HALA

THERMAL MANAGEMENT INTERFACE MATERIALS 2020

/ PRODUCT CATALOGUE /

CREATING DIMENSIONS


NEW DIMENSIONS
IN THERMAL
MANAGEMENT

CONTENT

■ electrically insulating
■ electrically non-insulating
■ low dielectric

/ LV = Low Volatile Siloxanes

HALA

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."

HALA

LEAVE THERMAL MANAGEMENT TO THE PROFES-SIONALS

WHAT HALA CAN DO FOR YOU

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

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

/ INDIVIDUAL CONSULTING THROUGHOUT THE ENTIRE SUPPLY CHAIN

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

/ WE OFFER FAST AND FLEXIBLE PROCESSING

/ OVER 100 YEARS OF EXPERIENCE

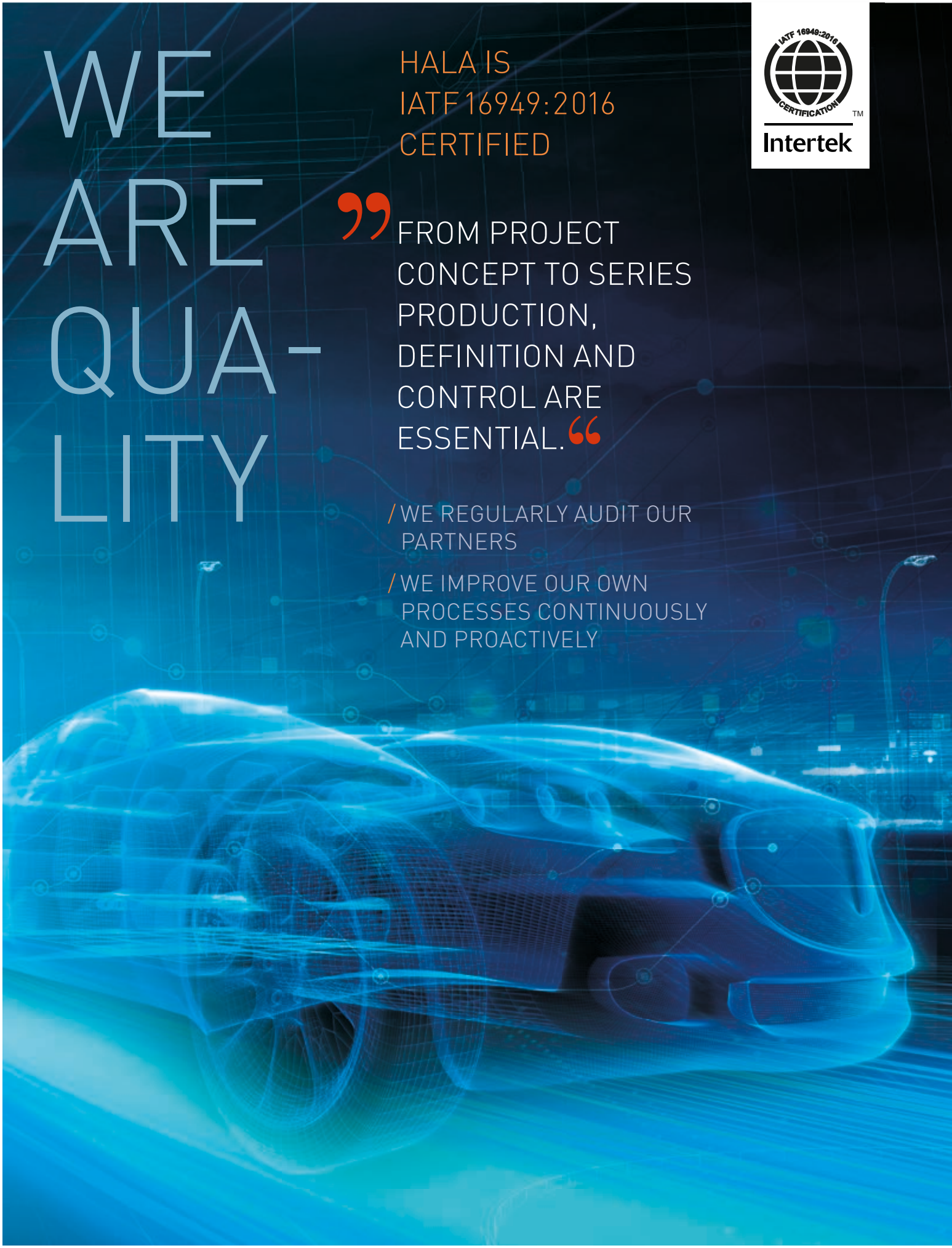
HALA

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
Management
Production
Quality
Order Management
Purchase


WE ARE QUA-LITY
HALA IS IATF 16949:2016 CERTIFIED
IATF 16949:2016 CERTIFICATION
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

HALA

A THERMAL MANAGEMENT

/ TOTAL THERMAL MANAGEMENT
/ HEAT PIPE ASSEMBLIES
/ CFD SIMULATION

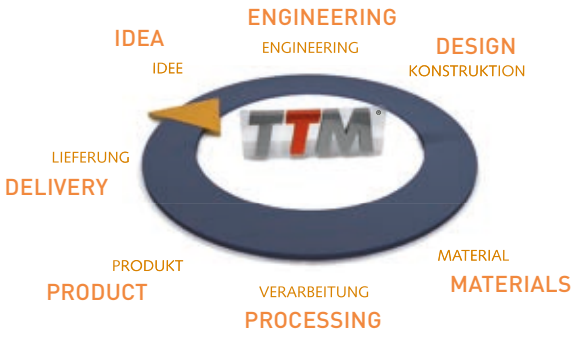
TOTAL THERMAL MANAGEMENT
FOR HEAT DISTRIBUTION & HEAT TRANSFER

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

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

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

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



TTM stands for solution expertise, project management, purchasing and delivery.
TTM works globally and internationally, from initial idea to series production.

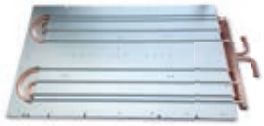
THERMAL SYSTEMS
We create integrated, high-performance thermal solutions for next generation products in a wide range of markets, including power semi-conductors, automotive, energy conversion, medical and test equipment, transportation, defense, aerospace, computers, communications and many other industries.

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

HEAT PIPE ASSEMBLIES
Heat distribution

Heat transfer

FLUID COOLING



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

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Managing Director
+49 89 665 477-84
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HALA

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
- Flattnesses 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

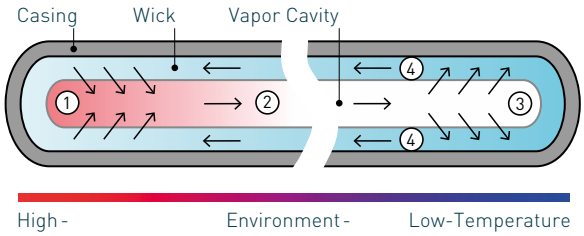
Connected by:

- Thermal Interface Materials

Tubular Heat Pipes

Vapor Chamber

Heat Pipe Thermal cycle



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 ø3mm	Pipe Diameter ø4mm	Pipe Diameter ø5mm	Pipe Diameter ø6mm	Pipe Diameter ø8mm
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

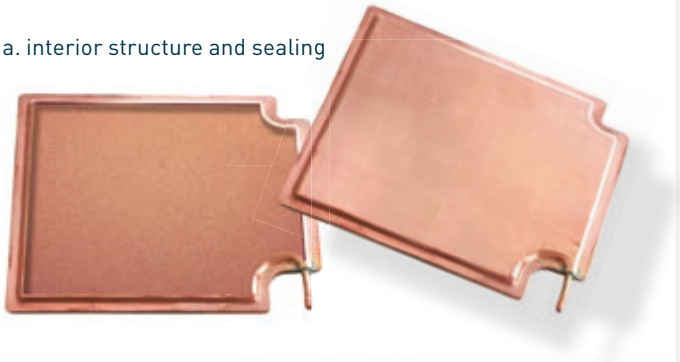
Diameter: 3 / 4 / 5 / 6 / 6.35 (¼") / 8 / 9.52 (⅜") / 10 / 12 / 12.7 (½")
Tube Wall Thickness 0.9 mm / 0.5 mm / 0.3 mm / 0.2 mm
Diameter Tolerance ±0.05 mm
Length Tolerance ±0.5 to ±1.0 mm
Thickness Tolerance ±0.05 mm
Width Tolerance ±0.10 to ±0.15 mm

HALA

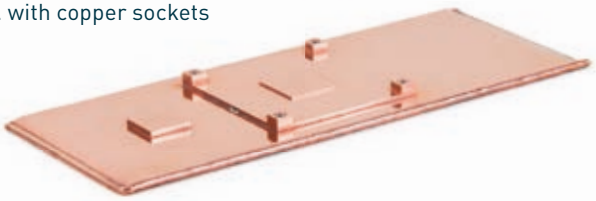
FLATTENED HEAT PIPES

VAPOR CHAMBERS

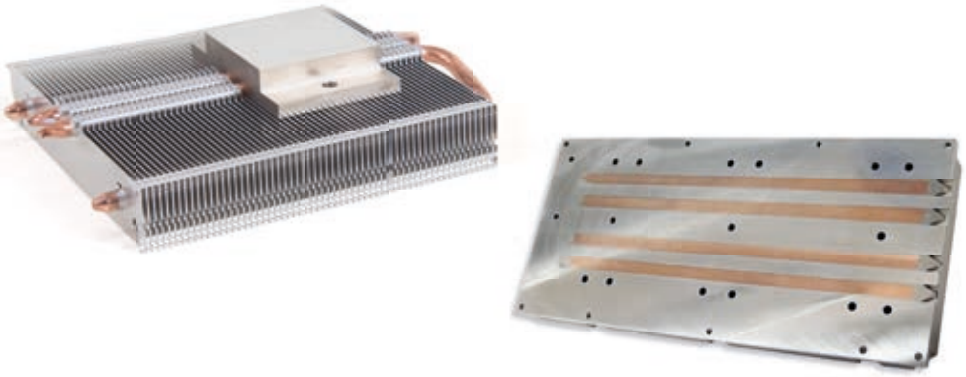
a. interior structure and sealing



b. with copper sockets



HEAT SPREADER



HEAT COLUMN

HEAT TRANSFER

CFD SIMULATION

DR. BREIER CONSULTING, PARTNER OF HALA

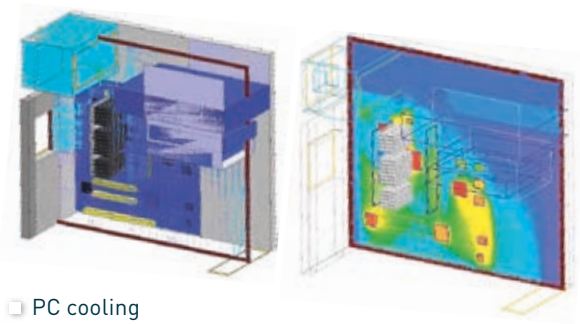
Cooling should be included as early as possible in the development process instead of trying to implement heat transfer as just an “afterthought.” In general, thermal redesigns are very expensive and time-consuming, especially when they affect the overall dimensions or design of the equipment.

The purpose of the “CFD Simulation” is to virtually describe fluid mechanical and thermodynamical transport mechanisms, allowing expected failure frequency and the change of functionality over time (e.g. In LED applications) to be investigated.

All distributions are taken into account, both inside the fluid (pressure, pressure drop, flow vectors, flow rate, fluid temperatures) and in solids (temperatures, heat conduction, heat sources) with related heat transfer effects from the surfaces to the fluid (local heat transfer coefficients), between solid surfaces (contact resistances, heat radiation) and heat radiation exchange between the surrounding environment and the system (surrounding walls, solar radiation).

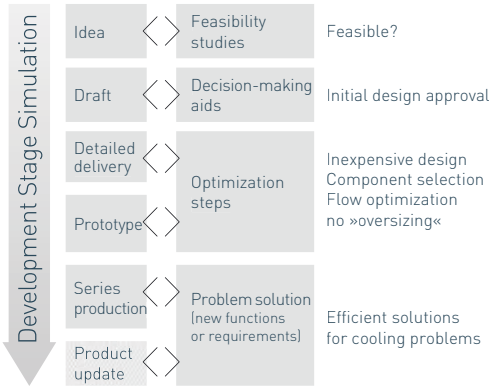
With the CFD simulation created by our partner Dr. Breier Consulting, we are able to support all phases of development with system-level analyses of heat transfer effects for thermal optimization down to the component level - even before a prototype is available. Other added benefits: Minimizing the time-to-market, rapid upgrades, quick failure mode analysis.
Simulation example personal computers

Simulation example personal computers

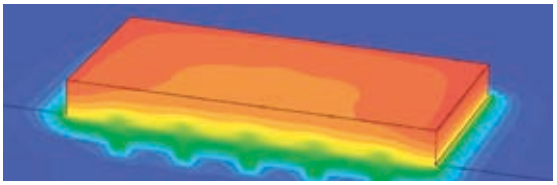


- PC cooling
- Flow distribution
- Temperature distribution air / solids
- Optimization strategies for CPU heatsinks
- Optimization strategies: e.g. with ventilation ducts through air deflectors at the intake or on the hood.

Development Stage Simulation



TIM COMPACT MODEL
Example gap filler elastomer with structural THERMAL VIAS

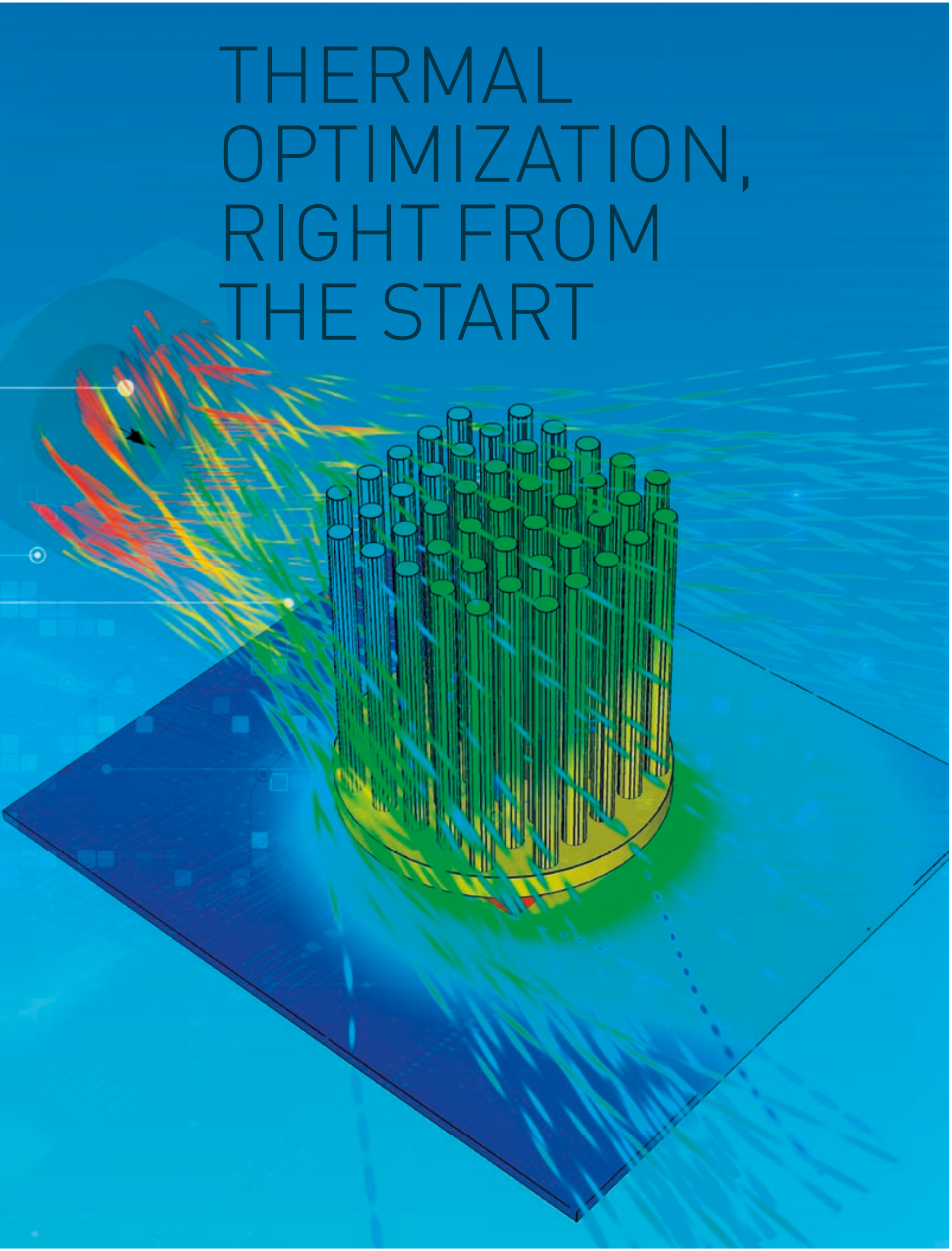


DR. BREIER CONSULTING

THERMAL MANAGEMENT CONSULTING
www.dr-breier-consulting.de

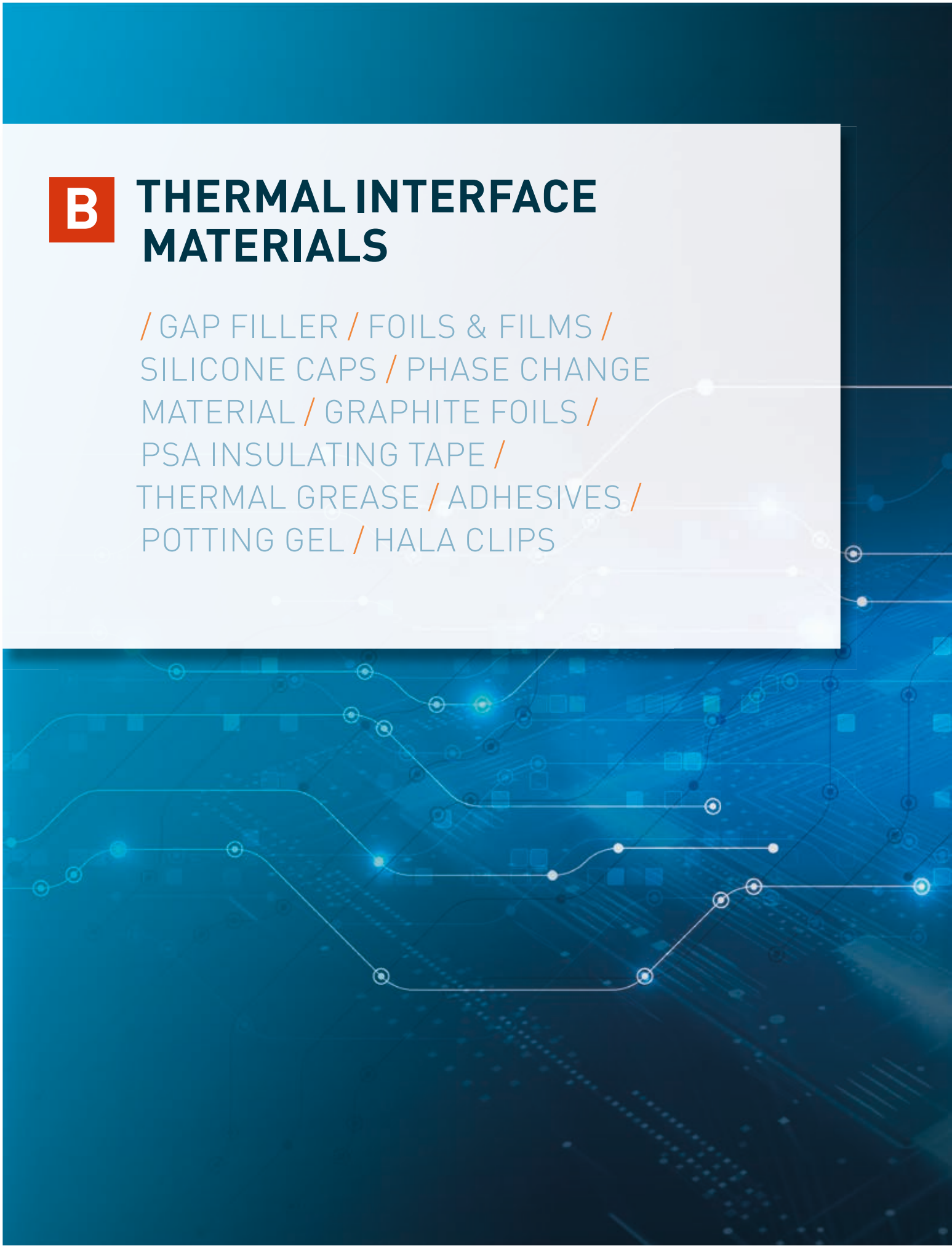
HALA

THERMAL OPTIMIZATION, RIGHT FROM THE START



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 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 compliable
- 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

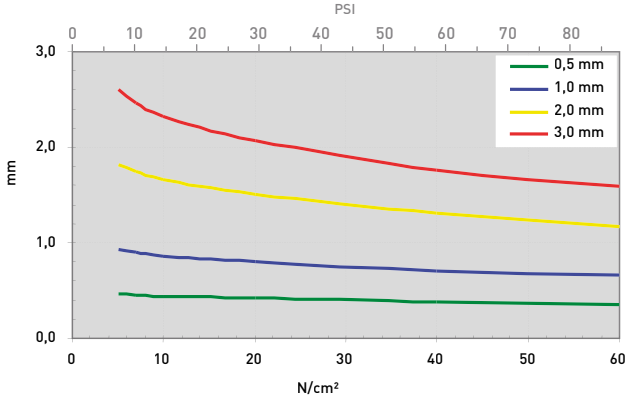
For use in Automotive applications / Laptops / Medicine engineering/ Industrial PCs

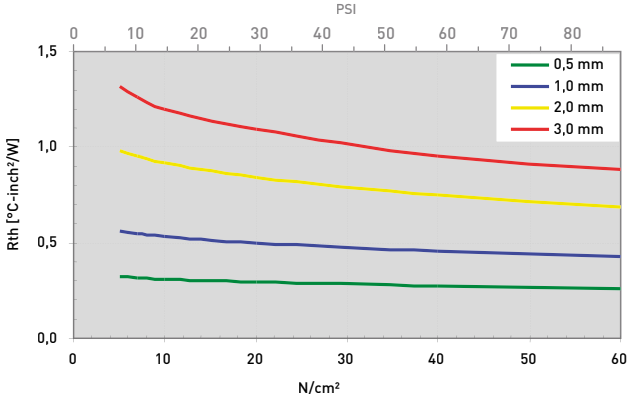
PROPERTY	UNIT	TGF-M0500-SI	TGF-M1000-SI	TGF-M2000-SI	TGF-M3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	50	50	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	°C-inch²/W (mm)	0.27 (0.38)	0.45 (0.71)	0.75(1.31)	0.96 (1.76)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.29 (0.42)	0.50 (0.80)	0.84 (1.50)	1.09 (2.07)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180	- 60 to + 180
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2	5.2

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: 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 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.

PROPERTIES

- Soft and compliable
- 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 450 x 460 mm (Thickness 3.0 / 4.0 mm)
- Sheet 450 x 450 mm (Thickness 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

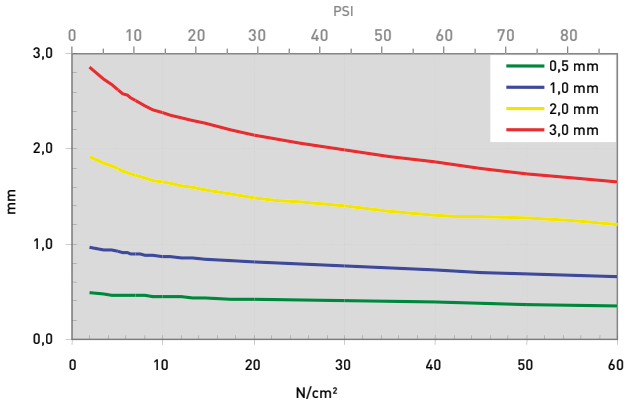
For use in Automotive applications/ Laptops / Medicine engineering / Industrial PCs

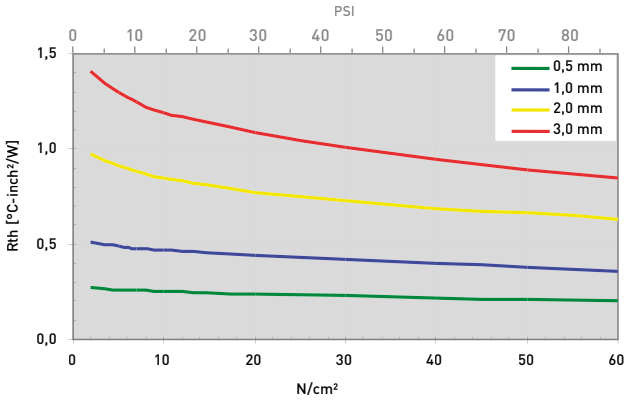
PROPERTY	UNIT	TGF-R0500-SI	TGF-R1000-SI	TGF-R2000-SI	TGF-R3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.30}$
Hardness	Shore 00	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-inch²/W (mm)	0.22 (0.39)	0.40 (0.73)	0.68 (1.31)	0.95 (1.86)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.24 (0.42)	0.44 (0.81)	0.77 (1.49)	1.09 (2.15)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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	- 60 to + 180	- 60 to + 180	- 60 to + 180
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2	5.2

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: 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 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 heigths 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 compliable
- 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

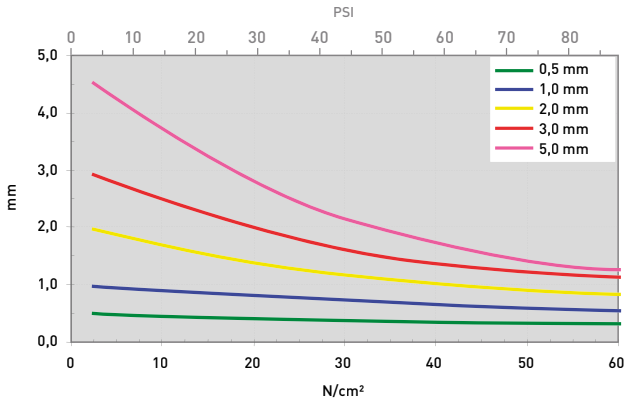
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

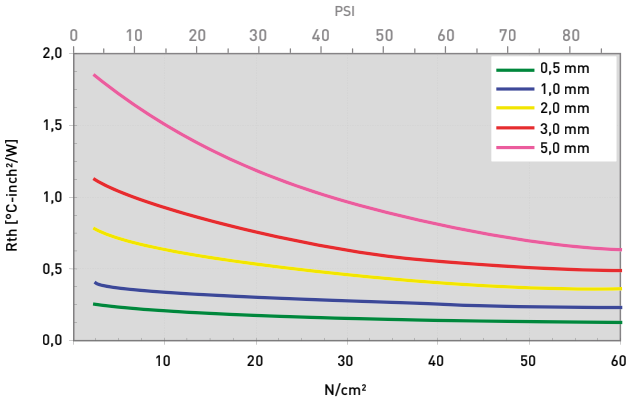
PROPERTY	UNIT	TGF-U0500-SI	TGF-U1000-SI	TGF-U2000-SI	TGF-U3000-SI	TGF-U5000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey	Grey
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.20	3.0 ±0.25	5.0 ±0.30
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-inch²/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-inch²/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-inch²/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	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
ELECTRICALLY						
Dielectric Strength	kV / mm	15	15	15	15	15

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: 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 TGF-VS-SI

soft, flexible / Low Volatile Siloxanes (LV)

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

PROPERTIES

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

AVAILABILITY

- Sheet 400 x 200 mm (<2.0 mm)
- Sheet 300 x 200 mm (≥2.0 mm)
- Tacky on both sides (TGF-VSXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

- SMD packages
- Through-hole vias
- RDRAMs memory modules
- Flip Chips, DSPs, BGAs, PPGAs

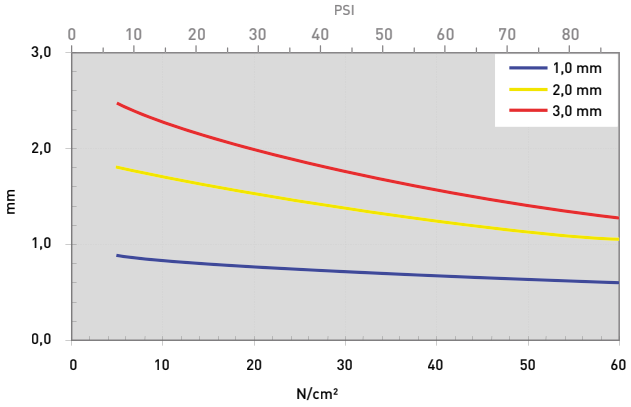
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

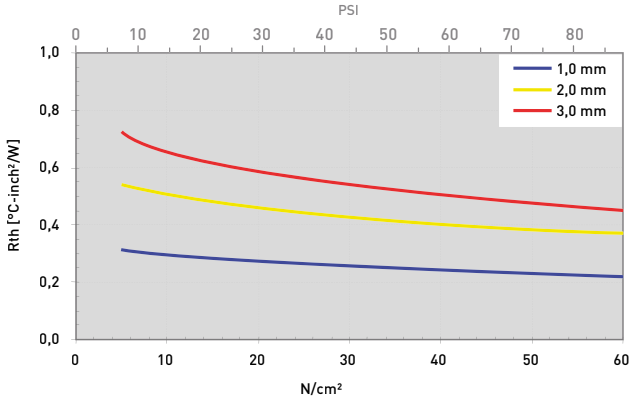
PROPERTY	UNIT	TGF-VS1000-SI	TGF-VS2000-SI	TGF-VS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Turquois	Turquois	Turquois
Density	g/cm³	3.3	3.3	3.3
Thickness	mm	$1.0^{+0.20}_{-0.10}$	$2.0^{\pm 0.20}$	$3.0^{\pm 0.30}$
Hardness	Shore 00	55	55	55
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.24 (0.67)	0.40 (1.25)	0.50 (1.55)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.28 (0.76)	0.46 (1.55)	0.59 (2.00)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.30 (0.87)	0.52 (1.78)	0.69 (2.42)
Thermal Conductivity[1]	W/mK	5.0	5.0	5.0
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130	- 40 to + 130
ELECTRICAL				
Dielectric Strength	kV / mm	≥8	≥8	≥8
Volume Resistivity	Ohm - cm	≥1.0 x 10^{10}	≥1.0 x 10^{10}	≥1.0 x 10^{10}

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: 0.5 / 1.0 mm / 2.0 mm / 3.0 mm

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





SILICONE GAP FILLER TGF-XS-SI

soft, flexible / Low Volatile Siloxanes (LV)

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

PROPERTIES

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

AVAILABILITY

- Sheet 400 x 200 mm (<2.0 mm)
- Sheet 300 x 200 mm (≥2.0 mm)
- Tacky on both sides (TGF-XSXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

- SMD packages
- Through-hole vias
- RDRAMs memory modules
- Flip Chips, DSPs, BGAs, PPGAs

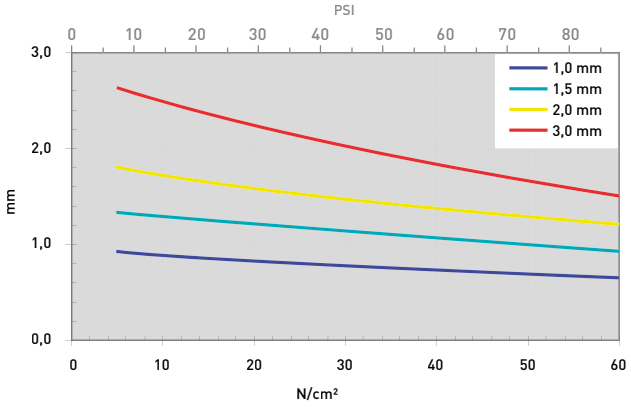
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

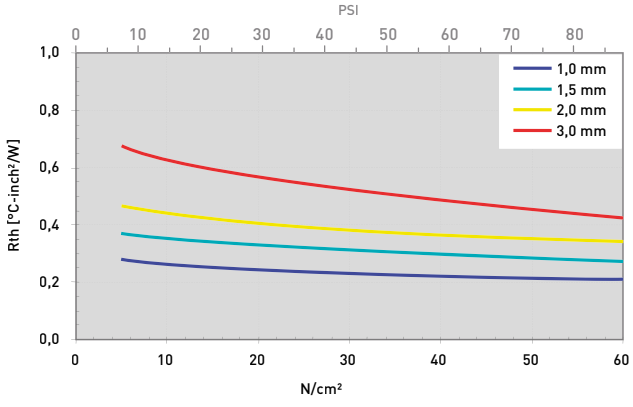
PROPERTY	UNIT	TGF-XS1000-SI	TGF-XS1500-SI	TGF-XS2000-SI	TGF-XS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey
Density	g/cm³	3.3	3.3	3.3	3.3
Thickness	mm	$1.0^{\pm 0.10}$	$1.5^{\pm 0.15}$	$2.0^{\pm 0.20}$	$3.0^{\pm 0.30}$
Hardness	Shore 00	60	60	60	60
UL Flammability (Equivalent)	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.22 (0.74)	0.30 (1.07)	0.36 (1.40)	0.48 (1.83)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.24 (0.83)	0.33 (1.22)	0.41 (1.60)	0.56 (2.26)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.27 (0.91)	0.36 (1.32)	0.45 (1.80)	0.66 (2.59)
Thermal Conductivity[1]	W/mK	6.0	6.0	6.0	6.0
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130	- 40 to + 130	- 40 to + 130
ELECTRICAL					
Dielectric Strength	kV / mm	≥8	≥8	≥8	≥8
Volume Resistivity	Ohm - cm	≥1.0 x 10^{10}	≥1.0 x 10^{10}	≥1.0 x 10^{10}	≥1.0 x 10^{10}

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: 0.75 / 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 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 heigths 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.

PROPERTIES

- Soft and compliable
- 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	3.3	3.3	3.3
Hardness	mm	1.0 $^{\pm 0.2}$	1.5 $^{\pm 0.2}$	2.0 $^{\pm 0.3}$
Thickness	Shore 00	64	64	64
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1]	°C-$inch^2$/W	0.17 @ 0.90 mm	0.24 @ 1.40 mm	0.30 @ 1.80 mm
Resistance[1]	°C-$inch^2$/W	0.15 @ 0.70 mm	0.23 @ 1.20 mm	0.27 @ 1.60 mm
Thermal Conductivity	W/mK	11.0	11.0	11.0
Operating Temperature Range	°C	- 50 to + 180	- 50 to + 180	- 50 to + 180
ELECTRICALLY				
Dielectric Strength	kV / mm	>10	>10	>10
Dielectric Constant	Ohm - cm	7.0 x 10^{11}	7.0 x 10^{11}	7.0 x 10^{11}
Volume Resistivity	1 MHz	ca. 7.5	ca. 7.5	ca. 7.5

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: 1.0 mm / 1.5 mm / 2.0 mm

SILICONE GAP FILLER TGF-BXS-SI

ultrasoft, 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 compliable
- 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-BXSXXXX-SI)
- Tacky on one side, PSA adhesive on one side (TGF-BXSXXXX-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

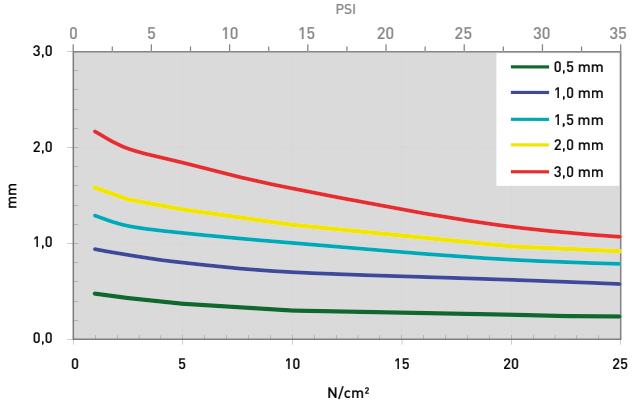
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

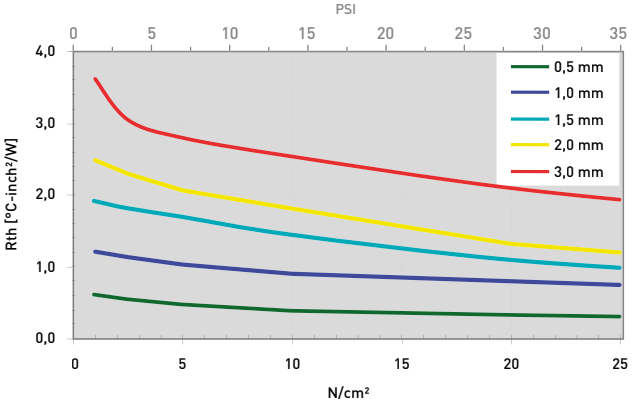
PROPERTY	UNIT	TGF-BXS0500-SI	TGF-BXS1000-SI	TGF-BXS1500-SI	TGF-BXS2000-SI	TGF-BXS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Pink	Pink	Pink	Pink	Pink
Thickness	mm	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$	1.5 $^{\pm 0.15}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.30}$
Hardness	Shore 00	15	15	15	15	15
Density	g/cm³	2.3	2.3	2.3	2.3	2.3
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-inch²/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-inch²/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-inch²/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	- 40 to + 150	- 40 to + 150	- 40 to + 150	-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}	3.5 x 10^{12}	3.5 x 10^{12}	3.5 x 10^{12}	3.5 x 10^{12}
Dielectric Constant	@ 1 MHz	3.87	3.87	3.87	3.87	3.87

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: 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 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.

PROPERTIES

- Extremely soft and compliable
- 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-HUSXXXX-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

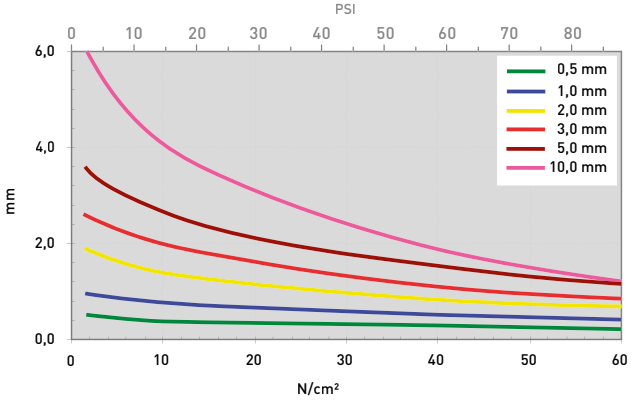
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

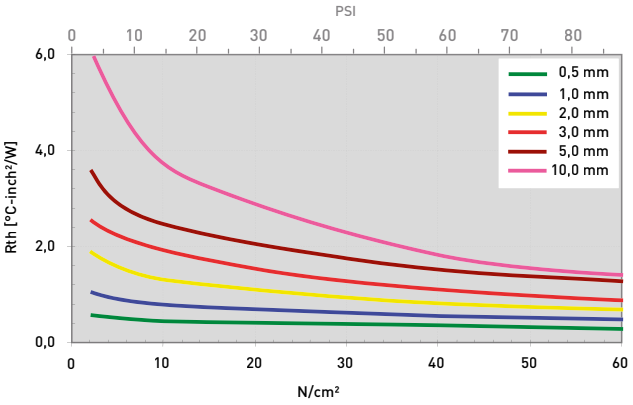
PROPERTY	UNIT	TGF-HUS0500-SI	TGF-HUS1000-SI	TGF-HUS2000-SI	TGF-HUS3000-SI	TGF-HUS5000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark grey	Dark grey	Dark grey	Dark grey	Dark grey
Thickness	mm	0.5 $^{\pm 0.10}$	1.0 $^{\pm 0.15}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.25}$	5.0 $^{\pm 0.30}$
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-inch²/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-inch²/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-inch²/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	- 40 to + 150	- 40 to + 150	- 40 to + 150	- 40 to + 150
ELECTRICALLY						
Dielectric Strength	kV / mm	> 10	> 10	> 10	> 10	> 10
Volume Resistivity	Ohm - cm	8.056 x 10^{12}	8.056 x 10^{12}	8.056 x 10^{12}	8.056 x 10^{12}	8.056 x 10^{12}
Dielectric Constant	5.6	5.6	5.6	5.6	5.6	5.6

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: 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 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 compliable
- 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-JUSXXXX-SI)
- Tacky on one side (TGF-JUSXXXX-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

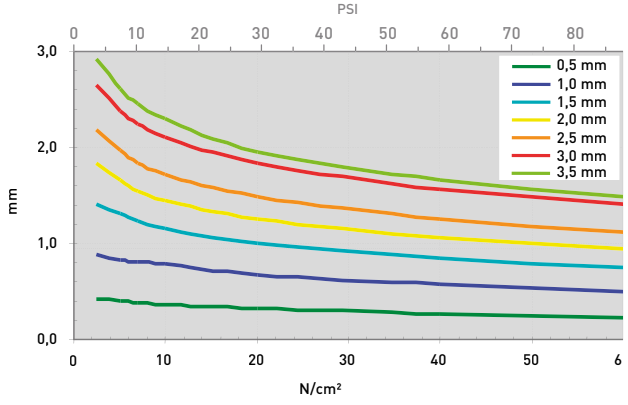
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

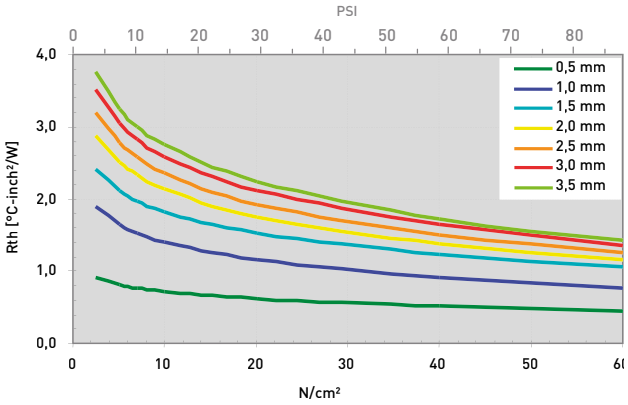
PROPERTY	UNIT	TGF-JUS0500-SI	TGF-JUS1000-SI	TGF-JUS2000-SI	TGF-JUS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30
Hardness	Shore 00	20	20	20	20
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[1] @ 60 PSI @ thickness	°C-inch²/W (mm)	0.60 (0.35)	1.00 (0.65)	1.40 (1.10)	1.70 (1.60)
Resistance[1] @ 30 PSI @ thickness	°C-inch²/W (mm)	0.70 (0.40)	1.20 (0.75)	1.80 (1.30)	2.10 (1.85)
Resistance[1] @ 10 PSI @ thickness	°C-inch²/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	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180	- 60 to + 180
ELECTRICALLY					
Dielectric Strength	kV / mm	10	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}
Dielectric Constant	@ 1 kHz	5	5	5	5

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: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 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 heigths 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.

PROPERTIES

- Ultra soft and compliable
- 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-JXSXXXX-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

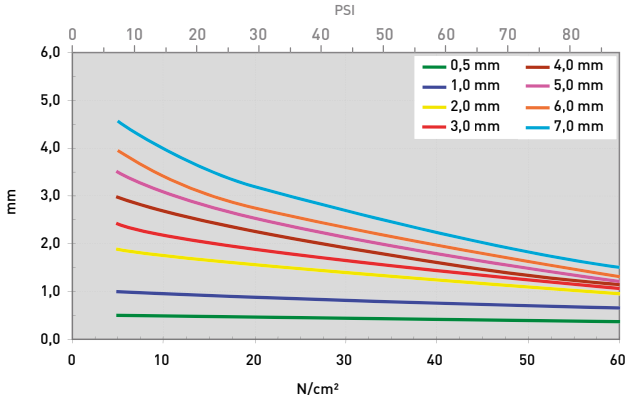
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

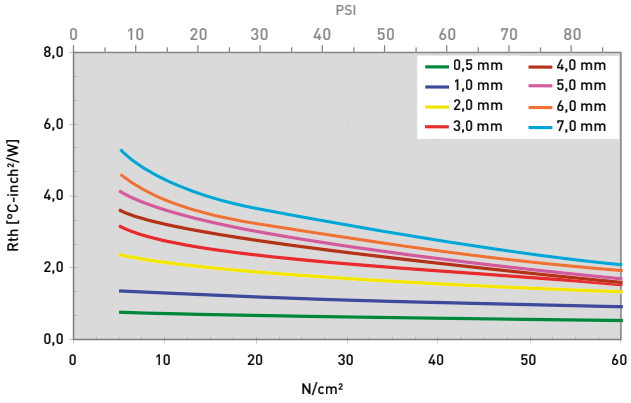
PROPERTY	UNIT	TGF-JXS0500-SI-A1	TGF-JXS1000-SI-A1	TGF-JXS2000-SI-A1	TGF-JXS3000-SI-A1	TGF-JXS5000-SI-A1
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey	Light blue / Grey
Thickness	mm	$0.5^{+0.20}_{-0.10}$	$1.0^{+0.20}_{-0.10}$	$2.0^{\pm 0.20}$	$3.0^{\pm 0.30}$	$5.0^{\pm 0.50}$
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-inch²/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-inch²/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-inch²/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	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}

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

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

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





SILICONE GAP FILLER 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 strengh.

PROPERTIES

- Ultra soft and compliable
- 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-MXSXXXX-SI)
- Tacky on one side by fibreglass reinforced laminate (TGF-MXSXXXX-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

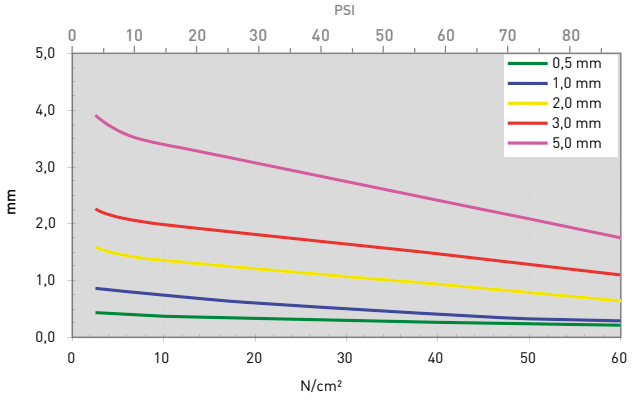
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

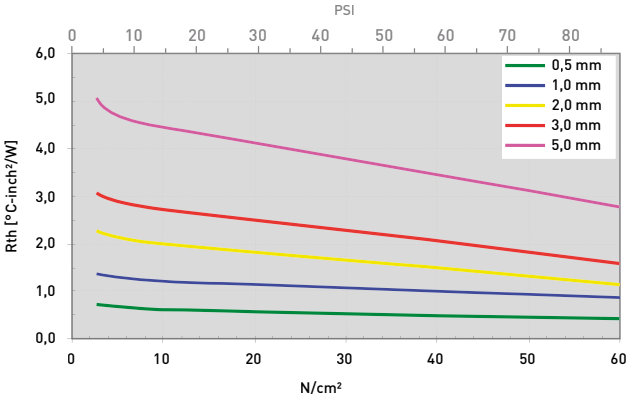
PROPERTY	UNIT	TGF-MXS0500-SI	TGF-MXS1000-SI	TGF-MXS2000-SI	TGF-MXS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey (/ Red laminate)	Grey (/ Red laminate)	Grey (/ Red laminate)	Grey (/ Red laminate)
Optional Reinforcement (TGF-MXSXXXX-SI-GF)		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	0.5 $^{\pm 0.10}$	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.30}$
Hardness	Shore 00	15	15	15	15
UL Flammability	UL 94	V1	V1	V1	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.44 (0.25)	1.00 (0.45)	1.49 (0.86)	2.05 (1.50)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.53 (0.32)	1.15 (0.63)	1.79 (1.15)	2.50 (1.73)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.63 (0.40)	1.26 (0.75)	2.03 (1.40)	2.77 (2.05)
Thermal Conductivity	W/mK	2.4	2.4	2.4	2.4
Operating Temperature Range	°C	- 40 to + 200	- 40 to + 200	- 40 to + 200	- 40 to + 200
ELECTRICAL					
Dielectric Strength	kV / mm	4	4	4	4
Volume Resistivity	Ohm - cm	1.7 x 10^{13}	1.7 x 10^{13}	1.7 x 10^{13}	1.7 x 10^{13}

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: 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 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.

PROPERTIES

- Extraordinary soft and compliable
- 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-LSSXXXX-SI)
- With fibreglass mesh inlay (TGF-LSSXXXX-SI-GF)
- With fibreglass reinforced film laminate (TGF-LSSXXXX-SI-LGF)
- With PI film laminate (TGF-LSSXXXX-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

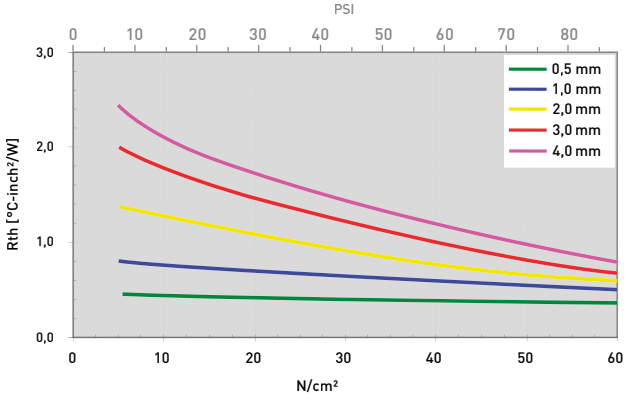
For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

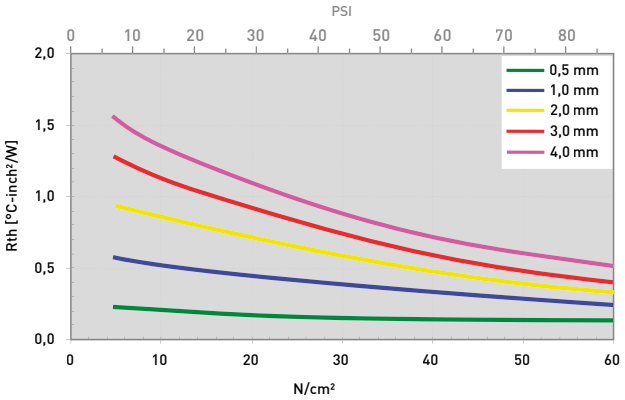
PROPERTY	UNIT	TGF-LSS0500-SI	TGF-LSS1000-SI	TGF-LSS2000-SI	TGF-LSS3000-SI	TGF-LSS4000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light beige	Light beige	Light beige	Light beige	Light beige
Thickness	mm	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.30}$	4.0 $^{\pm 0.40}$
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-inch²/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-inch²/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-inch²/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	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 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}	1.0 x 10^{13}	1.0 x 10^{13}	1.0 x 10^{13}	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: 0.15 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-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 compliable
- 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-MUSXXXX-SI)
- Tacky on one side (TGF-MUSXXXX-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

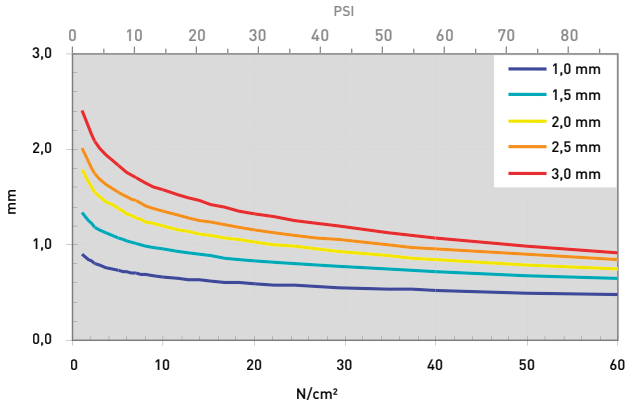
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

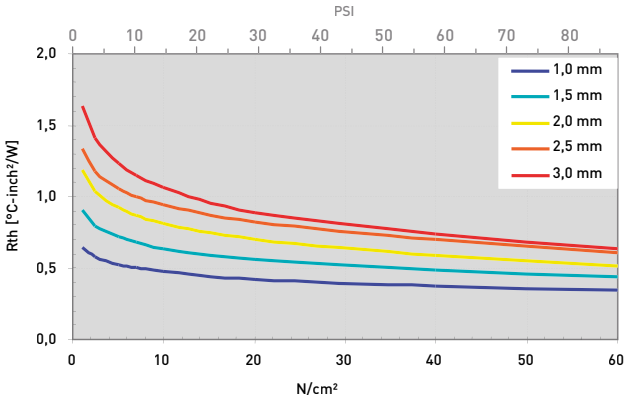
PROPERTY	UNIT	TGF-MUS1000-SI	TGF-MUS2000-SI	TGF-MUS3000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue
Thickness	mm	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.30}$
Hardness	Shore 00	20	20	20
UL Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.37 (0.52)	0.58 (0.85)	0.74 (1.06)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.42 (0.59)	0.70 (1.02)	0.89 (1.32)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180
ELECTRICAL				
Dielectric Strength	kV / mm	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10^{11}	1.0 x 10^{11}	1.0 x 10^{11}
Dielectric Constant	@ 1 kHz	5.2	5.2	5.2

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: 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 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.

PROPERTIES

- Extraordinary soft and compliable
- 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-RSSXXXX-SI)
- With fibreglass mesh inlay (TGF-RSSXXXX-SI-GF)
- With fibreglass reinforced film laminate (TGF-RSSXXXX-SI-LGF)
- With PI film laminate (TGF-RSSXXXX-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

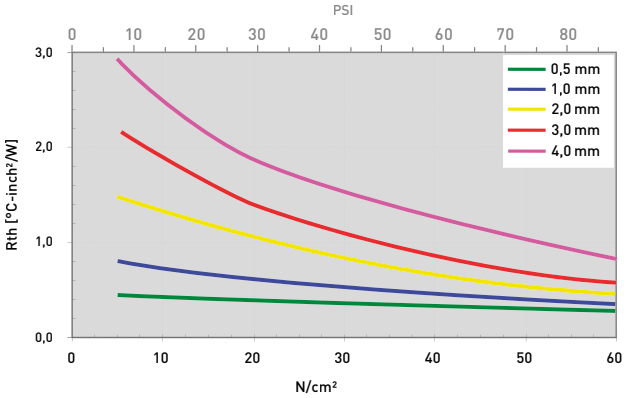
For use in Automotive applications / Laptops / Medical engineering / Embedded boards / Graphic cards / Memory modules / LED light / LCD and plasma TV

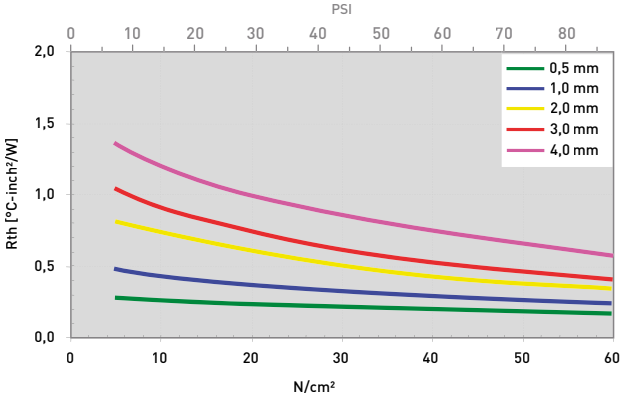
PROPERTY	UNIT	TGF-RSS0500-SI	TGF-RSS1000-SI	TGF-RSS2000-SI	TGF-RSS3000-SI	TGF-RSS4000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light blue	Light blue	Light blue	Light blue	Light blue
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20	3.0 ±0.30	4.0 ±0.40
Hardness	Shore 00	43	43	43	43	43
UL Flammability	UL 94	V0	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes	Yes
THERMAL						
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/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-inch²/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-inch²/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	- 50 to + 170	- 50 to + 170	- 50 to + 170	- 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}	1.0 x 10^{13}	1.0 x 10^{13}	1.0 x 10^{13}	1.0 x 10^{13}
Dielectric Constant	@ 1 MHz	5.6	5.6	5.6	5.6	5.6

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: 0.15 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-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 heigths 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 compliable
- 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-TSSXXXX-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

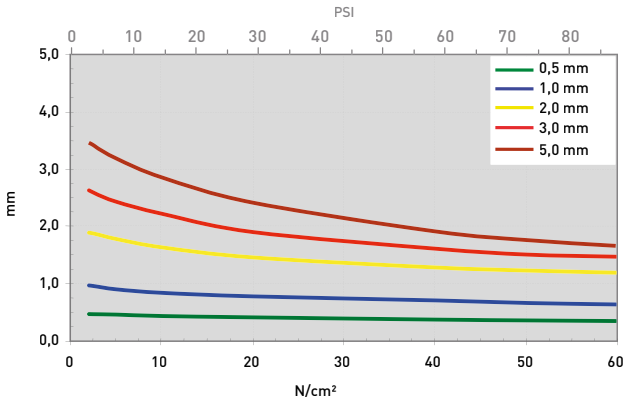
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

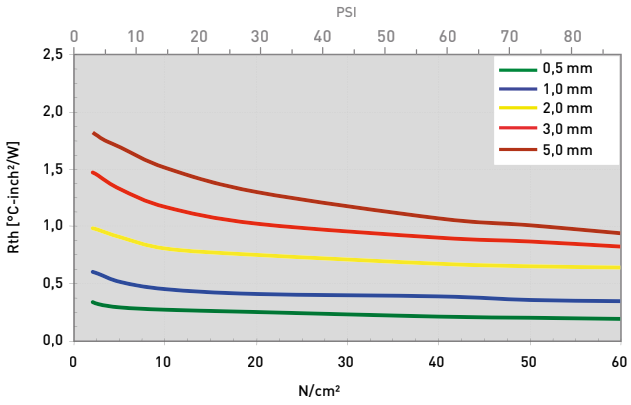
PROPERTY	UNIT	TGF-TSS0500-SI	TGF-TSS1000-SI	TGF-TSS2000-SI	TGF-TSS3000-SI	TGF-TSS5000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Light reddish purple	Light reddish purple	Light reddish purple	Light reddish purple	Light reddish purple
Thickness	mm	0.5 $^{\pm 0.10}$	1.0 $^{\pm 0.15}$	2.0 $^{\pm 0.20}$	3.0 $^{\pm 0.25}$	5.0 $^{\pm 0.30}$
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-inch²/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-inch²/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-inch²/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	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to+ 180
ELECTRICALLY						
Dielectric Strength	kV / mm	15	15	15	15	15

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: 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 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 heigths 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.

PROPERTIES

- Ultra soft and compliable
- 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 210 x 420 mm (0.5 - 3.0 mm)
- Tacky on one side by film laminate (TGF-USSXXXX-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

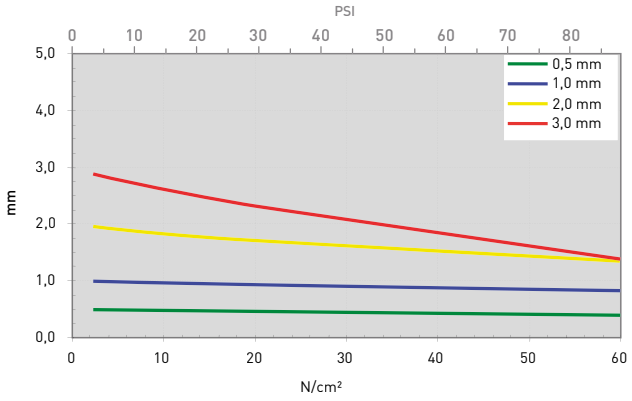
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

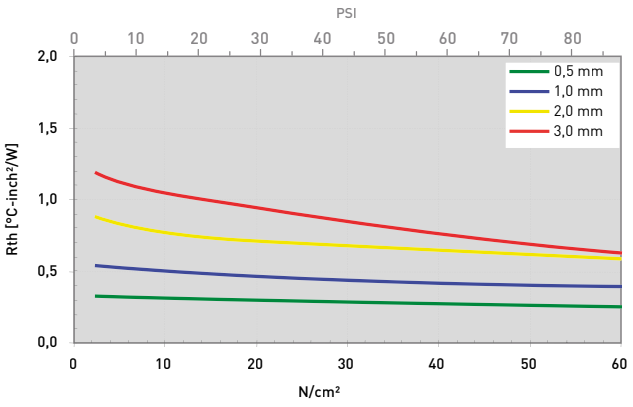
PROPERTY	UNIT	TGF-USS0500-SI-A1	TGF-USS1000-SI-A1	TGF-USS2000-SI-A1	TGF-USS3000-SI-A1
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark grey / Grey	Dark grey / Grey	Dark grey / Grey	Dark grey / Grey
Thickness	mm	$0.5^{+0.20}_{-0.10}$	$1.0^{+0.20}_{-0.10}$	$2.0^{\pm 0.20}$	$3.0^{\pm 0.30}$
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-inch²/W (mm)	0.26 (0.47)	0.40 (0.87)	0.63 (1.55)	0.75 (1.84)
Resistance[2] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.29 (0.48)	0.45 (0.93)	0.70 (1.70)	0.94 (2.30)
Resistance[2] @ 10 PSI @ Thickness	°C-inch²/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	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}	1.0×10^{10}

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

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

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

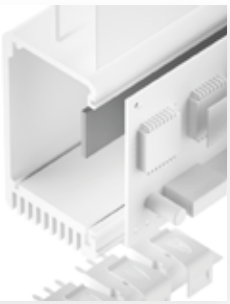




SILICONE GAP FILLER TGF-WSS-SI

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 compliable
- 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-WSSXXXX-SI)
- Tacky on one side (TGF-WSSXXXX-SI-A1)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

- SMD packages
- Through-hole vias
- RDRAMs memory modules
- Flip Chips, DSPs, BGAs, PPGAs

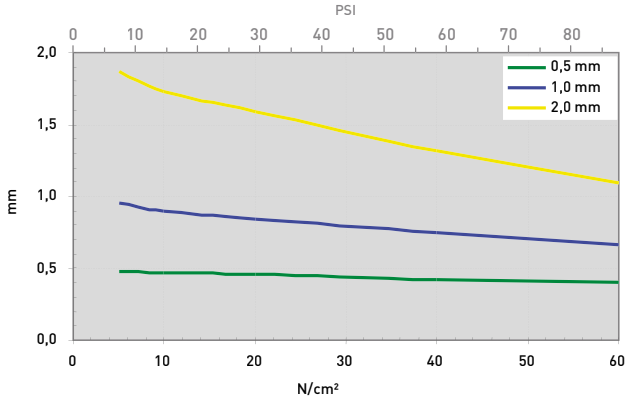
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

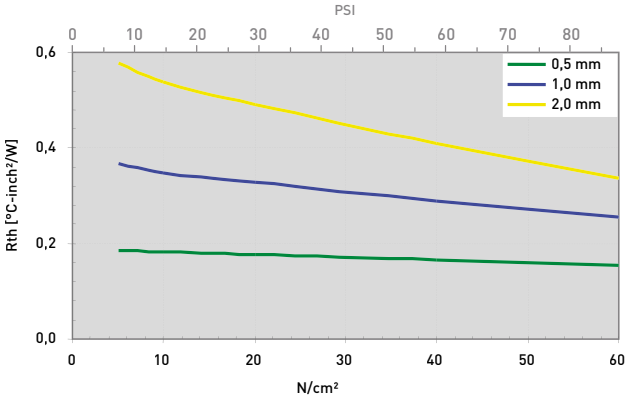
PROPERTY	UNIT	TGF-WSS0500-SI	TGF-WSS1000-SI	TGF-WSS2000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey
Thickness	mm	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$
Hardness	Shore 00	55	55	55
UL Flammability (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.16 (0.41)	0.30 (0.75)	0.41 (1.32)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.18 (0.46)	0.32 (0.85)	0.49 (1.59)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.19 (0.48)	0.36 (0.93)	0.56 (1.80)
Thermal Conductivity[1]	W/mK	5.5	5.5	5.5
Operating Temperature Range	°C	- 60 to + 180	- 60 to + 180	- 60 to + 180
ELECTRICAL				
Dielectric Strength	kV / mm	10	10	10
Volume Resistivity	Ohm - cm	1.0 x 10^{13}	1.0 x 10^{13}	1.0 x 10^{13}

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: 0.5 mm / 1.0 mm / 2.0 mm

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





SILICONE GAP FILLER 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 strengh.

PROPERTIES

- Ultra soft and compliable
- 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-DXSXXXX-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

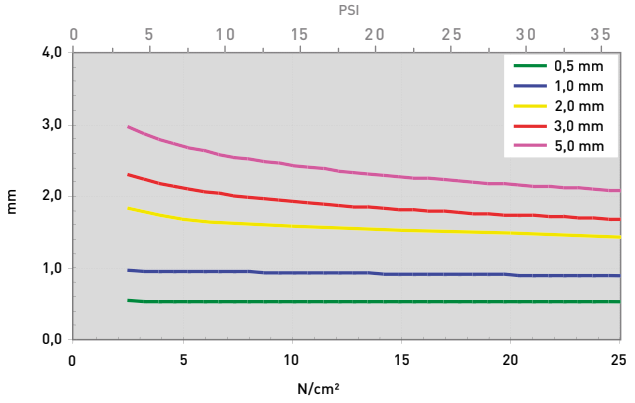
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

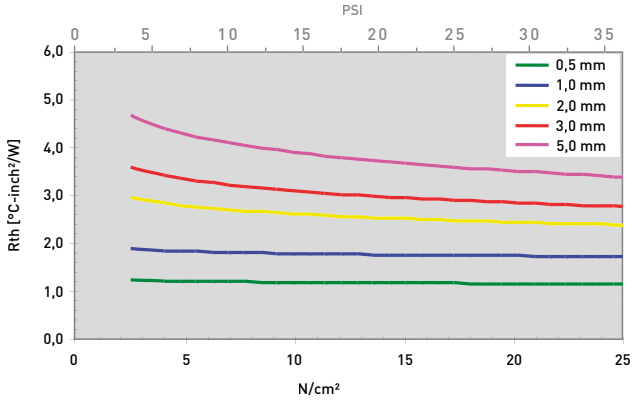
PROPERTY	UNIT	TGF-DXS1000-SI-GF	TGF-DXS2000-SI-GF	TGF-DXS3000-SI-GF	TGF-DXS5000-SI-GF
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		White / Pink	White / Pink	White / Pink	White / Pink
Reinforcement		Fibreglass laminate	Fibreglass laminate	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	5	5	5	5
UL Flammability	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[1] @ 35 PSI @ Thickness	°C-inch²/W (mm)	1.77 (0.94)	2.43 (1.40)	2.80 (1.65)	3.40 (2.10)
Resistance[1] @ 15 PSI @ Thickness	°C-inch²/W (mm)	1.85 (0.95)	2.70 (1.60)	3.10 (1.95)	3.95 (2.55)
Resistance[1] @ 7 PSI @ Thickness	°C-inch²/W (mm)	1.86 (0.97)	2.80 (1.70)	3.30 (2.20)	4.40 (2.70)
Thermal Conductivity	W/mK	1.3	1.3	1.3	1.3
Operating Temperature Range	°C	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
ELECTRICAL					
Dielectric Strength	kV / mm	6	6	6	6
Volume Resistivity	Ohm - cm	6.2×10^{15}	6.2×10^{15}	6.2×10^{15}	6.2×10^{15}
Dielectric Constant	@ 1 MHz	5.27	5.27	5.27	5.27

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: 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 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 heigths 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 compliable
- 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 rein forced laminate (TGF-EXSXXXX-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

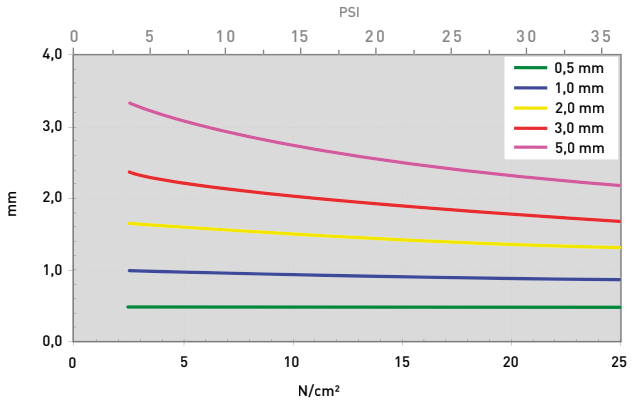
For use in Automotive applications / Laptops / Medicine engineering / Embedded boards

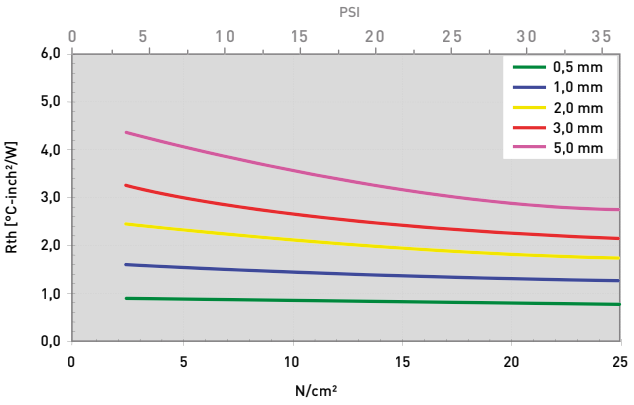
PROPERTY	UNIT	TGF-EXS0500-SI-GF	TGF-EXS1000-SI-GF	TGF-EXS2000-SI-GF	TGF-EXS3000-SI-GF	TGF-EXS5000-SI-GF
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Reddish brown / Grey	Reddish brown / Grey	Reddish brown / Grey	Reddish brown / Grey	Reddish brown / Grey
Reinforcement		Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate	Fibreglass laminate
Thickness	mm	0.5 ±0.10	1.0 ±0.15	2.0 ±0.25	3.0 ±0.25	5.0 ±0.30
Hardness	Shore 00	10	10	10	10	10
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-inch²/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-inch²/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-inch²/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	- 40 to + 180	- 40 to + 180	- 40 to + 180	- 40 to + 180
ELECTRICALLY						
Dielectric Strength	kV / mm	20	20	20	20	20

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: 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-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 putty
- Soft and compliable
- 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-YPXXXX-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

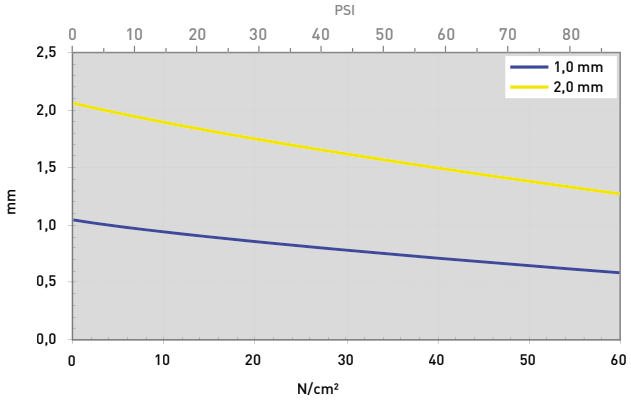
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

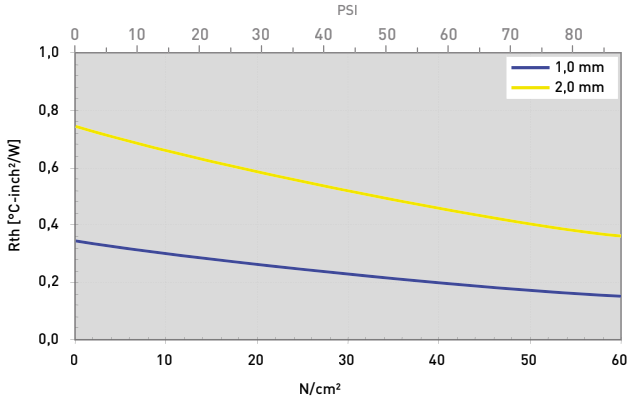
PROPERTY	UNIT	TGF-YP1000-SI	TGF-YP2000-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey
Thickness	mm	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$
Hardness	Shore 00	55	55
UL Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[1] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.20 (0.75)	0.45 (1.50)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.27 (0.90)	0.59 (1.75)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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: [1]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 heigths 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 putty
- Extremely soft and compliable
- 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/cm³	3.3	3.3
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[1] @ 1.5 mm	°C-inch²/W	---	0.24
Resistance[1] @ 0.8 mm	°C-inch²/W	0.14	0.14
Resistance[1] @ 0.5 mm	°C-inch²/W	0.10	0.10
Resistance[1] @ 0.2 mm	°C-inch²/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	7.0×10^{7}	7.0×10^{7}

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: 1.5 mm / 2.0 mm

SILICONE GAP FILLER / PUTTY TGL-W-SI

dispensable

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

PROPERTIESEN

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

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

- SMD packages
- Through-hole vias
- RDRAMs memory modules
- Flip Chips, DSPs, BGAs, PPGAs

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

PROPERTY	UNIT	TGL-W-SI
MATERIAL		Ceramic filled silicone compound
Colour		Grey
Density	g/cm³	3.1
Penetration	mm/10	290
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Thermal Conductivity	W/mK	5.5
Operating Temperature Range	°C	- 40 to + 150
ELECTRICAL		
Dielectric Strength	kV / mm	10
Volume Resistance	Ohm - cm	1.0×10^{13}

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

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

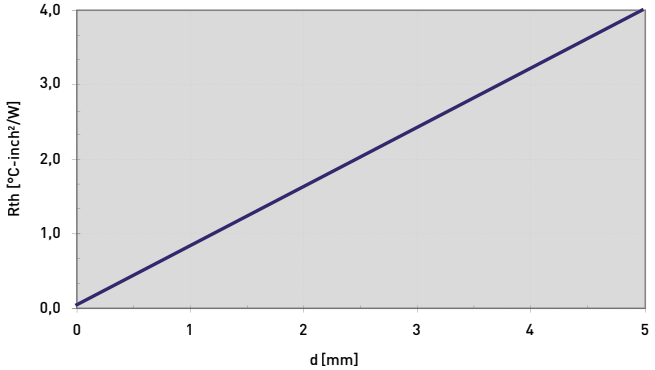
Thermal link of:

- FPBGA
- Capacitors
- Heat Pipes
- BGA

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

PROPERTY	UNIT	A Part	B Part
MATERIAL		Silicone	Silicone
Colour		Yellow	White
Density @ 25 °C	g/cm³	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.



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

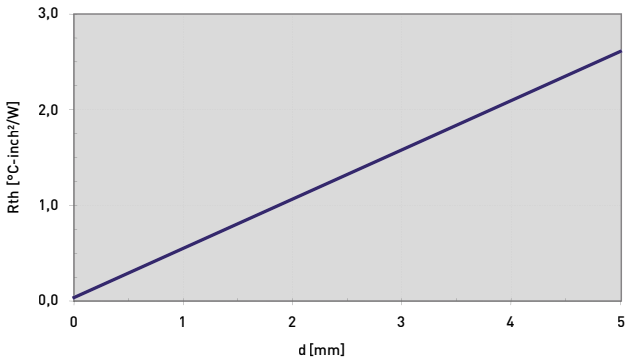
Thermal link of:

- 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/cm³	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	V0	V0
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: [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.



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

APPLICATION EXAMPLES

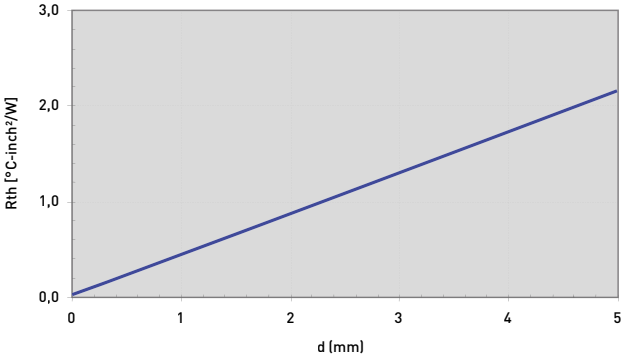
Thermal link of:

- FPBGA
- Capacitors
- Heat Pipes
- BGA

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

PROPERTY	UNIT	A Part	B Part
MATERIAL		Silicone	Silicone
Colour		Light Blue	White
Density @ 25 °C	g/cm³	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: [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.



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

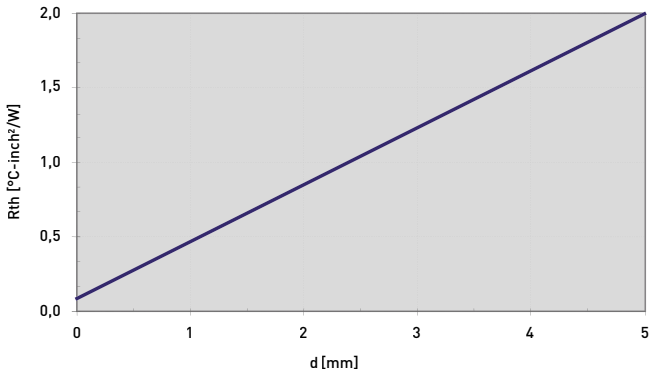
Thermal link of:

- 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/cm³	3.1	3.1
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore 00	60	60
Viscosity (Brookfield @ 10 rpm, 25 °C)	Pas	330	300
Viscosity (mixed) (Brookfield @ 10 rpm, 25 °C)	Pas	310	310
Pot Life @ 25 °C and 65 % RH (Time for viscosity to double)	min	> 100	> 100
Curing Time @ 25 °C / 100 °C		< 15h / 30 - 60 min	< 15h / 30 - 60 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	V1	V1
RoHS Conformity	2015 / 863 / EU	Yes	Yes
TECHNICAL			
Thermal Conductivity[2]	W/mK	4.5	4.5
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]P-VW 3-10.7 57650 Temp. Test, [2] ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.



SILICONE-FREE GAP FILLER 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 compliable
- 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-GUSXXXX-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

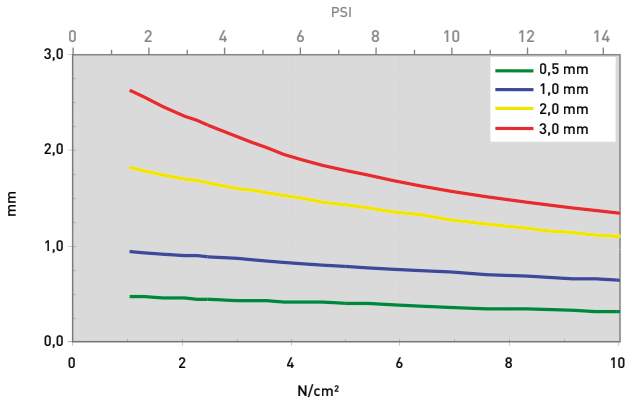
For use in Automotive applications / Laptops / Medicine engineering / Industrial PCs

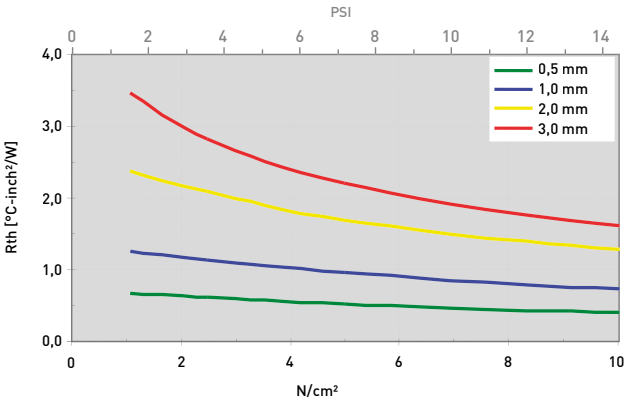
PROPERTY	UNIT	TGF-GUS0500-NS	TGF-GUS1000-NS	TGF-GUS2000-NS
MATERIAL		Ceramic filled silicone-free TPE elastomer	Ceramic filled , silicone-free TPE elastomer	Ceramic filled silicone-free TPE elastomer
Colour		Black	Black	Black
Thickness	mm	$0.5^{+0.20}_{-0.10}$	$1.0^{+0.20}_{-0.10}$	$2.0^{\pm 0.20}$
Specific Gravity	g/cm³	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-inch²/W (mm)	0.42 (0.32)	0.74 (0.63)	1.30 (1.11)
Resistance[1] @ 7 PSI @ Thickness	°C-inch²/W (mm)	0.54 (0.39)	0.98 (0.78)	1.70 (1.44)
Resistance[1] @ 3 PSI @ Thickness	°C-inch²/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	1.0×10^{10}	1.0×10^{10}	$> 1.0 \times 10^{10}$

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: 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 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.

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 0.25 – 1.5 mm)
- Sheet 140 x 140 mm (Thickness 2.0 – 3.0 mm)
- Double-side self tacky (TEL-RXXXX-SI)
- Die cut parts
- Kiss cut parts on sheet

APPLICATION EXAMPLES

Thermal link of:

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

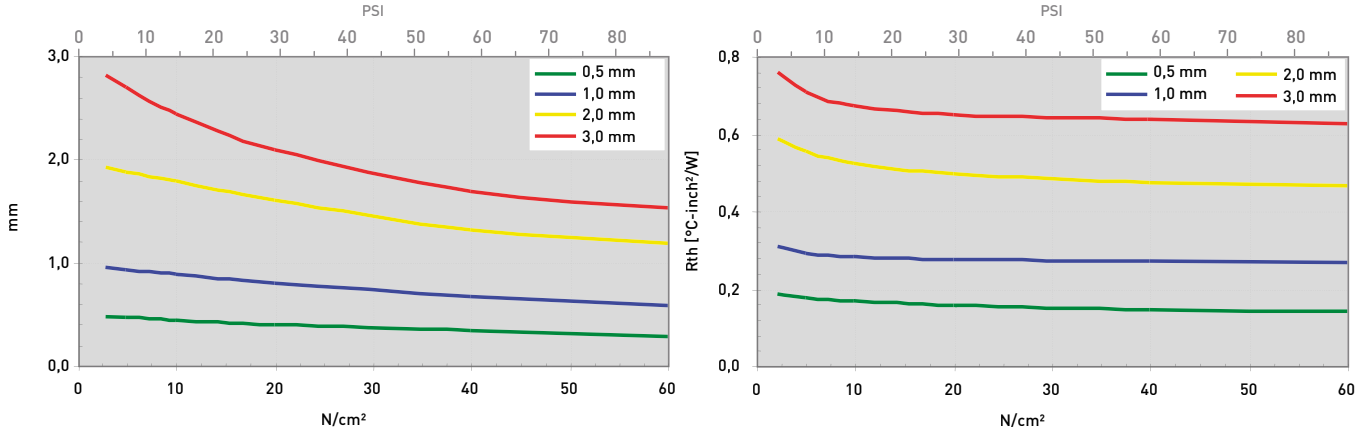
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TEL-R0500-SI	TEL-R1000-SI	TEL-R2000-SI
MATERIAL		Silicone with highly thermally conductive fillers	Silicone with highly thermally conductive fillers	Silicone with highly thermally conductive fillers
Colour		Black	Black	Black
Thickness	mm	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$	2.0 $^{\pm 0.20}$
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-inch²/W (mm)	0.15 (0.30)	0.27 (0.60)	0.47 (1.20)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.16 (0.41)	0.28 (0.81)	0.50 (1.61)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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: [1]ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 0.25 mm / 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 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

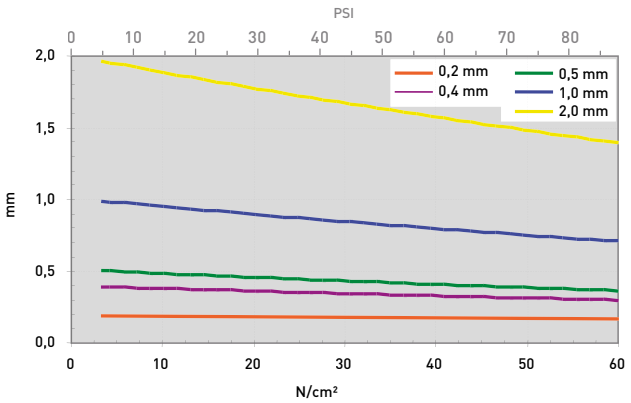
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

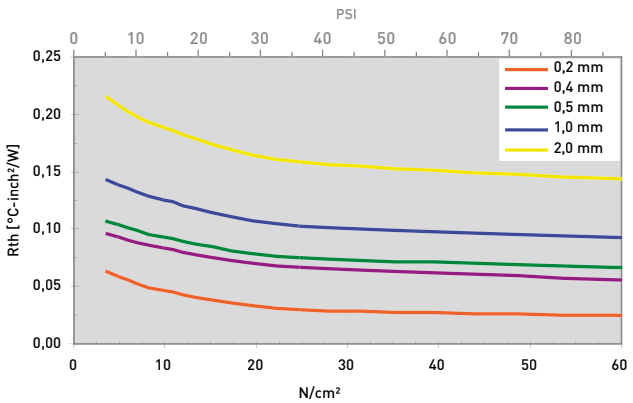
PROPERTY	UNIT	TEL-Z0200-SI	TEL-Z0500-SI	TEL-Z1000-SI
MATERIAL		Graphite filled silicone elastomere	Graphite filled silicone elastomere	Graphite filled silicone elastomere
Colour		Black	Black	Black
Thickness	mm	0.2 $^{\pm 0.05}$	0.5 $^{\pm 0.05}$	1.0 $^{\pm 0.10}$
Hardness	Shore 00	75	75	75
No Paint Wetting 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-inch²/W (mm)	0.020 (0.16)	0.060 (0.33)	0.09 (0.70)
Resistance[2] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.027 (0.18)	0.075 (0.48)	0.11 (0.91)
Resistance[2] @ 10 PSI @ Thickness	°C-inch²/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: [1]P-VW 3-10.7 57650 Temp. Test, [2]ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.
Shelf life adhesive: 6 months when stored in original packaging at room temperature and 50% relative humidity.

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

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





SILICONE GAP FILLER 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.

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-YSSXXXX-SI)
- Die cut parts
- Optional with adhesive stripes or dots (TEL-YSSXXXX-SI-A1)

APPLICATION EXAMPLES

Thermal link of:

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

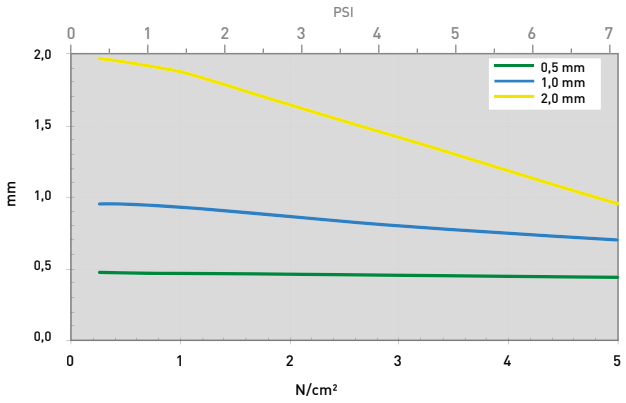
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

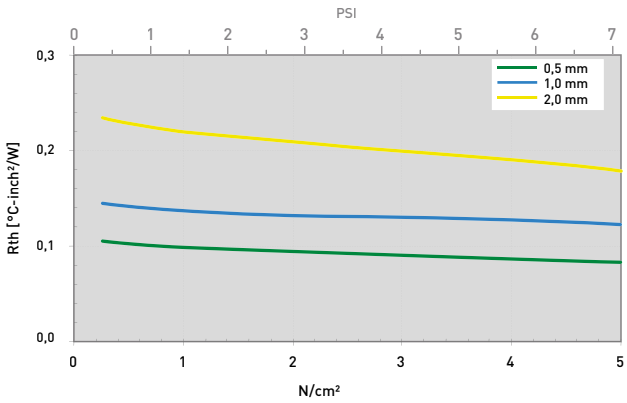
PROPERTY	UNIT	TEL-YSS0500-SI	TEL-YSS1000-SI	TEL-YSS2000-SI
MATERIAL		Graphite filled silicone elastomere	Graphite filled silicone elastomere	Graphite filled silicone elastomere
Colour		Black	Black	Black
Thickness	mm	0.5 ±0.05	1.0 ±0.10	2.0 ±0.20
Hardness	Shore 00	40	40	40
Flammability	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 7.5 PSI @ Thickness	°C-inch²/W (mm)	0.083 (0.42)	0.124 (0.700)	0.180 (0.954)
Resistance[1] @ 3.5 PSI @ Thickness	°C-inch²/W (mm)	0.089 (0.45)	0.129 (0.785)	0.205 (1.550)
Resistance[1] @ 1.5 PSI @ Thickness	°C-inch²/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: [1]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

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





SILICONE GAP FILLER 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: 25 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

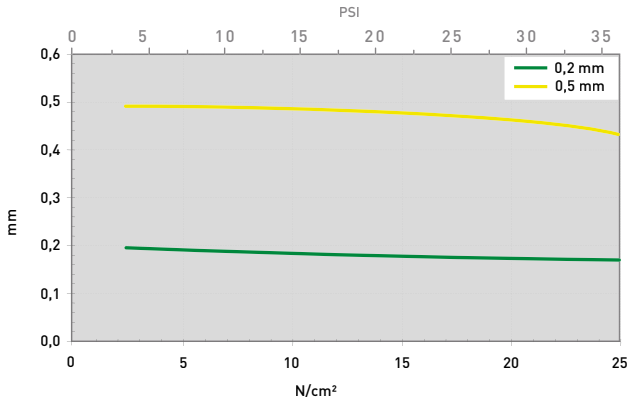
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

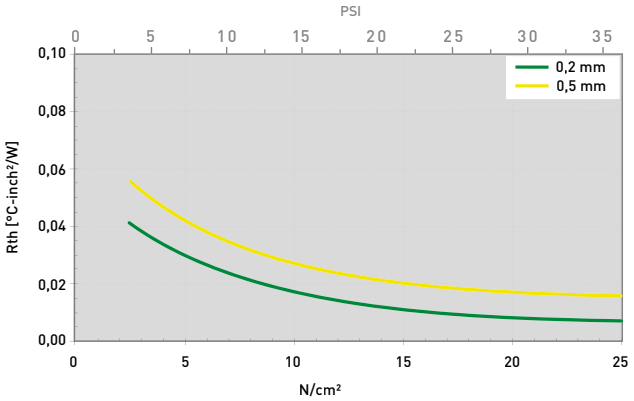
PROPERTY	UNIT	TEL-ZS0200-SI	TEL-ZS0500-SI
MATERIAL		Carbon filled silicone elastomere	Carbon filled silicone elastomere
Colour		Black	Black
Thickness	mm	0.2 ±0.05	0.5 ±0.05
Hardness	Shore 00	60	60
Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[1] @ 35 PSI @ Thickness	°C-inch²/W (mm)	0.007 (0.17)	0.018 (0.44)
Resistance[1] @ 15 PSI @ Thickness	°C-inch²/W (mm)	0.017 (0.18)	0.027 (0.48)
Resistance[1] @ 7 PSI @ Thickness	°C-inch²/W (mm)	0.030 (0.19)	0.042 (0.49)
Thermal Conductivity[1]	W/mK	25	25
Operating Temperature Range	°C	- 40 to + 150	- 40 to + 150
ELECTRICAL			
Volume Resistivity	Ohm - cm	< 50,000	< 50,000

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

Thicknesses: 0.2 mm / 0.3 mm / 0.5 mm

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

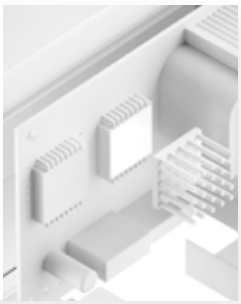




SILICONE-FREE GAP FILLER TAG-L-AC

Acrylate adhesive, thermally conductive

TAG-L-AC is a thermally conductive electrically insulating acrylate PSA 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. Its wide thickness range allows for the use as gap filler.



PROPERTIES

- Low thermal resistance
- Thermal conductivity: 1.0 W/mK
- Use as gap filler due to wide thickness range
- Reliable strong adherence on uneven or hardly machineable surfaces
- Silicone-free
- Neither mixing of components nor curing processes
- Replacement of fasteners e.g. screws, clips, etc.

AVAILABILITY

- Sheet (on request)
- Roll 900 mm x 33 m (Thickness 0.25 / 0.5 / 1.0 mm)
- Roll 900 mm x 16.5 m (Thickness 2.0 mm)
- TAG-LXXXX-AC
- Shaped parts
- Optional soft type TAG-LXSXXXX-AC

APPLICATION EXAMPLES

Thermal link of:

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

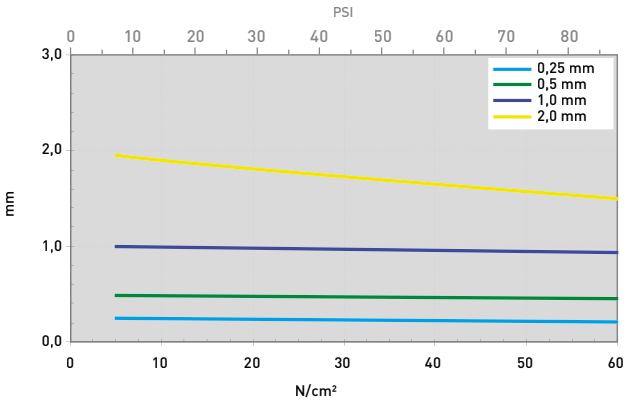
For use in Power supplies / PCs / Telecom engineering / Automotive applications / LED arrays

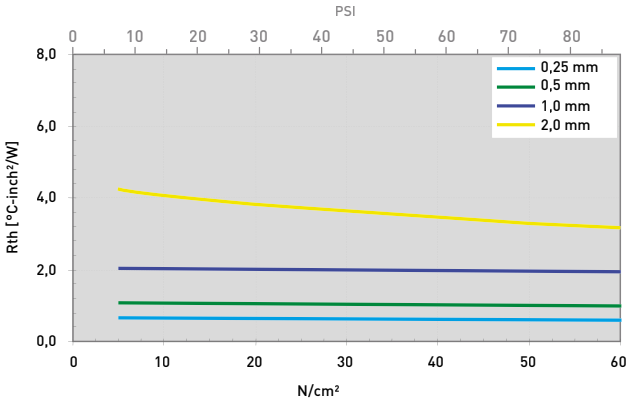
PROPERTY	UNIT	TAG-L0250-AC	TAG-L0500-AC	TAG-L1000-AC	TAG-L2000-AC
MATERIAL		Ceramic filled acrylate PSA adhesive	Ceramic filled acrylate PSA adhesive	Ceramic filled acrylate PSA adhesive	Ceramic filled acrylate PSA adhesive
Colour		White	White	White	White
Tape Thickness	mm	0.25 $^{\pm 0.038}$	0.50 $^{\pm 0.075}$	1.0 $^{\pm 0.150}$	2.0 $^{\pm 0.300}$
Liner Thickness[1]: Dual liner (Base / Top)	mm	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05	0.05 / 0.05
or Single liner	mm	0.14	0.14	0.14	0.14
Peel Off Strength (@ RT, Aluminum)[2]	N/cm	12	12	12	12
UL Flammability (Equivalent)	UL 94	V0	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[3] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.59 (0.23)	1.00 (0.49)	1.95 (0.90)	3.50 (1.60)
Resistance[3] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.62 (0.24)	1.05 (0.49)	2.00 (0.95)	3.90 (1.80)
Resistance[3] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.65 (0.25)	1.10 (0.50)	2.05 (0.98)	4.25 (1.90)
Thermal Conductivity	W/mK	0.8[3] / 1.0[4]	0.8[3] / 1.0[4]	0.8[3] / 1.0[4]	0.8[3] / 1.0[4]
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130	- 40 to + 130	- 40 to + 130
ELECTRICAL					
Breakdown Voltage[5]	kV AC	3.6	> 5.5	> 5.5	> 5.5

[1] Liner: Dual liner: BOPET bottom release liner (0.05 mm, transparent, siliconized) + LDPE top release liner (0.05 mm, white, siliconized) / Single liner: PE liner (0.14 mm, red).
Test Methods: [2] ASTM D 3330, [3] ASTM D 5470, [4] MTPS, [5] 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: 0.25 mm / 0.50 mm / 1.0 mm / 2.0 mm

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

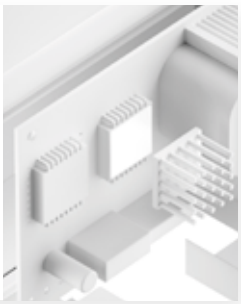




SILICONE-FREE GAP FILLER TAG-Q-AC

Acrylate adhesive, thermally conductive

TAG-Q-AC is a thermally conductive electrically insulating acrylate PSA 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. Its wide thickness range allows for the use as gap filler.



PROPERTIES

- Low thermal resistance
- Thermal conductivity: 2.0 W/mK
- Silicone-free
- Neither mixing of components nor curing processes

AVAILABILITY

- Sheet
- TAG-QXXXX-AC
- Shaped parts
- Optional soft type TAG-QXSXXXX-AC

APPLICATION EXAMPLES

Thermal link of:

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

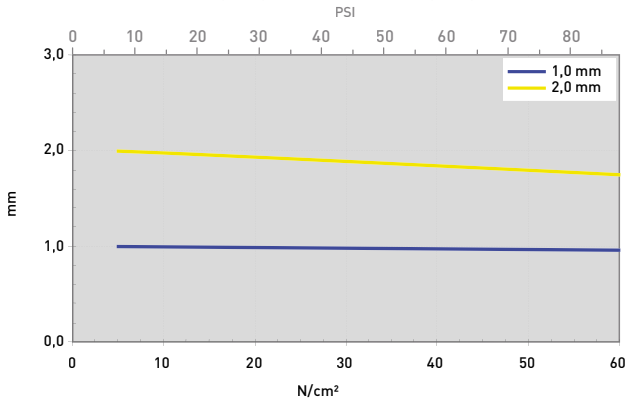
For use in Power supplies / PCs / Telecom engineering / Automotive applications / LED arrays

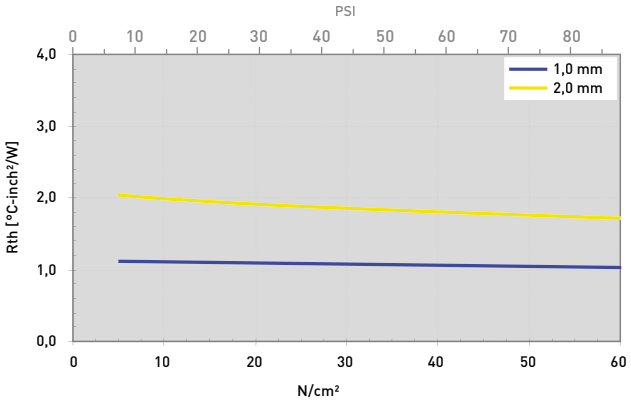
PROPERTY	UNIT	TAG-Q1000-AC	TAG-Q2000-AC
MATERIAL		Ceramic filled acrylate PSA adhesive	Ceramic filled acrylate PSA adhesive
Colour		White	White
Tape Thickness	mm	1.0	2.0
Liner Thickness[1]: Dual liner (Base / Top)	mm	0.05 / 0.05	0.05 / 0.05
or Single liner	mm	0.14	0.14
Peel Off Strength (@ RT, Aluminum)[2]	N/cm	7.9	7.9
UL Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[3] @ 60 PSI @ Thickness	°C-inch²/W (mm)	1.05 (0.97)	1.79 (1.82)
Resistance[3] @ 30 PSI @ Thickness	°C-inch²/W (mm)	1.07 (0.98)	1.92 (1.91)
Resistance[3] @ 10 PSI @ Thickness	°C-inch²/W (mm)	1.10 (0.99)	2.01 (1.98)
Thermal Conductivity	W/mK	1.6[3] / 2.0[4]	1.6[3] / 2.0[4]
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130
ELECTRICAL			
Breakdown Voltage[5]	kV AC	> 5.5	> 5.5

[1] Liner: Dual liner: BOPET bottom release liner (0.05 mm, transparent, siliconized) + LDPE top release liner (0.05 mm, white, siliconized) / Single liner: PE liner (0.14 mm, red).
Test Methods: [2] ASTM D 3330, [3] ASTM D 5470, [4] MTPS, [5] 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: 1.0 mm / 2.0 mm

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

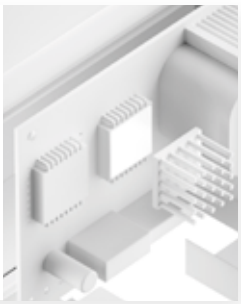




SILICONE-FREE GAP FILLER TAG-T-AC

Acrylate adhesive, thermally conductive

TAG-T-AC is a thermally conductive electrically insulating acrylate PSA 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. Its wide thickness range allows for the use as gap filler.



PROPERTIES

- Low thermal resistance
- Thermal conductivity: 3.0 W/mK
- Use as gap filler due to wide thickness range
- Silicone-free
- Neither mixing of components nor curing processes

AVAILABILITY

- Sheet
- TAG-TXXXX-AC
- Shaped parts
- Optional soft type TAG-TXSXXXX-AC

APPLICATION EXAMPLES

Thermal link of:

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

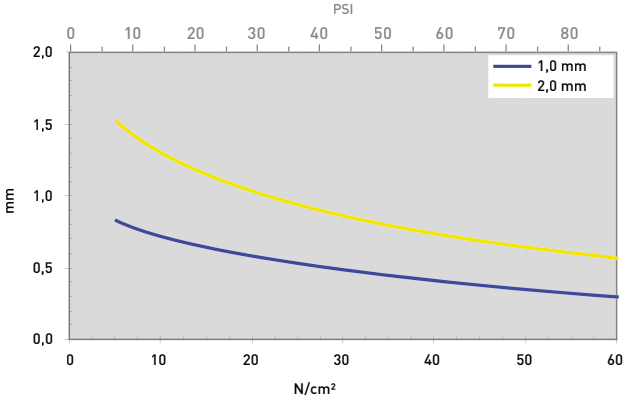
For use in Power supplies / PCs / Telecom engineering / Automotive applications / LED arrays

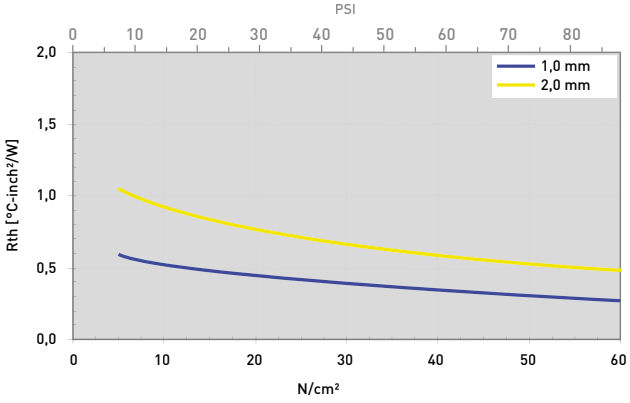
PROPERTY	UNIT	TAG-T1000-AC	TAG-T2000-AC
MATERIAL		Ceramic filled acrylate PSA adhesive	Ceramic filled acrylate PSA adhesive
Colour		White	White
Tape Thickness	mm	1.0	2.0
Liner Thickness[1]: Dual liner (Base / Top)	mm	0.05 / 0.05	0.05 / 0.05
or Single liner	mm	0.14	0.14
Peel Off Strength (@ RT, Aluminum)[2]	N/cm	5.9	5.9
UL Flammability (Equivalent)	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[3] @ 60 PSI @ Thickness	°C-inch²/W (mm)	0.34 (0.41)	0.60 (0.75)
Resistance[3] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.45 (0.58)	0.78 (1.03)
Resistance[3] @ 10 PSI @ Thickness	°C-inch²/W (mm)	0.56 (0.77)	1.00 (1.43)
Thermal Conductivity	W/mK	2.5[3] / 3.0[4]	2.5[3] / 3.0[4]
Operating Temperature Range	°C	- 40 to + 130	- 40 to + 130
ELECTRICAL			
Breakdown Voltage[5]	kV AC	> 5.5	> 5.5

[1] Liner: Dual liner: BOPET bottom release liner (0.05 mm, transparent, siliconized) + LDPE top release liner (0.05 mm, white, siliconized) / Single liner: PE liner (0.14 mm, red).
Test Methods: [2] ASTM D 3330, [3] ASTM D 5470, [4] MTPS, [5] ASTM D 149. All data without warranty and subject to change. Please contact us for further data and information.

Thicknesses: 1.0 mm / 2.0 mm

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





2 FOILS & FILMS

/SILICONE FOILS /INSULATING FILM SILICONE COATED

SILICONE FOIL TFO-D-SI

fibreglass reinforced, highly dielectric

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

PROPERTIES

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

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

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

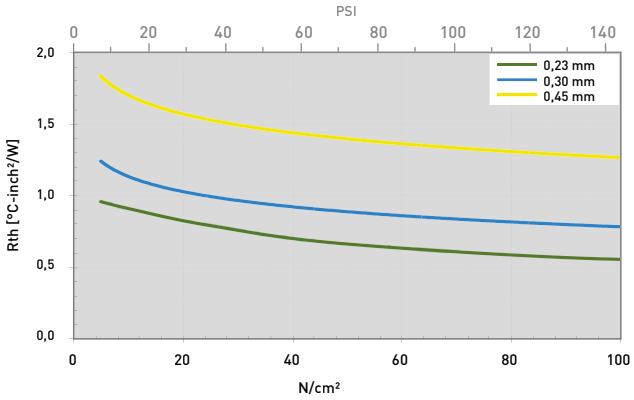
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTIES	UNIT	TFO-D230-SI	TFO-D300-SI	TFO-D450-SI
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	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[2] @ 150 PSI	°C-inch²/W	0.55	0.75	1.25
Resistance[2] @ 30 PSI	°C-inch²/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

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

APPLICATION EXAMPLES

Thermal link of:

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

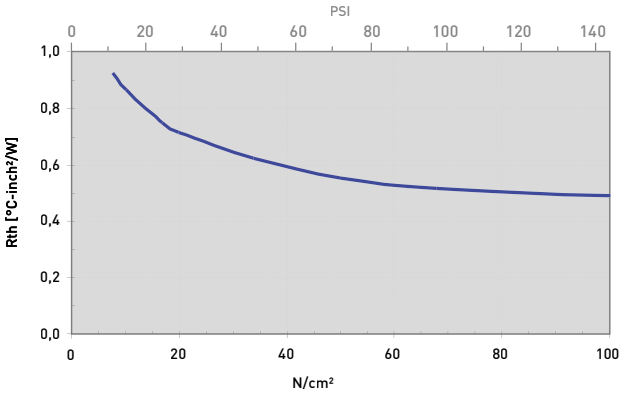
For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-G230-SI
MATERIAL		Ceramic filled silicone
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-inch²/W	0.49
Resistance[2] @ 30 PSI	°C-inch²/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	1.0×10^{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

Rth 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

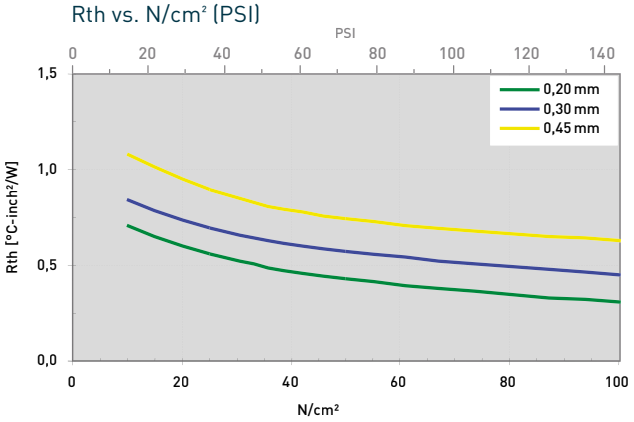
For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

PROPERTY	UNIT	TFO-J200-SI	TFO-J300-SI	TFO-J450-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Dark Brown	Dark Brown	Dark Brown
Reinforcement		Fibreglass	Fibreglass	Fibreglass
Thickness	mm	0.20 $^{\pm 0.05}$	0.30 $^{\pm 0.05}$	0.45 $^{\pm 0.05}$
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-inch²/W	0.31	0.45	0.63
Resistance[2] @ 30 PSI	°C-inch²/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

Rth 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

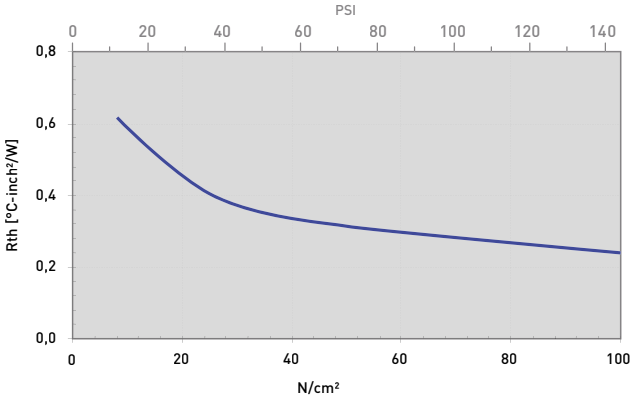
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTIES	UNIT	TFO-K200-SI
MATERIAL		Ceramic filled silicone
Colour		Grey
Reinforcement		Fibreglass
Thickness	mm	0.23 $^{\pm 0.05}$
Tensile Strength[1]	kpsi	2.9
UL Flammability	UL 94	V O
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Resistance[2] @ 150 PSI	°C-inch²/W	0.24
Resistance[2] @ 30 PSI	°C-inch²/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

Rth 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-0XXX-SI)
- Tacky on one side (TFO-0XXX-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

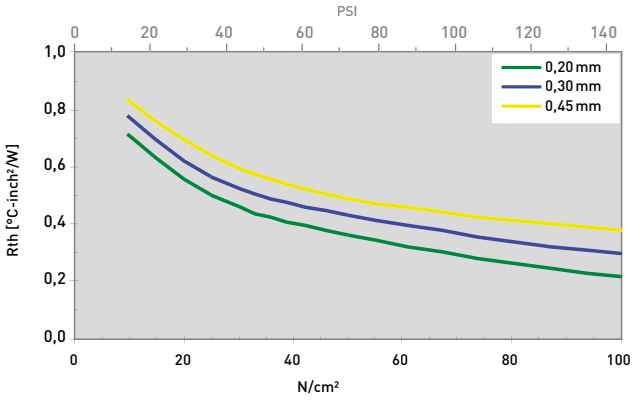
For use in Switch mode power supplies / Motor control units / High voltage hybrid automotive applications / PS units / Solar systems

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 $^{\pm 0.05}$	0.30 $^{\pm 0.05}$	0.45 $^{\pm 0.05}$
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-inch²/W	0.22	0.30	0.38
Resistance[2] @ 30 PSI	°C-inch²/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

Rth 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

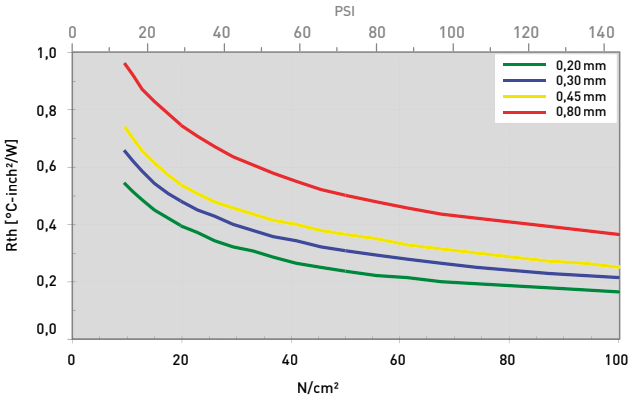
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-T200-SI	TFO-T300-SI	TFO-T450-SI	TFO-T800-SI
MATERIAL		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 $^{\pm 0.05}$	0.30 $^{\pm 0.05}$	0.45 $^{\pm 0.05}$	0.80 $^{+0.20}_{-0.05}$
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-inch²/W	0.16	0.21	0.24	0.36
Resistance[2] @ 30 PSI	°C-inch²/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	- 50 to + 200	- 50 to + 200	- 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

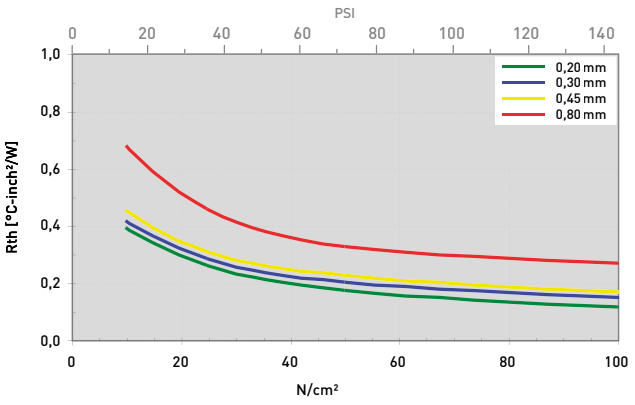
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-X200-SI	TFO-X300-SI	TFO-X450-SI	TFO-X800-SI
MATERIAL		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 $^{\pm 0.05}$	0.30 $^{\pm 0.05}$	0.45 $^{\pm 0.05}$	0.80 $^{+0.20}_{-0.05}$
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-inch²/W	0.11	0.15	0.17	0.27
Resistance[2] @ 30 PSI	°C-inch²/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	- 50 to + 200	- 50 to + 200	- 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: 0.08 mm / 0.20 mm / 0.30 mm / 0.45 mm / 0.80 mm

Rth 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-ZSXXXX-SI)
- Die cut parts

APPLICATION EXAMPLES

Thermal link of:

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

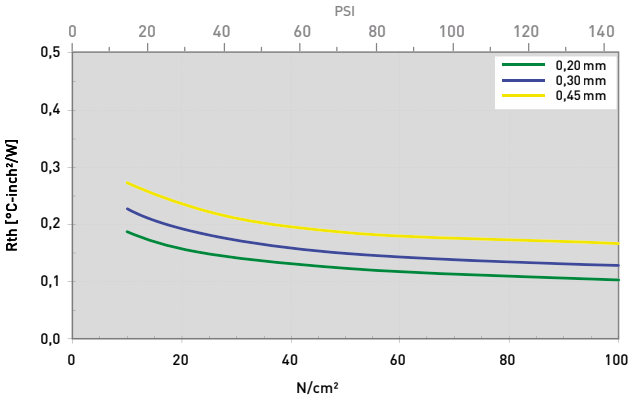
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-ZS0200-SI	TFO-ZS0300-SI	TFO-ZS0450-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		White	White	White
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 (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[2] @ 150 PSI	°C-inch²/W	0.10	0.13	0.17
Resistance[2] @ 30 PSI	°C-inch²/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

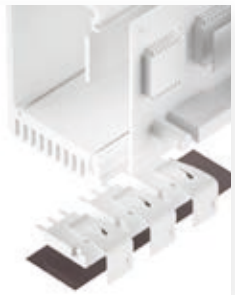
Rth vs. N/cm² (PSI)



SILICONE FOIL TFO-L-SI

not reinforced

TFO-L-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. Its conformal surface structure guarantees a very good compliance to the contact surfaces even at low pressure. Thus the total thermal resistance is minimised. The material can be applied in a broad field of applications.



PROPERTIES

- Thermal conductivity: 2.1 W/mK
- Very good surface compliance
- Very low thermal resistance
- Extraordinary chemical resistance and longterm stability
- Residue-free removal after use

AVAILABILITY

- Sheet 440 x 480 mm
- Non tacky (TFO-LXXX-SI)
- Die cut parts

APPLICATION EXAMPLES

Thermal link of:

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

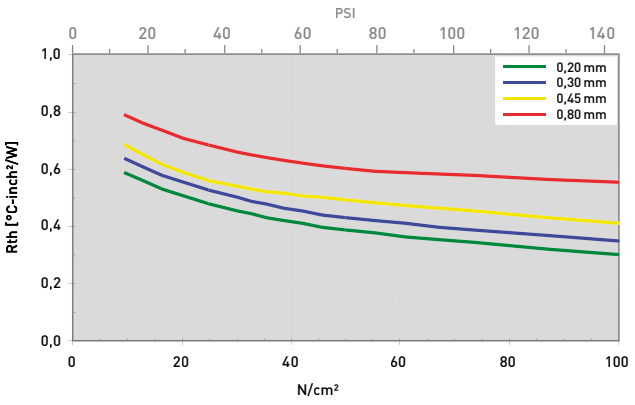
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-L200-SI	TFO-L300-SI	TFO-L450-SI	TFO-L800-SI
MATERIAL		Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone	Ceramic filled silicone
Colour		Grey	Grey	Grey	Grey
Reinforcement		None	None	None	None
Thickness	mm	0.20 ±0.05	0.30 ±0.05	0.45 ±0.05	0.80 ±0.05
Tensile Strength[1]	kpsi	0.45	0.45	0.45	0.45
UL Flammability	UL 94	VO	VO	VO	VO
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes	Yes
THERMAL					
Resistance[2] @ 1 MPa	°C-inch²/W	0.30	0.35	0.41	0.55
Resistance[2] @ 200 kPa	°C-inch²/W	0.50	0.56	0.59	0.71
Thermal Conductivity[2]	W/mK	2.1	2.1	2.1	2.1
Operating Temperature Range	°C	- 50 to + 200	- 50 to + 200	- 50 to + 200	- 50 to + 200
ELECTRICAL					
Breakdown Voltage[3]	kV AC	3	5	8	9
Volume Resistivity	Ohm - cm	1.5 x 10^{13}	6.0 x 10^{13}	5.4 x 10^{13}	7.7 x 10^{13}
Dielectric Constant	@ 1 MHz	5.5	5.5	5.5	5.5

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 / 0.80 mm

Rth vs. N/cm² (PSI)



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

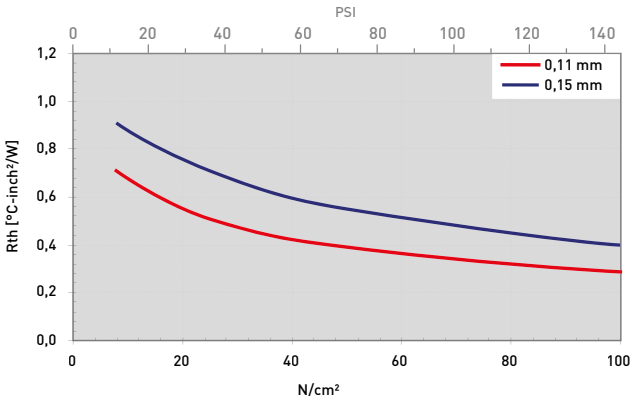
For use in Switch mode power supplies / Motor control units / Automotive engine management systems / UPS units / Solar systems

PROPERTY	UNIT	TFO-M110-SI-PI	TFO-M150-SI-PI
MATERIAL		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 $^{\pm 0.02}$	0.15 $^{\pm 0.02}$
UL Flammability	UL 94	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes
THERMAL			
Resistance[1] @ 150 PSI	°C-inch²/W	0.29	0.40
Resistance[1] @ 30 PSI	°C-inch²/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

Rth vs. N/cm² (PSI)

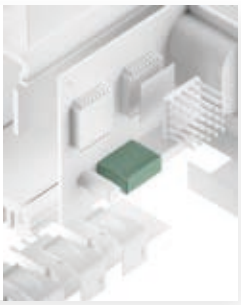


3 SILICONE CAPS

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:

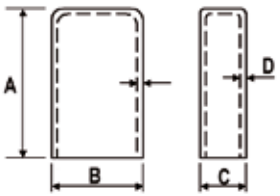
- MOSFETs or IGBTs
- Power diodes or AC/DC converters

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-inch²/W	0.48	0.58
Thermal Conductivity	W/mK	0.8	0.8
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 ±0.1	11.5 ±0.1	5.9 ±0.1	0.5 ±0.1
TCP-C250-SI	21.5 ±0.1	11.5 ±0.1	5.9 ±0.1	0.5 ±0.1
TCP-C280-SI	21.8 ±0.1	12.1 ±0.1	6.5 ±0.1	0.8 ±0.1
TCP-C450-SI	28.5 ±0.1	17.5 ±0.1	5.9 ±0.1	0.5 ±0.1
TCP-C480-SI	28.8 ±0.1	18.2 ±0.1	6.6 ±0.1	0.8 ±0.1



SILICONE CAP TCP-J-SI

all around dielectric

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

PROPERTIES

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

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

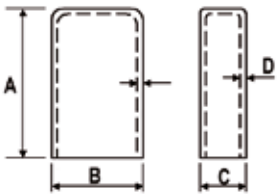
- MOSFETs or IGBTs
- Power diodes or AC/DC converters

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

PROPERTY	UNIT	TCP-J300-SI	TCP-J450-SI	TCP-J800-CP
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 (@ TO-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 TO-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / -0.00
TCP-J300-SI (für TO-3P)	28.5 ± 1.0	17.5 ± 0.5	5.8 ± 0.3	0.30 + 0.15 / -0.00
TCP-J450-SI (für TO-220)	21.5 ± 1.0	11.4 ± 0.5	5.8 ± 0.3	0.45 + 0.10 / -0.05
TCP-J450-SI (für TO-3P)	28.5 ± 1.0	17.5 ± 0.5	5.9 ± 0.3	0.45 + 0.10 / -0.05
TCP-J800-SI (für TO-220)	21.8 ± 1.0	12.1 ± 0.5	6.5 ± 0.3	0.80 + 0.15 / -0.00
TCP-J800-SI (for TO-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:

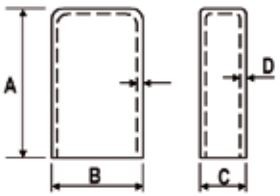
- MOSFETs or IGBTs
- Power diodes or AC/DC converters

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 Devinall 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 unevenesses and expels any air enclosures from micro structures even at low pressure. The wettening 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

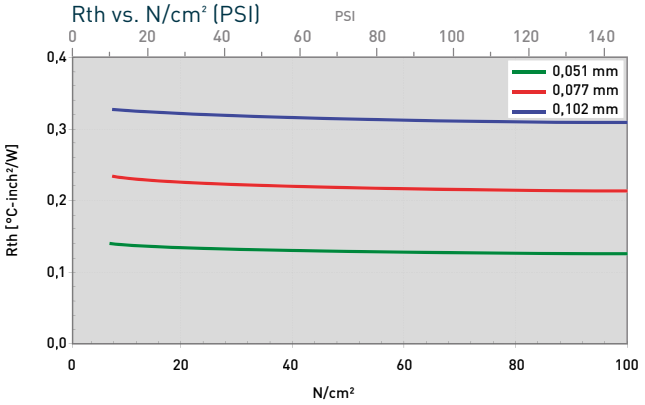
For use in Automotive motor control units / Power supplies / Traction drives / Telecom appliances

PROPERTY	UNIT	TPC-N051-PI	TPC-N077-PI	TPC-N102-PI
MATERIAL		Devinall TH Polyimide film with phase change coating on both sides	Devinall TH Polyimide film with phase change coating on both sides	Devinall TH Polyimide film with phase change coating on both sides
Colour		Light orange	Light orange	Light orange
Thickness Devinall TH	µm	$25^{+0.06}_{-0.05}$	$51^{+0.09}_{-0.07}$	$76^{+0.11}_{-0.09}$
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 Devinall TH (Equivalent)	UL 94	V0	V0	V0
RoHS Conformity	2015/863/EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 150 PSI	°C-inch²/W	0.126	0.215	0.311
Resistance[1] @ 30 PSI	°C-inch²/W	0.130	0.220	0.315
Resistance[1] @ 10 PSI	°C-inch²/W	0.143	0.237	0.332
Thermal Conductivity Devinall 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	1.0×10^{16}	1.0×10^{16}	1.0×10^{16}
Dielectric Constant	@ 25°C	4.0	4.0	4.0

Measurement technique according to: [1] ASTM D 5470. All data without warrenty 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: Devinall TH Polyimide: 25 µm / 51 µm / 76 µm. Total Thicknessess: 51 µm / 77 µm / 102 µm

Rth vs. N/cm² (PSI)



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 unevenesses and expels any air enclosures from micro structures even at low pressure. The wettening 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

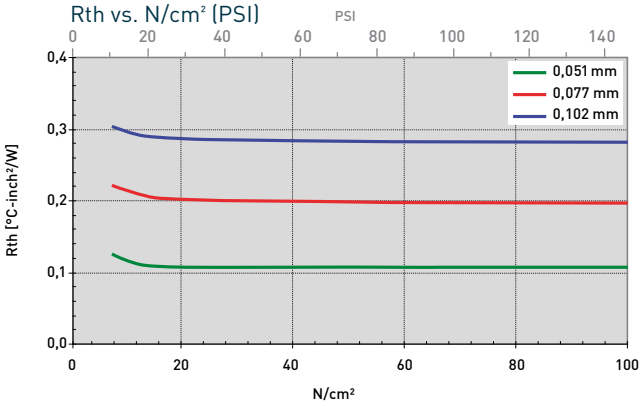
For use in Automotive motor control units / Power supplies / Traction drives / Telecom appliances

PROPERTY	UNIT	TPC-P051-KA	TPC-P077-KA	TPC-P102-KA
MATERIAL		Kapton®MT with phase change coating on both sides	Kapton®MT with phase change coating on both sides	Kapton®MT with phase change coating on both sides
Colour		Light orange	Light orange	Light orange
Thickness Kapton®MT	µm	$25^{+0.06}_{-0.05}$	$51^{+0.08}_{-0.07}$	$76^{+0.11}_{-0.09}$
Thickness Phase Change (per side)	µm	13	13	13
Total Thickness	µm	51	77	102
Tensile Strength[1]	kpsi	20	22	23
UL Flammability Kapton®MT	UL 94	V0	V0	V0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[2] @ 150 PSI	°C-inch²/W	0.110	0.195	0.285
Resistance[2] @ 30 PSI	°C-inch²/W	0.113	0.200	0.290
Resistance[2] @ 10 PSI	°C-inch²/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	1.0×10^{14}	1.0×10^{14}	1.0×10^{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 Thicknessess: 51 µm / 77 µm / 102 µm

Rth vs. N/cm² (PSI)



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 unevenesses and expels any air enclosures from micro structures even at very low pressure. The particular formulation and the thixotropic nature prevents from run-out as well as migration. 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
- No migrating, pump-out or run out due to thixotropic properties
- Ideal alternative and replacement of messy thermal grease
- Different optional substrates allow for one-side residue-freeness and improved reworkability

AVAILABILITY

- Sheet 356 x 305 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

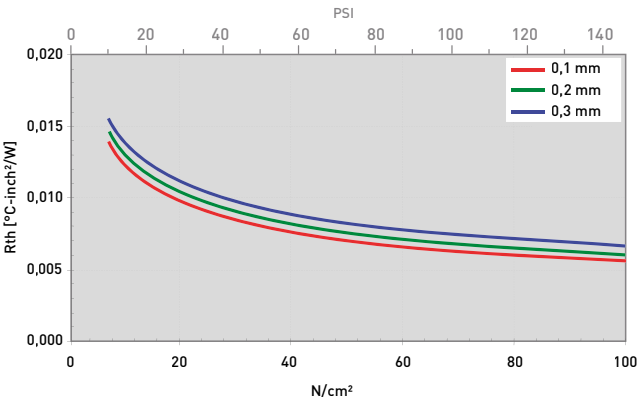
For use in Servo drive control units / Computers / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-W100-PC	TPC-W200-PC	TPC-W300-PC
MATERIAL		Phase Change Film	Phase Change Film	Phase Change Film
Colour		Grey	Grey	Grey
Total Thickness	mm	$0.1^{+0.12}_{-0.08}$	$0.2^{+0.23}_{-0.17}$	$0.3^{+0.33}_{-0.27}$
Specific Density	g/cm³	2.0	2.0	2.0
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance[1] @ 150 PSI	°C-inch²/W	0.0056	0.0061	0.0067
Resistance[1] @ 30 PSI	°C-inch²/W	0.0097	0.0103	0.0111
Resistance[1] @ 10 PSI	°C-inch²/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: [1]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 unevenesses and expels any air enclosures from micro structures even at low pressure. The wettening of the contact areas is further on improved by volumetric material expansion at increasing temperature. Thus the total thermal resistance is minimised. The particular formulation and the thixotropic nature prevents from run-out, dry-up as well as migration. The aluminum carrier effects high mechanical stability and easy handling.

PROPERTIES

- Optimal thermal contact
- Silicone-free
- No migrating, run out or pump-out due to thixotropic properties
- 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

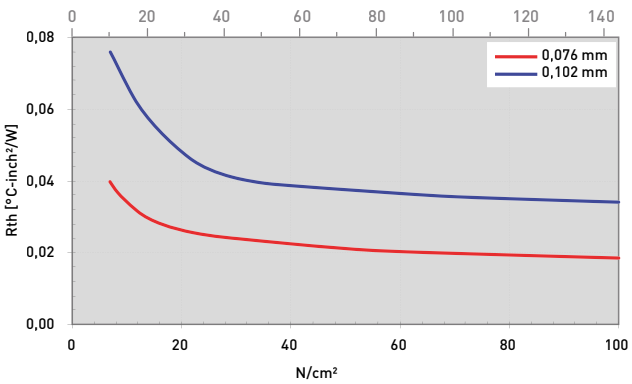
For use in Servo drive control units / Traction drives / Automation appliances / Microelectronics

PROPERTY	UNIT	TPC-R076-AL	TPC-R102-AL
MATERIAL		Aluminum with phase change coating on both sides	Aluminum with phase change coating on both sides
Colour		White	White
Thickness Aluminum	µm	51 $^{+0.09}_{-0.07}$	51 $^{+0.12}_{-0.09}$
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-inch²/W	0.019	0.034
Resistance[1] @ 30 PSI	°C-inch²/W	0.026	0.047
Resistance[1] @ 10 PSI	°C-inch²/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

Rth 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 unevenesses and expels any air enclosures from micro structures even at low pressure. The wettening of the contact areas is further on improved by volumetric material expansion at increasing temperature. Thus the total thermal resistance is minimised. The particular formulation and the thixotropic nature prevents from run-out, dry-up as well as migration. The aluminum carrier effects high mechanical stability and easy handling.

PROPERTIES

- Optimal thermal contact
- Silicone-free
- No migrating, run out, pump-out due to thixotropic properties
- 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

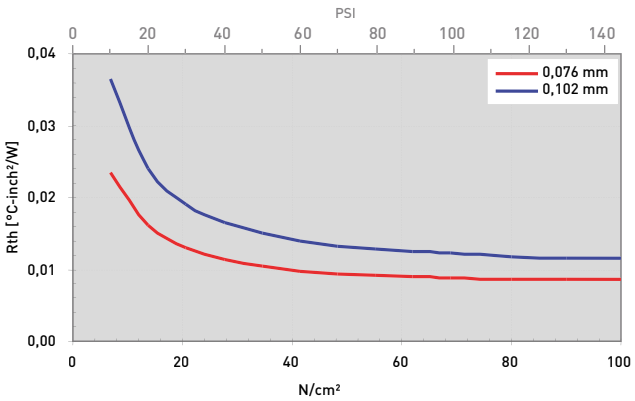
For use in Servo drive control units / Traction drives / Automation appliances / Microelectronics

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	$51^{+0.09}_{-0.07}$	$51^{+0.12}_{-0.09}$
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-inch²/W	0.009	0.011
Resistance[1] @ 30 PSI	°C-inch²/W	0.013	0.019
Resistance[1] @ 10 PSI	°C-inch²/W	0.022	0.037
Phase Change Temperature	°C	ca. 52	ca. 52

Measurement technique according to: [1]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 Thicknessess: 76 µm / 102 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 unevenesses and expels any air enclosures from micro structures even at very low pressure. Both thin bondline and high thermal conductivity minimise the total thermal resistance. It can be pre-applied by screen printing. After drying the compound is dry-to-the-touch and ready for use on the thermal contact area.
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:

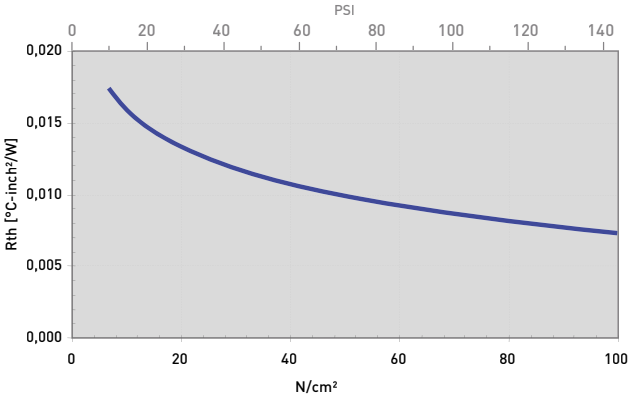
- MOSFETs und IGBTs
- Memory Modules
- IGBT Power Modules
- CPUs

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 undried	g/cm³ g/cm³	1.8 @ RT 1.6 @ RT	1.8 @ RT 1.7 @ RT
Viscosity dried @ 10 rpm Viscosity undried @ 10 rpm	Pas Pas	60 @ 60°C / 42 @ 80°C / 25 @ 100°C / 18 @ 120°C 85 @ RT	60 @ 60°C / 42 @ 80°C / 25 @ 100°C / 18 @ 120°C 96 @ RT
Drying @ Temperature @ Thickness	Time	@ 22°C: / @ 60°C: / @ 125°C: 24 h (0.05 mm) / 24 min (0.05 mm) / 4 min (0.05 mm) 48 h (0.15 mm) / 50 min (0.15 mm) / 5 min (0.15 mm) 56 h (0.25 mm) / 60 min (0.25 mm) / 9 min (0.25 mm)	@ 60°C: / @ 125°C: 3,5 h (0.05 mm) / 8 min (0.05 mm) 8 h (0.15 mm) / 15 min (0.15 mm) 13 h (0.25 mm) / 20 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
THERMAL			
Resistance[1] @ 150 PSI	°C-inch²/W	0.007	0.007
Resistance[1] @ 30 PSI	°C-inch²/W	0.013	0.013
Resistance[1] @ 10 PSI	°C-inch²/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: [1]ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

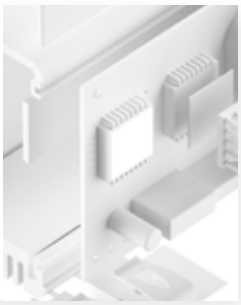
Rth vs. N/cm² (PSI)



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

printable, dielectric

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



PROPERTIES

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

AVAILABILITY

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

APPLICATION EXAMPLES

Thermal link of:

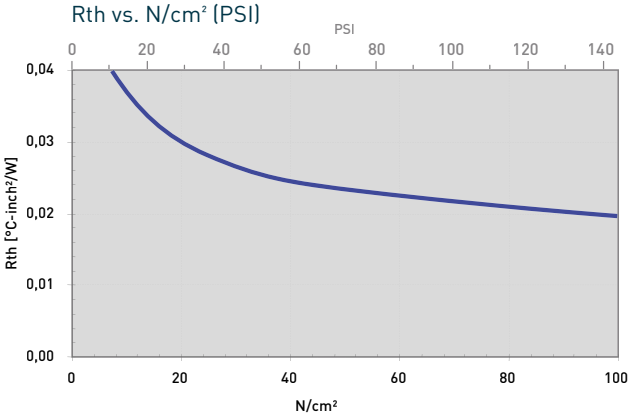
- MOSFETs und IGBTs
- Memory Modules
- IGBT Power Modules
- CPUs

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 undried	g/cm³ g/cm³	1.1 @ RT 1.0 @ RT	1.10 @ RT 1.05 @ RT
Viscosity dried @ 10 rpm Viscosity undried @ 10 rpm	Pas Pas	65 @ 60°C / 38 @ 80°C / 25 @ 100°C / 18 @ 120°C 70	65 @ 60°C / 38 @ 80°C / 25 @ 100°C / 18 @ 120°C 85
Drying @ Temperature @ Thickness	Time	@ 22°C: @ 60°C: @ 125°C: 24 h (0.05 mm) 24 min (0.05 mm) 4 min (0.05 mm) 48 h (0.15 mm) 53 min (0.15 mm) 6 min (0.15 mm) 56 h (0.25 mm) 56 min (0.25mm) 10 min (0.25 mm)	@ 60°C: @ 125°C: 4 h (0.05 mm) 10 min (0.05 mm) 12 h (0.15 mm) 15 min (0.15 mm) 20 h (0.25mm) 20 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
THERMAL			
Resistance[1] @ 150 PSI	°C-inch²/W	0.02	0.02
Resistance[1] @ 30 PSI	°C-inch²/W	0.03	0.03
Resistance[1] @ 10 PSI	°C-inch²/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: [1]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 unevenesses and expels any air enclosures from micro structures even at very low pressure. Both thin bondline and high thermal conductivity minimise the total thermal resistance. It can be pre-applied by screen printing. After drying the compound is dry-to-the-touch and ready for use on the thermal contact area. The compound is designed for applications with extended temperature requirements.
TPC-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:

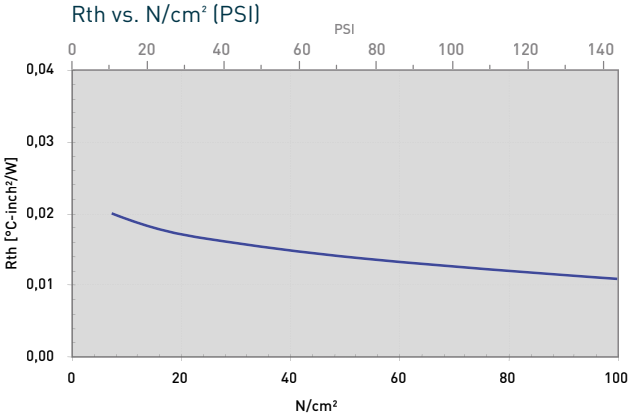
- MOSFETs und IGBTs
- Memory Modules
- IGBT Power Modules
- CPUs

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 undried	g/cm³ g/cm³	2.3 @ RT 2.0 @ RT	2.3 @ RT 2.1 @ RT
Viscosity dried @ 10 rpm Viscosity undried @ 10 rpm	Pas Pas	45 @ 60°C / 30 @ 80°C / 21 @ 100°C / 15 @ 120°C 60	45 @ 60°C / 30 @ 80°C / 20 @ 100°C / 15 @ 120°C 77.5
Drying @ Temperature @ Thickness	Time	@ 22°C: / @ 60°C: / @ 125°C: 24 h (0.05 mm) / 24 min (0.05 mm) / 3 min (0.05 mm) 48 h (0.15 mm) / 50 min (0.15 mm) / 5 min (0.15 mm) 56 h (0.25 mm) / 60 min (0.25 mm) / 10 min (0.25 mm)	@ 60°C: / @ 125°C: 4 h (0.05 mm) / 8 min (0.05 mm) 12 h (0.15 mm) / 15 min (0.15 mm) 20 h (0.25mm) / 20 min (0.25 mm)
Storage (@ RT)	Months	9	9
RoHS Conformity	2015/863/EU	Yes	Yes
THERMAL			
Resistance[1] @ 150 PSI	°C-inch²/W	0.011	0.011
Resistance[1] @ 30 PSI	°C-inch²/W	0.017	0.017
Resistance[1] @ 10 PSI	°C-inch²/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

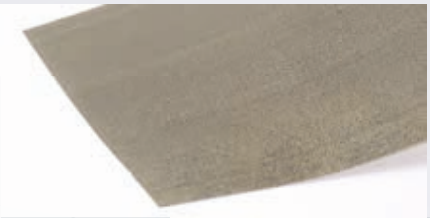
Measurement technique according to: [1]ASTM D 5470. All data without warranty and subject to change. Please contact us for further data and information.

Rth vs. N/cm² (PSI)



5 GRAPHITE FOILS

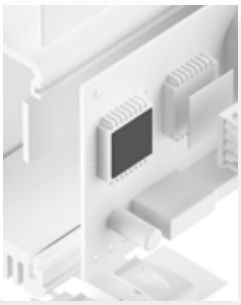
/ANISOTROPIC / PYROLYTIC



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

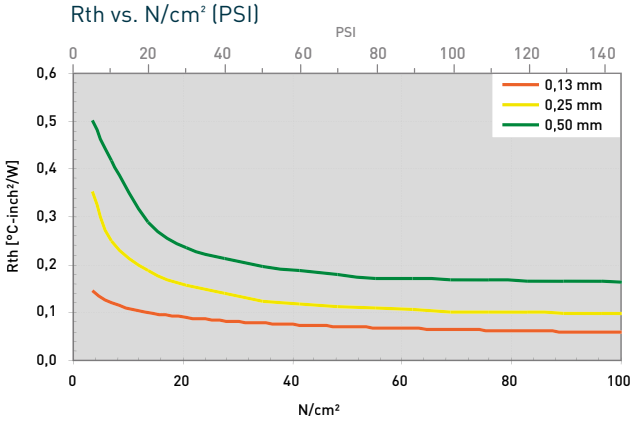
For use in Power inverters / Laptops / Automotive power supplies / Industrial PCs

PROPERTY	UNIT	TFO-S130-CB	TFO-S250-CB	TFO-S510-CB
MATERIAL		Natural Graphite 98%	Natural Graphite 98%	Natural Graphite 98%
Colour		Grey	Grey	Grey
Thickness	mm	0.13 $^{\pm 0.03}$	0.25 $^{\pm 0.03}$	0.5 $^{\pm 0.05}$
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-inch²/W	0.06	0.10	0.16
Resistance[1] @ 30 PSI	°C-inch²/W	0.09	0.16	0.23
Resistance[1] @ 10 PSI	°C-inch²/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: [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.

Thicknesses: 0.13 mm / 0.25 mm / 0.5 mm

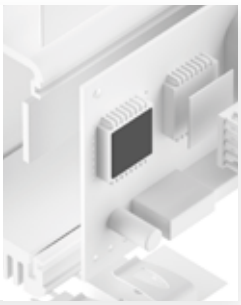
Rth vs. N/cm² (PSI)



PYROLYTIC GRAPHITE FOIL TFO-Y-PG

highly anisotropic conductive

TFO-Y-PG consists of pure pyroltytic 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 VO

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

SPECIAL CONFIGURATIONS

- With PEEK Laminate (TFO-YXXX-PG-PKXXX)
- With Polyimide Laminate (TFO-YXXX-PG-PIXXX)
- With PET Laminate (TFO-YXXX-PG-PEXXX)
- As laminate on ultrasoft silicone gap filler elastomer (TFO-YXXX-PG-GFXXXX)

APPLICATION EXAMPLES

Thermal link of:

- CPUs to heat sinks
- Laser diodes
- TEC modules

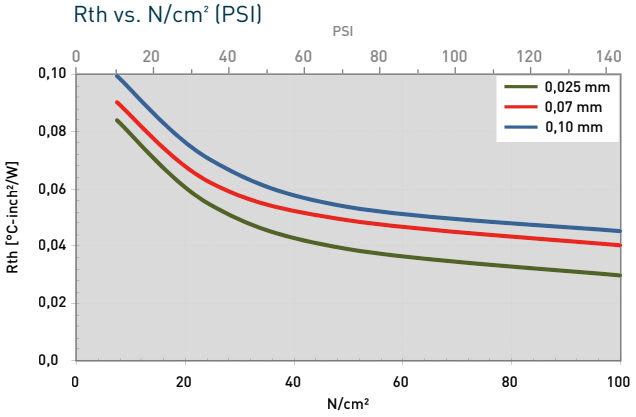
For use in high end computers / Analyzers / Photonics

PROPERTY	UNIT	TFO-Y025-PG	TFO-Y070-PG	TFO-Y100-PG
MATERIAL		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/cm³	1.9	1.21	0.85
UL Flammability	UL 94	V0	V0	V0)
RoHS Conformity	2015 / 863 / EU	Yes	Yes	Yes
THERMAL				
Resistance¹ @ 150 PSI	°C-inch²/W	0.03	0.04	0,045
Resistance¹ @ 30 PSI	°C-inch²/W	0.06	0.07	0,078
Resistance¹ @ 10 PSI	°C-inch²/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: 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: 0.025 mm / 0.04 mm / 0.05 mm / 0.07 mm / 0.10 mm

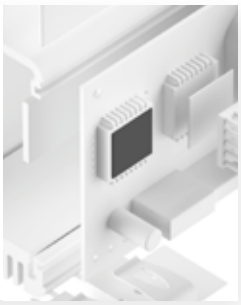
Rth vs. N/cm² (PSI)



PYROLYTIC GRAPHITE FOIL TFO-ZS-PG

soft, anistotropic 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
- Die cut parts

APPLICATION EXAMPLES

Thermal link of:

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

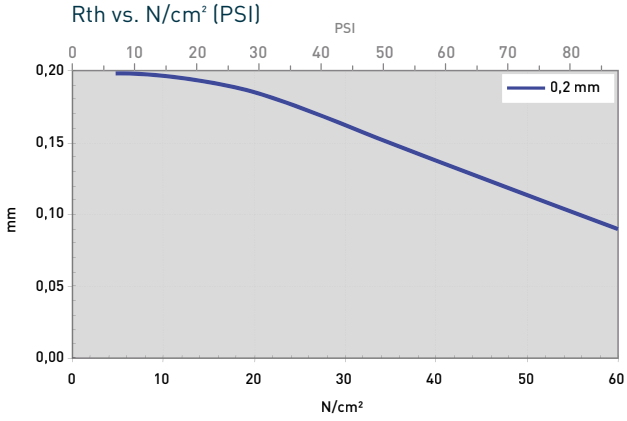
For use in liquid cold plates / high end computers / Analyzers / Photonics / LED arrays

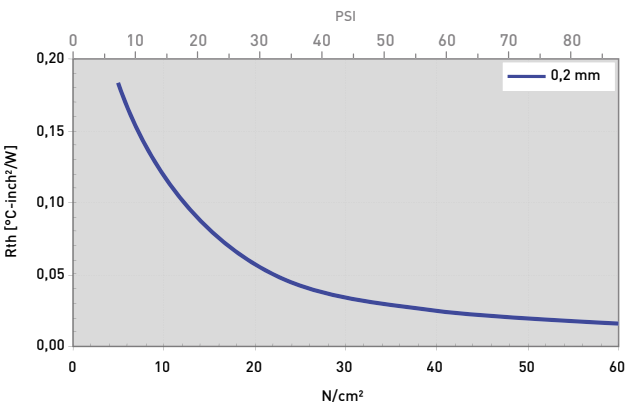
PROPERTY	UNIT	TFO-ZS200-PG
MATERIAL		Soft Pyrolytic Graphite
Colour		Grey
Thickness	mm	0.2 $^{\pm 0.05}$
Density	g/cm³	0.5
Flammability	UL 94	V0
RoHS Conformity	2015 / 863 / EU	Yes
THERMAL		
Resistance[1] @ 90 PSI @ Thickness	°C-inch²/W (mm)	0.015 (0.09)
Resistance[1] @ 30 PSI @ Thickness	°C-inch²/W (mm)	0.055 (0.18)
Resistance[1] @ 10 PSI @ Thickness	°C-inch²/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: [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.

Thicknesses: 0.20 mm

Rth 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		Thermally conductive acrylate PSA tape with polyester film
Colour		White
Tape Thickness	mm	0.20 $^{\pm 0.03}$
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-inch²/W	0.73
Resistance[1] @ 70 PSI	°C-inch²/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		Ceramic filled silicone PSA adhesive	Ceramic filled silicone PSA adhesive
Colour		White	White
Thickness	mm	0.10 $^{\pm 0.01}$	0.20 $^{\pm 0.01}$
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/cm²	> 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-inch²/W	0.28	0.49
ELECTRICAL			
Breakdown Voltage[2] (@ Initial Thickness, 25 °C)	kV AC	2.0	5.0

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

Thicknesses: 0.1 mm / 0.20 mm

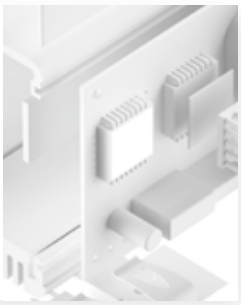
7 THERMAL GREASE

/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
- Jars 1 kg
- On request

APPLICATION EXAMPLES

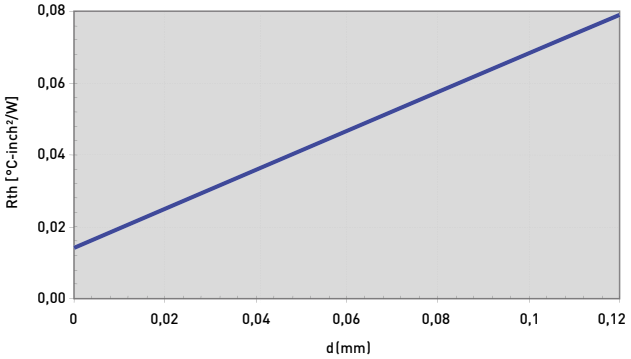
Thermal link of:

- 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 /cm³	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

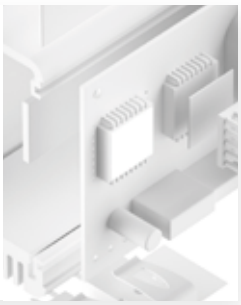
All data without warranty and subject to change. Please contact us for further data and information.



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
- Jars 1 kg
- On request

APPLICATION EXAMPLES

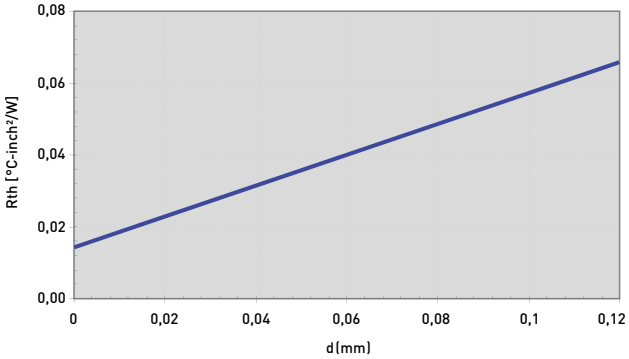
Thermal link of:

- 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 /cm³	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
- 310 ml cartridges
- 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		Silicone
Colour		Grey
Specific Gravity	g/cm³	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	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 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		Silicone
Colour		Grey
Specific Gravity	g/cm³	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		Silicone
Colour		Grey
Specific Gravity	g/cm³	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/cm²	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.

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 transformators, 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 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/cm³	1.6	1.6
Mixing Ratio	Weight or Volume	1 : 1	1 : 1
Hardness	Shore A	45	45
Viscosity (Brookfield)	Pas	6	6
Viscosity (Mixed) (Brookfield)	Pas	6	6
Tensile Strength (cured elastomer after 7 minutes @ 150 °C)	psi	252	252
Elongation at Break (cured elastomer after 7 minutes @ 150 °C)	%	240	240
Coefficient of Thermal Expansion (cured elastomer after 7 minutes @ 150 °C) Volumetric Linear	 1 x 10^{-6} /K 1 x 10^{-6} /K	 650 217	 650 217
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 transformators, 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 / 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	Silicone
Colour		Light grey	Orange
Density @ ~23 °C	g/cm³	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 Linear	 1 x 10^{-6} / K 1 x 10^{-6} / K	 402 134	 402 134
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	V0 (5.6 mm)	V0 (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.

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 treament
- 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)

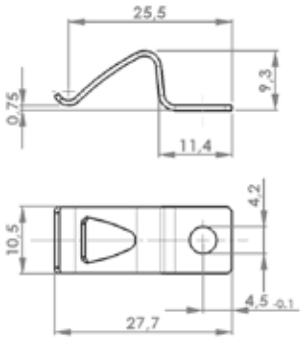
APPLICATION EXAMPLES

Fixing of semiconductors in TO220 or comparable packages onto heatsinks:

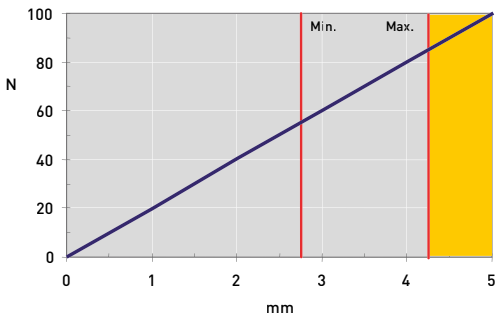
- MOSFETs and IGBTs
- Diodes and rectifiers
- Electronic modules

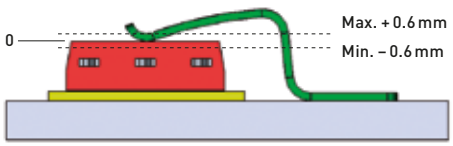
For use in switch mode power supplies / UPS units / Motor control units / Automotive applications / Solar technology

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 treament
- 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)

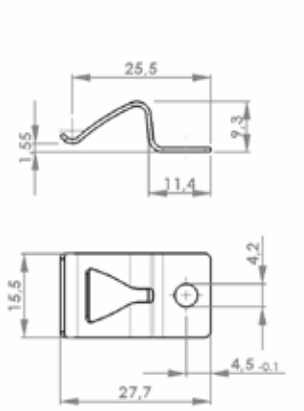
APPLICATION EXAMPLES

Fixing of semiconductors in TO247 or comparable packages onto heatsinks:

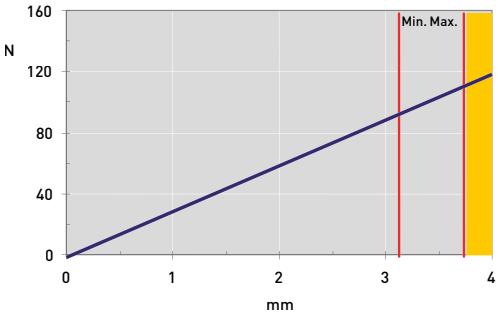
- MOSFETs
- IGBTs
- Diodes

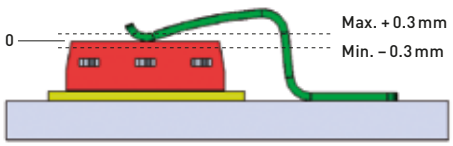
For use in switch mode power supplies / UPS units / Motor control units / Automotive applications

Dimensions



Force vs. Deflection





LEGAL INFORMATION

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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
zoodesign – artgerechte gestaltung / D-73525 schwäbisch gmünd / www.zoodesign.de

Release 3 / 2020

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