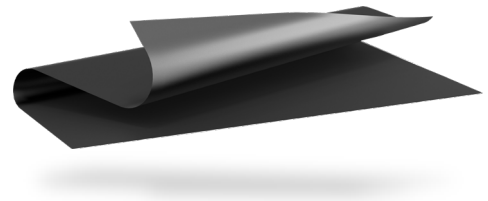


“PGS” Graphite Sheets

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/cm³
- 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*****)

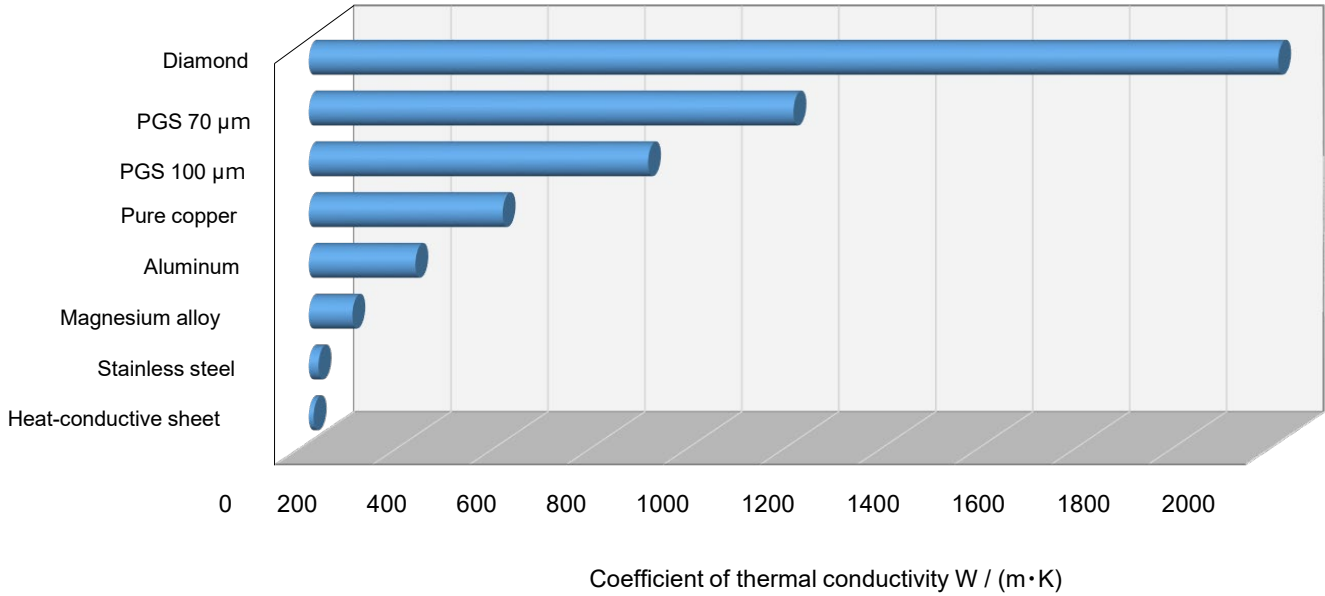
1	2	3	4	5	6	7	8	9	10
E	Y	G	S	0	9	1	2	1	0
Product code		Style		Dimension			PGS thickness		
PGS Graphite Sheet		S PGS only		0912	90 mm × 115 mm		10	100 μm	
				1218	115 mm × 180 mm		07	70 μm	
				1823	180 mm × 230 mm				

Characteristics of PGS Graphite Sheets

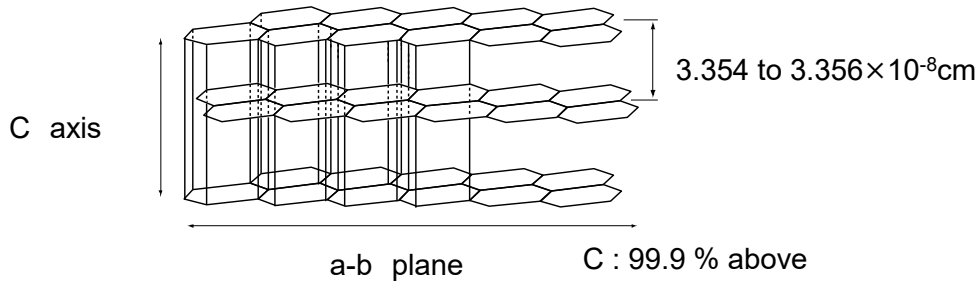
Thickness		100 μm	70 μm
		0.10±0.03 mm	0.07±0.015 mm
Density		0.85 g/cm ³	1.21 g/cm ³
Thermal conductivity a-b plane		700 W/(m·K)	1000 W/(m·K)
Electrical conductivity		10000 S/cm	10000 S/cm
Extensional strength		20.0 MPa	20.0 MPa
Expansion coefficient	a-b plane	9.3×10 ⁻⁷ 1/K	9.3×10 ⁻⁷ 1/K
	c axis	3.2×10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

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

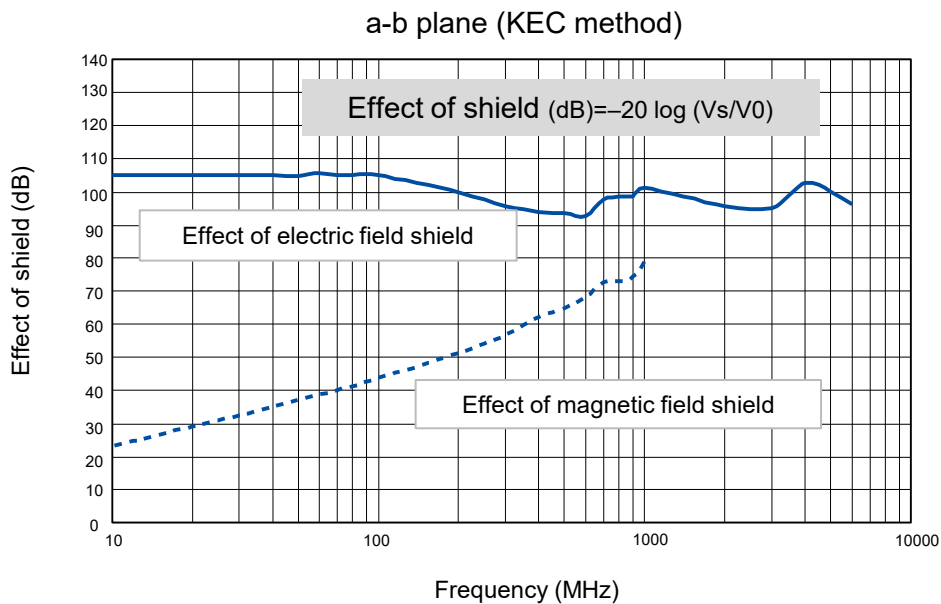
Comparison of thermal conductivity (a-b plane)



Layered structure of PGS

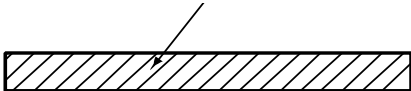


Electric field shield performance



Type / Composition example

- Standard series (PGS 100, 70 μm series)

Type	PGS Only	
	S type	
Front face	-	
Rear face	-	
Structure	<p style="text-align: center;">PGS Graphite Sheets</p> 	
Features	<ul style="list-style-type: none"> ◎ High thermal conductivity, High flexibility ◎ Low thermal resistance ◎ Available up to 400 °C ◎ Conductive material 	
Withstand temperature	400 °C	
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.

Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- Please ensure the safety by means of protection circuit, redundant circuit etc. in your system design in order to prevent the occurrence of life crisis and other serious damages due to the failure of our products.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

Please note that we do not owe any liability and responsibility if our products are used beyond the description of this catalog or without complying with precautions in this catalog.

 **Application Guidelines****Precautions on the whole**

- Do not use the products beyond the descriptions in this catalog.
- This catalog guarantees the quality of the products as individual components.
Before you use the products, please make sure to check and evaluate the products in the circumstance where they are installed in your product.
- This product was designed and manufactured for standard applications such as general electronics devices, office equipment, information and communications equipment, measuring instruments, household appliances and audio-video equipment.
For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product catalog which conform to such applications.

Safety and design considerations

- We are trying to improve the quality and the reliability, but the durability differs depending on the use environment and the use conditions. On use, be sure to confirm the actual product under the actual use conditions.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other signification damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/ gas equipment, rotating equipment, and disaster/crime prevention equipment.
 - The system is equipped with a protection circuit and protection device.
 - The system is equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault.
 - The system is equipped with an arresting the spread of fire or preventing glitch.
- When a dogma shall be occurred about safety for this product, be sure to inform us rapidly, operate your technical examination.
- The temperature of this product at the time of use changes depending on mounting conditions and usage conditions, therefore, please confirm that the temperature of this product is the specified temperature after mounting it.
- This product does not take the use under the following special environments into consideration. Accordingly, the use in the following special environments, and such environmental conditions may affect the performance of the product; prior to use, verify the performance, reliability, etc. thoroughly.
 - 1) Use in liquids such as water, oil, chemical, and organic solvent.
 - 2) Use under direct sunlight, in outdoor or in dusty atmospheres.
 - 3) Use in places full of corrosive gases such as sea breeze, C_{12} , H_2S , NH_3 , SO_2 , and NO_x .
 - 4) Use the product in a contaminated state.
 - 5) Use in acid.
 - 6) Use outside the range defined by the operating temperature range.
 - 7) Use under reduced pressure or vacuum.

Precaution of installation

- Do not reuse this product after removal from the mounting board.
- Do not drop this product on the floor. If this product is dropped, it can be damaged mechanically.
Avoid using the dropped product.
- This product is soft, do not rub or touch it with rough materials to avoid scratching it.
- Lines or folds in this product may affect thermal conductivity.
- Never touch a this product during use because it may be extremely hot.
- Use protective materials when handling and/or applying this product, do not use items with sharp edges as they might tear or puncture this product.
- Do not handle with bare hands as there is a concern about performance degradation.

Precaution on storage conditions

- Storage period is less than one year after our shipping inspection is completed.
Please use within the period.
- If the product is stored in the following environments and conditions, the performance may be badly affected, avoid the storage in the following environments.
 - (1) Storage in places full of corrosive gases such as sea breeze, Cl₂, H₂S, NH₃, SO₂, and NO_x.
 - (2) Storage in places exposed to ultraviolet light.
*Recommended storage in the dark.
 - (3) Store at a temperature outside the storage temperature range specified by this catalog.
- In the case of a product configuration that assumes bonding, please use after checking the adhesiveness of the product when the storage period is over.

Precaution specific to this product

- This product has conductivity. If required, This product should be provided insulation.
- This product can not guarantee the insulation because there is a concern for powder falling off of conductive materials.
- Thermal conductivity is dependent on the way it is used. Test the adaptability of the product to your application before use.

Applicable laws and regulations, others

- No ODCs or other ozone-depleting substances which are subject to regulation under the Montreal Protocol are used in our manufacturing processes, including in the manufacture of this product.
- This product complies with the RoHS Directive (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (DIRECTIVE 2011/65/EU and (EU)2015/863) .
- All the materials used in this part are registered material under the Law Concerning the Examination and Regulation of Manufactures etc. of Chemical substances.
- If you need the notice by letter of "A preliminary judgment on the Laws of Japan foreign exchange and Foreign Trade control", be sure to let us know.
- These products are not dangerous goods on the transportation as identified by UN(United Nations) numbers or UN classification.
- As to the disposal of the module, check the method of disposal in each country or region where the modules are incorporated in your products to be used.
- The technical information in this catalog provides examples of our products typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.