

Panasonic

Pyrolytic Graphite Sheet

The Advanced Thermal Management Solution For Today's Designs

Thermal management has long been a battle waged by design engineers. As the size of devices are decreasing, with power consumption increasing, the common methods of heat transfer are failing to meet today's designs.

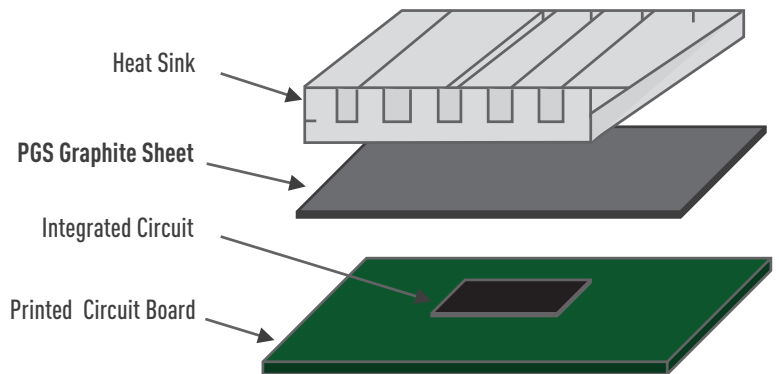
To address today's Thermal Management requirements, Panasonic has developed an advanced heat spreading material called Pyrolytic Graphite Sheet or PGS. Designed for thermal management/heat-sinking in limited spaces or to provide supplemental heat-sinking in addition to conventional means, PGS is the ultimate extreme Thermal Management Solution!

1-800-344-2112
na.industrial.panasonic.com/PGS



WHAT IS PGS?

PGS is an ultra-thin, lightweight, graphite polymer film with a thermal conductivity high enough to release and diffuse the heat generated by heat sources such as processors, power amplifiers and batteries. Developed by Panasonic engineers, this synthetically made material was named Pyrolytic Graphite Sheet or PGS. With a thermal conductivity up to five times greater than copper, PGS is extremely pliable and can be applied to heat-source shapes in high-density mounting situations. Ideal for providing thermal management / heat-sinking in limited spaces or as supplemental heat-sink protection in addition to conventional means, PGS is light-weight, flexible and can be cut into customizable shapes to protect any electronic device.



PGS THERMAL MANAGEMENT OPTIONS

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



PGS FEATURES AT-A-GLANCE

- Thermal Conductivity: 700 to 1950 W/(m-K)
- Offers Thermal Conductivity Two to Five Times as High as Copper, Three to Eight Times as High as Aluminum
- High Stability, No Deterioration With Age
- Simultaneous Solution For Thermal and Electromagnetic Wave Problems
- Thin, Flexible and Easy to Cut or Trim
- Withstands Repeated Bending
- Low Thermal Resistance
- RoHS and REACH Compliant

SELECTION GUIDE

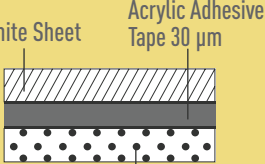
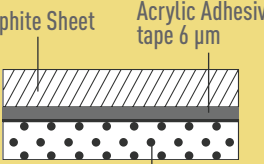
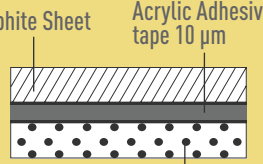
	SIZE	10μm	17μm	25μm	40μm	50μm	70μm	100μm
S-Type	90×115 mm			EYG-S091203	EYG-S091204	EYG-S091205	EYG-S091207	EYG-S091210
	115×180 mm			EYG-S121803	EYG-S121804	EYG-S121805	EYG-S121807	EYG-S121810
	180×230 mm				EYG-S182304	EYG-S182305	EYG-S182307	EYG-S182310
A-A Type	90×115 mm	EYG-A091201A	EYG-A091202A	EYG-A091203A	EYG-A091204A	EYG-A091205A	EYG-A091207A	
	115×180 mm	EYG-A121801A	EYG-A121802A	EYG-A121803A	EYG-A121804A	EYG-A121805A	EYG-A121807A	
A-F Type*	90×115 mm	EYG-A091201F	EYG-A091202F		EYG-A091204F	EYG-A091205F		
	115×180 mm	EYG-A121801F	EYG-A121802F		EYG-A121804F	EYG-A121805F		
A-M Type	90×115 mm	EYG-A091201M	EYG-A091202M	EYG-A091203M	EYG-A091204M	EYG-A091205M	EYG-A091207M	
	115×180 mm	EYG-A121801M	EYG-A121802M	EYG-A121803M	EYG-A121804M	EYG-A121805M	EYG-A121807M	
A-DF Type*	90×115 mm	EYG-A091201DF	EYG-A091202DF		EYG-A091204DF	EYG-A091205DF		
	115×180 mm	EYG-A121801DF	EYG-A121802DF		EYG-A121804DF	EYG-A121805DF		
A-PA Type	90×115 mm	EYG-A091201PA	EYG-A091202PA	EYG-A091203PA	EYG-A091204PA	EYG-A091205PA	EYG-A091207PA	
	115×180 mm	EYG-A121801PA	EYG-A121802PA	EYG-A121803PA	EYG-A121804PA	EYG-A121805PA	EYG-A121807PA	
A-PM Type	90×115 mm	EYG-A091201PM	EYG-A091202PM	EYG-A091203PM	EYG-A091204PM	EYG-A091205PM	EYG-A091207PM	
	115×180 mm	EYG-A121801PM	EYG-A121802PM	EYG-A121803PM	EYG-A121804PM	EYG-A121805PM	EYG-A121807PM	
A-DM Type	90×115 mm	EYG-A091201DM	EYG-A091202DM	EYG-A091203DM	EYG-A091204DM	EYG-A091205DM	EYG-A091207DM	
	115×180 mm	EYG-A121801DM	EYG-A121802DM	EYG-A121803DM	EYG-A121804DM	EYG-A121805DM	EYG-A121807DM	
A-V Type	90×115 mm	EYG-A091201V	EYG-A091202V	EYG-A091203V	EYG-A091204V	EYG-A091205V	EYG-A091207V	
	115×180 mm	EYG-A121801V	EYG-A121802V	EYG-A121803V	EYG-A121804V	EYG-A121805V	EYG-A121807V	
A-RV Type	90×115 mm	EYG-A091201RV	EYG-A091202RV	EYG-A091203RV	EYG-A091204RV	EYG-A091205RV	EYG-A091207RV	
	115×180 mm	EYG-A121801RV	EYG-A121802KV	EYG-A121803RV	EYG-A121804RV	EYG-A121805RV	EYG-A121807RV	
A-KV Type	90×115 mm	EYG-A091201KV	EYG-A091202KV	EYG-A091203KV	EYG-A091204KV	EYG-A091205KV	EYG-A091207KV	
	115×180 mm	EYG-A121801KV	EYG-A121802KV	EYG-A121803KV	EYG-A121804KV	EYG-A121805KV	EYG-A121807KV	

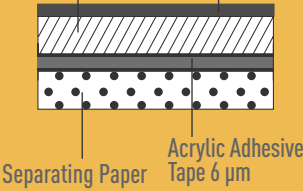
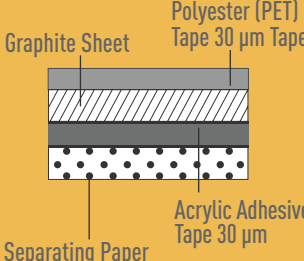
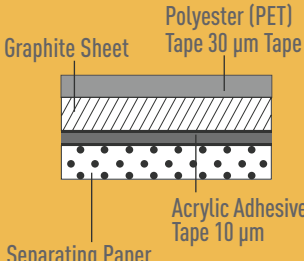
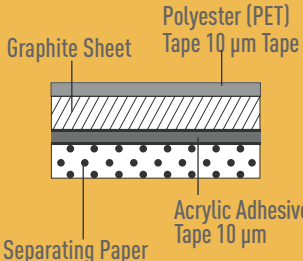
*For Part Number Information, Please Reference The PGS Datasheet at na.industrial.panasonic.com/PGS

CHARACTERISTICS

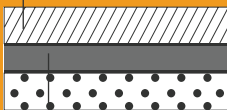
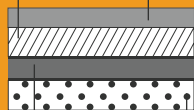
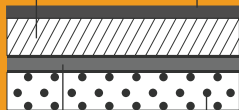
Characteristics	Units	100um	70um	50um	40um	25um	17um	10um
Thickness	mm	0.1	0.07	0.05	0.04	0.025	0.017	0.01
Density	g/cm^3	0.85	1.21	1.7	1.8	1.9	2.1	2.13
Thermal Conductivity (a-b plane)	W/(m-K)	700	1000	1300	1350	1600	1850	1950
Electrical Conductivity	S/cm	10,000	10,000	10,000	10,000	20,000	20,000	20,000
Extensional Strength	Mpa	20	20	20	25	30	40	40
Heat Resistance	"Degrees Celsius"	400°C						
Bending Angle (Radius 5mm, Angle 180)	"Number of Cycles"	10,000						

STANDARD PGS TYPES

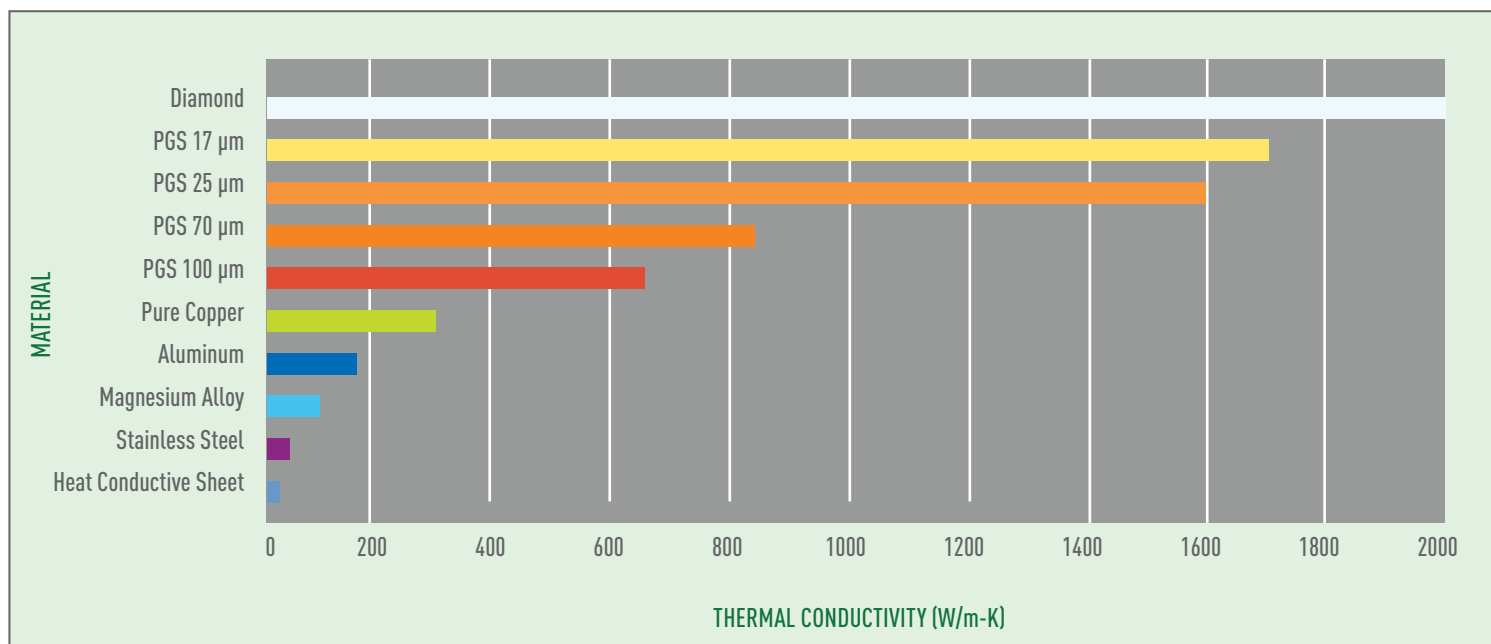
TYPE	PGS ONLY	ADHESIVE TYPES		
	S TYPE	A-A TYPE	A -F TYPE	A-M TYPE
REAR FACE		Insulative Adhesion Type: 30 µm	Insulative thin adhesion Type 6 µm	Insulative Thin Adhesion Type: 10 µm
STRUCTURE	 Graphite Sheet	 Graphite Sheet Acrylic Adhesive Tape 30 µm Separating Paper	 Graphite Sheet Acrylic Adhesive tape 6 µm Separating Paper	 Graphite Sheet Acrylic Adhesive tape 10 µm Separating Paper
FEATURES	- High Thermal Conductivity - High Flexibility - Low Thermal Resistance - Conductive Material	- With Insulation Material on One Side - With Strong Adhesive Tape - Withstanding Voltage: 2 kV	- With Insulation Material on One Side - Low Thermal Resistance compared with A-A Type	- With Insulation Material on One Side - Low Thermal Resistance Compared with A-A Type - Withstanding Voltage: 2 kV
WITHSTAND TEMPERATURE	400° C	100° C	100° C	100° C
STANDARD SIZE	115 x 180mm	90 x 115mm	90 x 115 mm	90 x 115mm
MAXIMUM SIZE	180 x 230mm 150 x 180mm (25µm)	115 x 180mm	115 x 180 mm	115 x 180mm

TYPE	LAMINATED TYPES (INSULATION AND ADHESIVE)			
	A-DF TYPE	A-PA TYPE	A-PM TYPE	A-DM TYPE
FRONT FACE	Polyester Tape Standard Type 10 µm	Polyester Tape Standard Type 30 µm	Polyester Tape Standard Type 30 µm	Polyester Tape Thin Type 10 µm
REAR FACE	Insulative Thin Adhesion Type 6 µm	Insulative Adhesion Type: 30 µm	Insulative Thin Adhesion Type: 10 µm	Insulative Thin Adhesion Type: 10 µm
STRUCTURE	 Graphite Sheet Polyester (PET) Tape 10 µm Acrylic Adhesive Tape 6 µm Separating Paper	 Graphite Sheet Polyester (PET) Tape 30 µm Acrylic Adhesive Tape 30 µm Separating Paper	 Graphite Sheet Polyester (PET) Tape 30 µm Acrylic Adhesive Tape 10 µm Separating Paper	 Graphite Sheet Polyester (PET) Tape 10 µm Acrylic Adhesive Tape 10 µm Separating Paper
FEATURES	- With Insulation Material on Both Sides - Withstanding Voltage: PET tape : 1 kV	- With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 4 kV - Adhesive Tape: 2 kV	- With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 4 kV - Adhesive Tape: 1 kV	- With Insulation Material on Both Sides - Withstanding Voltage: PET Tape: 1 kV - Adhesive Tape: 1 kV
WITHSTAND TEMPERATURE	100°C	100°C	100°C	100°C
STANDARD SIZE	90 x 115mm	90 x 115mm	90 x 115mm	90 x 115mm
MAXIMUM SIZE	115 x 180mm	115 x 180mm	115 x 180mm	115 x 180mm

HIGH HEAT RESISTANCE PGS TYPES

TYPE	A-V TYPE	A-RV TYPE	A-KV TYPE
FRONT FACE		High Heat Resistance and Insulation 13 μm	High Heat Resistance and Insulation 30 μm
REAR FACE	High Heat Resistant Adhesive Type: 18 μm	High Heat Resistant and Insulative Adhesive Type: 18 μm	High Heat Resistant and Insulative Adhesive Type: 18 μm
STRUCTURE	Graphite Sheet  High Resistant Acrylic Adhesive Tape 18 μm Separating Paper	Graphite Sheet  High Resistant PEEK Tape 13 μm High Resistant Acrylic Adhesive Tape 18 μm Separating Paper	Graphite Sheet  Polymide Tape 18 μm High Resistant Acrylic Adhesive Tape 18 μm Separating Paper
FEATURES	- With High Heat Resistant Adhesive Tape on One Side - Withstanding Voltage: Adhesive Tape: 2 kV	- With High Heat Resistant Adhesive and Insulative Tapes - Withstanding Voltage: PEEK Tape: 2 kV Adhesive Tape: 2 kV	- With High Heat Resistant and Insulative Tapes - Withstanding Voltage PI Tape: 5 kV Adhesive Tape: 2 kV
WITHSTAND TEMPERATURE	150° C	150° C	150° C
STANDARD SIZE	90 x 115mm	90 x 115mm	90 x 115mm
MAXIMUM SIZE	115 x 180mm	115 x 180mm	115 x 180mm

HIGH THERMAL CONDUCTIVITY



EXPANDED THICKNESS OPTIONS AND NEW SEMI-SEALING MATERIAL (SSM) NOW AVAILABLE!

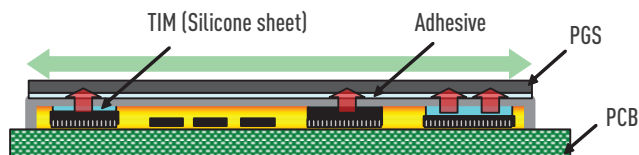
The groundbreaking thermal management material PGS is now available in several new thicknesses. PGS can now be ordered in 10 μm , 17 μm , 25 μm , 40 μm , and 50 μm thicknesses for expanded application coverage.

In addition, Panasonic has introduced a new addition to the PGS family called Semi-Sealing Material (SSM) layer. This is an elastomer layer that helps to facilitate the spread of heat generated by a PC board. Because it is compressible, this SSM layer fills the voids that are inherently present on any circuit board for greater contact with the heat source(s). This new option is ideal for applications where both electrical isolation and thermal management are required.

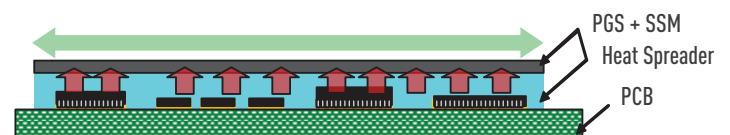


SSM IMPLEMENTATION

BEFORE: Example of current heat solution with PGS



AFTER: New heat solution with PGS and SSM



Panasonic

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