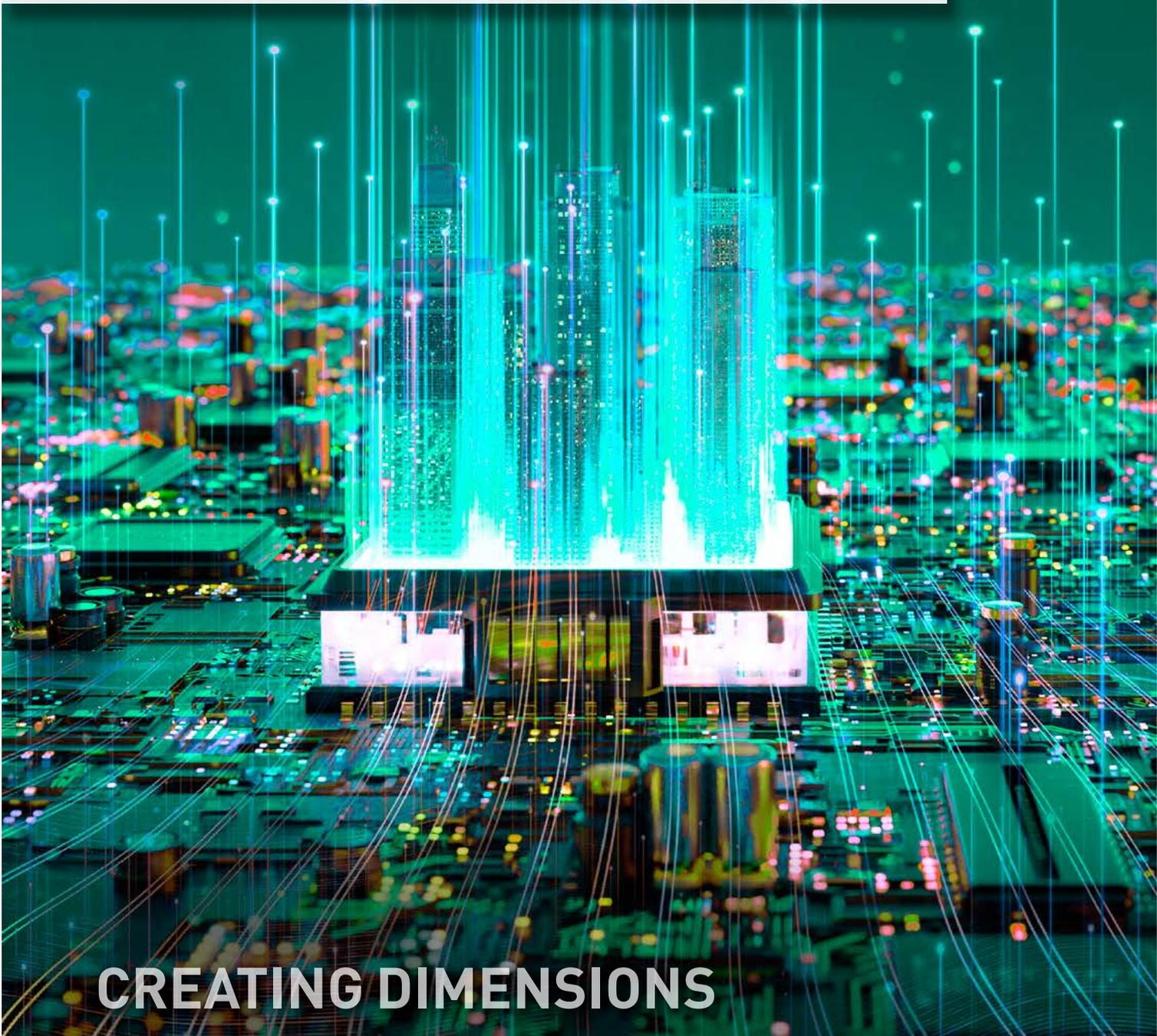


THERMAL MANAGEMENT
INTERFACE
MATERIALS 2023

CREATING DIMENSIONS





The background is a dark blue gradient with intricate, glowing circuit-like patterns. These patterns consist of thin white and light blue lines, some of which are dotted or have small circles at their ends, resembling a network or data flow. There are also several small, bright blue squares and circles scattered throughout, some of which appear to be part of the circuitry. The overall effect is a sense of high-tech, digital connectivity.

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

16	Total-Thermal-Management
18	Heat Pipe Assemblies

B THERMAL INTERFACE MATERIALS

	Material	Product Code	Insulating	Conductivity	
21	1 GAP FILLER			W/mK	
	Silicone				
22	Silicone Gap Filler Pad / soft	TGF-M-SI	■	2.5	
23	Silicone Gap Filler Pad / soft	TGF-R-SI	■	3.0	■ electrically insulating
24	Silicone Gap Filler Pad / soft	TGF-U-SI	■	4.5	
25	Silicone Gap Filler Pad / soft	TGF-Z-SI	■	11	
26	Silicone Gap Filler Pad / very soft	TGF-BXS-SI	■	1.2	■ electrically non-insulating
27	Silicone Gap Filler Pad / very soft	TGF-HUS-SI	■	1.8	
28	Silicone Gap Filler Pad / very soft	TGF-JUS-SI	■	2.0	■ low dielectric
29	Silicone Gap Filler Pad / very soft / LV	TGF-JXS-SI	■	2.0	
30	Silicone Gap Filler Pad / very soft / optional fibreglass reinforced	TGF-MXS-SI	■	2.4	/LV = Low Volatile Siloxanes
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-UP-SI	■	4.0	
40	Silicone Gap Filler / plastic	TGF-WP-SI	■	6.0	
41	Silicone Gap Filler / plastic	TGF-YP-SI	■	7.0	
42	Silicone Gap Filler / plastic	TGF-ZP-SI	■	11	
43	Silicone Gap Filler Pad / highly conductive / LV	TEL-R-SI	■	15	
44	Silicone Gap Filler Pad / highly conductive / LV	TEL-Z-SI	■	50	
45	Silicone Gap Filler Pad / highly conductive / LV	TEL-YSS-SI	■	16	
46	Silicone Gap Filler Pad / highly conductive / LV	TEL-ZS-SI	■	20	
47	2-Part Gap Filler / dispensable / LV	TDG-L-SI-2C-Y	■	2.0	
48	2-Part Gap Filler / dispensable / LV	TDG-T-SI-2C	■	3.0	
49	2-Part Gap Filler / dispensable / LV	TDG-U-SI-2C	■	3.6	
50	2-Part Gap Filler / dispensable / LV	TDG-W-SI-2C	■	4.5	
51	2-Part Gap Filler / dispensable / LV	TDG-Y-SI-2C	■	6.0	
52	1-Part Silicone Gap Filler / Putty / dispensable	TGL-W-SI	■	5.5	
53	1-Part Silicone Gap Filler / Putty / dispensable	TGL-X-SI	■	6.5	
	Silicone-free				
54	Silicone-free Gap Filler Pad / soft	TGF-R-NS	■	3.0	
55	Silicone-free Gap Filler Pad / soft	TGF-V-NS	■	5.0	
56	Silicone-free Gap Filler Pad / soft	TGF-W-NS	■	6.0	
57	Silicone-free Gap Filler Pad / soft	TGF-Y-NS	■	8.0	
58	Silicone-free Gap Filler Pad / very soft	TGF-GUS-NS	■	1.5	
59	Silicone-free Gap Filler Pad / very soft	TGF-IXS-NS	■	2.0	
60	Silicone-free Gap Filler Pad / very soft	TGF-NSS-NS	■	2.5	
61	Silicone-free Gap Filler Pad / elasto-plastic	TGF-ZP-NS	■	10.0	
62	1-Part Silicone-free Gap Filler / Putty / dispensable	TGL-U-NS	■	4.0	

65	2 FOILS & FILMS			W/mK
66	Silicone foil / fibreglass reinforced	TF0-D-SI	■	1.2
67	Silicone foil / fibreglass reinforced	TF0-G-SI	■	1.6
68	Silicone foil / fibreglass reinforced	TF0-J-SI	■	2.0
69	Silicone foil / fibreglass reinforced	TF0-K-SI	■	2.5
70	Silicone foil / fibreglass reinforced	TF0-O-SI	■	3.0
71	Silicone foil / fibreglass reinforced	TF0-Q-SI	■	6.0
72	Silicone foil / fibreglass reinforced	TF0-R-SI	■	3.5
73	Silicone foil / fibreglass reinforced	TF0-T-SI	■	4.1
74	Silicone foil / fibreglass reinforced	TF0-X-SI	■	5.0
75	Silicone foil / fibreglass reinforced	TF0-ZS-SI	■	8.0
76	Insulating film / silicone coated	TF0-M-SI-PI	■	-
77	3 SILICONE CAPS			
78	Silicone cap	TCP-C-SI	■	0.8
79	Silicone cap	TCP-J-SI	■	1.5
80	Silicone cap	TCP-L-SI	■	2.0
81	4 PHASE CHANGE MATERIAL			
82	Polyimide film / phase change coated	TPC-N-PI	■	-
83	Polyimide film / phase change coated	TPC-P-KA	■	-
84	Phase change film	TPC-W-PC	■	3.5
85	Aluminum film / phase change coated	TPC-R-AL	■	-
86	Aluminum film / phase change coated	TPC-T-AL-CB	■	-
87	Graphite film / phase change coated	TPC-V-PG-CB	■	-
88	Phase change compound	TPC-W-PC-M/-E	■	3.5
89	Phase change compound	TPC-X-PC-NC-HT-M/-E	■	3.0
90	Phase change compound	TPC-Z-PC-HT-M/-E	■	3.0
91	5 GRAPHITE FOILS			
92	Graphite foil / anisotropic	TF0-S-CB	■	z:8 / x-y:140
93	Graphite foil / pyrolytic	TF0-V-PG	■	z:5 / x-y:1500
94	Graphite foil / pyrolytic	TF0-Y-PG	■	z:>15 / x-y:>700
95	Graphite foil / pyrolytic	TF0-ZS-PG	■	z:30 / x-y:500
97	6 PSA INSULATING TAPE			
98	PSA Insulating tape / acrylate with insulating film	TAT-J-PE	■	0.7
99	PSA Insulating tape / silicone	TAT-M-SI	■	1.0
101	7 THERMAL GREASE			
102	Silicone-free grease / highly thermally conductive	TGR-J-NS	■	2.0
103	Silicone-free grease / highly thermally conductive	TGR-M-NS	■	2.4
105	8 ADHESIVES			
106	Silicone adhesive / thermally conductive / 1K	TAD-G-SI-1C	■	1.4
107	Silicone adhesive / thermally conductive / 1K	TAD-O-SI-1C	■	2.1
108	Silicone adhesive / thermally conductive / 1K RTV	TAD-P-SI-1C	■	2.3
109	Silicone adhesive / thermally conductive / 1K	TAD-U-SI-1C	■	3.3
110	Polyurethane adhesive / thermally conductive / 2K	TAD-N-PU-2C	■	2.0
111	9 POTTING GEL			
112	Silicone potting gel / 2 parts	TCR-D-SI-2C	■	0.7
113	Silicone potting gel / 2 parts	TCR-H-SI-2C	■	1.2
114	PU Potting gel / 2 parts	TCR-J-PU-2C-LV-AR	■	1.5
115	PU Potting gel / 2 parts	TCR-N-PU-2C-LV-AR	■	2.6
116	PU Potting gel / 2 parts	TCR-N-PU-2C-MV-AL	■	2.6
117	PU Potting gel / 2 parts	TCR-V-PU-2C-MV-AR	■	3.5
118	PU Potting gel / 2 parts	TCR-V-PU-2C-HV-AL	■	3.5
119	10 HALA CLIPS			
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 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. “

WWW.HALA-TEC.DE
CONTEC@HALA-TEC.DE





” SALES

” PRODUCTION

” MARKETING

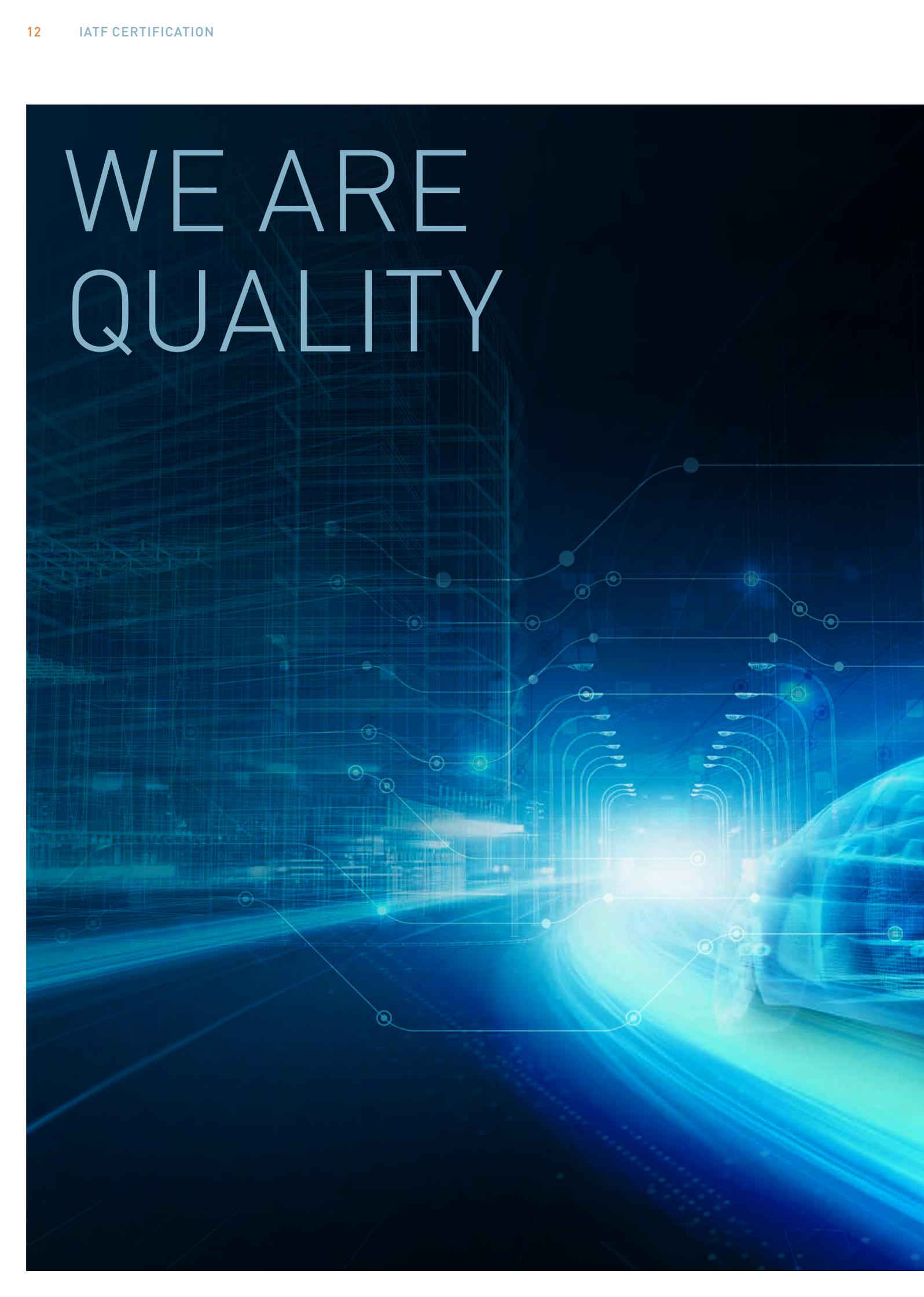
” QUALITY

” ORDER MANAGEMENT

” PURCHASE

” SALES

WE ARE QUALITY



HALA IS
IATF 16949:2016
CERTIFIED

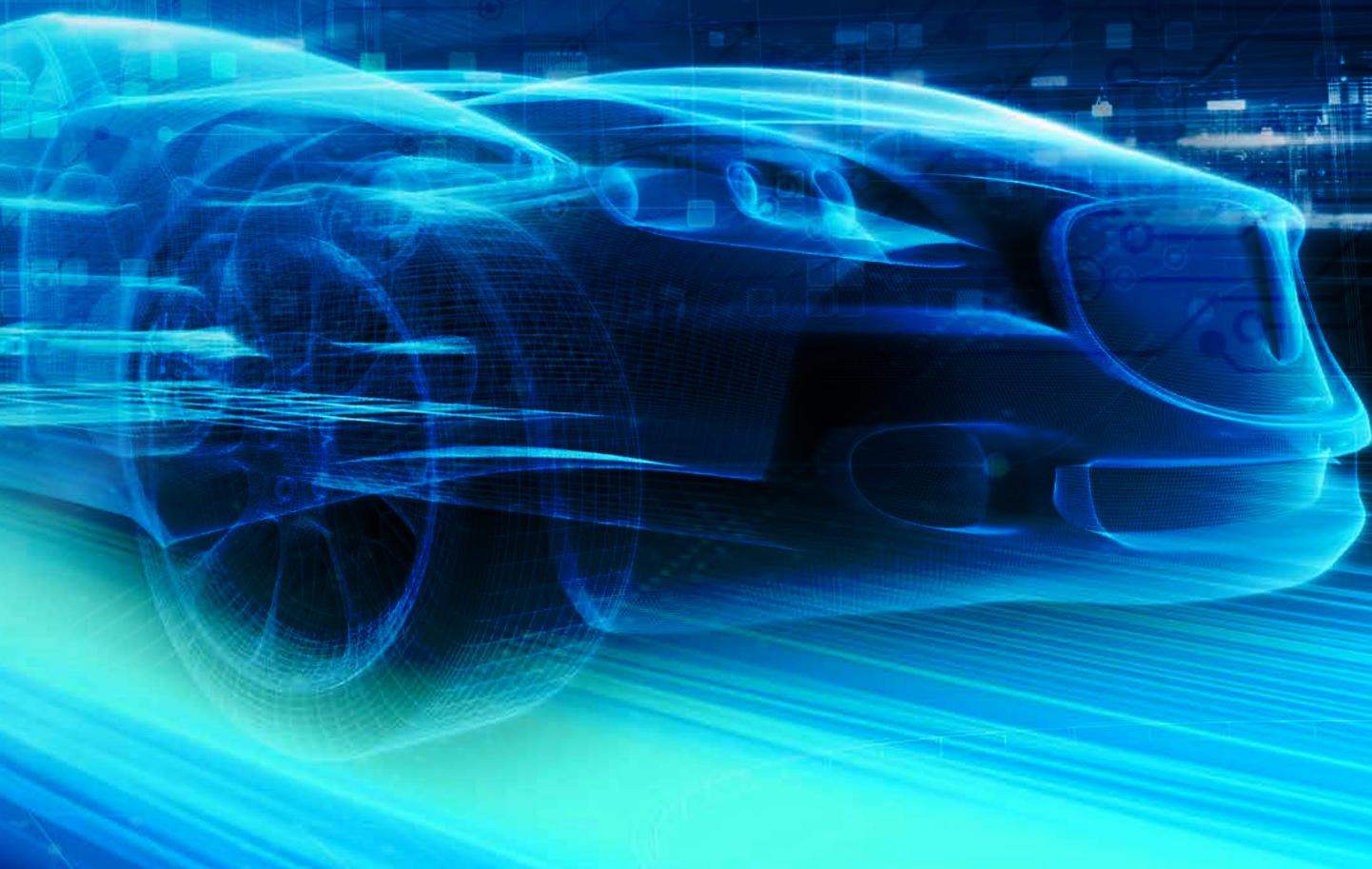


Intertek

” 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

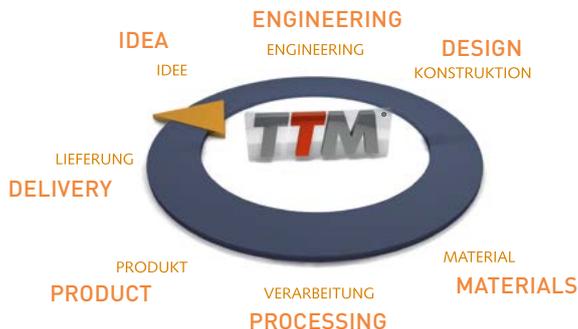
PROJECT MANAGEMENT

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“



Dr. Wilhelm Pohl
Managing Director
+49 89 665 477-84
wilhelm.pohl@hala-tec.de

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

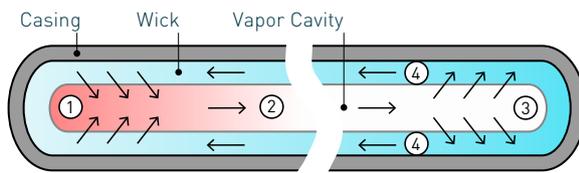
Tubular Heat Pipes



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 [¼"]	70 - 750	≥19	≥2.5 (e.g. 3.5)
8	70 - 750	≥24	≥3 (e.g. 4.0)
9.52 [⅜"]	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 [½"]	70 - 750	≥38	≥3 (e.g. 6.3)
15.875 [⅝"]	70 - 750	≥47	≥3 (e.g. 8.0)
19.05 [¾"]	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 [¼"] / 8 / 9.52 [⅜"] / 10 / 12 / 12.7 [½"]

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

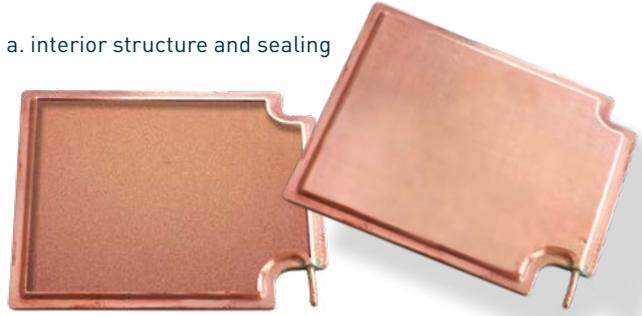
Width Tolerance ±0.10 to ±0.15 mm

FLATTENED HEAT PIPES

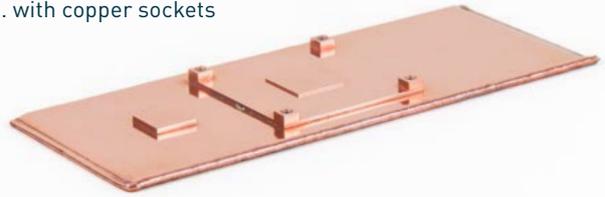


VAPOR CHAMBERS

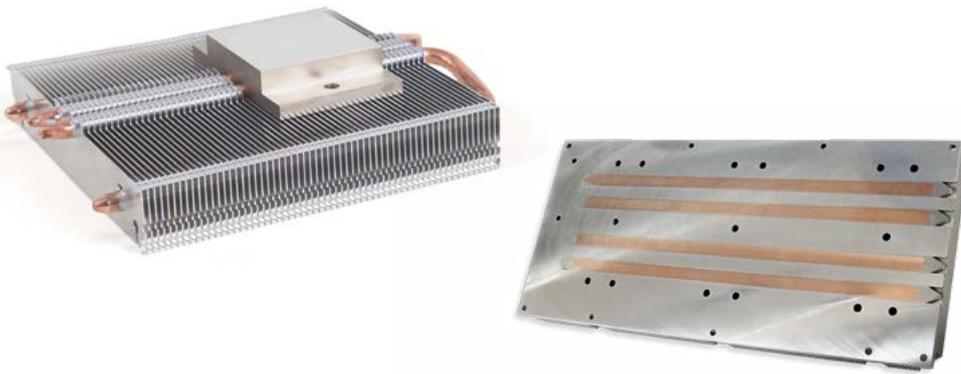
a. interior structure and sealing



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 ≥ 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

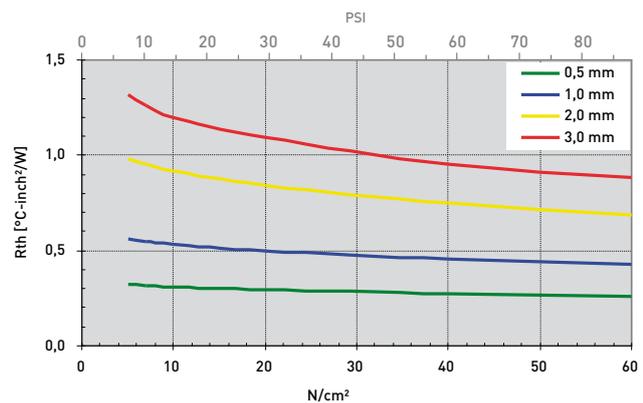
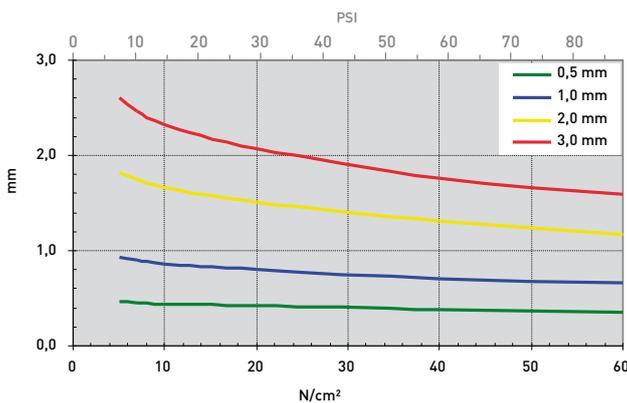
- Thermal link of:
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering/ Industrial PCs

PROPERTY	UNIT	TGF-M0500-SI	TGF-M1000-SI	TGF-M2000-SI	TGF-M3000-SI
MATERIAL					
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	50	50	50	50
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance ¹ @ 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 ¹ @ 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 ¹ @ 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 ¹	W/mK	2.5	2.5	2.5	2.5
Operating Temperature Range	$^{\circ}\text{C}$	- 60 to + 180			
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0×10^{11}	1.0×10^{11}	1.0×10^{11}	1.0×10^{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/cm² (PSI) / Rth vs. N/cm² (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

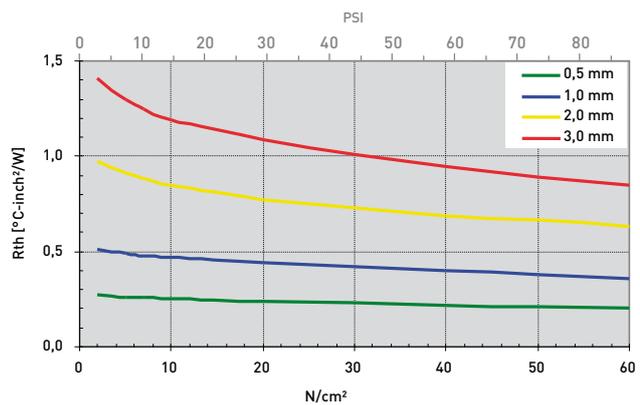
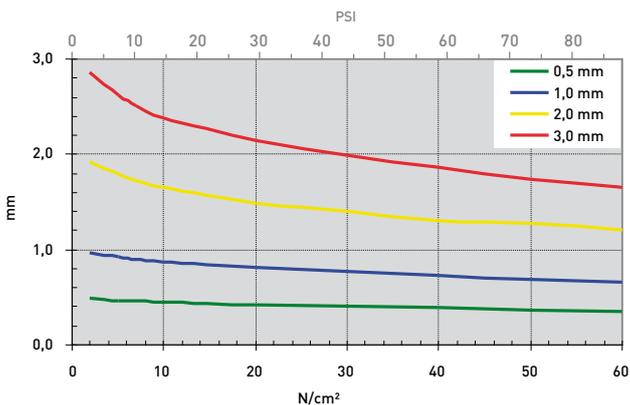
- Thermal link of:
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications/ Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-R0500-SI	TGF-R1000-SI	TGF-R2000-SI	TGF-R3000-SI
MATERIAL					
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
THERMAL					
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.22 (0.39)	0.40 (0.73)	0.68 (1.31)	0.95 (1.86)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.24 (0.42)	0.44 (0.81)	0.77 (1.49)	1.09 (2.15)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.26 (0.46)	0.48 (0.90)	0.88 (1.72)	1.25 (2.50)
Thermal Conductivity ¹	W/mK	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 60 to + 180			
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 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 / 4.0 mm / 5.0 mm

mm vs. N/cm² (PSI) / Rth vs. N/cm² (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:

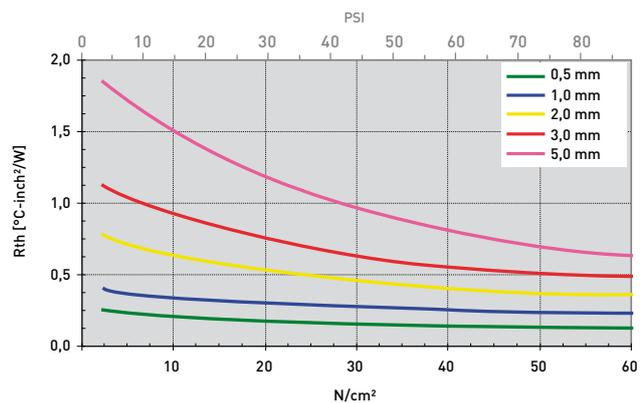
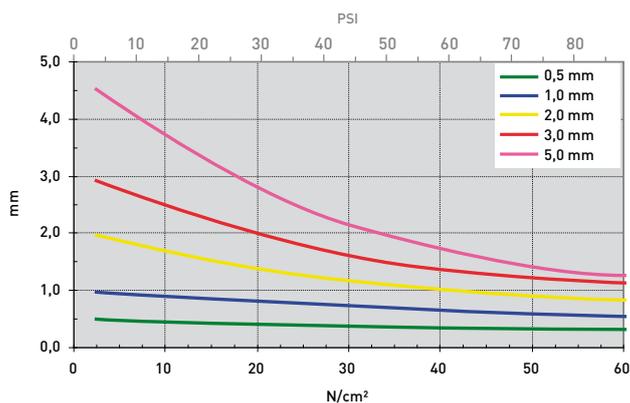
- SMD packages
 - Through-hole vias
 - RDRAMs Smemory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-U0500-SI	TGF-U1000-SI	TGF-U2000-SI	TGF-U3000-SI	TGF-U5000-SI
MATERIAL						
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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.15 (0.35)	0.27 (0.65)	0.42 (1.03)	0.57 (1.40)	0.84 (1.75)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.17 (0.40)	0.32 (0.81)	0.55 (1.40)	0.78 (1.98)	1.20 (2.75)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.22 (0.45)	0.36 (0.91)	0.68 (1.77)	0.99 (2.63)	1.62 (3.95)
Thermal Conductivity ¹	W/mK	4.5	4.5	4.5	4.5	4.5
Operating Temperature Range	°C	- 40 to + 180				
ELECTRICALLY						
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

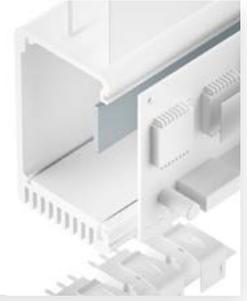
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

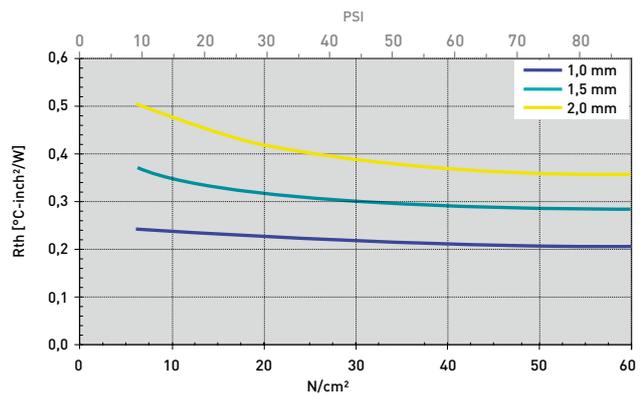
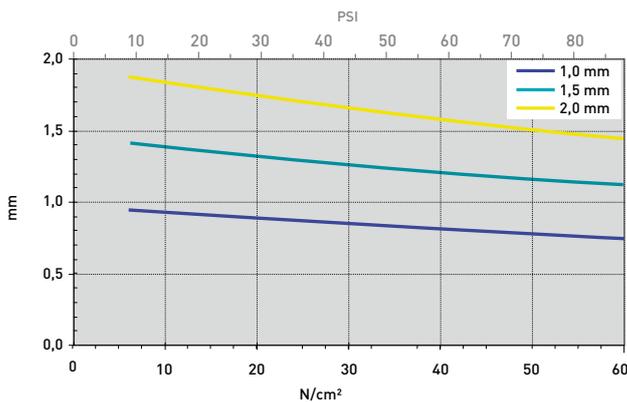
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Capacitors
- For use in Automotive applications / Laptops / Medicine engineering / Embedded-boards

PROPERTY	UNIT	TGF-Z1000-SI	TGF-Z1500-SI	TGF-Z2000-SI
MATERIAL				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light grey	Light grey	Light grey
Density	g/cm ³	3.4	3.4	3.4
Thickness	mm	1.0 ±0.2	1.5 ±0.2	2.0 ±0.3
Hardness	Shore 00	72	72	72
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.21 (0.82 mm)	0.30 (1.21 mm)	0.37 (1.59 mm)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.23 (0.89 mm)	0.32 (1.33 mm)	0.42 (1.76 mm)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICALLY				
Dielectric Strength	kV / mm	>14	>14	>14
Dielectric Constant	Ohm - cm	1.0 x 10 ¹¹	1.0 x 10 ¹¹	1.0 x 10 ¹¹
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

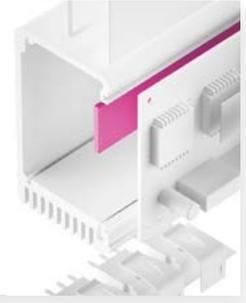
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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:

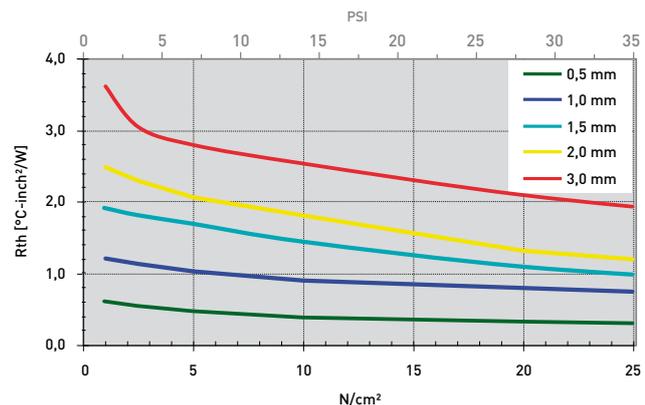
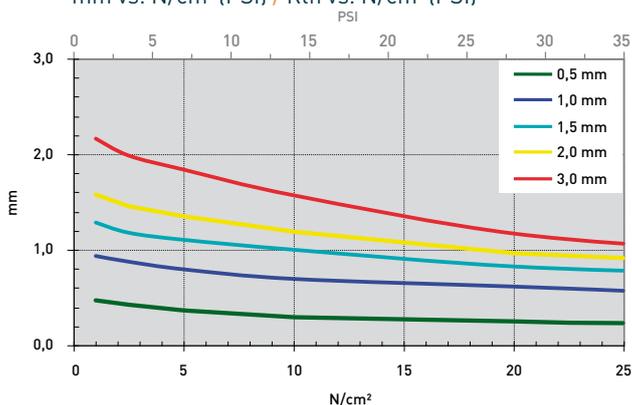
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications
/ Laptops / Medicine engineering
/ Industrial PCs

PROPERTY	UNIT	TGF-BXS0500-SI	TGF-BXS1000-SI	TGF-BXS1500-SI	TGF-BXS2000-SI	TGF-BXS3000-SI
MATERIAL						
		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 ³	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
THERMAL						
Resistance ¹ @ 35 PSI @ Thickness	°C-inch ² /W (mm)	0.31 (0.24)	0.75 (0.58)	1.00 (0.80)	1.20 (0.92)	1.95 (1.09)
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	0.39 (0.30)	0.90 (0.70)	1.45 (1.01)	1.81 (1.19)	2.54 (1.57)
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /W (mm)	0.48 (0.37)	1.03 (0.80)	1.70 (1.11)	2.07 (1.35)	2.80 (1.84)
Thermal Conductivity ¹	W/mK	1.2	1.2	1.2	1.2	1.2
Operating Temperature Range	°C	-40 to +150				
ELECTRIC						
Dielectric Strength	kV / mm	> 6.5	> 6.5	> 6.5	> 6.5	> 6.5
Volume Resistivity	Ohm - cm	3.5 x 10 ¹²				
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/cm² (PSI) / Rth vs. N/cm² (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

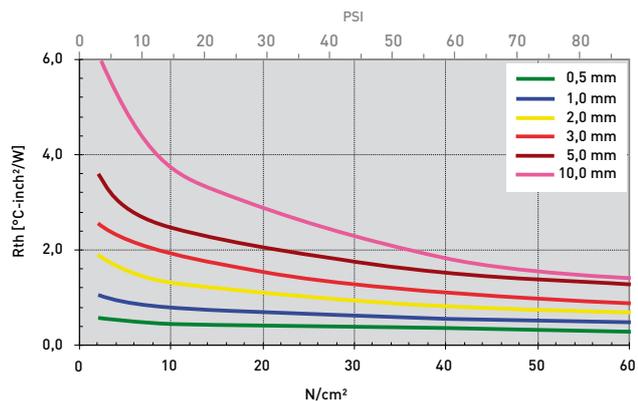
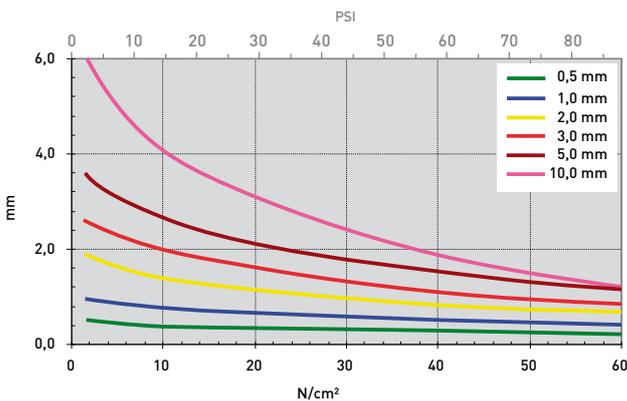
- Thermal link of:
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-HUS0500-SI	TGF-HUS1000-SI	TGF-HUS2000-SI	TGF-HUS3000-SI	TGF-HUS5000-SI
MATERIAL						
MATERIAL		Ceramic filled silicone				
Colour		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
THERMAL						
Resistance ¹ @ 60 PSI @ thickness	°C-inch ² /W (mm)	0.34 (0.31)	0.56 (0.54)	0.82 (0.85)	1.10 (1.09)	1.52 (1.54)
Resistance ¹ @ 30 PSI @ thickness	°C-inch ² /W (mm)	0.40 (0.36)	0.69 (0.68)	1.12 (1.16)	1.53 (1.63)	2.06 (2.13)
Resistance ¹ @ 10 PSI @ thickness	°C-inch ² /W (mm)	0.50 (0.46)	0.85 (0.85)	1.48 (1.57)	2.10 (2.18)	2.71 (2.92)
Thermal Conductivity ¹	W/mK	1.8	1.8	1.8	1.8	1.8
Operating Temperature Range	°C	- 40 to + 150				
ELECTRICALLY						
Dielectric Strength	kV / mm	> 10	> 10	> 10	> 10	> 10
Volume Resistivity	Ohm - cm	8.056 x 10 ¹²				
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

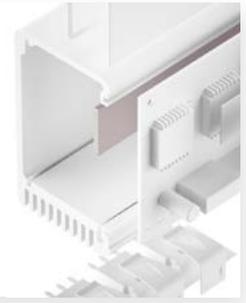
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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 ≥ 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:

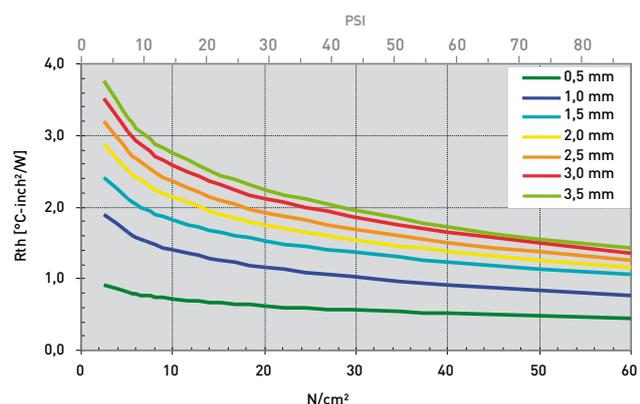
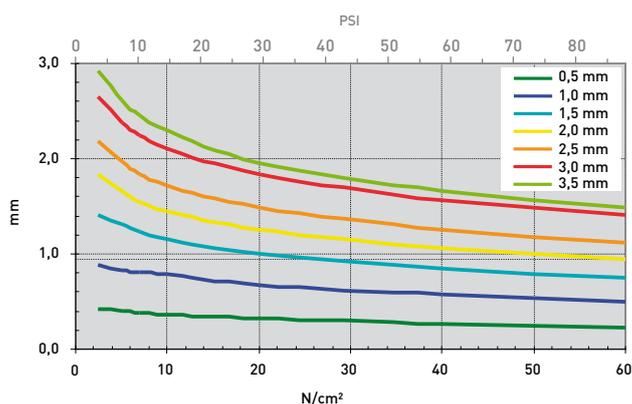
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-JUS0500-SI	TGF-JUS1000-SI	TGF-JUS2000-SI	TGF-JUS3000-SI
MATERIAL					
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey
Thickness	mm	0.5 ± 0.05	1.0 ± 0.10	2.0 ± 0.20	3.0 ± 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
THERMAL					
Resistance ¹ @ 60 PSI @ thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.60 (0.35)	1.00 (0.65)	1.40 (1.10)	1.70 (1.60)
Resistance ¹ @ 30 PSI @ thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.70 (0.40)	1.20 (0.75)	1.80 (1.30)	2.10 (1.85)
Resistance ¹ @ 10 PSI @ thickness	$^{\circ}\text{C}\text{-inch}^2/\text{W}$ (mm)	0.80 (0.45)	1.50 (0.85)	2.30 (1.58)	2.80 (2.25)
Thermal Conductivity ¹	W/mK	2.0	2.0	2.0	2.0
Operating Temperature Range	$^{\circ}\text{C}$	- 60 to + 180			
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0×10^{11}	1.0×10^{11}	1.0×10^{11}	1.0×10^{11}
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/cm² (PSI) / Rth vs. N/cm² (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

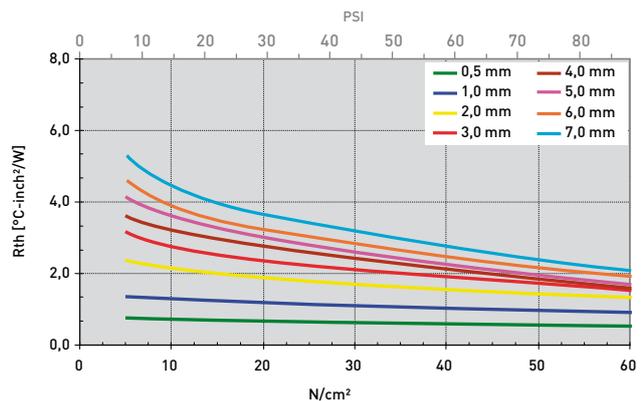
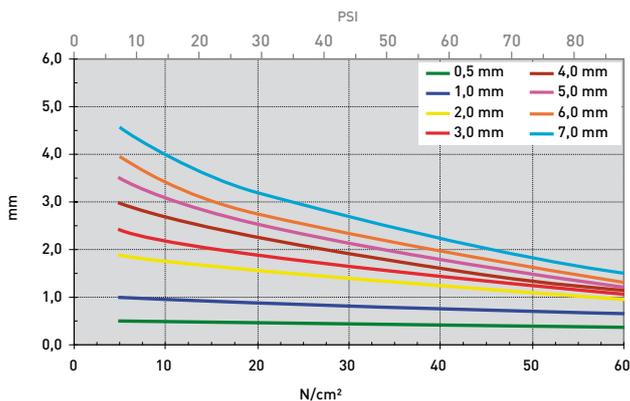
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs Smemory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-JXS0500-SI-A1	TGF-JXS1000-SI-A1	TGF-JXS2000-SI-A1	TGF-JXS3000-SI-A1	TGF-JXS5000-SI-A1
MATERIAL						
Colour		Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey
Thickness	mm	0.5 ^{+0.20} / _{-0.10}	1.0 ^{+0.20} / _{-0.10}	2.0 ^{+0.20}	3.0 ^{+0.30}	5.0 ^{+0.50}
Hardness	Shore 00	20	20	20	20	20
No Paint Wetting Impairment Substances (PWIS) ¹		Passed	Passed	Passed	Passed	Passed
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
THERMAL						
Resistance ² @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.59 (0.41)	1.03 (0.75)	1.57 (1.25)	1.90 (1.46)	2.26 (1.81)
Resistance ² @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.64 (0.45)	1.16 (0.86)	1.85 (1.55)	2.33 (1.87)	2.98 (2.52)
Resistance ² @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICALLY						
Dielectric Strength	kV / mm	>10	>10	>10	>10	>10
Volume Resistivity	Ohm - cm	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰

Measurement technique according to: ¹P-VW 3-10.7 57650 Temp. Test, ²ASTM 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

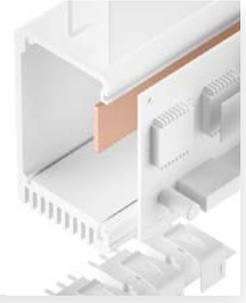
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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:

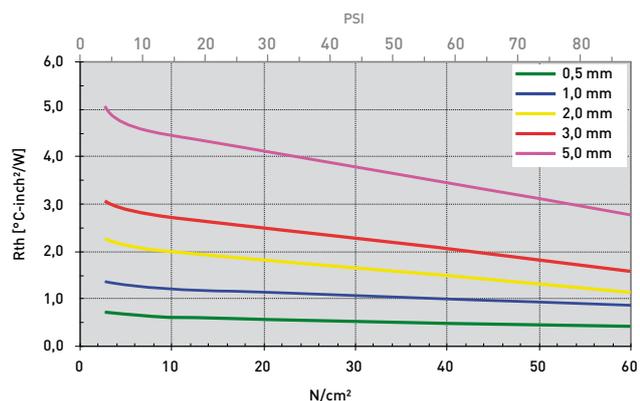
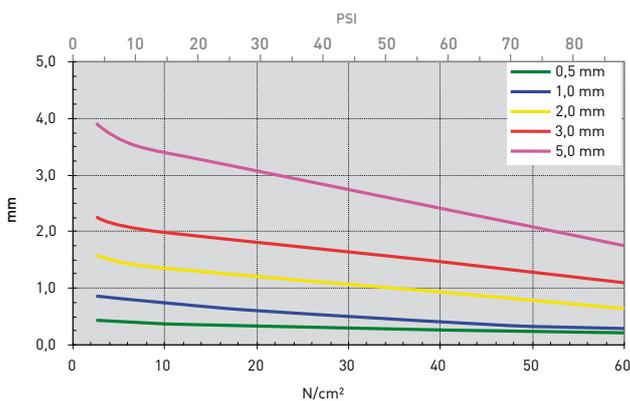
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-MXS0500-SI	TGF-MXS1000-SI	TGF-MXS2000-SI	TGF-MXS3000-SI
MATERIAL					
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		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
THERMAL					
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.44 (0.25)	1.00 (0.45)	1.49 (0.86)	2.05 (1.50)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.53 (0.32)	1.15 (0.63)	1.79 (1.15)	2.50 (1.73)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /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			
ELECTRICAL					
Dielectric Strength	kV / mm	4	4	4	4
Volume Resistivity	Ohm - cm	1.7 x 10 ¹³			

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/cm² (PSI) / Rth vs. N/cm² (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

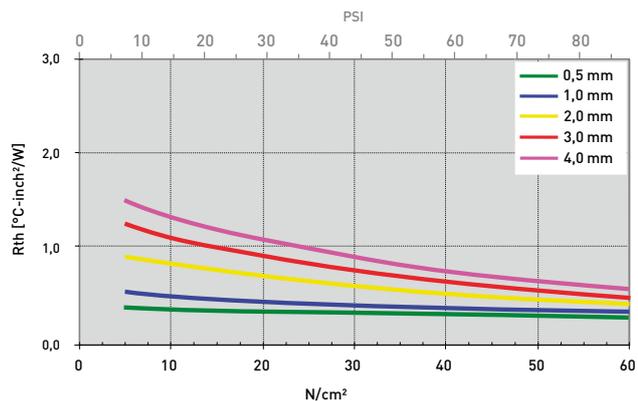
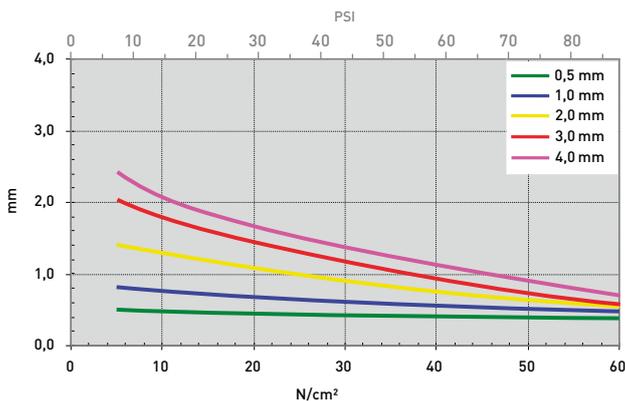
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

PROPERTY	UNIT	TGF-LSS0500-SI	TGF-LSS1000-SI	TGF-LSS2000-SI	TGF-LSS3000-SI	TGF-LSS4000-SI
MATERIAL						
Colour		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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.32 (0.39)	0.40 (0.54)	0.54 (0.71)	0.65 (0.90)	0.75 (1.10)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.35 (0.43)	0.46 (0.65)	0.75 (1.09)	0.96 (1.46)	1.11 (1.67)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.39 (0.47)	0.55 (0.77)	0.90 (1.35)	1.22 (1.93)	1.44 (2.30)
Thermal Conductivity ¹	W/mK	2.5	2.5	2.5	2.5	2.5
Operating Temperature Range	°C	- 50 to + 170				
ELECTRICAL						
Dielectric Strength	kV / mm	> 7.0	> 7.0	> 7.0	> 7.0	> 7.0
Volume Resistivity	Ohm - cm	1.0 x 10 ¹³				
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

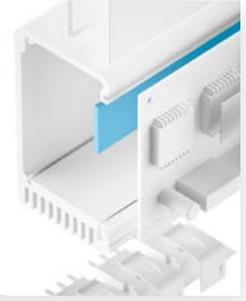
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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 (≥ 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:

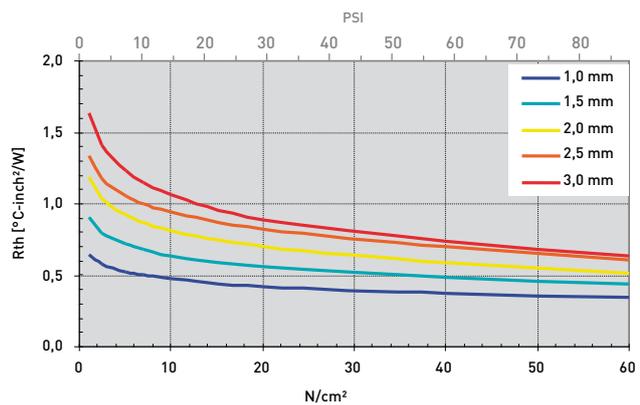
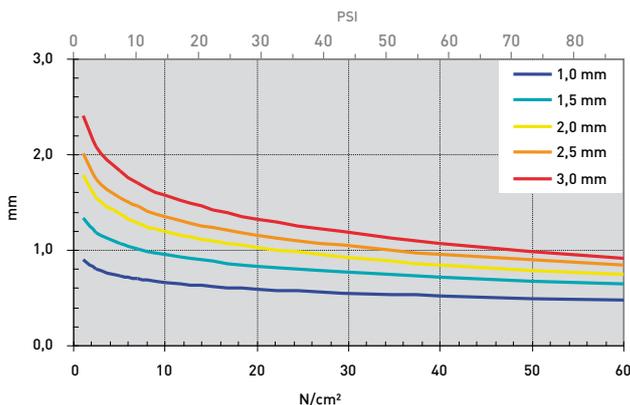
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

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

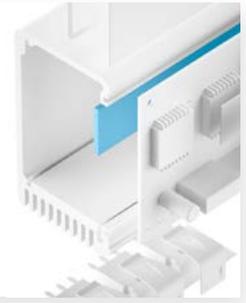
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

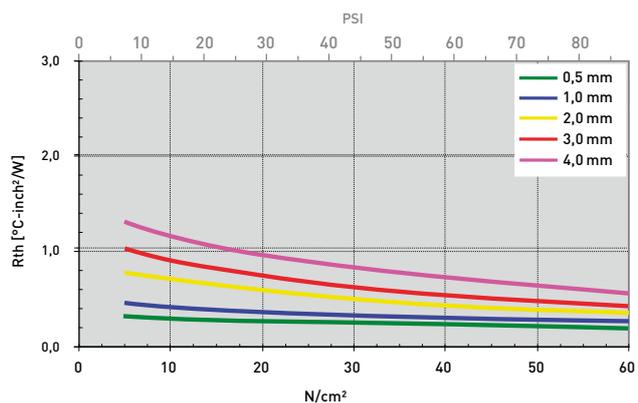
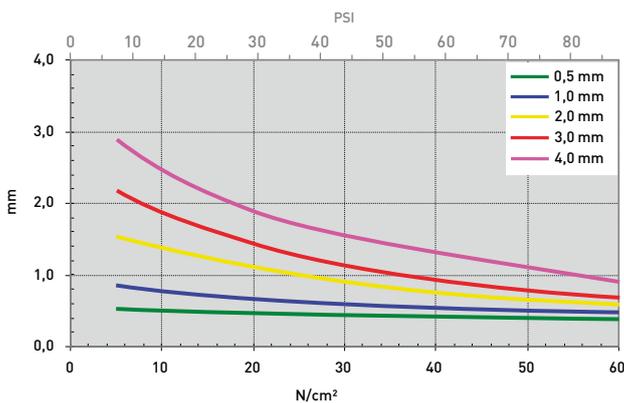
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

PROPERTY	UNIT	TGF-RSS0500-SI	TGF-RSS1000-SI	TGF-RSS2000-SI	TGF-RSS3000-SI	TGF-RSS4000-SI
MATERIAL						
Colour		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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.25 (0.41)	0.31 (0.52)	0.44 (0.73)	0.54 (0.93)	0.74 (1.33)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.27 (0.44)	0.37 (0.67)	0.59 (1.10)	0.75 (1.44)	0.95 (1.89)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.30 (0.48)	0.45 (0.81)	0.75 (1.48)	0.99 (2.08)	1.25 (2.74)
Thermal Conductivity ¹	W/mK	3.0	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 50 to + 170				
ELECTRICAL						
Dielectric Strength	kV / mm	>7.0	>7.0	>7.0	>7.0	>7.0
Volume Resistivity	Ohm - cm	1.0 x 10 ¹³				
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

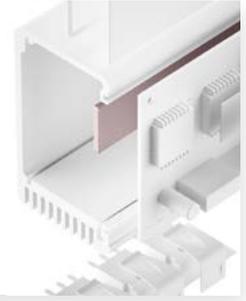
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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:

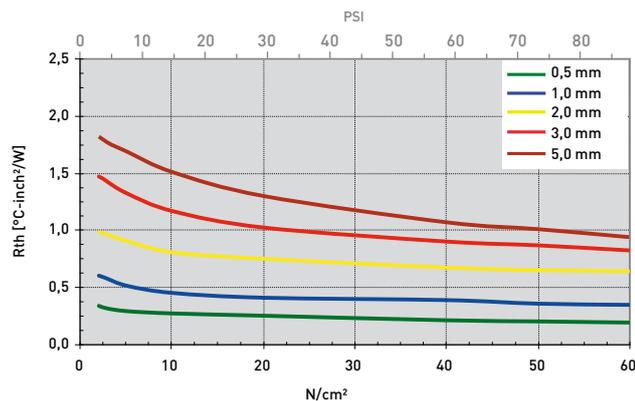
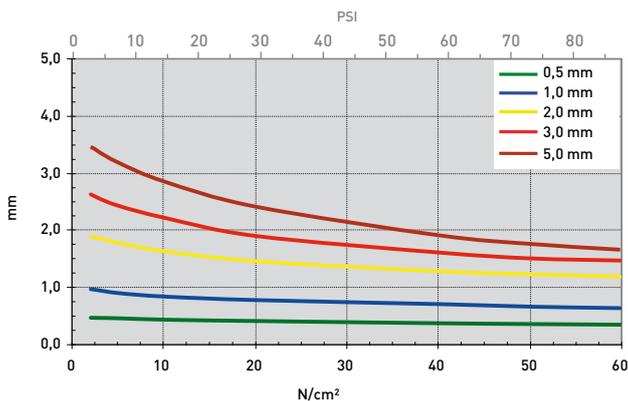
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-TSS0500-SI	TGF-TSS1000-SI	TGF-TSS2000-SI	TGF-TSS3000-SI	TGF-TSS5000-SI
MATERIAL						
Colour		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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.22 (0.37)	0.40 (0.70)	0.68 (1.27)	0.91 (1.60)	1.08 (1.90)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.26 (0.41)	0.42 (0.77)	0.76 (1.45)	1.03 (1.89)	1.31 (2.40)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.29 (0.44)	0.49 (0.86)	0.86 (1.70)	1.25 (2.31)	1.61 (3.01)
Thermal Conductivity ¹	W/mK	3.2	3.2	3.2	3.2	3.2
Operating Temperature Range	°C	- 40 to + 180				
ELECTRICALLY						
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

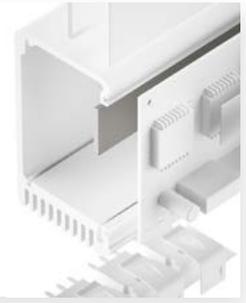
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

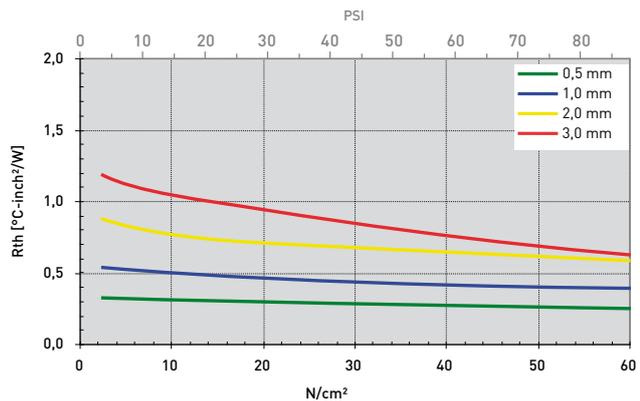
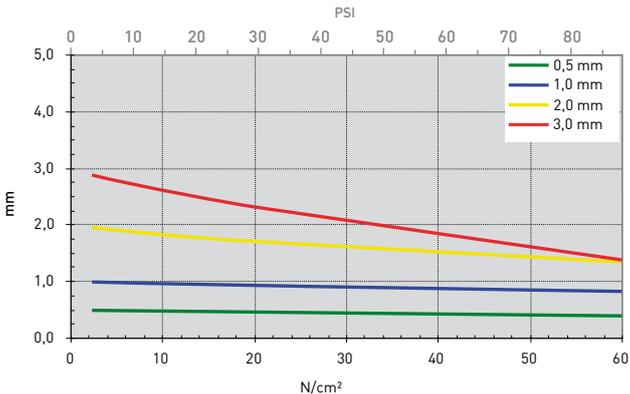
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-USS0500-SI-A1	TGF-USS1000-SI-A1	TGF-USS2000-SI-A1	TGF-USS3000-SI-A1
MATERIAL					
		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 ^{+0.20} / _{-0.10}	1.0 ^{+0.20} / _{-0.10}	2.0 ^{+0.20}	3.0 ^{+0.30}
Hardness	Shore 00	45	45	45	45
No Paint Wetting Impairment Substances (PWIS) ¹		Passed	Passed	Passed	Passed
UL Flammability (Equivalent)	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance ² @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.26 (0.47)	0.40 (0.87)	0.63 (1.55)	0.75 (1.84)
Resistance ² @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.29 (0.48)	0.45 (0.93)	0.70 (1.70)	0.94 (2.30)
Resistance ² @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.31 (0.49)	0.51 (0.99)	0.80 (1.85)	1.07 (2.68)
Thermal Conductivity ¹	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
ELECTRICAL					
Breakdown Voltage	kV / mm	>10	>10	>10	>10
Volume Resistivity	Ohm - cm	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰

Test Methods: ¹P-VW 3-10.7 57650 Temp. Test, ²ASTM 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

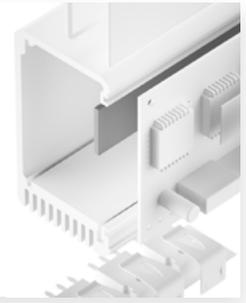
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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:

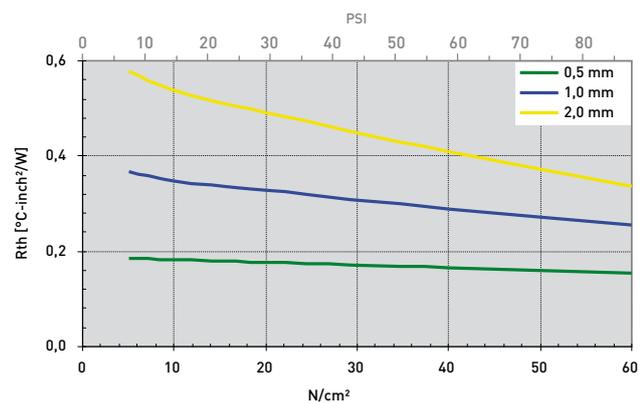
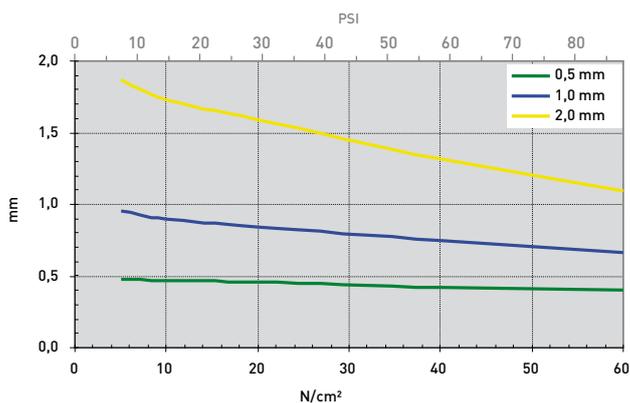
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-WSS1000-SI	TGF-WSS2000-SI
MATERIAL			
		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	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.30 (0.75)	0.41 (1.32)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.32 (0.85)	0.49 (1.59)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.36 (0.93)	0.56 (1.80)
Thermal Conductivity ¹	W/mK	5.5	5.5
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180
ELECTRICAL			
Dielectric Strength	kV / mm	10	10
Volume Resistivity	Ohm - cm	1.0 x 10 ¹³	1.0 x 10 ¹³

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

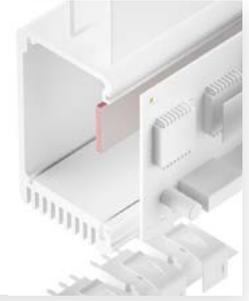
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

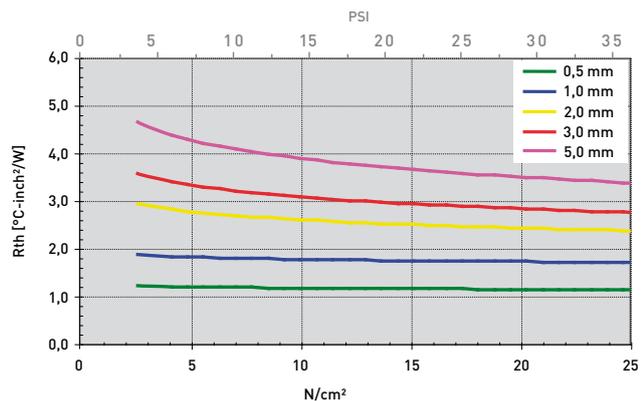
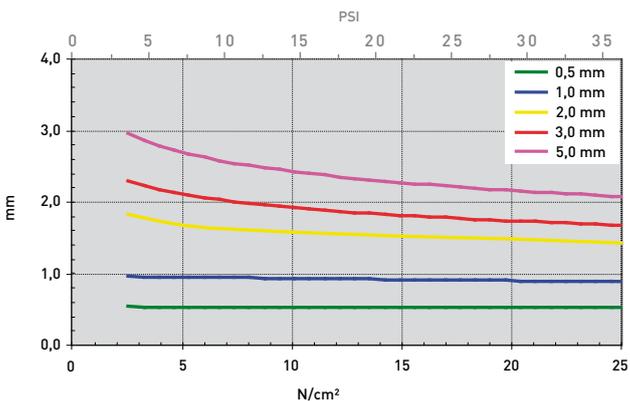
- Thermal link of:
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-DXS1000-SI-GF	TGF-DXS2000-SI-GF	TGF-DXS3000-SI-GF	TGF-DXS5000-SI-GF
MATERIAL					
Colour		White / Pink	White / Pink	White / Pink	White / Pink
Reinforcement		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	1.0 ^{+0.10} / _{-0.01}	2.0 ^{+0.20} / _{-0.02}	3.0 ^{+0.30} / _{-0.03}	5.0 ^{+0.50} / _{-0.05}
Hardness	Shore 00	25	25	25	25
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance ¹ @ 35 PSI @ Thickness	°C-inch ² /W (mm)	1.77 (0.94)	2.43 (1.40)	2.80 (1.65)	3.40 (2.10)
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	1.85 (0.95)	2.70 (1.60)	3.10 (1.95)	3.95 (2.55)
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /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			
ELECTRICAL					
Dielectric Strength	kV / mm	6	6	6	6
Volume Resistivity	Ohm - cm	6.2 x 10 ¹⁵			
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/cm² (PSI) / Rth vs. N/cm² (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:

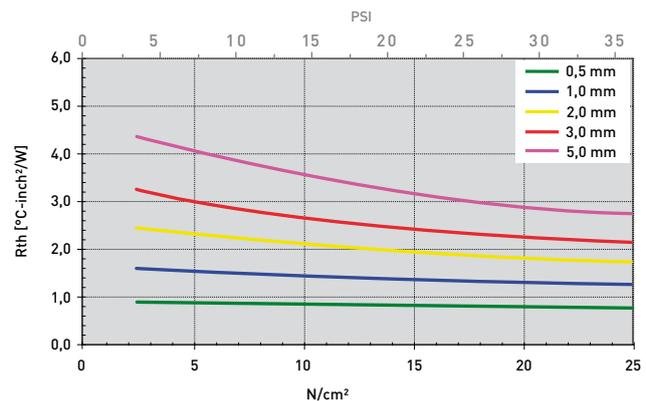
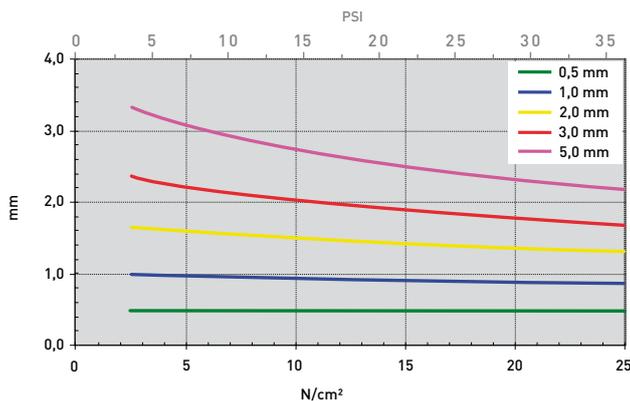
- SMD packages
 - Through-hole vias
 - RDRAMs Smemory modules
 - Flip Chips, DSPs, BGAs, PPGAs
- For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

PROPERTY	UNIT	TGF-EXS0500-SI-GF	TGF-EXS1000-SI-GF	TGF-EXS2000-SI-GF	TGF-EXS3000-SI-GF	TGF-EXS5000-SI-GF
MATERIAL						
Colour		Ceramic filled silicone Reddish brown / Grey				
Reinforcement		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
THERMAL						
Resistance ¹ @ 35 PSI @ Thickness	°C-inch ² /W (mm)	0.76 [0.46]	1.26 [0.86]	1.73 [1.30]	2.14 [1.68]	2.73 [2.17]
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	0.85 [0.47]	1.44 [0.92]	2.07 [1.50]	2.63 [2.03]	3.58 [2.72]
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /W (mm)	0.89 [0.48]	1.54 [0.95]	2.31 [1.58]	3.00 [2.20]	4.08 [3.06]
Thermal Conductivity ¹	W/mK	1.4	1.4	1.4	1.4	1.4
Operating Temperature Range	°C	- 40 to + 180				
ELECTRICALLY						
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

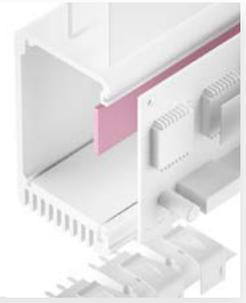
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



SILICONE GAP FILLER TGF-UP-SI

plastic

TGF-UP-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.



GAP FILLER

PROPERTIES

- Plastic
- Soft and compliant
- Thermal conductivity: 4.0 W/mK
- Extraordinary chemical resistance and longterm stability
- Two-side self-tacky

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

- ASICs, BGAs
- Through-hole vias
- Capacitors
- Electronic parts to heat pipes

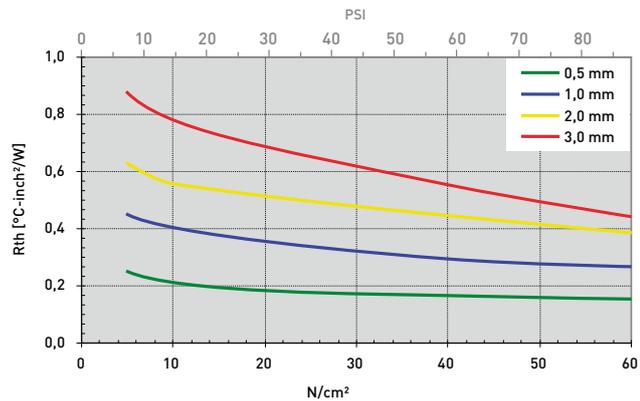
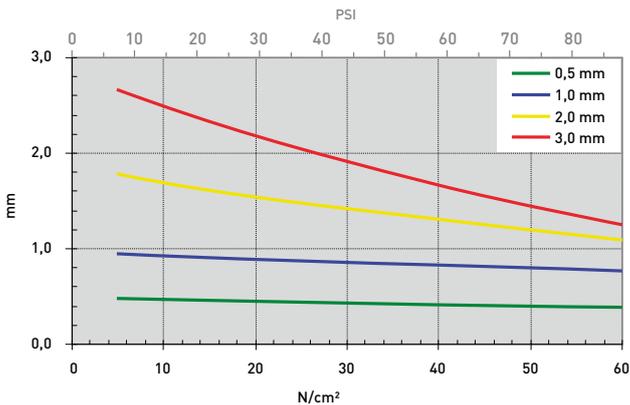
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs / Network Communication

PROPERTY	UNIT	TGF-UP0500-SI	TGF-UP1000-SI	TGF-UP2000-SI	TGF-UP3000-SI
MATERIAL					
Colour		Purple	Purple	Purple	Purple
Density	g/cm ³	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
Hardness	Shore 00	60	60	55	55
Shelf Life (unopened, dry storage conditions @ < 40°C)	Months	12	12	12	12
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.17 (0.41)	0.29 (0.82)	0.44 (1.31)	0.55 (1.66)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.18 (0.44)	0.36 (0.88)	0.52 (1.54)	0.68 (2.20)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.23 (0.48)	0.43 (0.94)	0.60 (1.75)	0.83 (2.61)
Thermal Conductivity ¹	W/mK	4.0	4.0	4.0	4.0
Operating Temperature Range	°C	- 40 to + 150			
ELECTRICALLY					
Dielectric Strength	kV / mm	> 6	> 6	> 6	> 6
Volume Resistivity	Ohm - cm	1.0 x 10 ¹³			
Dielectric Constant	@ 1 MHz	7.5	7.5	7.5	7.5

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

Thicknesses: 0.3 mm / 0.5 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / ... / 10.0 mm

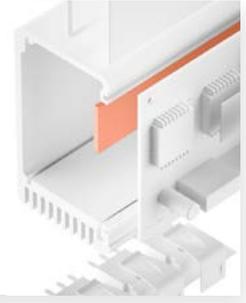
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



SILICONE GAP FILLER TGF-WP-SI

plastic

TGF-WP-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: 6.0 W/mK
- Extraordinary chemical resistance and longterm stability
- Two-side self-tacky

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

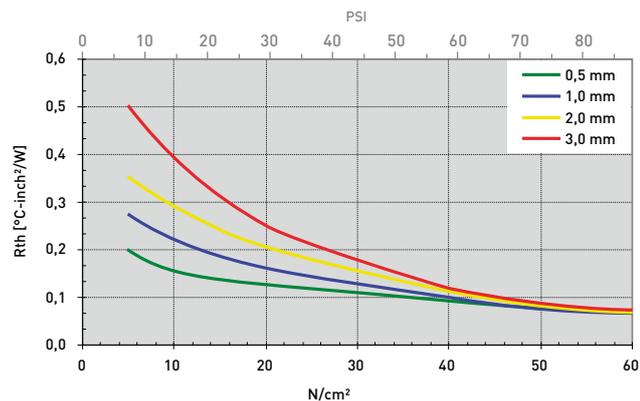
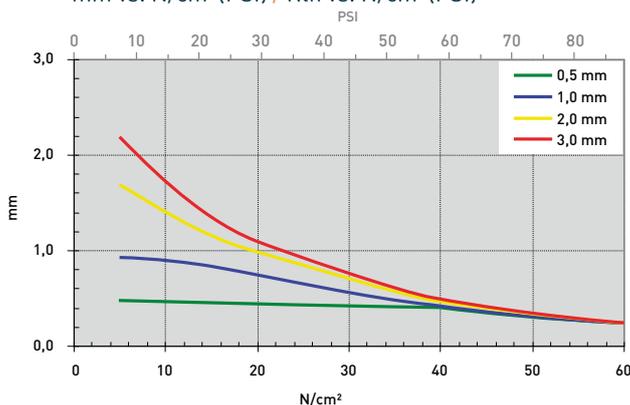
- ASICs, BGAs
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs / Network Communication

PROPERTY	UNIT	TGF-WP0500-SI	TGF-WP1000-SI	TGF-WP2000-SI	TGF-WP3000-SI
MATERIAL					
Colour		Apricot	Apricot	Apricot	Apricot
Density	g/cm ³	3.3	3.3	3.3	3.3
Thickness	mm	0.5 ±0.10	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	55	40	40	40
Shelf Life (unopened, dry storage conditions @ < 40°C)	Months	12	12	12	12
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.09 (0.40)	0.10 (0.42)	0.11 (0.48)	0.11 (0.49)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.12 (0.45)	0.16 (0.75)	0.20 (1.00)	0.25 (1.10)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.18 (0.48)	0.25 (0.93)	0.33 (1.59)	0.46 (2.01)
Thermal Conductivity	W/mK	6.0	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to + 150			
ELECTRICALLY					
Dielectric Strength	kV / mm	>5	>5	>5	>5
Volume Resistivity	Ohm - cm	1.0 x 10 ¹²			
Dielectric Constant	@ 1 MHz	7.9	7.9	7.9	7.9

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 / 0.75 mm / 1.0 mm / 2.0 mm / 3.0 mm / 4.0 mm / 5.0 mm / ... / 10.0 mm

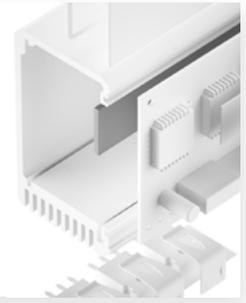
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

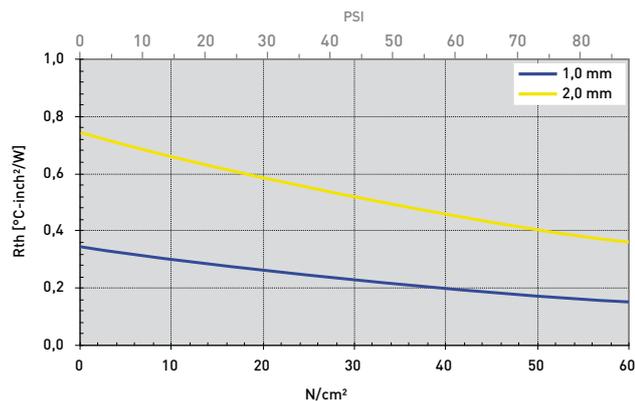
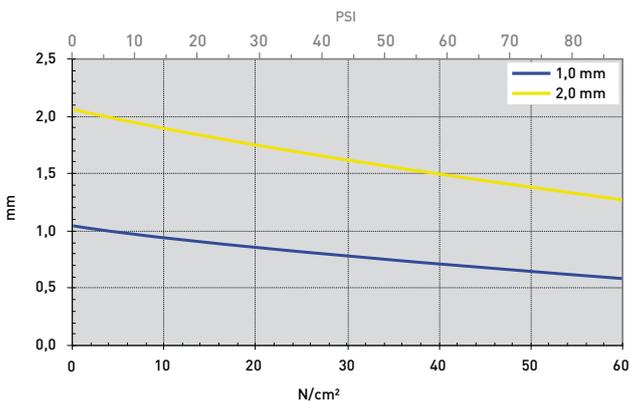
- Thermal link of:
- SMD packages
 - Through-hole vias
 - Capacitors
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-YP1000-SI	TGF-YP2000-SI
MATERIAL			
		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
THERMAL			
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.20 (0.75)	0.45 (1.50)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.27 (0.90)	0.59 (1.75)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICALLY			
Dielectric Strength	kV / mm	>10	>10
Volume Resistivity	Ohm - cm	> 1.0 x 10 ¹²	> 1.0 x 10 ¹²
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

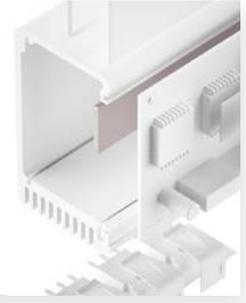
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

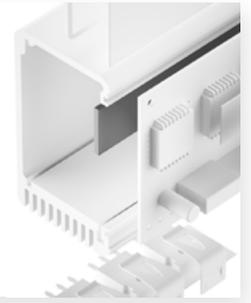
Measurement technique according to: ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.5 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-RXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

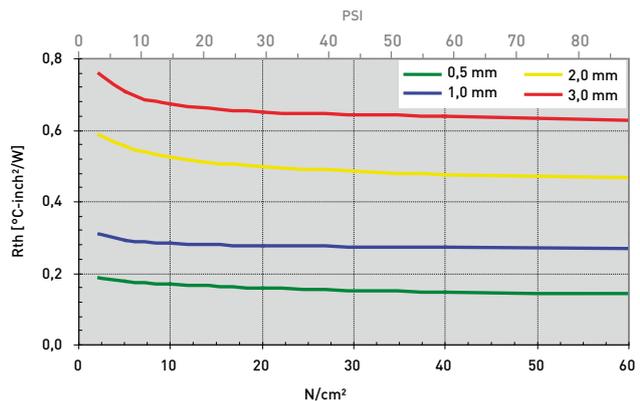
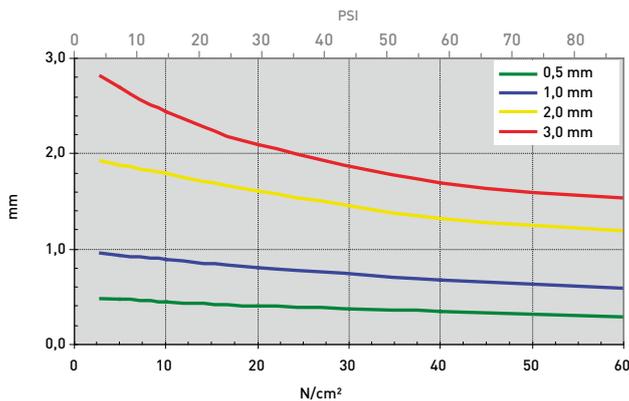
- Thermal link of:
- MOSFETs und IGBTs
 - Power diodes or AC/DC converters
 - Power modules
 - CPUs
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-R0500-SI	TEL-R1000-SI	TEL-R2000-SI
MATERIAL				
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
THERMAL				
Resistance ¹ @ 90 PSI Thickness	°C-inch ² /W (mm)	0.15 (0.30)	0.27 (0.60)	0.47 (1.20)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.16 (0.41)	0.28 (0.81)	0.50 (1.61)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICAL				
Dielectric Strength	kV/mm	1.0	1.0	1.0
Volume Resistivity	Ohm - cm	≥ 1 x 10 ¹²	≥ 1 x 10 ¹²	≥ 1 x 10 ¹²

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/cm² (PSI) / Rth vs. N/cm² (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:

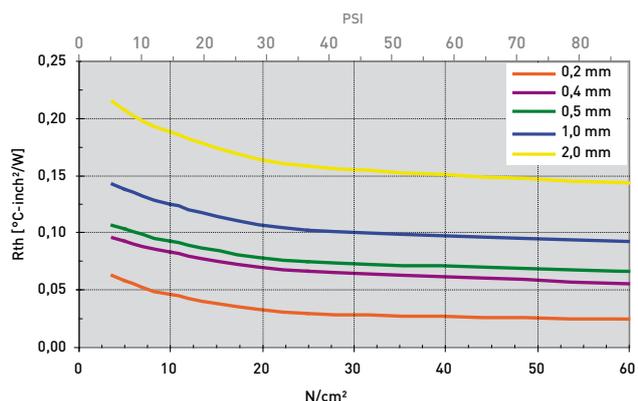
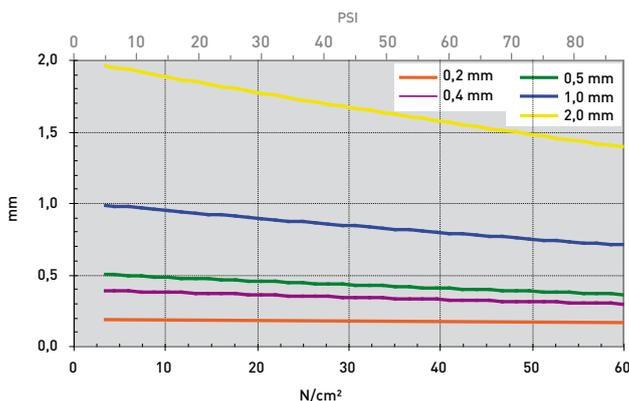
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-Z0200-SI	TEL-Z0500-SI	TEL-Z1000-SI
MATERIAL				
MATERIAL		Graphite filled silicone elastomere	Graphite filled silicone elastomere	Graphite filled silicone elastomere
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) ¹		Passed	Passed	Passed
Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 90 PSI @ Thickness	°C-inch ² /W (mm)	0.020 (0.16)	0.060 (0.33)	0.09 (0.70)
Resistance ² @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.027 (0.18)	0.075 (0.48)	0.11 (0.91)
Resistance ² @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICAL				
Volume Resistivity	Ohm - cm	< 50,000	< 50,000	< 50,000

Measurement technique according to: ¹P-VW 3-10.7 57650 Temp. Test, ²ASTM 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

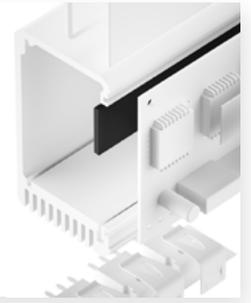
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

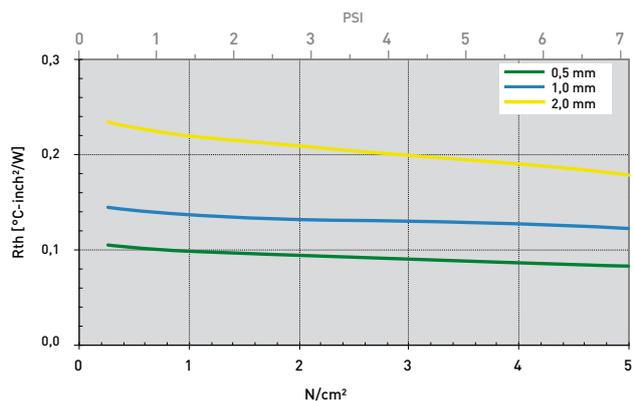
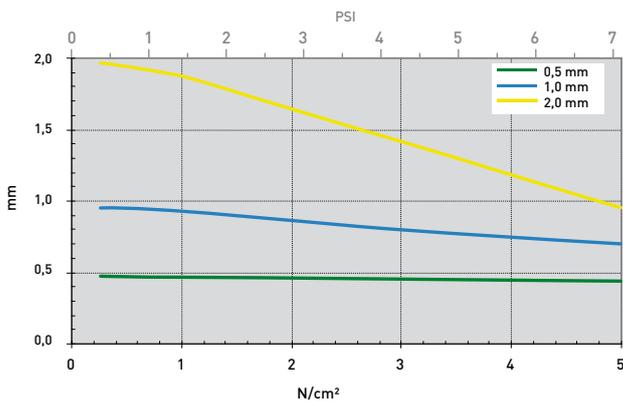
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-YSS0500-SI	TEL-YSS1000-SI	TEL-YSS2000-SI
MATERIAL				
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
THERMAL				
Resistance ¹ @ 7.5 PSI @ Thickness	°C-inch ² /W (mm)	0.083 (0.42)	0.124 (0.700)	0.180 (0.954)
Resistance ¹ @ 3.5 PSI @ Thickness	°C-inch ² /W (mm)	0.089 (0.45)	0.129 (0.785)	0.205 (1.550)
Resistance ¹ @ 1.5 PSI @ Thickness	°C-inch ² /W (mm)	0.100 (0.47)	0.137 (0.934)	0.220 (1.874)
Thermal Conductivity ¹	W/mK	16	16	16
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
ELECTRICAL				
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

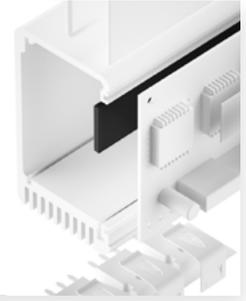
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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

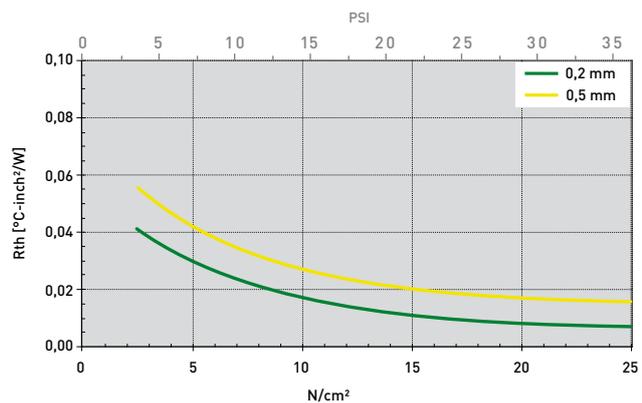
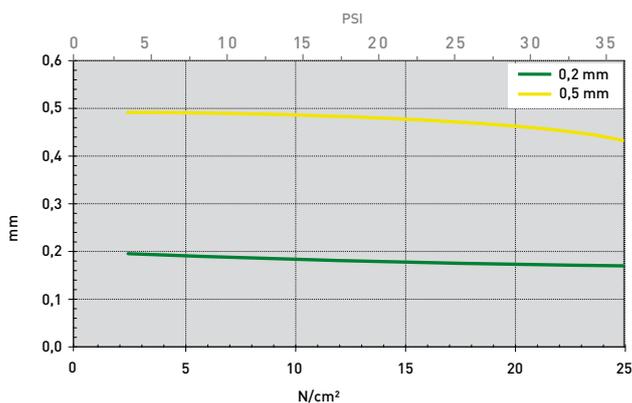
PROPERTY	UNIT	TEL-ZS0200-SI	TEL-ZS0500-SI
MATERIAL			
		Carbon filled silicone elastomere	Carbon filled silicone elastomere
Colour		Black	Black
Thickness	mm	0.2 ±0.05	0.5 ±0.05
Hardness	Shore 00	60	60
Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance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

Test Methods: ¹ASTM 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/cm² (PSI) / Rth vs. N/cm² (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

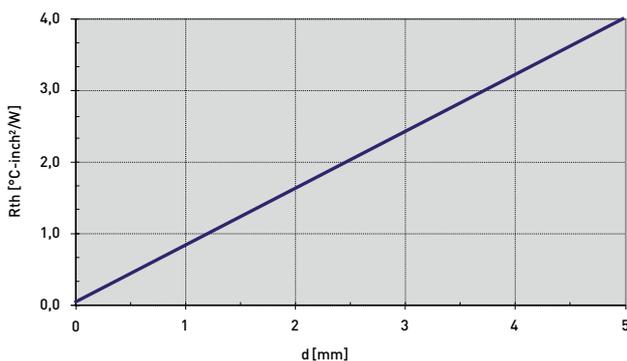
APPLICATION EXAMPLES

Thermal link of:

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

PROPERTY	UNIT	A Part	B Part
MATERIAL			
Colour		Yellow	White
Density @ 25 °C	g/cm ³	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 ¹	TML / CVCM / WVR %	0.16 / 0.03 / 0.04	0.16 / 0.03 / 0.04
No Paint Wetting Impairment Substances (PWIS) ²		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
TECHNICAL			
Thermal Conductivity ³	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 ¹⁰	1 x 10 ¹⁰

Measurement technique according to: ¹ ASTM E 595, ² P-VW 3-10.7 57650 Temp. Test, ³ 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

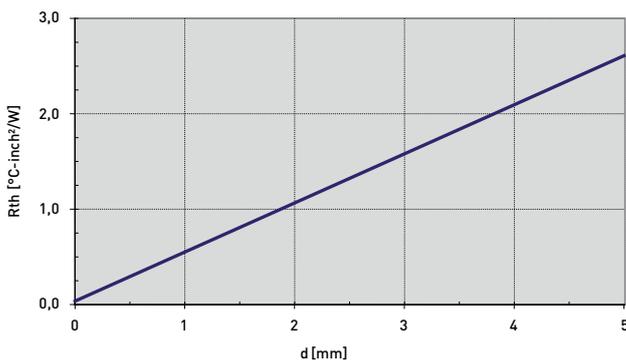
APPLICATION EXAMPLES

Thermal link of:

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

PROPERTY	UNIT	A Part	B Part
MATERIAL			
		Silicone	Silicone
Colour		Blue	White
Density @ 25 °C	g/cm ³	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 ¹	TML / CVCM / WVR %	0.07 / 0.02 / 0.02	0.07 / 0.02 / 0.02
No Paint Wetting Impairment Substances (PWIS) ²		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
TECHNICAL			
Thermal Conductivity ³	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 ¹⁰	1 x 10 ¹⁰

Measurement technique according to: ¹ASTM E 595, ²P-VW 3-10.7 57650 Temp. Test, ³ASTM 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

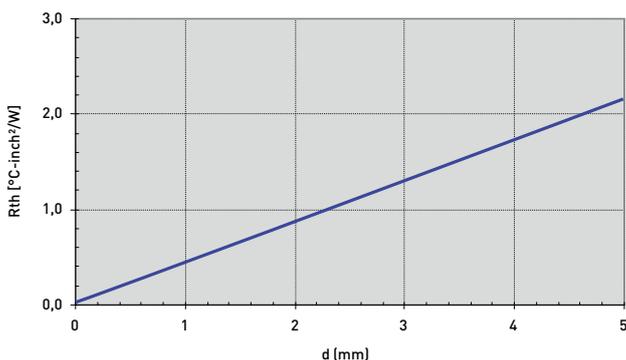
Thermal link of:

- FPBGA
- Capacitors
- Heat Pipes
- BGA

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

PROPERTY	UNIT	A Part	B Part
MATERIAL			
Colour		Light Blue	White
Density @ 25 °C	g/cm ³	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 ¹	TML / CVCM / WVR %	0.07 / 0.02 / 0.04	0.07 / 0.02 / 0.04
No Paint Wetting Impairment Substances (PWIS) ²		Passed	Passed
Flammability	UL 94	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes
TECHNICAL			
Thermal Conductivity ³	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 ¹⁰	1 x 10 ¹⁰

Measurement technique according to: ¹ASTM E 595, ²P-VW 3-10.7 57650 Temp. Test, ³ASTM 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

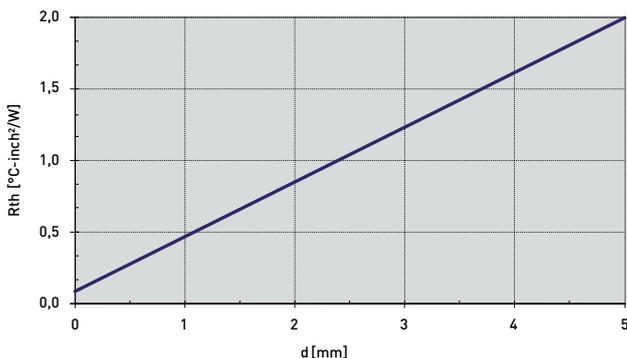
APPLICATION EXAMPLES

Thermal link of:

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

PROPERTY	UNIT	A Part	B Part
MATERIAL		Silicone	Silicone
Colour		Pink	White
Density @ 25 °C	g/cm ³	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) ¹		Passed	Passed
Flammability	UL 94	V0 (≥ 0.15 mm)	V0 (≥ 0.15 mm)
RoHS Conformity	2015 / 863 / EU	Yes	Yes
TECHNICAL			
Thermal Conductivity ²	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 ¹⁰	> 1 x 10 ¹⁰

Measurement technique according to: ¹P-VW 3-10.7 57650 Temp. Test, ²ASTM 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:

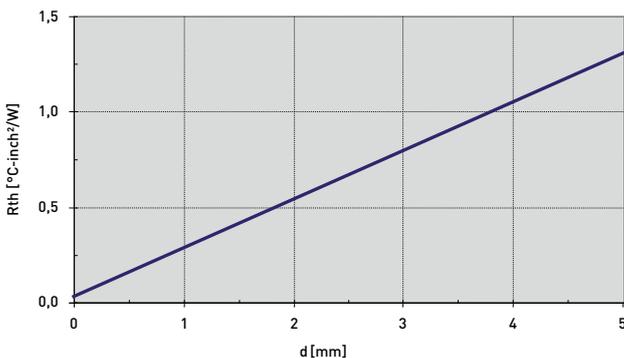
- FPBGA
- Capacitors
- Heat Pipes
- BGA

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

PROPERTY	UNIT	A Part	B Part
MATERIAL		Silicone	Silicone
Colour		Dark Blue	White
Density @ 25 °C	g/cm ³	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
TECHNICAL			
Thermal Conductivity ¹	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 ¹⁰	> 1 x 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.

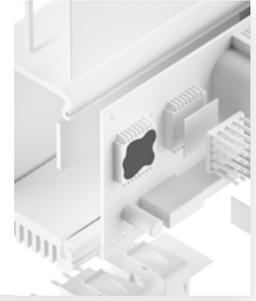
Warning: Only A / B part of the same lot number may be processed together.



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 crosslinking 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: 3.3¹ / 5.5² W/mK
- Ready-made, no additional crosslinking 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

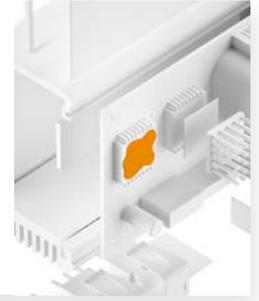
PROPERTY	UNIT	TGL-W-SI
MATERIAL		
Colour		Ceramic filled silicone compound Grey
Density	g/cm ³	3.1
Viscosity ($\dot{\gamma}$ 10 ¹ /min, 25 °C)	Pas	500
Penetration	mm/10	290
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Thermal Conductivity ¹	W/mK	3.3
Thermal Conductivity ²	W/mK	5.5
Operating Temperature Range	°C	- 40 to + 130
ELECTRICAL		
Dielectric Strength	kV / mm	7
Volume Resistance	Ohm - cm	1.1 x 10 ¹⁴

Test Methods: ¹ASTM D 5470. ²Intern method. All data without warranty and subject to change. Please contact us for further data and information.

SILICONE GAP FILLER / PUTTY TGL-X-SI

dispensable

TGL-X-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 crosslinking process. Due to the specific formulation and filling with ceramic particles the material has an extremely 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: 6.5 W/mK
- Ready-made, no additional crosslinking required

AVAILABILITY

- Cartridge 50 ml, 300 ml, 5 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 / 5G Telecommunication equipment

PROPERTY	UNIT	TGL-X-SI
MATERIAL		
		Ceramic filled silicone compound
Colour		Orange
Density	g/cm ³	3.4
Flow rate	g/s g/min	≥30 ¹ 3~4 ²
Penetration	mm	170
Shelf Life (from Date of Manufacturing, unopened, dry storage conditions @ < 40°C)	Months	6
Flammability (Equivalent)	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Thermal Conductivity ³	W/mK	6.5
Operating Temperature Range	°C	- 40 to + 150
ELECTRICAL		
Dielectric Strength ⁴	kV / mm	≥4.5
Volume Resistance	Ohm - cm	1.0 x 10 ¹⁴

Measurement technique according to: ¹ ISO 9048, ² 50 cc/14# @ 0.42 MPa, ³ ASTM D 5470, ⁴ ASTM D 149. 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.



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-RXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

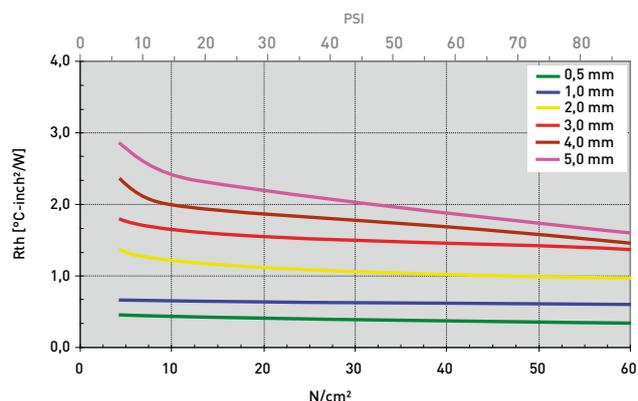
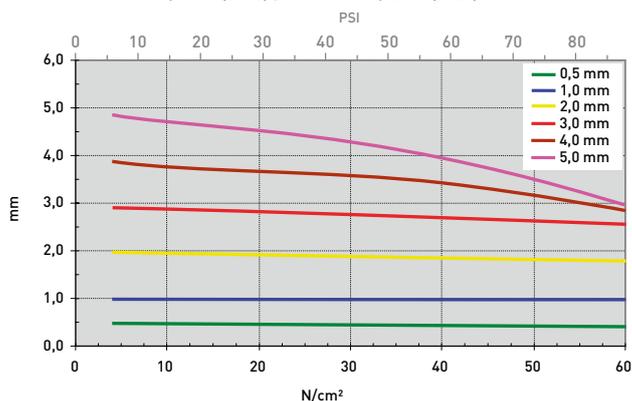
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-R0500-NS	TGF-R1000-NS	TGF-R2000-NS	TGF-R3000-NS	TGF-R5000-NS
MATERIAL						
		Ceramic filled silicone-free acrylic elastomer				
Colour		White	White	White	White	White
Specific Gravity	g/cm ³	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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.38 [0.44]	0.63 [0.97]	1.03 [1.85]	1.47 [2.71]	1.87 [3.96]
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.42 [0.46]	0.64 [0.98]	1.12 [1.91]	1.57 [2.81]	2.18 [4.53]
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.45 [0.47]	0.65 [0.99]	1.25 [1.96]	1.72 [2.88]	2.60 [4.79]
Thermal Conductivity ¹	W/mK	3.0	3.0	3.0	3.0	3.0
Operating Temperature Range	°C	- 40 to +130				
ELECTRICAL						
Dielectric Strength	kV / mm	7.8	7.8	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 ¹³	1 x 10 ¹¹			

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/cm² (PSI) / Rth vs. N/cm² (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.



GAP FILLER

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) ≥ 1.0 mm
- Tacky on one side by film laminate (TGF-VXXXX-NS-F) ≥ 0.5 mm
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

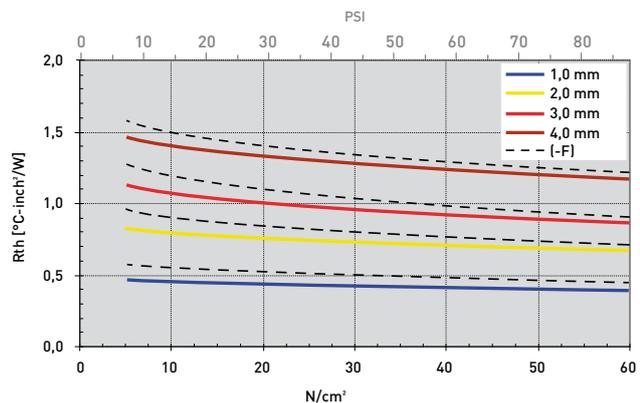
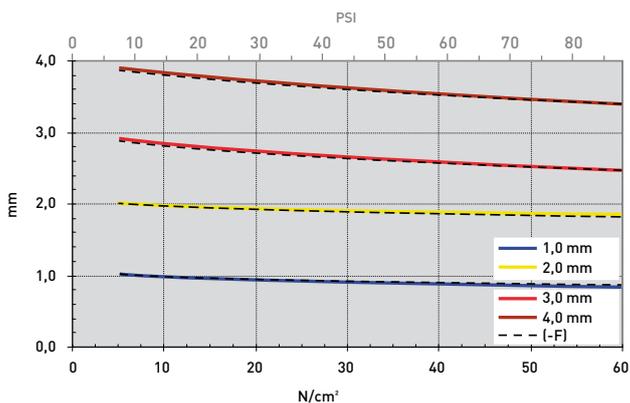
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

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

Measurement technique according to: ¹ASTM 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/cm² (PSI) / Rth vs. N/cm² (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:

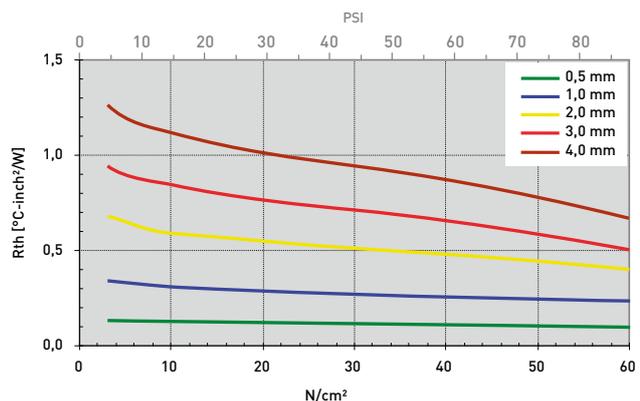
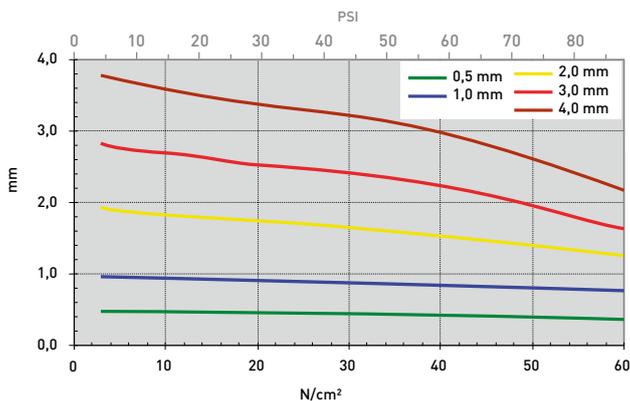
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-W0500-NS	TGF-W1000-NS	TGF-W2000-NS	TGF-W3000-NS	TGF-W4000-NS
MATERIAL						
		Ceramic filled silicone-free acrylic elastomer				
Colour		White	White	White	White	White
Specific Gravity	g/cm ³	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
THERMAL						
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.11 (0.43)	0.26 (0.84)	0.48 (1.54)	0.66 (2.25)	0.88 (3.00)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.12 (0.46)	0.28 (0.90)	0.55 (1.75)	0.76 (2.55)	1.02 (3.39)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.13 (0.48)	0.32 (0.95)	0.61 (1.85)	0.87 (2.75)	1.16 (3.66)
Thermal Conductivity ¹	W/mK	6.0	6.0	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to +130				
ELECTRICAL						
Dielectric Strength	kV / mm	7.8	7.8	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 ¹³				

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/cm² (PSI) / Rth vs. N/cm² (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.



GAP FILLER

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

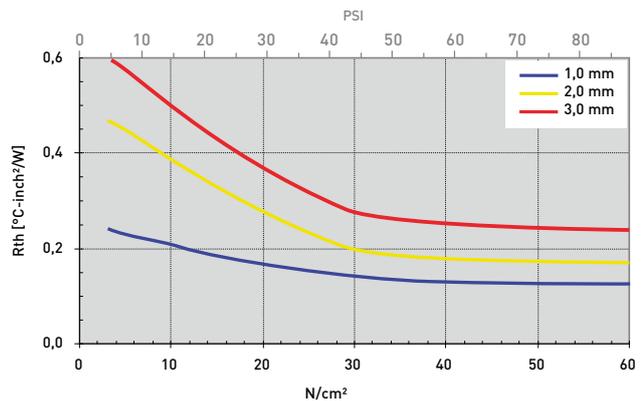
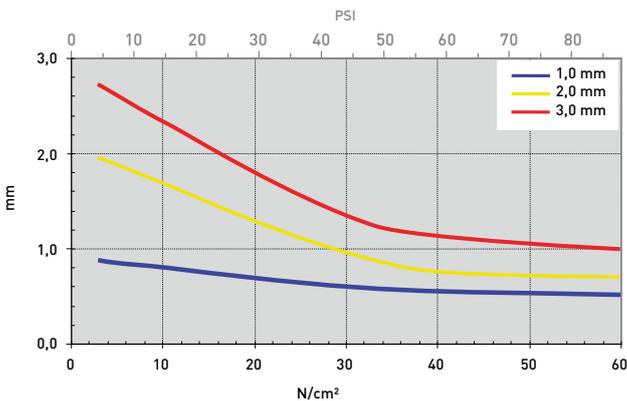
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-Y1000-NS	TGF-Y2000-NS	TGF-Y3000-NS
MATERIAL				
		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 ³	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
THERMAL				
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.13 (0.55)	0.18 (0.75)	0.25 (1.13)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.17 (0.72)	0.28 (1.30)	0.37 (1.80)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.22 (0.83)	0.43 (1.80)	0.55 (2.52)
Thermal Conductivity ¹	W/mK	8.0	8.0	8.0
Operating Temperature Range	°C	- 40 to +120	- 40 to +120	- 40 to +120
ELECTRICAL				
Dielectric Strength	kV / mm	7.8	7.8	7.8
Volume Resistivity	Ohm - cm	1 x 10 ¹¹	1 x 10 ¹¹	1 x 10 ¹¹

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

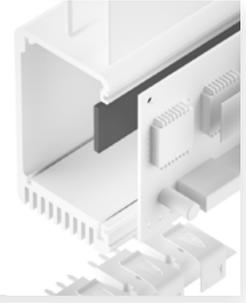
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



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.



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:

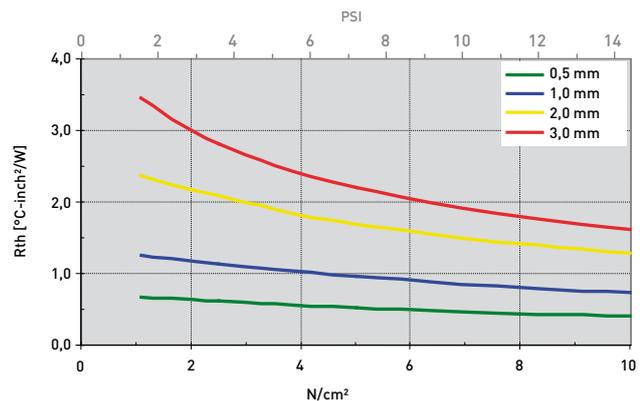
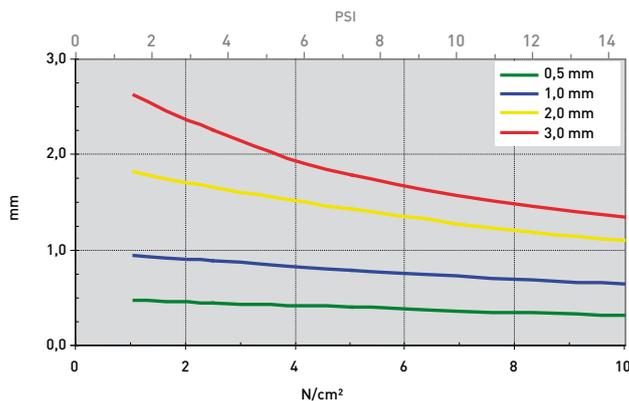
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-GUS0500-NS	TGF-GUS1000-NS	TGF-GUS2000-NS
MATERIAL				
		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 ^{+0.20} _{-0.10}	1.0 ^{+0.20} _{-0.10}	2.0 ^{+0.20} _{-0.10}
Specific Gravity	g/cm ³	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
THERMAL				
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	0.42 (0.32)	0.74 (0.63)	1.30 (1.11)
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /W (mm)	0.54 (0.39)	0.98 (0.78)	1.70 (1.44)
Resistance ¹ @ 3 PSI @ Thickness	°C-inch ² /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
ELECTRICAL				
Dielectric Strength	kV / mm	> 10	> 10	> 10
Volume Resistivity	Ohm - cm	1.0 x 10 ¹⁰	1.0 x 10 ¹⁰	> 1.0 x 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: 0.5 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/cm² (PSI) / Rth vs. N/cm² (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.



GAP FILLER

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

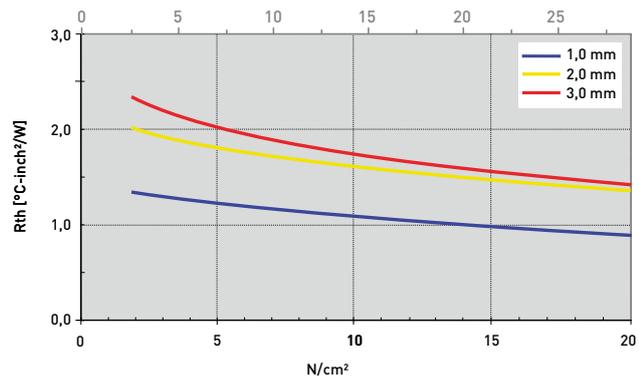
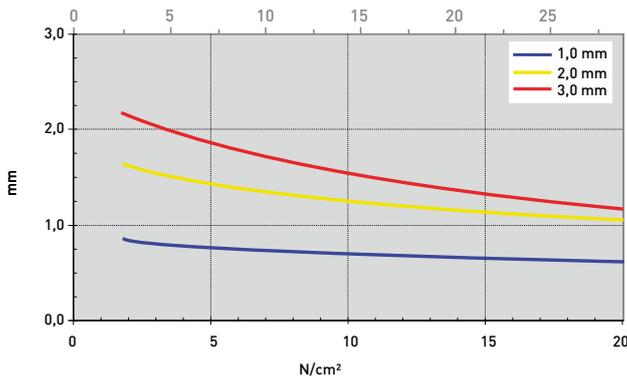
- Thermal link of:
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-IXS1000-NS-F	TGF-IXS2000-NS-F	TGF-IXS3000-NS-F
MATERIAL				
		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
THERMAL				
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	1.07 (0.70)	1.60 (1.25)	1.70 (1.52)
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /W (mm)	1.22 (0.74)	1.78 (1.40)	2.20 (1.85)
Resistance ¹ @ 3 PSI @ Thickness	°C-inch ² /W (mm)	1.32 (0.83)	2.00 (1.60)	2.30 (2.13)
Thermal Conductivity ¹	W/mK	2	2	2
Operating Temperature Range	°C	- 40 to + 125	- 40 to + 125	- 40 to + 125
ELECTRICAL				
Dielectric Strength	kV / mm	2.0	2.0	2.0
Volume Resistivity	Ohm - cm	1.0 x 10 ¹¹	1.0 x 10 ¹¹	> 1.0 x 10 ¹¹

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/cm² (PSI) / Rth vs. N/cm² (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.



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:

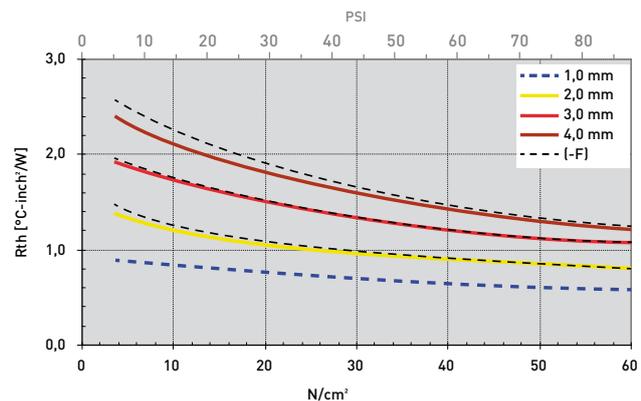
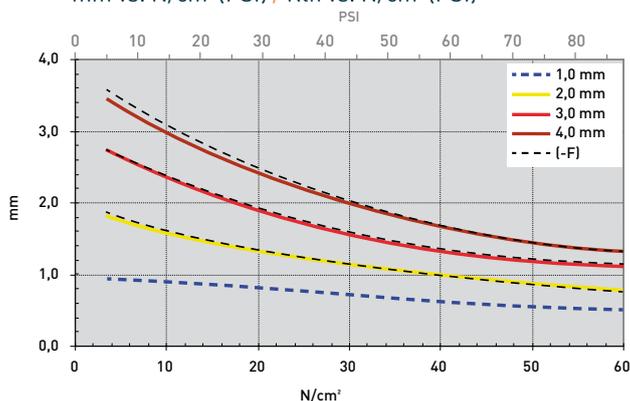
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-NSS1000-NS-F	TGF-NSS2000-NS	TGF-NSS3000-NS	TGF-NSS4000-NS
MATERIAL					
		Ceramic filled silicone-free acrylic elastomer			
Colour		Brown	Brown	Brown	Brown
Thickness	mm	1.0 ± 0.10	2.0 ± 0.20	3.0 ± 0.30	4.0 ± 0.40
Specific Gravity	g/cm ³	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
THERMAL					
Resistance ¹ @ 60 PSI @ Thickness	°C-inch ² /W (mm)	0.60 (0.62)	0.92 (0.99)	1.19 (1.32)	1.41 (1.64)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.67 (0.80)	1.05 (1.33)	1.51 (1.90)	1.81 (2.41)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /W (mm)	0.80 (0.91)	1.28 (1.68)	1.79 (2.50)	2.20 (3.20)
Thermal Conductivity ¹	W/mK	2.5	2.5	2.5	2.5
Operating Temperature Range	°C	- 40 to + 125			
ELECTRICAL					
Dielectric Strength	kV / mm	2.1	1.9	1.9	1.9
Volume Resistivity	Ohm - cm	1.0 x 10 ¹¹			
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/cm² (PSI) / Rth vs. N/cm² (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.



PROPERTIES

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

AVAILABILITY

- Sheet 130 x 130 mm
- Double-side tacky (TGF-ZPXXXX-NS)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

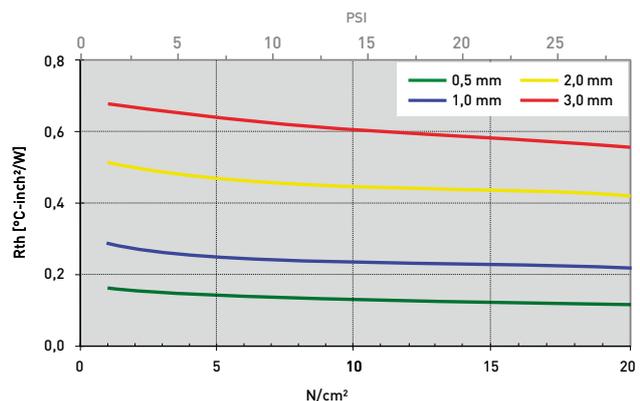
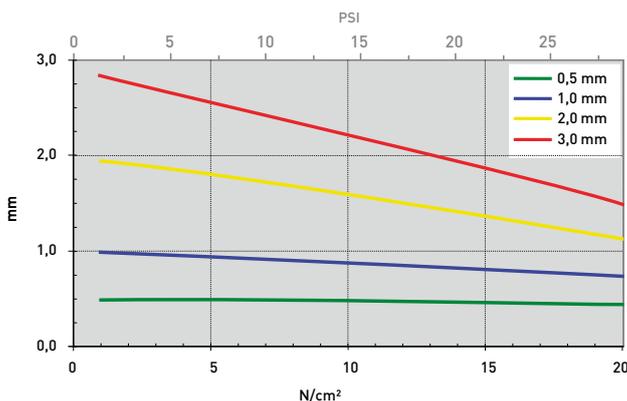
- SMD packages
 - Through-hole vias
 - RDRAMs memory modules
 - Electronic parts to heat pipes
- For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

PROPERTY	UNIT	TGF-ZP0500-NS	TGF-ZP1000-NS	TGF-ZP2000-NS	TGF-ZP3000-NS
MATERIAL					
		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 ³	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
THERMAL					
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.12 (0.45)	0.22 (0.74)	0.43 (1.13)	0.56 (1.50)
Resistance ¹ @ 15 PSI @ Thickness	°C-inch ² /W (mm)	0.13 (0.48)	0.24 (0.89)	0.45 (1.60)	0.61 (2.23)
Resistance ¹ @ 7 PSI @ Thickness	°C-inch ² /W (mm)	0.14 (0.49)	0.25 (0.95)	0.48 (1.82)	0.65 (2.56)
Thermal Conductivity ¹	W/mK	10	10	10	10
Operating Temperature Range	°C	- 40 to + 150			
ELECTRICAL					
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: ¹ASTM 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

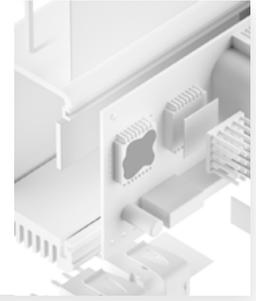
mm vs. N/cm² (PSI) / Rth vs. N/cm² (PSI)



SILICONE-FREE GAP-FILLER/PUTTY TGL-U-NS

dispensable

TGL-U-NS is an electrically insulating thermally conductive, highly viscous dispensable silicone-free 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 crosslinking 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: 4.0 W/mK
- Ready-made, no additional crosslinking required

AVAILABILITY

- Cartridge 330 ml
- 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 / 5G Telecommunication equipment

PROPERTY	UNIT	TGL-U-NS
MATERIAL		
		Ceramic filled silicone-free compound
Colour		Grey
Density	g/cm ³	2.9
Viscosity (@ 0,5 1/s) (@ 1,0 1/s)	Pas	3,300 2,500
Shelf Life (unopened, dry storage conditions @ 5–30°C)	Months	6
UL Flammability (Equivalent)	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Thermal Conductivity ¹	W/mK	4.0
Operating Temperature Range	°C	- 40 to + 125
ELECTRICAL		
Dielectric Strength	kV / mm	8
Volume Resistance	Ohm - cm	1.0 x 10 ⁹
Dielectric Constant	@ 500 MHz / @ 1 GHz	8.98 / 8.88

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



2 FOILS & FILMS

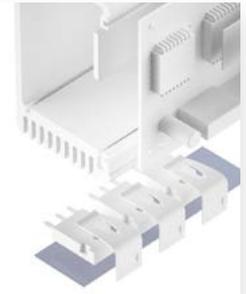
/ SILICONE FOILS / INSULATING FILM
SILICONE COATED



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 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)
- 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:

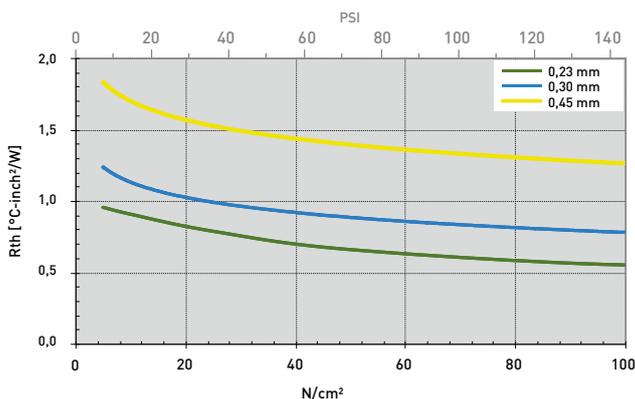
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTIES	UNIT	TFO-D230-SI	TFO-D300-SI	TFO-D450-SI
MATERIAL				
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 ¹	kpsi	5.0	4.1	2.9
UL Flammability	UL 94	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.55	0.75	1.25
Resistance ² @ 30 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage ³	kV AC	5.5	> 6.0	> 6.0
Volume Resistivity	Ohm - cm	> 1.0 x 10 ¹¹	> 1.0 x 10 ¹¹	> 1.0 x 10 ¹¹
Dielectric Constant	@ 1 MHz	6.0	6.0	6.0

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

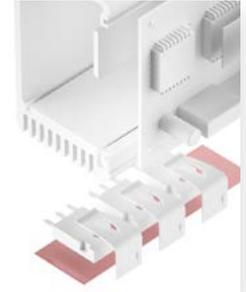
R_{th} vs. N/cm² (PSI)



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
- Tacky on one side (TFO-GXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet or roll

APPLICATION EXAMPLES

Thermal link of:

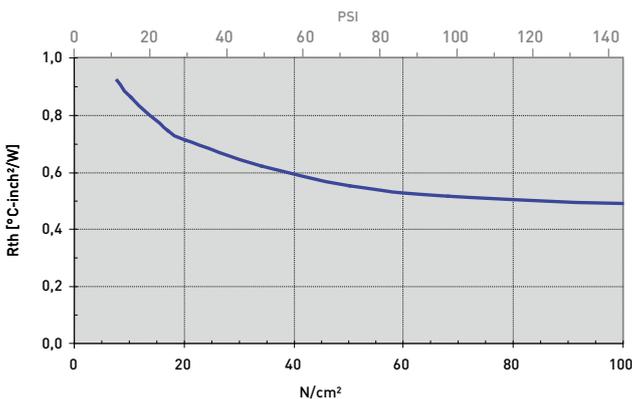
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

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

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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_{th} vs. N/cm² (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:

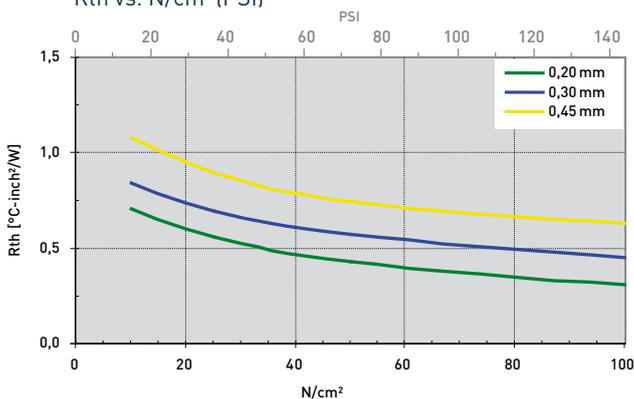
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-J200-SI	TFO-J300-SI	TFO-J450-SI
MATERIAL				
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 ^{±0.05}	0.30 ^{±0.05}	0.45 ^{±0.05}
Tensile Strength ¹	kpsi	5.8	4.0	2.9
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.31	0.45	0.63
Resistance ² @ 30 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage ³	kV AC	5.0	7.0	10.0
Volume Resistivity	Ohm - cm	4.2 x 10 ¹⁴	3.5 x 10 ¹⁴	3.8 x 10 ¹⁴
Dielectric Constant	@ 1 MHz	3.8	4.2	4.3

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

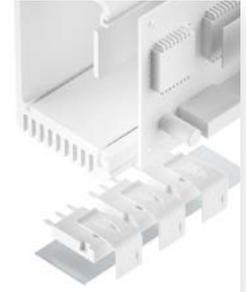
R_{th} vs. N/cm² (PSI)



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:

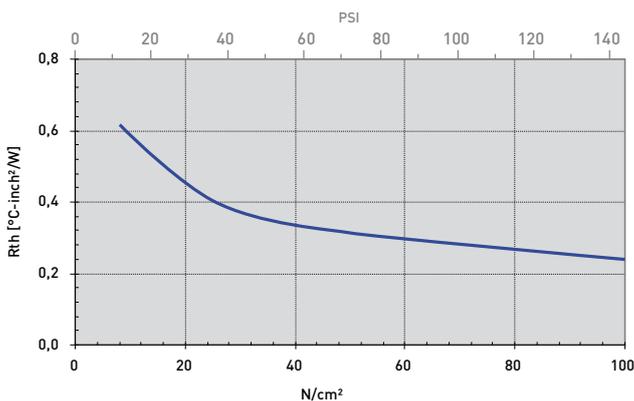
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

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

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

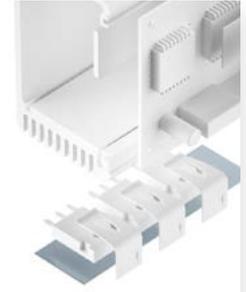
R_{th} vs. N/cm² (PSI)



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:

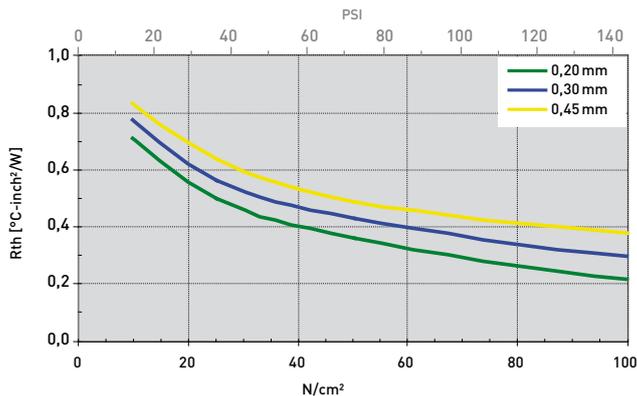
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-0200-SI	TFO-0300-SI	TFO-0450-SI
MATERIAL				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 ^{±0.05}	0.30 ^{±0.05}	0.45 ^{±0.05}
Tensile Strength ¹	kpsi	3.3	2.3	1.6
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.22	0.30	0.38
Resistance ² @ 30 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage ³	kV AC	5.0	7.0	8.0
Volume Resistivity	Ohm - cm	9,2 x 10 ¹³	8,8 x 10 ¹³	3,4 x 10 ¹²
Dielectric Constant	@ 1 MHz	4.8	5.6	6.2

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

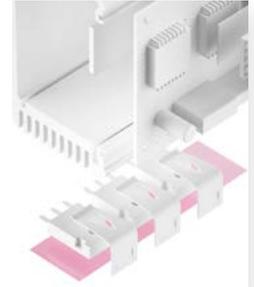
R_{th} vs. N/cm² (PSI)



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

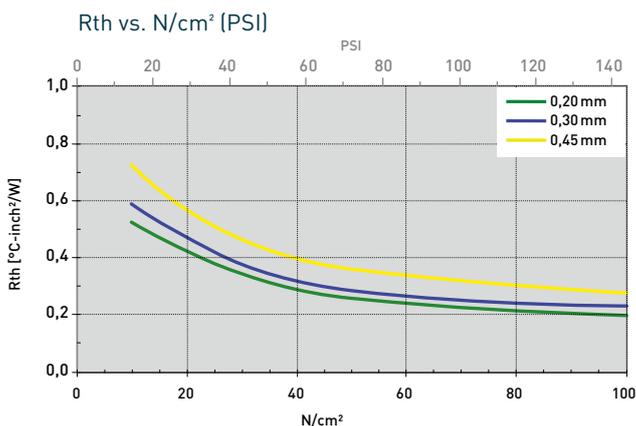
Thermal link of:

- 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
MATERIAL				
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 ¹	kpsi	2.4	1.7	1.3
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.20	0.23	0.28
Resistance ² @ 30 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage ³	kV AC	5.0	7.0	10.0
Volume Resistivity	Ohm - cm	4.8 x 10 ¹⁴	6.4 x 10 ¹⁴	1.1 x 10 ¹⁵
Dielectric Constant	@ 1 MHz	3.3	2.9	3.1

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

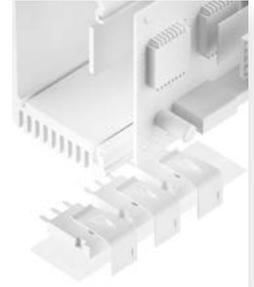
Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm



SILICONE FOIL TFO-R-SI

fibreglass reinforced

TFO-R-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 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: 3.5 W/mK
- High thermal contact
- Outstanding mechanic stability through fibreglass reinforcement
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

AVAILABILITY

- Sheet 300 x 280 mm
- Non tacky (TFO-RXXX-SI)
- Tacky on one side (TFO-RXXX-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

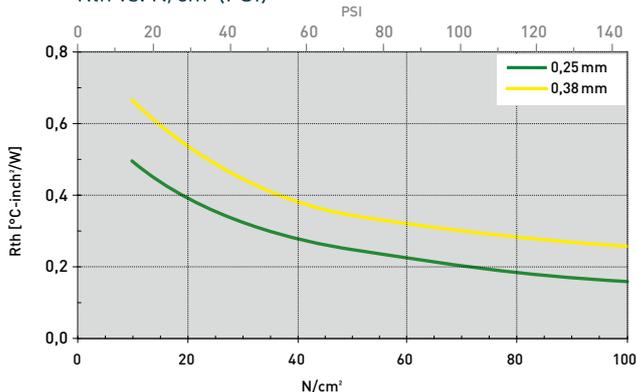
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems / Automotive pre-heaters

PROPERTY	UNIT	TFO-R250-SI	TFO-R380-SI
MATERIAL			
MATERIAL		Ceramic filled silicone	Ceramic filled silicone
Colour		White	White
Reinforcement		Fibreglass	Fibreglass
Thickness	mm	0.25 ±0.03	0.38 ±0.03
Tensile Strength ¹	kpsi	> 2.18	> 2.18
Shelf Life (unopened, dry storage conditions @ < 40°C)	Months	12	12
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance ² @ 150 PSI	°C-inch ² /W	0.16	0.26
Resistance ² @ 30 PSI	°C-inch ² /W	0.41	0.55
Thermal Conductivity ²	W/mK	3.5	3.5
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150
ELECTRICAL			
Breakdown Voltage ³	kV AC	3.0	4.0
Volume Resistivity	Ohm - cm	1 x 10 ¹⁴	1 x 10 ¹⁴
Dielectric Constant	@ 1 MHz	2.4	2.4

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

Thicknesses: 0.25 mm / 0.38 mm

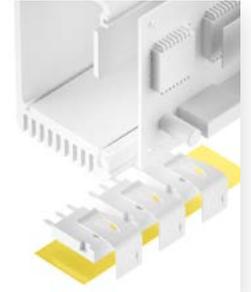
R_{th} vs. N/cm² (PSI)



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

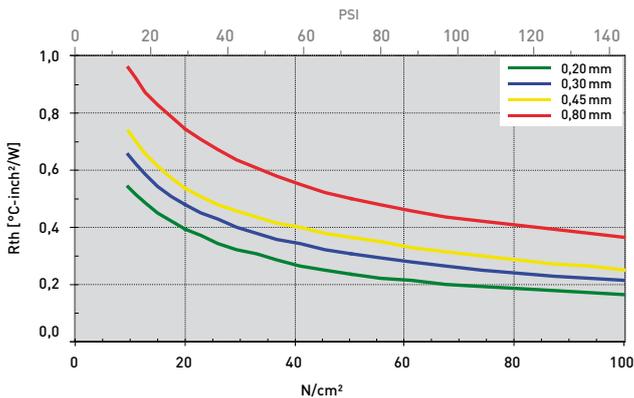
- Thermal link of:
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-T200-SI	TFO-T300-SI	TFO-T450-SI	TFO-T800-SI
MATERIAL					
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 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 ±0.20
Tensile Strength ¹	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
THERMAL					
Resistance ² @ 150 PSI	°C-inch ² /W	0.16	0.21	0.24	0.36
Resistance ² @ 30 PSI	°C-inch ² /W	0.39	0.47	0.53	0.74
Thermal Conductivity ²	W/mK	4.1	4.1	4.1	4.1
Operating Temperature Range	°C	- 50 to + 200			
ELECTRICAL					
Breakdown Voltage ³	kV AC	3.0	6.5	9.0	> 10
Volume Resistivity	Ohm - cm	1.9 x 10 ¹⁵	2.4 x 10 ¹⁵	3.3 x 10 ¹⁵	4.1 x 10 ¹⁵
Dielectric Constant	@ 1 MHz	3.6	3.6	3.6	3.6

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

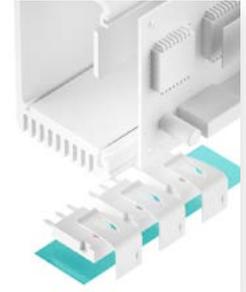
Rth vs. N/cm² (PSI)



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:

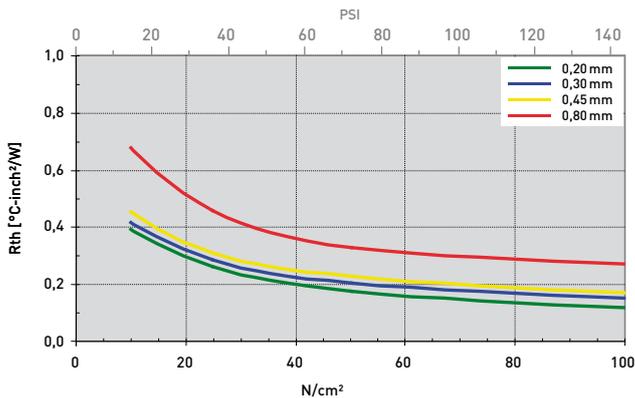
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-X200-SI	TFO-X300-SI	TFO-X450-SI	TFO-X800-SI
MATERIAL					
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 ^{+0.20}
Tensile Strength ¹	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
Thermal					
Resistance ² @ 150 PSI	°C-inch ² /W	0.11	0.15	0.17	0.27
Resistance ² @ 30 PSI	°C-inch ² /W	0.29	0.32	0.35	0.52
Thermal Conductivity ²	W/mK	5.0	5.0	5.0	5.0
Operating Temperature Range	°C	- 50 to + 200			
Electrical					
Breakdown Voltage ³	kV AC	3.0	6.0	9.0	> 10
Volume Resistivity	Ohm - cm	1.7 x 10 ¹⁵	7.9 x 10 ¹⁵	9.2 x 10 ¹⁵	8.9 x 10 ¹⁵
Dielectric Constant	@ 1 MHz	3.3	3.3	3.3	3.3

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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

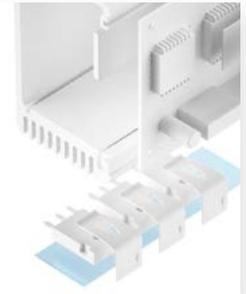
R_{th} vs. N/cm² (PSI)



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:

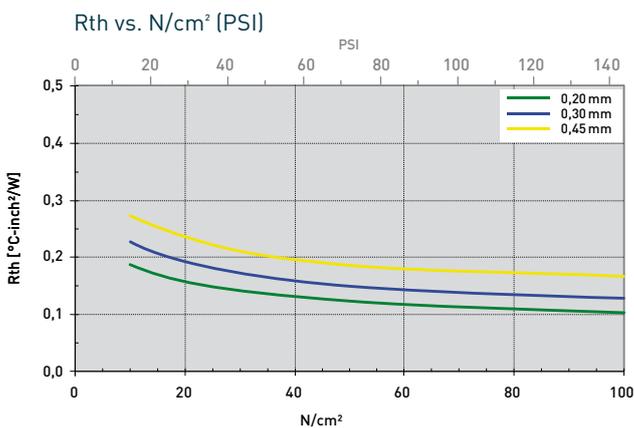
- MOSFETs or IGBTs
- Power diodes or AC/DC converters
- Power modules

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
MATERIAL				
Colour		Ceramic filled silicone Light Blue	Ceramic filled silicone Light Blue	Ceramic filled silicone Light Blue
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05
Tensile Strength ¹	kpsi	1.32	0.97	0.67
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.10	0.13	0.17
Resistance ² @ 30 PSI	°C-inch ² /W	0.15	0.19	0.24
Thermal Conductivity ²	W/mK	8.0	8.0	8.0
Operating Temperature Range	°C	-40 to +180	-40 to +180	-40 to +180
ELECTRICAL				
Breakdown Voltage ³	kV AC	3.6	4.5	5.0

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

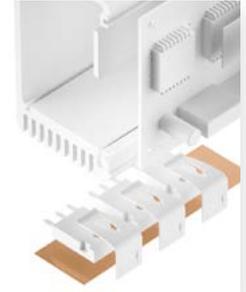
Thicknesses: 0.20 mm / 0.30 mm / 0.45 mm



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:

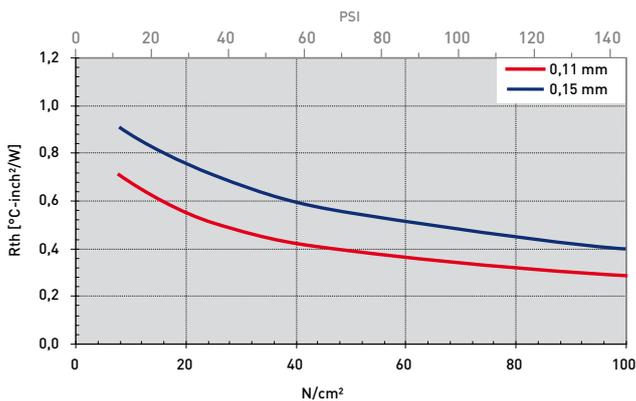
- MOSFETs or IGBTs
 - Power diodes or AC/DC converters
 - Power modules
- For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-M110-SI-PI	TFO-M150-SI-PI
MATERIAL			
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 ^{±0.02}	0.15 ^{±0.02}
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.29	0.40
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.55	0.75
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180
ELECTRICAL			
Breakdown Voltage ²	kV AC	6	> 6

Measurement technique according to: ¹ ASTM D 5470, ² 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

R_{th} vs. N/cm² (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

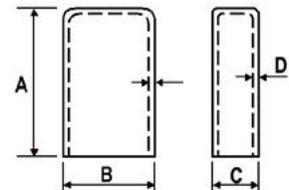
Thermal link of:

- 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
MATERIAL			
		Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey
Thickness	mm	0.50	0.80
Tensile Strength ¹	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
THERMAL			
Resistance @ 30 PSI	°C-inch ² /W	0.48	0.58
Thermal Conductivity	W/mK	1.0	1.0
Operating Temperature Range	°C	- 40 to + 155	- 40 to + 155
ELECTRICAL			
Breakdown Voltage ²	kV AC	4	10
Volume Resistivity	Ohm - cm	2.6×10^{15}	2.6×10^{15}
Dielectric Constant	@ 1 MHz	4.85	4.85

Measurement technique according to: ¹ ASTM D 412, ² 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 ± 0.8	11.5 ± 0.5	5.9 ± 0.3	0.5 $^{+0.15}_{-0.05}$
TCP-C250-SI	21.5 ± 0.8	11.5 ± 0.5	5.9 ± 0.3	0.5 $^{+0.15}_{-0.05}$
TCP-C280-SI	21.8 ± 0.8	12.1 ± 0.5	6.5 ± 0.3	0.8 $^{+0.15}_{-0.05}$
TCP-C450-SI	28.5 ± 0.8	17.5 ± 0.5	5.9 ± 0.3	0.5 $^{+0.15}_{-0.05}$
TCP-C480-SI	28.8 ± 0.8	18.2 ± 0.5	6.6 ± 0.3	0.8 $^{+0.15}_{-0.05}$



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

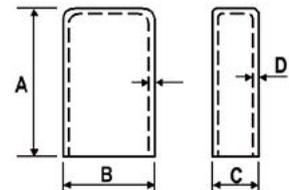
Thermal link of:

- 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
MATERIAL				
		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
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
THERMAL				
Resistance (@ T0-3P)	°C/W	0.68	0.95	1.60
Thermal Conductivity ¹	W/mK	1.5	1.5	1.5
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200
ELECTRICAL				
Breakdown Voltage	kV AC	10	13	18
Volume Resistivity	Ohm - cm	3.2×10^{14}	3.2×10^{14}	3.2×10^{14}
Dielectric Constant	@ 1 MHz	6.0	6.0	6.0

Measurement technique according to: ¹ 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

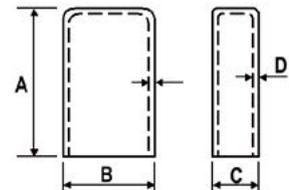
Thermal link of:

- 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
MATERIAL				
		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
THERMAL				
Resistance (@ TO-3P)	°C/W	0.4	0.6	1.1
Thermal Conductivity ¹	W/mK	2.0	2.0	2.0
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200
ELECTRICAL				
Breakdown Voltage	kV AC	5	7	12
Volume Resistivity	Ohm - cm	3.5×10^{14}	3.5×10^{14}	3.5×10^{14}
Dielectric Constant	@ 1 MHz	6.2	6.2	6.2

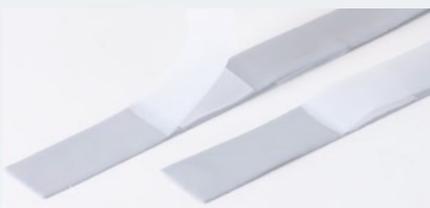
Measurement technique according to: ¹ ASTM E 1530. All data without warranty and subject to change. Please contact us for further data and information.

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



4 PHASE CHANGE MATERIAL

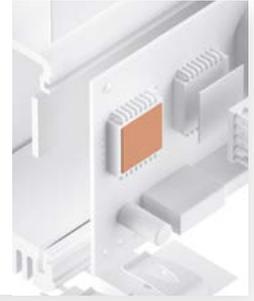
/ POLYIMIDE FILM COATED /
ALUMINUM FILM COATED /
FILM



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:

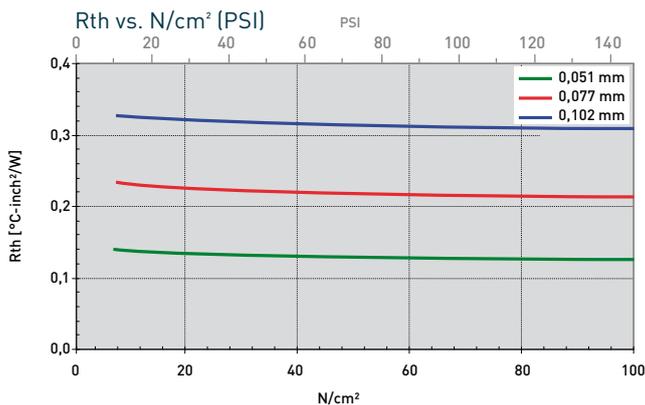
- MOSFETs or IGBTs
 - Diodes
 - A.C. converter
 - Uninsulated power modules
- For use in Automotive motor control units / Power supplies / Traction drives / Telecom appliances

PROPERTY	UNIT	TPC-N051-PI	TPC-N077-PI	TPC-N102-PI
MATERIAL				
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
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.126	0.215	0.311
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.130	0.220	0.315
Resistance ¹ @ 10 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage	kV AC	5.4	9.0	13.5
Volume Resistivity	Ohm - cm	1.0 x 10 ¹⁶	1.0 x 10 ¹⁶	1.0 x 10 ¹⁶
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.

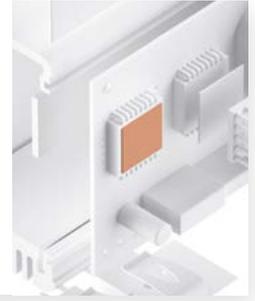
Thicknesses: Devinal TH Polyimide: 25 µm / 51 µm / 76 µm. Total Thicknesses: 51 µm / 77 µm / 102 µm



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

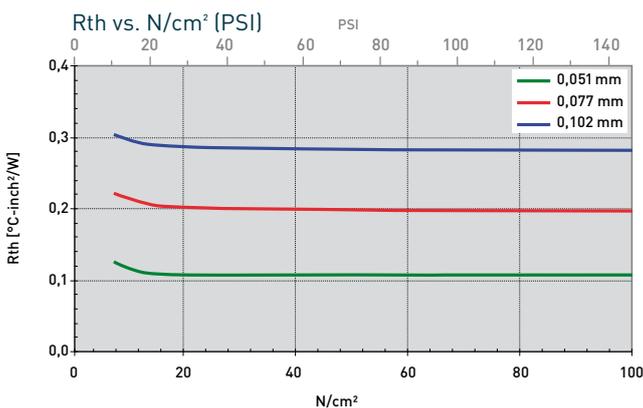
Thermal link of:

- 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
MATERIAL				
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 ¹	kpsi	20	22	23
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ² @ 150 PSI	°C-inch ² /W	0.110	0.195	0.285
Resistance ² @ 30 PSI	°C-inch ² /W	0.113	0.200	0.290
Resistance ² @ 10 PSI	°C-inch ² /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
ELECTRICAL				
Breakdown Voltage ³	kV AC	5.5	9.2	12.3
Volume Resistivity	Ohm - cm	1.0 x 10 ¹⁴	1.0 x 10 ¹⁴	1.0 x 10 ¹⁴
Dielectric Constant	@ 1 MHz	4.2	4.2	4.2

Measurement technique according to: ¹ ASTM D 412, ² ASTM D 5470, ³ 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.

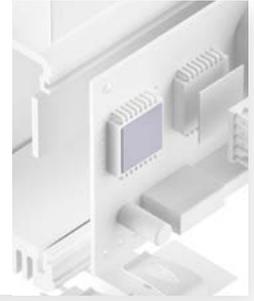
Thicknesses: Kapton® MT 25 µm / 51 µm / 76 µm. Total Thicknesses: 51 µm / 77 µm / 102 µm



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:

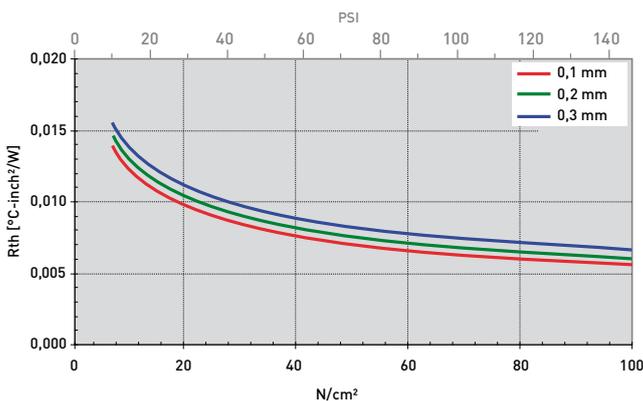
- MOSFETs or IGBTs
 - Memory modules
 - Power modules
 - CPUs
- For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-W100-PC	TPC-W200-PC	TPC-W300-PC
MATERIAL				
Colour		Grey	Grey	Grey
Total Thickness	mm	0.1 ±0.02	0.2 ±0.03	0.3 ±0.03
Specific Density	g/cm ³	2.0	2.0	2.0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.0056	0.0061	0.0067
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.0097	0.0103	0.0111
Resistance ¹ @ 10 PSI	°C-inch ² /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

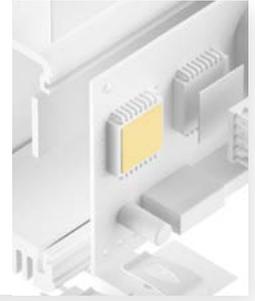
Rth vs. N/cm² (PSI)



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

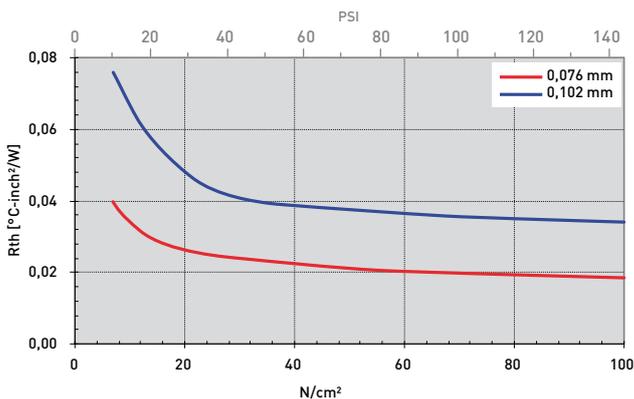
- Thermal link of:
- MOSFETs or IGBTs
 - Insulated diodes
 - Power modules
 - CPUs
- For use in Servo drive control units / Traction drives / Automation appliances / Micro-electronics

PROPERTY	UNIT	TPC-R076-AL	TPC-R102-AL
MATERIAL			
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
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.019	0.034
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.026	0.047
Resistance ¹ @ 10 PSI	°C-inch ² /W	0.040	0.076
Phase Change Temperature	°C	ca. 60	ca. 60

Measurement technique according to: ¹ 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

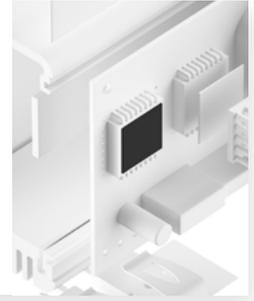
R_{th} vs. N/cm² (PSI)



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

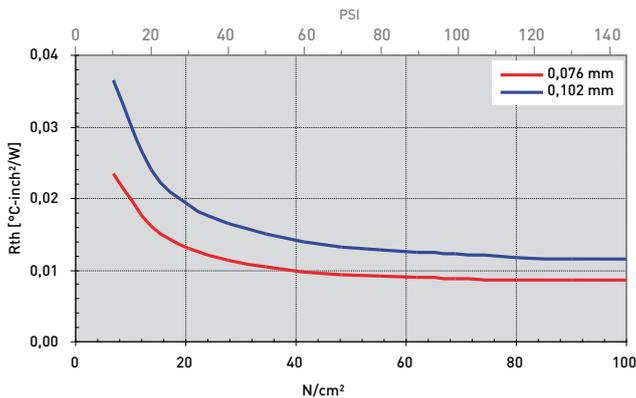
For use in Servo drive control units / Traction drives / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-T076-AL-CB	TPC-T102-AL-CB
MATERIAL			
		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
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.009	0.011
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.013	0.019
Resistance ¹ @ 10 PSI	°C-inch ² /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

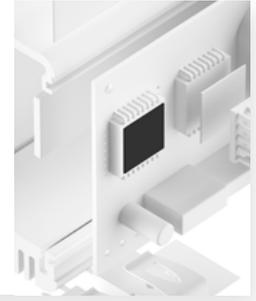
R_{th} vs. N/cm² (PSI)



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 µm)
- Sheet 139 x 355 mm (70 / 100 µm)
- Roll 190 mm x 25 m (min.) (40 µm)
- Roll 139 mm x 25 m (min.) (70 / 100 µm)
- 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

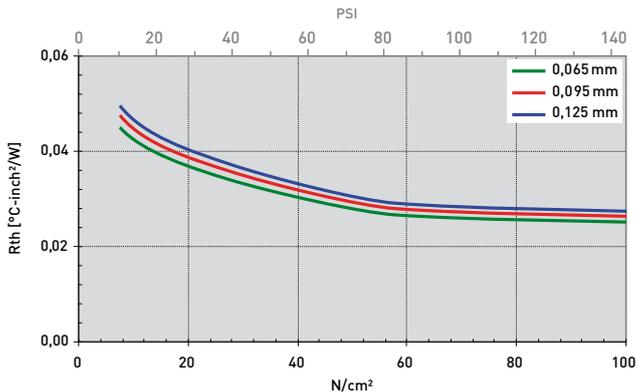
For use in Servo drive control units / Heat Pipe Assemblies / Traction drives / Automation appliances / Microelectronics / IT-Servers

PROPERTY	UNIT	TPC-V065-PG-CB	TPC-V095-PG-CB	TPC-V125-PG-CB
MATERIAL				
Colour		Black	Black	Black
Thickness pyrolytic graphite	µm	40	70	100
Thickness Phase Change (per side)	µm	12.5	12.5	12.5
Total Thickness	µm	65 ±5	95 ±7	125 ±8
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.025	0.026	0.027
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.037	0.039	0.041
Resistance ¹ @ 10 PSI	°C-inch ² /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	°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 µm / 25.5 µm / 31.8 µm
 Thicknesses pyrolytic graphite: 40 µm / 70 µm / 100 µm

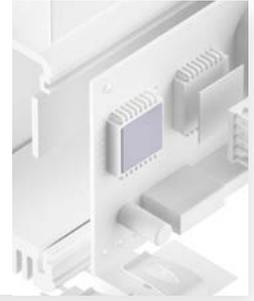
Rth vs. N/cm² (PSI)



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

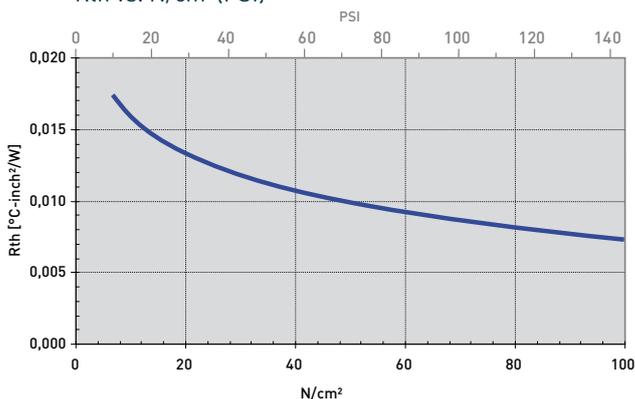
Thermal link of:

- 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
MATERIAL		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		Grey	Grey
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm ³	1.8 @ RT	1.8 @ RT
undried	g/cm ³	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: 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
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.007	0.007
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.013	0.013
Resistance ¹ @ 10 PSI	°C-inch ² /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_{th} vs. N/cm² (PSI)

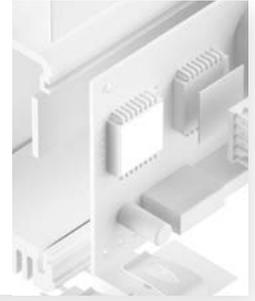


PHASE CHANGE COMPOUND TPC-X-PC-NC-HT-M/-E

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 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-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:

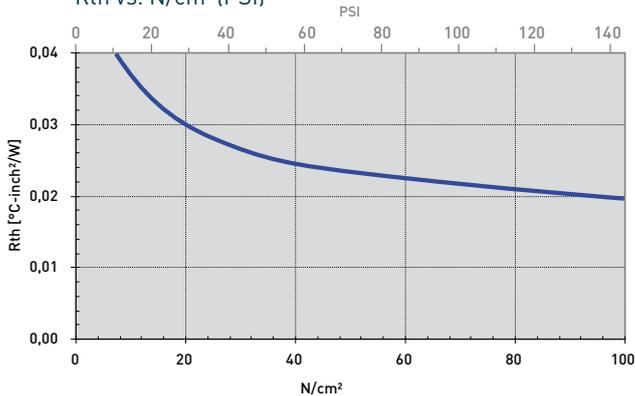
- MOSFETs and IGBTs
- Memory Modules
- IGBT Power Modules
- CPUs

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
MATERIAL			
		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		White	White
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm ³	1.1 @ RT	1.10 @ RT
undried	g/cm ³	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
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.02	0.02
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.03	0.03
Resistance ¹ @ 10 PSI	°C-inch ² /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/cm² (PSI)

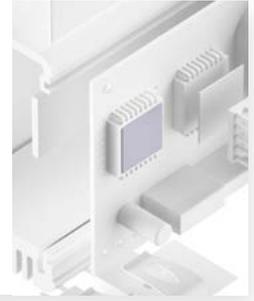


PHASE CHANGE COMPOUND TPC-Z-PC-HT-M/-E

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

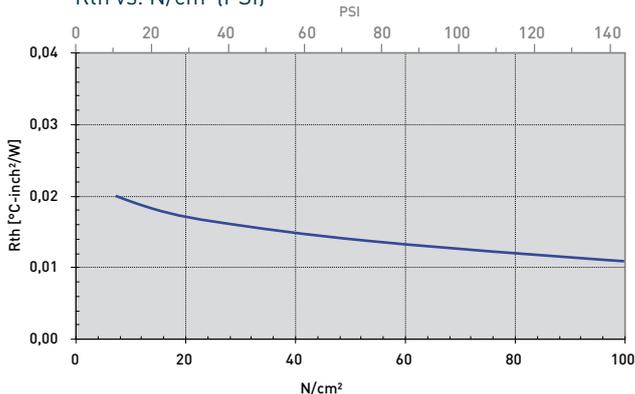
Thermal link of:

- 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
MATERIAL		Dryable Phase Change Compound	Dryable Phase Change Compound
Colour		Grey	Grey
Assembly		~ Print	~ Print
Specific Gravity dried	g/cm ³	2.3 @ RT	2.3 @ RT
Specific Gravity undried	g/cm ³	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
THERMAL			
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.011	0.011
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.017	0.017
Resistance ¹ @ 10 PSI	°C-inch ² /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_{th} vs. N/cm² (PSI)



5 GRAPHITE FOILS

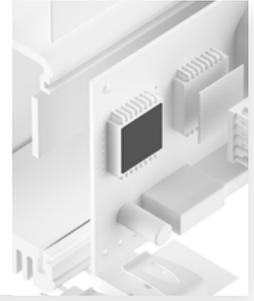
/ ANISOTROPIC / PYROLYTIC



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:

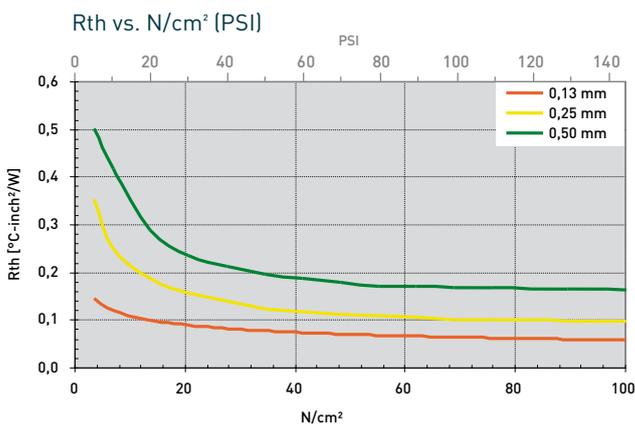
- CPUs to heat sinks
- Power modules
- Semiconductors
- IGBTs

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

PROPERTY	UNIT	TFO-S130-CB	TFO-S250-CB	TFO-S500-CB
MATERIAL				
		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
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.06	0.10	0.16
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.09	0.16	0.23
Resistance ¹ @ 10 PSI	°C-inch ² /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
ELECTRICAL				
Volume Resistivity	Ohm - cm	11.0 x 10 ⁻⁴	11.0 x 10 ⁻⁴	11.0 x 10 ⁻⁴
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.

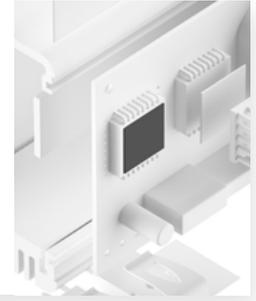
Thicknesses: 0.13 mm / 0.25 mm / 0.5 mm



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 µm)
- Sheet 152 x 355 mm (32 / 50 / 70 / 100 µm) or on demand
- Roll non tacky (TFO-VXXX-PG) 203 mm x 25 m (min.) (40 µm) 152 mm x 25 m (min.) (32 / 50 / 70 / 100 µm)
- Roll tacky on one side (TFO-VXXX-PG-A1) 177.8 mm x 25 m (min.) (40 µm) 127 mm x 25 m (min.) (32 / 50 / 70 / 100 µm)
- Phase change (TPC-VXXX-PG-CB)
- Die cut parts

APPLICATION EXAMPLES

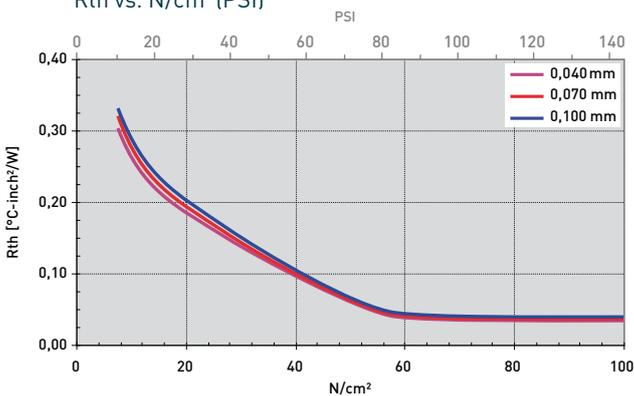
- Thermal link of:
- CPUs to heat sinks
 - Laser diodes
 - TEC modules
- For use in high end computers / Analyzers / Photonics / Heat Pipe Assemblies

PROPERTY	UNIT	TFO-V040-PG	TFO-V070-PG	TFO-V100-PG
MATERIAL				
MATERIAL		Pyrolytic Graphite	Pyrolytic Graphite	Pyrolytic Graphite
Colour		Grey	Grey	Grey
Thickness	µm	40 ^{±2}	70 ^{±4}	100 ^{±5}
Density	g/cm ³	2.0	2.0	2.0
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0,035	0,037	0,038
Resistance ¹ @ 30 PSI	°C-inch ² /W	0,190	0,198	0,206
Resistance ¹ @ 10 PSI	°C-inch ² /W	0,315	0,331	0,343
Thermal Conductivity (Z Direction)	W/mK	6	7	8
Thermal Conductivity (X-Y Direction)	W/mK	1,450	1,400	1,350
Operating Temperature Range	°C	- 250 bis + 500	- 250 bis + 500	- 250 bis + 500
ELECTRICAL				
Electrical Conductivity	S/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: 32 µm / 40 µm / 50 µm / 70 µm / 100 µm

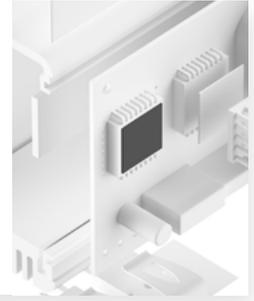
Rth vs. N/cm² (PSI)



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

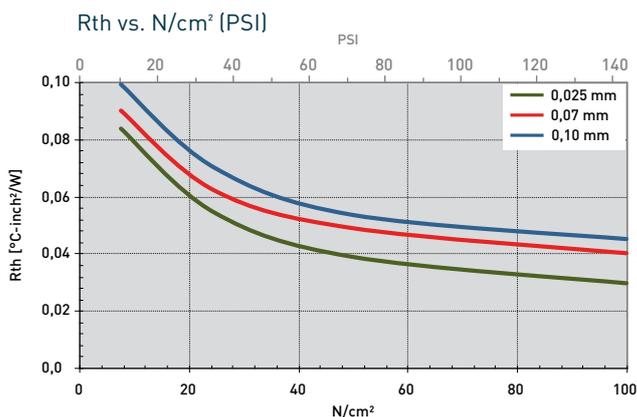
APPLICATION EXAMPLES

- 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
MATERIAL				
Material		Pyrolytic Graphite	Pyrolytic Graphite	Pyrolytic Graphite
Colour		Grey	Grey	Grey
Thickness	mm	0.025 ± 0.010	0.07 ± 0.015	0.10 ± 0.030
Density	g/cm ³	1.9	1.21	0.85
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance ¹ @ 150 PSI	°C-inch ² /W	0.03	0.04	0,045
Resistance ¹ @ 30 PSI	°C-inch ² /W	0.06	0.07	0,078
Resistance ¹ @ 10 PSI	°C-inch ² /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
ELECTRICAL				
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.

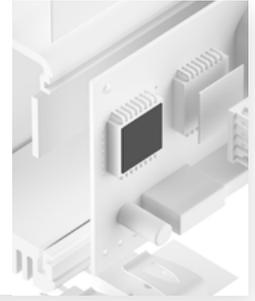
Thicknesses: 0.025 mm / 0.04 mm / 0.05 mm / 0.07 mm / 0.10 mm



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

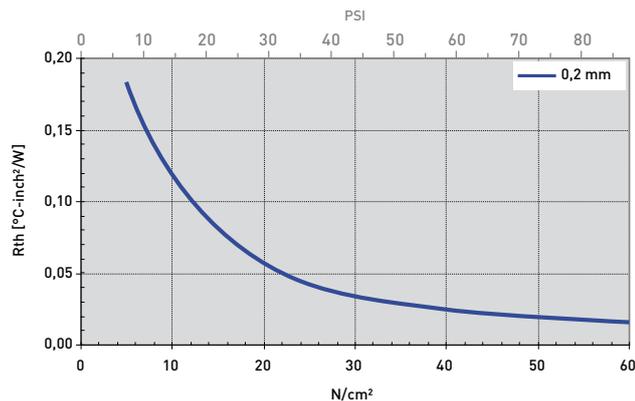
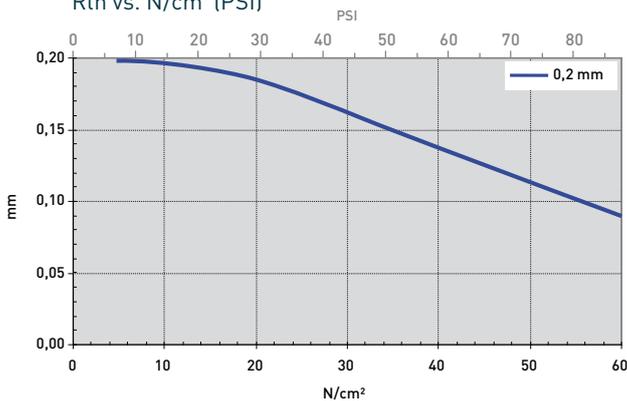
For use in liquid cold plates / high end computers / Analyzers / Photonics / LED arrays

PROPERTY	UNIT	TFO-ZS200-PG
MATERIAL		
Colour		Grey
Thickness	mm	0.2 ±0.05
Density	g/cm ³	0.5
Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Resistance ¹ @ 90 PSI @ Thickness	°C-inch ² /W (mm)	0.015 (0.09)
Resistance ¹ @ 30 PSI @ Thickness	°C-inch ² /W (mm)	0.055 (0.18)
Resistance ¹ @ 10 PSI @ Thickness	°C-inch ² /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
ELECTRICAL		
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

R_{th} vs. N/cm² (PSI)





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

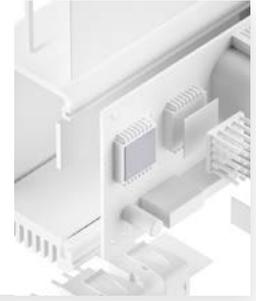
PROPERTY	UNIT	TAT-J200-PE
MATERIAL		
MATERIAL		Thermally conductive acrylate PSA tape with polyester film
Colour		White
Tape Thickness	mm	0.20 ^{±0.03}
PE Film Thickness	µm	12
Peel Off Strength (@ Stainless Steel @ RT)	N/cm	5.6
Peel Off Strength (@ Al 6063, @ RT)	N/cm	6.1
UL Flammability	UL 94	V0
RoHS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

Measurement technique according to: ¹ 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
MATERIAL			
Colour		White	White
Thickness	mm	0.10 ^{±0.01}	0.20 ^{±0.02}
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 ²	> 200	> 200
RoHS Conformity	2015 / 863 / EU	Yes	Yes
UL Flammability	UL 94	V0	V0
THERMAL			
Thermal Conductivity	W/mK	1.0	1.0
Resistance ¹	°C-inch ² /W	0.28	0.49
ELECTRICAL			
Breakdown Voltage ² (@ Initial Thickness, 25 °C)	kV AC	2.0	5.0

Measurement technique according to: ¹ASTM D 5470, ²ASTM 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

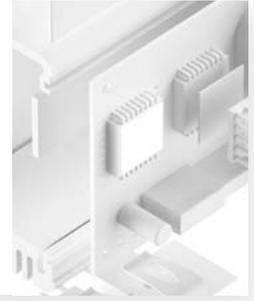
/ SILICONE / SILICONE-FREE



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

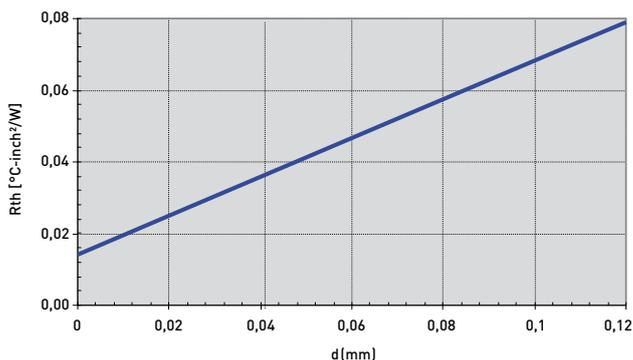
APPLICATION EXAMPLES

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
MATERIAL		
		Ceramic filled thermal grease
Colour		White
Density	g /cm ³	3.1
Viscosity @ 25°C (Brookfield @ 10 rpm, 25 °C)	Pas	170
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
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
ELECTRIC		
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

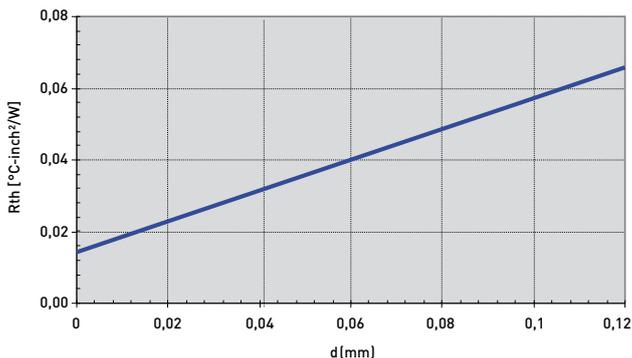
APPLICATION EXAMPLES

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
MATERIAL		
		Ceramic filled thermal grease
Colour		White
Density	g /cm ³	3.2
Viscosity @ 25°C (Brookfield @ 10 rpm, 25 °C)	Pas	110
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
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
ELECTRIC		
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
MATERIAL		
Colour		Grey
Specific Gravity	g/cm ³	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
THERMAL		
Thermal Conductivity	W/mK	1.38
Coefficient of Thermal Expansion Volumetric	x 10 ⁻⁶ /K	562
Coefficient of Thermal Expansion linear	x 10 ⁻⁶ /K	187
Operating Temperature Range	°C	- 50 to + 260
ELECTRICAL		
Dielectric Strength	kV/mm	22.5
Volume Resistivity	Ohm - cm	7.7 x 10 ¹⁵
Surface Resistivity	Ohm - cm	1.3 x 10 ¹⁵

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
MATERIAL		
Colour		Grey
Specific Gravity	g/cm ³	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
THERMAL		
Thermal Conductivity	W/mK	2.10
Coefficient of Thermal Expansion Volumetric	x 10 ⁻⁶ /K	586
Coefficient of Thermal Expansion Linear	x 10 ⁻⁶ /K	195
Operating Temperature Range	°C	- 50 to + 210
ELECTRICAL		
Dielectric Strength	kV/mm	> 18
Volume Resistivity	Ohm - cm	> 3.5 x 10 ¹³

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
MATERIAL		
Colour		Grey
Specific Gravity	g/cm ³	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 ²	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
Thermal		
Thermal Conductivity	W/mK	2.3
Coefficient of Thermal Expansion Volumetric	x 10 ⁻⁶ /K	493
Coefficient of Thermal Expansion Linear	x 10 ⁻⁶ /K	164
Operating Temperature Range	°C	- 50 to + 220
Electrical		
Dielectric Strength	kV/mm	> 20
Volume Resistivity	Ohm - cm	> 1 x 10 ¹⁴
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

- 160 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
MATERIAL		
Colour		Grey
Specific Gravity	g/cm ³	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 ²	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
Thermal		
Thermal Conductivity	W/mK	3.27
Operating Temperature Range	°C	- 65 to + 230
Electrical		
Volume Resistivity	Ohm - cm	1.26 x 10 ¹⁴

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
MATERIAL		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 ³	2.3	2.6
Specific Gravity (Mixed)	g/cm ³		2.45
Hardness	Shore D		70
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
THERMAL			
Thermal Conductivity ¹	W/mK		2.0
Operating Temperature Range	°C		- 40 to + 85
ELECTRICAL			
Dielectric Strength	kV/mm		13.5
Volume Resistivity	Ohm - cm		4.55 x 10 ¹²

Measurement technique according to: ¹ASTM 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
MATERIAL		Silicone	Hardener
Colour		Beige	Black
Density @ 23 °C	g/cm ³	1.63	1.63
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 ⁻⁶ /K	650	650
Linear	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁴	4.02 x 10 ¹⁴
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
MATERIAL		Silicone	Silicone
Colour		Light grey	Orange
Density @ -23 °C	g/cm ³	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 ⁻⁶ /K	402	402
Linear	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁴	1.8 x 10 ¹⁴
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
MATERIAL		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm ³	2.45 – 2.55	1.20 – 1.25
Mixing Ratio	Weight		100 : 8
Viscosity (@ 22 °C, 10 rpm)	mPas	45,000 – 50,000	160 – 240
Viscosity (Mixed, @ 22 °C, 10 rpm)	mPas		5,800 – 6,500
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 _g , TMA	1 x 10 ⁻⁶ /K		72.5
> T _g , TMA	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁵
Dielectric Constant (ε _r)	@ 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-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
MATERIAL		Polyurethan	Aromatic Isocyanate
Colour		Natural	Brown
Density @ 22 °C	g/cm ³	2.25 – 2.35	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		15,000 – 35,000
Hardness	Shore D		40 – 50
Water absorption (30 days @ 23 °C)	%		0.4
Coefficient of Thermal Expansion < T _g , TMA	1 x 10 ⁻⁶ /K		91.4
> T _g , TMA	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁵
Dielectric Constant (ε _r)	@ 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
MATERIAL		Polyurethan	Aliphatic Isocyanate
Colour		Natural	Transparent
Density @ 22 °C	g/cm ³	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 _g , TMA	1 x 10 ⁻⁶ /K		137.9
> T _g , TMA	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁵
Dielectric Constant (ε _r)	@ 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-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
MATERIAL			
Colour		Polyurethan Natural	Aromatic Isocyanate Brown
Density @ 22 °C	g/cm ³	2.0 – 2.2	1.20 – 1.25
Mixing Ratio	Weight		100 : 7
Viscosity (@ 22 °C, 10 rpm)	mPas	100,000 – 140,000	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 _g , TMA	1 x 10 ⁻⁶ /K		131.5
> T _g , TMA	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁵
Dielectric Constant (ε _r)	@ 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
MATERIAL		Polyurethan	Aliphatic Isocyanate
Colour		Natural	Transparent
Density @ 22 °C	g/cm ³	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 _g , TMA	1 x 10 ⁻⁶ /K		156.2
> T _g , TMA	1 x 10 ⁻⁶ /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
TECHNICAL			
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 ¹⁵
Dielectric Constant (ε _r)	@ 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/cm² (50 – 80 PSI) for different types of TO 220 packages (Surface area TO220 ca. 1.6 cm²)

APPLICATION EXAMPLES

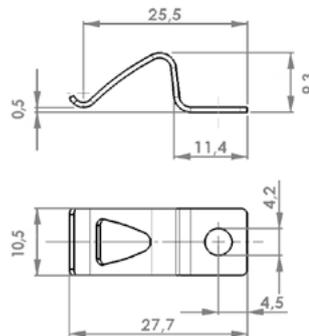
Fixing of semiconductors in TO220 or comparable packages onto heatsinks:

- MOSFETs and IGBTs
- Diodes and rectifiers
- Electronic modules

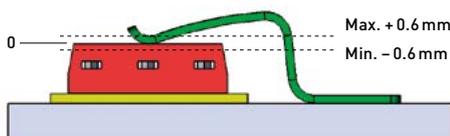
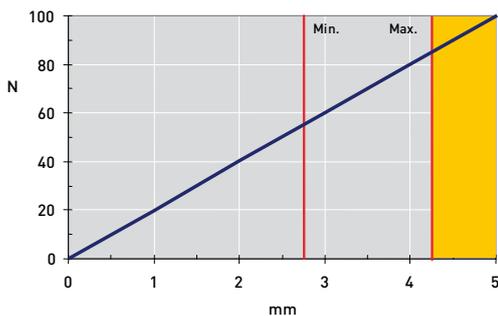
For use in switch mode power supplies / UPS units / Motor control units / Automotive applications / Solar technology



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

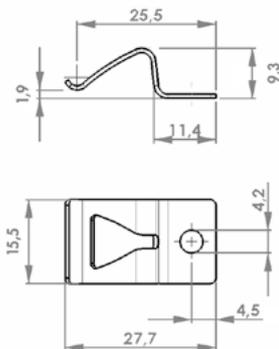
- Force range: ca. 95 – 110 N
- Pressure range: ca. 28 – 32 N/cm² (40 – 47 PSI) for different types of TO247 packages (Surface area TO247 ca. 3.4 cm²)

APPLICATION EXAMPLES

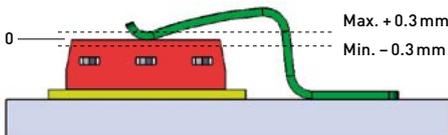
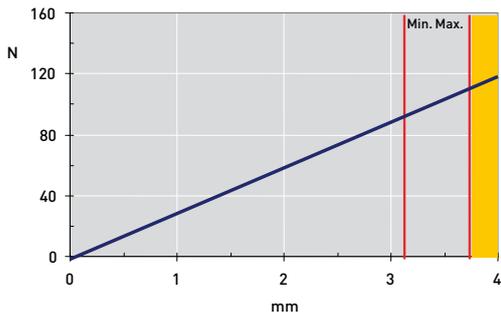
- Fixing of semiconductors in TO247 or comparable packages onto heatsinks:
- MOSFETs
 - IGBTs
 - Diodes
- For use in switch mode power supplies / UPS units / Motor control units / Automotive applications



Dimensions



Force vs. Deflection



LEGAL INFORMATION

CONTACT

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PICTURE CREDITS

shutterstock: pages 1,7, 9 and covers materials, istockphoto: page 12, zoodesign: pages 10,11,14 and material photos

DESIGN

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