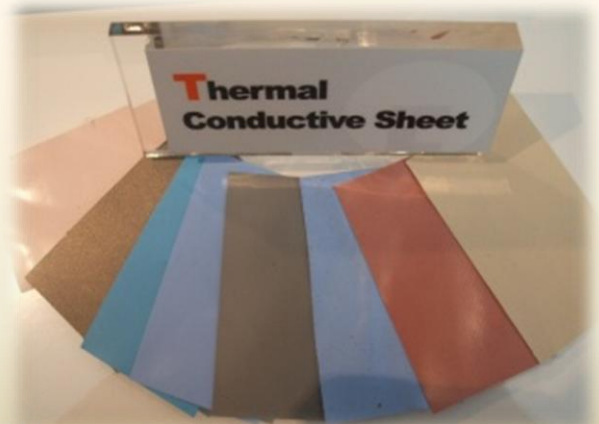
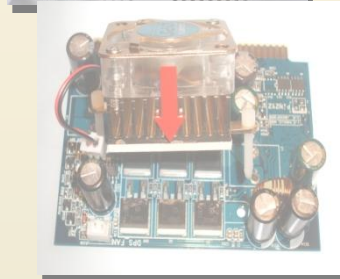
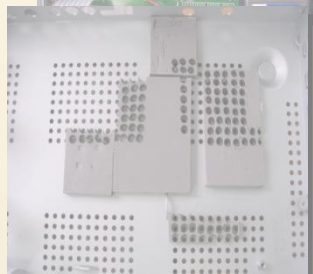
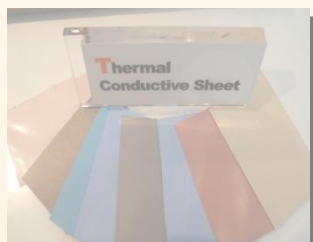


Quick Cooler

Thermal Conductive Sheet



CSC's Thermal interface materials are compound materials which contain a high thermal conductive fillers and high heat-resistant silicone resins. They are used in various fields of having thermal problems. Also, CSC's new products, having two properties, high thermal conductivity and EMI absorbing, are applied to high-tech industries. CSC can provide the solutions of thermal problems.



High-Hardness Thermal interface Silicone Pad Series

TP-H1000 : Low Thermal Conductivity (0.5~1.5 W/mK)

TP-H2000 : Medium Thermal Conductivity (2.0~2.5 W/mK)

TP-H3000 : High Thermal Conductivity (≥ 3.0 W/mK)

Low-Hardness Thermal interface Silicone Pad Series

TP-S1000 : Low Thermal Conductivity (1.0 W/mK)

TP-S2000 : High Thermal Conductivity (2.0~2.5 W/mK)

TP-S3000 : Specially High Thermal Conductivity (≥ 3.0 W/mK)

Thermal + EMI Absorbing Hybrid Pad Series

Siloxane & Halogen Free

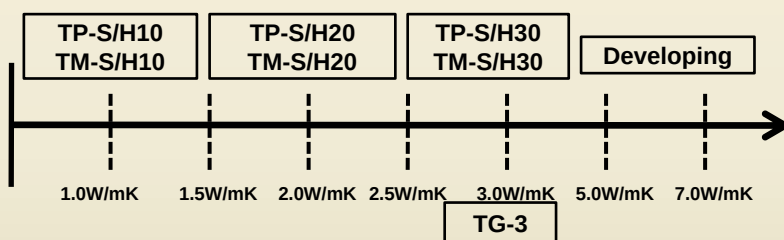
TM-S1500 : Soft Type Low Thermal Conductivity (1.5 W/mK)

TM-H2000 : Hard Type Medium Thermal Conductivity (2.5 W/mK)

Thermal Grease Series

TG-3 : Medium Thermal Conductivity (3.0 W/mK)

Section



T(X) - (S/H) 0000

T : Changsung Thermal Solution

X : Product Type

P - Pad type

M - Hybrid type

G - Grease type

S/H : Sheet Type

S - Low hardness type

H - High hardness type

0000 : Thermal

Conductivity/Thickness

ex) 1010 : 1W/mK, 1.0mm(T)

3015 : 3W/mK, 1.5mm(T)

TP [Thermal Interface Material] Series

Description & Applications

TP-H[High-Hardness] is designed as a cost effective thermally conductive material. The soft and conformable property allows the pad to apply to various heating devices. Primary use is to electrically isolate power sources from heat sinks.

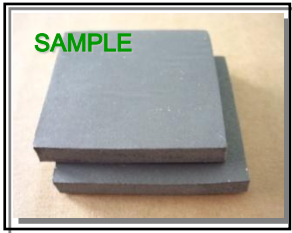
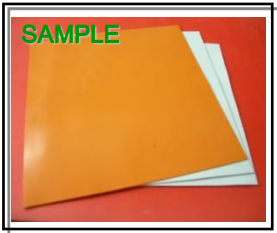
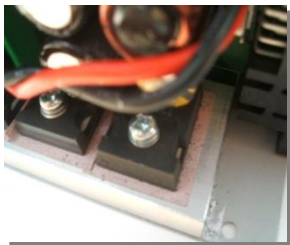
- Power Electronics (SMPS, Converter)
- Automotive Electronics (ABS)
- Power Semiconductors

TP-S[Low-Hardness] gel type has a very low hardness and is specially designed for the shock absorbing and vibration dampening applications. The soft and self sticky property allows the pads to apply to large sized heat dissipating devices.

- Telecommunication Devices (Router)
- Power Industries (SMPS)
- Flat Panel Displays (PDP, LCD)

Main Features

- Thermal conductivity = 1.0 ~ 3.0 W/mK
- Enhanced mechanical properties
- Conformable hardness
- Electrically insulating
- Thermal conductivity = 1.0 ~ 3.0 W/mK
- Self sticky properties
- Very low hardness
- Electrically insulating



Specifications

Item	TP-H1000	TP-H2000	TP-H3000	TP-S1000	TP-S2000	TP-S3000
Mechanical						
Base Polymer	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Color	Blue	Red	Yellow	Black	Gray	Gray
Thickness (mm)	0.2 ~ 5.0	0.2 ~ 5.0	0.2 ~ 5.0	0.2 ~ 5.0	0.2 ~ 5.0	0.2 ~ 5.0
Standard Size (mm×mm)	210×297	210×297	210×297	210×297	210×297	210×297
Hardness	45(Shore A)	54(Shore A)	79(Shore A)	25(Asker C)	25(Asker C)	25(Asker C)
Tensile Strength (kgf/cm ²)	Min. 38	Min. 27	Min. 16	Min. 2	Min. 2	Min. 2
Use Temp. (°C)	-60°C ~ 200°C	-60°C ~ 200°C	-60°C ~ 200°C	-60°C ~ 200°C	-60°C ~ 200°C	-60°C ~ 200°C
Electrical						
Dielectric Breakdown Voltage (kV)	Min. 6	Min. 6	Min. 6	Min. 2	Min. 2	Min. 2
Volume Resistivity (Ω · cm)	1 × 10 ¹³	1 × 10 ¹³	1 × 10 ¹³	1 × 10 ¹²	1 × 10 ¹²	1 × 10 ¹²
Thermal						
Thermal Conductivity (W/mK)	1	2	3	1	2	3
Flame Rating (UL94)	V-0 [File No. : E258204]					

TM [Dual Thermal & Absorber] Series

Description & Applications

TM-S/H[Hybrid] grades are designed as high thermal conductive and EMI absorbing materials. The high thermal conductivity and EMI absorbing properties allow the pads to apply to various electronic mobile devices, specially suitable for high frequency image transferring digital instruments.

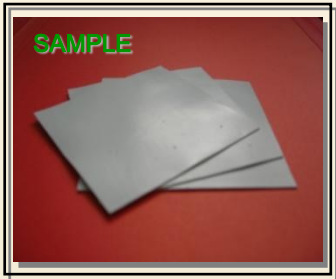
- Camcorders, Digital Cameras
- PDP, LCD devices
- Mobile Phones, DVDs

Main Features

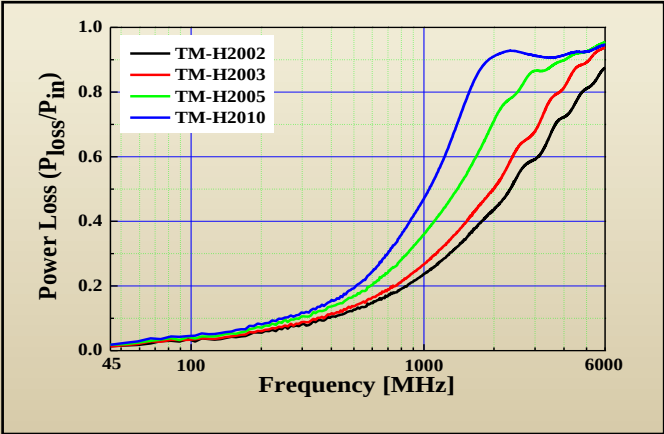
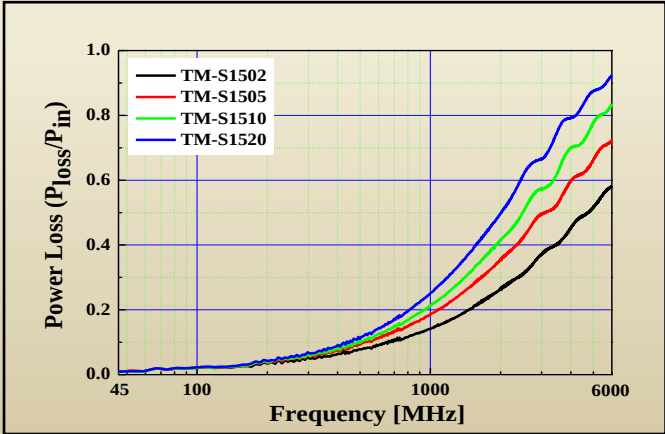
- Thermal conductivity = 1.5 ~ 2.0 W/mK
- High thermal performance
- Power loss = 0.1~0.4 (@ 1 GHz/1 mm(T))
- Electrically insulating
- Siloxane free products

Specifications

Item	TM-S1500	TM-H2000
Mechanical		
Base Polymer	Silicone	Acryl
Color	Gray	Black
Thickness (mm)	0.2 ~ 5.0	0.2 ~ 5.0
Standard Size (mm×mm)	210×297	210×297
Hardness	25(Asker C)	92(Shore A)
Tensile Strength (kgf/cm ²)	Min. 2	Min. 13
Use Temp. (°C)	-60°C ~ 200°C	-40°C ~ 130°C
Electrical		
Dielectric Breakdown Voltage (kV)	Min. 6	Min. 6
Volume Resistivity (Ω · cm)	1 × 10 ¹²	1 × 10 ¹²
Applicable Frequency	100MHz ~ 6GHz	100MHz ~ 6GHz
Thermal		
Thermal Conductivity (W/mK)	1.5	2.0
Flame Rating (UL94)	V-0 [File No. : E258204]	



■ Power Loss (by MSL-Method ; IC 62333-2)



Thermal Grease TG-3

Description & Applications

TG-3 thermal grease is a one-component type high thermally conductive compound specially designed. Using fine size fillers, the bond line thickness[BLT] can be minimized under 2 mils. The cross linking of silicone polymer inhibits the pump-out problems.

- Flip Chip Devices (CPU, Memory)
- CPU for Graphic Cards
- High Wattage Packages (Highly Integrated BGA)

Main Features

- High Thermal conductivity = 3.0 W/mK
- Excellent Reworkability
- Short Curing Time and Long Working Time
- Good Reliabilities (Temperature & Humidity)

Specifications

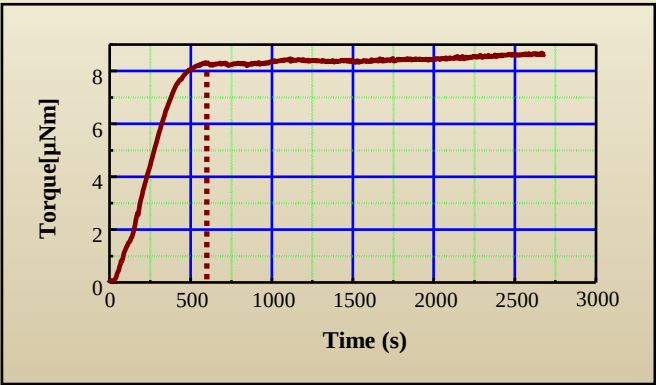
ITEM	TG-3	METHOD
Mechanical		
Viscosity (cps @ 20 rpm)	185,000	Brookfield DV++ #14 Spindle
Color	Gray	Visual
Specific Gravity (g/cc)	2.8	ASTM D792
Curing Condition (°C/min.)	150/10	Rheometer
Working Time (°C/hours)	25/24	Rheometer
Shelf Life (°C/months)	-30/6	Rheometer
Hardness (Shore 00 as cured)	10	ASTM D2240
Coefficient of Thermal Expansion (ppm/°C)	75	TMA
Glass Transition Temperature (°C)	-100	DSC
Use Temperature	-60~200	-
Electrical		
Dielectric Breakdown Voltage (V)	> 6,000	ASTM D149
Volume Resistivity (Ω · cm)	10 ¹³	ASTM D257
Thermal		
Thermal Conductivity (W/mK)	3.2	ASTM C518-98 (Modified)



Curing Profile & Storage Condition

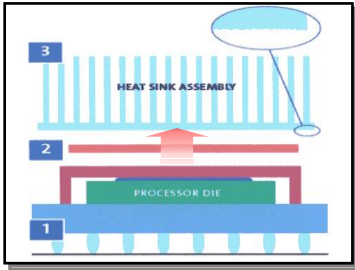
TG-3 thermal grease is specially designed for fast curing. And after complete curing, mechanical properties of the cured compound are not changed. The curing condition can be controlled as to customers request.

The recommended storage condition of TG-3 thermal grease is -10°C ~ -30°C. But preferable condition is -30°C. And in this recommended storage condition, approximately 6 months of shelf life is guaranteed.



Introduction to Thermal Interface Material

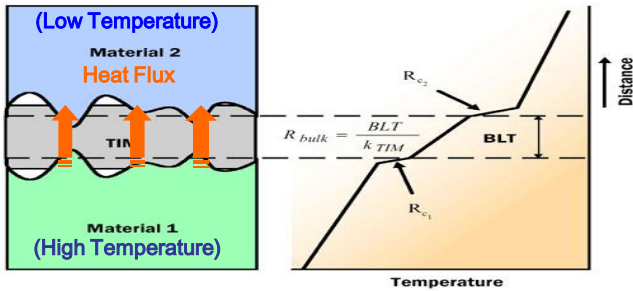
Mechanism of Heat Transfer



- ③ Heat sink → air ➤ Function of cooler
- ② TIM → heat sink ➤ Function of TIM
- ① Within package ➤ Material & design issue



Heat Transfer Rate



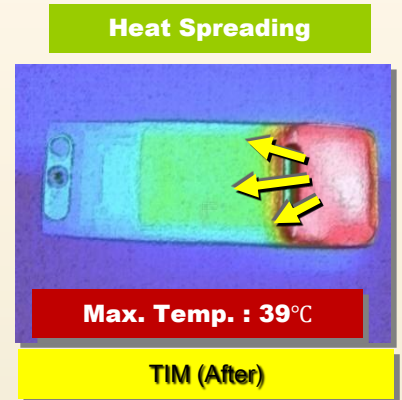
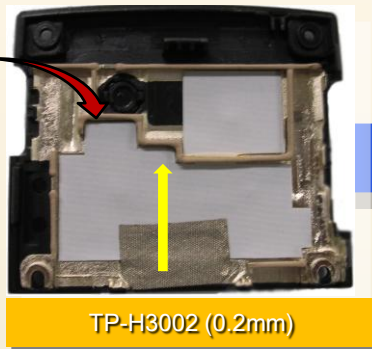
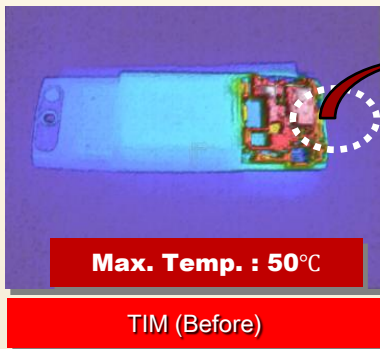
Heat Transfer Rate Q :
(Fourier equation)

$$Q = k \cdot A \cdot \Delta T / d$$

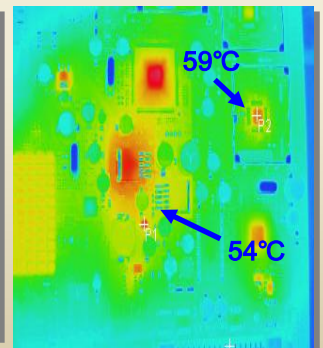
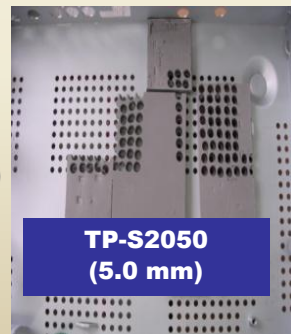
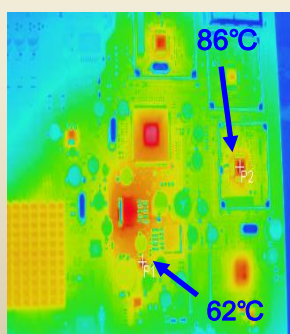
k : Thermal conductivity of TIM
 A : Contact area
 ΔT : Temperature gradient
 d : Contact distance

Example of Thermal Interface Material

Mobile Phone



Set-Top Box for Full HDTV





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Sung
Corporation

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Incheon , Korea

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