BFG - A

DENKA THERMALLY CONDUCTIVE SHEET

Product Information

Features

- Better Thermal performance than that of BFG.
- Thermally conductive and insulated sheet made of silicone with thermally conductive filler.
- Reinforced with glass fiber.
- Suitable for heat dissipation of power transistors etc.

Typical properties

Item		BFG20A	BFG30A	BFG45A	BFG80A	Test method
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 +0.20/-0.05	-
Thermal resistance	ºC/W	0.12	0.15	0.19	0.30	Denka standard
Thermal conductivity	W/mK	5.0				Denka standard
Withstand voltage	AC kV	1.0	3.0	4.0	5.0	JEM 1021
Dielectric breakdown voltage	AC kV	3.0	6.0	9.0	>10	JIS C2110
Volume resistivity	Ω·㎝	1.7×10^{15}	7.9×10^{15}	9.2×10^{15}	8.9×10^{15}	JIS C2123
Dielectric constant	-	3.3				(1MHz)
Reinforcement layer	-	with glassfiber				-
Hardness	Shore A	88				-
Specific gravity	-	1.7				-
Flame-rating	-	V-0				UL94
Color	-	White				-

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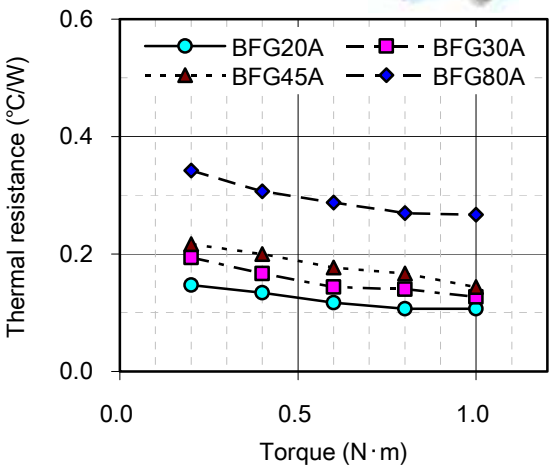
DENKA THERMALLY CONDUCTIVE SHEET

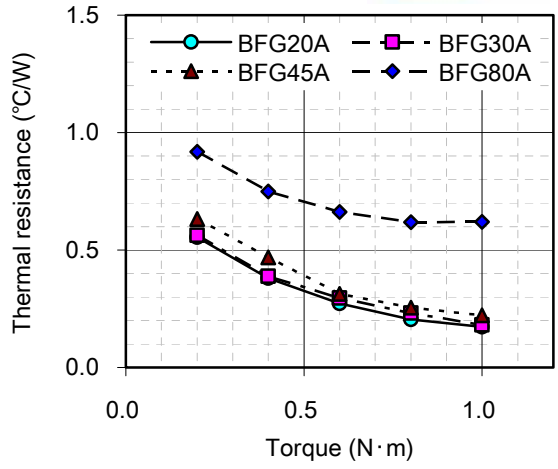
Product Information

Relation between torque and thermal Resistance.

In the case of TO-3



In the case of TO-3P

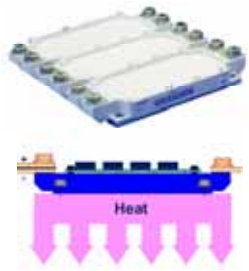


Typical applications

- Power modules
- Automotive modules
- Analog ICs
- Power discretes

Automotive module

Power module



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BFG

DENKA THERMALLY CONDUCTIVE SHEET

Product Information

Features

- Thermally conductive and insulated sheet made of silicone with thermally conductive filler.
- Reinforced with glass fiber.
- Suitable for heat dissipation of power transistors etc.
- Adhesive type is also available. (BFG-AD)

Typical properties

Item		BFG20	BFG30	BFG45	BFG80	Test method
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 +0.20/-0.05	-
Thermal resistance	ºC/W	0.18	0.20	0.25	0.36	Denka standard
Thermal resistance (Adhesive type)	ºC/W	0.30	0.32	0.35	0.44	Denka standard
Thermal conductivity	W/mK	4.1				Denka standard
Withstand voltage	AC kV	1.0	3.0	4.0	5.0	JEM 1021
Dielectric breakdown voltage	AC kV	3.0	6.5	9.0	>10	JIS C2110
Volume resistivity	Ω·cm	1.9×10^{15}	2.4×10^{15}	3.3×10^{15}	4.1×10^{15}	JIS C2123
Dielectric constant	-	3.6				(1MHz)
Reinforcement layer	-	with glassfiber				-
Hardness	Shore A	88				-
Specific gravity	-	1.7				-
Flame-rating	-	V-0				UL94
Color	-	Light green	White			-

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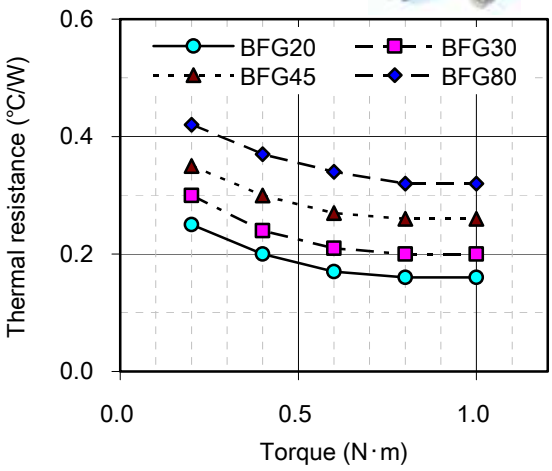
BFG

DENKA THERMALLY CONDUCTIVE SHEET

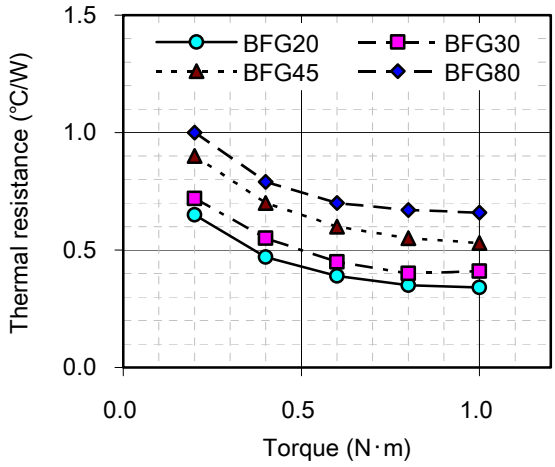
Product Information

Relation between torque and thermal Resistance

In the case of TO-3



In the case of TO-3P

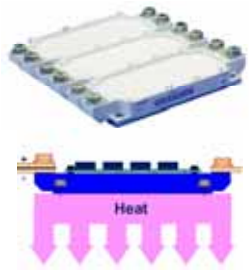


Typical applications

- Power modules
- Automotive modules
- Analog ICs
- Power discretes

Automotive module

Power module



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BS

DENKA THERMALLY CONDUCTIVE SHEET

Product Information

Features

- Thermally conductive and insulated sheet made of silicone with thermally conductive filler.
- Reinforced with glass fiber.
- Foldability is better than that of BFG grade.
- Suitable for heat dissipation of power transistors etc.

Typical properties

Item		BS20	BS30	BS45	BS80	Test method
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 +0.20/-0.05	-
Thermal resistance	ºC/W	0.19	0.21	0.26	0.37	Denka standard
Thermal conductivity	W/mK	3.9				Denka standard
Withstand voltage	AC kV	1.0	3.0	4.0	5.0	JEM 1021
Dielectric breakdown voltage	AC kV	3.0	5.1	7.8	>10	JIS C2110
Volume resistivity	Ω·cm	1.8×10^{15}	2.6×10^{15}	2.5×10^{15}	1.8×10^{15}	JIS C2123
Dielectric constant	-	3.6				(1MHz)
Reinforcement layer	-	with glassfiber				-
Hardness	Shore A	88-89				-
Specific gravity	-	1.7	1.6			-
Flame-rating	-	V-0				UL94
Color	-	Light green	White			-

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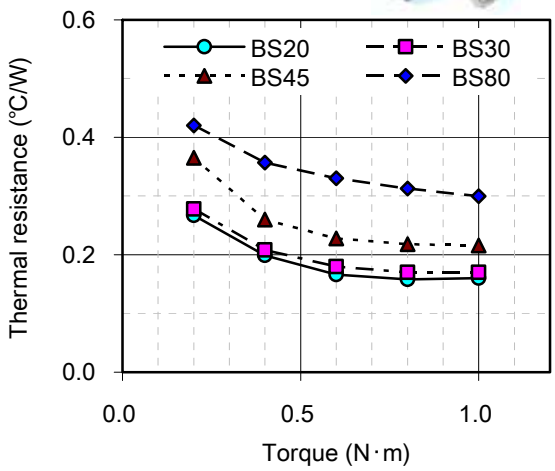
DENKA THERMALLY CONDUCTIVE SHEET

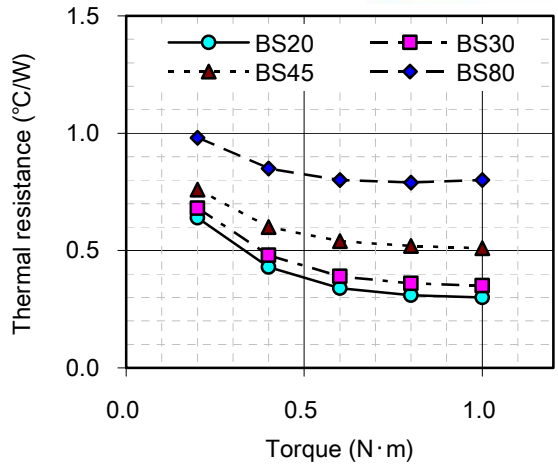
Product Information

Relation between torque and thermal Resistance

In the case of TO-3



In the case of TO-3P

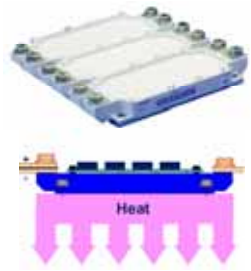


Typical applications

- Power modules
- Automotive modules
- Analog ICs
- Power discretes

Automotive module

Power module



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LF

DENKA THERMALLY CONDUCTIVE SHEET

Product Information

Features

- Thermally conductive and electrical insulated sheet made of silicone with thermally conductive filler.
- Suitable for heat dissipation of power transistors etc.

Typical properties

Item		LF30	LF45	Test method
Thickness	mm	0.30 ±0.05	0.45 ±0.05	-
Thermal resistance (TO-3 shape)	ºC/W	0.40	0.50	Denka standard
Thermal conductivity	W/mK	2.3		Denka standard
Withstand voltage	AC kV	3.0	4.0	JEM 1021
Dielectric breakdown voltage	AC kV	7.5	>10	JIS C2110
Volume resistivity	Ω·㎝	3.4×10^{15}	3.2×10^{15}	JIS C2123
Dielectric constant	-	3.8		(1MHz)
Reinforcement layer	-	with glassfiber		-
Hardness	Shore A	90		-
Specific gravity	-	1.8		-
Flame-rating	-	V-0 (File No.E49895)		UL94
Color	-	Gray		-

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LF

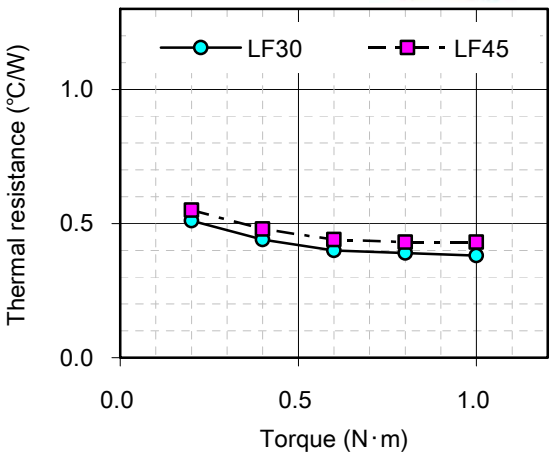
DENKA THERMALLY CONDUCTIVE SHEET

Product Information

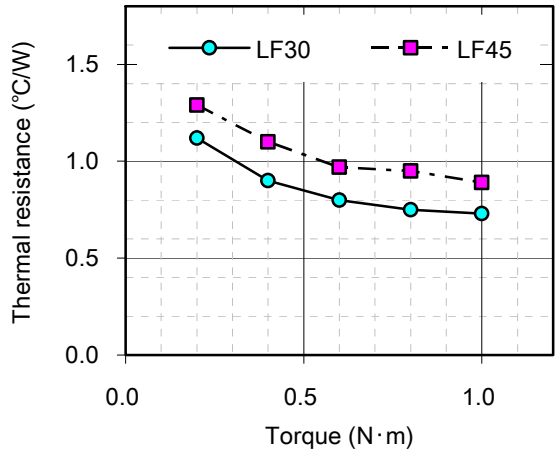
Example of property

Relation between torque and thermal Resistance

In the case of TO-3



In the case of TO-3P

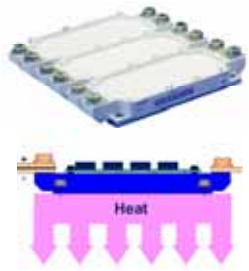


Typical applications

- Power modules
- Automotive modules
- Analog ICs
- Power discretes

Automotive module

Power module



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M

DENKA THERMALLY CONDUCTIVE SHEET

Product Information

Features

- Thermally conductive and insulated sheet made of silicone with thermally conductive filler.
- Reinforced with glass fiber.
- Suitable for heat dissipation of power transistors etc.
- Adhesive type is also available. (M-AD)

Typical properties

Item		M20	M30	M45	M80	Test method
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 +0.20/-0.05	-
Thermal resistance (TO-3 shape)	ºC/W	0.43	0.64	0.80	1.07	Denka standard
Thermal resistance (Adhesive type)	ºC/W	0.56	0.77	0.91	1.10	Denka standard
Thermal conductivity	W/mK	1.4				Denka standard
Withstand voltage	AC kV	1.0	3.0	4.0	5.0	JEM 1021
Dielectric breakdown voltage	AC kV	2.4	5.5	8.5	>10	JIS C2110
Volume resistivity	Ω·㎝	1.7×10^{15}	1.7×10^{15}	2.8×10^{15}	2.6×10^{15}	JIS C2123
Dielectric constant	-	4				(1MHz)
Reinforcement layer	-	with glassfiber				-
Hardness	Shore A	91				-
Specific gravity	-	1.9 - 2				-
Flame-rating	-	V-0 (File No.E49895)				UL94
Color	-	Yellow				-

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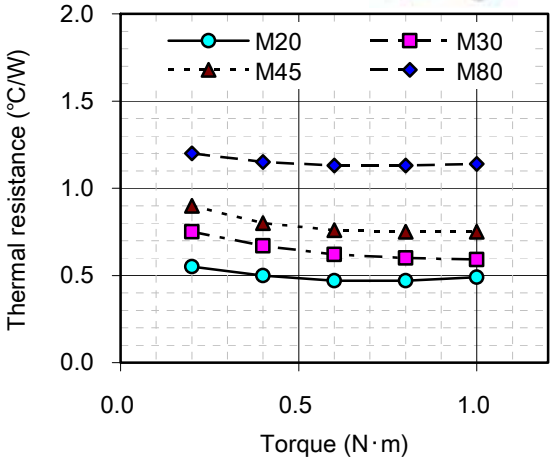
DENKA THERMALLY CONDUCTIVE SHEET

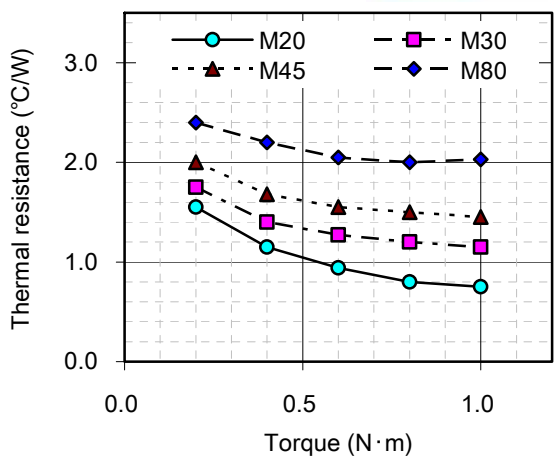
Product Information

Relation between torque and thermal Resistance

In the case of TO-3



In the case of TO-3P

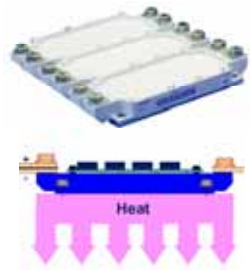


Typical applications

- Power modules
- Automotive modules
- Analog ICs
- Power discretes

Automotive module

Power module



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FSB-G

DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Features

- Excellent thermal performance
- Thermally conductive pad made of silicone with Boron Nitride Filler.
- Fills in micro-gaps and stick to it.
- Suitable for heat dissipation of high performance ICs, CPU, etc.

Typical properties

Item		FSB-G		Test method
		FSB030G	FSB050G	
Construction & Compositioı	-	Boron Nitride / Silicone		-
Color	-	White		Visual
Thickness	inch	0.012	0.020	-
	mm	0.3	0.5	-
Tolerance	inch	± 0.003	± 0.003	-
	mm	± 0.07	± 0.07	-
Inherent surface tack	1or2 side	Non-tacky		-
Specific gravity	-	1.7		-
Hardness	shore00	36		ASTM D2240
Compressibility	%	15		DENKA method
Flame-rating	-	V-0 (File No. E49895)		UL94
Thermal resistance	℃ / W	0.06	0.08	Denka method
Thermal conductivity	W/mK	-	16	DENKA method (TO-3 shape)
Dielectric constant	-	4.2		ASTM D150(1MHz)

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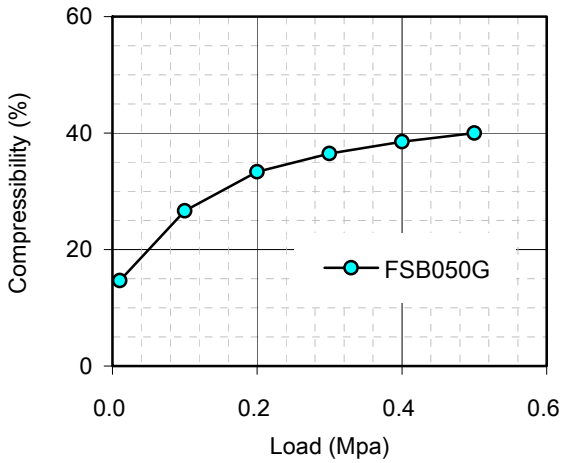
FSB-G

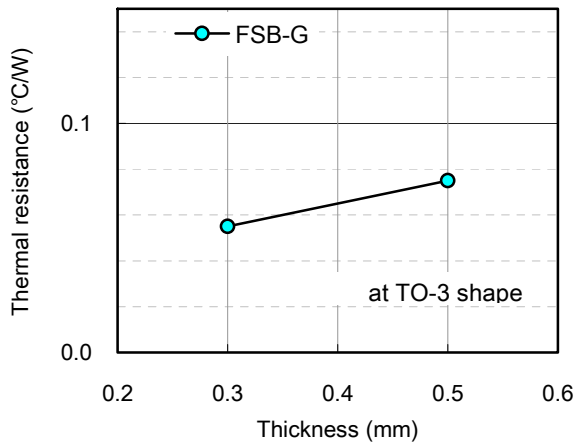
DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Compressibility vs. load



Thermal resistance vs. thickness



Typical applications

- Microprocessors
- Chipsets
- Graphics processors

HIGH SPEED DIGITAL APPLICATIONS

Example: PC Chipsets and Graphics Processors

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FSA-D

DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Features

- Thermally conductive pad made of silicone with Aluminum Nitride & Aluminum Oxide.
- Fills in micro-gaps and stick to it.
- Suitable for heat dissipation of Chipset, ICs for audio-visuals, power supplies, etc.

Typical properties

Item		FSA030D	FSA050D	FSA100D	Test method
Construction & Composition	-	Aluminum Nitride, Aluminum Oxide / Silicone			-
Color	-	Gray			Visual
Thickness	inch	0.012	0.020	0.039	-
	mm	0.3	0.5	1	-
Tolerance	inch	± 0.003	± 0.003	± 0.004	-
	mm	± 0.07	± 0.07	± 0.1	-
Inherent surface tack	1or2 side	2			-
Specific gravity	-	2.4			-
Hardness	shore00	43			ASTM D2240
Compressibility	%	10			ASTM D575
Flame-rating	-	File No. E49895			UL94
Thermal conductivity	W/mK	-	-	5	DENKA method (TO-3 shape)
Thermal impedance	℃ / W	0.14	0.21	0.38	DENKA method (TO-3 shape)
Volume resistivity	-	1×10^{13}			ASTM D257
Dielectric constant	-	-			ASTM D150(1MHz)

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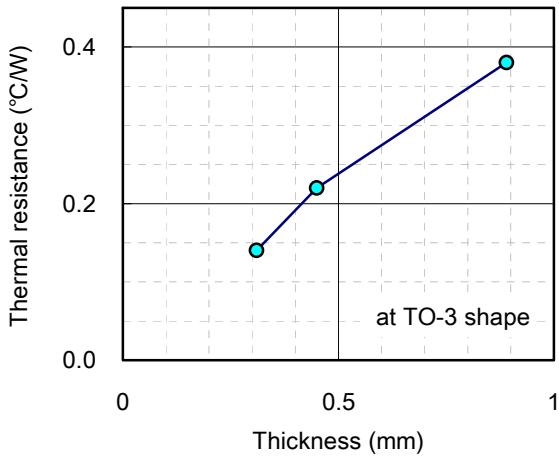
FSA-D

DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Thermal resistance vs. thickness



Typical applications

- Chipset
- Graphics processors
- ASICs
- Memory
- Power discretes

ASICs

NOTICE

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FSL-D

DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Features

- Thermally conductive pad made of silicone with Spherical Aluminum Oxide.
- Fills in micro-gaps and stick to it.
- Suitable for heat dissipation of Chipset, ICs for audio-visuals, power supplies, etc.

Typical properties

Item		FSL050D	FSL100D	FSL200D	FSL300D	Test method
Construction & Composition	-	Aluminum Oxide / Silicone				-
Color	-	Light Blue				Visual
Thickness	inch	0.020	0.039	0.079	0.118	-
	mm	0.5	1	2	3	-
Tolerance	inch	± 0.004	± 0.004	± 0.008	± 0.012	-
	mm	± 0.1	± 0.1	± 0.2	± 0.3	-
Inherent surface tack	1or2 side	2				-
Specific gravity	-	2.7				-
Hardness	Shore00	30				ASTM D2240
Compressibility	%	15				ASTM D575
Flame-rating	-	File No. E49895				UL94
Thermal conductivity	W/mK	2.2	2.5	2.6	2.7	DENKA method (TO-3 shape)
Thermal resistance	℃ / W	0.4	0.7	1.3	1.7	DENKA method (TO-3 shape)
Thermal conductivity	-	5.5				Proving method
Volume resistivity	-	1×10^{13}				ASTM D257
Dielectric constant	-	5.5				ASTM D150(1MHz)

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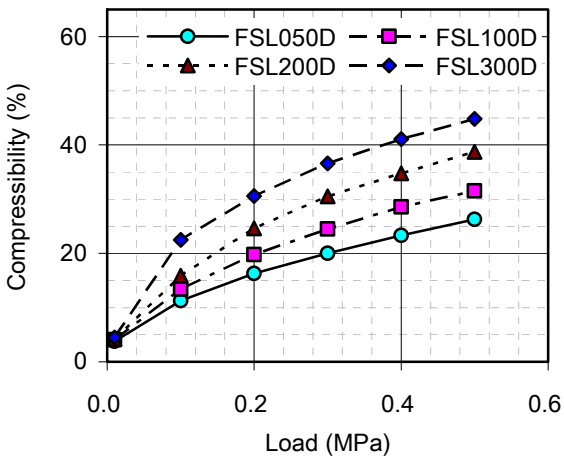
FSL-D

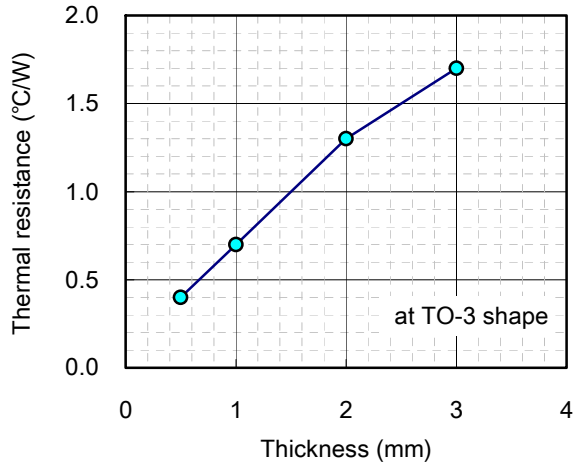
DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Compressibility vs. load



Thermal resistance vs. thickness



Typical applications

- Chipset
- Graphics processors
- ASICs
- Memory
- Power discretes

ASICs

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PCA

DENKA THERMALLY CONDUCTIVE SPACER

Product Information

Features

- Phase change thermal interface material.
- Non-silicone materials.
- Thermal resistance becomes low when it is heated.
- Suitable for heat dissipation of MPU, etc.

Typical properties

Item \ Grade		PCA-A8A (Reference)	PCA-B6	Test method
Thickness	mm	0.15±0.05, 0.25±0.05		-
Thermal Conductivity	W/mK	1.3	2.8	ASTM D5470 (□15mm,100μm)
Thermal resistance	℃/W	0.14	0.10	ASTM D5470 (□10mm, 60psi)
Phase change temperature	℃	50		DSC method
Specific gravity	-	2.4	2.7	-
Color	-	Light blue	Gray	-

Typical applications

- Microprocessors
- Chipset
- Graphics processors
- Memory
- Power modules

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PCA-Y

DENKA PHASE CHANGE

Product Information

Features

- Phase change thermal interface material with Al foil.
- Non-silicone materials.
- Thermal resistance becomes low when it is heated.
- Suitable for heat dissipation of MPU, etc.

Typical properties

Item \ Grade		PCA-A8A (Reference)	PCA-Y9	Test method
Thickness	mm	0.15±0.05, 0.25±0.05	0.15±0.05	-
Thermal Conductivity	W/mK	1.3	1.1	ASTM D5470 (□15mm,100μm)
Thermal resistance	℃/W	0.14	0.32	ASTM D5470 (□10mm, 60psi)
Phase change temperature	℃	50		DSC method
Specific gravity	-	2.4	2.4	-
Color	-	Light blue	Light purple	-

Typical applications

- Microprocessors
- Chipset
- Graphics processors
- Memory
- Power modules

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GFC

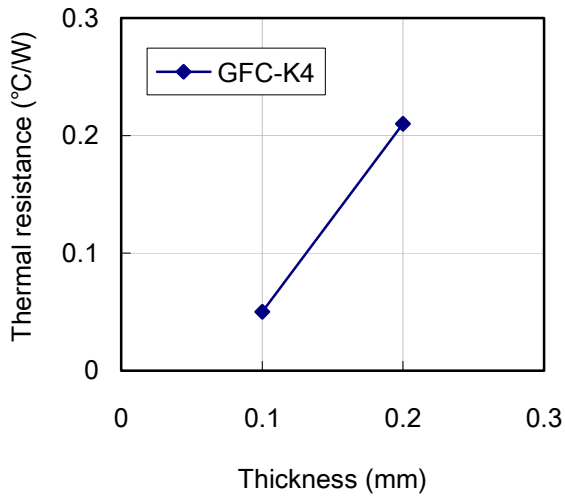
DENKA THERMALLY CONDUCTIVE GREASE

Product Information

Features

- Thermal grease made of silicone with thermally conductive filler.
- Extremely low thermal resistance.
- Best for MPU, package IC, etc.

Thickness vs. Thermal resistance



Typical properties

Item		GFC-K4	Test method
Shape	-	Grease	-
Thermal Conductivity	W/mK	8	ASTM D5470 (□15mm, 100μm)
Viscosity	Pa·s	190	Denka standard
Specific gravity	-	2.6	-
Color	-	Gray	-

※Conditions / Comb shaped electrode, Area; 35×35mm, Thicness; 100μm, 100V

Typical applications

- Microprocessors
- Chipset
- Graphics processors
- Memory
- Power modules

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