiality
- Higher level pre-aligned optical assemblies
- The Company is also proud of its ability to support customers in all phases of the product development cycle



Infrared and Laser Products

WIRE GRID POLARIZERS

Optometrics Manufactures Wire Grid Polarizers Using Two Methods:

1. Ruling precisely spaced grooves directly into a highly polished Calcium Fluoride (CaF₂) or Zinc Selenide (ZnSe) substrate and then aluminizing the substrate, allowing the use of the polarizers with relatively high power lasers.
2. Ruling precisely spaced grooves directly into a highly polished Calcium Fluoride (CaF₂) or Zinc Selenide (ZnSe) substrate and then aluminizing the substrate, allowing the use of the polarizers with relatively high power lasers.

PERFORMANCE

Optometrics manufactures ruled wire grid polarizers on CaF₂ and ZnSe substrates, together covering a wavelength range from 2 to 20 microns and holographic wire grid polarizers on ZnSe, CaF₂, BaF₂, KRS-5 and Ge, covering a wavelength region from 2 to 30 microns. Wire grid polarizers are commonly used to polarize radiation from an unpolarized molecular laser, attenuate radiation from a polarized laser or, using two in series, to both polarize and attenuate a laser beam. A second polarizer can be inserted in the reflected beam for applications requiring a polarizing beam splitter. Wire grid polarizers are also used in reflectance accessories for dispersive and FT-IR spectrophotometers. Applications include the investigation of metal surfaces and crystal structures at grazing incidence, where polarization of the incident radiation is required.

Wire grid polarizers transmit radiation when the "E" vector is perpendicular to the wire ($E \perp$). Radiation with the "E" vector parallel to the wire ($E \parallel$) is reflected. Due to surface reflections, the reflected beam contains both polarizations.

The extinction ratio of a polarizer is a measure of its ability to attenuate a plane polarized beam. Two principle transmissions are necessary to calculate an extinction ratio, T₁ and T₂. Assuming a perfectly plane polarized beam, T₁ is defined as the maximum transmission for which the polarizer can be oriented. Minimum transmission (T₂) is the transmission through the polarizer when it is rotated 90 degrees from T₁. The extinction ratio is given as $E = T_2/T_1$ and expressed as a decimal or percentage.

The inverse of E, expressed as a ratio (R = 100:1), is used in our specifications. Wire grid polarizers can also be characterized by the degree of polarization, defined as $P = (T_1 - T_2)/(T_1 + T_2)$.

Extinction ratios greater than 40,000:1 can be achieved by the use of two wire grid polarizers in series with their grids parallel (the overall extinction ratio is the product of the extinction ratio of the individual polarizers).

Infrared and Laser Products

HOLOGRAPHIC WIRE GRID POLARIZERS

HOLOGRAPHIC WIRE GRID POLARIZERS

Working with experts in the field, Optometrics has developed a special holographic technique to produce infrared polarizers with sub-micron grid spacing. In the company's holographic laboratory, an interferometrically generated pattern is produced from monochromatic light and exposed onto a photo-resist coated substrate. Once developed, the resist has a regular sinusoidal profile which is vacuum aluminized at an oblique angle to create the array of parallel conductors. The fabrication of holographic wire grid polarizers permits the use of a wide variety of infrared materials that do not lend themselves to the ruling process. They are available with a spacing of 2700 grooves/mm for optimum short wavelength efficiency.

OVERCOATINGS

Calcium Fluoride and Barium Fluoride have low refractive index (high Tx) values and do not require anti-reflective (AR) coatings. Zinc Selenide has a high refractive index and transmission at specific wavelength regions which can be enhanced by an AR coating on the rear surface only. Zinc Selenide is usually optimized for transmission at specific laser lines, typically from 9 to 11 microns. KRS-5 is not normally AR coated, because this would limit its broad transmission range, which is its primary advantage. Germanium is AR/AR coated to maximize transmission @10.6 μ .

STANDARD SIZES AND OPTIONS

Holographic wire grid polarizers are currently available in several standard sizes from 25 mm diameter up to 50 mm diameter, both mounted and unmounted.

HIGHLIGHTS

- 2700 grooves/mm for improved short wavelength performance
- Calcium Fluoride (CaF₂) Barium Fluoride (BaF₂) Zinc Selenide (ZnSe) KRS-5 Germanium (Ge)
- Extended infrared range
- High transmission
- High extinction ratios
- All polarizers can be mounted in a double protective ring

SPECIFICATIONS

- Wire grid spacing 2700 grooves/mm (nominal)
- Parallelism..... ≤ 3 arc minutes
- Surface Flatness* /20 @ 10.6 μ up to 25 mm C.A.
/10 @ 10.6 μ > 25 mm C.A.
- Substrate thickness: for sizes under 30 mm.....2 mm
for sizes 30-49 mm..... 3 mm for
sizes ≥ 49 mm..... 5 mm
- Dimensional Tolerance (unmounted)..... ± 0.5 mm

* Excludes KRS-5

NOMINAL EXTINCTION RATIOS

Material	Wavelength (microns)	Typical Extinction Ratio
CaF ₂	3	150
	8	300
BaF ₂	3	150
	10	300
ZnSe	3	150
	10	300
KRS-5	3	150
	15	300
Ge (AR/AR)	10.6	300

Infrared and Laser Products

HOLOGRAPHIC WIRE GRID POLARIZERS

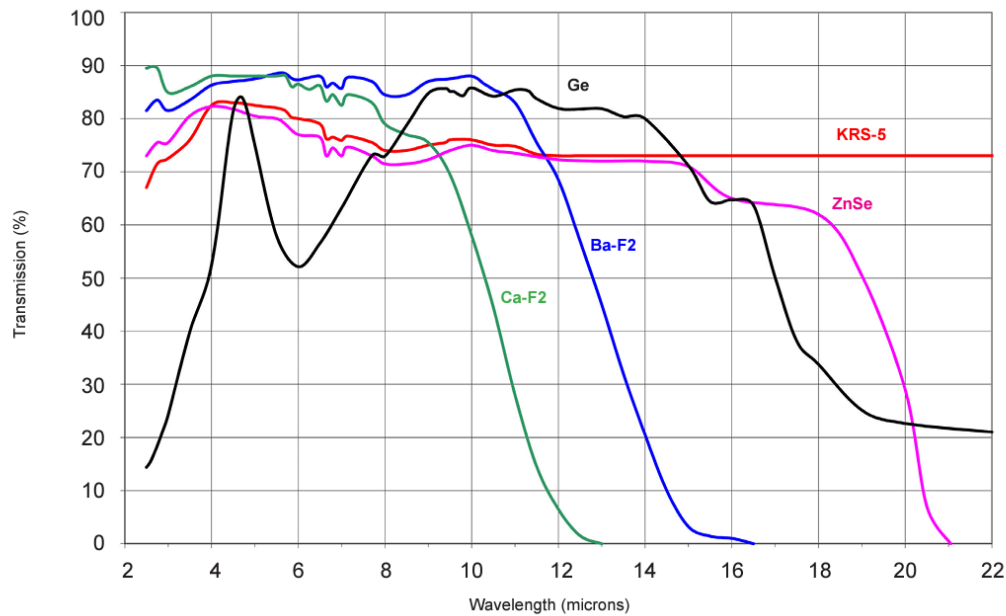


Figure 1 - Typical transmission in linearly polarized light with wire grid polarizers oriented for maximum transmission.

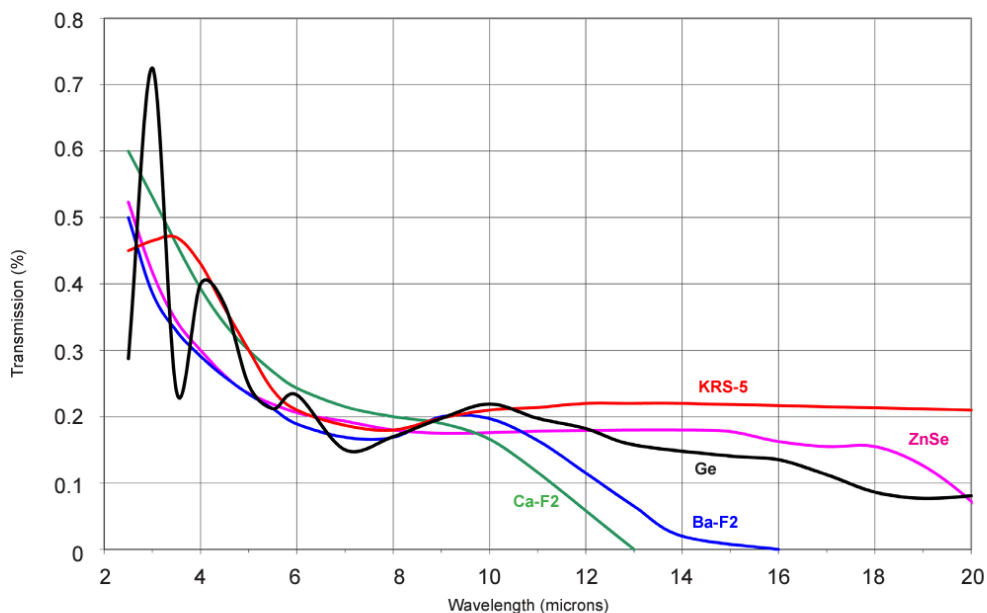


Figure 2 - Typical transmission in linearly polarized light with wire grid oriented for minimum transmission.

CAUTION: The surface of a wire grid polarizer, like a diffraction grating, is extremely delicate. Nothing should ever be allowed to touch the surface of the polarizer. Handling, when necessary, should be by the edge only and with protected fingers. Careful removal of dust by gentle air flow is the only cleaning procedure recommended by Optometrics. Particular care should be used when handling KRS-5.

HOLOGRAPHIC WIRE GRID POLARIZERS

NOMINAL EXTINCTION RATIOS

CATALOG NO.	SUBSTRATE	CLEAR APERTURE	OUTSIDE DIMENSION
5-8003	ZnSe	22.5 mm	25 mm dia.
5-8103	CaF ₂	22.5 mm	25 mm dia.
5-8203	BaF ₂	22.5 mm	25 mm dia.
5-8303	KRS-5	22.5 mm	25 mm dia.
5-8403	GE (AR/AR)	22.5 mm	29 mm dia.
5-8004	ZnSe	25 mm	29 mm dia.
5-8104	CaF ₂	25 mm	29 mm dia.
5-8204	BaF ₂	25 mm	29 mm dia.
5-8304	KRS-5	25 mm	29 mm dia.
5-8404	GE (AR/AR)	25 mm	29 mm dia.
5-8011	ZnSe	34 mm	38 mm dia.
5-8111	CaF ₂	34 mm	38 mm dia.
5-8211	BaF ₂	34 mm	38 mm dia.
5-8311	KRS-5	34 mm	38 mm dia.
5-8411	GE (AR/AR)	34 mm	38 mm dia.
5-8015	ZnSe	45 mm	50 mm dia.
5-8115	CaF ₂	45 mm	50 mm dia.
5-8215	BaF ₂	45 mm	50 mm dia.
5-8315	KRS-5	45 mm	50 mm dia.
5-8415	GE (AR/AR)	45 mm	50 mm dia.

MOUNTED* (PROTECTIVE DOUBLE RING)

CATALOG NO.	SUBSTRATE APERTURE	CLEAR DIMENSION	OUTSIDE mm	RING THICKNESS
5-8001	ZnSe	18 mm	25 mm dia.	5.0
5-8101	CaF ₂	18 mm	25 mm dia.	5.0
5-8201	BaF ₂	18 mm	25 mm dia.	5.0
5-8301	KRS-5	18 mm	25 mm dia.	5.0
5-8401	GE (AR/AR)	18 mm	25mm dia.	5.0
5-8031	ZnSe	25 mm	35 mm dia.	5.0
5-8131	CaF ₂	25 mm	35 mm dia.	5.0
5-8231	BaF ₂	25 mm	35 mm dia.	5.0
5-8331	KRS-5	25 mm	35 mm dia.	5.0
5-8431	GE (AR/AR)	25 mm	35 mm dia.	5.0
5-8021	ZnSe	34 mm	50 mm dia.	6.0
5-8121	CaF ₂	34 mm	50 mm dia.	6.0
5-8221	BaF ₂	34 mm	50 mm dia.	6.0
5-8321	KRS-5	34 mm	50 mm dia.	6.0
5-8421	GE (AR/AR)	34 mm	50 mm dia.	6.0

Infrared and Laser Products

MOLECULAR LASER (ML) GRATINGS

ML GRATINGS

ML gratings are original rulings or replicas that are normally used as end reflectors for tuning molecular lasers. Original gratings are ruled directly into an aluminum coating deposited on a kanigen coated copper substrate, resulting in an inherently higher damage threshold and are recommended for use with high powered molecular lasers.

The output wavelength of a molecular or dye laser can be tuned by rotating a Littrow mounted grating around an axis parallel to the grooves. The grating equation:

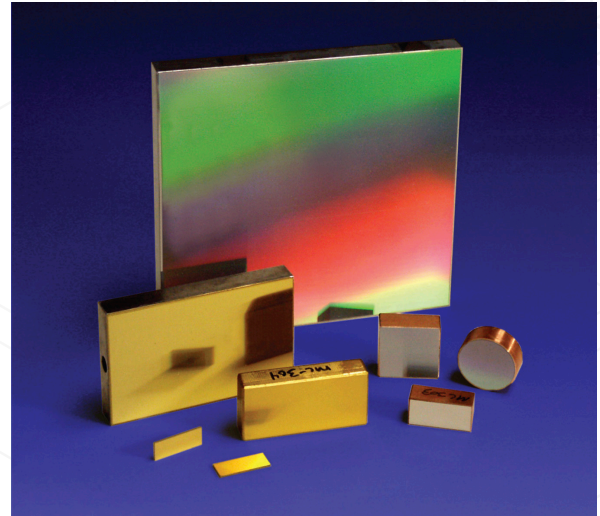
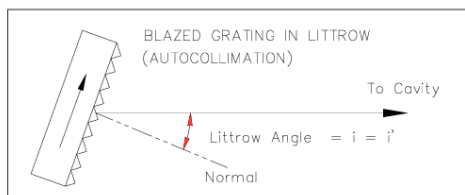
$$n\lambda = d(\sin i + \sin i')$$

where n is the order of diffraction, λ is the diffracted wavelength, d is the grating constant (the distance between successive grooves), i is the angle of incidence measured from the normal and i' is the angle of diffraction measured from the normal, reduces to $n\lambda = 2d \sin i$ for the Littrow configuration.

The angle of incidence (i) is adjusted to select the output wavelength while creating a narrow gain profile.

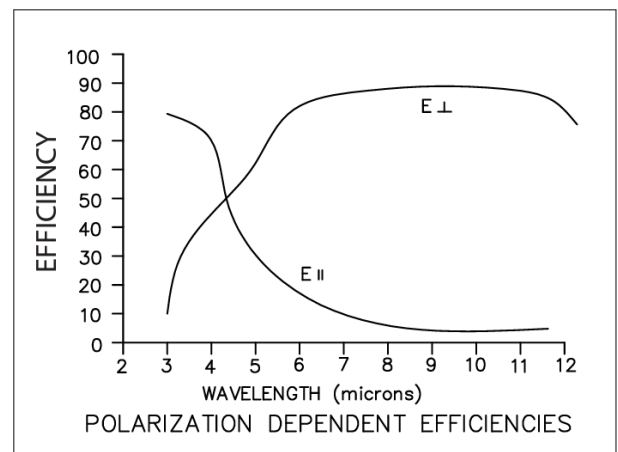
BLAZE ANGLE AND ALIGNMENT

Because the ML series of gratings are designed for peak polarized efficiency, the groove angle is not equivalent to the Littrow blaze angle of the grating. As a result, when using a He-Ne laser for preliminary grating alignment, the brightest He-Ne order will not correspond to the blaze wavelength of the grating. The grating must be aligned using the calculated He-Ne order that corresponds to the wavelength of interest, regardless of its relative intensity. The blaze arrow marked on the side or back of the grating should be oriented as shown below.



POLARIZATION

Typical efficiency curves illustrate that, in all cases, orienting the polarization of the E vector (P-Plane) perpendicular to the grooves ($E \perp$) increases the efficiency over a specific wavelength region. This should be considered when optimizing the figure of merit (Q) of a cavity, particularly when it is polarized by auxiliary components such as Brewster angle windows.



Infrared and Laser Products

MOLECULAR LASER (ML) GRATINGS

COATING

ML gratings can be overcoated with gold, increasing the reflectivity at 10.6 microns by approximately 1%, (single pass) but the damage threshold in high power applications may be reduced. No damage threshold minimums apply for overcoated gratings.

SPECIFICATIONS

Clear Aperture..... $\geq 90\%$
Groove Parallelism to Edge..... $\pm 0.5^\circ$
Dimensional Tolerances..... $\pm 0.5\text{mm}$

Thickness:

Originals..... $10\text{mm} \pm 0.5\text{mm}$
Replicas..... $9.5\text{mm} \pm 0.5\text{mm}$

Damage Threshold:

Original Gratings:

CW Laser..... 1 KW/cm^2
Pulsed Laser(100nsec pulse)..... 7 J/cm^2

Replicated Gratings:

CW Laser..... 250 W/cm^2
Pulsed Laser(200nsec pulse)..... 3.5 J/cm^2

SUMMARY ML GRATING SPECIFICATIONS

MODEL NO.	GROOVES/mm	MIN. POLARIZED ABS. EFFICIENCY	OPTIMUM RANGE (μ)	LITTROW ANGULAR DISPERSION (nm/mr)
ML-301	75	> 88%	9.0 - 11.0	12.3
ML-302	100	> 88%	9.0 - 11.0	8.5
ML-303	150	> 88%	9.0 - 11.0	4.2
ML-304	135	> 88%	9.0 - 11.0	5.2
ML-401	150	> 88%	5.0 - 6.0	6.1
ML-402	300	> 88%	5.0 - 6.0	2.0
ML-501	300	> 88%	2.5 - 3.0	3.0
ML-502	450	> 88%	2.0 - 4.0	1.6
ML-601	300	> 88%	2.5 - 4.0	0.35

Infrared and Laser Products

MOLECULAR LASER (ML) GRATINGS

ML SERIES GRATINGS - ORIGINAL AND REPLICATED

ML gratings are normally used as end reflections for tuning molecular lasers. Original gratings are ruled directly into an aluminum coating deposited on a kanigen coated copper substrate, resulting in an inherently higher damage threshold than the replicas which are replicated Pyrex® substrate.

SQUARES

SIZE MODEL NO.	25 x 25 mm		30 x 30 mm		50 x 50 mm		58 x 58 mm	
	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.
ML-301	5-3012	5-3112	5-3019	5-3119	5-3015	5-3115	5-3016	5-3116
ML-302	5-3022	5-3122	5-3029	5-3129	5-3025	5-3125	5-3026	5-3126
ML-303	5-3032	5-3132	5-3039	5-3139	5-3035	5-3135	5-3036	5-3136
ML-304	5-3042	5-3142	5-3049	5-3149	5-3045	5-3145	5-3046	5-3146
ML-401	5-4012	5-4112	5-4019	5-4119	5-4015	5-4115	5-4016	5-4116
ML-402	5-4022	5-4122	5-4029	5-4129	5-4025	5-4125	5-4026	5-4126
ML-501	5-5012	5-5112	5-5019	5-5119	5-5015	5-5115	5-5016	5-5116
ML-502	5-5022	5-5122	5-5029	5-5129	5-5025	5-5125	5-5026	5-5126
ML-601	5-6012	5-6112	5-6019	5-6119	5-6015	5-6115	5-6016	5-6116

RECTANGLES

SIZE MODEL NO.	12.5 x 25 mm		25 x 50 mm		1" x .825"	
	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.
ML-301	5-3610	5-3810	5-3013	5-3113	5-3018	5-3118
ML-302	5-3620	5-3820	5-3013	5-3123	5-3028	5-3128
ML-303	5-3630	5-3830	5-3013	5-3123	5-3038	5-3138
ML-304	5-3640	5-3830	5-3043	5-3123	5-3048	5-3148
ML-401	5-4610	5-4810	5-4013	5-3123	5-4018	5-4118
ML-402	5-4620	5-4810	5-4013	5-3123	5-4028	5-4128
ML-501	5-5610	5-5810	5-5013	5-5113	5-5018	5-5118
ML-502	5-5620	5-5810	5-5023	5-5123	5-5028	5-5128
ML-601	5-6610	5-6810	5-6013	5-6113	5-6018	5-6118

Infrared and Laser Products

MOLECULAR LASER (ML) GRATINGS

ML SERIES GRATINGS - ORIGINAL AND REPLICATED

ML gratings are normally used as end reflectors for tuning molecular lasers. Original gratings are ruled directly into an aluminum coating deposited on a kanigen coated copper substrate, resulting in an inherently higher damage threshold than the replicas which are replicated Pyrex® substrate.

DIAMETERS

SIZE MODEL NO.	25 mm DIA.		38 mm DIA.		1" x .825"	
	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.	ORIGINAL CAT. NO.	REPLICA CAT. NO.
ML-301	5-3011	5-3111	5-3017	5-3117	5-3014	5-3114
ML-302	5-3021	5-3121	5-3027	5-3127	5-3024	5-3124
ML-303	5-3031	5-3131	5-3037	5-3137	5-3034	5-3134
ML-304	5-3041	5-3141	5-3047	5-3147	5-3044	5-3144
ML-401	5-4011	5-4111	5-4017	5-4117	5-4014	5-4114
ML-402	5-4021	5-4121	5-4027	5-4127	5-4024	5-4124
ML-501	5-5011	5-5111	5-5017	5-5117	5-5014	5-5114
ML-502	5-5021	5-5121	5-5027	5-5127	5-5024	5-5124
ML-601	5-6011	5-6111	5-6017	5-6117	5-6014	5-6114

COATINGS

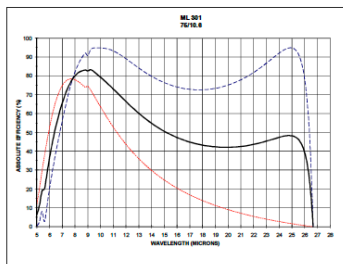
Gold overcoat that enhances reflectivity in the IR is available for an additional charge. No damage threshold minimums apply for overcoated gratings.

Infrared and Laser Products

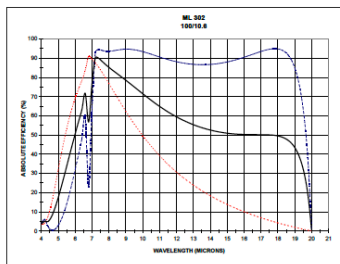
MOLECULAR LASER (ML) GRATINGS

TYPICAL EFFICIENCY CURVES-ML GRATINGS

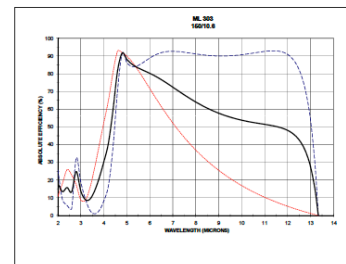
Larger graphs can be viewed from the Optometrics web site at: <http://www.optometrics.com>



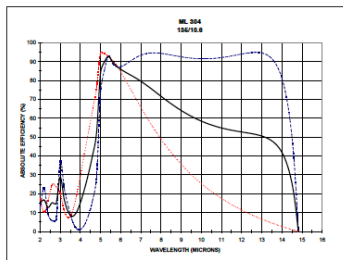
ML-301: 75 g/mm, Blazed at 10.6 μ (E \perp)
Angular Dispersion 12.3 nm/mr



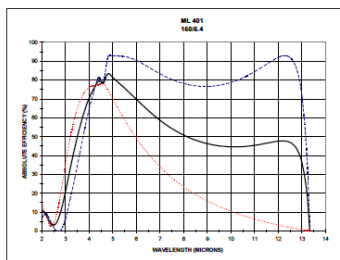
ML-302: 100 g/mm, Blazed at 10.6 μ (E \perp)
Angular Dispersion 8.5 nm/mr



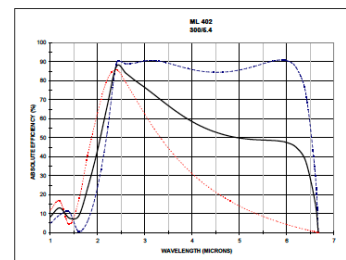
ML-303: 150 g/mm, Blazed at 10.6 μ (E \perp)
Angular Dispersion 2.0 nm/mr



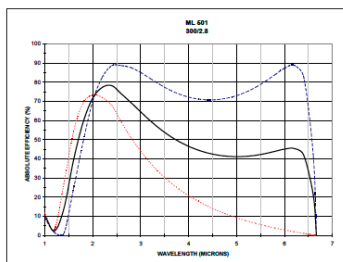
ML-304: 135 g/mm, Blazed at 10.6 μ (E \perp)
Angular Dispersion 3.0 nm/mr



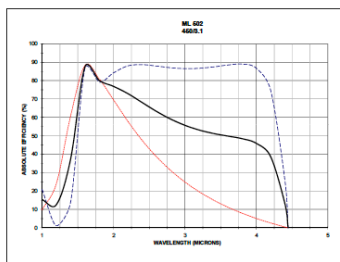
ML-401: 150 g/mm, Blazed at 5.4 μ (E \perp)
Angular Dispersion 6.1 nm/mr



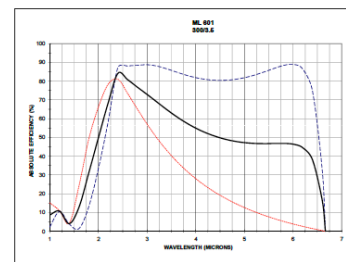
ML-402: 300 g/mm, Blazed at 5.4 μ (E \perp)
Angular Dispersion 2.0 nm/mr



ML-601: 300 g/mm, Blazed at 2.8 μ (E \perp)
Angular Dispersion 3.0 nm/mr



ML-502: 450 g/mm, Blazed at 3.1 μ (E \perp)
Angular Dispersion 1.6 nm/mr



ML-601: 300 g/mm, Blazed at 3.5 μ (E \perp)
Angular Dispersion 0.35 nm/mr

Legend

— Perpendicular Polarization
- - - Parallel Polarization
— Average

* All gratings are measured in the Littrow mounting configuration

* All gratings utilize an aluminum (Al) reflective coat

Infrared and Laser Products

GRATINGS RULED IN GOLD

Gold gratings for high power, high efficiency IR Laser Applications

GOLD GRATINGS

We design and rule custom gratings directly in gold for IR laser applications. Gold gratings are particularly important to IR lasers since their increased efficiency allows more of the generated light to be used. Their resistance to degradation allows them to be used in high power applications that might damage gratings having a thin gold coating over aluminum, for example.

These gratings are available on both INVAR and ceramic substrates. If you are interested in working with other materials please contact us for more information.

CAPABILITIES

- Custom gratings ruled directly in gold on special substrates in various materials and mediums for 4-12 micron laser applications
- Standard molecular laser gratings on aluminized copper substrates. (See standard ML Gratings on pages 12 - 16)

SPECIFICATIONS

Grooves/mm.....	70 - 450
Substrate Materials.....	Copper, Invar, Ceramic, glass or Silicon
Clear Aperture.....	90%
Groove Parallelism to Edge.....	± 0.5°
Dimensional Tolerance.....	± 0.5 mm
Thickness Tolerance.....	± 0.5 mm
Typical Peak Efficiency (Polarized).....	≥ 95%

Custom sizes, rulings and substrates are available on request.

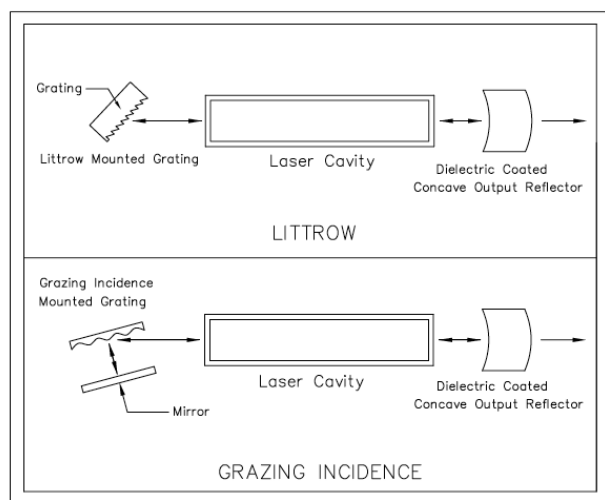


Infrared and Laser Products

GRATING END REFLECTORS FOR DYE LASERS

GRAZING INCIDENCE GRATINGS

Grazing incidence is a simple and inexpensive optical configuration that can tune and increase the resolution of a dye laser. A holographic grating, functioning as an end reflector in a dye laser cavity, is positioned so that laser radiation strikes the grating almost perpendicular to the grating normal. As the angle of incidence approaches 89 degrees, a relatively large area of the grating is illuminated by the laser beam, increasing angular dispersion and resolving power significantly. The sizes of the grating and mirror (12.7 x 50.8 mm) are optimized for grazing incidence. The grazing angle is fixed and tuning is achieved by rotation of the mirror. The laser beam is diffracted twice in grazing incidence, resulting in a two-fold increase in resolution. Low grating efficiency is characteristic of the grazing incidence configuration but is compensated for by the high gain of the dyes used.



Infrared and Laser Products

GRATING END REFLECTORS FOR DYE LASERS

LITTROW SERIES GRATINGS

SPECIFICATIONS

Dimensional tolerances.....± 0.5 mm

Thickness tolerances.....± 0.5 mm

Efficiencies:

Ruled.....60 - 80% at blaze

Holographic..... 45 - 65% at peak

Clear aperture..... 90%

Groove parallelism to edge..... ±0.5°

All dimensions in millimeters.

GROOVES PER mm	BLAZE ANGLE	BLAZE (nm)	DISPERSION (nm/mr) @ 500 nm	12.5 x 25 x 6 CAT. NO.	25 x 25 x 9.5 CAT. NO.	30 x 30 x 9.5 CAT. NO.	50 x 50 x 9.5 CAT. NO.
1200	10° 22'	300	0.82	3-4131	3-2131	5-3131	3-5131
1200	17° 26'	500	0.79	3-4151	5-4151	5-3151	3-5151
1200	26° 45'	750	0.74	3-4171	5-4171	5-3171	3-5171
1200	36° 52'	1000	0.67	3-4111	5-4111	5-3111	3-5111
1800	26° 45'	500	0.50	3-4851	5-4851	5-3851	3-5851

All gratings are available with higher damage thresholds. Contact sales for more information.

GRAZING INCIDENCE GRATINGS AND MIRROR

SPECIFICATIONS

Grating:

Thickness..... 9.5 mm ±0.5 mm

Resolution..... 90% of theoretical

Efficiency at Grazing Incidence:

Single Pass..... Approx. 24%

Double Pass..... Approx. 4%

Mirror:

Coating.....AlSiO

Thickness..... 9.5 mm ±0.5 mm

GROOVES/mm	BLAZE	CAT NO.
1800	VIS	5-2402
3600	VIS	5-2404

MIRROR: Used in conjunction with grazing incidence gratings (above) for double pass high resolution tuning of dye lasers.

SIZE	CATALOG NO.
12.7 x 50.8 mm	5-2405



Optometrics

Special sizes or other substrates available.
Quantity discounts available and OEM inquiries welcome.

For more information, contact Optometrics Corporation
at sales@optometrics.com.

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