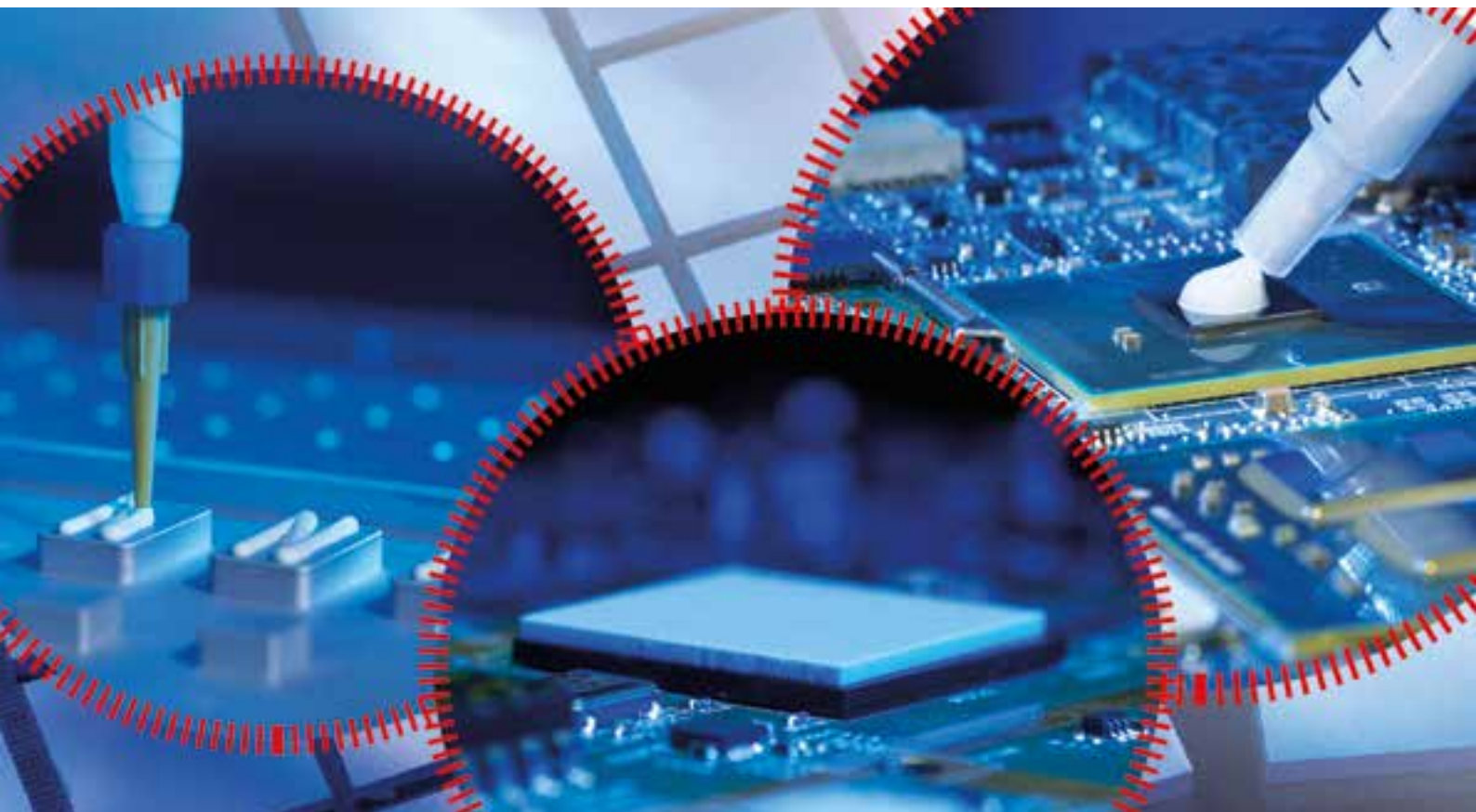




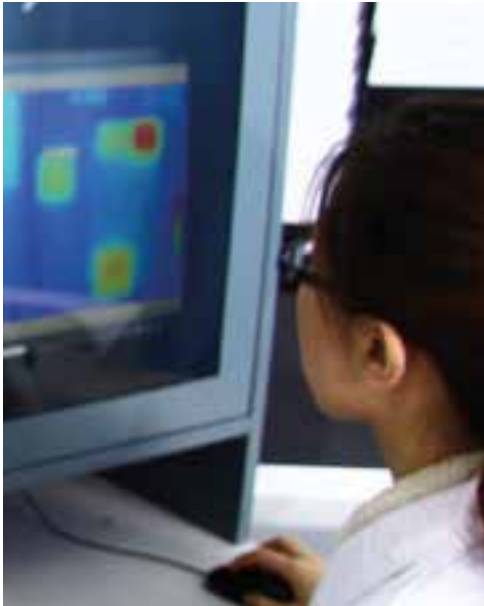
Compatherm® Product Portfolio

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

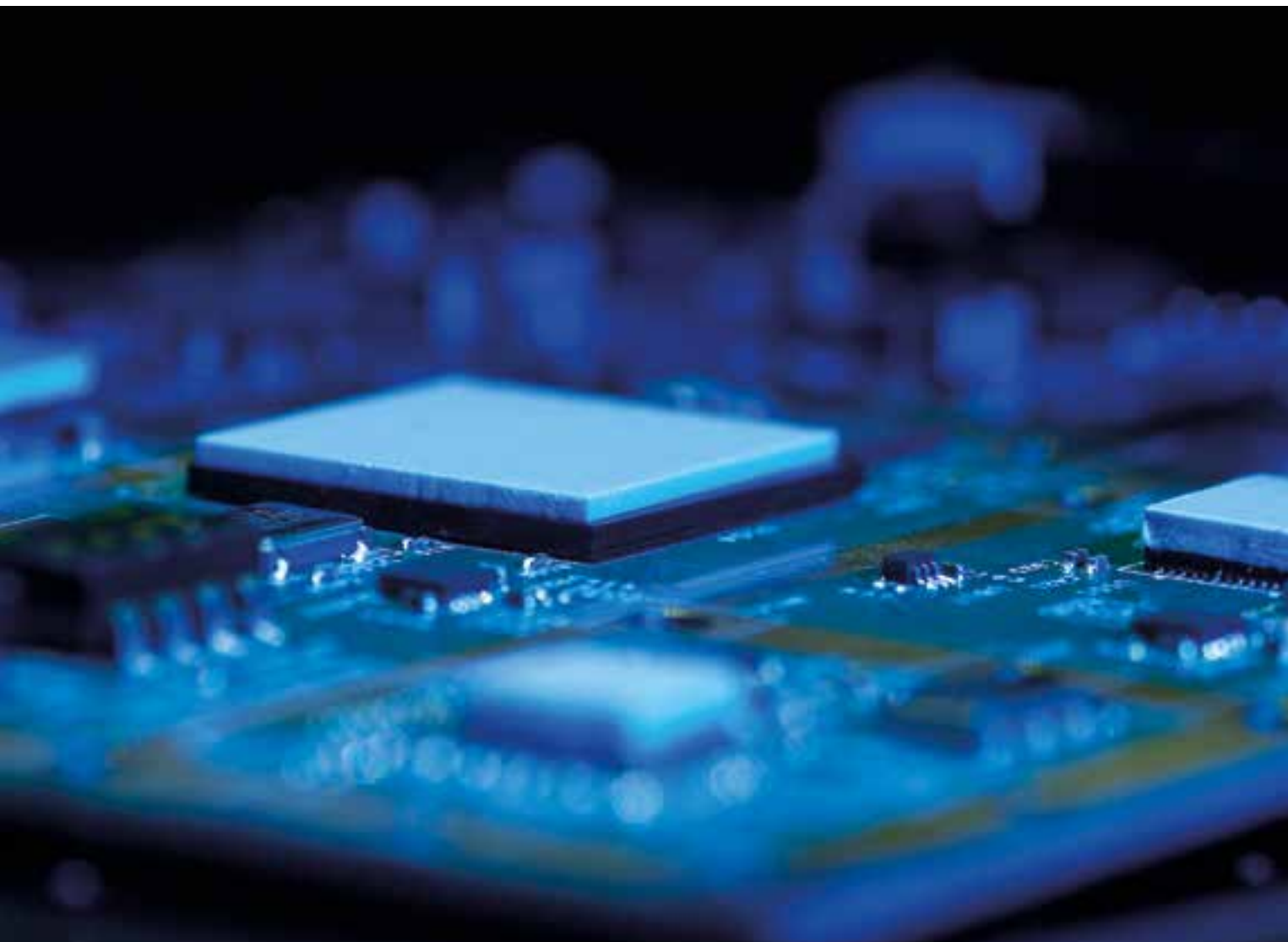
- ▶ Excellent thermal properties
- ▶ Ultra-softness for low compression forces
- ▶ Highly conformable
- ▶ Naturally tacky surfaces
- ▶ Comprehensive range of standard materials
- ▶ Customisation available

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	9423	9430	9431
Base matrix			Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Thermally conductive filler			Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Colour	Visual		Pink	Lt Blue	Lt Blue	Lt Brown	Lt Blue	Lt Brown	Grey	Blue
Thickness Range	ASTM D374	mm	0.25 - 5.00	0.50 - 5.00	0.25 - 5.00	0.50 - 5.00	0.50 - 5.00	0.50 - 5.00	0.25 - 5.00	0.25 - 5.00
Thermal Conductivity	ISO 22007-2 mod	W/(m-K)	1	1.3	2	2.5	2	2.5	3	3
Hardness	ASTM D2240	Shore 00	40	9	40	40	25	60	60	40
Density	Helium Pycnometer	g/cm ³	2.07	2.50	2.73	2.70	2.70	2.70	2.65	3.10
Dielectric Breakdown Voltage	ASTM D149	VAC/mm	5 000	5 000	5 000	5 000	5 000	5 000	400	> 8 000
Dielectric Constant @ 1MHZ	ASTM D150		3.96	5.33	3.63	7.47	3.96	7.47	3.96	4.07
Outgassing, TML	ASTM E595	%	0.06	0.2	0.06	0.13	0.1	0.13	0.06	0.04
Outgassing, CVCMM	ASTM E595	%	0.01	TBD	0.01	TBD	TBD	TBD	0.01	0.003
Flammability	UL94		V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0



9432	9433	9434	9440	9441	9450	9451	9452	9453	9470	9471	9472	9473	9480	9611
Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Carbon
Brown	Grey	Blue	Green	Green	Grey	Grey	Grey	Grey	LT Grey	Pink	Lt Grey	Pink	Blue	Dk Grey
1.00 - 5.00	0.25 - 5.00	0.25 - 5.00	0.50 - 5.00	1.00 - 5.00	0.50 - 5.00	0.50 - 5.00	0.50 - 5.00	0.50 - 5.00	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00	1.00 - 5.00	0.50 - 5.00	0.50 - 5.00
3	3	3	4	4	5	5	5	5	7	7	7	7	8	15
10	28	40	40	8	40	28	60	40	40	40	20	20	40	22
2.92	2.65	3.00	3.10	3.10	3.10	3.07	3.10	3.15	2.55	3.10	2.55	3.10	3.10	2.76
> 7 000	400	8 000	> 8 000	> 8 000	> 7 000	> 5 000	> 5 000	> 10 000	1 500	8 000	1 500	8 000	8 000	n/a
3.85	3.96	TBD	7.90	7.90	5.27	5.27	5.27	TBD	6.4	7.68	6.4	7.68	TBD	n/a
0.051	0.06	0.10	0.10	0.10	0.04	0.04	0.33	0.2	0.23	0.3	0.23	0.3	0.3	0.2
0.005	0.01	TBD	TBD	TBD	0.01	0.01	TBD	TBD	0.03	TBD	0.03	TBD	TBD	TBD
V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0

Benefits of Compatherm® Filler

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



Compatherm® Filler	Test Standard	Unit	9230	9240	9260	9261	9320	9343	9344
Base matrix			Silicone 1-part	Silicone 1-part	Silicone 1-part	Silicone 1-part	Silicone 2-part	Silicone 2-part	Silicone 2-part
Thermally conductive filler			Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Colour, part A	Visual		White	LT Grey	White	White	White	White	White
Colour, part B	Visual		n/a	n/a	n/a	n/a	Blue	Pink	Green
Pot life		h	n/a	n/a	n/a	n/a	3	4	2.5
Cure time @25°C		h	n/a	n/a	n/a	n/a	18	24	20
Thermal Conductivity	ISO 22007-2 mod	W/(m·K)	3.7	4.7	6	6.3	2.1	4	4
Viscosity (mixed)	Brookfield 20rpm	Pa·s					110	350	300
Flow Rate		g/min	18	17	18	14	56	28	36
Density	Helium Pycnometer	g/cm ³	3.2	3.3	3.3	3.3	2.8	3.1	3.1
Dielectric Breakdown Voltage	ASTM D149	VAC/mm	8 000	5 000	5 000	5 000	5 000	5 000	5 000
Volume Resistivity	ASTM D257	Ω·cm	TBD	1·10 ¹³	1·10 ¹³	1·10 ¹³	3·10 ¹⁴	9.37·10 ¹²	2·10 ¹⁴
Outgassing, TML	ASTM E595	%	0.1	0.07	0.1	0.1	0.15	0.1	0.1
Flammability	UL94		V-0	V-0	V-0	V-0	V-0	V-0	V-0

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® Paste	Test Standard	Unit	9520	9521	9522	9530	9531	9540	9541	9542	9542
Base matrix			Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone	Silicone
Thermally conductive filler			Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic	Ceramic
Colour	Visual		Grey	White	Grey	Grey	Grey	Grey	Grey	White	Grey
Minimum Achievable Bondline		µm	20	20	20	20	20	20	20	50	20
Thermal Conductivity	ISO 22007-2 mod	W/(m·K)	2.5	2	2.8	3	3.5	4.3	4.3	4.5	4.3
Viscosity	Brookfield 10rpm	cP	80 000	110 000	250 000	80 000	100 000	300 000	500 000	300 000	250 000
Density	Helium Pycnometer	g/cm ³	2.2	2.8	2.2	2.2	2.2	2.3	2.3	2.98	2.3
Dielectric Breakdown Voltage	ASTM D149	VAC/mm	400	>4 000	400	400	400	400	400	5 000	400
Volatile Content	ASTM E595 (mod.)	%	0.3	0.3	0.3	0.9	1.0	0.6	0.6	1.7	1.9

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