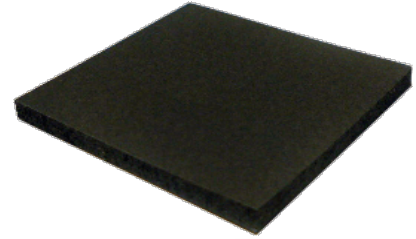


“Graphite-PAD” high thermal conductivity in z-direction

EYGT type



Graphite-PAD is a thermal interface material (TIM) that compatibly obtained excellent thermal conductivity in thickness direction (Z-axis direction) and high flexibility (deformable with a low load). The properties are greater than that of existing TIMs. The product is created by filling PGS Graphite Sheet into silicon resin.

Features

- High thermal conductivity : 13 W/m·K
- Excellent compressibility : 50 % (t=2 mm, Pressure 300 kPa)
- Thermal resistance : fit into uneven parts and provide excellent thermal resistance with a low load
- High reliability : correspond to -40 to 150 °C and maintains long-term reliability
- Thickness range : 0.5, 1.0, 1.5, 2.0, 2.5, 3.0 mm
- RoHS compliant

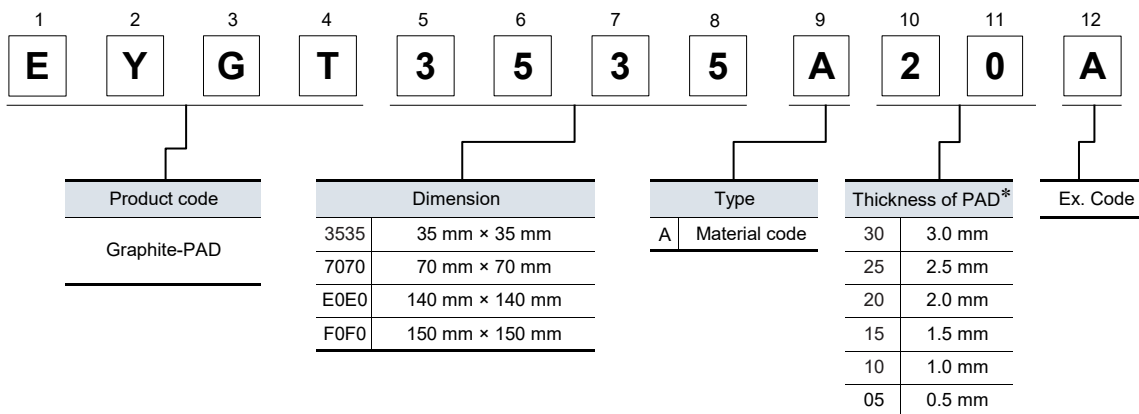
Recommended applications

Cooling of heat generating components, such as electronic devices, semiconductor memory device, etc.

- General-purpose inverter, medical equipment, and DSC
- Car-mounted camera, motor control unit, automotive lighting (LED), car navigation, luminous source of laser HUD
- Base station, IGBT module

Explanation of part numbers

- Graphite-PAD (EYGT*****A)



* E0E0 : 2.0 mm, 2.5 mm, 3.0 mm
F0F0 : 0.5 mm, 1.0 mm, 1.5 mm

** Please confirm other condition separately.

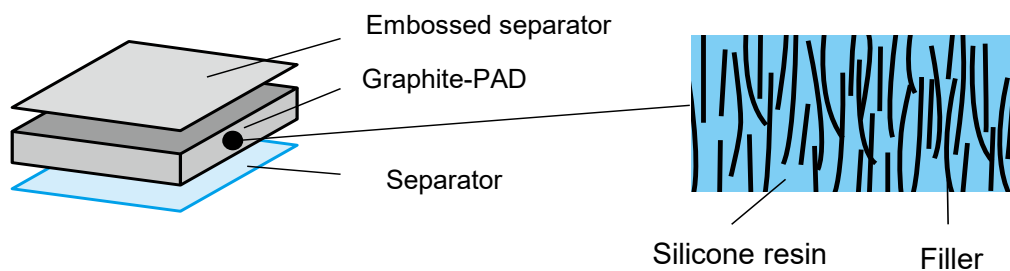
“Graphite-PAD” high thermal conductivity in z-direction

Typical characteristics

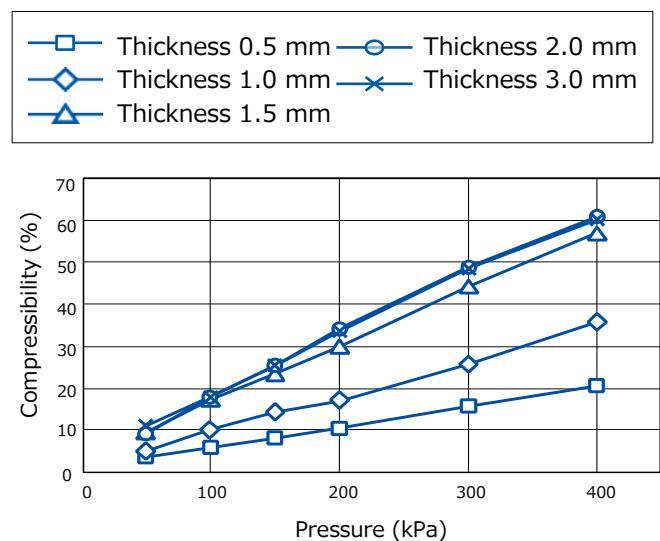
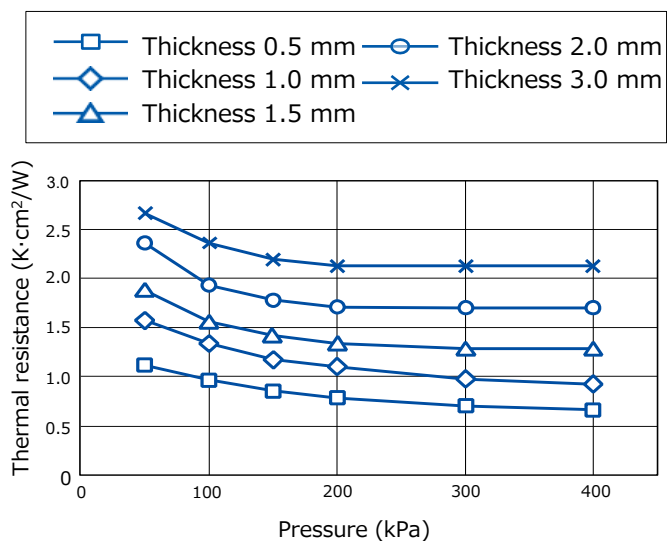
Items	Test equipment/ method	Condition	Data					
Thickness (mm)			0.5	1.0	1.5	2.0	2.5	3.0
Thermal resistance (K·cm ² /W)	TIM Tester	100 kPa	0.96	1.34	1.56	1.93	2.10	2.36
Compressibility (%)	TIM Tester	100 kPa (50 °C)	5.78	10.29	17.46	17.8	17.6	17.9
Thermal conductivity of Graphite-PAD with a unit (W/m·K) <small>(including contact resistance)</small>	TIM Tester	100 kPa	5.08	7.02	7.80	8.60	9.66	10.10
Thermal conductivity of the Graphite-PAD (W/m·K)	(ASTM D5470)	50 kPa	13					
Hardness	(ASTM D2240)	TYPE E	25					
Adhesive			Adhesive on both faces					
Volume resistivity (Ω·cm)	(ASTM D257)		4×10 ⁵					
Operating temperature range (°C)			-40 to 150					
Siloxane		Σ (D4-D10)	≤ 70 ppm					

Typical values, not guaranteed.

Structure

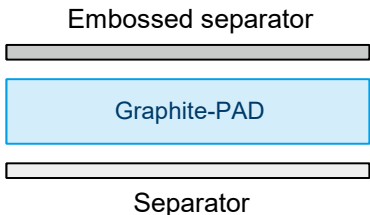


Thermal resistance and compressibility



“Graphite-PAD” high thermal conductivity in z-direction

Composition example

Structure	 <p style="text-align: center;">Embossed separator</p> <p style="text-align: center;">Graphite-PAD</p> <p style="text-align: center;">Separator</p>				
Operating temperature range	-40 °C to 150 °C				
Standard dimension	35 × 35 mm	70 × 70 mm	140 × 140 mm	150 × 150 mm	
0.5 mm	Standard Part No.	EYGT3535A05A	EYGT7070A05A	-	EYGTf0f0A05A
	Thickness	0.5 mm	0.5 mm	-	0.5 mm
1.0 mm	Standard Part No.	EYGT3535A10A	EYGT7070A10A	-	EYGTf0f0A10A
	Thickness	1.0 mm	1.0 mm	-	1.0 mm
1.5 mm	Standard Part No.	EYGT3535A15A	EYGT7070A15A	-	EYGTf0f0A15A
	Thickness	1.5 mm	1.5 mm	-	1.5 mm
2.0 mm	Standard Part No.	EYGT3535A20A	EYGT7070A20A	EYGTE0E0A20A	-
	Thickness	2.0 mm	2.0 mm	2.0 mm	-
2.5 mm	Standard Part No.	EYGT3535A25A	EYGT7070A25A	EYGTE0E0A25A	-
	Thickness	2.5 mm	2.5 mm	2.5 mm	-
3.0 mm	Standard Part No.	EYGT3535A30A	EYGT7070A30A	EYGTE0E0A30A	-
	Thickness	3.0 mm	3.0 mm	3.0 mm	-

- * Above listed Part No. are examples for evaluation and selection, not for mass production.
Customized service available for mass production spec..
- ** Contact us for custom-made samples.
We can make samples in various forms and/or dimensions other than standard samples.

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 Cl₂, H₂S, NH₃, SO₂, or NO_x.
 - (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 Cl₂, H₂S, NH₃, SO₂, 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.