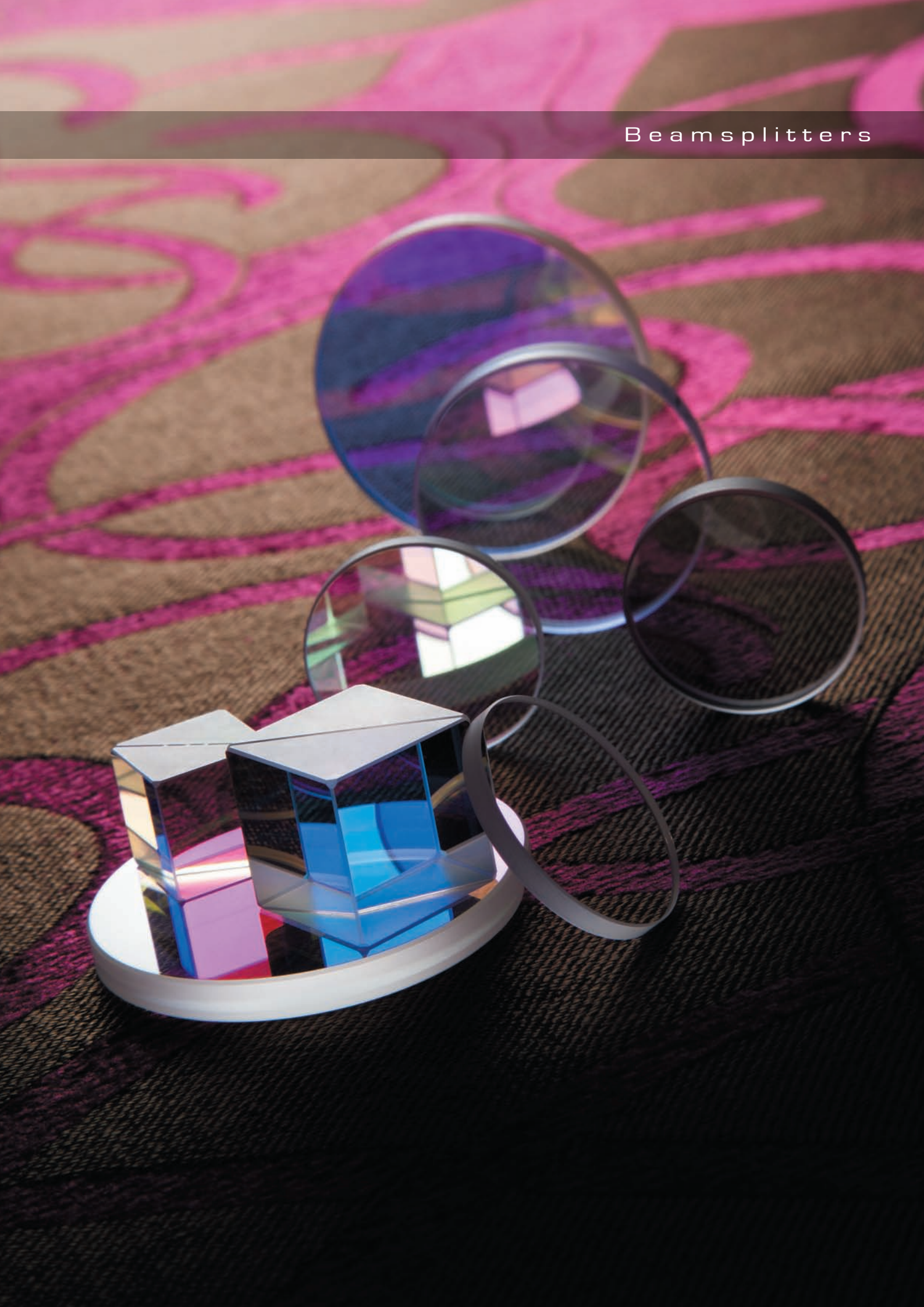
Beamsplitters

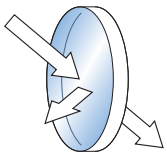
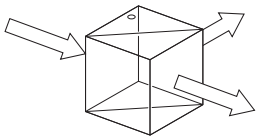


Beamsplitters | INDEX

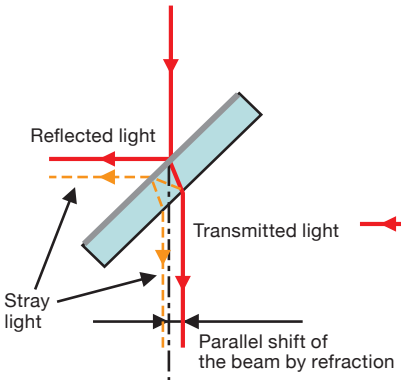
Beamsplitters selection Guide

A beamsplitter is an optic that splits light into 2 directions.
The split ratio of light transmittance and reflectance is 1:1 and is called a half mirror.

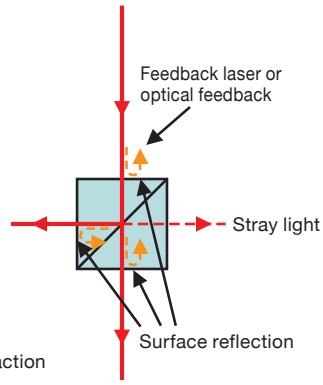
The 2 forms of beamsplitters are cube and plate type.

Type	Affected products	Features	Application
Plate		Good fit for large beam size applications at a reasonable price. Advantages are: minimal back reflection, compact light-path as compared to cube type beamsplitters and low chromatic dispersion. There may be a slight offset of the transmitted beam due to refraction. For 45 degrees incident application, the clear aperture would be elliptical. There may be some vignetting on angle of incidence.	Large beam size optical set up. Used in large beam size optical layouts. Used for monitoring optical systems, split beams into different wave-lengths, polarizations or intensities.
Cube		Can be applied at its maximum effective area from any incident direction, easy to be applied in optical design and simple for optical set up adjustment High cost and high weight for large beam size application. Feedback light at less than 1% may happen. The transmittance light through the cube is longer than a plate type, the chromatic dispersion is higher. Eliminates the problem of beam deviation.	For a compact size optical set up. For high accuracy experiment and optical set up usage.

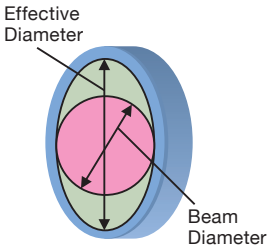
Plate



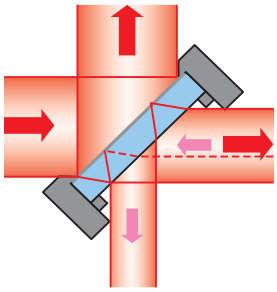
Cube



Incident angle 45°

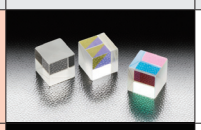
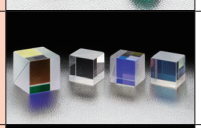
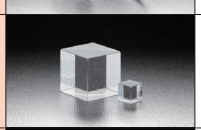
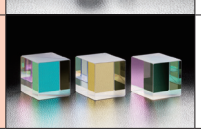


Eclipse of beam of half mirror



Experimentation with laser (Linear polarized light)

Lasers are used to evaluate our half mirrors and with the polarization properties of the laser, we are able to check the change of light splitting ratios.

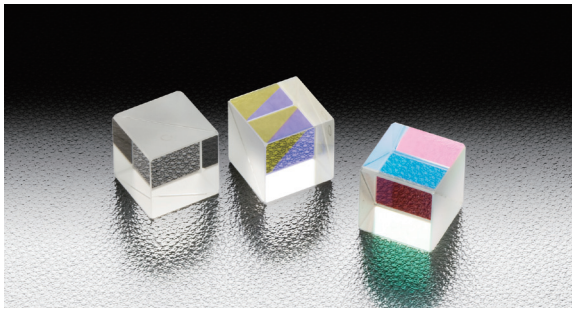
Type	Affected products	Application	Experimention with laser (Linear polarized light)	Polarization dependency
Non-polarizing (NPCH) Reference B046		For high accuracy laser experiment with accurate light ratios at any polarization levels.	The light ratios at 1:1 stay stable even when the polarization situation changes. No power loss.	Small
Hybrid (HBCH) Reference B048		For multi-wavelength light splitting solutions.	Light ratio at 1:1 from any specified light incident direction will remain similar.	
Laser Line Plate (PSMH) Reference B055		Large beam size, multi mirror optical set up with small power light source and supports high power laser light splitting.	Polarization at 45 degree (AOI) or circle polarization light with no power loss detected.	
Chromium Plate (PSCH) Reference B058		Large beam size and observation optical system.	Polarization at 45 degree (AOI) or circle polarization light with 36% absorption of light power.	
Chromium Cube (CSCH) Reference B049		For basic laser experiments and compact optical solutions. Great entry level price.	Polarization at 45 degree (AOI) or circle polarization light with 40% absorption of light power.	
Dielectric Cube (CSMH) Reference B050		For general white light and non-polarizing light i.e. LED light splitting solutions.	Polarization at 45 degree (AOI) or circle polarization light with no power loss detected.	Large

Non-polarizing Cube Half Mirrors | NPCH

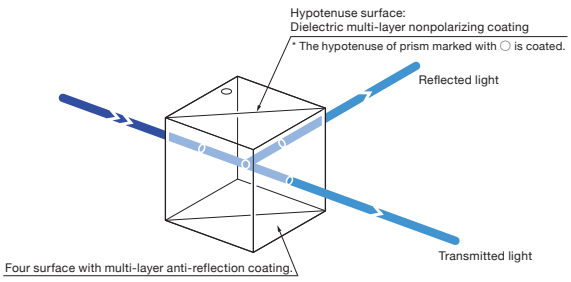
RoHS

This is a half mirror that has an even 1:1 ratio of reflection and transmission in both linear polarized light and normal light source.

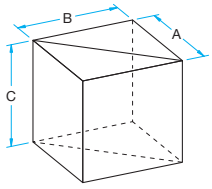
- The reflection to transmission ratio is 1:1 regardless of the polarization condition from the input beam.
- Depending on polarization, the reflection to transmission ratio of these products does not vary.
- The laser line corresponds to various wavelengths.
- Narrowband multi-layer AR coatings are applied to the four surfaces of the cube.
- Because the effective bandwidth of a non-polarizing coat is narrow, these products are designed for a single wavelength.



Schematic



Outline Drawing (in mm)



●Tolerance
A ±0.2
B ±0.2
C ±0.1

Specifications

Material	BK7, Synthetic fused silica
Surface flatness of substrate	λ/4
Beam Deviation	<5′
Coating	Hypotenuse Surface: Dielectric multi-layer nonpolarizing coating Four Surfaces: Multi-layer anti-reflection coating
Incident angle	0°
Divergence ratio (reflectance : transmittance)	1 : 1
Laser Damage Threshold	0.3J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	20–10
Clear aperture	85% of Circle to actual dimension (80% of actual aperture for 5 and 7mm dimension (A=B=C) products.)

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- To produce non-polarizing beam splitter (plate type) is also possible.
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

Attention

- Input beam from the prism side is indicated by a ○.
- Phase retardation of light input will not be preserved. Use a waveplate for phase compensation.
- Wavelength dispersion on transmitted and reflected light derives from refraction index and glass thickness. And also, when diverging or introducing a focusing beam, chromatic aberration or spherical aberration may occur.

266 – 532nm

Part Number	Wavelength Range [nm]	A=B=C [mm]	Material	Transmittance [%]
NPCH-10-2660	266	10	Synthetic fused silica	50±10
NPCH-15-2660	266	15	Synthetic fused silica	50±10
NPCH-20-2660	266	20	Synthetic fused silica	50±10
NPCH-10-3550	355	10	Synthetic fused silica	50±7
NPCH-15-3550	355	15	Synthetic fused silica	50±7
NPCH-20-3550	355	20	Synthetic fused silica	50±7
NPCH-10-4050	405	10	BK7	50±7
NPCH-15-4050	405	15	BK7	50±7
NPCH-20-4050	405	20	BK7	50±7
NPCH-10-4880	488	10	BK7	50±5
NPCH-15-4880	488	15	BK7	50±5
NPCH-20-4880	488	20	BK7	50±5
NPCH-10-5145	514.5	10	BK7	50±5
NPCH-15-5145	514.5	15	BK7	50±5
NPCH-20-5145	514.5	20	BK7	50±5
NPCH-10-5320	532	10	BK7	50±5
NPCH-15-5320	532	15	BK7	50±5
NPCH-20-5320	532	20	BK7	50±5

Compatible Optic Mounts

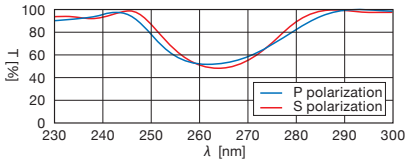
PLH-25, -40 / KKD-25PHRO, -40PHRO

Cube Type: Nonpolarizing 632.8 – 1550nm				
Part Number	Wavelength Range [nm]	A=B=C [mm]	Material	Transmittance [%]
NPCH-05-6328	632.8	5	BK7	50±5
NPCH-10-6328	632.8	10	BK7	50±5
NPCH-15-6328	632.8	15	BK7	50±5
NPCH-20-6328	632.8	20	BK7	50±5
NPCH-10-6700	670	10	BK7	50±5
NPCH-15-6700	670	15	BK7	50±5
NPCH-20-6700	670	20	BK7	50±5
NPCH-10-7800	780	10	BK7	50±5
NPCH-15-7800	780	15	BK7	50±5
NPCH-20-7800	780	20	BK7	50±5
NPCH-10-8300	830	10	BK7	50±5
NPCH-15-8300	830	15	BK7	50±5
NPCH-20-8300	830	20	BK7	50±5
NPCH-10-10640	1064	10	BK7	50±5
NPCH-15-10640	1064	15	BK7	50±5
NPCH-20-10640	1064	20	BK7	50±5
NPCH-10-13000	1300	10	BK7	50±5
NPCH-15-13000	1300	15	BK7	50±5
NPCH-20-13000	1300	20	BK7	50±5
NPCH-10-15500	1550	10	BK7	50±5
NPCH-15-15500	1550	15	BK7	50±5
NPCH-20-15500	1550	20	BK7	50±5

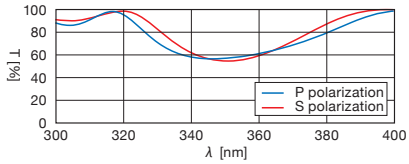
Typical Transmittance Data

T: Transmission

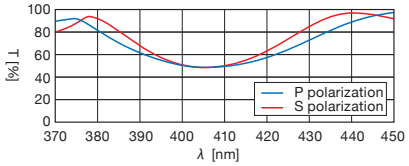
NPCH-2660



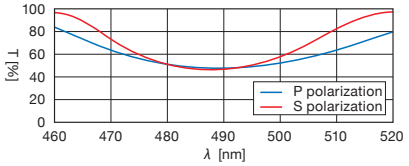
NPCH-3550



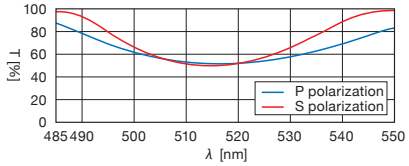
NPCH-4050



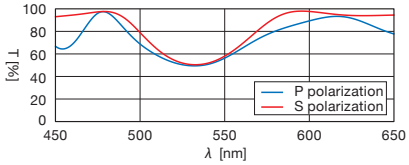
NPCH-4880



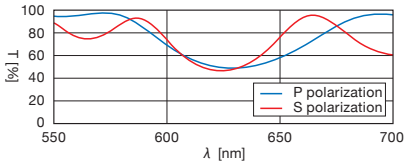
NPCH-5145



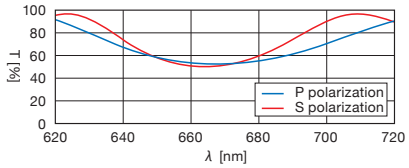
NPCH-5320



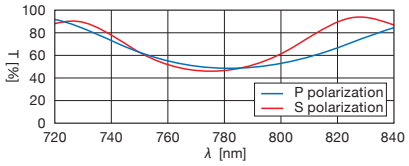
NPCH-6328



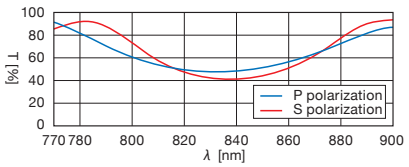
NPCH-6700



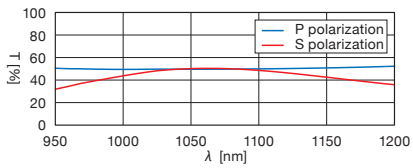
NPCH-7800



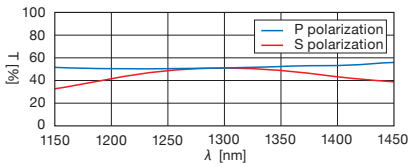
NPCH-8300



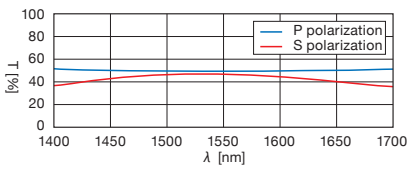
NPCH-10640



NPCH-13000



NPCH-15500

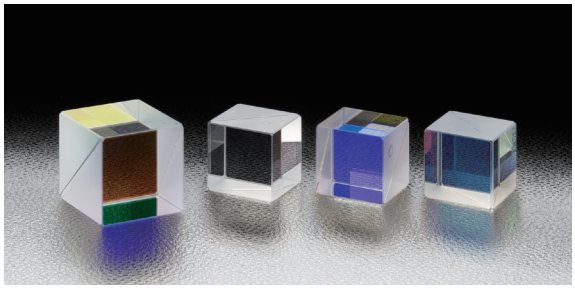


Hybrid Cube Half Mirrors | HBCH

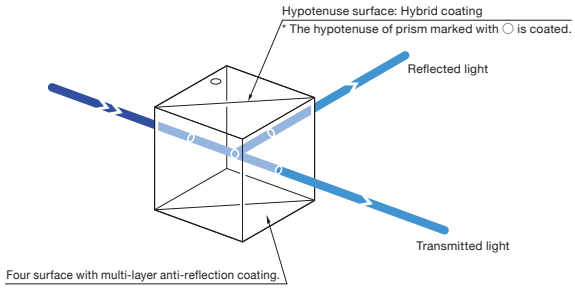
RoHS | Catalog Code W3013

Low polarizing cube half mirrors that can be used for broadband visible and infrared light. Applicable for polarizing systems and lasers with multiple wavelength or visible light.

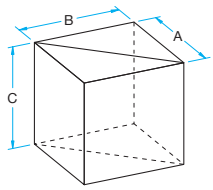
- This hybrid coating is consisting of dielectric multi-layer and metallic coatings. The result is low polarizing and broadband.
- As it is cube shaped, there will not be any lateral shift of the optical axis when a normal incident beam is applied. During transmission and reflection of lights, the aperture remains unchanged.
- Even when the orientation of linear polarization has been changed, beams are equally divided as reflected (R) : transmitted (T) (ratio is 1:1)



Schematic



Outline Drawing (in mm)



●Tolerance
A ±0.2
B ±0.2
C ±0.2

Specifications

Material	BK7
Surface flatness of substrate	λ/4
Beam Deviation	<5′
Coating	Hypotenuse surface: Hybrid coating (dielectric multi-layer coating and metallic coating) Four surfaces: Multi-layer anti-reflection coating
Incident angle	0°
Divergence ratio (reflectance : transmittance)	1 : 1
Laser Damage Threshold	0.3J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	40–20
Clear aperture	85% of actual dimension

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

Attention

- Input beam from the prism side is indicated by a ○. Reflection and refraction over wavelength will differ when light input is applied from the opposite side of the prism.
- Approximately 10% to 15% of absorption occurs in hybrid coating due to the properties in metallic coating. Hence, any additional transmitted or reflected light will not achieve 100%.
- Phase retardation of light input will not be preserved. Use a waveplate for phase compensation.
- Wavelength dispersion on transmitted and reflected light derives from refraction index and glass thickness. And also, when diverging or introducing a focusing beam, chromatic aberration or spherical aberration may occur.

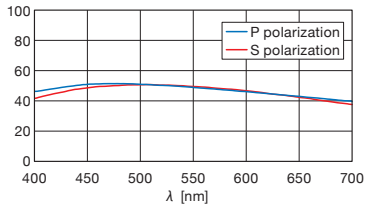
Specifications

Part Number	Wavelength Range [nm]	A=B=C [mm]	Transmittance [%]	Polarization dependency | Tp-Ts | [%]
HBCH-10-550	400 – 700	10	45±10 (550nm)	<10
HBCH-15-550	400 – 700	15	45±10 (550nm)	<10
HBCH-20-550	400 – 700	20	45±10 (550nm)	<10
HBCH-10-NIR	700 – 1100	10	47±10 (900nm)	<20 (<10: 800 – 1100nm)
HBCH-15-NIR	700 – 1100	15	47±10 (900nm)	<20 (<10: 800 – 1100nm)
HBCH-20-NIR	700 – 1100	20	47±10 (900nm)	<20 (<10: 800 – 1100nm)
HBCH-10-IR	1300 – 1550	10	45±10 (1400nm)	<10
HBCH-15-IR	1300 – 1550	15	45±10 (1400nm)	<10
HBCH-20-IR	1300 – 1550	20	45±10 (1400nm)	<10

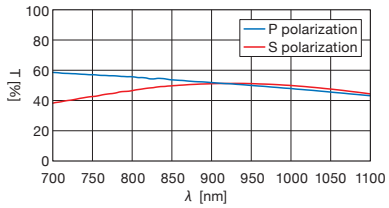
Typical Transmittance Data

T: Transmission

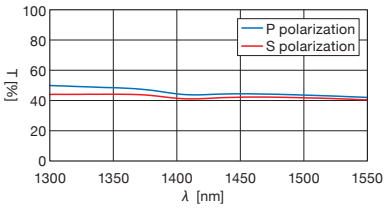
HBCH-550



HBCH-NIR



HBCH-IR

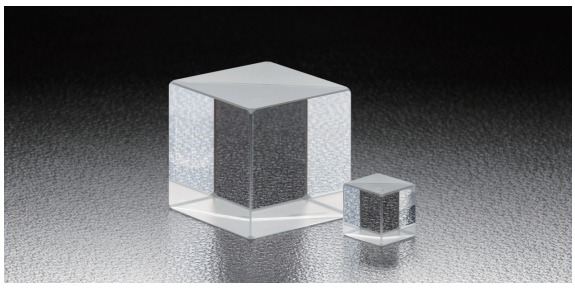


Compatible Optic Mounts

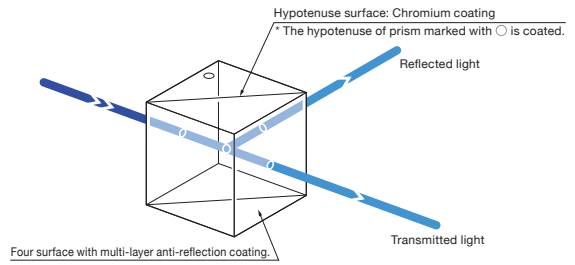
PLH-25, -40 / KKD-25PHRO, -40PHRO

Chromium cube half mirrors consist of two right angle prisms. One of them is coated with chromium (Cr) on the hypotenuse face. Half mirror divides input beam to reflectance and transmittance in 1:1. A beamsplitter of R:T=1:1 is called "Half Mirror".

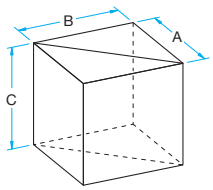
- Four surfaces of the cube are coated with multi-layer anti-reflection coatings
- Approximately one third of the input beam is lost because of absorption of chromium. However these beamsplitters do not depend on wavelength, polarization and incident angle of the input beam, and provide a highly neutral reflectivity.
- For cube beamsplitters, unlike plate beamsplitters, beam deviations at transmission and ghosts rarely occur.



Schematic



Outline Drawing (in mm)



●Tolerance
A ±0.2
B ±0.2
C ±0.1

Specifications

Part Number	Wavelength Range [nm]	A=B=C [mm]
CSCH-10-550	400 – 700	10
CSCH-15-550	400 – 700	15
CSCH-20-550	400 – 700	20
CSCH-25-550	400 – 700	25
CSCH-30-550	400 – 700	30
CSCH-40-550	400 – 700	40
CSCH-50-550	400 – 700	50
CSCH-10-800	750 – 850	10
CSCH-15-800	750 – 850	15
CSCH-20-800	750 – 850	20

Specifications

Material	BK7
Surface flatness of substrate	λ/4
Beam Deviation	<5′
Coating	Hypotenuse surface: Chromium Four surfaces: Multi-layer anti-reflection coating
Incident angle	0°
Transmittance	Average 28±5% (The average value of the P-Polarization and the S-Polarization)
Divergence ratio (reflectance : transmittance)	1 : 1
Laser Damage Threshold	0.3J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	40–20
Clear aperture	85% of actual aperture

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

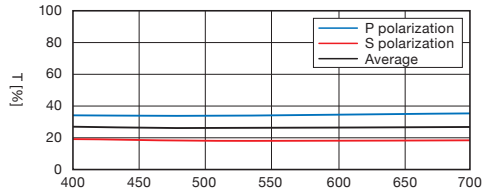
Attention

- Input beam from the prism side is indicated by a ○.
- Phase retardation of light input will not be preserved. Use a waveplate for phase compensation.
- Wavelength dispersion on transmitted and reflected light derives from refraction index and glass thickness. And also, when diverging or introducing a focusing beam, chromatic aberration or spherical aberration may occur.
- The transmittance curves are based on actual measurements and may be different with manufacturing lots.
- 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.

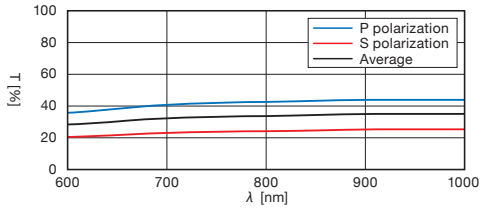
Typical Reflectance Data

T: Transmission

CSCH-550



CSCH-800



Compatible Optic Mounts

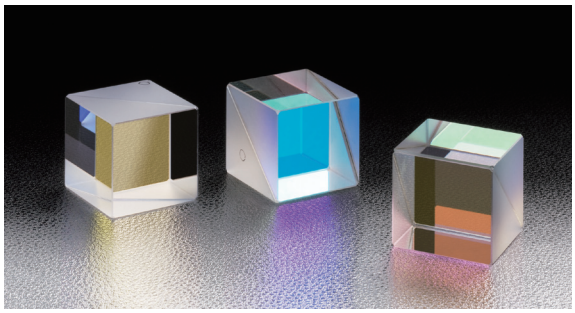
PLH-25, -40 / KKD-25PHRO, -40PHRO

Dielectric Cube Half Mirrors | CSMH

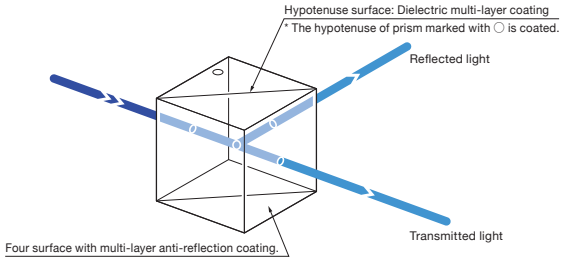
RoHS

Dielectric cube half mirrors consist of two right angle prisms.
One of them is coated with dielectric multi-layer partial reflection coating on the hypotenuse face.

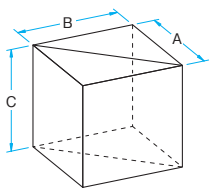
- Half mirror divides input beam to reflectance and transmittance at a 1:1 ratio. A beamsplitter with R:T (1:1 ratio) is called "Half Mirror".
- Four surfaces of the cube are coated with multi-layer anti-reflection coatings.
- The loss of input beam is minimized as there is no absorption from dielectric coating. However the reflection to transmission ratio of these dielectric cube half mirrors vary depending on wavelength, polarization and the incident angle of input beam. These higher refraction harf mirrors show strong dependency.



Schematic



Outline Drawing (in mm)



●Tolerance
A ±0.2
B ±0.2
C ±0.1

Specifications

Material	BK7
Surface flatness of substrate	λ/4
Beam Deviation	<5′
Coating	Hypotenuse surface: Dielectric multi-layer coating Four surfaces: Multi-layer anti-reflection coating
Incident angle	0°
Divergence ratio (reflectance : transmittance)	1 : 1
Polarization of the incident beam	Non-polarized beam 45 degrees direction of lineraly polarization or cirlular polarization
Laser Damage Threshold	0.3J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	20–10
Clear aperture	85% of circle to actual dimension (80% of actual aperture for 5 and 7mm dimension (A=B=C) products.)

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

Attention

- Input beam from the prism side is indicated by a ○. Reflection and refraction over wavelength will differ when light input is applied from the opposite side of the prism.
- The transmittance curves are based on actual measurements and may be different with manufacturing lots.
- 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.

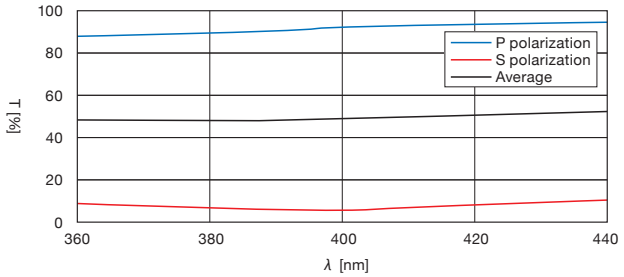
Specifications

Part Number	Wavelength Range [nm]	A=B=C [mm]	Transmittance (The average value of the P-Polarization and the S-Polarization) [%]
CSMH-10-405	390 – 410	10	Average 50±3
CSMH-12.7-405	390 – 410	12.7	Average 50±3
CSMH-15-405	390 – 410	15	Average 50±3
CSMH-20-405	390 – 410	20	Average 50±3
CSMH-25-405	390 – 410	25	Average 50±3
CSMH-30-405	390 – 410	30	Average 50±3
CSMH-05-550	400 – 700	5	Average 50±5
CSMH-07-550	400 – 700	7	Average 50±5
CSMH-10-550	400 – 700	10	Average 50±5
CSMH-12.7-550	400 – 700	12.7	Average 50±5
CSMH-15-550	400 – 700	15	Average 50±5
CSMH-20-550	400 – 700	20	Average 50±5
CSMH-25-550	400 – 700	25	Average 50±5
CSMH-30-550	400 – 700	30	Average 50±5
CSMH-40-550	400 – 700	40	Average 50±5
CSMH-50-550	400 – 700	50	Average 50±5
CSMH-10-800	750 – 850	10	Average 50±5
CSMH-12.7-800	750 – 850	12.7	Average 50±5
CSMH-15-800	750 – 850	15	Average 50±5
CSMH-20-800	750 – 850	20	Average 50±5
CSMH-25-800	750 – 850	25	Average 50±5
CSMH-30-800	750 – 850	30	Average 50±5
CSMH-10-1400	1300 – 1550	10	Average 50±5
CSMH-12.7-1400	1300 – 1550	12.7	Average 50±5
CSMH-20-1400	1300 – 1550	20	Average 50±5

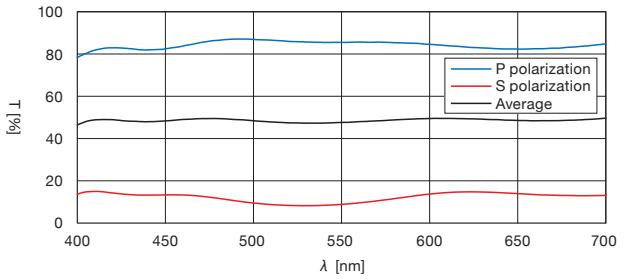
Typical Transmittance Data

T: Transmission

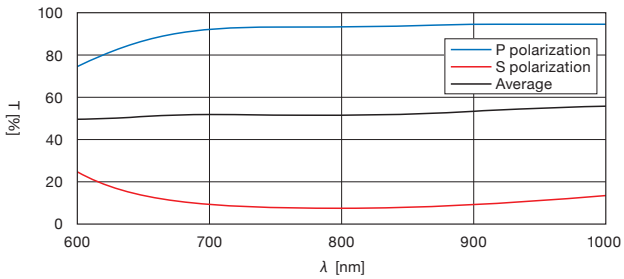
CSMH-405



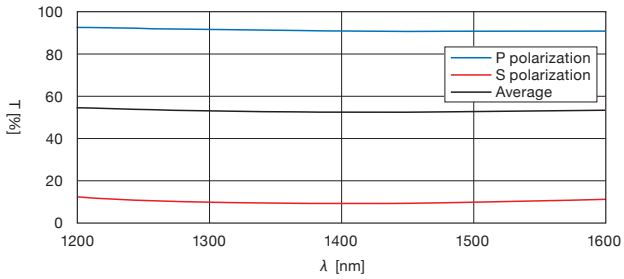
CSMH-550



CSMH-800



CSMH-1400



Compatible Optic Mounts

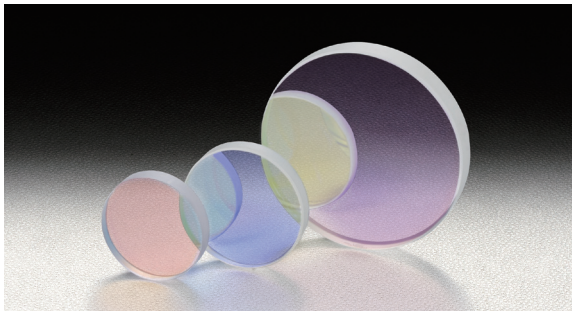
PLH-25, -40 / KKD-25PHRO, -40PHRO, -60PHRO / SHA-60RO

Ultra Broadband Dieletric Half Mirrors | PMH/PSMH

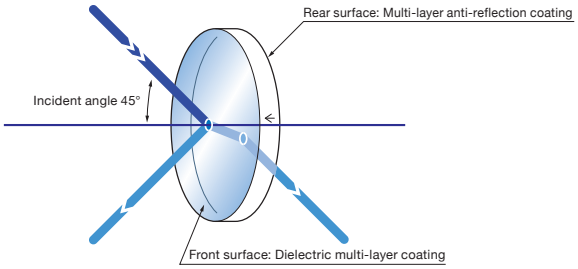
RoHS

**Half-Mirror optics designed for use in Ultraviolet, Visible and Infrared wavelengths.
Used for both transmission and divergence of multi-wavelength laser and white light source.
Ultra broadband half-mirrors are used for spectrometry applications.**

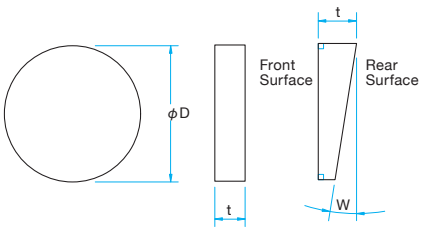
- PMH series have 4 types of ultra-broadband optics with a recovery range from UV to IR.
- PSMH series have 3 types of ultra-broadband optics with a recovery range from Visible to NIR, which are used for optical communication applications.
- Dielectric multi-layer coated optics are an excellent choice for beam deviation applications because of low absorption capabilities.
- Its low polarization characteristic can also be applied in beam deviation with a linear polarization laser or a laser light.
- Sigma Koki produces plate form optics that are light weight and maintain low dispersion with less aberration.
- Both wedge and plate type mirrors are made to have “low ghosting and low interference effect.



Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{0}_{-0.1}$
Thickness t ±0.1

Specifications

Material	BK7, Synthetic fused silica
Surface Flatness	λ/10
Coating	Front surface: Dielectric multi-layer coating Rear surface: Multi-layer anti-reflection coating
Incident angle	45°
Divergence ratio (reflectance : transmittance)	1 : 1
Surface Quality (Scratch–Dig)	10–5
Clear aperture	90% of actual aperture

Guide

- For customization, we can offer different sizes, wavelengths and deviation ratios. Reference B069
  Please contact our International Sales Division.
- For guaranteed higher reflectance accuracy and higher transmittance optics, please contact us.
- An arrow mark will be printed on the thick side of the wedge plate to indicate the surface of the mirror.

Attention

- When applying a laser linear polarized light, the direction of polarization may affect the ratio of reflectance and transmittance. For a rigorous divergence usage of 1:1 ratio, ensure the direction of polarization is set to 45 degrees or use a circular polarizer.
- When a laser light transmits through the optics, the light path may shift by a few millimetres horizontally due to the refraction and the thickness of the wedge plate.
- The transmittance wavelength properties may be different if the incident angle is other than 45 degrees.
- Please check the arrow mark on the side of the wedge plate that indicates the coated surface.
- The phase difference of incident light cannot be preserved on transmittance and reflectance light. Please use a wave plate to compensate.

Ultra broadband

Part Number	Wavelength Range [nm]	Diameter ϕD [mm]	Thickness t [mm]	Material	Parallelism W	Transmittance (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
PMH-25.4C03-10-25/7	250 – 700	ϕ25.4	3	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-30C03-10-25/7	250 – 700	ϕ30	3	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-50C05-10-25/7	250 – 700	ϕ50	5	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-25.4C03-10-3/10	300 – 1000	ϕ25.4	3	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-30C03-10-3/10	300 – 1000	ϕ30	3	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-50C05-10-3/10	300 – 1000	ϕ50	5	Synthetic fused silica	<5″	Average 50±10	0.5
PMH-25.4C03-10-6/18	600 – 1800	ϕ25.4	3	BK7	<5″	Average 50±10	0.5
PMH-30C03-10-6/18	600 – 1800	ϕ30	3	BK7	<5″	Average 50±10	0.5
PMH-50C05-10-6/18	600 – 1800	ϕ50	5	BK7	<5″	Average 50±10	0.5
PMH-25.4C03-10-4/20	400 – 2000	ϕ25.4	3	BK7	<5″	Average 50±10	0.5
PMH-30C03-10-4/20	400 – 2000	ϕ30	3	BK7	<5″	Average 50±10	0.5
PMH-50C05-10-4/20	400 – 2000	ϕ50	5	BK7	<5″	Average 50±10	0.5

* Laser pulse width 10ns, repetition frequency 20Hz

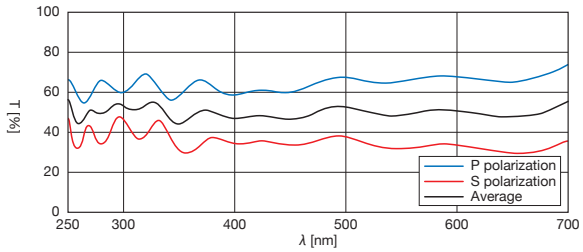
Compatible Optic Mounts

BHAN-30S, -50S / MHG-HS25-NL, MP30-NL, MP50-NL

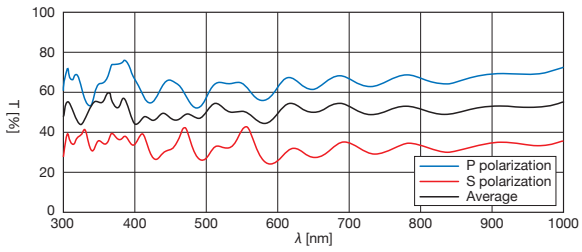
Typical Transmittance Data

T: Transmission

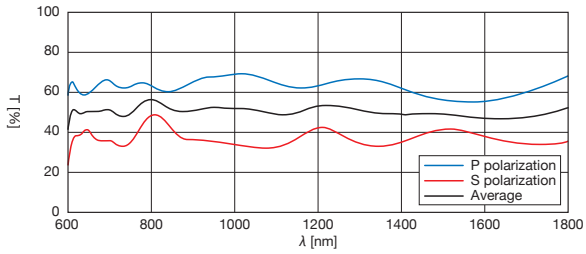
PMH-25/7



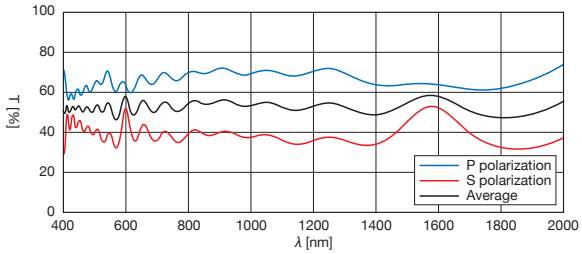
PMH-3/10



PMH-6/18



PMH-4/20



Broadband

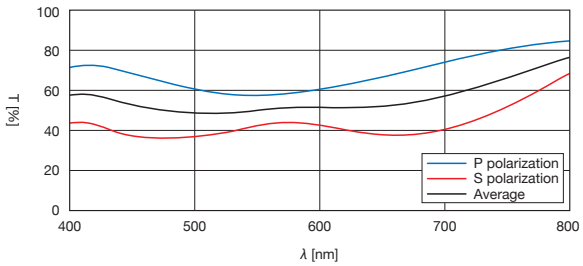
Part Number	Wavelength Range [nm]	Diameter ϕD [mm]	Thickness t [mm]	Material	Parallelism W	Transmittance (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
PSMH-25.4C03-10-550	400 – 700	ϕ25.4	3	BK7	<5″	Avarage 50±5	2.1
PSMH-30C03-10-550	400 – 700	ϕ30	3	BK7	<5″	Avarage 50±5	2.1
PSMH-30C05-10W-550	400 – 700	ϕ30	5	BK7	1°±5′	Avarage 50±5	2.1
PSMH-40C04-10-550	400 – 700	ϕ40	4	BK7	<5″	Avarage 50±5	2.1
PSMH-50C05-10-550	400 – 700	ϕ50	5	BK7	<5″	Avarage 50±5	2.1
PSMH-50C08-10W-550	400 – 700	ϕ50	8	BK7	1°±5′	Avarage 50±5	2.1
PSMH-30C03-10-800	700 – 900	ϕ30	3	BK7	<5″	50±3 (800nm)	2.1
PSMH-30C05-10W-800	700 – 900	ϕ30	5	BK7	1°±5′	50±3 (800nm)	2.1
PSMH-50C05-10-800	700 – 900	ϕ50	5	BK7	<5″	50±3 (800nm)	2.1
PSMH-50C08-10W-800	700 – 900	ϕ50	8	BK7	1°±5′	50±3 (800nm)	2.1
PSMH-30C03-10-1400	1300 – 1550	ϕ30	3	BK7	<5″	50±3 (1400nm)	2.1
PSMH-30C05-10W-1400	1300 – 1550	ϕ30	5	BK7	1°±5′	50±3 (1400nm)	2.1

* Laser pulse width 10ns, repetition frequency 20Hz

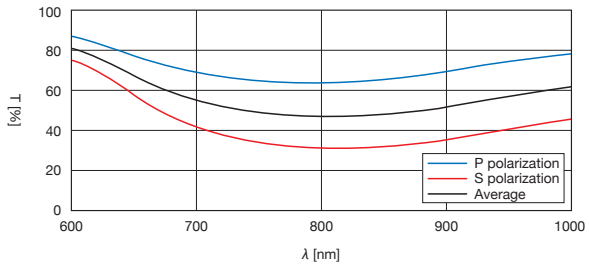
Typical Transmittance Data

T: Transmission

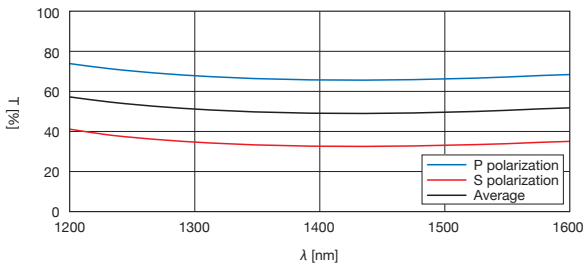
PSMH-550



PSMH-800



PSMH-1400

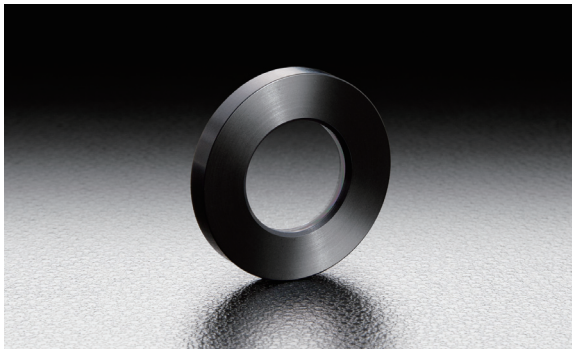


Thin Plate Beamsplitter | MPSMH

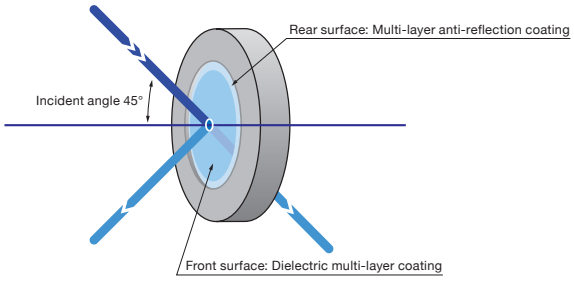
RoHS Catalog Code W3017

Extremely thin beamsplitter.
It can be inserted into an optical light path without any beam shift or chromatic dispersion for any light transmittance application.

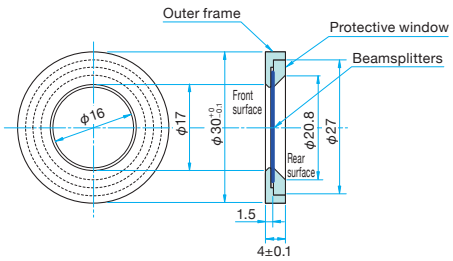
- 2 choices of thickness, 300um and 90um.
- Dielectric multi-layer optical coating with reflectance and transmittance ratios at 1:1
- Dielectric multi-layer optical coating on the surface and AR coating on the rear to provide a mirror with no loss of power.
- The plate if firmly held by a glass retainer to avoid thermal expansion.
- Because of our fabrication method, it offers good durability and high resistance against vibration and with our traditional and proven optical polishing process on silica quartz which is different from a pellicle.



Schematic



Outline Drawing (in mm)



Specifications

Material	Synthetic fused silica
Coating	Front surface: Dielectric multi-layer coating Rear surface (45 degrees taper hole): Multi-layer anti-reflection coating
Incident angle	45°
Transmittance	Average 50±5% (The average value of the P-Polarization and the S-Polarization)
Divergence ratio (reflectance : transmittance)	1 : 1
Surface Quality (Scratch–Dig)	40–20
Clear aperture	φ10mm
Material propreties	Protective window: Synthetic fused silica Outer frame: Aluminum Finishing: Matt black almite

Guide

- For customization, we can offer different sizes, wavelengths and deviation ratios. Reference B069
  Please contact our International Sales Division.

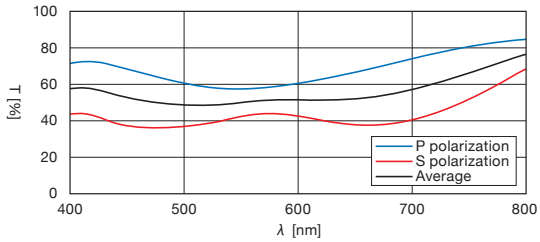
Attention

- Thin beamsplitters are extremely thin and fragile. Special care must be taken during cleaning and handling.
- When removing dust from the surface, do not use optics tissue paper to clean. Use a compress gas spray instead.
- When applying a laser linear polarized light, the direction of polarization may affect the ratio of reflectance and transmittance. For a rigorous divergence usage of 1:1 ratio, ensure the direction of polarization is set to 45 degrees or use a circular polarizer.
- The transmittance wavelength properties may be different if the incident angle is other than 45 degrees.
- Avoid pushing the glass retainer as the mirror can bend or break. When handling, please use the other metal frame.
- The surface reflectance accuracy may deteriorate when used outside recommended operating temperature.
- The phase difference of incident light cannot be preserved on transmittance and reflectance light. Please use a wave plate to compensate.

Specifications

Part Number	Wavelength Range [nm]	Optics Thickness [mm]	Surface Accuracy after coating
MPSMH-30C0.3-1-550	400 – 700	0.3±0.03	Reflectance: λ Transmittance: λ
MPSMH-30C0.09-1-550	400 – 700	0.09±0.01	Reflectance: Polishing Transmittance: Polishing

Typical Transmittance Data T: Transmission



Compatible Optic Mounts

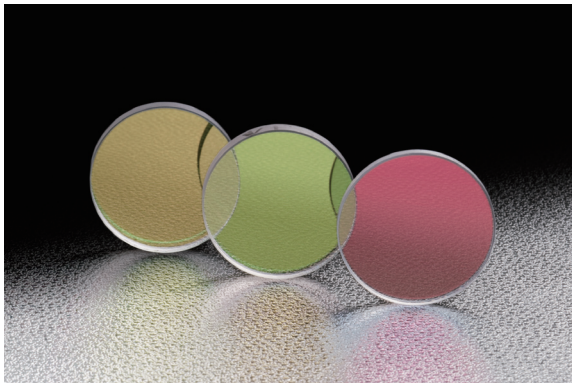
MHG-HS30-NL / BHAN-30S

Laser Line Plate Half Mirrors | PSMH

RoHS | Catalog Code W3018

**Laser line plate mirrors are part of plate beamsplitters that are optically coated with dielectric multi-layer on the front surface of optical parallels or wedged substrates.
The rear surface is coated with multi-layer anti-reflection.**

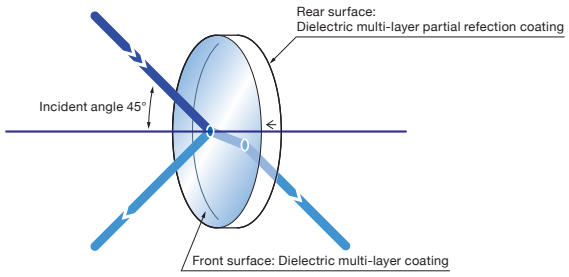
- Half mirror divides input beam to reflectance and transmittance in 1:1. A beamsplitter of R:T=1:1 is called “Half Mirror”.
- Any loss from the input beams on this product is minimized because dielectric coating has no absorption properties. However, the input ratio of reflection to transmission depends on wavelength, polarization and incident of angle of input beam.
- Plate beamsplitters have beam deviations on transmission and ghost on rear surface reflections. Wedged substrates are used to prevent ghost.



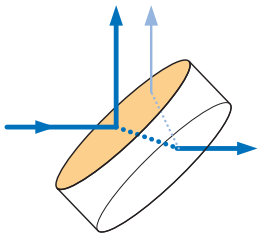
Specifications

Material	BK7, Synthetic fused silica, CaF_2
Surface Flatness	λ/10 (PSMH-157 is Polished)
Coating	Front surface: Dielectric multi-layer partial refection coating Rear surface: Multi-layer anti-reflection coating
Incident angle	45°
Divergence ratio (reflectance : transmittance)	1 : 1
Surface Quality (Scratch–Dig)	10–5 (PSMH-157: 40–20)
Clear aperture	90% of actual aperture

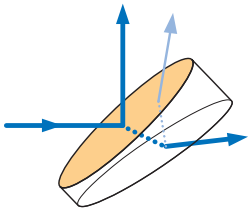
Schematic



Optical Parallel



Wedged Substrate



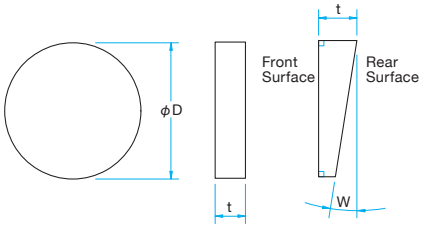
Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- We also have ultra-wideband, broadband and cube types.
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.
- On most thickness surfaces, there is a thickness direction arrow marked for wedged types.

Attention

- Should these products do not function as a half mirror, please check the polarization characteristics of the light source. Do note that LD laser is linear in polarization.
- The beam deviation at transmission of a wedged beamsplitter is large compared to a one made of optical parallel.
- The amount of beam deviation of a beamsplitter depends on the thickness of the substrate and the wavelength or the incident angle of the input beam.
- Transmission curves are based on actual measurements and may be different with manufacturing lots.
- Surface flatness is the reflected wavefront distortion of the surface prior to coating.

Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{+0}_{-0.1}$
Thickness t ±0.1

Compatible Optic Mounts

BHAN-30S, -50S / MHG-MP30-NL, MP50-NL

Laser Line Plate Half Mirrors | PSMH

Catalog Code W3018

Laser Line

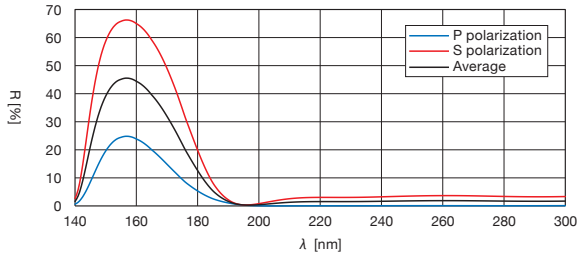
Part Number	Wavelength Range [nm]	Diameter ϕD [mm]	Thickness t [mm]	Material	Parallelism W	Reflectance:R Transmittance:T (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
PSMH-30C03-P-157	157	ϕ30	3	CaF_2	<3′	R=40±10	0.5
PSMH-50C05-P-157	157	ϕ50	5	CaF_2	<3′	R=40±10	0.5
PSMH-30C03-10-193	193	ϕ30	3	Synthetic fused silica	<5″	T=45±5	1
PSMH-30C05-10W-193	193	ϕ30	5	Synthetic fused silica	1°±5′	T=45±5	1
PSMH-50C05-10-193	193	ϕ50	5	Synthetic fused silica	<5″	T=45±5	1
PSMH-50C08-10W-193	193	ϕ50	8	Synthetic fused silica	1°±5′	T=45±5	1
PSMH-30C03-10-248/266	248 – 266	ϕ30	3	Synthetic fused silica	<5″	T=50±3	2
PSMH-30C05-10W-248/266	248 – 266	ϕ30	5	Synthetic fused silica	1°±5′	T=50±3	2
PSMH-50C05-10-248/266	248 – 266	ϕ50	5	Synthetic fused silica	<5″	T=50±3	2
PSMH-50C08-10W-248/266	248 – 266	ϕ50	8	Synthetic fused silica	1°±5′	T=50±3	2
PSMH-30C03-10-308/355	308 – 355	ϕ30	3	Synthetic fused silica	<5″	T= Average 50±5	2
PSMH-30C05-10W-308/355	308 – 355	ϕ30	5	Synthetic fused silica	1°±5′	T= Average 50±5	2
PSMH-50C05-10-308/355	308 – 355	ϕ50	5	Synthetic fused silica	<5″	T= Average 50±5	2
PSMH-50C08-10W-308/355	308 – 355	ϕ50	8	Synthetic fused silica	1°±5′	T= Average 50±5	2
PSMH-30C03-10-405	390 – 410	ϕ30	3	BK7	<5″	T=50±3	2.1
PSMH-30C05-10W-405	390 – 410	ϕ30	5	BK7	1°±5′	T=50±3	2.1
PSMH-50C05-10-405	390 – 410	ϕ50	5	BK7	<5″	T=50±3	2.1
PSMH-50C08-10W-405	390 – 410	ϕ50	8	BK7	1°±5′	T=50±3	2.1
PSMH-30C03-10-1064	1064	ϕ30	3	BK7	<5″	T=50±3	20
PSMH-30C05-10W-1064	1064	ϕ30	5	BK7	1°±5′	T=50±3	20
PSMH-50C05-10-1064	1064	ϕ50	5	BK7	<5″	T=50±3	20
PSMH-50C08-10W-1064	1064	ϕ50	8	BK7	1°±5′	T=50±3	20

*Laser pulse width 10ns (PSMH-157: 20ns), repetition frequency 20Hz

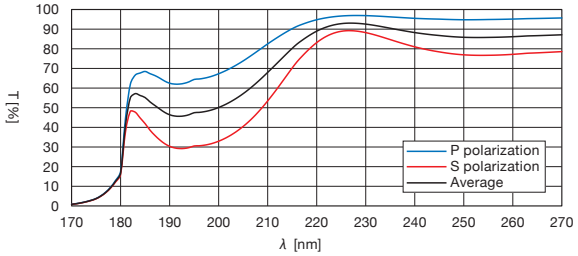
Typical Reflectance Data & Typical Transmittance Data

R: Reflectance T: Transmission

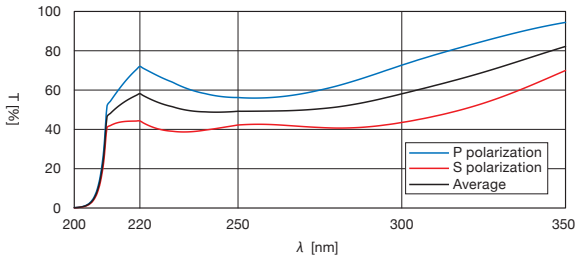
PSMH-157



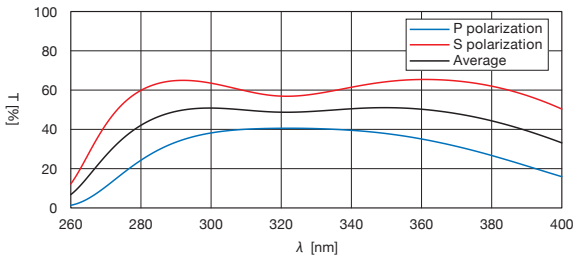
PSMH-193



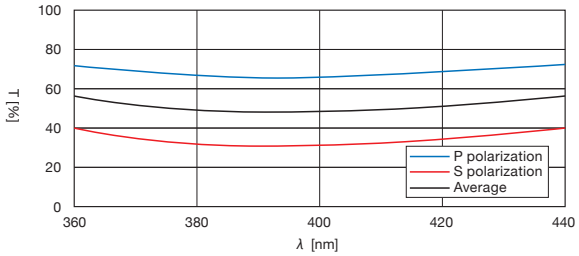
PSMH-248/266



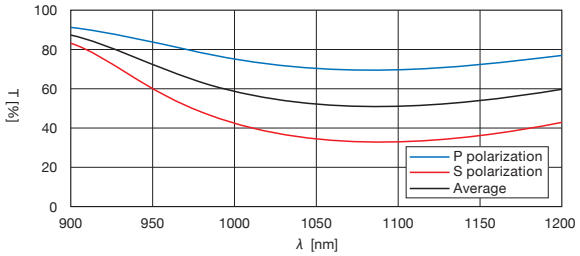
PSMH-308/355



PSMH-405



PSMH-1064

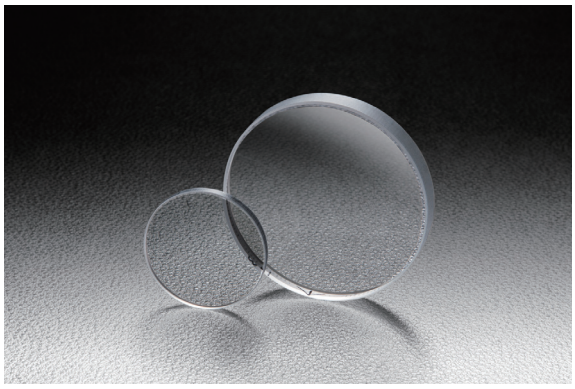


Chromium Plate Half Mirrors | PSCH

RoHS Catalog Code W3019

**Chromium plate half mirrors are part of plate beamsplitters that are coated with chromium (Cr) on the front surface of optical parallels or wedged substrates.
The rear surface is coated with multi-layer anti-reflection.**

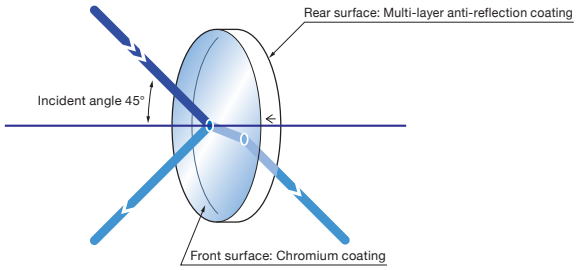
- Half mirror divides input beam to reflectance and transmittance in 1:1. A beamsplitter of R:T=1:1 is called “Half Mirror”.
- Approximately one third of the input beam is lost because of absorption of chromium. However these beamsplitters do not depend on wavelength, polarization and incident angle of the input beam, and provide a highly neutral reflectivity.
- Plate beamsplitters have beam deviations on transmission and ghost on rear surface reflections. Wedged substrates are used to prevent ghost.



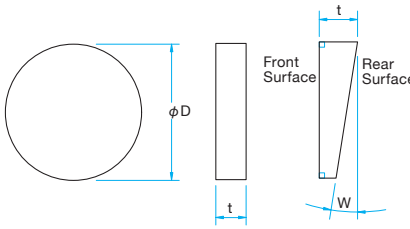
Specifications

Material	BK7
Surface Flatness	λ/10
Coating	Front surface: Chromium Rear surface: Multi-layer anti-reflection coating
Incident angle	45°
Transmittance	Average 30±5% (The average value of the P-Polarization and the S-Polarization)
Divergence ratio (reflectance : transmittance)	1 : 1
Laser Damage Threshold	0.25J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	40–20
Clear aperture	90% of actual aperture

Schematic



Outline Drawing (in mm)



●Tolerance
≦ϕ50
Diameter $\phi D^{+0}_{-0.1}$
Thickness t ±0.1
●Tolerance
ϕ60≦
Diameter $\phi D^{+0}_{-0.2}$
Thickness t ±0.2

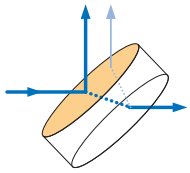
Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

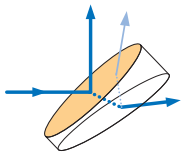
Attention

- The beam deviation at transmission of a wedged beamsplitter is large compared to a one made of optical parallel.
- The amount of beam deviation of a beamsplitter depends on the thickness of the substrate and the wavelength or the incident angle of the input beam.
- Transmission curves are based on actual measurements and may be different with manufacturing lots.
- Surface flatness is the reflected wavefront distortion of the surface prior to coating.
- Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

Optical Parallel



Wedged Substrate



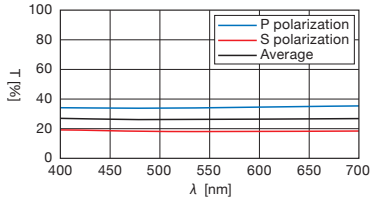
Specifications

Part Number	Wavelength Range [nm]	Diameter ϕD [mm]	Thickness t [mm]	Parallelism W
PSCH-25.4C03-10-550	400 – 700	ϕ25.4	3	<5″
PSCH-30C03-10-550	400 – 700	ϕ30	3	<5″
PSCH-30C05-10W-550	400 – 700	ϕ30	5	1°±5′
PSCH-40C04-10-550	400 – 700	ϕ40	4	<5″
PSCH-50C05-10-550	400 – 700	ϕ50	5	<5″
PSCH-50C08-10W-550	400 – 700	ϕ50	8	1°±5′
PSCH-60C06-10-550	400 – 700	ϕ60	6	<5″
PSCH-100C10-10-550	400 – 700	ϕ100	10	<5″
PSCH-100C15-10W-550	400 – 700	ϕ100	15	1°±5′
PSCH-25.4C03-10-800	750 – 850	ϕ25.4	3	<5″
PSCH-30C03-10-800	750 – 850	ϕ30	3	<5″
PSCH-30C05-10W-800	750 – 850	ϕ30	5	1°±5′
PSCH-50C05-10-800	750 – 850	ϕ50	5	<5″
PSCH-50C08-10W-800	750 – 850	ϕ50	8	1°±5′

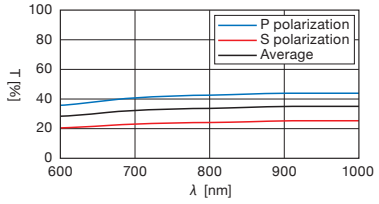
Typical Transmittance Data

T: Transmission

PSCH-550



PSCH-800



Compatible Optic Mounts

BHAN-30S, -50S / MHAN-25.4S, -40S, -60S / MHG-MP25-NL, MP30-NL, MP50-NL

About light behaviour on a beamsplitter

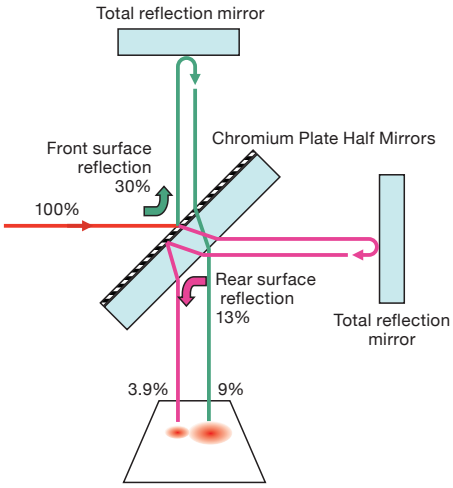
A half mirror is designed with reflectance and transmission of light with a 1:1 ratio. If light incident direction and polarization conditions change, it may impact the ratio.

Reflectance and transmittance properties of the incident light direction

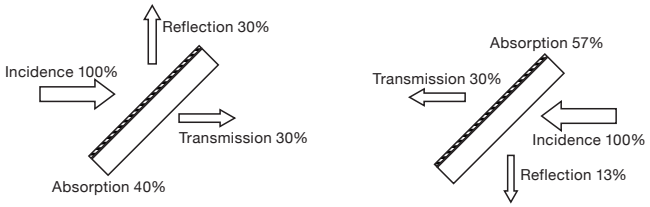
Chrome coating and multi-wavelength coating application.

Reflection properties change when light is projected onto the coated and black surfaces.
Any configuration similar to Michelson interferometer may require both sides to have incident light. In this case, light ratios may be unbalanced.

Choose the following set up if the light incident direction can be selected.
Incident light onto the coated surface of plate type beamsplitter.
Incident light onto the ○ mark surface for cube type beamsplitter.
If the Incident light is on the wrong surface, the specifications mentioned in the catalogue cannot be realized.



Comparison reflectance and transmittance properties of the incident light direction in the chromium plate half mirror.



The difference in reflectance due to the incident direction occurs when there is absorption in the coating.
It does not occur in the dielectric multilayer coating.

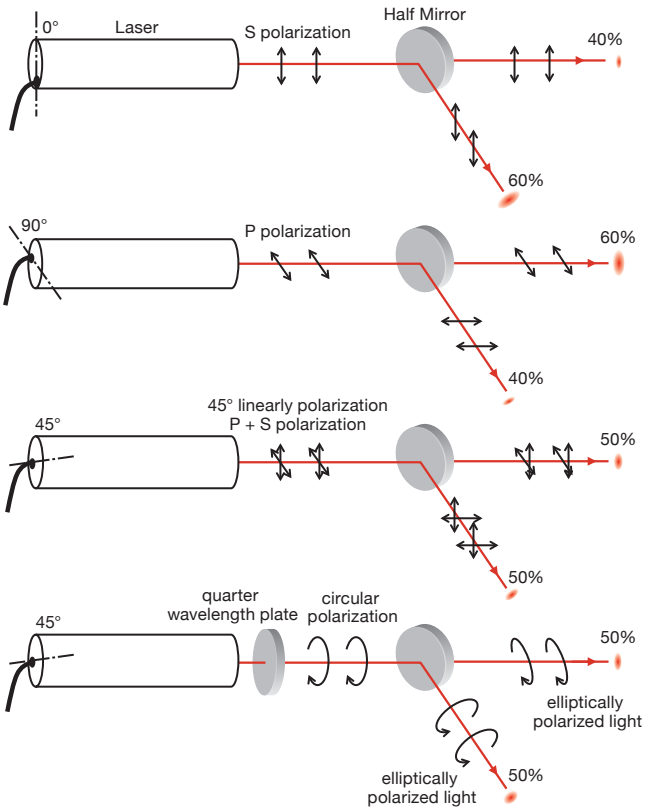
Large value ← Difference in reflectance due to the incident direction → Small value

Chromium Plate **PSCH**	Hybrid Cube **HBCH**	Laser Line Plate **PSMH**	Chromium Cube・Dielectric Cube **CSCH** **CSMH** etc

The reflectance and the transmittance of a polarized light incident

In case fo using Laser

Light emitted from the laser is linearly polarized light. Because of this, even though it is used in the experiments and the optical system which are not related to the polarization, it is necessary to take into account the polarization characteristics of the beam splitter.
The transmittance and the reflectance may change in accordance with the type of beamsplitter and its polarization direction.
To split the light into a balanced light ratio, a non-polarized beam splitter (NPCH) is recommanded.
The polarization properties of the laser has no influence to it.

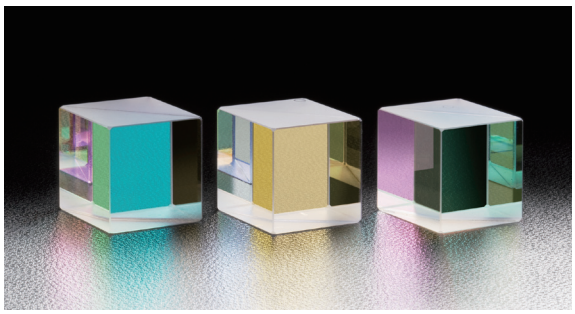


Dielectric Cube Beamsplitters | CSM

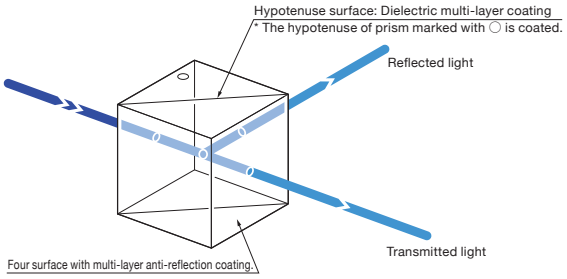
RoHS Catalog Code W3020

Cube beamsplitters with dielectric multi-layer coated to the oblique faces of a 45° right angle prism. Divides beams at reflected light (R) : transmission light (T) ratio of 1:2 or 1:3.

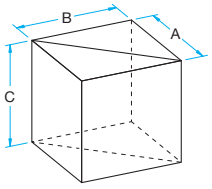
- Anti-reflection coating (AR coat) is applied to the incident and outgoing planes.
- The dielectric multi-layer coating has virtually zero light absorption and very low light intensity loss. However, transmittance and reflectance may change according to wavelength, polarization and incident angles. A higher reflectance will occur from a higher dependence.
- In contrast to plate type half mirrors, cube mirrors have no ghosting or transmission optical path deviation.



Schematic



Outline Drawing (in mm)



●Tolerance
A ±0.2
B ±0.2
C ±0.1

Specifications

Material	BK7
Surface Flatness	λ/4
Wavelength Range	400 – 700nm
Beam Deviation	<5′
Coating	Hypotenuse surface: Dielectric multi-layer coating Four surfaces: Multi-layer anti-reflection coating
Incident angle	0°
Polarization of the incident beam	Non-polarized beam 45 degrees direction of lineraly polarization or cirlular polarization
Laser Damage Threshold	0.3J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	20–10
Clear aperture	85% of actual aperture

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

Attention

- Introduce light (from or to) the prism on the side indicated by ○ (half coated side).
- The transmission curve on the graph is based on actual measurements and may vary from different production lots.
- Phase retardation of inputting light will not be preserved. Use waveplate for phase compensation.
- Use only non-polarized light or circular polarized light as incident light for dielectric multi-layer coated beam splitters. Using polarized light may result in division ratios that vary according to polarization components.

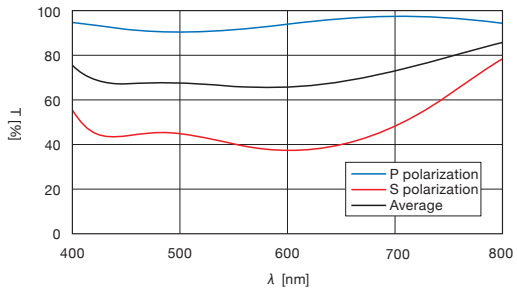
Specifications

Part Number	Reflectance : Transmittance	A=B=C [mm]	Transmittance at 550nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 400·700nm (The average value of the P-Polarization and the S-Polarization) [%]
CSM33-10-550	1 : 2	10	67±5	<80
CSM33-20-550	1 : 2	20	67±5	<80
CSM25-10-550	1 : 3	10	75±5	<90
CSM25-20-550	1 : 3	20	75±5	<90

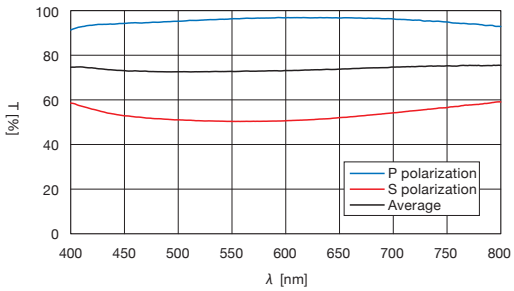
Typical Transmittance Data

T: Transmission

CSM33



CSM25

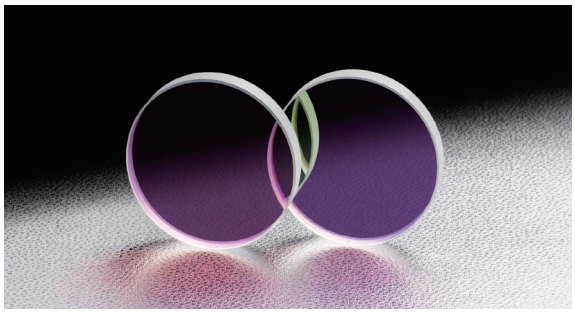


Compatible Optic Mounts

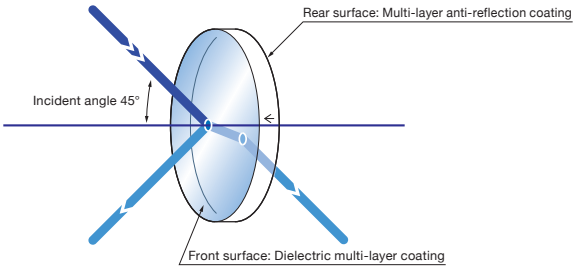
PLH-25, -40 / KKD-25PHRO, -40PHRO

Plate-type beam splitters with a dielectric multi-layer coat on a parallel plate and a wedge substrate.
Divides beams at a reflected light (R) : transmission light (T) ratio of 1:2 or 1:3
The rear surface is coated with anti-reflection (AR).

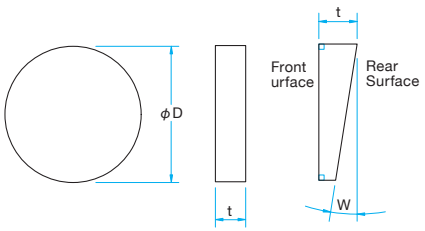
- The dielectric multi-layer coating has virtually zero light absorption and very low light intensity loss. However, transmittance and reflectance may change according to wavelength, polarization and incident angles. A higher reflectance will occur from a higher dependence. Some deviation of the transmission optical path or ghosting may occur. To prevent ghosting, use wedge substrate type of beam splitters.



Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{0}_{-0.1}$
Thickness t ±0.1

Specifications

Material	BK7
Surface Flatness	λ/10
Coating	Front surface: Dielectric multi-layer coating Rear surface: Multi-layer anti-reflection coating
Wavelength Range	400 – 700nm
Incident angle	45°
Laser Damage Threshold	2.1J/cm^2 (Laser pulse width 10ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	10–5
Clear aperture	90% of actual aperture

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.
- Wedge type substrates have a thickness direction arrow that is marked on most surfaces.

Attention

- The transmission curve on the graph is based on actual measurements and may vary from different production lots.
- Surface flatness is the reflected wavefront distortion of the surface prior to coating.
- Compared to precision parallel plate type splitters, wedged substrate type beam splitters can prevent ghosting caused by rear surface reflection and significantly increase the displacement of the optical path.
- Dielectric multi-layer coated beam splitters sometimes do not function effectively in specified division ratios. During such case, first check the polarization characteristics of the light source (laser). Do keep in mind that lasers used for the semiconductor field emit a linear polarized light.

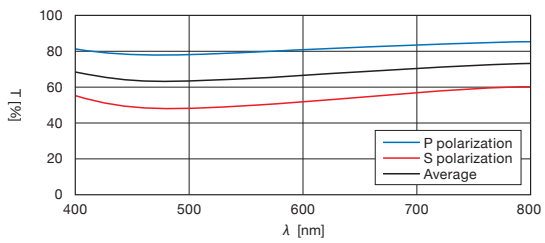
Specifications

Part Number	Reflectance : Transmittance	Diameter ϕD [mm]	Thickness t [mm]	Parallelism W	Transmittance at 550nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 400-700nm (The average value of the P-Polarization and the S-Polarization) [%]
PSM33-25.4C03-10-550	1 : 2	ϕ25.4	3	<5″	67±3	<80
PSM33-30C03-10-550	1 : 2	ϕ30	3	<5″	67±3	<80
PSM33-30C05-10W-550	1 : 2	ϕ30	5	1°±5′	67±3	<80
PSM25-25.4C05-10-550	1 : 3	ϕ25.4	3	<5″	75±3	<90
PSM25-30C03-10-550	1 : 3	ϕ30	3	<5″	75±3	<90
PSM25-30C05-10W-550	1 : 3	ϕ30	5	1°±5′	75±3	<90

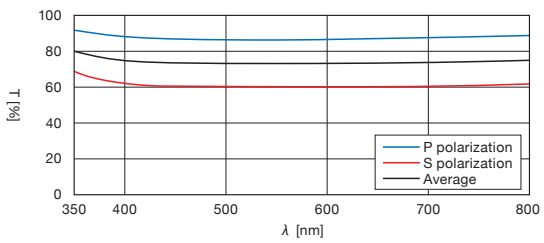
Typical Transmittance Data

T: Transmission

PSM33



PSM25



Compatible Optic Mounts

BHAN-30S / MHAN-25.4DS / MHG-MP25-NL, MP30-NL

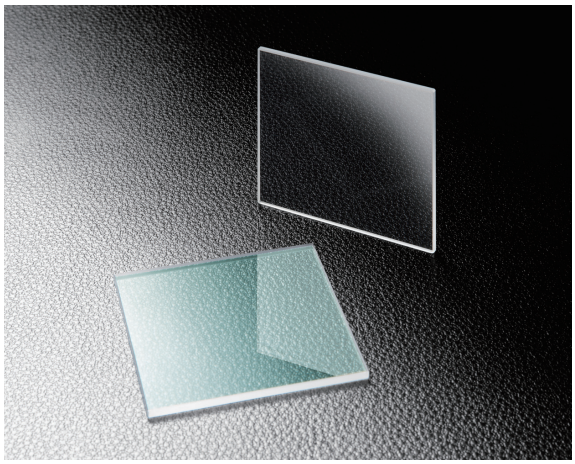
Variable Beamsplitter Light path corrector

VBS
WSQNA/WBNA

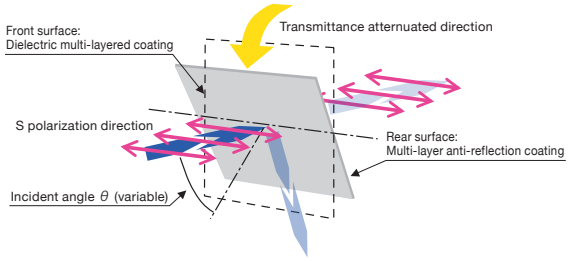
RoHS
RoHS

With a variable beam splitter, the incident angle of a laser can be changed. The (R:T) ratios can also be modified. This is commonly used for when adjusting the light quantity for the laser without a variable adjustment of the light quantity or the laser to be stabilized, when weakening the light quantity temporarily by adjusting the optical system, and when splitting to any two light quantity.

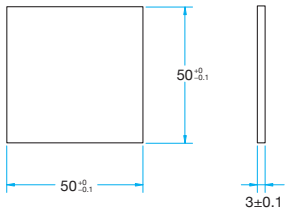
- Since it is used a dielectric multilayer coating, it is excellent in durability and light resistance.
- The beam shift caused by the tilt of the beam splitter can be removed by using with a correcting plate. (See how to use)
- It can be used for arbitrary polarization. However, the transmittance characteristic depends on the polarization state.



Schematic



Outline Drawing (in mm)



Specifications

Material	BK7, Synthetic fused silica
Surface Flatness	λ
Parallelism	<5″
Coating	VBS Front surface: Dielectric multi-layer Coating Rear surface: Multi-layer anti-reflection coating WBMA, WSQMA Both surfaces: Multi-layer anti-reflection coating
Surface Quality (Scratch–Dig)	10–5
Clear aperture	Circle that internally connected to 90% of the side length
Effective beam incident diameter	Ellipsoidal 30×43mm (Angle of inclinaison)

Guide

- Different size, wavelength and deviation ratio are not mentioned in this catalog but available as custom product upon on request.
  Reference B069
- We offer the most comprehensive range of beam splitter holder and stages to choose from. Let us know the angle of your choice.
- This variable attenuator (model SHPS) can be used as a system and is available from this catalogue page.

Attention

- When using with high power laser, make sure to execute at the end edge of the reflected light.
- The reflectance properties of the optics may change in a high temperature environment.
- When adjusting the transmittance, the incident angle may change and cause the light path to shift. To correct this, please use the light path corrector (model WSQNA/WBNA)
- For a large beam size at dia 30mm or more and used it at a high inclinaison level, the beam can be cut at the reflected area.
- For “P” polarization use, make sure that the incident angle is at 45 degrees or more.

Variable beamsplitter

Part Number	Wavelength Range [nm]	Transmittance of S polarization (θ=0°) [%]	Transmittance of S polarization (θ=45°) [%]	Material	Laser Damage Threshold* [J/cm²]
VBS-50S03-1-266	266	>90	<5	Synthetic fused silica	1
VBS-50S03-1-355	355	>93	<5	Synthetic fused silica	1
VBS-50S03-1-532	532	>95	<5	BK7	2.5
VBS-50S03-1-1064	1064	>95	<5	BK7	3.5

* Laser pulse width 10ns, repetition frequency 20Hz

Light path corrector

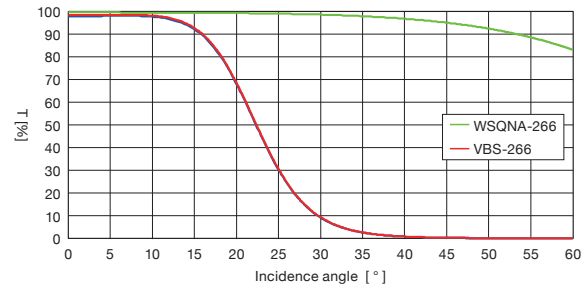
Part Number	Wavelength Range [nm]	Transmittance of S polarization (θ=0° – 45°) [%]	Material	Laser Damage Threshold* [J/cm²]
WSQNA-50S03-1-266-0/45D	266	Average 97	Synthetic fused silica	1
WSQNA-50S03-1-355-0/45D	355	Average 97	Synthetic fused silica	1
WBNA-50S03-1-532-0/45D	532	Average 98	BK7	2.5
WBNA-50S03-1-1064-0/45D	1064	Average 98	BK7	3.5

* Laser pulse width 10ns, repetition frequency 20Hz

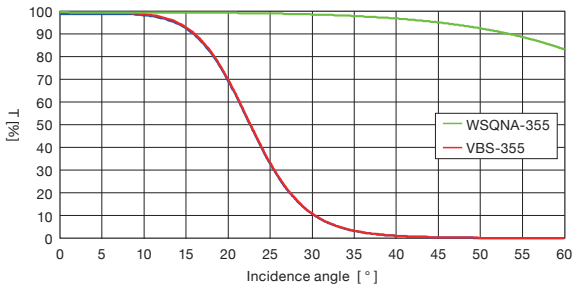
Typical Transmittance Data

T: Transmission (S polarization)

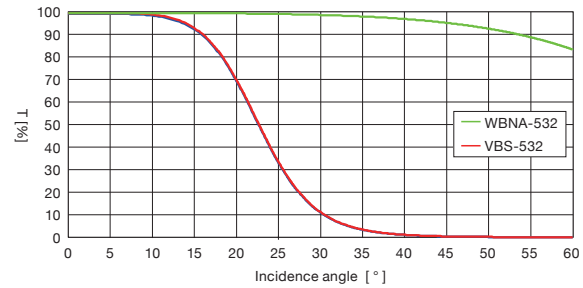
VBS-266 / WSQNA-266



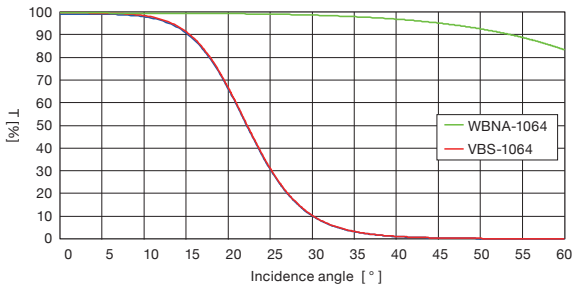
VBS-355 / WSQNA-355



VBS-532 / WBNA-532



VBS-1064 / WBNA-1064

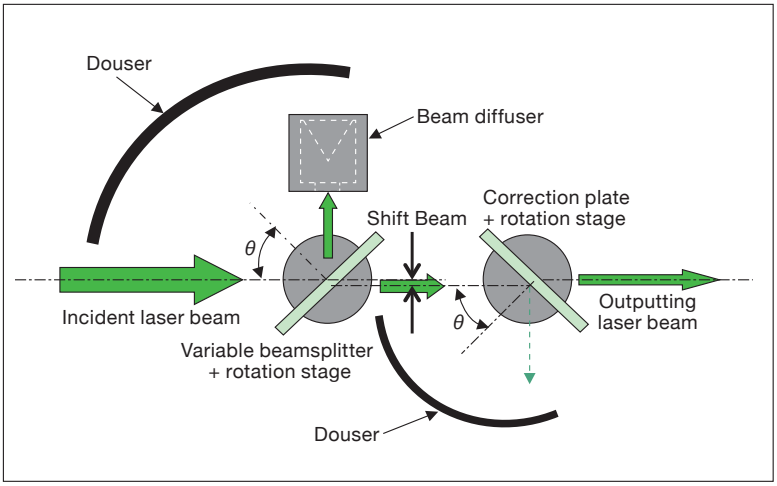


Sample of use

The variable beam splitter can be used individually. When modifying the incident angle, optics thickness and its refractive properties, a shift may occur in the light path. To reduce this shift, we highly recommend a light path corrector. Please see image below.

- Place the variable beamsplitter onto a rotation stage to allow an angle adjustment.
- Install the light path corrector onto a rotating stage.
- Position the light path corrector at a similar angle with the variable beamsplitter on an opposite side.
- If the reflected light of the variable beamsplitter is not used, make sure to place a light cut-off material or a beam diffuser at the edge-end of the light.
- The power of the reflected light from the light path corrector must be cut off at the edge-end of the light.

For part structure, please contact our International Sales Division.



Compatible Optic Mounts

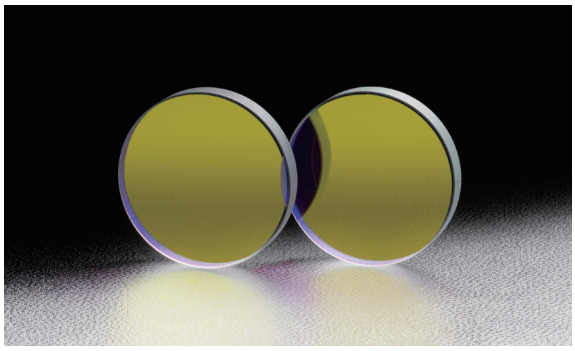
CHA-60, -60F

Harmonic Separators | YHS

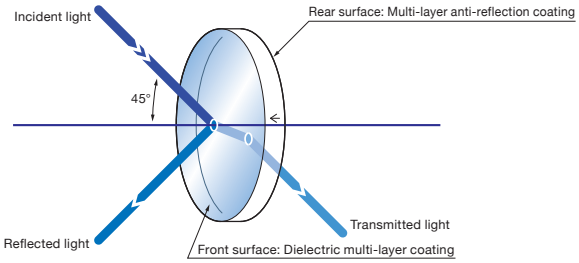
RoHS

Harmonic separators are part of dichroic mirrors used to separate specific YAG harmonic from other harmonics.
We have prepared three different wavelength reflectance.

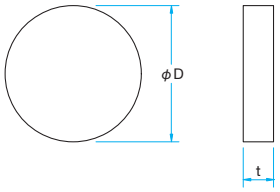
- These mirrors are coated with multi-layered dielectric with different refractive index by turns using BK7 optical parallels with λ/10 surface flatness and parallelism is 5 arc second. The other surface is coated with multi-layer anti-reflection.
- These mirrors are used at 45°incident angle to reflect specific wavelength beam and transmits other wavelength.
- For plate type, you can use a large laser beam diameter.



Schematic



Outline Drawing (in mm)



●Tolerance
Diameter $\phi D^{+0}_{-0.1}$
Thickness t ±0.1

Specifications

Material	BK7
Surface Flatness	λ/10
Coating	Front surface: Dielectric multi-layer coating Rear surface: Multi-layer anti-reflection coating
Angle of Incidence	45°
Parallelism	<5″
Surface Quality (Scratch–Dig)	10–5
Clear aperture	90% of actual aperture

Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.

Attention

- The reflection surface is indicated with an arrow on the side of substrate.
- The reflectance curves are based on actual measurements and may vary from different manufacturing lots.
- Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.
- The reflectance in the specifications list is at random polarization or (p-polarization reflectance + s-polarization reflectance) / 2.

For Reflected wavelength : 355nm, Transmitted wavelength : 532, 1064nm

Part Number	Diameter ϕD [mm]	Thickness t [mm]	Reflectance at 355nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 532・1064nm (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
YHS-25.4C05-355	ϕ25.4	5	>99.5	>85	5
YHS-30C05-355	ϕ30	5	>99.5	>85	5
YHS-50C08-355	ϕ50	8	>99.5	>85	5

*Laser pulse width 10ns, repetition frequency 20Hz

For Reflected wavelength : 532nm, Transmitted wavelength : 1064nm

Part Number	Diameter ϕD [mm]	Thickness t [mm]	Reflectance at 532nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 1064nm (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
YHS-25.4C05-532	ϕ25.4	5	>99.5	>95	8
YHS-30C05-532	ϕ30	5	>99.5	>95	8
YHS-50C08-532	ϕ50	8	>99.5	>95	8

*Laser pulse width 10ns, repetition frequency 20Hz

For Reflected wavelength : 1064m, Transmitted wavelength : 532nm

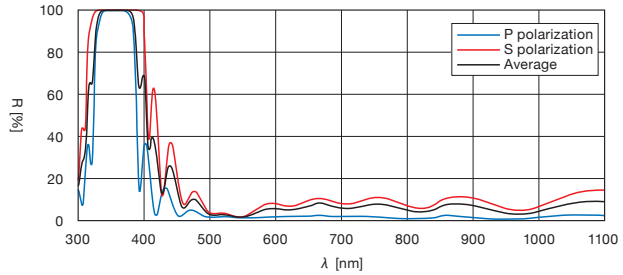
Part Number	Diameter ϕD [mm]	Thickness t [mm]	Reflectance at 1064nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 532nm (The average value of the P-Polarization and the S-Polarization) [%]	Laser Damage Threshold* [J/cm²]
YHS-25.4C05-1064	ϕ25.4	5	>99.5	>90	20
YHS-30C05-1064	ϕ30	5	>99.5	>90	20
YHS-50C08-1064	ϕ50	8	>99.5	>90	20

*Laser pulse width 10ns, repetition frequency 20Hz

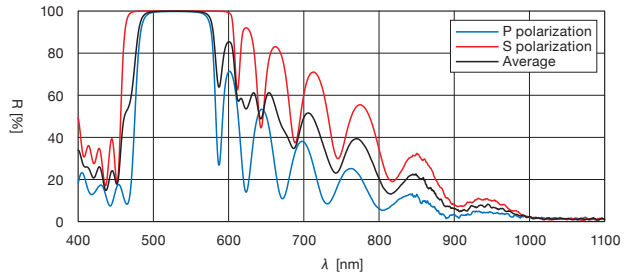
Typical Reflectance Data

R:Reflectance

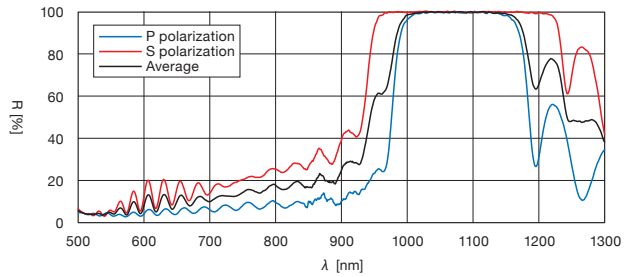
YHS-355



YHS-532



YHS-1064



Compatible Optic Mounts

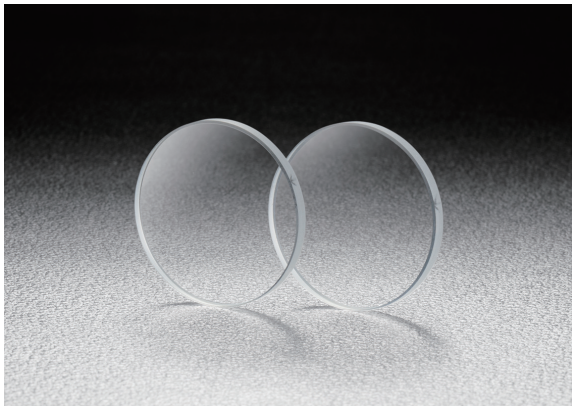
MHG-HS25-NL, HS30-NL / MHG-PM50-NL / BHAN-30S, -50S

Beam Samplers | BS4

RoHS Catalog Code W3025

A beam sampler behaves like a plate beam splitter, it has the ability to reflect approximately 5.2% of the entire beam.

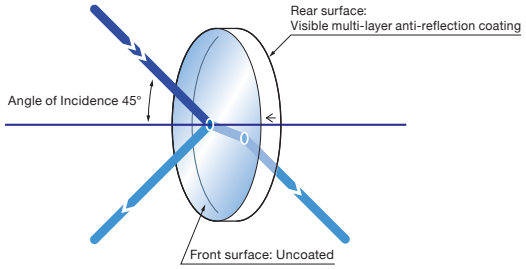
- Uncoated surfaces of optical parallels or wedged substrates are reflection surfaces. The rear surfaces are coated with multi-layer anti-reflection.
- These products have beam deviations at transmission and ghost by rear surface reflections due to the characteristics of plate beam splitters.
- To prevent ghost, wedged substrate is used with rear surface AR coating.



Specifications

Material	BK7
Surface Flatness	λ/10
Coating	Front Surface: Uncoated Rear Surface: Visible multi-layer anti-reflection coating
Incident angle	45°
Divergence ratio (reflectance : transmittance)	5 : 95 (The average value of the P-Polarization and the S-Polarization)
Laser Damage Threshold	4J/cm^2 (Laser pulse width 4ns, repetition frequency 20Hz)
Surface Quality (Scratch–Dig)	10–5
Clear aperture	90% of actual aperture

Schematic



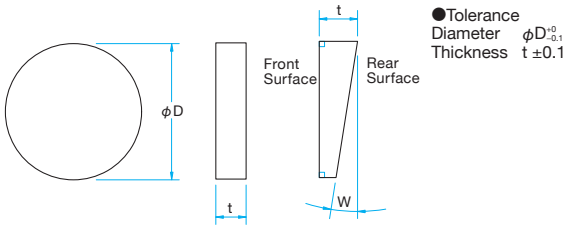
Guide

- Please contact our International Sales Division for customized products. (Customized on size, wavelength or R:T, etc.) Reference B069
- For a guarantee in reflected wavefront error or transmitted wavefront error, please contact our International Sales Division.
- An arrow mark will be printed on the thick side of the wedge plate to indicate the surface of the mirror.

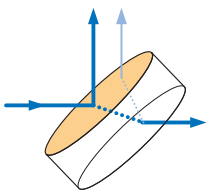
Attention

- The reflectance of 5.2% is the value when the material is BK7 and the input beam is unpolarized or circularly polarized.
- The beam deviation at transmission of a wedged beam splitter is large compared with beam splitter made of optical parallel.
- The amount of beam deviation of a beamsplitter depends on thickness of the substrate and the wavelength/the incident angle of the input beam.
- Be sure to wear laser safety goggles when checking optical path and adjusting optical axis.

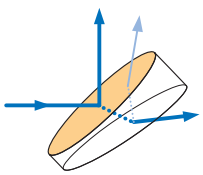
Outline Drawing (in mm)



Optical Parallel



Wedged Substrate

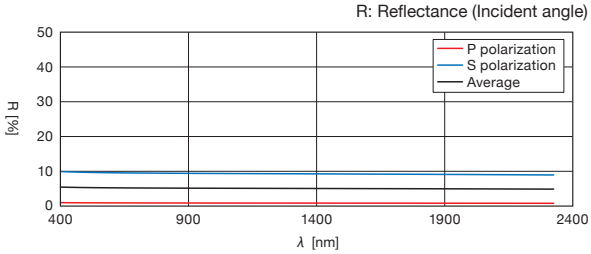


ϕ30·ϕ50

Part Number	Wavelength Range [nm]	Diameter ϕD [mm]	Thickness t [mm]	Parallelism W
BS4-25.4C03-10-550	400 – 700	ϕ25.4	3	<5″
BS4-30C03-10-550	400 – 700	ϕ30	3	<5″
BS4-30C05-10W-550	400 – 700	ϕ30	5	1°±5′
BS4-50C05-10-550	400 – 700	ϕ50	5	<5″
BS4-50C08-10W-550	400 – 700	ϕ50	8	1°±5′

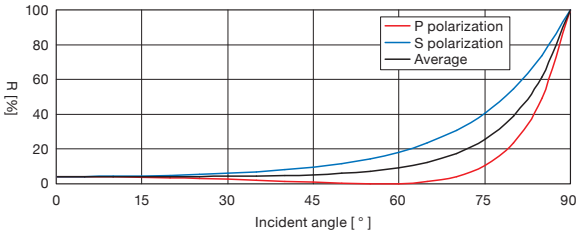
Typical Reflectance Data (Calculated value)

R: Reflectance (Incident angle)



Reflectivity change in accordance with incident angle (Calculated value)

R: Reflectance



Compatible Optic Mounts

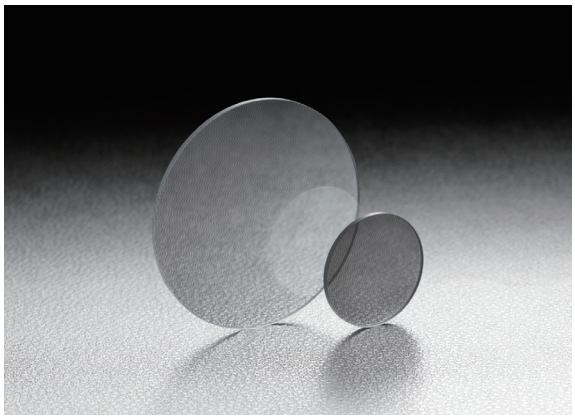
BHAN-30S, -50S / MHG-MP25-NL, MP30-NL

Polka dot beam splitter | PDBS

RoHS Catalog Code W3173

The polka dot beam splitter is a beam splitter that has been made by the aluminum coating of halftone dots (polka dots) on the glass substrate.
It has a low dependence on the incident angle and can be used in a wide range of wavelengths from ultraviolet region to infrared region.

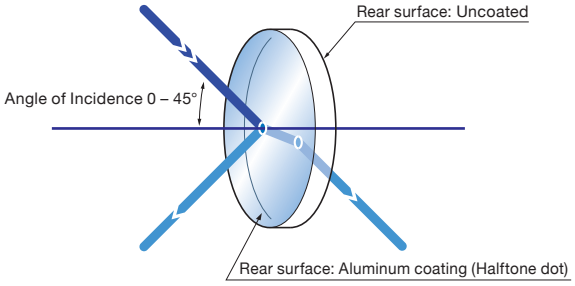
- Reflectance to transmittance ratio has been adjusted by the area ratio of the points that have been coated.
- Unlike the beam splitter of the dielectric type, in spite of the change in the incident angle, the reflectance and transmittance ratio does not alter.
- There are two types of the outer diameter like ϕ25.4mm and ϕ50.8mm and three types of reflectance to transmittance ratio such as 7:3, 5:5 and 3:7.



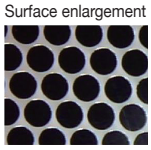
Specifications

Material	Synthetic fused silica
Parallelism	<3′
Coating	Front Surface: Al+MgF_2 Rear Surface: Uncoated
Recommended angle of incidence	0 – 45°
Wavelength range	250 – 2200nm
Surface Quality (Scratch–Dig)	80–50
Dot pitch	0.3mm
Clear aperture	Circle except surrounding 1.5mm

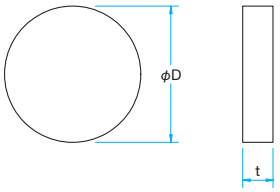
Schematic



Surface enlargement



Outline Drawing (in mm)



●Tolerance
Diameter ϕD±0.1
Thickness t ±0.1

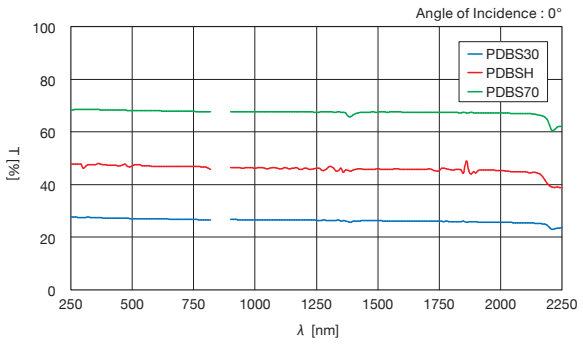
Guide

▶We can also offer different sizes, wavelengths and branching ratios that are not mentioned in the catalog. Reference B069

Attention

- ▶When used with a laser beam with high interference, diffraction occurs.
- ▶When light is incident, scattering light by the halftone dot occurs.
- ▶By the effect of the refractive index and the thickness of the substrate, the optical path of the transmitted light over the incident light will move by 0.5 extent parallel.
- ▶When the incident beam diameter is very thin, it is not possible to separate into the split ratio.
- ▶Do not clean with water or solvents. It may cause surface deterioration.
- ▶Please use in the environments which are non-condensing and less dust.
  If the dust or dirt is deposited, please do not blow but blow it off gently with dried air.

Typical Transmittance Data T: Transmission



Specifications

Part Number	Reflectance : Transmittance	Diameter ϕD [mm]	Thickness t [mm]	Transmission (Wavelength Range 555nm, Angle of Incidence : 0°) [%]
PDBS70-25.4C1.5	70 : 30	ϕ25.4	1.5	30^{+9}_{-5}
PDBS70-50.8C1.5	70 : 30	ϕ50.8	1.5	30^{+9}_{-5}
PDBSH-25.4C1.5	50 : 50	ϕ25.4	1.5	50^{+9}_{-5}
PDBSH-50.8C1.5	50 : 50	ϕ50.8	1.5	50^{+9}_{-5}
PDBS30-25.4C1.5	30 : 70	ϕ25.4	1.5	70^{+9}_{-5}
PDBS30-50.8C1.5	30 : 70	ϕ50.8	1.5	70^{+9}_{-5}

Compatible Optic Mounts

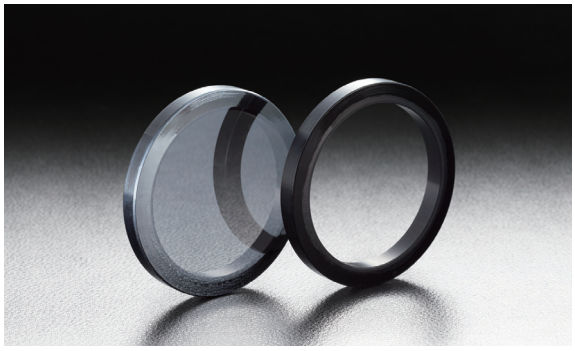
P25-NL, MP50.8-NL / MHAN-25.4S, -50.8S

Pellicle beam splitter | PELL

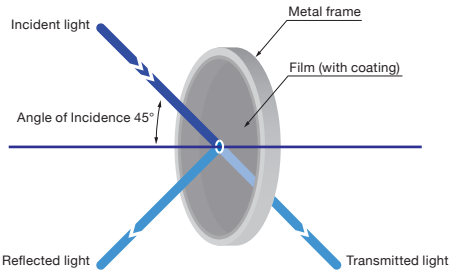
RoHS

By using the thin film in (as) a beam splitter, it is possible to remove the shift of the transmitted beam and the ghost image due to backside reflection. In addition, it can also be used without changing the wavelength dispersion in ultrashort pulse laser, to separate laser beam.

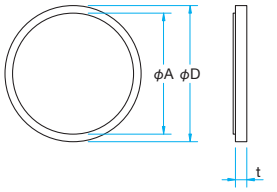
- Since it is used a thin film with a thickness of 2um or less, (Therefore) in case of the absence of the film the difference of optical path length (between the absence of the film) will be controlled to (less than) 1um or less.
- It does not (is never) occur that the beam will be divided into two by the back reflection and surface reflection. And the ghost of back reflection will not occur to the image being reflected by the pellicle.
- Because it can be used at high effective diameter of ϕ101.6mm, it can also be used to a large optical system of the effective diameter.
- It is available to provide such as;
  "PELL50" the dielectric multilayer coating that will divide into the (1:1) transmittance and reflectance at a 1:1 ratio,
  "PELL40" chromium film that has a small change in the dividing (branching) ratio of the transmittance and reflectance due to the wavelength. (is small,)
  "PELL33" a dielectric multilayer coating that will (to) divide (branch) into the (1:2 ratio) transmittance and reflectance at a 1:2 ratio, and "PELL10" can be used as a beam sampler.



Schematic



Schematic (in mm)



●Tolerance
Diameter $\phi D^{0}_{-0.5}$
Thickness t ±0.1

Specifications

Material	Nitrocellulose film
Thickness of film	<2μm
Refractive index	1.5
Transmitted wavefront distribution	2λ (ϕ25.4mm)
Wavelength Range	633nm
Coating	PELL10: Uncoated PELL40: Chromium film (Inconel) PELL33, PELL50: Dielectric Multilayer coating
Incident angle	45°
Material of frame	Aluminum Surface treatment: black alumite anodized
Surface Quality (Scratch–Dig)	40–20

Attention

- Pellicle is very easy to tear. Do not press with your fingers and poke with pointed objects.
- Pellicle is easy to be scratched. Do not rub with the paper. Please blow dirt or dust off with an air duster.
- Because this film is an organic, it can not be used for high-power laser.
- Because it is a product that has stuck to the film, there is a possibility that the beam of reflected light is divergence or convergence.
- When it is used in large beam, interference fringes due to the front and back side surface will occur in the reflected beam.

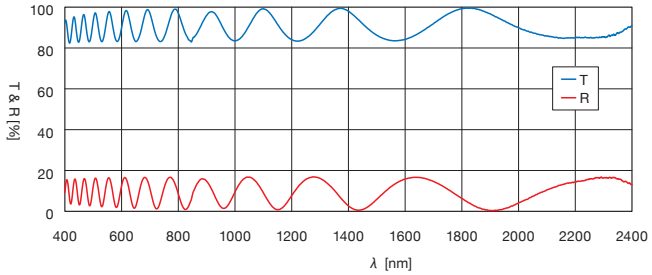
Specifications

Part Number	Diameter ϕD [mm]	Clear aperture ϕA [mm]	Thickness t [mm]	Reflectance at 632.8nm (The average value of the P-Polarization and the S-Polarization) [%]	Transmittance at 632.8nm (The average value of the P-Polarization and the S-Polarization) [%]
PELL10-34.9-633	ϕ34.9	ϕ25.4	4.8	8	92
PELL10-63.5-633	ϕ63.5	ϕ50.8	6.4	8	92
PELL10-114.3-633	ϕ114.3	ϕ101.6	6.4	8	92
PELL33-34.9-633	ϕ34.9	ϕ25.4	4.8	33	67
PELL33-63.5-633	ϕ63.5	ϕ50.8	6.4	33	67
PELL33-114.3-633	ϕ114.3	ϕ101.6	6.4	33	67
PELL40-34.9-633	ϕ34.9	ϕ25.4	4.8	40	40
PELL40-63.5-633	ϕ63.5	ϕ50.8	6.4	40	40
PELL40-114.3-633	ϕ114.3	ϕ101.6	6.4	40	40
PELL50-34.9-633	ϕ34.9	ϕ25.4	4.8	50	50
PELL50-63.5-633	ϕ63.5	ϕ50.8	6.4	50	50
PELL50-114.3-633	ϕ114.3	ϕ101.6	6.4	50	50

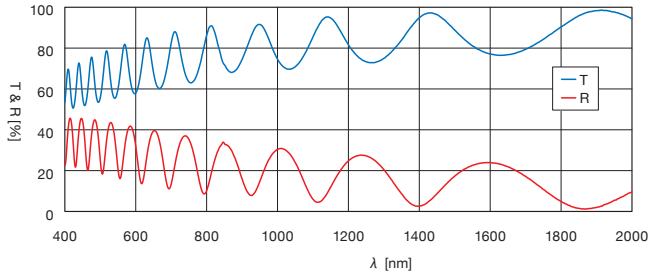
Typical Reflectance Data & Typical Transmittance Data

T: Transmission R: Reflectance

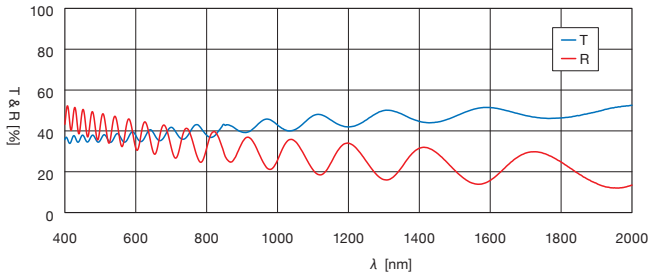
PELL10-633



PELL33-633



PELL40-633



PELL50-633