

Information About *Dow Corning*[®] Brand Thermal Interface Pads & Films

(formerly known as *HeatPath*[™])

Long-term, reliable protection of sensitive circuits and components is important in today's delicate and demanding electronic applications. With the increase in processing power and the trend toward smaller, more compact electronic modules, the need for thermal management is growing. Dow Corning's family of thermal interface pads and films provides excellent thermal management options without the challenge of handling and curing liquid material. Thermal interface pads and films offer superior performance in a wide range of applications while providing excellent economic value.

Good heat transfer depends on a good interface between a heat-producing device and a heat-transfer media. Silicones have a low surface tension that enables them to wet most surfaces, which can lower the thermal contact resistance between the substrate and the material. Phase change materials flow above the phase change temperature and wet out the thermal interface.

In addition to sustaining their physical and electrical properties over a broad range of operating conditions, silicones are resistant to ozone and ultraviolet degradation and have good chemical stability. Dow Corning's line of thermal interface pads and films includes thin thermal interface, gap filler thermal interface, and phase change thermal interface materials.

PRODUCT APPLICATION AND OPTIONS

Thin thermal interface and gap filler thermal interface materials are cold-applied and require no heating or curing. The materials can be removed easily and cleanly, with no special tools, for access and rework. Unlike greases, *Dow Corning*[®] brand thermal interface materials are not messy to apply and do not flow away from the interface with thermal cycling. These thermally conductive silicones function as heat-transfer media, barriers against environmental contaminants and as stress-relieving shock and vibration absorbers over a wide temperature and humidity range. For gap filling, their high compressibility accommodates tolerance stack-up and requires a lower clamping force, reducing system costs.

Thin Thermal Interface Materials

Type

Reinforced thermally conductive-cured silicone gel

Physical Form

Non-messy alumina-filled and fiberglass-reinforced cured thermal gel

Special Properties

Low thermal resistance at low pressures; high compressibility; soft; tacky; conformable; UL 94-V-0 on TP-1502; others are UL 94 HB or equivalent

Potential Uses

Maximize heat transfer from power components

Gap Filler Thermal Interface Materials

Type

Foam-based thermally conductive-cured silicone gel

Physical Form

Soft and tacky open cell reticulate foam with thermally conductive cured gel

Special Properties

Gap-filling thermal bridge; high compressibility; soft; tacky; conformable; UL 94 V-1 on TP-2101; others are UL 94 HB or equivalent

Potential Uses

Maximize heat transfer from power components

Phase Change Thermal Interface Materials

Type

Heat to apply phase change thermal interface material

Physical Form

Unsupported film, or with abrasion-resistant or mesh carriers

Special Properties

Very low mounting force; very low thermal resistance; easy to handle; dry nontacky surface; most available with adhesive backing

Potential Uses

Maximize heat transfer from power components such as CPUs or microprocessors to heat sinks

Phase change thermal interface materials are designed to cost effectively maximize heat transfer from power components such as CPUs or microprocessors to heat sinks. Above the phase change temperature (52°C), the material flows and wets out the thermal interface surfaces to provide the lowest thermal resistance. *Dow Corning* phase change thermal interface materials will not drip or run like grease and require very low mounting forces of less than 5 psi, making it feasible to use low-pressure clips to hold components in place.



PRODUCT INFORMATION

Dow Corning® Brand Product	Description	Potential Uses
Thin Thermal Interface Materials		
TP-1500 Thermal Pad	Thin thermal interface; fiberglass-reinforced; both sides tacky	Thermal bridge for low thermal resistance between heat sources and heat sinks of power components
TP-1502 Thermal Pad	Thin thermal interface; fiberglass-reinforced; flame retardant; both sides tacky	Thermal bridge for low thermal resistance between heat sources and heat sinks of power components
TP-1560 Thermal Pad	Thin thermal interface; fiberglass-reinforced; one side tacky	Thermal bridge for low thermal resistance between heat sources and heat sinks of power components
Gap Filler Thermal Interface Materials		
TP-2100 Thermal Pad	Gap filler interface; foam-based thermal gel; both sides tacky	Thermal bridge to fill gaps between heat sources and heat sinks of power components
TP-2101 Thermal Pad	Gap filler interface; foam-based, flame-retardant thermal gel; both sides tacky	Thermal bridge to fill gaps between heat sources and heat sinks of power components
TP-2160 Thermal Pad	Gap filler interface; foam-based, thermal gel; one side tacky	Thermal bridge to fill gaps between heat sources and heat sinks of power components
Phase Change Thermal Interface Materials		
PC-4103 Organic Phase Change Material	Phase change unsupported film	Thermal bridge to flow out and wet out surfaces between power components such as CPUs or microprocessors to heat sinks
PC-4223 Organic Phase Change Material	Phase change 0.002" polyimide film	Thermal bridge to flow out and wet out surfaces between power components such as CPUs or microprocessors to heat sinks
PC-4323 Organic Phase Change Material	Phase change aluminum film carrier	Thermal bridge to flow out and wet out surfaces between power components such as CPUs or microprocessors to heat sinks
Thermal Phase Change Material PC-2500	Thermally conductive phase change material that melts above 50°C and provides complete wet out of the interface	Ideal for use between a hot device and a heatsink, fansink or heat pipe assembly where mechanical fastening is required

<i>Dow Corning</i>[®] Brand Product	Application Methods
Thin Thermal Interface Materials	
TP-1500 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
TP-1502 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
TP-1560 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
Gap Filler Thermal Interface Materials	
TP-2100 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
TP-2101 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
TP-2160 Thermal Pad	Cold applied requiring no heating or curing, material can be installed and removed easily and cleanly
Phase Change Thermal Interface Materials	
PC-4103 Organic Phase Change Material	Heat to apply
PC-4223 Organic Phase Change Material	Heat to apply
PC-4323 Organic Phase Change Material	Heat to apply
Thermal Phase Change Material PC-2500	Heat to apply

TYPICAL PROPERTIES

Specification Writers: Please contact your local Dow Corning sales office or your Global Dow Corning Connection before writing specifications on this product.

<i>Dow Corning</i> [®] Brand Product	Color	Thickness, mm	Thermal Resistance, °C-in ² /W @ 20 psi	Thermal Conductivity W/m·K	Dielectric Strength, volts/mil	Useful Temperature Range, °C	Flammability, UL 94	Construction	Matrix	Filler
Thin Thermal Interface Materials										
TP-1500 Thermal Pad	Gray	0.25 to 2.0	0.7 ¹	1.1	225	-40 to 150	HB	Fiberglass	Silicone Gel	Alumina
TP-1502 Thermal Pad	Gray	0.25 to 2.0	0.9 ¹	0.9	225	-40 to 150	V-0	Fiberglass	Silicone Gel	Alumina
TP-1560 Thermal Pad	Gray	0.25 to 1.5	1.0 ¹	1.1	250	-40 to 150	HB Equivalent (internal testing)	Fiberglass	Silicone Gel	Alumina
Gap Filler Thermal Interface Materials										
TP-2100 Thermal Pad	Gray	2.2 to 4.6	4.5 ²	0.7	225	-40 to 150	HB	Foam	Silicone Gel	Alumina
TP-2101 Thermal Pad	Gray	2.2 to 5.0	4.5 ²	0.7	225	-40 to 150	V-1	Foam	Silicone Gel	Alumina
TP-2160 Thermal Pad	Gray	2.2 to 4.6	4.7 ²	0.7	250	-40 to 150	HB Equivalent (internal testing)	Foam – One Side Tacky	Silicone Gel	Alumina
Phase Change Thermal Interface Materials										
PC-4103 Organic Phase Change Material	White	0.127	0.03	N/A	N/A	–	–	Unsupported	Paraffin Wax	Ceramic
PC-4223 Organic Phase Change Material	White/orange	0.076	0.27	N/A	2600	–	V-0 ³	Polyimide	Paraffin Wax	Ceramic
PC-4323 Organic Phase Change Material	White/silver	0.076	0.05	N/A	N/A	–	–	Aluminum	Paraffin Wax	Ceramic
Thermal Phase Change Material PC-2500	Teal	0.15	0.037 ⁴	>7	N/A	–	V-0	Aluminum Mesh	Silicone Wax	Alumina

¹0.5-mm thickness.

²3-mm thickness.

³Clamped between two 6" x 0.5" x 0.25" metal bars.

⁴Pressure not controlled at 20 psi.

<i>Dow Corning®</i> Brand Product	Phase Change Temperature, °C	Hardness, Shore OO	Compression Deflection at 20%, psi	Specific Gravity	Tensile Strength, psi	Elongation, %	Tear Strength, 0.5-mm thickness, lb/in	Weight Loss, after 336 hr at 150°C, %	Volume Resistivity, ohm-cm	Specific Heat, J/g·°C	Linear Coefficient of Thermal Expansion, µm/(m·°C)
Thin Thermal Interface Materials											
TP-1500 Thermal Pad	N/A	–	15	2.0	–	–	30	0.5	1 x 10 ¹²	1	590
TP-1502 Thermal Pad	N/A	–	15	2.0	–	–	30	0.5	1 x 10 ¹²	1	590
TP-1560 Thermal Pad	N/A	–	30	2.0	–	–	30	0.5	1 x 10 ¹²	1	590
Gap Filler Thermal Interface Materials											
TP-2100 Thermal Pad	N/A	50	10	1.9	40	150	–	0.8	1 x 10 ¹¹	1	380
TP-2101 Thermal Pad	N/A	50	10	1.9	40	150	–	0.8	1 x 10 ¹¹	1	380
TP-2160 Thermal Pad	N/A	60	15	1.9	40	150	–	0.8	1 x 10 ¹¹	1	380
Phase Change Thermal Interface Materials											
PC-4103 Organic Phase Change Material	52	–	–	2.2	–	–	–	–	–	–	–
PC-4223 Organic Phase Change Material	52	–	–	1.9	–	–	–	–	1 x 10 ¹³	–	–
PC-4323 Organic Phase Change Material	52	–	–	2.5	–	–	–	–	–	–	–
Thermal Phase Change Material PC-2500	>50	–	–	3.1	–	–	–	–	3.3 x 10 ¹⁵ @ 25°C 2.6 x 10 ¹⁴ @ 90°C	–	22

STORAGE AND SHELF LIFE

The product should be stored in the original packaging under normal warehouse conditions to maintain the integrity of the packaging materials.

LIMITATIONS

These products are neither tested nor represented as suitable for medical or pharmaceutical uses.

SAFE HANDLING INFORMATION

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND MATERIAL SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE MATERIAL SAFETY DATA SHEET IS AVAILABLE ON THE DOW CORNING WEBSITE AT WWW.DOWCORNING.COM, OR FROM YOUR DOW CORNING REPRESENTATIVE, OR DISTRIBUTOR, OR BY CALLING YOUR GLOBAL DOW CORNING CONNECTION.

HEALTH AND ENVIRONMENTAL INFORMATION

To support customers in their product safety needs, Dow Corning has an extensive Product Stewardship organization and a team of Product Safety and Regulatory Compliance (PS&RC) specialists available in each area.

For further information, please see our website, www.dowcorning.com, or consult your local Dow Corning representative.

LIMITED WARRANTY INFORMATION – PLEASE READ CAREFULLY

The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer's tests to ensure that Dow Corning's products are safe, effective, and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow Corning's sole warranty is that the product will meet the Dow Corning sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

DOW CORNING SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY.

DOW CORNING DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Product Nomenclature and Packaging – Thin Thermal Interface Materials

Part Numbering System for Stamped and Strip Products

TP-1500-TX.X-XXXX



Product Drawing Number (e.g., 0001)

0XXX = Stamped on sheets
1XXX = Stamped on rolls
2XXX = Unstamped sheets
5XXX = Unstamped rolls

Product Thickness

0.25 mm (0.010 inch)
0.50 mm (0.020 inch)
0.75 mm (0.030 inch)
1.00 mm (0.040 inch)
1.50 mm (0.059 inch)
2.00 mm (0.079 inch)

Gel Type

1500 = Fiberglass-reinforced gel
1502 = Fiberglass-reinforced, flame-retardant thermal gel
1560 = Fiberglass-reinforced, one-side-tacky gel

Standard Packaging

Stamped shapes (3 x 10 inch sheets)

T0.25 mm	200 sheets/box
T0.50 mm	150 sheets/box
T0.75 mm	100 sheets/box
T1.00 mm	75 sheets/box
T1.50 mm	58 sheets/box

Stamped shapes (rolls)

T0.25 mm	150 ft/roll
T0.50 mm	100 ft/roll
T0.75 mm	75 ft/roll
T1.00 mm	50 ft/roll
T1.50 mm	45 ft/roll

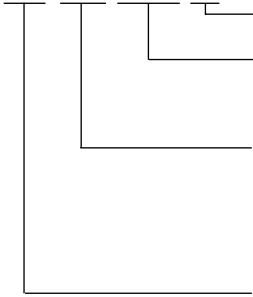
Stamped shapes (6 x 12 inch sheets)

T0.25 mm	125 sheets/box
T0.50 mm	100 sheets/box
T0.75 mm	75 sheets/box
T1.00 mm	50 sheets/box
T1.50 mm	48 sheets/box

Product Nomenclature and Packaging – Gap Filler Thermal Interface Materials

Part Numbering System for Stamped and Strip Products

TP-2100-TX.X-XXXX-XX



Optional – MYL (mylar)

Product Drawing Number (e.g., 0001)

1XXX = Stamped on rolls
5XXX = Unstamped on rolls

Product Thickness

2.2 mm (0.090 inch)
3.0 mm (0.120 inch)
3.8 mm (0.150 inch)
4.6 mm (0.180 inch)

Gel Type

TP-2100 = Foam-based thermal gel
TP-2101 = Foam-based, flame-retardant thermal gel
TP-2160 = Foam-based one-side-tacky thermal gel

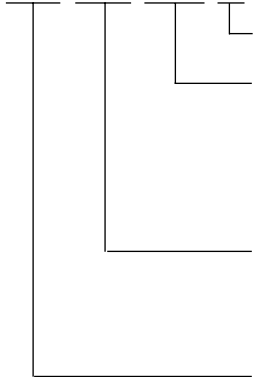
Standard Packaging – Strip Products on Release Paper

4.0 m (13.2 ft) per roll for 2.2-mm thickness
3.5 m (11.5 ft) per roll for 3.0-mm thickness
2.5 m (8.2 ft) per roll for 3.8 mm thickness
2.0 m (6.6 ft) per roll for 4.6-mm thickness

Product Nomenclature and Packaging – Phase Change Thermal Interface Materials

Part Numbering System for Stamped and Strip Products

PC-4XXX-T0.XX-XXXX-XX



AD = Adhesive option

Product Drawing Number

0XXX = Stamped on sheets
1XXX = Stamped on rolls
2XXX = Unstamped sheets
3XXX = Individual stamped sheets
5XXX = Unstamped rolls

Product Thickness

4103 = 0.127 mm (0.005 inch)
4223 = 0.076 mm (0.003 inch)
4323 = 0.076 mm (0.003 inch)

Material Type

4103 = Unsupported film
4223 = With 0.002 inch polyimide film carrier
4323 = With 0.002 inch aluminum film carrier



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