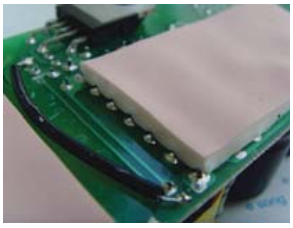
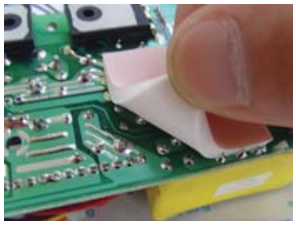
THERMAL INTERFACE MATERIAL

- RoHS compliant
- Excellent thermal conductivity
- Flame retardant

- Made of silicone resin and thermally conductive filler
- Many are inherently tacky and easy to attach
- Thermally conductive PSA is available, if not inherently tacky.

SILICONE PAD TYPE





■ Features

- Highly thermally conductive
- Soft and tacky for close-contact for high conductivity
- Reusable

■ Applications

PDP TV, heat spreader for CPU and CDROM, heatsink for semiconductor, etc.

■ Structure

Thermally conductive silicone is generally tacky in itself and does not require PSA to adhere on a clean even surface.
Some part numbers are not tacky in itself as intended for some applications. PSA is is available as an option.
Tacky silicone types are provided with PET release liner to prevent collecting foreign particles on the surface. Remove the liner after cutting the pad into size to apply the pad on a clean surface.

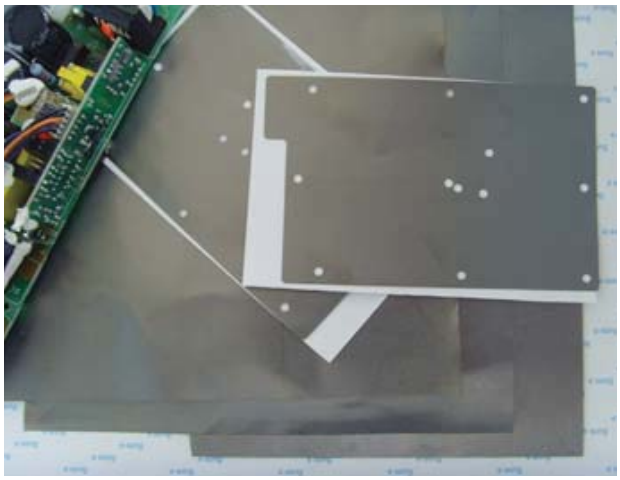
■ Types and specifications

	Part number	Color	Thickness [mm]	Hardness	Thermalconductivity [W/mK]	Operating temp. [° C]	Volume resistivity [Ω · m]
Ultra soft type	THEA710	White	0.5~15	Shore 00 5	1.0	-60~200	Min. $1x10^{11}$
	THEA710H	White	0.5~15	Shore 00 25	1.0	-60~200	Min. $1x10^{11}$
Soft type	THEA715	Gray	0.5~10	Shore 00 50	1.5	-60~200	Min. $1x10^{11}$
	THEA720	Gray	0.5~10	Shore 00 60	2.0	-60~200	Min. $1x10^{11}$
	THEA730	Gray	0.5~10	Shore 00 60	3.0	-60~200	Min. $1x10^{11}$
	THEA750	Gray	0.5~10	Shore 00 65~85	5.0	-60~200	Min. $1x10^{11}$
	THEA770	Gray	0.5~10	Shore 00 65~85	7.0	-60~200	Min. $1x10^{11}$
Hard type	THEA909F	Pink	0.13, 0.23, 0.28	Shore A 85	0.9	-60~180	Min. $2x10^{13}$
	THEA916F	Pink	0.13, 0.23, 0.28	Shore A 90	1.6	-60~180	Min. $5x10^{13}$

Note: Above data is for reference only.
F at the end of part number indicates fiber-glass reinforcement.
Fiber-glass reinforcement is available for all part numbers.
Ultra-thin PET film reinforcement is also available.

E-Song America, Inc., 1360 Pomeroy Ave., Suite 1, Santa Clara, CA 95051 www.esongamerica.com Tel. (408) 466-5446

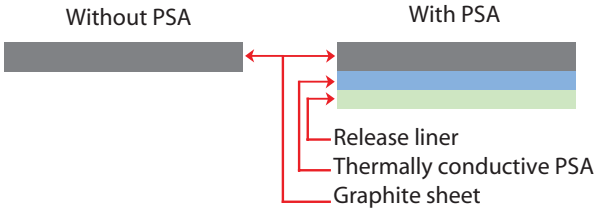
GRAPHITE SHEET



■ Features

- 300 W/mK conductivity in plane, spreading heat energy quickly (heat spreader)
- 6.25 W/mK conductivity through thickness (thermal pad)
- Special coated surface to keep out foreign particles
- High operating temperature
- Corrosion resistant

■ Structure



■ Specifications

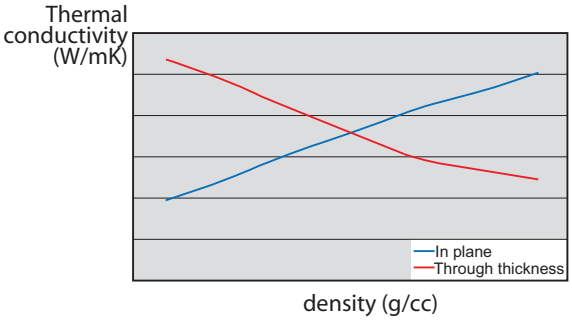
Part number: THGS-PS-300625

	Unit	Value	Test Method
Color		Dark gray	
Restoration	%	≥ 9.0	ASTM F36A
Compression Rate	%	35 ~ 55	ASTM F36A
Tensile Strength	Mpa	> 3.5	JB/T 91412
Thermal Conductivity	W/mK	6.25 / 300 *	ASTM 5470
Thickness	mm	0.2~1.0	
Width	mm	500, 1,000, 1,500	
Length	m	50, 70	

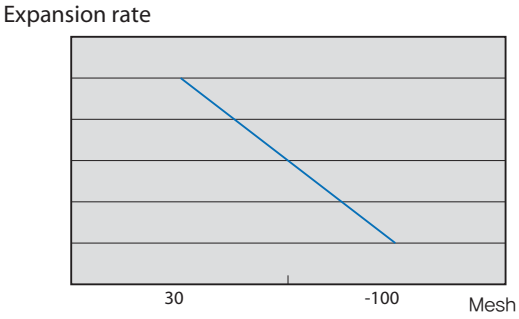
* 6.25 through thickness; 300 in plane

■ Typical performance

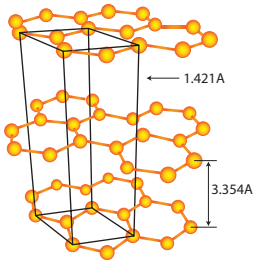
① Correlation between density and thermal conductivity of graphite

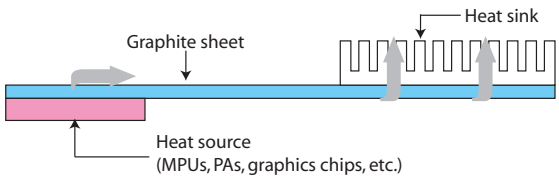


② Correlation between expansion rate factor and thermal conductivity of graphite



■ Graphite Structure





Graphite sheet transfers heat to a remote heatsink when the heatsink cannot mounted on the heat source, due to space limitation.

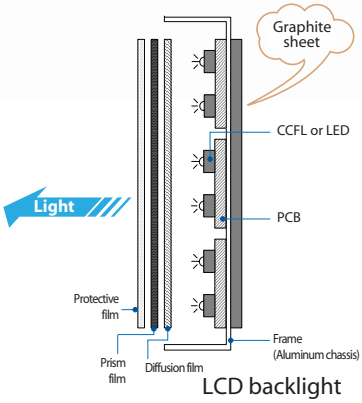
E-Song America, Inc., 1360 Pomeroy Ave., Suite 1, Santa Clara, CA 95051 www.esongamerica.com Tel. (408) 466-5446

■ Usage examples

CPU, SMPS, Power AMP, LCD/PDP TV, etc.

Digital camcorder

TH754G
Graphite sheet



LCD backlight

THERMAL GREASE

■ Feature

- Highly thermally conductive
- Auto-dispensing compatible
- Silk-screen printing compatible
- High use temperature, low outgassing and little weight change in usage

■ Part numbers

THEA-P2100 rated at 2.1W/mK thermal conductivity

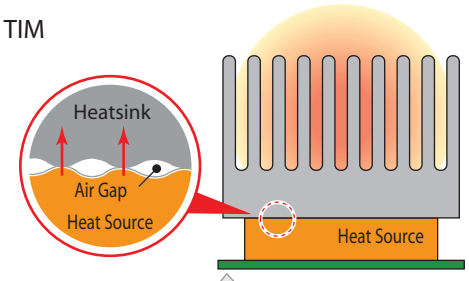
THEA-P4100 rated at 4.1W/mK thermal conductivity.

■ THEA-P4100 Specifications

Property	Unit	THEA-P2100	THEA-P4100
Color		Light Gray	Gray
Thermal Conductivty	W/mK	2.1	4.1
Specific Gravity	At 23℃	2.5	2.9
Viscosity	Pa.s	250	300
Bleed	150C/24h (Wt%)	<0.1	<0.1
Evaporation	150C/24h (Wt%)	0.3	0.3
Volume Resistance	Ω · m	0.05	0.05
Breakdown Voltage	kV/0.25mm	4.1	4.1
Operating Temp.	℃	-50~170	-50~170

ROLE OF THERMAL INTERFACE MATERIAL (TIM) AND MEASURING THERMAL CONDUCTIVITY

■ Role of TIM



The surfaces of CPU and heatsink are not truly flat and there are numerous air gaps where the two furfaces meet. Air gaps hinder transfer of heat from the heat source to the heatsink. The grease fills these air gaps, provides efficient thermal transfer.

■ Heat characteristic evaluation and measuring method

thermal conduvtivity λ

$$Q=\lambda \frac{(T_1-T_2)A}{L} \qquad \lambda=\frac{Q}{A}\frac{L}{(T_1-T_2)}$$

Q: amount of thermal transfer A: area L: length of thermal transfer T_1: high temp. T_2: low temp.

■ Calculation of thermal resistance

Thermal Resistance R

$$R_O=\frac{(T_1-T_2)}{Q}=\frac{L}{\lambda} \qquad R = R_O + R_S$$

R_O: natural thermal resistance R_S: contact thermal resistance

■ How to measure thermal conductivity

Hot Wire Method (JIS R 2616)

The hot wire method is used for unhardened product(oil compound). Probe(hot wire and thermocouple) on the insulation layer on the sample measure thermal conductivity according to flow changes, voltage, current and time.

Evaluating the Resistance to Thermal Transmission of Materials by the Guarded Heat Flow Meter Technique (ASTM E-1530)

This method is used for hardened products (ie. rubber, RTV rubber, gel, etc.) After inserting sample and measuring probe between heat-source and heatsink, thermal conductivity is calculated based on the differences in temperature and heat flow.

E-Song America, Inc., 1360 Pomeroy Ave., Suite 1, Santa Clara, CA 95051 www.esongamerica.com Tel. (408) 466-5446