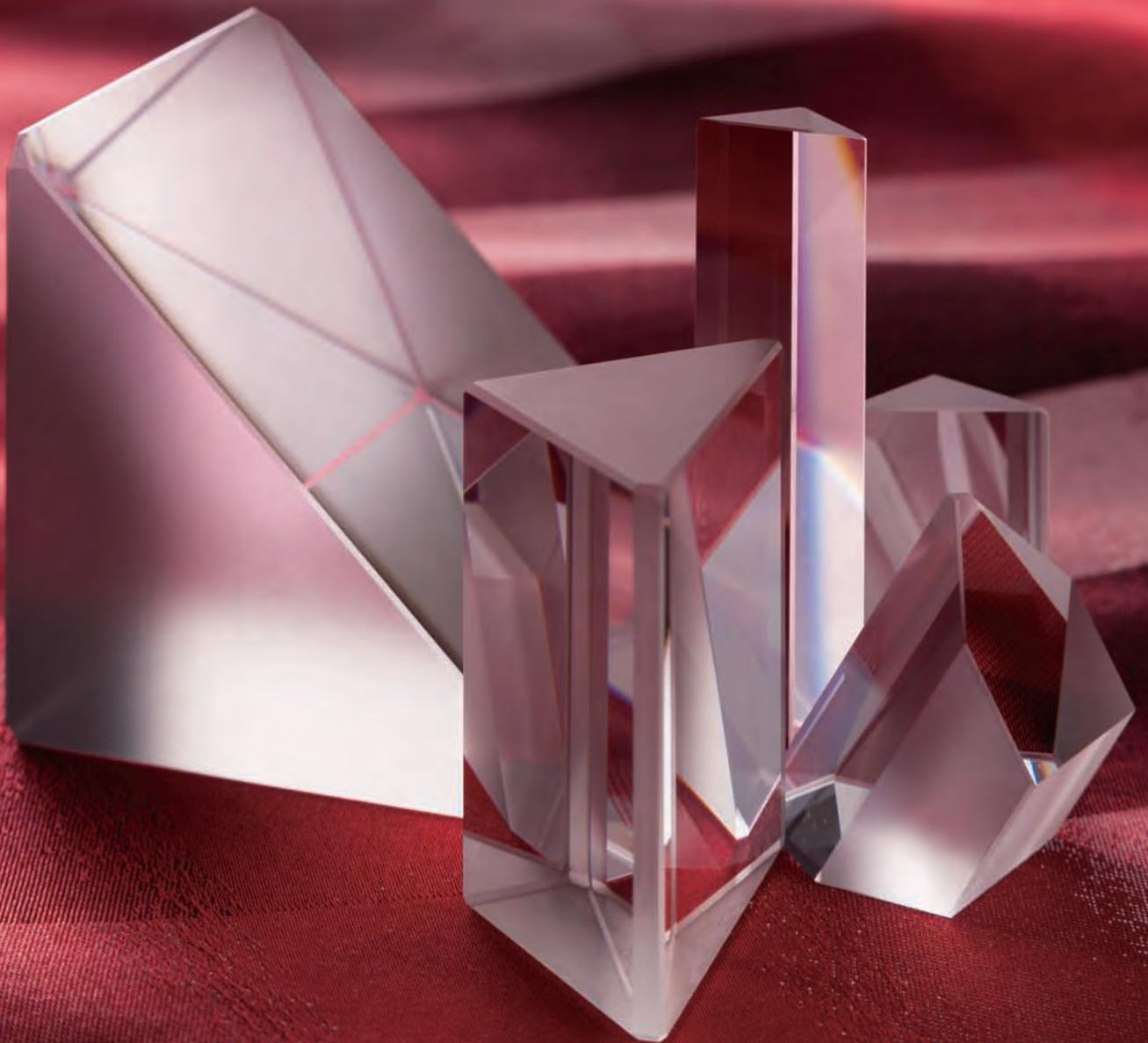


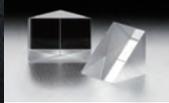
P r i s m s



Prisms Selection Guide

B265

45 Degrees Angle



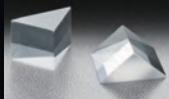
Coated Right Angle Prisms
RPB1 - 5

B266



Right Angle Prisms
RPB/RPSQ

B268



Knife Edge Right Angle Prisms
KRPB/KRPB4

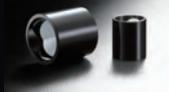
B270

Retro-reflectors



Corner Cube Prisms
Corner Cube Prism Holders
CCB/KUA

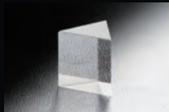
B272



Hollow Retro-reflectors
RCCB

B273

Equilateral Dispersing Prisms



Equilateral Dispersing Prisms
DPB/DPSQ/DPTIH11

B274

Others



Dove Prisms
Dove Prism Holders
DOP/DBH

B276



Penta Prisms
Brewster dispersing littrow type prism
PPB

B277



Pellin Broca prism
PBPQ

B278



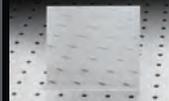
Light Pipe
LPB/LPSQ

B279



Parabolic lens of internal reflection type
CPC

B280



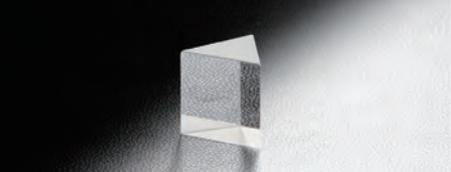
Prism Sheet
PRS

B281

Contact sheet **B282**

Prisms Selection Guide

By processing the various forms of glass, the prism produces a special effect due to refraction. Since there is no angular offset that after manufacture, it is also used as a reference angle for accurate angle.

Application	Products	Sample of use	
Reflecting light		Right Angle Prisms (RPB / RPSQ) Reference > B266	Substitute of the mirror, Reflector of the compact optical system.
Replacing the light		Corner Cube Prisms (CCB) Reference > B272 Hollow Retro-reflectors (RCCB) Reference > B273	Interferometer, Reflector, such as distance measurement
Dispersion wavelength		Equilateral Dispersing Prisms (DPB/DPSQ/DPTIH11) Reference > B274	Spectroscopic measurement, Dispersion compensation
Special effects		Dove Prisms (DOP) Reference > B276 Penta Prisms (PPB) Reference > B277 Pellin-Broca prism (PBPQ) Reference > B278	Rotate or flip the image

About Refraction and Critical angle

When the light is incident oblique angle on the glass, causing the refracted at the interface of the glass and air, the traveling direction of the light will change.

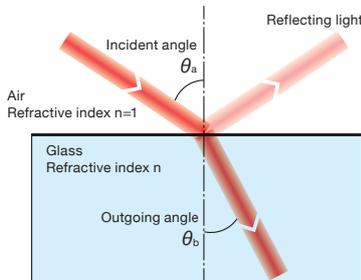
At this time, emission angle toward the side of the glass is smaller than the incident angle of the air. If the refractive index of the glass can be seen, this relationship can be determined from Snell's law.

Then, even if the incident light is emitted at the same angle as the angle θ_b shown below the boundary surface of the glass, through the same path at all, it will be emitted to the air incident angle θ_a .

However, if it will be incident at a large angle with the boundary surface from the side of the glass, then emitted to the air-side angle will exceed 90 degrees. It is called "critical" the emission angle of the air side when 90 degrees. It is called to be this angle "critical angle".

When the incident light from the glass boundary at an angle larger the critical angle θ_r , the light will not come out to the air causing total reflection.

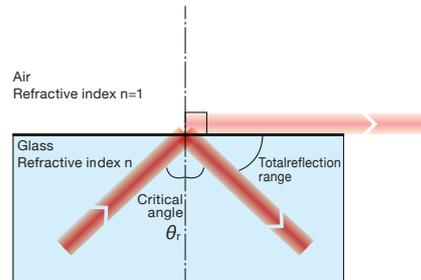
Conditions for refraction



Snell's law

$$\sin \theta_a = n \sin \theta_b$$

Conditions for Critical



Conditions for Critical angle

$$\sin 90^\circ = n \sin \theta_r$$

	BK7	Synthetic fused silica
Refractive index n_d	1.517	1.458
Critical angle θ_r	41.2°	43.3°

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45 Degrees Angle

Retro-reflectors

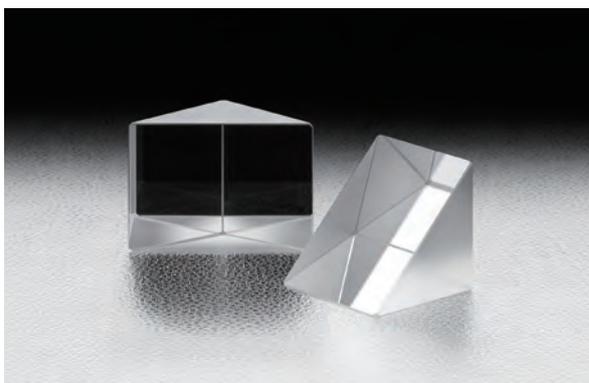
Equilateral Dispersing Prisms

Others

Right-angle prism can be used as a substitute for the mirror.

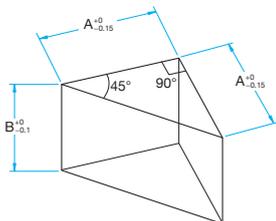
Independent even without a special holder, and since the choice of a variety of installation methods, it is useful if you want to reduce the size of the device. In addition, with very high accuracy and precision angle of the prism surface, it can also be used directly bonded to machined parts.

- RPB1 to 3 are used as a substitute for the mirror reflection of the slope.
RPB1 is coated with anti-reflection coating with two surfaces which the light is incident and emitted by using the critical angle prism reflection of the slope and the surface.
RPB2 are coated with reflective coating (Al+MgF₂) on the surface of slope.
RPB3 are the product which does not pass through the light reflected by the inclined surface of the interior of the prism, and there are three types.
- RPB4 can be used when you want to use the reflection of the two surfaces sandwiching the apex angle (right angle).
RPB4 can be used as to when observe two opposite directions at the same time, or as a prototype orthogonal basis and so on.
- RPB5 are used in applications where light back at the same angle as the incident light with respect to the horizontal direction. And double pass interferometer is used in (such as self-correlator) auto correlator.



Outline Drawing

(in mm)



Chamfer Ridge line
<C0.2 (A_{≤15})
<C0.3 (20_≤A)

Specifications

Material	BK7 (Refractive index n _d =1.517)
Surface flatness of substrate	λ/4
Angle accuracy	±1' (90° or 45°)
Coating	Broadband multi-layer AR coating for Visible Protected Aluminum (Al+MgF ₂)
Wavelength Range	400 – 700nm
Surface Quality (Scratch-Dig)	40–20
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Guide

- ▶ Also available other than the production of the catalog, such as the size and the wavelength used.
- ▶ Prisms are also available without a coat. [Reference](#) B268

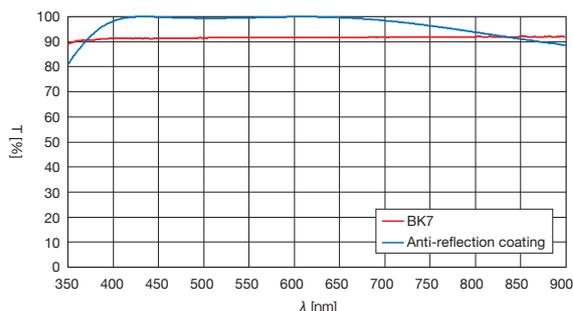
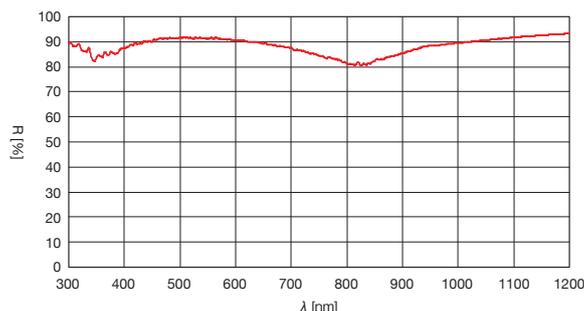
Attention

- ▶ A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- ▶ If the light is incident on the slope from the air side, most of the light through the prism side and it reflects only part of the light.
- ▶ If the incident light at an incident angle of 41 degrees or less (less than the critical angle) from the side of the glass which is no coating on the surface, will not be total reflection but part of the light is transmitted through the air side.
- ▶ Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen any more than the critical angle. Do not contact anything on the no coated surface.
- ▶ Please use RPB5 in the range of 0±5.7 degrees for the slope. Beyond this range, it will not be totally reflected.
- ▶ RPB2 are also reflected at an angle smaller than the critical angle by Al coating, but the reflectance will be lower to 12% less than the RPB1.

Typical Transmittance Data & Typical Reflectance Data

T: Transmission R: Reflectance

The transmittance and the Anti-reflection effect of BK7

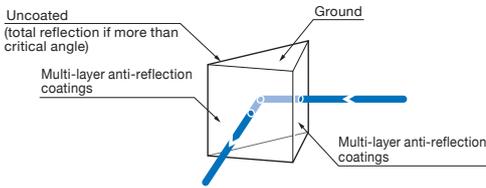
Al+MgF₂

Compatible Optic Mounts

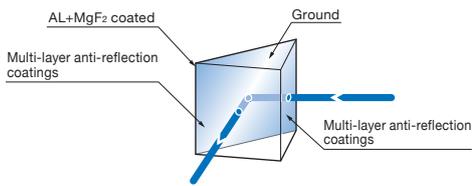
PLH / KKD / SHA

Schematic

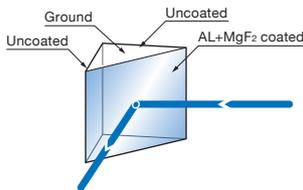
RPB1



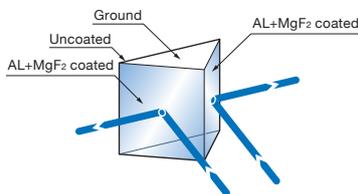
RPB2



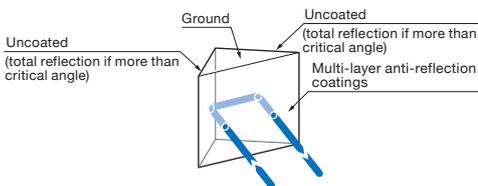
RPB3



RPB4



RPB5



45° with a coat

Part Number	A = B [mm]	Laser Damage Threshold* [J/cm ²]
RPB1-05-550	5	4
RPB1-07-550	7	4
RPB1-10-550	10	4
RPB1-12.7-550	12.7	4
RPB1-15-550	15	4
RPB1-20-550	20	4
RPB1-25-550	25	4
RPB1-25.4-550	25.4	4
RPB1-30-550	30	4
RPB2-05-550	5	0.25
RPB2-07-550	7	0.25
RPB2-10-550	10	0.25
RPB2-12.7-550	12.7	0.25
RPB2-15-550	15	0.25
RPB2-20-550	20	0.25
RPB2-25-550	25	0.25
RPB2-25.4-550	25.4	0.25
RPB2-30-550	30	0.25
RPB3-05-550	5	0.25
RPB3-07-550	7	0.25
RPB3-10-550	10	0.25
RPB3-12.7-550	12.7	0.25
RPB3-15-550	15	0.25
RPB3-20-550	20	0.25
RPB3-25-550	25	0.25
RPB3-25.4-550	25.4	0.25
RPB3-30-550	30	0.25
RPB4-05-550	5	0.25
RPB4-07-550	7	0.25
RPB4-10-550	10	0.25
RPB4-12.7-550	12.7	0.25
RPB4-15-550	15	0.25
RPB4-20-550	20	0.25
RPB4-25-550	25	0.25
RPB4-25.4-550	25.4	0.25
RPB4-30-550	30	0.25
RPB5-05-550	5	4
RPB5-07-550	7	4
RPB5-10-550	10	4
RPB5-12.7-550	12.7	4
RPB5-15-550	15	4
RPB5-20-550	20	4
RPB5-25-550	25	4
RPB5-25.4-550	25.4	4
RPB5-30-550	30	4

* Laser pulse width 10ns, repetition frequency 20Hz

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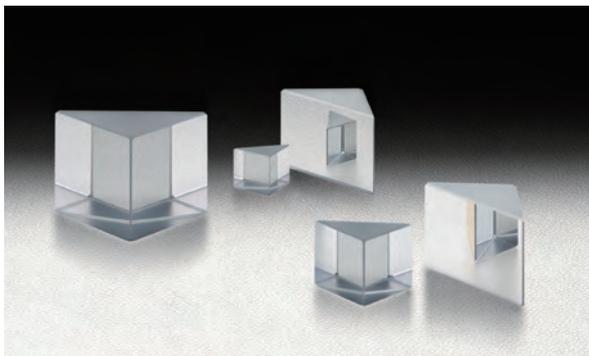
Retro-reflectors

Equilateral Dispersing Prisms

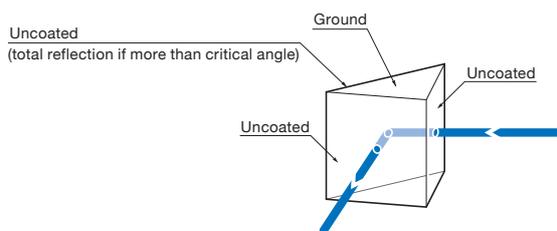
Others

It is a prism which is not coated and can be used in various applications, such as total internal reflection critical angle and wavelength dispersion. In addition, because it is possible to various coating on prism, it is possible to produce a prism optical element of which the wavelength customer use.

- In terms of angle tolerance and surface accuracy, there are three types for standard, simple and high-precision. And, there are two types of materials such BK7, and synthetic fused silica for using in UV region.
- With very high accuracy and precision angle of the prism surface, it can also be used directly bonded to machined parts.
- Independent even without a special holder, and since the choice of a variety of installation methods, it is useful as a substitute for the small mirror.

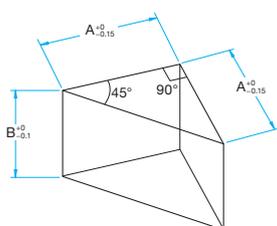


Schematic



Outline Drawing

(in mm)



Chamfer Ridge line
 Not chamfered ($A \leq 4$)
 $< C0.2$ ($5 \leq A \leq 15$)
 $< C0.3$ ($20 \leq A \leq 30$)
 $< C0.5$ ($40 \leq A$)

Specifications

Material	BK7 (Refractive Index $n_d=1.517$) Synthetic fused silica (Refractive Index $n_d=1.458$)
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

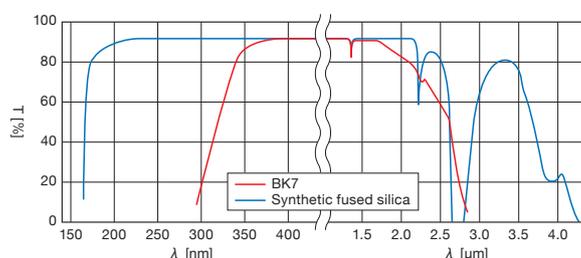
Guide

► It is available other than the products which listed in the catalog.

Attention

- A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- Surface reflectance of the critical angle is nearly 100% reflection. However, the reflectivity of the surface that emits or incident on the glass has a loss of about 8 percent.
- Most of the light through the prism side, if the light is incident on the slopes from the air it will not be reflected only partially.
- In BK7, when the incident light at an angle of 41 degrees or less (less than the critical angle) from the side of the glass, it will not be a total reflection on the part of the light is transmitted through the air for the slope in BK7. In synthetic fused silica at an angle of incidence of 43 degrees or less (less than the critical angle) will not be a total internal reflection.
- Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen any more than the critical angle. Do not contact anything on the no coated surface.

Typical Transmittance Data T: Transmission



BK7 / Standard

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPB-01-4M	1	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-02-4M	2	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-03-4M	3	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-04-4M	4	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-05-4M	5	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-07-4M	7	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-10-4M	10	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-12.7-4M	12.7	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-15-4M	15	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-20-4M	20	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-25-4M	25	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-25.4-4M	25.4	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-30-4M	30	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-40-4M	40	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPB-50-4M	50	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5

Compatible Optic Mounts

PLH / KKD / SHA



BK7 / Simple

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPB-01-2L	1	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-02-2L	2	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-03-2L	3	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-04-2L	4	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-05-2L	5	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-07-2L	7	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-10-2L	10	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-15-2L	15	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-20-2L	20	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-25-2L	25	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-30-2L	30	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-40-2L	40	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPB-50-2L	50	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10

BK7 / High-precision

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPB-05-10H	5	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-07-10H	7	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-10-10H	10	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-15-10H	15	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-20-10H	20	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-25-10H	25	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-30-10H	30	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-40-10H	40	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPB-50-10H	50	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5

Synthetic fused silica / Standard

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPSQ-05-4M	5	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-07-4M	7	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-10-4M	10	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-12.7-4M	12.7	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-15-4M	15	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-20-4M	20	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-25-4M	25	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-25.4-4M	25.4	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
RPSQ-30-4M	30	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5

Synthetic fused silica / Simple

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPSQ-05-2L	5	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-07-2L	7	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-10-2L	10	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-15-2L	15	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-20-2L	20	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-25-2L	25	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-30-2L	30	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-40-2L	40	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10
RPSQ-50-2L	50	$\lambda/2$	$\pm 3'$	$\pm 3'$	20-10

Synthetic fused silica / High-precision

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
RPSQ-05-10H	5	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-07-10H	7	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-10-10H	10	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-15-10H	15	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-20-10H	20	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-25-10H	25	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
RPSQ-30-10H	30	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5

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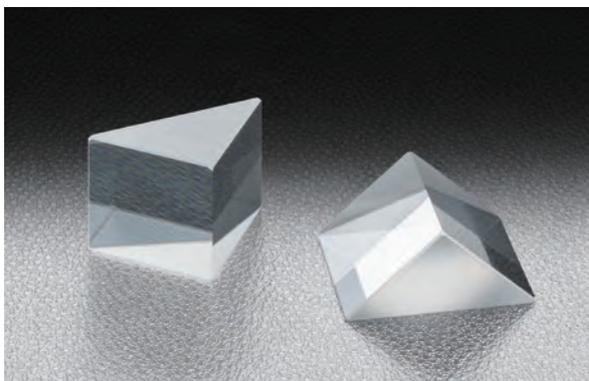
Retro-reflectors

Equilateral Dispersing Prisms

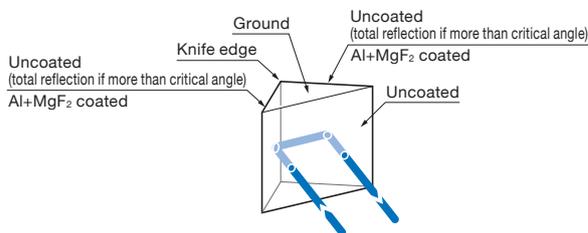
Others

It is a prism which was sharply polished the right angle ridge line between the two bottom surfaces.

- With a No coat type (KRPB), when using light in the range of 0 ± 5.7 degrees angle of incidence to the slope surface, the total reflection critical angle is obtained.

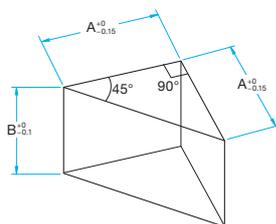


Schematic



Outline Drawing

(in mm)



Chamfered, the entire circumference of the ridge crest except right angles
 $< C0.2 (A \leq 15)$
 $< C0.3 (20 \leq A)$

Specifications

Material	BK7 (Refractive Index $n_d=1.517$)
Ridge Processing	Right-angle ridge: Knife edge (Not chamfered) Other ridge: Chamfered
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Guide

- ▶ It is available other than the products which listed in the catalog.

Attention

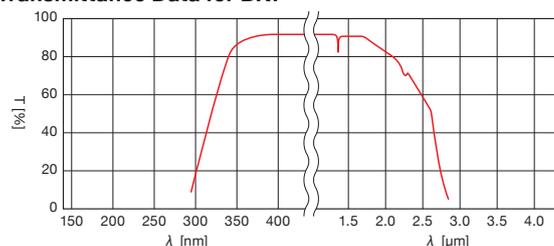
- ▶ Knife-edge ridge right angle is very easy missing. So please carefully handled so as not to come into contact with others.
- ▶ Part of the knife edge will not be able to wipe the lens, such as paper. Use an air blower for the small dusts.
- ▶ A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- ▶ KRPB (with a no coat), the reflectance of the reflection above the critical angle is nearly 100%, there is a loss of about 8% in the reflection of the input and the exit surface of the prism.
- ▶ Sometimes when dirt or fingerprints on the surface with no coating, total reflection will not happen any more than the critical angle. Do not contact anything on the no coated surface.

Specifications

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
KRPB-10-4M	10	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
KRPB-15-4M	15	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
KRPB-20-4M	20	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
KRPB-25-4M	25	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
KRPB-30-4M	30	$\lambda/4$	$\pm 1'$	$\pm 1'$	10-5
KRPB-10-10H	10	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
KRPB-15-10H	15	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
KRPB-20-10H	20	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
KRPB-25-10H	25	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5
KRPB-30-10H	30	$\lambda/10$	$\pm 5''$	$\pm 30''$	10-5

Typical Transmittance Data T: Transmission

Transmittance Data for BK7



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Equilateral Dispersing Prisms

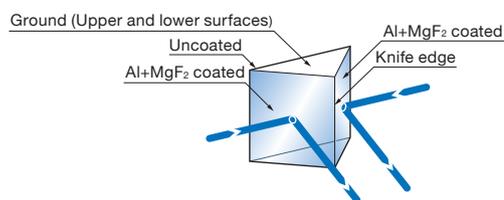
Others

It is a prism which was sharply polished the right angle ridge line across the bottom of the two sides.
It is a prism which was sharply polished the right angle ridge line between the two bottom surfaces.

- With a coat type (KRPB4), it can be used such as divergent light or light incident angle wider than ± 5.7 degrees, the observation system is suitable for a wide field of view.

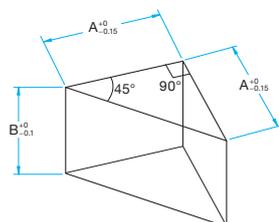


Schematic



Outline Drawing

(in mm)



Chamfered, the entire circumference of the ridge crest except right angles
 $< C0.2$ ($A \leq 15$)
 $< C0.3$ ($20 \leq A$)

Specifications

Material	BK7 (Refractive Index $n_d=1.517$)
Ridge Processing	Right-angle ridge: Knife edge (Not chamfered) Other ridge: Chamfered
Coating	2-surface that make up the right angle: Al+MgF ₂ (Protected Aluminum), Obliquity: Uncoating
Laser Damage Threshold	0.25J/cm ² (Laser pulse with 10ns, repetition frequency 20Hz)
Clear aperture	90% of Circle or Ellipse to Actual dimension for entrance and exit surface

Guide

- ▶ It is available other than the products which listed in the catalog.

Attention

- ▶ Knife-edge ridge right angle is very easy missing. So please carefully handled so as not to come into contact with others.
- ▶ Part of the knife edge will not be able to wipe the lens, such as paper. Use an air blower for the small dusts.
- ▶ A dimension measured is slightly shorter than the catalog size because it contains chamfer dimension. Dimensional tolerances are defined by the sides of the triangle with the slope and two bottom surface.
- ▶ KRPB4 is reflected in a wide angle than the degree of ± 5.7 by Al coat, however, its reflectivity (about 12% surface 1) is lower than 23% or more KRPB.

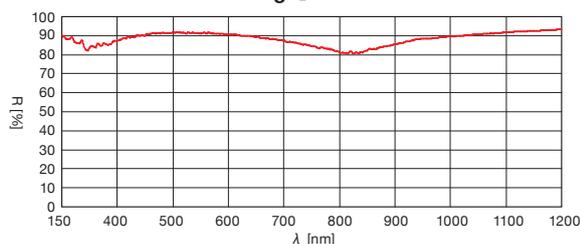
Specifications

Part Number	A = B [mm]	Surface flatness of substrate	Angle accuracy		Surface Quality (Scratch-Dig)
			90°	45°	
KRPB4-10-550	10	$\lambda/4$	$\pm 1'$	$\pm 1'$	40-20
KRPB4-15-550	15	$\lambda/4$	$\pm 1'$	$\pm 1'$	40-20
KRPB4-20-550	20	$\lambda/4$	$\pm 1'$	$\pm 1'$	40-20
KRPB4-25-550	25	$\lambda/4$	$\pm 1'$	$\pm 1'$	40-20
KRPB4-30-550	30	$\lambda/4$	$\pm 1'$	$\pm 1'$	40-20

Typical Reflectance Data

R: Reflectance

Reflectance Data for Al+MgF₂



Compatible Optic Mounts

PLH / KKD / SHA

Corner Cube Prisms | CCB

RoHS Catalog Code W3126

The corner cube can reflect the incident light back its original source. It is used in length measurement system as its reflector. It has been designed for measuring the distance between the moon and the earth, when Apollo spaceship reached the moon, corner cube was set on the surface of the moon for scientific research use.

- The corner cube is fabricated under high precision process; it can assure the reflection of high accuracy light.
- In measurement process, even the corner cube light is slightly inclined; the reflective light inclination stays unchanged and reflects back to the measurement system.
- To assure a low light power lost, we are also offering AR optical coating CCB-M.



Specifications	
Material	BK7
Accuracy on the side of the aperture	$\lambda/4$
Angular deviation of beam	$<5''$
Coating	CCB: Uncoated CCB-M: Broadband multi-layer AR coating for Visible (BMAR)
Incident angle	$\pm 20^\circ$ (Range obtained by Total reflection Critical Angle)
Surface Quality (Scratch-Dig)	40-20
Clear aperture	90% of actual aperture

Guide

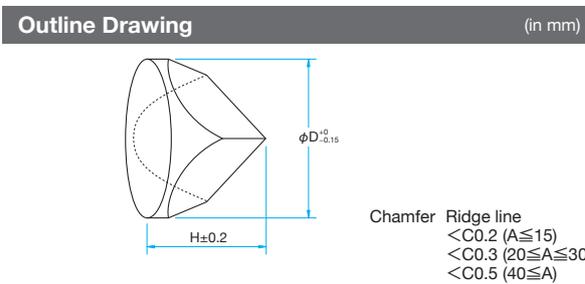
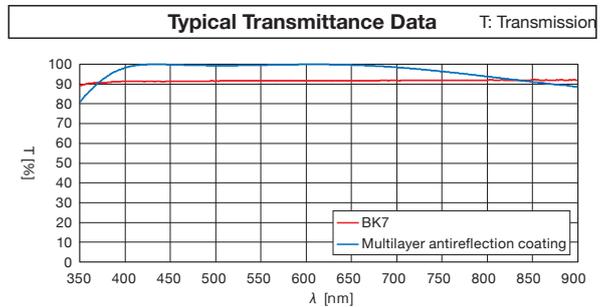
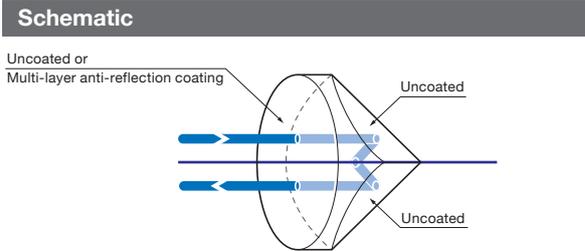
► We are also offering hollow retroreflector (RCCB) which can assure incident angle of 20 degrees without change in reflection light power. [Reference](#) B273

Attention

► The corner cube reflects light back to its source at high precision. If the incident light position is slide from the incident center; the reflected light will also be slide at the similar distance.

► Protect the uncoated surfaces from fingerprint or dirt, it affects the reflection even at the critical angle.

► The phase difference may occur at all reflective surfaces, the polarization characteristic of the reflected light may change. For low polarization characteristic change, we recommend to use hollow retroreflector (RCCB). [Reference](#) B273



Uncoated		
Part Number	Diameter ϕD [mm]	Height H [mm]
CCB-10	$\phi 10$	8.6
CCB-15	$\phi 15$	11.4
CCB-20	$\phi 20$	15.6
CCB-25	$\phi 25$	19.0
CCB-30	$\phi 30$	22.7
CCB-50	$\phi 50$	36.5

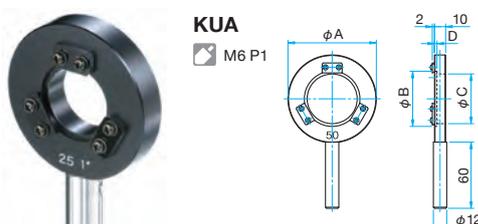
Multi-layer anti-reflection coating			
Part Number	Diameter ϕD	Height H	Laser Damage Threshold* [J/cm ²]
CCB-10M	$\phi 10$	8.6	4
CCB-15M	$\phi 15$	11.4	4
CCB-20M	$\phi 20$	15.6	4
CCB-25M	$\phi 25$	19.0	4
CCB-30M	$\phi 30$	22.7	4
CCB-50M	$\phi 50$	36.5	4

* Laser pulse width 10ns, repetition frequency 20Hz

Corner Cube Prism Holders | KUA

Catalog Code W3127

We are provide holder made specifically for this corner cube, please ask our International Sales Division.



Specifications

Part Number	Parts of Assembled optics	Diameter ϕA [mm]	Optics aperture ϕB [mm]	Clear aperture ϕC [mm]	D [mm]	Weight [kg]
KUA-10	CCB-10	$\phi 42$	$\phi 10$	$\phi 8$	1.0	0.07
KUA-15	CCB-15	$\phi 42$	$\phi 15$	$\phi 12$	1.2	0.08
KUA-20	CCB-20	$\phi 52$	$\phi 20$	$\phi 17$	1.5	0.09
KUA-25	CCB-25	$\phi 52$	$\phi 25$	$\phi 22$	1.4	0.10
KUA-30	CCB-30	$\phi 62$	$\phi 30$	$\phi 27$	2.0	0.12
KUA-50	CCB-50	$\phi 82$	$\phi 50$	$\phi 45$	2.0	0.14

The hollow retro-reflector is similar to the corner cube; it reflects the incident light back to its original source. This is made of a high precision assembly of 3 flat mirrors; insensitive of chromatic dispersion of the refractive index of glass and the absorptive of glass.

- The hollow is fabricated under high precision process; it can assure the reflection of high accuracy light.
- Can be used at broad wavelength range from UV to IR.
- Since there is no glass chromatic dispersion, the position of the back incident beam does not change in certain wavelength.
- With a small polarization effects, it is recommended to use in multiple interferometer optical path.

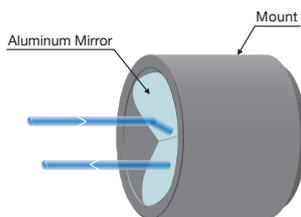


Specifications	
Material	BK7
Material of frame	Aluminum Finishing: Black anodized
Coating	Aluminum (No Protected Coating)
Laser Damage Threshold	0.25J/cm ² (Laser pulse with 10ns, repetition frequency 20Hz)
Surface Quality (Scratch-Dig)	40-20

- Guide**
- ▶ We have specific holders designed for this hollow retro-reflector, please ask our International Sales Division.
 - ▶ For high reflective type, we are proposing the corner cube CCB.
Reference ▶ B272

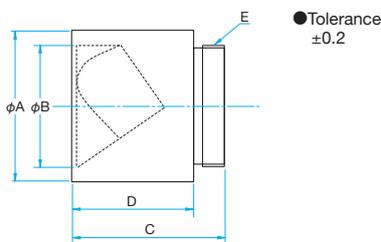
- Attention**
- ▶ The corner cube reflects light back to its source at high precision. If the incident light position is slide from the incident center; the reflected light will also be slide at the similar distance.
 - ▶ Reflection on aluminum mirror may have some polarization effects.
 - ▶ Avoid using optical cleaning tissue for the surface cleaning; there is no protection layer on the top of the aluminum coating. Please use air-blow type of cleaner.
 - ▶ The aluminum reflectance index is about 85% to 90%. The hollow reflect on 3 surfaces, therefore the back incident light reflectance performance is at 61% tp 73%.

Schematic



Outline Drawing

(in mm)

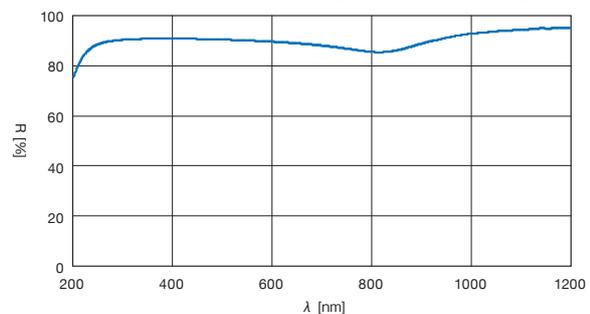


Part Number	φA [mm]	φB [mm]	C [mm]	D [mm]	E
RCCB-10	φ13	φ10	18	13	M10.85 P0.75
RCCB-20	φ25	φ20	25	20	M20.85 P0.75
RCCB-30	φ35	φ30	35	30	M30.85 P0.75

Typical Transmittance Data

R: Reflectance

Reflectance Data for Aluminum (surface reflection)



Specifications

Part Number	Clear aperture [mm]	Angular deviation of beam [°]	Wavefront aberration
RCCB-10-10	φ8	<10	1λ
RCCB-10-30	φ8	<30	2λ
RCCB-20-5	φ18	<5	1λ
RCCB-20-30	φ18	<30	2λ
RCCB-30-5	φ27	<5	1λ
RCCB-30-30	φ27	<30	2λ

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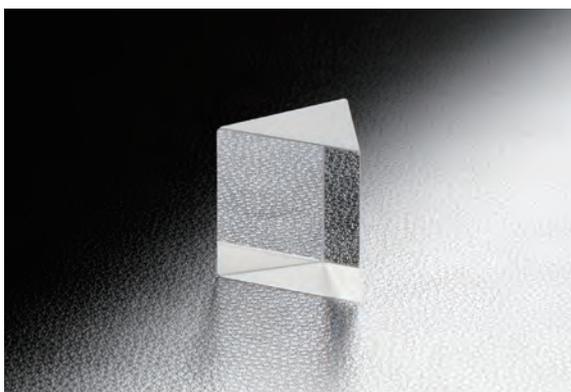
Retro-reflectors

Equilateral
Dispersing Prisms

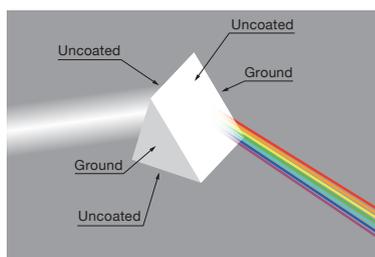
Others

Equilateral dispersing prisms disperse a light into its different colors and are used for spectrum analyzing experiments and instruments. Each colors in the light incident at an oblique angle to the first face is bent in different angle by the difference of refractive index of the glass according to wavelength and emerges as a spectrum from the opposite face.

- The roof angle of 60 degrees causes the best combination of wide dispersion and low reflection losses. A glass with large dispersive power or small Abbe's number leads to large angular dispersion.
- We offer both BK7 and fused silica for a selection of wavelength range from UV to near IR. We recommend a prism of BK7 if the light is not UV, because the angular dispersion of BK7 is larger than that of fused silica.
- In case of DPTIH11, it has a large wavelength dispersion of the refractive index and can observe the spectrum efficiently.

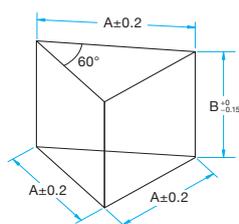


Schematic



Outline Drawing

(in mm)

Chamfer Ridge line
<C0.3

Specifications

Part Number	DPB	DPSQ	DPTIH11
Material	BK7	Synthetic fused silica	S-TIH11 equivalent
Refractive index n_d	1.517	1.458	1.785
Minimum deviation	49.3°	46.8°	66.4°
Abbe number v_d^*	64.1	67.8	25.7°
Angle	60°±3'		
Surface flatness of substrate	λ/10		λ/4
Surface Quality (Scratch-Dig)	20-10		40-20
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimensions A and B		

$$* \text{ Abbe number } V_d = \frac{n_d - 1}{n_F - n_C} \quad \begin{array}{l} n_d: \text{Refractivity of 587.6nm wavelength} \\ n_F: \text{Refractivity of 486.1nm wavelength} \\ n_C: \text{Refractivity of 656.3nm wavelength} \end{array}$$

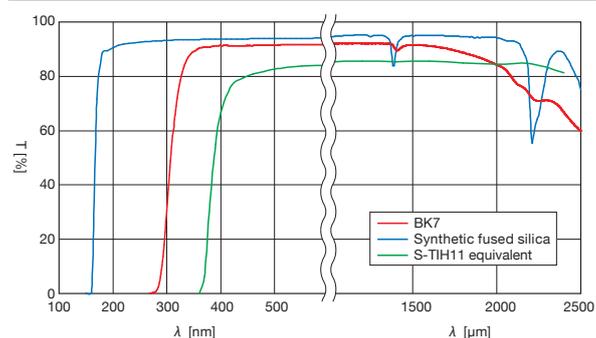
Guide

- ▶ Fixed to the prism, Prism Holder (PLH) are available. [Reference](#) C048
- ▶ Other sizes are available upon production of the catalog.

Attention

- ▶ Every edge of these prisms is chamfered (beveled) for chipping prevention. The dimensions of these prisms are values not including chamfer.
- ▶ Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

Typical Transmittance Data T: Transmission



BK7	
Part Number	A = B [mm]
DPB-20-10H	20
DPB-25-10H	25
DPB-30-10H	30

S-TIH11	
Part Number	A = B [mm]
DPTIH11-20-4H	20
DPTIH11-25-4H	25
DPTIH11-30-4H	30

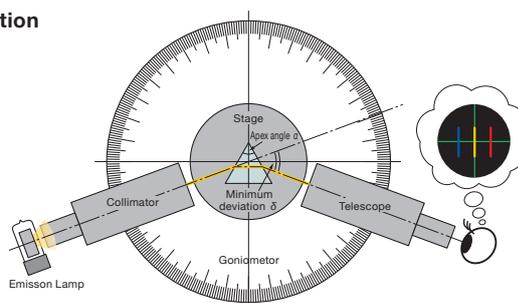
Synthetic fused silica	
Part Number	A = B [mm]
DPSQ-20-10H	20
DPSQ-25-10H	25
DPSQ-30-10H	30

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■ Glass refractive index measurement method of minimum deviation

The refractive index of optical glass is accurately measured by the angle measuring device called a goniometer. Accurately measuring the refractive index for each wavelength with the known wavelength of the emission spectrum of the lamp is emitted. Wavelength dispersion of the refractive index is determined by the results of this measurement.

$$n = \frac{\sin\left(\frac{\alpha + \delta}{2}\right)}{\sin\left(\frac{\alpha}{2}\right)}$$



Compatible Optic Mounts

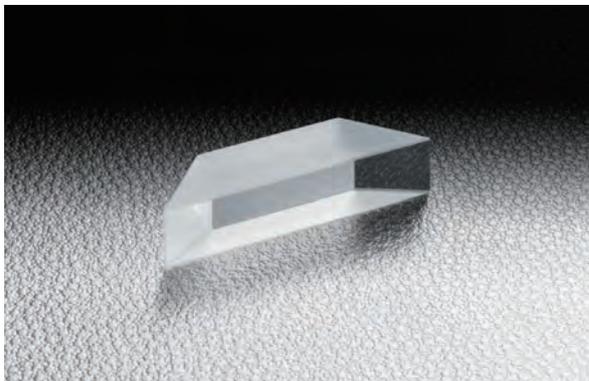
PLH / KKD / SHA

Dove Prisms | DOP

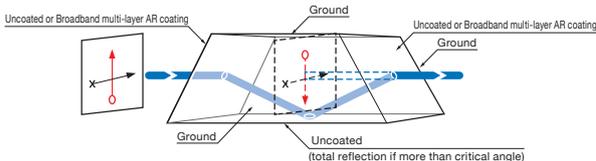
RoHS Catalog Code W3130

Observe an image through the dove prism; you will see the image in inversion. Moreover, when you turn the prism the image will be turning around 2 times. The dove prism is widely used in where images inversion adjustment is needed.

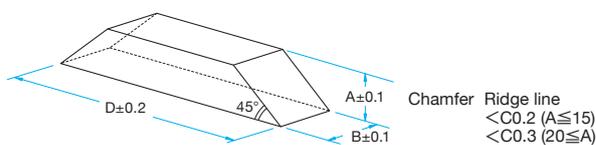
- This is made with high fabrication process; there is no light incident axis deviation.
- The bore (A × B) of the length (D) has been designed and manufactured with high precision with no crack occur.



Schematic



Outline Drawing



Specifications

Material	BK7 ($n_d=1.517$)
Inclination angle	$45^\circ \pm 3'$
Coating	DOP-4: Uncoated DOP-4M: Broadband multi-layer AR coating
Surface Quality (Scratch-Dig)	20-10
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimensions A and B

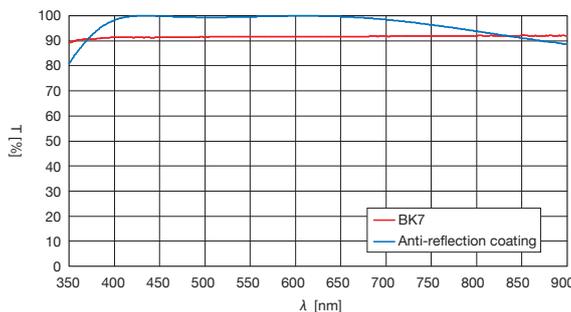
Guide

► AR coating on incident surface and emitting surface and aluminum coat on lower surface can be done as an option. Please contact our International Sales Division.

Attention

- When the prism is on the upright image position, the right and left side images are on mirror symmetry.
- The chromatic aberration may happen when observation of image at high magnification through the dove prism.
- The dimension of the D side mention in the catalog could be smaller in real due to the chamfer. The tolerance of the dimension of the bottom of the both slope side of the prism is taken as standard.
- If dirt is found on the bottom surface of the dove prism (uncoated side), the dirt can be captured into the image.

Typical Transmittance Data T: Transmission



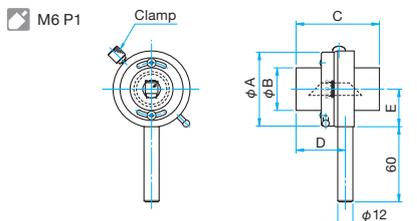
Specifications

Part Number	A = B [mm]	Length D [mm]	Surface flatness of substrate
DOP-10-4	10	42.2	$\lambda/4$
DOP-15-4	15	63.3	$\lambda/4$
DOP-20-4	20	84.4	$\lambda/4$
DOP-25-4	25	105.5	$\lambda/4$
DOP-30-4	30	126.6	$\lambda/4$
DOP-10-4M	10	42.2	$\lambda/4$
DOP-15-4M	15	63.3	$\lambda/4$
DOP-20-4M	20	84.4	$\lambda/4$
DOP-25-4M	25	105.5	$\lambda/4$
DOP-30-4M	30	126.6	$\lambda/4$

Dove Prism Holders | DBH

Catalog Code W3131

Dove prism mounted with turnable holder. The rotation center of the optics and the holder is adjustable.



Part Number	φA [mm]	φB [mm]	C [mm]	D [mm]	E [mm]
DBH-10	φ59	φ34	66	39	30
DBH-30	φ94	φ64	152	80	46.5

Specifications

Part Number	Part number of optics included	Sensitivity [°]	Primary material: Aluminum Finish: Black Anodized	
			Weight [kg]	
DBH-10	DOP-10-4	1	0.35	
DBH-30	DOP-30-4	1	1.3	

Penta Prisms

Brewster dispersing littrow type prism

PPB
Custom-made

RoHS
RoHS

PPB

Catalog Code W3132

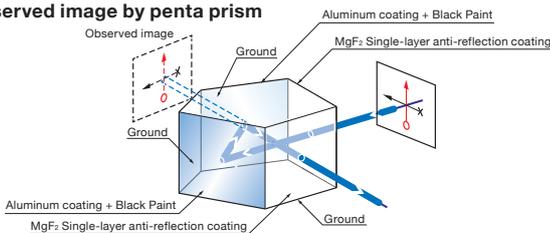
By reflecting twice in the mirror, it converts the image of the same object and erect a reflection image of mirror symmetry. To avoid the image mirror symmetry, digitized before the camera, the light rays are bent at a right angle from the object using a penta prism. It is also used as the basis of the device perpendicular by the laser positioning marking.

- The incident angle of the prism is changed, then always emitted at 90 degrees for the incident light.
- You can compact the whole better to use the internal reflection prism than using two mirrors of the angle deviation is not generated.

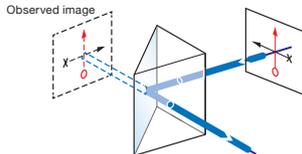


Schematic

Observed image by penta prism



Observed image by right-angle prism (mirror symmetry)



Specifications

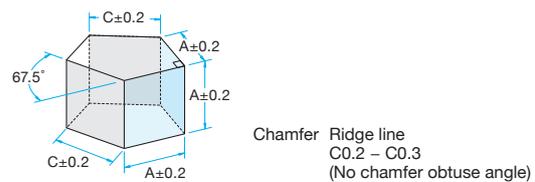
Material	BK7
Surface flatness of substrate	$\lambda/4$
Angle tolerance	$\pm 3'$
Surface Quality (Scratch-Dig)	40-20
Coating	Aluminum coating + Black Paint MgF ₂ Single-layer anti-reflection coating
Clear aperture	Circle inscribed in a square of 90% of the dimensions A

Attention

- ▶ There is a possibility to take the black ink will melt if wiped with a solvent.
- ▶ There is a loss with Aluminum coating of about 12% in the single-side, and 23% in both side reflectance internal reflection of prism. Input and output efficiency will be about 77%.

Outline Drawing

(in mm)



Specifications

Part Number	A [mm]	C [mm]
PPB-10-4	10	10.8
PPB-15-4	15	16.0
PPB-20-4	20	23.0
PPB-25-4	25	27.1

Custom-made

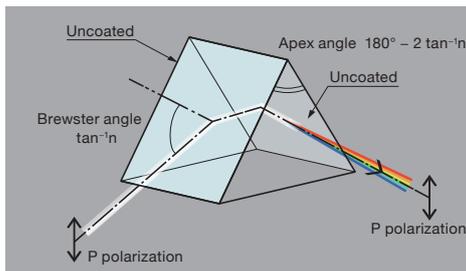
Catalog Code W3133

This is the incident angle of the prism apex angle of the prism was adjusted so that the dispersion was Brewster angle p-polarized light reflection angle is zero. It can be used as the wavelength selection prism used in the tunable laser resonator.

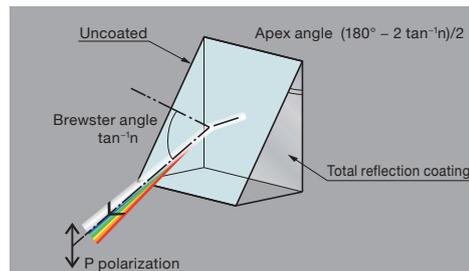
- If linearly polarized light (polarized light P), is suppressed by the reflection loss for both the incident surface and the exit surface, the incident beam has a high transmission efficiency can be obtained.
- Brewster angle are computed from the refractive index with wavelength and use of glass material, it must be always specified wavelength and using glass materials.
- Brewster prism dispersion is coated littrow type to total reflection and transmission type.
- When ordering, please use the Contact sheet in the catalog for the custom prism.

Schematic

Transparent type



Littrow type



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Pellin Broca prism | PBPQ

RoHS Catalog Code W3410

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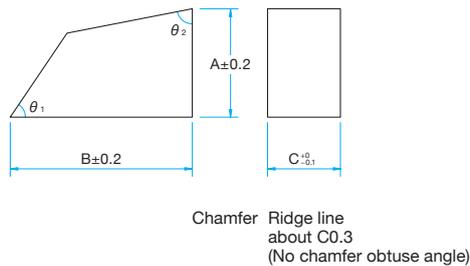
Others

Pellin Broca prism is a one of the dispersing Brewster prism and is characterized to emit in the direction of perpendicular to the incident. When the incident at Brewster angle a YAG laser, it is possible to separate the second harmonic generation beam (532nm) and the fundamental harmonic generation beam (1064nm).

- Since it is using the Brewster angle and the critical angle, reflection losses will not occur, and a high transmittance can be obtained.
- Because there is no coating on the surface with Pellin Broca prism, it will also be used in high energy pulsed laser.
- This is used to fit the (Brewster angle) angle of light intensity of the beam of light (invisible) of the YAG fundamental harmonic generation and second harmonic generation beam reflected by the prism incident surface is minimized.
- Make sure to use to be converted so as to be parallel to the bottom surface of the prism is the polarization direction of the laser beam.
- It can also be used for multi-wavelength oscillation laser spectroscopy of Argon laser.



Outline Drawing (in mm)



Specifications	
Material	Synthetic fused silica
Design wavelength	706nm (intermediate of 532nm and 1063nm)
Angle accuracy	<3'
Surface flatness of substrate	$\lambda/10$
Surface Quality (Scratch-Dig)	20-10
Clear aperture	Circle or ellipse inscribed in a rectangular of 90% of the dimension size

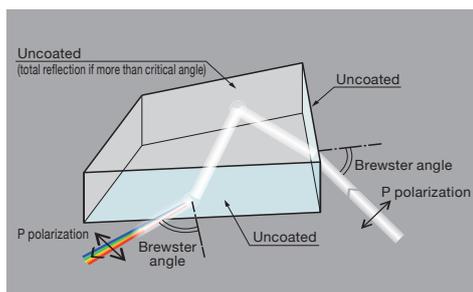
Guide

- ▶ Perrin blocker prism can also be produced on request to suit for the wavelengths of the laser.
- ▶ Other sizes are available upon production of the catalog.

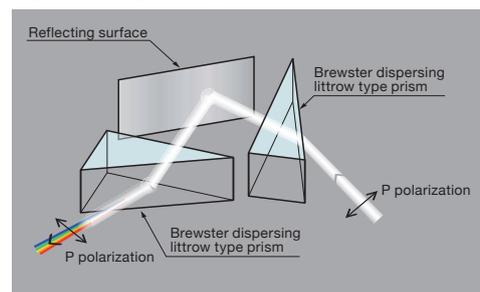
Attention

- ▶ Because it deviates from the Brewster angle, the beam emitted from the ultraviolet wavelength is not a non-reflective.
- ▶ Although it can also be used as a dispersing prism of non-polarized light, and not allowed to enter in the Brewster angle, it is not emitted at right angles to the incident angle.
- ▶ It can also be dispersed incident S polarized laser beam, reflection loss occurs in the incident surface and the exit surface.
- ▶ Fingerprints and dirt adhering to the surface of no coated, the effect of the total reflection or no reflection can not be obtained. Please use without touching anything on the surface is not coated.
- ▶ A and B dimension is slightly shorter than the actual catalog because it contains chamfer dimension. Dimensional tolerances are defined at the intersection of each side that does not include a chamfer.

Schematic



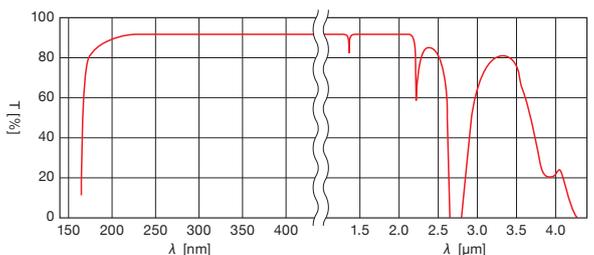
Equivalent optical system



Angular dispersion of YAG Laser

Brewster wavelength	1064nm	532nm
Incident angle (Brewster angle) [°]	55.39	55.61
Output angle [°]	1064nm	54.93
	532nm	56.30
	355nm	58.09
	266nm	61.01

Typical Transmittance Data T: Transmission



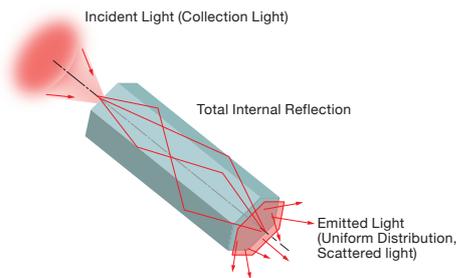
Specifications					
Part Number	A [mm]	B [mm]	C [mm]	θ_1 [°]	θ_2 [°]
PBPQ-30L20-10	30	50	20	56.13	79.50

It is an optical element for the illumination of uniform brightness distribution from a light having a non-uniform brightness distribution. It is used for the illumination optical system for image processing, and for converting the Gaussian profile to a top-hat profile.

- It uses a hexagonal prism type with highly uniform efficiency than rectangular prism.
- There is a line up of the compact type of 30mm and higher homogeneity of 75mm.
- There are two materials such as BK7 for the visible to near-infrared region and synthetic fused silica for ultraviolet light.
- Distance of opposite sides are available in two types of 5mm and 10mm.



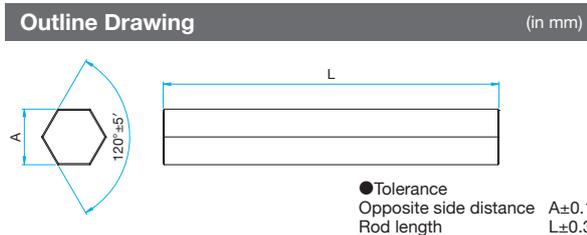
Schematic



Specifications	
Material	BK7, Synthetic fused silica
Angle accuracy	120°±5'
Parallelism	5'
Coating	Uncoated (Including the sides)
Recommended incident numerical aperture (NA)	>0.5
Surface Quality (Scratch-Dig)	60-40

Guide
 ▶ Dedicated adapter (LPH-ADP) is available to attach the light pipe to the lens holder and the mirror holder.

Attention
 ▶ Since it is totally reflected at the side, reflectance may extremely get worse if fingerprints and dirt are at the side. And it may cause an unevenness in the brightness distribution of the emitted light.
 ▶ It can not be used in collimated light. Please use by being incident a large light of collection angle (divergence angle)
 ▶ Anti-reflection coating is not attached on both end faces. For this reason, by the reflection (4%) of both end faces, transmittance loss of 7-8% occurs.



Specifications				
Part Number	Material	Opposite side distance A [mm]	Rod length L [mm]	surface flatness of polished surface
LPB-05L30	BK7	5	30	λ
LPB-10L75	BK7	10	75	3λ
LPSQ-05L30	Synthetic fused silica	5	30	λ
LPSQ-10L75	Synthetic fused silica	10	75	3λ

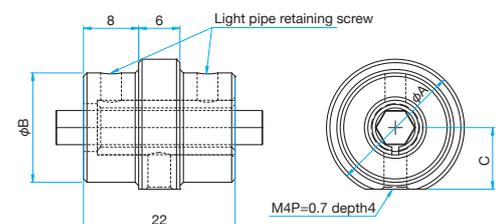
Light pipe adapter | LPH-ADP

This is the adapter for fixing the light pipe (LPB / LPSQ) and attaching to the mirror holder and lens holder.



- It can fix the light pipe without contacting the polished surface of the light pipe.
- Because of the resin attached, scratches can not occur to the light pipe.

Outline Drawing (in mm)



Part Number	φA [mm]	φB [mm]	C [mm]
LPH-ADP-05	φ20	φ16	9
LPH-ADP-10	φ30	φ20	14

Specifications	
Part Number	Compatible optics
LPH-ADP-05	LPB-05L30, LPSQ-05L30
LPH-ADP-10	LPB-10L75, LPSQ-10L75

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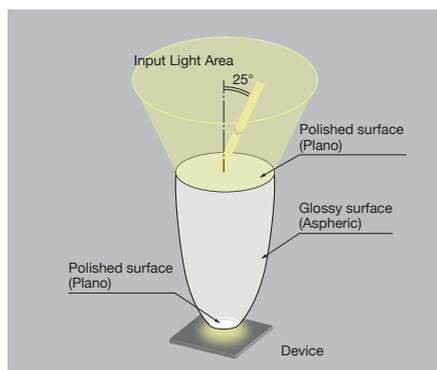
Others

Parabolic lens of internal reflection type is an optical element that, with incident lights from various directions reflected at the streamlined side surface, can collect the lights on the emitting end surface. It is used as a collector of solar cells.

- If it is the parallel light of 25° or less as an incident angle, it is possible to collect efficiently the light at the emitting end surface even though the incident from any directions occurs.
- Since it is used the internal reflection of the glass, the configuration can be simplified compared with the lens system.
- By using the press molding technique of the glass lens, it achieved both high performance and low cost.



Schematic



Specifications

Part Number	CPC-14.24C29.02-P
-------------	-------------------

Specifications

Material	B270® equivalent
Coating	Uncoated
Allowable acceptance angle	25°
Surface Quality (Scratch-Dig)	Both end surfaces: 80-50 Side surface (non-spherical): 160-50

* B270® is a registered trademark of SCHOTT AG.

Guide

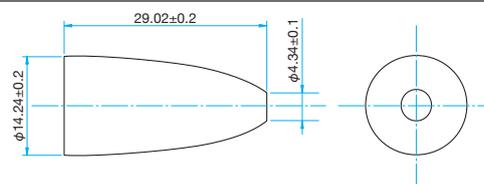
- ▶ It is available for the production of anti-reflection coating on both end surfaces on demand.
- ▶ Other sizes are available excepting catalog products.

Attention

- ▶ Since it is totally reflected at the side (non-spherical), reflectance may extremely get worse if fingerprints and dirt are at the side.
- ▶ The reflectance of the side is 99% or more, but since anti-reflection coating is not applied in the incident surface and emitting surface, the reflection loss of about 4% occurs.
- ▶ Light emitted from the end surface diverges largely and randomly without condensing to one point. Therefore, it can not be used for the application of the focused beam and collimated beam.

Outline Drawing

(in mm)



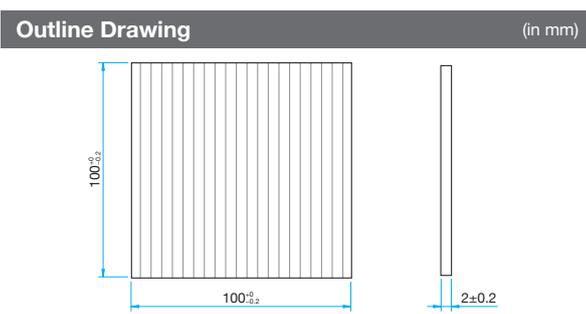
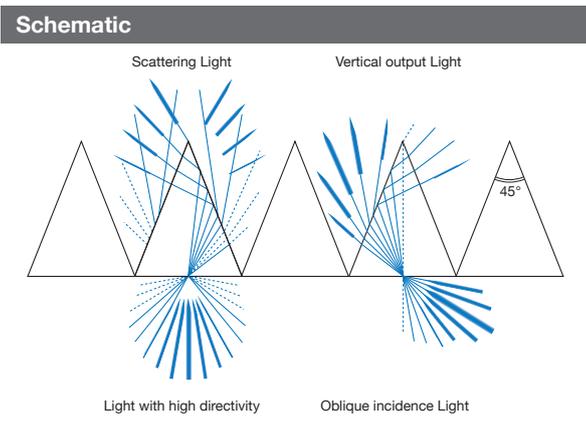
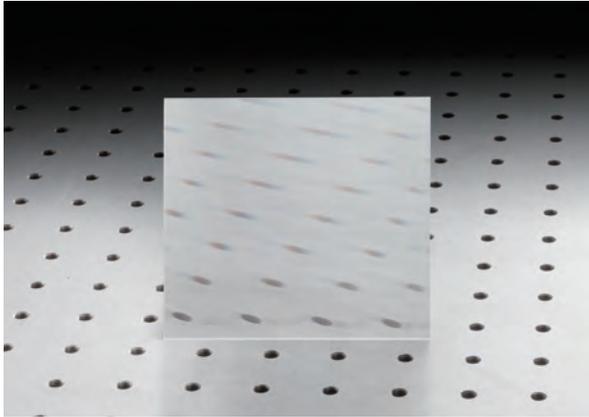
Formula for Aspheric

$$Z(x) = I + \frac{Cx^2}{\sqrt{1 - (1+K)C^2x^2}} + a^2x^2 + a^4x^4 + a^6x^6 + a^8x^8 + a^{10}x^{10} + a^{12}x^{12}$$

Coefficient	Numerical value
C	-0.00661615
K	21.98945555
a ²	6.634803136×10 ⁻⁴
a ⁴	-3.044342187×10 ⁻⁶
a ⁶	6.004115152×10 ⁻⁹
a ⁸	-1.208582175×10 ⁻¹¹
a ¹⁰	1.189971496×10 ⁻¹⁴
a ¹²	-5.290757204×10 ⁻¹⁸

As an optical device for the LCD TV and the display of the mobile terminal, it is used when changing the incident direction or diffusing a light source that there is directional.

- Since the prism is processed directly to an acrylic plate of 2mm thickness, the performance is stable and not easily deformed.
- There are two types of 0.03mm and 0.05mm pitch of the prism line.
- It can also be used as a Fresnel prism (prism plane).



Specifications	
Material	CLAREX
Refractive Index	1.49
Tip Angle	45°

* CLAREX is a registered trademark of Nitto Jushi Kogyo Co., Ltd.

- Guide**
- ▶ It is available for the prism sheet other than 45 °.
 - ▶ It is also available for the production of prism sheet size on demand.
 - ▶ The prism surface looks jagged when observing the reflected light. (Reflection that looks pretty is a real surface)

- Attention**
- ▶ There is a directional nature in the prism sheet. If it is desired to diffuse the light in two dimensions, please use crossed two prism sheets.
 - ▶ There is a wavelength dispersion in the prism sheet. When using a small width light source such as a fluorescent lamp. A chromatic dispersion (Rainbow) occurs.
 - ▶ When strongly rubbing the processed surface of the prism, the performance may be degraded. Please do not directly touch the processed surface.
 - ▶ It can be deformed when exposed to high temperature of 80 degrees or more and the performance can be severely affected.
 - ▶ Do not use organic solvents such as acetone and chloroform. Prism structure will be broken by dissolving.
 - ▶ It is delivered that protection sheet is affixed to the surface, please use peel it off.

Specifications	
Part Number	Prism pitch [mm]
PRS-100S02-0.05	0.05
PRS-100S02-0.03	0.03

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Contact sheet

It is also available for custom fabrication of a prism of which size is different in the catalog. Simply fill in the inquiry sheet specifications, and please send us a fax or by e-mail. We will contact you by return and confirm the specification.

Contact sheet for Special Order for Prism

Estimation Order

Date

To: Sigma Koki Co., Ltd. **FAX +81-3-5638-6550**

Affiliation (Organization Name)					
Department			Name		
TEL		FAX		E-mail	
Country/Address					
Name & Designation	(Tentative name is okay)				
Drawing Number			Estimate	<input type="checkbox"/> Yes: by Date <input type="checkbox"/> No	
Desired Delivery Date			Budget	JP Yen	
Specifications of Prism	Quantity				
	Selected from standard product	Products Number	If you are using a prism of standard product, please fill in the product number.		
	Custom made	Name of the prism			
		Material	<input type="checkbox"/> BK7 <input type="checkbox"/> Synthetic fused silica <input type="checkbox"/> Other ()		
	Surface flatness of substrate	Angle accuracy	<input type="checkbox"/> Standard ($\pm 3'$) <input type="checkbox"/> Other ()		
Specifications of Coating	Presence or absence of coating	<input type="checkbox"/> No coating <input type="checkbox"/> Single-layer AR coating <input type="checkbox"/> Multi-layer AR coating <input type="checkbox"/> Al only			
		<input type="checkbox"/> Al+MgF ₂ <input type="checkbox"/> Dielectric coating <input type="checkbox"/> Other ()			
Specifications of Light Source Used	Wavelength Range	$\lambda =$	nm	Type	
	Output or Energy	W		Beam size	mm
		J	Pulse width	s	Repetition frequency
Incident angle	$\theta =$ °				
Shape, other	* Write more detailed specifications here. (Rough illustration is acceptable.)				

Sigma Koki Co., Ltd.

In addition to the catalog product, it can also be produced the special specifications such as the following.

[Examples of custom prism]

