

Polarizer

Polarizer-Overview

Union Optic provides the following polarizers with four materials include a-BBO, Calcite, Quartz and YVO_4 for widest spectrum and high polarization application.

Polarizer	Material	Illustration	Properties and Application
Glan-Taylor Polarizer	a-BBO(220-3000nm) Calcite(350-2300nm) YVO_4 (500-4000nm)		<ul style="list-style-type: none"> Air-spaced Close to Brewster's angle cutting For medium power application
Glan-Laser Polarizer	a-BBO(220-3000nm) Calcite(350-2300nm) YVO_4 (500-4000nm)		<ul style="list-style-type: none"> Air-spaced Close to Brewster's angle cutting Mounted with escape window Suitable for high power applications
Glan-Thompson Polarizer	Calcite(400-2300nm)		<ul style="list-style-type: none"> Cemented Suitable for low power applications Wide acceptance angle
Brewster Polarizer	Calcite(350-2300nm) YVO_4 (500-4000nm)		<ul style="list-style-type: none"> Extinction Ratio: $<5 \times 10^{-5}$ Transmission efficiency $T_p > 98\%$ High damage threshold No AR coating needed
Wollaston Polarizer	Calcite(400-2300nm) YVO_4 (500-4000nm) Quartz(400-2300nm)		<ul style="list-style-type: none"> Cemented Separate ordinary and extraordinary beams at certain angle Suitable for low power application and where the large deviation is required
Rochon Polarizer	YVO_4 (500-4000nm) Quartz(400-2300nm)		<ul style="list-style-type: none"> Wide wavelength range High extinction ratio Split the ordinary and extraordinary ray, but only ordinary beam is deviated
56Deg Polarization Beamsplitter Plate	BK7/UV Fused Silica		<ul style="list-style-type: none"> Split the S beam and P beam Brewster angle of incidence Suitable for high power application
45Deg Polarization Beamsplitter Plate	UV Fused Silica		<ul style="list-style-type: none"> Split the S beam and P beam 45degree angle of incidence Suitable for high power application

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



Polarizer	Material	Illustration	Properties and Application
Polarization Beamsplitter Cube	BK7 SF Glass		<ul style="list-style-type: none"> Split the S beam and P beam Widely used in most application Good extinction ratio
High Power Polarization Beamsplitter Cube	BK7 UV Fused Silica		<ul style="list-style-type: none"> Split the S beam and P beam Optical path epoxy free High extinction ratio High damage threshold
Dichroic Sheet Polarizer	BK7		<ul style="list-style-type: none"> Working wavelength 400-700nm Large size available Acceptable angle >20deg
Polarization Beam Displacer/Combiner	a-BBO(220-3000nm) Calcite(350-2300nm) YVO ₄ (500-4000nm)		<ul style="list-style-type: none"> Working wavelength 350-4000nm Orthogonally polarized outputs, outputs parallel to Input High extinction ratio(>10⁵)

Comparison of the four materials

	YVO ₄	Calcite	a-BBO	Quartz
Transparency	500-4000nm	350-2300nm	220-3000nm	200-2300nm
Crystal Class (Uniaxial)	Positive $n_o=n_a=n_b, n_e=n_c$	Negative $n_o=n_a=n_b, n_e=n_c$	Negative $n_o=n_a=n_b, n_e=n_c$	Positive $n_o=n_a=n_b, n_e=n_c$
Mohs Hardness	5	3	4.5	7
Thermal Expansion Coefficient	$a_a=4.43 \times 10^{-6}/K$ $a_c=11.37 \times 10^{-6}/K$	$a_a=24.39 \times 10^{-6}/K$ $a_c=5.68 \times 10^{-6}/K$	$a_a=4 \times 10^{-6}/K$ $a_c=36 \times 10^{-6}/K$	$a_a=6.2 \times 10^{-6}/K$ $a_c=10.7 \times 10^{-6}/K$
Hygroscopic Susceptibility	Low	Low	Low	Low

Note:

Classic Glan type prisms (PGT, PGM, and PGL Series) suffer a small, unavoidable loss at the two internal interfaces. This loss is avoided in the Brewster type (PBI Series) by presenting the P-polarized transmitted beam to these interfaces at Brewster's angle. The result is a high power, low loss polarizer that does not need AR coating. The user should be aware of two important considerations in the using of Brewster Polarizer. Firstly, we must use collimated beam only mainly as the stringent angular acceptance requirement. Secondly, the transmitted beam has a relatively large displacement with respect to the incident beam, but they are parallel.



Waveplate

Polarizer

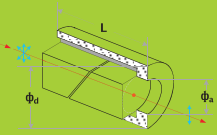
Depolarizer

Brewster Window

Quartz Polarization Rotator

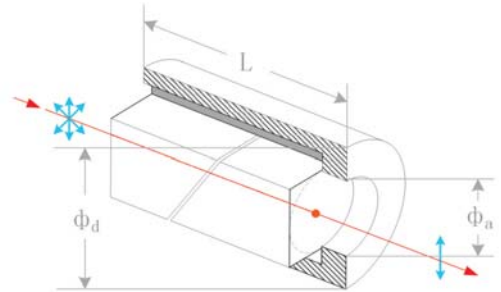
Optical Isolator

Lateral Displacement Polarization Beamsplitter



Glan Taylor Polarizer

- Air-spaced, medium power polarizers for visible or near IR wavelengths
- Rejected beam absorbed internally, $<5 \times 10^{-6}$ extinction ratio
- Close to Brewster's Angle Cutting
- High Polarization Purity
- Short Length
- RoHS Compliant



Standard Product Specifications

Material	a-BBO, Calcite, YVO ₄
Wavelength Range	a-BBO: 220-3000nm; Calcite: 350-2300nm; YVO ₄ : 500-4000nm
Extinction Ratio	$<5 \times 10^{-6}$
Surface Quality	20/10 scratch and dig
Beam Deviation	<3 arc minutes
Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Damage Threshold	$>1\text{J/cm}^2$, 20ns, 20Hz, @1064nm
Coating	Single Layer MgF ₂ @1064nm, T _p $>85\%$ @1064nm Typical
Mount	Black Anodized Aluminium

Standard Product

1. Calcite Glan Taylor Polarizer

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGT5008	350-2300	$<5 \times 10^{-6}$	>7.7	8.0	25.4	17.0
PGT5010				10.0	25.4	19.0
PGT5012				12.7	25.4	21.0
PGT5015				15.0	30.0	23.0
PGT5020				20.0	38.0	29.0

Waveplate

Polarizer

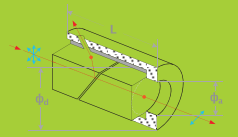
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



2.a-BBO Glan Taylor Polarizer

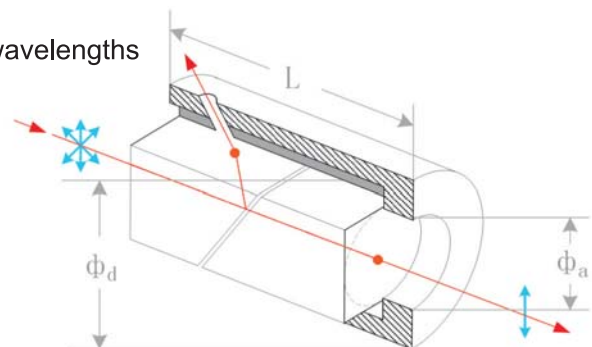
Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGT6208	220-350	$<5 \times 10^{-6}$	>6.0	8.0	25.4	17.0
PGT6210				10.0	25.4	19.0
PGT6212				12.7	25.4	21.0
PGT6215				15.0	30.0	23.0
PGT6220				20.0	38.0	29.0
PGT6308	350-700	$<5 \times 10^{-6}$	>6.0	8.0	25.4	17.0
PGT6310				10.0	25.4	19.0
PGT6312				12.7	25.4	21.0
PGT6315				15.0	30.0	23.0
PGT6320				20.0	38.0	29.0
PGT6708	700-3000	$<5 \times 10^{-6}$	>6.0	8.0	25.4	17.0
PGT6710				10.0	25.4	19.0
PGT6712				12.7	25.4	21.0
PGT6715				15.0	30.0	23.0
PGT6720				20.0	38.0	29.0

3.YVO₄ Glan Taylor Polarizer

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGT7008	500-4000	$<5 \times 10^{-6}$	>6.0	8.0	25.4	15.0
PGT7010				10.0	25.4	17.0
PGT7012				12.7	25.4	18.5
PGT7015				15.0	30.0	20.0
PGT7020				20.0	38.0	25.0

Glan Laser Polarizer

- Broadband high power polarizers for visible or near IR wavelengths
- Air-spaced
- Close to Brewster's Angle Cutting
- High Polarization Purity
- Short Length
- Double escape windows for intracavity use
- RoHS Compliant



Waveplate

Polarizer

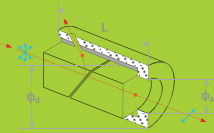
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beam splitter



Standard Product Specifications

Material	a-BBO, Calcite, YVO ₄
Wavelength Range	a-BBO: 220-3000nm; Calcite: 350-2300nm; YVO ₄ : 500-4000nm
Extinction Ratio	<5x10 ⁻⁶
Surface Quality	20/10 scratch and dig
Beam Deviation	<3 arc minutes
Wavefront Distortion	λ/4@632.8nm
Damage Threshold	>5J/cm ² , 20ns, 20Hz, @1064nm
Coating	Single Layer MgF ₂ @1064nm, Tp>85%@1064nm Typical
Mount	Black Anodized Aluminium

Standard Product

1. Calcite Glan Laser Polarizer

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGL5008	350-2300	<5x10 ⁻⁶	>7.7	8.0	25.4	24.5
PGL5010				10.0	25.4	26.2
PGL5012				12.7	25.4	27.5
PGL5015				15.0	30.0	33.0

2. a-BBO Glan Laser Polarizer

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGL6208	220-350	<5x10 ⁻⁶	>6.0	8.0	25.4	30.4
PGL6210				10.0	25.4	31.0
PGL6212				12.7	25.4	31.5
PGL6215				15.0	30.0	38.6
PGL6308	350-700	<5x10 ⁻⁶	>6.0	8.0	25.4	25.0
PGL6310				10.0	25.4	26.0
PGL6312				12.7	25.4	27.0
PGL6315				15.0	30.0	33.4
PGL6708	700-3000	<5x10 ⁻⁶	>6.0	8.0	25.4	24.7
PGL6710				10.0	25.4	25.9
PGL6712				12.7	25.4	27.0
PGL6715				15.0	30.0	33.0

Waveplate

Polarizer

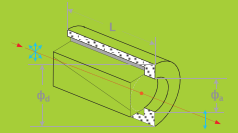
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beam Splitter

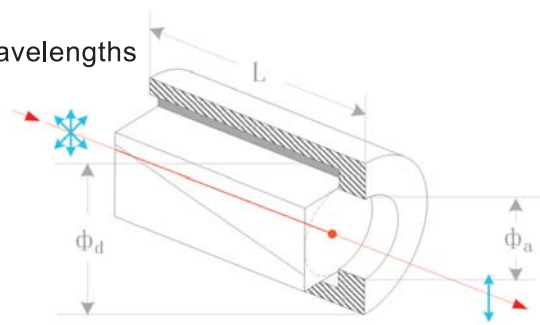


3.YVO₄ Glan Laser Polarizer

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGL7008	500-4000	5×10^{-6}	>6.5	8.0	25.4	20.0
PGL7010				10.0	25.4	23.0
PGL7015				15.0	30.0	29.0
PGL7020				20.0	38.0	38.0

Glan Thompson Polarizer

- Broadband low power polarizers for visible or near IR wavelengths
- Large Acceptance Angle
- High Polarization Purity
- Low Power Application
- RoHS Compliant

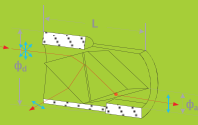


Standard Product Specifications

Material	Calcite
Wavelength Range	400-2300nm
Extinction Ratio	5×10^{-5}
Surface Quality	20/10 scratch and dig
Beam Deviation	3 arc minutes
Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Damage Threshold	>5W/cm ² CW, 1064nm
Coating	Single Layer MgF ₂ @1064nm, T _p >90%@1064nm Typical
Mount	Black Anodized Aluminium

Standard Product

Part No.	Wavelength Range (nm)	Extinction	Angular Field(°)	CA(mm)	OD(mm)	L(mm)
PGM5008	400-2300	5×10^{-5}	14-16	8.0	25.4	28.0
PGM5010				10.0	25.4	33.0
PGM5012				12.7	25.4	40.0



Waveplate

Polarizer

Depolarizer

Brewster Window

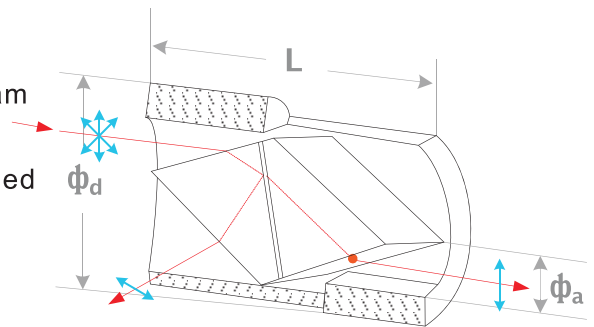
Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beam Splitter

Brewster Polarizer

- Brewster angle incidence at all surfaces yields greater than 98% transmission efficiency
- Rejected beams available for beam splitting/beam combining applications or safe dumping
- No anti-reflection coatings needed, so can be used in high power conditions
- RoHS Compliant



Standard Product Specifications

Material	Calcite, YVO ₄
Wavelength Range	Calcite: 350-2300nm; YVO ₄ : 500-4000nm
Extinction Ratio	<math><5 \times 10^{-5}</math>
Surface Quality	20/10 scratch and dig
Beam Deviation	<3 arc minutes
Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Damage Threshold	>1000 MW/cm ²
Coating	No Coating
Mount	Black Anodized Aluminium

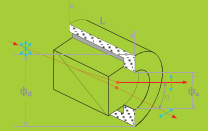
Standard Product

1. Calcite Brewster Polarizer

Part No.	Wavelength Range (nm)	Extinction	CA(mm)	OD(mm)	L(mm)
PBI5005	350-2300	<math><5 \times 10^{-5}</math>	5.0	15.0	18.0
PBI5010			10.0	25.4	37.0

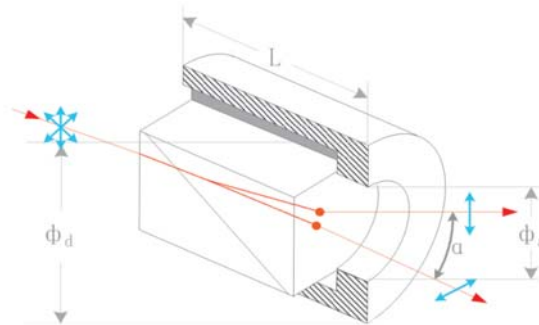
2. YVO₄ Brewster Polarizer

Part No.	Wavelength Range (nm)	Extinction	CA(mm)	OD(mm)	L(mm)
PBI7005	500-4000	<math><5 \times 10^{-5}</math>	5.0	18.0	21.0
PBI7010			10.0	32.0	40.0



Wollaston Polarizer

- Wide Wavelength Range
- Low Power Application
- Broadband high extinction ratio
- RoHS Compliant



Standard Product Specifications

Material	Calcite, YVO ₄ , Quartz
Wavelength Range	Calcite(400-2300nm), YVO ₄ (500-4000nm), Quartz(400-2300nm)
Extinction Ratio	Calcite: $<5 \times 10^{-5}$; YVO ₄ : $<5 \times 10^{-5}$; Quartz: $<5 \times 10^{-4}$
Surface Quality	20/10 scratch and dig
Parallelism	<3 arc minutes
Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Damage Threshold	$>5\text{W}/\text{cm}^2$ CW, 1064nm
Coating	Single Layer MgF ₂ @1064nm
Mount	Black Anodized Aluminium

Standard Product

1、 Quartz Wollaston Polarizer

Part No.	Wavelength Range (nm)	Extinction	Separation Angle(°)	CA(mm)	OD(mm)	L(mm)
PWS3008	400-2300	$<5 \times 10^{-4}$	2.0 @980nm	8.0	25.4	26.0
PWS3010				10.0	25.4	28.0
PWS3012				12.7	25.4	33.0
PWS3015				15.0	30.0	38.0
PWS3020				20.0	38.0	48.0

2、 Calcite Wollaston Polarizer

Part No.	Wavelength Range (nm)	Extinction	Separation Angle(°)	CA(mm)	OD(mm)	L(mm)
PWS5008	400-2300	$<5 \times 10^{-5}$	16.0 @1064nm	8.0	25.4	17.0
PWS5010				10.0	25.4	19.0
PWS5012				12.7	25.4	21.0
PWS5015				15.0	30.0	23.0

Waveplate

Polarizer

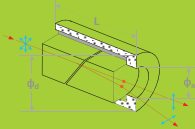
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beam splitter

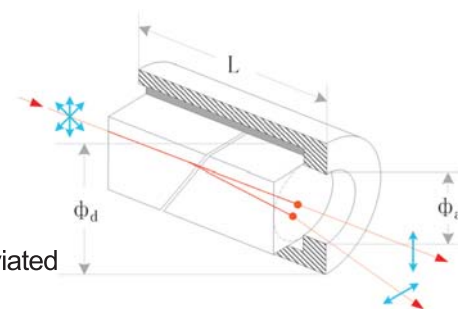


3、YVO₄ Wollaston Polarizer

Part No.	Wavelength Range (nm)	Extinction	Separation Angle(°)	CA(mm)	OD(mm)	L(mm)
PWS7008	500-4000	<5x10 ⁻⁵	20.0 @1550nm	8.0	25.4	17.0
PWS7010				10.0	25.4	19.0
PWS7012				12.7	25.4	21.0
PWS7015				15.0	30.0	23.0

Rochon Polarizer

- Wide Wavelength Range
- High Extinction Ratio
- Large Field Angle
- Cemented, Suitable for low power application
- Split the ordinary and extraordinary ray, but only ordinary beam is deviated
- RoHS Compliant



Standard Product Specifications

Material	YVO ₄ , Quartz
Wavelength Range	YVO ₄ : 500-4000nm Quartz: 400-2300nm
Extinction Ratio	YVO ₄ : <5x10 ⁻⁵ ; Quartz: <5x10 ⁻⁴
Surface Quality	20/10 scratch and dig
Beam Deviation	<3 arc minutes
Wavefront Distortion	λ/4@632.8nm
Damage Threshold	>5W/cm ² CW, 1064nm
Coating	Single Layer MgF ₂ @1064nm
Mount	Black Anodized Aluminium

1、 Quartz Rochon Polarizer

Part No.	Wavelength Range (nm)	Extinction	Separation Angle(°)	CA(mm)	OD(mm)	L(mm)
PRH3008	400-2300	<5x10 ⁻⁴	1.0 @980nm	8.0	25.4	26.0
PRH3010				10.0	25.4	28.0
PRH3012				12.7	25.4	33.0
PRH3015				15.0	30.0	38.0
PRH3020				20.0	38.0	48.0

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beam splitter



2、YVO₄ Rochon Polarizer

Part No.	Wavelength Range (nm)	Extinction	Separation Angle(°)	CA(mm)	OD(mm)	L(mm)
PRH7008	500-4000	5×10^{-5}	6.0 @1550nm	8.0	25.4	17.0
PRH7010				10.0	25.4	19.0
PRH7012				12.7	25.4	21.0
PRH7015				15.0	30.0	23.0
PRH7020				20.0	38.0	29.0

Rotate Mount for Polarizer

Specifications

- Material: Black Anodized Aluminum
- Adjustment range: $\theta_x: \pm 360^\circ$ $\theta_y: \pm 5^\circ$ $\theta_z: \pm 5^\circ$
- Minimum reading: 2°

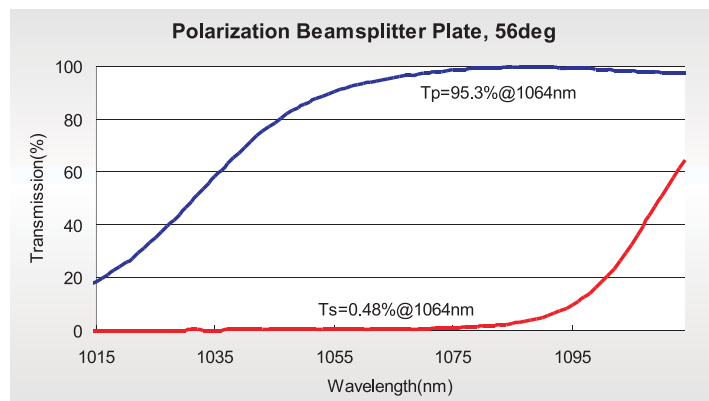
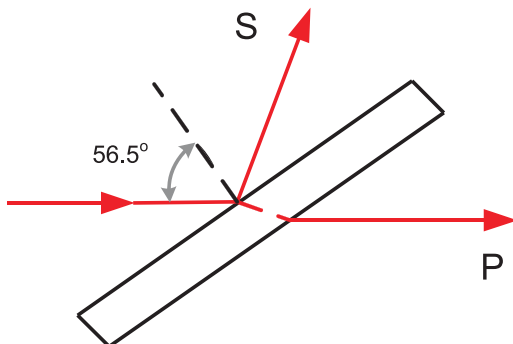


Standard Product

Part No.	Dimension(mm)	Center Height(mm)	Applied Optic Dimension(mm)	Clear Aperture (mm)
OMPO25.4-LJ	56.0*56.0*41.0	33.0	$\Phi 25.4$	22.9
OMPO30-LJ	64.0*64.0*41.0	37.0	$\Phi 30.0$	27.0

56Deg Polarization Beamsplitter Plate

- Split the S beam and P beam
- Brewster angle of incidence
- Suitable for high power application
- RoHS Compliant



Waveplate

Polarizer

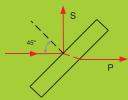
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



Specifications

Material	BK7/UV Fused Silica
Dimension Tolerance	+0/-0.2mm
Thickness Tolerance	±0.2mm
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Parallelism	<3 arc minutes
Flatness	$\lambda/8@632.8\text{nm}$ per 25mm
Extinction Ratio	>100:1
Transmission	$T_p > 95\%$, $T_s < 0.5\%$
Reflection	$R_s > 99.5\%$, $R_p < 5\%$
Coating	AOI 56.5deg (Should be tuned to optimized AOI in use), one surface coated, rear surface uncoated Damage threshold $>5\text{J}/\text{cm}^2$

Standard Product

Part No.	Material	Dimension(mm)	Tp/Ts	Wavelength(nm)	AOI(Deg)
PBP0012-1064	BK7	$\Phi 12.7 \times 3.0$	>100:1	1064	56.5
PBP0025-1064	BK7	$\Phi 25.4 \times 3.0$	>100:1	1064	56.5
PBP0030-1064	BK7	$\Phi 30.0 \times 3.0$	>100:1	1064	56.5
PBP0050-1064	BK7	$\Phi 50.8 \times 3.0$	>100:1	1064	56.5
PBP0025-532	BK7	$\Phi 25.4 \times 3.0$	>100:1	532	56.5
PBP0030-532	BK7	$\Phi 30.0 \times 3.0$	>100:1	532	56.5
PBP0050-532	BK7	$\Phi 50.8 \times 3.0$	>100:1	532	56.5
PBP1025-355	UVFS	$\Phi 25.4 \times 3.0$	>100:1	355	56.5
PBP1030-355	UVFS	$\Phi 30.0 \times 3.0$	>100:1	355	56.5
PBP1050-355	UVFS	$\Phi 50.8 \times 3.0$	>100:1	355	56.5
PBP1025-266	UVFS	$\Phi 25.4 \times 3.0$	>100:1	266	56.5
PBP1030-266	UVFS	$\Phi 30.0 \times 3.0$	>100:1	266	56.5
PBP1050-266	UVFS	$\Phi 50.8 \times 3.0$	>100:1	266	56.5

45Deg Polarization Beamsplitter Plate

- Split the S beam and P beam
- 45degree Angle of Incidence
- Suitable for High Power Application
- RoHS Compliant

Waveplate

Polarizer

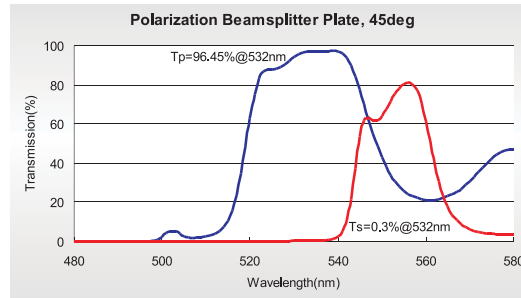
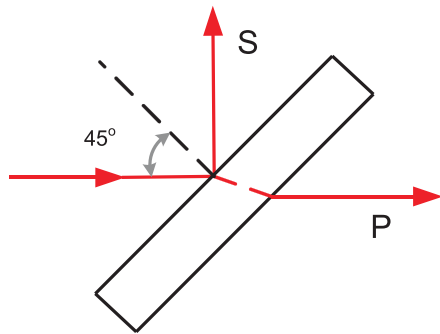
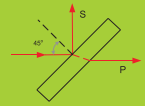
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



Specifications

Material	UV Fused Silica
Dimension Tolerance	+0/-0.2mm
Thickness Tolerance	±0.25mm
Surface Quality	60/40
Clear Aperture	>90%
Parallelism	<3 arc minutes
Wavefront Distortion	<λ/4@632.8nm
Extinction Ratio	Tp/Ts>200:1
Transmission	Tp>95%, Ts<0.5%
Reflection	Rs>99.5%, Rp<5%
Coating	AOI 45deg (Should be tuned to optimized AOI in use), one surface coated, rear surface uncoated Damage threshold >5J/cm ²

Standard Product

Part No.	Material	Dimension(mm)	Tp/Ts	Wavelength(nm)	AOI(Deg)
PBP1112-355	UVFS	Φ12.7*3.0	>200:1	355	45
PBP1125-355	UVFS	Φ25.4*6.35	>200:1	355	45
PBP1150-355	UVFS	Φ50.8*6.35	>200:1	355	45
PBP1112-532	UVFS	Φ12.7*3.0	>200:1	532	45
PBP1125-532	UVFS	Φ25.4*6.35	>200:1	532	45
PBP1150-532	UVFS	Φ50.8*6.35	>200:1	532	45
PBP1112-633	UVFS	Φ12.7*3.0	>200:1	633	45
PBP1125-633	UVFS	Φ25.4*6.35	>200:1	633	45
PBP1150-633	UVFS	Φ50.8*6.35	>200:1	633	45
PBP1112-780	UVFS	Φ12.7*3.0	>200:1	780	45
PBP1125-780	UVFS	Φ25.4*6.35	>200:1	780	45

Waveplate

Polarizer

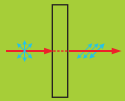
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter

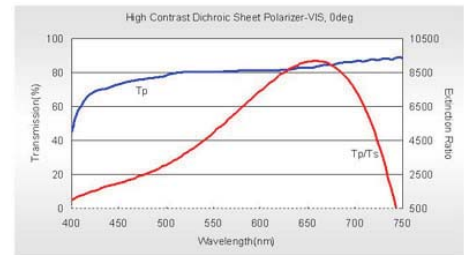
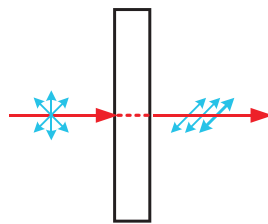


PBP1150-780	UVFS	Φ50.8*6.35	>200:1	780	45
PBP1112-1064	UVFS	Φ12.7*3.0	>200:1	1064	45
PBP1125-1064	UVFS	Φ25.4*6.35	>200:1	1064	45
PBP1150-1064	UVFS	Φ50.8*6.35	>200:1	1064	45

High Contrast Dichroic Sheet Polarizer

High contrast dichroic sheet polarizer is made of dichroic film sandwiched by two glass plates. When a natural beam transmits through the dichroic material, one of the orthogonal polarization component of the beam is strongly absorbed and the other goes out with a weak absorption. So, dichroic sheet polarizer can be used to convert randomly polarized beam into linearly polarized beam. Compared with polarizing prisms, dichroic sheet polarizer offers a much bigger size and acceptable angle, but it can not be used in high power applications.

- Working Wavelength 400-700nm
- High Extinction Ratio >1000:1
- Large size available
- Acceptable angle >20Deg
- RoHS Compliant



Specifications

Substrate Material	BK7 or B270
Dimension Tolerance	+0/-0.2mm
Thickness	around 2.5mm
Working Wavelength	400-700nm
Extinction Ratio	>1000:1
Single Transmission for Parallel Polarized Beam	>70%@632.8nm
Acceptable Angle	>20deg
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Coating	No
Damage Threshold	>10W/cm ² Continuous Pass, >1W/cm ² Continuous Block

Standard Product

Part No.	Diameter(mm)	Tp/Ts	Wavelength(nm)
SHP1012	12.7	>1000:1	400-700
SHP1025	25.4	>1000:1	400-700
SHP1050	50.8	>1000:1	400-700

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

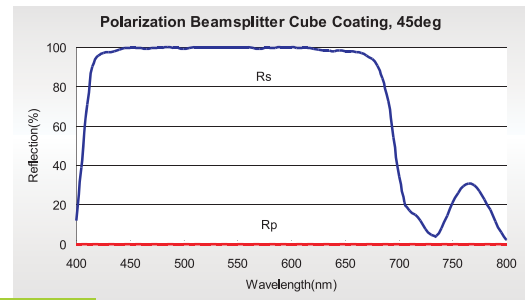
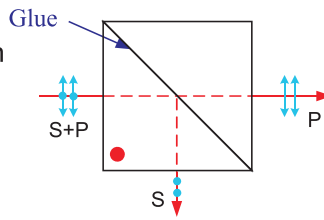
Optical Isolator

Lateral Displacement Polarization Beamsplitter



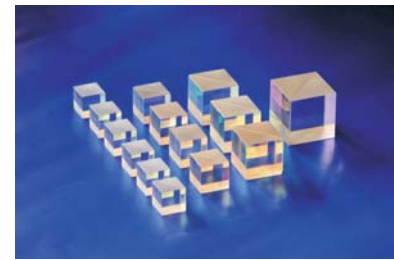
Polarization Beamsplitter Cube

- Widely used in most application
- Good Extinction Ratio
- RoHS Compliant



Specifications

Material	BK7, SF glass
Dimension Tolerance	±0.2mm
Extinction Ratio	>100:1 for broadband >500:1 for narrow band
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Beam Deviation	<3 arc minutes
Flatness	$\lambda/4@632.8\text{nm}$ per 25mm
Principal Transmittance	Narrow: $T_p > 95\%$ and $T_s < 1\%$, Broad: $T_p > 90\%$ and $T_s < 1\%$
Principal Reflectance	Narrow: $R_s > 99\%$ and $R_p < 5\%$, Broad: $R_s > 99\%$ and $R_p < 10\%$
Coating	Polarization beamsplitter coating on hypotenuse face AR coating on all input and output faces
Damage Threshold	>500mJ/cm ² , 20ns, 20Hz, @1064nm



Standard Product

Part No.	Material	Dimension(mm)	Bandwidth	Tp/Ts
PBS0105	BK7	5.0*5.0*5.0	Narrow	>500:1
PBS0110	BK7	10.0*10.0*10.0	Narrow	>500:1
PBS0112	BK7	12.7*12.7*12.7	Narrow	>500:1
PBS0115	BK7	15.0*15.0*15.0	Narrow	>500:1
PBS0120	BK7	20.0*20.0*20.0	Narrow	>500:1
PBS0125	BK7	25.4*25.4*25.4	Narrow	>500:1
PBS9105	SF Glass	5.0*5.0*5.0	Broadband	>100:1
PBS9110	SF Glass	10.0*10.0*10.0	Broadband	>100:1
PBS9112	SF Glass	12.7*12.7*12.7	Broadband	>100:1
PBS9115	SF Glass	15.0*15.0*15.0	Broadband	>100:1
PBS9120	SF Glass	20.0*20.0*20.0	Broadband	>100:1
PBS9125	SF Glass	25.4*25.4*25.4	Broadband	>100:1

Order Information

PBS9105 — **450-650nm** ↻ Part No.-Wavelength

Frequently Used Wavelength

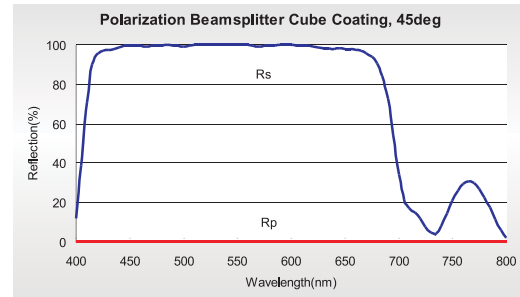
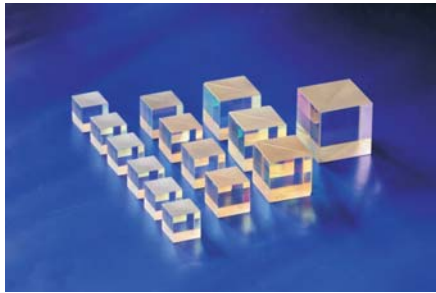
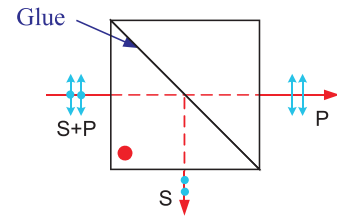
Narrow Band: 397, 405, 488, 515, 532, 632.8, 780, 1064, 1550nm

Broadband: 450-650, 650-900, 900-1200nm



High Extinction Ratio Broadband PBS

- Widely used in most application
- Good Extinction Ratio for Broadband
- RoHS Compliant



Specifications

Material	N-SF1
Dimension Tolerance	±0.2mm
Extinction Ratio	>1000:1
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Beam Deviation	<3 arc minutes
Flatness	λ/4@632.8nm per 25mm
Principal Transmittance	Tp>90%
Principal Reflectance	Rs>99.5%
Coating	Polarization beamsplitter coating on hypotenuse face AR coating on all input and output faces
Damage Threshold	>500mJ/cm ² , 20ns, 20Hz, @1064nm

Standard Product

Part No.	Material	Dimension(mm)	Tp/Ts	Wavelength(nm)
PBS9005	H-ZF3	5.0*5.0*5.0	>1000:1	420-680,620-1000,900-1300,1200-1600
PBS9010	H-ZF3	10.0*10.0*10.0	>1000:1	420-680,620-1000,900-1300,1200-1600
PBS9012	H-ZF3	12.7*12.7*12.7	>1000:1	420-680,620-1000,900-1300,1200-1600
PBS9020	H-ZF3	20.0*20.0*20.0	>1000:1	420-680,620-1000,900-1300,1200-1600
PBS9025	H-ZF3	25.4*25.4*25.4	>1000:1	420-680,620-1000,900-1300,1200-1600

Order Information

PBS9010

420-680nm



Part No.-Wavelength

Frequently Used Wavelength: 420-680, 620-1000, 900-1300nm, 1200-1600nm

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

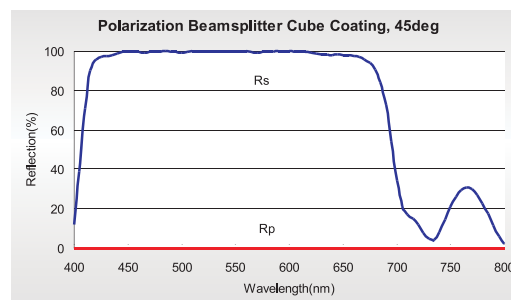
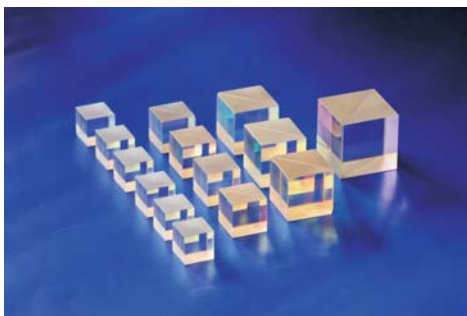
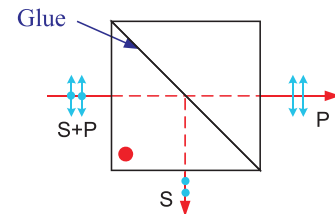
Lateral Displacement Polarization Beamsplitter



High Performance Two Channel PBS

For normal polarization Beamsplitter cube(PBS), the extinction ratio of the beam from reflected channel is not good, not suitable for special application which has high request for reflected channel, like interferometer. Union Optic can offer high performance two channel PBS, due to our unique coating design, we can improve the extinction ratio of reflected channel. High performance two channel PBS is always used in interferometer.

- Widely Used In Interferometer Application
- High Extinction Ratio for Both Transmitted & Reflected Channels
- Good Wavefront Distortion for Both Transmitted & Reflected Channels
- RoHS Compliant



Specifications

Material	BK7
Dimension Tolerance	±0.2mm
Extinction Ratio	Tp/Ts>1000:1, Rs/Rp>200:1
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Beam Deviation	<3 arc minutes
Transmitted Wavefront Distortion	<λ/8@632.8nm per 10mm
Reflected Wavefront Distortion	<λ/8@632.8nm per 10mm
Principal Transmittance	Tp>97%
Principal Reflectance	Rs>99.5%
Coating	Polarization beamsplitter coating on hypotenuse face AR coating on all input and output faces
Damage Threshold	>500mJ/cm ² , 20ns, 20Hz, @1064nm

Standard Product

Part No.	Material	Dimension(mm)	Tp/Ts	Rs/Rp	Wavelength(nm)
PBS0025-633	BK7	25.4*25.4*25.4	>1000:1	>200:1	633
PBS0025-780	Bk7	25.4*25.4*25.4	>1000:1	>200:1	780

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

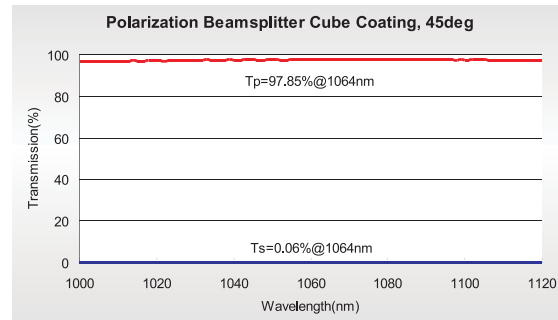
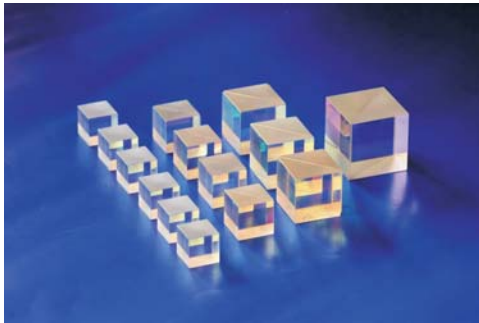
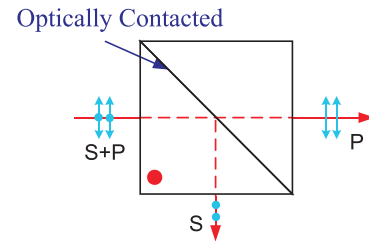
Optical Isolator

Lateral Displacement Polarization Beamsplitter



High Power Polarization Beamsplitter Cube

- Widely used in most application
- Optical Path Epoxy Free
- High Extinction Ratio
- High Damage Threshold
- RoHS Compliant



Specifications

Material	BK7, UVFS
Dimension Tolerance	±0.2mm
Extinction Ratio	Tp/Ts>1000:1
Surface Quality	40/20 scratch and dig
Clear Aperture	>90%
Beam Deviation	<3 arc minutes
Flatness	<λ/8@632.8nm
Principal Transmittance	Tp>95% and Ts<0.1%
Principal Reflectance	Rs>99.9% and Rp<5%
Coating	Polarization beamsplitter coating on hypotenuse face AR coating on all input and output faces
Damage Threshold	>5J/cm ² , 20ns, 20Hz, @1064nm

Standard Product

Part No.	Material	Dimension(mm)	Tp/Ts	Wavelength(nm)
PBS0312-355	UVFS	12.7*12.7*12.7	>1000:1	355
PBS0320-355	UVFS	20.0*20.0*20.0	>1000:1	355
PBS0312-532	BK7	12.7*12.7*12.7	>1000:1	532
PBS0320-532	BK7	20.0*20.0*20.0	>1000:1	532
PBS0312-1064	BK7	12.7*12.7*12.7	>1000:1	1064
PBS0320-1064	BK7	20.0*20.0*20.0	>1000:1	1064

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



Polarization Beam Displacer/Combiner

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 (>10⁵)
- RoHS Compliant



Specifications

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

Order Information

PBD — Calcite — 10x10mm — 2.0mm — 633nm — AR633nm

➡ PBD-Material-Dimension-Displacement(D)-Wavelength-AR Coating

Waveplate

Polarizer

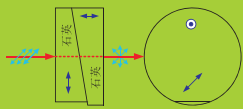
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter



Depolarizer

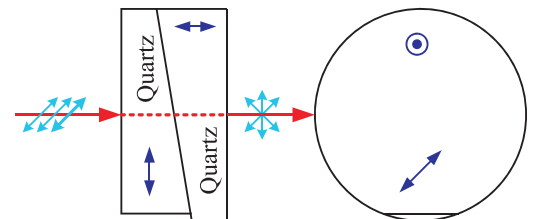
Quartz Wedge Depolarizer

Plane polarized beam is not welcomed in some circumstances such as reflecting spectrometer. A depolarizer will change the plane polarization into a mix of polarization states by scrambling up the polarization, the result is to change plane polarized beam into pseudo-depolarized beam and produce depolarization. Depolarizer is widely used in polarization sensitive instrument.

Union Optic's quartz wedge depolarizer consists of two 3° wedges of crystal quartz. Usual wedge depolarizer consists of one crystal quartz wedge and a compensation fused silica to avoid big beam deviation, but the deviation is also very big for some precise instruments. Union Optic does not use fused silica plate to compensate the beam deviation, we use a crystal quartz plate with its optical axis along the propagation direction. Because the depolarizer is constructed by same material, so the beam deviation can be much better. The usual depolarizer can only be used at narrow band wavelength to avoid the big beam deviation. With our special design, our depolarizer can be used in a wide range of wavelength and keep the beam deviation in an acceptable range.

When a beam hits on the depolarizer, there is a variable phase shift across the beam aperture on the wedge, so a polarized beam can be effectively depolarized. Quartz wedge depolarizer can work well with monochromatic and broadband light source. Usually we can get better result if we orient the input polarization state 45deg to the optical axis of the depolarizer. And also the effectiveness of the depolarizer increases with the size of the beam cross-section.

- Better At 45deg Optical Axis Alignment
- Ideal for >Φ6mm Monochromatic Light & Broadband Light
- Epoxy Cemented or Optically Contacted Available

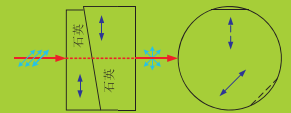


Specifications

Material	Quartz+Quartz
Dimension Tolerance	+0/-0.2mm
Thickness Tolerance	±0.2mm
Surface Quality	60/40 scratch and dig
Parallelism	<1 arc minute
Beam Deviation	<3 arc minutes
Flatness	<λ/8@632.8nm
Retardation	0.5 λ /mm@1064nm
Clear Aperture	>90% central
Coating	Uncoated
Damage Threshold	Cemented: >500mJ/cm ² , 20ns, 20Hz @1064nm Optically contacted: >5J/cm ² , 20ns, 20Hz @1064nm

Standard Product

Part No.	Material	Dimension (mm)	Thickness (mm)	Type	Wavelength (nm)
QWD3225	Crystal Quartz	25.4	5.0	Cemented	400-2500
QWD3325	Crystal Quartz	25.4	5.0	Optically Contacted	220-2500



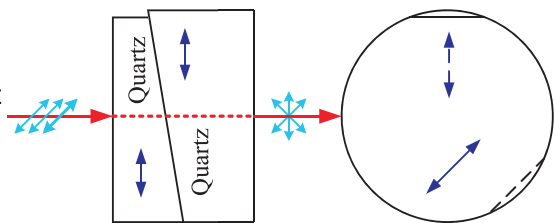
Quartz Lyot Depolarizer

Plane polarized beam is not welcomed in some circumstances such as reflecting spectrometer. A depolarizer will change the plane polarization into a mix of polarization states by scrambling up the polarization, the result is to change plane polarized beam into pseudo-depolarized beam and produce depolarization. Depolarizer is widely used in polarization sensitive instrument.

Union Optic's quartz Lyot depolarizer converts a polarized beam into a pseudo-random polarized beam. Regarding Linearly polarized beam from a monochromatic source, the output beam is converted to pseudo-depolarized beam with polarization state varies spatially. Linearly polarized beam comes from a broadband source which is transmitted through a quartz Lyot depolarizer will have a polarization that varies spatially as well as with wavelength. Union Optic's quartz Lyot depolarizer consists of two crystal quartz wedges, the thickness of one is twice of the other. The optical axis of each wedge is in the plane of aperture, the orientation angle between two optical axes is 45°. The unique design of the quartz Lyot depolarizer does not require orienting the optical axes of a depolarizer at a specific angle, which is especially useful where the initial polarization state of the light is unknown or varies with time.

Regarding monochromatic light, we can only get good pseudo-random polarization when the input diameter is bigger than 6mm. The minimum beam diameter requirement comes from that randomization of the output beam's polarization is achieved by producing a spatial variation when the light hits on the wedge surface. Regarding a broadband source, it does not have the same beam diameter restriction because of the wavelength dependent retardation and also spatial variation.

- No Requirement Of Optical Axis Alignment
- Ideal for >Φ6mm Monochromatic Light & Broadband Light
- Epoxy Cemented or Optically Contacted Available

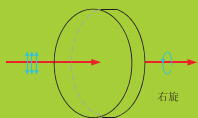


Specifications

Material	Quartz+Quartz
Dimension Tolerance	+0/-0.2mm
Thickness Tolerance	±0.2mm
Surface Quality	60/40 scratch and dig
Parallelism	<1 arc minute
Beam Deviation	<3 arc minutes
Flatness	<λ/8@632.8nm
Clear Aperture	>90% central
Coating	Uncoated
Damage Threshold	Cemented: >500mJ/cm ² , 20ns, 20Hz @1064nm Optically contacted: >5J/cm ² , 20ns, 20Hz @1064nm

Standard Product

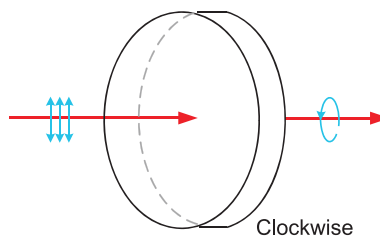
Part No.	Material	Dimension (mm)	Thickness (mm)	Type	Wavelength (nm)
QLD3225	Crystal Quartz	25.4	7.5	Cemented	400-2500
QLD3325	Crystal Quartz	25.4	7.5	Optically Contacted	220-2500



Quartz Polarization Rotator

Due to the rotation activity of natural quartz crystal, it also can be used as polarization rotators so that the plane of input linearly polarized beam will be rotated at special angle which is determined by the thickness of quartz crystal. Left-handed and right-handed rotators can be offered by Union Optic now.

- Made of quartz, 200-2500nm
- Up to 100mm diameter
- Custom rotation angle available
- RoHS Compliant



Specifications

Material	Crystal Quartz 200-2500nm
Dimension Tolerance	+0/-0.2mm
Rotation Accuracy	<5 arc minutes
Parallelism	<10 arc seconds
Wavefront Distortion	< $\lambda/4$ @632.8nm
Surface Quality	20/10 scratch and dig
Clear Aperture	>90%
Rotation	clockwise and counter-clockwise
Coating	AR coated on both sides, $R<0.25\%$ @central wavelength
Damage Threshold	>5J/cm ² , 20ns, 20Hz @1064nm

Standard Product

Part No.	Diameter(mm)	Thickness(mm)	Rotation(Deg)	Wavelength (nm)	Direction
ROT3012-355-45	12.7	0.7	45	355	Clockwise
ROT3025-355-45	25.4	0.7	45	355	Clockwise
ROT3012-355-90	12.7	1.4	90	355	Clockwise
ROT3025-355-90	25.4	1.4	90	355	Clockwise
ROT3012-532-45	12.7	1.7	45	532	Clockwise
ROT3025-532-45	25.4	1.7	45	532	Clockwise
ROT3012-532-90	12.7	3.4	90	532	Clockwise
ROT3025-532-90	25.4	3.4	90	532	Clockwise
ROT3012-633-45	12.7	2.4	45	633	Clockwise
ROT3025-633-45	25.4	2.4	45	633	Clockwise
ROT3012-633-90	12.7	4.8	90	633	Clockwise
ROT3025-633-90	25.4	4.8	90	633	Clockwise
ROT3012-1053-45	12.7	7.0	45	1053	Clockwise
ROT3025-1053-45	25.4	7.0	45	1053	Clockwise
ROT3012-1053-90	12.7	14.0	90	1053	Clockwise
ROT3025-1053-90	25.4	14.0	90	1053	Clockwise
ROT3012-1064-45	12.7	7.1	45	1064	Clockwise
ROT3025-1064-45	25.4	7.1	45	1064	Clockwise
ROT3012-1064-90	12.7	14.2	90	1064	Clockwise
ROT3025-1064-90	25.4	14.2	90	1064	Clockwise

Waveplate

Polarizer

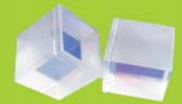
Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

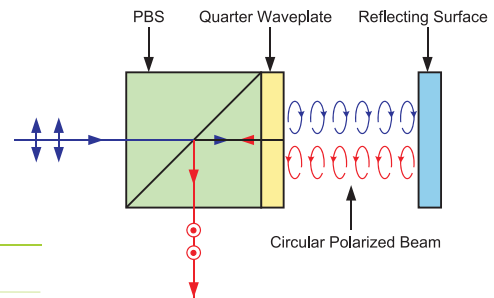
Lateral Displacement Polarization Beam splitter



Optical Isolator

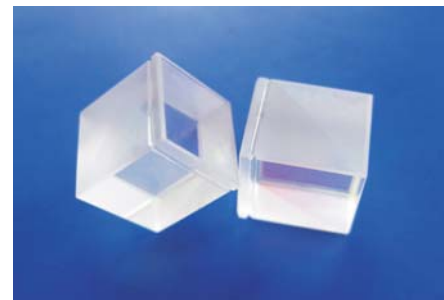
Optical isolator is a combination of a polarization Beamsplitter cube (PBS) and a quarter waveplate made of crystal quartz. Incident light is linearly polarized by PBS and converted to circular polarization by the quarter waveplate. If any portion of the emerging beam is reflected back into the isolator, 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.

- Block optical feedback
- Passive isolation of linearly polarized light
- High isolation
- RoHS Compliant



Specifications

Material	Crystal Quartz & BK7
Dimension Tolerance	±0.2mm
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Beam Deviation	<3 arc minutes
Transmitted Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Isolation	>20dB
Transmission	$T_p > 95\%$, $T_s < 1\%$
Reflection	$R_s > 99\%$, $R_p < 5\%$
AR Coating	$R < 0.25\% @$ central wavelength on all entrances
Damage Threshold	>500mJ/cm ² , 20ns, 20Hz, @1064nm



Standard Product

Part No.	Dimension(mm)	Isolation(dB)	Wavelength(nm)
OIS9005-532	5.0*5.0*5.0	>20	532
OIS9010-532	10.0*10.0*10.0	>20	532
OIS9012-532	12.7*12.7*12.7	>20	532
OIS9005-633	5.0*5.0*5.0	>20	633
OIS9010-633	10.0*10.0*10.0	>20	633
OIS9012-633	12.7*12.7*12.7	>20	633
OIS9005-780	5.0*5.0*5.0	>20	780
OIS9010-780	10.0*10.0*10.0	>20	780
OIS9012-780	12.7*12.7*12.7	>20	780
OIS9005-1064	5.0*5.0*5.0	>20	1064
OIS9010-1064	10.0*10.0*10.0	>20	1064
OIS9012-1064	12.7*12.7*12.7	>20	1064
OIS9005-1550	5.0*5.0*5.0	>20	1550
OIS9010-1550	10.0*10.0*10.0	>20	1550
OIS9012-1550	12.7*12.7*12.7	>20	1550

Waveplate

Polarizer

Depolarizer

Brewster Window

Quartz Polarization Rotator

Optical Isolator

Lateral Displacement Polarization Beamsplitter

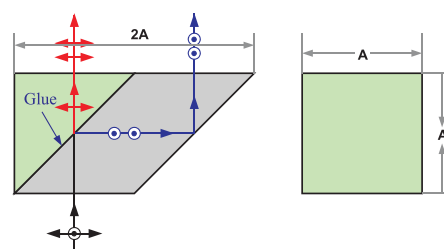


Lateral Displacement Polarization Beamsplitter

Lateral displacement polarization Beamsplitter produces two parallel output beams which are separated by a lateral displacement. And the displacement is decided by the size of rhomboid prism. This Beamsplitter consists of one or two rhomboid prisms cemented to a right angle prism, and sometimes we can add a waveplate to manage the polarization state of the output beams. By using high precision prisms, we can ensure the parallelism between input and output beams within 30 arc seconds. And all entrances feature a multi layer anti-reflection coating.



- Split incident beam into two displaced parallel beams
- Waveplate can be added to manage polarization state
- NOA61 cemented
- RoHS Compliant



Specifications

Material	BK7
Dimension Tolerance	±0.2mm
Surface Quality	60/40 scratch and dig
Clear Aperture	>90%
Beam Deviation	<1 arc minute
Transmitted Wavefront Distortion	$\lambda/4@632.8\text{nm}$
Extinction Ratio	>100: 1 for broadband; >500: 1 for single wavelength
Transmission	$T_p > 90\%$, $T_s < 1\%$
Reflection	$R_s > 99\%$, $R_p < 5\%$
AR Coating	$R < 0.25\%$ @central wavelength on all entrances
Damage Threshold	$>500\text{mJ/cm}^2$, 20ns, 20Hz@1064nm

Standard Product

Part No.	Material	A(mm)	Tp/Ts	Wavelength(nm)
LDP0112-4	BK7	12.7	>100:1	450-650
LDP0125-4	BK7	25.4	>100:1	450-650
LDP0112-6	BK7	12.7	>100:1	650-900
LDP0125-6	BK7	25.4	>100:1	650-900
LDP0112-9	BK7	12.7	>100:1	900-1200
LDP0125-9	BK7	25.4	>100:1	900-1200