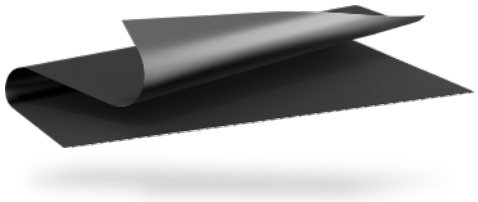
Panasonic
INDUSTRY

“PGS” Graphite Sheets

EYG type



“PGS (Pyrolytic Graphite Sheet)” is a thermal conductivity sheet which is very thin, synthetically made, has high thermal conductivity, and is made from a polymer film.
It is ideal for providing thermal management/heat-sinking in limited spaces.
This material is flexible and can be cut into customizable shapes.

Features

- Excellent thermal conductivity : 700 to 1000 W/(m·K)
  (2 times as high as copper, 3 to 5 time as high as aluminum)
- Lightweight: Specific gravity : 0.85 to 1.00 g/cm^3
- Flexible and easy to be cut or trimmed. (withstands repeated bending)
- Low thermal resistance
- RoHS compliant

Recommended applications

- Semiconductor manufacturing equipment (Sputtering, Dry etching, Steppers)
- Optical communications equipment
- TIM(Thermal Interface Material)

Explanation of part numbers

- PGS only (EYGS******)

1	2	3	4	5	6	7	8	9	10
E	Y	G	S	0	9	1	2	1	0

Product code
PGS Graphite Sheet

Style	
S	PGS only

Dimension	
0912	90 mm × 115 mm
1218	115 mm × 180 mm
1823	180 mm × 230 mm

PGS thickness	
10	100 µm
07	70 µm

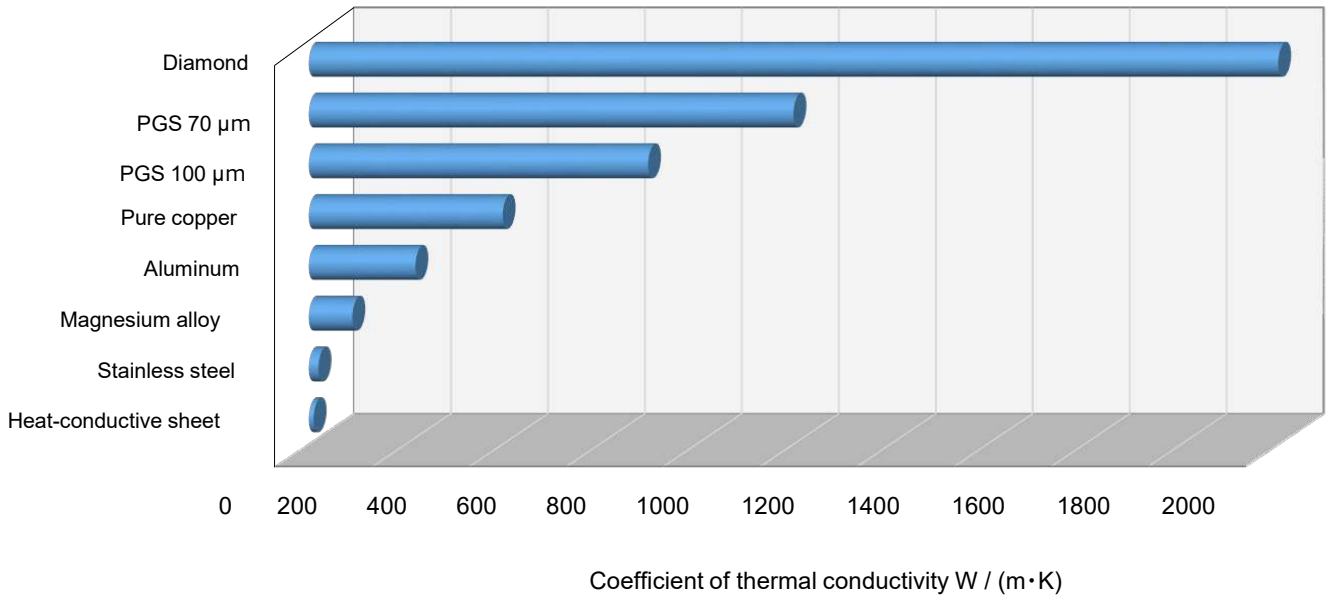
Characteristics of PGS Graphite Sheets

		100 µm	70 µm
Thickness		0.10±0.03 mm	0.07±0.015 mm
Density		0.85 g/cm^3	1.21 g/cm^3
Thermal conductivity a-b plane		700 W/(m·K)	1000 W/(m·K)
Electrical conductivity		10000 S/cm	10000 S/cm
Extensional strength		20.0 MPa	20.0 MPa
Expansion coefficient	a-b plane	9.3×10^{-7} 1/K	9.3×10^{-7} 1/K
	c axis	3.2×10^{-5} 1/K	3.2×10^{-5} 1/K
Heat resistance*1		400 ℃	
Bending(angle 180,R5)		10000 cycles	

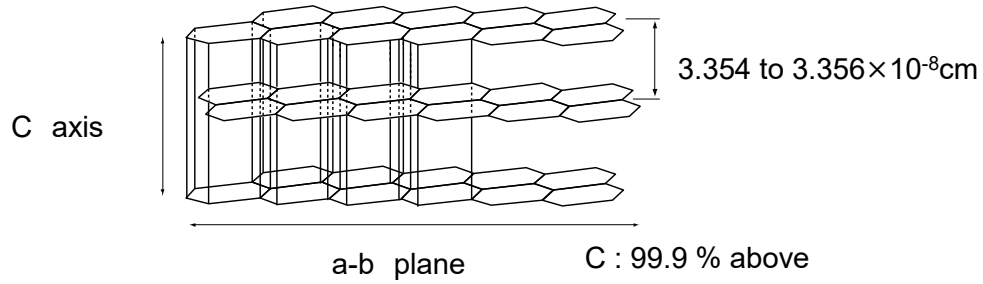
*1 : Withstand temperature refers to PGS only. (Lamination material such as PET tape etc. is not included)

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

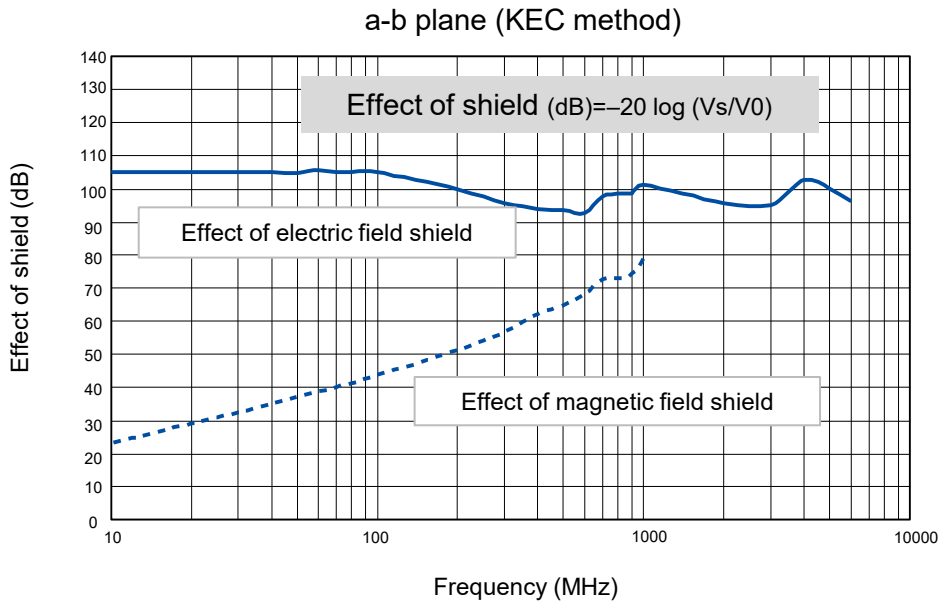
Comparison of thermal conductivity (a-b plane)



Layered structure of PGS



Electric field shield performance



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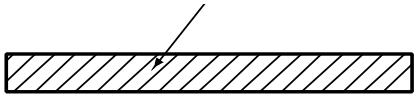
Type / Composition example

● Standard series (PGS 100, 70 μm series)

Type		PGS Only
		S type
Front face		-
Rear face		-
Structure		PGS Graphite Sheets 
Features		◎ High thermal conductivity, High flexibility ◎ Low thermal resistance ◎ Available up to 400 ℃ ◎ Conductive material
Withstand temperature		400 ℃
100 μm	Part No.	EYGS121810
	Thickness	100 μm
70 μm	Part No.	EYGS121807
	Thickness	70 μm

Minimum order

Item	Type	Part No.	Size	Minimum order
PGS Graphite Sheet Only	S type 100 μm	EYGS091210	90×115 mm	20
		EYGS121810	115×180 mm	10
		EYGS182310	180×230 mm	10
	S type 70 μm	EYGS091207	90×115 mm	20
		EYGS121807	115×180 mm	10
		EYGS182307	180×230 mm	10

(1) The above-listed part number is sample part number for testing.
(2) Please contact us about your request of custom part number which will be arranged separately.
(3) Please contact us if quantity is below Minimum Order Quantity.

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Should a safety concern arise regarding this product, please be sure to contact us immediately.

Safety and Legal Matters to Be Observed

Product specifications and applications

■ Please be advised that this product and product specifications are subject to change without notice for improvement purposes. Therefore, please request and confirm the latest delivery specifications that explain the specifications in detail before the final design, or purchase or use of the product, regardless of the application. In addition, do not use this product in any way that deviates from the contents of the company's delivery specifications.

■ Unless otherwise specified in this catalog or the delivery specifications, this product is intended for use in general electronic equipment (AV products, home appliances, commercial equipment, office equipment, information and communication equipment, etc.).
When this product is used for the following special cases, please separately discuss the delivery specifications suited to each application with the company. These include applications requiring special quality and reliability, wherein their failures or malfunctions may directly threaten human life or cause harm to the human body (e.g.: space/aircraft equipment, transportation/traffic equipment, combustion equipment, medical equipment, disaster prevention/crime prevention equipment, safety equipment, etc.).

Safety design and product evaluation

■ Please ensure safety through protection circuits, redundant circuits, etc., in the customer's system design so that a defect in our company's product will not endanger human life or cause other serious damage.

■ This catalog shows the quality and performance of individual parts. The durability of parts varies depending on the usage environment and conditions. Therefore, please ensure to evaluate and confirm the state of each part after it has been mounted in your product in the actual operating environment before use.
If you have any doubts about the safety of this product, then please notify us immediately, and be sure to conduct a technical review including the above protection circuits and redundant circuits at your company.

Laws / Regulations / Intellectual property

■ The transportation of dangerous goods as designated by UN numbers, UN classifications, etc., does not apply to this product. In addition, when exporting products, product specifications, and technical information described in this catalog, please comply with the laws and regulations of the countries to which the products are exported, especially those concerning security export control.

■ Each model of this product complies with the RoHS Directive (Restriction of the use of hazardous substances in electrical and electronic equipment) (2011/65/EU and (EU) 2015/863). The date of compliance with the RoHS Directive and REACH Regulation varies depending on the product model.
Further, if you are using product models in stock and are not sure whether or not they comply with the RoHS Directive or REACH Regulation, please contact us by selecting "Sales Inquiry" from the inquiry form.

■ During the manufacturing process of this product and any of its components and materials to be used, Panasonic does not intentionally use ozone-depleting substances stipulated in the Montreal Protocol and specific bromine-based flame retardants such as PBBs (Poly-Brominated Biphenyls) / PBDEs (Poly-Brominated Diphenyl Ethers). In addition, the materials used in this product are all listed as existing chemical substances based on the Act on the Regulation of Manufacture and Evaluation of Chemical Substances.

■ With regard to the disposal of this product, please confirm the disposal method in each country and region where it is incorporated into your company's product and used.

■ The technical information contained in this catalog is intended to show only typical operation and application circuit examples of this product. This catalog does not guarantee that such information does not infringe upon the intellectual property rights of Panasonic or any third party, nor imply that the license of such rights has been granted.

Panasonic Industry will assume no liability whatsoever if the use of our company's products deviates from the contents of this catalog or does not comply with the precautions. Please be advised of these restrictions.

Matters to Be Observed When Using This Product
(PGS graphite sheet)

Use environments

■ This product (graphite sheet) is not designed for use in specific environments. Using the product in specific environments or service conditions described below, therefore, may affect the performance of the product. Please check the performance and reliability of the product first and then use the product.

(1) Used in liquid, such as water, oil, chemicals, and organic solvents.
(2) Used in a place exposed to direct sunlight, an outdoor place with no shielding, or a dusty place.
(3) Used in a place where the product is heavily exposed to sea breeze or a corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NOX.
(4) Used in a contaminated state.
(5) Used in a place where acid is present nearby.
(6) Used in a temperature condition outside a specified working temperature range.
(7) Used in a depressurized or vacuum atmosphere.

■ Temperatures of the graphite sheet in use vary depending on mounting conditions, service conditions, etc. Make sure to confirm that the temperature of the graphite sheet mounted on your board matches the specified temperature.

Handling conditions

■ The product is likely to suffer mechanical damage when dropped on the floor. Avoid using such a product. The graphite sheet is soft and is therefore easily scratched or damaged. Do not rub or hit the graphite sheet against a hard object. A stripe, folding line, etc., formed on the graphite sheet may affect its heat conductivity.

■ Do not reuse a graphite sheet having been used on a printed board and removed therefrom. A tearing load applied to the graphite sheet or a pointed object coming in contact with the sheet may tear the sheet or leave a hole thereon. Use the sheet with a protective material.

■ The graphite sheet may get hotter during its use. Do not touch the graphite sheet in use. Touching the graphite sheet with a bare hand may degrade the graphite sheet in performance. Do not do it.

■ Because the graphite sheet is conductive, you have to perform an insulation treatment on the graphite sheet if you want it to be insulative. Still, there is a concern that a conductive material in powder form may fall from the graphite sheet. Making the graphite sheet completely insulative, therefore, cannot be guaranteed.

■ The heat conductivity of the graphite sheet changes depending on how it is used. Conduct a heat conductivity test of the graphite sheet before using it to see if its heat conductivity meets the use purpose.

Storage conditions

■ Do not keep the graphite sheet in the following environments that may affect the performance of the graphite sheet.

(1) Stored in a place where the product is heavily exposed to sea breeze or a corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_X.
(2) Stored in a place where the graphite sheet is exposed to UV-rays (storing the graphite sheet in a dark place is recommendable).
(3) Stored at a temperature different from the specified storage temperature.

■ The storage period of the graphite sheet is one year or less from completion of a shipment inspection. Use the graphite sheet before this storage period expires.

■ When the graphite sheet is incorporated in a circuit structure on the assumption that the graphite sheet is bonded, confirm the bonding performance of the graphite sheet before using it.