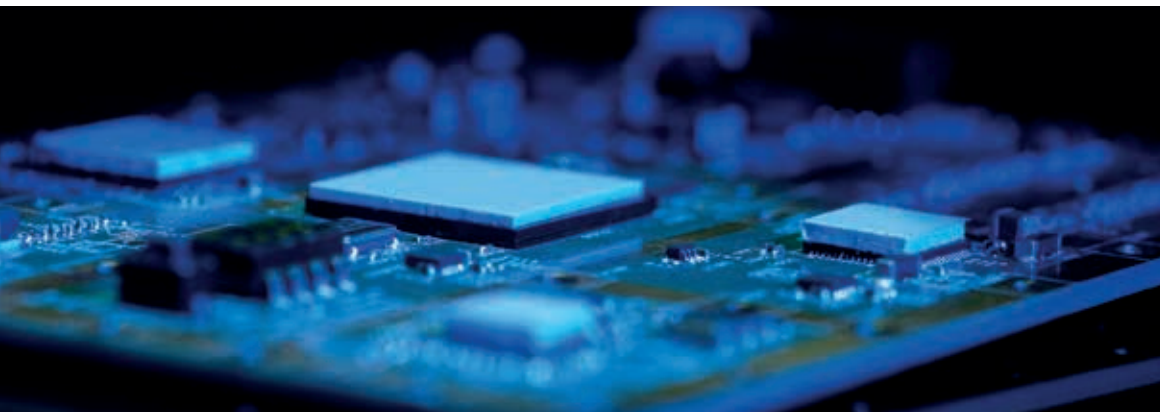
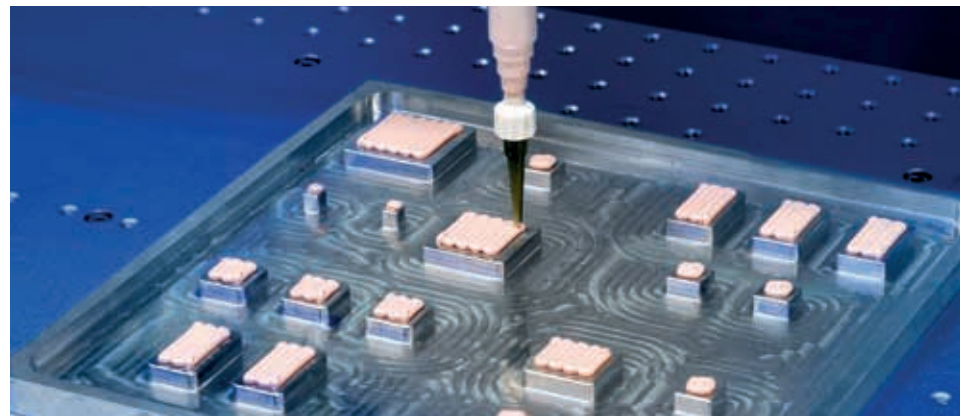
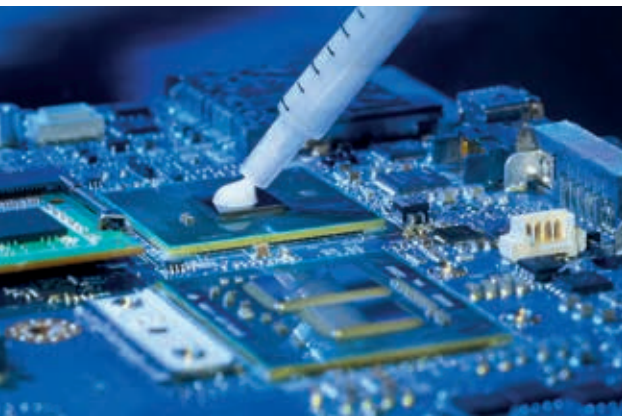




Compatherm® Product Portfolio

Experience and Innovation





Nolato has a long successful history of driving innovation and developing materials, processes and equipment for silicone based applications.



Thermal Interface Materials (TIM)

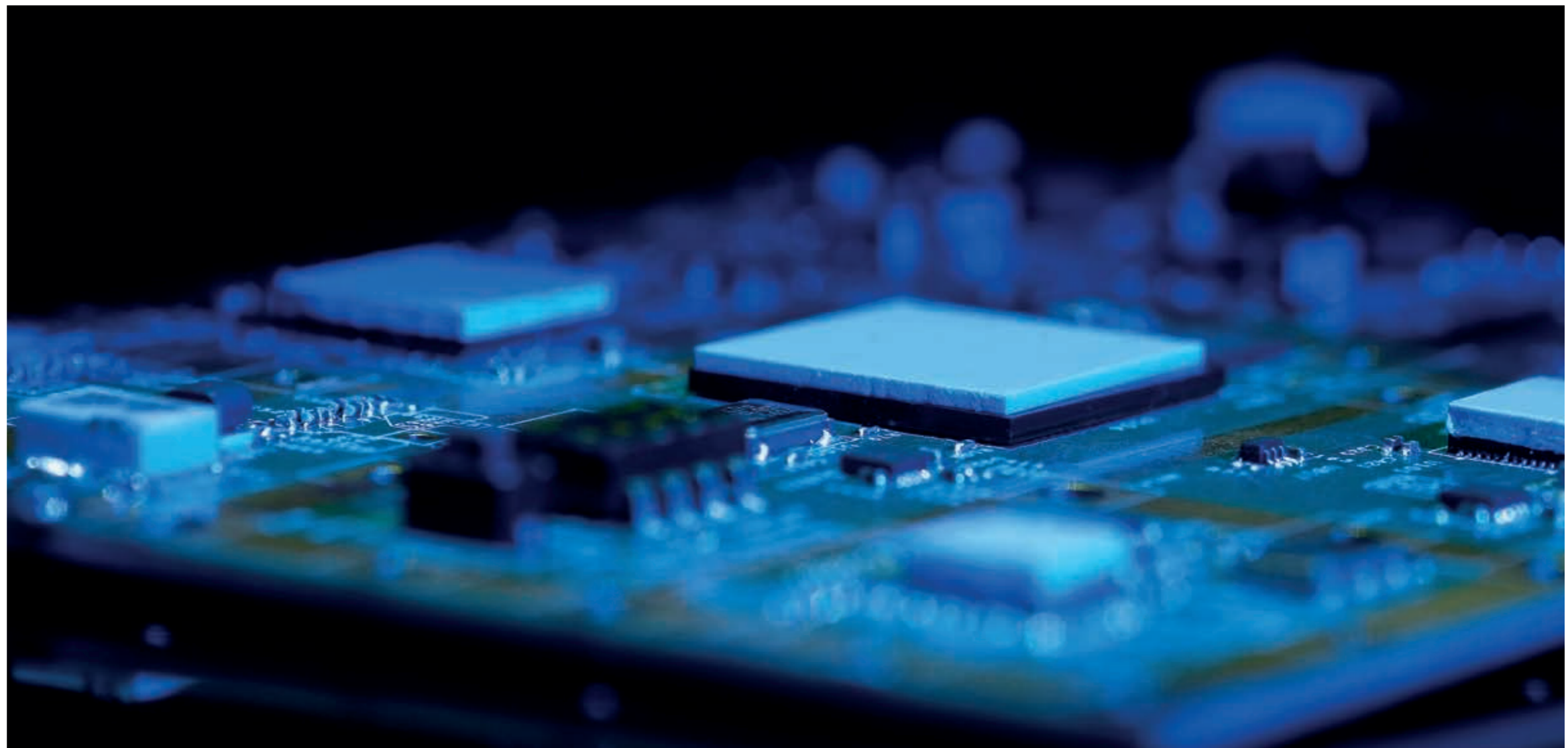
Compatherm, Nolato's range of thermally conductive materials, is used to facilitate the transfer of heat from hot components, e.g. on a PCB, to heat sinks and cold plates. The purpose of these materials is to displace the pockets of insulating air that form in the irregularities between surfaces, and thereby reduce the thermal resistance.

Benefits of Compatherm® Pad

- ▶ Excellent thermal properties
- ▶ Ultra-softness for low compression forces
- ▶ Highly conformable
- ▶ Naturally tacky surfaces
- ▶ Comprehensive range of standard materials
- ▶ Customisation available

Customised solutions

- ▶ De-tackification coating
- ▶ Thermal resistance vs. pressure
- ▶ Deflection vs. pressure
- ▶ Custom test procedures
- ▶ Custom raw material sheet format
- ▶ Fibreglass reinforcement
- ▶ Insulator carrier
- ▶ Other mechanical and/or thermal properties



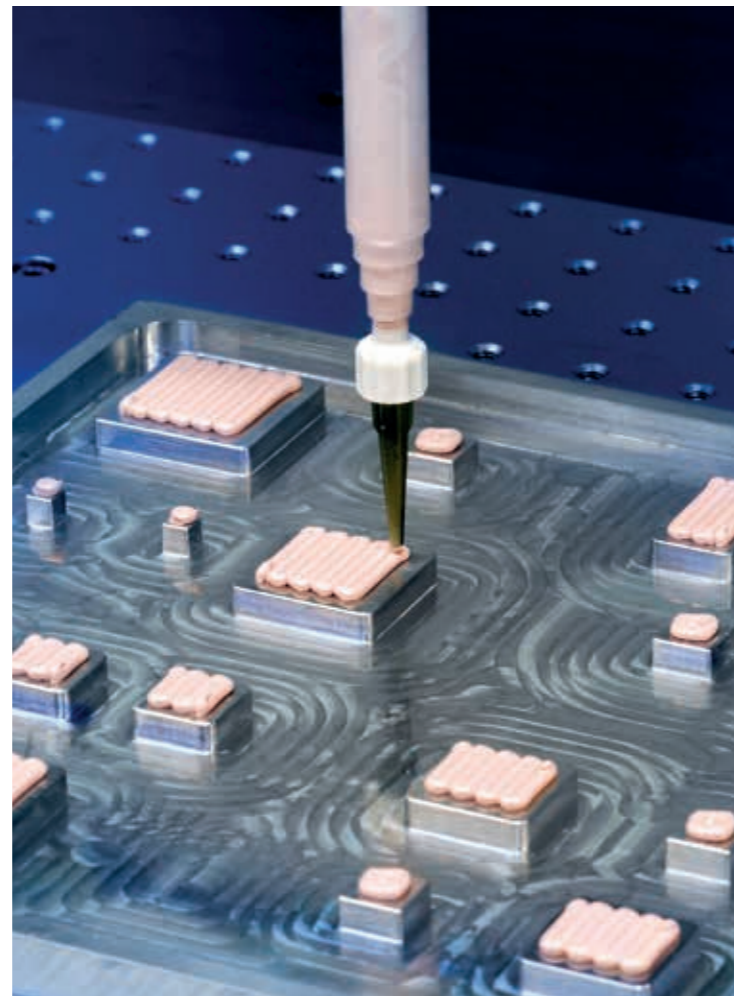
| Compatherm® Pad | Test Standard | Unit | 9410 | 9411 | 9420 | 9421 | 9422 |
|------------------------------|-------------------|-------------------|-------------|-------------|-------------|-------------|-------------|
| Base matrix | | | Silicone | Silicone | Silicone | Silicone | Silicone |
| Thermally conductive filler | | | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic |
| Colour | Visual | | Pink | Lt Blue | Lt Blue | Lt Brown | Lt Blue |
| Thickness | ASTM D374 | mm | 0.25 - 5.00 | 0.50 - 5.00 | 0.25 - 5.00 | 0.50 - 5.00 | 0.50 - 5.00 |
| Thermal Conductivity | ISO 22007-2 mod | W/(m·K) | 1 | 1.3 | 2 | 2.5 | 2 |
| Hardness | ASTM D2240 | Shore 00 | 40 | 9 | 40 | 40 | 25 |
| Density | Helium Pycnometer | g/cm ³ | 2.37 | 2.50 | 2.73 | 2.70 | 2.70 |
| Dielectric Breakdown Voltage | ASTM D149 | VAC/mm | 5 000 | 5 000 | 5 000 | 5 000 | 5 000 |
| Dielectric Constant @ 1MHZ | ASTM D150 | | 3.96 | 5.33 | 3.63 | 7.47 | 3.96 |
| Outgassing, TML | ASTM E595 | % | 0.06 | 0.2 | 0.06 | 0.13 | 0.1 |
| Flammability | UL94 | | 5 | V-0 | V-0 | V-0 | V-0 |

| 9430 | 9431 | 9432 | 9433 | 9440 | 9450 | 9451 | 9470 | 9471 | 9472 | 9473 |
|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Silicone | Silicone | Silicone | Silicone | Silicone | Silicone | Silicone | Silicone | Silicone | Silicone | Silicone |
| Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic |
| Grey | Blue | Brown | Grey | Green | Black | Grey | LT Grey | Pink | Lt Grey | Pink |
| 0.25 - 5.00 | 0.25 - 5.00 | 1.00 - 5.00 | 0.50 - 5.00 | 0.75 - 5.00 | 0.50 - 5.00 | 0.30 - 5.00 | 1.00 - 5.00 | 1.00 - 5.00 | 1.00 - 5.00 | 1.00 - 5.00 |
| 3 | 3 | 3 | 3 | 4 | 5 | 5 | 7 | 7 | 7 | 7 |
| 60 | 40 | 10 | 28 | 40 | 40 | 28 | 40 | 40 | 20 | 20 |
| 2.65 | 3.10 | 2.92 | 2.65 | 3.10 | 3.10 | 3.07 | 2.55 | 3.10 | 2.55 | 3.10 |
| 400 | > 8 000 | 5 000 | 400 | > 8 000 | 5 000 | > 5 000 | 1 500 | > 8 000 | 1 500 | 8 000 |
| 3.96 | 4.07 | 3.85 | 3.96 | 7.90 | 5.27 | 5.27 | 6.4 | 7.68 | 6.4 | 7.68 |
| 0.06 | 0.04 | 0.051 | 0.06 | 0.10 | 0.04 | 0.04 | 0.23 | 0.3 | 0.23 | 0.3 |
| V-0 | V-0 | V-0 | V-0 | V-0 | V-0 | V-0 | V-0 | V-0 | V-0 | V-0 |

COMPATHERM FILLER

Benefits of Compatherm® Filler

- ▶ Excellent thermal properties
- ▶ Ultra-conforming
- ▶ Negligible compression forces
- ▶ Very low contact resistance
- ▶ High-volume efficiency
- ▶ Customised material properties available



COMPATHERM PASTE

Benefits of Compatherm® Paste

- ▶ Very high thermal performance due to ultra-thin bondline
- ▶ Allows bondlines down to tens of microns
- ▶ Reduced contact resistance due to superior wetting
- ▶ Dispensable and silk/stencil screen printable
- ▶ Highly thixotropic, with minimum migration
- ▶ Stable composition with no dry-out



| Compatherm® Filler | Test Standard | Unit | 9310 | 9343 | 9344 |
|------------------------------|-------------------|-------------------|--------------------|-----------------------|--------------------|
| Base matrix | | | Silicone 2-part | Silicone 2-part | Silicone 2-part |
| Thermally conductive filler | | | Ceramic | Ceramic | Ceramic |
| Colour, part A | Visual | | White | White | White |
| Colour, part B | Visual | | Blue | Pink | Green |
| Pot life | | h | 3 | 4 | 2.5 |
| Cure time @25°C | | h | 18 | 24 | 12 |
| Thermal Conductivity | ISO 22007-2 mod | W/(m·K) | 1.8 | 4 | 4 |
| Viscosity (mixed) | Brookfield 20rpm | Pa·s | 110 | 350 | 300 |
| Density | Helium Pycnometer | g/cm ³ | 2.8 | 3.1 | 3.1 |
| Dielectric Breakdown Voltage | ASTM D149 | VAC/mm | 5 000 | 5 000 | 5 000 |
| Volume Resistivity | ASTM D257 | Ω·cm | 1·10 ¹³ | 9.37·10 ¹² | 1·10 ¹³ |
| Outgassing, TML | ASTM E595 | % | 0.15 | 0.1 | 0.1 |
| Flammability | UL94 | | V-0 | V-0 | V-0 |

| Compatherm® Paste | Test Standard | Unit | 9520 | 9521 | 9530 | 9540 | 9541 |
|------------------------------|-------------------|-------------------|----------|----------|----------|----------|----------|
| Base matrix | | | Silicone | Silicone | Silicone | Silicone | Silicone |
| Thermally conductive filler | | | Ceramic | Ceramic | Ceramic | Ceramic | Ceramic |
| Colour | Visual | | Grey | White | Grey | Grey | Grey |
| Minimum Achievable Bondline | | µm | 20 | 20 | 20 | 20 | 20 |
| Thermal Conductivity | ISO 22007-2 mod | W/(m·K) | 2.5 | 2 | 3 | 4.3 | 4.3 |
| Viscosity | Brookfield 10rpm | cP | 80 000 | 110 000 | 80 000 | 300 000 | 500 000 |
| Density | Helium Pycnometer | g/cm ³ | 2.2 | 2.8 | 2.2 | 2.3 | 2.3 |
| Dielectric Breakdown Voltage | ASTM D149 | VAC/mm | 400 | >4 000 | 400 | 400 | 400 |
| Volatile Content | ASTM E595 (mod.) | % | 0.3 | 0.3 | 0.9 | 0.6 | 0.6 |

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