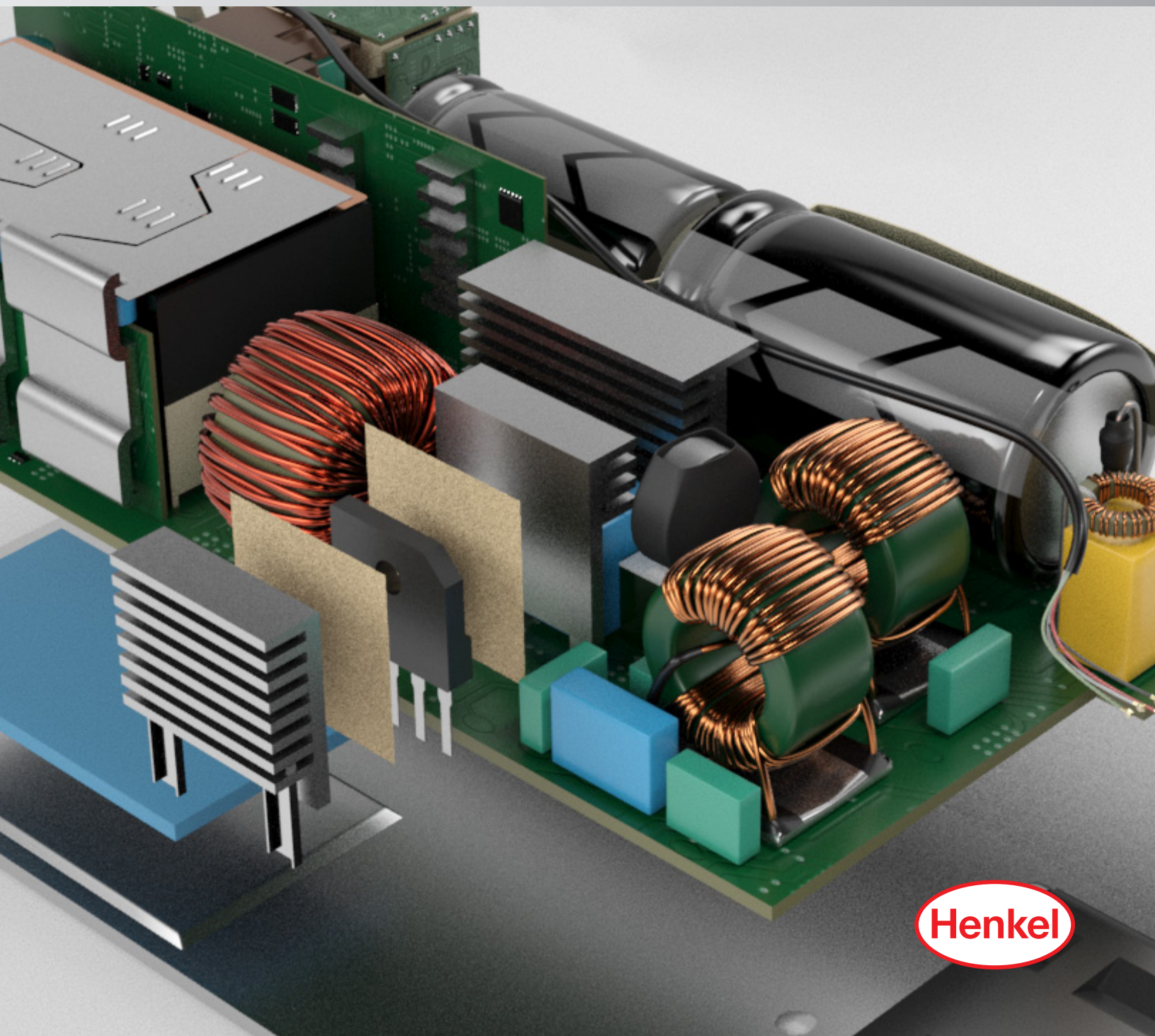
LOCTITE®
TECHNOMELT®

BERGQUIST®

MATERIALS FOR POWER SUPPLIES & CONVERTERS

SOLUTIONS FOR AC/DC AND DC/DC POWER DEVICES



Henkel

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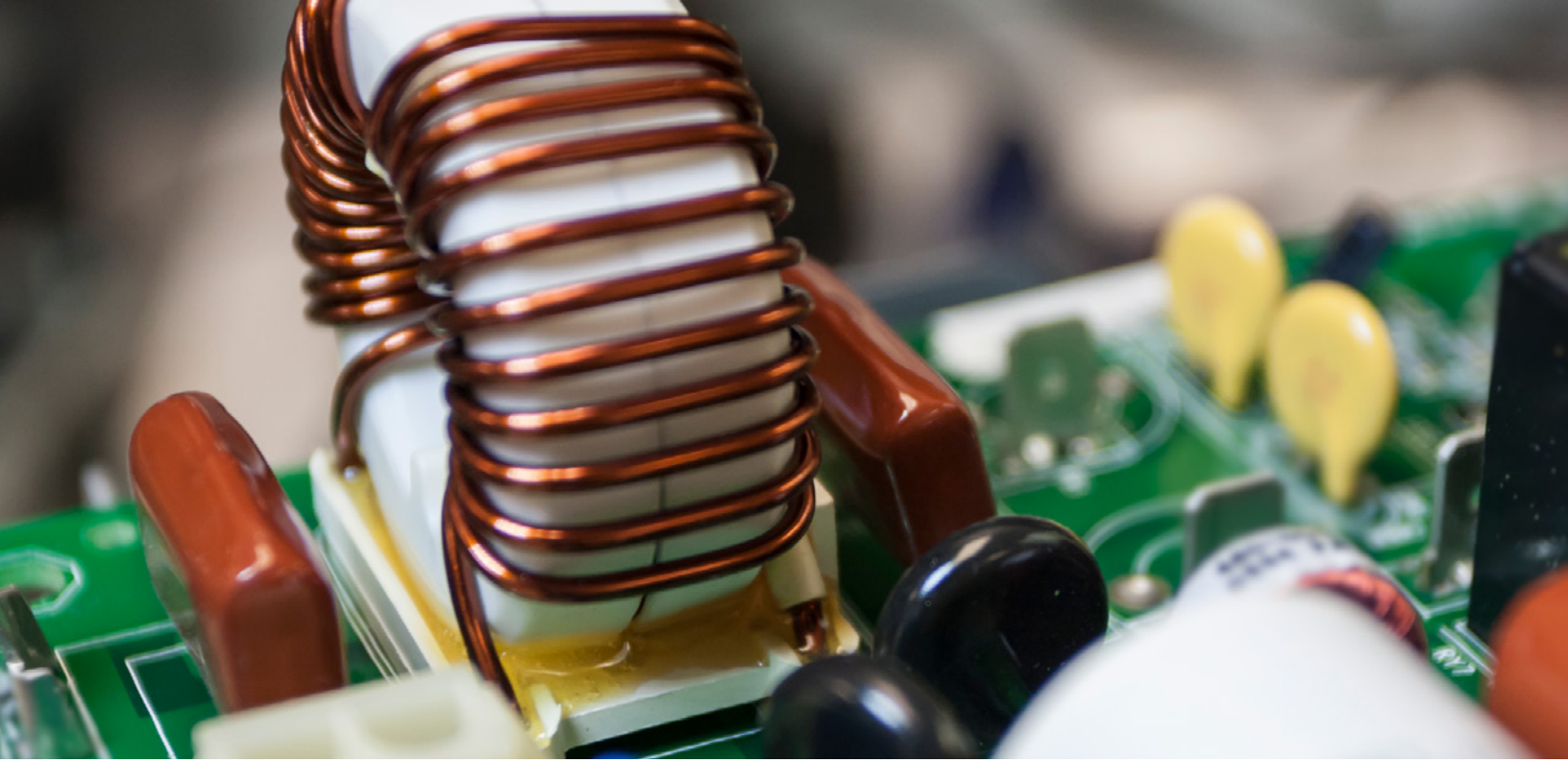
MATERIAL FOR POWER DEVICES

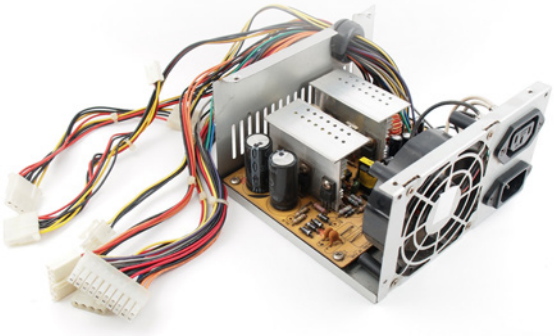


INTRODUCTION TO POWER SUPPLIES

The demands on power supplies in industrial electronics are immense. Expectations for higher power and increased functionality within smaller dimensions – without impacting reliability or raising cost – are driving manufacturers toward more capable Material and processes. As a global partner with proven product performance, Henkel's family of electronic Material helps designers achieve these ambitions.

AC/DC Power Converters

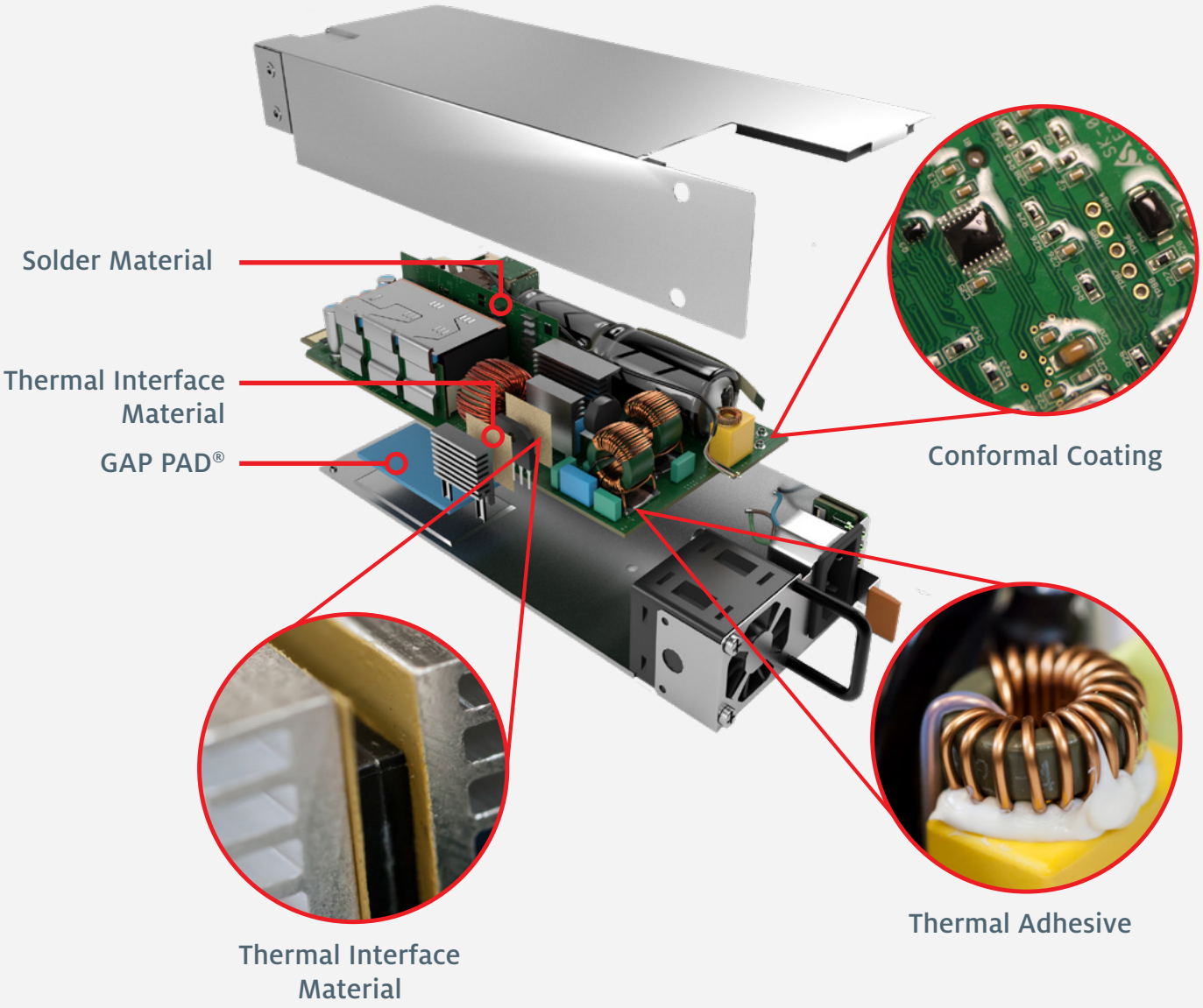
AC/DC power supplies are designed to convert AC distribution power to DC power for use by end applications, distribution systems and alternative energy devices. Improvements in design and capability facilitated by novel electronic Material allow these important electronic systems to be smaller, more portable, increasingly powerful, and highly reliable. Henkel Material play a critical role in producing AC/DC power supplies so that electrical connections are secure, structures are durable and function is dependable.



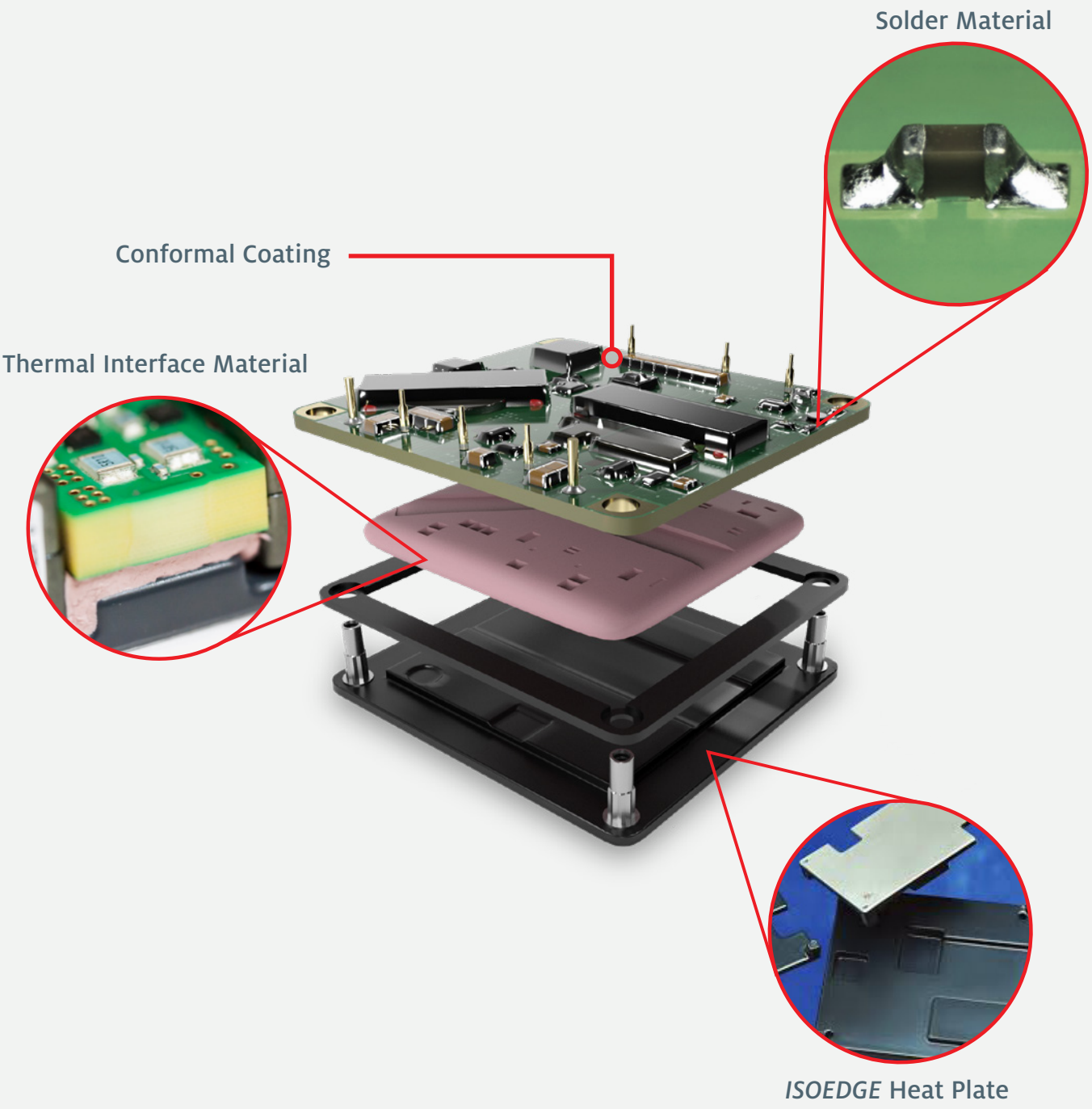
DC/DC Power Converters

Utilized to enable efficient distribution of power through electronic systems, DC/DC power converters are under constant pressure to handle more watts per cubic centimeter, run more efficiently and maintain high reliability standards. With Henkel Material as a central component to achieving these ambitions, DC/DC converters can be designed and manufactured with increased power densities and higher reliability at reduced cost.

MATERIAL SOLUTIONS FOR AC/DC POWER DEVICE



MATERIAL SOLUTIONS FOR DC/DC POWER DEVICE

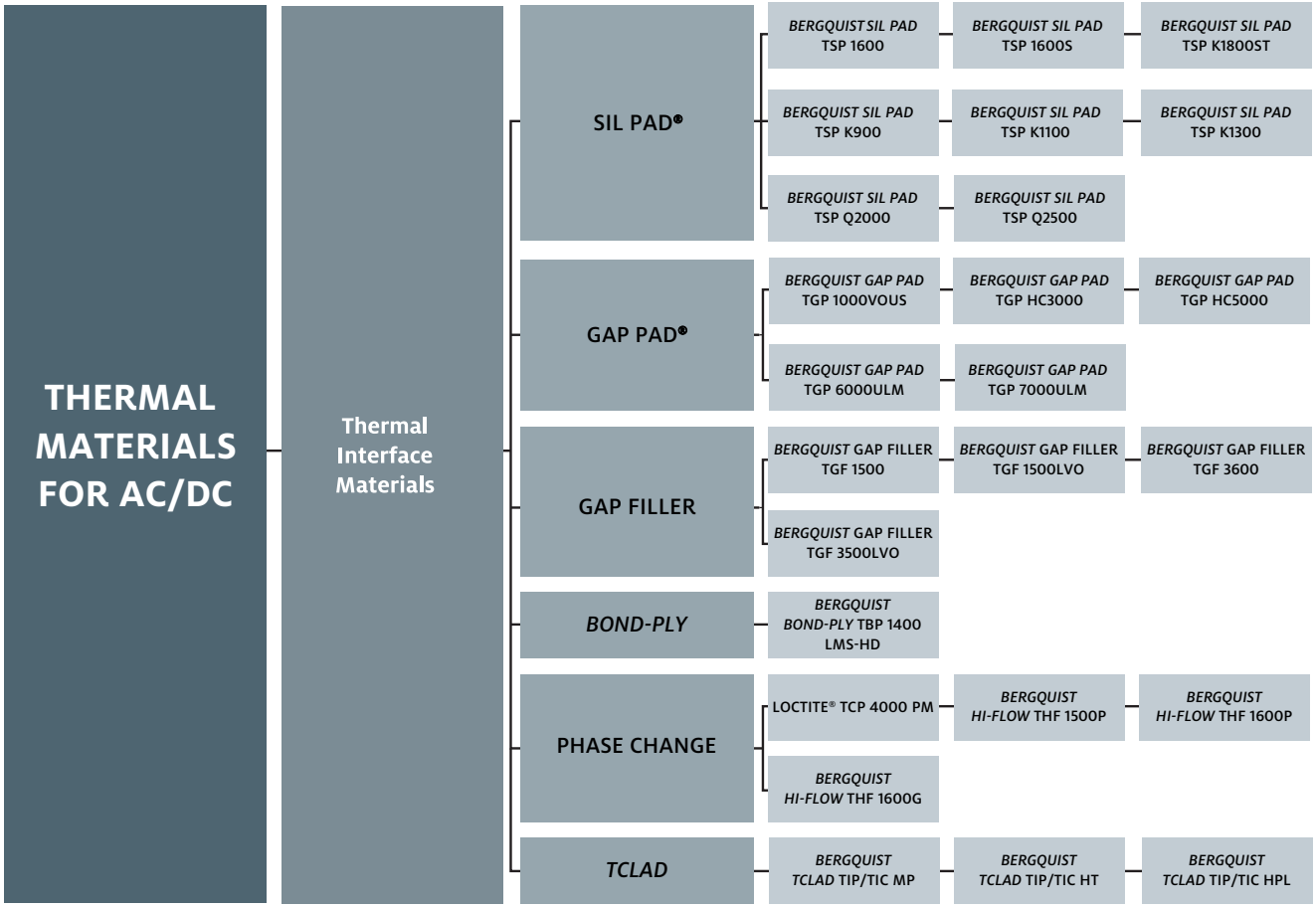


A Total Solutions Approach

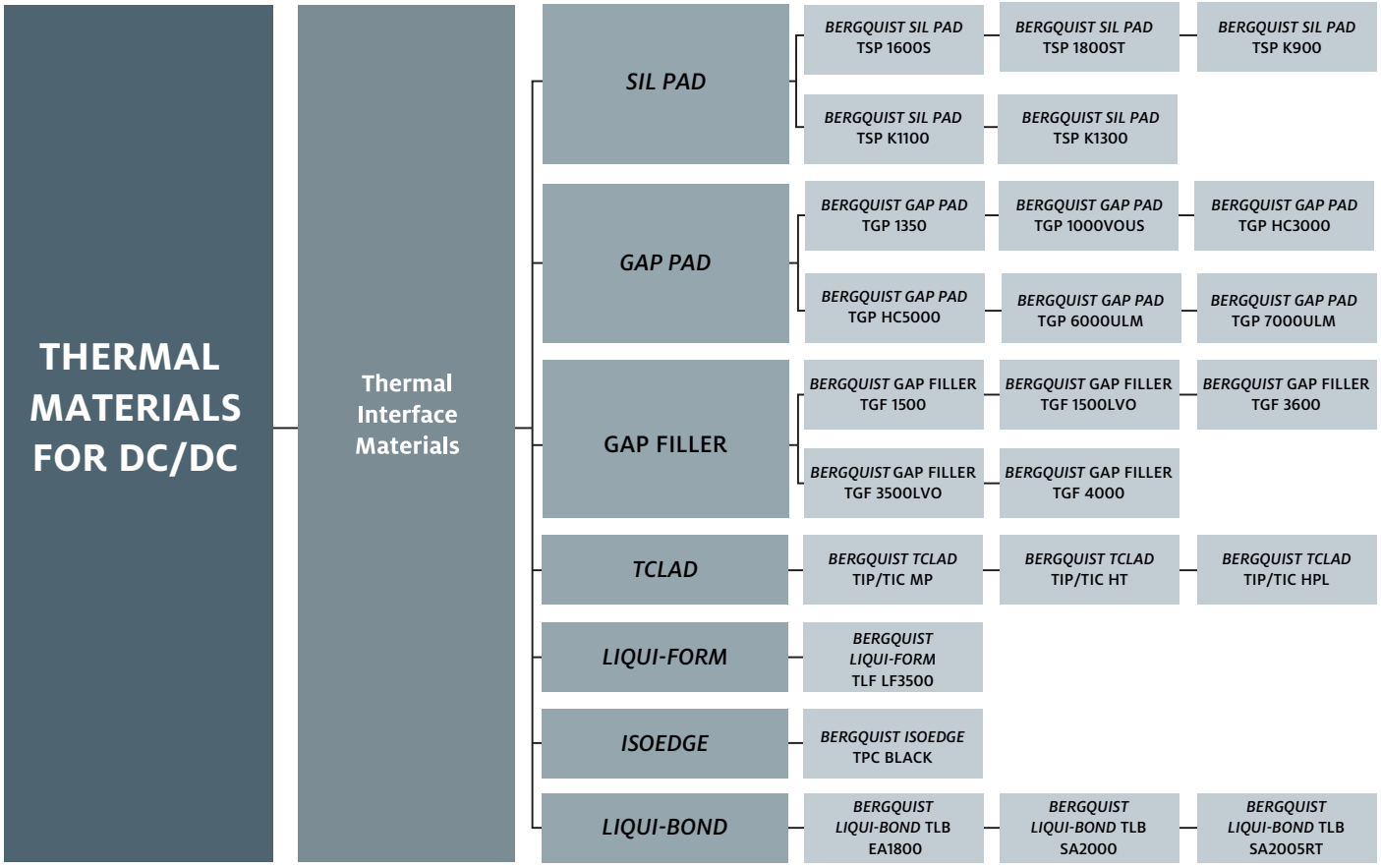
Henkel's portfolio of products for power conversion technology offers a holistic approach through compatible material sets that simplify the supply chain with a single, low-risk source for thermal, connecting, protecting and bonding solutions.

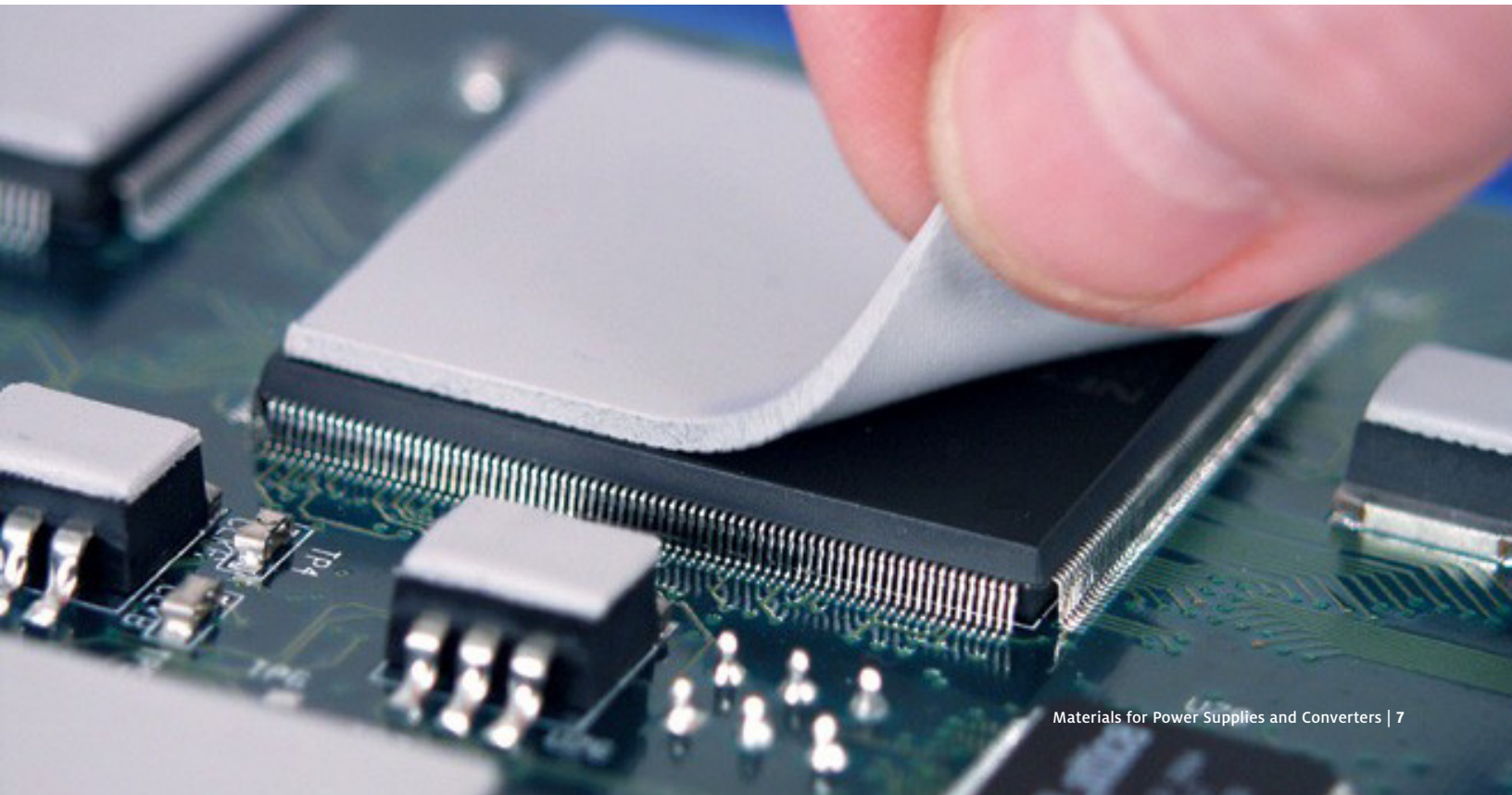
Thermal Management Material

Managing the thermal load produced by expanded function with smaller dimensions is challenging all electronic sectors, including the power supply market. As power densities increase and reliability expectations rise, Henkel's *BERGQUIST* brand of thermal interface Material (TIMs) and *TCLAD* insulated metal substrates provide safety agency recognition and low thermal resistance dielectric interfaces between power-generating components and heat sinks. A wide range of TIMs in pad, liquid and phase change formulations are available in a variety of chemistry platforms and thermal conductivities to suit almost any AC/DC or DC/DC power converter requirement.



THERMAL INTERFACE MATERIAL FOR DC/DC





THERMAL INTERFACE MATERIAL

SIL PAD®

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Hardness	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST SIL PAD TSP 1600	A highly compliant pad that provides high thermal performance and electrical isolation at low mounting pressures	• Thermal impedance: 0.45°C-in²/W (at 50 psi) • High value material • Smooth and highly compliant surface • Electrically isolating	1.6	91 (Shore A)	3,000	0.127	UL 94 V-0
BERGQUIST SIL PAD TSP 1600S	A thermally conductive insulation material that provides high thermal performance and electrical isolation at low mounting pressures	• Thermal impedance: 0.61°C-in²/W (at 50 psi) • Electrically isolating • Low mounting pressures • Smooth and highly compliant surface • General-purpose thermal interface material solution	1.6	92 (Shore A)	5,500	0.229	UL 94 V-0
BERGQUIST SIL PAD TSP 1800ST	A fiberglass-reinforced material that is tacky on both sides for high volume assemblies	• Thermal impedance: 0.23°C-in²/W (at 50 psi) • Naturally tacky on both sides • Pad is repositionable • Excellent thermal performance • Auto-placement and dispensable	1.8	75 (Shore 00)	3,000	0.203	UL 94 V-0
BERGQUIST SIL PAD TSP K900	A specially developed film that withstands high voltages and requires no thermal grease	• Thermal impedance: 0.48°C-in²/W (at 50 psi) • Withstands high voltages • High dielectric strength • Very durable	0.9	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST SIL PAD TSP K1100	A medium performance film coated with silicone elastomer to provide a strong dielectric barrier	• Thermal impedance: 0.49°C-in²/W (at 50 psi) • Physically strong dielectric barrier against cut-through • Medium performance film	1.1	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST SIL PAD TSP K1300	A high performance insulator to replace ceramic insulators such as Beryllium Oxide, Boron Nitride, and Alumina	• Thermal impedance: 0.41°C-in²/W (at 50 psi) • Tough dielectric barrier against cut-through • High performance film • Designed to replace ceramic insulators	1.3	90 (Shore 00)	6,000	0.152	UL 94 VTM-0
BERGQUIST SIL PAD TSP Q2000	A fiberglass-reinforced grease replacement that withstands processing stresses without losing physical integrity and provides ease of handling during application	• Thermal impedance: 0.35°C-in²/W (at 50 psi) • Eliminates processing constraints typically associated with grease • Conforms to surface textures • Easy handling • May be installed prior to soldering and cleaning without worry	2.0	86 (Shore A)	Non-Insulating	0.127	UL 94 V-0
BERGQUIST SIL PAD TSP Q2500	Aluminum foil coated on both sides with thermally/electrically conductive rubber for applications needing maximum heat transfer but not requiring electrical isolation	• Thermal impedance: 0.22°C-in²/W (at 50 psi) • Maximum heat transfer • Aluminum foil coated both sides • Designed to replace thermal grease	2.5	93 (Shore A)	Non-Insulating	0.152	UL 94 V-0

GAP PAD®

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Modulus at 25°C (kPa)	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST GAP PAD TGP 1000VOUS	Thermally conductive gap filling material	• Highly conformable, low hardness • "Gel-like" modulus • Decreased strain • Puncture, shear and tear resistant • Electrically isolating	1.0	55	6,000 V at 500 µm	0.508 – 6.350	UL 94 V-0
BERGQUIST GAP PAD TGP HC3000	Thermally conductive gap filling material	• High-compliance, low compression stress • Fiberglass reinforced for shear and tear resistance • Low modulus	3.0	110	5,000 V at 500 µm	0.508 – 3.175	UL 94 V-0
BERGQUIST GAP PAD TGP HC5000	Thermally conductive gap filling material	• Highly conformable • Exceptional thermal performance • High-compliance, low compression stress • Fiberglass reinforced for shear and tear resistance • Low modulus	5.0	121	5,000 V at 500 µm	0.508 – 3.175	UL 94 V-0
BERGQUIST GAP PAD TGP 6000ULM	A high performance thermally conductive gap filling material with ultra-low modulus	• Thermally conductive: 6.0 W/m-K • High-compliance, low compression stress • Ultra-low modulus	6.0	41	5,000 V at 500 µm	1.524 – 3.175	UL 94 V-0
BERGQUIST GAP PAD TGP 7000ULM	A high performance thermally conductive gap filling material with ultra-low modulus	• Thermally conductive: 7.0 W/m-K • Highly conformable, extremely low compression stress • Conforms and maintains structured integrity with minimum stress applied	7.0	28	5,000 V at 500 µm	1.016 – 3.175	UL 94 V-0

GAP FILLER

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Viscosity at 25°C (cP)	Dielectric Strength (V/25 µm)	Recommended Cure	Flammability Rating
BERGQUIST GAP FILLER TGF 1500	Two-part, high performance, thermally conductive liquid gap filling material	• Optimized shear thinning characteristics for ease of dispensing • Excellent slump resistance (stays in place) • Ultra-conforming with excellent wet-out for low stress interface applications • 100% solids – no cure by-products • Excellent low and high temperature mechanical and chemical stability	1.8	250,000	400	5 hr. at 25°C	UL 94 V-0
BERGQUIST GAP FILLER TGF 1500LVO	A two-part, high performance, thermally conductive liquid gap filling material with significantly lower levels of silicone outgassing	• Thermal conductivity: 1.8 W/m-K • Low volatility for silicone sensitive applications • Ultra-conforming, with excellent wet-out • 100% solids — no cure by-products • Excellent low and high temperature mechanical and chemical stability	1.8	20,000	400	8 hr. at 25°C	UL 94 V-0

THERMAL INTERFACE MATERIAL

GAP FILLER – CONTINUED

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Viscosity at 25°C (cP)	Dielectric Strength (V/25 µm)	Recommended Cure	Flammability Rating
BERGQUIST GAP FILLER TGF 3600	Thermally conductive liquid gap filling material	• High thermal performance • Thixotropic nature makes it easy to dispense • Ultra-conforming material designed for fragile and low-stress applications • Ambient or accelerated cure schedules	3.6	150,000	275	15 hr. at 25°C	UL 94 V-0
BERGQUIST GAP FILLER TGF 3500LVO	Thermally conductive, low outgassing liquid gap filling material	• Low volatility for outgassing sensitive applications • Ultra-conforming with excellent wet-out for low stress interfaces on applications • 100% solids - no cure by-products • Ambient or accelerated cure schedules	3.5	45,000	275	24 hr. at 25°C	UL 94 V-0

TCLAD

Product Name	Description	Thickness (in.)	Thermal Performance (°C/W)	Thermal Impedance	Thermal Conductivity (W/m-K)	Dielectric Breakdown Voltage
BERGQUIST TCLAD TIP/TIC MP	Industry-proven dielectric for a multitude of applications including LED, power conversion, heat-rails, solid state relays and motor drives.	0.003	0.65	0.09	2.4	08.5
BERGQUIST TCLAD TIP/TIC HT	Dielectric resistant to degradation from high temperature exposure. Features high dielectric breakdown characteristics.	0.003	0.45	0.05	4.1	08.5
		0.006	0.70	0.11	4.1	11.0
BERGQUIST TCLAD TIP/TIC HPL	Dielectric, specifically formulated for high-power lighting LED applications with demanding thermal performance requirements.	0.0015	0.3	0.02	7.5	05.0

LIQUI-FORM

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Volume Resistivity (Ω-m)	Dielectric Strength (V/25 µm)	Dispense Rate (g/min.)	**Flammability Rate**
BERGQUIST LIQUI-FORM TLF LF3500	A one-part, highly conformable thermally conductive gel with thixotropic properties	• Thermal Conductivity: 3.5 W/m-K • Dispensable pre-cured gel • Stable viscosity in storage and in the application • Excellent chemical stability and mechanical stability	3.5	1×10^{11}	250	40	UL94 V-0

THERMAL INTERFACE MATERIAL – CONTINUED

LIQUI-BOND

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Viscosity at 25°C (cP)	Dielectric Strength (V/25 µm)	Thickness (mm)	Flammability Rating
BERGQUIST LIQUI-BOND TLB EA1800	A two-component, epoxy based, thixotropic liquid-dispensable adhesive	• Room temperature cure • Room temperature storage • Thermal Conductivity: 1.8 W/m-K • Eliminates need for mechanical fasteners • Maintains structural bond in severe-environment applications • Excellent chemical and mechanical stability	1.8	61,000	250	10 hr. at 25°C or 10 min. at 125°C	UL 94 V-0
BERGQUIST LIQUI-BOND TLB SA2000	A high performance, thermally conductive, one-part liquid silicone adhesive that cures to a solid bonding elastomer	• High thermal conductivity: 2.0 W/m-K • Eliminates need for mechanical fasteners • One-part formulation for easy dispensing • Mechanical and chemical stability • Maintains structural bond in severe environment applications • Heat cure	2.0	200,000	250	20 min. at 125°C	UL 94 V-0
BERGQUIST LIQUI-BOND TLB SA2005RT	A two-part, high performance silicone thermal adhesive that offers an adaptable cure at multiple temperatures from 25°C up to 180°C	• Thermally conductivity: 2.0 W/m-K • Adaptive thermal cure • No cure by-products • Cures and bonds at room temperature • Cure rate is greatly accelerated at elevated temperatures • Room temperature storage	2.0	70,000	275	7 days at 25°C or 1 hr. at 85°C	UL 94 V-0

PHASE CHANGE

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Volume Resistivity (Ω-m)	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST HI-FLOW THF 1600G	Consists of a thermally conductive 55°C phase change compound coated on a fiberglass web. Is designed as a thermal interface material between a computer processor and a heat sink.	• Thermal impedance: 0.20°C-in^2/W (at 25 psi) • Will not drip or run like grease • Phase change compound coated on a fiberglass carrier	1.6	1 x 10^8	300	0.127	UL 94 V-0
BERGQUIST HI-FLOW THF 1500P	A thermally conductive phase change material, reinforced with a polyimide film that provides high dielectric strength and cut through resistance	• Thermal Impedance: 0.20°C-in^2/W (at 25 psi) • 150°C high temperature reliability • Natural tack one side for ease of assembly • Exceptional thermal performance in an insulated pad	1.5	1 x 10^{12}	5,000	0.114 – 0.140	UL 94 V-0

PHASE CHANGE (CONTINUED)

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Volume Resistivity (Ω-m)	Dielectric Breakdown Voltage	Thickness (mm)	Flammability Rating
BERGQUIST HI-FLOW THF 1600P	A thermally conductive 55°C phase change compound coated on a thermally conductive polyimide film	• Thermal impedance: 0.13°C-in^2/W (at 25 psi) • Field-proven polyimide film with excellent dielectric performance and cut-through resistance • Outstanding thermal performance in an insulated pad	1.6	1 x 10^{12}	5,000	0.102 – 0.127	UL 94 V-0

Product Name	Description	Phase Change Temperature	Thermal Conductivity (W/m-K)	Specific Gravity	Recommended Drying Condition
LOCTITE® TCP 4000 PM	A reworkable and repeatable phase change material suitable for use between heat generating devices and the surfaces to which they are mounted or other heat dissipating surfaces	45°C	3.4	2	.051 mm thickness: 30 hr. at 22°C 22 min. at 60°C 3 min. at 125°C

BOND-PLY

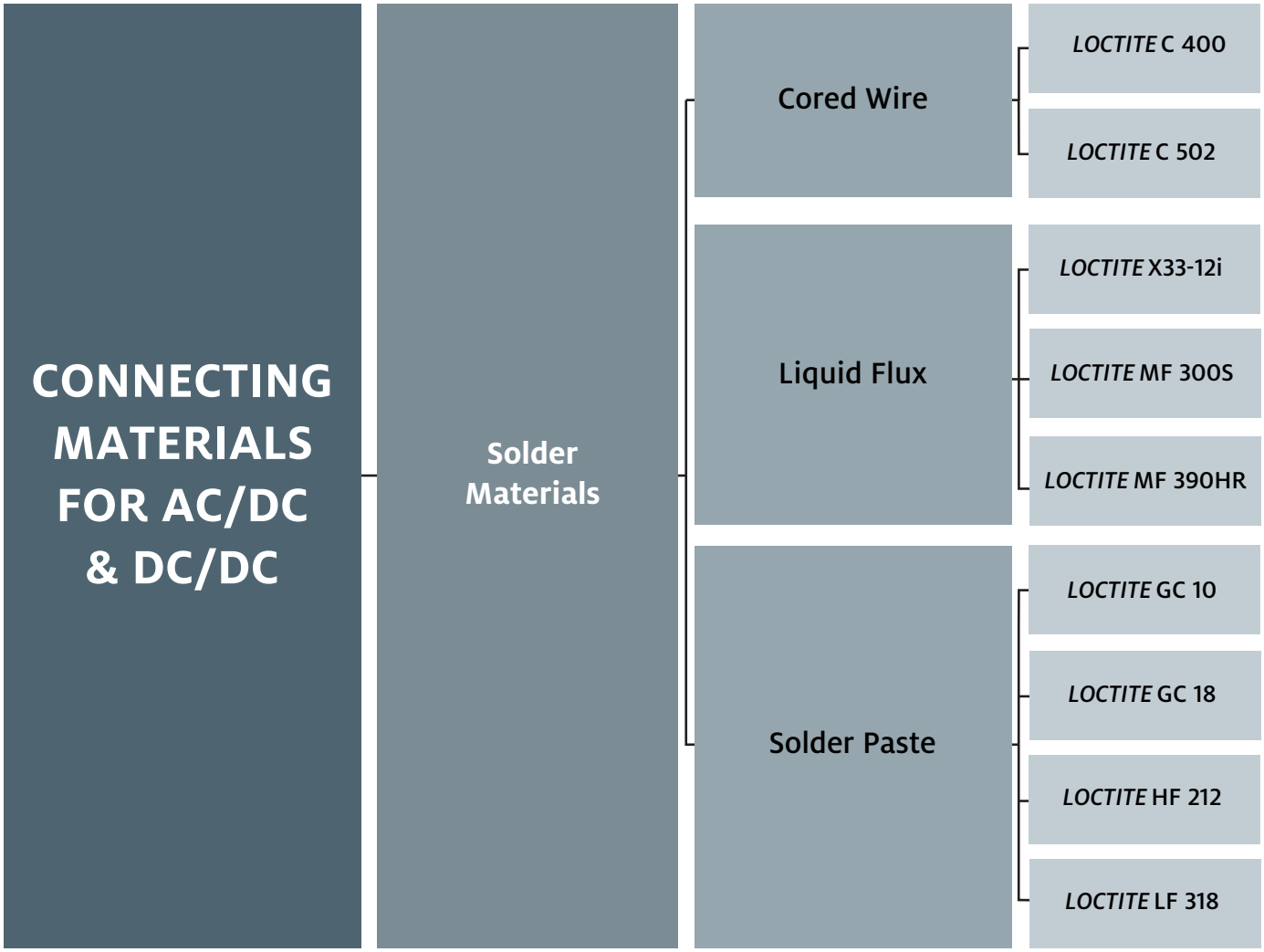
Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Dielectric Breakdown Voltage	Thickness (mm)	Recommended Cure	Flammability Rating
BERGQUIST BOND-PLY TBP 1400 LMS-HD	A thermally conductive, heat curable laminate material	• TO-220 Thermal performance: 2.3°C/W, initial pressure only lamination • Exceptional dielectric strength • Very low interfacial resistance • 200 psi adhesion strength • Continuous use of -60 – 180°C • Eliminates mechanical fasteners	1.4	5,000	0.254 – 0.457	30 min. at 125°C	UL 94 V-0

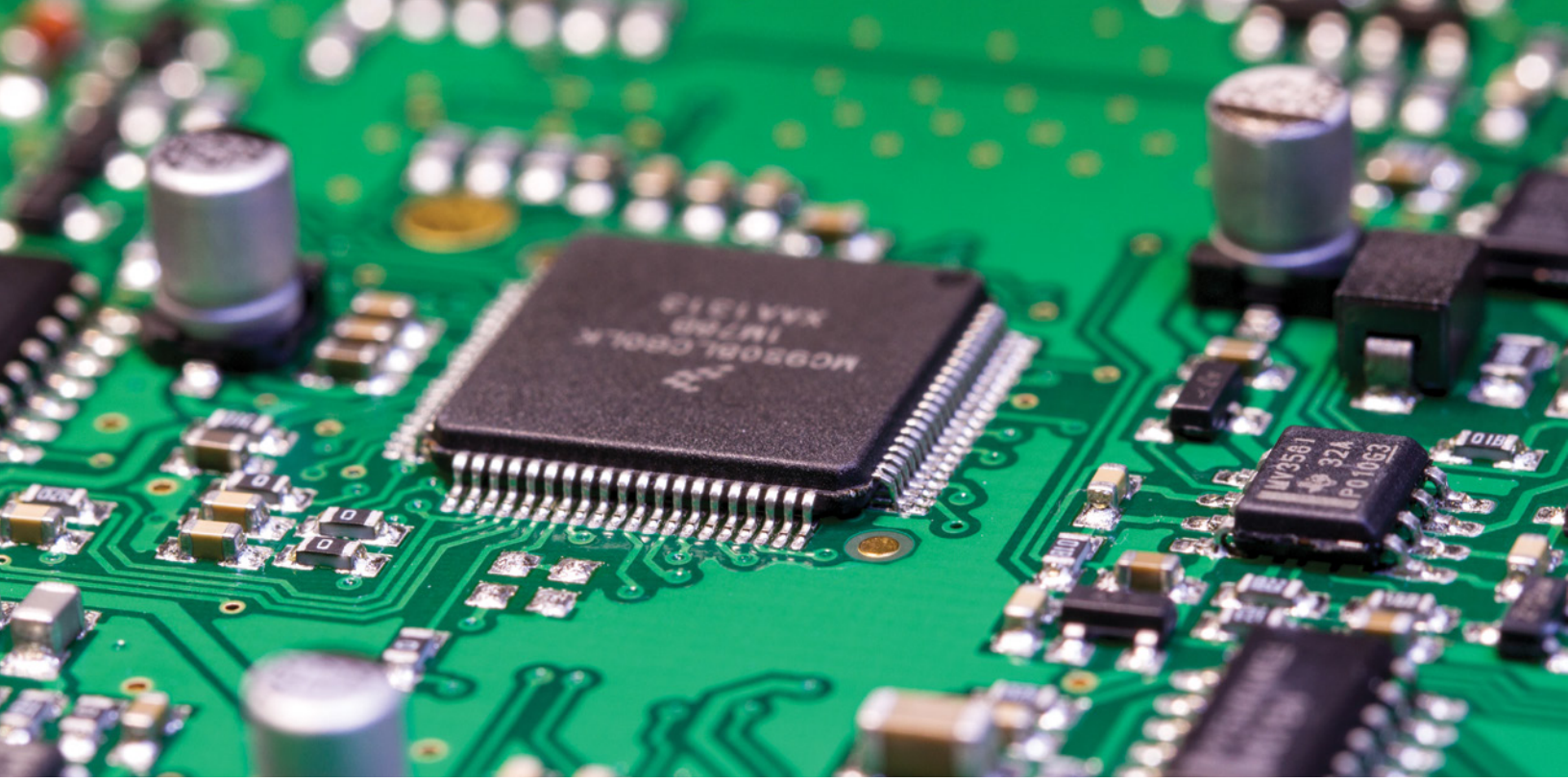
ISOEDGE

Product Name	Description	Key Attributes	Thermal Conductivity (W/m-K)	Dielectric Strength (V/25 µm)	Permittivity (Dielectric Constant)	Thickness (mm)	Flammability Rating
BERGQUIST ISOEDGE TPC BLACK	A thin thermally conductive and electrically isolating dielectric coating that provides excellent heat transfer with electrical isolation on heat sinks	• U.L. RTI rating of 130°C • Low thermal impedance 2.2°C/W (TO-220 Test Method) • U.L. recognized thermal solution that allows heat sink placement in very close proximity to components • Significantly improves overall thermal performance when compared to traditional flat heat sinks and pads	0.6	650	6	0.102 – 0.254	UL 94 V-0

UNFAILING ELECTRICAL CONNECTIVITY

Power supplies and converters have to work. There is no room for error, so ensuring dependable electrical function means the formation of reliable solder joints – even as power densities increase and component sizes shrink. To enable robust electrical interconnection, Henkel's award-winning solder portfolio offers a wide selection of material that help streamline operations through on-the-line stability, wide process windows and proven in-field reliability. Multi-award-winning, temperature stable LOCTITE® GC solder Material provide stability from shipping to transport to storage to the production line, resulting in excellent transfer efficiency and high-performance for dependable electrical connectivity.





SOLDER MATERIAL

CORED WIRE

Product Name	Description	Approximate Flux Content (% by Weight)	Diameter Range (mm)	Pb-Free Alloy	SnPb Alloy	IPC J-STD-004B Classification
LOCTITE® C 400	Halide-free, no-clean, clear residue, cored solder wire with increased flux content for improved wetting	2.2	0.38 – 1.63	• 90iSC • 99C • SAC305 • SAC387	• Sn60 • Sn62 • Sn63	ROL0
LOCTITE C 502	No-clean, clear residue, cored solder wire with medium activity flux with good wetting on difficult substrates	2.7	0.25 – 1.63	• 99C • SAC305 • SAC387	• Sn60 • Sn62 • Sn63	ROM1

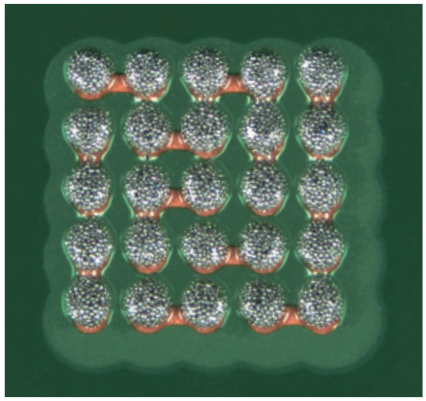
LIQUID FLUXES

Product Name	Description	Solid Content (% by Weight)	Acid Value (mg KOH/g)	Application	IPC J-STD-004B Classification
LOCTITE X33-12i	No clean, resin free, halide free liquid flux for surfaces with poor solderability	0.029	22.5	Foam, spray or wave	ORM0
LOCTITE MF 300S	General-purpose, resin-free, water-based flux with a special formulation designed to minimize solder balling. Compatible with Pb-free and SnPb wave solder processes.	4.600	37.0	Spray, Foam	ORM0
LOCTITE MF 390HR	Designed for optimum wetting of surfaces, not aggressive towards common plastics and work over a wide range of solder finishes, including bare copper, immersion tin and nickel-gold	6.000	20 – 25	Wave	ROL0

CONNECTING MATERIAL FOR AC/DC & DC/DC – CONTINUED

SOLDER PASTES

Product Name	Description	Alloy	Particle Size Distribution	IPC J-STD-004B Classification	Optimal Shelf Life	Reflow Atmosphere
LOCTITE GC 10	Pb-free, halogen-free, no-clean, RoHS-compliant solder paste with excellent resistance in high humidity	• SAC305	• Type 3 • Type 4 • Type 4.5 (4A) • Type 5	ROL0	1 year at 26.5°C	Designed for air; suitable with nitrogen
LOCTITE GC 18	Halogen free, no-clean, low voiding, Pb-free solder paste formulated to have excellent storage stability	• SAC305	• Type 3 • Type 4	ROL0	6 months at 5°C – 25°C	Air and Nitrogen
LOCTITE HF 212	Pb-free, halogen-free, high tack, low voiding solder paste with excellent fine pitch coalescence and extended stencil life and abandon time	• 90iSC • SAC0307 • SAC305 • SAC387	• Type 3 • Type 4 • Type 4.5 (4A) • Type 5	ROL0	6 months at 0°C – 10°C	Air and Nitrogen
LOCTITE LF 318	Pb-free, halide-free, no-clean solder paste with pin-testable flux exhibits excellent humidity resistance and able to resist component movement during high-speed placement	• 90iSC • SAC305 • SAC387	• Type 3 • Type 4	ROL0	6 months at 0°C – 10°C	Air and Nitrogen

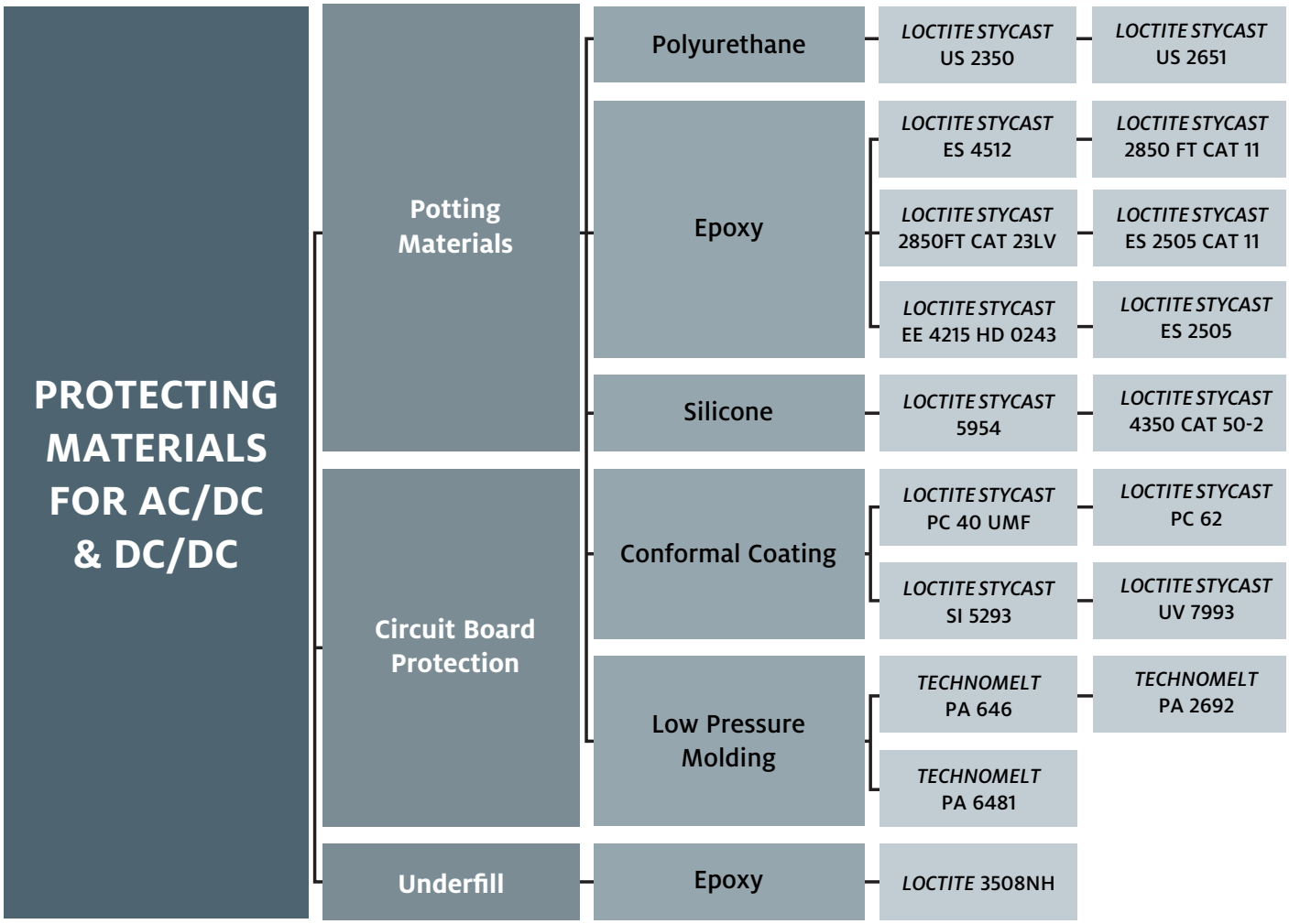


SOLDER POWDER PARTICLE SIZE

Powder Description	Henkel Description	Particle Size Distribution (µm)
Type 2.5 (2A)	**AAS**	38 – 53
Type 3	**AGS**	20 – 45
Type 3C	**ACP**	15 – 45
Type 4	**DAP**	25 – 38
Type 4.5 (4A)	**DAP+**	20 – 32
Type 5	**KBP**	10 – 25
Type 6	**LAW**	5 – 15

PCB AND COMPONENT PROTECTION

Electrical interconnection is bolstered through protection of the PCB and its components, with LOCTITE® and TECHNOMELT® brand circuit board protection Material delivering critical safeguarding against harsh industrial environments and delivering long-term defense against electrically harmful conditions. Conformal coatings keep electronic circuits shielded from moisture, chemicals and other contaminants; chip-on-board encapsulants provide a protective barrier for delicate components; underfills minimize stress on array devices; *TECHNOMELT* low pressure molding Material provide a fast, non-damaging solution for electronic encapsulation; and potting Material in silicone, epoxy and polyurethane chemistries offer processing flexibility and maximum protection. With environmental consciousness as a priority, Henkel's Material development efforts focus on formulation of halogen-free, lead-free, solvent-free and low-VOC products.



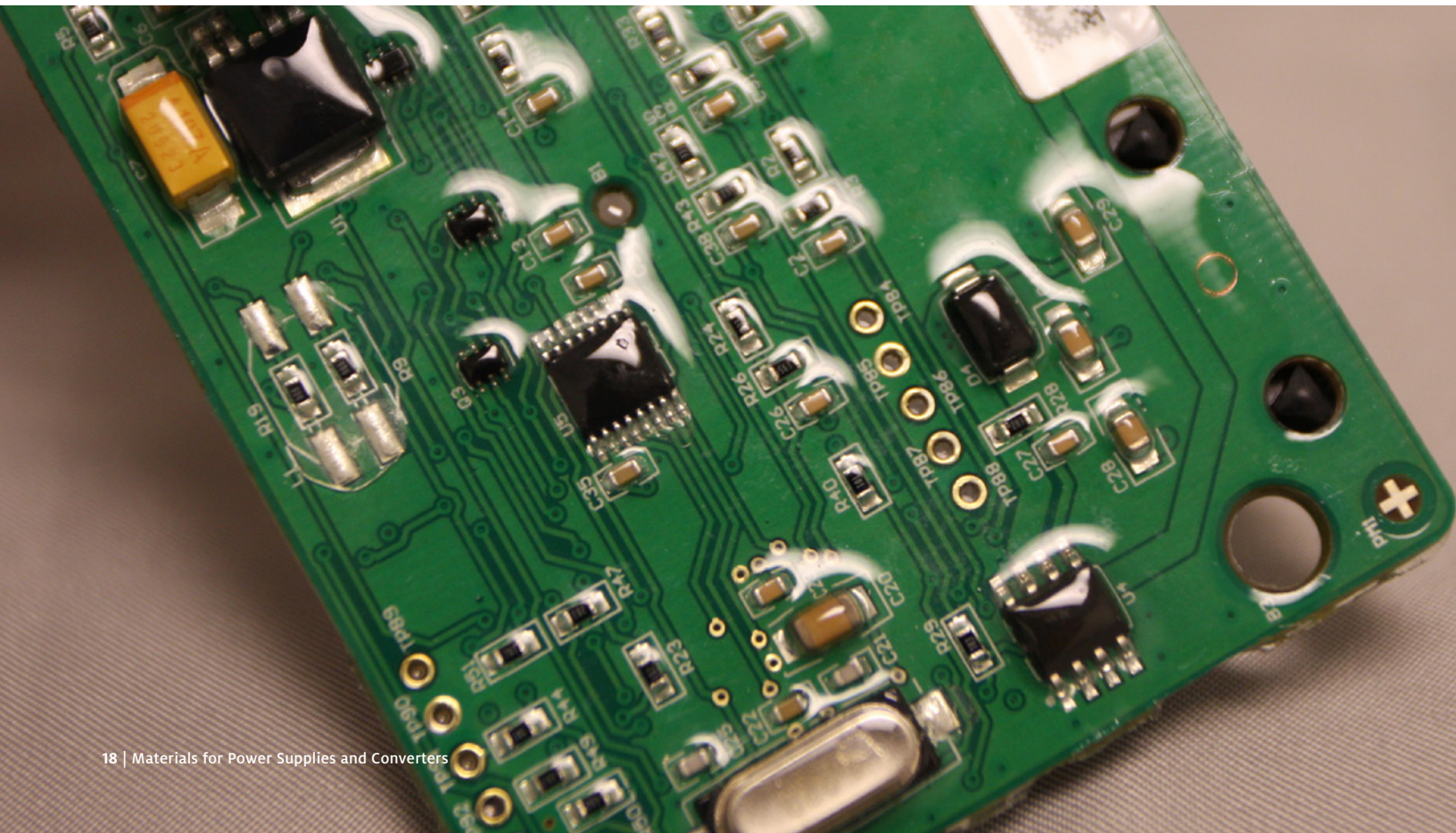
POTTING

Product Name	Alternate Cure	Viscosity at 25°C (cP)	Pot Life at 25°C	Hardness	Thermal Conductivity (W/m-K)	Temperature Range	Shelf Life
Polyurethane							
LOCTITE STYCAST US 2350	2 hr. at 60°C	2,400	45 min.	85A	0.510	-65°C – 125°C	1 year
LOCTITE STYCAST US 2651	16 hr. at 25°C	1,000	10 min.	15A	0.180	-65°C – 125°C	1 year
Epoxy							
LOCTITE STYCAST ES 4512	36 – 48 hr. at 25°C (Recommended Cure) 3 hr. at 60°C (Alternate cure)	19,000	200 g mass for 60 min.	88D	0.644	-40°C – 125°C	1 year
LOCTITE STYCAST 2850FT / CAT 11	8 – 16 hr. at 80°C 2 – 4 hr. at 100°C 30 – 60 min. at 120°C	64,000	100 g mass at 25°C for 1 hr.	96D	1.280	-55°C – 125°C	1 year
LOCTITE STYCAST 2850FT / CAT 23LV	16 – 24 hr. at 25°C 4 – 6 hr. at 25°C 2 – 4 hr. at 65°C	5,600	100 g mass at 25°C for 1 hr.	92D	1.100	65°C – 105°C	1 year
LOCTITE STYCAST ES 2505 / CAT 11	4 hr. at 100°C (w/CAT 11)	5,000	> 4 hr.	72D	0.820	-55°C – 155°C	1 year
LOCTITE STYCAST EE 4215 / HD 0243	2 hr. at 80°C + 2 hr. at 150°C	20,000 to 30,000	7 – 8 hr.	80 – 85D	0.480	-40°C – 180°C	6 months

Product Name	Description	Color	Cure Schedule	Application	Storage Temperature	Shelf Life
Silicone						
LOCTITE STYCAST 5954	Two-part, highly filled, addition-cure, thermally conductive silicone. High thermal conductivity. Noncorrosive.	Red	4 hr. at 65°C	Encapsulant	25°C	6 months at 25°C
LOCTITE STYCAST 4350/CAT 50-2	RTV condensation cure, silicone rubber potting compound is designed for potting and encapsulation	Red	16 – 24 hr. at 25 °C 2 – 4 hr. at 65°C	Potting or Encapsulant	25°C	152 days at 25°C

CONFORMAL COATINGS

Product Name	Description	Key Attributes	Viscosity at 25°C	Operating Temperature (°C)	Volume Resistivity (Ω-cm)	Color	Recommended Cure
LOCTITE® *STYCAST* PC 40-UMF	Urethane conformal coating	• One component • VOC-free • Conforms to IPC-CC-830 requirements	250	-40 – 135	3.50×10^{16}	Clear	10 sec. at 300 – 600 mW/cm² + 2 – 3 days at atmospheric moisture
LOCTITE STYCAST UV 7993	Urethane conformal coating	• One component • Solvent-free • Good moisture resistance • Excellent chemical resistance	120	-40 – 130	2.20×10^{16}	Translucent Yellow	5 sec. at 400 – 700 mW/cm² + 100 hr. at 50% relative humidity
LOCTITE STYCAST PC 62	Rapid drying acrylic for circuit board protection applications	• Fluorescent under UV light • Provides environmental and mechanical protection • Toluene-free alternative • Superior toughness and abrasion resistance • Easily removable with soldering iron or suitable solvent	50	-40 – 125	1.04×10^{16}	Colorless	24 hr. at 25°C
LOCTITE SI 5293	Silicone conformal coating	• One component • Exhibits positive fluorescence under UV light • Repairable • Solvent-free • Designed for severe temperature environments and high-reliability automotive applications	400 – 800	-40 – 200	1.00×10^{14}	Transparent amber to yellow	20 – 40 sec. per side at 70 mW/cm² + 72 hr. at 50% relative humidity



LOW PRESSURE MOLDING

Product Name	Description	Key Attributes	Color	Operating Temperature (°C)	Shore Hardness
TECHNOMELT® PA 646	Moldable polyamide	• Ideal for applications where strength and hardness are needed • Good adhesion for high-temperature applications	Black	-40 – 125°C	92A
TECHNOMELT PA 6481	Moldable polyamide	• Used for molding applications • This material is formulated with improved UV stability • Especially suitable for outdoor applications.	Black	-40 – 130°C	93A
TECHNOMELT PA 2692	Moldable polyamide	• Suitable for high-humidity applications • Formulated for very low water vapor transmission	Amber	-40 – 150°C	88A

ENCAPSULANT

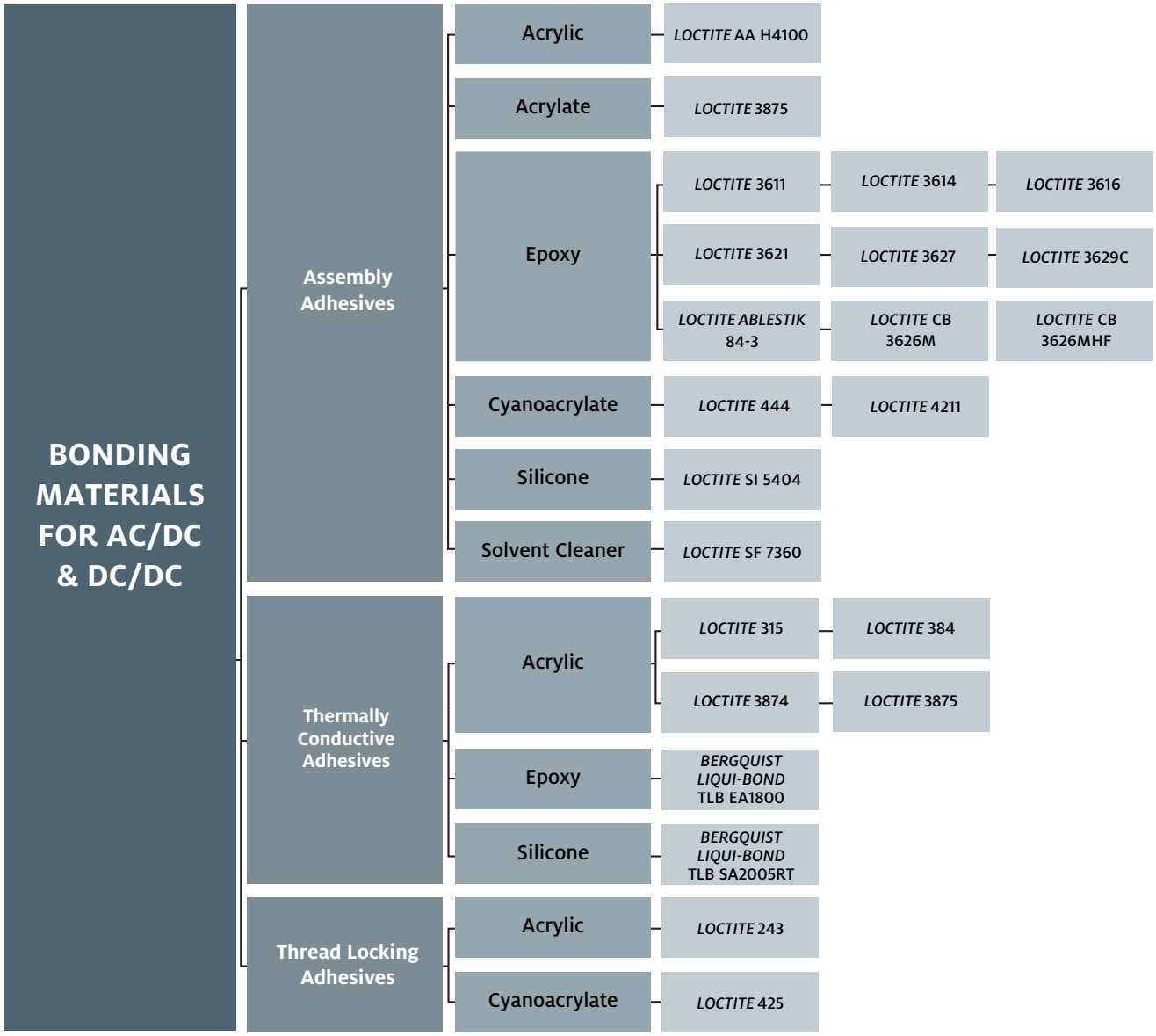
Product Name	Description	Key Attributes	Viscosity at 25°C (cP)	Glass Transition Temperature, T_g (°C)	Coefficient of Thermal Expansion, CTE (ppm/°C)		Pot Life	Recommended Cure
					Below T_g	Above T_g		
LOCTITE ABLESTIK 933-1	Epoxy encapsulant is designed for encapsulating microelectronic chips	• One component • Electrically Insulating • Provides environmental and mechanical protection	360,500	124	30	100	–	2 hr. at 125°C 3 hr. at 150°C
LOCTITE ECCOBOND EO 1061	Designed to pass 1,000 hours of temperature/humidity/bias testing and thermal cycling up to 125°C	• High performance • Medium flow	50,000 (Spindle 6, speed 2 rpm)	125	40	–	25°C for 25 days	3 hours at 140°C

UNDERFILLS

Product Name	Description	Key Attributes	Viscosity at 25°C (cP)	Glass Transition Temperature, T_g (°C)	Coefficient of Thermal Expansion, CTE (ppm/°C)		Pot Life	Recommended Cure
					Below T_g	Above T_g		
LOCTITE 3508NH	Reworkable cornerfill designed to cure during Pb-free reflow while allowing self-alignment of IC components	• One component • Reflow curable • Eliminates post-reflow dispense and cure steps • Reworkable • Halogen-free	70,000	118	65	175	30 days at 25°C	Cure during Pb-free solder reflow profile at 245°C
LOCTITE ECCOBOND FP4531	Underfill is designed for flip chip on flex applications with a 1mil gap	• Snap curable • Fast flow • Passes NASA outgassing	10,000	161	28	104	25°C for 24 hr.	7 min. at 160°C

STREAMLINED STRUCTURAL INTEGRITY

LOCTITE® adhesives allow the reduction of processing costs and device footprints by providing reliable, strong bonding that eliminates manufacturing steps and does away with mechanical hardware such as screws or clips. A diverse portfolio of adhesive and sealant solutions offers adaptable and customizable bonding technologies for demanding power conversion applications. From *CHIPBONDER* and *ECCOBOND* adhesives for mixed- and double-sided SMT applications to *BERGQUIST BOND-PLY* Material for structural adhesion of components and PCBs to heat sinks, Henkel's range of bonding solutions ensures all parts are securely connected for long-lasting product integrity and processes are optimized for maximum efficiency.



ASSEMBLY ADHESIVES

Product Name	Description	Chemistry	Color	Cure Speed	Application	Storage Temp
Acrylic						
LOCTITE AA H4100	Non-sagging, two component, room temperature curing, 10:1 mix ratio, methacrylate adhesive system	Acrylic	Dark, red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
Acrylate						
LOCTITE 3875	Bead-on-bead, thermally conductive adhesive is designed to thermally couple and structurally bond heats sinks to heat dissipating electronic components	Acrylate	Part A - Pale Yellow Part B - Pale Blue	24 – 72 hr. at 23°C, 50% RH	Thermal management	Optimal Storage (PART A): -20°C Alternative Storage (PART A): 2 – 8°C Optimal Storage (PART B): 2 – 8°C
Epoxy						
LOCTITE 3611	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE 3614	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE 3616	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous pastel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE 3621	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red viscous gel	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE 3627	Designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	90 – 120 sec. at 150°C	Surface mount adhesive	2 – 8°C
LOCTITE 3629C	Epoxy is formulated for bonding surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red	150 sec. at 120°C or 90 sec. at 150°C at the bondline	Surface mount adhesive	2 – 8°C
LOCTITE ABLESTIK 84-3	Adhesive is designed for die attach applications as well as component attach	Epoxy	Blue	1 hr. at 150°C 2 hr. at 125°C	Die Attach	-40°C
LOCTITE 3626M	Designed for bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	Minimum 120 sec. at 130°C or 90 sec. at 150°C at the bondline	Surface mount adhesive	2 – 8°C
LOCTITE CB 3626MHF	Designed for bonding of surface mounted devices to printed circuit boards prior to wave soldering	Epoxy	Red gel-like material	30 min. at 150°C	Component assembly, NCA, surface mount adhesive	2 – 8°C

ASSEMBLY ADHESIVE – CONTINUED

Product Name	Description	Chemistry	Color	Cure Speed	Viscosity (cP) at 25°C
Cyanoacrylate					
LOCTITE® 444	Single part, fast curing medium viscosity cyanoacrylate adhesive formulated for electronics applications	Ethyl Cyanoacrylate	Clear	30 sec. fixture / 24 hr. full	700
LOCTITE 4211	Single part, fast curing high viscosity cyanoacrylate adhesive	Ethyl Cyanoacrylate	Black	60 sec. fixture / 24 hr. full	2,500

Product Name	Description	Chemistry	Color	Cure Speed	Optimal Storage
Silicone					
LOCTITE SI 5404	Designed to bond metallic heat sinks, ceramic chips and circuit board substrates	Silicone	White to gray pastel	1 hr. at 150 °C	2 – 8°C
Solvent Cleaner					
LOCTITE SF 7360	Non-CFC, low odor, solvent based formulation intended for the removal of uncured adhesive and adhesive residues used in the PCB assembly industry	Aliphatic ester blend	Clear colorless solution	N/A	8 – 21°C

THERMALLY CONDUCTIVE ADHESIVES

Product Name	Description	Cure Type	Thermal Conductivity (W/m-K)	Volume Resistivity (Ω-m)	Cure Schedule	Shelf Life
Acrylic						
LOCTITE 315	A self-shimming, thermally-conductive, one-part adhesive for bonding electrical components to heat sinks with an insulating gap	Activator (*LOCTITE* SF 7387)	0.81	1.3×10^{12}	24 – 72 hr. at 20°C	9 months at 5°C
LOCTITE 384	Repairable, room-temperature, curing adhesive utilized for parts subject to disassembly	Activator (*LOCTITE* SF 7387)	0.76	1.3×10^{12}	24 – 72 hr. at 20°C	9 months at 5°C
LOCTITE 3874	Thermally conductive adhesive. When used with *LOCTITE* SF 7387 activator, it cures rapidly to form a high strength, high modulus, thermoset acrylic polymer	Activator (*LOCTITE* SF 7387)	1.25	4.3×10^{14}	24 hr. at 70 °C, followed by 7 days at 22 °C	–
LOCTITE 3875	Bead-on-bead, thermally conductive adhesive is designed to thermally couple and structurally bond heats sinks to heat dissipating electronic components	–	1.75	–	24 – 72 hr. at 23°C, 50% RH	–

THERMALLY CONDUCTIVE ADHESIVES – CONTINUED

Product Name	Description	Operating Temperature Range	Thermal Conductivity (W/m-K)	Volume Resistivity (Ω-m)	Cure Schedule	UL Rating
Epoxy						
BERGQUIST LIQUI-BOND TLB EA1800	Thermally conductive, two-part, liquid epoxy adhesive	-40 – 125ºC	1.8	1×10^{14}	10 hr. at 25°C or 10 min. at 125°C	UL 94 V-0
Silicone						
BERGQUIST LIQUI-BOND TLB SA2005RT	A two-part, high performance silicone thermal adhesive	-60 – 180ºC	2.00	1.0×10^{13}	7 days at 25°C or 1 hr. at 85°C	UL 94 V-0

THREAD LOCKING ADHESIVES

Product Name	Description	Chemistry	Color	Cure Speed	Viscosity cP at 25°C
Acrylic					
LOCTITE 243	General purpose threadlocker of medium bond strength. This threadlocker secures and seal bolts, nuts and studs to prevent loosening due to vibration.	Acrylic	Blue	24 hr.	1,300 – 3,000
Cyanoacrylate					
LOCTITE 425	Fast curing, low strength adhesive for locking metal and plastics fasteners	Cyanoacrylate	Dark blue liquid	24 hr. at 22 °C	40 – 80

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BERGQUIST®

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