Broadband Quartz Waveplates | WPQW

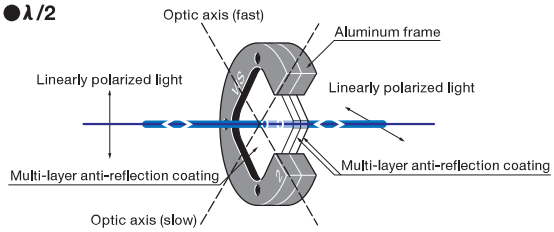
RoHS

Air spaced two piece waveplates are suitable for use with high-energy lasers (no optical contact occurs). These products utilize birefringence of quartz and give phase difference of λ/4 (π/2, 90°) or λ/2 (π, 180°) to the input beams. λ/4 retarders convert linearly polarization to circularly and circularly polarization to linearly. λ/2 retarders convert the direction of polarization arbitrarily.

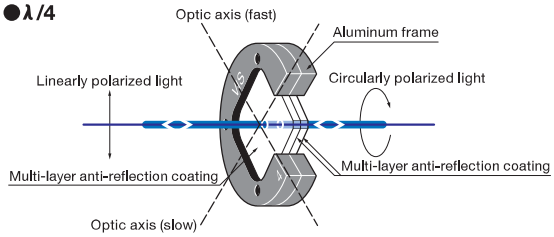
- Air spaced type waveplates are zero-order (first-order) retardation plates (phase plates) which are assembled from pairs of crystalline quartz plates and are mounted on aluminum frames.

Schematic

●λ/2



●λ/4



Specifications

Material	Optical grade crystalline quarts, MgF_2
Material of frame	Aluminum Finishing: Black anodized
Clear aperture	14×14mm
Transmitted wavefront distortion	λ/4 (per one surface)
Angular deviation of beam	<5″
Coating	Both surfaces: Narrowband multi-layer anti-reflection coating (Four surfaces)
Transmittance	> Average 98%
Surface Quality (Scratch–Dig)	20–10

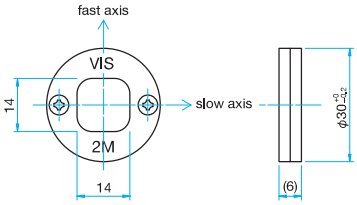
Guide

- Custom-made air spaced broadband quartz waveplates for other wavelengths are also available, contact our Sales Division with you requests.
- Standard thickness of Aluminum frame is 6mm (subject to differ without notice).
- Optical axis is parallel to the edge of 14mm squared plate.

Attention

- These products can be used for the beams which wavelengths are in +/–1% of rated wavelength.
- The surface flatness is the reflected wavefront distortion of the surface before coating.
- Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

Outline Drawing (in mm)



Visible

Part Number	Type	Wavelength Range λ [nm]	Theoretical retardation [nm] λ=400nm	λ=500nm	λ=600nm	λ=700nm	Laser Damage Threshold* [J/cm²]
WPQW-VIS-2M	λ/2	400 – 700	184.6	259.0	300.3	328.9	4
WPQW-VIS-4M	λ/4	400 – 700	92.8	130.0	150.6	164.9	4

650 – 780nm

Part Number	Type	Wavelength Range λ [nm]	Theoretical retardation [nm] λ=650nm	λ=700nm	λ=750nm	λ=800nm	Laser Damage Threshold* [J/cm²]
WPQW-65/78-2M	λ/2	650 – 780	325.3	352.7	376.9	398.8	7
WPQW-65/78-4M	λ/4	650 – 780	162.2	175.9	188.0	198.9	7

700 – 1000nm

Part Number	Type	Wavelength Range λ [nm]	Theoretical retardation [nm] λ=700nm	λ=800nm	λ=900nm	λ=1000nm	Laser Damage Threshold* [J/cm²]
WPQW-NIR-2M	λ/2	700 – 1000	344.8	402.0	450.4	494.4	7
WPQW-NIR-4M	λ/4	700 – 1000	172.4	201.0	225.2	247.2	7

1000 – 1600nm

Part Number	Type	Wavelength Range λ [nm]	Theoretical retardation [nm] λ=1000nm	λ=1200nm	λ=1400nm	λ=1600nm	Laser Damage Threshold* [J/cm²]
WPQW-IR-2M	λ/2	1000 – 1600	510.2	595.4	696.3	814.3	7
WPQW-IR-4M	λ/4	1000 – 1600	255.1	297.7	348.1	407.1	7

* Laser pulse width 10ns, repetition frequency 20Hz

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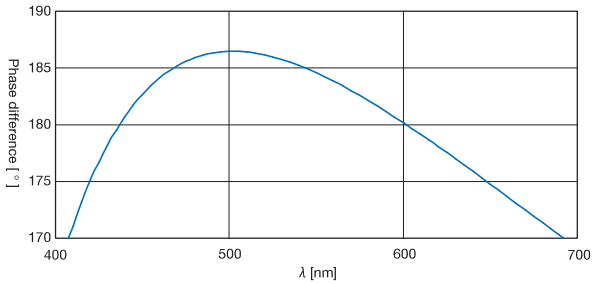
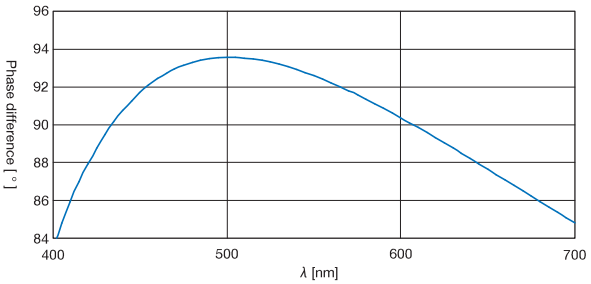
Typical Angular Field Data

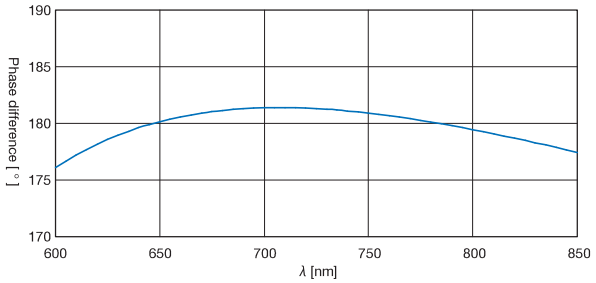
WPQW-VIS-2M



WPQW-VIS-4M



WPQW-65/78-2M



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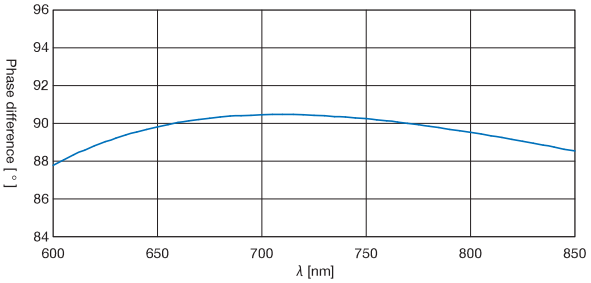
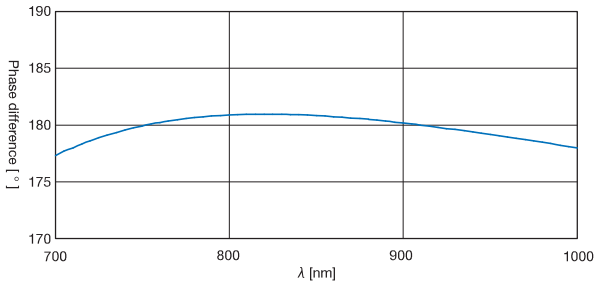
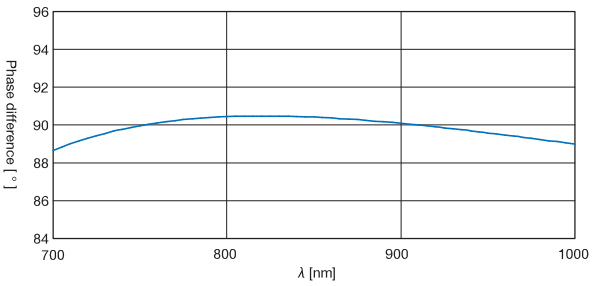


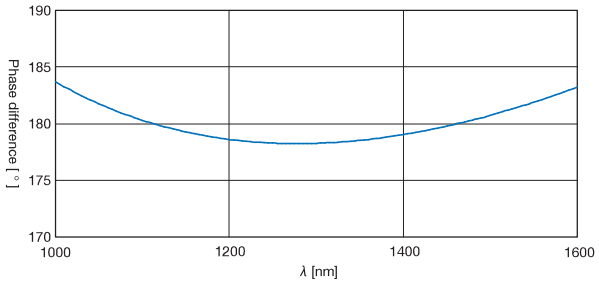
WPQW-NIR-2M



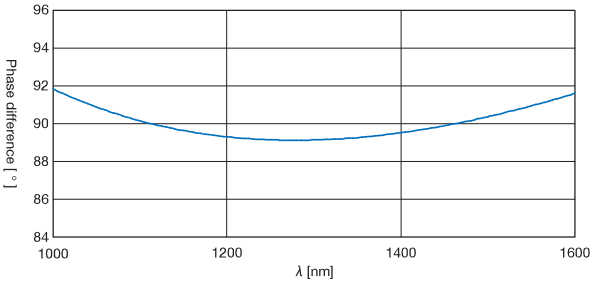
WPQW-NIR-4M



WPQW-IR-2M



WPQW-IR-4M



Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

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Air Gap Type Waveplates | WPQG

RoHS Catalog Code W3031

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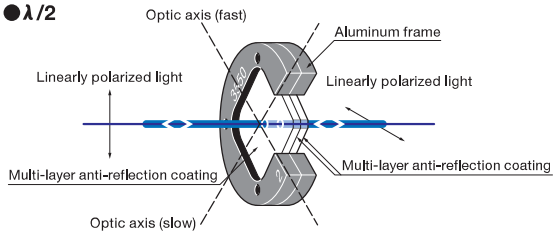
Air spaced two piece waveplates are suitable for use with high-energy lasers (no optical contact occurs).

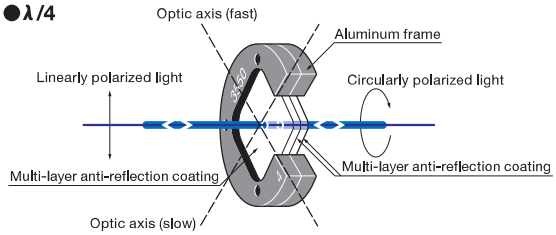
- These products utilize birefringence of quartz and give phase difference of λ/4 (π/2, 90°) or λ/2 (π, 180°) to the input beams. λ/4 retarders convert linearly polarization to circularly and circularly polarization to linearly. λ/2 retarders convert the direction of polarization arbitrarily.
- Air spaced type waveplates are zero-order (first-order) retardation plates (phase plates) which are assembled from pairs of crystalline quartz plates and are mounted on aluminum frames.
- Custom-made air spaced type waveplates for other wavelengths (248nm, 257nm, 308nm etc.) are also available.

Schematic

●λ/2



●λ/4



Specifications

Material	Optical grade crystalline quarts
Material of frame	Aluminum Finishing: Black anodized
Clear aperture	15×15mm
Surface flatness of substrate	λ/10
Angular deviation of beam	<5″
Coating	Both surfaces: Narrowband multi-layer anti-reflection coating (Four surfaces)
Transmittance	>98%
Surface Quality (Scratch–Dig)	20–10

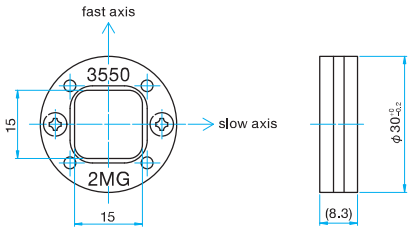
Guide

▶Please contact our Sales Division for customized products. (Customized on size etc.)

Attention

▶Unlike multiple-order (higher-order) waveplates that are made from a single quartz plate, the net retardations of zero-order waveplates are almost not affected by temperature change.
▶Optical axis is parallel to the edge of 15mm squared plate.
▶These products can be used for the beams which wavelengths are in +/–1% of rated wavelength.
▶The surface flatness is the reflected wavefront distortion of the surface before coating.
▶Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.
▶Standard thickness of Aluminum frame is 8.3mm (subject to differ without notice).

Outline Drawing (in mm)



λ/2

Part Number	Wavelength Range [nm]	Theoretical retardation [nm]	Retardation tolerance	Laser Damage Threshold* [J/cm²]
WPQG-2660-2M	266	133.0	<λ/50	1.4
WPQG-3550-2M	355	177.5	<λ/50	4
WPQG-5320-2M	532	266.0	λ/100 – λ/200	4
WPQG-10640-2M	1064	532.0	λ/200 – λ/500	7

* Laser pulse width 10ns, repetition frequency 20Hz

λ/4

Part Number	Wavelength Range [nm]	Theoretical retardation [nm]	Retardation tolerance	Laser Damage Threshold* [J/cm²]
WPQG-2660-4M	266	66.5	<λ/50	1.4
WPQG-3550-4M	355	88.8	<λ/50	4
WPQG-5320-4M	532	133.0	λ/100 – λ/200	4
WPQG-10640-4M	1064	266.0	λ/200 – λ/500	7

* Laser pulse width 10ns, repetition frequency 20Hz

Quartz Waveplates | WPQ

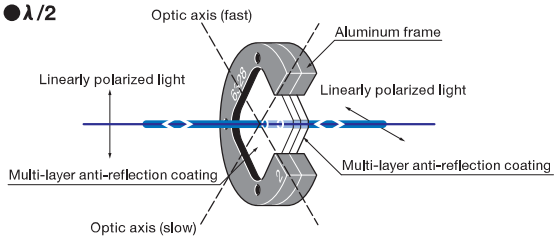
RoHS

**Quartz waveplates are zero-order retardation plates (phase plates) which are assembled from pairs of optically contacted crystalline quartz plates and are mounted on aluminum frames.
Unlike multiple-order (higher-order) waveplates that are made from a single quartz plate, the net retardations of zero-order waveplates are only slightly affected by temperature change.**

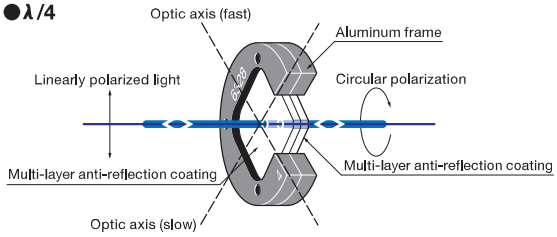
- These products utilize birefringence of quartz and give phase difference of λ/4 (π/2, 90°) or λ/2 (π, 180°) to the input beams. λ/4 retarders convert linearly polarization to circularly and circularly polarization to linearly. λ/2 retarders convert the direction of polarization in 90 degrees.
- Usually linearly polarized beams are input to the waveplates in a leaning of 45 degrees against its optic axis.

Schematic

●λ/2



●λ/4



Specifications

Material	Optical grade crystalline quarts
Material of frame	Aluminum Finishing: Black anodized
Clear aperture	17×17mm
Surface flatness of substrate	λ/10
Angular deviation of beam	<5″
Coating	Both surfaces: Narrowband multi-layer anti-reflection coating
Transmittance	>98.5%
Laser Damage Threshold	1J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	20–10

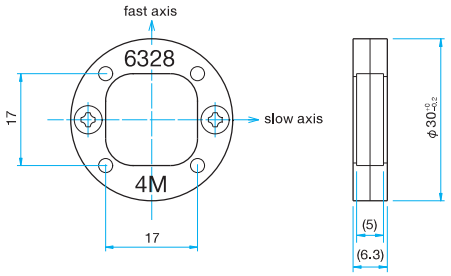
Guide

▶Please contact our Sales Division for customized products. (Customized on size etc.)

Attention

▶These products can be used for the beams which wavelengths are in +/–1% of rated wavelength.
▶The surface flatness is the reflected wavefront distortion of the surface before coating.
▶Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

Outline Drawing (in mm)



Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

Quartz Waveplates | WPQ

Catalog Code W3032

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λ/2

Part Number	Wavelength Range [nm]	Theoretical retardation [nm]	Retardation tolerance
WPQ-2660-2M	266	133.0	<λ/50
WPQ-3250-2M	325	162.5	<λ/50
WPQ-3550-2M	355	177.5	<λ/50
WPQ-4050-2M	405	202.5	λ/100 – λ/200
WPQ-4100-2M	410	205.0	λ/100 – λ/200
WPQ-4416-2M	441.6	220.8	λ/100 – λ/200
WPQ-4579-2M	457.9	229.0	λ/100 – λ/200
WPQ-4880-2M	488	244.0	λ/100 – λ/200
WPQ-5145-2M	514.5	257.3	λ/100 – λ/200
WPQ-5320-2M	532	266.0	λ/100 – λ/200
WPQ-6328-2M	632.8	316.4	λ/100 – λ/200
WPQ-6700-2M	670	335.0	λ/100 – λ/200
WPQ-7800-2M	780	390.0	λ/200 – λ/500
WPQ-8300-2M	830	415.0	λ/200 – λ/500
WPQ-10640-2M	1064	532.0	λ/200 – λ/500
WPQ-13000-2M	1300	650.0	λ/200 – λ/500
WPQ-15500-2M	1550	775.0	λ/200 – λ/500

λ/4

Part Number	Wavelength Range [nm]	Theoretical retardation [nm]	Retardation tolerance
WPQ-2660-4M	266	66.5	<λ/50
WPQ-3250-4M	325	81.3	<λ/50
WPQ-3550-4M	355	88.8	<λ/50
WPQ-4050-4M	405	101.3	λ/100 – λ/200
WPQ-4100-4M	410	102.5	λ/100 – λ/200
WPQ-4416-4M	441.6	110.4	λ/100 – λ/200
WPQ-4579-4M	457.9	114.5	λ/100 – λ/200
WPQ-4880-4M	488	122.0	λ/100 – λ/200
WPQ-5145-4M	514.5	128.6	λ/100 – λ/200
WPQ-5320-4M	532	133.0	λ/100 – λ/200
WPQ-6328-4M	632.8	158.2	λ/100 – λ/200
WPQ-6700-4M	670	167.5	λ/100 – λ/200
WPQ-7800-4M	780	195.0	λ/200 – λ/500
WPQ-8300-4M	830	207.5	λ/200 – λ/500
WPQ-10640-4M	1064	266.0	λ/200 – λ/500
WPQ-13000-4M	1300	325.0	λ/200 – λ/500
WPQ-15500-4M	1550	387.5	λ/200 – λ/500

Quartz depolarizers convert linearly polarized input beams into unpolarized beams and are used in front and behind of measurement equipment that must avoid polarization.

- 1N type is made of single optical quartz plate. It has a wider transmission range, but has a larger beam deviation due to the 2 degree wedge shape.
- 2S type consists of cemented plates of optical quartz and synthetic fused silica. It does not have beam deviation, but the transmission range is not as wide as the single type.
- OP type consists of optical contact. It has a wider transmission range without beam deviation.
- It is similar to waveplate and mounted in a frame of ø30mm diameter.

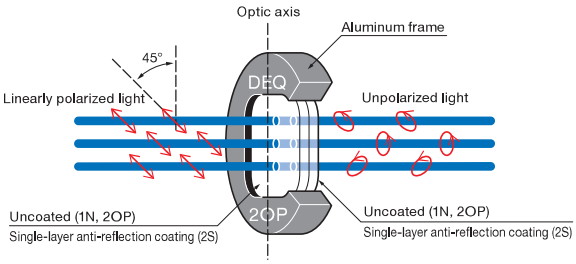
Specifications

Material	Optical Grade Crystalline Quarts Synthetic fused silica
Material of frame	Aluminum Finishing: Black anodized
Surface Quality (Scratch–Dig)	40–20

Attention

▶Custom Quartz depolarizers are available, contact our Sales Division for products not list on-line or in our catalog.

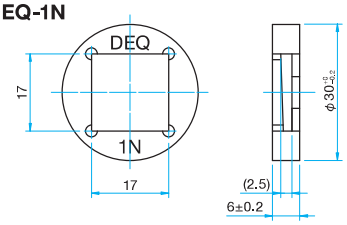
Schematic



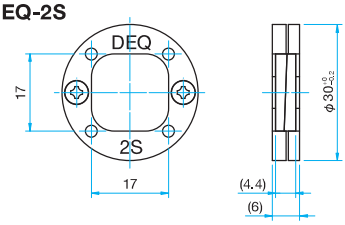
Outline Drawing

(in mm)

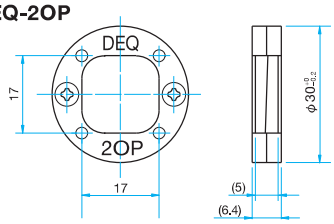
DEQ-1N



DEQ-2S



DEQ-2OP



Specifications

Part Number	Wavelength Range [nm]	Material	Thickness of Optics [mm]	Laser Damage Threshold* [J/cm²]
DEQ-1N	180 – 3500	Optical Grade Crystalline Quarts	2.5 (Maximum)	–
DEQ-2S	350 – 2500	Optical Grade Crystalline Quarts Synthetic fused silica	4.4	0.3
DEQ-2OP	180 – 3500	Optical Grade Crystalline Quarts	5.0	1

* Laser pulse width 10ns, repetition frequency 20Hz

Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

Mica Waveplates | WPM

RoHS Catalog Code W3034

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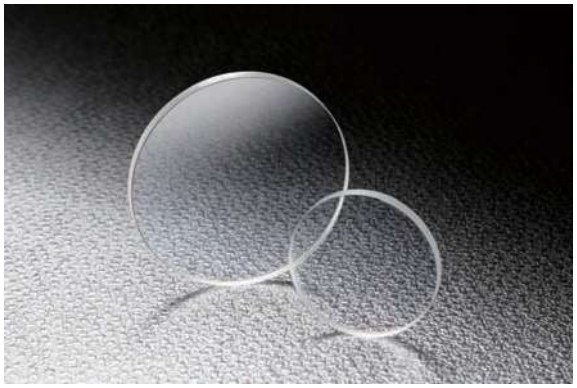
Mica waveplates are zero-order (first-order) retardation plates (phase plates) which are designed at 550nm wavelength and effective from 400 – 700nm. A mica sheet is sandwiched between optical glass discs for protection and ease of use.

- These products utilize birefringence of mica and give phase difference of λ/4 (π/2, 90°) or λ/2 (π, 180°) to the input beams. λ/4 plates convert linearly polarization to circularly and circularly polarization to linearly. λ/2 plates convert the direction of polarization in 90 degrees.
- Usually linearly polarized beams are input to the waveplates in a leaning of 45 degrees against its optical axis.



Specifications

Material	A mica sheet is sandwiched between optical glass discs for protection and ease of use.
Wavelength Range	400 – 700nm
Transmitted wavefront distortion	2λ λ=550nm
Incident angle	0°
Design wavelength	580nm
Theoretical retardation	λ/4: 145nm λ/2: 290nm
Surface Quality (Scratch–Dig)	40–20

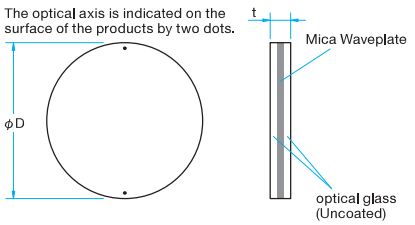
Guide

▶Please contact our Sales Division for customized products. (Customized on size etc.)

Attention

▶Mica waveplates cannot be used for high-power laser applications because of their relatively high absorption coefficient and occasional inhomogeneities.
▶Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.
▶If you want to use the polarization measurement, please use the crystal waveplate. Reference B087

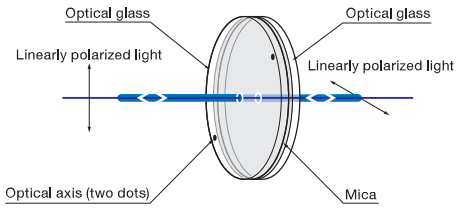
Outline Drawing (in mm)



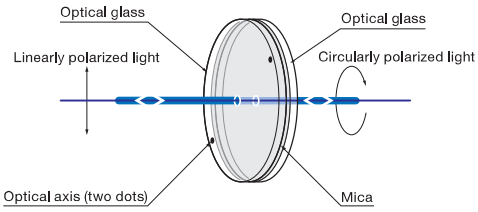
●Tolerance
Diameter ϕD±0.2
Thickness t ±0.2

Schematic

●λ/2



●λ/4



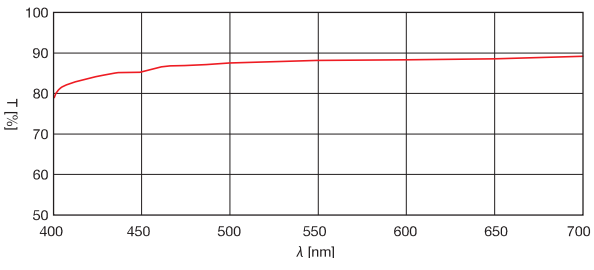
λ/2

Part Number	Diameter ϕD [mm]	Thcikness t [mm]
WPM-10-2P	ϕ10	2.5
WPM-20-2P	ϕ20	2.5
WPM-25-2P	ϕ25	2.5
WPM-30-2P	ϕ30	2.5
WPM-40-2P	ϕ40	3.5
WPM-50-2P	ϕ50	3.5

λ/4

Part Number	Diameter ϕD [mm]	Thcikness t [mm]
WPM-10-4P	ϕ10	2.5
WPM-20-4P	ϕ20	2.5
WPM-25-4P	ϕ25	2.5
WPM-30-4P	ϕ30	2.5
WPM-40-4P	ϕ40	3.5
WPM-50-4P	ϕ50	3.5

Typical Transmittance Data T: Transmission

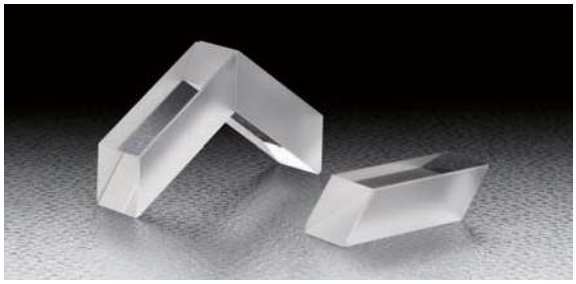


Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

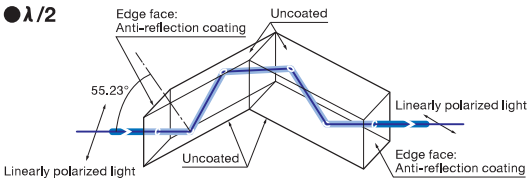
The optical retardation can be given without the wavelength dependence for all visible ranges. It can be used in optical systems that change the polarization direction of the white-light source or spectroscopic measurement using polarization.

- There are two types of Fresnel rhomb waveplate, a half waveplate can rotate the polarization orientation and a quarter waveplate can convert linear polarization into circular polarization.
- As the entrance, exit and reflecting surfaces are processed to provide high parallelism and to minimize beam deflection.
- When the linear polarization orientation of incident light is 45 degrees against the sides of square faces, the specified optical retardation will be obtained. The light will exit as linear polarization with –45 degrees orientation for the half waveplate, and as circular polarization for the quarter waveplate.

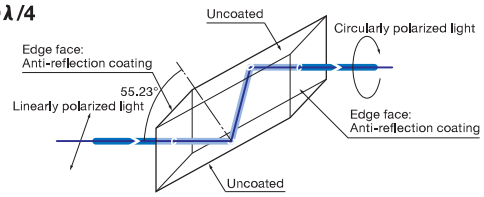


Schematic

●λ/2

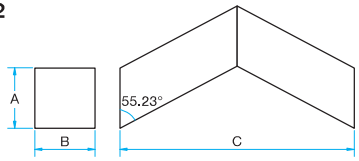


●λ/4



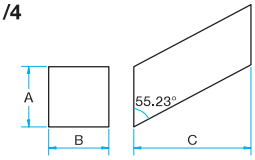
Outline Drawing (in mm)

●λ/2



●Tolerance
A·B±0.1
C±0.2

●λ/4



●Tolerance
A·B±0.1
C±0.2

Specifications

Material	BK7
Surface flatness of substrate	λ/10
Coating	Edge faces: Anti-reflection coating Side surfaces: Uncoated
Design wavelength	587.6nm
Incident angle	0°
Surface Quality (Scratch–Dig)	40–20

Guide

- Fresnel rhomb waveplates made of synthetic fused silica are also available.
- For Fresnel rhomb waveplates with different size, wavelength range, or retardation, please contact our Sales Division with your requests.

Attention

- The quarter waveplate has optical axis shift (refer to the optical axis shift listed in the table below). Use the Fresnel rhomb waveplate by mounting it horizontally or vertically and rotating the polarization orientation of the incidence beam.
- If finger prints or grease stain the polished surfaces of the Fresnel rhomb waveplate, the specified optical retardation will not be obtained. Use it carefully to prevent the side surfaces from contacting anything. (An FRH mounted in a holder is also available).
- If the incidence angle varies, the specified optical retardation performance will not be obtained.
- The Fresnel rhomb waveplate is less dependant to the wavelength, and it can be used in extended range outside the visible range. However the effectiveness of the anti-reflection coating drops outside the visible range and the transmittance decreases.
- When the linear polarization orientation of incident light is aligned at 0 degrees or 90 degrees against the side of square face, the polarization orientation will not change output. (this is same for half waveplate and quarter waveplate)

λ/2

Part Number	A×B×C [mm]	optical axis shift [mm]
FRB-1010-2	10×10×40.0	<0.5
FRB-1515-2	15×15×58.6	<0.5

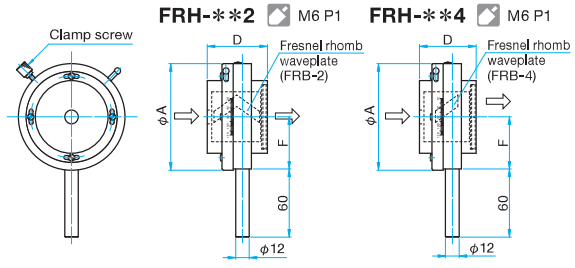
λ/4

Part Number	A×B×C [mm]	optical axis shift [mm]
FRB-1010-4	10×10×20.0	13.5
FRB-1515-4	15×15×29.3	20.2

Fresnel Rhomb Waveplate Holders

We offer holder specifically designed for mounting our fresnel rhomb waveplates. For a λ/2 plate (FRH-**2), the optical axis of waveplate and rotation axis of holder are aligned.

Outline Drawing (in mm)



Part Number	Center height F [mm]	Diameter ϕA [mm]	Length D [mm]
FRH-102	46	ϕ94	53
FRH-152	57.5	ϕ116	74
FRH-104	46	ϕ94	50
FRH-154	57.5	ϕ116	46

Specifications

Part Number	Part number of waveplate	Sensitivity [°]	Weight [kg]
FRH-102	FRB-1010-2	1	0.59
FRH-152	FRB-1515-2	1	1.05
FRH-104	FRB-1010-4	1	0.57
FRH-154	FRB-1515-4	1	1.81

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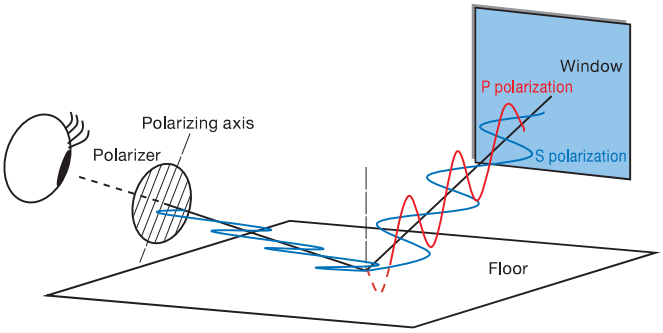
Polarizers

Human with naked eye can not make the differencs in between a linear polarized light and a circularly polarized light. But polarizer optics will allow you to see the polarized light situation. Here we introduce the fundamentals of the usage of the polarizer optics.

How to affirm the polarizing axis of a polarizer optics

The following method will show you how to find the polarizing direction when there is no marking shown on the optics neither the direction of the polarizing axis.
Observe the reflection of a slanting ray of light from a window over a brilliant mat. Use the light polarizer to confirm the light direction of the reflected light.
Peep the reflected light with the polarizer by turning the polarizer, the illumination go up and down. When the light is dark, the upside and downside of the polarizer shows the polarization axis of the reflected light. We don't need any particular tool and location to confirm the light direction.



What is the normal coordinate of the polarizer

A single polarizer optic can not perform a circular polarized light. It depends on the object that the light hits. That is the reason why the experiment sample or the experiment target depends on the direction of the normal coordinate.

①Polarizing axis

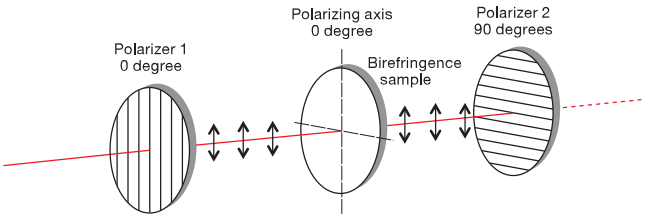
A standard experiment sets up with a laser a fixed polarizer and a linear polarizer axis.

○Polarizer optic case:

⇒ When turning the Polarizer 2 at 90 degrees, the light axis went through the Polarizer 1 disappears.

○Birefringence sample (waveplate):

⇒ Set a standard experiment with a laser, the polarizer 1 and the polarizer 2. A waveplate sample sets in between the Polarizer 1 and Polarizer 2. Turn the waveplate till the darkest position and mark the position as 0 degrees.



②Vertical direction on a table

There is no necessary of any particular setting; the optics can be at any direction. This experiment will be done at a vertical direction.

○In case of none adjusted polarized optics:

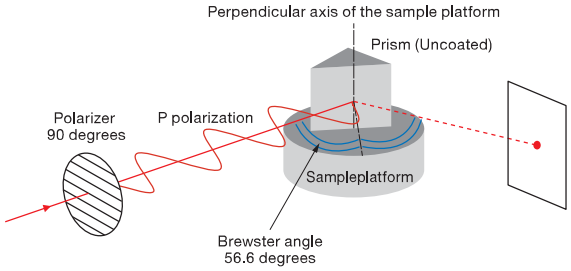
⇒ Take the polarizer optic as a standard and set it up vertically onto holders and adjust the polarizer at 0 degrees. Set other optics according to the standard, see ① setting.

○Requirement of adjusting the polarizer:

⇒ For optics that being sold mounted with a holder, the polarizer direction can be pre-set at 90 degrees before the shipment. For a waveplate to be adjusted at fast direction 90 degrees, the tolerance of 2 degrees or 3 degrees of the polarizer direction mounted with a holder may happen.

③Perpendicular to the sample axis

Experiment with a BK7 prism. Set an incident angle at 56.6 degrees to the polished surface of the prism. Incident with a light-source through the polarizer and turn the polarizer then observe the changing power of reflected light from the prism. When the incident ray angle matches the angle 56.6 degrees which is called Brewster's angle then the reflection ray disappears. The smallest reflection angle from the prism is the P polarization; the polarizer angle is 90 degrees or 0 degrees.



④Match the polarization to the reflective object

Set the polarization axis according to the reflective object and incident direction.

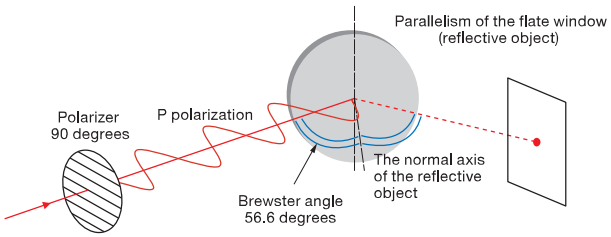
The reflection ray and the laser ray produce a plane oscillation polarization axis is called P polarization, the vertical oscillation polarization axis is called the S polarization.

Place an uncoated BK7 flat window as a test sample.

Incident ray at Brewster s angle 56.6 degrees. Place a polarizer optic in the incident ray. Turn the polarizer and observe the change of the power of the light reflected from the flat window. There is surface reflection and back reflection of light from the flat window.

Similar to ③ setting, turn the angle to the smallest polarization angle of 90 degrees or 0 degrees.

Replace the BK7 window by another sample; similar to ① setting and adjust the waveplate to execute the experiment.



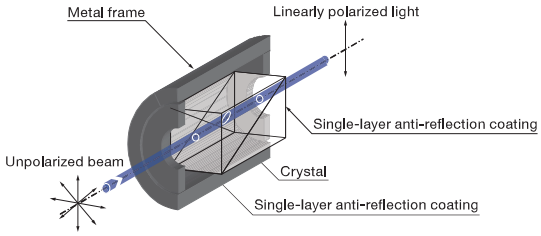
Glan Thompson Prisms | GTPB/GTPC

Catalog Code W3450

This is a special polarizer with minimal transmission loss, and a high extinction ratio below 5×10^{-5} is obtained. It is used in high-precision polarization experiments.
The Calcite can be used in the visible to the infrared region, and α-BBO crystal type usable in the ultraviolet region are available.

- Glan Thompson prism is housed in a metal frame, and no stress is applied to the inner element when frame is mounted in the holder.
- Calcite type Glan Thompson prism are available in two acceptance angles.
- A single-layer anti-reflection coating has been applied on the surface of the Glan Thompson prism to provide high transmittance.

Schematic



Specifications

Material	α-BBO, Calcite
Beam Deviation	<3″
Transmitted wavefront distortion	λ/4
Coating	MgF_2 Single-layer anti-reflection coating
Laser Damage Threshold	0.3J/cm² (Pulse duration 10ns)
Surface Quality (Scratch–Dig)	20–10
Material of metal frame	Aluminum Finishing: Black anodized

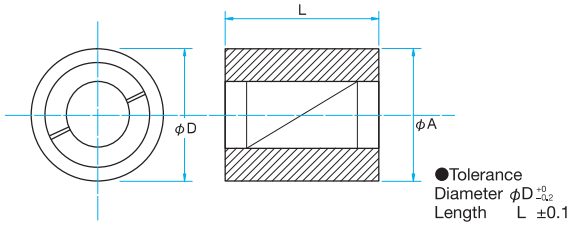
Guide

- Glan laser prism for high-power laser (GLPB / GLPC) and Wollaston prism (WPPB / WPPC) are also available.
- If you need uncoated Glan Thompson prism or anti-reflection coating with specific reflectance, please contact our Sales Division with your request.

Attention

- A change in the incident angle may also change the extinction ratio of the linearly polarized transmitted light.
- Separation angle will vary depending on the wavelength. Please confirm the wavelength characteristic graph for separation angle.
- Because of natural calcite crystals, there are individual differences, and variations in quality.

Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{+0}_{-0.2}$
Length L ±0.1

α-BBO

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GTPB-06-18SN	200 – 900	$<5\times10^{-6}$	ϕ6	15×18
GTPB-08-21SN	200 – 900	$<5\times10^{-6}$	ϕ8	25.4×21
GTPB-10-24.5SN	200 – 900	$<5\times10^{-6}$	ϕ10	25.4×24.5
GTPB-15-32.5SN	200 – 900	$<5\times10^{-6}$	ϕ15	30×32.5

Calcite

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GTPC-06-23SN	350 – 2300	$<5\times10^{-5}$	ϕ6	15×23
GTPC-08-28SN	350 – 2300	$<5\times10^{-5}$	ϕ8	25.4×28
GTPC-10-33SN	350 – 2300	$<5\times10^{-5}$	ϕ10	25.4×33
GTPC-15-45.5SN	350 – 2300	$<5\times10^{-5}$	ϕ15	30×45.5
GTPC-06-26SN	350 – 2300	$<5\times10^{-5}$	ϕ6	15×26
GTPC-08-32SN	350 – 2300	$<5\times10^{-5}$	ϕ8	25.4×32
GTPC-10-38SN	350 – 2300	$<5\times10^{-5}$	ϕ10	25.4×38
GTPC-15-53SN	350 – 2300	$<5\times10^{-5}$	ϕ15	30×53

Compatible Optic Mounts

GTPC-PH30 / GTPC-SPH30 / GTPC-ADP

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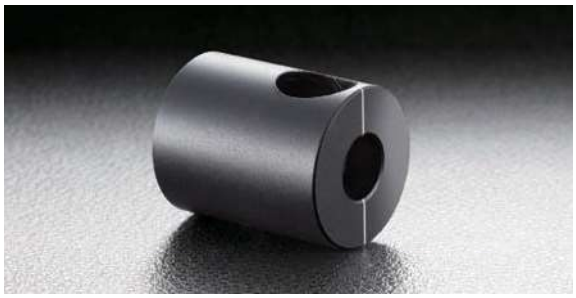
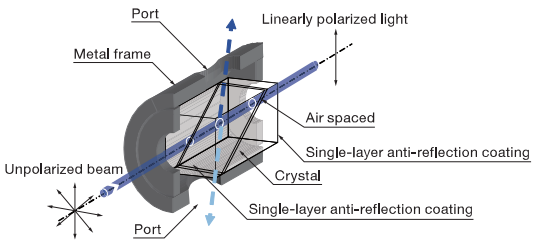
The Glan Laser polarizer are designed to provide an enhanced laser damage threshold for high power lasers and high energy laser pulses.
The transmission loss is minimal, and a high extinction ratio below 5×10^{-5} is obtained.
The Calcite type that can be used in the visible to the infrared region,and α-BBO crystal type usable in the ultraviolet region are available.

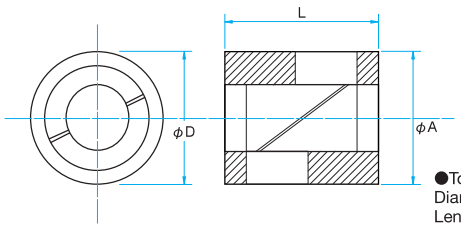


- The two prisms are mounted with a small gap (air-gap) to eliminate the adhesive and reduce laser damage.
- Gran Laser prism is housed in a metal frame. The polarization component which does not pass through the prism exit out of the frame through port (hole) of the metal frame.
- Since there are two ports, the prism can also be used by replacing the input and output direction.
- A single-layer anti-reflection coating has been applied on the surface of the Glan Laser prism to provide higher transmittance.

Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{+0}_{-0.2}$
Length L ±0.1

Specifications

Material	α-BBO, Calcite
Beam Deviation	<3″
Transmitted wavefront distortion	$\lambda/4$
Coating	MgF_2 Single-layer anti-reflection coating
Laser Damage Threshold	2J/cm² (Pulse duration 10ns)
Surface Quality (Scratch–Dig)	20–10
Material of metal frame	Aluminum Finishing: Black anodized

Guide

- Glan Thompson prism with wider acceptance angle (GTPB / GTPC) and Wollaston prism (WPPB / WPPC) are also available.
- If you need uncoated Glan Laser prism or anti-reflection coating with specific reflectance, please contact our Sales Division with your request.

Attention

- A change in the incident angle may also change the extinction ratio of the linearly polarized transmitted light.
- Because of natural calcite crystals, there are individual differences, and variations in quality.

α-BBO

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GLPB2-06-29SN-2/3	200 – 270	<5×10⁻⁶	ϕ6	15×29
GLPB2-08-31SN-2/3	200 – 270	<5×10⁻⁶	ϕ8	25.4×31
GLPB2-10-31SN-2/3	200 – 270	<5×10⁻⁶	ϕ10	25.4×31
GLPB2-15-38.6SN-2/3	200 – 270	<5×10⁻⁶	ϕ15	30×38.6
GLPB2-20-48.9SN-2/3	200 – 270	<5×10⁻⁶	ϕ20	38×48.9
GLPB2-06-25SN-3/7	300 – 700	<5×10⁻⁶	ϕ6	15×25
GLPB2-08-25SN-3/7	300 – 700	<5×10⁻⁶	ϕ8	25.4×25
GLPB2-10-26SN-3/7	300 – 700	<5×10⁻⁶	ϕ10	25.4×26
GLPB2-15-33.4SN-3/7	300 – 700	<5×10⁻⁶	ϕ15	30×33.4
GLPB2-20-43.6SN-3/7	300 – 700	<5×10⁻⁶	ϕ20	38×43.6
GLPB2-06-23SN-7/30	700 – 3000	<5×10⁻⁶	ϕ6	15×23
GLPB2-08-24.7SN-7/30	700 – 3000	<5×10⁻⁶	ϕ8	25.4×24.7
GLPB2-10-25.9SN-7/30	700 – 3000	<5×10⁻⁶	ϕ10	25.4×25.9
GLPB2-15-33SN-7/30	700 – 3000	<5×10⁻⁶	ϕ15	30×33
GLPB2-20-43.6SN-7/30	700 – 3000	<5×10⁻⁶	ϕ20	38×43.6

Calcite

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GLP2-06-21SN	350 – 2300	<5×10⁻⁵	ϕ6	15×21
GLP2-08-24.5SN	350 – 2300	<5×10⁻⁵	ϕ8	25.4×24.5
GLP2-10-26.2SN	350 – 2300	<5×10⁻⁵	ϕ10	25.4×26.2
GLP2-15-33.3SN	350 – 2300	<5×10⁻⁵	ϕ15	30×33.3
GLP2-20-42.3SN	350 – 2300	<5×10⁻⁵	ϕ20	38×42.3

Compatible Optic Mounts

GTPC-PH30, -PH50 / GTPC-SPH30, -SPH50 / GTPC-ADP

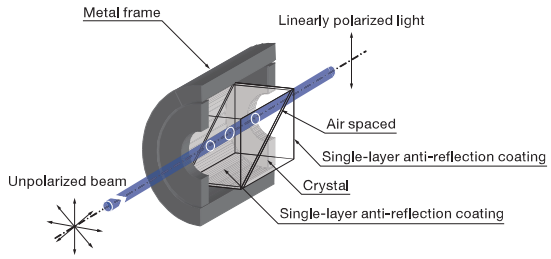
Glan Tayler Prisms | GYPB/GYPC

Catalog Code W3452

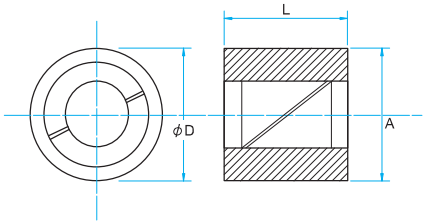
The transmission loss is minimal, and a high extinction ratio below 5×10^{-5} is obtained.
The Calcite type that can be used in the visible to the infrared region,and α-BBO crystal type usable in the ultraviolet region are available.
The polarizer provides a very short prism length.

- The two prisms are mounted with a small gap (air-gap) to eliminate the adhesive and reduce laser damage.
- A single-layer anti-reflection coating has been applied on the surface of the polarizing prism to provide high transmittance.

Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{0}_{-0.2}$
Length L ±0.1

Specifications

Material	α-BBO, Calcite
Beam Deviation	<3″
Transmitted wavefront distortion	$\lambda/4$
Coating	MgF_2 Single-layer anti-reflection coating
Laser Damage Threshold	1J/cm² (Pulse duration 10ns)
Surface Quality (Scratch–Dig)	20–10
Material of metal frame	Aluminum Finishing: Black anodized

Guide

- Glan laser prism for high-power laser (GLPB / GLPC) and Wollaston prism (WPPB / WPPC) are also available.
- If you need uncoated Glan Thompson prism or anti-reflection coating with specific reflectance, please contact our Sales Division with your request.

Attention

- A change in the incident angle may also changes the extinction ratio of the linearly polarized transmitted light.
- Light not transmitted through the Gran Taylor prism is absorbed and scattered in all side faces of the prism. In the high-precision measurement system, it is necessary to use pinhole to block light scattered in the side face of the prism.
- Because of natural calcite crystals, there are individual differences, and variations in quality.

α-BBO

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GYPB-06-15SN-2/3	200 – 270	$<5\times10^{-6}$	ϕ6	15×15
GYPB-08-17SN-2/3	200 – 270	$<5\times10^{-6}$	ϕ8	25.4×17
GYPB-10-19SN-2/3	200 – 270	$<5\times10^{-6}$	ϕ10	25.4×19
GYPB-15-23SN-2/3	200 – 270	$<5\times10^{-6}$	ϕ15	30×23
GYPB-20-29SN-2/3	200 – 270	$<5\times10^{-6}$	ϕ20	38×29
GYPB-06-15SN-3/7	300 – 700	$<5\times10^{-6}$	ϕ6	15×15
GYPB-08-17SN-3/7	300 – 700	$<5\times10^{-6}$	ϕ8	25.4×17
GYPB-10-19SN-3/7	300 – 700	$<5\times10^{-6}$	ϕ10	25.4×19
GYPB-15-23SN-3/7	300 – 700	$<5\times10^{-6}$	ϕ15	30×23
GYPB-20-29SN-3/7	300 – 700	$<5\times10^{-6}$	ϕ20	38×29
GYPB-06-15SN-7/30	700 – 3000	$<5\times10^{-6}$	ϕ6	15×15
GYPB-08-17SN-7/30	700 – 3000	$<5\times10^{-6}$	ϕ8	25.4×17
GYPB-10-19SN-7/30	700 – 3000	$<5\times10^{-6}$	ϕ10	25.4×19
GYPB-15-23SN-7/30	700 – 3000	$<5\times10^{-6}$	ϕ15	30×23
GYPB-20-29SN-7/30	700 – 3000	$<5\times10^{-6}$	ϕ20	38×29

Calcite

Part Number	Wavelength Range [nm]	Extinction ratio	ϕA [mm]	ϕD×L
GYPC-06-15SN	350 – 2300	$<5\times10^{-5}$	ϕ6	15×15
GYPC-08-17SN	350 – 2300	$<5\times10^{-5}$	ϕ8	25.4×17
GYPC-10-19SN	350 – 2300	$<5\times10^{-5}$	ϕ10	25.4×19
GYPC-15-23SN	350 – 2300	$<5\times10^{-5}$	ϕ15	30×23
GYPC-20-29SN	350 – 2300	$<5\times10^{-5}$	ϕ20	38×29

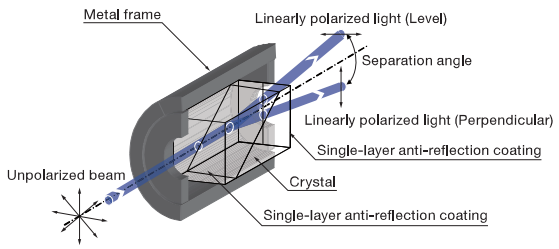
Compatible Optic Mounts

GTPC-PH30, -PH50 / GTPC-SPH30, -SPH50 / GTPC-ADP

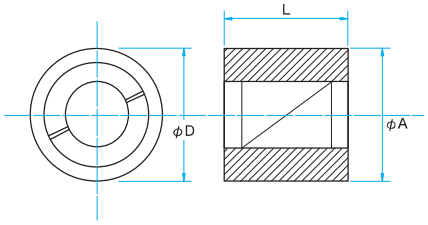
It is a prism for separating the incident beam into two linearly polarized beams with orthogonal polarizing direction.
Used in the optical system of a phase-contrast microscope.

- Outgoing beam is emitted with deviation. In this case, the emitted beams are in opposite directions depending on the orientation of polarization.
- A single-layer anti-reflection coating has been applied on the surface of the Wollaston prism to proved higher transmittance.

Schematic



Outline Drawing (in mm)



●Tolerance
Diameter ϕD $^{+0}_{-0.2}$
Length L ±0.1

Specifications

Material	α-BBO, Calcite
Beam Deviation	<3″
Transmitted wavefront distortion	λ/4
Coating	MgF_2 Single-layer anti-reflection coating
Laser Damage Threshold	0.3J/cm^2 (Pulse duration 10ns)
Surface Quality (Scratch–Dig)	20–10
Material of metal frame	Aluminum Finishing: Black anodized

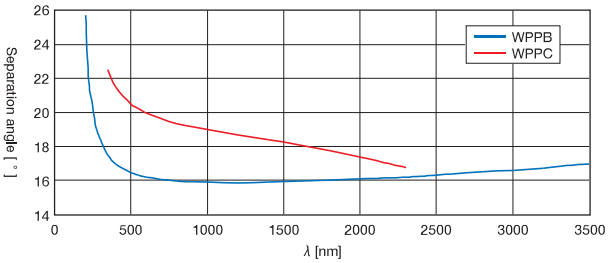
Guide

- Glan Thompson prism with wider acceptance angle (GTPB / GTPC) and Glan laser prism for high-power laser (GLPB / GLPC) are also available.
- If you need uncoated Glan Laser prism or anti-reflection coating with specific reflectance, please contact our Sales Division with your request.

Attention

- A change in the incident angle may also change the extinction ratio of the linearly polarized transmitted light.
- Separation angle will vary depending on the wavelength. Please confirm the wavelength characteristic graph for separation angle.
- Because of natural calcite crystals, there are individual differences, and variations in quality.

Typical Separation angle Data



α-BBO

Part Number	Wavelength Range [nm]	Extinction ratio	Separation angle 190nm [°]	Separation angle 800nm [°]	Separation angle 3500nm [°]	ϕA [mm]	ϕD×L
WPPB-06-14SN	190 – 3500	<5×10^{-6}	27	16	17	ϕ6	15×14
WPPB-08-16SN	190 – 3500	<5×10^{-6}	27	16	17	ϕ8	25.4×16
WPPB-10-18SN	190 – 3500	<5×10^{-6}	27	16	17	ϕ10	25.4×18
WPPB-15-23SN	190 – 3500	<5×10^{-6}	27	16	17	ϕ15	30×23
WPPB-20-28SN	190 – 3500	<5×10^{-6}	27	16	17	ϕ20	38×28

Calcite

Part Number	Wavelength Range [nm]	Extinction ratio	Separation angle 350nm [°]	Separation angle 980nm [°]	Separation angle 2300nm [°]	ϕA [mm]	ϕD×L
WPPC-06-14SN	350 – 2300	<5×10^{-5}	22.5	19	16.7	ϕ6	15×14
WPPC-08-16SN	350 – 2300	<5×10^{-5}	22.5	19	16.7	ϕ8	25.4×16
WPPC-10-18SN	350 – 2300	<5×10^{-5}	22.5	19	16.7	ϕ10	25.4×18
WPPC-15-23SN	350 – 2300	<5×10^{-5}	22.5	19	16.7	ϕ15	30×23
WPPC-20-28SN	350 – 2300	<5×10^{-5}	22.5	19	16.7	ϕ20	38×28

Compatible Optic Mounts

GTPC-PH30, -PH50 / GTPC-SPH30, -SPH50 / GTPC-ADP

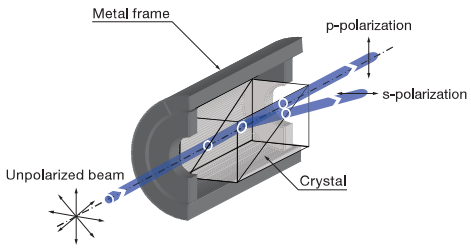
Roshon Polarizing Prism | RSPCQ/RSPMF

Catalog Code W3454

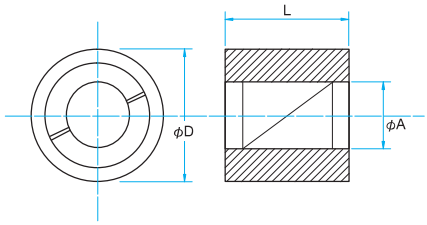
The polarizer separates the incident light into two linearly polarized lights that cross perpendicular. It corresponds to the wide wavelength range from ultraviolet to infrared.

- P polarized light is emitted straight without the displacement from the optical path, and S-polarized light is emitted with a separation angle.
- We offer the RSPCQ-10 of crystalline quartz product and RSPMF-10 of MgF_2 single crystal corresponding to the broad-band more than DUV.

Schematic



Outline Drawing (in mm)



●Tolerance
Diameter ϕD ±0.1
Length L ±0.1

Specifications

Beam Deviation	<3″
Transmitted wavefront distortion	λ/4
Coating	Uncoated
Laser Damage Threshold	0.3J/cm^2 (Pulse duration 10ns)
Surface Quality (Scratch–Dig)	20–10
Material of metal frame	Aluminum Finishing: Black anodized

Guide

▶If you need anti-reflective coating, please contact our Sales Division with your specific request.

Attention

▶The incident angle changes and the extinction ratio of linear polarization of the transmitted light also changes.

Specifications

Part Number	Material	Wavelength Range [nm]	Extinction ratio	Separation angle [°]	ϕA [mm]	ϕD×L [mm]
RSPCQ-10	Quartz	200 – 2300	<2×10^{-4}	1 – 1.5	ϕ10	25.4×28
RSPMF-10	MgF_2	130 – 7000	<1×10^{-4}	1 – 2	ϕ10	25.4×28

Compatible Optic Mounts

GTPC-PH30 / GTPC-SPH30 / GTPC-ADP

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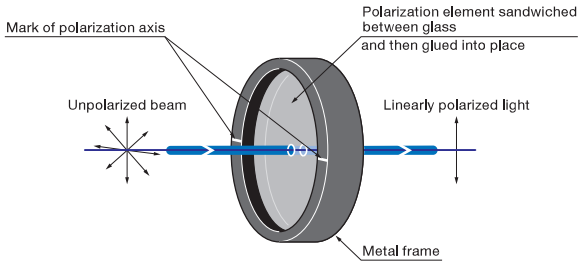
Polarizers

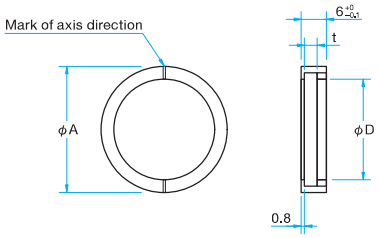
By the use of dichroic dye film, a good linear polarization can be obtained in a wide range. The sheet polarizer can be used in the basic polarization experiments which do not require high precision, and adjustment of the light intensity.

- Since the polarizing film is sandwiched between the protective glass plate, it hardly gets scratched, and dirt can be wiped off.
- Because it is mounted in the frame, the handling of the optics and mounting in the holder is easy.
- There are products offer for three wavelength ranges, Visible, UV and Near Infrared.
- Since the anti-reflection film is applied on both sides the stray light and back reflection to the light source is reduced.

Schematic



Outline Drawing (in mm)



Specifications

Material	Dicrhoic dye film Sheet glass (Quartz glass for NSPFU) Film laminated between optical glasses
Coating	Anti-reflection coating on both surfaces
Material of metal frame	Aluminum Finishing: Black anodized

Guide

- A sheet polarizer other than the size listed on-line or in our catalog, or without the frame are also available.
- If there is a request for specific transmittance, extinction ratio or wavelength range, please contact our Sales Division.
- Glan Thompson prism (GTPC) with high transmittance and high extinction ratio are also available. Reference B094

Attention

- A change in the incident angle may also change the extinction ratio of the linearly polarized transmitted light.
- Separation angle will vary depending on the wavelength. Please confirm the wavelength characteristic graph for separation angle.
- Because of natural calcite crystals, there are individual differences, and variations in quality.

400 – 700nm

Part Number	Wavelength Range [nm]	Diameter of frame ϕA [mm]	Clear aperture ϕD [mm]	Thcikness t [mm]
SPF-30C-32	400 – 700	ϕ30	ϕ24	3
SPF-50C-32	400 – 700	ϕ50	ϕ44	3

320 – 400nm

Part Number	Wavelength Range [nm]	Diameter of frame ϕA [mm]	Clear aperture ϕD [mm]	Thcikness t [mm]
NSPFU-30C	320 – 400	ϕ30	ϕ24	2.4

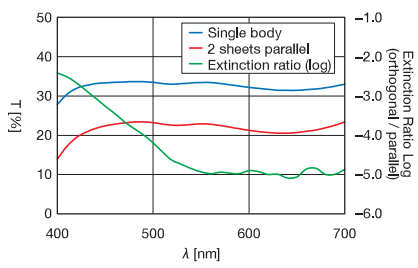
760 – 2000nm

Part Number	Wavelength Range [nm]	Diameter of frame ϕA [mm]	Clear aperture ϕD [mm]	Thcikness t [mm]
SPFN-30C-26	760 – 2000	ϕ30	ϕ24	3

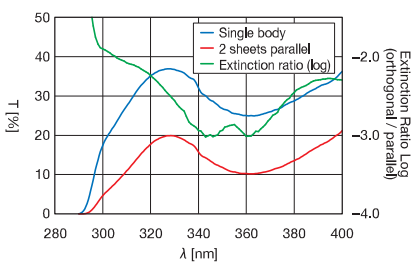
Typical Transmittance Data

T: Transmission

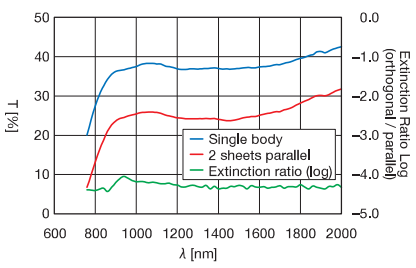
SPF-32



NSPFU



SPFN



Compatible Optic Mounts

PH-30-ARS / PH-50-ARS / SPH-30-ARS / SPH-50-ARS

Wire Grid Polarizing Filter | WGPF

RoHS Catalog Code W3175

Since the filter is manufactured using a wire grid film processed with aluminum wire mesh of the interval of 100nm to 150nm, it is possible to extract the linearly polarized light from the visible to the infrared region.

- In the infrared region, the extinction ratio of 10-3 degree can be obtained.
- It has superior heat resistance when compared to the polarizing film of the absorption type.
- It is fixed to the frame so it is easy to handle this filter.
- Only linearly polarized light that is vibrated in the direction of the mark of the metal frame is transmitted.

Specifications

Material	Optical glass, Wire grid polarizing film
Coating	Uncoated
Material of metal frame	Aluminum Finishing: Black alumite (anodized)

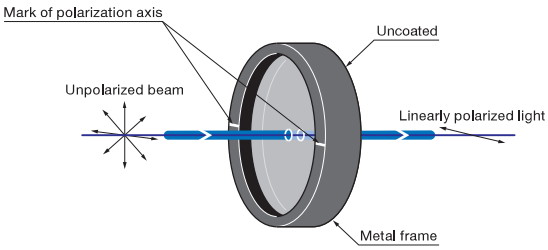
Guide

- Other sizes are available, please consult our Sales Division.
- Glan-Thompson prism (GTPB / GTPC), which can obtain high transmittance and extinction ratio is also available. Reference B094

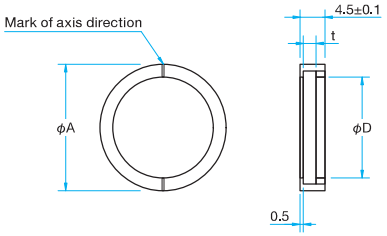
Attention

- Most of the light that is not transmitted will be reflected.
- Please note processing of the reflected (return) light when used with a laser. Because it is easy to be scratched, please do not wipe with a cloth or paper on wire grid surface.

Schematic

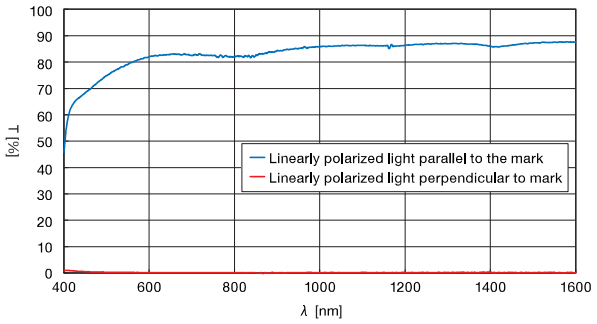


Outline Drawing (in mm)



●Tolerance
Diameter ϕA±0.1

Typical Transmittance Data T: Transmission



Specifications

Part Number	Wavelength Range [nm]	Diameter of frame ϕA [mm]	Clear aperture ϕD [mm]	Thcikness t [mm]
WGPF-30C	420 – 1600	ϕ30	ϕ23	2.2

Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

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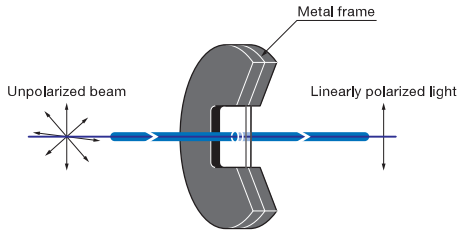
Polarizers

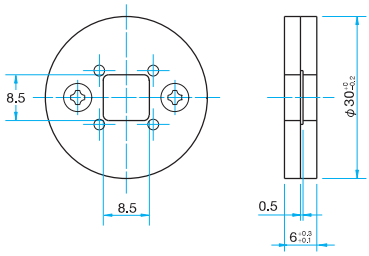
Polarcor is a glass made polarizer; it offers a high extinction ratio in the infrared region. It is widely used in experiments of telecommunication LD.

- Strong against corrosion and scratches resistant; offers excellent durability.
- High transmittance in the infrared region, usable for high power laser.
- Mounted in aluminum frame; easy to be placed in mirror holder.

Schematic



Outline Drawing (in mm)



Specifications

Material	Alkali Borosilicate Glass
Extinction ratio	1×10^{-4}
Angular Field	±15°
Transmitted wavefront distortion	λ
Beam Deviation	<20″
Coating	AR coating
Material of frame	Aluminum Finishing: Lusterless black anodized
Surface Quality (Scratch–Dig)	40–20
Laser Damage Threshold	0.1J/cm² (Laser pulse width 13ns) 25W/cm² (CW Laser)

Guide

- For larger effective diameter, please see our NIR polarizer product at page. Reference B099
- For unmounted product, please contact our Sales Division with your requests.

Attention

- Low transmittance when used in visible region.
- When use at unspecified wavelengths the extinction ratio is worsen.

Specifications

Part Number	Wavelength Range [nm]	Transmittance [%]
PLC-10-660	630 – 700	>83
PLC-10-800	740 – 860	>91
PLC-10-900	840 – 960	>94
PLC-10-1060	960 – 1160	>95
PLC-10-1310	1275 – 1345	>98
PLC-10-1550	1510 – 1590	>98

Compatible Optic Mounts

PH-30-ARS / SPH-30-ARS

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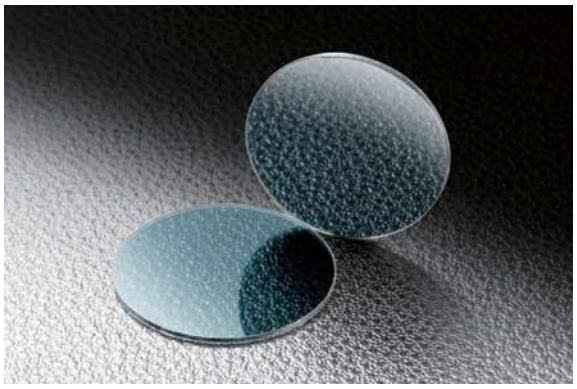
Plastic Polarizer | USP

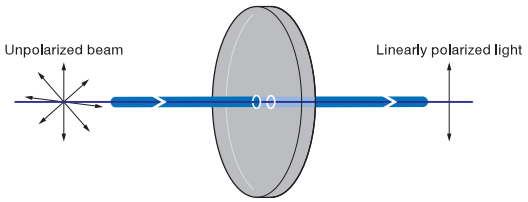
RoHS Catalog Code W3039

Look for a low cost polarization solution, USP is for you.
Usage in Photo-elasticity experiments and simple polarization experiment or light intensity adjustment in illumination application.

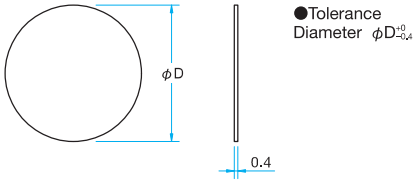
- Possible to use 2 plastic polarizer for various experiments.
- Place 2 polarizers onto the light axis by changing the polarization of each polarizer, it allows you to experience the light intensity adjustment across a wide dynamic range.
- The plastic polarizer is thin and convenient for confined experiments space.
- Since product is made of plastic there is no risk of damage when dropped.



Schematic



Outline Drawing (in mm)



Specifications

Material and structure	Polarizing high-polymer film laminated between plastic sheets
Wavelength Range	400 – 700nm

Guide

- For product sizes that is not listed on-line or in our catalog, please contact our Sales Division.
- Because the product is made of plastic, it is easy to cut and provide the product in any form.
- For high extinction ratio products, we suggest our polarizer filet (SPF) Reference B099 or the Glan Thompson prism (GTPC). Reference B094
- We suggest using our filter holder (FHS) for mounting your polarizer. WEB Reference Catalog Code W4043

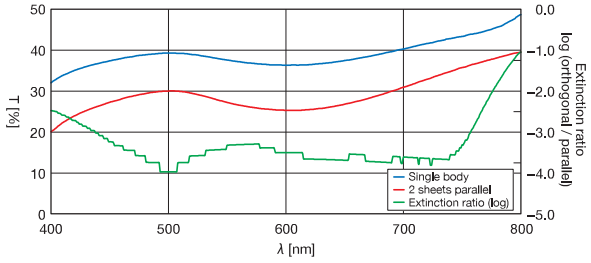
Attention

- The polarizer light axis direction is not indicated, please see our application note to find out how to identify the correct direction.
- Do not use this plastic filter with high power laser applications.
- Do not use solvents other than alcohol to wipe the polarizer.
- Do not use paper to wipe the polarizer, you may scratch the surface and may not be efficient for your experiment due to scattering and diffraction problem. Please use polarizer filter (SPF) it this is a concern. Reference B099
- The extinction ratio may be changed according to the wavelength.

400 – 700nm

Part Number	Diameter ϕD [mm]
USP-25.4C0.4-38	ϕ25.4
USP-30C0.4-38	ϕ30
USP-50C0.4-38	ϕ50

Typical Transmittance Data T: Transmission



Compatible Optic Mounts

FHS-25 / FHS-50

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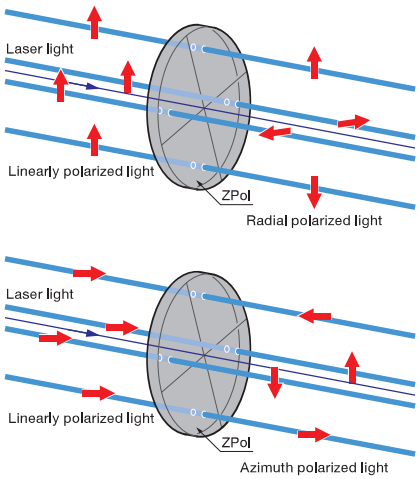
Z-Polarizer produces light polarization in the direction of its propagation. It enables you to obtain 3D measurement of molecules and crystal.

- Useful for various application such as laser scanning microscopy, tip-enhanced near-field microscopy, Raman microscopy, laser trapping, and laser processing.
- Z-polarizer is comprised of four-segment waveplate with the different orientation of the optical axis of each of the segmented waveplate so you can generate both radial polarization and azimuth polarization.
- In combination with condenser lens, Z-polarizer can produce a field of the light beam with a large electric field component in the z-direction (radial polarization). It can also produce azimuthal polarization by choice, a light collecting field that the z component of the electric field to zero.

Schematic



Specifications

Material	Synthetic fused silica, fused quartz or quartz (below 350nm)
Diameter	ϕ25mm
Clear aperture	ϕ10mm
Incident angle	0°
Selectable wavelength range	200 – 2000nm
Center wavelength tolerance	±4% from center wavelength
Retardation tolerance	±0.05λ at center wavelength
Crystal axis tolerance	±2°

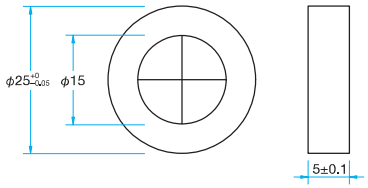
Guide

▶If you need a mount to hold the Z-polarizer, please contact our Sales Division with your request.

Attention

▶The condenser lens is not included for the Z-polarizer.

Outline Drawing (in mm)



Schematic of Z-vector generation