MT optics

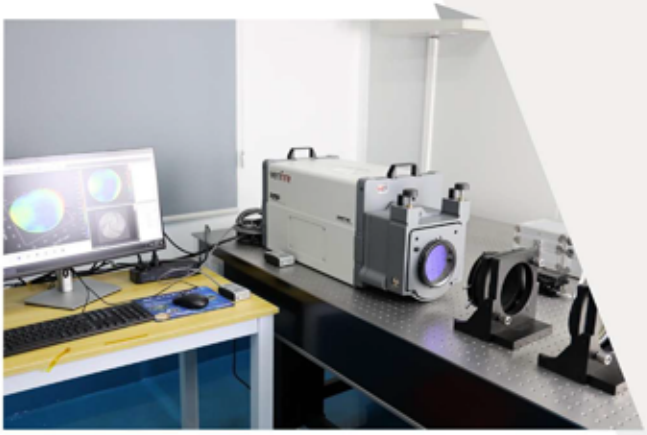
福州美扬光电有限公司
Fuzhou MT-Optics,Inc.

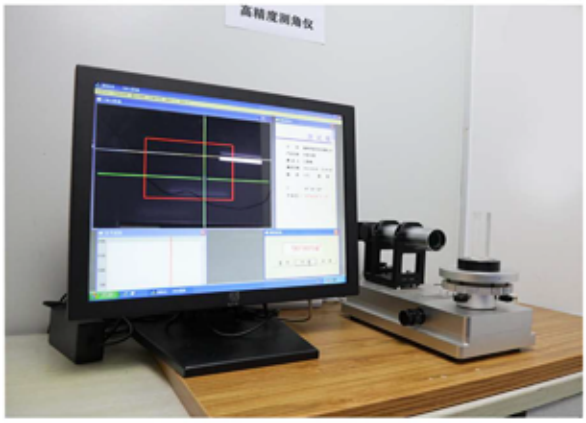


CATALOG

福州美扬光电有限公司
Fu Zhou MT-Optics, Inc.

A Special Leading Manufacturer in





Tel:+86-591-28318070 Fax:+86-591-28318069 E-mail:sales@mt-optics.com http://www.mt-optics.net

Precision Optical Field in China

MT optics 福州美扬光电有限公司 Fu Zhou MT-Optics,Inc.

MT-Optics,Inc. was established in 2008,it's a professional Manufacturer for Optical Components in Fuzhou,China. With a professional and experienced team and advanced equipments to ensure efficient production capacity and high quality.

MT-Optics owns advanced fabricating machine,including Optorun coating machine, CNC Grinding&polishing,High Speed &precision polishing,Ultrasonic cleaner,etc.And inspection instruments,like Zygo, Cary 5000,Trioptics Prism Master 0.5" prism measurement system and so on.These advanced facilities ensure the big production capacity and high quality for OEM and ODM perfectly.

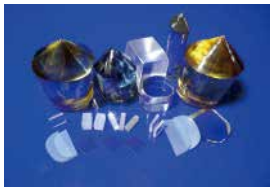
MT-Optics always actively commits to provide the best service to customers all over the world ,insure the high quality,competitive price,flexible lead time,etc.

Polarization Optics

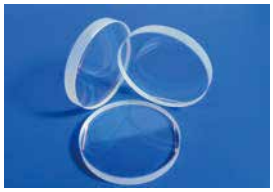
Polarizer

Waveplate

Crystals

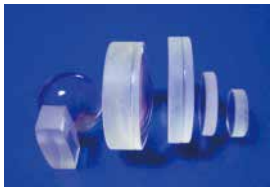


Window



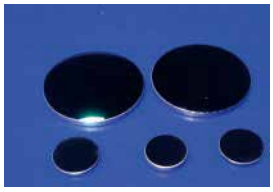
Prism

Lens



Beamsplitter Plate

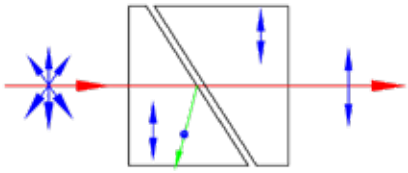
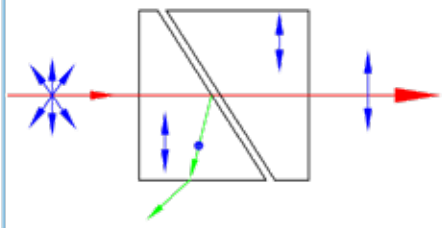
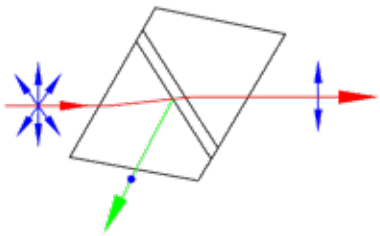
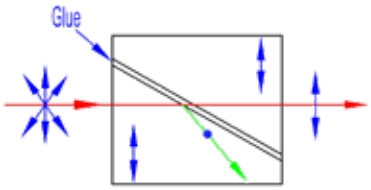
IR Optics

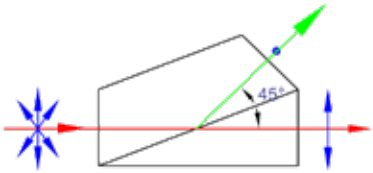
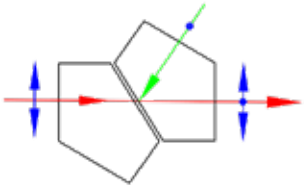
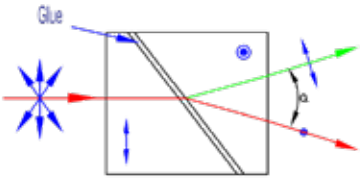
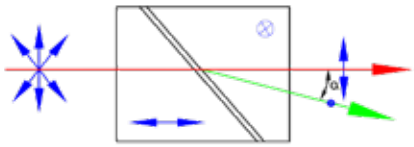


Coating

Polarizer Overview

A Polarizer is an important optical component that is widely used in laser systems to generate the linear polarization laser. MT-Optics,Inc makes following polarizers with four materials, a-BBO, Calcite, YVO4 and Quartz suitable for the widest spectrum and high polarization purity application. Following is the summary for kinds of polarizers and you can compare them to choose the best suitable for your application.

Polarizer	Material	Illustration	Properties and Application
Glan-Taylor Polarizer	a-BBO(200-3500nm) Calcite(350-2300nm) YVO4(500-4000nm)		Air-Spaced Close to Brewster's Angle Cutting High Polarization Purity Short-Length Suitable for Low Medium Power Application
Glan-Laser Polarizer	a-BBO(200-3500nm) Calcite(350-2300nm) YVO4(500-4000nm)		Air-Spaced Close to Brewster's Angle Cutting High Polarization Purity Mounted with escape window Suitable for High Power Application
High Transmission Glan Laser Polarizer	YVO4(500-4000nm) Calcite(350-2300nm)		Air-Spaced All Brewster's Angle Cutting High Polarization Purity Mounted with escape window Suitable for High Power Application High Transmission Brewster Angle Input
Glan-Thompson Polarizer	a-BBO(220-900nm) Calcite(350-2300nm)		Cemented Wide Acceptance Angle Field Suitable for Low Power Application

Polarizer	Material	Illustration	Properties and Application
Glan Thompson Polarizing Beamsplitter Cubes	Calcite (350-2300nm)		Cemented High Polarization Purity High Transmission Suitable for Low Power Application Split o-ray & e-ray at 45deg
Broad band Polarization Beam Combiner	YVO4(500-4000nm)		Air Spaced High Damaged Threshold Broad Band for 500-4000nm
Wollaston Polarizer	a-BBO(200-3500nm) Calcite(350-2300nm) YVO4(500-4000nm) Quartz(200-2300nm)		Cemmented Separate ordinary and extraordinary beams at certain angle Suitable for low power application and where the large deviation is required
Rochon Polarizer	a-BBO(200-3500nm) YVO4(500-4000nm) Quartz(200-2300nm)		Optically Contacted High Polarization Purity Suitable for Low or High Power Application

Comparison of the four materials

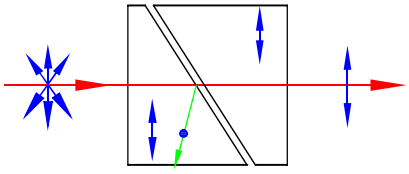
	YVO4	Calcite	a-BBO	Quartz
Transparency	500-4000nm	350-2200nm	200-3500nm	200-2300nm
Crystal Class (Uniaxial)	Positive no=na=nb,ne=nc	Negative no=na=nb,ne=nc	Negative no=na=nb,ne=nc	Positive no=na=nb,ne=nc
Mohs Hardness	5	3	4.5	7
Thermal Expansion Coefficient	a_a=4.43x10^{-6}/K a_c=11.37x10^{-6}/K	a_a=24.39x10^{-6}/K a_c=5.68x10^{-6}/K	a_a=4x10^{-6}/K a_c=36x10^{-6}/K	a_a=6.2x10^{-6}/K a_c=10.7x10^{-6}/K
Hygroscopic Susceptibility	Low	Low	Low	Low

Glan Taylor Polarizer

Glan Taylor Polarizer is a device that produces linearly polarized light from light of other states of polarization. It consists two same birefringence material prisms which are separated by an air space. Glan taylor polarizer will divide an entering unpolarized beam into beam rays, one is the extraordinary that is transmitted through the other side, another is the ordinary ray that is totally internally reflected and absorbed.

Features:

Air-Spaced
Close to Brewster's Angle Cutting
High Polarization Purity
Short-Length
Suitable for Low Medium Power Application



Specifications:

Material:	a-BBO, Calcite or YVO_4
Wavelength Range:	a-BBO: 200-3500 nm, Calcite: 350-2300 nm, YVO_4:500-4000 nm
Extinction Ratio:	Calcite:<$5x10^{-5}$, a-BBO:<$5x10^{-6}$,YVO_4<$5x10^{-6}$
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>200 MW/cm^2
Coating:	Single Layer MgF_2
Mount:	Black Anodized Aluminum

Standard Products

1. Calcite Glan Taylor Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D. Φd(mm)	L ±0.1 (mm)
GTP6006	350-2300	<$5x10^{-5}$	>7.7	6.0	15.0	15.0
GTP6008				8.0	25.4	17.0
GTP6010				10.0	25.4	19.0
GTP6015				15.0	30.0	23.0
GTP6020				20.0	38.0	29.0

2. a-BBO Glan Taylor Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D. Φd(mm)	L±0.1 (mm)
GTP5206	200-270	$<5x10^{-6}$	>6.0	6.0	15.0	15.0
GTP5208				8.0	25.4	17.0
GTP5210				10.0	25.4	19.0
GTP5215				15.0	30.0	23.0
GTP5220				20.0	38.0	29.0
GTP5306	300-700	$<5x10^{-6}$	>6.0	6.0	15.0	15.0
GTP5308				8.0	25.4	17.0
GTP5310				10.0	25.4	19.0
GTP5315				15.0	30.0	23.0
GTP5320				20.0	38.0	29.0
GTP5706	700-3000	$<5x10^{-6}$	>6.0	6.0	15.0	15.0
GTP5708				8.0	25.4	17.0
GTP5710				10.0	25.4	19.0
GTP5715				15.0	30.0	23.0
GTP5720				20.0	38.0	29.0

3. YVO4 Glan Taylor Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D. Φd(mm)	L ±0.1 (mm)
GTP9006	500-4000	$<5x10^{-5}$	>6.5	6.0	15.0	12.0
GTP9008				8.0	25.4	15.0
GTP9010				10.0	25.4	17.0
GTP9015				15.0	30.0	20.0
GTP9020				20.0	38.0	25.0

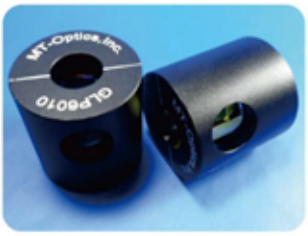
Note:

A wide variety of custom design Glan Taylor Polarizer is available upon request.

Custom Size Mount is available upon request.

AR coated Polarizer is available upon request.

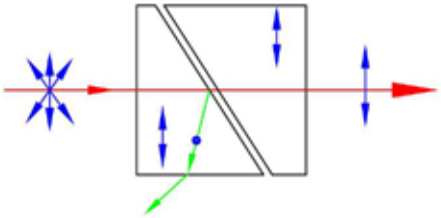
Glan Laser Polarizer



Glan Laser Polarizer is a glan taylor polarizer that is specially designed for high energy application. The side of housing are drilled two holes. The ordinary ray is reflected through an angle and exits the polarizer through one of holes.

Features:

Air-Spaced
Close to Brewster's Angle Cutting
High Polarization Purity
Mounted with escape window
Suitable for High Power Application



Specifications:

Material:	a-BBO, Calcite or YVO_4
Wavelength Range:	a-BBO: 200-3500 nm, Calcite: 350-2300 nm, YVO_4:500-4000 nm
Extinction Ratio:	Calcite:<$5x10^{-5}$, a-BBO:<$5x10^{-6}$,YVO_4<$5x10^{-6}$
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>500 MW/cm^2
Coating:	Single Layer MgF_2
Mount:	Black Anodized Aluminum

Standard Products

1. Calcite Glan Laser Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D. Φd(mm)	L ±0.1 (mm)
GLP6006	350-2300	<$5x10^{-5}$	>7.7	6	15	21
GLP6008				8	25.4	24.5
GLP6010				10	25.4	26.2
GLP6015				15	30	33.3
GLP6020				20	38	42.3

2.a-BBO Glan Laser Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D. Φd(mm)	L±0.1 (mm)
GLP5206	200-270	$<5x10^{-5}$	>6.0	6.0	15.0	29.0
GLP5208				8.0	25.4	31.0
GLP5210				10.0	25.4	31.0
GLP5215				15.0	30.0	38.6
GLP5220				20.0	38.0	48.9
GLP5306	300-700	$<5x10^{-6}$	>6.0	6.0	15.0	25.0
GLP5308				8.0	25.4	25.0
GLP5310				10.0	25.4	26.0
GLP5315				15.0	30.0	33.4
GLP5320				20.0	38.0	43.6
GLP5706	700-3000	$<5x10^{-6}$	>6.0	6.0	15.0	23.0
GLP5708				8.0	25.4	24.7
GLP5710				10.0	25.4	25.9
GLP5715				15.0	30.0	33.0
GLP5720				20.0	38.0	43.6

3. YVO4 Glan Laser Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa(mm)	O.D.Φd(mm)	L ±0.1(mm)
GLP9006	500-4000	$<5x10^{-6}$	>6.5	6	15	15.5
GLP9008				8	25.4	19
GLP9010				10	25.4	22.5
GLP9015				15	30	31
GLP9020				20	38	38

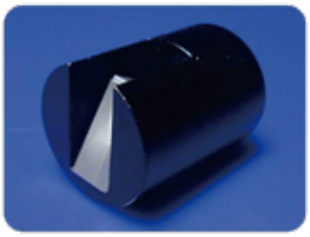
Note:

A wide variety of custom design Glan Laser Polarizer is available upon request.

Custom Size Mount is available upon request.

AR coated Polarizer is available upon request.

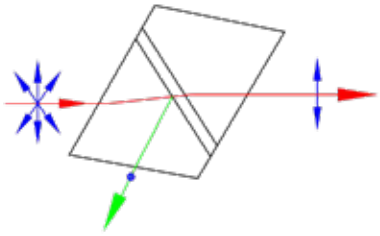
High Transmission Glan Laser Polarizer



High Transmission Glan Laser Polarizer is specially designed polarizer which is based on the Brewster Cut crystal and can improve the transmission from normally >85% to 95%. This polarizer can bemade from both Calcite and YVO4.

Features:

Air-Spaced
All Brewster's Angle Cutting
High Polarization Purity
Mounted with escape window
Suitable for High Power Application
High Transmission
Brewster Angle Input



Specifications:

Material:	Calcite or YVO4
Wavelength Range:	Calcite: 350-2300 nm, YVO4:500-4000 nm
Extinction Ratio:	Calcite:<$5x10^{-5}$, YVO4:<$5x10^{-6}$
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>500 MW/cm^2
Coating:	Uncoated
Transmission:	>95%
Mount:	Black Anodized Aluminum

Standard Products

1.Calcite High Transmission Glan Laser Polarizer

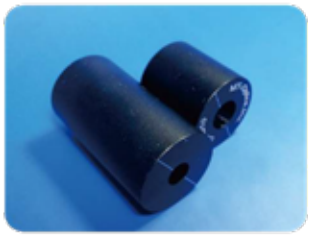
Part No.	Wavelength Rang(nm)	Extinction Ratio	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
GLH6006	350-2300	<$5x10^{-5}$	6	25.4	25.0
GLH6008			8	25.4	32.0
GLH6010			10	30.0	38.0

2.YVO4 High Transmission Glan Laser Polarizer

Part No.	Wavelength Rang(nm)	Extinction Ratio	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
GLH9006	500-4000	<$5x10^{-6}$	6	25.4	28.0
GLH9008			8	30.0	38.0
GLH9010			10	38.0	45.0

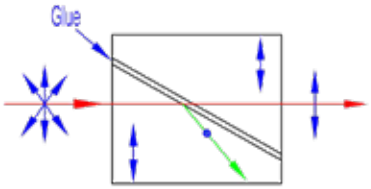
Glan Thompson Polarizer

Glan Thompson polarizer consists two same calcite prisms which are comented together. The extraordinary ray is transmitted, while ordinary ray is deflected and absorbed.



Features:

Cemented
Wide Acceptance Angle Field
Suitable for Low Power Application



Specifications:

Material:	a-BBO, Calcite
Wavelength Range:	a-BBO: 220-900 nm, Calcite:350-2300nm
Extinction Ratio:	Calcite:<5x10^{-5}, a-BBO:<5x10^{-4}
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>200 MW/cm^2
Coating:	Single Layer MgF2
Mount:	Black Anodized Aluminum

Standard Products

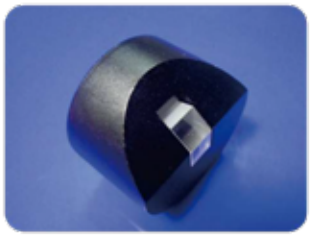
1.a-BBO Glan Thompson Polarizer(Special for DUV, Visible and NIR(200-900nm)

Part No.	Wavelength Rang(nm)	L/CA	Extinction Ratio	Angular Field(°)	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
GMP5006	220-900	1.6	<5x10-6	>15	6	15	18
GMP5008					8	25.4	21
GMP5010					10	25.4	24.5
GMP5015					15	30	32.5
GMP5020					20	38	40.7

2.Calcite Glan Thompson Polarizer

Part No.	Wavelength Rang(nm)	L/CA	Extinction Ratio	Angular Field(°)	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
GMP6106	350-2300	2.5	<5x10-5	14-16	6	15	23
GMP6108					8	25.4	28
GMP6110					10	25.4	33
GMP6115					15	30	45.5
GMP6206	350-2300	3	<5x10-5	25-28	6	15	26
GMP6208					8	25.4	32
GMP6210					10	25.4	38
GMP6215					15	30	53

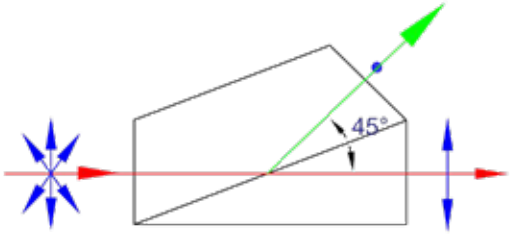
Glan Thompson Polarizing Beamsplitter Cubes



Glan Thompson Polarizing Beamsplitter Cubes has been arranged to permit their output of the s-polarized beam at 45 deg from the straight through p-polarized beam. They provide high polarization purity and high transmission in the two emerging beams. These are useful if it is required to utilize both linear polarization states . They are mounted in a rectangular metal cell and surrounded with an absorbing compound.

Features:

Cemmented
High Polarization Purity
High Transmission
Suitable for Low Power Application
Split o-ray & e-ray at 45deg



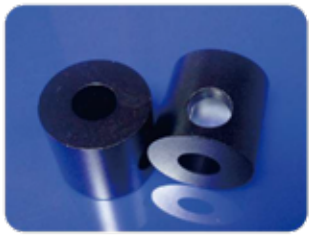
Specifications:

Material:	Calcite
Wavelength Range:	350-2300 nm
Extinction Ratio:	Calcite:<5x10^{-5}
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>200 MW/cm^2
Coating:	Single Layer MgF2
Mount:	Black Anodized Aluminum

Standard Products

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
GPB6006	350-2300	<5x10^{-5}	14-16	6.0x6.0	50.8	33
GPB6008				8.0x8.0	50.8	33
GPB6010				10.0x10.0	50.8	33
GPB6012				12.0x12.0	50.8	33
GPB6015				15.0x15.0	50.8	38

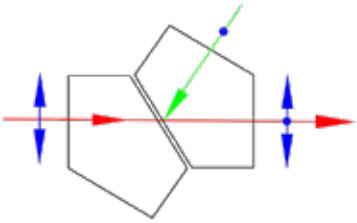
Broad Band Polarization Beam Combiner



Polarization Beam Combiner is made of two pieces YVO4 prism. The calcite polarization combiner can be with 45°of two polarization beam input. Please refer to Glan Thompson Polarizing Beamsplitter Cube which is made of calcite can also wark as polarization beam combiner. But since it is glue cemented, the damage threshold is lower. While we specially design the air spaced Polarization Beam Combiner which is made of YVO4. The Angle between two input polarization beam is 100.6 deg. All the input & output surfacces are optical polished and coated.

Features:

Air Spaced
High Damaged Threshold
Broad Band for 500-4000nm



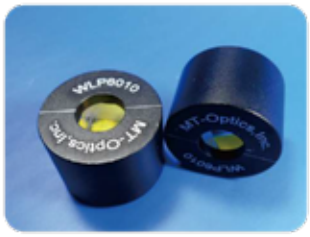
Specifications:

Material:	YVO4
Wavelength Range:	500-4000nm
Extinction Ratio:	$<5x10^{-6}$
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>500 MW/cm^2
Coating:	Single Layer MgF2
Mount:	Black Anodized Aluminum

Standard Products

Part No.	Wavelength Rang(nm)	Extinction Ratio	Angular Field(°)	C.A. Φa (mm)	O.D. Φd (mm)	L ±0.1 (mm)
PBC9006	500-4000	$<5x10^{-6}$	100.6	6	15	10.9
PBC9008				8	25.4	14.5
PBC9010				10	25.4	18.1
PBC9015				15	25.4	27

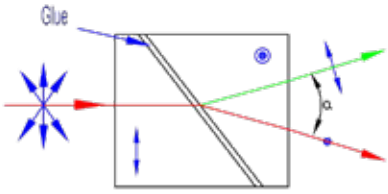
Wollaston Polarizer



Wollaston polarizer can separate an incident beam into two rays: extraordinary and ordinary ray with a deviation angle which is dependent on wavelength. Both rays are transmitted through the other surface.

Features:

Cemented or Optically Contacted
Separate ordinary and extraordinary beams at certain angle
Suitable for low power application and where the large deviation is required



Specifications:

Material:	a-BBO, Calcite ,YVO4,Quartz
Wavelength Range:	A-BBO:200-3500 nm, Calcite:350-2300 nm, YVO4:500-4000nm, Quartz:200-2300nm
Extinction Ratio:	Calcite,Quartz:<5x10^{-5}; a-BBO,YVO4:<5x10^{-6}
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>500 MW/cm^2
Coating:	Single Layer MgF2
Mount:	Black Anodized Aluminum

Standard Products

1.Calcite Wollaston Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
WLP6006	350-2300	<5x10^{-5}	16.7-22.5 19@980nm	6	15	14
WLP6008				8	25.4	16
WLP6010				10	25.4	18
WLP6015				15	30	23
WLP6020				20	38	28

2. a-BBO Wollaston Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
WLP5006	200-3500	$<5x10^{-6}$	15-27 16@ 800nm	6	15	14
WLP5008				8	25.4	16
WLP5010				10	25.4	18
WLP5015				15	30	23
WLP5020				20	38	28

3. Quartz Wollaston Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
WLP8006	200-2300	$<5x10^{-5}$	2-3 2@ 1064nm	6	15	20
WLP8008				8	25.4	24
WLP8010				10	25.4	28
WLP8015				15	30	38
WLP8020				20	38	48

4. YVO4 Wollaston Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
WLP9006	500-4000	$<5x10^{-6}$	19.6-23.3 20@ 1550nm	6	15	14
WLP9008				8	25.4	16
WLP9010				10	25.4	18
WLP9015				15	30	20
WLP9020				20	38	25

Note:

A wide variety of custom design Glan Wollaston Polarizer is available upon request.

Custom Designed Separation Angle at Certain Wavelength is available upon request.

Custom Size Mount is available upon request.

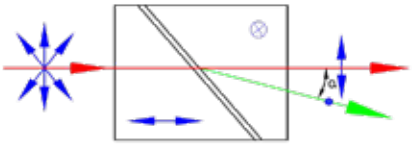
AR coated Polarizer is available upon request.

Rochon Polarizer

Rochon polarizer separates incident beam into ordinary ray and extrordinary ray like wollaston polarizer, but extraordinary ray is straight transmitted through, while ordinary is transmitted with a deviation angle.

Features:

Optically Contacted
High Polarization Purity
Suitable for Low or High Power Application



Specifications

Material:	a-BBO, Quartz, YVO4
Wavelength Range:	a-BBO:200-3500nm,Quartz:200-2300mm , YVO4:400-4000nm
Extinction Ratio:	a-BBO:<5x10^{-6}, Quartz:<5x10^{-5}, YVO4:<5x10^{-5}
Surface Quality:	20/10
Beam Deviation:	< 3 arc minutes
Wavefornt Distortion:	λ/4@632.8nm
Damage Threshold:	>500 MW/cm^2
Coating:	Single Layer MgF2
Mount:	Black Anodized Aluminum

Standard Products

1. a-BBO Rochon Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
RHP5006	200-3500	<5x10^{-6}	8.0-14 8@ 800nm	6	15	14
RHP5008				8	25.4	16
RHP5010				10	25.4	18
RHP5015				15	30	23
RHP5020				20	38	28

2.Quartz Rochon Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D.Φd (mm)	L±0.1 (mm)
RHP8-006	200-2300	$<5x10^{-5}$	1.0-1.5 1@980nm	6	15	20
RHP8008				8	25.4	24
RHP8010				10	25.4	28
RHP8015				15	30	38
RHP8020				20	38	48

3.YVO4 Rochon Polarizer

Part No.	Wavelength Range(nm)	Extinction Ratio	Separation Angle(°)	C.A. Φa (mm)	O.D. Φd (mm)	L±0.1 (mm)
RHP9006	500-4000	$<5x10^{-6}$	9.8-13.0 10@ 1550nm	6	15	14
RHP9008				8	25.4	16
RHP9010				10	25.4	16
RHP9015				15	30	20
RHP9020				20	38	25

Note:

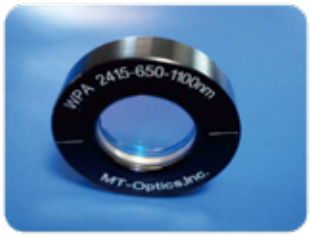
A wide variety of custom design Glan Rochon Polarizer is available upon request.

Custom Designed Separation Angle at Certain Wavelength is available upon request.

Custom Size Mount is available upon request.

AR coated Polarizer is available upon request.

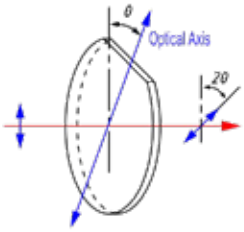
Waveplate



A waveplate is made from material which exhibits birefringence and it is an optical device in which the polished faces contain the optical axis. The velocities of the extraordinary and ordinary rays through the birefringent materials vary inversely with their refractive indices. The difference in velocities gives rise to a phase difference when the two beams recombine. At any specific wavelength the phase difference is governed by the thickness of the waveplate.

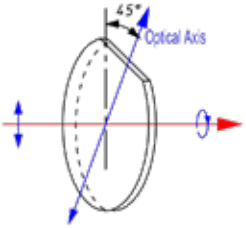
Half Waveplate

A half waveplate rotates linearly polaried light to any desired orientation.The rotation angle is twice the angle between the incident polarized light and optical axis.



Quarter Waveplate

When linearly polarized light is input at 45deg to the axis of a quarter waveplate ,the output is circularly polarized,similarly,input circularly polarized light is transformed into linearly polarized light.

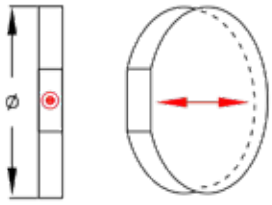


Low Order Waveplate(Multi-Order)

Multiple order waveplate means the retardance of a light path will undergo a certain number of full wavelength shifts in addition to the fractional design retardance. The thickness of multi order waveplate is always around 0.5mm. Compared with zero order waveplate, multi order waveplate is more sensitive to wavelength and temperature changes. However, they are less expensive and widely used in many applications where the increased sensitivities are not critical.

Features:

Thickness: 0.2-0.5 mm
High Damage Threshold
Better Temperature Bandwidth
Low Cost



Specifications:

Material:	Quartz
Diameter Tolerance:	+0.0, -0.1mm
Wavefront Distortion :	λ/8 @ 632.8nm
Retardation Tolerance:	λ/300
Parallelism:	<1 arc second
Surface Quality:	20/10
Clear Aperture:	>90%
Coating:	S1&S2: R<0.2% @ wavelength
Standard Wavelength	266nm, 355nm, 400nm, 532nm, 632.8nm, 780nm, 808nm, 850nm, 980nm, 1064nm, 1310nm, 1480nm, 1550nm

Standard Products

Half Waveplates P/N#	Quarter Waveplates P/N#	Diameter(mm)
WPL210	WPL410	10.0
WPL212	WPL412	12.7
WPL215	WPL415	15.0
WPL220	WPL420	20.0
WPL225	WPL425	25.4
WPL230	WPL430	30.0

Dual Wavelengths Waveplate

Dual wavelength waveplate is a multiple waveplate that provides a specific retardance at two different wavelengths.

Specifications:

Material:	Quartz
Diameter Tolerance:	+0.0, -0.1mm
Wavefront Distortion :	λ/8 @ 632.8nm
Retardation Tolerance:	λ/100
Parallelism:	<1 arc second
Surface Quality:	20/10
Clear Aperture:	>90%
Coating:	R<0.2% @ foundational wavelength & R<0.5% @ SHG wavelength

Standard Products

P/N#	Diameter(mm)	Phase Retardation
WPD1212	12.7	λ@1064nm +λ/2 @532nm
WPD1221	12.7	λ/2 @1064nm +λ@532nm
WPD1512	15.0	λ@1064nm +λ/2 @532nm
WPD1521	15.0	λ/2 @1064nm +λ@532nm
WPD2012	20.0	λ@1064nm +λ/2 @532nm
WPD2021	20.0	λ/2 @1064nm +λ@532nm
WPD2512	25.4	λ@1064nm +λ/2 @532nm
WPD2521	25.4	λ/2 @1064nm +λ@532nm

Zero Order Waveplate

The zero order waveplate is designed to give a retardance of zero full waves, plus the desired fraction. Zero order waveplate shows better performances than multiple order waveplates, it has broad bandwidth and a lower sensitivity to temperature and wavelength changes.

Specifications:

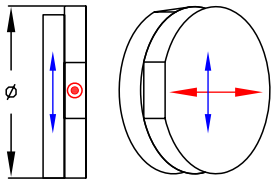
Material:	Quartz
Diameter Tolerance:	+0.0, -0.1mm
Wavefront Distortion :	λ/8 @ 632.8nm
Retardation Tolerance:	λ/300
Parallelism:	<1 arc second
Surface Quality:	20/10
Clear Aperture:	>90%
Coating:	S1&S2: R<0.2% @ wavelength
Standard Wavelength	266nm, 355nm,532nm, 632.8nm,780nm,808nm, 850nm, 980nm,1064nm, 1310nm, 1480nm, 1550nm

Zero Order Waveplate-Cemented by Epoxy

Cemented zero order waveplate is constructed by two quartz plates with their fast axis crossed, the two plates are cemented by UV epoxy. The difference in thickness between the two plates determines the retardation. Zero order waveplates offer a substantially lower dependence on temperature and wavelength change than multi order waveplates.

Features:

Cemented by Epoxy
Thickness 1.5~2mm
Double Retardation Plates
Broad Spectral Bandwidth
Wide Temperature bandwidth



Standard products

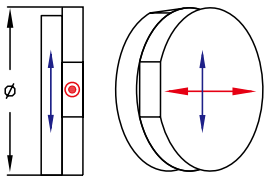
Half Waveplates P/N#	Quarter Waveplates P/N#	Diameter(mm)
WPC210	WPC410	10.0
WPC212	WPC412	12.7
WPC215	WPC415	15.0
WPC220	WPC420	20.0
WPC225	WPC425	25.4
WPC230	WPC430	30.0

Zero Order Waveplate-Optically Contacted

Optically Contacted zero order waveplate is constructed by two quartz plates with their fast axis crossed, the two plates are constructed by optically contacted method, the optical path is epoxy free. The difference in thickness between the two plates determines the retardation. Zero order waveplates offer a substantially lower dependence on temperature and wavelength change than multi order waveplates.

Features:

Optically Contacted
Thickness 1.5~2mm
Double Retardation Plates
Broad Spectral Bandwidth
Wide Temperature bandwidth
High Damage Threshold



Standard products

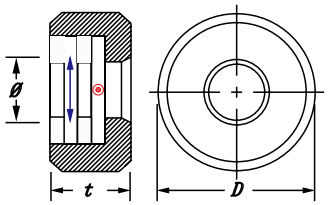
Half Waveplates P/N#	Quarter Waveplates P/N#	Diameter(mm)
WPO210	WPO410	10.0
WPO212	WPO412	12.7
WPO215	WPO415	15.0
WPO220	WPO420	20.0
WPO225	WPO425	25.4
WPO230	WPO430	30.0

Zero Order Waveplate—Air Spaced

Air spaced zero order waveplate is constructed by two quartz plates installed in a mount, to form a air gap between the two quartz plates. The difference in thickness between the two plates determines the retardation. Zero order waveplates offer a substantially lower dependence on temperature and wavelength change than multi order waveplates.

Features:

Air Spaced
Thickness 1.5~2mm
Double Retardation Plates
Broad Spectral Bandwidth
Wide Temperature bandwidth
High Damage Threshold
Mounted



Standard Products

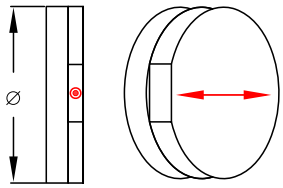
Half Waveplates P/N#	Quarter Waveplates P/N#	Mount Diameter (mm)	Aperture (mm)	Thickness (mm)
WPA210	WPA410	25.4	10.0	8.0
WPA212	WPA412	25.4	12.7	8.0
WPA215	WPA415	25.4	15.0	8.0
WPA220	WPA420	30.0	20.0	8.0
WPA225	WPA425	30.0	25.4	8.0

True Zero Order Waveplate-Cemented

This type of zero order waveplate is constructed of a true zero order waveplate and a BK7 substrate as the waveplate is very thin and easy to be damaged, the BK7 plate's function is to strengthen the waveplate.

Features:

Cemented by Expoy
Broad Spectral Bandwidth
Wide Temperature Bandwidth
Wide Angle Bandwidth



Standard wavelength:

λ/4:532nm, 632.8nm, 780nm, 800nm,808nm, 980nm,1064nm, 1310nm, 1480nm, 1550nm
λ/2:532nm, 632.8nm, 780nm, 800nm,808nm, 850nm, 980nm,1064nm, 1310nm, 1480nm

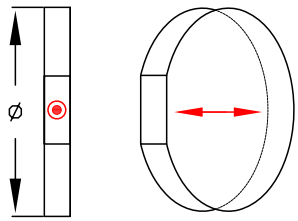
Standard products

Half Waveplates P/N#	Quarter Waveplates P/N#	Diameter(mm)
WPF210	WPF410	10.0
WPF212	WPF412	12.7
WPF215	WPF415	15.0
WPF220	WPF420	20.0
WPF225	WPF425	25.4
WPF230	WPF430	30.0

True Zero Order Waveplate-Single Plate

Features:

Single Plate
Wide Angle Bandwidth
Wide Temperature Bandwidth
Wide Wavelength Bandwidth
High Damage Threshold
Thin Thickness:0.04~0.09 microns



Standard wavelength:

λ/4:1480nm,1550nm
λ/2:980nm,1064nm,1310nm,1480nm,1550nm

Standard products

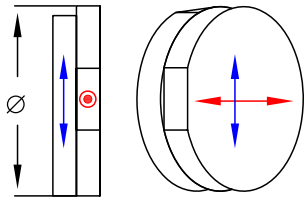
Half Waveplates P/N#	Quarter Waveplates P/N#	Diameter(mm)
WPS210	WPS410	10.0
WPS212	WPS412	12.7
WPS215	WPS415	15.0
WPS220	WPS420	20.0

Achromatic Waveplate

Achromatic waveplate is similar to zero order waveplate except that the two plates are made from different birefringent crystals. Since the dispersion of the birefringence of two materials is different, it is possible to specify the retardation values at a broad wavelength range. So, the retardation will be less sensitive to wavelength change. In other words, it can be used at a broadband wavelength range.

Features:

Epoxy Cemented or Air Spaced available
Very Broad Bandwidth



Specifications:

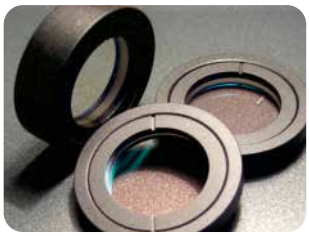
Material:	Quartz+MgF2
Dimension Tolerance:	+0.0/-0.2mm
Wavefront Distortion:	λ/4 @632.8nm (for air spaced type)
Retardation Tolerance:	λ/100
Parallelism:	<10 arc seconds (for cemented type)
Surface Quality:	40/20 scratch and dig
Clear Aperture:	>90% central area
Standard Wave:	quarter-wave (v/4), half-wave (λ/2)
Coating:	Both sides AR coated, R<1% per face
Damage Threshold:	Cemented: >500mJ/cm^2, 20ns, 20Hz @1064nm Air spaced: >3J/cm^2, 20ns, 20Hz @1064nm
Standard Wavelength:	450-650nm 550-750nm 650-1100nm 900-2100nm

Standard Products

λ/2 Part No.	λ/4 Part No.	Diameter(mm)	Type
AWP210	AWP410	10.0	Cemented
AWP215	AWP415	15.0	
AWP225	AWP425	25.4	
AWP2210	AWP4410	10.0	Air Spaced
AWP2215	AWP4415	15.0	
AWP2225	AWP4425	25.4	

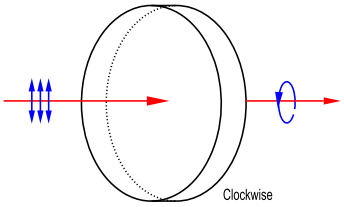
Quartz Polarization Rotator

Polarization rotators offer 45deg or 90deg rotation at a number of common laser wavelength, the optical axis in a polarization rotator is perpendicular to the polished face of the optic. The result is that the orientation of input linearly polarized light is rotated as it propagates through the device. Left-handed and right-handed rotators can be offered by MT-Optics,Inc.



Specifications:

Material:Optical Grade Crystal Quartz
Dimension tolerance: +0.0, -0.1mm
Wavefront distortion:<λ/4@633nm
Wavelength range: 440-1600nm
Retardation accuracy:<5 arc minutes
Surface quality:20/10 scratches and dig
Clear aperture: >90%
AR coating:R<0.2% at center wavelength
Rotation orientation: counter-clockwise
Standard wavelength:532nm, 632.8nm, 1064nm

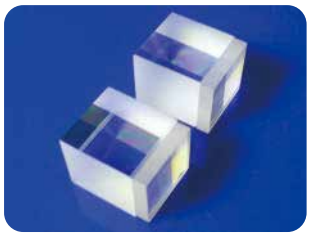


Standard Products

Part No.	Diameter (mm)	Rotation (Deg)
WPR4512	12.7	45
WPR4515	15.0	45
WPR4520	20.0	45
WPR4525	25.4	45
WPR9012	12.7	90
WPR9015	15.0	90
WPR9020	20.0	90
WPR9025	25.4	90

Angle of Rotation	10°	45°	90°
Waveplatge (nm)	Thinkeness(nm)	Thinkeness(nm)	Thinkeness(nm)
532	0.37	1.67	3.33
632.8	0.55	2.4	4.81
808	0.89	4.02	8.03
1064	1.58	7.131	14.26

Optical Isolator



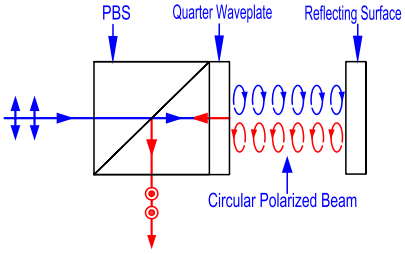
Optical isolator is a combination of a polarization Beamsplitter cube (PBS) and a quarter waveplate made of crystal quartz. Incident light is linearly polarized by PBS and converted to circular polarization by the quarter waveplate. If any portion of the emerging beam is reflected back into the isolator, the quarter waveplate will convert the reflected beam into a linearly polarized beam which is perpendicular to the input beam. This beam is then blocked by PBS and it will not return to the input side of the system.

Features:

Block optical feedback

Passive isolation of linearly polarized light

High isolation



Specifications:

Material: ----------BK7&Crystal Quartz

Dimension tolerance:----------+/-0.2mm

Surface quality:----------60/40

Beam Deviation:----------<3 arc minutes

Transmitted Wavefront Distortion:----------λ/4@632.8nm

Isolation:---------->20dB

Transmission:----------Tp>95%, Ts<1%

Reflection:----------Rs>99%, Rp<5%

AR coating:----------R<0.25%@ central wavelength on all entrances

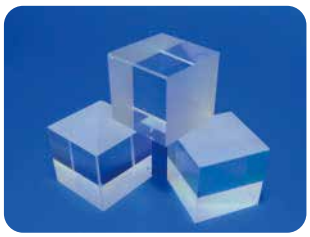
Damage Threshold: ---------->500mJ/cm2, 20ns, 20Hz, @1064nm

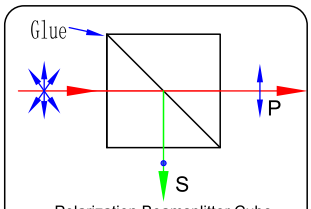
Standard Product

Part No.	Dimension(mm)	Isolation(dB)	Wavelength(mm)
OI8005-532	5x5x5	>20	532
OI8010-532	10x10x10	>20	532
OI8012-532	12.7x12.7x12.7	>20	532
OI8005-633	5x5x5	>20	633
OI8010-633	10x10x10	>20	633
OI8012-633	12.7x12.7x12.7	>20	633
OI8005-780	5x5x5	>20	780
OI8010-780	10x10x10	>20	780
OI8012-780	12.7x12.7x12.7	>20	780
OI8005-1064	5x5x5	>20	1064
OI8010-1064	10x10x10	>20	1064
OI8012-1064	12.7x12.7x12.7	>20	1064
OI8005-1550	5x5x5	>20	1550
OI8010-1550	10x10x10	>20	1550
OI8012-1550	12.7x12.7x12.7	>20	1550

Polarization Cube Beamsplitter (PBS)

Polarizing Cube Beamsplitters split randomly polarized beams into two orthogonal,linearly,polarized components. S-polarized light is reflected at a 90deg.angle while P-polarized light is transmitted. Each beamsplitter consists of a pair of precision high tolerance right angle prisms cemented together with a dielectric coating on the hypotenuse of one of prisms.





Polarization Beamsplitter Cube

Specifications:

Dimension Tolerance:	±0.2mm
Flatness:	λ/4 @ 632.8nm
Surface Quality:	60/40
Extinction Ratio:	>1000:1
Beam Deviation:	< 3 arc minutes
Principal Transmittance:	Tpave>96%,Ts<1%(Narrowband) Tpave>95%, Ts<1% (Broadband)
Principal Reflectance:	Rs>99%, Rp<5%
Coating:	Hypotenuse face: Polarization beamsplitter coating All input and output faces: AR Coating

Narrow Band: BK7 Material

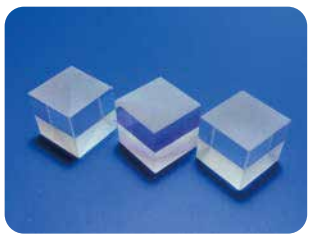
Part No.	Extinction Ratio	Standard Wavelength	Size(mm)
PBS1-101	>1000:1	488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 nm	5x5x5
PBS1-102			10x10x10
PBS1-103			12.7x12.7x12.7
PBS1-104			15x15x15
PBS1-105			20x20x20
PBS1-106			25.4x25.4x25.4

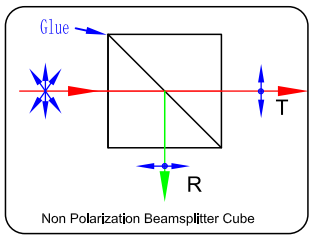
Broad Band: ZF Glass

Part No.	Extinction Ratio	Standard Wavelength	Size(mm)
PBS1-201	>1000:1	420-680,620-1000, 900-1300,1200-1600nm	5x5x5
PBS1-202			10x10x10
PBS1-203			12.7x12.7x12.7
PBS1-204			15x15x15
PBS1-205			20x20x20
PBS1-206			25.4x25.4x25.4

Non-Polarization Beamsplitter Cube(NPBS)

Non-Polarizing Cube Beamsplitter consists of a pair of precision high tolerance right angle prisms cemented together with a metallic-dielectric coating on the hypotenuse of one of the prisms. The low polarization dependence of the metallic-dielectric coating allows the transmission and reflection for S and P-polarization states to be within 5% of each other. This means that they will not change the state of polarization of the incident beam.





We offer both broadband and single wavelength non-polarizing cube beamsplitters (NPBS). An antireflective coating has beam applied to each face of the beamsplitter in order to produce maximum transmission efficiency for the appropriate wavelength range

Specifications:

Dimension Tolerance:	±0.2mm
Flatness:	λ/4 @ 632.8nm
Surface Quality:	60/40
Beam Deviation:	< 3 arc minutes
Transmittance and Reflectance:	Tp=45%+/-5%,Ts=45%+/-5%, Rs=45+/-5%,Rp=45%+/-5%
Absorption:	<10%
Coating:	Hypotenuse face: Non-Polarization beamsplitter coating All input and output faces: AR Coating

Narrow Band: BK7 Material

Part No.	Standard Wavelength	Size(mm)
NPBS1-101	488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 nm	5x5x5
NPBS1-102		10x10x10
NPBS1-103		12.7x12.7x12.7
NPBS1-104		15x15x15
NPBS1-105		20x20x20
NPBS1-106		25.4x25.4x25.4

Broad Band: BK7 Material

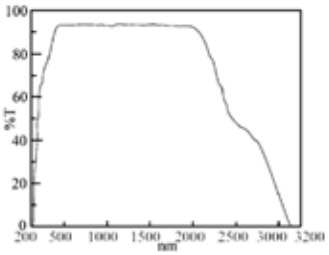
Part No.	Standard Wavelength	Size(mm)
NPBS1-201	400-700nm 700-1100nm 1100-1600nm	5x5x5
NPBS1-202		10x10x10
NPBS1-203		12.7x12.7x12.7
NPBS1-204		15x15x15
NPBS1-205		20x20x20
NPBS1-206		25.4x25.4x25.4

Calcite Crystal

Calcite is a negative uniaxial crystal that has high birefringence, wide spectral transmission and availability in reasonably sized rhombs. Although is a fairly soft crystal and is easily scratched, it is ideal material used as visible and near IR Beam Displacers and Polarizers such as Glan Taylor, Glan Laser and Glan Thompson Polarizers.

Properties:

Crystal Structure:	Crystalline rhombihedral
Density:	2.7 g/cm^3
Transmission Range:	350-2300nm
Mohs Hardness:	3
Hygroscopic Susceptibility:	Low
Thermal Expansion Coefficients (/CO) :	$24.39X10^{-6}$ (C) $5.68X10^{-6}$ (A)
Refractive Indices:	n_o= 1.66315 , n_e= 1.48854 , 532nm n_o=1.64237 , n_e=1.47968 , 1064nm
Sellmeier Equation (λ in μm):	$n_o^2=2.69705 + 0.0192064/(\lambda^2-0.01820) - 0.0151624\lambda^2$ $n_e^2=2.18438 + 0.0087309/(\lambda^2-0.01018) - 0.0024411\lambda^2$



Transparency Curve

Specifications:

Dimension Tolerance:	+/-0.1mm
Clear Aperture:	> 90%
Optical Axis Orientation:	+/-6 arc mins
Parallelism:	< 10 arc secs
Perpendicularity:	< 5 arc mins
Surface quality:	20/10 scratch/dig
Flatness:	λ/4 @632.8nm
Wavefront Distortion:	λ/2 @632.8nm
Coating:	Coating upon Request

Note:
Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

Barium Borate(a-BBO) Crystal

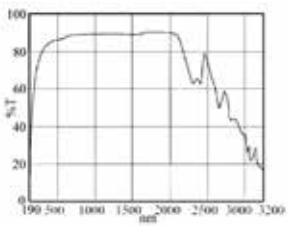
High Temperature form BBO (a-BaB2O4) is a negative uniaxial crystal. It has large birefringence over the broad transparent range from 189 nm to 3500 nm. Recently, MT-Optics has succeeded in growing this crystal into large size. The physical, chemical, thermal and optical properties of a-BBO crystal are similar to those of β-BBO. However, the nonlinear optical properties of a-BBO crystal is vanished due to the centric symmetry with its crystal structure, it is not recommended to use for NLO processes.

Properties:

Transmission range:	189nm~3500nm
Density:	3.85g/cm^3
Therm-Optic Coefficients:	dn_o/dT=-9.3 x 10-6/ °C dn_o/dT=-16.6x10-6/ °C
Mohs Hardness:	4.5
Damage Threshold:	1GW/cm^2 at 1064nm 500MW/cm^2 at 532nm
Hygroscopic Susceptibility:	Low
Thermal Expansion Coefficients: (25 °C - 900 °C)	α_a=4x10^{-6} a_c=36x10^{-6}
Linear Absorption Coefficients:	a<0.005cm-1 from 300nm to 2300nm
Refractive Indices, Birefringence($\triangle n=n_e-n_o$) and wal-off Angle at 45 °C(ρ)	n_e=1.58462, n_o=1.65790, Δn=-0.073282;ρ=-4.9532° at 1064nm n_e=1.60206, n_o=1.67755, Δn=-0.075491;ρ=-5.0407° at 532nm n_e=1.67190, n_o=1.76171, Δn=-0.089805;ρ=-5.6926° at 266nm
Sellmeier equation(λ in μm):	n_o^2=2.7471+0.01878/(λ^2-0.01822)-0.01354 λ^2 n_e^2=2.3174+0.01224/(λ^2-0.01667)-0.01516 λ^2

Specifications:

Diameter:	Max 50mm
Length:	Max 35mm
Clear Aperture:	> 90%
Optical Axis Orientation:	+/-6 arc mins
Parallelism:	< 10 arc secs
Surface Quality:	10/5 scratch/dig
Flatness:	λ/4 @632.8nm
Wavefront Distortion:	λ/2 @632.8nm
Coating:	Coating upon Request



Transparency Curve

Note:

Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

CRYSTAL

Yttrium Vanadate(YVO4) Crystal

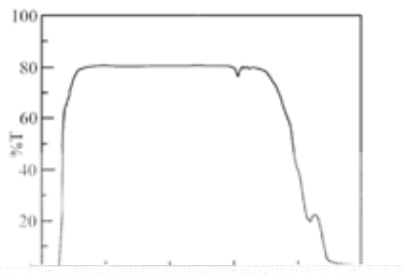
The yttrium orthovanadate (YVO4) is a positive uniaxial crystal grown with Czochralski method. It has good mechanical and physical properties and is ideal for optical polarizing components because of its wide transparency range and large birefringence. It is an excellent synthetic substitute for Calcite (CaCO3) and Rutile (TiO2) crystals in many applications including fiber optic isolators and circulators, beam displacers, Glan polarizers and other polarizing optics, etc.

Properties:

Transmission range:	400~5000nm
Crystal Class:	Positive uniaxial with $n_o=n_a=n_b$, $n_e=n_c$
Density:	4.22 g/cm^2
Hygroscopic Susceptibility:	Non-hygroscopic
Mohs Hardness:	5
Thermal Conductivity Coefficient:	‖C: 5.23 w/m/k; ⊥C:5.10w/m/k
Refractive Indices, Birefringence(△n=ne-no) and Walk-Off Angle at 45 deg(ρ)	n_o=1.9929, n_e=2.2154, △n=0.2225, ρ=6.04°, at 630nm n_o=1.9500, n_e=2.1554, △n=0.2054, ρ=5.72°, at 1300nm n_o=1.9447, n_e=2.1486, Dn=0.2039, ρ=5.69°, at 1550nm
Sellmeier Equation (λ in μm):	n_o^2 =3.77834+0.069736/(λ^2 -0.04724)-0.0108133 λ^2
	n_e^2=4.5905+0.110534/(λ^2 -0.04813)-0.0122676 λ^2

Specifications:

Diameter:	Max 25mm
Length:	Max 35mm
Clear Aperture:	> 90%
Optical Axis Orientation:	+/-6 arc mins
Parallelism:	< 10 arc secs
Surface Quality:	10/5 scratch/dig
Flatness:	λ/4 @632.8nm
Wavefront Distortion:	λ/2 @632.8nm
Coating:	Coating upon Request



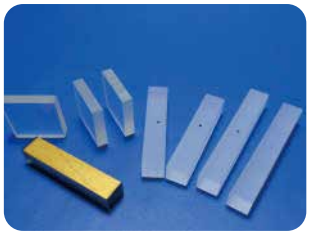
Transparency Curve

Note:

Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

Lithium Niobate (LiNbO3) Crystal

Lithium Niobate (LiNbO3) is widely used as electro-optic modulator and Q-switch for Nd:YAG, Nd:YLF and Ti:Sapphire lasers as well as modulator for fiber optics, etc. The transverse modulation is mostly employed for LiNbO3 crystal. Also LiNbO3 Crystal is widely used as frequency doublers for wavelength >1um and optical parametric oscillators (OPO) pumped at 1064 nm as well as quasi-phase-matched (QPM) devices.



Main Features:

Large Electro-Optic (E-O) coefficients
Large Acousto-Optic (A-O) coefficients

Typical Applications:

Frequency doublers
Optical parametric oscillators (OPO)
Quasi-phase-matched (QPM) device
Q-switches and modulator

Specifications:

Dimensional Tolerance:	±0.1mm
Angle Tolerance:	±0.5deg
Clear Aperture:	> 90%
Parallelism	< 20 arc seconds
Perpendicularity:	< 5 arc minuntes
Surface Quality:	20/10 Scratch and Dig
Surface Flatness:	λ/8 @ 633 nm
Wavefront Distortion:	λ/4 @ 633nm
Coating:	Coating upon Request

Note:
Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

Lithium Triborate (LBO) Crystal

Lithium triborate(LBO) is an excellent nonlinear optical crystal not just for its relatively large conversion coefficient-3X that of KDP, but also for its excellent physical properties. It is widely used for SHG and THG of Nd:YAG, Nd:YLF, Nd:YVO4 and ultra-fast Ti:Sapphire lasers, OPOs(Optical Parametric Oscillators) and OPAs(Optical Parametric Amplifier).

Specifications:

Dimensional Tolerance:	(W ± 0.1mm) x (H ± 0.1mm) x (L + 0.2mm/-0.1mm)
Clear Aperture:	>95%
Angle tolerance:	Δθ< ± 0.5°; Δφ< ±0.5°
Cutting Angle of BBO:	Determined by different kinds of homonic generartion
Phase matching type:	Type I or Type II
Parallelism:	< 20 arc seconds
Perpendicularity:	< 5 arc minutes
Surface Quality:	10/5 scratch/dig
Flatness:	λ/8 at 633nm
Wavefront Distortion:	λ/8 at 632.8nm
Coating:	Coating Upon request

Note:

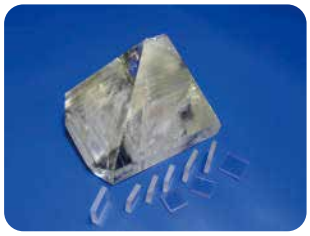
Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

Properties:

Crystal Structure:	Orthorhombic, Space group Pna21, Point group mm2
Lattice Parameter:	a=8.4473Å, b=7.3788Å , c=5.1395Å , Z=2
Melting Point:	About 834℃
Mohs Hardness:	6
Density:	2.47 g/cm^3
Thermal Conductivity:	3.5W/m/K
Thermal Expansion Coefficient:	a_x=10.8x10^{-5}/K, a_y= -8.8x10^{-5}/K, a_z=3.4x10^{-5}/K
Transparency Range:	160-2600nm
SHG Phase Matchable Range:	551 ~ 2600nm (Type I) 790-2150nm (Type II)
Therm-optic Coefficient: (°C, λ in μm)	dn_x/dT=-9.3X10^{-6} dn_y/dT=-13.6X10^{-6} dn_z/dT=(-6.3-2.1λ)X10^{-6}
Absorption Coefficient:	<0.1%/cm at 1064nm <0.3%/cm at 532nm
Angle Acceptance:	6.54mrad-cm (φ, Type I,1064 SHG) 15.27mrad-cm (q, Type II,1064 SHG)
Temperature Acceptance:	4.7°C-cm (Type I, 1064 SHG) 7.5°C-cm (Type II,1064 SHG)
Spectral Acceptance:	1.0nm-cm (Type I, 1064 SHG) 1.3nm-cm (Type II,1064 SHG)
Walk-off Angle:	0.60° (Type I 1064 SHG) 0.12° (Type II 1064 SHG)
NLO Coefficients:	$d_{eff}(I)=d_{32}\cos\Phi$ (Type I in XY plane) $d_{eff}(I)=d_{31}\cos^2\theta+d_{32}\sin^2\theta$ (Type I in XZ plane) $d_{eff}(II)=d_{31}\cos\theta$ (Type II in YZ plane) $d_{eff}(II)=d_{31}\cos^2\theta+d_{32}\sin2\theta$ (Type II in XZ plane)
Non-vanished NLO susceptibilities:	d_{31}=1.05 ± 0.09 pm/V d_{32}= -0.98 ± 0.09 pm/V d_{33}=0.05 ± 0.006 pm/V
Sellmeier Equations (λ in μm):	$n_x^2=2.454140+0.011249/(\lambda^2-0.011350)-0.014591\lambda^2-6.60x10-5\lambda^4$ $n_y^2=2.539070+0.012711/(\lambda^2-0.012523)-0.018540\lambda^2+2.0x10-4\lambda^4$ $n_z^2=2.586179+0.013099/(\lambda2-0.011893)-0.017968\lambda^2-2.26x10-4\lambda^4$
Features:	Broad transparency range from 160nm to 2.6μm (SHG range from 0.55μm to 2.6μm) Type I and type II non-critical phase-matching (NCPM) surpass the common wavelength range. Relatively large effective SHG coefficient (about three times larger than that of KDP). High damage threshold (18.9 GW/cm² for a 1.3ns laser at 1.054μm). Wide acceptance angle and small walk-off. High optical quality (homogeneity Δn ≈ 10 /cm) and free of inclusion.

KTP

KTP (KTiOPO4)crystal is mostly used as nonlinear crystals for frequency doubling of solid-state Nd:YAG crystal or Nd:YVO4 crystal laser, as it has large nonlinear optical coefficients, wide angular bandwidth and small walk-off angle, broad temperature and spectral bandwidth. KTP crystal also has high electro-optic(E-O) coefficient and low dielectric constant, and large figure of merit, these features make it also widely used in electro-optic application.



Specifications:

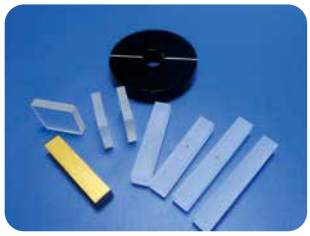
Aperture:	2x2 ~ 10x10mm
Lenght:	0.1 - 20mm
Dimensional Tolerance:	(W ± 0.1mm) x (H ± 0.1mm) x (L + 0.2mm/-0.1mm)
Clear Aperture:	> 95%
Cutting Angle:	Determined by different kinds of homonic generartion
Angle tolerance:	Δθ< ± 0.5°; Δφ< ±0.5°
Phase matching type:	Type I or Type II
Parallelism:	< 20 arc seconds
Perpendicularity:	< 5 arc minutes
Surface Quality:	10/5 Scracth/Dig
Flatness:	λ/8 at 633nm
Wavefront Distortion:	λ/8 at 632.8nm
Coating:	a) S1,S2: AR @ 1064 nm R<0.1% & 532nm R<0.25% b) S1:HR @ 1064nm R>99.8% & HT@ 808nm T>95% S2:AR @ 1064 nm R<0.1% & 532nm R<0.25%

Physical and Optical Properties:

Crystal structure:	Orthorhombic, point group mm2			
Melting point:	1172°C			
Cell parameters:	a=6.404Ä, b=10.616Ä, c=12.814Ä, Z=8			
Curie point:	936°C			
Mohs hardness:	~5			
Density:	3.01 g/cm^3			
Color:	colorless			
Hygroscopic susceptibility:	no			
Specific heat:	0.1643 caλ/g.°C			
Thermal conductivity:	0.13 W/cm/°K			
Electrical conductivity:	3.5x10^{-8} s/cm (c-axis, 22°C, 1KHz)			
Transmitting range:	350nm~4500nm			
Refractive indices:	Wavelength	nx	ny	nz
	1064nm	1.7377	1.7453	1.8297
	532nm	1.778	1.7886	1.8887
Absorption coefficients:	a < 1%/cm @1.064μ m and 0.532μ m			
Phase matchable range:	0.984 - 3.4 μ m			
Therm-optic coefficients:	$dn_x/dT=1.1x10^{-5}$/°C, $dn_y/dT=1.3x10^{-5}$/°C, dnz/dT=1.6x10-5/°C			
Nonlinear optical coefficients:	d_{31}=2.54pm/V, d_{31}=4.35pm/V, d_{31}=16.9pm/V			
	d_{24}=3.64pm/V, d_{15}=1.91pm/V at 1.064 mm			
	$d_{eff}(II)\approx(d_{24} - d_{15})\sin^2\Phi\sin^2\Theta - (d_{15}+ d \sin^2\Phi 24\cos^2\Phi)\sin\Theta$			
Electro-optic coefficients:	Wavelength	Low frequency(pm/V)	High requency(pm/V)	
	γ_{13}	9.5	8.8	
	γ_{23}	15.7	13.8	
	γ_{33}	36.3	35	
	γ_{51}	7.3	6.9	
	γ_{42}	9.3	8.8	
Dielectric constant:	e_{eff}=13			
Sellmeier equations:	$n_x^2=3.0065+0.03901/(\lambda^2-0.04251)-0.01327\lambda^2$			
	$n_y^2=3.0333+0.04154/(\lambda^2-0.04547)-0.01408\lambda^2$			
	$n_z^2=3.3134+0.05694/(\lambda^2-0.05658)-0.01682\lambda^2$			

BBO

BBO(Beta-BaB2O4) crystal is an efficient NLO crystal for the second, third and fourth harmonic generation of Nd:YAG lasers, and the best NLO crystal for the fifth harmonic generation at 213 nm. Conversion efficiencies of more than 70% for SHG, 60% for THG and 50% for 4HG, and 200 mW output at 213 nm (5HG) have been obtained, respectively.



Physical and Optical Properties:

Crystal Structure:	trigonal, space group R3c
Cell Parameters:	a = b = 12.532Ä, c = 12.717Ä, Z = 6
Melting Point:	1095 +/-5°C
Transition Temperature:	925 +/-5°C
Optical Homogeneity:	Dn≈10-6/cm
Mohs Hardness:	4.5
Density:	3.85 g/cm^3
Absorption Coefficient:	< 0.1%/cm (at 1064 nm)
Hygroscopic Susceptibility:	low
Resistivity:	> 1011 ohm-cm
Thermal Expansion Coefficients(in the range of 25℃- 900℃):	a, 4 x 10^{-6}/K c, 36 x 10^{-6}/K
Thermal Conductivity:	⊥c, 1.2 W/m/K; ||c, 1.6 W/m/K

Specifications:

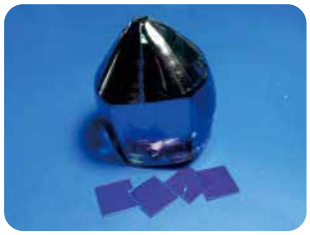
Aperture:	2x2 ~ 25x25mm
Length:	0.02 - 25mm
Dimensional Tolerance:	(W ± 0.1mm) x (H ± 0.1mm) x (L + 0.2mm/-0.1mm)
Clear Aperture:	>95%
Cutting Angle:	Determined by different kinds of homonic generartion
Angle tolerance:	Δθ< ± 0.5°; Δφ< ±0.5°
Phase matching type:	Type I or Type II
Parallelism:	< 20 arc seconds
Perpendicularity:	< 5 arc minutes
Surface Quality:	10/5 scratch/dig
Flatness:	λ/8 at 633nm
Wavefront Distortion:	λ/8 at 632.8nm
Coating:	Protective coating or Anti-reflection upon Request

Note:

Kinds of sizes with different cut-angle can be supplied by MT-Optics,Inc.

Neodymium Doped Yttrium Vanadate(Nd:YVO4)Crystal

Nd:YVO4 is one of the most efficient laser host crystal currently existing for diode laser-pumped solid-state lasers. Its large stimulated emission cross-section at lasing wavelength, high absorption coefficient and wide absorption bandwidth at pump wavelength, high laser induced damage threshold as well as good physical, optical and mechanical properties make Nd:YVO4 an excellent crystal for high power, stable and cost-effective diode pumped solid-st ate lasers.



Physical and Optical Properties:

Crystal Structure:	Zircon Tetragonal, space group D4h, a=b=7.12, c=6.29
Density:	4.22 g/cm^3
Mohs Hardness:	Glass-like, ~5
Thermal Expansion Coefficient:	a_a=4.43x10^{-6}/K, ac=11.37x10^{-6}/K
Thermal Conductivity Coefficient:	||C: 5.23 W/m/K; ^C: 5.10 W/m/K
Lasing Wavelengths:	914nm, 1064 nm, 1342 nm
Peak Absorption Wavelength:	808nm
Crystal Class:	positive uniaxial, no=na=nb ne=nc n_o=1.9573, n_e=2.1652, @ 1064nm no=1.9721, n_e=2.1858, @ 808nm n_o=2.0210, n_e=2.2560, @ 532nm
Thermal Optical Coefficient:	dn_a/dT=8.5x10^{-6}/K, dnc/dT=3.0x10^{-6}/K
Diode Pumped Optical to Optical efficiency:	> 60%
Sellmeier Equation (for pure YVO4 crystals):	n_o^2=3.77834+0.069736/(λ^2 - 0.04724) - 0.0108133λ^2 n_o^2=4.59905+0.110534/(λ^2 - 0.04813) - 0.0122676λ^2

Specifications:

Nd Dopant:	0.27%, 0.3%, 0.4%, 0.5%, 0.7%, 1.0%, 2.0%, 3.0%
Width x Height:	1x1 ~ 16x16mm
Length:	0.05 ~ 20mm
Dimensional Tolerance:	+/-0.1mm
Clear Aperture:	> 95%
Parallelism:	< 10 arc seconds
Perpendicularity:	< 5 arc minutes
Surface Quality:	20/10 Scracth/Dig
Surface Flatness:	λ/10 at 632.8nm
Wavefront Distortion:	λ/8 at 633nm
Coating:	1.AR@1064nm R<0.1% 2.AR@1064nm R< 0.1% & HT@808nm T>95% 3.HR@1064nm R>99.8% & HR@532nm R>99% & HT@808nm T>95%

Nd:YAG Crystal

Nd:YAG crystal is the most widely used solid-state laser material today. They are wildly used in all types of solid-state lasers systems-frequency-doubled continuous wave, high-energy Q-switched, and so forth. Its good fluorescent lifetime thermal conductivity and physical strengths makes it suitable for high power lamp pumped laser.

Physical and Optical Properties:

Chemical Formula:	Nd:Y3A15O12
Crystal Structure:	Cubic
Melting Point:	1970 °C
Density:	4.56 g/cm3
Mohs Hardness:	8.5
Refractive Index:	1.82
Thermal Expansion Coefficient:	7.8 x 10^{-6} /K [111], 0 - 250 °C
Thermal Conductivity:	14 W/m /K @20 °C, 10.5 W /m /K @100 °C.
Lasing Wavelength:	1064 nm
Effective Emission Cross Section:	2.8 x 10-19 cm^2
Pump Wavelength:	807.5 nm
Absorption band at pump wavelength:	1 nm

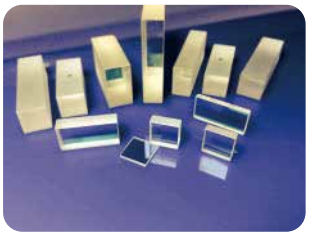
Specifications:

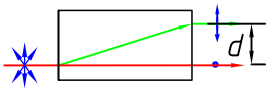
Nd dopant:	0.5-1.2 atm% tolerance within 10% of concentration
Diameter:	3 ~ 20mm
Length:	1 ~ 160mm
Clear Aperture:	>95%
Orientation:	<111> crystalline direction (+/-0.5℃)
Dimensional Tolerance:	+/-0.1mm
Parallelism:	< 10 arc seconds
Perpendicularity:	< 5 arc minutes
Surface Quality:	20 / 10
Surface Flatness:	λ/10 at 633nm
Wavefront Distortion:	λ/8 at 633nm
Coating:	1.AR@1064nm R<0.2% 2.AR@1064nm R< 0.2% & HT@808nm T>95% 3.HR@1064nm R>99.8% & HT@808nm T>95% 4.HR@1064nm R>99.8% & HR@532nm R>99% & HT@808nm T>95%

Polarization Beam Displacer

Polarization Beam Displacer is used to separate an unpolarized beam into two orthogonally polarized output beams which are parallel to each other. The ordinary polarization transmits straight through while the extraordinary walks off from the ordinary beam. It can be used as polarizing Beamsplitter. Polarization beam displacer can also be used to combine two orthogonally polarized beam. The most widely used materials for Polarization Beam Displacer are Yttrium Vanadate (YVO4), a-BBO, Calcite and etc.

Working Wavelength 350-4000nm
YVO4, a-BBO, Calcite available
Orthogonally Polarized Outputs, Outputs Parallel to Input
High Extinction Ratio (>10^5)
RoHS Compliant





Polarization Beam Displacer

Specifications:

Dimension Tolerance:	±0.1mm
Parallelism:	< 15 arc seconds
Perpendicularity:	< 15 arc minutes
Flatensss:	< λ / 8@632.8nm
Transmitted Wavefront Distortion:	< λ / 4@632.8nm
Surface Quality:	20/10 scratch and dig
Clear Aperture:	>90%
Coating:	Upon request

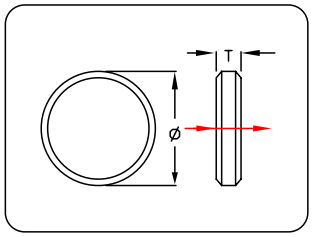
Note:

The dimension and displacer distance are available upon request.
AR coating is available upon request.

Window

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness Tolerance:	±0.2mm
Clear Aperture:	>80%
Parallelism:	1'(Standard), 10"(High Precision)
Parallelism:	60/40(Standard), 10/5(High Precision)
Surface Quality:	λ/2@633nm (Standard), λ/10@633nm per 25mm(High Precision)
Wavefront Distortion:	λ/4 @632.8nm
Bevel:	<0.25mm x 45°
Coating:	Uncoated, available upon request



BK7 Window

Standard			High Precision		
Part No.	Φ (mm)	T(mm)	Part No.	Φ (mm)	T(mm)
WIN1101	10	3	WIN1201	10	6
WIN1102	12.7	3	WIN1202	12.7	6
WIN1103	15	3	WIN1203	15	6
WIN1104	25.4	3	WIN1204	25.4	6.35
WIN1105	50.8	3	WIN1205	50.8	10

Fused silica Window

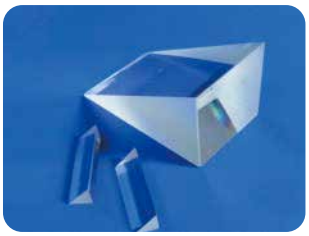
Standard			High Precision		
Part No.	Φ (mm)	T(mm)	Part No.	Φ (mm)	T(mm)
WIN2101	10	3	WIN2201	10	6
WIN2102	12.7	3	WIN2202	12.7	6
WIN2103	15	3	WIN2203	15	6
WIN2104	25.4	3	WIN2204	25.4	6.35
WIN2105	50.8	3	WIN2205	50.8	10

Borofloat Window

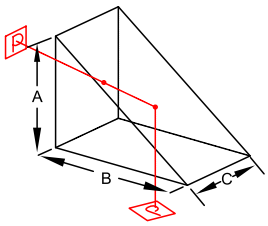
Standard			High Precision		
Part No.	Φ (mm)	T(mm)	Part No.	Φ (mm)	T(mm)
WIN3101	10	3	WIN3201	10	6
WIN3102	12.7	3	WIN3202	12.7	6
WIN3103	15	3	WIN3203	15	6
WIN3104	25.4	3	WIN3204	25.4	6.35
WIN3105	50.8	3	WIN3205	50.8	10

Note: Custom-made windows at other sizes are available. Besides round, at shape of quadrate, triangular, or other polygonal are available upon request.

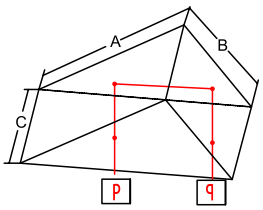
Right Angle Prism



Right angle prism is deviating or deflecting a beam of light with 90deg or 180deg.It is often used in telescope, periscope and other optical system. Furthermore, Laser grade right angle prism is also available from MT-Optics.



90° Deflection



180° Deflection

Specifications:

Material:	BK7 or Fused silica
Dimension Tolerance:	+0,-0.2mm
Clear Aperture:	>80%
Surface Quality:	60-40 scratch and dig
Flatness:	λ/4 @632.8nm
Bevel:	0.2 mm to 0.5 mm x 45deg
Coating:	Uncoated, available upon request

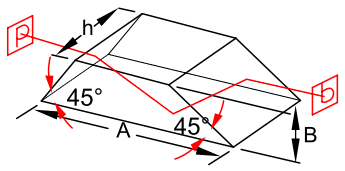
Standard products

Size(mm)	1 min. deviation	30 sec. deviation
A,B,C	Part No.	Part No.
A=B=C=3.2x3.2x3.2	RAP0101	RAP0201
A=B=C=10.0	RAP0102	RAP0202
A=B=C=12.7	RAP0103	RAP0203
A=B=C=25.4	RAP0104	RAP0204

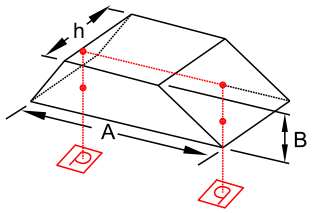
Note:

Custom-made Right Angle Prism at other sizes are available upon request.

Dove Prism



90° Deflection



180° Deflection

Specifications:

Material:	BK7 or Fused silica
Dimension Tolerance:	+0,-0.2mm
Clear Aperture:	>80%
Angle Tolerance:	±3 arc mins
Surface Quality:	60-40 scratch and dig
Flatness:	λ/4 @632.8nm
Bevel:	0.2 mm to 0.5 mm x 45deg
Coating:	Uncoated, available upon request

Standard products

Part No.	A (mm)	B (mm)	h (mm)
DVP0101	21.1	5	5
DVP0102	42.3	10	10
DVP0103	63.4	15	15
DVP0104	80	20	20

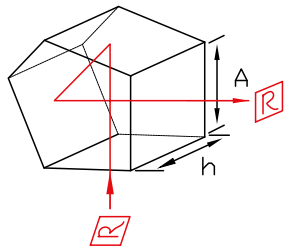
Note:

Custom-made Dove Prism at other sizes are available upon request.

Penta Prism

Specifications:

Material:	BK7 or Fused silica
Dimension Tolerance:	+0,-0.2mm
Clear Aperture:	>80%
Flatness:	λ/4 @632.8nm
Surface Quality:	60-40 scratch and dig
Bevel:	0.2 mm to 0.5 mm x 45deg
Reflectivity:	R > 95% (for design wavelength) per face



Standard products

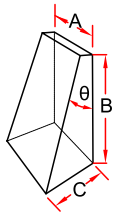
Size	30sec. devation	10sec. devation
Axh (mm)	Part No.	Part No.
3.2x3.2	PTP0101	PTP0201
7x6	PTP0102	PTP0202
10x10	PTP0103	PTP0203
15x15	PTP0104	PTP0204

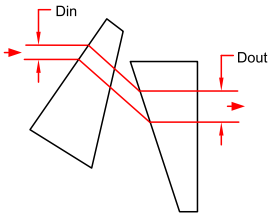
Note: Custom-made Penta Prism at other sizes are available upon request.

Anamorphic Prism

Specifications:

Material:	SF11
Dimension Tolerance:	+0,-0.2mm
Clear Aperture:	>80%
Flatness:	λ/8 @633nm
Surface Quality:	60/40
Theta:	29°27'±30"
Coating:	MgF2 on perpendicular surface



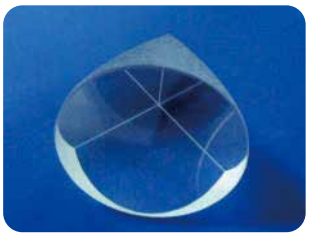


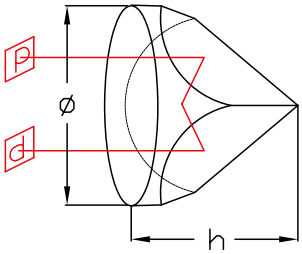
Standard products

Part No.	A (mm)	B (mm)	C (mm)
ANP0-101	12	12	8.5

Note: Custom-made Anamorphic Prism at other sizes are available upon request.

Corner Cube Retroreflector





Specifications:

Material:	BK7
Dimension Tolerance:	+0,-0.2mm
Clear Aperture:	>80%
Deviation:	180°±6 arc secs
Surface Quality:	60- 40 scratch and dig
Flatness:	λ/4 @632.8 nm on big surface, λ/10 @632.8 nm on other surface
Wavefront Distortion:	λ/2 @632.8
Bevel:	0.2 mm to 0.5 mm x 45deg
Coating on input and output sides:	Uncoated, available upon request

Standard products

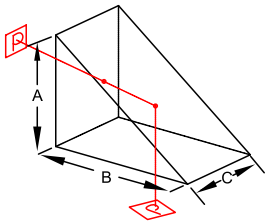
Part No.	Φ(mm)	h (mm)
CCR0101	15	11.3
CCR0201	25.4	19
CCR0301	38	28.5

Note:

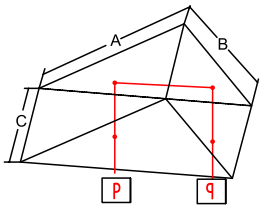
Custom-made Corner Cube Retroreflector at other sizes are available upon request.

Micro Prism

MT-Optics,Inc. very excel in processing Micro Prism, coated and uncoated, for use with laser sources and imaging applications. The micro prisms are right angle, 45°-90°-45° prisms, whose sizes range from 0.5mm to 5.0mm with a format of A=B=C.



90° Deflection



180° Deflection

Specifications:

Material:	BK7
Dimension Tolerance:	+0,-0.2mm
Angle Tolerance:	+/-3 arc minutes
Flatness:	λ /2@632.8 nm
Surface Quality:	40/20 scratch and dig
Clear Aperture	>80%
Protected Bevel:	<0.1mmx45deg
Coating:	Uncoated, available upon request

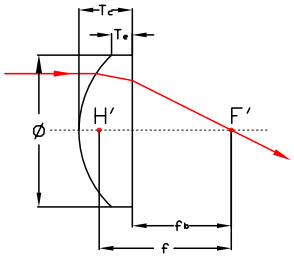
Standard Products

Part NO.	Material	Size(A=B=C,mm)
MRAP1-1.0	BK7	1.0x1.0x1.0
MRAP1-1.5	BK7	1.5x1.5x1.5
MRAP1-2.0	BK7	2.0x2.0x2.0
MRAP1-2.5	BK7	2.5x2.5x2.5
MRAP1-3.0	BK7	3.0x3.0x3.0
MRAP1-4.0	BK7	4.0x4.0x4.0
MRAP1-5.0	BK7	5.0x5.0x5.0

Plano Convex Lens

Specifications:

Material:	N-BK7, Fused Silica, N-SF10, Silicon, Ge,CaF2, etc.
Dimension Tolerance:	+0.0/-0.15mm
Focal Length Tolerance:	+/-2%
Centration:	<3 arc minutes
Flatness at IRR (@632.8nm)	<λ/4
Surface Quality:	60/40
Protected Bevel:	<0.25mmx45deg
Coating:	Uncoated, AR, HR, PR Coating, etc.



Plano Convex Lens -- N-BK7

Design wavelength: 546.1nm, Design Index:1.5183 ± 0.0005

Part No.	Dia (mm)	f (mm)	R1 (mm)	Tc(mm)	Te (mm)	f b (mm)
PCX1101	12.7	15	7.78	5.3	2	11.5
PCX1102	12.7	20	10.37	4.2	2	17.2
PCX1103	12.7	25	12.96	3.7	2	22.6
PCX1104	12.7	30	15.55	3.4	2	27.8
PCX1105	12.7	40	20.73	3	2	38
PCX1106	12.7	50	25.92	2.8	2	48.2
PCX1201	25.4	50	25.92	5.3	2	46.5
PCX1202	25.4	60.4	13.1	4.7	2	56.9
PCX1203	25.4	75	38.87	4.1	2	72.3
PCX1204	25.4	100	51.83	3.6	2	97.6
PCX1205	25.4	125	64.79	3.3	2	122.8
PCX1206	25.4	150	77.75	3	2	148

Plano Convex Lens - Fused Silica

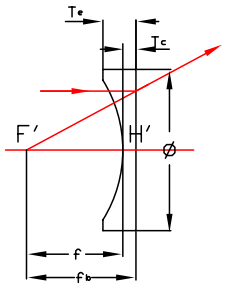
Design wavelength: 546.1nm, Design Index:1.46008

Part No.	Dia(mm)	f (mm)	R1 (mm)	Tc(mm)	Te (mm)	fb (mm)
PCX2101	12.7	20	9.2	4.34	1.8	17.03
PCX2102	12.7	25	11.51	3.71	1.8	24.47
PCX2103	12.7	30	13.8	3.35	1.8	27.71
PCX2104	12.7	40	18.41	2.93	1.8	38
PCX2105	12.7	50	23.01	2.69	1.8	48.17
PCX2106	12.7	75	34.51	2.39	1.8	73.37
PCX2201	25.4	35	16.11	8.2	2	29.39
PCX2202	25.4	40	18.41	7.08	2	35.16
PCX2203	25.4	50	23.01	5.82	2	46.03
PCX2204	25.4	75	34.51	4.42	2	71.98
PCX2205	25.4	100	46.03	3.79	2	97.45
PCX2206	25.4	125	57.54	3.42	2	122.72

Plano Concave Lens

Specifications:

Material:	N-BK7, Fused Silica, N-SF10, Silicon, Ge,CaF2, etc.
Dimension Tolerance:	+0.0/-0.15mm
Clear Aperture:	>85%
Focal Length Tolerance:	+/-2%
Centration:	<3 arc minutes
Flatness at IRR (@632.8nm)	<λ/4
Surface Quality:	60/40
Protected Bevel:	<0.25mmx45deg
Coating:	Uncoated, AR, HR, PR Coating, etc



Plano Concave Lens-- N-BK7

Design wavelength: 546.1nm, Design Index:1.5183 ± 0.0005

Part No.	Dia(mm)	f(mm)	R1 (mm)	Tc(mm)	Te (mm)	fb (mm)
PCV1101	12.7	-15	7.78	2	5.3	-16.3
PCV1102	12.7	-20	10.37	2	4.1	-21.3
PCV1103	12.7	-25	12.96	2	3.7	-26.3
PCV1104	12.7	-30	15.55	2	3.4	-31.3
PCV1105	12.7	-40	20.73	2	3	-41.3
PCV1106	12.7	-50	25.92	2	2.8	-51.3
PCV1201	25.4	-25	12.97	2	10.9	-26.3
PCV1202	25.4	-35	18.14	2	7.2	-36.3
PCV1203	25.4	-50	25.92	2	5.3	-51.3
PCV1205	25.4	-75	38.87	2	4.1	-76.3
PCV1206	25.4	-100	51.83	2	3.6	-101.3

Plano Concave Lens - Fused Silica

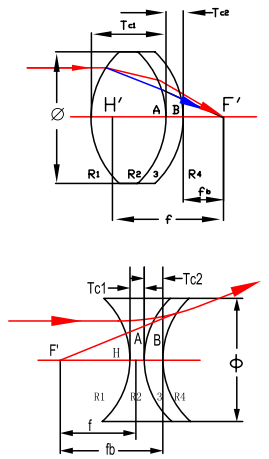
Design wavelength: 546.1nm, Design Index:1.46008

Part No.	Dia(mm)	f(mm)	R(mm)	Tc (mm)	Te (mm)	fb (mm)
PCV2101	12.7	-15	6.92	2	6.17	-16.41
PCV2102	12.7	-20	9.2	2	4.54	-21.38
PCV2103	12.7	-25	11.51	2	3.91	-26.38
PCV2104	12.7	-30	13.8	2	3.55	-31.37
PCV2105	12.7	-40	18.41	2	3.13	-41.38
PCV2201	25.4	-35	16.11	2	8.2	-36.36
PCV2202	25.4	-50	23.01	2	5.82	-51.38
PCV2203	25.4	-75	34.51	2	4.42	-76.38
PCV2204	25.4	-100	46.03	2	3.79	-101.42
PCV2205	25.4	-150	69.02	2	3.18	-151.39

Achromatic Lens

Specifications:

Design Wavelength:	480.0, 546.1, 643.8nm
Diameter Tolerance:	+0.0/-0.15mm
Clear Aperture:	>85%
Focal Length Tolerance :	+/-2%
Centration:	<3 arc minutes
Flatness at IRR (@632.8nm)	<λ/4
Surface Quality:	60/40
Protected Bevel:	<0.25mmx45deg
Coating:	1/4 wave MgF2@550nm



Positive Achromatic Lens

Part No.	Dia (mm)	f(mm)	fb(mm)	R1(mm)	R2=R3 (mm)	R4(mm)	Tc1 (mm)	Tc2 (mm)	Lens A	Lens B
ALP0101	12.7	25	22.251	15.596	-11.402	-31.05	4.3	1.3	BK7	SF5
ALP0102	12.7	30	27.36	18.535	-13.49	-37.84	4	1.3	BK7	SF5
ALP0103	12.7	40	37.778	25.23	-17.539	-48.75	3.4	1.3	BK7	SF5
ALP0104	12.7	50	47.992	31.26	-21.93	-62.37	3.1	1.3	BK7	SF5
ALP0105	12.7	60	58.127	37.33	-26.42	-75.86	2.8	1.3	BK7	SF5
ALP0106	12.7	75	73.227	46.77	-32.96	-94.62	2.6	1.3	BK7	SF5
ALP0201	25.4	60	55.565	37.33	-27.16	-75.86	7	2	BK7	SF5
ALP0202	25.4	120	117.103	73.28	-54.33	-159.96	4.2	2	BK7	SF5

Negative Achromatic Lens

Part No.	Dia (mm)	f(mm)	fb(mm)	R1(mm)	R2=R3(mm)	R4(mm)	Tc1(mm)	Tc2(mm)	Lens A	Lens B
ALN0101	12.7	-25	-27.5	-15.6	13.09	44.16	3	2.67	BK7	F2
ALN0102	12.7	-40	-42.5	-24.45	17.97	66.6	3	2.34	BK7	F2
ALN0103	25.4	-50	-53.3	-31.19	24.89	85.31	3	4.22	BK7	F2

Note:

Different size, focal length can be available from MT-Optics,Inc.

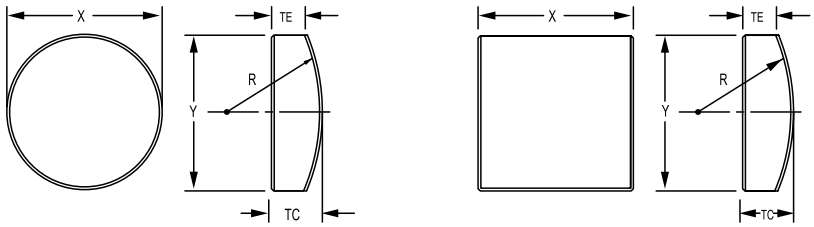
Cylindrical Lens

Cylindrical lenses are available in either plano-concave or plano-convex configurations from MT-Optics,Inc. Cylindrical lenses are used to correct astigmatism in the eye and in rangefinders, to produce astigmatism, stretching a point of light into a line, they are widely used in bar code scanning, projection optics systems, laser measurement systems and holography.

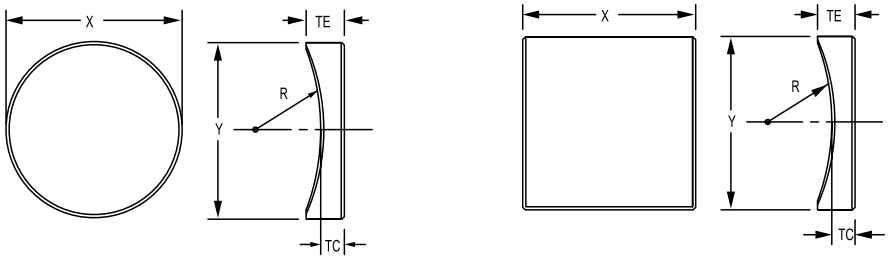
Specifications:

Material:	N-BK7, Fused Silica,N-SF10, CaF2 etc.
Diameter Tolerance:	+0.0/-0.15mm (General); +0.0/-0.02mm (High Precision)
Clear Aperture:	>80% (Small Size); >95% (Large Size)
Focal Length Tolerance:	+/-2%
Centration:	<3 arc minutes
Surface Figure X (per 25mm@632.8nm)	λ/2 (General); λ/4 (High Precision)
Surface Figure Y (per 25mm@632.8nm)	2λ (General); λ (High Precision)
Surface Quality:	60/40 (General);10/5 (High Precision)
Protected Bevel:	<0.25mmx45deg
Coating:	Uncoated, AR, HR, PR Coating, etc.

Circular and Square Plano-Convex Cylindrical Lens



Circular and Square Plano-Concave Cylindrical Lens



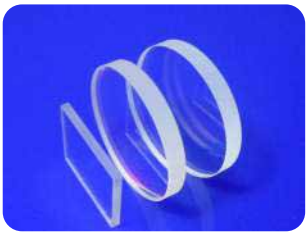
Note:

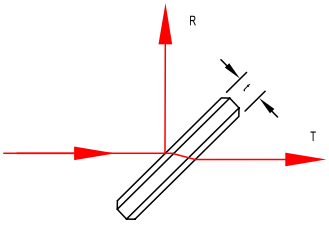
Different size, focal length can be available from MT-Optics,Inc.

LENS

Beamsplitter Plate

Beamsplitter plate is an optical window with semi-transparent mirrored coating to break a beam into two separate beams.





Specifications:

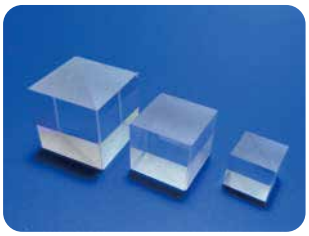
Material:	BK7
Dimension Tolerance:	±0.2mm
Thickness Tolerance:	±0.2mm
Flatness:	λ /4 @ 632.8 nm
Surface Quality:	60/40 scratch and dig
Parallelism:	<1 arc minute
T/R:	50/50±5% for random polarization, T=(Ts+Tp)/2, R=(Rs+Rp)/2
Incidence angle:	45 deg
Coating on input side coating:	partial reflectance
Coating on output side coating:	AR coating

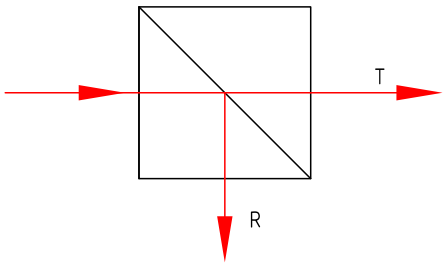
Standard Products

Size(mm)	Standard Wavelength		Narrow Band	Broadband
	Narrow Band	Broadband	Part No.	Part No.
10x10x2	488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 nm	450-650, 650-900, 900-1200, 1200-1550, 1500-1610 nm	BSP1103	BSP1203
12.7x12.7x2			BSP1104	BSP1204
25.4x25.4x2			BSP1105	BSP1205
Dia25.4x2			BSP1106	BSP1206

Beamsplitter Cube

Cube beamsplitters are constructed by cementing two precision right angle prism together with appropriate interference coating on the hypotenuse surface. The absorption loss to the coating is minimal, transmission and reflection approach 50% (average) though output is partially polarized. If polarization sensitivity is critical to your online ordering, we recommended that you select from our Polarization Cube Beamsplitter.





Specifications:

Material:	BK7 grade A, optical glass
Dimension Tolerance:	±0.2mm
Flatness:	λ /4 @ 632.8 nm
Surface Quality:	60-40 scratch and dig
T/R:	50/50±5% for random polarization , T=(Ts+Tp)/2, R=(Rs+Rp)/2
Beam Deviation:	<3 arc minutes
Coating on hypotenuse face:	Partial reflectance
Coating on all input and output faces:	AR Coating

Standard Products

Size(mm)	Standard Wavelength		Narrow Band	Broadband
	Narrow Band	Broadband	Part No.	Part No.
3.2x3.2x3.2	488, 532, 632.8, 650, 808, 850, 980, 1064, 1310, 1550 nm	450-650, 650-900, 900-1200, 1200-1550, 1500-1610 nm	BSC1101	BSC1201
5x5x5			BSC1102	BSC1202
10x10x10			BSC1103	BSC1203
12.7x12.7x12.7			BSC1104	BSC1204
15x15x15			BSC1105	BSC1205
20x20x20			BSC1106	BSC1206
25.4x25.4x25.4			BSC1107	BSC1207

CaF2

CaF2 is a cubic single crystal. It has good transmission from UV to middle infrared wavelength. It is always used in excimer laser components. CaF2 material is relatively soft and somewhat hygroscopic, so polishing, coating and handling are more critical than UV Fused Silica components. Beside UV application, CaF2 also is commonly used in IR components such as windows, Lenses and prisms.

Properties:

Transmission range: 170 nm~7775 nm

Thermal Expansion coefficient: $18.85X10^{-6}$ /K

Density: 3.18 g/cm^3

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min(General); <10 arc secs(High Precision)
Surface quality:	80/50(General); better than 40/20(High Precision)
Flatness:	λ/2(General); λ/8 (High Precision)
Coating:	Coating upon Request

MgF2

MgF2 is a tetragonal positive birefringent crystal. MgF2 has good chemical, mechanical and thermal characteristics compared with CaF2. Due to its high vacuum UV transmission and high damage threshold, MgF2 is usually used in VUV and excimer laser windows, polarizers, lenses and etc.

Properties:

Transparence Range: 120nm ~ 7000nm

Density: 3.17g/cm^3

Thermal Expansion Coefficient: $||a=13.7x10^{-6}$/K, $||c=8.48x10^{-6}$/K

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min(General); <10 arc secs(High Precision)
Surface quality:	80/50(General); better than 40/20(High Precision)
Flatness:	λ/2(General); λ/8 (High Precision)
Coating:	Coating upon Request

Germanium(Ge)

Germanium(Ge) is widely used in far infrared wavelength, it is transparent from 2 micron to 17 micron.. Germanium also has higher refractive index about 4 at 10.6 micron. Germanium is very popular in FLIR and imaging applications. Ge windows and lenses can be manufactured by MT-Optics,Inc.

Properties:

Transmission Range: 2000 nm~17000 nm

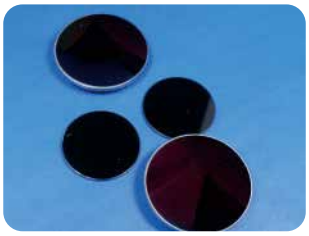
Thermal Expansion Coefficient: $5.5x10^{-6}$/K

Density: 5.33g/cm^3

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min
Surface quality:	40/20
Flatness:	λ/4 @633nm
Coating:	Coating upon Request

Silicon(Si)



Silicon(Si) is commonly used as a substrate material for infrared reflectors and windows in the 1.5um-8um region. The strong absorption band at 9um makes it unsuitable for CO2 laser transmission application but it is frequently used for laser mirrors because of its high thermal conductivity and low density. Silicon is also a useful transmitter in 20um range. Si windows and lenses can be manufactured by MT-Optics,Inc.

Properties:

Transmission Range: 1000nm-10000nm, 30000nm-300000nm

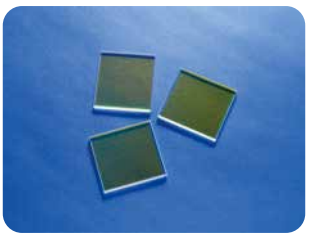
Resistivity(Ohm/cm): 0.003-50

Density: 2.33g/cm^3 at 20°C

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min
Surface quality:	40/20
Flatness:	λ/4 @633nm
Coating:	Coating upon Request

Zinc Selenide(ZnSe)



Zinc Selenide(ZnSe) is the most popular material for infrared applications. It is transparent from0.5 micron to 19 micron. CVD grown ZnSe has very high quality and can be used in high power IR laser. It is mainly used in CO2-laser application for its excellent imaging characteristics and high resistance to thermal shock. ZnSe windows and lenses can be manufactured by MT-Optics,Inc.

Properties:

Transmission Range: 500 nm~19000 nm

Thermal Expansion Coefficient: $7.6x10^{-6}$/K

Density: 5.27g/cm^3

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min
Surface quality:	40/20
Flatness:	λ/4 @633nm
Coating:	Coating upon Request

Zinc Sulphur(ZnS)

Zinc Sulphur(ZnS) mateiral have two grades and can be use in imaging systems. Regular grade material is grown by the chemical vapor deposition process. This material is often used in the 3um to 5 um and 8um to 12 um region. It has reasonable hardness and is moderately priced. It is available in large size as well. It can replace ZnSe in certain harsh environment. Multi Spectral grade ZnS is treated after growth to eliminate microscopic voids and defects which occur in the regular grade, thus extending the usefulness of this material to include the visible region. ZnS windows and lenses can be manufactured by MT-Optics,Inc.

Properties:

Transmission Range: 3~5um and 8-12um

Thermal Expansion Coefficient: 7.85 $x10^{-6}$/K

Density: 4.09 g/cm^3

Specifications:

Diameter Tolerance:	+0.0, -0.1mm
Thickness tolerance:	+/-0.2mm
Clear aperture:	>80% (Small Size); >90% (Large Size)
Parallelism:	< 1 arc min
Surface quality:	40/20
Flatness:	λ/4 @633nm
Coating:	Coating upon Request

Sapphire

Sapphire is a single crystal aluminum oxide (Al2O3). Its Mohs hardness is 9, it is one of the hardest materials. Sapphire has good mechanical strength, and it is also transparent from visible to IR spectrum. So, it is always used as window material where scratch resistance is required.

Properties:

Transparent Range: 180nm ~ 4500nm

Density: 3.98g/cm^3

Mohs Hardness: 9

Melting Point: 2030℃

Thermal Conductivity: 0.04W/m/K

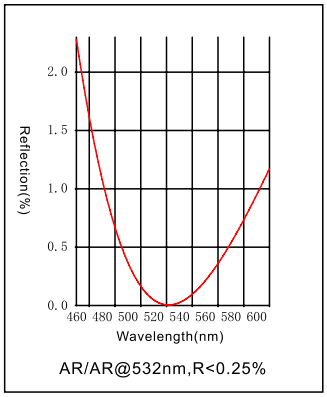
Expansion Coefficient: 8.4x10^{-6}/K

Refractive Index: 1.755@1um

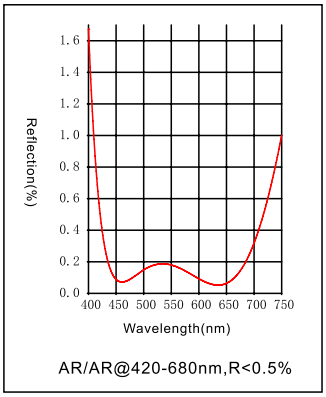
Coating

MT-Optics not only provide kinds of optical components, but also can make various types of optical coatings such as Anti-Reflection Coating, High-Reflection Coating, Partial Reflection Coating and Polarization Beamsplitter Coating etc at single wavelength or broadband wavelength. The coating on the optical element is very important, which can improve the transmission, high reflection, etc.

Anti-Reflection Coating

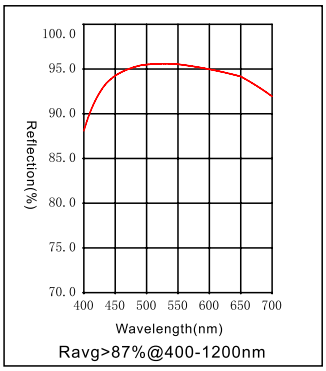


Single Wavelength AR Coating

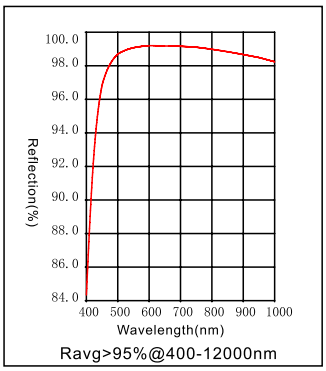


Broadband Multi-Layer AR coating

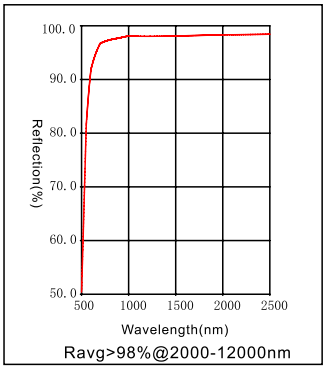
High-Reflection Coating



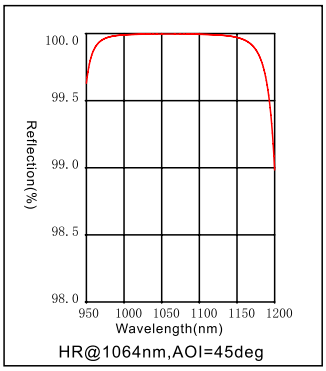
Protected Aluminum Coating



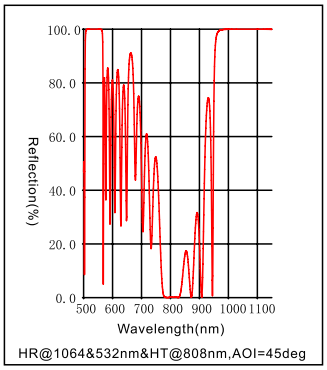
Protected Silver Coating



Protected Gold Coating

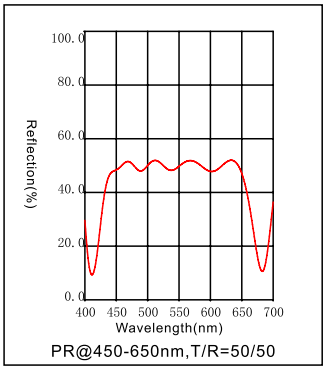


Dielectric High Reflection Coating

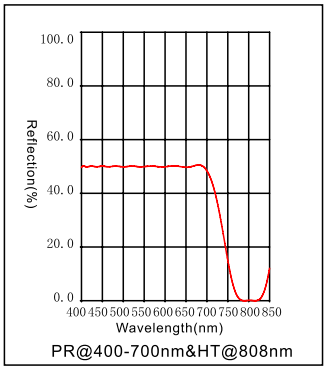


High Reflection and High Transmission Coating

Partial Reflection Coating

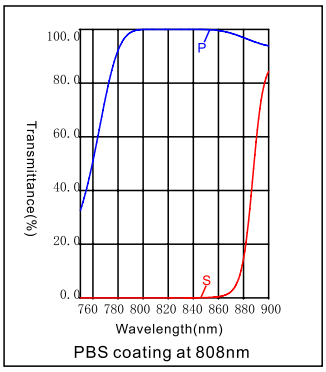


Broadband Wavelength Partial Reflection Coating

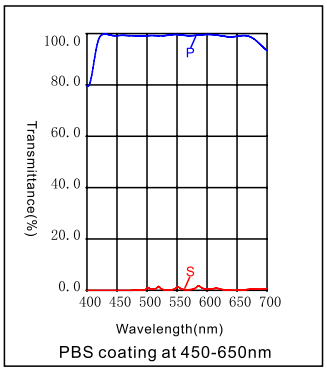


Partial Reflection and High Transmission Coating

Polarization Beamsplitter Coating



Single Wavelength Polarization Beamsplitter Coating



Broadband Wavelength Polarization Beamsplitter Coating

Frequently Asked Questions

FAQ about ordering

1) How to know the price of products?

Re: Please contact our sales with your detail requirements, we'll send you the quotation within 1 day. European customers can get a reply in same day.

We do not issue standard prices, because the specifications and quantity of optical components are various.

2) How to order products from MT-Optics,Inc.?

Re: You can place an order to us via fax, email, or postal mail. Our sales will send you an order confirmation within 2 days. To avoid any misunderstand, we don't accept order by phone.

3) I want to custom the products for my application. Is it available?

Re: It's available. We produce optical components in both customized design and standard design. Please send us your detail requirements or drawings. We will check if it's possible to produce, and reply you in 2 days.

4) What's the lead time and shipping carrier?

Re: It depends on the products. It also depends on the quantity. Some products can be shipped within 2 weeks, some need more weeks. Delivery time will be indicated in the quotation and your order will be shipped within the agreed delivery time.

The frequently used shipping carrier will be UPS, Fedex or DHL, other carrier is also available per your request. We will default to the most efficient and economical shipping method to your order. Default shipping and handling charges are prepaid and will be added to your invoice. If you have an account for freight collect, please notice it in your purchase order.

5) How to make payments to MT-Optics,Inc.? What's the payment term?

Re: The payments can be made by Wire Transfer. The term is net 30 days for regular customers.

But if it is the first time cooperation with each other, the customer should be prepayment by wire transfer.

6) I have no experience with MT-Optics,Inc. products, and worry about the products quality. Can MT-Optics,Inc. guarantee the products to be complied with requirements?

Re: You don't need worry the quality too much. First of all, we do what we are capable of. When we receive your inquiry and send you quotation, we will report you what we can achieve and what we can't. With years of experience and skilful staff, MT-Optics,Inc. have the capability to produce high quality products. All of optical components shipped from MT-Optics,Inc. are fully inspected and controlled to meet customers' requirements.

7) In case there is a faulty product, or one of specification is out of requirement. How do I handle it?

Re: We will provide a RMA number for you to return faulty products to MT-Optics,Inc., and we'll inspect them and make free replacements for you.

8) What is the warranty about the products?

All products are guaranteed to be in specifications in material and workmanship for a period of 12 months after shipment. We do not assume liability for installation, labor or consequential damages. MT-Optics,Inc. reserves the right to repair or replace defective products at our option. This warranty is not suitable for failure of the products due to misuse, abuse, accident, or neglect. Our liability is limited to the order value.

福州美扬光电有限公司

地址：福建省福州市仓山区福湾工业园阳岐路61号1号楼

网站：http://www.mt-optics.com

邮箱：sales@mt-optics.com

电话：0591 28318070

传真：0591 28318069

Address: Bldg.1,NO.61,Yangqi Road,Fuwan Industrial Park,Fuzhou,Fujian,350008,China

Web site: http://www.mt-optics.net

E-mail:sales@mt-optics.com

Phone: +86 0591 28318070

Fax:+86 0591 28318069

Web http://www.mt-optics.net