



Pyrolytic Graphite Sheet

The Future of Thermal Management

You are the visionaries. The engineers. The designers. The architects of the next dimension. We are the makers of your building blocks. Panasonic manufactures products that efficiently diffuse heat in today's world of compact electronic devices. With Panasonic Electronic Components, enter the next dimension of thermal management.

1-800-344-2112
www.panasonic.com/pgs

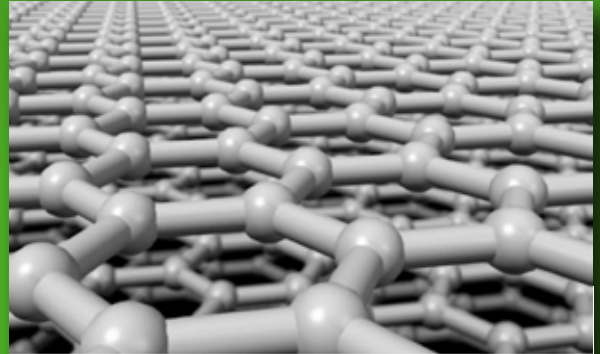


Pyrolytic Graphite Sheet

Panasonic has achieved the thermal management solution to today's requirement for efficient heat diffusion in compact electronic devices. As designs require greater functionality and higher levels of performance in lighter, thinner, shorter and smaller devices, thermal management solutions become more challenging. For today's extreme thermal management conditions, specify Panasonic's Pyrolytic Graphite Sheet – PGS.

What is **PGS**?

PGS is an ultra-thin, lightweight, graphite film with a thermal conductivity high enough to release and diffuse the heat generated by heat sources such as CPU's, processors, power amplifiers and cameras. Developed by Panasonic engineers, this synthetically made material was named Pyrolytic Graphite Sheet or PGS. With a thermal conductivity up to four times greater than copper, PGS is extremely pliable and can be applied to heat-source shapes even in high-density mounting situations.



The high conductivity and flexibility of PGS are based on the nature of the crystalline structure and technology developed by Panasonic.

PGS Thermal Management Options

Ideal for providing thermal management / heat-spreading in limited spaces or as supplemental heat-sink interface in addition to conventional means, PGS is light-weight, flexible and can even be cut into customizable shapes to protect any electronic device.

Standard Pyrolytic Graphite Sheets provide excellent thermal conductivity that can withstand temperatures up to 400°C! PGS is also available with additional adhesives and laminants to provide extreme high heat resistance, insulation and stability within an application. Please review the PGS Selection Guide in this brochure for complete details.

PGS Features At-A-Glance

- Thermal Conductivity: 700 to 1750 W/(m-K)
- Offers thermal conductivity two to four times that of copper, three to seven times that of aluminum
- Lightweight: specific gravity of 0.85 to 2.1 g/cm³
- Flexible and easy to cut or trim
- Withstands repeated bending
- Low thermal resistance
- RoHS directive compliant

Plain PGS Sheets are now available with individual separator sheets, which provide ease in handling!



Exceptional Design Support and **PGS** Custom Solutions

Panasonic engineers are available to provide design in assistance and will work to provide custom thermal management solutions utilizing PGS technology when standard product is not enough to insure device safety and functionality. Contact your Panasonic sales representative for more information.

Standard PGS Types

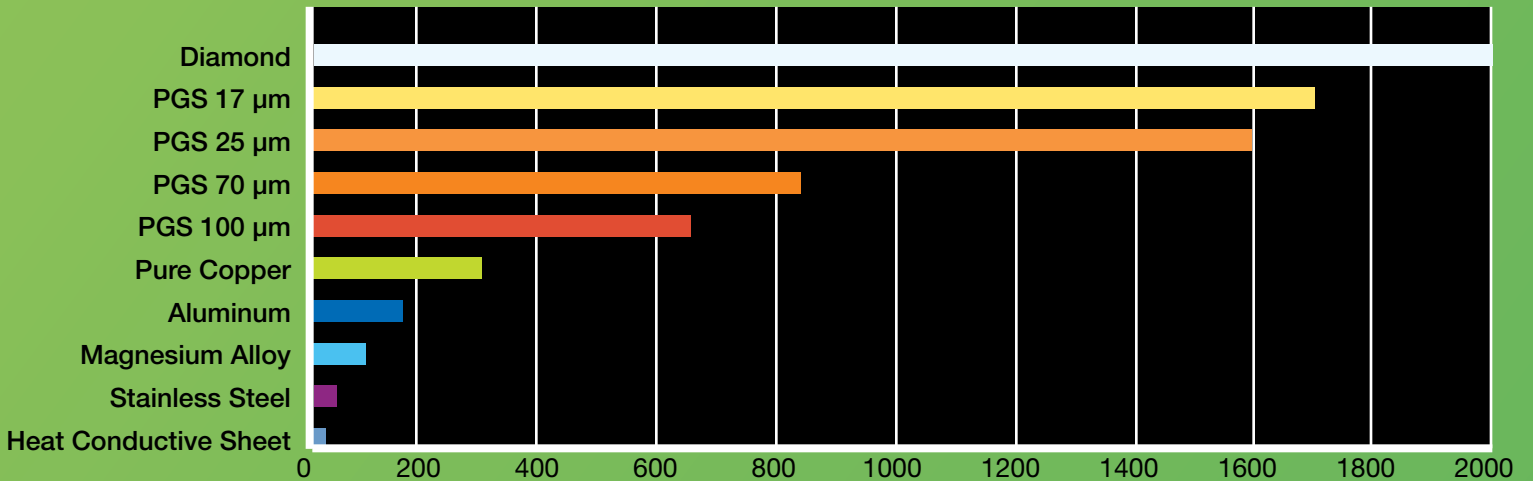
Type	PGS Only	Adhesive Types		Laminated Types (Insulation + Adhesive)		
	S Type	A-A Type	A-M Type	A-PA Type	A-PM Type	A-DM Type
Front Face	—	—	—	Polyester Tape Standard Type 30 μm	Polyester Tape Standard Type 30 μm	Polyester Tape Thin Type 10 μm
Rear Face	—	Insulative Adhesion Type: 30 μm	Insulative Thin Adhesion Type: 10 μm	Insulative Adhesion Type: 30 μm	Insulative Thin Adhesion Type: 10 μm	Insulative Thin Adhesion Type: 10 μm
Structure						
Features	<ul style="list-style-type: none"> - High Thermal Conductivity - High Flexibility - Low Thermal Resistance - Available Up to 400°C - Conductive Material 	<ul style="list-style-type: none"> - With Insulation Material on One Side - With Strong Adhesive Tape for Putting Chassis - Withstanding Voltage: 2 kV 	<ul style="list-style-type: none"> - With Insulation Material on One Side - Low Thermal Resistance Comparison with A-A Type - Withstanding Voltage: 1 kV 	<ul style="list-style-type: none"> - With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 4 kV - Adhesive Tape: 2 kV 	<ul style="list-style-type: none"> - With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 4 kV - Adhesive Tape: 1 kV 	<ul style="list-style-type: none"> - With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 1 kV - Adhesive Tape: 1 kV
Withstand Temperature	400°C	100°C	100°C	100°C	100°C	100°C
Standard Size	115 x 180 mm	90 x 115 mm	90 x 115 mm	90 x 115 mm	90 x 115 mm	90 x 115 mm
Maximum Size	180 x 230 mm 150 x 180 mm (25μm)	115 x 180 mm	115 x 180 mm	115 x 180 mm	115 x 180 mm	115 x 180 mm

High Heat Resistance PGS Types

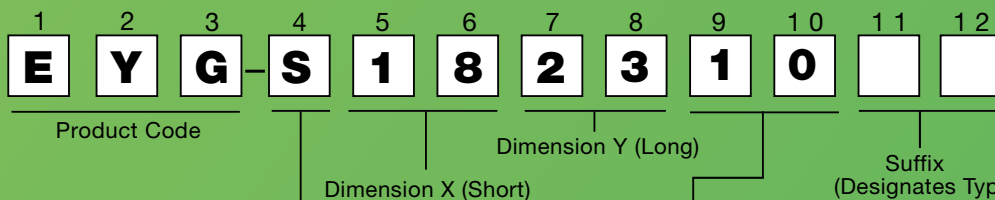
Type	A-V Type	A-RV Type	A-KV Type
Front Face	—	High Heat Resistance and Insulation Type 13 μm	High Heat Resistance and Insulation Type 30 μm
Rear Face	High Heat Resistance and Insulation Adhesive Type: 18 μm	High Heat Resistance and Insulation Adhesive Type: 18 μm	High Heat Resistance and Insulation Adhesive Type: 18 μm
Structure			
Features	<ul style="list-style-type: none"> - With High Heat resistance and Insulation Tape on One Side - Withstanding Voltage Adhesive Tape: 2 kV 	<ul style="list-style-type: none"> - With High Heat resistance and Insulation Tape on Both Sides - Withstanding Voltage PEEK Tape: 2 kV - Adhesive tape: 2 kV 	<ul style="list-style-type: none"> - With High Heat resistance and More Insulated Tape on Both Sides - Withstanding Voltage PI Tape: 5 kV - Adhesive tape: 2 kV
Withstand Temperature	150°C	150°C	150°C (Polyimide: 180°C)
Standard Size	90 x 115 mm	90 x 115 mm	90 x 115 mm
Maximum Size	115 x 180 mm	115 x 180 mm	115 x 180 mm

Characteristics		Specifications			
Thickness		0.10 ± 0.03 mm	0.07 ± 0.015 mm	0.025 ± 0.010 mm	0.017 ± 0.005 mm
Density		0.85 g/cm ³	1.1 g/cm ³	2.1 g/cm ³	2.10 g/cm ³
Thermal Conductivity		600 to 800 W/(m·K)	750 to 950 W/(m·K)	1500 to 1700 W/(m·K)	1750 W/(m·K)
Electrical Conductivity		10000 S/cm	10000 S/cm	20000 S/cm	20000 S/cm
Extensional Strength		19.6 MPa	22.0 MPa	30.0 MPa	40.0 MPa
Expansion Coefficient	a-b plane	9.3 x 10 ⁻⁷ 1/K	9.3 x 10 ⁻⁷ 1/K	9.3 x 10 ⁻⁷ 1/K	9.3 x 10 ⁻⁷ 1/K
	c axis	3.2 x 10 ⁻⁵ 1/K	3.2 x 10 ⁻⁵ 1/K	3.2 x 10 ⁻⁵ 1/K	3.2 x 10 ⁻⁵ 1/K
Heat Resistance		400°C			
Bending (Angle 180, R5)		10000 Cycles			

High Thermal Conductivity



Part Number Information



Style	Description
S	PGS Only
A	Taping
C	Coating
M	Other Materials Laminated

Thickness (mm)	Digit
0.1	10
0.07	07
0.025	03
0.017	02

Suffix	Description
SP	PGS Only with Separator Sheets
A	Adhesive Types
M	
PA	
PM	Laminated Types
DM	
V	High Heat Resistance
RV	
KV	



Selection Guide

Type	Thickness	Part Number	Sheet Size
S-Type Graphite Sheet Only	100 µm	EYG-S091210 *	90 x 115
		EYG-S121810 *	115 x 180
		EYG-S182310 *	180 x 230
	70 µm	EYG-S091207 *	90 x 115
		EYG-S121807 *	115 x 180
		EYG-S182307 *	180 x 230
	25 µm	EYG-S091203 *	90 x 115
		EYG-S121803 *	115 x 180
	A-A Type Graphite Sheet With Acrylic Adhesive	70 µm	EYG-A091207A
EYG-A121807A			115 x 180
25 µm		EYG-A091203A	90 x 115
		EYG-A121803A	115 x 180
17 µm		EYG-A091202A	90 x 115
		EYG-A121802A	115 x 180
A-M Type Graphite Sheet With Thin Acrylic Adhesive	70 µm	EYG-A091207M	90 x 115
		EYG-A121807M	115 x 180
	25 µm	EYG-A091203M	90 x 115
		EYG-A121803M	115 x 180
	17 µm	EYG-A091202M	90 x 115
		EYG-A121802M	115 x 180
A-PA Type Graphite Sheet With Acrylic Adhesive and Polyester Tape	70 µm	EYG-A091207PA	90 x 115
		EYG-A121807PA	115 x 180
	25 µm	EYG-A091203PA	90 x 115
		EYG-A121803PA	115 x 180
	17 µm	EYG-A091202PA	90 x 115
		EYG-A121802PA	115 x 180
A-PM Type Graphite Sheet With Thin Acrylic Adhesive and Polyester Tape	70 µm	EYG-A091207PM	90 x 115
		EYG-A121807PM	115 x 180
	25 µm	EYG-A091203PM	90 x 115
		EYG-A121803PM	115 x 180
	17 µm	EYG-A091202PM	90 x 115
		EYG-A121802PM	115 x 180
A-DM Type Graphite Sheet With Thin Acrylic Adhesive and Thin Polyester Tape	70 µm	EYG-A091207DM	90 x 115
		EYG-A121807DM	115 x 180
	25 µm	EYG-A091203DM	90 x 115
		EYG-A121803DM	115 x 180
	17 µm	EYG-A091202DM	90 x 115
		EYG-A121802DM	115 x 180
A-V Type Graphite Sheet With High Heat Resistant Acrylic Adhesive	70 µm	EYG-A091207V	90 x 115
		EYG-A121807V	115 x 180
	25 µm	EYG-A091203V	90 x 115
		EYG-A121803V	115 x 180
	17 µm	EYG-A091202V	90 x 115
		EYG-A121802V	115 x 180
A-RV Type Graphite Sheet With High Heat Resistant Acrylic Adhesive and PEEK Tape	70 µm	EYG-A091207RV	90 x 115
		EYG-A121807RV	115 x 180
	25 µm	EYG-A091203RV	90 x 115
		EYG-A121803RV	115 x 180
	17 µm	EYG-A091202RV	90 x 115
		EYG-A121802RV	115 x 180
A-KV Type Graphite Sheet With High Heat Resistant Acrylic Adhesive and Polyimide Tape	70 µm	EYG-A091207KV	90 x 115
		EYG-A121807KV	115 x 180
	25 µm	EYG-A091203KV	90 x 115
		EYG-A121803KV	115 x 180
	17 µm	EYG-A091202KV	90 x 115
		EYG-A121802KV	115 x 180

* NEW! For ease of handling, order standard EYG-S Type PGS Sheets, individually packed with paper separators, by adding a SP suffix to the part number

Pyrolytic Graphite Sheet



Visit www.panasonic.com/pgs

Visit Panasonic's interactive website portal for quick and easy access to everything PGS! Complete PGS product details, thermal conductivity simulation and comparison data, flexibility testing, live product video demonstrations and much more!

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