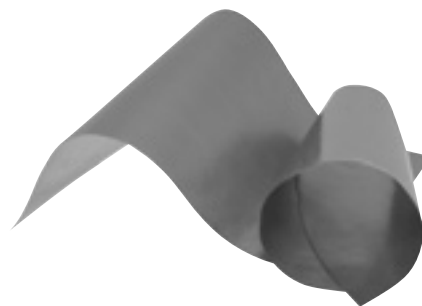


### “PGS” Graphite Sheets

Type: **EYG**

PGS (Pyrolytic Graphite Sheet) is a thermal interface material which is very thin, synthetically made, has high thermal conductivity, and is made from a highly oriented graphite polymer film. It is ideal for providing thermal management/heat-sinking in limited spaces or to provide supplemental heat-sinking in addition to conventional means. This material is flexible and can be cut into customizable shapes.



#### ■ Features

- Excellent thermal conductivity : 700 to 1950 W/(m·K)  
(2 to 5 times as high as copper, 3 to 8 time as high as aluminum)
- Lightweight: Specific gravity : 0.85 to 2.13 g/cm<sup>3</sup>  
(1/4 to 1/10 of copper, 1/1.3 to 1/3 of aluminum in density)
- Flexible and easy to be cut or trimmed.  
(withstands repeated bending)
- Low thermal resistance
- RoHS compliant

#### ■ Recommended applications

- Smart phones, Mobile phones, DSC, DVC, Tablet PCs, PCs and peripherals, LED Devices
- Semiconductor manufacturing equipment  
(Sputtering, Dry etching, Steppers)
- Optical communications equipment

#### ■ 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*	
			S	PGS only	0912	90 mm × 115 mm		10	100 μm
					1218	115 mm × 180 mm		07	70 μm
					1823	180 mm × 230 mm		05	50 μm
							04	40 μm	
							03	25 μm	

\* PGS thickness 17 μm, 10 μm do not carry out the correspondence in the one piece of article.

- Taping (EYGA\*\*\*\*\*)

1	2	3	4	5	6	7	8	9	10	11	12
E	Y	G	A	0	9	1	2	1	0	D	M
Product Code			Style		Dimension**			PGS Thickness		Suffix	
			A	Taping	0912	90 mm × 115 mm		10	100 μm	A	Processing type * Please refer to a constitution example
					1218	115 mm × 180 mm		07	70 μm	M	
							05	50 μm	F		
							04	40 μm	PA		
							03	25 μm	PM		
							02	17 μm	DM		
							01	10 μm	DF		
									V		
									PV		
									KV		

\*\* Please contact us for other dimensions other than those above.

\*\* Please contact us for other dimensions other than those above.

## ■ Characteristics

Thickness		100 μm	70 μm	50 μm	40 μm
		0.10±0.03 mm	0.07±0.015 mm	0.050±0.015 mm	0.040±0.012 mm
Density		0.85 g/cm <sup>3</sup>	1.21 g/cm <sup>3</sup>	1.70 g/cm <sup>3</sup>	1.80 g/cm <sup>3</sup>
Thermal conductivity	a-b plane	700 W/(m·K)	1000 W/(m·K)	1300 W/(m·K)	1350 W/(m·K)
Electrical conductivity		10000 S/cm	10000 S/cm	10000 S/cm	10000 S/cm
Extensional strength		20.0 MPa	20.0 MPa	20.0 MPa	25.0 MPa
Expansion coefficient	a-b plane	9.3×10 <sup>-7</sup> 1/K	9.3×10 <sup>-7</sup> 1/K	9.3×10 <sup>-7</sup> 1/K	9.3×10 <sup>-7</sup> 1/K
	c axis	3.2×10 <sup>-5</sup> 1/K	3.2×10 <sup>-5</sup> 1/K	3.2×10 <sup>-5</sup> 1/K	3.2×10 <sup>-5</sup> 1/K
Heat resistance*		400 °C			
Bending(angle 180,R5)		10000 cycles			

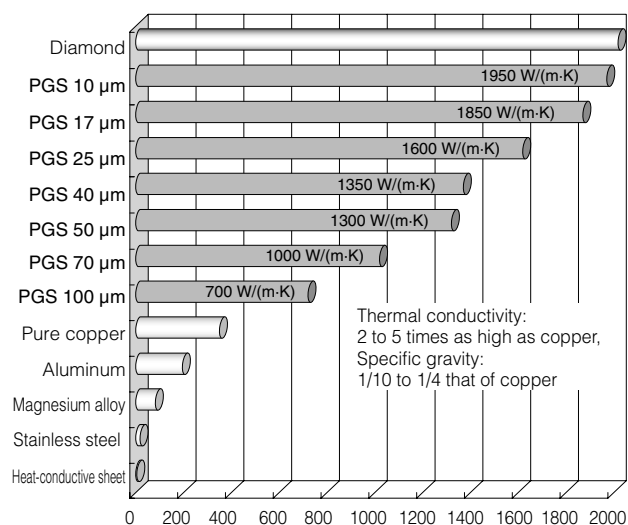
Thickness		25 μm	17 μm	10 μm
		0.025±0.010 mm	0.017±0.005 mm	0.010±0.002 mm
Density		1.90 g/cm <sup>3</sup>	2.10 g/cm <sup>3</sup>	2.13 g/cm <sup>3</sup>
Thermal conductivity	a-b plane	1600 W/(m·K)	1850 W/(m·K)	1950 W/(m·K)
Electrical conductivity		20000 S/cm	20000 S/cm	20000 S/cm
Extensional strength		30.0 MPa	40.0 MPa	40.0 MPa
Expansion coefficient	a-b plane	9.3×10 <sup>-7</sup> 1/K	9.3×10 <sup>-7</sup> 1/K	9.3×10 <sup>-7</sup> 1/K
	c axis	3.2×10 <sup>-5</sup> 1/K	3.2×10 <sup>-5</sup> 1/K	3.2×10 <sup>-5</sup> 1/K
Heat resistance*		400 °C		
Bending(angle 180,R5)		10000 cycles		

\* The heat-resistant temperature is a thing of the PGS simple substance performance.

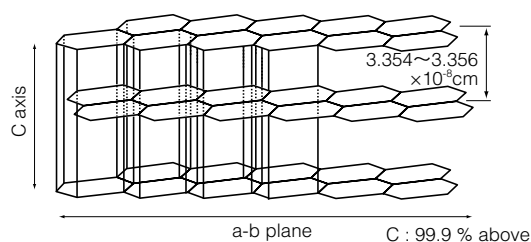
(When I do not include processing materials such as the PET tape)

\*\* Values are for reference, not guaranteed.

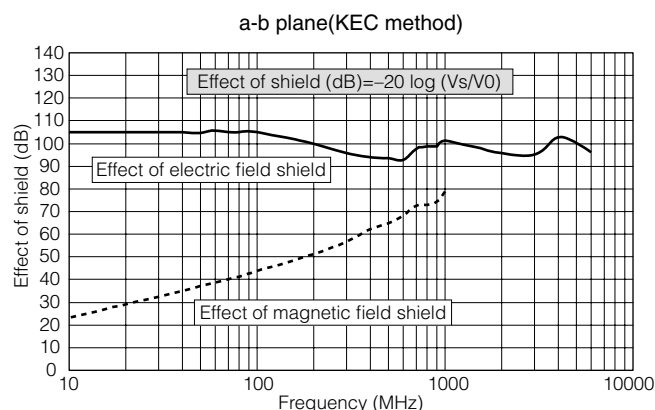
## ■ Comparison of thermal conductivity (a-b plane)



## ■ Layered structure of PGS



## ■ Electric field shield performance

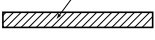
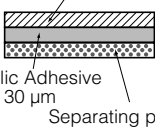
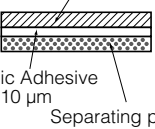
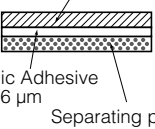


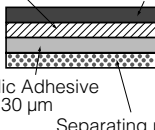
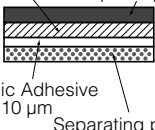
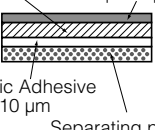
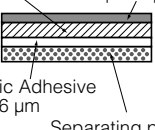
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

05 Dec. 2013

### ■ Constitution example of the artefact

#### ● Standard series ( PGS 100, 70, 50, 40, 25, 17, 10 μm )

Type	PGS Only		Adhesive Type	
	S type	A-A type	A-M type	A-F type
Front face	—	—	—	—
Rear face	—	Insulative adhesion type 30 μm	Insulative thin adhesion type 10 μm	Insulative thin adhesion type 6 μm
Structure				
Features	<ul style="list-style-type: none"> <li>High Thermal Conductivity</li> <li>High Flexibility</li> <li>Low Thermal Resistance</li> <li>Available up to 400 °C</li> <li>Conductive Material</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on one side</li> <li>With strong adhesive tape for putting chassis</li> <li>Withstanding Voltage : 2 kV</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on one side</li> <li>Low thermal resistance comparison with A-A type</li> <li>Withstanding Voltage : 1 kV</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on one side</li> <li>Low thermal resistance comparison with A-A type</li> </ul>
Withstand temperature	400 °C	100 °C	100 °C	100 °C
Standard Size	115 × 180 mm	90 × 115 mm	90 × 115 mm	90 × 115 mm
Maximam size	180 × 230 mm (25 μm to)	115 × 180 mm	115 × 180 mm	115 × 180 mm
100 μm	Part No.	EYGS121810	EYGA091210A	EYGA091210M
	Thickness	100 μm	130 μm	110 μm
70 μm	Part No.	EYGS121807	EYGA091207A	EYGA091207M
	Thickness	70 μm	100 μm	80 μm
50 μm	Part No.	EYGS121805	EYGA091205A	EYGA091205M
	Thickness	50 μm	80 μm	60 μm
40 μm	Part No.	EYGS121804	EYGA091204A	EYGA091204M
	Thickness	40 μm	70 μm	50 μm
25 μm	Part No.	EYGS121803	EYGA091203A	EYGA091203M
	Thickness	25 μm	55 μm	35 μm
17 μm	Part No.	—	EYGA091202A	EYGA091202M
	Thickness	—	47 μm	27 μm
10 μm	Part No.	—	EYGA091201A	EYGA091201M
	Thickness	—	40 μm	20 μm

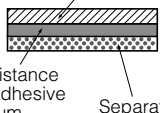
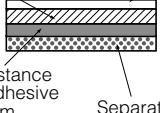
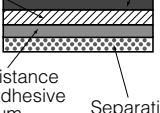
Type	Laminated type (Insulation & Adhesive)			
	A-PA type	A-PM type	A-DM type	A-DF type
Front face	Polyester tape standard type 30 μm	Polyester tape standard type 30 μm	Polyester tape thin type 10 μm	Polyester tape thin type 10 μm
Rear face	Insulative adhesion type 30 μm	Insulative thin adhesion type 10 μm	Insulative thin adhesion type 10 μm	Insulative thin adhesion type 6 μm
Structure				
Features	<ul style="list-style-type: none"> <li>With insulation material on both side</li> <li>Withstanding Voltage PET tape : 4 kV</li> <li>Adhesive Tape : 2 kV</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on both side</li> <li>Withstanding Voltage PET tape : 4 kV</li> <li>Adhesive Tape : 1 kV</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on both side</li> <li>Withstanding Voltage PET tape : 1 kV</li> <li>Adhesive Tape : 1 kV</li> </ul>	<ul style="list-style-type: none"> <li>With insulation material on both side</li> <li>Withstanding Voltage PET tape : 1 kV</li> </ul>
Withstand temperature	100 °C	100 °C	100 °C	100 °C
Standard Size	90 × 115 mm	90 × 115 mm	90 × 115 mm	90 × 115 mm
Maximam size	115 × 180 mm	115 × 180 mm	115 × 180 mm	115 × 180 mm
100 μm	Part No.	EYGA091210PA	EYGA091210PM	EYGA091210DM
	Thickness	160 μm	140 μm	120 μm
70 μm	Part No.	EYGA091207PA	EYGA091207PM	EYGA091207DM
	Thickness	130 μm	110 μm	90 μm
50 μm	Part No.	EYGA091205PA	EYGA091205PM	EYGA091205DM
	Thickness	110 μm	90 μm	70 μm
40 μm	Part No.	EYGA091204PA	EYGA091204PM	EYGA091204DM
	Thickness	100 μm	80 μm	60 μm
25 μm	Part No.	EYGA091203PA	EYGA091203PM	EYGA091203DM
	Thickness	85 μm	65 μm	45 μm
17 μm	Part No.	EYGA091202PA	EYGA091202PM	EYGA091202DM
	Thickness	77 μm	57 μm	37 μm
10 μm	Part No.	EYGA091201PA	EYGA091201PM	EYGA091201DM
	Thickness	70 μm	50 μm	30 μm

\* Please contact our engineering section or factory about to special applications.

\*\* Withstanding Voltage are for reference, not guaranteed.

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.

### ● High heat resistance series (PGS 100, 70, 50, 40, 25, 17, 10 μm)

Type	high heat resistance type		
	A-V type	A-RV type	A-KV type
Front face	–	High heat resistance and insulation type 13 μm	High heat resistance and insulation type 30 μm
Rear face	High heat resistance and insulation adhesion type 18 μm	High heat resistance and insulation adhesion type 18 μm	High heat resistance and insulation adhesion type 18 μm
Structure			
Features	<ul style="list-style-type: none"> <li>With high heat resistance and insulation tape on one side</li> <li>Withstanding Voltage Adhesive tape : 2 kV</li> </ul>	<ul style="list-style-type: none"> <li>With high heat resistance and insulation tape on both side</li> <li>Withstanding Voltage PEEK tape : 2 kV</li> <li>Adhesive tape : 2 kV</li> </ul>	<ul style="list-style-type: none"> <li>With high heat resistance and more insulated tape on both side</li> <li>Withstanding Voltage PI tape : 5 kV</li> <li>Adhesive tape : 2 kV</li> </ul>
Withstand temperature	150 °C	150 °C	150 °C (Polyimide : 180 °C)
Standard Size	90 × 115 mm	90 × 115 mm	90 × 115 mm
Maximum size	115 × 180 mm	115 × 180 mm	115 × 180 mm
100 μm	Part No.	EYGA091210V	EYGA091210KV
	Thickness	118 μm	148 μm
70 μm	Part No.	EYGA091207V	EYGA091207KV
	Thickness	88 μm	118 μm
50 μm	Part No.	EYGA091205V	EYGA091205KV
	Thickness	68 μm	98 μm
40 μm	Part No.	EYGA091204V	EYGA091204KV
	Thickness	58 μm	88 μm
25 μm	Part No.	EYGA091203V	EYGA091203KV
	Thickness	43 μm	73 μm
17 μm	Part No.	EYGA091202V	EYGA091202KV
	Thickness	35 μm	65 μm
10 μm	Part No.	EYGA091201V	EYGA091201KV
	Thickness	28 μm	58 μm

\* Please contact our engineering section or factory about to special applications.

\*\* Withstanding Voltage are for reference, not guaranteed.

**Minimum order**

Item	Type	Part No.	Size	Minimum order
PGS Graphite Sheet Only	S type 100 $\mu$ m	EYGS091210	90×115 mm	20
		EYGS121810	115×180 mm	10
		EYGS182310	180×230 mm	10
	S type 70 $\mu$ m	EYGS091207	90×115 mm	20
		EYGS121807	115×180 mm	10
		EYGS182307	180×230 mm	10
	S type 50 $\mu$ m	EYGS091205	90×115 mm	20
		EYGS121805	115×180 mm	10
		EYGS182305	180×230 mm	10
	S type 40 $\mu$ m	EYGS091204	90×115 mm	20
		EYGS121804	115×180 mm	10
		EYGS182304	180×230 mm	10
	S type 25 $\mu$ m	EYGS091203	90×115 mm	20
		EYGS121803	115×180 mm	10
		EYGS182303	180×230 mm	10
PGS 70, 25, 17 $\mu$ m Adhesive Type [Standard series]	A-A type 70 $\mu$ m	EYGA091207A	90×115 mm	20
		EYGA121807A	115×180 mm	10
	A-A type 25 $\mu$ m	EYGA091203A	90×115 mm	20
		EYGA121803A	115×180 mm	10
	A-A type 17 $\mu$ m	EYGA091202A	90×115 mm	20
		EYGA121802A	115×180 mm	10
	A-M type 70 $\mu$ m	EYGA091207M	90×115 mm	20
		EYGA121807M	115×180 mm	10
	A-M type 25 $\mu$ m	EYGA091203M	90×115 mm	20
		EYGA121803M	115×180 mm	10
	A-M type 17 $\mu$ m	EYGA091202M	90×115 mm	20
		EYGA121802M	115×180 mm	10
PGS 70, 25, 17 $\mu$ m Laminated Type (Insulation & Adhesive) [Standard series]	A-PA type 70 $\mu$ m	EYGA091207PA	90×115 mm	20
		EYGA121807PA	115×180 mm	10
	A-PA type 25 $\mu$ m	EYGA091203PA	90×115 mm	20
		EYGA121803PA	115×180 mm	10
	A-PA type 17 $\mu$ m	EYGA091202PA	90×115 mm	20
		EYGA121802PA	115×180 mm	10
	A-PM type 70 $\mu$ m	EYGA091207PM	90×115 mm	20
		EYGA121807PM	115×180 mm	10
	A-PM type 25 $\mu$ m	EYGA091203PM	90×115 mm	20
		EYGA121803PM	115×180 mm	10
	A-PM type 17 $\mu$ m	EYGA091202PM	90×115 mm	20
		EYGA121802PM	115×180 mm	10
	A-DM type 70 $\mu$ m	EYGA091207DM	90×115 mm	20
		EYGA121807DM	115×180 mm	10
	A-DM type 25 $\mu$ m	EYGA091203DM	90×115 mm	20
		EYGA121803DM	115×180 mm	10
	A-DM type 17 $\mu$ m	EYGA091202DM	90×115 mm	20
		EYGA121802DM	115×180 mm	10

\* A 180×230mm shape is only S type.

(17  $\mu$ m and 10  $\mu$ m do not carry out the correspondence in the one piece of article).

\*\* As for the tape processing, the processing that is similar as for PGS 10  $\mu$ m, 40  $\mu$ m, the 50  $\mu$ m type is possible.

\*\*\* The above-mentioned part number is sample part number for examination.

\*\*\*\* Because adjustment is necessary separately, please refer for the demand of the custom product to us.

\*\*\*\*\* Please consult if the quantity of orders is little.

Item	Type	Part No.	Size	Minimum order
PGS 70, 25, 17 $\mu$ m [High heat resistance type]	A-V type 70 $\mu$ m	EYGA091207V	90×115 mm	20
		EYGA121807V	115×180 mm	10
	A-V type 25 $\mu$ m	EYGA091203V	90×115 mm	20
		EYGA121803V	115×180 mm	10
	A-V type 17 $\mu$ m	EYGA091202V	90×115 mm	20
		EYGA121802V	115×180 mm	10
	A-RV type 70 $\mu$ m	EYGA091207RV	90×115 mm	20
		EYGA121807RV	115×180 mm	10
	A-RV type 25 $\mu$ m	EYGA091203RV	90×115 mm	20
		EYGA121803RV	115×180 mm	10
	A-RV type 17 $\mu$ m	EYGA091202RV	90×115 mm	20
		EYGA121802RV	115×180 mm	10
	A-KV type 70 $\mu$ m	EYGA091207KV	90×115 mm	20
		EYGA121807KV	115×180 mm	10
	A-KV type 25 $\mu$ m	EYGA091203KV	90×115 mm	20
		EYGA121803KV	115×180 mm	10
	A-KV type 17 $\mu$ m	EYGA091202KV	90×115 mm	20
		EYGA121802KV	115×180 mm	10

\* A 180×230mm shape is only S type.

(17  $\mu$ m and 10  $\mu$ m do not carry out the correspondence in the one piece of article).

\*\* As for the tape processing, the processing that is similar as for PGS 10  $\mu$ m, 40  $\mu$ m, the 50  $\mu$ m type is possible.

\*\*\* The above-mentioned part number is sample part number for examination.

\*\*\*\* Because adjustment is necessary separately, please refer for the demand of the custom product to us.

\*\*\*\*\* Please consult if the quantity of orders is little.

## “PGS” (Pyrolytic Graphite Sheet) Heat sink sheet

### Handling Precautions

#### ⚠ Safety Precautions

- When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate their operations when installed in your products.
- 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 significant 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.
- \* Systems equipped with a protection circuit and a protection device
- \* Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault

PGS (Pyrolytic Graphite Sheet) Heat sink sheet (hereafter referred to as PGS) may result in accidents or trouble when subjected to severe conditions of electrical, environmental and /or mechanical stress beyond the specified “Rating” and specified “Conditions” found in the Specifications. Please follow the recommendations in “Safety Precautions” and “Application Notes”. Contact our engineering staff or the factory with any questions.

#### 1. ⚠ Safety Precautions

- 1.1 The PGS shall be used within the specified operating temperature range.
- 1.2 The PGS is soft, do not rub or touch it with rough materials to avoid scratching it.
- 1.3 Lines or folds in the PGS may affect thermal conductivity.
- 1.4 The PGS shall not be used with acid.  
The PGS shall not be used in contact with a soldering iron at 400 °C or more
- 1.5 The PGS shall not be exposed to salt water or direct sunlight during use. The PGS shall not be used in corrosive gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia etc.).
- 1.6 Our PGS has been developed for general industry applications. Prior to using the PGS for special applications such as medical, work please contact our engineering staff or the factory.
- 1.7 Never touch a PGS during use because it may be extremely hot.

#### 2. Application notes

- 2.1 Use protective materials when handling and/or applying the PGS, do not use items with sharp edges as they might tear or puncture the PGS.
- 2.2 The PGS does not work properly if overheated.
- 2.3 Thermal conductivity is dependant on the way it is used.  
Test the adaptability of PGS to your application before use.
- 2.4 The PGS has conductivity.  
If required, the PGS should be provided insulation.
- 2.5 Long term storage
  - The PGS shall not be stored under severe conditions of salt water, direct sunlight or corrosive gases (hydrogen sulfide, sulfurous acid, chlorine, ammonia etc.).
  - The PGS shall not be stored near acid.

#### <Package markings>

Package markings include the product number, quantity, and country of origin.  
In principle, the country of origin should be indicated in English.