



Wire Grid Reflective Polarizer **WGFTM**

Technical information

Asahi Kasei Corporation
Electronics materials div.
WGF Project

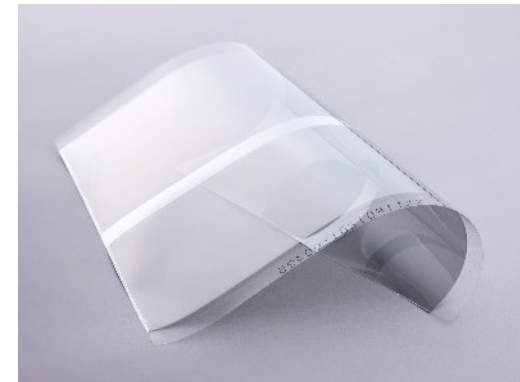
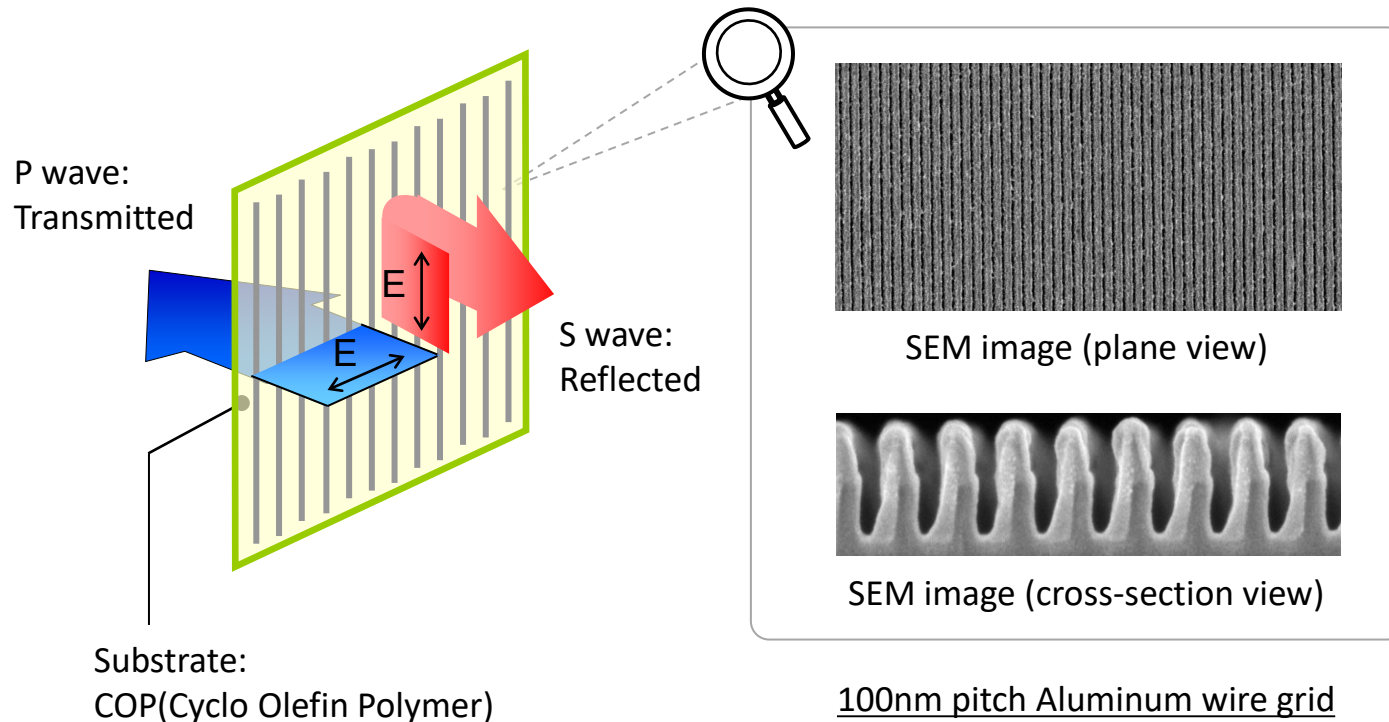
WGF™ - Outline -

What's WGF™?

WGF™ is film-based wire grid polarizer. Its Aluminum wire grid structure brings a high polarization separation performance in a wide range of wavelength not only VIS but Infrared(IR) or longer. Furthermore, it has excellent heat resistance compared to other film-based polarizers.

Asahi Kasei's Original Technology

- Continuous roll to roll nano-imprinting process
- 100nm pitch Nano-scale wire grid structure



Features of WGF™

- ✓ **Reflective polarization film with low heat absorption**

Usable in both transmission and reflection use

- ✓ **Low AOI dependence**

Stable optical performance even at wide AOI such as PBS

- ✓ **Wide effective range from VIS to IR or more**

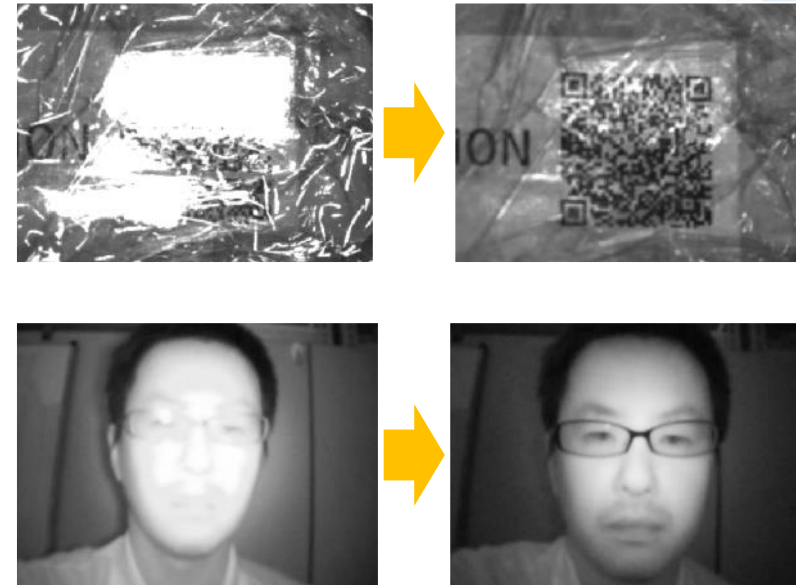
The anti-reflection effect when using with IR image sensors has been used in several industrial fields.

- ✓ **Excellent reliability - high temperature and humid conditions**

WGF™ can be used even in an environment where conventional polarizer cannot be used. Widely applied for automotive use & high brightness lighting.

- ✓ **Flexible and excellent workability**

High workability such as cutting into complicated shapes, bonding to other materials, and even curved surface molding is possible. We can offer WGF™ as various components based on your requests.



Anti-reflection effect with WGF™

Component with WGF™

We can offer WGF™ as various components based on your requests. Please feel free to contact us for details.

■ How to cut WGF™

Die-cutting The most common cutting method. Can be applied & worked for complicated shapes.

Laser-cutting WGF™ can be cut even laminated on thick substrate.



■ Lamination to various material/substrate

Glass/PC/PMMA For reflective applications, common to be laminated with highly flat glass.
AR coated glass, PMMA and PC are also common.

Absorptive polarizer Effective when you want to remove reflection performance considering stray light.

Waveplate Can be laminated with waveplate & even Diffuser

■ More complicated shape

3D-formed product Combined with various Polymer, can be applied to 3D shape structure such as lens. Under development for next-generation VR.



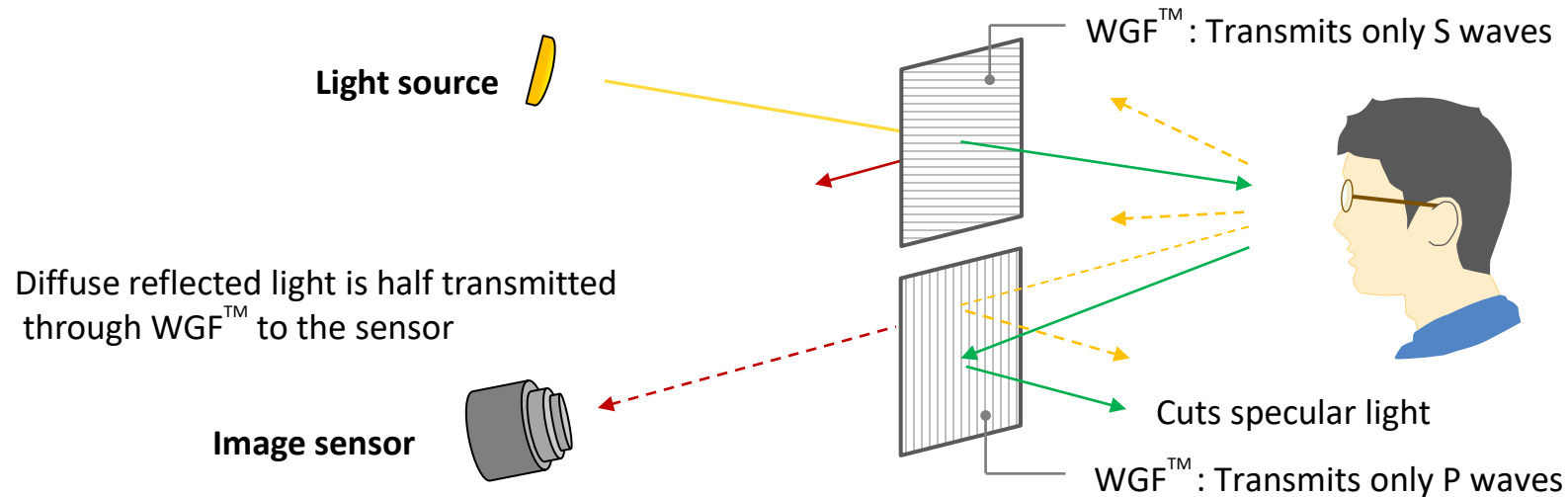
※ WGF™ Camera Filter - can be easily applied to your existing camera- and WGF™ PBS(Polarized Beam Splitter) - WGF™ sandwiched with a couple of prisms - are introduced from p.10.

Application example

Application		Wavelength	Effect/Usage	Customer adoption
In-vehicle HUD	HUD; Head-up Display	VIS	High heat resistance	Yes
HMD	AR Glass	VIS	PBS effective at wide AOI	Yes
	VR HMD	VIS	Improvement of lens magnification	Under study
AGV	LiDAR for AGV	Infrared (850~940nm)	Prevent malfunction by stray light	Yes
Camera	In-vehicle IR camera	Infrared (~1,000nm)	Cut reflected light Higher image recognition	Yes
	Security camera			Yes
Biometrics	vein	Infrared (~1,000nm)	Cut reflected light Higher image recognition	Yes
	iris			Yes
Medical	OCT for ophthalmology	Infrared (~1,000nm)	Anti-reflection	Under study
	Fundus/Retinal examination tool	Infrared (~2,000nm)	Cut reflected light Higher image recognition	Yes
Industrial inspection	Semiconductor inspection	Infrared (~1,600nm)	Cut reflected light Higher image recognition	Yes
	PCB inspection	VIS~Infrared (2,000nm)		Yes
	Multi Layer film inspection	Infrared (~2,000nm)	Defect inspection/detection	Yes
Food, Agriculture	Sorting machine	Infrared (~2,000nm)	Cut reflected light Higher image recognition	Yes
Polarized light source	Various VIS inspection	VIS	Anti-reflection (For high intensity light)	Yes
Radars		THZ/millimeter wave	Interference prevention	Under study

Anti-reflection effect of WGF™

Taking advantage of its property, WGF™ has been used as a filter for taking fine images with infrared sensors. In addition, WGF™ which absorbs less heat, can be used even in strong light that conventional polarizers cannot endure.



Example of effect when imaging human face



No Light



With infrared LED



With infrared LED and WGF™

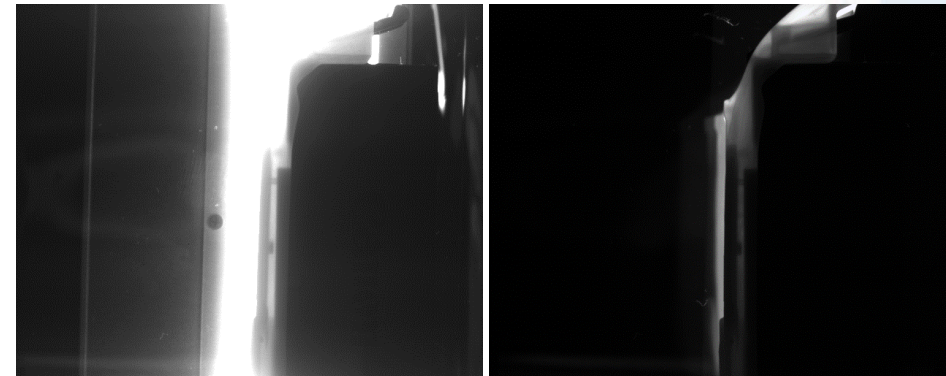
NIR Imaging effect examples of WGF™

WGF™ offers various imaging solutions. WGF™ are used for industrial purpose such as metal/plastic product inspection and currently expanding market for perishables food and biometrics market.

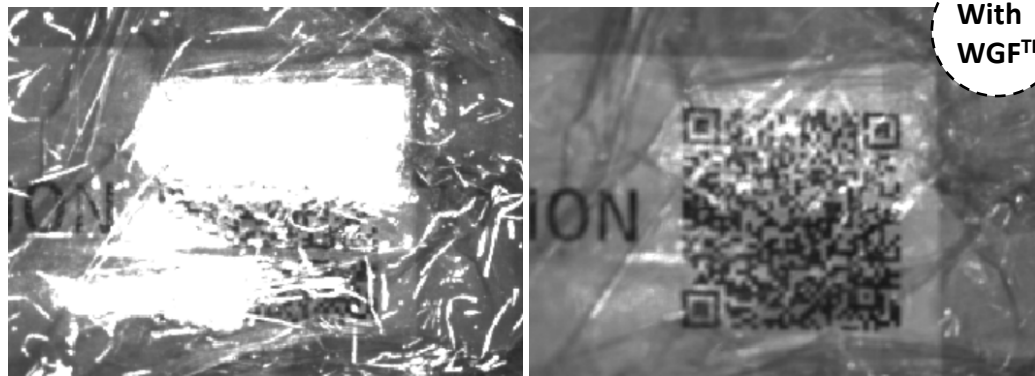
Sensor model: ABA-003IR-GE



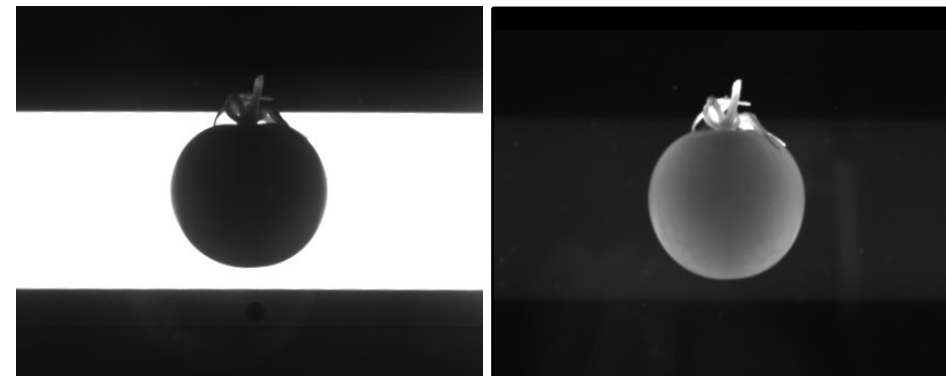
Anti-reflection when shooting a metal can



Cutting unnecessary transmitted light during transmission inspection inside the printer ink tank



QR code reading through wrapping film



Transmission inspection of tomato

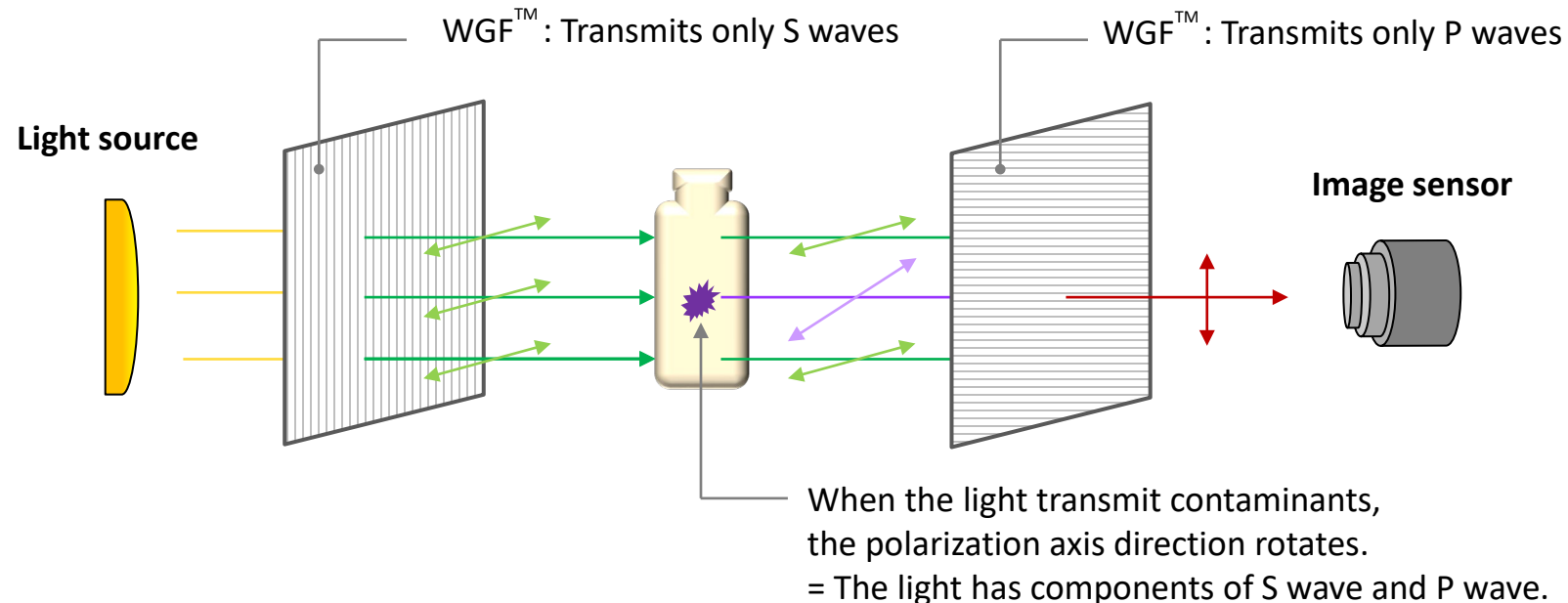
Transmitted light observation with WGF™

Are you suffering from reflected light?

Our Wire Grid type WGF™ CAMERA FILTER supports wideband imaging from CMOS to InGaAs.

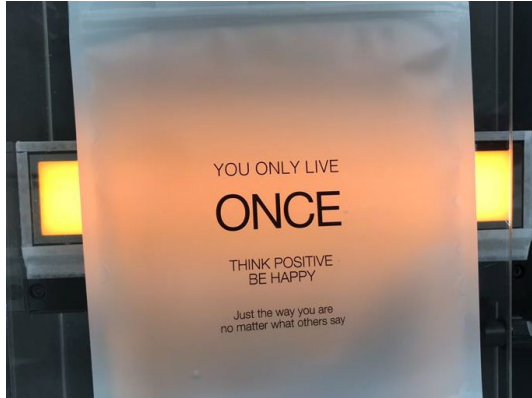
What Our Filter Can Do

Polarization is also useful for detecting contaminants in opaque containers and for detecting contaminants of the same color as liquids. Most polymer has phase contrast effect. When WGF™s are placed to both ; in front of the light source and the sensor as cross nicole status, the light from the light source basically can not reach the sensor. On the other hand, the light whose polarization axis is rotated or depolarized by the polymer characteristics can reach the sensor.

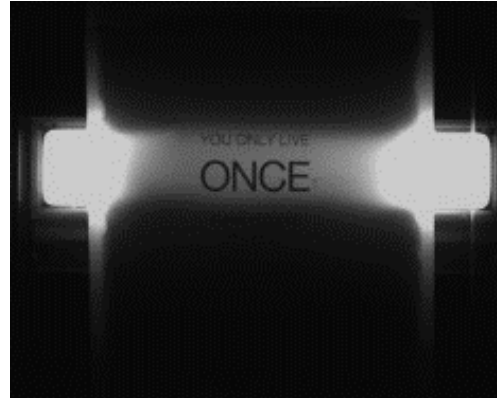


Transmitted light observation Examples

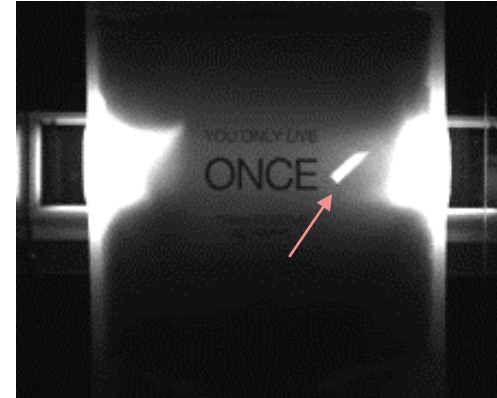
Visible light observation



1200nm infrared observation



1200nm infrared observation **With WGF™**



Detection of polymer fragment in an opaque bag filled with water

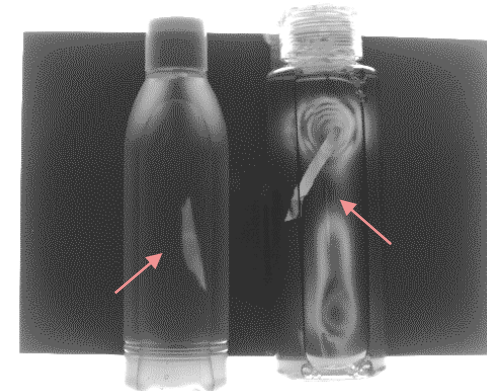
Visible light observation



1200nm infrared observation



1200nm infrared observation **With WGF™**



Detection of polymer fragments in liquid Left bottle) water Right bottle) coffee

WGF™ Camera Filter, WGF™ Panel

● WGF™ Camera Filter



Frame for fixing lens

Rotation frame
for polarization axis
adjustment



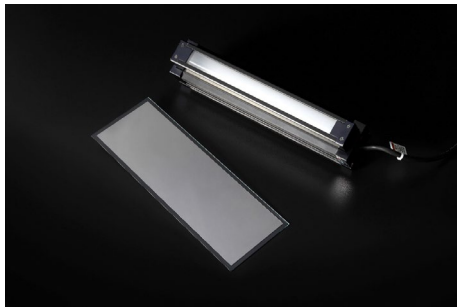
M40.5 M46 M52 M55 M58 M77(mm)

Lineup of 6 sizes.

Applicable to most sizes with step-up rings.

You can apply the WGF™ Camera Filter to your existing camera. It supports wideband imaging from CMOS, CCD or InGaAs cameras.

● WGF™ Panel



PN01



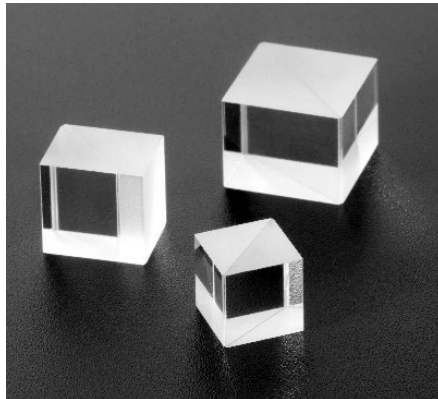
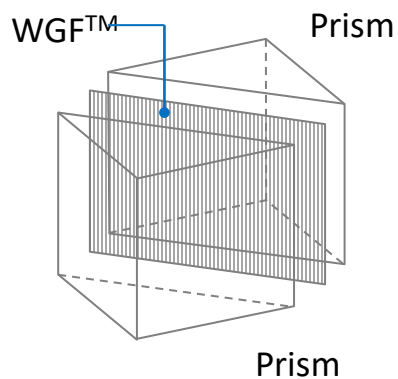
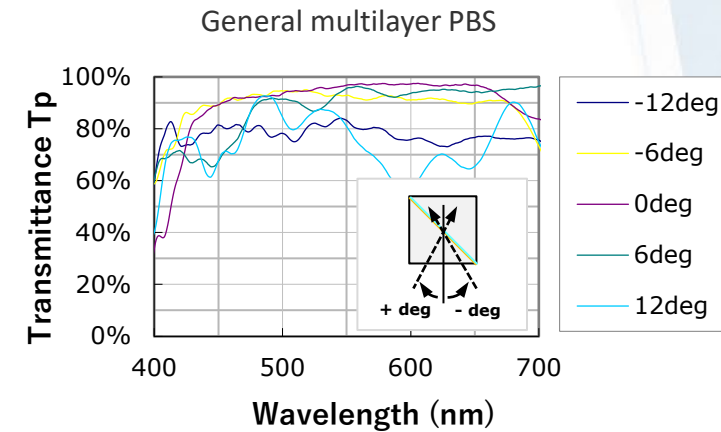
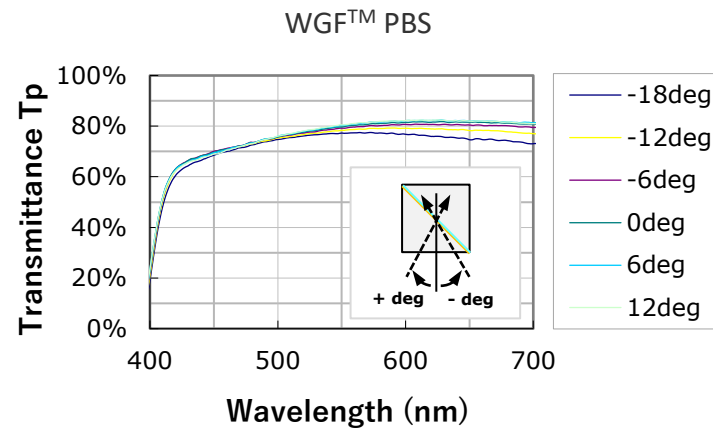
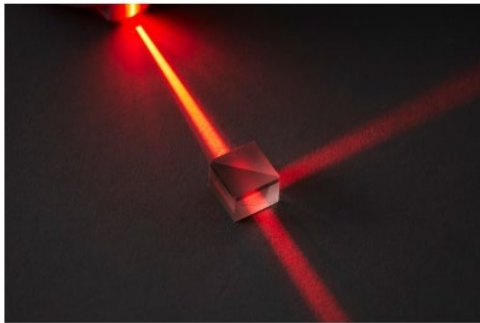
PN02

By polarizing light source with WGF™ Panel, you can observe the images more effectively.
WGF™ can be used with high-intensity halogen lighting.

In addition to standard models(PN01, PN02), we are capable to offer **customization**.
We are ready to solve your issues.

WGF™ PBS

Polarizing beam splitter, PBS with WGF™ has stable optical performance in a wide range AOI. Even in the optical system with reducing lenses, the color and polarization do not change partially, which can be expected to improve quality of imaging inspection. It is effective for coaxial epi-illumination and Telecentric optical system. If you are already using a half mirror, you can expect brightness improvement by replacing with WGF™ PBS.

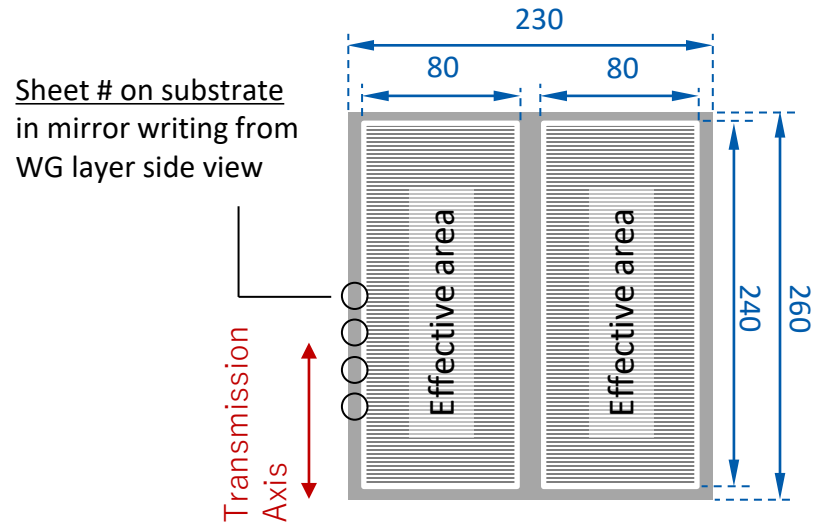


- WGF™ PBS can be offered the wide range of the sizes up to about 50 mm.
- Glass with refractive index can be selected according to the equipment.
- Installment for substrate inspection equipment purpose.
- Both WGF™ PBS cube and plate are available.
- We can offer other specifications such as 4-sided AR.

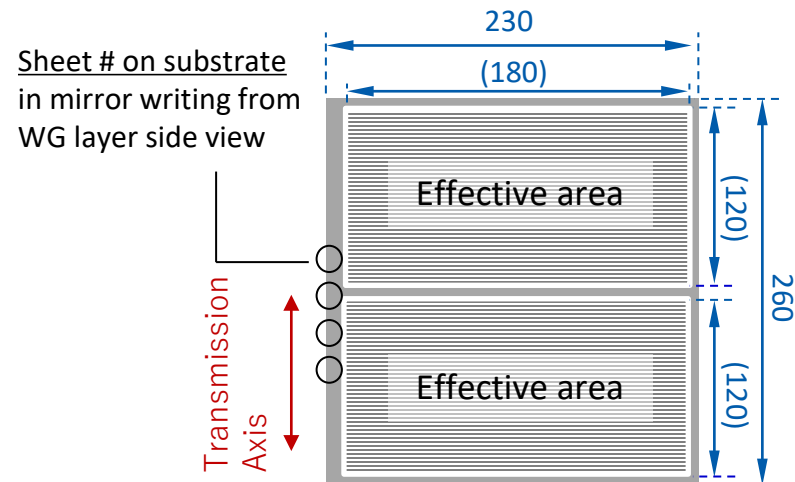
We are ready to solve your issues!

Product size and composition

Type 1 240x80mm x 2pcs

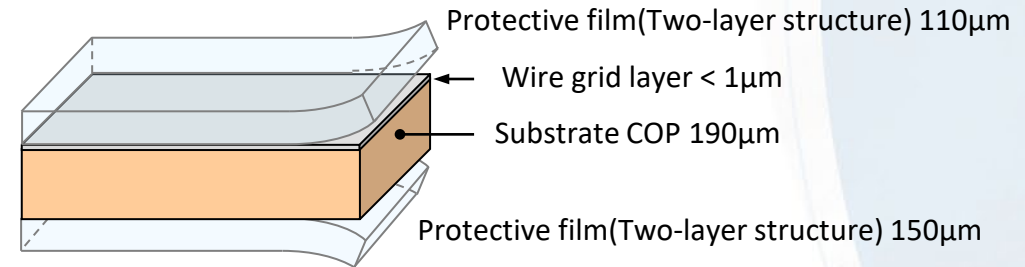


Type2 120x180mm x 2pcs (Development model)

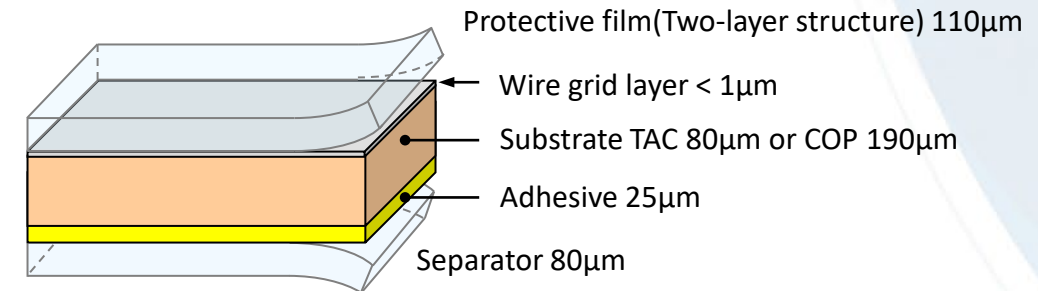


Layer composition

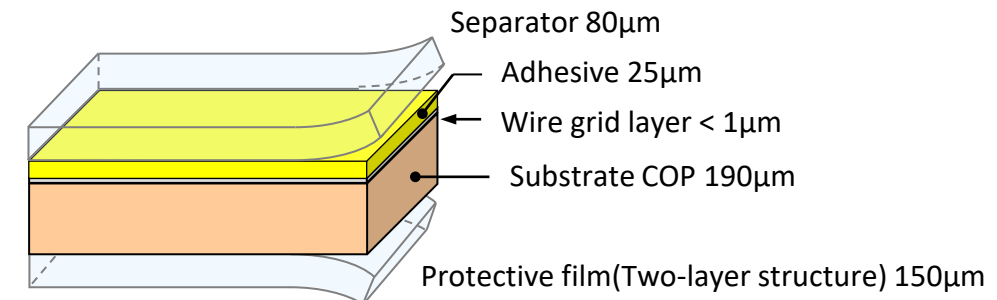
No adhesive(Product ends by N)



Adhesive on substrate(Product ends by U)



Adhesive on WG layer (Product ends by A)





Creating for Tomorrow

THE COMMITMENT OF THE ASAHI KASEI GROUP:

To do all that we can in every era to help the people of the world make the most of life and attain fulfillment in living.

Since our founding, we have always been deeply committed to contributing to the development of society, boldly anticipating the emergence of new needs.

This is what we mean by “Creating for Tomorrow.”

