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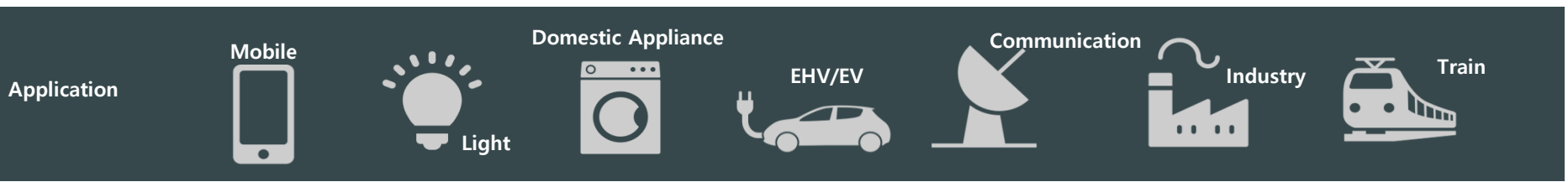
TIM

(Thermal Interface Material)

2020. 5. 21.

We provide solution for heat dissipation & EMI

AMO Materials for Thermal Solution



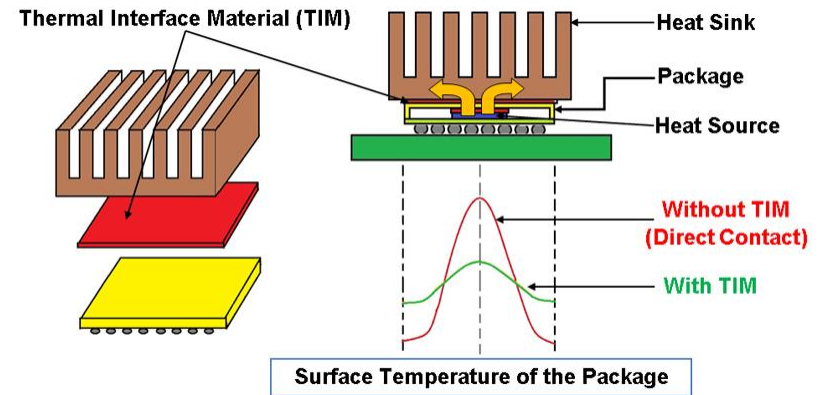
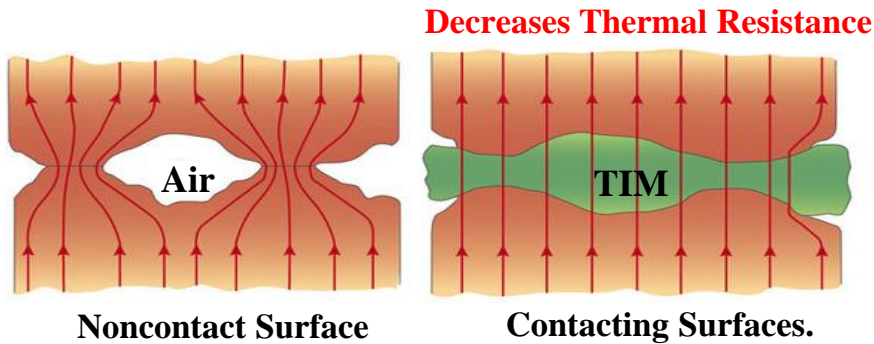
	Acrylic TIM (0.6~0.8W/m-K)		High Insulation (1.5~2.5W/m-K)		Graphite TIM (400~1,700W/m-K)	
			Gap Filler (1.5~4.0W/m-K)			
			PCM (1.5~4.0W/m-K)			
			Gap Pad (1.5~5.0W/m-K)		Gap Pad (7.0~11.0W/m-K)	
			Low Restoration (1.5~5.0W/m-K)			Graphite TIM(R&D) (30W/m-K)
			Thermal Grease (1.7~7.0W/m-K)			



: Conductive : Insulation

We provide solution for heat dissipation & EMI

What is Thermal Interface Materials?



Rapidly Heat Transfer to Heat-Sink
Thermal Contact Conductance \uparrow \rightarrow Thermal Transfer Efficiency \uparrow

► **Thermal Conductivity (k) of Various Materials**

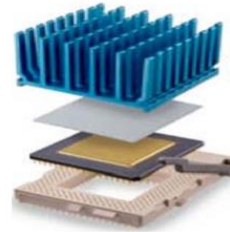
Material	k (W/m-k)
Silver	427
Aluminum	237
Alumina	36
Silicone	0.16
TIM	1~11
Air	0.025

► **Type of Thermal Interface Materials**

Product	Composition	Application
Insulation Pad	Silicone rubber	SMPS FET/TIM/Heat Sink
Gap Pad	Soft silicone rubber	PDP/LCD inverter
PCM	Epoxy, polyolefin (Wax) etc.	Semiconductor
Grease	Silicone binder + Silicone oil	Semiconductor
Adhesive	Epoxy, acrylic, rubber	SMPS FET/TIM/Heat sink



Thermally Conductive Insulators



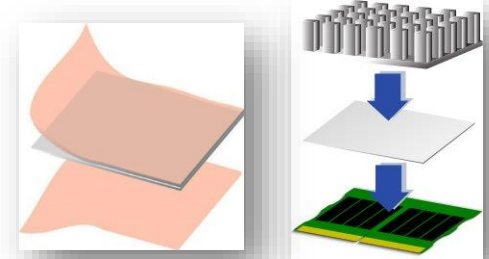
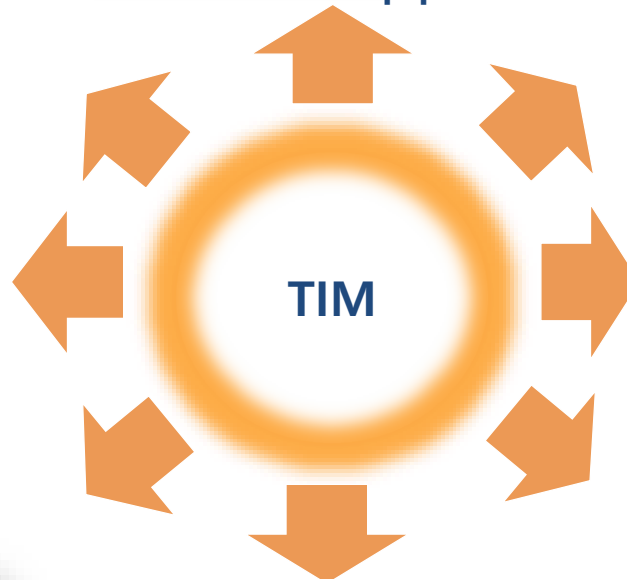
Thermal Gap pad



Thermally Conductive Adhesive (Pressure Sensitive)



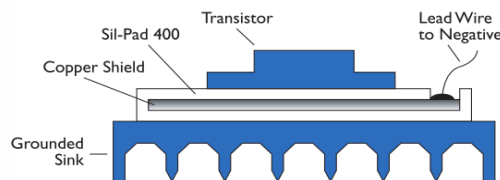
Thermal Gap Filler



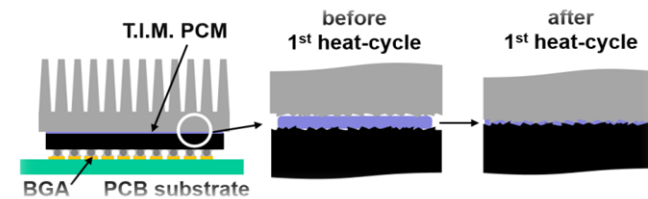
Thermally Conductive Adhesive (Heat Curing)



Thermal Grease



EMI/RFI Shielding Thermal Pad

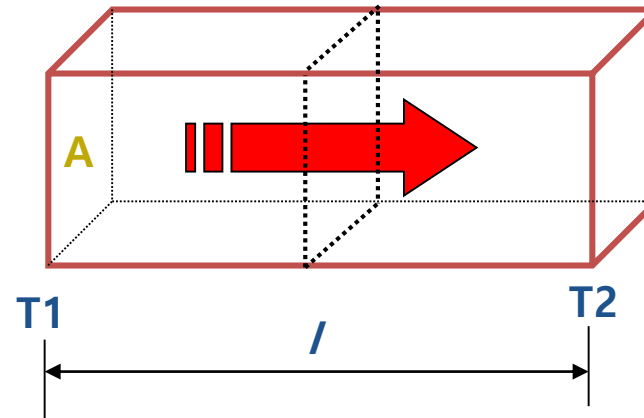


Phase Change Material

Thermal Conductivity (k)

Thermal Conductivity = Heat × Distance / (Area × Temperature Gradient)

$$\frac{dQ}{dt} = kA \frac{T_2 - T_1}{l}$$



A : Area, Q : Thermal Energy, l : Distance, t : Time, T_1 , T_2 : Temperature Gradient

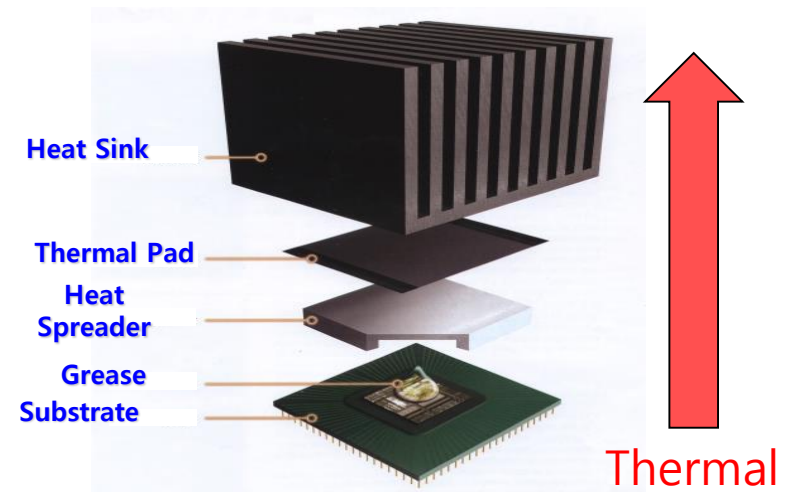
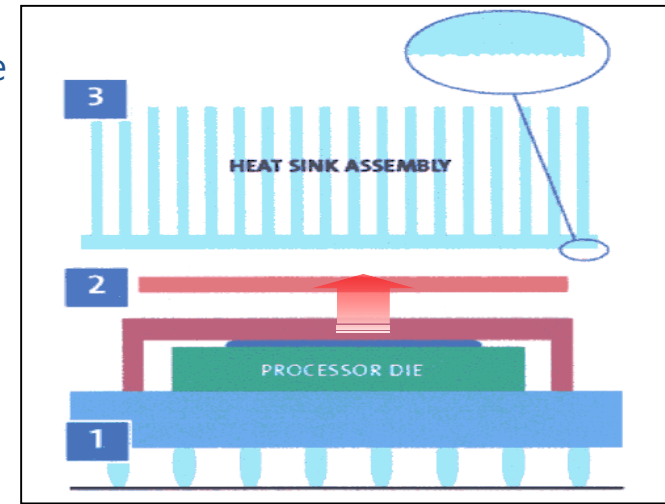
k : Thermal Coefficient

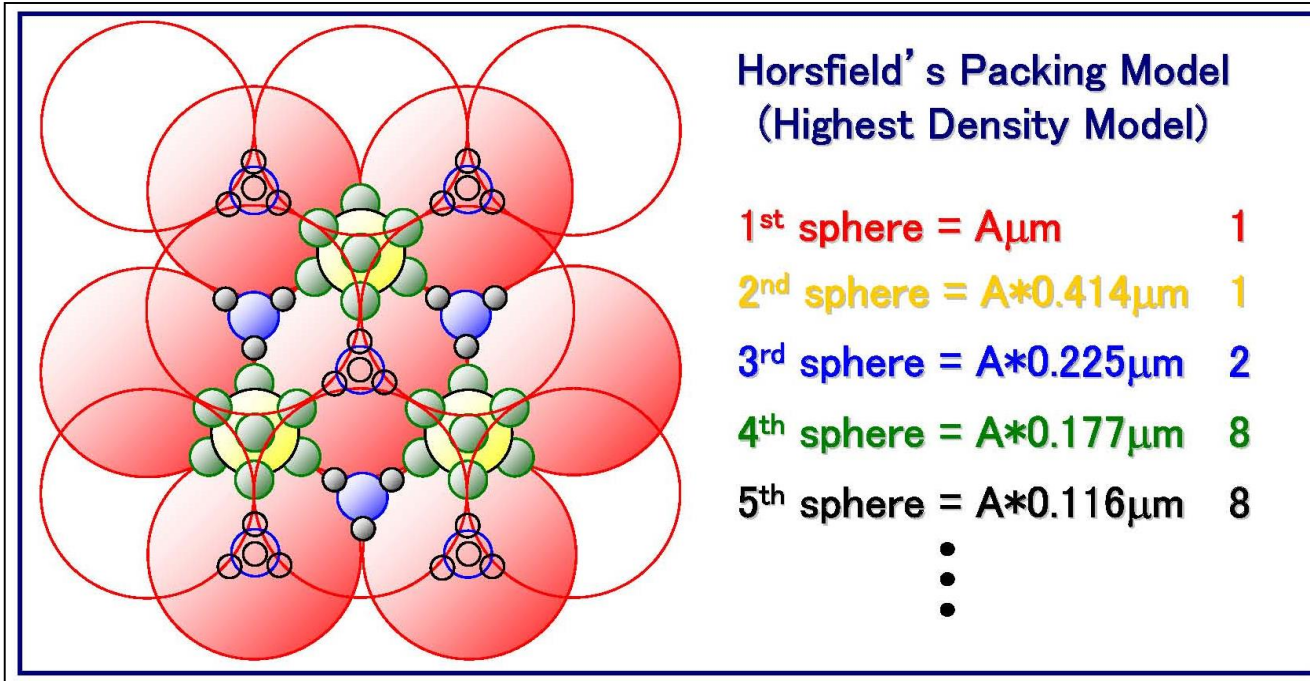
$$k = \frac{Q l}{(T_2 - T_1) A t}$$

Thermal Conductivity (k) Unit : W/m-K

◆ Thermal Conductive System By Semiconductor

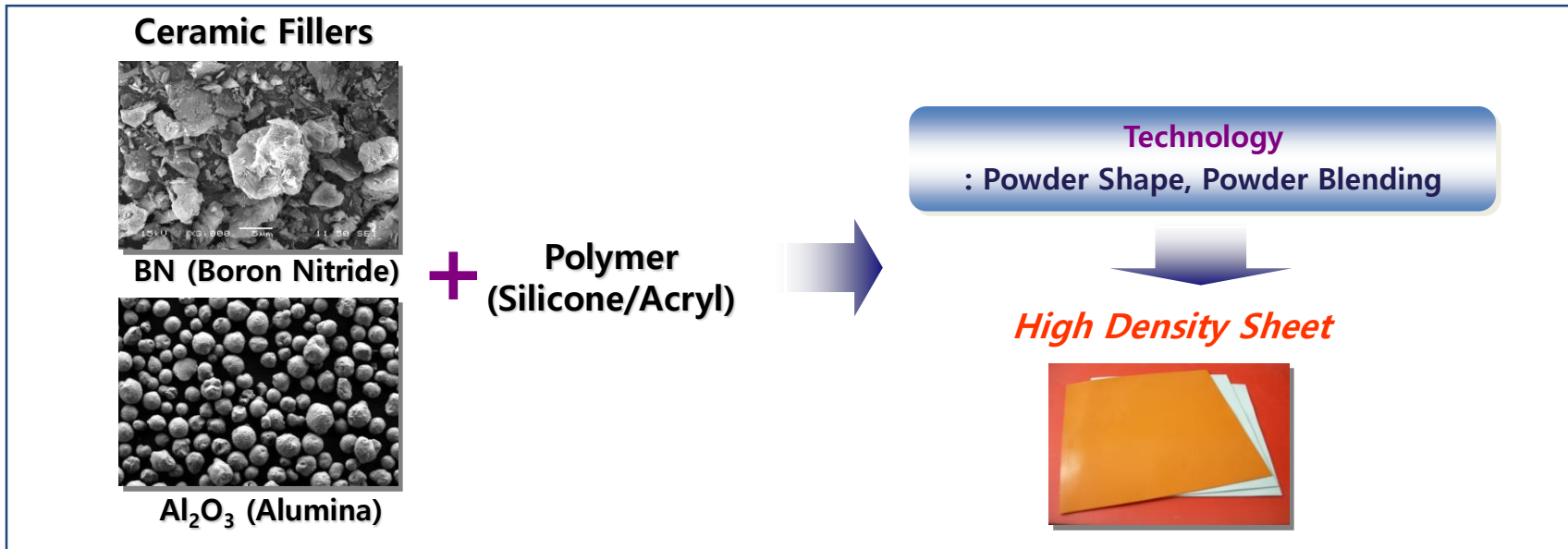
- ③ Thermal Generated Heat-sink Releases to Atmosphere
- ② **Thermal Pad Conducts Rapidly to Heat-sink**
- ① Generating Heat in Semiconductor Package
→ Conductive to Thermal Pad





■ 1.0 ~ 6.0 W/m-K : Al_2O_3 (1st ~ 5th)

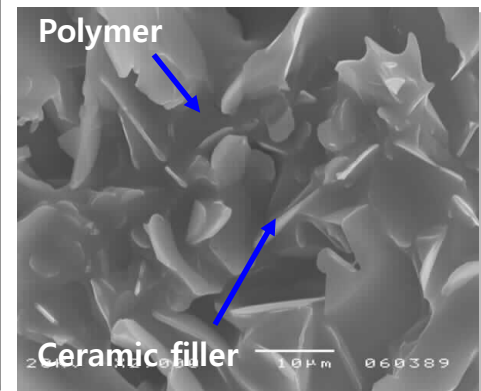
■ 7.0 ~ 10.0 W/m-K : AlN , BN (1st ~ 2nd) + Al_2O_3 (3rd ~ 5th) composite

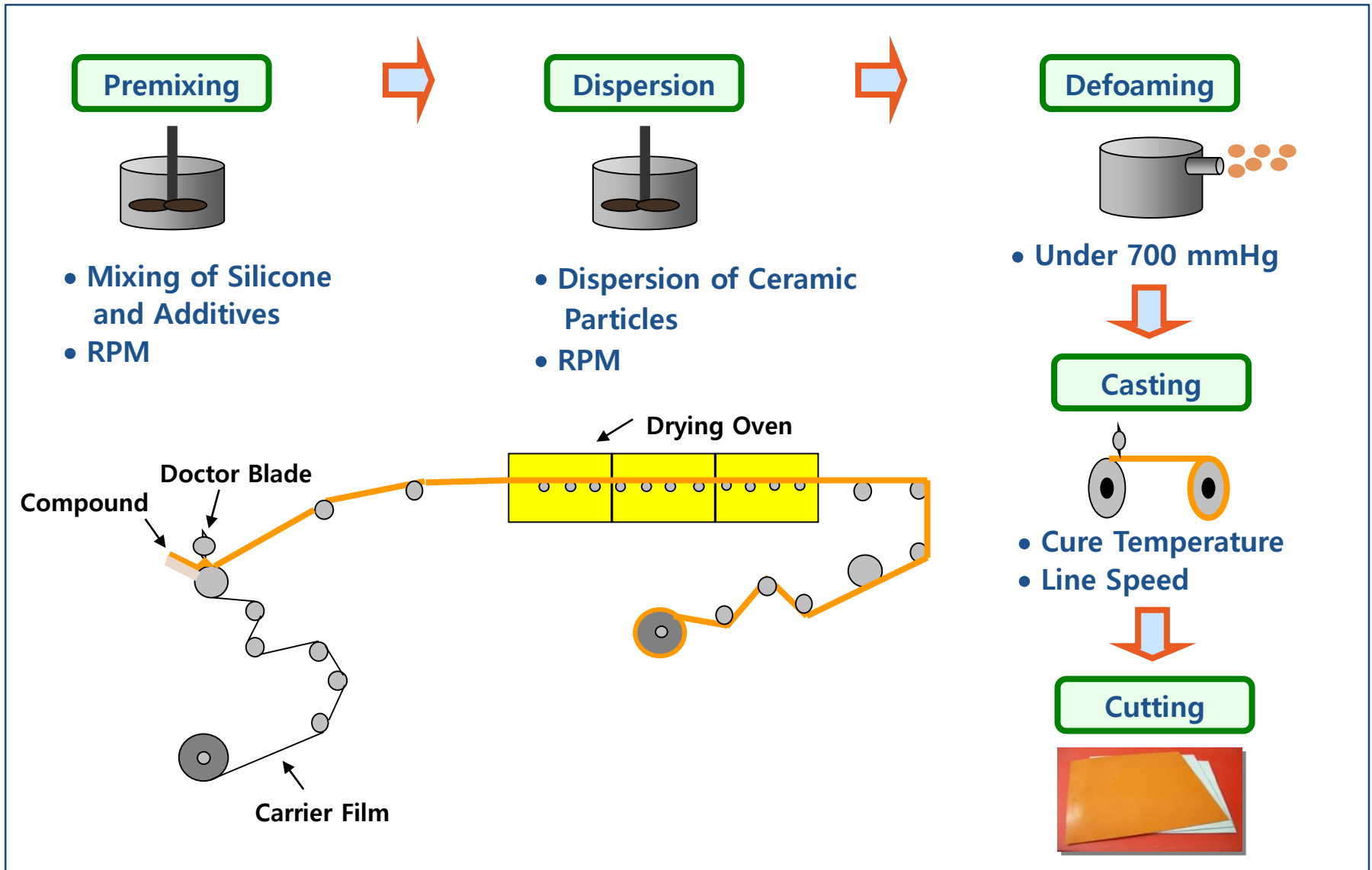


Thermal Conductivity (k) of Various Materials

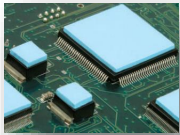

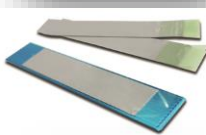




Material	k (W/mK)	Material	k (W/mK)	Material	k (W/mK)
CNT	2,000	AlN	180	Epoxy	0.300
Ag	427	SiC	115	Silicone	0.160
Cu	398	Alumina	36	Water	0.610
Al	237	BN	60	Ethanol	0.166
Al alloy	120	Quartz	1.38	Air	0.026
Si	148	Glass	1.0	Hydrogen	0.181
Fe	79	MgO	26	Foam	0.024

Cross-Section of TIM Sheet





ATSP Product Family (Standard)

No.	Product	Composition	Characteristic	Thermal Conductivity (W/m-K)	Application
1	Thermal Insulation Pad 	Silicone Rubber Glass Fiber, Polyimide : Mechanical Property	Ultra Slim(0.1-1.0mm) Isolated Electrically	1.5 ~ 4.0	SMPS FET/TIM/Heat Sink
2	Thermal Silicone Pad 	Soft Silicone Rubber Gel Type Silicone (Liquid Type)	Self-Adhesion, Low Hardness	1.5 ~ 5.0	Mobile phone, Tablet PC, LED, ECU, Memory
3	PCM 	Epoxy, Polyolefin (Wax), Acryl Binder	Low Thermal Resistance Easy Handling	1.8 ~ 4.0	Display/LED/Memory ASICs Chip (Processor, IC)
4	Thermal Grease 	Silicone Binder +Silicone Oil	No Need Curing Time Irregular Surface	1.7 ~ 7.0	Telecommunication SMPS/Inverter
5	Thermal Gap Filler 	Gel Type Silicone (One-Part, Two-Part)	Fully Cured/Reworkable Minimal Stress	1.5 ~ 4.0	Power Supplies/Phone Display/ECU
6	Thermally Conductive Acrylic Tape 	Acrylic Adhesive (PET Film)	Strong Adhesion Strength Isolated Electrically	0.6 ~ 0.8	BLU, LED Lighting, Heat Sink, ECU
7	Graphite TIM 	Sheet type TIM (Graphite, additionally PET)	Super ultra slim (0.03~150um) Excellent Thermal Conductivity	X-Y plane : 400~1,900 Z axis : 7~15	Mobile phone, LED Lighting, Heat Sink, LED, Display

We provide solution for heat dissipation & EMI

1. ATSP-U Series (Thermal Silicone Pad)

◆ General Features

- **Ultra Slim (0.1~1.0mm)**
- Isolated Electrically (Glass Fiber)
- Excellent Thermal Performance
- Minimize the Surface Resistance
- Self Adhesion (One Side or Both Side)

◆ Application Fields

- Mobile Phone / Tablet PC
- LED Applications
- Memory Module / Solid State Drive
- Automobile
- Custom ASICS Chip (Processor, IC, etc.)

◆ General Specification

Items	Test Conditions	Units	ATSP 15U	ATSP 30U	ATSP 40U
Thermal Conductivity	QTM500	W/m·K	1.5±0.1	3.0±0.1	4.0±0.1
Hardness	Shore 00	-	30~80	30~80	40~80
Density	25°C, Gravimeter	g/cm ³	2.4±0.1	2.7±0.1	2.9±0.1
Thickness	Mitsutoyo	mm	0.1~1.0	0.25~1.0	0.25~1.0
Inflammability	Vertical Burning Test	-	V-0 suitable	V-0 suitable	V-0 suitable
Volume Resistance	-	Ω·cm	3.4X10 ¹¹	8X10 ¹⁰	3.6X10 ¹¹
Breakdown Voltage	-	kV	> 6	> 6	> 6
Thermal Stability	-40 ~ 150°C	-	No Change	No Change	No Change
RoHS	-	-	Not detected	Not detected	Not detected

2. ATSP Series (Thermal Silicone Pad)

◆ General Features

- **Conformable, Low Hardness**
- Isolated Electrically
- Excellent Thermal Performance
- Minimize the Surface Resistance
- Self Adhesion (One Side or Both Side)

◆ Application Fields

- Mobile Phone / Tablet PC
- LED Applications
- Memory Module
- Automotive Electronic Control Unit (ECU)
- Power Conversion Equipment

◆ General Specification

Items	Test Conditions	Units	ATSP 15	ATSP 30	ATSP 40	ATSP 50
Thermal Conductivity	QTM500	W/m-K	1.5±0.1	3.0±0.1	4.0±0.1	5.0±0.1
Hardness	Shore 00	-	30~80	30~80	40~80	60~80
Density	25°C, Gravimeter	g/cm ³	2.4±0.1	2.7±0.1	2.9±0.1	3.0±0.1
Thickness	Mitsutoyo	mm	0.25~20	0.25~12	0.25~12	0.5~12
Inflammability	Vertical Burning Test	-	V-0 suitable	V-0 suitable	V-0 suitable	V-0 suitable
Volume Resistance	-	Ω-cm	3.4X10 ¹¹	8X10 ¹⁰	3.6X10 ¹¹	6.1X10 ¹¹
Breakdown Voltage	-	kV	> 6	> 6	> 6	> 6
Thermal Stability	-40 ~ 150°C	-	No Change	No Change	No Change	No Change
RoHS	-	-	Not detected	Not detected	Not detected	Not detected

3. APCM Series (Phase Change Material)

◆ General Features

- Phase Change Temperature at 45°C
- Minimize the Surface Resistance
- Excellent Thermal Performance
- Easy to Handle
- Inherently Tacky

◆ Application Fields

- Display (OLED, LED, etc.)
- LED Applications
- Memory Module
- Digital Mobile Convergence
- Custom ASICS Chip (Processor, IC, etc.)

◆ General Specification

Items	Test Conditions	Units	APCM 40	APCM 30	APCM 18
Thermal Conductivity	QTM500	W/m·K	4.0	3.0	1.8
Hardness	Shore 00	-	30~80	30~80	40~80
Density	25°C, Gravimeter	g/cm ³	2.7	2.2	2.2
Thickness	25°C	mm	0.15~2.0	-	0.1
Reinforcement	-	-	None	None	Polyimide
Thermal Resistance	20 psi	°C·cm ² /W	0.16	0.11	0.25
Thermal Stability	-40 ~ 150°C	-	No Change	No Change	No Change
RoHS	-	-	Not detected	Not detected	Not detected

4. ATG Series (Thermal Grease)

◆ General Features

- High Thermal Performance
- **No need Curing Time / Conforms to Irregular Surface**
- Low Thermal Resistance
- Price Competitive

◆ Application Fields

- Note PC / Tablet PC
- LED Applications
- Telecommunication Equipments
- Power supplies / Invertor & Convertor
- Custom ASICS Chip (Processor, IC, etc.)

◆ General Specification

Items	Test Conditions	Units	ATG 17	ATG 40	ATG 70
Thermal Conductivity	QTM500	W/m·K	1.7	4.0	7.0
Specific Gravity	25°C ASTM D70	-	2.4	2.6	2.7
Viscosity	25°C	Pa·s	250	300	380
Color	Visual		White	Gray	Gray
Thermal Resistance	10 psi	°C·cm ² /W	0.31	0.14	0.12
	40 psi		0.23	0.09	0.07
Operating Temperature	-	°C	0~150	0~150	0~150
Evaporation Rate	150°C, 24hr	wt%	< 1	< 1	< 1
RoHS	-	-	Not detected	Not detected	Not detected

5. ATGF Series (Thermal Gap Filler)

◆ General Features

- Dispensable
- Highly Conformable at Low Pressure
- Minimal Stress on Components
- **Fully Cured**
- **Reworkable**

◆ Application Fields

- Mobile Phone / Tablet PC
- Power Supplies
- MOSFET Arrays with Heatsink
- Display and Consumer Electronics
- Automotive Electronic Control Unit (ECU)

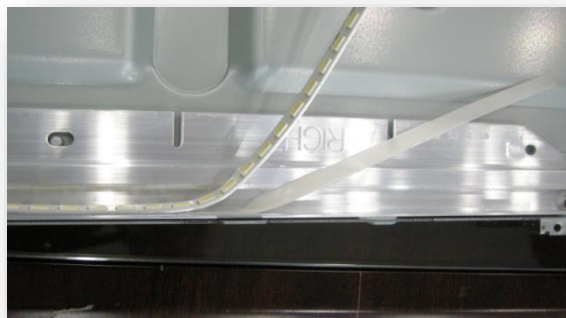
◆ General Specification

Items	Test Conditions	Units	ATGF (One-Part)	ATGF (Two-Part)
Thermal Conductivity	QTM500	W/m·K	1.5~4.0	1.5~4.0
Hardness	Shore 00	-	50±10	45±10
Density	25°C, Gravimeter	g/cm ³	1.3±0.1	2.5±0.1
Curing Time	-	min	120°C @20 min.	80°C @30 min.
Inflammability	Vertical Burning Test	-	V-0 suitable	V-0 suitable
Volume Resistance	-	Ω·cm	3.4X10 ¹¹	6X10 ¹²
Breakdown Voltage	-	kV	> 5.8	> 6
RoHS	-	-	Not detected	Not detected
Shelf Life	20°C	months	1	6

6-1. ATCA Series (Thermally Conductive Acrylic Tape)

◆ General Features

- Heat management of electronic devices for dissipation device and other bonding /joining parts
- Good thermal conductivity
- Good and reliable adhesion performance against Al and SUS

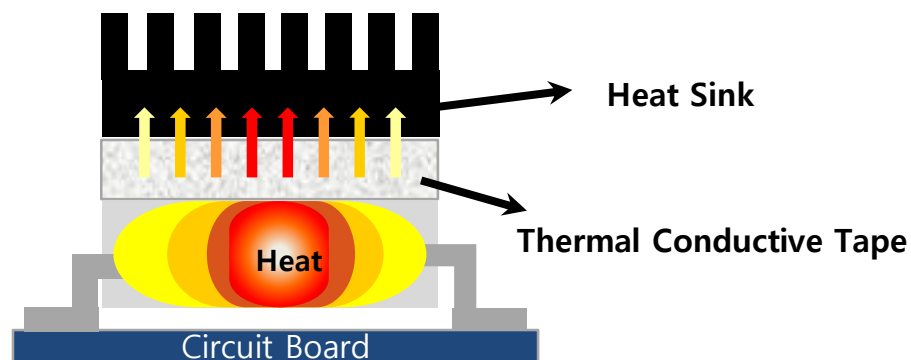


Edge LED TV

Bonding / thermal conducting between LED module and Al plate


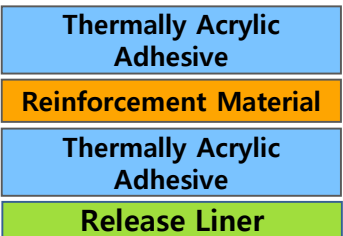

◆ Application Fields

- BLU LED Array
- LED Lighting
- Heat Conduction Between IC Package & PCB
- LED Module / Board Bonding
- Print Circuit Board



6-2. ATCA Series (Thermally Conductive Acrylic Tape)

◆ General Specification

Contents	ATCA Series	ATCA(R) Series	ATCA PAD	Remark
Structure				
Color	White			
Thickness (um)	200 / 250 / 400		1,500 / 3,000	Micro Meter
Thermal Cond. (W/m-K)	0.8	0.6	1.5	ASTM E 1461
Adhesive Strength (gf/25mm)	Min. 1,500		-	KS T 1028
Holding Power (mm)	Less than 0.2 (80°C * 500g * 72hrs)		-	
Flame Retardant	UL94 V-2		UL94 V-0	
RoHS	N.D.	N.D.	ND	
Advantages	<ul style="list-style-type: none"> - Good Thermal Conductivity - High Electrical Insulation - Good Workability and Easily-Removable 			

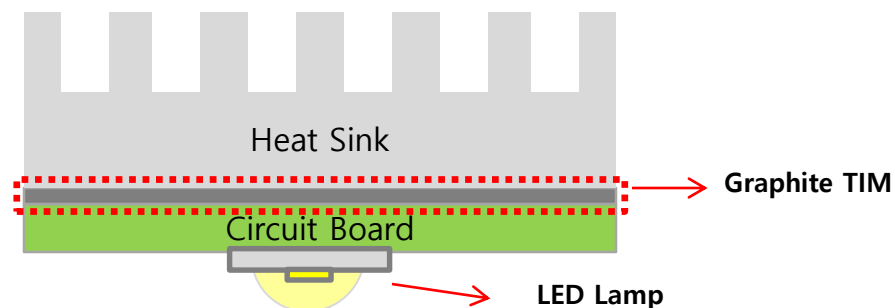
7. AGS Series (Graphite TIM)

◆ General Features

- Excellent Thermal Performance in X-Y plane/ Z axis
- Easy to Handle


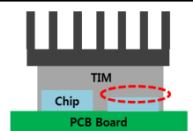

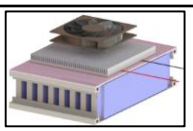
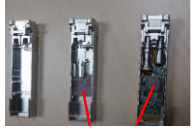
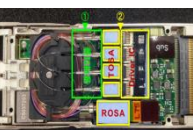
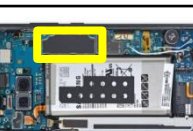
◆ Application Fields

- Smart Phone/ Note PC / Tablet PC
- LED Applications/ Heat Sink
- Automotive LED Head Lamp/ Electric Device



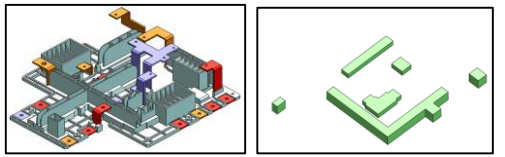
		Unit	AGS series
Thickness		um	27~150
Density		g/cm ³	1.3~2.2
Thermal Conductivity	X-Y Plane	W/m-K	400~1,700
	Z axis	W/m-K	7~15
Tensile Strength		MPa	4.5~45.0
Heat Resistance		°C	-40°C to 500°C
Thermal Diffusivity		cm ² /S	10.7

New ATSP Product Family (Special)

No.	Application Fields	Product	Characteristic	Thermal Conductivity (W/m-K)	Application
1	Automotive (EV, PHEV)	High Insulation Thermal Pad 	Excellent Electric Property (DC 6kV, 0.5mA Under) Workability	2.7	PTC Heater / Transformer EV Battery Cooling
2		Low Restoration TIM 	Low Restoration Low Thermal Impedance Minimal Stress	1.5 ~ 5.0	OBC / Inverter / Converter / LED Lighting / Wireless Charging
3		Liquid TIM for Molding (2-Part) 	Low Viscosity Thermally Conductive Molding Quick Curing Time(2hrs)	0.7 ~ 2.5	EV Battery Cell / Transformer
4		Lightweight TIM 	Low Specific Gravity (1.8~2.0) Low Hardness	2.0	EV Battery Cooling / LED Lighting / ECU
5	Transceiver	Low Restoration TIM 	Ultra Softness & Minimal Stress Low Thermal Impedance	1.5 ~ 7.0	Optical Transceiver (ROSA, TOSA, Diver IC)
6		Multi-Functional TIM (R&D) 	EMI Suppressing & TIM Low Hardness	3.0	Optical Transceiver (ROSA, TOSA, Diver IC)
7	Mobile	Graphite TIM (R&D) 	Highly Conductive TIM (20~40W/m-K) Low Hardness	20 ~ 40	AP Chip/ Antenna

We provide solution for heat dissipation & EMI

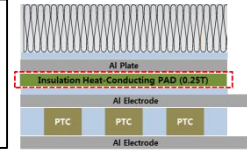
Battery Thermal Dissipation ***TIM Solution @ EV***



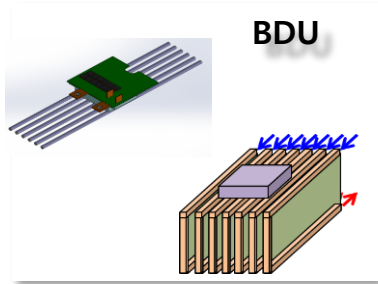
Relay J/B & Bus Bar



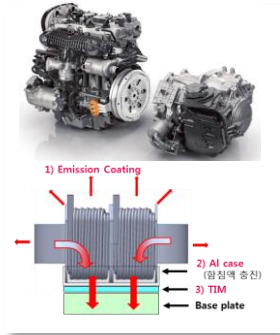
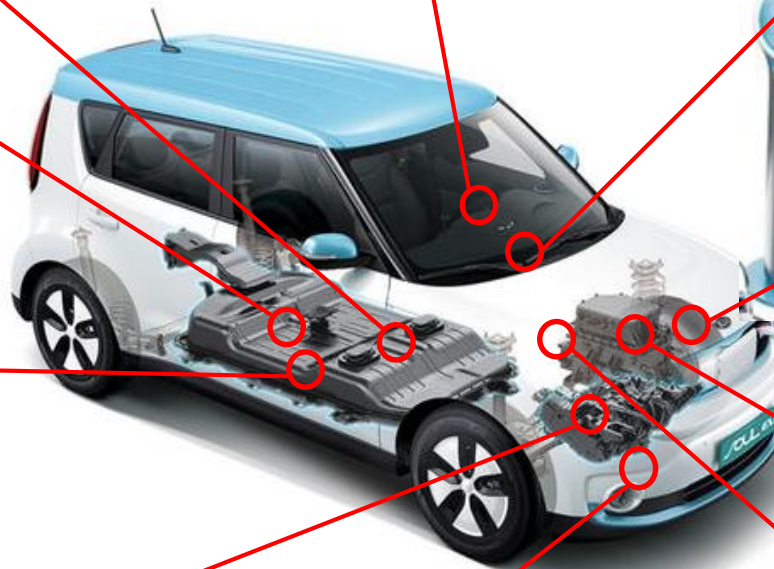
AVN



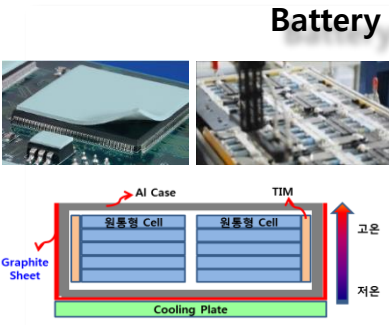
PTC Heater



BDU



Core

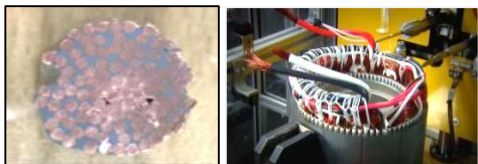


Battery

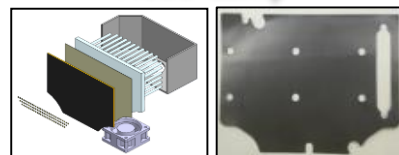


DC-DC Converter & Inverter

Motor



Head Lamp



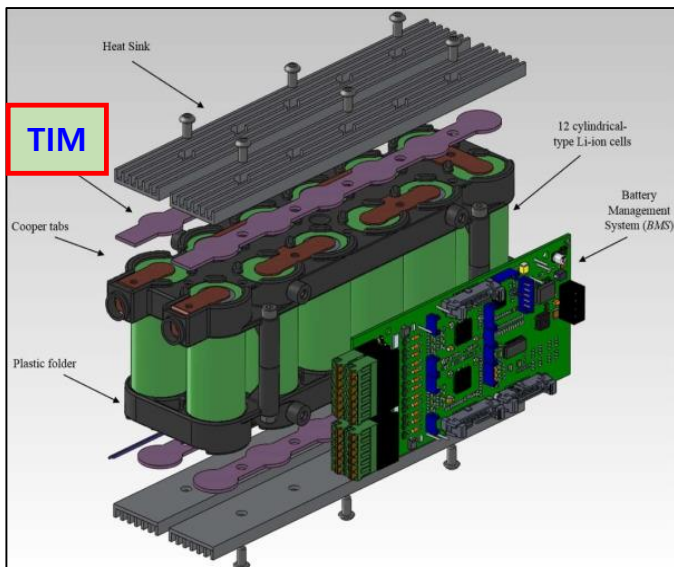
OBC





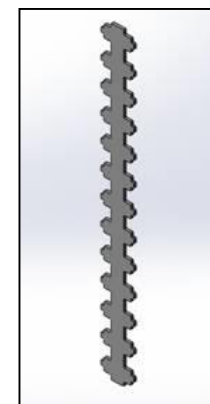
LEV Battery

- 1) Application : LEV Battery Pack (EV low emission 3-wheels vehicle)
- 2) Material application : 1.0 W/m-K TIM (3mm and 4mm)


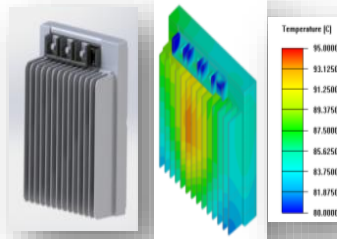



Electric Mobility Scooter

- 1) Vehicle : Scooter
- 2) Material application : 1.0W/m-K & 2.0W/m-K (2T)



1. Special TIM (Low Hardness, High Efficiency)

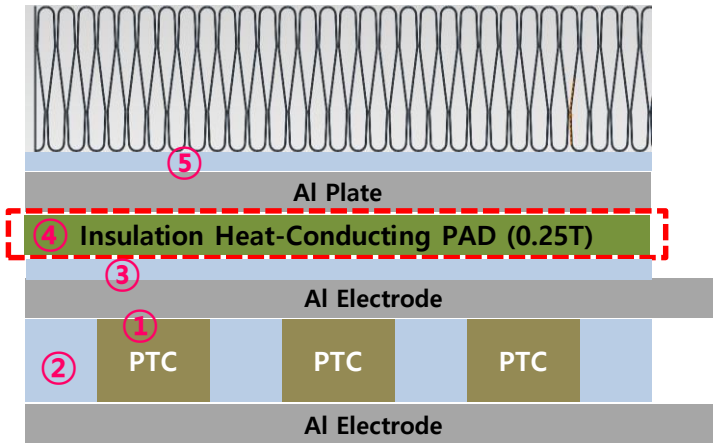
	Insulation TIM	High-Efficiency, Low Density TIM	Liquid TIM
Thermal Conductivity	1~3W/m-K	Max. 11W/m-K	3~5 W/m-K
Features	General	Soft, High Thermal Performance, Minimizes Component Stress	Minimize Stress When Assembling PCB Components
Applications	 <p>Mobile Phone, LED</p>	 <p>DC-DC Converter</p>	 <p>Optical Communication Module</p>
Binder	Silicone, Acrylic Resin	Silicone	Silicone
Filler	Ceramic	Ceramic	Ceramic
Hardness	Shore 00 40~60	ASKER C 20 under	Shore A 80
Dielectric Breakdown	Min. 6 kV/mm	Min. 6 kV/mm	Min. 6 kV/mm
Flame Rating	UL94 V-0 Equivalent	UL94 V-0 Equivalent	UL94 V-0 Equivalent

We provide solution for heat dissipation & EMI

2. Highly Insulation Heat-Conducting Pad

◆ Description

- High Insulation for PTC Heater



	Materials	Required Property
①	Bonding Silicone	Insulation/Heat-Resistance /Adhesion
②	Molding Gap Filler	Molding/Heat Conduction /Insulation/Flammability
③	Thermally Conductive Adhesive	High Insulation/Heat Conduction
④	Insulation Heat-Conducting pad	High Insulation/Heat Conduction
⑤	Thermally Conductive Adhesive	High Insulation/Heat Conduction

■ Specification

Property	Unit	Value
Thermal Cond.	W/m-K	3.0
Color	-	Gray
Thickness	mm	0.25
Hardness	Shore A	80
Leakage Current	mA	0.03uA (@ DC 6.0kV)

■ Main Property

- Dielectric Strength : DC 4.3kV 60Sec., Leakage Current 0.5mA under
- Core Performance : 5.5kW

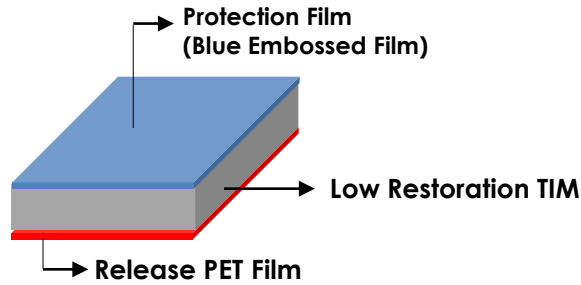


We provide solution for heat dissipation & EMI

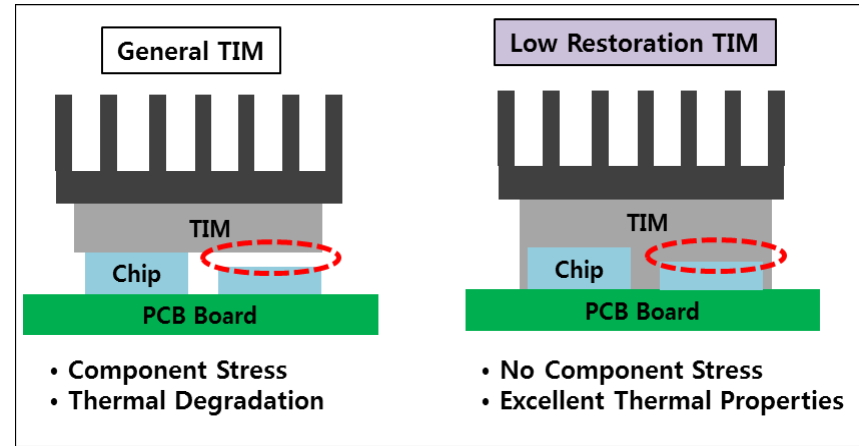
3-1. Low Restoration TIM

◆ Description

- Low Restoration & Ultra Low Hardness
- No Stress When Assembling Electronic Parts

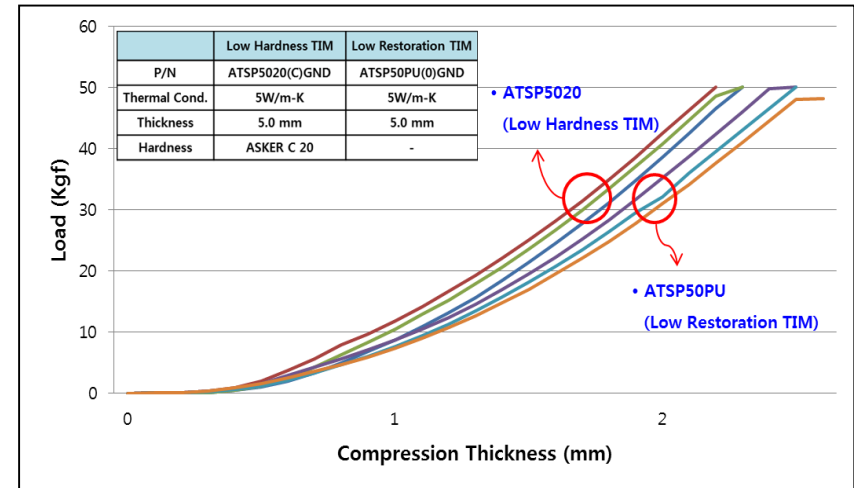


◆ Features



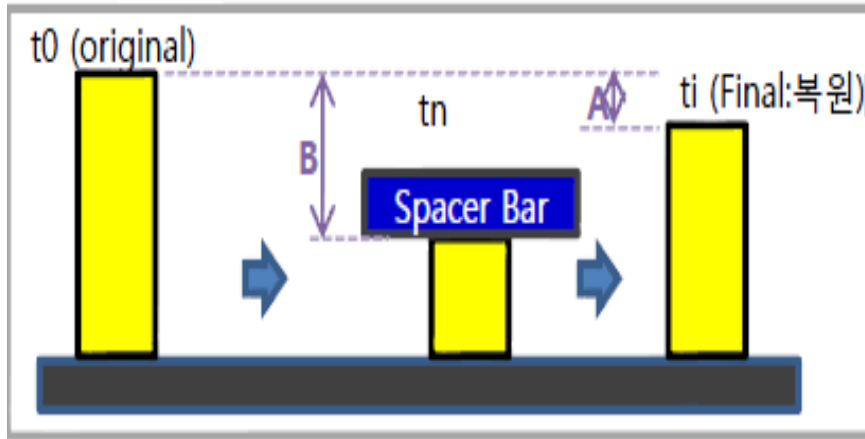
Properties	Unit	ATSP15PU	ATSP30PU	ATSP50PU
Thickness	mm	More than 0.5		
Hardness	-	Low Restoration		
Color	-	Gray	Gray	Gray
Thermal Conductivity	W/m-K	1.5	3.0	5.0
Specific Gravity	-	2.5	2.9	3.0
Volume Resistivity	Ω -cm	10^{12}	10^{12}	10^{12}
Breakdown Voltage	kV/mm	10	6	6
Using Temp.	$^{\circ}$ C	-40 ~ 200		
RoHS Compliant	-	N.D.		
Flame Rating	UL94	V-0 Equivalent		

◆ C.F.D.(Compression Force Deflection)



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◆ Compression Recovery Rate



C : Compression Set

t0 : Original Thickness

ti : Final Thickness

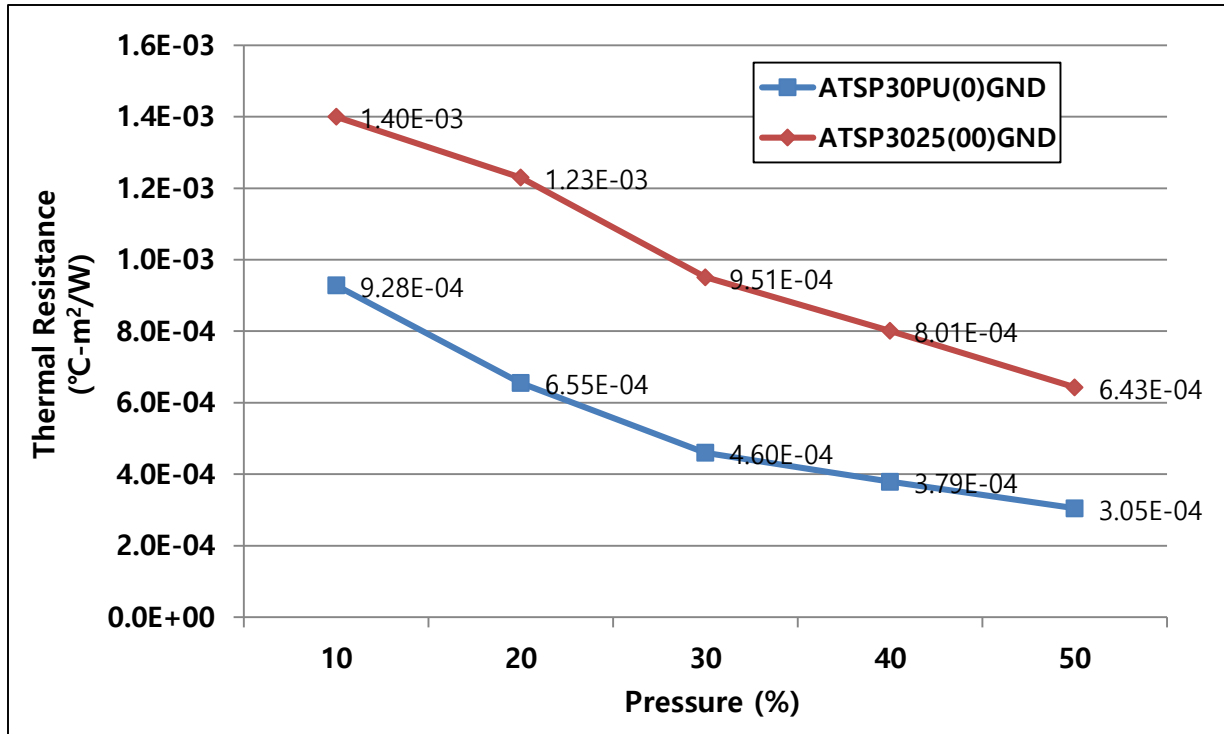
tn : Thickness of the Spacer Bar Used

$$C = [A(t_0 - t_i) / B(t_0 - t_n)] \times 100$$

Product	P/N	Thermal Conductivity	Initial Thickness (mm), t0	50% Compression (mm), tn	Final Thickness (mm), ti	Compression Set (%)	Compression Recovery Rate (%)
Low Restoration TIM	ATSP30PU(0)GND	3.0W/m-K	5.2	2.6	3.1	80.7	19.3
Low Hardness TIM	ATSP3025(00)GND	3.0W/m-K	5.1	2.55	3.5	62.7	37.3

3-3. Low Restoration TIM

◆ Thermal Resistance versus Pressure ($^{\circ}\text{C}\text{-m}^2/\text{W}$)



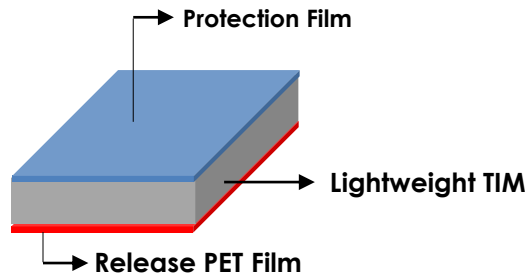
Product		Thermal Conductivity	Pressure (%)	10 %	20 %	30 %	40 %	50 %
Low Restoration TIM	ATSP30PU(0)GND	3.0W/m-K	Thermal Resistance	0.000928	0.000655	0.00046	0.000379	0.000305
Low Hardness TIM	ATSP3025(00)GND	3.0W/m-K	($^{\circ}\text{C}\text{-m}^2/\text{W}$)	0.0014	0.00123	0.000951	0.000801	0.000643

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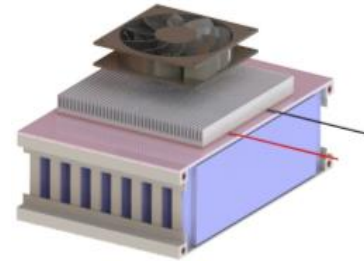
4. Lightweight TIM (for EV Battery Cooling System)

◆ Description

- Lightweight & Low Hardness
- Cooling of EV Battery and Lightweight of EV

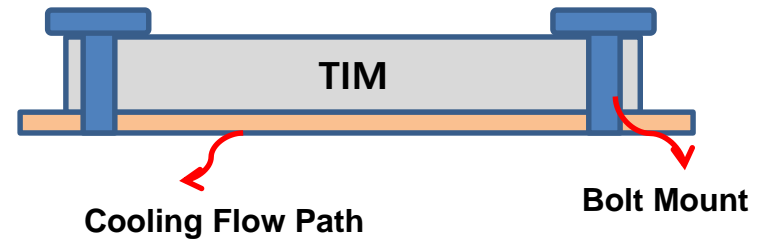
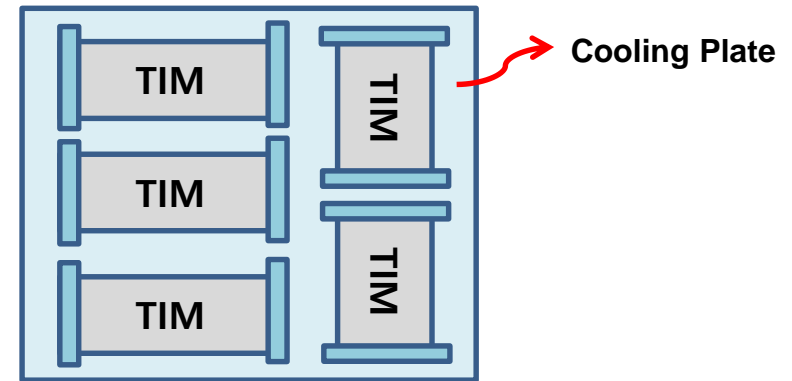


◆ Features



Lightweight heat dissipation TIM between cooling water channel and battery pack

Properties	Unit	ATSP2040(00)
Thickness	mm	More than 0.5
Hardness	-	40 ± 10
Color	-	Gray
Thermal Conductivity	W/m-K	2.0
Specific Gravity	-	1.8~2.0
Volume Resistivity	Ω-cm	10 ¹²
Breakdown Voltage	kV/mm	6
Using Temperature	°C	-40 ~ 200
RoHS Compliant	-	N.D.
Flame Rating	UL94	V-0 Equivalent



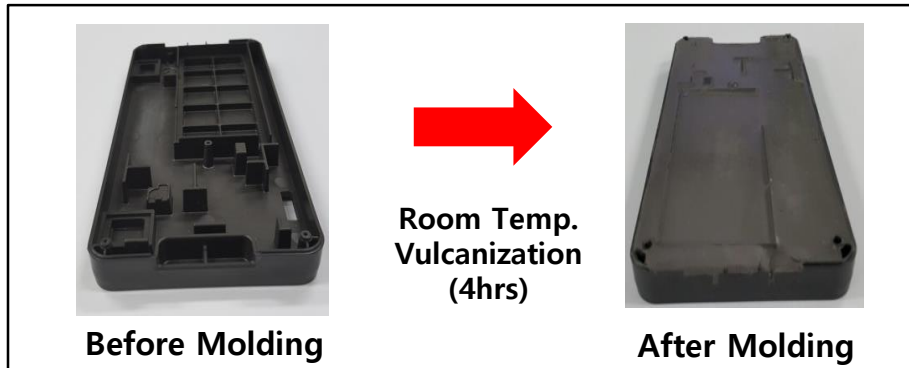
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5-1. Low Viscosity Liquid TIM (for EV Battery Cell)

◆ Description

- Low Viscosity 2-Part Liquid Insulation TIM
- Thermally Conductive Molding for EV Battery Cell

◆ Features



◆ Applications

Electronics 	Transformer
EV Battery Cooling 	EV Battery Cell
Transceiver 	

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◆ Specifications

■ ATGF0770

● Uncured Properties

Properties	Unit	ATGF0770-A	ATGF0770-B
Thickness	mm	White	Dark Gray
Viscosity	cPs	4,000	4,000
Pot Life (@ 25°C)	Min.	120	
Cure Time(@60°C)	Min.	60	

● Cured Properties

Properties	Unit	Value	Test Method
Thermal Cond.	W/m-K	0.7	ASTM E 1530
Hardness	Shore 00	70 ± 10	ASTM D 2240
Volume Resistivity	Ω-cm	1.0*10 ¹³	ASTM D 257
Dielectric Strength	kV/mm	Min. 20	ASTM D 149

■ ATGF2590

● Uncured Properties

Properties	Unit	ATGF2590-A	ATGF2590-B
Thickness	mm	White	White
Viscosity	cPs	10,000	10,000
Pot Life (@ 25°C)	Min.	120	
Cure Time(@100°C)	Min.	30	

● Cured Properties

Properties	Unit	Value	Test Method
Thermal Cond.	W/m-K	2.5	ASTM E 1530
Hardness	Shore 00	90 ± 10	ASTM D 2240
Volume Resistivity	Ω-cm	1.0*10 ¹²	ASTM D 257
Dielectric Strength	kV/mm	Min. 11	ASTM D 149

5-3. Low Viscosity Liquid TIM (for EV Battery Cell)

◆ Flowability of Liquid TIM

	Company A	Company B	AMO
Injection Properties	<p>70,000cP 0.1mm gap Over-flow</p>	<p>10,640cP Over-flow</p>	<p>4,000cP</p>
Molding Air Gap	-		
Flowability	Bad	Good	Good
Over Flow	Occur	Occur	Not Occur
Results	N.G.	N.G.	O.K.

6. High Efficiency TIM

◆ Description

- Low Hardness / Multi-Function / High Conductivity
- No Stress When Assembling Electronic Parts



Optical Transceiver



◆ Applicable TIM

No	Product	Part Name	Thermal Cond. (W/m-K)	Hardness
1	Thermal Conduction / Shock Absorption	ATSP 3025(00)GND	3.0	Shore 00 25
2	Multi-Function : EMI Suppression, Thermal Conduction	ASTH	3.0	ASKER C 35
3	High Thermal Conduction	ATSP X1PU(0)GND	11.0	-

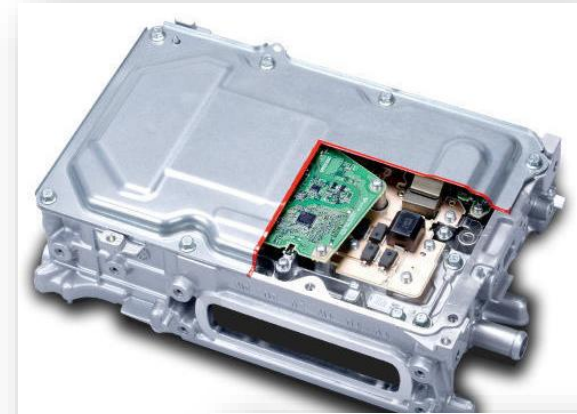
7. Low Hardness TIM (for DC-DC Converter)

◆ Description

- Next Generation DC-DC Converter
- Power Semiconductor Output : 1kW, 1MHz
- Stepped Portion between H/S and Circuit
 - Minimize Component Stress (Soft TIM)
 - Low Hardness, High Thermal Conductivity

◆ TIM (Thermal Interface Material)

Contents	Unit	Value
Thermal Conductivity	W/m-K	5.0
Hardness (ASKER C)	-	15±5
Specific Gravity	-	3.0
Volume Resistivity	Ω-cm	10 ¹²
Breakdown Voltage	kVac/mm	6
Using Temperature	°C	-40 ~ 200
RoHS Compliant	-	N.D.
Flame Rating	UL94	V-0 Equivalent

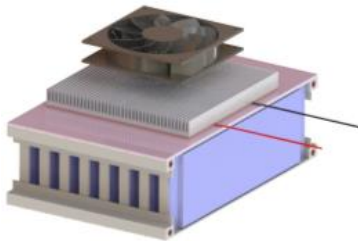


DC-DC Converter for Automobile

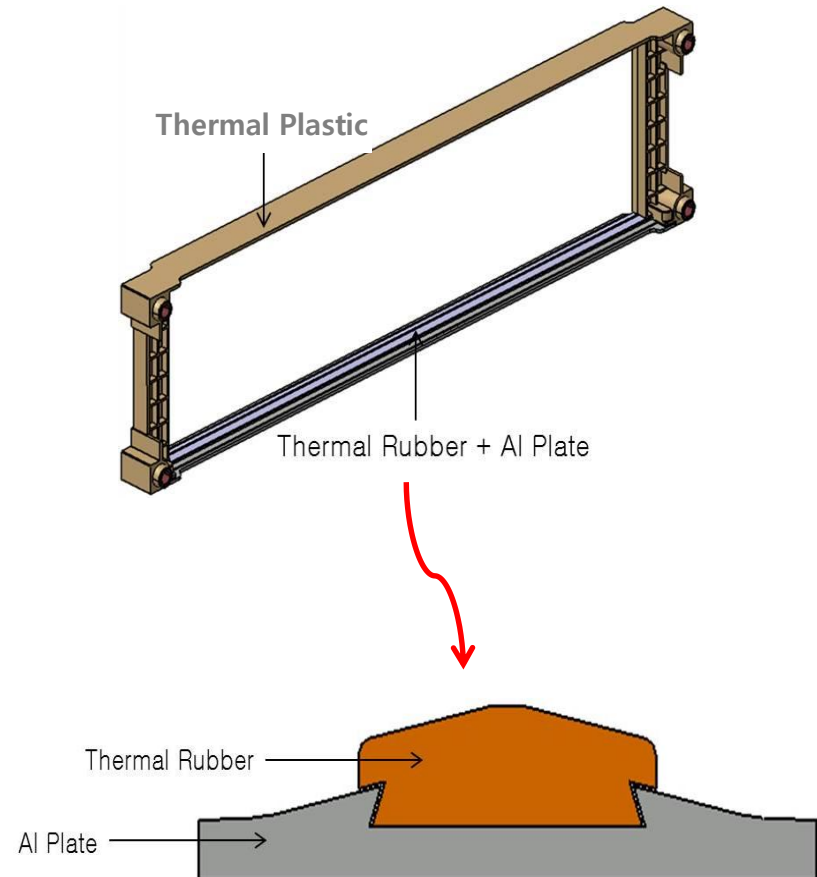
8. Insulation TIM (for EV Battery Cooling System)

◆ Description

- Two-Component Gap Filler
- RTV (Room Temperature Vulcanization)



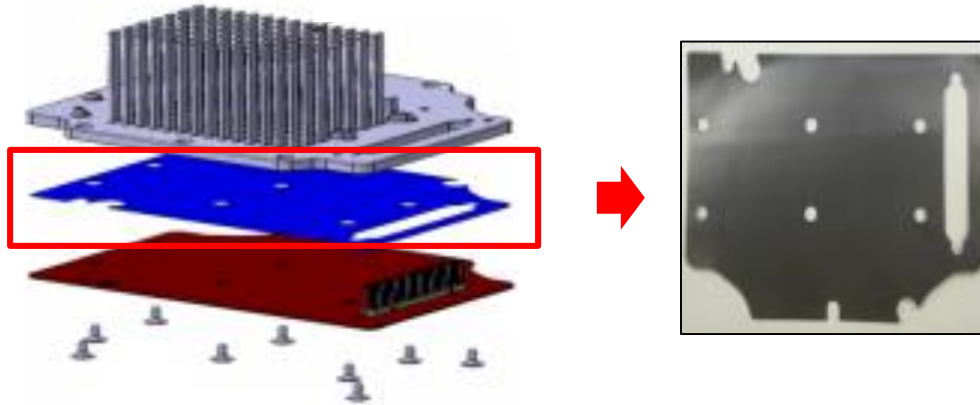
Properties	Unit	Value
Appearance Type	-	Potting Gel
Color	-	White
Hardness	Shore 00	40±10
Specific Gravity	-	2.2
Volume Resistivity	Ω-cm	1.0 * 10 ¹³
Breakdown Voltage	kV/mm	10
Using Temperature	°C	-50 ~ 200
Thermal Conductivity	W/m-K	1.0



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9. Graphite TIM (for Head Lamp)

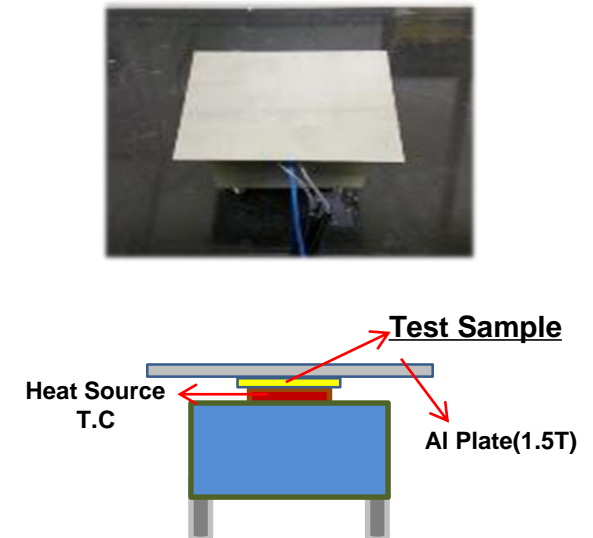
Thermal Foil for LED Head Lamp



Applied by an AMO Graphite TIM with high thermal conductivity between PCB and Heat Sink

Sample	Thermal Conductivity (W/m-k)	Thickness (mm)	Test Result (°C)		
			Heat Source	Ambient	ΔT
Silicon TIM	1.5	0.13	75.5	27.2	48.3
Silicon TIM	5	0.13	73.4 (-2.1)	26.7 (-0.5)	46.7 (-1.6)
Thermal Foil	Z Axis : 20 In Plane : 400	0.13	70.2 (-5.3)	26.5 (-0.7)	43.7 (-4.6)

* Mass production approval of Company L



Thank You!

