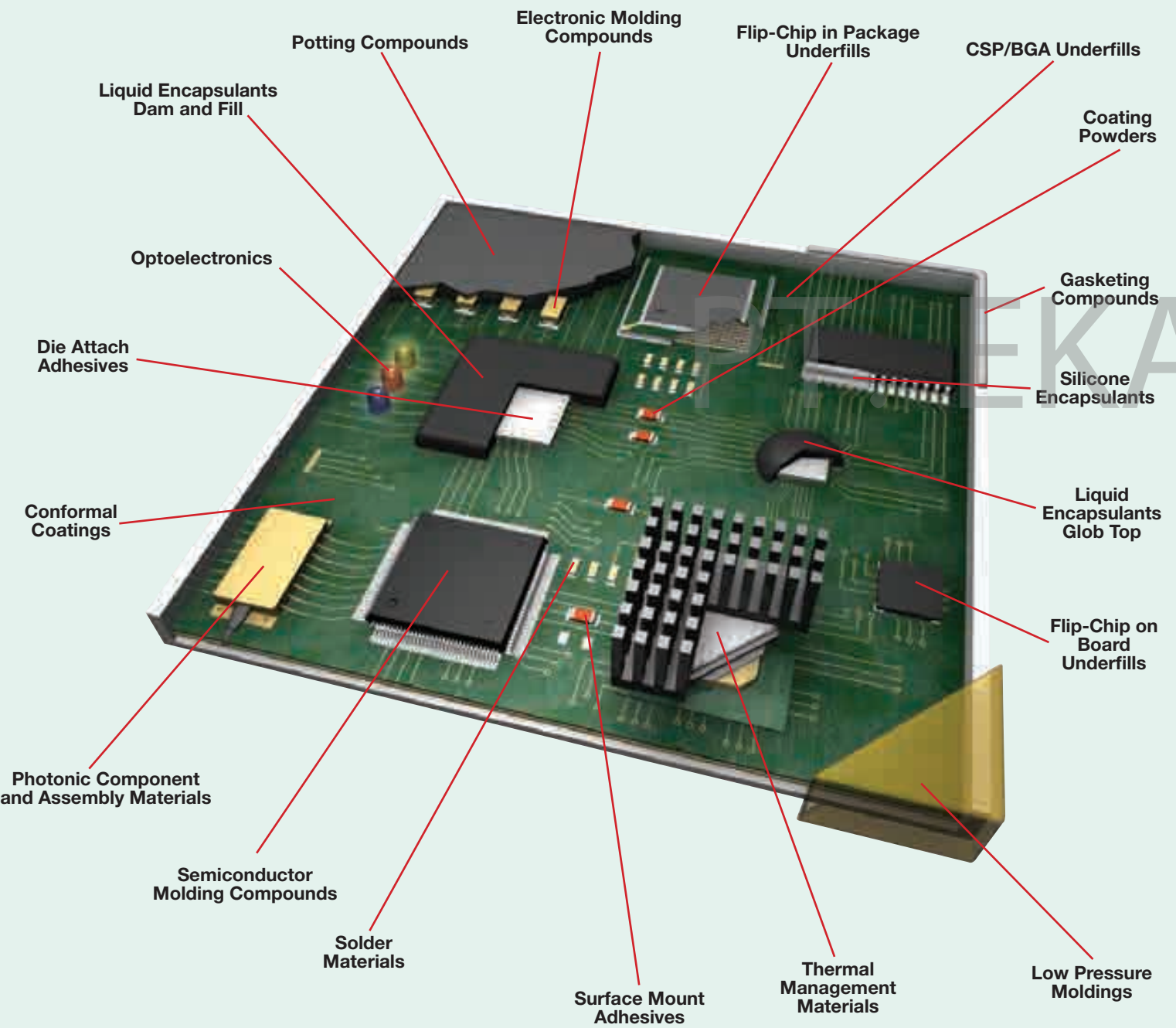


SOLUTIONS
ACROSS THE BOARD



Ablestik Hysol LOCTITE

Thermal Management Materials

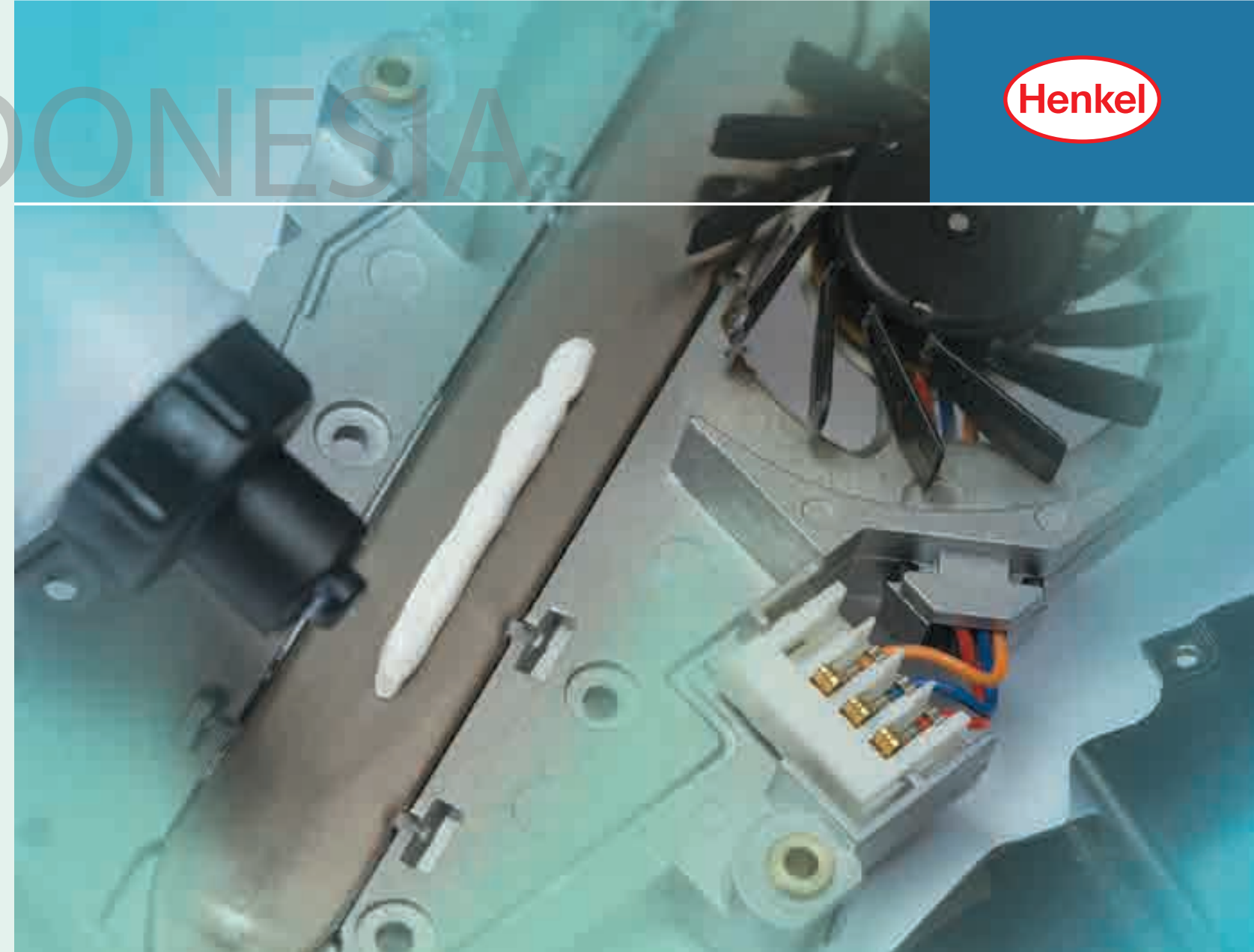


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HENKEL THERMAL MANAGEMENT MATERIALS

Henkel's thermal materials scientists have developed unique and user-friendly products to address today's thermal transfer priorities. The line of Phase Change Thermal Interface Materials (PCTIM) offers exceptionally low thermal impedance between heat generating devices and the surfaces to which they are mounted. The premier product in this lineup, Loctite Powerstrate Xtreme, adheres to heat sinks and components without heating, delivering amazing ease-of-use without compromising thermal performance.

For applications where the need for process convenience outweighs the need for PCTIM's extremely high thermal performance, Henkel's portfolio of thermally conductive adhesives delivers user-friendly functionality with outstanding thermal conductivity.



PHASE CHANGE MATERIALS

PRODUCT	DESCRIPTION	THERMAL IMPEDANCE (*C-in. ² /W @ 80 psi)	THERMAL IMPEDANCE (*C-cm ² /W @ 550 kPa)	THERMAL CONDUCTIVITY (W/mK)	PHASE CHANGE TEMP. (*C)	VOLUME RESISTIVITY (OHM.CM)	DIELECTRIC STRENGTH (V/MIL)	THICKNESS (IN.)
LOCTITE ISOSTRATE	Industry standard electrically insulating phase change material.	0.12	0.78	0.45	60	N/A	4,500 minimum	0.002 - 0.006
LOCTITE POWERSTRATE XTREME	Unsupported film with superior thermal performance even at low pressure. Direct attach to heat sink at room temperature without adhesive.	0.003	0.022	3.4	45	N/A	N/A	0.008
LOCTITE PSX-D & PSX-P	Repeatable phase change thermal interface material. Supplied as a paste that can be stenciled, needle dispensed, screen printed, or applied manually onto a heat sink, baseplate or other surfaces.	0.003	0.022	3.4	45	N/A	N/A	0.0005 - 0.010+
LOCTITE SILVERSTRATE	Excellent thermal performance particularly at higher pressures. Typically used on RF devices and SCRs where electrical conductivity is required (silver-filled).	0.003	0.022	3.14	51	2	N/A	0.004
LOCTITE THERMSTRATE	Industry standard phase change thermal interface material. Suitable for power IGBTs, semiconductors, DC-DC converters and other electrically isolated packages.	0.022	0.143	1	60	1.0 x 10 ¹²	N/A	0.0025 - 0.008

THERMAL GREASES

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	DIELECTRIC STRENGTH (V/MIL)	THICKNESS (IN.)
LOCTITE NSWC100	Non-silicone, water-cleanable thermal compound.	1.4	1.9 x 10 ¹⁵	250 minimum	0.0005 to 0.010+
STYCAST TC4	Thermally conductive, high temperature silicone thermal grease.	1.5	1 x 10 ¹³	500	0.0005 to 0.010+
STYCAST TC 8 M	High thermal conductivity, high temperature thermal grease.	2.3	1 x 10 ¹³	500	0.0005 to 0.010+
LOCTITE TG100	Ultra-high performance thermal grease.	3.4	N/A	N/A	0.0005 to 0.010+

THERMALLY CONDUCTIVE ADHESIVE FILMS – ELECTRICALLY INSULATING

PRODUCT	DESCRIPTION	TENSILE STRENGTH LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	SHELF LIFE	FILM THICKNESS AVAILABLE (MILS)
ABLEFILM 506	Flexible film adhesive designed for bonding CTE mismatched materials. Slight tack can simplify assembly.	1,200	0.9	7 x 10 ¹²	1 hr. @ 150°C	6 months @ -40°C	4, 5, 6
ABLEFILM 561K	High adhesion strength with excellent flexibility for bonding mismatched CTE materials.	3,300	0.9	9 x 10 ¹²	30 min. @ 150°C	1 year @ -40°C	4, 5, 6
ABLEFILM 563K	Electrically insulating film with high thermal conductivity and adhesion strength. Available either unsupported or with a fiberglass carrier.	3,000	1	1 x 10 ¹³	30 min. @ 150°C	1 year @ -40°C	2, 3, 4, 5, 6

THERMALLY CONDUCTIVE ADHESIVE FILMS – ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	TENSILE STRENGTH LAP SHEAR (PSI)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	PRIMARY CURE CYCLE	SHELF LIFE	FILM THICKNESS AVAILABLE (MILS)
EMERSON & CUMING CF3350	Silver-filled film with an excellent balance of adhesion strength, electrical and thermal conductivity, and processability. It is specially suited for RF applications.	3,400	7	0.0002	30 min. @ 150°C	9 months @ 5°C	2, 4
ABLEFILM 5025E	Sister formulation to CF3350™ that has been certified to MIL-STD-883, Method 5011.	2,500	6.5	0.0002	30 min. @ 150°C	6 months @ 5°C	2, 3, 4, 5, 6
ABLEFILM ECF561E	Most flexible of the fiberglass-supported, electrically conductive products.	2,000	1.6	0.0060	1 hr. @ 150°C	1 year @ -40°C	4, 5, 6

THERMALLY CONDUCTIVE ADHESIVES – SHIMMING – ROOM TEMPERATURE CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE
LOCTITE 315*	A self-shimming, thermally conductive, one-part adhesive for bonding electrical components to heat sinks with an insulating gap.	—	—	Activator (7387) or Heat	24-72 hrs. @ 20°C	600,000	0.81	1.3 x 10 ¹²	9 months @ 5°C
LOCTITE 3873*	Self-shimming, use with activator 7387. High bonding strength for heat sink application.	—	—	Activator (7387) or Heat	24-72 hrs. @ 20°C	200,000	1.25	4.3 x 10 ¹⁴	21 months @ 5°C

THERMALLY CONDUCTIVE ADHESIVES – SHIMMING – HEAT CURE

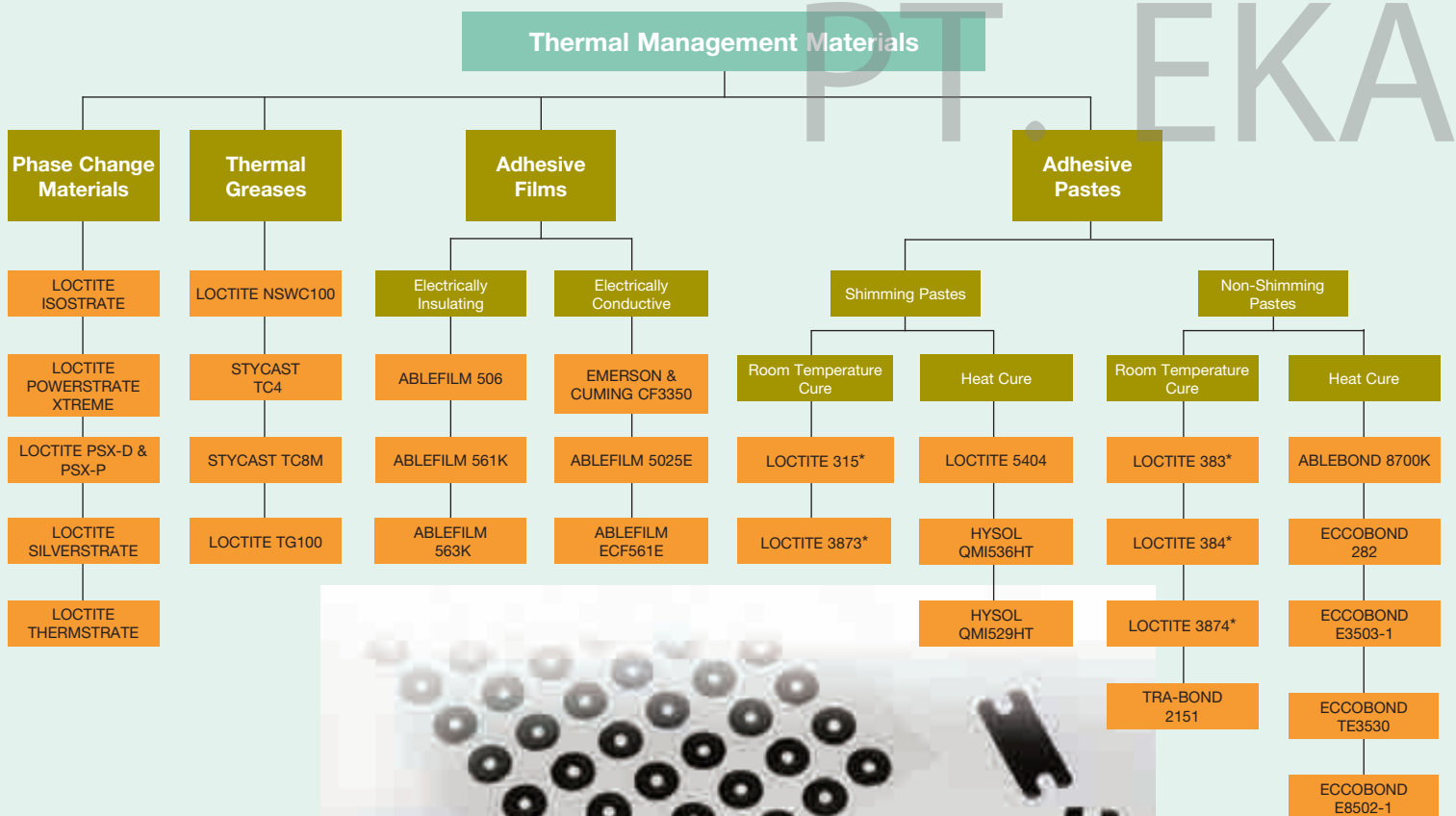
PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE
LOCTITE 5404	Self-shimming, flexible silicone adhesive for high temperature resistant applications such as ceramic boards.	—	—	Heat	10 min. @ 150°C	Paste	1.0	2.9 x 10 ¹⁴	5 months @ 5°C
HSOL QM536HT	Boron nitride-filled non-electrically conductive paste.	—	—	Heat	≥8 sec. @ 150°C (SkipCure) 15 min. @ 150°C (oven)	13,000	0.9	1.0 x 10 ¹³	12 months @ -40°C
HSOL QM529HT	High thermal, electrically conductive, silver filled adhesive.	—	—	Heat	Snap Cure (single zone): 60 seconds @ 185°C. Oven cure: 30 min. @ 185°C	18,500	6	0.00004	12 months @ -40°C

THERMALLY CONDUCTIVE ADHESIVES – NON-SHIMMING – ROOM TEMPERATURE CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE
LOCTITE 383*	High strength, room temperature curing adhesive for permanent assemblies.	—	—	Activator (7387) or Heat	24-72 hrs. @ 20°C	500,000	0.6	5.2 x 10 ¹¹	9 months @ 5°C
LOCTITE 384*	Repairable, room temperature curing adhesive utilized for parts subject to disassembly.	—	—	Activator (7387) or Heat	24-72 hrs. @ 20°C	100,000	0.76	1.3 x 10 ¹²	9 months @ 5°C
LOCTITE 3874*	Fast-curing, high-conductivity for bonding heat-generating devices to thermal spreader "without glass beads."	—	—	Activator (7387) or Heat	24-72 hrs. @ 20°C	800,000	1.25	4.3 x 10 ¹⁴	9 months @ 5°C
TRA-BOND 2151	Thermally conductive electrically insulating adhesive.	—	Yes	Room Temp. or Heat	24 hrs. @ 25°C	40,000	0.95	2.10 x 10 ¹³	6 months @ 25°C

THERMALLY CONDUCTIVE ADHESIVES – NON-SHIMMING – HEAT CURE

PRODUCT	DESCRIPTION	MIL STANDARD 883, METHOD 5011 APPROVED	NASA OUTGASSING ASTM E 595-77/84/90 APPROVED	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	THERMAL CONDUCTIVITY (W/mK)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE
ABLEBOND 8700K	Mil standard certified, one-component, thermally conductive, epoxy adhesive.	Yes	Yes	Heat	60 min. @ 175°C 2 hrs. @ 160°C	45,000	0.5	3 x 10 ¹⁴	9 months @ -40°C
ECCOBOND 282	High performance, low temperature curing, thermally conductive epoxy adhesive.	—	—	Heat	4 hrs. @ 100°C	280,000 - 380,000	1.3	1.0 x 10 ¹⁵	3 months @ 5°C
ECCOBOND E3503-1	Smooth paste assuring minimum bondline thickness for lower overall thermal resistance.	—	—	Heat	30 min. @ 100°C 10 min. @ 120°C 5 min. @ 150°C	60,000	1	1.0 x 10 ¹⁴	6 months @ -18°C to -25°C
ECCOBOND TE3530	One-component, low temperature curing, thermally conductive epoxy adhesive.	—	—	Heat	30 min. @ 100°C	60,000	2.3	1.0 x 10 ¹⁵	6 months @ -18°C to -25°C
ECCOBOND EB502-1	This low modulus, thermally conductive, modified epoxy adhesive is ideally suited for management of large CTE mismatch & bonding of stress sensitive components.	—	—	Heat	90 min. @ 120°C 60 min. @ 150°C 15 min. @ 175°C	45,000	0.6	4.07 x 10 ¹³	6 months @ -18°C to -25°C



* Product Requires Loctite 7387 Activator for Room Temperature Cure



* Product requires Loctite 7387 Activator for Room Temperature Cure

MISCELLANEOUS – THERMALLY CONDUCTIVE ACTIVATORS

PRODUCT	DESCRIPTION
LOCTITE 7387	Activator used in combination with Loctite brands 315*, 383*, 384*, 3873*, 3874*.

MISCELLANEOUS ADHESIVES – CLEAN-UP SOLVENTS

PRODUCT	DESCRIPTION	SOLVENT TYPE	FLASH POINT
LOCTITE 7360	Nozzle and dispense machine component cleaner. Excellent for removal of uncured adhesive from the board without causing the adhesive to get. Available in environmentally responsible pump spray non-aerosol can for nozzle cleaning.	Aliphatic Ester Blend	100°C