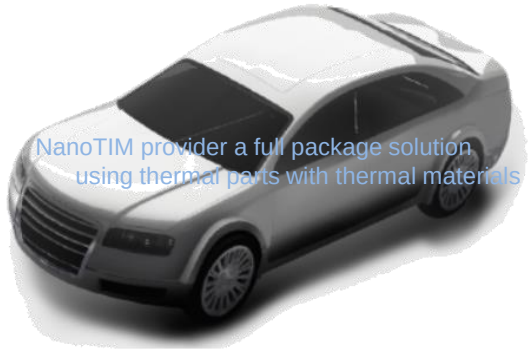
세계 최고의 방열소재 기업

MOST * COMPETITIVE THERMAL SOLUTION PROVIDER

About NanoTIM co.,Ltd

Thermal Interface Material(TIM) 전문기업 나노팀 주식회사

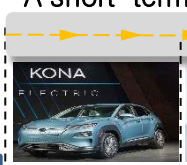


Nano Thermal **I**nterface **M**aterial **Catalog** **ver. 15**

Development Roadmap

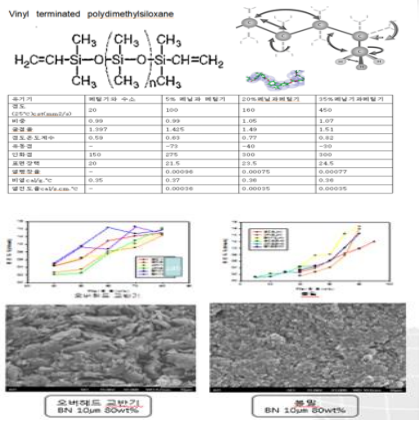
S.G : Specific gravity
T.C : Thermal conductivity

"A short-term goal" → "A middle-term goal" → "A long-term goal"



				2020	2021	2022	2023	2024	2025
Silicone	Gap filler		Low S.G	3 W/mk S.G : 2.0	3 W/mk S.G : 1.8	3 W/mk S.G : 1.5 ↓	5 W/mk, S.G : 1.5 ↓		
			High T.C	5 W/mk	7 ~ 10 W/mk				
			Usability improvement		UV hardening type				
	Pad	High T.C	Electrical insulation	7 W/mk	~ 15 W/mk				
			Electrical conductivity		~ 35 W/mk				
	Potting		Low viscosity	3 W/mk		5 W/mk ↑			
	Adhesive		1 or 2 part	0.2~2 W/mk	3 W/mk ↑				
Organic materials	Gap filler		Acrylic	2 W/mk UV hardening					
			Poly urethane		2 W/mk ↑				
			Epoxy		2 W/mk ↑				
			MS Polymer (Silicone free)	2 W/mk					
	Potting		Epoxy		2 W/mk ↑				

Technology Roadmap



S.G : Specific gravity
T.C : Thermal conductivity

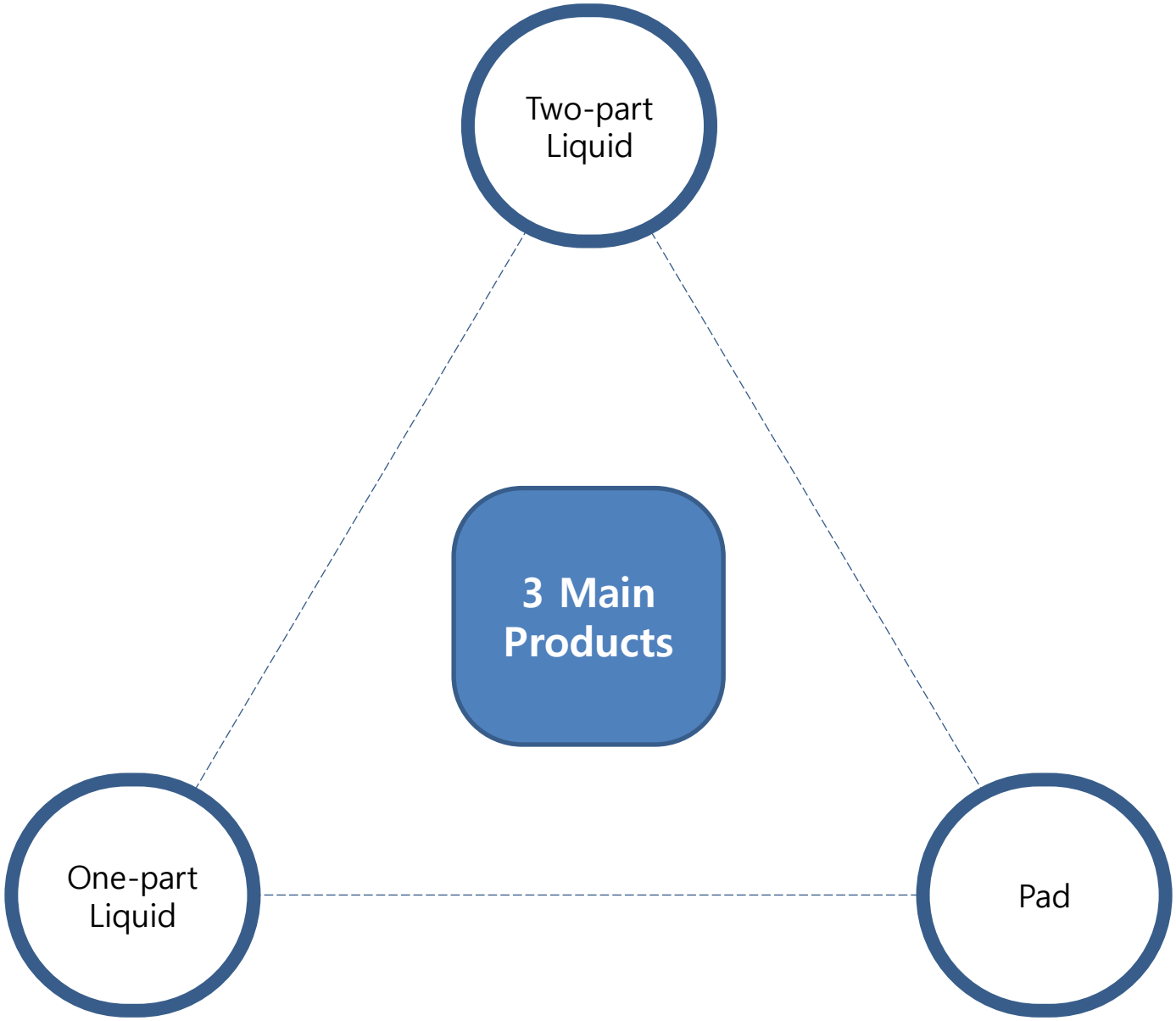
"A short-term goal"

"A middle-term goal"

"A long-term goal"

2020 | 2021 | 2022 | 2023 | 2024 | 2025

Filler	Low S.G filler Rheology transformation Filler deposition High T.C filler (Low-price)
Surface treatment	Dispersion agent (Low-price) Using silane reaction
Various reactive technology	Various hardener structure Condensation reaction
UV hardening	Silicone UV hardening Acrylic UV hardening


Two-part Liquid
3 Main Products
One-part Liquid
Pad

Overview

Two-part Liquid

- TGF - Thermal Gap Filler (MS945-02 TYPE C) 6
- TAF - Thermal Adhesive Filler (MS945-02 TYPE C) 17
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- STS - Silicone Tack Series (MS945-02 TYPE C) 35

One-part Liquid

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- TMF - Thermal Modified Silane Filler (MS945-02 TYPE C) 48
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Pad

- PCM - Phase Change Material (MS945-02 TYPE D) 53
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TGF - Thermal Gap Filler

■ Information

TGF stands for Thermal Gap Filler.
It is a thermally conductive gap filling material that is offered as two-part component. The purpose of this material is to improve the heat delivery from the heat source to the heat sink. Depending on the customer's request, the material is available in different viscosity and hardness.

Typical properties of the gap filling material consist of the following characteristics: Thermal conductivity, viscosity, hardness, working time, volume resistivity, etc. It is generally offered in either cartridges or containers, whereas the cartridges are used with a static mixing nozzle and a dispensing gun.

By mixing the two-part component into a single mixed material, the liquid form cures into a solid form depending on the curing time and temperature. Before the liquid form cures completely into the solid form, the material placed in the interface may be conformed or pressurized by the surrounding surfaces to remove as much air layers or gaps as possible.

Features and Benefits

- Conformable
- low hardness
- Easy dispense
- Isolated electrically
- Minimized interfacial resistance
- Superior Thermal Performance
- Superior peel-adhesion

Applications

- Display (LED, LCD, PDP TV etc.)
- Memory Devices
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence
- Automobile(motors)

Characteristics

- Thermal conductivity
- Viscosity
- Hardness
- Working time

How to use

Depending on the stored time of the material from the date of manufacture, premix prior to the actual use. For the two-part component, mix the part A and B material by a ratio of 1:1 and apply the mixed material on the desired surfaces. Once the surface is applied by a pressure with a surface the air gaps could be removed as much as possible for better heat dissipation from the heat source.

Processing

After the material is exposed to air the material will begin to cure. At room temperature the cure time is generally set to a certain time which can be shorten by applying additional heat or other accelerating factors. Overall the material applied at the desired surface will eventually cure throughout the material after being dispensed. Upon customer's request the curing time can be adjusted by changing the amount of catalysts.

TGF - Thermal Gap Filler

■ Selection Guides

Building a Product Number

TGF	NT000[ ]	00[ ]00
Thermal Gap Filler	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Viscosity

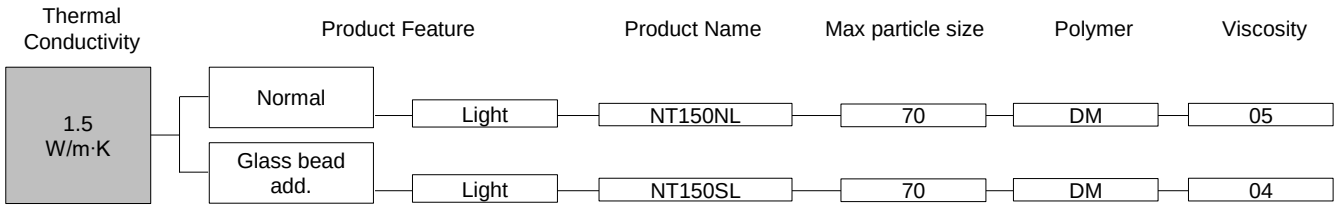
NO	Product Name	Thermal Conductivity [W/m·K]	Viscosity [cps]	Hardness [Shore 00]								Product Characteristics
				20	30	40	50	60	70	80	90	
1	TGF-100-Series	1.0 ~ 1.9	~ 200,000	●	●	●	●	●	●	●	●	N - Normal S - Glass Bead add. L - Light(Density)
2	TGF-200-Series	2.0 ~ 2.9	~ 300,000	●	●	●	●	●	●	●	●	
3	TGF-300-Series	3.0 ~ 3.9	~ 350,000	●	●	●	●	●	●	●	●	
4	TGF-400-Series	4.0 ~ 4.9	~450,000	●	●	●	●	●	●	●	●	
5	TGF-500-Series	5.0 ~ 5.9	~550,000			●	●	●	●	●	●	

TGF - Thermal Gap Filler

■ Products Introduction

TGF-100 Series

The TGF-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT150NL, NT150SL.



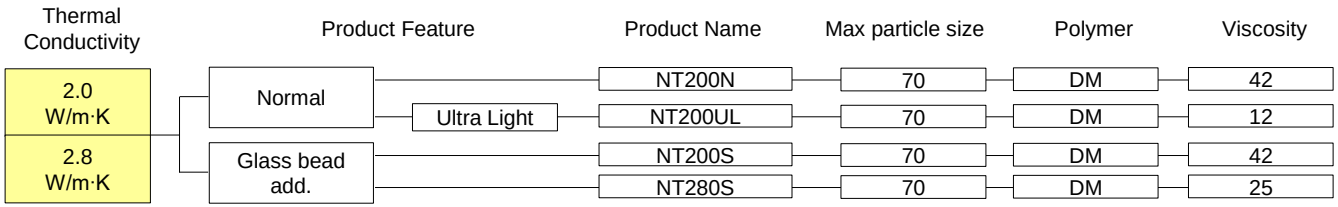
ITEM		Test Conditions	Units	NT150NL	NT150SL
General	Color	Visual (A : B)	-	A : Gray B : White	A : Gray B : White
	Continuous Use temp	-	℃	-50 ~ 150	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	60,000	50,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	50,000	30,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	55,000	40,000
	Density	25℃, Gravimeter	g/cc	1.81	1.75
Mechanical	Hardness	Shore	00	50	60
	Elongation	-	%	80	80
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.7	1.5
Cure	Pot life @ 25°C	Time for viscosity to double	min.	120	120

TGF - Thermal Gap Filler

■ Products Introduction

TGF-200 Series

The TGF-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200S, NT280S.



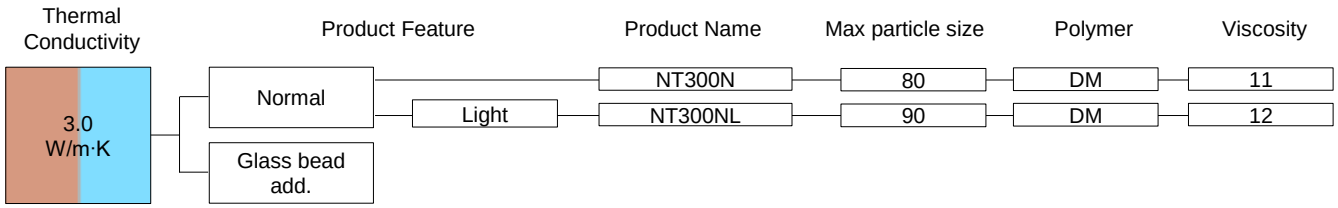
ITEM		Test Conditions	Units	NT200N	NT200UL	NT200S	NT280S
General	Color	Visual (A : B)	-	A:Yellow B:White	A:Yellow B:White	A:Yellow B:White	A:Yellow B:White
	Continuous Use temp	-	℃	-60 ~ 200	-50 ~ 150	-60 ~ 200	-60 ~ 200
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	430,000	120,000	430,000	230,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	420,000	120,000	420,000	250,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	420,000	120,000	420,000	250,000
	Density	25℃, Gravimeter	g/cc	2.4	1.78	2.4	2.5
Mechanical	Hardness	Shore	00	60	50	60	60
	Elongation	-	%	90	90	90	90
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.0	2.4	2.0	2.8
Cure	Pot life @ 25°C	Time for viscosity to double	min.	60	120	60	120

TGF - Thermal Gap Filler

■ Products Introduction

TGF-300 Series

The TGF-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N, NT300NL.



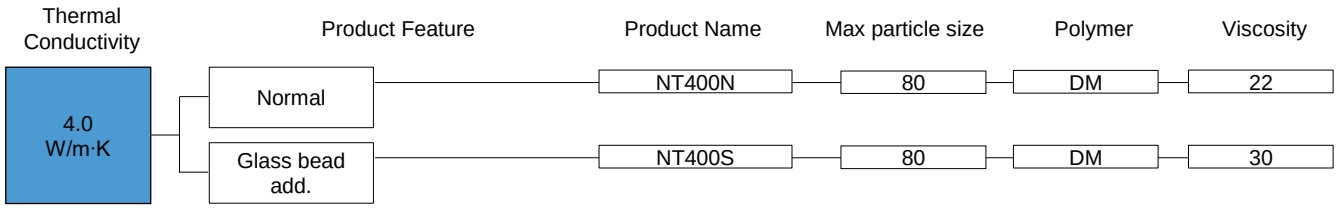
ITEM		Test Conditions	Units	NT300N	NT300NL
General	Color	Visual (A : B)	-	A : Brown B : White	A : Navy blue B : White
	Continuous Use temp	-	℃	-50 ~ 150	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	120,000	135,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	110,000	120,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	110,000	135,000
	Density	25℃, Gravimeter	g/cc	2.47	2.05
Mechanical	Hardness	Shore	00	50	46
	Elongation	-	%	80	90
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> 1*1012	> 1*1012
Thermal	Thermal Conductivity	-	W/m·K	3.5	3.2
	Specific heat	25 ℃	J/g·K	0.99	1.18
	Thermal Resistivity	T = 1.0 mm	K/W	-	1.033
		T= 2.0 mm	K/W	-	2.509
	Coefficient of Thermal Expansion	-	ppm	-	95
Cure	Pot life @ 25°C	Time for viscosity to double	min.	120	120

TGF - Thermal Gap Filler

■ Products Introduction

TGF-400 Series

The TGF-400 Series are Thermal Conductivity 4.0~5.0W/m·K ※ It does not include 5.0W/m·K
The products that apply are NT400N, NT400S.



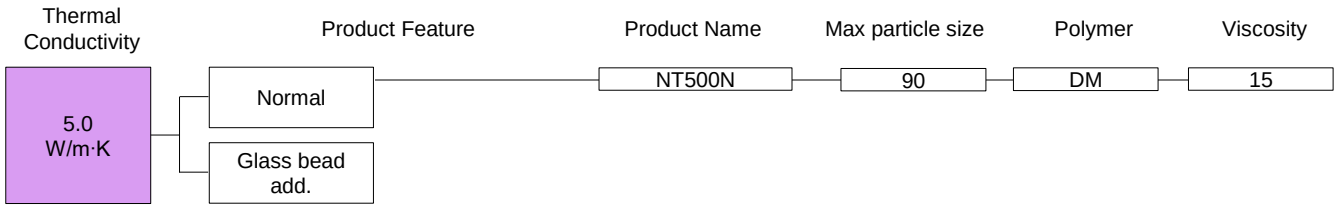
ITEM		Test Conditions	Units	NT400N	NT400S
General	Color	Visual (A : B)	-	A : Blue B : White	A : Blue B : White
	Continuous Use temp	-	℃	-60 ~ 200	-60 ~ 200
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	240,000	300,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	180,000	300,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	220,000	300,000
	Density	25℃, Gravimeter	g/cc	3.0	3.0
Mechanical	Hardness	Shore	00	80	80
	Elongation	-	%	50	50
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.3	< 0.3
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	4.0	4.0
	Coefficient of Thermal Expansion	-	ppm	80	-
Cure	Pot life @ 25°C	Time for viscosity to double	min.	120	120

TGF - Thermal Gap Filler

■ Products Introduction

TGF-500 Series

The TGF-500 Series are Thermal Conductivity 5.0~6.0W/m·K ※ It does not include 6.0W/m·K
The products that apply are NT500N.



ITEM		Test Conditions	Units	NT500N
General	Color	Visual (A : B)	-	A : Pink B : White
	Continuous Use temp	-	℃	-60 ~ 200
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	145,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	155,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	150,000
	Density	25℃, Gravimeter	g/cc	3.1
Mechanical	Hardness	Shore	00	80
	Elongation	-	%	50
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.3
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	5.0
Cure	Pot life @ 25°C	Time for viscosity to double	min.	60

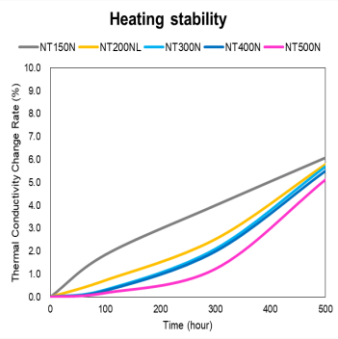
TGF - Thermal Gap Filler

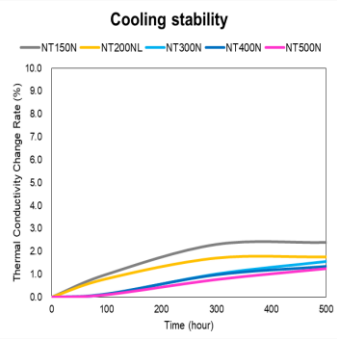
■ Durability Property

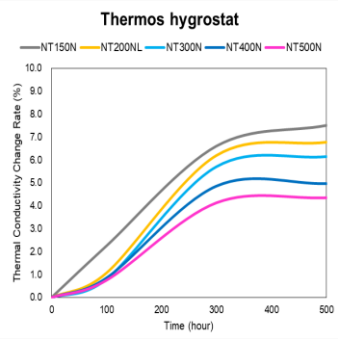
TGF of NanoTIM has the same conditions for durability property.

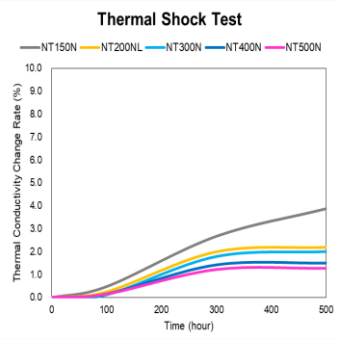
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









TGF - Thermal Gap Filler

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

■ Packaging

Package type	Volume	Weight	Photograph
Cartridge (Integral two-part type)	25ml	40g ~ 75g	
	200ml	300g ~ 500g	
Syringe (separation two-part type)	590ml	1kg ~ 1.6kg	
Pail (separation two-part type)	20L	30kg ~ 40kg	
Drum (separation two-part type)	200L	300kg ~ 400kg	

Upon customer's request the gap fillers may be packed into the desired size of containers.
However, for small sizes NanoTIM offers cartridges for easy dispensing and large sizes the gap fillers are packed into a container.

※ The package weight may vary depending on the density of the product.
※ The volume/weight are indicated separately for each A/B.

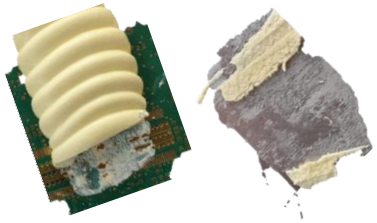
TGF - Thermal Gap Filler

■ Useable life and storage

The gap filler products are best to maintain the product characteristics when it is stored in a cool and non-humid environment, especially where it is not exposed by any sunlight. Containers that passed 2 months from the date of manufacture should be remixed with a clean mixer and vacuumed to prevent any air gaps forming prior to the mixing procedure. Whereas the cartridge contained products, the package should be flipped upside down every two weeks in order to prevent the particle fillers settling near the bottom side. The shelf life can go up to 6 months above when properly stored. Storage temperatures range from 15 to 25 degrees.

※ Once an open product is stored for a long time, there is a possibility of product contamination, so the quality of the product is not guaranteed.

TAF - Thermal Adhesive Filler



■ Information

TAF stands for Thermal Adhesive Filler.
TAF series are two-part silicone-based thermal filler that has low viscosity prior to curing. TAF series are an ideal thermal interface material specially designed for filling between to heat source like Chip set and other plastic encapsulated components with excellent thermal conductivity cushioning and filling properties. The purpose of this material is to improve the heat delivery from the heat source to the heat sink. Depending on the customer's request, the material is available in different viscosity and hardness.

Typical properties of the filling material consist of the following characteristics: Thermal conductivity, adhesion, viscosity, hardness, working time, volume resistivity, etc. It is generally offered in either cartridges or containers, whereas the cartridges are used with a static mixing nozzle and a dispensing gun.

By mixing the two-part component into a single mixed material, the liquid form cures into a solid form depending on the curing time and temperature.

Features and Benefits

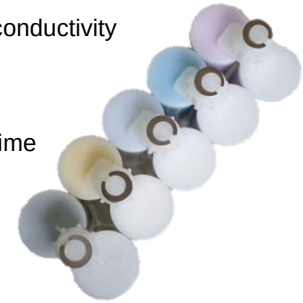
- Conformable
- Isolated electrically
- Minimized interfacial resistance
- Superior Thermal Performance
- Superior self-adhesion
- Tends to maintain formability

Applications

- Display (LED, LCD, PDP TV etc.)
- Memory Devices
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence
- Automobile(motors)

Characteristics

- Thermal conductivity
- Adhesion
- Viscosity
- Hardness
- Working time



How to use

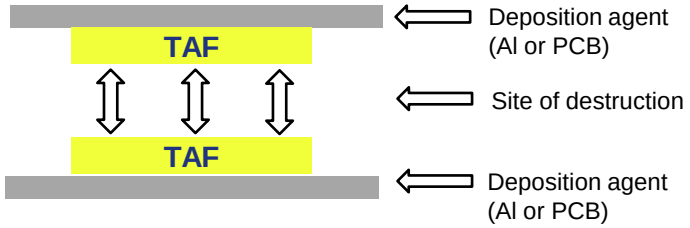
Depending on the stored time of the material from the date of manufacture, premix prior to the actual use. For the two-part component, mix the part A and B material by a ratio of 1:1 and apply the mixed material on the desired surfaces. Once the surface is applied by a pressure with a surface the air gaps could be removed as much as possible for better heat dissipation from the heat source.

Processing

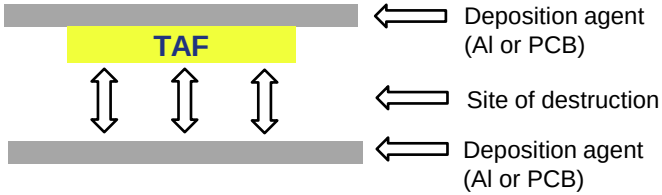
After the material is exposed to air the material will begin to cure. At room temperature the cure time is generally set to a certain time which can be shorten by applying additional heat or other accelerating factors. Overall the material applied at the desired surface will eventually cure throughout the material after being dispensed. Upon customer's request the curing time can be adjusted by changing the amount of catalysts.

TAF - Thermal Adhesive Filler

Description of Adhesion



(a) Cohesive Failure



(b) Adhesive Failure

- CF(Cohesive Failure)
  The term refers to either partial or complete destruction within the adhesive layer.
- AF(Adhesive Failure)
  The term refers to either partial or complete separation of interfacial deposition agent surface and adhesive layer.

TAF - Thermal Adhesive Filler

■ Selection Guides

Building a Product Number

TAF	NT000[ ]	00[ ]00
Thermal Adhesive Filler	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Viscosity

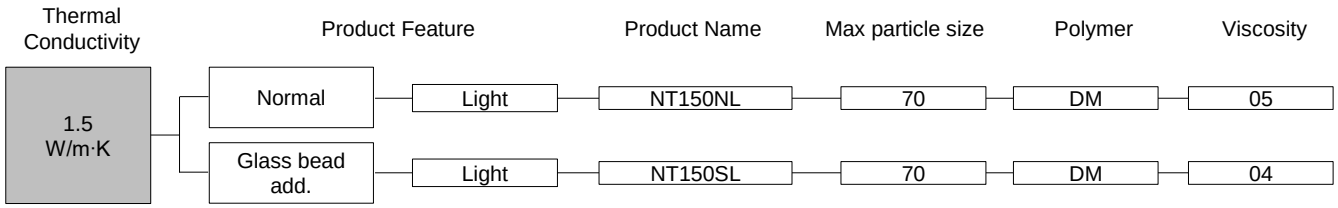
NO	Product Name	Thermal Conductivity [W/m·K]	Viscosity [cps]	Hardness [Shore A]								Product Characteristics
				20	30	40	50	60	70	80	90	
1	TAF-100-Series	1.0 ~ 1.9	~ 200,000			●	●	●	●	●	●	N - Normal S - Glass Bead add L - Light(Density)
2	TAF-200-Series	2.0 ~ 2.9	~ 300,000			●	●	●	●	●	●	
3	TAF-300-Series	3.0 ~ 3.9	~ 350,000			●	●	●	●	●	●	
4	TAF-400-Series	4.0 ~ 4.9	~450,000			●	●	●	●	●	●	
5	TAF-500-Series	5.0 ~ 5.9	~550,000			●	●	●	●	●	●	

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-100 Series

The TAF-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT150NL, NT150SL.



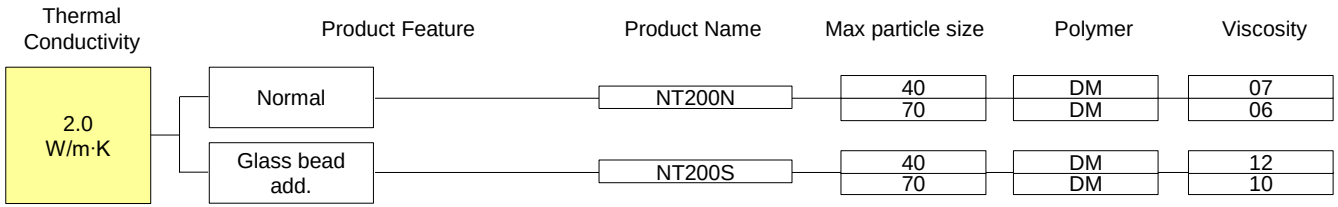
ITEM		Test Conditions	Units	NT150NL	NT150SL
General	Color	Visual (A : B)	-	A : Gray B : White	A : Gray B : White
	Continuous Use temp	-	℃	-50 ~ 150	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	60,000	50,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	50,000	30,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	55,000	40,000
	Density	25℃, Gravimeter	g/cc	1.81	1.75
Mechanical	Hardness	Shore	00	85	85
	Hardness	Shore	A	40	40
	Adhesion PCB	150℃, 1Hour	-	CF 100%	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.7	1.5
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	9	9

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-200 Series

The TAF-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200N(2), NT200S(2).



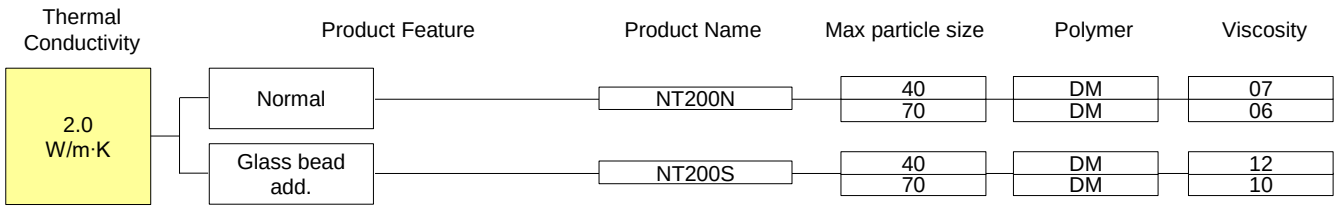
ITEM		Test Conditions	Units	NT200N-40DM07	NT200N-70DM06
General	Color	Visual (A : B)	-	A:Yellow B:White	A:Yellow B:White
	Continuous Use temp	-	℃	-50 ~ 200	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	70,000	68,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	70,000	60,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	70,000	60,000
	Density	25℃, Gravimeter	g/cc	2.55	2.05
Mechanical	Hardness	Shore	00	90	85
	Hardness	Shore	A	60	40
	Adhesion PCB	150℃, 1Hour	-	CF 100%	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.0	2.3
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	9	9

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-200 Series

The TAF-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200N(2), NT200S(2).



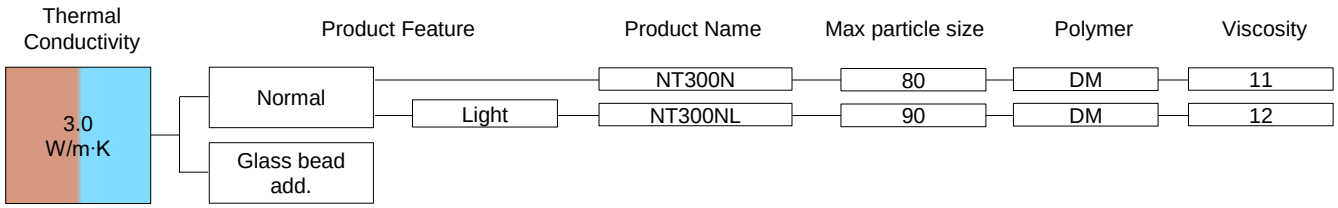
ITEM		Test Conditions	Units	NT200S-40DM12	NT200S-70DM10
General	Color	Visual (A : B)	-	A:Yellow B:White	A:Yellow B:White
	Continuous Use temp	-	℃	-50 ~ 200	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	112,000	90,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	105,000	105,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	120,000	100,000
	Density	25℃, Gravimeter	g/cc	2.11	2.36
Mechanical	Hardness	Shore	00	87	85
	Hardness	Shore	A	45	47
	Adhesion PCB	150℃, 1Hour	-	CF 100%	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.1	2.1
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	9	9

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-300 Series

The TAF-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N, NT300NL.



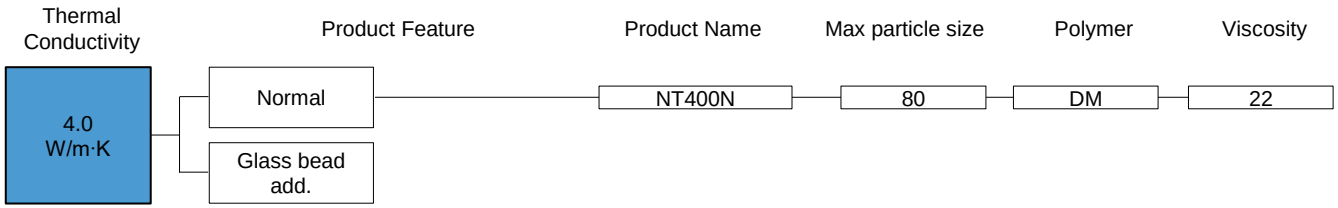
ITEM		Test Conditions	Units	NT300N	NT300NL
General	Color	Visual (A : B)	-	A : Brown B : White	A : Navy blue B : White
	Continuous Use temp	-	℃	-50 ~ 150	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	120,000	130,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	110,000	120,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	110,000	120,000
	Density	25℃, Gravimeter	g/cc	2.47	2.05
Mechanical	Hardness	Shore	00	85	85
	Hardness	Shore	A	30	30
	Adhesion PCB	150℃, 1Hour	-	CF 100%	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	3.5	3.2
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	9	10

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-400 Series

The TAF-400 Series are Thermal Conductivity 4.0~5.0W/m·K ※ It does not include 5.0W/m·K
The products that apply are NT400N, NT400S.



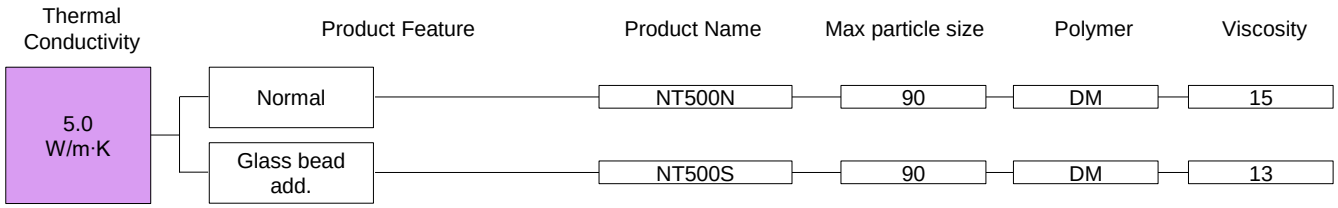
ITEM		Test Conditions	Units	NT400N
General	Color	Visual (A : B)	-	A : Blue B : White
	Continuous Use temp	-	℃	-60 ~ 200
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	220,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	220,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	220,000
	Density	25℃, Gravimeter	g/cc	3.0
Mechanical	Hardness	Shore	00	95
	Hardness	Shore	A	60
	Adhesion PCB	150℃, 1Hour	-	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.3
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	4.0
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	6

TAF - Thermal Adhesive Filler

■ Products Introduction

TAF-500 Series

The TAF-500 Series are Thermal Conductivity 5.0~6.0W/m·K ※ It does not include 6.0W/m·K
The products that apply are NT500N.



ITEM		Test Conditions	Units	NT500N	NT500S
General	Color	Visual (A : B)	-	A : Pink B : White	A : Pink B : White
	Continuous Use temp	-	℃	-60 ~ 200	-60 ~ 200
	Viscosity(A)	25℃, 1rpm, No.52 Spindle	cps	145,000	135,000
	Viscosity(B)	25℃, 1rpm, No.52 Spindle	cps	155,000	114,000
	Viscosity(Mixes)	25℃, 1rpm, No.52 Spindle	cps	150,000	132,000
	Density	25℃, Gravimeter	g/cc	3.1	3.1
Mechanical	Hardness	Shore	00	85	85
	Hardness	Shore	A	40	40
	Adhesion PCB	150℃, 1Hour	-	CF 100%	CF 100%
	Adhesion AL	150℃, 1Hour	-	CF 100%	CF 100%
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.3	< 0.3
	Volume Resistivity	-	Ω·cm	$> 1*10^{12}$	$> 1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	5.0	5.0
Cure	Pot life @ 25°C	Time for viscosity to double	Hour	8	8

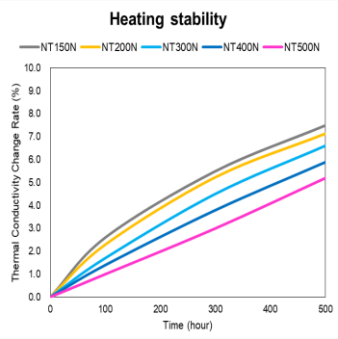
TAF - Thermal Adhesive Filler

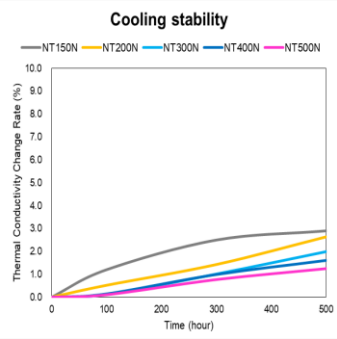
■ Durability Property

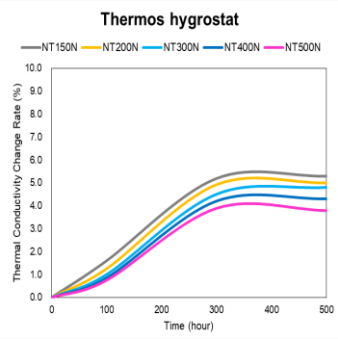
TAF of NanoTIM has the same conditions for durability property.

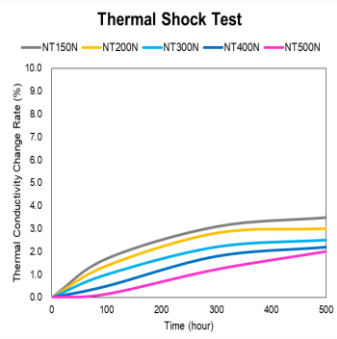
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









TAF - Thermal Adhesive Filler

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

Package type	Volume	Weight	Photograph
Cartridge (Integral two-part type)	25ml	40g ~ 75g	
	200ml	300g ~ 500g	
Syringe (separation two-part type)	590ml	1kg ~ 1.6kg	
Pail (separation two-part type)	20L	30kg ~ 40kg	
Drum (separation two-part type)	200L	300kg ~ 400kg	

Upon customer's request the adensive fillers may be packed into the desired size of containers.
However, for small sizes NanoTIM offers cartridges for easy dispensing and large sizes the adhesive fillers are packed into a container.

※ The package weight may vary depending on the density of the product.
※ The volume/weight are indicated separately for each A/B.

TAF - Thermal Adhesive Filler

■ Useable life and storage

The adhesive filler products are best to maintain the product characteristics when it is stored in a cool and non-humid environment, especially where it is not exposed by any sunlight. Containers that passed 2 months from the date of manufacture should be remixed with a clean mixer and vacuumed to prevent any air gaps forming prior to the mixing procedure. Whereas the cartridge contained products, the package should be flipped upside down every two weeks in order to prevent the particle fillers settling near the bottom side. The shelf life can go up to 6 months above when properly stored. Storage temperatures range from 15 to 25 degrees.

※ Once an open product is stored for a long time, there is a possibility of product contamination, so the quality of the product is not guaranteed.

TSG - Thermal Silicone Gel

■ Information

TSG stands for Thermal Silicone Gel.
It is a thermally conductive silicone gel material that is offered as two-part component. This product is low in viscosity and works well, and It cures at room temperature or with heat to form elastic, thermally conductive and flame-retardant rubber.

Features and Benefits

- Low viscosity
- Thermal management
- Excellent adhesion

Applications

- OBC(on-board charger)
- Inverter
- Converter
- Automotive electronics

How to use

Depending on the stored time of the material from the date of manufacture, premix prior to the actual use. For the two-part component, mix the part A and B material by a ratio of offered and apply the mixed material on the desired surfaces.

TSG - Thermal Silicone Gel

■ Selection Guides

Building a Product Number

TSG	NT000[ ]	00[ ]00
Thermal Silicone Gel	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Viscosity

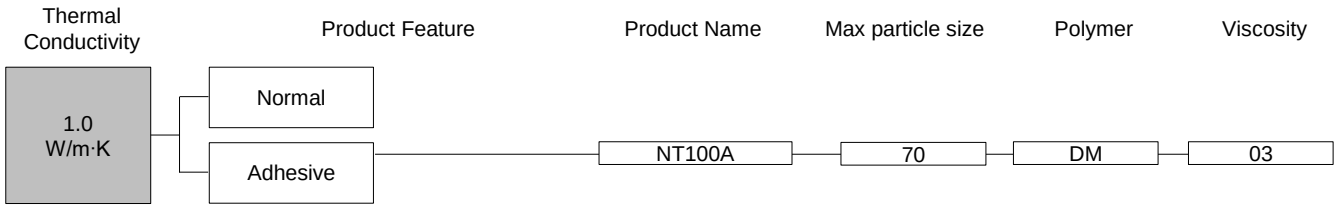
NO	Product Name	Thermal Conductivity [W/m·K]	Viscosity [cps]	Hardness [Shore A]								Product Characteristics
				20	30	40	50	60	70	80	90	
1	TSG-100-Series	1.0 ~ 1.9	~ 5,000		●	●	●	●	●	●	●	N - Normal A - Adhesive
2	TSG-200-Series	2.0 ~ 2.9	~ 10,000		●	●	●	●	●	●	●	
2	TSG-300-Series	3.0 ~ 3.9	~ 20,000		●	●	●	●	●	●	●	

TSG - Thermal Silicone Gel

■ Products Introduction

TSG-100 Series

The TSG-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT100N.



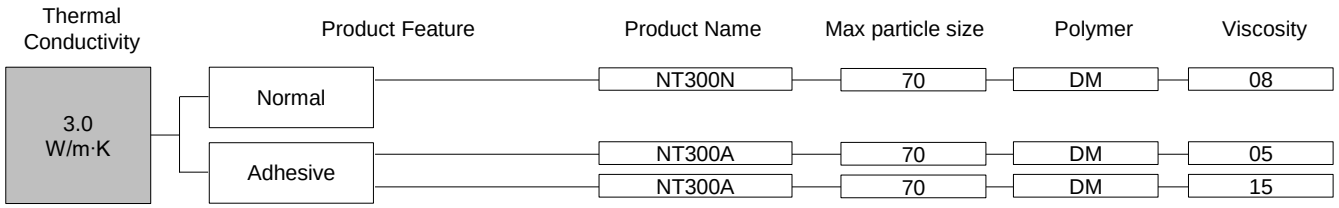
ITEM		Test Conditions	Units	NT100N
General	Color	Visual (A : B)	-	A : White B : Gary
	Continuous Use temp	-	℃	-50 ~ 150
	Viscosity(A)	25℃, 3rpm, No.40 Spindle	cps	2,900
	Viscosity(B)	25℃, 3rpm, No.40 Spindle	cps	3,100
	Viscosity(Mixes)	25℃, 3rpm, No.40 Spindle	cps	3,000
	Density	25℃, Gravimeter	g/cc	1.75
Mechanical	Hardness	Shore	A	40
	Elongation	-	%	100
	Tensile strength	-	Mpa	> 0.5
	Adhesion Al	150℃, 1H, Oven	Mpa	> 1
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.15
	Volume Resistivity	-	Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.0
Cure	Pot life @ 25°C	Time for viscosity to double	min.	120

TSG - Thermal Silicone Gel

■ Products Introduction

TSG-300 Series

The TSG-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N.



ITEM		Test Conditions	Units	NT300N-70DM08	NT300A-70DM05	NT300A-70DM15
General	Color	Visual (A : B)	-	A : White B : Gary	A : White B : Gary	A : White B : Gary
	Continuous Use temp	-	℃	-50 ~ 150	-50 ~ 150	-50 ~ 150
	Viscosity(A)	25℃, 1rpm, No.40 Spindle	cps	9,500	7,000	15,000
	Viscosity(B)	25℃, 1rpm, No.40 Spindle	cps	8,700	5,700	13,000
	Viscosity(Mixes)	25℃, 1rpm, No.40 Spindle	cps	8,300	5,500	15,000
	Density	25℃, Gravimeter	g/cc	2.9	2.9	2.9
Mechanical	Hardness	Shore	A	-	70	-
	Hardness	Shore	00	50	-	75
	Elongation	-	%	50	50	50
	Tensile strength	-	Mpa	-	> 0.5	> 0.5
	Adhesion Al	150℃, 1H, Oven	Mpa	-	> 1	> 1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2	< 0.2
	Volume Resistivity	-	Ω·cm	$> 1*10^{12}$	$> 1*10^{12}$	$> 1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	3.0	3.0	3.0
	CTE	TMA	ppm/℃	250	250	250
Cure	Pot life @ 25°C	Time for viscosity to double	min.	40	48	48
	Cure @ 120°C	Oven	minutes	60	90	90

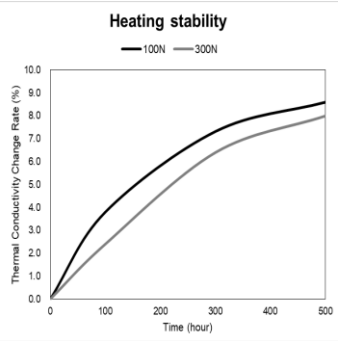
TSG - Thermal Silicone Gel

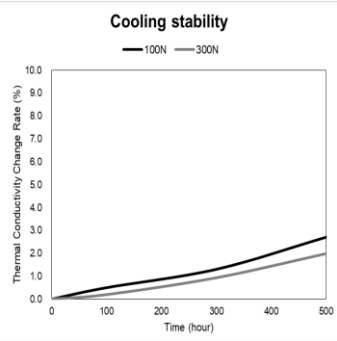
■ Durability Property

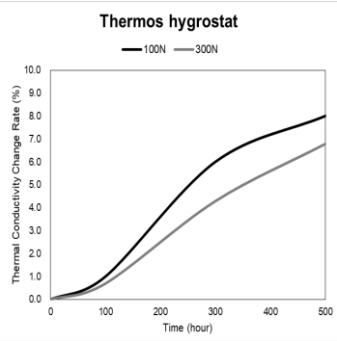
TSG of NanoTIM has the same conditions for durability property.

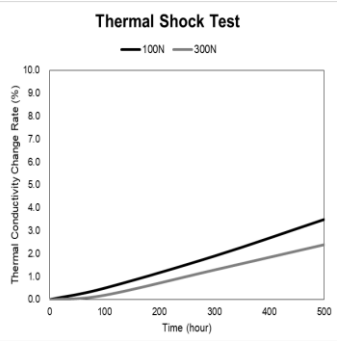
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









TSG - Thermal Silicone Gel

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

Upon customer's request the TSG may be packed into the desired size of containers.
※ Please contact NanoTIM representative for information on packaging size and availability.

■ Useable life and storage

Special precautions must be taken to prevent moisture from contacting these materials. Containers should be kept tightly closed and head or air space minimized.
Some filler may settle to the bottom of the liquid after several weeks. To ensure a uniform product mix, the material in each container should be thoroughly free-mixing prior to use.

STS - Silicone Tack Series

■ Information

STS series are two-part silicone-based Tackiness that has low viscosity prior to curing.

STS series are mixing two-part 1:1 weight ratio will heat up and harden to form a soft silicone gel.

Features and Benefits

- Transparency
- Good workability
- Low viscosity
- Soft and tacky gel
- Excellent tackiness after curing
- Excellent resistance to temperature extremes
- Excellent electrical properties
- Environment friendly product
- Rapid heat cure(Room-temperature curable)

Applications

- Display (LED, LCD, PDP TV etc…)
- Memory Devices
- IC insulation potting
- Power module potting
- Delicate assemblies

How to use

STS blend A and B to 1:1.
For appropriate gel property A and B are blended homogeneously.
Curing takes place without any heat release but can be accelerated by heating.

STS - Silicone Tack Series

■ Selection Guides

Building a Product Number

STS	NT000[ ]
Silicon Tack Series	NT - NanoTIM
	000 - Thermal Conductivity
	[ ] - Product characteristics

NO	Product Name	Thermal Conductivity [W/m·K]	Viscosity [cps]	Product Characteristics
1	STS-000-Series	0.0 ~ 0.9	~ 2,000	N - Normal

STS - Silicone Tack Series

■ Products Introduction

STS-000 Series

The STS-000 Series are simple silicone.
The products that apply are NT020.

ITEM		Test Conditions	Units	NT020
General	Color	-	-	clear
	Viscosity(A)	25℃, 5rpm, No.40 Spindle	cps	1,200
	Viscosity(B)	25℃, 5rpm, No.40 Spindle	cps	1,100
	Viscosity(Mixes)	25℃, 5rpm, No.40 Spindle	cps	1,100
	Density	25℃, Gravimeter	g/cc	< 1
	Operating temperature	-	℃	-40 ~ 150
Thermal	Thermal Conductivity	-	W/m·K	0.1 ~ 0.2
Cure	Cure	Pot Life @ 25°C	minutes	150
		Cure @ 25°C	hour	24
		Cure @ 60°C	minutes	30
		Cure @ 100°C	minutes	10
		Cure @ 120°C	minutes	< 10

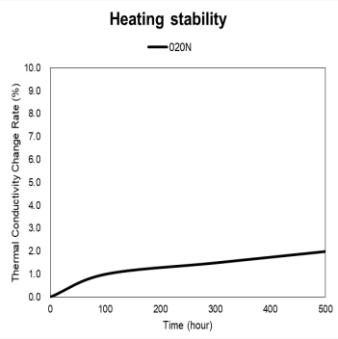
STS - Silicone Tack Series

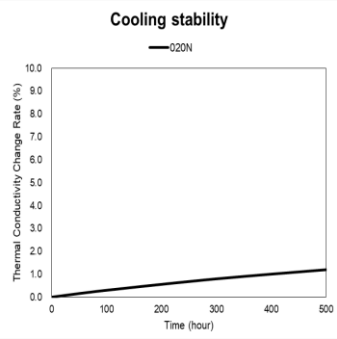
■ Durability Property

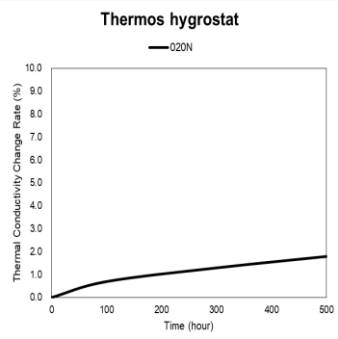
STS of NanoTIM has the same conditions for durability property.

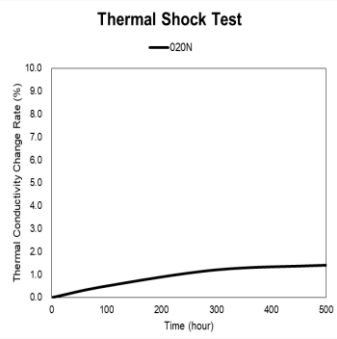
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









STS - Silicone Tack Series

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

Upon customer's request the STS may be packed into the desired size of containers.
※ Please contact NanoTIM representative for information on packaging size and availability

■ Useable life and storage

Special precautions must be taken to prevent moisture from contacting these materials. Containers should be kept tightly closed and head or air space minimized.

TGS - Thermal Grease Series

■ Information

TGS series are the superior thermal interface material with Nano-dispersion technology to mix the silicon fluid and high-performance nano powder, which can help the thermal dissipating of electric components.

TGS thermal compound is a silicone-based thermal grease made from a silicone fluid with thermally conductive material and metal oxide fillers. Also, this is able to achieve less than thickness of 1 mils to minimize the thermal pathway and maximize heat-flow.

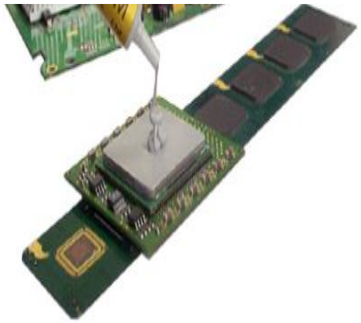
This material can be divided into two main categories: Automobile and Computer.

Features and Benefits

- Conformable
- Isolated electrically
- Minimized interfacial resistance
- Superior Thermal Performance
- Tends to maintain formability

Applications

- CPU, GPU (Notebooks, Desktops, Servers)
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence
- Telecommunication Equipment



How to use

Depending on the stored time of the material from the date of manufacture, premix prior to the actual use. Apply the mixed material on the desired surfaces. Once the surface is applied by a pressure with a surface the air gaps could be removed as much as possible for better heat dissipation from the heat source.

TGS - Thermal Grease Series

■ Selection Guides

Building a Product Number : Computer

TGS	A000
Thermal Grease Series	A - Attach
	000 - Thermal Conductivity

Building a Product Number : Automobile

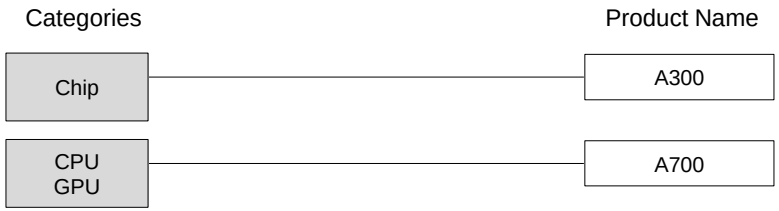
TGS	NT000[ ]	00[ ]00
Thermal Grease Series	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Viscosity
	G - Gray(Normal)	
	L – Low B.L.T	

TGS - Thermal Grease Series

■ Products Introduction

TGS-A Series

The TGS-A Series are for computers.
The products that apply are A300, A700.



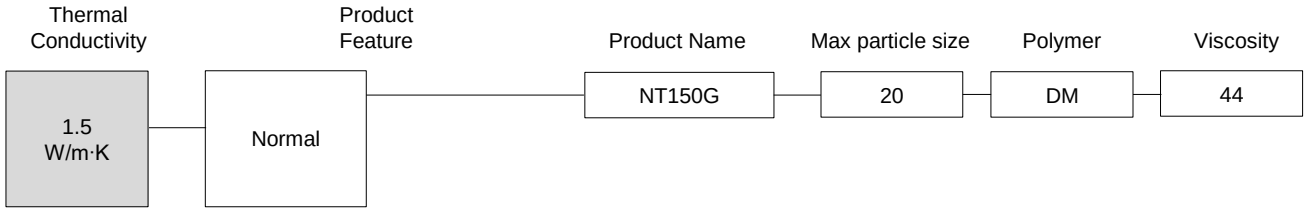
ITEM		Test Conditions	Units	A300	A700
General	Color	-	-	Gray	Gray
	Viscosity	25℃, 5rpm, No.52 Spindle	cps	300,000	400,000
	Density	25℃, Gravimeter	g/cc	2.6	2.6
	Operating temperature		℃	-40 ~ 150	-40 ~ 150
Thermal	Thermal Conductivity	-	W/m·K	3.0< A300 <4.0	7.0
	Thermal Resistance	10 psi	℃·cm²/W	0.14	0.12
		20 psi		0.11	0.10
		40 psi		0.09	0.07
		90 psi		0.07	0.05
Evaporation rate		150°C, 24hr	Wt%	< 1	< 1

TGS - Thermal Grease Series

■ Products Introduction

TGS-100 Series

The TGS-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT150G.



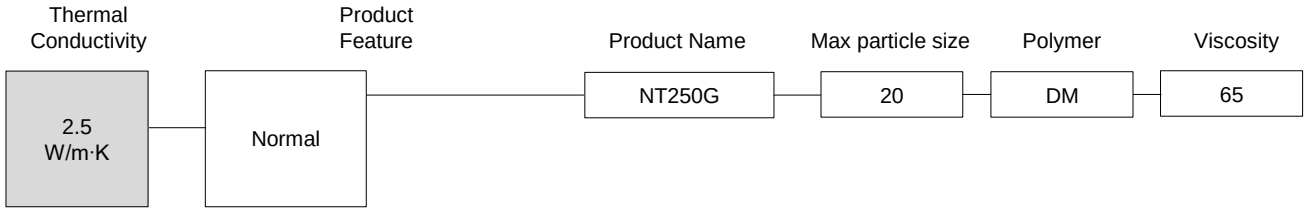
ITEM		Test Conditions	Units	NT150G
General	Color	-	-	Gray
	Viscosity	25℃, 1rpm, No.40 Spindle	cps	440,000
	Density	25℃, Gravimeter	g/cc	2.8
	Operating temperature	-	℃	-40 ~ 150
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Breakdown Voltage	DC	KV/mm	3
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.5
	Thermal Resistance	10 psi	℃·cm^2/W	0.36
		20 psi		0.28
		40 psi		0.23
		90 psi		0.16

TGS - Thermal Grease Series

■ Products Introduction

TGS-200 Series

The TGS-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT250G.



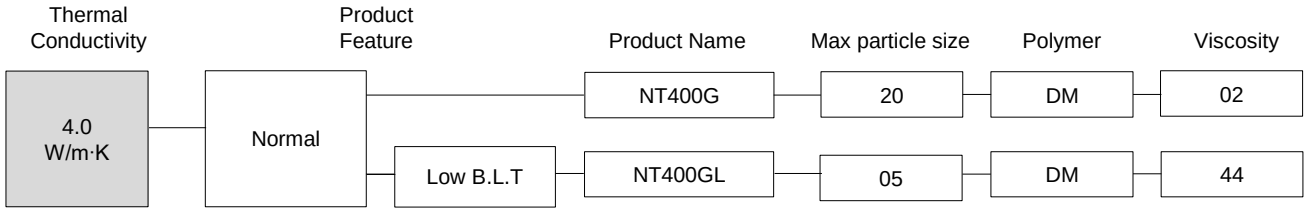
ITEM		Test Conditions	Units	NT250G
General	Color	-	-	Gray
	Viscosity	25℃, 1rpm, No.40 Spindle	cps	650,000
	Density	25℃, Gravimeter	g/cc	2.5
	Operating temperature	-	℃	-40 ~ 150
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Breakdown Voltage	DC	KV/mm	3
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.43
	Thermal Resistance	10 psi	℃·cm^2/W	0.28
		20 psi		0.22
		40 psi		0.19
		90 psi		0.15

TGS - Thermal Grease Series

■ Products Introduction

TGS-400 Series

The TGS-400 Series are Thermal Conductivity 4.0~5.0W/m·K ※ It does not include 5.0W/m·K
The products that apply are NT400G, NT400GL.



ITEM		Test Conditions	Units	NT400G	NT400GL
General	Color	-	-	Gray	Gray
	Viscosity	25℃, 1rpm, No.40 Spindle	cps	2,000,000	440,000
	Density	25℃, Gravimeter	g/cc	2.8	2.8
	Operating temperature	-	℃	-40 ~ 150	-40 ~ 150
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Breakdown Voltage	DC	KV/mm	3	3
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	4.0	4.0
	Thermal Resistance	10 psi	℃·cm^2/W	0.25	0.3
		20 psi		0.21	0.13
		40 psi		0.17	0.071
		90 psi		0.13	0.056

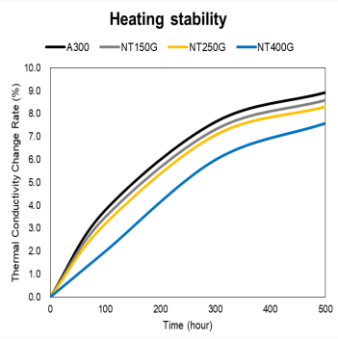
TGS - Thermal Grease Series

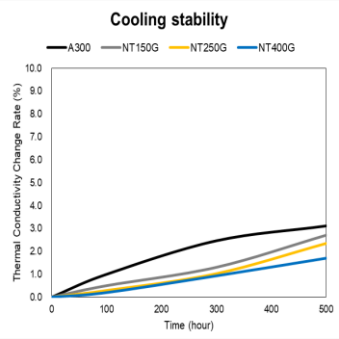
■ Durability Property

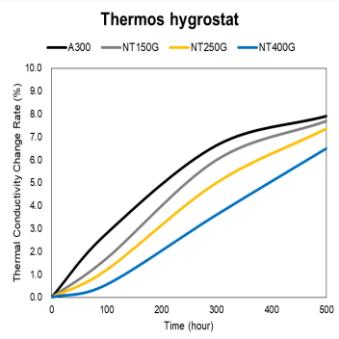
TGS of NanoTIM has the same conditions for durability property.

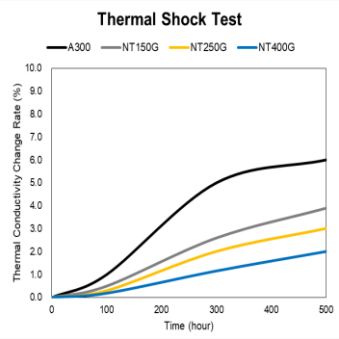
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	Thermal conductivity change rate : Within 10%
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Low molecular siloxane	D3~D6	ppm	< 100
Oil Bleeding	150℃, 200hr	%	< 10
Evaporation volume		%	< 1

Thermal Conductivity Change Rate









TGS - Thermal Grease Series

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

Package type	Volume	Photograph
Cartridge	333ml	
Pail	20L	

Upon customer's request the TGS may be packed into the desired size of containers.
However, for small sizes(333ml Syringe) NanoTIM offers syringe for easy dispensing. and large sizes(20L Pail) the grease are packed into a container.

※ Please contact NanoTIM representative for information on packaging size and availability.

■ Useable life and storage

The grease products are best to maintain the product characteristics when it is stored in a cool and non-humid environment, especially where it is not exposed by any sunlight. Containers that passed 2 months from the date of manufacture should be remixed with a clean mixer and vacuumed to prevent any air gaps forming prior to the mixing procedure. Whereas the syringe contained products, the package should be flipped upside down every two weeks in order to prevent the particle fillers settling near the bottom side. The shelf life can go up to max 6 months above when properly stored. Storage temperatures range from 15 to 25 degrees.
※ Once an open product is stored for a long time, there is a possibility of product contamination, so the quality of the product is not guaranteed.

TMF - Thermal Modified Silane Filler

■ Information

TMF is a one-liquid type heat dissipation product with MS Polymer and is a flexible product with excellent thermal conductivity, adhesion, and elasticity.

Features and Benefits

- Adhesive
- Conformable
- low hardness
- Easy dispense
- Isolated electrically
- Minimized interfacial resistance
- Superior Thermal Performance

Applications

- Display (LED, LCD, PDP TV etc.)
- Memory Devices
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence
- Automobile(motors)

Characteristics

- Thermal conductivity
- Viscosity
- Hardness
- Working time

How to use

Apply this product to the desired surface with minimal air contact after opening.

TMF - Thermal Modified Silane Filler

■ Selection Guides

Building a Product Number

TMF	NT000[ ]	00[ ]00
Thermal Modified Silane Filler	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Viscosity

NO	Product Name	Thermal Conductivity [W/m·K]	Viscosity [cps]	Hardness [Shore A]								Product Characteristics
				20	30	40	50	60	70	80	90	
1	TMF-200-Series	2.0 ~ 2.9	200,000 ~				●	●	●	●	●	N - Normal

TMF - Thermal Modified Silane Filler

■ Products Introduction

TMF-200 Series

The TMF-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200N.

ITEM		Test Conditions	Units	NT200N
General	Color		-	White
	Viscosity	25℃, 1rpm, No.52 Spindle	cps	200,000
	Density	25℃, Gravimeter	g/cc	2.27
Mechanical	Hardness	Shore	A	55
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Withstand Voltage	AC, 3000V	mA	< 0.15
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.09
Durability Property	Low molecular siloxane	D4~D10	ppm	< 20
		D4~D20	ppm	< 30
Cure	Working time @ 25°C		min.	30
	Cure	2T	Hour	24

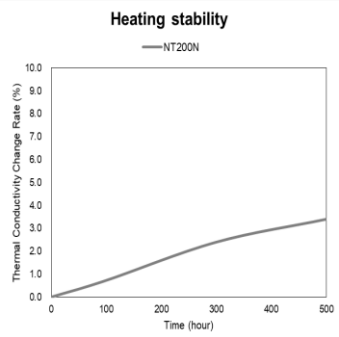
TMF - Thermal Modified Silane Filler

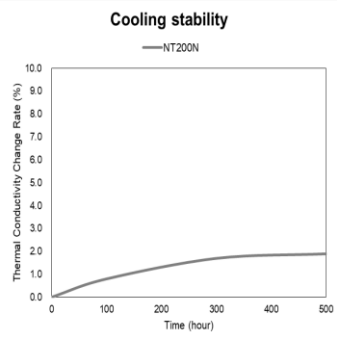
■ Durability Property

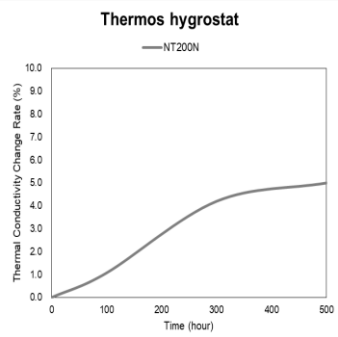
TMF of NanoTIM has the same conditions for durability property.

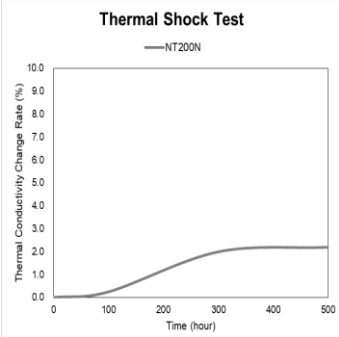
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction

Thermal Conductivity Change Rate









TMF - Thermal Modified Silane Filler

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
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  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

■ Packaging

Package type	Volume	Photograph
Cartridge	333ml	
Pail	20L	

Upon customer's request the TMF may be packed into the desired size of containers.
However, for small sizes(333ml Syringe) NanoTIM offers syringe for easy dispensing. and large sizes(20L Pail) the grease are packed into a container.

※ Please contact NanoTIM representative for information on packaging size and availability.

■ Useable life and storage

Special precautions must be taken to prevent moisture from contacting these materials. because It could curing.
So containers should be kept tightly closed and head or air space minimized.

One-part Liquid & Pad

Information on PCM

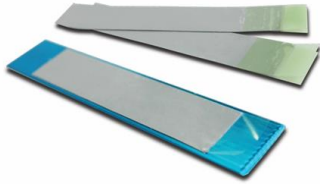
Selection Guides

Products Introduction

Durability Property

Safety & Packaging

PCM - Phase Change Material



■ Information

PCM is a thermal interface material to meet the requirement of heat in electronic component through high thermal performance. PCM is a wax based organic composed of thermal filler, metal oxide and other additive. At typical application operating temperature, PCM softens and flows to produce high thermal performance by achieving minimum bond-line and maximum surface wetting.

PCM is also easy to use and re-workable. PCM can be also easily used on the component to need high thermal resistance and reliability.

PCM meets all environmental requirement Including RoHS and flame rating. This Application Note contains Recommendations on how to specify, handle and install PCM thermal interface pad and liquid.

Features and Benefits

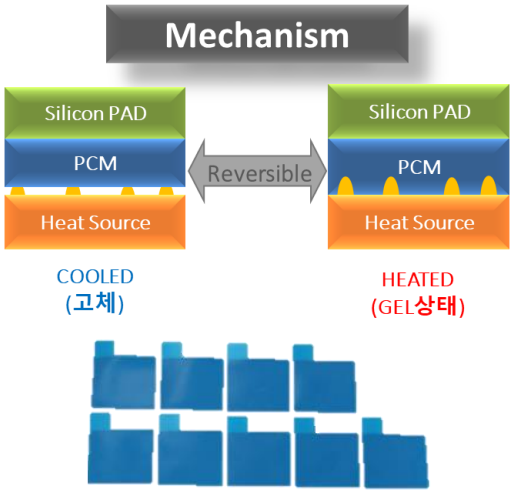
- High thermal conductivity
- Stable at elevated temperature
- Easy handling(Flexible) at room temperature
- Sticky at room temperature

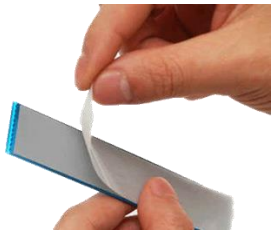
Applications

- CPU (Notebooks, Desktops, Servers)
- Custom ASICS Chips
- GPUs (Graphics Chips)
- North & Southbridge Chipsets
- FBDIMM, UDIMM, RDIMM
- High-power Module

Characteristics

- Organic phase change sheet
- Highly wetting interface material
- Re-workability





PCM - Phase Change Material

■ Selection Guides

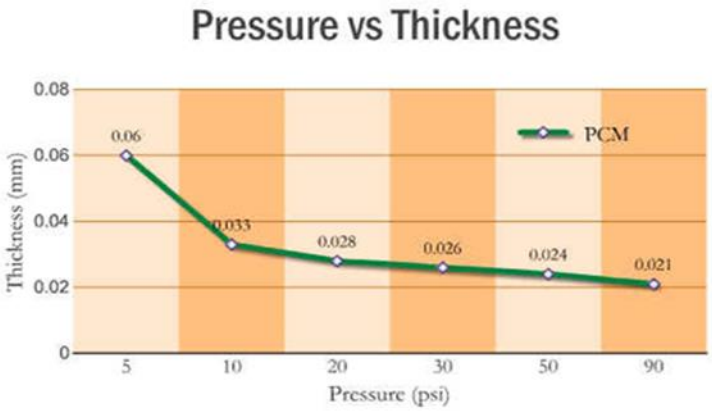
Building a Product Number

PCM	NT000[ ]	00[ ]00
Phase Change Material	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Phase Change temperature
	N - Normal Pad	
	HV - High Viscosity Liquid	
	LV - Low Viscosity Liquid	

NO	Product Name	Thermal Conductivity [W/m·K]	Change Temperature [℃]							Product Characteristics
			40	50	60	70	80	90	100	
1	Liquid PCM	2.5					●	●		HV - High Viscosity
		4.0		●						LV - Low viscosity
2	PCM-400-Series	4.0 ~ 4.9		●						N - Normal Pad

PCM - Phase Change Material

Selection Guides



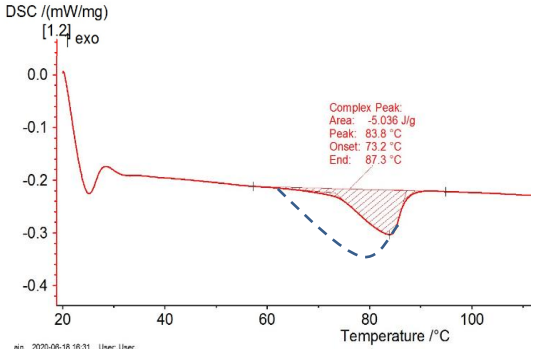
PCM softens and flows at the phase change temperature and pressure conditions encountered in a typical application between a hot component and its cooling component. During the initial power cycle, as the PCM pad softens and flows to displace air in the interface gap, the average thickness of the pad will decrease and the total area covered by the pad will increase.

PCM will be increased on the order of 30% in length and width. This 30% length/width increase was determined using a “generic” heat sink, its associated metal spring clip and a microprocessor device with integrated heat spreader. It is very important that thermal interface material is to fully cover the footprint of the heat generating device. Each application will vary in terms of flatness, co-planarity, applied clamping pressure, operating temperature, PCM to spreader placement tolerance, spreader-to component placement tolerance, etc., so it is recommended that the PCM size is verified through actual testing to be sure that thermal requirements are met.

PCM - Phase Change Material

■ Products Introduction

ITEM		Test Conditions	Units	NT400N	NT250HV	NT400LV
General	Form	Visual	-	Pad	High Viscosity	Low Viscosity
	Color	Visual	-	Gray	White	Gray
	Viscosity	10 shear rate, 60℃	Pa·s	75	-	-
		25℃, 1rpm, No.52 Spindle	cps	-	370,000	57,000
	Density	25℃, Gravimeter	g/cc	2.8	1.9	2.7
	Thickness	25℃	mm	0.15~1.0	-	-
	Operating temperature		℃	-40 ~ 125	-40 ~ 150	-40 ~ 125
	Phase Change temperature		℃	45	73 ~ 87	45
	Change peak temperature		℃	-	84	-
Electrical	Flame Rating	Vertical Burning Test	-	V-2	V-1	V-2
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2	< 0.2
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	4.0	2.5	4.0
	Latent heat		J/g	-	5.04	-



Latent heat of PCM-NT250HV

The DSC has been utilized to measure the latent heat.

PCM-NT250HV phase changes within the temperature range from 73C to 87C. Also, the peak that is found around 84C shows that this change is maximized.

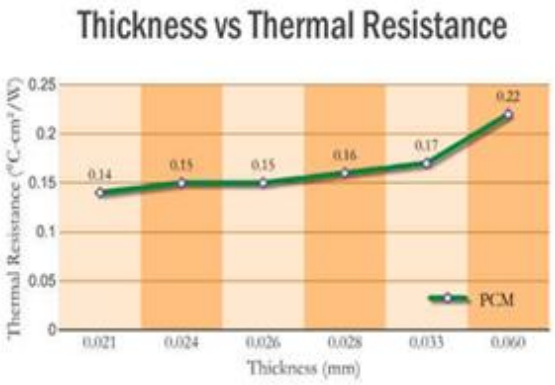
When the material phase changes, about 5J/g of energy is used for the endothermic reaction.
As the portion of the phase changing material increases the phase change occurring temperature decreases.
*** However, latent heat is assumed to increase proportionally.**

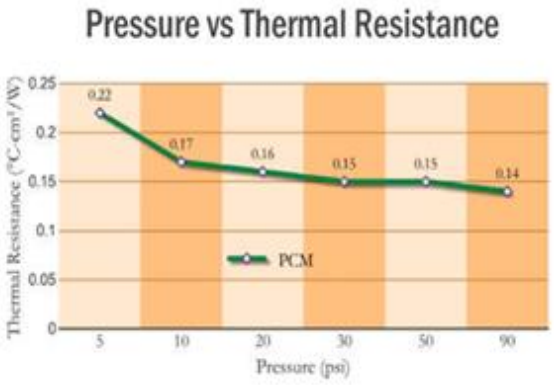
PCM - Phase Change Material

■ Durability Property

ITEM	Test Conditions	Units	PCM-NT400N
Thermal resistance	10 psi	°C-cm²/W	0.17
	20 psi		0.16
	50 psi		0.15
	90 psi		0.14
Withstand Voltage	AC, 3000V	mA	No insulation destruction

Thermal Performance Curve





PCM - Phase Change Material

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

As with any (PCM) phase change material, PCM material requires an initial phase change to achieve optimum thermal performance. Initial thermal performance will behave as a dry joint thermal interface, because the material has not yet driven out the air gaps between the heat spreader and the component. Re-flow and wetting of the surfaces typically takes only a few minutes once the 45°C phase change temperature is achieved. Also, allowing the monitored electronic component to reach 60°C, the PCM sheet would fully change phase for maximum wetting. Pressure enhances and accelerates the effect. After this initial re-flow, the interface resistance will behave as high performance thermal grease, even after powering down of the microprocessor. Unless the heat spreader is removed from the component the initial high interface resistance will not be seen during subsequent power cycles.

■ Useable life and storage

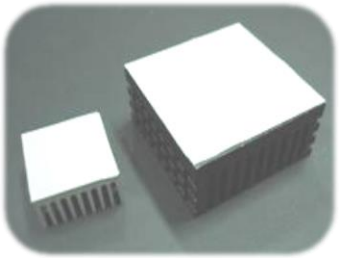
PCM is a temperature sensitive material, and should be stored below 25°C.
Short term exposure to higher temperatures, up to 45°C during product shipment will not affect product performance. It is recommended there is no weight pressing down onto the PCM on preventing wrinkling of the sheet.

SPS – Silicone Pad Series

■ Information

SPS series are an ideal thermal interface material specially designed for heatsink attachment to heat source like Chip set, and other plastic encapsulated components with excellent thermal conductivity cushioning and gap-filling properties.

It is also suitable for mounting heat spreader onto power converter and motor control PCB. SPS series also meet all environmental requirement including RoHS.



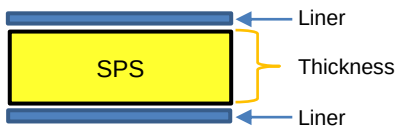
Features and Benefits

- Conformable
- Isolated electrically
- Minimized interfacial resistance
- Superior Thermal Performance
- Superior peel-adhesion

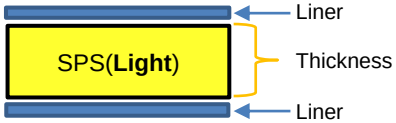
Applications

- Display (LED, LCD, PDP TV etc…)
- Memory Devices
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence

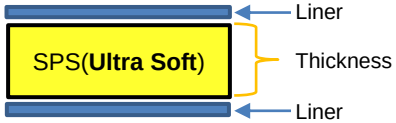
Structure



N Type

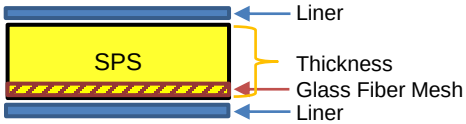


NL Type

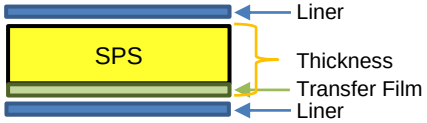


NU Type

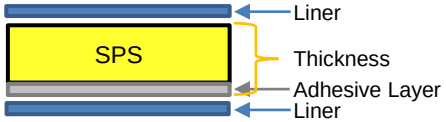
Structure - Natural + add.



NS Type



NF Type



NA Type

SPS – Silicone Pad Series

■ Selection Guides

Building a Product Number

SPS	NT000[ ]	00[ ]00
Silicone Pad Series	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Hardness

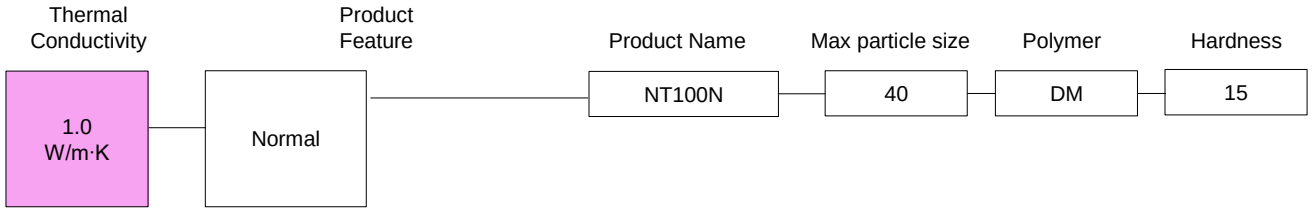
NO	Product Name	Thermal Conductivity [W/m·K]	Hardness [Shore 00 / A]								Product Characteristics
			0~20	30	40	50	60	70	80	90	
1	SPS-100-Series	1.0 ~ 1.9	●	●	●	●	●	●	●	●	N - Natural L - Light(Density) U - Ultra Soft S - Glass Fiber mesh add. F - Transfer Film add. A - Adhesive Film add.
2	SPS-200-Series	2.0 ~ 2.9	●	●	●	●	●	●	●	●	
3	SPS-300-Series	3.0 ~ 3.9	●	●	●	●	●	●	●	●	
4	SPS-400-Series	4.0 ~ 4.9	●	●	●	●	●	●	●	●	
5	SPS-500-Series	5.0 ~ 5.9			●	●	●	●	●	●	

SPS – Silicone Pad Series

■ Products Introduction

SPS-100 Series

The SPS-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT100N, NT150N, NT150NS, NT150NUF.



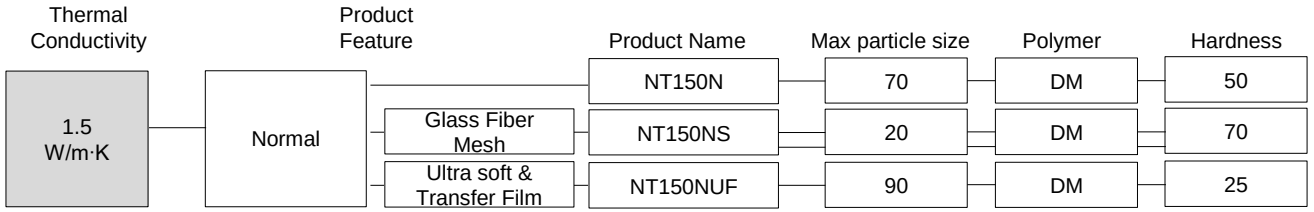
ITEM		Test Conditions	Units	NT100N
General	Color	-	-	Pink
	Density	25℃, Gravimeter	g/cc	2.0
	Operating temperature	-	℃	-40 ~ 150
	Thickness	Mitsutoyo	mm	0.5 ~ 3
Mechanical	Hardness	Shore	00	15
	Elongation		%	120
	Tensile strength		N	1.2
	Internal tearing strength		N	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Breakdown Voltage	-	KV	> 12
	Withstand Voltage	AC, 3000V	mA	< 0.29
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.0
	Heat loss	100℃, 5Hour	%	< 0.14
	Heat shrinkage	100℃, 1Hour	%	< 0.08

SPS – Silicone Pad Series

■ Products Introduction

SPS-100 Series

The SPS-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT100N, NT150N, NT150NS, NT150NUF.



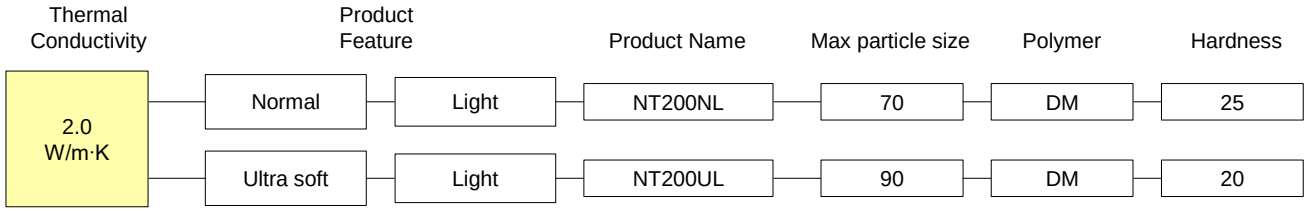
ITEM		Test Conditions	Units	NT150N	NT150NS	NT150NUF
General	Color	-	-	Gray	Gray	White
	Density	25℃, Gravimeter	g/cc	2.6	2.4	1.72
	Operating temperature	-	℃	-40 ~ 150	-40 ~ 150	-40 ~ 150
	Thickness	Mitsutoyo	mm	1 ~ 10	0.2 ~ 1	0.5 ~ 9
Mechanical	Hardness	Shore	00	50	70	5 ~ 25
	Elongation		%	100	20	150
	Tensile strength		N	1.4	1.5	1.5
	Internal tearing strength		N	0.1	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0
	Breakdown Voltage	-	KV	> 12	> 12	> 12
	Withstand Voltage	AC, 3000V	mA	< 0.29	< 0.29	< 0.29
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.8	1.5	1.5
	Heat loss	100℃, 5Hour	%	< 0.14	< 0.14	< 0.14
	Heat shrinkage	100℃, 1Hour	%	< 0.08	< 0.08	< 0.08

SPS – Silicone Pad Series

■ Products Introduction

SPS-200 Series

The SPS-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200NL, NT250NUS, NT250NUF.



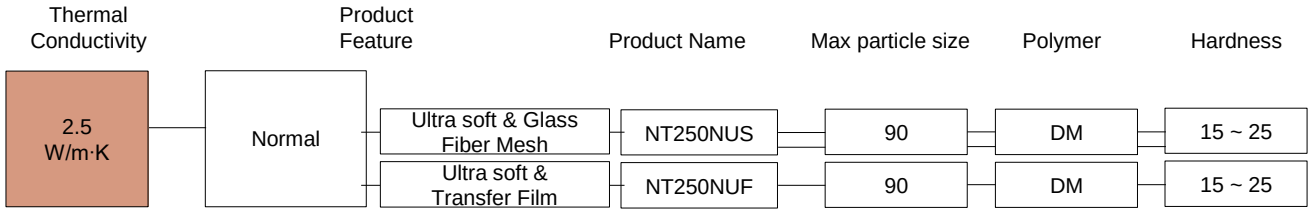
ITEM		Test Conditions	Units	NT200NL	NT200UL
General	Color	-	-	Yellow	Yellow
	Density	25℃, Gravimeter	g/cc	1.8	1.62
	Operating temperature	-	℃	-40 ~ 150	-40 ~ 150
	Thickness	Mitsutoyo	mm	1.5 ~ 3	0.3 ~ 2.0
Mechanical	Hardness	Shore	00	25	5 ~ 25
	Elongation		%	120	120
	Tensile strength		N	1.2	1.2
	Internal tearing strength		N	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Breakdown Voltage	-	KV	> 12	> 12
	Withstand Voltage	AC, 3000V	mA	< 0.20	< 0.20
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.0	1.95
	Heat loss	100℃, 5Hour	%	< 0.14	< 0.14
	Heat shrinkage	100℃, 1Hour	%	< 0.08	< 0.08

SPS – Silicone Pad Series

■ Products Introduction

SPS-200 Series

The SPS-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200NL, NT250NUS, NT250NUF.



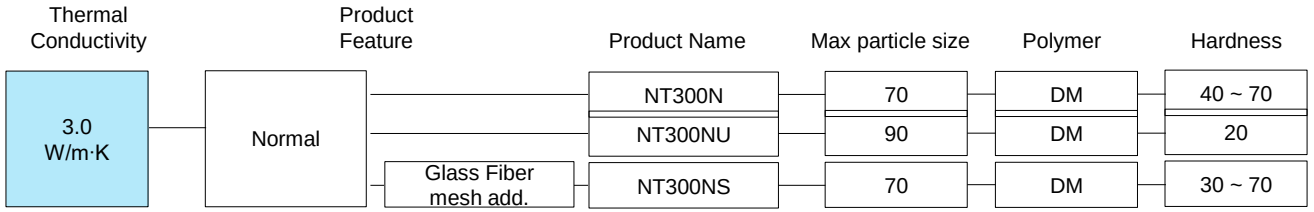
ITEM		Test Conditions	Units	NT250NUS	NT250NUF
General	Color	-	-	Brown	Brown
	Density	25℃, Gravimeter	g/cc	1.98	1.95
	Operating temperature	-	℃	-40 ~ 150	-40 ~ 150
	Thickness	Mitsutoyo	mm	0.5 ~ 9	0.5 ~ 9
Mechanical	Hardness	Shore	00	5 ~ 25	5 ~ 25
	Elongation		%	20	120
	Tensile strength		N	1.5	1.2
	Internal tearing strength		N	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Breakdown Voltage	-	KV	> 12	> 12
	Withstand Voltage	AC, 3000V	mA	< 0.29	< 0.29
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.5	2.5
	Heat loss	100℃, 5Hour	%	< 0.14	< 0.14
	Heat shrinkage	100℃, 1Hour	%	< 0.08	< 0.08

SPS – Silicone Pad Series

■ Products Introduction

SPS-300 Series

The SPS-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N, NT300NU, NT300NS, NT300NL, NT300NLS, NT360NS, NT380N.



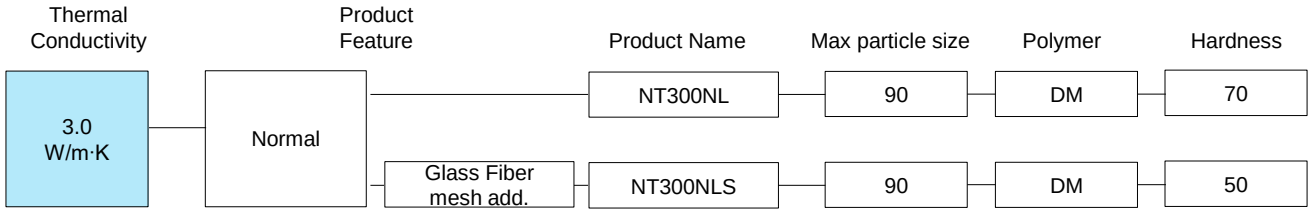
ITEM		Test Conditions	Units	NT300N	NT300NU	NT300NS
General	Color	-	-	Gray	Light Blue	White
	Density	25℃, Gravimeter	g/cc	2.8	2.8	2.8
	Operating temperature	-	℃	-40 ~ 150	-60 ~ 200	-40 ~ 150
	Thickness	Mitsutoyo	mm	1.5 ~ 5	0.5 ~ 9	0.3 ~ 0.7
Mechanical	Hardness	Shore	00	50	20	70
	Elongation		%	120	100	20
	Tensile strength		N	1.2	1.5	1.2
	Internal tearing strength		N	0.1	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0
	Breakdown Voltage	-	KV	> 6	➢ 12	> 7
	Withstand Voltage	AC, 3000V	mA	< 0.29	< 0.30	< 0.29
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	3.0	3.0	3.0
	Heat loss	100℃, 5Hour	%	< 0.14	< 0.14	< 0.2
	Heat shrinkage	100℃, 1Hour	%	< 0.08	< 0.08	< 0.15

SPS – Silicone Pad Series

■ Products Introduction

SPS-300 Series

The SPS-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N, NT300NS, NT300NL, NT300NLS, NT360NS, NT380N.



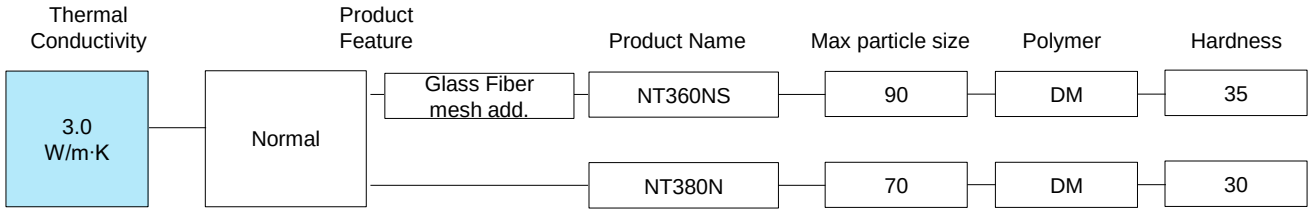
ITEM		Test Conditions	Units	NT300NL	NT300NLS
General	Color	-	-	Light Blue	Light Blue
	Density	25℃, Gravimeter	g/cc	2.05	2.05
	Operating temperature	-	℃	-40 ~ 150	-40 ~ 150
	Thickness	Mitsutoyo	mm	1.5 ~ 5	1.5 ~ 3
Mechanical	Hardness	Shore	00	70	50
	Elongation		%	120	20
	Tensile strength		N	1.5	1.2
	Internal tearing strength		N	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Breakdown Voltage	-	KV	> 6	> 6
	Withstand Voltage	AC, 3000V	mA	< 0.2	< 0.2
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	3.2	3.2
	Heat loss	100℃, 5Hour	%	< 0.3	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2	< 0.2

SPS – Silicone Pad Series

■ Products Introduction

SPS-300 Series

The SPS-300 Series are Thermal Conductivity 3.0~4.0W/m·K ※ It does not include 4.0W/m·K
The products that apply are NT300N, NT300NS, NT300NL, NT300NLS, NT360NS, NT380N.



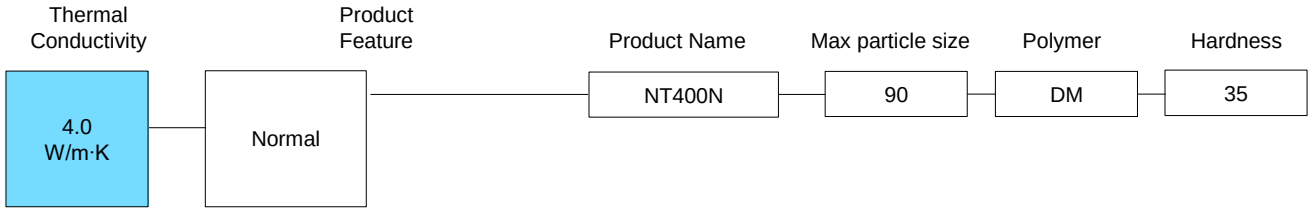
ITEM		Test Conditions	Units	NT360NS	NT380N
General	Color	-	-	Light Blue	Light Blue
	Density	25℃, Gravimeter	g/cc	2.7	2.85
	Operating temperature	-	℃	-40 ~ 180	-40 ~ 180
	Thickness	Mitsutoyo	mm	0.5 ~ 9	0.5 ~ 20
Mechanical	Hardness	Shore	00	35	30
	Elongation		%	20	120
	Tensile strength		N	1.5	1.2
	Internal tearing strength		N	0.1	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0
	Breakdown Voltage	-	KV	> 6	> 6
	Withstand Voltage	AC, 3000V	mA	< 0.3	< 0.3
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	3.6	3.8
	Heat loss	100℃, 5Hour	%	< 0.3	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2	< 0.2

SPS – Silicone Pad Series

■ Products Introduction

SPS-400 Series

The SPS-400 Series are Thermal Conductivity 4.0~5.0W/m·K ※ It does not include 5.0W/m·K
The products that apply are NT400N.



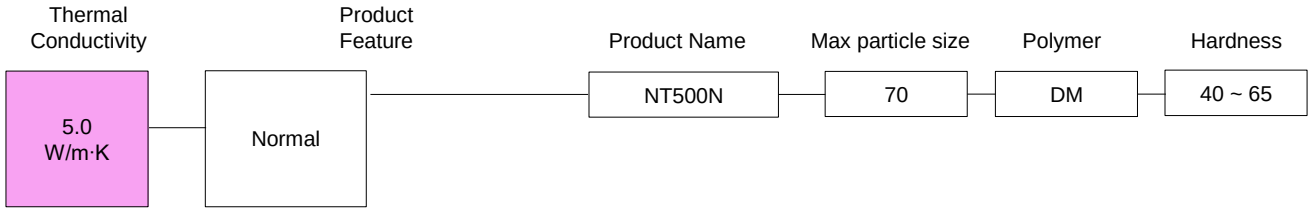
ITEM		Test Conditions	Units	NT400N
General	Color	-	-	Blue
	Density	25℃, Gravimeter	g/cc	2.8
	Operating temperature	-	℃	-40 ~ 180
	Thickness	Mitsutoyo	mm	0.5 ~ 9
Mechanical	Hardness	Shore	00	35
	Elongation		%	60
	Tensile strength		N	1.2
	Internal tearing strength		N	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Breakdown Voltage	-	KV	> 12
	Withstand Voltage	AC, 3000V	mA	< 0.3
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	4.0
	Heat loss	100℃, 5Hour	%	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2

SPS – Silicone Pad Series

■ Products Introduction

SPS-500 Series

The SPS-500 Series are Thermal Conductivity 5.0~6.0W/m·K ※ It does not include 6.0W/m·K
The products that apply are NT500N.



ITEM		Test Conditions	Units	NT500N
General	Color	-	-	Pink
	Density	25℃, Gravimeter	g/cc	3.1
	Operating temperature	-	℃	-40 ~ 200
	Thickness	Mitsutoyo	mm	1.5 ~ 3
Mechanical	Hardness	Shore	00	40 ~ 65
	Elongation		%	60
	Tensile strength		N	1.2
	Internal tearing strength		N	0.1
Electrical	Flame Rating	Vertical Burning Test	-	V-0
	Breakdown Voltage	-	KV	> 6
	Withstand Voltage	AC, 3000V	mA	< 0.3
	Volume Resistivity		Ω·cm	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	5.0
	Heat loss	100℃, 5Hour	%	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2

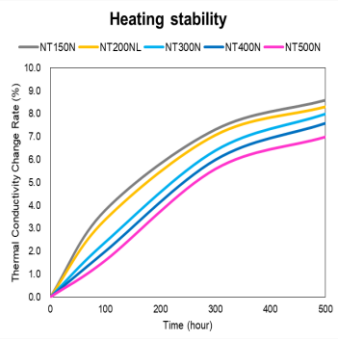
SPS – Silicone Pad Series

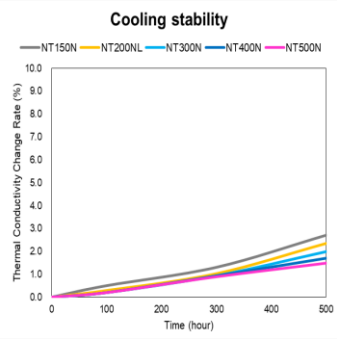
■ Durability Property

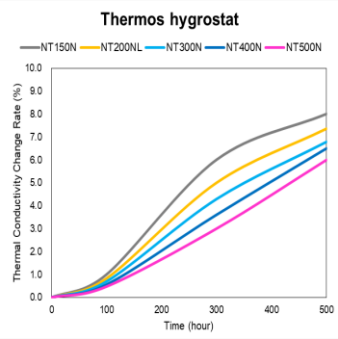
SPS of NanoTIM has the same conditions for durability property.

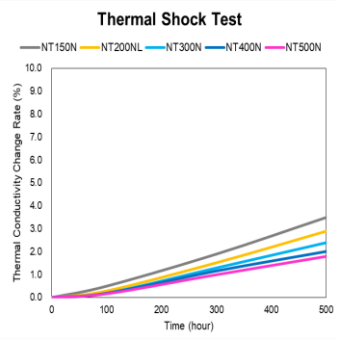
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









SPS – Silicone Pad Series

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

It can be sold by adjusting various thickness and area.
Contact NanoTIM Incorporated. Thank you very much.

ex) sample

■ Useable life and storage

Products are best to maintain the product characteristics when it is stored in a cool and non-humid environment, especially where it is not exposed by any sunlight.

THS – Thermal High Consistency Rubber Series

■ Information

THS series are an ideal thermal interface material specially designed for heatsink attachment to heat source like Chip set, and other plastic encapsulated components with excellent thermal conductivity cushioning and gap-filling properties.

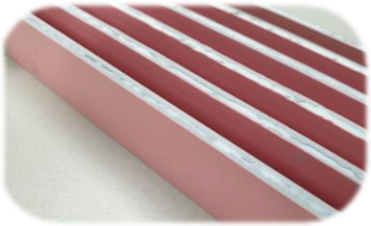
THS series also meet all environmental requirement including RoHS.

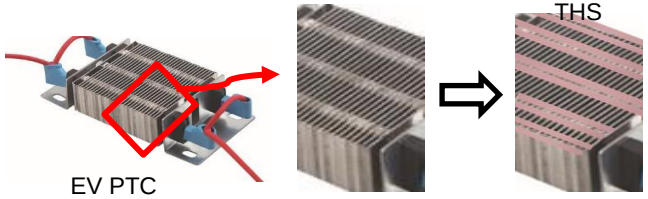
Features and Benefits

- Electrically isolating
- Low mounting pressures
- Smooth and highly compliant surface
- General-purpose thermal interface material solution

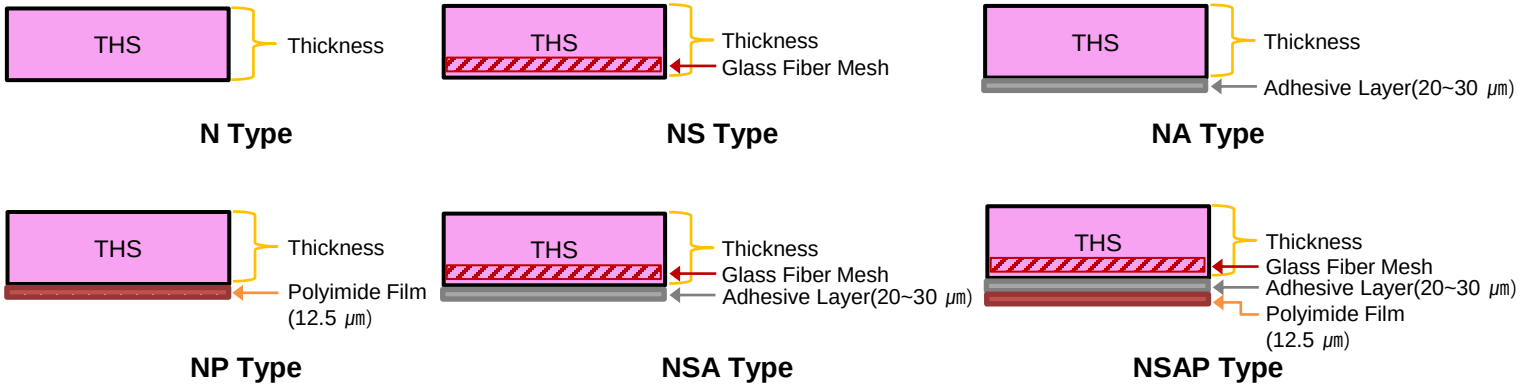
Applications

- Display (LED, LCD, PDP TV etc…)
- Memory Devices
- Custom ASICS Chips
- LED Applications
- Digital Mobile Convergence
- **Automobile(motors)**





Structure



THS – Thermal High Consistency Rubber Series

■ Selection Guides

Building a Product Number

THS	NT000[ ]	00[ ]00
Thermal High Consistency Rubber Series	NT - NanoTIM	00 - Max particle size
	000 - Thermal Conductivity	[ ] – Polymer
	[ ] - Product characteristics	00 - Hardness

NO	Product Name	Thermal Conductivity [W/m·K]	Hardness [Shore A]								Product Characteristics
			20	30	40	50	60	70	80	90	
1	THS-100-Series	1.0 ~ 1.9				●	●	●	●	●	N - Normal S - Glass fiber mesh add. A - Adhesive Layer add. P - Polyimide Film add. E - High Elongation
2	THS-200-Series	2.0 ~ 2.9				●	●	●	●	●	

THS – Thermal High Consistency Rubber Series

■ Products Introduction

THS-100 Series

The THS-100 Series are Thermal Conductivity 1.0~2.0W/m·K ※ It does not include 2.0W/m·K
The products that apply are NT100NP, NT100NSP, NT160N, NT160NS, NT160NSA, NT160NSAP.

ITEM		Test Conditions	Units	NT160N	NT160NS	NT160NSA	NT160NSAP
General	Color	-	-	Pink	Gray	Pink	Pink
	Density	25℃, Gravimeter	g/cc	2.12	2.12	2.12	2.12
	Operating temperature	-	℃	-60 ~ 200	-60 ~ 200	-60 ~ 200	-60 ~ 200
	Thickness	Mitsutoyo	mm	0.2 ~ 0.3	0.2 ~ 0.3	0.2 ~ 0.5	0.12 ~ 0.5
Mechanical	Hardness	Shore	A	90	90	90	90
	Elongation		%	50	20	20	< 10
	Tensile strength		MPa	36.7	64.4	64.4	28.23
	Internal tearing strength		kN/m	43.1	58.8	58.8	31.15
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0	V-0
	Withstand Voltage	DC	V	6000	6000	6000	6000
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	1.7	1.7	1.7	1.0
	Heat loss	100℃, 5Hour	%	< 0.3	< 0.3	< 0.3	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2	< 0.2	< 0.2	< 0.2

THS – Thermal High Consistency Rubber Series

■ Products Introduction

THS-200 Series

The THS-200 Series are Thermal Conductivity 2.0~3.0W/m·K ※ It does not include 3.0W/m·K
The products that apply are NT200NA, NT250NS, NT250NSA, NT250NSAP,

ITEM		Test Conditions	Units	NT200NA	NT250NS	NT250NSA	NT250NSAP
General	Color	-	-	Pink	Pink	Pink	Pink
	Density	25℃, Gravimeter	g/cc	2.12	2.12	2.43	2.43
	Operating temperature	-	℃	-60 ~ 200	-60 ~ 200	-60 ~ 200	-60 ~ 200
	Thickness	Mitsutoyo	mm	0.2 ~ 0.5	0.2 ~ 0.5	0.2 ~ 0.5	0.2 ~ 0.5
Mechanical	Hardness	Shore	A	60	80	80	80
	Elongation		%	< 10	20	< 10	< 10
	Tensile strength		MPa	36.7	64.4	64.4	28.23
	Internal tearing strength		kN/m	43.1	58.8	58.8	31.15
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0	V-0
	Withstand Voltage	DC	V	6000	6000	6000	6000
	Volume Resistivity		Ω·cm	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$	> $1*10^{12}$
Thermal	Thermal Conductivity	-	W/m·K	2.0	2.5	2.5	1.9
	Heat loss	100℃, 5Hour	%	< 0.3	< 0.3	< 0.3	< 0.3
	Heat shrinkage	100℃, 1Hour	%	< 0.2	< 0.2	< 0.2	< 0.2

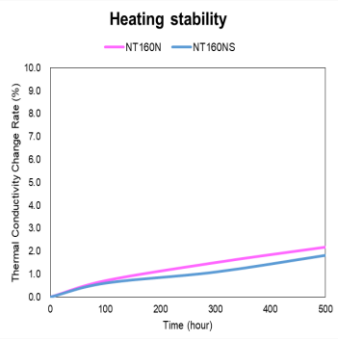
THS – Thermal High Consistency Rubber Series

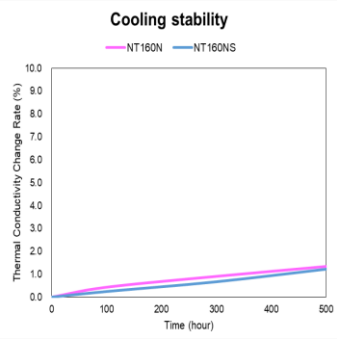
■ Durability Property

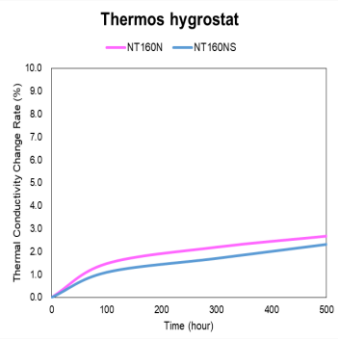
THS of NanoTIM has the same conditions for durability property.

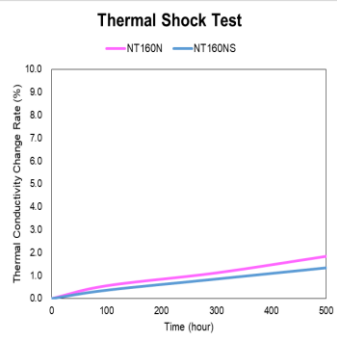
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100
Heat loss	100℃, 5Hour	%	Within 0.3%
Heat shrinkage	100℃, 1Hour	%	Within 0.2%

Thermal Conductivity Change Rate









THS – Thermal High Consistency Rubber Series

■ Safety Date

The stability test is being carried out on the following items and the test results have been determined to be suitable.

- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

It can be sold by adjusting various thickness and area.
※ Please contact NanoTIM representative for information on packaging size and availability.

■ Useable life and storage

Products are best to maintain the product characteristics when it is stored in a cool and non-humid environment, especially where it is not exposed by any sunlight.

APS – Acrylic Pad Series

■ Information

This product is made of acrylic base and is a pad type.
Used as a heat dissipation product with shock, high tear resistance and high bonding strength.
In addition, it has the advantage of being able to remove this product without residue.

Features and Benefits

- Outstanding shock resistance
- High tear resistance
- Very high bonding strength
- Excellent push out resistance
- Easy removability by stretching the adhesive
- The tape can be removed even after a long bonding time
- Residue free removability

Applications

- Battery mounting
- Permanent mounting of components in electronic devices with the option to remove the parts for repairing or recycling
- Temporary fixation of components

APS – Acrylic Pad Series

■ Selection Guides

Building a Product Number

APS	NT000[ ]	000
Acrylic Pad Series	NT - NanoTIM	00 – Product thickness
	000 - Thermal Conductivity	
	[ ] - Product characteristics	

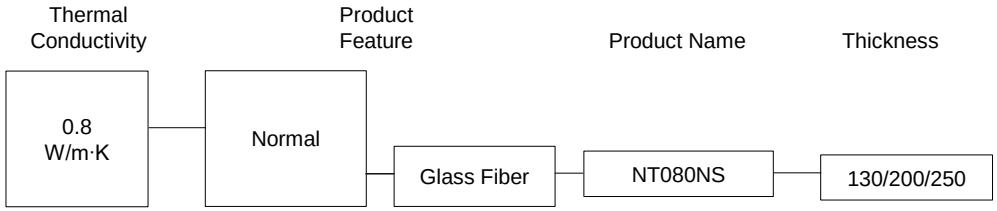
NO	Product Name	Thermal Conductivity [W/m·K]	Hardness [Shore A]								Product Characteristics
			20	30	40	50	60	70	80	90	
1	APS-000-Series	0.0 ~ 0.9						●	●	●	N - Normal S - Glass Fiber mesh add.

APS – Acrylic Pad Series

■ Products Introduction

APS-000 Series

The APS-000 Series are Thermal Conductivity 0.0~1.0W/m·K ※ It does not include 1.0W/m·K
The products that apply are NT080NS. Product thickness are 130㎛, 200㎛, 250㎛.



ITEM		Test Conditions	Units	NT080NS-130	NT080NS-200	NT080NS-250
General	Color		-	White	White	White
	Thickness		㎛	130	200	250
	Reinforcement Carrier			Glass Fiber	Glass Fiber	Glass Fiber
	Density	25℃, Gravimeter	g/cc	1.78	1.78	1.78
	CTE		ppm	325	325	325
Mechanical	Hardness	Shore	A	70	70	70
	Elongation		%	20	20	20
	Tensile strength		Mpa	6	6	6
Adhesion	Lap Shear	R.T	gf/inch	1,500	1,500	1,500
		10 min at 100℃	gf/inch	1,650	1,650	1,650
		10 min at 150℃	gf/inch	1,800	1,800	1,800
Electrical	Flame Rating	Vertical Burning Test	-	V-0	V-0	V-0
	Withstand Voltage	AC	V	3000	5800	8500
	Volume Resistivity		Ω·cm	> $1*10^{10}$	> $1*10^{10}$	> $1*10^{10}$
Thermal	Thermal Conductivity	-	W/m·K	0.8	0.85	0.8

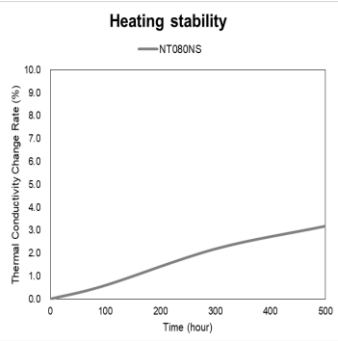
APS – Acrylic Pad Series

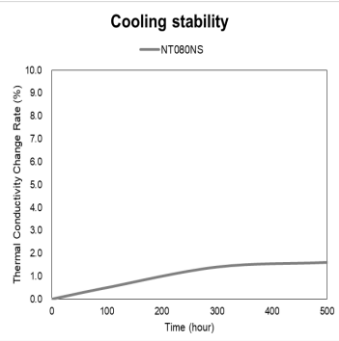
■ Durability Property

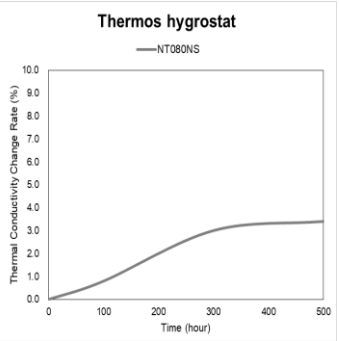
APS of NanoTIM has the same conditions for durability property.

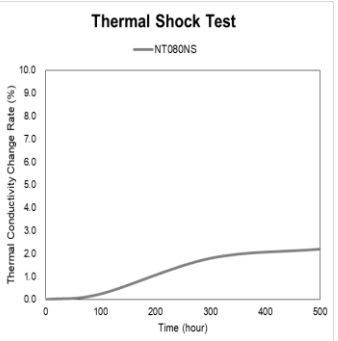
ITEM	Test Conditions	Units	Demand Date
Heating stability (Thermal conductivity, Breakdown voltage)	150°C, 500hr	%	1. Thermal conductivity change rate : Within 10% 2. Withstand Voltage : No insulation destruction
Cooling stability (Thermal conductivity, Breakdown voltage)	-40°C, 500hr	%	
Thermos hygrostat (Thermal conductivity, Breakdown voltage)	(85 ℃, humidity 85%) 500hr	%	
Thermal Shock Test (Thermal conductivity, Breakdown voltage)	(-40℃~150℃) 500 Cycle	%	
Withstand Voltage	AC, 3000V	mA	No insulation destruction
Low molecular siloxane	D3~D6	ppm	< 100

Thermal Conductivity Change Rate









APS – Acrylic Pad Series

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- Heavy Metals (Test Method by ICP-OES)
  - Cadmium(Cd), Lead(Pb), Mercury(Hg), Hexavalent Chromium(Cr VI)
- Flame Retardants-PBBs/PBDEs (Test Method by GC-MS)
  - Monobromobiphenyl, Dibromobiphenyl, Tribromobiphenyl, Tetrabromobiphenyl, Pentabromobiphenyl, Hexabromobiphenyl, Octabromobiphenyl, Nonabromobiphenyl, Decabromobiphenyl, Monobromobiphenyl ether, Dibromobiphenyl ether, Tribromobiphenyl ether, Tetrabromobiphenyl ether, Pentabromobiphenyl ether, Hexabromobiphenyl ether, Octabromobiphenyl ether, Nonabromobiphenyl ether, Decabromobiphenyl ether
- RoHS Phthalates (Test Method by GC-MS)
  - Di-(2-ethylhexyl) phthalate (DEHP), Di-butyl phthalate (DBP), Benzyl butyl phthalate (BBP), Di-isobutyl phthalate (DIBP)

SGS

Test Report

SGS

Test Report

■ Packaging

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■ Useable life and storage

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