

THERMAL MANAGEMENT  
INTERFACE  
MATERIALS 2022

**CREATING DIMENSIONS**





The background is a dark blue gradient with intricate, glowing circuit-like patterns. These patterns consist of thin white lines, small squares, and circles, some of which are illuminated with a bright blue light. The overall effect is a sense of digital connectivity and advanced technology.

# NEW DIMENSIONS IN THERMAL MANAGEMENT

# CONTENT

## THE HALA PRINCIPLE

06	Services and products
08	Expertise
10	Your partner-team
12	IATF Certification

## A THERMAL MANAGEMENT

14	Total-Thermal-Management
16	Heat Pipe Assemblies

## B THERMAL INTERFACE MATERIALS

	Material	Product Code	Insulating	Conductivity W/mK	
19	<b>1 GAP FILLER</b>				
	<b>Silicone</b>				
20	Silicone Gap Filler Pad / soft	TGF-M-SI	■	2.5	
21	Silicone Gap Filler Pad / soft	TGF-R-SI	■	3.0	■ electrically insulating
22	Silicone Gap Filler Pad / soft	TGF-U-SI	■	4.5	
23	Silicone Gap Filler Pad / soft / LV	TGF-VS-SI	■	5.0	■ electrically non-insulating
24	Silicone Gap Filler Pad / soft / LV	TGF-XS-SI	■	6.0	
25	Silicone Gap Filler Pad / soft	TGF-Z-SI	■	11	■ low dielectric
26	Silicone Gap Filler Pad / very soft	TGF-BXS-SI	■	1.2	
27	Silicone Gap Filler Pad / very soft	TGF-HUS-SI	■	1.8	
28	Silicone Gap Filler Pad / very soft	TGF-JUS-SI	■	2.0	
29	Silicone Gap Filler Pad / very soft / LV	TGF-JXS-SI	■	2.0	/LV = Low Volatile Siloxanes
30	Silicone Gap Filler Pad / very soft / optional fibreglass reinforced	TGF-MXS-SI	■	2.4	
31	Silicone Gap Filler Pad / very soft	TGF-LSS-SI	■	2.5	
32	Silicone Gap Filler Pad / very soft	TGF-MUS-SI	■	2.5	
33	Silicone Gap Filler Pad / very soft	TGF-RSS-SI	■	3.0	
34	Silicone Gap Filler Pad / very soft	TGF-TSS-SI	■	3.2	
35	Silicone Gap Filler Pad / very soft / LV	TGF-USS-SI	■	3.3	
36	Silicone Gap Filler Pad / very soft	TGF-WSS-SI	■	5.5	
37	Silicone Gap Filler Pad / very soft / fibreglass reinforced	TGF-DXS-SI-GF	■	1.3	
38	Silicone Gap Filler Pad / very soft / fibreglass reinforced	TGF-EXS-SI-GF	■	1.4	
39	Silicone Gap Filler / plastic	TGF-YP-SI	■	7.0	
40	Silicone Gap Filler / plastic	TGF-ZP-SI	■	11	
41	Silicone Gap Filler Pad / highly conductive / LV	TEL-R-SI	■	15	
42	Silicone Gap Filler Pad / highly conductive / LV	TEL-Z-SI	■	50	
43	Silicone Gap Filler Pad / highly conductive / LV	TEL-YSS-SI	■	16	
44	Silicone Gap Filler Pad / highly conductive / LV	TEL-ZS-SI	■	20	
45	2-Part Gap Filler / dispensable / LV	TDG-L-SI-2C-Y	■	2.0	
46	2-Part Gap Filler / dispensable / LV	TDG-T-SI-2C	■	3.0	
47	2-Part Gap Filler / dispensable / LV	TDG-U-SI-2C	■	3.6	
48	2-Part Gap Filler / dispensable / LV	TDG-W-SI-2C	■	4.5	
49	2-Part Gap Filler / dispensable / LV	TDG-Y-SI-2C	■	6.0	
50	Silicone Gap Filler / Putty / dispensable	TGL-W-SI	■	5.5	
	<b>Silicone-free</b>				
51	Silicone-free Gap Filler Pad / soft	TGF-R-NS	■	3.0	
52	Silicone-free Gap Filler Pad / soft	TGF-V-NS	■	5.0	
53	Silicone-free Gap Filler Pad / soft	TGF-W-NS	■	6.0	
54	Silicone-free Gap Filler Pad / soft	TGF-Y-NS	■	8.0	
55	Silicone-free Gap Filler Pad / very soft	TGF-GUS-NS	■	1.5	
56	Silicone-free Gap Filler Pad / very soft	TGF-IXS-NS	■	2.0	
57	Silicone-free Gap Filler Pad / very soft	TGF-NSS-NS	■	2.5	
58	Silicone-free Gap Filler Pad / elasto-plastic	TGF-XP-NS	■	7.0	
59	Silicone-free Gap Filler Pad / elasto-plastic	TGF-ZP-NS	■	10.0	
61	<b>2 FOILS &amp; FILMS</b>				
				W/mK	
62	Silicone foil / fibreglass reinforced	TF0-D-SI	■	1.2	
63	Silicone foil / fibreglass reinforced	TF0-G-SI	■	1.6	

64	Silicone foil / fibreglass reinforced	TF0-J-SI	■	2.0
65	Silicone foil / fibreglass reinforced	TF0-K-SI	■	2.5
66	Silicone foil / fibreglass reinforced	TF0-O-SI	■	3.0
67	Silicone foil / fibreglass reinforced	TF0-Q-SI	■	6.0
68	Silicone foil / fibreglass reinforced	TF0-T-SI	■	4.1
69	Silicone foil / fibreglass reinforced	TF0-X-SI	■	5.0
70	Silicone foil / fibreglass reinforced	TF0-ZS-SI	■	8.0
71	Insulating film / silicone coated	TF0-M-SI-PI	■	-
<b>73</b>	<b>3 SILICONE CAPS</b>			
74	Silicone cap	TCP-C-SI	■	0.8
75	Silicone cap	TCP-J-SI	■	1.5
76	Silicone cap	TCP-L-SI	■	2.0
<b>77</b>	<b>4 PHASE CHANGE MATERIAL</b>			
78	Polyimide film / phase change coated	TPC-N-PI	■	-
79	Polyimide film / phase change coated	TPC-P-KA	■	-
80	Phase change film	TPC-W-PC	■	3.5
81	Aluminum film / phase change coated	TPC-R-AL	■	-
82	Aluminum film / phase change coated	TPC-T-AL-CB	■	-
83	Graphite film / phase change coated	TPC-V-PG-CB	■	-
84	Phase change compound	TPC-W-PC-M/-E	■	3.5
85	Phase change compound	TPC-X-PC-NC-HT-M/-E	■	3.0
86	Phase change compound	TPC-Z-PC-HT-M/-E	■	3.0
<b>87</b>	<b>5 GRAPHITE FOILS</b>			
88	Graphite foil / anisotropic	TF0-S-CB	■	z:8 / x-y:140
89	Graphite foil / pyrolytic	TF0-V-PG	■	z:5 / x-y:1500
90	Graphite foil / pyrolytic	TF0-Y-PG	■	z:>15 / x-y:>700
91	Graphite foil / pyrolytic	TF0-ZS-PG	■	z:30 / x-y:500
<b>93</b>	<b>6 PSA INSULATING TAPE</b>			
94	PSA Insulating tape / acrylate with insulating film	TAT-J-PE	■	0.7
95	PSA Insulating tape / silicone	TAT-M-SI	■	1.0
<b>97</b>	<b>7 THERMAL GREASE</b>			
98	Silicone-free grease / highly thermally conductive	TGR-J-NS	■	2.0
99	Silicone-free grease / highly thermally conductive	TGR-M-NS	■	2.4
<b>101</b>	<b>8 ADHESIVES</b>			
102	Silicone adhesive / thermally conductive / 1K	TAD-G-SI-1C	■	1.4
103	Silicone adhesive / thermally conductive / 1K	TAD-O-SI-1C	■	2.1
104	Silicone adhesive / thermally conductive / 1K RTV	TAD-P-SI-1C	■	2.3
105	Silicone adhesive / thermally conductive / 1K	TAD-U-SI-1C	■	3.3
106	Polyurethane adhesive / thermally conductive / 2K	TAD-N-PU-2C	■	2.0
<b>107</b>	<b>9 POTTING GEL</b>			
108	Silicone potting gel / 2 parts	TCR-D-SI-2C	■	0.7
109	Silicone potting gel / 2 parts	TCR-H-SI-2C	■	1.2
110	PU Potting gel / 2 parts	TCR-J-PU-2C-LV-AR	■	1.5
111	PU Potting gel / 2 parts	TCR-L-PU-2C-LV-AR	■	2.1
112	PU Potting gel / 2 parts	TCR-N-PU-2C-LV-AR	■	2.6
113	PU Potting gel / 2 parts	TCR-N-PU-2C-MV-AL	■	2.6
114	PU Potting gel / 2 parts	TCR-R-PU-2C-LV-AR	■	3.0
115	PU Potting gel / 2 parts	TCR-R-PU-2C-MV-AL	■	3.0
116	PU Potting gel / 2 parts	TCR-V-PU-2C-MV-AR	■	3.5
117	PU Potting gel / 2 parts	TCR-V-PU-2C-HV-AL	■	3.5
<b>119</b>	<b>10 HALA CLIPS</b>			
120	Hala Clip for TO-220	TO-220-1		
121	Hala Clip for TO-247	TO-247-1		

# WHAT MAKES HALA UNIQUE

” WITH COMPREHENSIVE EXPERTISE, HALA PARTNERS CLOSELY WITH ITS CUSTOMERS TO DEVELOP AND DELIVER CUSTOM-TAILORED HEAT MANAGEMENT SOLUTIONS GLOBALLY THROUGH A MANUFACTURER-INDEPENDENT PROCESS. “

# LEAVE THERMAL MANAGEMENT TO THE PROFES- SIONALS



# WHAT HALA CAN DO FOR YOU

” HALA IS THE EXPERT-BRAND FOR OPTIMIZING HEAT MANAGEMENT SOLUTIONS AND THERMAL INTERFACES.

OUR MOTIVATION: TO MAKE OUR CUSTOMERS' PRODUCTS MORE EFFICIENT AND SUSTAINABLE.“

/ INDIVIDUAL CONSULTING THROUGHOUT THE ENTIRE SUPPLY CHAIN

/ WE ARE YOUR DEVELOPMENT PARTNER AND SUPPLIER, AND WE THINK THROUGH YOUR REQUIREMENTS FROM START TO FINISH

/ WE OFFER FAST AND FLEXIBLE PROCESSING

/ OVER 100 YEARS OF EXPERIENCE

# THERMAL MANAGEMENT REQUIRES EXPERIENCE



# WHAT HALA IS: ONE TEAM

” YOU BRING US YOUR  
JOBS AND IDEAS.  
WE EXECUTE THEM.  
FLEXIBLE. GLOBAL.  
AND AROUND THE CLOCK,  
IF NECESSARY. “

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[CONTEC@HALA-TEC.DE](mailto:CONTEC@HALA-TEC.DE)





” SALES

” PRODUCTION

” MARKETING

” QUALITY

” ORDER MANAGEMENT

” PURCHASE

” SALES

# WE ARE QUALITY

HALA IS  
IATF 16949:2016  
CERTIFIED



”FROM PROJECT  
CONCEPT TO SERIES  
PRODUCTION,  
DEFINITION AND  
CONTROL ARE  
ESSENTIAL.“

/ WE REGULARLY AUDIT OUR  
PARTNERS

/ WE IMPROVE OUR OWN  
PROCESSES CONTINUOUSLY  
AND PROACTIVELY





# THERMAL MANAGEMENT

- / TOTAL THERMAL MANAGEMENT
- / HEAT PIPE ASSEMBLIES
- / CFD SIMULATION

# TOTAL THERMAL MANAGEMENT

## FOR HEAT DISTRIBUTION & HEAT TRANSFER

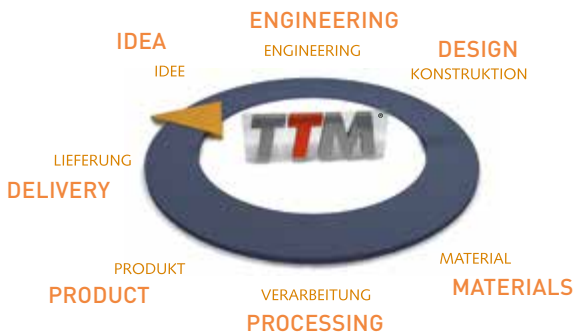
### PROJECT MANAGEMENT

As project managers, we develop and optimize system solutions for thermal management. We can work with you from initial idea to end product.

How we work: Our approach is to consider all components, taking into account mechanical, thermal, electronic and manufacturing interactions.

We always keep your technical requirements in mind to deliver the best quality and most economical solution.

We serve as a development partner and supplier, in your country and in your language.



TTM stands for solution expertise, project management, purchasing and delivery.

TTM works globally and internationally, from initial idea to series production.

### THERMAL SYSTEMS

We create integrated, high-performance thermal solutions for next generation products in a wide range of markets, including power semi-conductors, automotive, energy conversion, medical and test equipment, transportation, defense, aerospace, computers, communications and many other industries.

In doing so, we integrate engineering, CAD, CFD simulation, prototyping, series manufacturing and operations as well as testing and analysis.

### HEAT PIPE ASSEMBLIES

Heat distribution



Heat transfer



### FLUID COOLING

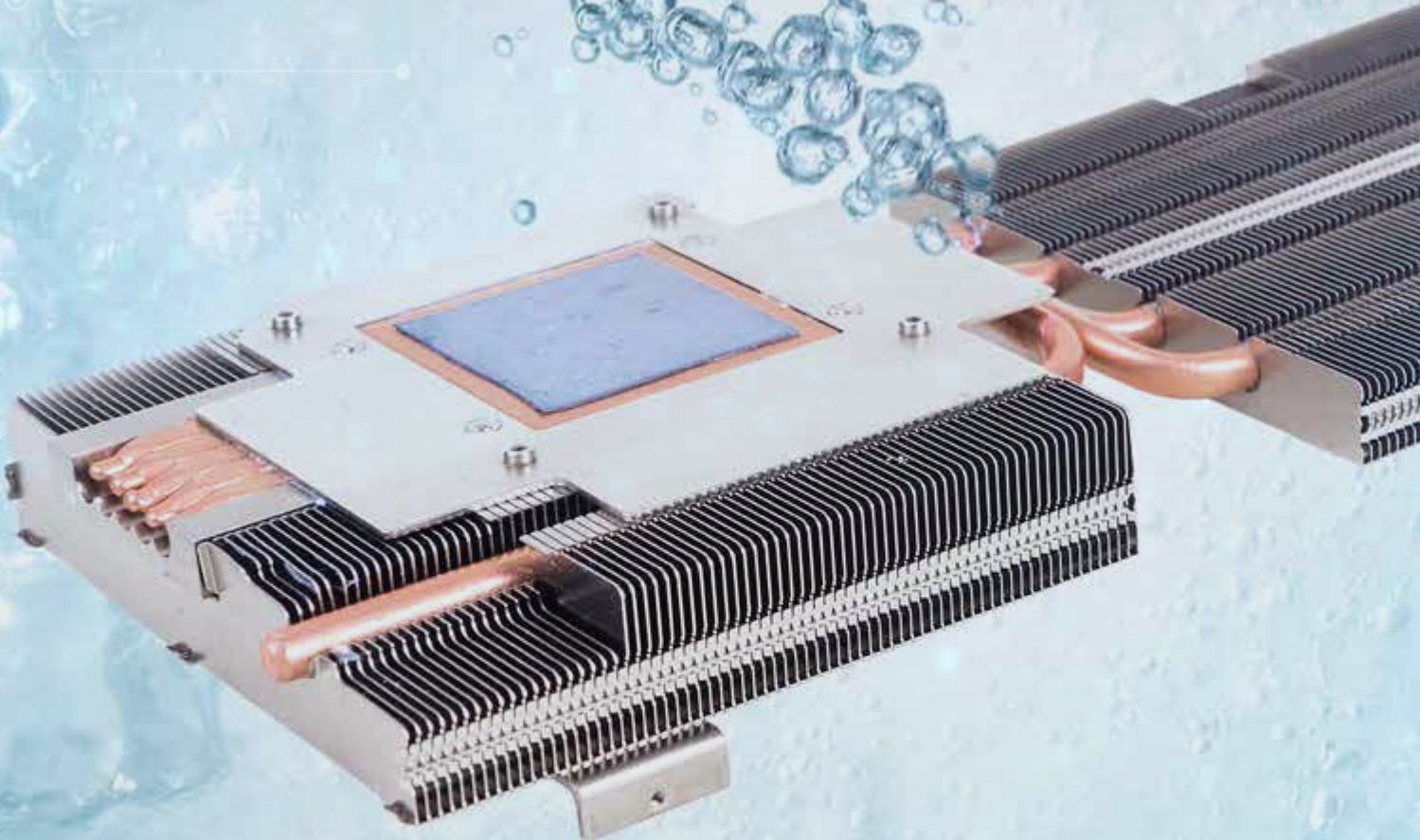


”CONSULT WITH US SO WE CAN WORK TOGETHER TO DEVELOP THE BEST SOLUTION FOR YOUR REQUIREMENTS“



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# TOTAL THERMAL MANAGEMENT



# HEAT PIPE ASSEMBLIES

## TUBULAR- AND VAPOR CHAMBER PLANAR PIPES <>

HALA supplies 2 Phase Modules of two basic configurations: Tubular Heat Pipes and Vapor Chamber Planar Heat Pipes

### HEAT PIPES

- Outer diameter: From 2.0 mm up to and over 50 mm
- Internal structures: sintered, mesh, groove or hybrid (sintered-groove)
- Cross section geometry: round, rectangular, flattened
- Flatnesses down to 0.4 mm
- Length: up to 70 cm
- Geometry: straight or multiple bends
- Bonding of heat pipes to the assembly: soldering, press fit, epoxy
- Heat pipe surface coating: nickel or tin plated

All copper/water heat pipes are designed to survive numerous freeze/thaw cycles without any degradation.

Copper/water heat pipes are made of copper, use water as a working fluid and typically operate in the temperature range of 20 up to 150°C [and over].

The planar heat pipes are called Vapor Chambers (VC) which are used as heat spreaders.

Copper/water 2 phase systems can be combined with other components to form heat transfer modules:

- Extruded heat sinks
- Die cast heat sinks
- Fin Stack heat sinks
- Skived heat sinks

Connected by:

- Thermal Interface Materials

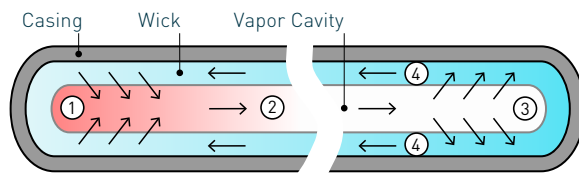
Tubular Heat Pipes



Vapor Chamber



### Heat Pipe Thermal cycle



High - Environment - Low-Temperature

#### Heat pipe thermal cycle

- ① Working fluid evaporates to vapor absorbing thermal energy.
- ② Vapor migrates along cavity to lower temperature end.
- ③ Vapor condenses back to fluid and is absorbed by the wick, releasing thermal energy.
- ④ Working fluid flows back to the higher temperature end.

### DIMENSION AND PERFORMANCE Range (mm)

Diameter	Recommended Overall Length Range	Recommended Bending Radius	Recommended Flattened Thickness
3	70 - 750	≥9	≥2.0
4	70 - 750	≥12	≥2 (e.g. 2.4)
5	70 - 750	≥15	≥2 (e.g. 3.0)
6	70 - 750	≥18	≥2.5 (e.g. 3.6)
6.35 (1/4")	70 - 750	≥19	≥2.5 (e.g. 3.5)
8	70 - 750	≥24	≥3 (e.g. 4.0)
9.52 (3/8")	70 - 750	≥28.6	≥3 (e.g. 4.5)
10	70 - 750	≥30	≥3 (e.g. 5.0)
12	70 - 750	≥36	≥3 (e.g. 6.0)
12.7 (1/2")	70 - 750	≥38	≥3 (e.g. 6.3)
15.875 (5/8")	70 - 750	≥47	≥3 (e.g. 8.0)
19.05 (3/4")	70 - 750	≥57	≥3 (e.g. 9.5)
25.4 (1")	70 - 750	≥76	≥3 (e.g. 12.0)

Qmax (W) Flattened Thickness	Pipe Diameter ø 3 mm	Pipe Diameter ø 4 mm	Pipe Diameter ø 5 mm	Pipe Diameter ø 6 mm	Pipe Diameter ø 8 mm
T = 2.0 mm	10 W	15 W	21 W	N/A	N/A
T = 2.5 mm	14 W	17 W	32 W	46 W	65 W
T = 3.0 mm	15 W	19 W	42 W	56 W	75 W
Rounded	16 W	20 W	46 W	60 W	85 W

Diameter: 3 / 4 / 5 / 6 / 6.35 (1/4") / 8 / 9.52 (3/8") / 10 / 12 / 12.7 (1/2")

Tube Wall Thickness 0.9 mm / 0.5 mm / 0.3 mm / 0.2 mm

Diameter Tolerance ±0.05 mm

Length Tolerance ±0.5 to ±1.0 mm

Thickness Tolerance ±0.05 mm

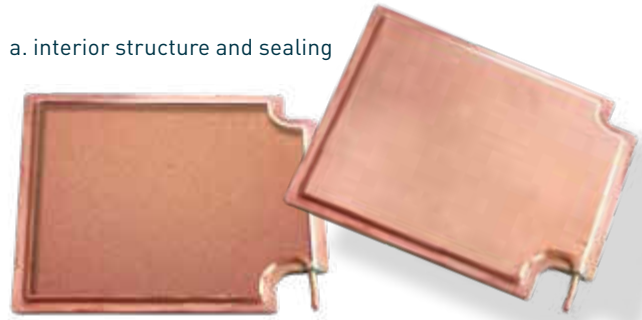
Width Tolerance ±0.10 to ±0.15 mm

FLATTENED HEAT PIPES

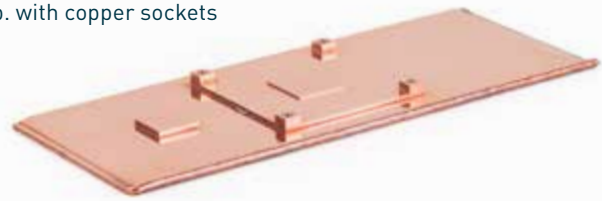


VAPOR CHAMBERS

a. interior structure and sealing



b. with copper sockets



HEAT SPREADER



HEAT COLUMN



HEAT TRANSFER



## **B** THERMAL INTERFACE MATERIALS

/ GAP FILLER / FOILS & FILMS /  
SILICONE CAPS / PHASE CHANGE  
MATERIAL / GRAPHITE FOILS /  
PSA INSULATING TAPE /  
THERMAL GREASE / ADHESIVES /  
POTTING GEL / HALA CLIPS

# 1 GAP-FILLER

/ PAD / PUTTY / 2-PART DISPENSABLE



# SILICONE GAP FILLER PAD TGF-M-SI

soft, flexible

TGF-M-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its high softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Soft and compliant
- Thermal conductivity: 2.5 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

## AVAILABILITY

- Sheet 480 x 460 mm (Thickness 0.5 / 1.0 mm)
- Sheet 460 x 460 mm (Thickness 2.0 mm)
- Sheet 450 x 460 mm (Thickness  $\geq 2.5$  mm)
- Tacky on both sides (TGF-MXXXX-SI)
- Tacky on one side (TGF-MXXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

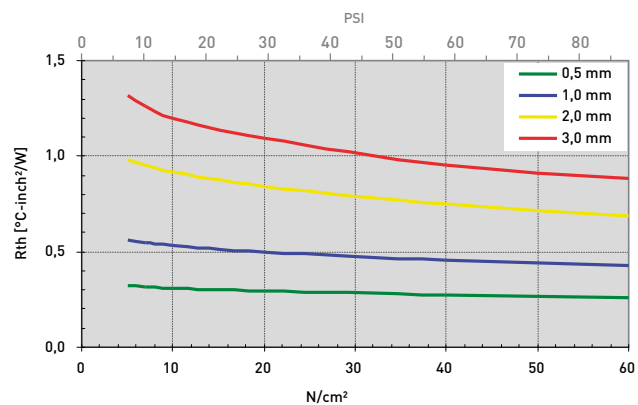
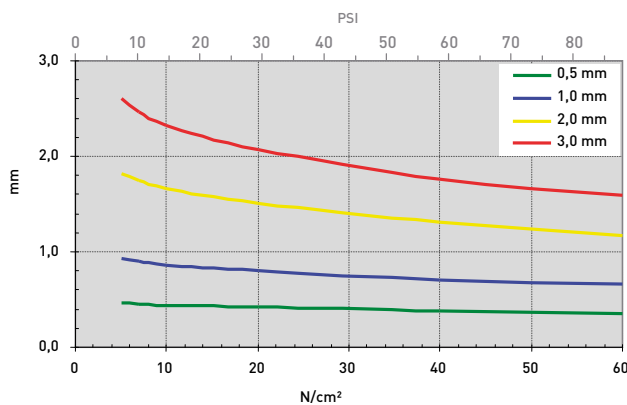
- Thermal link of:
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering/ Industrial PCs

PROPERTY	UNIT	TGF-M0500-SI	TGF-M1000-SI	TGF-M2000-SI	TGF-M3000-SI
<b>MATERIAL</b>					
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 $\pm 0.05$	1.0 $\pm 0.10$	2.0 $\pm 0.20$	3.0 $\pm 0.30$
Hardness	Shore 00	50	50	50	50
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ Thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.27 (0.38)	0.45 (0.71)	0.75(1.31)	0.96 (1.76)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.29 (0.42)	0.50 (0.80)	0.84 (1.50)	1.09 (2.07)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.32 (0.45)	0.55 (0.90)	0.95 (1.75)	1.26 (2.46)
Thermal Conductivity <sup>1</sup>	W/mK	2.5	2.5	2.5	2.5
Operating Temperature Range	$^{\circ}\text{C}$	- 60 to + 180	- 60 to + 180	- 60 to + 180	- 60 to + 180
<b>ELECTRICALLY</b>					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	$1.0 \times 10^{11}$	$1.0 \times 10^{11}$	$1.0 \times 10^{11}$	$1.0 \times 10^{11}$
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2	5.2

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-R-SI

soft, flexible

TGF-R-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its high softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Soft and compliant
- Thermal conductivity: 3.0 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

### AVAILABILITY

- Sheet 480 x 460 mm (Thickness 0.5 / 1.0 mm)
- Sheet 460 x 460 mm (Thickness 2.0 mm)
- Sheet 460 x 450 mm (Thickness 3.0 / 4.0 / 5.0 mm)
- Tacky on both sides (TGF-RXXXX-SI)
- Tacky on one side (TGF-RXXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

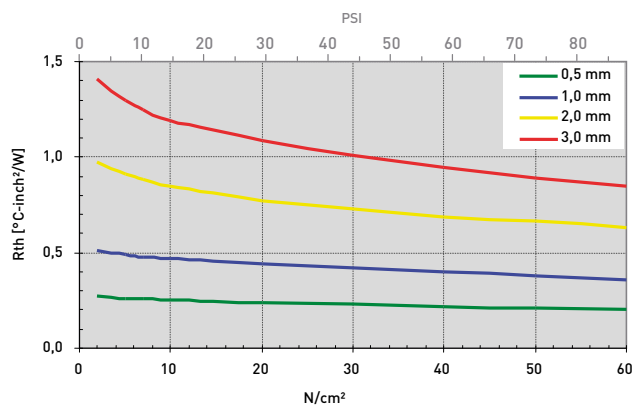
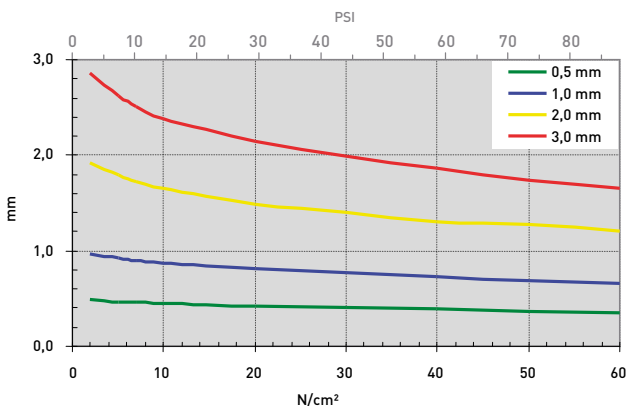
- Thermal link of:
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications/ Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-R0500-SI	TGF-R1000-SI	TGF-R2000-SI	TGF-R3000-SI
<b>MATERIAL</b>					
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	55	55	55	55
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.22 (0.39)	0.40 (0.73)	0.68 (1.31)	0.95 (1.86)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.24 (0.42)	0.44 (0.81)	0.77 (1.49)	1.09 (2.15)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.26 (0.46)	0.48 (0.90)	0.88 (1.72)	1.25 (2.50)
Thermal Conductivity <sup>1</sup>	W/mK	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180	- 60 to + 180
<b>ELECTRICALLY</b>					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2	5.2

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-U-SI

soft, flexible

TGF-U-SI is an electrically insulating thermally conductive high performance silicone gap filler. It is ideal for use in applications where a very good thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Soft and compliant
- Thermal conductivity: 4.5 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness

## AVAILABILITY

- Sheet 300 x 400 mm
- Tacky on both sides (TGF-UXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

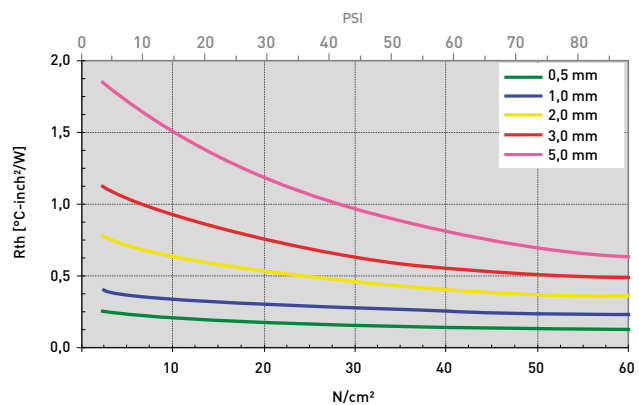
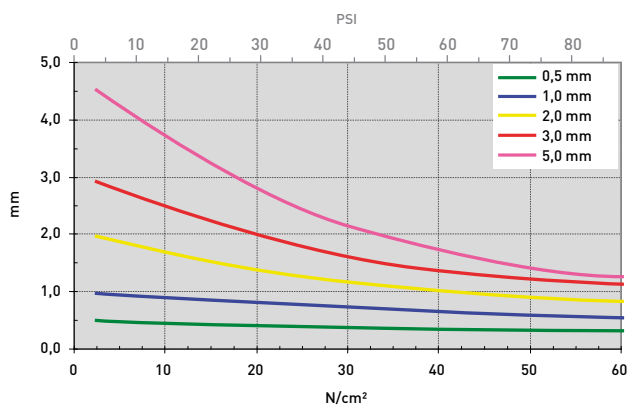
- SMD packages
  - Through-hole vias
  - RDRAMs Smemory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-U0500-SI	TGF-U1000-SI	TGF-U2000-SI	TGF-U3000-SI	TGF-U5000-SI
<b>MATERIAL</b>						
Colour		Grey	Grey	Grey	Grey	Grey
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.20	3.0 ±0.25	5.0 ±0.30
Hardness	Shore 00	60	60	60	60	60
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.15 (0.35)	0.27 (0.65)	0.42 (1.03)	0.57 (1.40)	0.84 (1.75)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.17 (0.40)	0.32 (0.81)	0.55 (1.40)	0.78 (1.98)	1.20 (2.75)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.22 (0.45)	0.36 (0.91)	0.68 (1.77)	0.99 (2.63)	1.62 (3.95)
Thermal Conductivity <sup>1</sup>	W/mK	4.5	4.5	4.5	4.5	4.5
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
<b>ELECTRICALLY</b>						
Dielectric Strength	kV / mm	15	15	15	15	15

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-VS-SI

soft, flexible / Low Volatile Siloxanes (LV)

TGF-VS-SI is an electrically insulating thermally conductive high performance LV silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its high softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Soft and compliant
- Low volatile siloxane content (LV)
- Thermal conductivity: 5.0 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

### AVAILABILITY

- Sheet 400 x 200 mm
- Tacky on both sides (TGF-VSXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

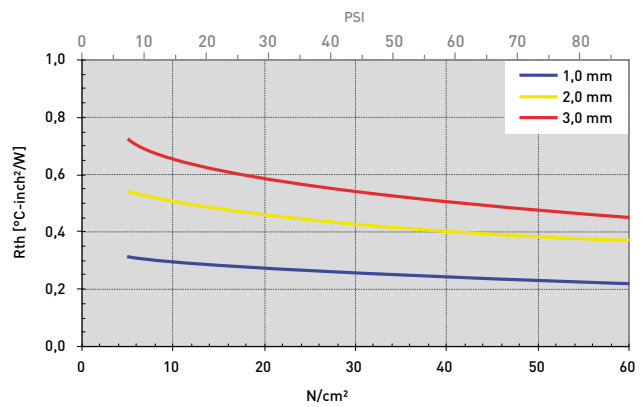
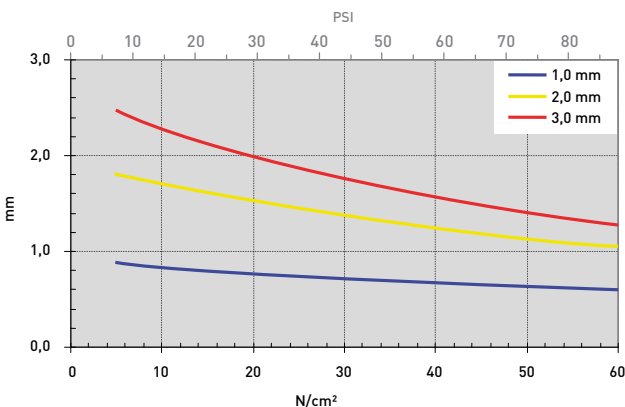
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-VS1000-SI	TGF-VS2000-SI	TGF-VS3000-SI
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Turquoise	Turquoise	Turquoise
Density	g/cm <sup>3</sup>	3.3	3.3	3.3
Thickness	mm	1.0 <sup>+0.20</sup> / <sub>-0.10</sub>	2.0 <sup>+0.20</sup>	3.0 <sup>+0.30</sup>
Hardness	Shore 00	55	55	55
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.24 (0.67)	0.40 (1.25)	0.50 (1.55)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.28 (0.76)	0.46 (1.55)	0.59 (2.00)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.30 (0.87)	0.52 (1.78)	0.69 (2.42)
Thermal Conductivity <sup>1</sup>	W/mK	5.0	5.0	5.0
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130	- 40 to + 130
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	≥8	≥8	≥8
Volume Resistivity	Ohm - cm	≥1.0 x 10 <sup>10</sup>	≥1.0 x 10 <sup>10</sup>	≥1.0 x 10 <sup>10</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm

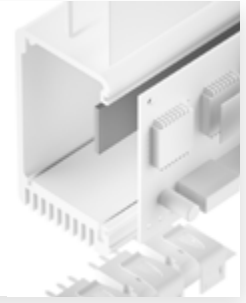
mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-XS-SI

soft, flexible / Low Volatile Siloxanes (LV)

TGF-XS-SI is an electrically insulating thermally conductive high performance LV silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Soft and compliant
- Low volatile siloxane content (LV)
- Thermal conductivity: 6.0 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

## AVAILABILITY

- Sheet 400 x 200 mm ( $\geq 1$  mm)
- Sheet 200 x 200 mm ( $< 1$  mm)
- Tacky on both sides (TGF-XSXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

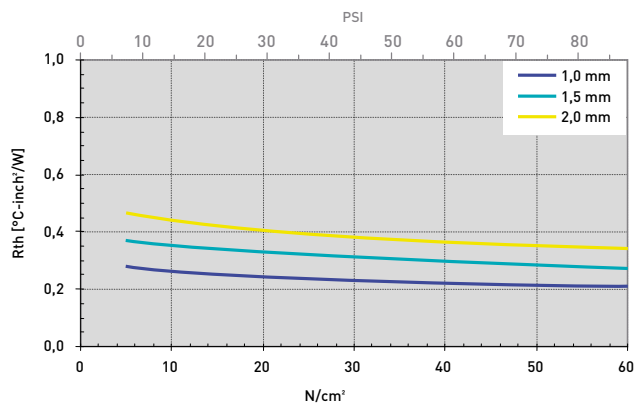
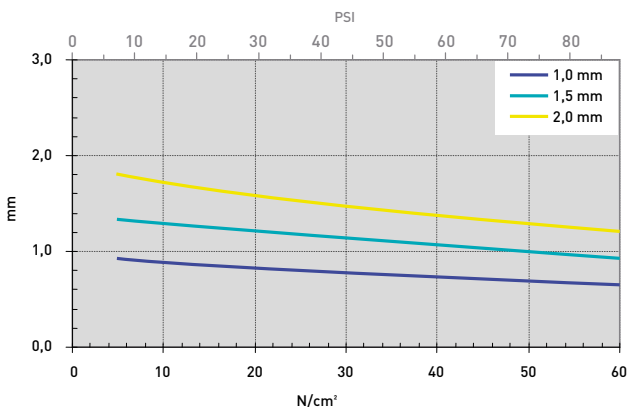
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-XS1000-SI	TGF-XS1500-SI	TGF-XS2000-SI
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Density	g/cm <sup>3</sup>	3.3	3.3	3.3
Thickness	mm	1.0 <sup>±0.10</sup>	1.5 <sup>±0.15</sup>	2.0 <sup>±0.20</sup>
Hardness	Shore 00	60	60	60
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.22 (0.74)	0.30 (1.07)	0.36 (1.40)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.24 (0.83)	0.33 (1.22)	0.41 (1.60)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.27 (0.91)	0.36 (1.32)	0.45 (1.80)
Thermal Conductivity <sup>1</sup>	W/mK	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130	- 40 to + 130
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	$\geq 8$	$\geq 8$	$\geq 8$
Volume Resistivity	Ohm - cm	$\geq 1.0 \times 10^{10}$	$\geq 1.0 \times 10^{10}$	$\geq 1.0 \times 10^{10}$

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.75 mm / 1.0 mm / 1.5 mm / 2.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-Z-SI

soft, flexible

TGF-Z-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its softness and plasticity the material perfectly mates to irregular surfaces thus optimizing the thermal contact at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Soft and compliant
- Thermal conductivity: 11 W/mK
- Operates at low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

### AVAILABILITY

- Sheet 200 x 300 mm
- Tacky on both sides (TGF-ZXXXX-SI)
- Tacky on one side by talcum coating (TGF-ZXXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

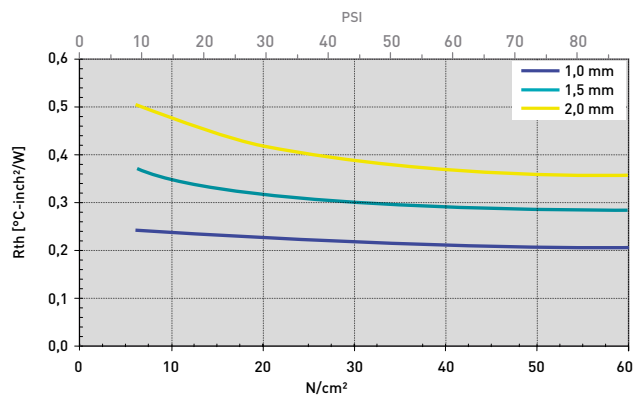
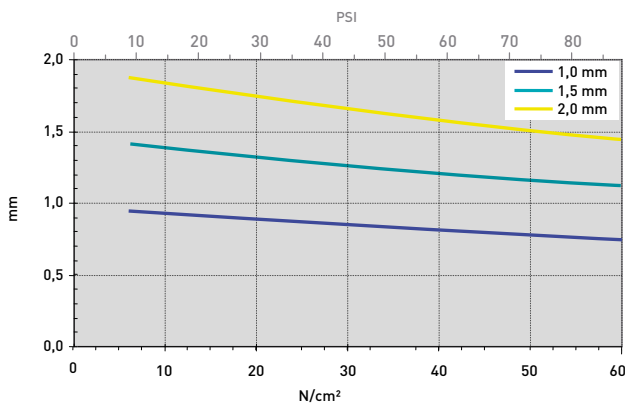
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Capacitors
- For use in Automotive applications / Laptops / Medicine engineering / Embedded-boards

PROPERTY	UNIT	TGF-Z1000-SI	TGF-Z1500-SI	TGF-Z2000-SI
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light grey	Light grey	Light grey
Density	g/cm <sup>3</sup>	3.4	3.4	3.4
Hardness	mm	1.0 ±0.2	1.5 ±0.2	2.0 ±0.3
Thickness	Shore 00	72	72	72
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.21 (0.82 mm)	0.30 (1.21 mm)	0.37 (1.59 mm)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.23 (0.89 mm)	0.32 (1.33 mm)	0.42 (1.76 mm)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.24 (0.95 mm)	0.37 (1.41 mm)	0.50 (1.88 mm)
Thermal Conductivity	W/mK	11.0	11.0	11.0
Operating Temperature Range	°C	- 50 to + 150	- 50 to + 150	- 50 to + 150
<b>ELECTRICALLY</b>				
Dielectric Strength	kV / mm	>14	>14	>14
Dielectric Constant	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>
Volume Resistivity	1 MHz	ca. 7.2	ca. 7.2	ca. 7.2

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.0 mm / 1.5 mm / 2.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-BXS-SI

ultra soft, flexible

TGF-BXS-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a good thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The optional PSA on one side provides for a strong adhesiveness.



## PROPERTIES

- Ultra soft and compliant
- Thermal conductivity: 1.2 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock-absorbing
- Easy mounting through self tackiness
- Two-side tacky or one-side adhesive

## AVAILABILITY

- Sheet 200 x 400 mm
- Tacky on both sides (TGF-BXSXXX-SI)
- PSA adhesive on one side (TGF-BXSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

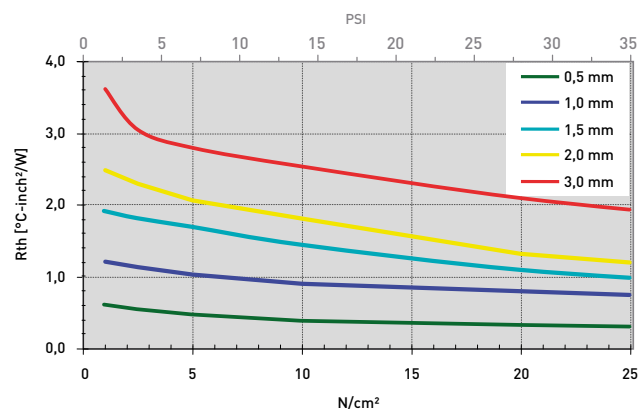
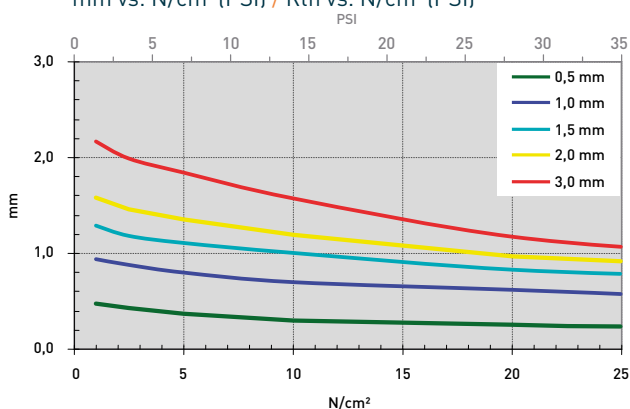
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications  
/ Laptops / Medicine engineering  
/ Industrial PCs

PROPERTY	UNIT	TGF-BXS0500-SI	TGF-BXS1000-SI	TGF-BXS1500-SI	TGF-BXS2000-SI	TGF-BXS3000-SI
<b>MATERIAL</b>						
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Pink	Pink	Pink	Pink	Pink
Thickness	mm	0.5 ±0.10	1.0 ±0.10	1.5 ±0.15	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	30	30	30	30	30
Density	g/cm <sup>3</sup>	2.3	2.3	2.3	2.3	2.3
UL Flammability	UL 94	VO	VO	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 35 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.31 (0.24)	0.75 (0.58)	1.00 (0.80)	1.20 (0.92)	1.95 (1.09)
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.39 (0.30)	0.90 (0.70)	1.45 (1.01)	1.81 (1.19)	2.54 (1.57)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.48 (0.37)	1.03 (0.80)	1.70 (1.11)	2.07 (1.35)	2.80 (1.84)
Thermal Conductivity <sup>1</sup>	W/mK	1.2	1.2	1.2	1.2	1.2
Operating Temperature Range	°C	-40 to +150	-40 to +150	-40 to +150	-40 to +150	-40 to +150
<b>ELECTRIC</b>						
Dielectric Strength	kV / mm	> 6.5	> 6.5	> 6.5	> 6.5	> 6.5
Volume Resistivity	Ohm - cm	3.5 x 10 <sup>12</sup>	3.5 x 10 <sup>12</sup>	3.5 x 10 <sup>12</sup>	3.5 x 10 <sup>12</sup>	3.5 x 10 <sup>12</sup>
Dielectric Constant	@ 1 MHz	3.87	3.87	3.87	3.87	3.87

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm / 4.5 mm / 5.0 mm / .. 12.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-HUS-SI

extremely soft, flexible

TGF-HUS-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a good thermal conductivity. Through its extreme softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Extremely soft and compliant
- Thermal conductivity: 1.8 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

### AVAILABILITY

- Sheet 300 x 400 mm
- Tacky on both sides (TGF-HUSXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

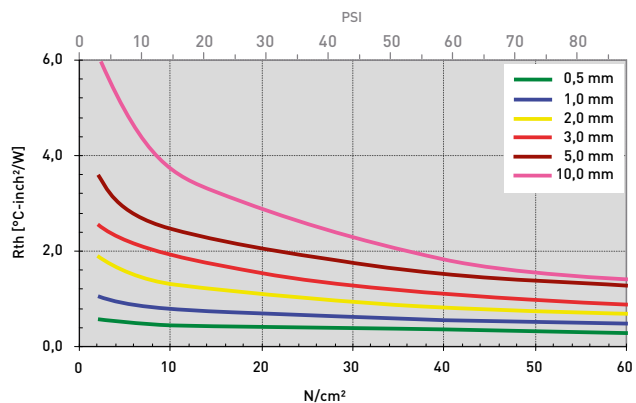
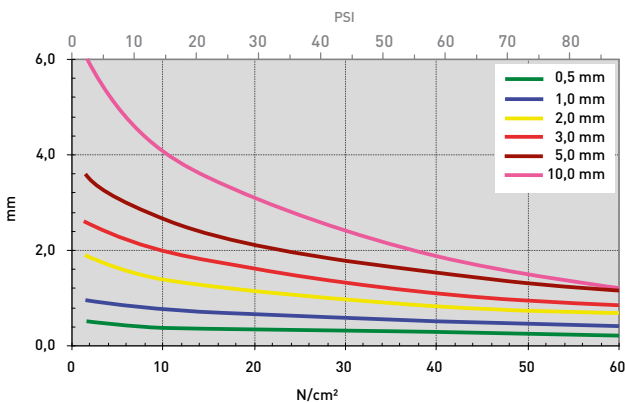
- Thermal link of:
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-HUS0500-SI	TGF-HUS1000-SI	TGF-HUS2000-SI	TGF-HUS3000-SI	TGF-HUS5000-SI
<b>MATERIAL</b>						
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark grey	Dark grey	Dark grey	Dark grey	Dark grey
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.20	3.0 ±0.25	5.0 ±0.30
Hardness	Shore 00	30	30	30	30	30
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.34 (0.31)	0.56 (0.54)	0.82 (0.85)	1.10 (1.09)	1.52 (1.54)
Resistance <sup>1</sup> @ 30 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.40 (0.36)	0.69 (0.68)	1.12 (1.16)	1.53 (1.63)	2.06 (2.13)
Resistance <sup>1</sup> @ 10 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.50 (0.46)	0.85 (0.85)	1.48 (1.57)	2.10 (2.18)	2.71 (2.92)
Thermal Conductivity <sup>1</sup>	W/mK	1.8	1.8	1.8	1.8	1.8
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150
<b>ELECTRICALLY</b>						
Dielectric Strength	kV / mm	> 10	> 10	> 10	> 10	> 10
Volume Resistivity	Ohm - cm	8.056 x 10 <sup>12</sup>	8.056 x 10 <sup>12</sup>	8.056 x 10 <sup>12</sup>	8.056 x 10 <sup>12</sup>	8.056 x 10 <sup>12</sup>
Dielectric Constant	5.6	5.6	5.6	5.6	5.6	5.6

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm / 10.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-JUS-SI

extremely soft, flexible

TGF-JUS-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a good thermal conductivity. Through its extreme softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Extremely soft and compliant
- Thermal conductivity: 2.0 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

## AVAILABILITY

- Sheet 480 x 460 mm (Thickness 1.0 mm)
- Sheet 460 x 460 mm (Thickness 2.0 mm)
- Sheet 450 x 460 mm (Thickness  $\geq 2.5$  mm)
- Tacky on both sides (TGF-JUSXXX-SI)
- Tacky on one side (TGF-JUSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

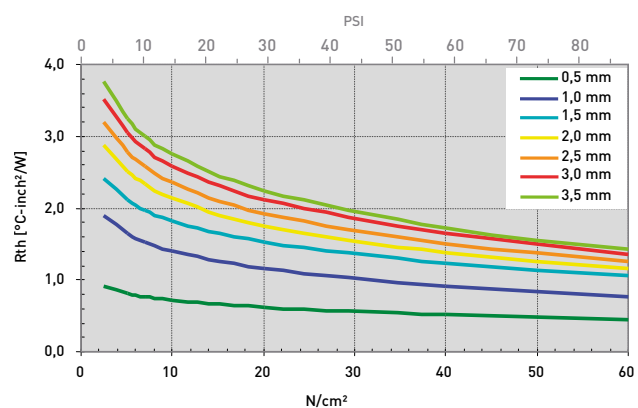
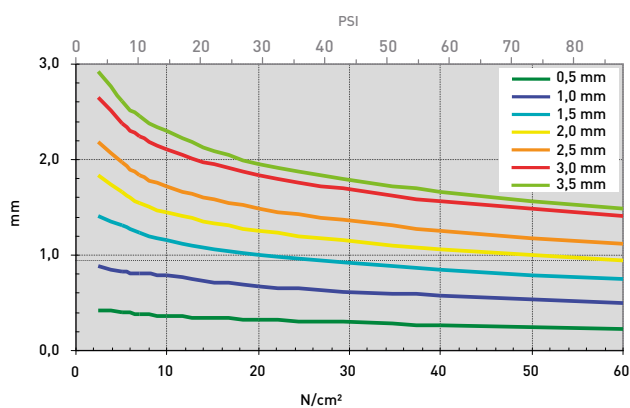
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-JUS0500-SI	TGF-JUS1000-SI	TGF-JUS2000-SI	TGF-JUS3000-SI
<b>MATERIAL</b>					
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey
Thickness	mm	0.5 $\pm 0.05$	1.0 $\pm 0.10$	2.0 $\pm 0.20$	3.0 $\pm 0.30$
Hardness	Shore 00	40	40	40	40
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.60 (0.35)	1.00 (0.65)	1.40 (1.10)	1.70 (1.60)
Resistance <sup>1</sup> @ 30 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.70 (0.40)	1.20 (0.75)	1.80 (1.30)	2.10 (1.85)
Resistance <sup>1</sup> @ 10 PSI @ thickness	°C-inch <sup>2</sup> /W (mm)	0.80 (0.45)	1.50 (0.85)	2.30 (1.58)	2.80 (2.25)
Thermal Conductivity <sup>1</sup>	W/mK	2.0	2.0	2.0	2.0
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180	- 60 to + 180
<b>ELECTRICALLY</b>					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>
Dielectric Constant	@ 1 kHz	5	5	5	5

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm / 4.5 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-JXS-SI

ultra soft, flexible / Low Volatile Siloxanes (LV)

TGF-JXS-SI is an electrically insulating thermally conductive LV silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a high thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material is one-side tacky through lamination with a thermally conductive film.



GAP FILLER

### PROPERTIES

- Ultra soft and compliant
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 2.0 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One-side self-tacky

### AVAILABILITY

- Sheet 210 x 420 mm (0.5 - 3.0 mm)
- Sheet of 210 x 350 mm (3.5 - 6.0 mm)
- Tacky on one side by film laminate (TGF-JXSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

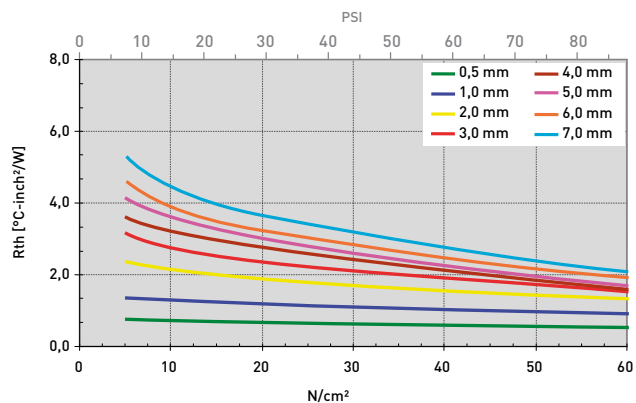
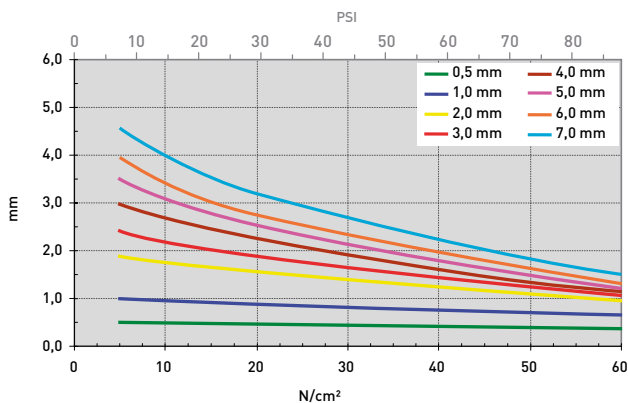
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs Smemory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-JXS0500-SI-A1	TGF-JXS1000-SI-A1	TGF-JXS2000-SI-A1	TGF-JXS3000-SI-A1	TGF-JXS5000-SI-A1
<b>MATERIAL</b>						
Colour		Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey
Thickness	mm	0.5 <sup>+0.20</sup> <sub>-0.10</sub>	1.0 <sup>+0.20</sup> <sub>-0.10</sub>	2.0 <sup>+0.20</sup>	3.0 <sup>+0.30</sup>	5.0 <sup>+0.50</sup>
Hardness	Shore 00	20	20	20	20	20
No Paint Wetting Impairment Substances (PWIS) <sup>1</sup>		Passed	Passed	Passed	Passed	Passed
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>2</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.59 (0.41)	1.03 (0.75)	1.57 (1.25)	1.90 (1.46)	2.26 (1.81)
Resistance <sup>2</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.64 (0.45)	1.16 (0.86)	1.85 (1.55)	2.33 (1.87)	2.98 (2.52)
Resistance <sup>2</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.74 (0.49)	1.32 (0.96)	2.27 (1.82)	2.96 (2.31)	3.89 (3.32)
Thermal Conductivity	W/mK	2.0	2.0	2.0	2.0	2.0
Operating Temperature Range	°C	- 40 to + 200	- 40 to + 200	- 40 to + 200	- 40 to + 200	- 40 to + 200
<b>ELECTRICALLY</b>						
Dielectric Strength	kV / mm	>10	>10	>10	>10	>10
Volume Resistivity	Ohm · cm	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>

Measurement technique according to: <sup>1</sup>P-VW 3-10.7 57650 Temp. Test, <sup>2</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm / 6.0 mm / 7.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-MXS-SI

ultra soft, with or without fibreglass reinforcement

TGF-MXS-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a high thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The optional conductive fibreglass reinforced silicone laminate on one side provides for a high mechanic stability and strength.



## PROPERTIES

- Ultra soft and compliant
- Thermal conductivity: 2.4 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

## AVAILABILITY

- Sheet 200 x 400 mm
- Tacky on both sides (TGF-MXSXXX-SI)
- Tacky on one side by fibreglass reinforced laminate (TGF-MXSXXX-SI-GF)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

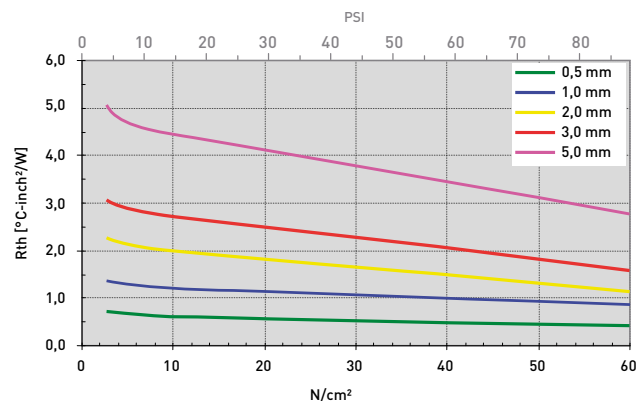
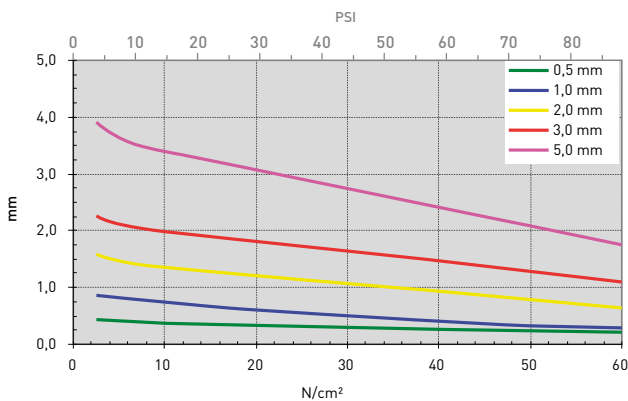
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-MXS0500-SI	TGF-MXS1000-SI	TGF-MXS2000-SI	TGF-MXS3000-SI
<b>MATERIAL</b>					
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey (/ Red laminate)	Grey (/ Red laminate)	Grey (/ Red laminate)	Grey (/ Red laminate)
Optional Reinforcement (TGF-MXSXXX-SI-GF)		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	0.5 ±0.10	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	25	25	25	25
UL Flammability	UL 94	V1	V1	V1	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.44 (0.25)	1.00 (0.45)	1.49 (0.86)	2.05 (1.50)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.53 (0.32)	1.15 (0.63)	1.79 (1.15)	2.50 (1.73)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.63 (0.40)	1.26 (0.75)	2.03 (1.40)	2.77 (2.05)
Thermal Conductivity	W/mK	2.4	2.4	2.4	2.4
Operating Temperature Range	°C	- 40 to + 200	- 40 to + 200	- 40 to + 200	- 40 to + 200
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	4	4	4	4
Volume Resistivity	Ohm - cm	1.7 x 10 <sup>13</sup>	1.7 x 10 <sup>13</sup>	1.7 x 10 <sup>13</sup>	1.7 x 10 <sup>13</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / ... / 10.0 mm. Other thicknesses on request

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-LSS-SI

very soft, flexible

TGF-LSS-SI is an electrically insulating thermally conductive high performance silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its extraordinary softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material can be mechanically reinforced by a fibreglass mesh inlay or a film laminate with fibreglass or by a PI film laminate.



GAP FILLER

## PROPERTIES

- Extraordinary soft and compliant
- Thermal conductivity: 2.5 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

## AVAILABILITY

- Sheet 200 x 400 mm
- Two-side self-tacky (TGF-LSSXXX-SI)
- With fibreglass mesh inlay (TGF-LSSXXX-SI-GF)
- With fibreglass reinforced film laminate (TGF-LSSXXX-SI-LGF)
- With PI film laminate (TGF-LSSXXX-SI-LPI)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

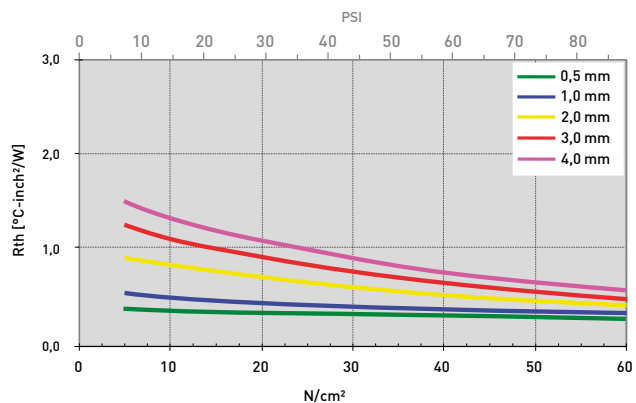
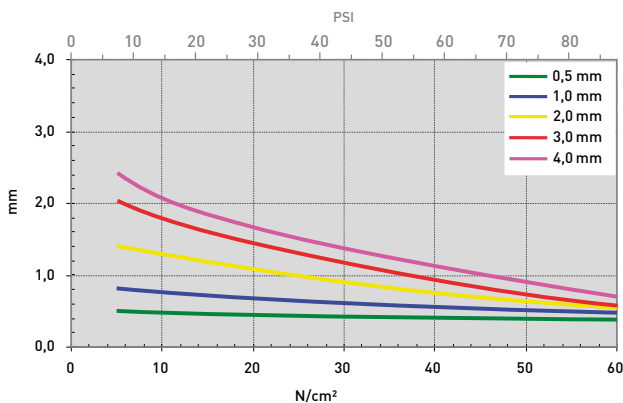
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

PROPERTY	UNIT	TGF-LSS0500-SI	TGF-LSS1000-SI	TGF-LSS2000-SI	TGF-LSS3000-SI	TGF-LSS4000-SI
<b>MATERIAL</b>						
Colour		Light beige	Light beige	Light beige	Light beige	Light beige
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30	4.0 ±0.40
Hardness	Shore 00	34	34	34	34	34
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.32 (0.39)	0.40 (0.54)	0.54 (0.71)	0.65 (0.90)	0.75 (1.10)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.35 (0.43)	0.46 (0.65)	0.75 (1.09)	0.96 (1.46)	1.11 (1.67)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.39 (0.47)	0.55 (0.77)	0.90 (1.35)	1.22 (1.93)	1.44 (2.30)
Thermal Conductivity <sup>1</sup>	W/mK	2.5	2.5	2.5	2.5	2.5
Operating Temperature Range	°C	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 50 to + 170
<b>ELECTRICAL</b>						
Dielectric Strength	kV / mm	> 7.0	> 7.0	> 7.0	> 7.0	> 7.0
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>
Dielectric Constant	@ 1 MHz	5.3	5.3	5.3	5.3	5.3

Measurement technique according to: \*ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / ... / 10.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-MUS-SI

extremely soft, flexible

TGF-MUS-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its extreme softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Extremely soft and compliant
- Thermal conductivity: 2.5 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

## AVAILABILITY

- Sheet 480 x 460 mm (1.0 mm)
- Sheet 460 x 460 mm (2.0 mm)
- Sheet 450 x 460 mm ( $\geq 3.0$  mm)
- Tacky on both sides (TGF-MUSXXX-SI)
- Tacky on one side (TGF-MUSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

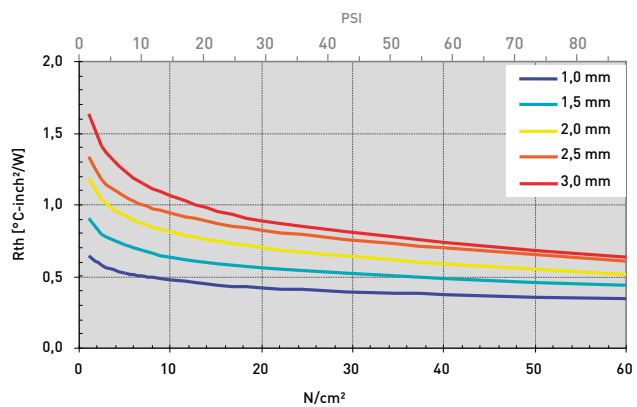
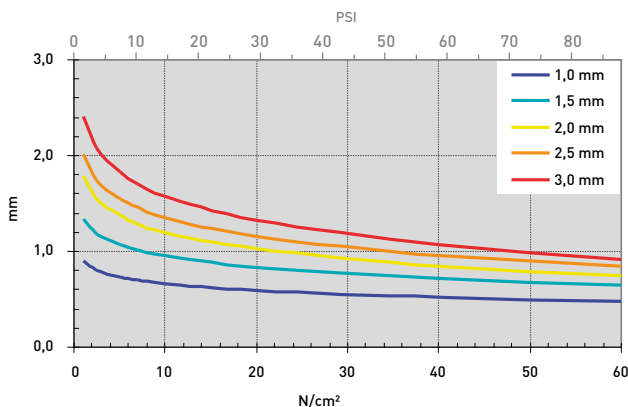
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-MUS1000-SI	TGF-MUS2000-SI	TGF-MUS3000-SI
<b>MATERIAL</b>				
Material		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue
Thickness	mm	1.0 $\pm 0.10$	2.0 $\pm 0.20$	3.0 $\pm 0.30$
Hardness	Shore 00	20	20	20
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.37 (0.52)	0.58 (0.85)	0.74 (1.06)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.42 (0.59)	0.70 (1.02)	0.89 (1.32)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.49 (0.70)	0.89 (1.29)	1.20 (1.70)
Thermal Conductivity <sup>1</sup>	W/mK	2.5	2.5	2.5
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-RSS-SI

very soft, flexible

TGF-RSS-SI is an electrically insulating thermally conductive high performance silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its extraordinary softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material can be mechanically reinforced by a fibreglass mesh inlay or a film laminate with fibreglass or by a PI film laminate.



GAP FILLER

### PROPERTIES

- Extraordinary soft and compliant
- Thermal conductivity: 3.0 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

### AVAILABILITY

- Sheet 200 x 400 mm
- Two-side self-tacky (TGF-RSSXXX-SI)
- With fibreglass mesh inlay (TGF-RSSXXX-SI-GF)
- With fibreglass reinforced film laminate (TGF-RSSXXX-SI-LGF)
- With PI film laminate (TGF-RSSXXX-SI-LPI)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

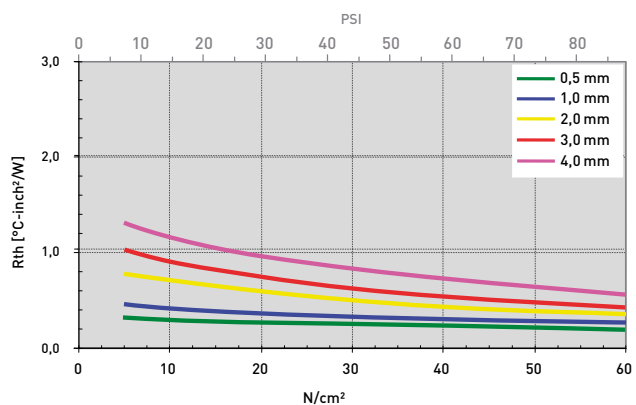
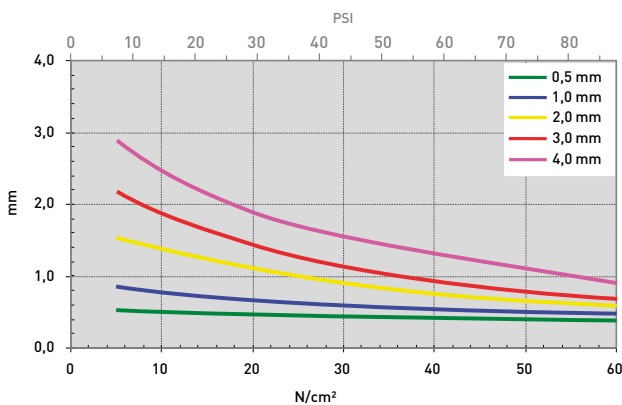
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

PROPERTY	UNIT	TGF-RSS0500-SI	TGF-RSS1000-SI	TGF-RSS2000-SI	TGF-RSS3000-SI	TGF-RSS4000-SI
<b>MATERIAL</b>						
Colour		Light blue	Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30	4.0 ±0.40
Hardness	Shore 00	43	43	43	43	43
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.25 (0.41)	0.31 (0.52)	0.44 (0.73)	0.54 (0.93)	0.74 (1.33)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.27 (0.44)	0.37 (0.67)	0.59 (1.10)	0.75 (1.44)	0.95 (1.89)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.30 (0.48)	0.45 (0.81)	0.75 (1.48)	0.99 (2.08)	1.25 (2.74)
Thermal Conductivity <sup>1</sup>	W/mK	3.0	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 50 to + 170
<b>ELECTRICAL</b>						
Dielectric Strength	kV / mm	>7.0	>7.0	>7.0	>7.0	>7.0
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>
Dielectric Constant	@ 1 MHz	5.6	5.6	5.6	5.6	5.6

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / ... / 10.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-TSS-SI

very soft, flexible

TGF-TSS-SI is an electrically insulating thermally conductive high performance silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a very high thermal conductivity. Through its extraordinary softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Extremely soft and compliant
- Thermal conductivity: 3.2 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness

## AVAILABILITY

- Sheet 300 x 400 mm
- Tacky on both sides [TGF-TSSXXX-SI]
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

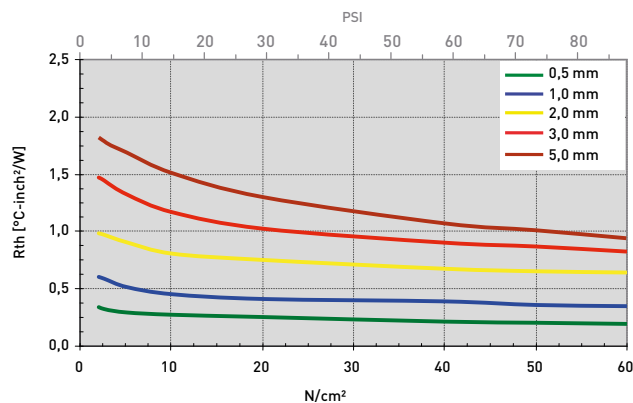
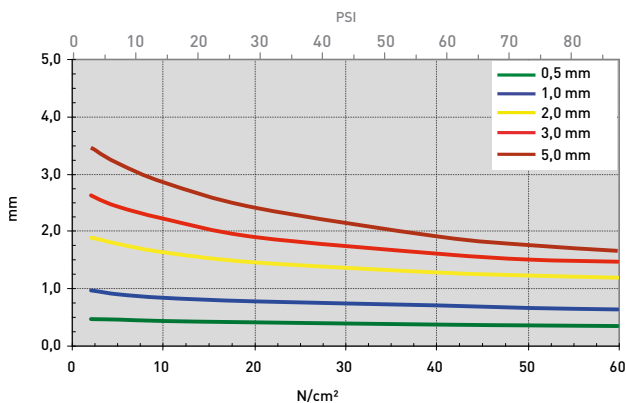
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-TSS0500-SI	TGF-TSS1000-SI	TGF-TSS2000-SI	TGF-TSS3000-SI	TGF-TSS5000-SI
<b>MATERIAL</b>						
Colour		Ceramic filled silicone Light reddish purple	Ceramic filled silicone Light reddish purple	Ceramic filled silicone Light reddish purple	Ceramic filled silicone Light reddish purple	Ceramic filled silicone Light reddish purple
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.20	3.0 ±0.25	5.0 ±0.30
Hardness	Shore 00	37	37	37	37	37
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.22 (0.37)	0.40 (0.70)	0.68 (1.27)	0.91 (1.60)	1.08 (1.90)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.26 (0.41)	0.42 (0.77)	0.76 (1.45)	1.03 (1.89)	1.31 (2.40)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.29 (0.44)	0.49 (0.86)	0.86 (1.70)	1.25 (2.31)	1.61 (3.01)
Thermal Conductivity <sup>1</sup>	W/mK	3.2	3.2	3.2	3.2	3.2
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
<b>ELECTRICALLY</b>						
Dielectric Strength	kV / mm	15	15	15	15	15

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-USS-SI

very soft, flexible / Low Volatile Siloxanes (LV)

TGF-USS-SI is an electrically insulating thermally conductive high performance LV silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic articles the silicone elastomer has a very high thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material is one-side tacky through lamination with a thermally conductive film.



GAP FILLER

## PROPERTIES

- Ultra soft and compliant
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 3.3 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One-side self-tacky

## AVAILABILITY

- Sheet 200 x 200 mm (0.5 - 3.0 mm)
- Sheet 200 x 400 mm (0.5 - 3.0 mm)
- Tacky on one side by film laminate (TGF-USSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

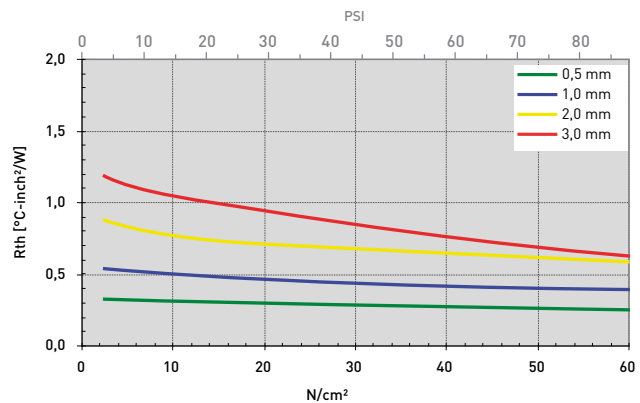
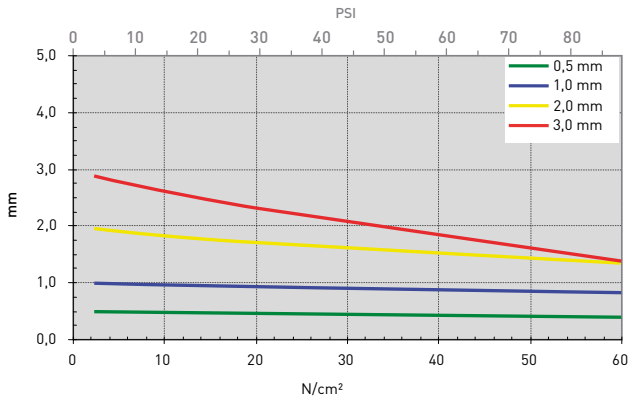
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-USS0500-SI-A1	TGF-USS1000-SI-A1	TGF-USS2000-SI-A1	TGF-USS3000-SI-A1
<b>MATERIAL</b>					
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark grey / Grey	Dark grey / Grey	Dark grey / Grey	Dark grey / Grey
Thickness	mm	0.5 <sup>+0.20</sup> <sub>-0.10</sub>	1.0 <sup>+0.20</sup> <sub>-0.10</sub>	2.0 <sup>+0.20</sup>	3.0 <sup>+0.30</sup>
Hardness	Shore 00	45	45	45	45
No Paint Wetting Impairment Substances (PWIS) <sup>1</sup>		Passed	Passed	Passed	Passed
UL Flammability (Equivalent)	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>2</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.26 (0.47)	0.40 (0.87)	0.63 (1.55)	0.75 (1.84)
Resistance <sup>2</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.29 (0.48)	0.45 (0.93)	0.70 (1.70)	0.94 (2.30)
Resistance <sup>2</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.31 (0.49)	0.51 (0.99)	0.80 (1.85)	1.07 (2.68)
Thermal Conductivity <sup>1</sup>	W/mK	3.3	3.3	3.3	3.3
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150
<b>ELECTRICAL</b>					
Breakdown Voltage	kV / mm	>10	>10	>10	>10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>

Test Methods: <sup>1</sup>P-VW 3-10.7 57650 Temp. Test, <sup>2</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm

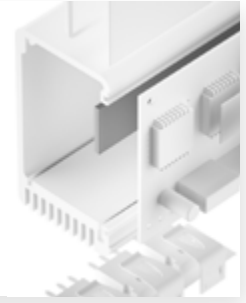
mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-WSS-SI

very soft, flexible

TGF-WSS-SI is an electrically insulating thermally conductive high performance silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its high softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Very soft and compliant
- Thermal conductivity: 5.5 W/mK
- Operates at very low pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One or two-side self-tacky

## AVAILABILITY

- Sheet 460 x 100 mm
- Tacky on both sides (TGF-WSSXXX-SI)
- Tacky on one side (TGF-WSSXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

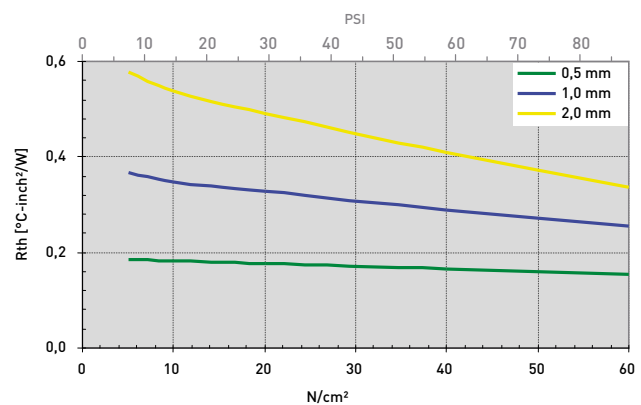
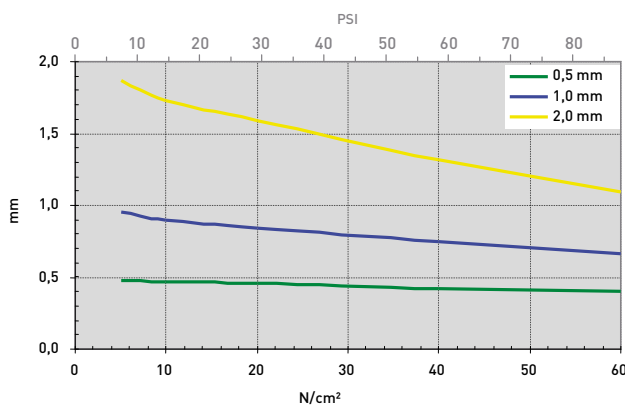
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-WSS0500-SI	TGF-WSS1000-SI	TGF-WSS2000-SI
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Thickness	mm	0.5 <sup>±0.05</sup>	1.0 <sup>±0.10</sup>	2.0 <sup>±0.20</sup>
Hardness	Shore 00	55	55	55
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.16 (0.41)	0.30 (0.75)	0.41 (1.32)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.18 (0.46)	0.32 (0.85)	0.49 (1.59)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.19 (0.48)	0.36 (0.93)	0.56 (1.80)
Thermal Conductivity <sup>1</sup>	W/mK	5.5	5.5	5.5
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>	1.0 x 10 <sup>13</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-DXS-SI-GF

ultra soft, with fibreglass reinforcement

TGF-DXS-SI-GF is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a good thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The conductive fibreglass reinforced silicone laminate on one side provides for a high mechanic stability and strength.



GAP FILLER

### PROPERTIES

- Ultra soft and compliant
- Thermal conductivity: 1.3 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One side self-tacky

### AVAILABILITY

- Sheet 200 x 400 mm
- Tacky on one side by fibreglass reinforced laminate (TGF-DXSXXX-SI-GF)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

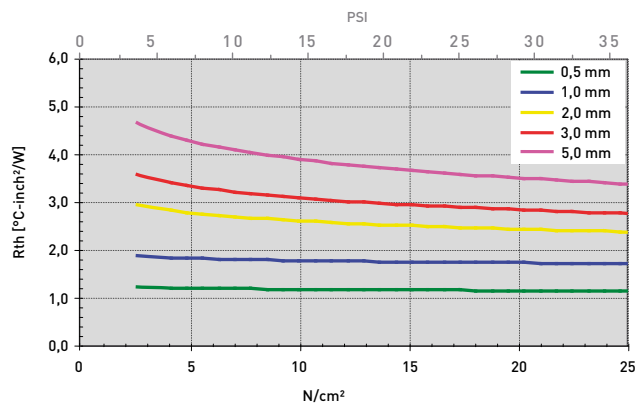
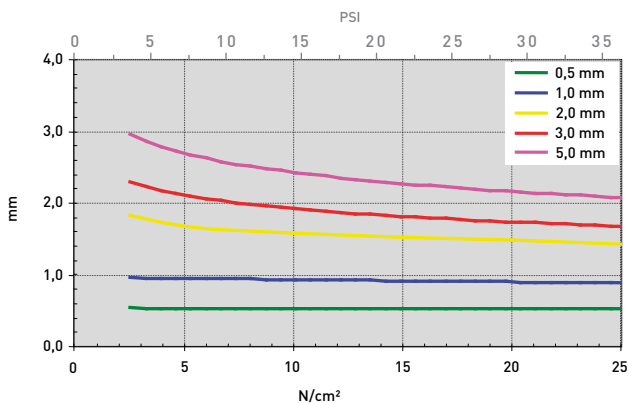
- Thermal link of:
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-DXS1000-SI-GF	TGF-DXS2000-SI-GF	TGF-DXS3000-SI-GF	TGF-DXS5000-SI-GF
<b>MATERIAL</b>					
Colour		White / Pink	White / Pink	White / Pink	White / Pink
Reinforcement		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	1.0 <sup>+0.10</sup> / <sub>-0.01</sub>	2.0 <sup>+0.20</sup> / <sub>-0.02</sub>	3.0 <sup>+0.30</sup> / <sub>-0.03</sub>	5.0 <sup>+0.50</sup> / <sub>-0.05</sub>
Hardness	Shore 00	25	25	25	25
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 35 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.77 (0.94)	2.43 (1.40)	2.80 (1.65)	3.40 (2.10)
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.85 (0.95)	2.70 (1.60)	3.10 (1.95)	3.95 (2.55)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.86 (0.97)	2.80 (1.70)	3.30 (2.20)	4.40 (2.70)
Thermal Conductivity	W/mK	1.3	1.3	1.3	1.3
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	6	6	6	6
Volume Resistivity	Ohm - cm	6.2 x 10 <sup>15</sup>	6.2 x 10 <sup>15</sup>	6.2 x 10 <sup>15</sup>	6.2 x 10 <sup>15</sup>
Dielectric Constant	@ 1 MHz	5.27	5.27	5.27	5.27

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / 6.0 mm / 7.0 mm / 8.0 mm / 9.0 mm / 10.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TGF-EXS-SI-GF

ultra soft, flexible

TGF-EXS-SI-GF is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has a high thermal conductivity. Through its ultra softness and flexibility the material perfectly mates to irregular surfaces thus filling gaps at minimum pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The conductive fiberglass reinforced silicone laminate on one side allows for a high mechanic stability and strength.



## PROPERTIES

- Ultra soft and compliant
- Thermal conductivity: 1.4 W/mK
- Operates at minimum pressure
- Extraordinary chemical resistance and longterm stability
- Shock absorbing
- Easy mounting through self tackiness
- One-side self-tacky

## AVAILABILITY

- Sheet 300 x 400 mm
- Tacky on one side by fibreglass reinforced laminate (TGF-EXSXXX-SI-GF)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

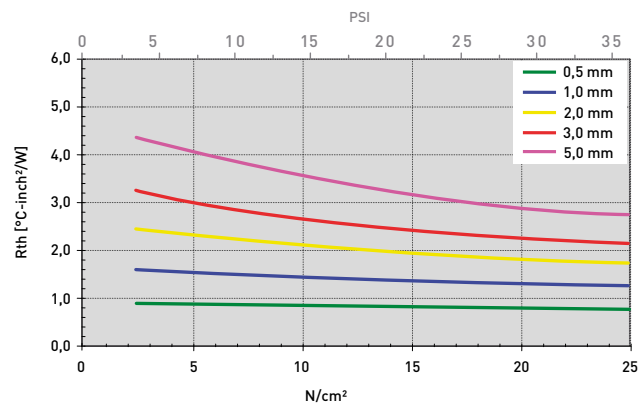
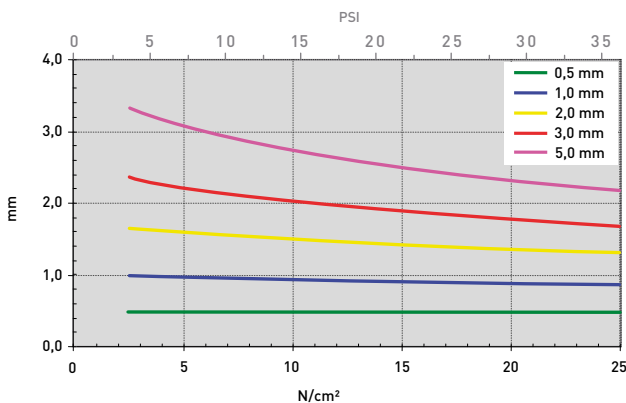
- SMD packages
  - Through-hole vias
  - RDRAMs Smemory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-EXS0500-SI-GF	TGF-EXS1000-SI-GF	TGF-EXS2000-SI-GF	TGF-EXS3000-SI-GF	TGF-EXS5000-SI-GF
<b>MATERIAL</b>						
Colour		Ceramic filled silicone Reddish brown / Grey	Ceramic filled silicone Reddish brown / Grey	Ceramic filled silicone Reddish brown / Grey	Ceramic filled silicone Reddish brown / Grey	Ceramic filled silicone Reddish brown / Grey
Reinforcement		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.25	3.0 ±0.25	5.0 ±0.30
Hardness	Shore 00	25	25	25	25	25
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 35 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.76 [0.46]	1.26 [0.86]	1.73 [1.30]	2.14 [1.68]	2.73 [2.17]
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.85 [0.47]	1.44 [0.92]	2.07 [1.50]	2.63 [2.03]	3.58 [2.72]
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.89 [0.48]	1.54 [0.95]	2.31 [1.58]	3.00 [2.20]	4.08 [3.06]
Thermal Conductivity <sup>1</sup>	W/mK	1.4	1.4	1.4	1.4	1.4
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
<b>ELECTRICALLY</b>						
Dielectric Strength	kV / mm	20	20	20	20	20

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm

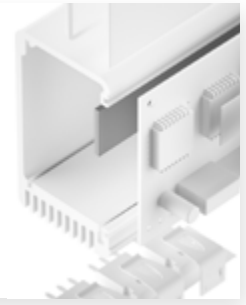
mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER TGF-YP-SI

plastic

TGF-YP-SI is an electrically insulating thermally conductive very high performance silicone gap filler. It is ideal for use in applications where a very good thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an outstandingly high thermal conductivity. Through its softness and plasticity the material perfectly mates to irregular surfaces thus filling gaps at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



### PROPERTIES

- Plastic
- Soft and compliant
- Thermal conductivity: 7.0 W/mK
- Extraordinary chemical resistance and longterm stability
- Two-side self-tacky

### AVAILABILITY

- Sheet 460 x 100 mm
- Tacky on both sides (TGF-YPXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

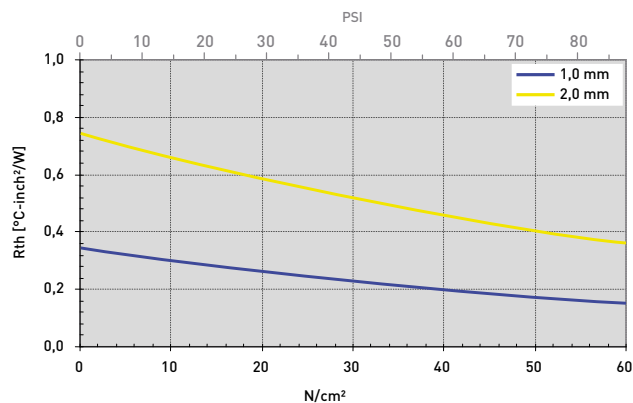
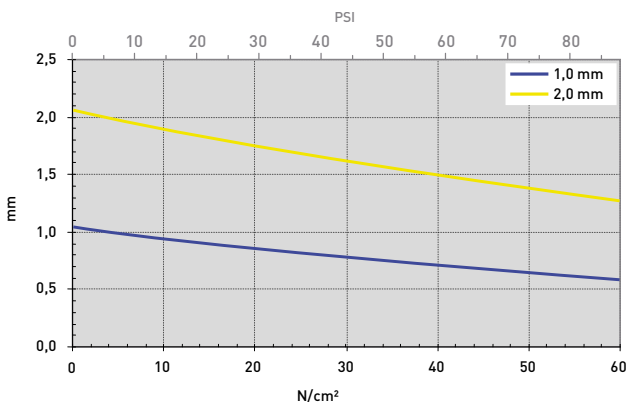
- Thermal link of:
- SMD packages
  - Through-hole vias
  - Capacitors
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-YP1000-SI	TGF-YP2000-SI
<b>MATERIAL</b>			
		Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey
Thickness	mm	1.0 ±0.10	2.0 ±0.20
Hardness	Shore 00	55	55
UL Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.20 (0.75)	0.45 (1.50)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.27 (0.90)	0.59 (1.75)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.32 (0.95)	0.67 (1.90)
Thermal Conductivity	W/mK	7.0	7.0
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150
<b>ELECTRICALLY</b>			
Dielectric Strength	kV / mm	>10	>10
Volume Resistivity	Ohm - cm	> 1.0 x 10 <sup>12</sup>	> 1.0 x 10 <sup>12</sup>
Dielectric Constant	@ 1 MHz	7	7

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.0 mm / 2.0 mm / 3.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER TGF-ZP-SI

plastic

TGF-ZP-SI is an electrically insulating thermally conductive silicone gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. Due to the specific formulation and filling with ceramic particles the silicone elastomer has an extremely high thermal conductivity. Through its extreme softness and plasticity the material perfectly mates to irregular surfaces thus filling gaps at almost zero pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Plastic
- Extremely soft and compliant
- Thermal conductivity: 11 W/mK
- Operates at almost zero pressure
- For minimal gaps
- Extraordinary chemical resistance and longterm stability
- Easy mounting through self tackiness

## AVAILABILITY

- Sheet 300 x 200 mm
- Tacky on both sides (TGF-ZPXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Capacitors
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-ZP1500-SI	TGF-ZP2000-SI
<b>MATERIAL</b>			
		Ceramic filled silicone	Ceramic filled silicone
Colour		Light grey	Light grey
Reinforcement		None	None
Thickness	mm	1.5 <sup>+0.50</sup> <sub>-0.00</sub>	2.0 <sup>+0.70</sup> <sub>-0.00</sub>
Density	g/cm <sup>3</sup>	3.3	3.3
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 1.5 mm	°C-inch <sup>2</sup> /W	---	0.24
Resistance <sup>1</sup> @ 0.8 mm	°C-inch <sup>2</sup> /W	0.14	0.14
Resistance <sup>1</sup> @ 0.5 mm	°C-inch <sup>2</sup> /W	0.10	0.10
Resistance <sup>1</sup> @ 0.2 mm	°C-inch <sup>2</sup> /W	0.06	0.06
Thermal Conductivity	W/mK	11	11
Operating Temperature Range	°C	- 50 to + 180	-50 to + 180
<b>ELECTRICAL</b>			
Dielectric Strength	kV / mm	11	11
Dielectric Constant	@ 1 MHz	7.5	7.5
Volume Resistivity	Ohm - cm	7.0 x 10 <sup>7</sup>	7.0 x 10 <sup>7</sup>

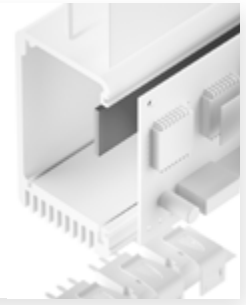
Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.5 mm / 2.0 mm

# SILICONE GAP FILLER PAD TEL-R-SI

highly thermally conductive elastomer / Low Volatile Siloxanes (LV)

TEL-R-SI is a low dielectric, high performance thermally conductive LV silicone gap filler for an optimised thermal coupling between electronic packages and heat sinks even over large gaps or big tolerances. Through the specific formulation and filling with highly thermally conductive particles an extraordinary high anisotropic thermal conductivity is reached. Its conformal surface structure and extreme softness guarantee a very good compliance to the contact surfaces at very low pressure. Thus the total thermal resistance is minimised. The elastomer shows a low dielectric strength.



GAP FILLER

### PROPERTIES

- High surface compliance and extremely soft
- Low volatile siloxane content (LV)
- Thermal conductivity: 15 W/mK (anisotropic)
- Low dielectric
- Extraordinary chemical resistance and longterm stability
- Shock absorbing

### AVAILABILITY

- Sheet 150 x 150 mm (Thickness 0.5 – 1.5 mm)
- Sheet 140 x 140 mm (Thickness 2.0 – 3.0 mm)
- Double-side self tacky (TEL-RXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

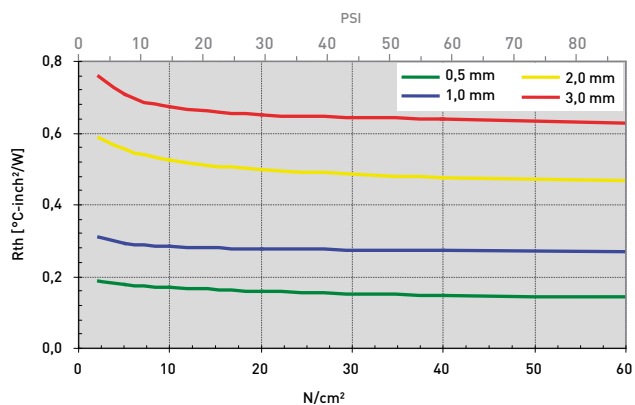
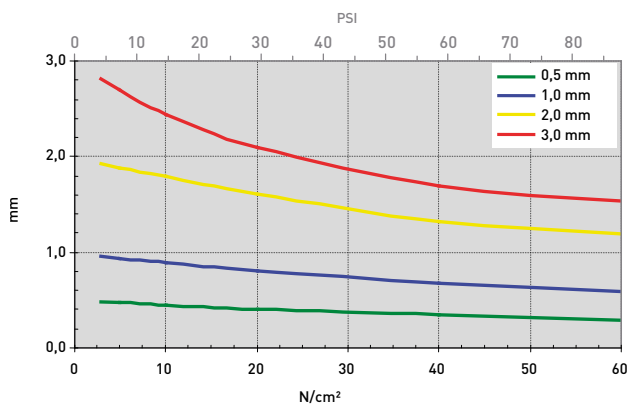
- Thermal link of:
- MOSFETs und IGBTs
  - Power diodes or AC/DC converters
  - Power modules
  - CPUs
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-R0500-SI	TEL-R1000-SI	TEL-R2000-SI
<b>MATERIAL</b>				
Colour		Black	Black	Black
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20
Hardness	Shore 00	55	55	55
Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 90 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.15 (0.30)	0.27 (0.60)	0.47 (1.20)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.16 (0.41)	0.28 (0.81)	0.50 (1.61)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.18 (0.47)	0.29 (0.93)	0.54 (1.85)
Thermal Conductivity	W/mK	15	15	15
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
<b>ELECTRICAL</b>				
Dielectric Strength	kV/mm	1.0	1.0	1.0
Volume Resistivity	Ohm - cm	≥ 1 x 10 <sup>12</sup>	≥ 1 x 10 <sup>12</sup>	≥ 1 x 10 <sup>12</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.5 mm / 1.0 mm / 2.0 mm / 3.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TEL-Z-SI

highly thermally conductive elastomer / Low Volatile Siloxanes (LV)

TEL-Z-SI is a non dielectric high performance thermally conductive LV silicone foil for an optimised thermal coupling between electronic packages and heat sinks even over large gaps or big tolerances. Through the specific formulation and filling an extraordinary high anisotropic thermal conductivity is reached. Its conformal surface structure and high softness guarantee a very good compliance to the contact surfaces at low pressure. Thus the total thermal resistance is minimised.



## PROPERTIES

- High surface compliance and softness
- Low volatile siloxane content (LV)
- Non dielectric
- No paint wetting impairment
- Thermal conductivity: 50 W/mK (anisotropic)
- Extraordinary chemical resistance and longterm stability
- Shock absorbing

## AVAILABILITY

- Sheet 140 x 140 mm (TEL-ZXXXX-SI)
- Die cut parts
- Optional with adhesive stripes or dots (TEL-ZXXXX-SI-A1)

## APPLICATION EXAMPLES

Thermal link of:

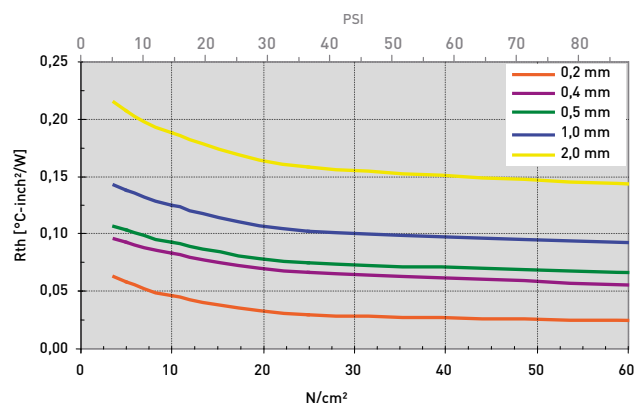
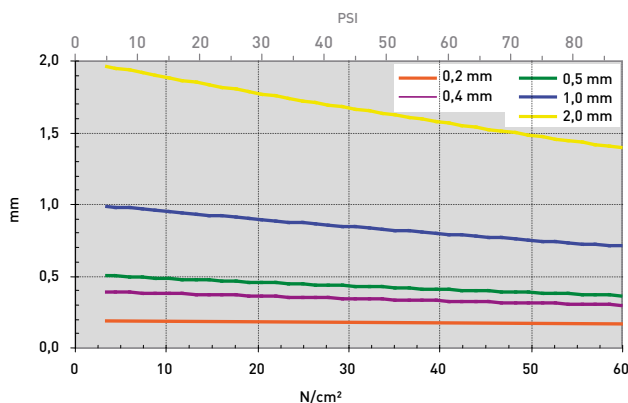
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-Z0200-SI	TEL-Z0500-SI	TEL-Z1000-SI
<b>MATERIAL</b>				
Colour		Black	Black	Black
Thickness	mm	0.2 ±0.05	0.5 ±0.05	1.0 ±0.10
Hardness	Shore 00	75	75	75
No Paint Wetting Impairment Substances (PWIS) <sup>1</sup>		Passed	Passed	Passed
Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 90 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.020 (0.16)	0.060 (0.33)	0.09 (0.70)
Resistance <sup>2</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.027 (0.18)	0.075 (0.48)	0.11 (0.91)
Resistance <sup>2</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.050 (0.19)	0.095 (0.49)	0.13 (0.97)
Thermal Conductivity	W/mK	50	50	50
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
<b>ELECTRICAL</b>				
Volume Resistivity	Ohm - cm	< 50.000	< 50.000	< 50.000

Measurement technique according to: <sup>1</sup>P-VW 3-10.7 57650 Temp. Test, <sup>2</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.2 mm / 0.4 mm / 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TEL-YSS-SI

very soft, highly thermally conductive elastomer / Low Volatile Siloxanes (LV)

TEL-YSS-SI is a non dielectric high performance thermally conductive LV silicone gap filler for an optimised thermal coupling between electronic packages and heat sinks even over large gaps or big tolerances. Through the specific formulation and filling an extraordinary high anisotropic thermal conductivity is reached. Its conformal surface structure and extraordinary softness guarantee a very good compliance to the contact surfaces at low pressure. Thus the total thermal resistance is minimised.



GAP FILLER

### PROPERTIES

- High surface compliance and extraordinary softness
- Low volatile siloxane content (LV)
- Non dielectric
- Thermal conductivity: 16 W/mK (anisotropic)
- Extraordinary chemical resistance and longterm stability
- Shock absorbing

### AVAILABILITY

- Sheet 130 x 130 mm (TEL-YSSXXX-SI)
- Die cut parts
- Optional with adhesive stripes or dots (TEL-YSSXXX-SI-A1)

### APPLICATION EXAMPLES

Thermal link of:

- MOSFETs or IGBTs
- Power diodes or AC/DC converters
- Power modules

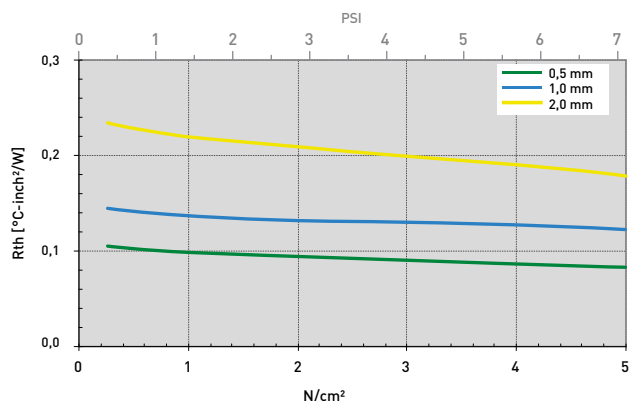
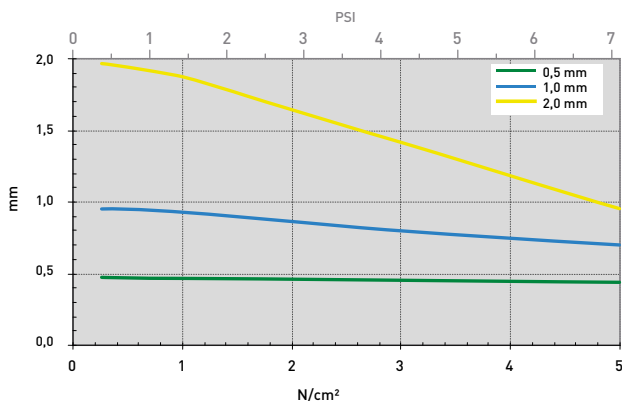
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-YSS0500-SI	TEL-YSS1000-SI	TEL-YSS2000-SI
<b>MATERIAL</b>				
MATERIAL		Graphite filled silicone elastomere	Graphite filled silicone elastomere	Graphite filled silicone elastomere
Colour		Black	Black	Black
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20
Hardness	Shore 00	40	40	40
Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 7.5 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.083 (0.42)	0.124 (0.700)	0.180 (0.954)
Resistance <sup>1</sup> @ 3.5 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.089 (0.45)	0.129 (0.785)	0.205 (1.550)
Resistance <sup>1</sup> @ 1.5 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.100 (0.47)	0.137 (0.934)	0.220 (1.874)
Thermal Conductivity <sup>1</sup>	W/mK	16	16	16
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
<b>ELECTRICAL</b>				
Volume Resistivity	Ohm - cm	< 50.000	< 50.000	< 50.000

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 3.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE GAP FILLER PAD TEL-ZS-SI

soft, highly thermally conductive elastomer / Low Volatile Siloxanes (LV)

TEL-ZS-SI is a non dielectric high performance thermally conductive LV silicone foil for an optimised thermal coupling between electronic packages and heat sinks even over large gaps or big tolerances. Through the specific formulation and filling an extraordinary high anisotropic thermal conductivity is reached. Its conformal surface structure and high softness guarantee a very good compliance to the contact surfaces at low pressure. Thus the total thermal resistance is minimised.



## PROPERTIES

- High surface compliance and softness
- Low volatile siloxane content (LV)
- Non dielectric
- Thermal conductivity: 20 W/mK (anisotropic)
- Extraordinary chemical resistance and longterm stability
- Shock absorbing

## AVAILABILITY

- Sheet 120 x 120 mm (TEL-ZSXXXX-SI)
- Die cut parts
- Optional with adhesive stripes or dots (TEL-ZSXXXX-SI-A1)

## APPLICATION EXAMPLES

Thermal link of:

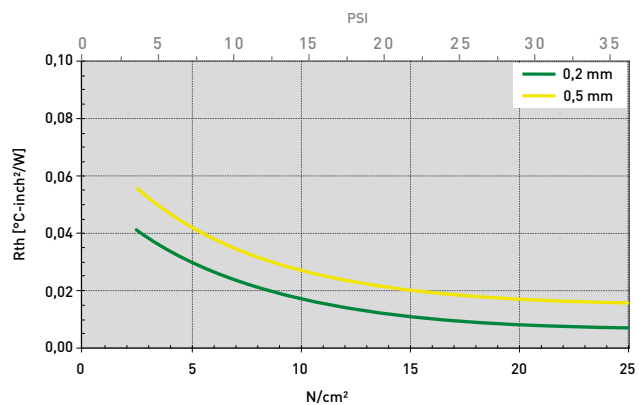
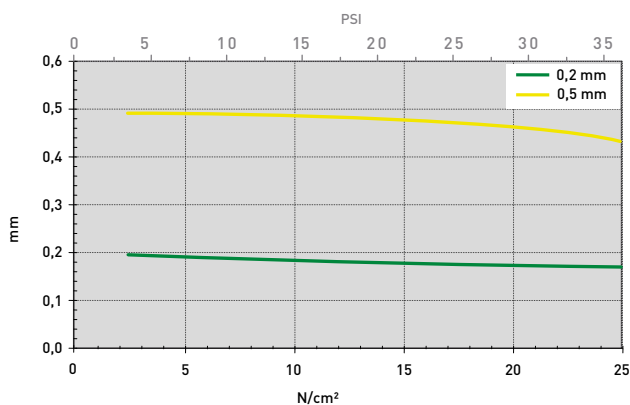
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-ZS0200-SI	TEL-ZS0500-SI
<b>MATERIAL</b>			
		Carbon filled silicone elastomere	Carbon filled silicone elastomere
Colour		Black	Black
Thickness	mm	0.2 ±0.05	0.5 ±0.05
Hardness	Shore 00	60	60
Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 35 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.007 (0.17)	0.018 (0.44)
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.017 (0.18)	0.027 (0.48)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.030 (0.19)	0.042 (0.49)
Thermal Conductivity <sup>1</sup>	W/mK	20	20
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150
<b>ELECTRICAL</b>			
Volume Resistivity	Ohm - cm	< 50,000	< 50,000

Test Methods: <sup>1</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.2 mm / 0.3 mm / 0.5 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# 2-PART SILICONE GAP FILLER TDG-L-SI-2C-Y

dispensable / 2 parts / Low Volatile Siloxanes (LV) / Form-in-Place

TDG-L-SI-2C-Y is a 2-part dispensable low volatile LV silicone gap filler which is filled with thermally conductive fillers. After curing under heat the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for compensating extreme tolerances and spaces at non-coplanar systems. Its thixotropic behaviour allows for a definite placement and cure-in-place. It has a natural low level tack that enhances a good thermal contact. Due to its negligible and controlled volatile content it is suited for environments where volatile silicones and paint wetting impairment are critical.



### PROPERTIES

- Dispensable 2-part silicone
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 2.0 W/mK
- Remains elastic after polymerisation
- Zero stress on components
- Heat accelerated curing
- Shock absorbing

### AVAILABILITY

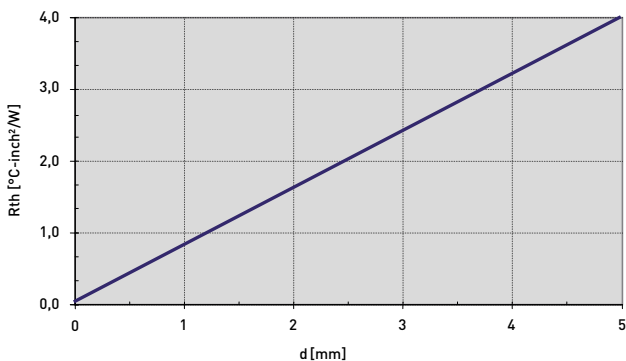
- Optional in blue colour: TDG-L-SI-2C
- Cartridges 2 x 25 ml / 2 x 100 ml / 2 x 200 ml / 2 x 600 ml
- Pail 2 x 25 kg / 2 x 35 kg
- On request

### APPLICATION EXAMPLES

- Thermal link of:
- FPBGA
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications / Telecommunication / Multimedia / Industrial PCs

PROPERTY	UNIT	A Part	B Part
<b>MATERIAL</b>			
Colour		Yellow	White
Density @ 25 °C	g/cm <sup>3</sup>	1.9	1.9
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	52	52
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	260	260
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	260	260
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 120	> 120
Curing Time @ 25 °C / 100 °C		< 24h / 15 - 30 min	< 24h / 15 - 30 min
Shelf Life (from Date of Manufacturing, unopened, @ < 35 °C)	Months	6	6
Outgasing <sup>1</sup>	TML / CVCM / WVR %	0.16 / 0.03 / 0.04	0.16 / 0.03 / 0.04
No Paint Wetting Impairment Substances (PWIS) <sup>2</sup>		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity <sup>3</sup>	W/mK	2.0	2.0
Operating Temperature	°C	- 50 to + 150	- 50 to + 150
Dielectric Strength	kV/mm	> 10	> 10
Volume Resistivity	Ohm - cm	1 x 10 <sup>10</sup>	1 x 10 <sup>10</sup>

Measurement technique according to: <sup>1</sup> ASTM E 595, <sup>2</sup> P-VW 3-10.7 57650 Temp. Test, <sup>3</sup> ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Warning: Only A / B part of the same lot number may be processed together.



# 2-PART SILICONE GAP FILLER TDG-T-SI-2C

dispensable / 2 parts / Low Volatile Siloxanes (LV) / Form-in-Place

TDG-T-SI-2C is a 2-part dispensable low volatile LV silicone gap filler which is filled with thermally conductive fillers. After curing under heat the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for compensating extreme tolerances and spaces at non-coplanar systems. Its thixotropic behaviour allows for a definite placement and cure-in-place. It has a natural low level tack that enhances a good thermal contact. Due to its negligible and controlled volatile content it is suited for environments where volatile silicones and paint wetting impairment are critical.



## PROPERTIES

- Dispensable 2-part silicone
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 3.0 W/mK
- Remains elastic after polymerisation
- Zero stress on components
- Heat accelerated curing
- Shock absorbing

## AVAILABILITY

- Cartridges 2 x 25 ml / 2 x 100 ml / 2 x 200 ml / 2 x 600 ml
- Pail 2 x 25 kg / 2 x 35 kg
- On request

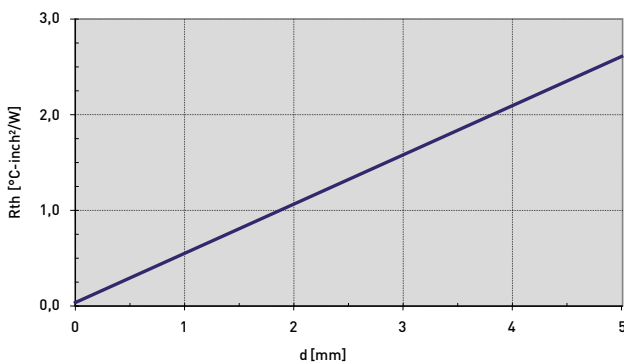
## APPLICATION EXAMPLES

Thermal link of:

- FPBGA
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications / Telecommunication / Multimedia / Industrial PCs

PROPERTY	UNIT	A Part	B Part
<b>MATERIAL</b>			
		Silicone	Silicone
Colour		Blue	White
Density @ 25 °C	g/cm <sup>3</sup>	2.75	2.75
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	55	55
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	290	260
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	275	275
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 120	> 120
Curing Time @ 25 °C / 100 °C		< 15h / 15 - 30 min	< 15h / 15 - 30 min
Shelf Life (from Date of Manufacturing, unopened, @ < 35 °C)	Months	6	6
Outgasing <sup>1</sup>	TML / CVCM / WVR %	0.07 / 0.02 / 0.02	0.07 / 0.02 / 0.02
No Paint Wetting Impairment Substances (PWIS) <sup>2</sup>		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity <sup>3</sup>	W/mK	3.0	3.0
Operating Temperature	°C	- 50 to + 150	- 50 to + 150
Dielectric Strength	kV/mm	> 10	> 10
Volume Resistivity	Ohm - cm	1 x 10 <sup>10</sup>	1 x 10 <sup>10</sup>

Measurement technique according to: <sup>1</sup>ASTM E 595, <sup>2</sup>P-VW 3-10.7 57650 Temp. Test, <sup>3</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Warning: Only A / B part of the same lot number may be processed together.



# 2-PART SILICONE GAP FILLER TDG-U-SI-2C

dispensable / 2 parts / Low Volatile Siloxanes (LV) / Form-in-Place

TDG-U-SI-2C is a 2-part dispensable low volatile LV silicone gap filler which is filled with thermally conductive fillers. After curing under heat the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for compensating extreme tolerances and spaces at non-coplanar systems. Its thixotropic behaviour allows for a definite placement and cure-in-place. It has a natural low level tack that enhances a good thermal contact. Due to its negligible and controlled volatile content it is suited for environments where volatile silicones and paint wetting impairment are critical.



## PROPERTIES

- Dispensable 2-part silicone
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 3.6 W/mK
- Remains elastic after polymerisation
- Zero stress on components
- Heat accelerated curing
- Shock absorbing

## AVAILABILITY

- Cartridges 2 x 25 ml / 2 x 100 ml / 2 x 200 ml / 2 x 600 ml
- Pail 2 x 25 kg / 2 x 35 kg
- On request
- Optional with glass beads

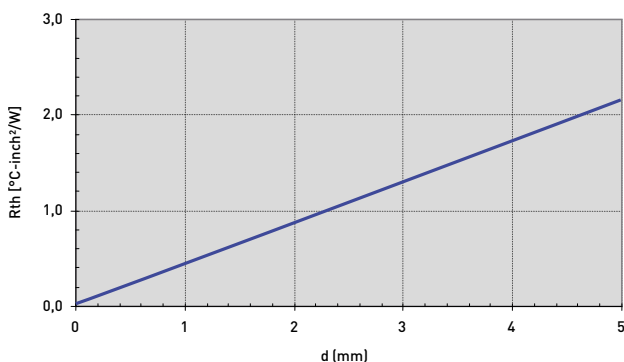
## APPLICATION EXAMPLES

Thermal link of:

- FPBGA
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications / Telecommunication / Multimedia / Industrial PCs

PROPERTY	UNIT	A Part	B Part
<b>MATERIAL</b>			
Colour		Light Blue	White
Density @ 25 °C	g/cm <sup>3</sup>	2.85	2.85
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	38	38
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	220	190
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	260	260
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 100	> 100
Curing Time @ 25 °C / 100 °C		< 15h / 15 - 30 min	< 15h / 15 - 30 min
Shelf Life (from Date of Manufacturing, unopened, @ < 35 °C)	Months	6	6
Outgasing <sup>1</sup>	TML / CVCM / WVR %	0.07 / 0.02 / 0.04	0.07 / 0.02 / 0.04
No Paint Wetting Impairment Substances (PWIS) <sup>2</sup>		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity <sup>3</sup>	W/mK	3.6	3.6
Operating Temperature	°C	- 50 to + 150	- 50 to + 150
Dielectric Strength	kV/mm	> 10	> 10
Volume Resistivity	Ohm - cm	1 x 10 <sup>10</sup>	1 x 10 <sup>10</sup>

Measurement technique according to: <sup>1</sup>ASTM E 595, <sup>2</sup>P-VW 3-10.7 57650 Temp. Test, <sup>3</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Warning: Only A / B part of the same lot number may be processed together.



# 2-PART SILICONE GAP FILLER TDG-W-SI-2C

dispensable / 2 parts / Low Volatile Siloxanes (LV) / Form-in-Place

TDG-W-SI-2C is a 2-part dispensable low volatile LV silicone gap filler which is filled with thermally conductive fillers. After curing under heat the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for compensating extreme tolerances and spaces at non-coplanar systems. Its thixotropic behaviour allows for a definite placement and cure-in-place. It has a natural low level tack that enhances a good thermal contact. Due to its negligible and controlled volatile content it is suited for environments where volatile silicones and paint wetting impairment are critical.



## PROPERTIES

- Dispensable 2-part silicone
- Low volatile siloxane content (LV)
- No paint wetting impairment
- Thermal conductivity: 4.5 W/mK
- Remains elastic after polymerisation
- Zero stress on components
- Heat accelerated curing
- Shock absorbing

## AVAILABILITY

- Cartridges 2 x 25 ml / 2 x 100 ml / 2 x 200 ml / 2 x 600 ml
- Pail 2 x 25 kg
- On request

## APPLICATION EXAMPLES

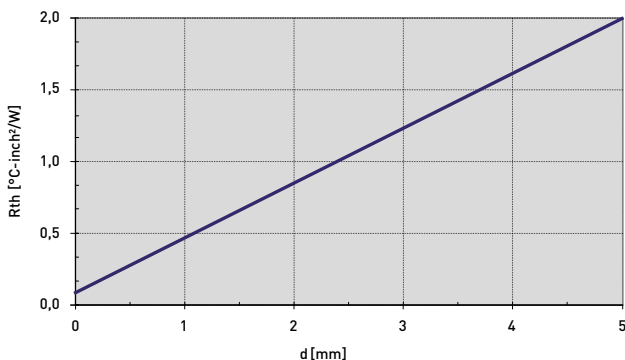
Thermal link of:

- FPBGA
- Capacitors
- Heat Pipes
- BGA

For use in Automotive applications / Telecommunication / Multimedia / Industrial PCs

PROPERTY	UNIT	A Part	B Part
<b>MATERIAL</b>		Silicone	Silicone
Colour		Pink	White
Density @ 25 °C	g/cm <sup>3</sup>	3.15	3.15
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	55	55
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	250	250
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	250	250
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 120	> 120
Curing Time @ 25 °C / 100 °C		< 24 h / 15-30 min	< 24 h / 15-30 min
Shelf Life (from Date of Manufacturing, unopened, @ < 35 °C)	Months	6	6
No Paint Wetting Impairment Substances (PWIS) <sup>1</sup>		Passed	Passed
Flammability	UL 94	V0 (≥ 0.15 mm)	V0 (≥ 0.15 mm)
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity <sup>2</sup>	W/mK	4.5	4.5
Operating Temperature	°C	- 40 to + 150	- 40 to + 150
Dielectric Strength	kV/mm	> 10	> 10
Volume Resistivity	Ohm - cm	> 1 x 10 <sup>10</sup>	> 1 x 10 <sup>10</sup>

Measurement technique according to: <sup>1</sup>P-VW 3-10.7 57650 Temp. Test, <sup>2</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Warning: Only A / B part of the same lot number may be processed together.



# 2-PART SILICONE GAP FILLER TDG-Y-SI-2C

dispensable / 2 parts / Low Volatile Siloxanes (LV) / Form-in-Place

TDG-Y-SI-2C is a 2-part dispensable low volatile LV silicone gap filler which is filled with thermally conductive fillers. After curing under heat the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for compensating extreme tolerances and spaces at non-coplanar systems. Its thixotropic behaviour allows for a definite placement and cure-in-place. It has a natural low level tack that enhances a good thermal contact. Due to its negligible and controlled volatile content it is suited for environments where volatile silicones are critical.



## PROPERTIES

- Dispensable 2-part silicone
- Low volatile siloxane content (LV)
- Thermal conductivity: 6 W/mK
- Remains elastic after polymerisation
- Zero stress on components
- Heat accelerated curing
- Shock absorbing

## AVAILABILITY

- Cartridges 2 x 25 ml / 2 x 100 ml / 2 x 200 ml / 2 x 330 ml / 2 x 600 ml
- Pail 2 x 25 kg
- On request

## APPLICATION EXAMPLES

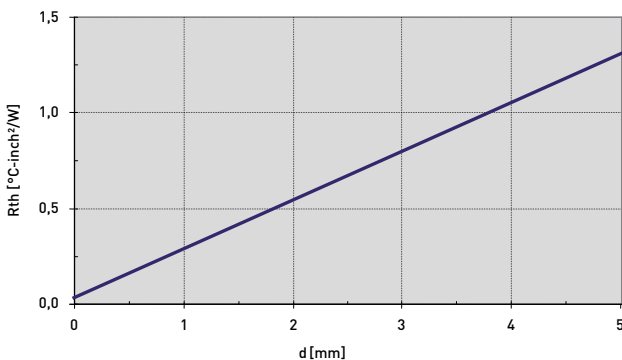
Thermal link of:

- FPBGA
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications / Telecommunication / Multimedia / Industrial PCs

PROPERTY	UNIT	A Part	B Part
<b>MATERIAL</b>		Silicone	Silicone
Colour		Dark Blue	White
Density @ 25 °C	g/cm <sup>3</sup>	3.4	3.4
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	50	50
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	350	350
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	350	350
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 60	> 60
Curing Time @ 25 °C		< 24 h	< 24 h
Shelf Life (from Date of Manufacturing, unopened, @ < 35 °C)	Months	6	6
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity <sup>1</sup>	W/mK	6	6
Operating Temperature	°C	- 40 to + 150	- 40 to + 150
Dielectric Strength	kV/mm	≥ 10	≥ 10
Volume Resistivity	Ohm - cm	≥ 1 x 10 <sup>10</sup>	> 1 x 10 <sup>10</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

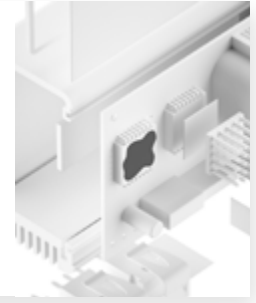
Warning: Only A / B part of the same lot number may be processed together.



# SILICONE GAP FILLER / PUTTY TGL-W-SI

dispensable

TGL-W-SI is an electrically insulating thermally conductive, highly viscous dispensable form-in-place gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The ready-made compound does not require an additional curing process. Due to the specific formulation and filling with ceramic particles the material has a very high thermal conductivity. After dispensing the viscoplastic material leads to an optimum thermal contact at no pressure. By its use the total thermal resistance is minimised.



## PROPERTIESEN

- Dispensable
- Almost zero pressure at assembly due to viscoplasticity
- Thermal conductivity: 5.5 W/mK
- Ready-made, no additional curing required

## AVAILABILITY

- Cartridge 30 ml
- Tube 250 g
- Pail 2 kg
- Others on request

## APPLICATION EXAMPLES

Thermal link of:

- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGL-W-SI
<b>MATERIAL</b>		
Colour		Ceramic filled silicone compound
Density	g/cm <sup>3</sup>	Grey
Penetration	mm/10	3.1
RoHS Conformity	2015 / 863 / EU	290
		Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	5.5
Operating Temperature Range	°C	- 40 to + 150
<b>ELECTRICAL</b>		
Dielectric Strength	kV / mm	10
Volume Resistance	Ohm - cm	1.0 x 10 <sup>13</sup>

All data without warranty and subject to change. Please contact us for further data and information.

# SILICONE-FREE GAP FILLER PAD TGF-R-NS

siloxane-free, soft acrylate

TGF-R-NS is an electrically insulating highly thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. Through its softness the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Silicone-free acrylate
- No emission of volatile siloxanes
- Soft and compliant
- Thermal conductivity: 3.0 W/mK
- Shock absorbing
- Easy mounting through self-tackiness

### AVAILABILITY

- Sheet 400 x 200 mm
- Double-side tacky (TGF-RXXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

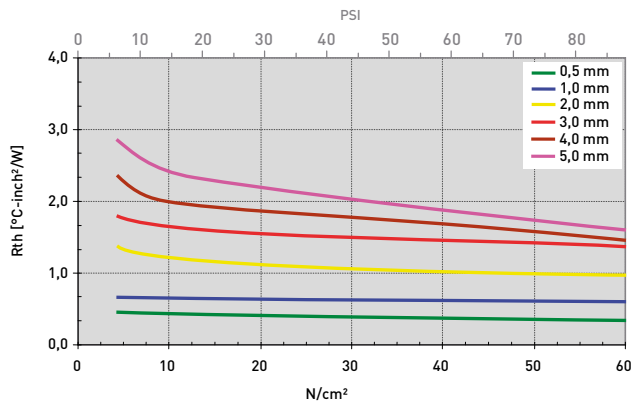
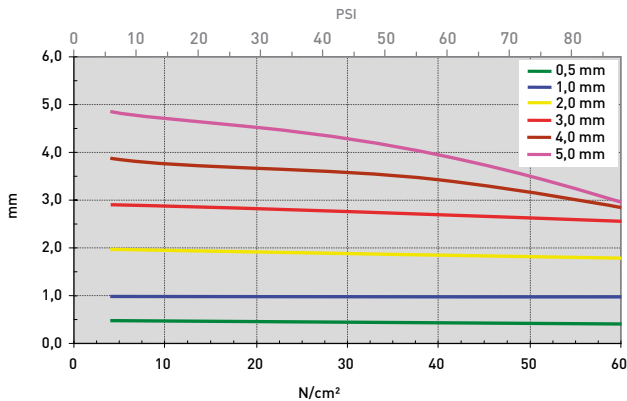
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-R0500-NS	TGF-R1000-NS	TGF-R2000-NS	TGF-R3000-NS	TGF-R5000-NS
<b>MATERIAL</b>						
		Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer
Colour		White	White	White	White	White
Specific Gravity	g/cm <sup>3</sup>	2.9	2.9	2.9	2.9	2.9
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30	5.0 ±0.50
Hardness	Shore 00	70	70	70	70	70
Flammability (Equivalent)	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.38 [0.44]	0.63 [0.97]	1.03 [1.85]	1.47 [2.71]	1.87 [3.96]
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.42 [0.46]	0.64 [0.98]	1.12 [1.91]	1.57 [2.81]	2.18 [4.53]
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.45 [0.47]	0.65 [0.99]	1.25 [1.96]	1.72 [2.88]	2.60 [4.79]
Thermal Conductivity <sup>1</sup>	W/mK	3.0	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 40 to +130	- 40 to +130	- 40 to +130	- 40 to +130	- 40 to +130
<b>ELECTRICAL</b>						
Dielectric Strength	kV / mm	7.8	7.8	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 <sup>13</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-V-NS

siloxane-free, soft acrylate

TGF-V-NS is an electrically insulating extremely thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has an extremely high thermal conductivity. Through its softness the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material is double-side tacky or alternatively one-side tacky through lamination with a transparent film.



## PROPERTIES

- Silicone-free acrylate
- No emission of volatile siloxanes
- Soft and compliant
- Thermal conductivity: 5 W/mK
- Shock absorbing
- Easy mounting through self-tackiness
- One or two-side self tacky

## AVAILABILITY

- Sheet 510 x 210 mm
- Double-side tacky (TGF-VXXXX-NS)  $\geq 1.0$  mm
- Tacky on one side by film laminate (TGF-VXXXX-NS-F)  $\geq 0.5$  mm
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

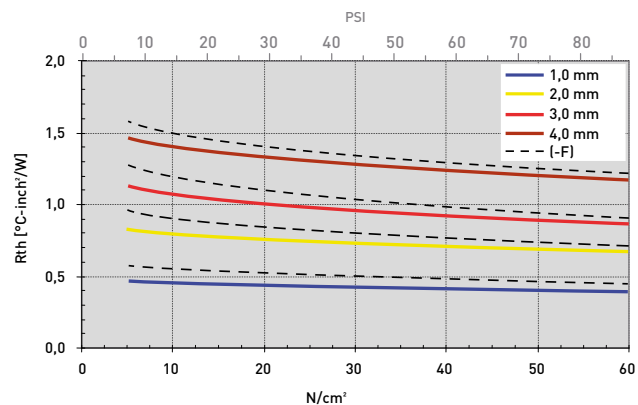
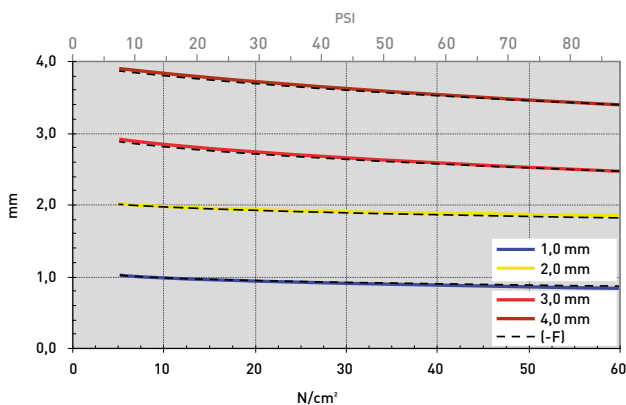
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-V1000-NS	TGF-V2000-NS	TGF-V3000-NS	TGF-V4000-NS
<b>MATERIAL</b>					
		Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer
Colour		Light green	Light green	Light green	Light green
Specific Gravity	g/cm <sup>3</sup>	2.89	2.89	2.89	2.89
Thickness	mm	1.0 $\pm 0.10$	2.0 $\pm 0.20$	3.0 $\pm 0.30$	4.0 $\pm 0.40$
Hardness	Shore 00	64	64	64	64
Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.42 (0.89)	0.73 (1.89)	0.93 (2.57)	1.25 (3.50)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.45 (0.93)	0.77 (1.93)	1.01 (2.72)	1.33 (3.70)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.47 (0.96)	0.83 (1.97)	1.11 (2.86)	1.44 (3.90)
Thermal Conductivity <sup>1</sup>	W/mK	5	5	5	5
Operating Temperature Range	°C	- 40 to + 125	- 40 to + 125	- 40 to + 125	- 40 to + 125
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	1.2	1.2	1.2	1.2
Volume Resistivity	Ohm - cm	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>
Dielectric Constant	@ 1 MHz	18.2	18.2	18.2	18.2

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-W-NS

siloxane-free, soft acrylate

TGF-W-NS is an electrically insulating extremely thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has an extremely high thermal conductivity. Through its softness the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



### PROPERTIES

- Silicone-free acrylate
- No emission of volatile siloxanes
- Soft and compliant
- Thermal conductivity: 6.0 W/mK
- Shock absorbing
- Easy mounting through self-tackiness

### AVAILABILITY

- Sheet 400 x 200 mm
- Double-side tacky (TGF-WXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

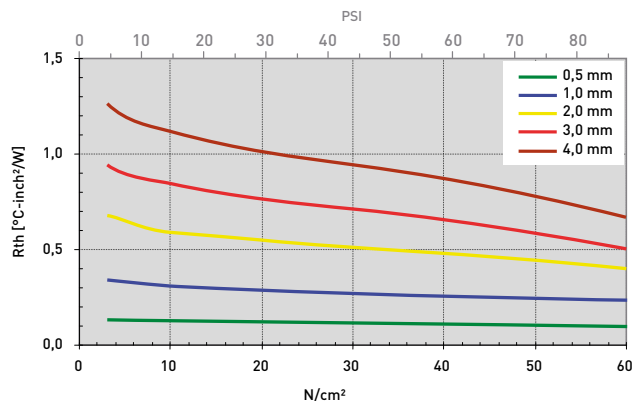
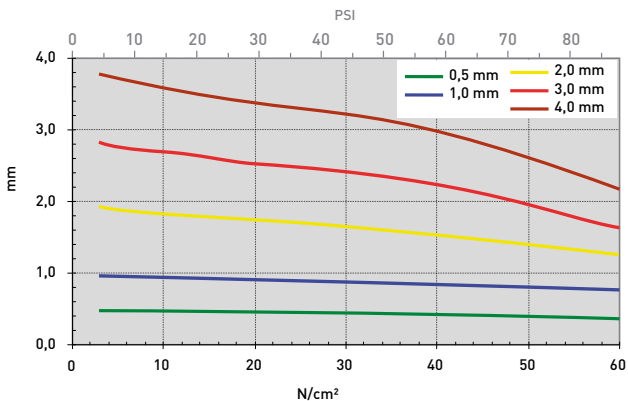
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-W0500-NS	TGF-W1000-NS	TGF-W2000-NS	TGF-W3000-NS	TGF-W4000-NS
<b>MATERIAL</b>						
		Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer
Colour		White	White	White	White	White
Specific Gravity	g/cm <sup>3</sup>	3.1	3.1	3.1	3.1	3.1
Thickness	mm	0.5 ±0.10	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30	4.0 ±0.40
Hardness	Shore 00	70	70	70	70	70
Flammability (Equivalent)	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
<b>THERMAL</b>						
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.11 (0.43)	0.26 (0.84)	0.48 (1.54)	0.66 (2.25)	0.88 (3.00)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.12 (0.46)	0.28 (0.90)	0.55 (1.75)	0.76 (2.55)	1.02 (3.39)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.13 (0.48)	0.32 (0.95)	0.61 (1.85)	0.87 (2.75)	1.16 (3.66)
Thermal Conductivity <sup>1</sup>	W/mK	6.0	6.0	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to +130	- 40 to +130	- 40 to +130	- 40 to +130	- 40 to +130
<b>ELECTRICAL</b>						
Dielectric Strength	kV / mm	7.8	7.8	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>	1 x 10 <sup>13</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm / 4.5 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-Y-NS

siloxane-free, soft acrylate

TGF-Y-NS is an electrically insulating extremely thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has an extremely high thermal conductivity. Through its softness the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



## PROPERTIES

- Silicone-free acrylate
- No emission of volatile siloxanes
- Soft and compliant
- Thermal conductivity: 8.0 W/mK
- Shock absorbing
- Easy mounting through self-tackiness

## AVAILABILITY

- Sheet 400 x 200 mm
- Double-side tacky (TGF-YXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

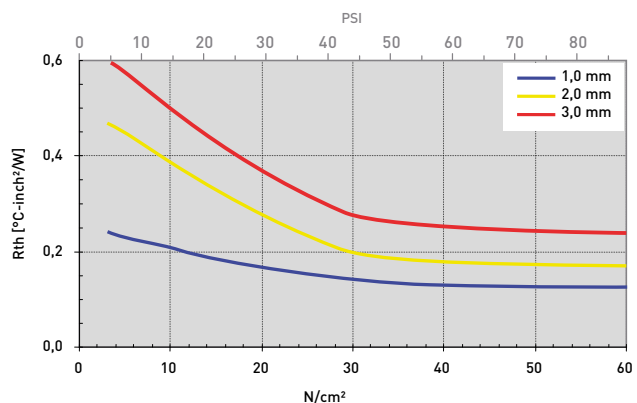
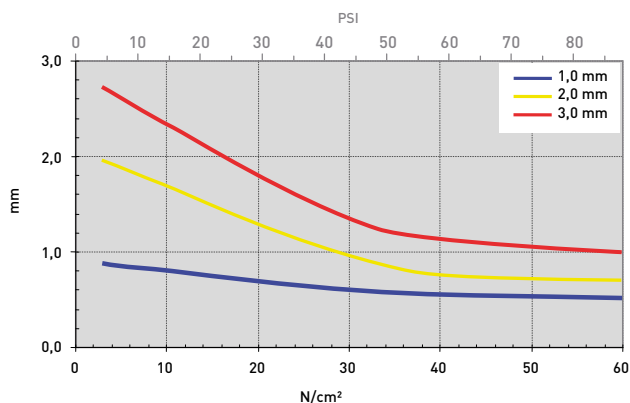
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-Y1000-NS	TGF-Y2000-NS	TGF-Y3000-NS
<b>MATERIAL</b>				
		Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer
Colour		White	White	White
Specific Gravity	g/cm <sup>3</sup>	3.4	3.4	3.4
Thickness	mm	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	70	70	70
Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.13 (0.55)	0.18 (0.75)	0.25 (1.13)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.17 (0.72)	0.28 (1.30)	0.37 (1.80)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.22 (0.83)	0.43 (1.80)	0.55 (2.52)
Thermal Conductivity <sup>1</sup>	W/mK	8.0	8.0	8.0
Operating Temperature Range	°C	- 40 to +120	- 40 to +120	- 40 to +120
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>	1 x 10 <sup>11</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm / 4.5 mm / 5.0 mm

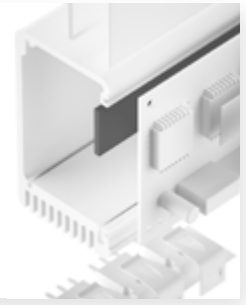
mm vs. N/cm<sup>2</sup> (PSI) / R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-GUS-NS

siloxane-free, extremely elastic TPE

TGF-GUS-NS is an electrically insulating thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The TPE polymer based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. Through its extreme softness the material perfectly mates to irregular surfaces thus filling gaps and operates at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly.



GAP FILLER

### PROPERTIES

- Silicone-free TPE polymer
- Extremely soft and compliant
- Thermal conductivity: 1.5 W/mK
- Operates at very low pressure
- Shock absorbing
- Easy mounting through self tackiness
- Two-side self-tacky

### AVAILABILITY

- Sheet 300 x 200 mm
- Tacky on both sides (TGF-GUSXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

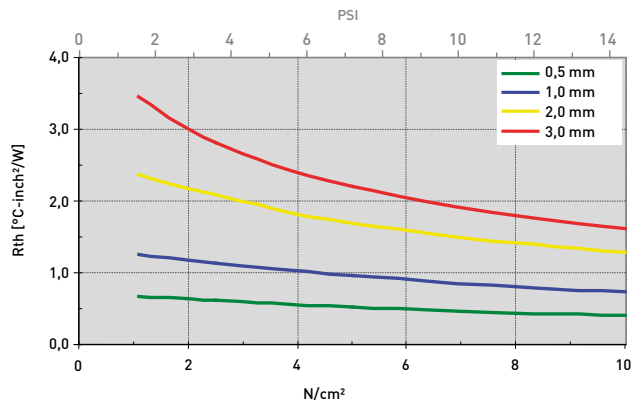
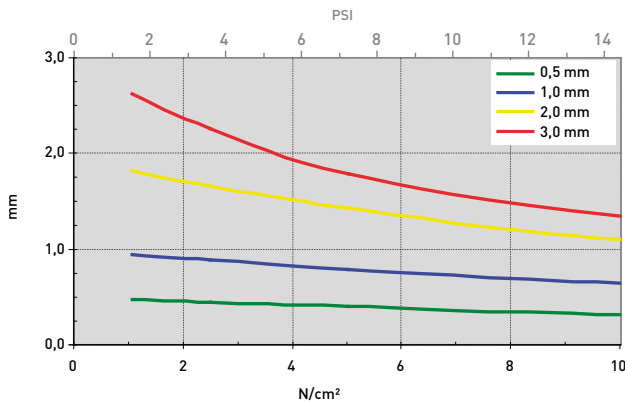
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-GUS0500-NS	TGF-GUS1000-NS	TGF-GUS2000-NS
<b>MATERIAL</b>				
		Ceramic filled silicone-free TPE elastomer	Ceramic filled , silicone-free TPE elastomer	Ceramic filled silicone-free TPE elastomer
Colour		Black	Black	Black
Thickness	mm	0.5 <sup>+0.20</sup> <sub>-0.10</sub>	1.0 <sup>+0.20</sup> <sub>-0.10</sub>	2.0 <sup>+0.20</sup> <sub>-0.10</sub>
Specific Gravity	g/cm <sup>3</sup>	1.7	1.7	1.7
Hardness	Shore 00	25	25	25
UL Flammability (Equivalent)	UL 94	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.42 (0.32)	0.74 (0.63)	1.30 (1.11)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.54 (0.39)	0.98 (0.78)	1.70 (1.44)
Resistance <sup>1</sup> @ 3 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.64 (0.45)	1.19 (0.90)	2.20 (1.72)
Thermal Conductivity	W/mK	1.5	1.5	1.5
Operating Temperature Range	°C	- 40 to + 120	- 40 to + 120	- 40 to + 120
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	> 10	> 10	> 10
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>10</sup>	1.0 x 10 <sup>10</sup>	> 1.0 x 10 <sup>10</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm / 4.5 mm / 5.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-IXS-NS

siloxane-free, extremely soft acrylate

TGF-IXS-NS is an electrically insulating thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. Through its extreme softness the material perfectly mates to irregular surfaces thus filling gaps and operates at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material is one-side tacky through lamination with a transparent film.



## PROPERTIES

- Multilayer silicone-free acrylate: Soft-Ultrasoft-Film
- No emission of volatile siloxanes
- Extremely soft and compliant
- Thermal conductivity: 2 W/mK
- Operates at very low pressure
- Shock absorbing
- Easy mounting through self tackiness
- One-side self-tacky

## AVAILABILITY

- Sheet 525 x 210 mm
- Tacky on one side by film laminate (TGF-IXSXXX-NS-F)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

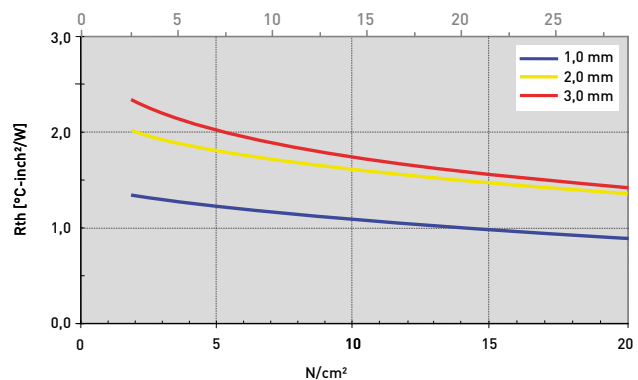
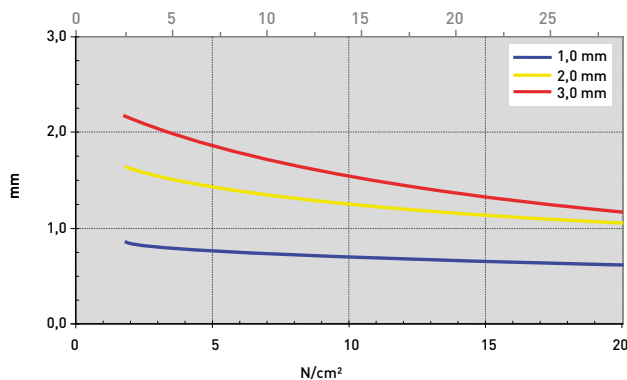
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-IXS1000-NS-F	TGF-IXS2000-NS-F	TGF-IXS3000-NS-F
<b>MATERIAL</b>				
		Ceramic filled multilayer silicone-free acrylic elastomer	Ceramic filled multilayer silicone-free acrylic elastomer	Ceramic filled multilayer silicone-free acrylic elastomer
Colour		Dark green / White	Dark green / White	Dark green / White
Thickness	mm	1.0 ±0.1	2.0 ±0.2	3.0 ±0.3
Hardness (White layer)	Shore 00	27	27	27
UL Flammability	UL 94	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.07 (0.70)	1.60 (1.25)	1.70 (1.52)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.22 (0.74)	1.78 (1.40)	2.20 (1.85)
Resistance <sup>1</sup> @ 3 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	1.32 (0.83)	2.00 (1.60)	2.30 (2.13)
Thermal Conductivity <sup>1</sup>	W/mK	2	2	2
Operating Temperature Range	°C	- 40 to + 125	- 40 to + 125	- 40 to + 125
<b>ELECTRICAL</b>				
Dielectric Strength	kV / mm	2.0	2.0	2.0
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	> 1.0 x 10 <sup>11</sup>

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / 6.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-NSS-NS

siloxane-free, very soft acrylate

TGF-NSS-NS is an electrically insulating thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The acrylate based elastomer does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. Through its extraordinary softness the material perfectly mates to irregular surfaces thus filling gaps and operates at very low pressure. By its use the total thermal resistance is minimised. The natural tackiness of the material allows for an easy and reliable pre-assembly. The material is double-side tacky or alternatively one-side tacky through lamination with a transparent film.



GAP FILLER

### PROPERTIES

- Silicone-free acrylate
- No emission of volatile siloxanes
- Extremely soft and compliant
- Thermal conductivity: 2.5 W/mK
- Operates at very low pressure
- Shock absorbing
- Easy mounting through self tackiness
- One-side self-tacky

### AVAILABILITY

- Sheet 510 x 210 mm
- Tacky on both sides (TGF-NSSXXX-NS) ≥ 2.0 mm
- Tacky on one side by film laminate (TGF-NSSXXX-NS-F)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

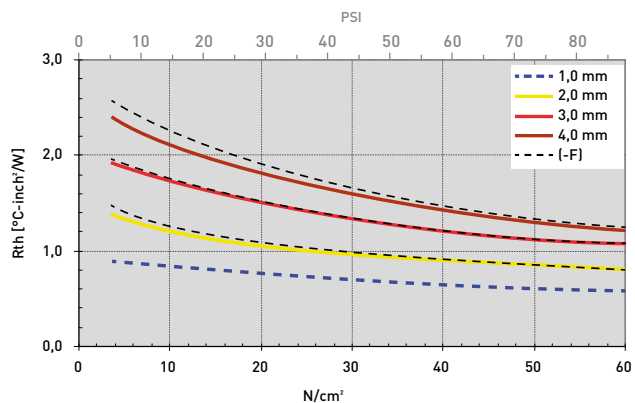
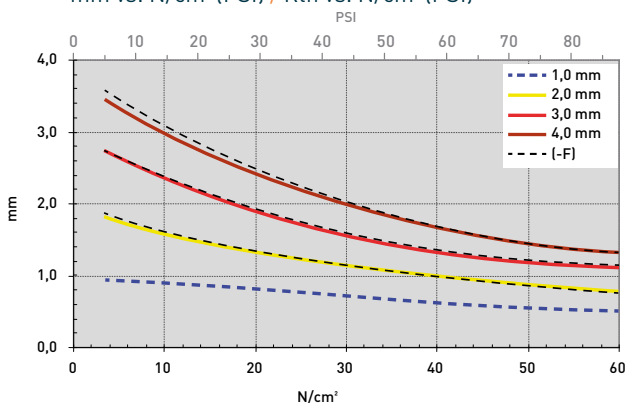
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-NSS1000-NS-F	TGF-NSS2000-NS	TGF-NSS3000-NS	TGF-NSS4000-NS
<b>MATERIAL</b>					
		Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer	Ceramic filled silicone-free acrylic elastomer
Colour		Brown	Brown	Brown	Brown
Thickness	mm	1.0 <sup>+0.10</sup>	2.0 <sup>+0.20</sup>	3.0 <sup>+0.30</sup>	4.0 <sup>+0.40</sup>
Specific Gravity	g/cm <sup>3</sup>	2.33	2.33	2.33	2.33
Hardness	Shore 00	47	47	47	47
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 60 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.60 (0.62)	0.92 (0.99)	1.19 (1.32)	1.41 (1.64)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.67 (0.80)	1.05 (1.33)	1.51 (1.90)	1.81 (2.41)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.80 (0.91)	1.28 (1.68)	1.79 (2.50)	2.20 (3.20)
Thermal Conductivity <sup>1</sup>	W/mK	2.5	2.5	2.5	2.5
Operating Temperature Range	°C	- 40 to + 125	- 40 to + 125	- 40 to + 125	- 40 to + 125
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	2.1	1.9	1.9	1.9
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>	1.0 x 10 <sup>11</sup>
Dielectric Constant	@ 1 MHz	18.2	19.6	19.6	19.6

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 3.5 mm / 4.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-XP-NS

siloxane-free, plastic

TGF-XP-NS is an electrically insulating extremely thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The butadiene elastomer as base does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has an extremely high thermal conductivity. Through its softness and plasticity the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised.



## PROPERTIES

- Silicone-free
- No emission of siloxanes through silicone-freeness
- Soft and compliant
- Thermal conductivity: 7 W/mK

## AVAILABILITY

- Sheet 100 x 100 mm
- Double-side tacky (TGF-XPXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

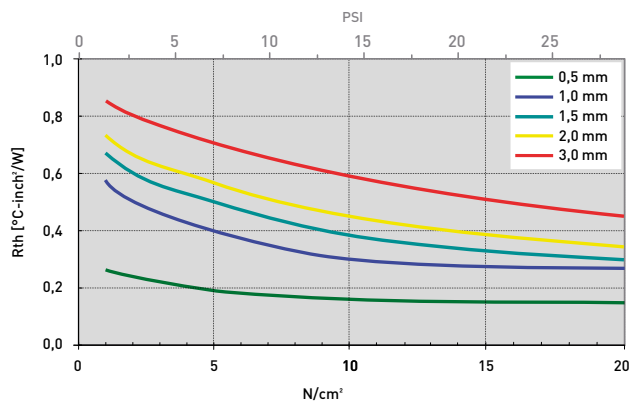
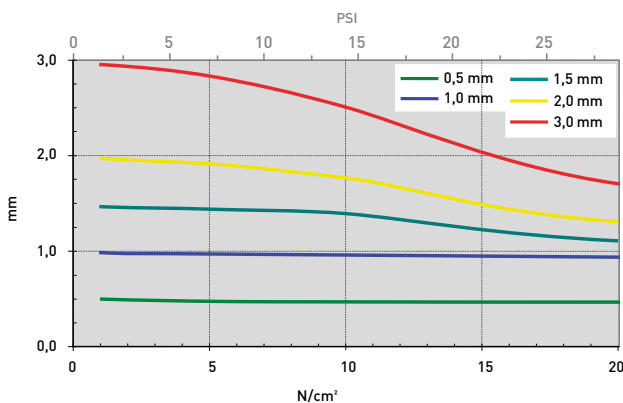
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-XP0500-NS	TGF-XP1000-NS	TGF-XP2000-NS	TGF-XP3000-NS
<b>MATERIAL</b>					
		Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer
Colour		Light Grey	Light Grey	Light Grey	Light Grey
Thickness	mm	0.5 ±0.20	1.0 ±0.20	2.0 ±0.20	3.0 ±0.20
Specific Gravity	g/cm <sup>3</sup>	2.0	2.0	2.0	2.0
Hardness	Shore 00	70	70	70	70
Flammability (Equivalent)	UL 94	HB	HB	HB	HB
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.15 (0.45)	0.27 (0.94)	0.35 (1.31)	0.45 (1.70)
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.17 (0.47)	0.30 (0.95)	0.45 (1.77)	0.59 (2.51)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.19 (0.48)	0.40 (0.97)	0.57 (1.91)	0.71 (2.84)
Thermal Conductivity <sup>1</sup>	W/mK	7	7	7	7
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	2.0	2.0	2.0	2.0
Dielectric Constant	@ 1 MHz	4.8	4.8	4.8	4.8

Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)



# SILICONE-FREE GAP FILLER PAD TGF-ZP-NS

siloxane-free, plastic

TGF-ZP-NS is an electrically insulating extremely thermally conductive silicone-free gap filler. It is ideal for use in applications where thermal transfer over large gaps caused e.g. by big tolerances or different stack up heights must be achieved. The butadiene elastomer as base does not contain any volatile siloxanes which are inevitably emitted by silicones. Due to the specific formulation and filling with ceramic particles the material has an extremely high thermal conductivity. Through its softness and plasticity the material perfectly mates to irregular surfaces thus filling gaps and operates at low pressure. By its use the total thermal resistance is minimised.



GAP FILLER

### PROPERTIES

- Silicone-free
- No emission of siloxanes through silicone-freeness
- Soft and compliant
- Thermal conductivity: 10 W/mK

### AVAILABILITY

- Sheet 100 x 100 mm
- Double-side tacky (TGF-ZPXXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

### APPLICATION EXAMPLES

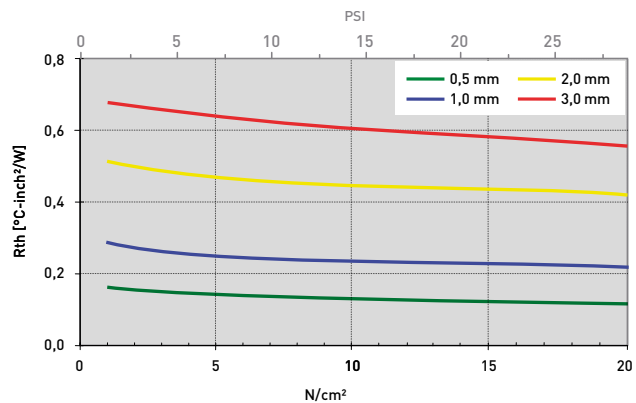
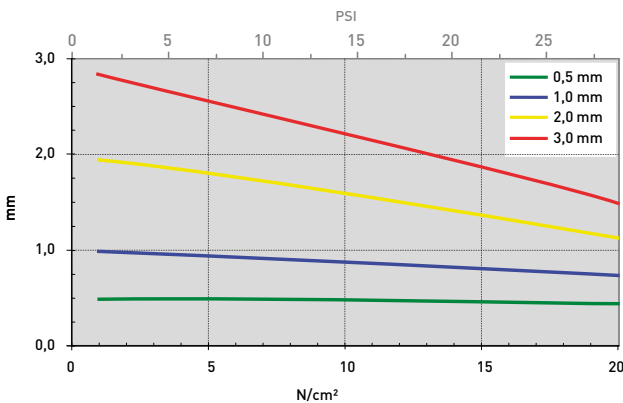
- Thermal link of:
- SMD packages
  - Through-hole vias
  - RDRAMs memory modules
  - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-ZP0500-NS	TGF-ZP1000-NS	TGF-ZP2000-NS	TGF-ZP3000-NS
<b>MATERIAL</b>					
		Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer	Ceramic filled silicone-free elastomer
Colour		White	White	White	White
Thickness	mm	0.5 ±0.20	1.0 ±0.20	2.0 ±0.20	3.0 ±0.20
Specific Gravity	g/cm <sup>3</sup>	1.6	1.6	1.6	1.6
Hardness	Shore 00	70	70	70	70
Flammability (Equivalent)	UL 94	HB	HB	HB	HB
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.12 (0.45)	0.22 (0.74)	0.43 (1.13)	0.56 (1.50)
Resistance <sup>1</sup> @ 15 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.13 (0.48)	0.24 (0.89)	0.45 (1.60)	0.61 (2.23)
Resistance <sup>1</sup> @ 7 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.14 (0.49)	0.25 (0.95)	0.48 (1.82)	0.65 (2.56)
Thermal Conductivity <sup>1</sup>	W/mK	10	10	10	10
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150
<b>ELECTRICAL</b>					
Dielectric Strength	kV / mm	2.0	2.0	2.0	2.0
Dielectric Constant	@ 1 MHz	3.2	3.2	3.2	3.2

Measurement technique according to: <sup>1</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.5 mm / 1.0 mm / 1.5 mm / 2.0 mm / 2.5 mm / 3.0 mm / 4.0 mm

mm vs. N/cm<sup>2</sup> (PSI) / Rth vs. N/cm<sup>2</sup> (PSI)





## 2 FOILS & FILMS

/ SILICONE FOILS / INSULATING FILM  
SILICONE COATED



# SILICONE FOIL TFO-D-SI

fibreglass reinforced, highly dielectric

TFO-D-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The fibreglass reinforcement provides for an outstanding mechanic stability and cut-through resistance as well as easy handling. For an easy and reliable pre-assembly the interface material is available with self tackiness on one side with no need for an additional adhesive coating or with a one side adhesive coating.



## PROPERTIES

- Thermal conductivity: 1.2 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Very high dielectric strength
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 300 x 1000 mm
- Roll 300 mm x 50 m
- Non tacky (TFO-DXXX-SI)
- Self tacky on one side without adhesive coating (TFO-DXXX-SI-A0)
- One side adhesive (TFO-DXXX-SI-A1)
- Die cut parts
- Kiss cut parts on roll
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

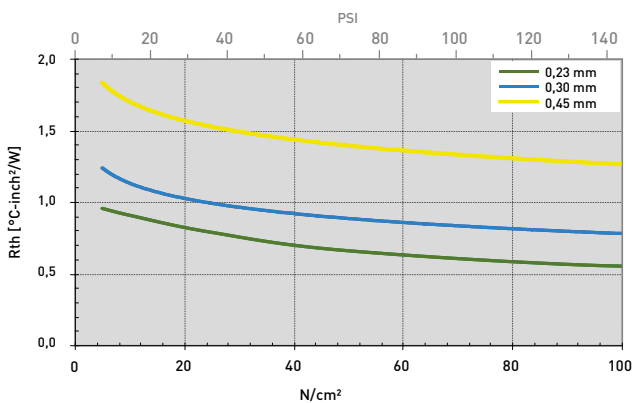
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTIES	UNIT	TFO-D230-SI	TFO-D300-SI	TFO-D450-SI
<b>MATERIAL</b>				
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.23 ±0.05	0.3 ±0.05	0.45 ±0.05
Tensile Strength <sup>1</sup>	kpsi	5.0	4.1	2.9
UL Flammability	UL 94	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.55	0.75	1.25
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.79	1.05	1.55
Thermal Conductivity	W/mK	1.2	1.2	1.2
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	5.5	> 6.0	> 6.0
Volume Resistivity	Ohm - cm	> 1.0 x 10 <sup>11</sup>	> 1.0 x 10 <sup>11</sup>	> 1.0 x 10 <sup>11</sup>
Dielectric Constant	@ 1 MHz	6.0	6.0	6.0

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.23 mm / 0.30 mm / 0.45 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-G-SI

fibreglass reinforced, highly dielectric

TFO-G-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The fibreglass reinforcement provides for an outstanding mechanic stability and cut-through resistance as well as easy handling. For an easy and reliable pre-assembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 1.6 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Very high dielectric strength
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet
- Roll 290 mm x 50 m
- Non tacky (TFO-GXXX-SI)
- Tacky on one side (TFO-GXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet or roll

## APPLICATION EXAMPLES

Thermal link of:

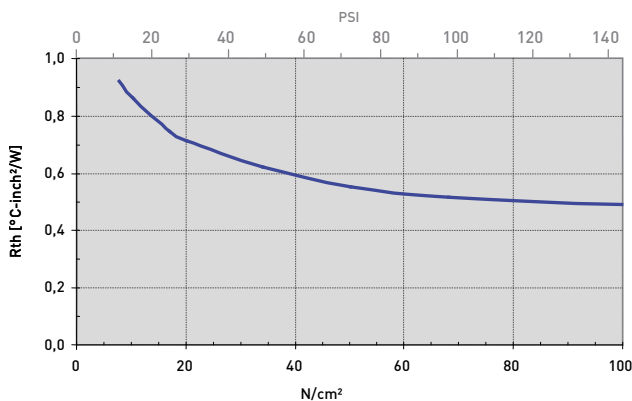
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-G230-SI
<b>MATERIAL</b>		
		Ceramic filled silicone
Colour		Pink
Reinforcement		Fibreglass
Thickness	mm	0.23 <sup>+0.023</sup> / <sub>-0.002</sub>
Tensile Strength <sup>1</sup>	kpsi	2.9
UL Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.49
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.71
Thermal Conductivity	W/mK	1.6
Operating Temperature Range	°C	- 50 to + 180
<b>ELECTRICAL</b>		
Breakdown Voltage <sup>3</sup>	kV AC	5.5
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>11</sup>

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.23 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-J-SI

fibreglass reinforced, highly dielectric

TFO-J-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The fibreglass reinforcement provides for an outstanding mechanic stability and cut-through resistance as well as easy handling. For an easy and reliable pre-assembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 2.0 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Very high dielectric strength
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet
- Roll 300 mm x 50 m (0.20 / 0.30 mm)
- Roll 300 mm x 25 m (0.45 mm)
- Non tacky (TFO-JXXX-SI)
- Tacky on one side (TFO-JXXX-SI-A1)
- Die cut parts
- Kiss cut parts on roll
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

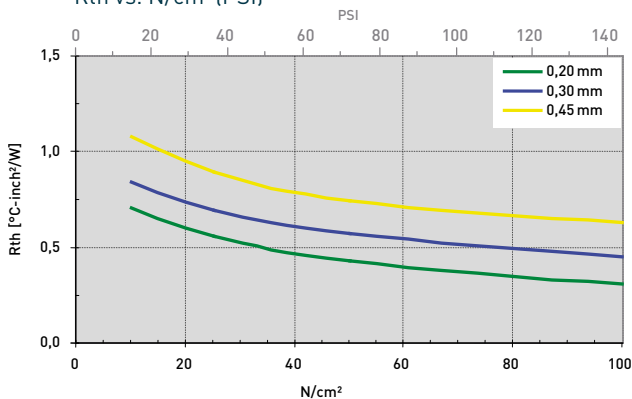
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-J200-SI	TFO-J300-SI	TFO-J450-SI
<b>MATERIAL</b>				
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark Brown	Dark Brown	Dark Brown
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 <sup>±0.05</sup>	0.30 <sup>±0.05</sup>	0.45 <sup>±0.05</sup>
Tensile Strength <sup>1</sup>	kpsi	5.8	4.0	2.9
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.31	0.45	0.63
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.61	0.74	0.96
Thermal Conductivity	W/mK	2.0	2.0	2.0
Operating Temperature Range	°C	-40 to +180	-40 to +180	-40 to +180
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	5.0	7.0	10.0
Volume Resistivity	Ohm - cm	4.2 x 10 <sup>14</sup>	3.5 x 10 <sup>14</sup>	3.8 x 10 <sup>14</sup>
Dielectric Constant	@ 1 MHz	3.8	4.2	4.3

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm / 0.80 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-K-SI

fibreglass reinforced

TFO-K-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a very high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The fibreglass reinforcement provides for an outstanding mechanic stability and cut-through resistance as well as easy handling. For an easy and reliable pre-assembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 2.5 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 320 x 1000 mm
- Roll 320 mm x 50 m
- Non tacky (TFO-K200-SI)
- Tacky on one side (TFO-K200-SI-A1)
- Die cut parts
- Kiss cut parts on roll
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

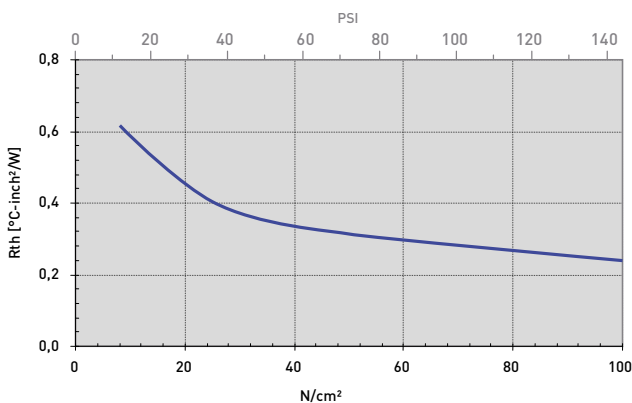
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTIES	UNIT	TFO-K200-SI
<b>MATERIAL</b>		
		Ceramic filled silicone
Colour		Grey
Reinforcement		Fibreglass
Thickness	mm	0.23 ±0.05
Tensile Strength <sup>1</sup>	kpsi	2.9
UL Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.24
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.47
Thermal Conductivity	W/mK	2.5
Operating Temperature Range	°C	- 50 to + 200
<b>ELECTRICAL</b>		
Breakdown Voltage <sup>3</sup>	kV AC	2.0
Volume Resistivity	Ohm - cm	2.0 x 10 <sup>14</sup>
Dielectric Constant	@ 1 MHz	4.0

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thickness: 0.23 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-0-SI

fibreglass reinforced, highly dielectric

TFO-0-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a very high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The fibreglass reinforcement provides for an outstanding mechanic stability and cut-through resistance as well as easy handling. For an easy and reliable pre-assembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 3.0 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Very high dielectric strength
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet
- Roll 300 mm x 50 m (0.20 / 0.30 mm)
- Roll 300 mm x 25 m (0.45 mm)
- Non tacky (TFO-OXXX-SI)
- Tacky on one side (TFO-OXXX-SI-A1)
- Die cut parts
- Kiss cut parts on roll
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

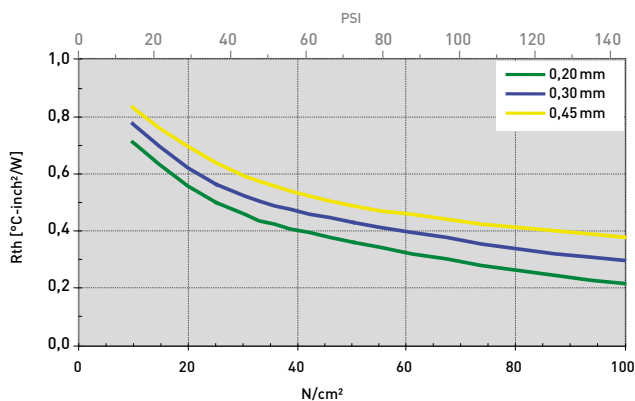
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-0200-SI	TFO-0300-SI	TFO-0450-SI
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 <sup>±0.05</sup>	0.30 <sup>±0.05</sup>	0.45 <sup>±0.05</sup>
Tensile Strength <sup>1</sup>	kpsi	3.3	2.3	1.6
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.22	0.30	0.38
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.55	0.60	0.70
Thermal Conductivity	W/mK	3.0	3.0	3.0
Operating Temperature Range	°C	-40 to +180	-40 to +180	-40 to +180
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	5.0	7.0	8.0
Volume Resistivity	Ohm - cm	9,2 x 10 <sup>13</sup>	8,8 x 10 <sup>13</sup>	3,4 x 10 <sup>12</sup>
Dielectric Constant	@ 1 MHz	4.8	5.6	6.2

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-Q-SI

fibreglass reinforced, highly dielectric

TFO-Q-SI is an electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a very high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The fibreglass reinforcement provides for an outstanding mechanic stability and cutthrough resistance as well as easy handling. For an easy and reliable preassembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 6.0 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Very high dielectric strength
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 420 x 500 mm
- Non tacky (TFO-QXXX-SI)
- Tacky on one side (TFO-QXXX-SI-A1H)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

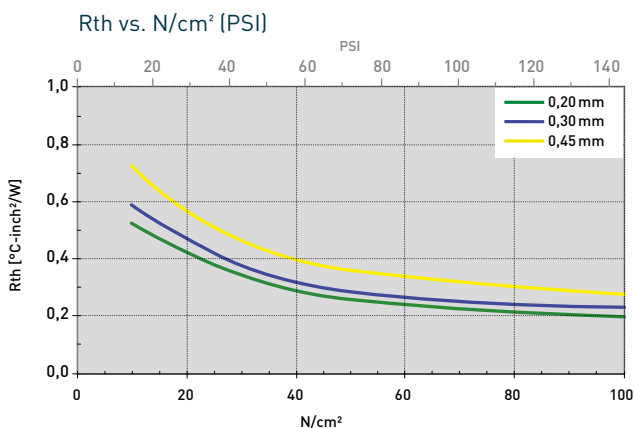
Thermal link of:

- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-Q200-SI	TFO-Q300-SI	TFO-Q450-SI
<b>MATERIAL</b>				
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Pink	Pink	Pink
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05
Tensile Strength <sup>1</sup>	kpsi	2.4	1.7	1.3
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.20	0.23	0.28
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.43	0.47	0.57
Thermal Conductivity	W/mK	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	5.0	7.0	10.0
Volume Resistivity	Ohm - cm	4.8 x 10 <sup>14</sup>	6.4 x 10 <sup>14</sup>	1.1 x 10 <sup>15</sup>
Dielectric Constant	@ 1 MHz	3.3	2.9	3.1

Test Methods: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm



# SILICONE FOIL TFO-T-SI

fibreglass reinforced

TFO-T-SI is a high performance electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with highly thermally conductive ceramic particles a very high thermal conductivity is reached. Its conformal surface structure guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised. The fibreglass reinforcement provides for an outstanding mechanic stability and cutthrough resistance as well as easy handling. For an easy and reliable preassembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 4.1 W/mK
- High surface compliance
- Excellent thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 440 x 510 mm
- Non tacky (TFO-TXXX-SI)
- Tacky on one side (TFO-TXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

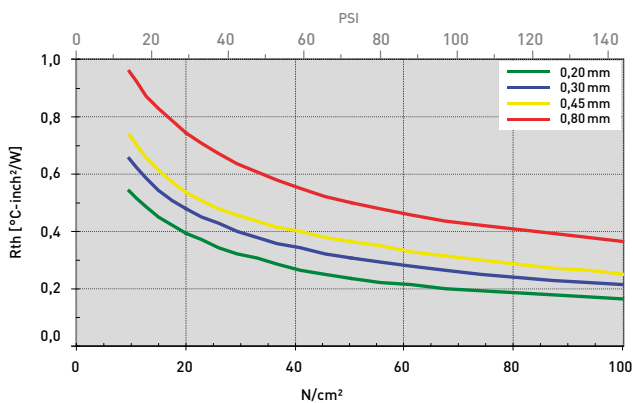
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-T200-SI	TFO-T300-SI	TFO-T450-SI	TFO-T800-SI
<b>MATERIAL</b>					
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light green	White	White	White
Reinforcement		Fibreglass	Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 <sup>±0.05</sup>	0.30 <sup>±0.05</sup>	0.45 <sup>±0.05</sup>	0.80 <sup>±0.20</sup> <sub>±0.05</sub>
Tensile Strength <sup>1</sup>	kpsi	3.6	2.9	2.0	1.3
UL Flammability	UL 94	VO	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>THERMAL</b>					
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.16	0.21	0.24	0.36
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.39	0.47	0.53	0.74
Thermal Conductivity <sup>2</sup>	W/mK	4.1	4.1	4.1	4.1
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200	- 50 to + 200
<b>ELECTRICAL</b>					
Breakdown Voltage <sup>3</sup>	kV AC	3.0	6.5	9.0	> 10
Volume Resistivity	Ohm - cm	1.9 x 10 <sup>15</sup>	2.4 x 10 <sup>15</sup>	3.3 x 10 <sup>15</sup>	4.1 x 10 <sup>15</sup>
Dielectric Constant	@ 1 MHz	3.6	3.6	3.6	3.6

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information. Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm / 0.80 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-X-SI

fibreglass reinforced

TFO-X-SI is a high performance electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with highly thermally conductive ceramic particles an excellent thermal conductivity is reached. Its conformal surface structure guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised. The fibreglass reinforcement provides for an outstanding mechanic stability and cutthrough resistance as well as easy handling. For an easy and reliable preassembly the interface material is available with low tack pressure sensitive adhesive on one side.



## PROPERTIES

- Thermal conductivity: 5.0 W/mK
- High surface compliance
- Excellent thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 440 x 510 mm
- Non tacky (TFO-XXXX-SI)
- Tacky on one side (TFO-XXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

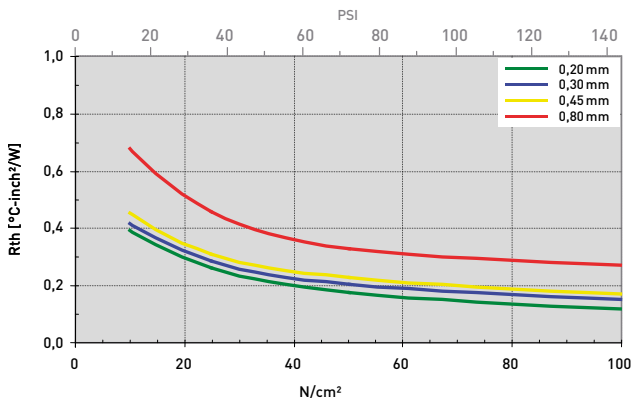
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-X200-SI	TFO-X300-SI	TFO-X450-SI	TFO-X800-SI
<b>MATERIAL</b>					
Material		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		White	White	White	White
Reinforcement		Fibreglass	Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 ±0.05
Tensile Strength <sup>1</sup>	kpsi	1.3	1.2	0.7	0.6
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
<b>Thermal</b>					
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.11	0.15	0.17	0.27
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.29	0.32	0.35	0.52
Thermal Conductivity <sup>2</sup>	W/mK	5.0	5.0	5.0	5.0
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200	- 50 to + 200
<b>Electrical</b>					
Breakdown Voltage <sup>3</sup>	kV AC	3.0	6.0	9.0	> 10
Volume Resistivity	Ohm - cm	1.7 x 10 <sup>15</sup>	7.9 x 10 <sup>15</sup>	9.2 x 10 <sup>15</sup>	8.9 x 10 <sup>15</sup>
Dielectric Constant	@ 1 MHz	3.3	3.3	3.3	3.3

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information. Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm / 0.80 mm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# SILICONE FOIL TFO-ZS-SI

fibreglass reinforced

TFO-ZS-SI is a high performance electrically insulating thermally conductive silicone foil for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with highly thermally conductive ceramic particles an extremely high thermal conductivity is reached. Its conformal surface structure and flexibility guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised. The fibreglass reinforcement provides for an outstanding mechanic stability and cutthrough resistance as well as easy handling.



## PROPERTIES

- Thermal conductivity: 8.0 W/mK
- High surface compliance and flexibility
- Excellent thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 440 x 510 mm
- Non tacky (TFO-ZSXXX-SI)
- Die cut parts

## APPLICATION EXAMPLES

Thermal link of:

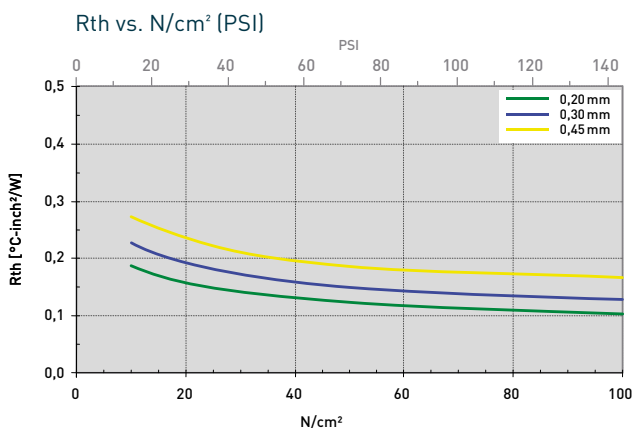
- MOSFETs or IGBTs
- Power diodes or AC/DC converters
- Power modules

For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-ZS0200-SI	TFO-ZS0300-SI	TFO-ZS0450-SI
<b>MATERIAL</b>				
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light Blue	Light Blue	Light Blue
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05
Tensile Strength <sup>1</sup>	kpsi	1.32	0.97	0.67
UL Flammability (Equivalent)	UL 94	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.10	0.13	0.17
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.15	0.19	0.24
Thermal Conductivity <sup>2</sup>	W/mK	8.0	8.0	8.0
Operating Temperature Range	°C	-40 to +180	-40 to +180	-40 to +180
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	3.6	4.5	5.0

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm



# INSULATING FILM TFO-M-SI-PI

silicone coated, highly dielectric

TFO-M-SI-PI is an electrically insulating thermally conductive foil made of a high voltage resistant Polyimide film with thermally conductive silicone coating on both sides for an optimised thermal coupling between electronic packages and heat sinks. Through the specific formulation and filling with thermally conductive ceramic particles a very high thermal conductivity is reached. Under pressure the total thermal resistance is minimised. The material is characterised by its very high dielectric properties. The substrate film provides for an outstanding mechanic stability and cutthrough resistance as well as easy handling.



## PROPERTIES

- High thermal contact
- Very high dielectric strength
- Outstanding mechanic stability through substrate film
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Sheet 320 x 400 mm  
Others on request
- Roll 320 mm x 50 m
- Non tacky  
(TFO-MXXX-SI-PI)
- Die cut parts

## APPLICATION EXAMPLES

Thermal link of:

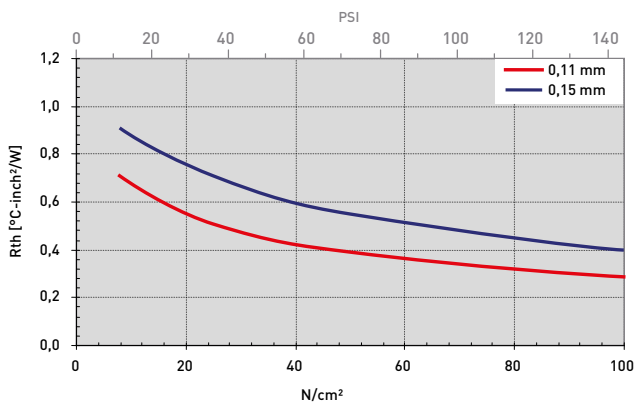
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
  - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-M110-SI-PI	TFO-M150-SI-PI
<b>MATERIAL</b>			
MATERIAL		Insulating film coated with ceramic filled silicone	Insulating film coated with ceramic filled silicone
Colour		Light brown	Light brown
Reinforcement		Polyimide film	Polyimide film
Thickness	mm	0.11 <sup>±0.02</sup>	0.15 <sup>±0.02</sup>
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.29	0.40
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.55	0.75
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180
<b>ELECTRICAL</b>			
Breakdown Voltage <sup>2</sup>	kV AC	6	> 6

Measurement technique according to: <sup>1</sup> ASTM D 5470, <sup>2</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.

Thickness: 0.11 / 0.15 mm

Rth vs. N/cm<sup>2</sup> (PSI)





## 3 SILICONE CAPS



# SILICONE CAP TCP-C-SI

all around dielectric

TCP-C-SI is a thermally conductive silicone cap for an optimised thermal coupling between electronic packages and heat sinks which provides for a reliable electrical all-around insulation. Through the specific formulation and filling with thermally conductive ceramic particles a good thermal conductivity is reached. Its conformal surface structure guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised.



## PROPERTIES

- Very good surface compliance
- High thermal contact
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Thicknesses: 0.5 mm and 0.8 mm
- Different sizes available

## APPLICATION EXAMPLES

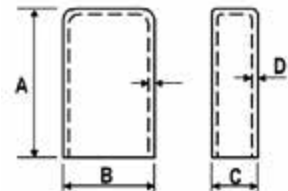
Thermal link of:

- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TCP-C250-SI	TCP-C280-SI
<b>MATERIAL</b>			
		Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey
Thickness	mm	0.50	0.80
Tensile Strength <sup>1</sup>	kpsi	0.5	0.5
Tear Strength	kN/m	6.0	6.0
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance @ 30 PSI	°C-inch <sup>2</sup> /W	0.48	0.58
Thermal Conductivity	W/mK	0.8	0.8
Operating Temperature Range	°C	- 40 to + 155	- 40 to + 155
<b>ELECTRICAL</b>			
Breakdown Voltage <sup>2</sup>	kV AC	4	10
Volume Resistivity	Ohm - cm	$2.6 \times 10^{15}$	$2.6 \times 10^{15}$
Dielectric Constant	@ 1 MHz	4.85	4.85

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.

SIZES IN MM	A	B	C	D
TCP-C150-SI	16.0 ± 0.1	11.5 ± 0.1	5.9 ± 0.1	0.5 ± 0.1
TCP-C250-SI	21.5 ± 0.1	11.5 ± 0.1	5.9 ± 0.1	0.5 ± 0.1
TCP-C280-SI	21.8 ± 0.1	12.1 ± 0.1	6.5 ± 0.1	0.8 ± 0.1
TCP-C450-SI	28.5 ± 0.1	17.5 ± 0.1	5.9 ± 0.1	0.5 ± 0.1
TCP-C480-SI	28.8 ± 0.1	18.2 ± 0.1	6.6 ± 0.1	0.8 ± 0.1



# SILICONE CAP TCP-J-SI

all around dielectric

TCP-J-SI is a thermally conductive silicone cap for an optimised thermal coupling between electronic packages and heat sinks which provides for a reliable electrical all-around insulation. Through the specific formulation and filling with thermally conductive ceramic particles a high thermal conductivity is reached. Its conformal surface structure guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised.



## PROPERTIES

- Very good surface compliance
- High thermal contact
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Thicknesses: 0.30 mm / 0.45 mm / 0.80 mm
- Different sizes available (See table Sizes)

## APPLICATION EXAMPLES

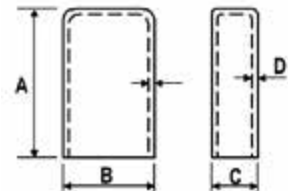
Thermal link of:

- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TCP-J300-SI	TCP-J450-SI	TCP-J800-CP
<b>MATERIAL</b>				
Colour		Reddish	Reddish	Reddish
Thickness	mm	0.30	0.45	0.80
Tensile Strength	kpsi	0.5	0.5	0.5
Tear Strength	kN/m	9.8	9.8	9.8
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance (@ T0-3P)	°C/W	0.68	0.95	1.60
Thermal Conductivity <sup>1</sup>	W/mK	1.5	1.5	1.5
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200
<b>ELECTRICAL</b>				
Breakdown Voltage	kV AC	10	13	18
Volume Resistivity	Ohm - cm	$3.2 \times 10^{14}$	$3.2 \times 10^{14}$	$3.2 \times 10^{14}$
Dielectric Constant	@ 1 MHz	6.0	6.0	6.0

Measurement technique according to: <sup>1</sup> ASTM E 1530. All data without warranty and subject to change. Please contact us for further data and information.

SIZES IN MM	A	B	C	D
TCP-J300-SI (für T0-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / -0.00
TCP-J300-SI (für T0-3P)	28.5 ± 1.0	17.5 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / -0.00
TCP-J450-SI (für T0-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.45 + 0.10 / -0.05
TCP-J450-SI (für T0-3P)	28.5 ± 1.0	17.5 ± 0.5	5.9 ± 0.3	0.45 + 0.10 / -0.05
TCP-J800-SI (für T0-220)	21.8 ± 1.0	12.1 ± 0.5	6.5 ± 0.3	0.80 + 0.15 / -0.00
TCP-J800-SI (für T0-3P)	28.8 ± 1.0	18.2 ± 0.5	6.6 ± 0.3	0.80 + 0.15 / -0.00



# SILICONE CAP TCP-L-SI

all around dielectric

TCP-L-SI is a thermally conductive silicone cap for an optimised thermal coupling between electronic packages and heat sinks which provides for a reliable electrical all-around insulation. Through the specific formulation and filling with thermally conductive ceramic particles a very high thermal conductivity is reached. Its conformal surface structure guarantees a very good compliance to the contact surfaces. Thus the total thermal resistance is minimised.



## PROPERTIES

- Thermal conductivity: 2.0 W/mK
- Very good surface compliance
- High thermal contact
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

## AVAILABILITY

- Thicknesses: 0.30 mm / 0.45 mm / 0.80 mm
- Different sizes available (See table Sizes)

## APPLICATION EXAMPLES

Thermal link of:

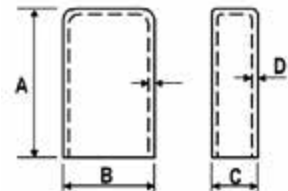
- MOSFETs or IGBTs
  - Power diodes or AC/DC converters
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TCP-L300-SI	TCP-L450-SI	TCP-L800-CP
<b>MATERIAL</b>				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Brown	Brown	Brown
Thickness	mm	0.30	0.45	0.80
Tensile Strength	kpsi	0.44	0.44	0.44
Tear Strength	kN/m	6.0	6.0	6.0
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance (@ T0-3P)	°C/W	0.4	0.6	1.1
Thermal Conductivity <sup>1</sup>	W/mK	2.0	2.0	2.0
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200
<b>ELECTRICAL</b>				
Breakdown Voltage	kV AC	5	7	12
Volume Resistivity	Ohm - cm	$3.5 \times 10^{14}$	$3.5 \times 10^{14}$	$3.5 \times 10^{14}$
Dielectric Constant	@ 1 MHz	6.2	6.2	6.2

Measurement technique according to: <sup>1</sup> ASTM E 1530. All data without warranty and subject to change. Please contact us for further data and information.

## SIZES IN MM

	A	B	C	D
TCP-L300-SI (für T0-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / - 0.00
TCP-L300-SI (für T0-3P)	28.5 ± 1.0	17.5 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / - 0.00
TCP-L450-SI (für T0-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.45 + 0.10 / - 0.05
TCP-L450-SI (für T0-3P)	28.5 ± 1.0	17.5 ± 0.5	5.9 ± 0.3	0.45 + 0.10 / - 0.05
TCP-L800-SI (für T0-220)	21.8 ± 1.0	12.1 ± 0.5	6.5 ± 0.3	0.80 + 0.15 / - 0.00
TCP-L800-SI (for T0-3P)	28.8 ± 1.0	18.2 ± 0.5	6.6 ± 0.3	0.80 + 0.15 / - 0.00



## 4 PHASE CHANGE MATERIAL

/ POLYIMIDE FILM COATED /  
ALUMINUM FILM COATED /  
FILM



# POLYIMIDE FILM/PHASE CHANGE TPC-N-PI

phase change coating, highly dielectric

TPC-N-PI is a thermally conductive film with an electrically insulator made of Devinal TH Polyimide which is coated with a thermally conductive phase changing compound on both sides thus optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change coating starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at low pressure. The wetting of the contact areas is further on improved by volumetric material expansion of approximately 10 to 15% at increasing temperature. Thus the total thermal resistance is minimised. The material is characterised by its very high dielectric properties.



## PROPERTIES

- Optimal thermal contact
- High dielectric strength
- Silicone-free
- No dry up, pump-out migration
- No run-out through thixotropic properties
- Process reliable coating thickness
- Ideal replacement of messy thermal grease

## AVAILABILITY

- Sheet 305 x 495 / 610 x 495 mm
- Roll 495 mm x 152 m
- Non tacky (TPC-NXXX-PI)
- Tacky on one side with PSA (TPC-NXXX-PI-A1)
- With adhesive strips on request
- Thicker phase coating (25 µm)
- Die cut parts
- Kiss cut parts

## APPLICATION EXAMPLES

Thermal link of:

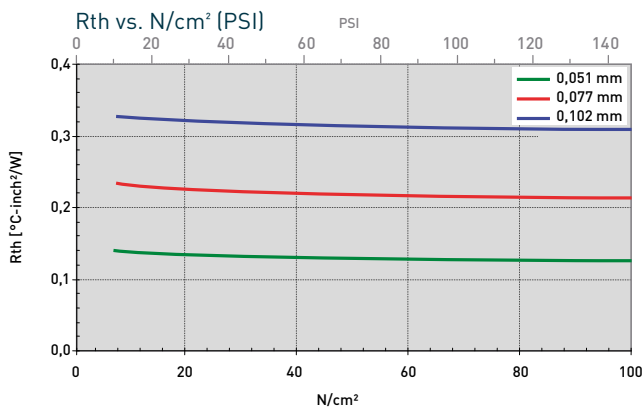
- MOSFETs or IGBTs
  - Diodes
  - A.C. converter
  - Uninsulated power modules
- For use in Automotive motor control units / Power supplies / Traction drives / Telecom appliances

PROPERTY	UNIT	TPC-N051-PI	TPC-N077-PI	TPC-N102-PI
<b>MATERIAL</b>				
Colour		Light orange	Light orange	Light orange
Thickness Devinal TH	µm	25 ±4	51 ±8	77 ±12
Thickness Phase Change (per side)	µm	13	13	13
Total Thickness	µm	51	77	102
Tensile Strength	kpsi	19.7	19.7	19.7
UL Flammability Devinal TH (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015/863/EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance¹ @ 150 PSI	°C-inch²/W	0.126	0.215	0.311
Resistance¹ @ 30 PSI	°C-inch²/W	0.130	0.220	0.315
Resistance¹ @ 10 PSI	°C-inch²/W	0.143	0.237	0.332
Thermal Conductivity Devinal TH	W/mK	0.36	0.36	0.36
Phase Change Temperature	°C	ca. 60	ca. 60	ca. 60
<b>ELECTRICAL</b>				
Breakdown Voltage	kV AC	5.4	9.0	13.5
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>16</sup>	1.0 x 10 <sup>16</sup>	1.0 x 10 <sup>16</sup>
Dielectric Constant	@ 25°C	4.0	4.0	4.0

Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: Devinal TH Polyimide: 25 µm / 51 µm / 76 µm. Total Thicknesses: 51 µm / 77 µm / 102 µm



# KAPTON® FILM WITH PHASE CHANGE TPC-P-KA

phase change coating, highly dielectric

TPC-P-KA is a thermally conductive film with an electrically insulator made of Kapton®MT which is coated with a thermally conductive phase changing compound on both sides thus optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change coating starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at low pressure. The wetting of the contact areas is further on improved by volumetric material expansion of approximately 10 to 15% at increasing temperature. Thus the total thermal resistance is minimised. The material is characterised by its very high dielectric properties.



## PROPERTIES

- Optimal thermal contact
- High dielectric strength
- Silicone-free
- No dry up, pump-out migration
- No run-out through thixotropic properties
- Process reliable coating thickness
- Ideal replacement of messy thermal grease

## AVAILABILITY

- Sheet 305 x 394 / 610 x 394 mm
- Roll 394 mm x 152 m
- Non tacky (TPC-PXXX-KA)
- Tacky on one side with PSA (TPC-PXXX-KA-A1)
- With adhesive strips on request
- Thicker phase coating (25 µm)
- Die cut parts
- Kiss cut parts

## APPLICATION EXAMPLES

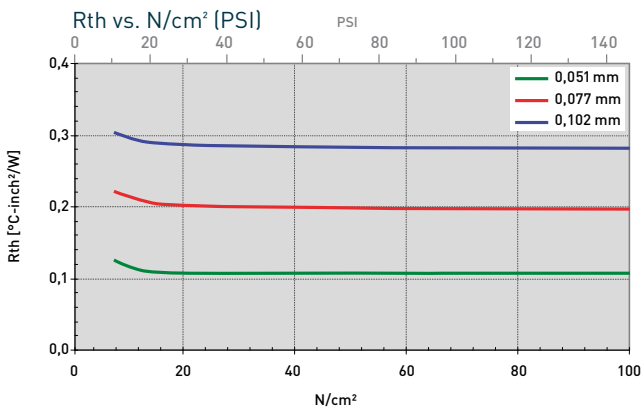
Thermal link of:

- MOSFETs or IGBTs
  - Diodes
  - A.C. converter
  - Uninsulated power modules
- For use in Automotive motor control units / Power supplies / Traction drives / Telecom appliances

PROPERTY	UNIT	TPC-P051-KA	TPC-P077-KA	TPC-P102-KA
<b>MATERIAL</b>				
Colour		Kapton®MT with phase change coating on both sides Light orange	Kapton®MT with phase change coating on both sides Light orange	Kapton®MT with phase change coating on both sides Light orange
Thickness Kapton®MT	µm	25 ±4	51 ±8	77 ±12
Thickness Phase Change (per side)	µm	13	13	13
Total Thickness	µm	51	77	102
Tensile Strength <sup>1</sup>	kpsi	20	22	23
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>2</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.110	0.195	0.285
Resistance <sup>2</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.113	0.200	0.290
Resistance <sup>2</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.125	0.213	0.300
Thermal Conductivity Kapton®MT	W/mK	0.45	0.45	0.45
Phase Change Temperatur	°C	ca. 60	ca. 60	ca. 60
<b>ELECTRICAL</b>				
Breakdown Voltage <sup>3</sup>	kV AC	5.5	9.2	12.3
Volume Resistivity	Ohm - cm	1.0 x 10 <sup>14</sup>	1.0 x 10 <sup>14</sup>	1.0 x 10 <sup>14</sup>
Dielectric Constant	@ 1 MHz	4.2	4.2	4.2

Measurement technique according to: <sup>1</sup> ASTM D 412, <sup>2</sup> ASTM D 5470, <sup>3</sup> ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

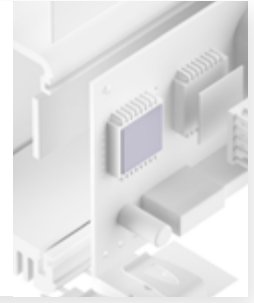
Thicknesses: Kapton® MT 25 µm / 51 µm / 76 µm. Total Thicknesses: 51 µm / 77 µm / 102 µm



# PHASE CHANGE TPC-W-PC

as stand alone or with substrate

TPC-W-PC is thermally conductive phase changing film optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change compound starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at very low pressure. The material is available as TPC-W-PC as free standing film or with different substrates thus reworkability is improved since no compound residues remain on one side.



## PROPERTIES

- Optimal thermal contact
- Thermal conductivity: 3.5 W/mK
- Silicone-free
- Ideal alternative and replacement of messy thermal grease
- Different optional substrates allow for one-side residue-freeness and improved reworkability

## AVAILABILITY

- Sheet 305 x 152 mm
- Roll 356 mm (Liner 394 mm ) x L (up to 150 m)
- TPC-WXXX-PC: Die cut parts between 2 release liners
- One-side coated substrates: Aluminum TPC-WXXX-PC-ALYYY  
Copper TPC-WXXX-PC-CUYYY

## APPLICATION EXAMPLES

Thermal link of:

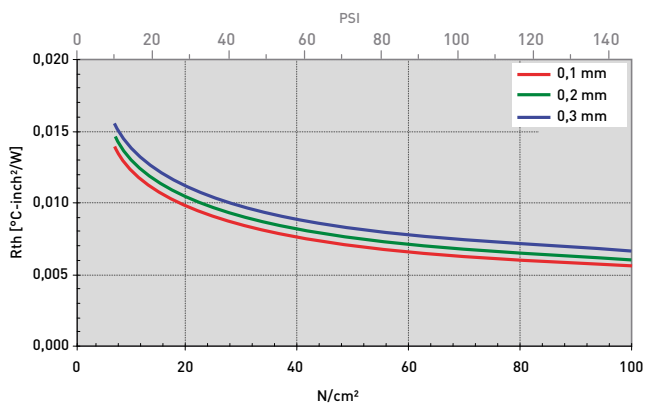
- MOSFETs or IGBTs
  - Memory modules
  - Power modules
  - CPUs
- For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-W100-PC	TPC-W200-PC	TPC-W300-PC
<b>MATERIAL</b>				
Material		Phase Change Film	Phase Change Film	Phase Change Film
Colour		Grey	Grey	Grey
Total Thickness	mm	0.1 ±0.02	0.2 ±0.03	0.3 ±0.03
Specific Density	g/cm <sup>3</sup>	2.0	2.0	2.0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.0056	0.0061	0.0067
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.0097	0.0103	0.0111
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.0138	0.0148	0.0158
Thermal Conductivity	W/mK	3.5	3.5	3.5
Phase Change Temperature	°C	ca. 45	ca. 45	ca. 45
Storage	Months	24	24	24
Max. Storage Temperature	°C	27	27	27

Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.1 mm / 0.2 mm / 0.3 mm / 0.4 mm

Rth vs. N/cm<sup>2</sup> (PSI)



# ALUMINUM FILM WITH PHASE CHANGE TPC-R-AL

phase change coating

TPC-R-AL is an aluminum film which is coated with a thermally conductive phase changing compound on both sides thus optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change coating starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at low pressure. The wetting of the contact areas is further on improved by volumetric material expansion at increasing temperature. Thus the total thermal resistance is minimised. The aluminum carrier effects high mechanical stability and easy handling.



### PROPERTIES

- Optimal thermal contact
- Silicone-free
- Process reliable coating thickness
- Ideal alternative and replacement of messy thermal grease

### AVAILABILITY

- Sheet 305 x 610 mm or 457 x 610 mm
- Roll 292 or 445 mm x 152 m
- Non tacky (TPC-RXXX-AL)
- Tacky on one side with PSA (TPC-RXXX-AL-A1)
- With adhesive strips on request
- Optional AL (25 / 51 / 76 / 127 / 254 µm), phase change coating (13 / 25 / 51 µm)
- Die cut or kiss cut parts

### APPLICATION EXAMPLES

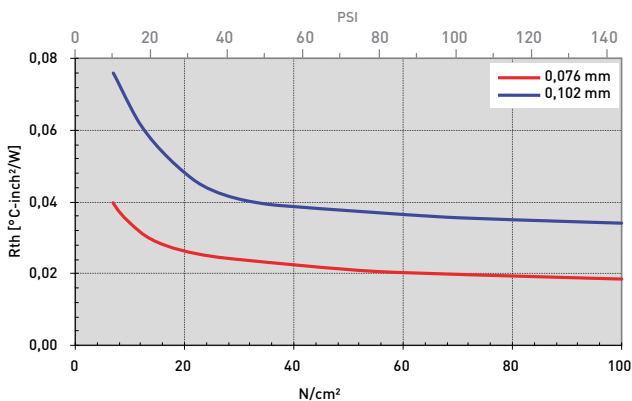
- Thermal link of:
- MOSFETs or IGBTs
  - Insulated diodes
  - Power modules
  - CPUs
- For use in Servo drive control units / Traction drives / Automation appliances / Micro-electronics

PROPERTY	UNIT	TPC-R076-AL	TPC-R102-AL
<b>MATERIAL</b>			
Colour		White	White
Thickness Aluminum	µm	51 ±8	51 ±8
Thickness Phase Change (per side)	µm	13	25
Total Thickness	µm	76	102
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.019	0.034
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.026	0.047
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.040	0.076
Phase Change Temperature	°C	ca. 60	ca. 60

Measurement technique according to: <sup>1</sup> ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 51 µm / 76 µm / 102 µm / 127 µm / 152 µm / 177 µm / 279 µm / 304 µm

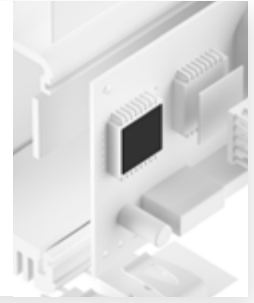
R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# ALUMINUM FILM WITH PHASE CHANGE TPC-T-AL-CB

phase change coating

TPC-T-AL-CB is an aluminum film which is coated with a thermally conductive phase changing compound on both sides thus optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change coating starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at low pressure. The wetting of the contact areas is further on improved by volumetric material expansion at increasing temperature. Thus the total thermal resistance is minimised. The aluminum carrier effects high mechanical stability and easy handling.



## PROPERTIES

- Optimal thermal contact
- Silicone-free
- Process reliable coating thickness
- Ideal alternative and replacement of messy thermal grease

## AVAILABILITY

- Sheet 445 x 500 mm
- Roll 445 mm x 152 m
- Non tacky
- (TPC-TXXX-AL-CB)
- Die cut parts

## APPLICATION EXAMPLES

Thermal link of:

- MOSFETs or IGBTs
- Insulated diodes
- Power modules
- CPUs

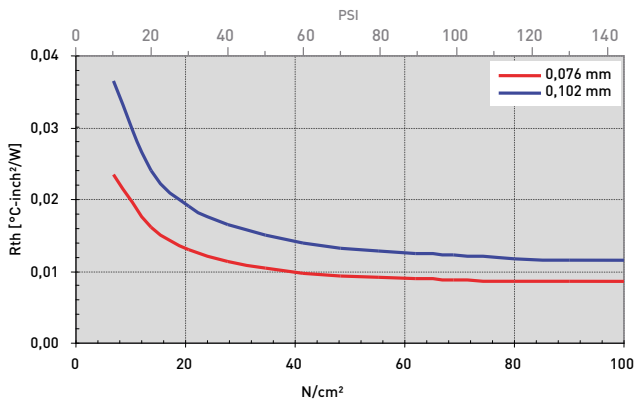
For use in Servo drive control units  
/ Traction drives / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-T076-AL-CB	TPC-T102-AL-CB
<b>MATERIAL</b>			
		Aluminum with graphite filled phase change coating on both sides	Aluminum with graphite filled phase change coating on both sides
Colour		Black	Black
Thickness Aluminum	µm	51 ±8	51 ±8
Thickness Phase Change (per side)	µm	12.5	25.5
Total Thickness	µm	76	102
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.009	0.011
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.013	0.019
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.022	0.037
Phase Change Temperature	°C	ca. 52	ca. 52

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Phase Change coatings per side: 12.5 µm / 25.5 µm  
Total Thicknesses: 76 µm / 102 µm

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)

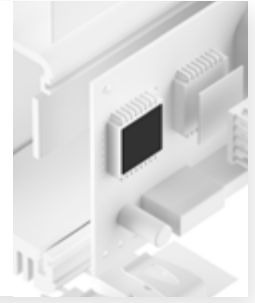


# GRAPHITE FILM WITH PHASE CHANGE

## TPC-V-PG-CB

Pyrolytic graphite, phase change coating

TPC-V-PG-CB is an anisotropic thermally conductive pyrolytic graphite film which is coated with a thermally conductive phase changing compound on both sides thus optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change coating starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at low pressure. The wetting of the contact areas is further on improved by volumetric material expansion at increasing temperature. Thus the total thermal resistance is minimised. The flexible pyrolytic graphite carrier effects mechanical stability and easy handling.



### PROPERTIES

- Optimal thermal contact
- Silicone-free
- Flexible, easy to handle
- Process reliable coating thickness
- Ideal alternative and replacement of messy thermal grease
- EMI shielding

### AVAILABILITY

- Sheet 190 x 355 mm (40  $\mu\text{m}$ )
- Sheet 139 x 355 mm (70 / 100  $\mu\text{m}$ )
- Roll 190 mm x 25 m (min.) (40  $\mu\text{m}$ )
- Roll 139 mm x 25 m (min.) (70 / 100  $\mu\text{m}$ )
- Non tacky (TPC-VXXX-PG-CB)
- Tacky on one side (TPC-VXXX-PG-CB-A1)
- Die cut parts

### APPLICATION EXAMPLES

Thermal link of:

- MOSFETs or IGBTs
- Insulated diodes
- Power modules
- CPUs

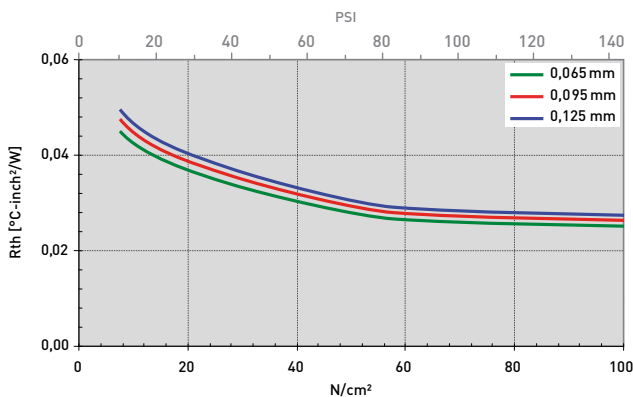
For use in Servo drive control units / Heat Pipe Assemblies / Traction drives / Automation appliances / Microelectronics / IT-Servers

PROPERTY	UNIT	TPC-V065-PG-CB	TPC-V095-PG-CB	TPC-V125-PG-CB
<b>MATERIAL</b>				
Colour		Black	Black	Black
Thickness pyrolytic graphite	$\mu\text{m}$	40	70	100
Thickness Phase Change (per side)	$\mu\text{m}$	12.5	12.5	12.5
Total Thickness	$\mu\text{m}$	65 $\pm$ 5	95 $\pm$ 7	125 $\pm$ 8
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 150 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0.025	0.026	0.027
Resistance <sup>1</sup> @ 30 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0.037	0.039	0.041
Resistance <sup>1</sup> @ 10 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0.046	0.048	0.051
Thermal Conductivity Pyrolytic graphite (Z Direction)	W/mK	6	7	8
Thermal Conductivity Pyrolytic graphite (X-Y Direction)	W/mK	1,450	1,400	1,350
Phase Change Temperature	$^{\circ}\text{C}$	ca. 52	ca. 52	ca. 52

Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Phase Change coatings per side: 12.5  $\mu\text{m}$  / 25.5  $\mu\text{m}$  / 31.8  $\mu\text{m}$   
 Thicknesses pyrolytic graphite: 40  $\mu\text{m}$  / 70  $\mu\text{m}$  / 100  $\mu\text{m}$

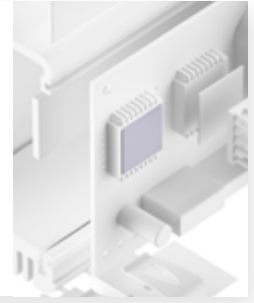
R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



# PHASE CHANGE COMPOUND TPC-W-PC-M/-E

printable

TPC-W-PC is a thixotropic thermally conductive phase changing compound optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change compound starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at very low pressure. Both thin bondline and high thermal conductivity minimise the total thermal resistance. It can be pre-applied by screen printing. After drying the compound is dry-to-the-touch and ready for use on the thermal contact area. TPC-W-PC-M and TPC-W-PC-E are printable compounds with alternatively long and extended dry times. TPC-W-PC-E dries only at elevated temperature.



## PROPERTIES

- Optimal thermal contact by thin bondline
- Silicone-free
- Thermal conductivity: 3.5 W/mK
- Thixotropic
- Ideal alternative and replacement of messy thermal grease
- Accurate automated application by stencil printing for mass production
- TPC-W-PC-M med dry time: @ RT or elevated temp.
- TPC-W-PC-E extended dry time: only @ elevated temp.

## AVAILABILITY

- TPC-W-PC-M and TPC-W-PC-E: Printable type med dry -M and extended dry -E
- E dries at elevated temperature only
- 360 ml SEMCO cartridges (transparent)
- 30 ml syringes

## APPLICATION EXAMPLES

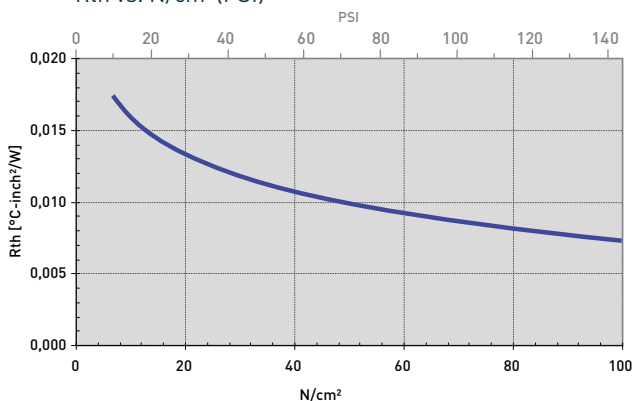
Thermal link of:

- MOSFETs und IGBTs
  - Memory Modules
  - IGBT Power Modules
  - CPUs
- For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-W-PC-M	TPC-W-PC-E
<b>MATERIAL</b>		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		Grey	Grey
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm <sup>3</sup>	1.8 @ RT	1.8 @ RT
undried	g/cm <sup>3</sup>	1.6 @ RT	1.7 @ RT
Viscosity dried @ 10 rpm	Pas	60 @ 60°C / 42 @ 80°C / 25 @ 100°C / 18 @ 120°C	60 @ 60°C / 42 @ 80°C / 25 @ 100°C / 18 @ 120°C
Viscosity undried @ 10 rpm	Pas	85 @ RT	96 @ RT
Drying @ Temperature	Time	@ 22°C: 24 h (0.05 mm) 48 h (0.15 mm) 56 h (0.25 mm)	@ 60°C: 3,5 h (0.05 mm) 8 h (0.15 mm) 13 h (0.25 mm)
@ Thickness		@ 60°C: 24 min (0.05 mm) 50 min (0.15 mm) 60 min (0.25 mm)	@ 125°C: 4 min (0.05 mm) 5 min (0.15 mm) 9 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.007	0.007
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.013	0.013
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.017	0.017
Thermal Conductivity	W/mK	3.5	3.5
Phase Change Temperature	°C	ca. 45	ca. 45
Operating Temperature Range	°C	< 110	< 110
Max. Storage Temp.	°C	25	25

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)

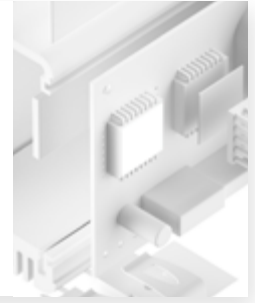


# PHASE CHANGE COMPOUND TPC-X-PC-NC-HT-M/-E

printable, dielectric

TPC-X-PC-NC-HT-M/-E is a thixotropic thermally conductive phase changing compound optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change compound starts filling up surface-specific roughnesses and unevenesses and expels any air enclosures from micro structures even at very low pressure. Both thin bondline and high thermal conductivity minimise the total thermal resistance. It can be pre-applied by screen printing. After drying the compound is dry-to-the-touch and ready for use on the thermal contact area. The compound is designed for applications with extended temperature requirements.

TPC-X-PC-NC-HT-M and TPC-X-PC-NC-HT-E are printable compounds with alternatively long and extended dry times. TPC-X-PC-NC-HT-E dries only at elevated temperature.



### PROPERTIES

- Optimal thermal contact by thin bondline
- Silicone-free
- Thermal conductivity: 3.0 W/mK
- Dielectric
- Thixotropic
- Ideal alternative and replacement of messy thermal grease
- Accurate automated application by stencil printing for mass production
- TPC-X-PC-NC-HT-M med dry time: @ RT or elevated temp.
- TPC-X-PC-NC-HT-E extended dry time: only @ elevated temp.

### AVAILABILITY

- TPC-X-PC-NC-HT-M and TPC-X-PC-NC-HT-E: Printable type med dry -M and extended dry -E
- E dries at elevated temperature only
- 360 ml SEMCO cartridges (transparent)
- 30 ml syringes

### APPLICATION EXAMPLES

Thermal link of:

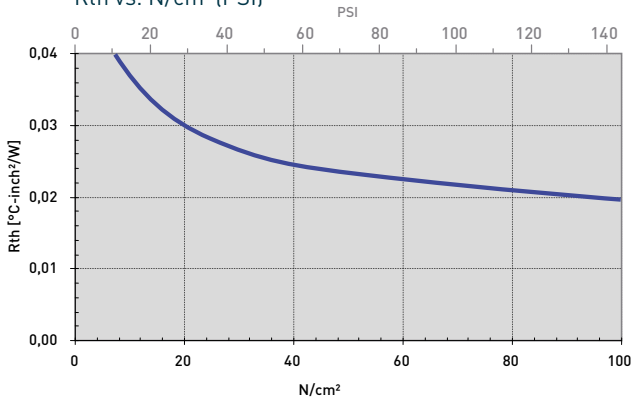
- MOSFETs and IGBTs
- Memory Modules
- IGBT Power Modules
- CPUs

For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-X-PC-NC-HT-M	TPC-X-PC-NC-HT-E
<b>MATERIAL</b>			
		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		White	White
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm <sup>3</sup>	1.1 @ RT	1.10 @ RT
undried	g/cm <sup>3</sup>	1.0 @ RT	1.05 @ RT
Viscosity dried @ 10 rpm	Pas	65 @ 60°C / 38 @ 80°C / 25 @ 100°C / 18 @ 120°C	65 @ 60°C / 38 @ 80°C / 25 @ 100°C / 18 @ 120°C
Viscosity undried @ 10 rpm	Pas	70	85
Drying @ Temperature	Time	@ 22°C: 24 h (0.05 mm) 48 h (0.15 mm) 56 h (0.25 mm)	@ 60°C: 4 h (0.05 mm) 12 h (0.15 mm) 20 h (0.25mm)
@ Thickness		@ 60°C: 24 min (0.05 mm) 53 min (0.15 mm) 56 min (0.25mm)	@ 125°C: 10 min (0.05 mm) 15 min (0.15 mm) 20 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.02	0.02
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.03	0.03
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.04	0.04
Thermal Conductivity	W/mK	3.0	3.0
Phase Change Temperature	°C	ca. 45	ca. 45
Operating Temperature Range	°C	< 140	< 140
Max. Storage Temp.	°C	25	25

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Rth vs. N/cm<sup>2</sup> (PSI)

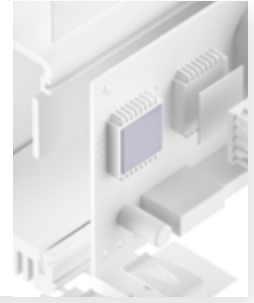


# PHASE CHANGE COMPOUND TPC-Z-PC-HT-M/-E

printable

TPC-Z-PC-HT is a thixotropic thermally conductive phase changing compound optimising the thermal path e.g. between electronic packages and heat sinks. During warm-up the phase change compound starts filling up surface-specific roughnesses and unevennesses and expels any air enclosures from micro structures even at very low pressure. Both thin bondline and high thermal conductivity minimise the total thermal resistance. It can be pre-applied by screen printing. After drying the compound is dry-to-the-touch and ready for use on the thermal contact area. The compound is designed for applications with extended temperature requirements.

TPC-Z-PC-HT-M and TPC-Z-PC-HT-E are printable compounds with alternatively long and extended dry times. TPC-Z-PC-HT-E dries only at elevated temperature.



## PROPERTIES

- Optimal thermal contact by thin bondline
- Silicone-free
- Thermal conductivity: 3.0 W/mK
- Thixotropic
- Ideal alternative and replacement of messy thermal grease
- Accurate automated application by stencil printing for mass production
- TPC-Z-PC-HT-M med dry time: @ RT or elevated temp.
- TPC-Z-PC-HT-E extended dry time: only @ elevated temp.

## AVAILABILITY

- TPC-Z-PC-HT-M and TPC-Z-PC-HT-E: Printable type med dry -M and extended dry -E
- E dries at elevated temperature only
- 360 ml SEMCO cartridges (transparent)
- 30 ml syringes

## APPLICATION EXAMPLES

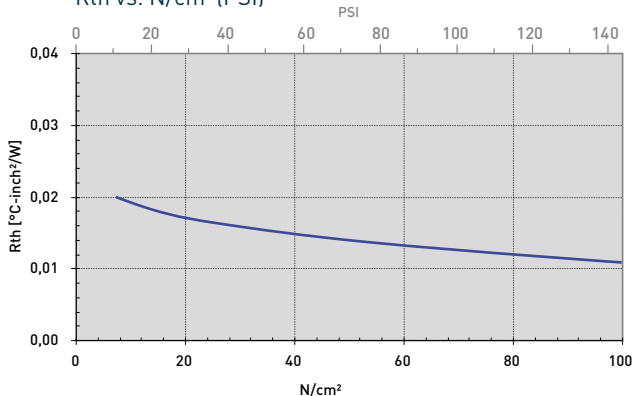
Thermal link of:

- MOSFETs und IGBTs
  - Memory Modules
  - IGBT Power Modules
  - CPUs
- For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-Z-PC-HT-M	TPC-Z-PC-HT-E
<b>MATERIAL</b>		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		Grey	Grey
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm <sup>3</sup>	2.3 @ RT	2.3 @ RT
Specific Gravity undried	g/cm <sup>3</sup>	2.0 @ RT	2.1 @ RT
Viscosity dried @ 10 rpm	Pas	45 @ 60°C / 30 @ 80°C / 21 @ 100°C / 15 @ 120°C	45 @ 60°C / 30 @ 80°C / 20 @ 100°C / 15 @ 120°C
Viscosity undried @ 10 rpm	Pas	60	77.5
Drying @ Temperature @ Thickness	Time	@ 22°C: 24 h (0.05 mm) 48 h (0.15 mm) 56 h (0.25 mm)	@ 60°C: 24 min (0.05 mm) 50 min (0.15 mm) 60 min (0.25 mm)
		@ 125°C: 3 min (0.05 mm) 5 min (0.15 mm) 10 min (0.25 mm)	@ 125°C: 8 min (0.05 mm) 15 min (0.15 mm) 20 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
<b>THERMAL</b>			
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.011	0.011
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.017	0.017
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.020	0.020
Thermal Conductivity	W/mK	3.0	3.0
Phase Change Temperature	°C	ca. 45	ca. 45
Operating Temperature Range	°C	< 140	< 140
Max. Storage Temp.	°C	25	25

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

R<sub>th</sub> vs. N/cm<sup>2</sup> (PSI)



## 5 GRAPHITE FOILS

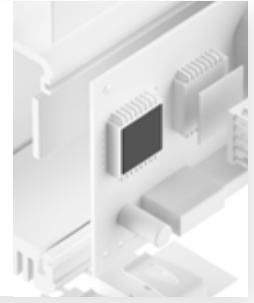
/ANISOTROPIC / PYROLYTIC



# GRAPHITE FOIL TFO-S-CB

anisotropic

TFO-S-CB consists of more than 98% pure natural graphite. Due to the flake-like shape they show anisotropic thermal conductivities in-plane (x-y-plane) and in through direction (z-direction). Their softness allows for a good compliance to the contact surfaces. Thus the total thermal resistance is minimised. Their low densities compared to copper (15%) or aluminum (50%) make them ideal for applications where low weight is required. The very high temperature resistance allows for the use in extreme hot environments.



## PROPERTIES

- Maximum contact through good surface compliance
- Very low weight
- Silicone-free
- Very high temperature resistance
- EMI-shielding through high electrical conductivity

## AVAILABILITY

- Sheet 300 x 500 mm
- Roll 300 mm x 50 m
- Die cut parts
- Non adhesive (TFO-SXXX-CB)
- Adhesive on one side (TFO-SXXX-CB-A1)

## APPLICATION EXAMPLES

Thermal link of:

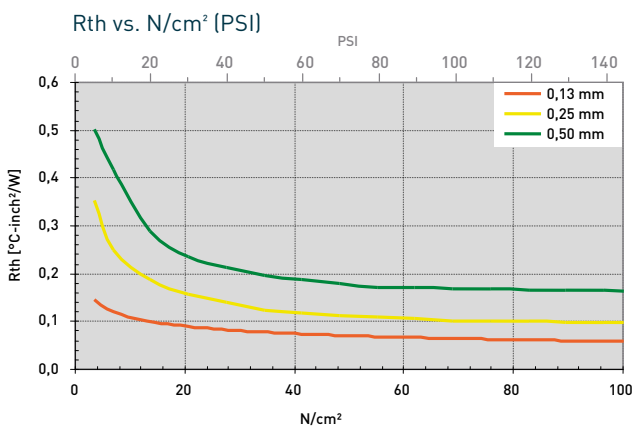
- CPUs to heat sinks
- Power modules
- Semiconductors
- IGBTs

For use in Power inverters / Laptops / Automotive power supplies / Industrial PCs

PROPERTY	UNIT	TFO-S130-CB	TFO-S250-CB	TFO-S500-CB
<b>MATERIAL</b>				
		Natural Graphite 98%	Natural Graphite 98%	Natural Graphite 98%
Colour		Grey	Grey	Grey
Thickness	mm	0.13 ±0.03	0.25 ±0.03	0.5 ±0.05
Hardness	Shore A	85	85	85
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.06	0.10	0.16
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.09	0.16	0.23
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.12	0.24	0.40
Thermal Conductivity (Z Direction)	W/mK	8	8	8
Thermal Conductivity (X-Y Direction)	W/mK	140	140	140
Operating Temperature Range	°C	- 250 to + 400	- 250 to + 400	- 250 to + 400
<b>ELECTRICAL</b>				
Volume Resistivity	Ohm - cm	11.0 x 10 <sup>-4</sup>	11.0 x 10 <sup>-4</sup>	11.0 x 10 <sup>-4</sup>
Dielectric Constant	@ 1 MHz	< 0.001	< 0.001	< 0.001

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

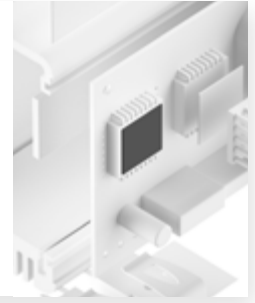
Thicknesses: 0.13 mm / 0.25 mm / 0.5 mm



# PYROLYTIC GRAPHITE FOIL TFO-V-PG

highly anisotropic conductive

TFO-V-PG consists of pure pyrolytic graphite. Due to the synthetic structure it shows highly anisotropic heat spreading conductivities in-plane (x-y-plane) and in through direction (z-direction). Its flexibility allows for a good compliance to the contact surfaces. Thus the total thermal resistance is minimised. Their low densities make them ideal for applications where low weight is required. The very high temperature resistance allows for the use in extreme hot environments. Due to its high flexibility it is very bending-resistant and mechanically stable. It can be used for curved surfaces and corners because its thermal conductivity will remain unchanged in the absence of sharp folds. The film can be configured with phase change coating on both sides.



## PROPERTIES

- Maximum contact through good surface compliance and high flexibility
- Very low weight
- Silicone-free
- Very high temperature resistance
- EMI-shielding through high electrical conductivity
- Ultra low water absorption

## AVAILABILITY

- Sheet 203 x 355 mm (40  $\mu\text{m}$ )
- Sheet 152 x 355 mm (70 / 100  $\mu\text{m}$ ) or on demand
- Roll 203 mm x 25 m (min.) (40  $\mu\text{m}$ )
- Roll 152 mm x 25 m (min.) (70 / 100  $\mu\text{m}$ )
- Non tacky (TFO-VXXX-PG)
- Tacky (TFO-VXXX-PG-A1)
- Phase change (TPC-VXXX-PG-CB)
- Die cut parts

## APPLICATION EXAMPLES

Thermal link of:

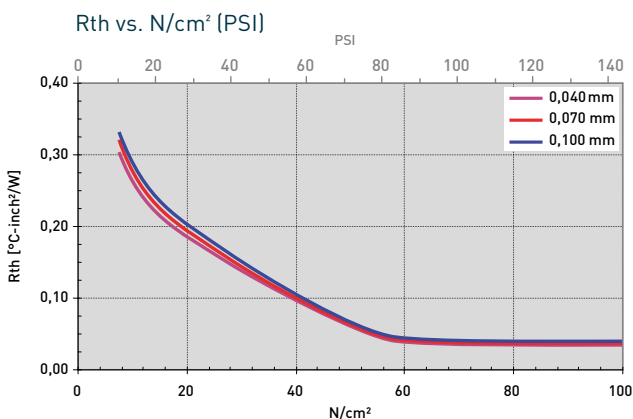
- CPUs to heat sinks
- Laser diodes
- TEC modules

For use in high end computers / Analyzers / Photonics / Heat Pipe Assemblies

PROPERTY	UNIT	TFO-V040-PG	TFO-V070-PG	TFO-V100-PG
<b>MATERIAL</b>				
Material		Pyrolytic Graphite	Pyrolytic Graphite	Pyrolytic Graphite
Colour		Grey	Grey	Grey
Thickness	$\mu\text{m}$	40 <sup>±2</sup>	70 <sup>±4</sup>	100 <sup>±5</sup>
Density	$\text{g}/\text{cm}^3$	2.0	2.0	2.0
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 150 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0,035	0,037	0,038
Resistance <sup>1</sup> @ 30 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0,190	0,198	0,206
Resistance <sup>1</sup> @ 10 PSI	$^{\circ}\text{C}\text{-inch}^2/\text{W}$	0,315	0,331	0,343
Thermal Conductivity (Z Direction)	$\text{W}/\text{mK}$	6	7	8
Thermal Conductivity (X-Y Direction)	$\text{W}/\text{mK}$	1,450	1,400	1,350
Operating Temperature Range	$^{\circ}\text{C}$	- 250 bis + 500	- 250 bis + 500	- 250 bis + 500
<b>ELECTRICAL</b>				
Electrical Conductivity	$\text{S}/\text{cm}$	14,000	14,000	14,000

Measurement technique according to: \*ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

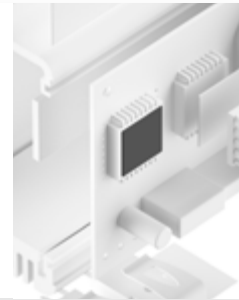
Thicknesses: 40  $\mu\text{m}$  / 70  $\mu\text{m}$  / 100  $\mu\text{m}$



# PYROLYTIC GRAPHITE FOIL TFO-Y-PG

highly anisotropic conductive

TFO-Y-PG consists of pure pyrolytic graphite. Due to the synthetic structure it shows highly anisotropic heat spreading conductivities in-plane (x-y-plane) and in through direction (z-direction). Its softness allows for a good compliance to the contact surfaces. Thus the total thermal resistance is minimised. Their low densities make them ideal for applications where low weight is required. The very high temperature resistance allows for the use in extreme hot environments. Due to its flexibility it is bending-resistant. It can be used for curved surfaces and corners because its thermal conductivity will remain unchanged in the absence of sharp folds. Special configurations are dielectric with insulating films or laminated on flexible gap filler elastomers.



## PROPERTIES

- Maximum contact through good surface compliance
- Very low weight
- Silicone-free
- Very high temperature resistance
- EMI-shielding through high electrical conductivity
- UL V0

## AVAILABILITY

- Sheet 115 x 180 mm
- Sheet 180 x 230 mm (0.07 – 0.1 mm Thickness)
- Non adhesive (TFO-YXXX-PG)
- Adhesive (TFO-YXXX-PG-A1)
- Die cut parts

## APPLICATION EXAMPLES

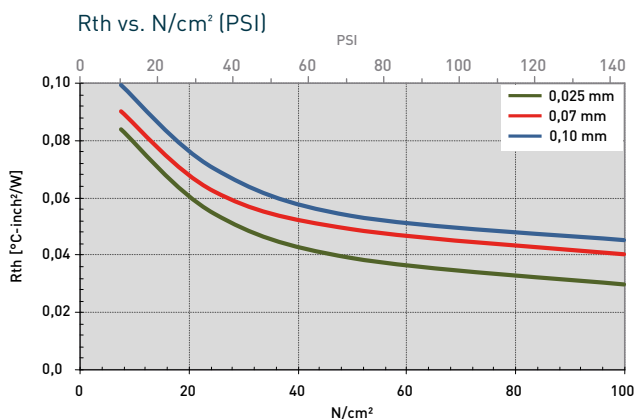
Thermal link of:

- CPUs to heat sinks
  - Laser diodes
  - TEC modules
- For use in high end computers / Analyzers / Photonics

PROPERTY	UNIT	TFO-Y025-PG	TFO-Y070-PG	TFO-Y100-PG
<b>MATERIAL</b>				
Material		Pyrolytic Graphite	Pyrolytic Graphite	Pyrolytic Graphite
Colour		Grey	Grey	Grey
Thickness	mm	0.025 <sup>±0.010</sup>	0.07 <sup>±0.015</sup>	0.10 <sup>±0.030</sup>
Density	g/cm <sup>3</sup>	1.9	1.21	0.85
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
<b>THERMAL</b>				
Resistance <sup>1</sup> @ 150 PSI	°C-inch <sup>2</sup> /W	0.03	0.04	0,045
Resistance <sup>1</sup> @ 30 PSI	°C-inch <sup>2</sup> /W	0.06	0.07	0,078
Resistance <sup>1</sup> @ 10 PSI	°C-inch <sup>2</sup> /W	0.08	0.09	0,10
Thermal Conductivity (Z Direction)	W/mK	18	20	25
Thermal Conductivity (X-Y Direction)	W/mK	1,600	1,000	700
Operating Temperature Range	°C	- 250 to + 400	- 250 to + 400	- 250 to + 400
<b>ELECTRICAL</b>				
Electrical Conductivity	S/cm	20,000	10,000	10,000

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

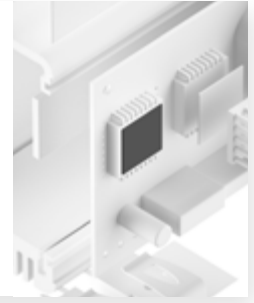
Thicknesses: 0.025 mm / 0.04 mm / 0.05 mm / 0.07 mm / 0.10 mm



# PYROLYTIC GRAPHITE FOIL TFO-ZS-PG

soft, anisotropic highly conductive

TFO-ZS-PG consists of pure soft pyrolytic graphite. Due to the synthetic structure it shows a high anisotropic heat spreading conductivity in-plane (x-y-plane) and an outstanding thermal conductivity in through thickness direction (z-direction). Its flexibility and softness allow for a very good compliance to larger uneven contact surfaces such as IGBT base plates. Thus the total thermal resistance is minimised. Compared to copper or aluminum the material is ideal for applications where low weight is required. The very high temperature resistance allows for the use in extreme hot environments.



### PROPERTIES

- Maximum contact through good surface compliance
- Very soft
- Very low weight
- Silicone-free
- Extremely temperature resistant
- EMI-shielding through high electrical conductivity

### AVAILABILITY

- Sheet 90 x 90 mm
- Sheet 90 x 180 mm
- Sheet 180 x 180 mm
- Die cut parts

### APPLICATION EXAMPLES

Thermal link of:

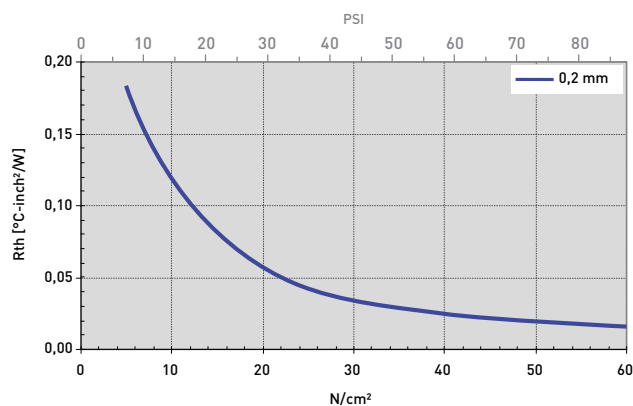
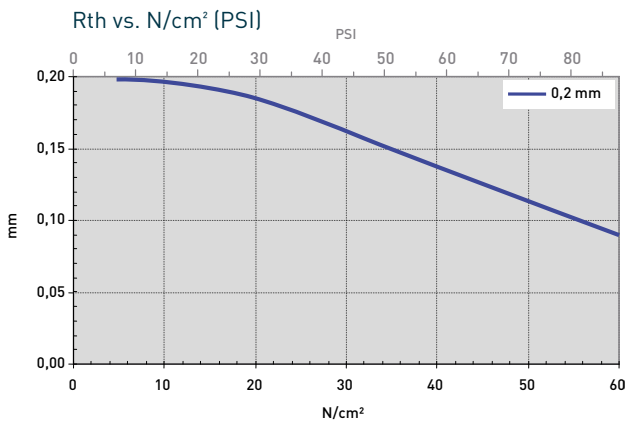
- IGBT modules
- Laser diodes
- TEC modules
- High flux LEDs

For use in liquid cold plates / high end computers / Analyzers / Photonics / LED arrays

PROPERTY	UNIT	TFO-ZS200-PG
<b>MATERIAL</b>		
Colour		Grey
Thickness	mm	0.2 ±0.05
Density	g/cm <sup>3</sup>	0.5
Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Resistance <sup>1</sup> @ 90 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.015 (0.09)
Resistance <sup>1</sup> @ 30 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.055 (0.18)
Resistance <sup>1</sup> @ 10 PSI @ Thickness	°C-inch <sup>2</sup> /W (mm)	0.181 (0.19)
Thermal Conductivity (Z Direction)	W/mK	30
Thermal Conductivity (X-Y Direction)	W/mK	500
Operating Temperature Range	°C	- 250 to + 400
<b>ELECTRICAL</b>		
Electrical Conductivity	S/cm	10,000

Measurement technique according to: 'ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information. Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.20 mm / 0.25 mm / 0.35 mm





## 6 PSA INSULATING TAPES

/ ACRYLATE / SILICONE



# PSA INSULATING TAPE TAT-J-PE

acrylate adhesive with polyester insulating film

TAT-J-PE is a thermally conductive PSA tape with an electrically insulating polyester film reinforcement. Through the thermally conductive acrylate adhesive coated on both sides of the polyester film the thermal contact is highly improved even at low pressures. Convex and concave surface structures and stack up tolerances are effectively compensated. Materials with different expansion coefficients can easily be bonded. Thus the total thermal resistance is minimised. The tape works well for realizing an effective and cost efficient thermal coupling in a broad field of applications. Above all it is used in applications having little space only and where the permitted weight is limited. Using screws, springs, clips as mechanic fasteners thus becomes superfluous.



## PROPERTIES

- Low thermal resistance
- High dielectric strength
- Reliable strong adherence on uneven or hardly machineable surfaces
- Silicone-free
- Neither mixing of components nor curing processes
- High mechanical stability and an easy handling through polyester film
- Replacement of fasteners e.g. screws, clips, etc.

## AVAILABILITY

- Sheet
- Roll 10 ~1,000 mm x 20 m
- Both side tacky (TAT-J200-PE)
- Die cut parts
- Kiss cut parts on sheet

## APPLICATION EXAMPLES

Thermal link of:

- LEDs
  - CPUs
  - RDRAM memory modules
  - Flip Chips, DSPs, BGAs, PPGAs
  - MOSFETs to heat sinks
- For use in Power supplies / PCs / Telecom engineering / Automotive applications / LED arrays

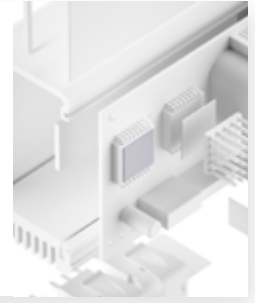
PROPERTY	UNIT	TAT-J200-PE
<b>MATERIAL</b>		
		Thermally conductive acrylate PSA tape with polyester film
Colour		White
Tape Thickness	mm	0.20 <sup>±0.03</sup>
PE Film Thickness	µm	12
Peel Off Strength (@ Stainless Steel @ RT)	N/cm	5.6
Peel Off Strength (@ Al 6063, @ RT)	N/cm	6.1
UL Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	0.7
Resistance <sup>1</sup> @ 7 PSI	°C-inch <sup>2</sup> /W	0.73
Resistance <sup>1</sup> @ 70 PSI	°C-inch <sup>2</sup> /W	0.50
Operating Temperature Range	°C	- 40 to + 125
<b>ELECTRICAL</b>		
Breakdown Voltage	kV AC	8.9

Measurement technique according to: <sup>1</sup> ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

# PSA TAPE TAT-M-SI

silicone adhesive, thermally conductive

TAT-M-SI is a thermally conductive electrically insulating silicone PSA transfer tape. Through the thermally conductive adhesive the thermal contact is highly improved even at low pressures. Convex and concave surface structures and stack up tolerances are effectively compensated. Materials with different expansion coefficients can easily be bonded. Thus the total thermal resistance is minimised. The tape works well for realizing an effective and cost efficient thermal coupling in a broad field of applications. Above all it is used in applications having little space only and where the permitted weight is limited. Using screws, springs, clips as mechanic fasteners thus becomes superfluous.



## PROPERTIES

- Low thermal resistance
- Thermal conductivity: 1.0 W/mK
- High dielectric strength
- Reliable strong adherence on uneven or hardly machineable surfaces
- Neither mixing of components nor curing processes
- Replacement of fasteners e.g. screws clips, etc.

## AVAILABILITY

- Sheet 300 mm x 400 mm
- Roll 300 mm x 50 m
- Both side tacky
- Die cut parts

## APPLICATION EXAMPLES

Thermal link of:

- CPUs
- RDRAM memory modules
- Flip Chips, DSPs, BGAs, PPGAs
- MOSFETs to heat sinks
- LED

For use in Power supplies / PCs / Telecom engineering / Automotive applications / LED arrays

PROPERTY	UNIT	TAT-M100-SI	TAT-M200-SI
<b>MATERIAL</b>			
Colour		White	White
Thickness	mm	0.10 <sup>±0.01</sup>	0.20 <sup>±0.02</sup>
Peel Off Strength (@ 23 °C) @ Aluminum / @ Glass	N/cm	6.0 / 7.6	6.4 / 7.6
Shear Strength (@ 125 °C after 10,000 hrs.)	N/cm <sup>2</sup>	> 200	> 200
RoHS Conformity	2015 / 863 / EU	Yes	Yes
UL Flammability	UL 94	V0	V0
<b>THERMAL</b>			
Thermal Conductivity	W/mK	1.0	1.0
Resistance <sup>1</sup>	°C-inch <sup>2</sup> /W	0.28	0.49
<b>ELECTRICAL</b>			
Breakdown Voltage <sup>2</sup> (@ Initial Thickness, 25 °C)	kV AC	2.0	5.0

Measurement technique according to: <sup>1</sup>ASTM D 5470, <sup>2</sup>ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.  
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

Thicknesses: 0.1 mm / 0.20 mm



## 7 THERMAL GREASE

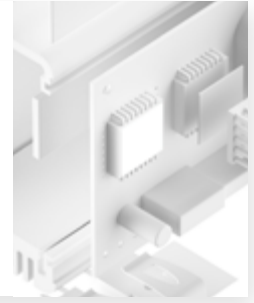
/ SILICONE / SILICONE-FREE



# SILICONE-FREE THERMAL GREASE TGR-J-NS

highly thermally conductive

TGR-J-NS is high performing silicone-free thermal grease based on an ester oil matrix. It is ideal for use in applications where a very good and highly reliable thermal transfer must be achieved. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. By its use the thermal contact is maximised, hence the total thermal resistance is minimised.



## PROPERTIES

- Thermal conductivity: 2.0 W/mK
- Silicone-free
- Dispensable
- Almost zero pressure at assembly
- Dielectric strength
- Operating temperature range: -40 to 150°C

## AVAILABILITY

- Syringes 70 ml
- Jars 1 kg

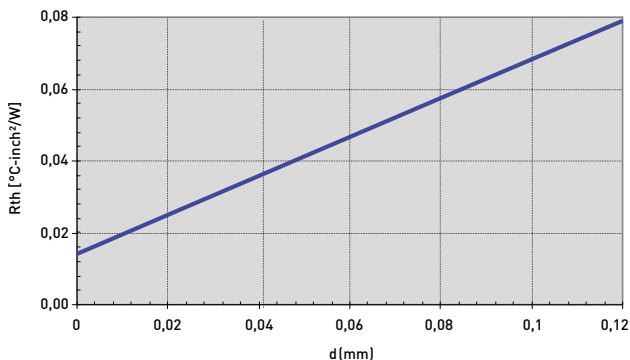
## APPLICATION EXAMPLES

Thermal link of:

- LED Boards
  - Power modules
  - RDRAMs memory modules
  - Flip Chips, DSPs , BGAs, PPGAs
- For use in Automotive applications / Power electronics / Light technology / Industrial PCs

PROPERTY	UNIT	TGR-J-NS
<b>MATERIAL</b>		
		Ceramic filled thermal grease
Colour		White
Density	g /cm <sup>3</sup>	3.1
Viscosity @ 25°C (Brookfield @ 10 rpm, 25 °C)	Pas	170
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	2.0
Operating Temperature Range	°C	- 40 to + 150
Storage Temperature	°C	< 35
Shelf Life (from Date of Manufacturing, unopened)	Months @ RT	12
<b>ELECTRIC</b>		
Dielectric Strength	kV / mm	5.0

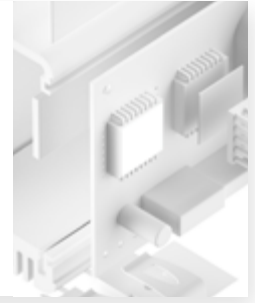
All data without warranty and subject to change. Please contact us for further data and information.



# SILICONE-FREE THERMAL GREASE TGR-M-NS

highly thermally conductive

TGR-M-NS is high performing silicone-free thermal grease based on an ester oil matrix. It is ideal for use in applications where a very good and highly reliable thermal transfer must be achieved. Due to the specific formulation and filling with ceramic particles the material has a high thermal conductivity. By its use the thermal contact is maximised, hence the total thermal resistance is minimised.



### PROPERTIES

- Thermal conductivity: 2.4 W/mK
- Silicone-free
- Dispensable
- Almost zero pressure at assembly
- Dielectric strength
- Operating temperature range: -40 to 150°C

### AVAILABILITY

- Syringes 70 ml
- Jars 1 kg

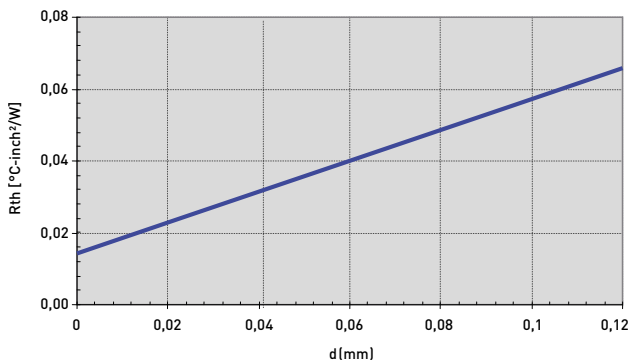
### APPLICATION EXAMPLES

Thermal link of:

- LED Boards
  - Power modules
  - RDRAMs memory modules
  - Flip Chips, DSPs , BGAs, PPGAs
- For use in Automotive applications / Power electronics / Light technology / Industrial PCs

PROPERTY	UNIT	TGR-M-NS
<b>MATERIAL</b>		
		Ceramic filled thermal grease
Colour		White
Density	g /cm <sup>3</sup>	3.2
Viscosity @ 25°C (Brookfield @ 10 rpm, 25 °C)	Pas	110
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	2.4
Operating Temperature Range	°C	- 40 to + 150
Storage Temperature	°C	< 35
Shelf Life (from Date of Manufacturing, unopened)	Months @ RT	12
<b>ELECTRIC</b>		
Dielectric Strength	kV / mm	4.5

All data without warranty and subject to change. Please contact us for further data and information.





## 8 ADHESIVES

/ ADDITIONAL CURING /  
CONDENSATIONAL CURING



# SILICONE ADHESIVE TAD-G-SI-1C

thermally conductive 1 part / addition cure

TAD-G-SI-1C is a liquid addition cure corrosion-free highly thermally conductive 1 part silicone adhesive. It cures at elevated temperature over 100°C to a strong but still elastic rubber and exhibits excellent primerless adhesion to most surfaces. The adhesive features good thermal conductivity. It allows for being operated at temperatures up to 260°C and does not corrode copper or its alloys when fully cured. It is characterised by high resistance to water, acids, bases and most organic solvents and is especially suitable for applications where high thermal conductivity, adhesion, fast curing and controlled, precision application are essential.



## PROPERTIES

- Thermal conductivity: 1.38 W/mK
- High bonding properties
- Heat addition cure
- Non corrosive
- High operating temperatures up to 260°C
- Extraordinary chemical resistance and longterm stability

## AVAILABILITY

- 1 kg jars
- Bulk packaging options on request
- Optional with glass beads

## APPLICATION EXAMPLES

- LED systems
- Processor cooling
- Memory chip assembly
- CPU board

PROPERTY	UNIT	TAD-G-SI-1C
<b>MATERIAL</b>		
Colour		Grey
Specific Gravity	g/cm <sup>3</sup>	2.06
Linear Shrinkage	%	2.0
Viscosity	Pas	43
Hardness	Shore A	67
Tensile Strength	MPa	3.1
Elongation at Break	%	70
Curing Time (@ 100°C)	min	30
Shelf Life (from Date of Manufacturing, unopened, @ < 15°C)	Months	6
Flammability [Equivalent]	UL 94	HB (1.5 mm)
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	1.38
Coefficient of Thermal Expansion Volumetric	x 10 <sup>-6</sup> /K	562
Coefficient of Thermal Expansion linear	x 10 <sup>-6</sup> /K	187
Operating Temperature Range	°C	- 50 to + 260
<b>ELECTRICAL</b>		
Dielectric Strength	kV/mm	22.5
Volume Resistivity	Ohm - cm	7.7 x 10 <sup>15</sup>
Surface Resistivity	Ohm - cm	1.3 x 10 <sup>15</sup>

All data without warranty and subject to change. Please contact us for further data and information.

# SILICONE ADHESIVE TAD-O-SI-1C

thermally conductive 1 part / addition cure

TAD-O-SI-1C is an addition cure corrosion-free highly thermally conductive 1 part silicone adhesive. It cures at elevated temperature over 100°C to a strong but still elastic rubber and exhibits excellent primerless adhesion to most surfaces. The adhesive features high thermal conductivity and a thixotropic rheology that will prevent slumping or flow during the process. It allows for being operated at temperatures up to 210°C and does not corrode copper or its alloys when fully cured. It is characterised by high resistance to water, acids, bases and most organic solvents and is especially suitable for applications where high thermal conductivity, adhesion, fast curing and controlled, precision application are essential.



### PROPERTIES

- Thermal conductivity: 2.1 W/mK
- High bonding properties
- Heat cure
- Non corrosive
- Thixotropic rheology preventing flow during the process
- High operating temperatures up to 210°C
- Extraordinary chemical resistance and longterm stability

### AVAILABILITY

- 1 kg jars
- 310 ml cartridges
- Bulk packaging options on request
- Optional with glass beads

### APPLICATION EXAMPLES

- LED systems
- Processor cooling
- Memory chip assembly
- CPU boards

PROPERTY	UNIT	TAD-O-SI-1C
<b>MATERIAL</b>		
Colour		Grey
Specific Gravity	g/cm <sup>3</sup>	2.18
Viscosity	Pas	140
Hardness	Shore A	56
Tensile Strength	MPa	2.20
Elongation at Break	%	105
Curing Time (3 mm @ 125°C / @ 100°C)	min	10 / 16
Shelf Life (from Date of Manufacturing, unopened, @ 10 – 30°C / @ < 10°C)	Months	2 / 12
Flammability	UL 94	HB (1.5 mm, V0 6.0 mm)
RoHS Conformity	2015 / 863 / EU	Yes
<b>THERMAL</b>		
Thermal Conductivity	W/mK	2.10
Coefficient of Thermal Expansion Volumetric	x 10 <sup>-6</sup> /K	586
Coefficient of Thermal Expansion Linear	x 10 <sup>-6</sup> /K	195
Operating Temperature Range	°C	- 50 to + 210
<b>ELECTRICAL</b>		
Dielectric Strength	kV/mm	> 18
Volume Resistivity	Ohm - cm	> 3.5 x 10 <sup>13</sup>

All data without warranty and subject to change. Please contact us for further data and information.

# SILICONE ADHESIVE TAD-P-SI-1C

thermally conductive 1 part / RTV condensation cure

TAD-P-SI-1C is a condensation curing, non-corrosive highly thermally conductive 1 part silicone adhesive. It vulcanises at room temperature (RTV) to a strong but still elastic rubber and exhibits excellent primerless adhesion to most surfaces. Due to rapid acetone curing while being in contact with atmospheric moisture it is solvent free. The adhesive features good thermal conductivity and a thixotropic rheology that will prevent slumping or flow during the process. It allows for being operated at temperatures up to 220°C and does not corrode copper or its alloys when fully cured. It is characterised by high resistance to water, acids, bases and most organic solvents and is especially suitable for applications where high thermal conductivity, adhesion, fast curing and controlled, precision application are essential.



## PROPERTIES

- Thermal conductivity: 2.3 W/mK
- High bonding properties
- Cures at room temperature (RTV condensation cure)
- Fast skinning
- Low linear shrinkage
- Non corrosive
- Thixotropic rheology preventing flow during the process
- High operating temperatures up to 220°C
- Extraordinary chemical resistance and longterm stability

## AVAILABILITY

- 310 ml cartridges
- Bulk packaging options on request
- Optional with glass beads

## APPLICATION EXAMPLES

- LED systems
- Processor cooling
- Memory chip assembly
- CPU boards

PROPERTY	UNIT	TAD-P-SI-1C
<b>MATERIAL</b>		
Colour		Grey
Specific Gravity	g/cm <sup>3</sup>	2.11
Linear Shrinkage	%	0.5
Viscosity	Pas	350
Hardness	Shore A	67
Tensile Strength	MPa	3.9
Elongation at Break	%	103
Tack Free Time (@ 23 °C and 65% RH)	min	4
Curing Time (3 mm @ 23 °C and 65% RH)	h	< 8
Full Cure	d	7
Overlap Shear Strength (Al / Cu / St 304 / PC)	kg/cm <sup>2</sup>	7.15 / 3.6 / 2.98 / 4.62
Shelf Life (from Date of Manufacturing, unopened)	Months	12
Max. Storage Temperature	°C	40
RoHS Conformity	2015 / 863 / EU	Yes
<b>Thermal</b>		
Thermal Conductivity	W/mK	2.3
Coefficient of Thermal Expansion Volumetric	x 10 <sup>-6</sup> /K	493
Coefficient of Thermal Expansion Linear	x 10 <sup>-6</sup> /K	164
Operating Temperature Range	°C	- 50 to + 220
<b>Electrical</b>		
Dielectric Strength	kV/mm	> 20
Volume Resistivity	Ohm - cm	> 1 x 10 <sup>14</sup>
Dielectric Constant	@ 1 MHz	4.9

All data without warranty and subject to change. Please contact us for further data and information.

# SILICONE ADHESIVE TAD-U-SI-1C

thermally conductive 1 part / RTV condensation cure

TAD-U-SI-1C is a condensation curing, non-corrosive highly thermally conductive 1 part silicone adhesive. It vulcanises at room temperature (RTV) to a strong but still elastic rubber and exhibits excellent primerless adhesion to most surfaces. Due to rapid alcoxic curing while being in contact with atmospheric moisture it is solvent free. The adhesive features very high thermal conductivity and a thixotropic rheology that will prevent slumping or flow during the process. It allows for being operated at temperatures up to 230°C and does not corrode copper or its alloys when fully cured. It is characterised by high resistance to water, acids, bases and most organic solvents and is especially suitable for applications where very high thermal conductivity, adhesion, fast curing and controlled, precision application are essential.



## PROPERTIES

- Thermal conductivity: 3.27 W/mK
- High bonding properties
- Cures at room temperature (RTV condensation cure)
- Fast skinning
- Non corrosive
- Thixotropic rheology preventing flow during the process
- High operating temperatures up to 230°C
- Extraordinary chemical resistance and longterm stability

## AVAILABILITY

- 310 ml cartridges
- Bulk packaging options on request
- Optional with glass beads

## APPLICATION EXAMPLES

- LED systems
- Processor cooling
- Memory chip assembly
- CPU boards

PROPERTY	UNIT	TAD-U-SI-1C
<b>MATERIAL</b>		
Colour		Grey
Specific Gravity	g/cm <sup>3</sup>	2.95
Extrusion Rate	g/min	104
Hardness	Shore A	84
Tensile Strength	psi	264
Elongation at Break	%	11
Tack Free Time	min	10
Max. Cure	h	48
Overlap Shear Strength (Al)	kg/cm <sup>2</sup>	13.1
Young Modulus	psi	3,330
Shelf Life (from Date of Manufacturing, unopened)	Months	12
Max. Storage Temperature	°C	40
Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
<b>Thermal</b>		
Thermal Conductivity	W/mK	3.27
Operating Temperature Range	°C	- 65 to + 230
<b>Electrical</b>		
Volume Resistivity	Ohm - cm	1.26 x 10 <sup>14</sup>

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHANE ADHESIVE TAD-N-PU-2C

thermally conductive / 2 part / dispensable / Form-in-Place

TAD-N-PU-2C is a thermally conductive two part thixotropic PU-adhesive with thermally conductive fillers in both components. It cures once the two parts come into contact without requiring heat or primer. It has good wetting and high bonding adhesion to most surfaces. The system cures at room temperature or by accelerated heat.

Because of its thixotropic properties, the material can also be used as dispensable 2 part form-in-place gap filler that cures precisely positioned in place. This allows for compensating extreme tolerances and spaces at non-coplanar systems.



## PROPERTIES

- Thermal conductivity: 2 W/mK
- Very high bonding properties
- Extraordinary chemical resistance and longterm stability
- Zero stress on components
- Heat accelerated curing

## AVAILABILITY

- 400 ml (2 x 200 ml) twin cartridges
- 2 x 1 kg cans
- 18 l in pails

## APPLICATION EXAMPLES

- LED systems
- Processor cooling
- Memory chip assembly
- CPU boards
- EHV battery systems

PROPERTY	UNIT	A-Part	B-Part
<b>MATERIAL</b>			
		Polyurethane	Polyurethane
Colour		Black	White
Viscosity @ 5 rpm / 10 rpm	Pas	300 / 284	272 / 165
Viscosity (Mixed) @ 5 rpm	Pas		520
Specific Gravity	g/cm <sup>3</sup>	2.3	2.6
Specific Gravity (Mixed)	g/cm <sup>3</sup>		2.45
Hardness	Shore D		60
Mixing Ratio	Weight		1 : 1
Tensile Shear Strength (AI)	psi		1,380
Tensile Strength	psi		2,030
Elongation	%		30
Shelf Live @ 25 °C	Months		6
Curing Time @ 25 °C			< 24 h
Flammability	UL 94		V0
RoHS Conformity	2015 / 863 / EU		Yes
<b>THERMAL</b>			
Thermal Conductivity <sup>1</sup>	W/mK		2.0
Operating Temperature Range	°C		- 40 to + 85
<b>ELECTRICAL</b>			
Dielectric Strength	kV/mm		13.5
Volume Resistivity	Ohm - cm		4.55 x 10 <sup>12</sup>

Measurement technique according to: <sup>1</sup>ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

## 9 **POTTING GEL**



# SILICONE POTTING GEL TCR-D-SI-2C

dispensable / 2 parts

TCR-D-SI-2C is a 2-part addition cure silicone potting compound which is filled with thermally conductive fillers of high temperature stability. After curing the system remains elastic. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed at normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



## PROPERTIES

- Silicone
- 2 part addition cure
- Thermal conductivity: 0.68 W/mK
- Remains elastic after curing
- Almost zero stress on components
- Dispensable or mouldable
- High resistivity against water and humidity
- Shock absorbing

## AVAILABILITY

- 2 kg / 40 kg (2 x 20 kg) AB Kit

## APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	A PART	B PART
<b>MATERIAL</b>		Silicone	Hardener
Colour		Beige	Black
Density @ 23 °C	g/cm <sup>3</sup>	1.6	1.6
Mixing Ratio	Weight or Volume	1:1	1:1
Hardness	Shore A	45	45
Viscosity (Brookfield)	Pas	6	6
Viscosity (Mixed) (Brookfield)	Pas	6	6
Tensile Strength (cured elastomer after 7 minutes @ 150 °C)	psi	252	252
Elongation at Break (cured elastomer after 7 minutes @ 150 °C)	%	240	240
Coefficient of Thermal Expansion (cured elastomer after 7 minutes @ 150 °C)			
Volumetric	1 x 10 <sup>-6</sup> /K	650	650
Linear	1 x 10 <sup>-6</sup> /K	217	217
Pot Life @ 23 °C, 65 % rel. H.	min	ca.100	ca. 100
Curing Time @ 25 °C / 100 °C		24 h / 7 min	24 h / 7 min
Shelf Life (from Date of Manufacturing, unopened, @ < 30 °C)	Months	24	24
Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK	0.68	0.68
Operating Temperature	°C	- 55 to + 260	- 55 to + 260
Dielectric Strength	kV/mm	> 18	> 18
Volume Resistivity	Ohm - cm	4.02 x 10 <sup>14</sup>	4.02 x 10 <sup>14</sup>
Dielectric Constant	@ 1 kHz	3.08	3.08
Dissipation Factor	@ 1 kHz	0.009	0.009

All data without warranty and subject to change. Please contact us for further data and information.

# SILICONE POTTING GEL TCR-H-SI-2C

dispensable / 2 parts / low viscosity

TCR-H-SI-2C is a 2-part addition cure silicone potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



## PROPERTIES

- Silicone
- Low viscosity
- 2 part addition cure
- Thermal conductivity: 1.2 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Heat accelerated curing
- High resistivity against water and humidity
- Shock absorbing

## AVAILABILITY

- 2 kg / 10 kg (2 x 5 kg) AB Kit

## APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - Heat Pipes
  - BGA
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	A PART	B PART
<b>MATERIAL</b>		Silicone	Silicone
Colour		Light grey	Orange
Density @ -23 °C	g/cm <sup>3</sup>	2.2	2.2
Mixing Ratio	Weight or Volume	1:1	1:1
Hardness (7 days @ -23 °C and 50 % rel. H.)	Shore A	40	40
Viscosity (Brookfield)	Pas	2	1.9
Viscosity (Mixed) (Brookfield)	Pas	1.95	1.95
Tensile Strength (7 days @ -23 °C and 50 % rel. H.)	psi	117	117
Elongation at Break (7 days @ -23 °C and 50 % rel. H.)	%	30	30
Tear Strength (7 days @ -23 °C and 50 % rel. H.)	kN/m	4.56	4.56
Young Modulus (7 days @ -23 °C and 50 % rel. H.)	psi	722	722
Coefficient of Thermal Expansion (7 days @ -23 °C and 50 % rel. H.)			
Volumetric	1 x 10 <sup>-6</sup> /K	402	402
Linear	1 x 10 <sup>-6</sup> /K	134	134
Linear Shrinking (7 days @ -23 °C and 50 % rel. H.)	%	0.03	0.03
Pot Life	min	ca. 50	ca. 50
Curing Time @ 25 °C / 100 °C		4 hrs. / 6 min	4 hrs. / 6 min
Shelf Life (from Date of Manufacturing, unopened, @ < 30 °C)	Months	12	12
Flammability	UL 94	VO (5.6 mm)	VO (5.6 mm)
RoHS Conformity	2015 / 863 / EU	Yes	Yes
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK	1.2	1.2
Operating Temperature	°C	- 70 bis + 250	- 70 bis + 250
Dielectric Strength	kV/mm	14	14
Volume Resistivity	Ohm - cm	1.8 x 10 <sup>14</sup>	1.8 x 10 <sup>14</sup>
Dielectric Constant	@ 1 kHz	4.53	4.53

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-J-PU-2C-LV-AR

dispensable / 2 parts / low viscosity

TCR-J-PU-2C-LV-AR is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Low viscosity
- 2 part addition cure
- Thermal conductivity: 1.5 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm <sup>3</sup>	2.35 – 2.45	1.20 – 1.25
Mixing Ratio	Weight		100 : 8
Viscosity (@ 22 °C, 10 rpm)	mPas	45,000 – 50,000	15 – 35
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		3,500 – 5,000
Hardness	Shore D		40 – 50
Tensile Strength	psi		580
Elongation at Break	%		25
Water absorption (30 days @ 23 °C)	%		0.2
Young Modulus	kpsi		9.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		72.5
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		141.7
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		25 – 35
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (1.5 mm)
RoHS Conformity	2015 / 863 / EU		Ja
Class of Insulation			F
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		1.5
Operating Temperature	°C		- 50 to + 160
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.6 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-L-PU-2C-LV-AR dispensable / 2 parts / low viscosity

TCR-L-PU-2C-LV-AR is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Low viscosity
- 2 part addition cure
- Thermal conductivity: 2.1 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm <sup>3</sup>	2.4 – 2.5	1.20 – 1.25
Mixing Ratio	Weight		100 : 8
Viscosity (@ 22 °C, 10 rpm)	mPas	100,000 – 135,000	15 – 35
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		7,000 – 10,000
Hardness	Shore D		50 – 60
Tensile Strength	psi		870 – 1,160
Elongation at Break	%		9 – 10
Young Modulus	kpsi		8 – 8.7
Curing Shrinkage	%		< 1
Pot Life (100g @ 22 °C / adjustable)	min		10 – 20
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		2.1
Operating Temperature	°C		- 40 to + 160
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50 % rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.5 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-N-PU-2C-LV-AR

dispensable / 2 parts / low viscosity

TCR-N-PU-2C-LV-AR is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Low viscosity
- 2 part addition cure
- Thermal conductivity: 2.6 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm <sup>3</sup>	2.3 – 2.4	1.20 – 1.25
Mixing Ratio	Weight		100 : 8
Viscosity (@ 22 °C, 10 rpm)	mPas	100,000 – 140,000	15 – 35
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		20,000 – 40,000
Hardness	Shore D		40 – 50
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		91.4
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		129.1
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		10 – 30
Curing Time @ 22 °C / Full chemical hardening	h / days		14 – 24 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		2.6
Operating Temperature	°C		- 40 to + 130
Dielectric Strength	kV/mm		31
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.8 / 5.2 / 4.6
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-N-PU-2C-MV-AL

dispensable / 2 parts / medium viscosity

TCR-N-PU-2C-MV-AL is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Medium viscosity
- 2 part addition cure
- Thermal conductivity: 2.6 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aliphatic Isocyanate
Colour		Natural	Transparent
Density @ 22 °C	g/cm <sup>3</sup>	2.3 – 2.4	1.10 – 1.15
Mixing Ratio	Weight		100 : 9
Viscosity (@ 22 °C, 10 rpm)	mPas	110,000 – 130,000	450 – 750
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		60,000 – 70,000
Hardness	Shore D		40 – 50
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		137.9
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		162.0
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		Adjustable
Curing Time @ 22 °C / Full chemical hardening	h / days		12 – 24 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		2.6
Operating Temperature	°C		- 40 to + 130
Dielectric Strength	kV/mm		31
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.8 / 5.2 / 4.6
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-R-PU-2C-LV-AR

dispensable / 2 parts / low viscosity

TCR-R-PU-2C-LV-AR is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Low viscosity
- 2 part addition cure
- Thermal conductivity: 3.0 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm <sup>3</sup>	2.3 – 2.4	1.20 – 1.25
Mixing Ratio	Weight		100 : 8
Viscosity (@ 22 °C, 10 rpm)	mPas	110,000 – 150,000	15 – 35
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		30,000 – 40,000
Hardness	Shore D		45 – 55
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		73.9
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		125.3
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		10 – 30
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		3.0
Operating Temperature	°C		- 40 to + 130
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.5 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-R-PU-2C-MV-AL

dispensable / 2 parts / medium viscosity

TCR-R-PU-2C-MV-AL is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Medium viscosity
- 2 part addition cure
- Thermal conductivity: 3.0 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aliphatic Isocyanate
Colour		Natural	Transparent
Density @ 22 °C	g/cm <sup>3</sup>	2.4 – 2.5	1.10 – 1.15
Mixing Ratio	Weight		100 : 9
Viscosity (@ 22 °C, 10 rpm)	mPas	160,000 – 185,000	450 – 750
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		80,000 – 90,000
Hardness	Shore D		40 – 50
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		106.8
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		121.5
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		Adjustable
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		3.0
Operating Temperature	°C		- 40 to + 130
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.5 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-V-PU-2C-MV-AR dispensable / 2 parts / medium viscosity

TCR-V-PU-2C-MV-AR is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- Medium viscosity
- 2 part addition cure
- Thermal conductivity: 3.5 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm <sup>3</sup>	2.1 – 2.3	1.20 – 1.25
Mixing Ratio	Weight		100 : 7
Viscosity (@ 22 °C, 10 rpm)	mPas	100,000 – 130,000	15 – 35
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		60,000 – 100,000
Hardness	Shore D		20 – 30
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		131.5
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		157.4
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		10 – 30
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (4.0 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		3.5
Operating Temperature	°C		- 30 to + 130
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.5 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.

# POLYURETHAN POTTING GEL

## TCR-V-PU-2C-HV-AL

dispensable / 2 parts / high viscosity

TCR-V-PU-2C-HV-AL is a 2-part addition cure polyurethan potting compound which is filled with thermally conductive fillers of high temperature stability. It is characterised by very good dielectric and mechanic properties and is suited for encapsulating electric and electronic parts such as transformers, capacitors, inductors, sensors, LEDs and can be moulded or dispensed under normal conditions at room temperature or in vacuum. Its rheologic behaviour allows for usage in geometries that are difficult to access.



### PROPERTIES

- Polyurethan
- High viscosity
- 2 part addition cure
- Thermal conductivity: 3.5 W/mK
- Almost zero stress on components
- Dispensable or mouldable
- Solvent-free
- High resistivity against water and humidity
- Free of halogenated flame retardants

### AVAILABILITY

- Tinplate container

### APPLICATION EXAMPLES

Thermal link of:

- Inductors
  - Capacitors
  - LED
  - Battery packs
- For use in Automotive applications  
/ Telecommunication / Controlling  
units / Industrial PCs

PROPERTY	UNIT	CASTING RESIN	HARDENER
<b>MATERIAL</b>		Polyurethan	Aliphatic Isocyanate
Colour		Natural	Transparent
Density @ 22 °C	g/cm <sup>3</sup>	2.1 – 2.3	1.10 – 1.15
Mixing Ratio	Weight		100 : 9
Viscosity (@ 22 °C, 10 rpm)	mPas	150,000 – 200,000	450 – 750
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		110,000 – 130,000
Hardness	Shore D		35 – 45
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		156.2
> T <sub>g</sub> , TMA	1 x 10 <sup>-6</sup> /K		187.9
Curing Shrinkage	%		< 1
Pot Life (100 g @ 22 °C / adjustable)	min		30 – 50
Curing Time @ 22 °C / Full chemical hardening	h / days		16 – 30 / 10 – 14
Shelf Life (from Date of Manufacturing, unopened @ 15 – 25 °C)	Months		6
Flammability (Equivalent)	UL 94		VO (5.6 mm)
RoHS Conformity	2015 / 863 / EU		Yes
Class of Insulation			B
<b>TECHNICAL</b>			
Thermal Conductivity	W/mK		3.5
Operating Temperature	°C		- 40 to + 130
Dielectric Strength	kV/mm		28
Volume Resistivity (@ 23 °C, 50% rel. H.)	Ohm - cm		1 x 10 <sup>15</sup>
Dielectric Constant (ε <sub>r</sub> )	@ 50 Hz / 1 kHz / 1 MHz @ 23 °C		5.5 / 4.5 / 3.9
Dielectric Loss Factor (tan δ)	@ 50 Hz @ 23 °C		0.09
Comparative Tracking Index (CTI)			600

All data without warranty and subject to change. Please contact us for further data and information.



# 10 HALA CLIPS

/ SINGLE SCREWING CLIPS



# HALA CLIP TO 220-1

The single screwing clip HALA Clip TO 220-1 allows for a strong springy fixing of a semiconductor in a TO220 or comparable package and exerts a reliable pressure onto heatsinks. It can be easily fastened by use of M4 screws. Due to its particular shape an optimum mechanic stress behaviour within a wide operating range is achieved thus avoiding any overstrains of the material at the load limits. Even in case of maximum TO 220 tolerances the forces still suffice to generate adequate pressures. Through the special clip geometry the forces operate concentrated on the semiconductor package plates thus maximizing the contact zone and minimizing the thermal resistance. Due to the special surface treatment the clip is protected against corrosion.



## PROPERTIES

- Fixing by M4-screw
- FE-simulation optimised stress behaviour
- Mounting friendly design
- Sufficient pressure even at minimum package height (ca. 3.5 mm for TO 220)
- Anticorrosive by Delta Seal surface treatment
- Easy chip identification by apertures

## OPERATING RANGE

- Force range: ca. 55 – 85 N
- Pressure range: ca. 35 – 55 N/cm<sup>2</sup> (50 – 80 PSI) for different types of TO 220 packages (Surface area TO220 ca. 1.6 cm<sup>2</sup>)

## APPLICATION EXAMPLES

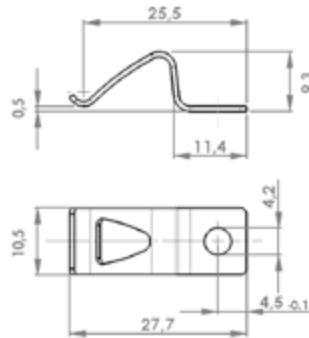
Fixing of semiconductors in TO220 or comparable packages onto heatsinks:

- MOSFETs and IGBTs
- Diodes and rectifiers
- Electronic modules

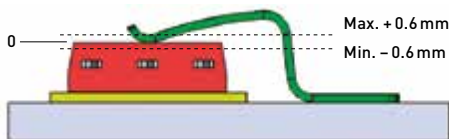
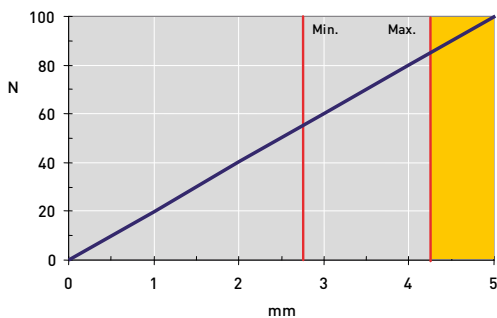
For use in switch mode power supplies / UPS units / Motor control units / Automotive applications / Solar technology



## Dimensions



## Force vs. Deflection



# HALA CLIP TO 247-1

The single screwing clip HALA Clip TO 247-1 allows for a strong springy fixing of a semiconductor in a TO247 or comparable package and exerts a reliable pressure onto heatsinks. It can be easily fastened by use of M4-screws. Due to its particular shape an optimum mechanic stress behaviour within a wide operating range is achieved thus avoiding any overstrains of the material at the load limits. Even in case of maximum TO 247 tolerances the forces still suffice to generate adequate pressures. Through the special clip geometry the forces operate concentrated on the semiconductor package plates thus maximizing the contact zone and minimizing the thermal resistance. Due to the special surface treatment the clip is protected against corrosion.



## PROPERTIES

- Fixing by M4-screw
- FE-simulation optimised stress behaviour
- Mounting friendly design
- Sufficient pressure even at minimum package height (ca. 4.7 mm for TO 247)
- Anticorrosive by Delta Seal surface treatment
- Easy chip identification by apertures

## OPERATING RANGE

- Force range: ca. 95 – 110 N
- Pressure range: ca. 28 – 32 N/cm<sup>2</sup> (40 – 47 PSI) for different types of TO247 packages (Surface area TO247 ca. 3.4 cm<sup>2</sup>)

## APPLICATION EXAMPLES

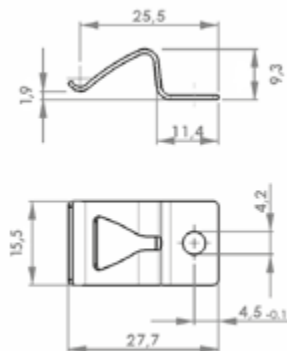
Fixing of semiconductors in TO247 or comparable packages onto heatsinks:

- MOSFETs
- IGBTs
- Diodes

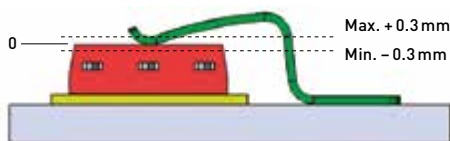
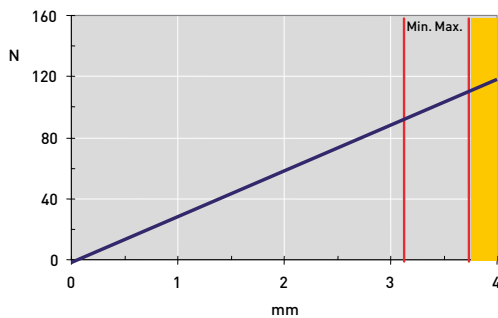
For use in switch mode power supplies / UPS units / Motor control units / Automotive applications



## Dimensions



## Force vs. Deflection



## LEGAL INFORMATION

### CONTACT

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### PICTURE CREDITS

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### DESIGN

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