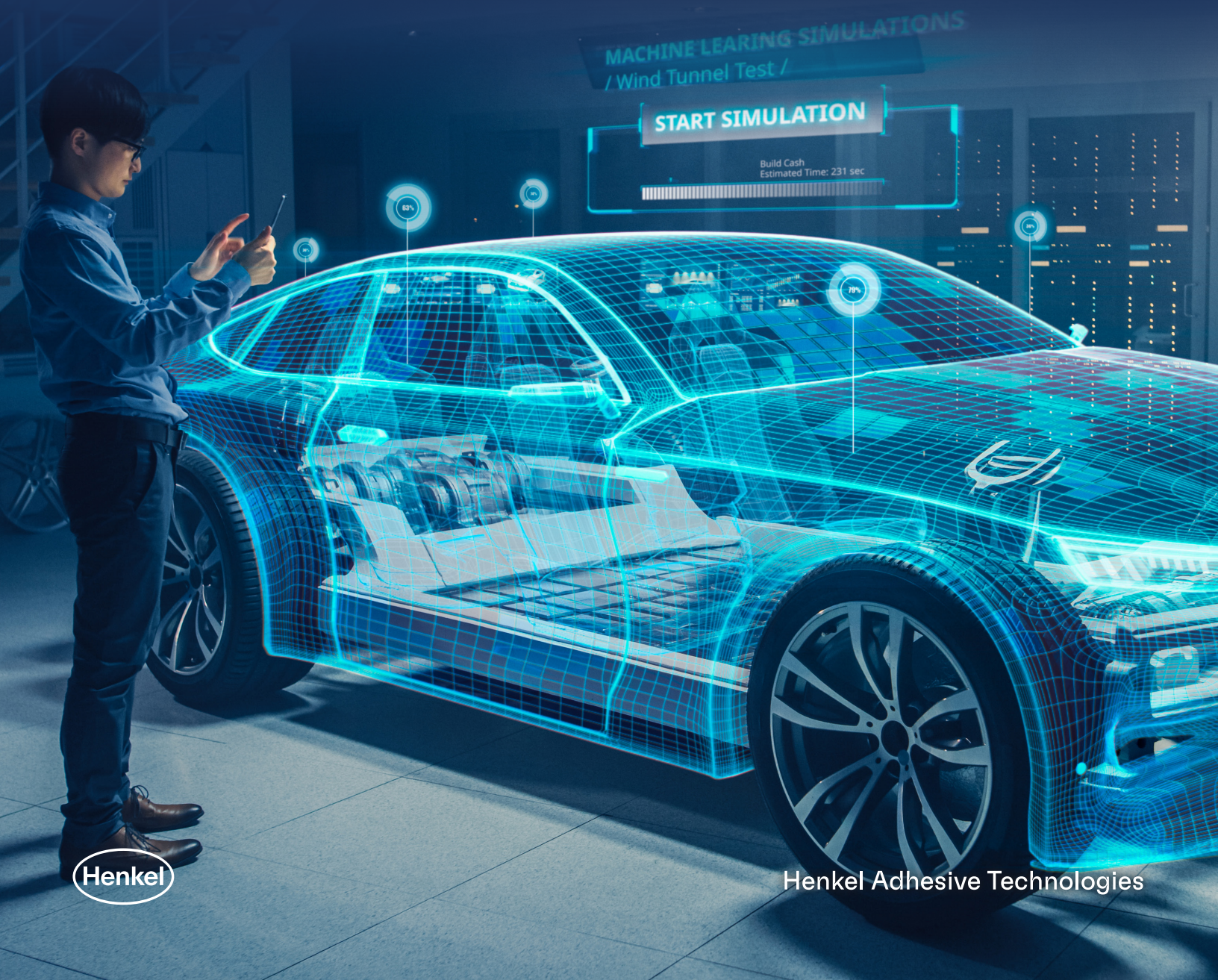


LOCTITE®

BUILT FOR PERFORMANCE
***CUTTING-EDGE* MATERIALS FOR
AUTOMOTIVE SEMICONDUCTOR
TECHNOLOGY**



Henkel

Henkel Adhesive Technologies

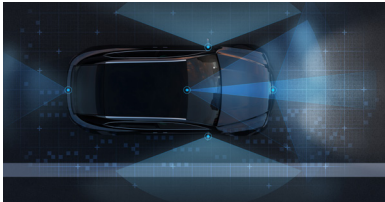
AUTOMOTIVE SEMICONDUCTOR TRENDS

DOWNLOAD



Market Trends

Active Safety



Autonomous Driving



Electrification



Connectivity Modules



Implications

Sensors



Increased use of sensing technologies such as cameras and RADARs, as well as adoption of new technologies like LIDAR and imaging RADAR sensors for ADAS, safety and comfort require new wafer-level packaging methods and an upgrade in reliability of die attach and encapsulation materials.

Processors



32-bit growth is increasing RISC-V multicore processing, enabling large I/O packaging for microcontroller units (MCUs) and further centralization of the electrical/electronic (E/E) architecture. These developments will continue to drive demand for more complex and powerful domain controller units (DCUs) requiring high-reliability flip-chip package designs.

Power Devices



For higher power density and efficiency, the industry is migrating toward wide band gap (WBG) substrates like silicon carbide (SiC) and gallium nitride (GaN) in power discretes and modules. WBG semiconductors require sintering and other high thermal die attach materials for better heat dissipation and improved reliability.

Analog ICs



Increased adoption of 300 mm technology and the move to advanced Analog nodes enables the use of smaller and thinner die. This is also driving multi-chip wire bond and Fan-in/Fan-out packaging requiring controlled flow and film-based die attach materials, in addition to other advanced packaging solutions.

Solutions

Henkel material solutions are designed to meet customer needs and resolve industry challenges through:

A BROAD TECHNOLOGY PORTFOLIO

Comprehensive solutions with customizable chemistries, tailored to meet demanding automotive applications for **high-reliability** and **high thermal** die attach materials including **traditional pastes, films and pressure-less sintering materials**, as well as **underfills and liquid molding and encapsulation materials**.

PROCESS EXPERTISE AND MANUFACTURING

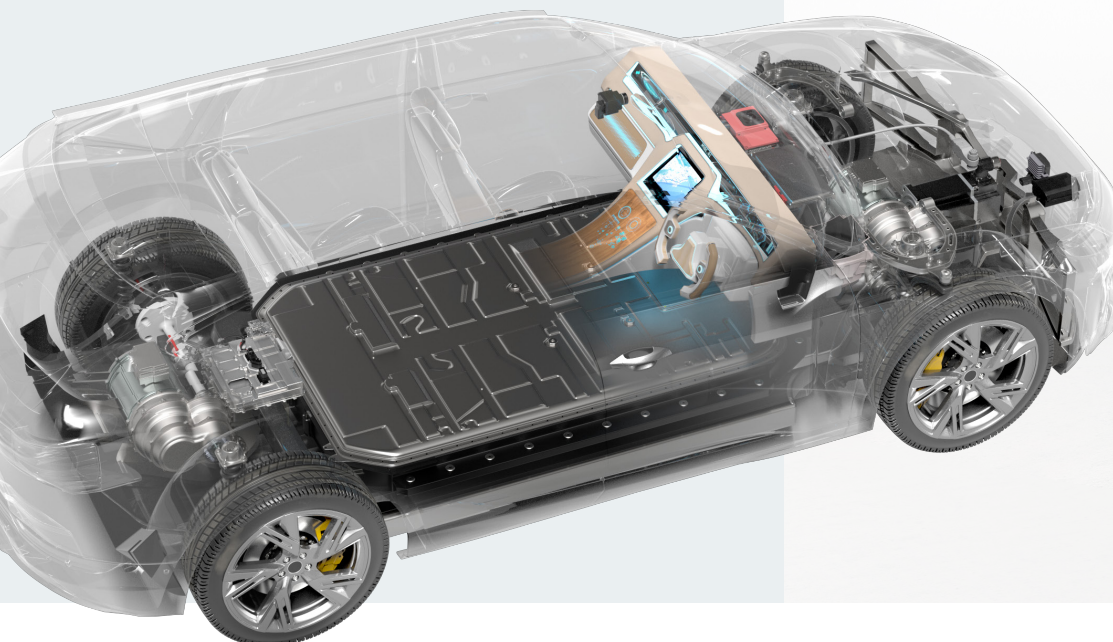
Supporting high-volume automotive electronics packaging with global competency. Henkel's network of regional innovation centers, modern facilities with smart factory systems, and our commitment to sustainable energy sources offers global electronics customers unmatched technology access that aligns with corporate value priorities.

2030+ SUSTAINABILITY AMBITION FRAMEWORK

Transformational Impact for the Good of Generations by striving to achieve a circular economy, a climate-neutral future, actively contribute to people being able to lead a better life through our business and brands, committing to product quality and safety while ensuring business success with integrity.

AUTOMOTIVE SEMICONDUCTOR PACKAGING SOLUTIONS

Automotive semiconductor technology is mission-critical, requiring automotive grade high reliability, and addressing the converging demands of increased function, tight dimensional requirements, thermal control, and fail-safe, long-term performance. Henkel's high-reliability semiconductor materials for wire bond and advanced packaging devices meet the challenging and dynamic conditions for next- generation automotive electronics with the highest standards.



Microcontrollers

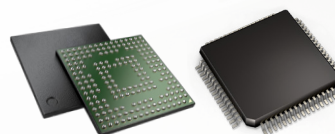
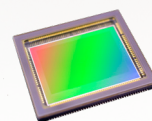
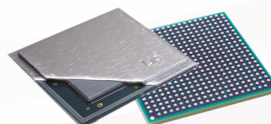


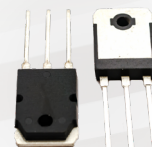
Image Sensors



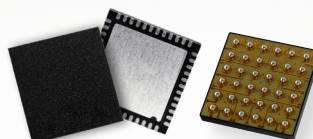
**Active Safety
Processing**



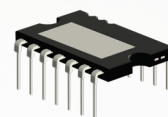
MOSFETs/Diodes



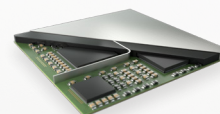
**Analog/
Power ICs**



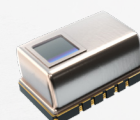
SiC IPMs



Connectivity Module



MEMs



DIE ATTACH PASTES AND ENCAPSULATION

High-reliability Die Attach Pastes (DAPs) formulated for large die/body packaging using a hybrid-resin filler system with low modulus/stress management for high-density bare Cu and Ag/PPF leadframes.

DIE ATTACH FILMS

High-reliability Conductive Die Attach Films (CDAFs) targeting a wide die size range and diverse substrates. Improved thermal conductivity and use of a unique resin system to improve the wetting and reliability for large die applications.

Non-Conductive Die Attach Film (ncDAF) compatible with multiple die sizes and substrates.

PRESSURE-LESS SINTERING

Pressure-less Sintering Pastes for use with multiple die sizes, formulated for Ag/PPF and bare Cu leadframes, improving interfacial sintering, enhancing stress management capability, all while delivering 140 – 200 W/m-K in bulk thermal conductivity.

UNDERFILL AND ENCAPSULANT

Automotive Grade 1 Capillary Underfill (CUF) materials for active safety/infotainment/RF application processors and delivering exceptional protection of leading-edge Si nodes (< 7 nm).

Wafer-level encapsulant for general analog ICs, wafer-level packaging for Fan-in/Fan-out, bump and 5/6 side protection.

Low CTE/modulus encapsulation with improved BHAST enabling Grade 1 automotive reliability.

SENSORS

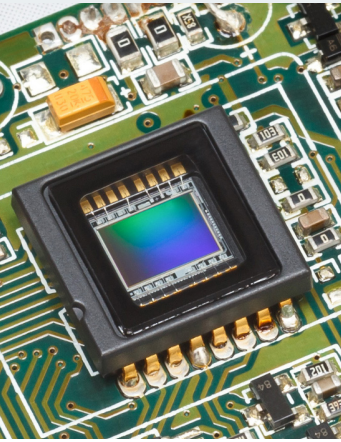


Image sensors are central to the performance of advanced driver assistance systems (ADAS) and autonomous driving technologies. Camera content in an average car is expected to exceed four cameras by 2027, and the roadmap extends beyond 20 cameras per vehicle for mobility sharing.

Imaging BGAs (iBGAs) are integral to automotive packaging designs due to their reliability, and Henkel remains focused on improving overall reliability and enabling stress reduction by designing new encapsulation, die attach, and glass attach materials. Despite their high-precision performance advantages, light detection and ranging (LIDAR) can be cost-prohibitive as an indispensable sensing modality in ADAS. While Henkel has broad solutions for LIDAR technology, materials for micro-electromechanical systems (MEMS) mirror-style packaging are also a development priority.

NON-CONDUCTIVE DIE ATTACH PASTE

LOCTITE® ABLESTIK ABP 2053S

LOCTITE® ABLESTIK ABP 2053S is designed for all BGAs, especially for large devices that require extremely low warpage for large single die, higher adhesion to the printed circuit board (PCB) and electromagnetic compatibility (EMC), low bleed on various surfaces, good moisture sensitivity level (MSL) performance with good PCT performance. LOCTITE® ABLESTIK ABP 2053S uses a hybrid die attach adhesive technology which incorporates industry-proven epoxy chemistry, along with other organic resins, and a proprietary polymer. It can be cured at low temperature or snap cured.

ENCAPSULATION

LOCTITE® ECCOBOND FP 4803 (Coming soon)

This novel encapsulant is designed for low-stress encapsulation of iBGA image sensor packages. With LOCTITE® ECCOBOND FP4803's design and resin-filler balancing, CTE and modulus are optimized for lower stress and better reliability performance. The material delivers no or low resin bleed out (RBO) and increases productivity by improving work life.

LOCTITE® ECCOBOND FP 4661 (Coming soon)

This material is widely used as low stress encapsulation for ceramic cavity packaging. With this material's unique design, lower CTE and high T_g are maintained due to newer resin technology and additives to deliver improved biased highly accelerated stress tests (BHAST) performance.

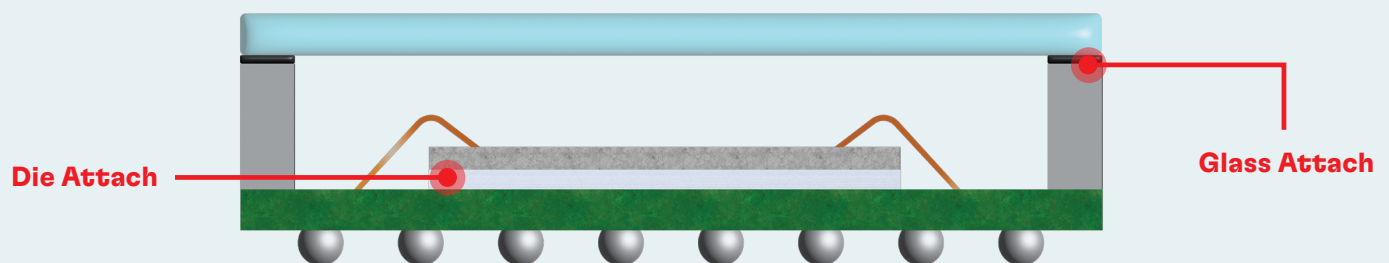
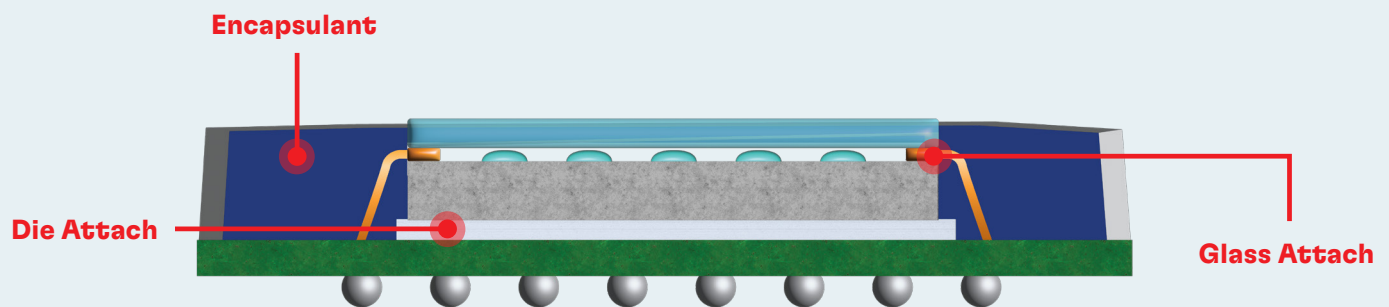
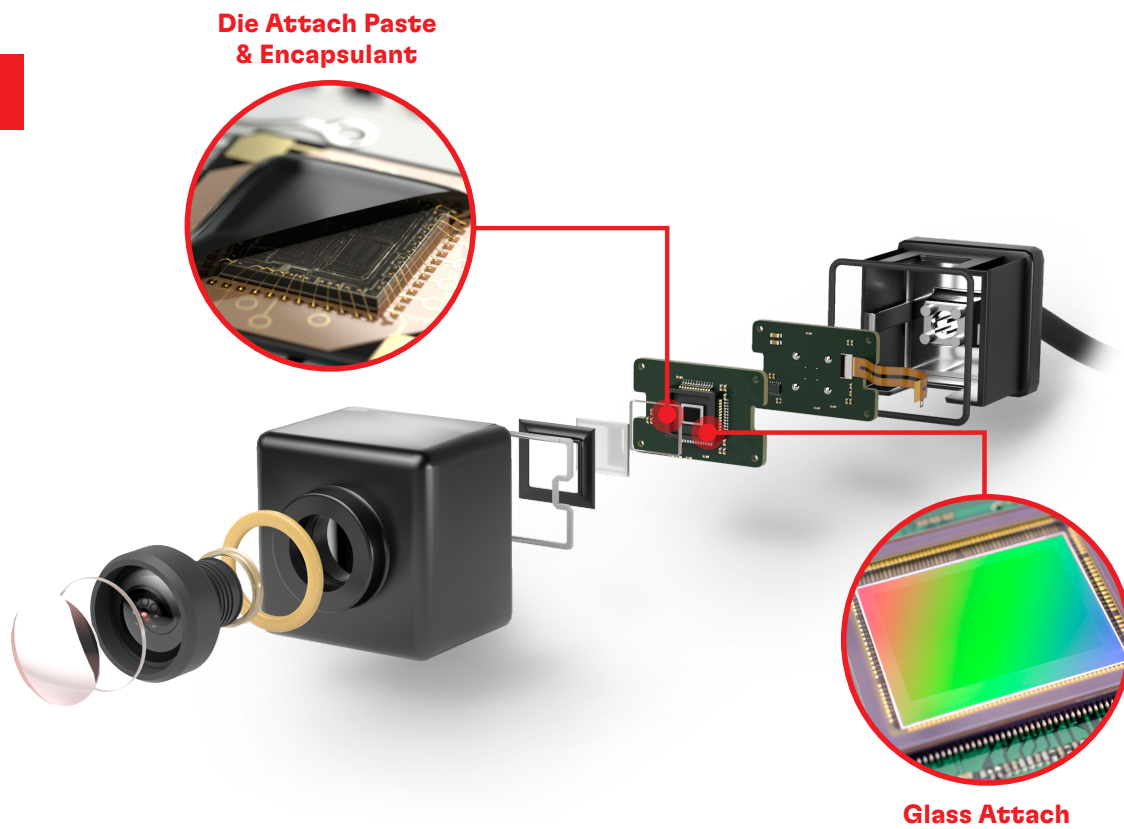
GLASS ATTACH

LOCTITE® ABLESTIK NCA 01UV



This glass attach adhesive can be cured in a single step with just three seconds of UV LED light exposure, eliminating the need for oven curing to save time, energy, and CO₂ emissions. LOCTITE® ABLESTIK NCA 01UV demonstrates high reliability and dimensional stability, as well as no outgassing from volatile compounds to deliver high image quality and no optical system fogging.

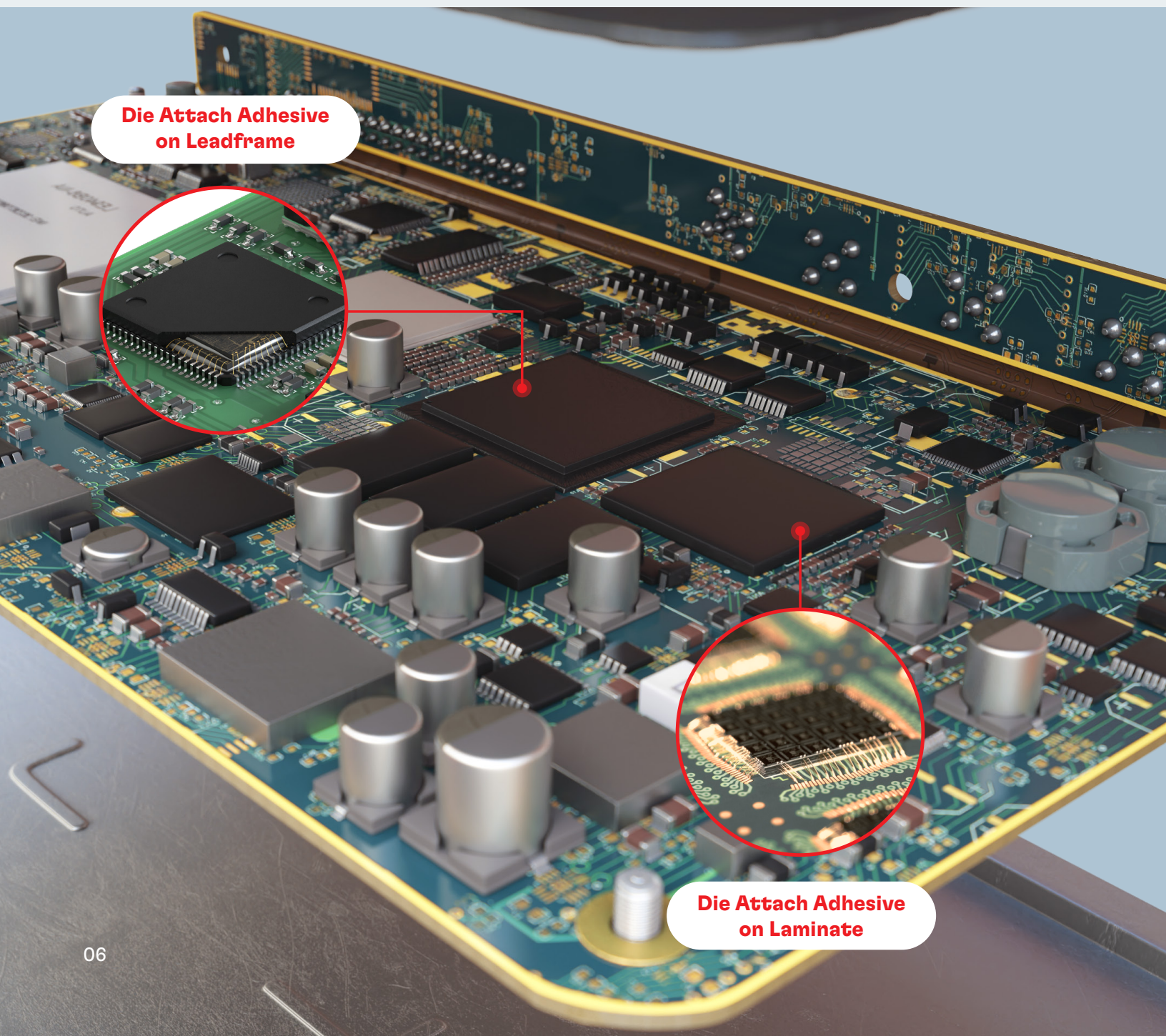
Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.



MICROCONTROLLER UNIT (MCU) PACKAGING

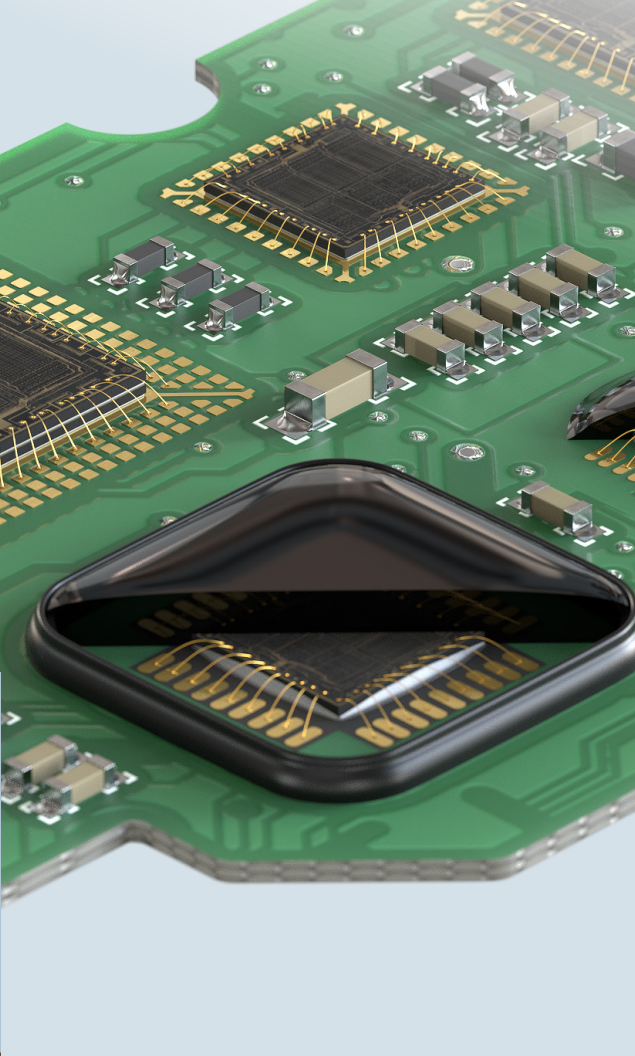
The MCU is an important digital component, but not a complex one. High-reliability class MCUs that are primarily used for automotive applications frequently compete for near cutting-edge manufacturing process foundry. High-reliability characteristics include resistance to errors and maximized performance by mitigating for heat, vibration, electromagnetic interference, prolonged use, and exposure to radiation. MCU reliability is generally achieved by careful design and improved packaging. All vehicles contain MCUs, which can range from 5 to as many as 80 MCUs per car. With 32-bit- RISC-V multicore processing growth, large body wire bond packaging material solutions for QFPs and BGAs are a Henkel priority.

MCUs typically integrate larger die, and Henkel's packaging solutions focus on improving the stress distribution generated from cure shrinkage, CTE mismatch, moisture absorption encountered during processing, and ensuring overall reliability.



**Die Attach Adhesive
on Leadframe**

**Die Attach Adhesive
on Laminate**



CONDUCTIVE DIE ATTACH PASTE

LOCTITE® ABLESTIK ABP 8303A



LOCTITE® ABLESTIK ABP 8303A is based on a proprietary, hybrid resin-filler system with low modulus/stress management for **high-density bare Cu** and Ag/PPF leadframes with long open and stage time. LOCTITE® ABLESTIK ABP 8303A uses a hybrid die attach adhesive that incorporates industry-proven epoxy chemistry, organic resins and silver (Ag). Designed with stress control in mind for large body standard **QFPs/TSSOPs**, the material enables uniform stress distribution during processing and in application.

LOCTITE® ABLESTIK ABP 6392TEA (Coming soon)

LOCTITE® ABLESTIK ABP 6392TEA is based on a proprietary, hybrid system. This material has high thermal conductivity of 9 W/m-K. It has excellent RBO performance. This material has high thermal conductivity of 9.0 W/m-K, excellent RBO performance, and a low modulus at room temperature with a high modulus at wire bonding temperature. Due to good stress management, the die size can be extended up to 8 x 8 mm. Based on internal data and customer feedback, this material is able to meet MSL 1 and automotive grade 0. This material works on various leadframe finishes such as **bare Cu, Ag spot and PPF**, but performs the best on bare Cu.

CONDUCTIVE DIE ATTACH FILM



LOCTITE® ABLESTIK CDF 500

LOCTITE® ABLESTIK CDF 500 is based on a proprietary, high-viscosity thermoset resin system with higher molecular weight (solid resins) and lower cross-linking, resulting in high toughness and increased adhesion and MSL performance. LOCTITE® ABLESTIK CDF 500 is designed to control stress in large body **standard QFPs/TSSOPs**, and incorporates silver (Ag) designed to have optimal Z-axis performance.

LOCTITE® ABLESTIK CDF 900 (Coming soon)

LOCTITE® ABLESTIK CDF 900 is based on a proprietary, higher resin content improves the wetting and reliability for large die applications, as well as providing high thermal conductivity with relatively low silver loading. LOCTITE® ABLESTIK CDF 900 is designed to control stress for large body **exposed pad QFPs/TSSOPs**, and incorporates silver (Ag) designed to have optimal Z-axis performance.

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.

CONDUCTIVE DIE ATTACH FILM

LOCTITE® ABLESTIK CDF 600

The proprietary, high-viscosity thermoset resin system with higher molecular weight (solid resins) and lower cross-linking, results in a film with high toughness that increases adhesion and MSL performance. LOCTITE® ABLESTIK CDF 600 is designed for both leadframe and laminate applications, and incorporates silver (Ag) designed to have optimal Z-axis performance.

NON-CONDUCTIVE DIE ATTACH FILM

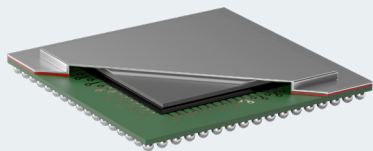
LOCTITE® ABLESTIK ATB 100GL (Coming soon)

This film integrates proprietary, high-viscosity thermoset resin system with higher molecular weight (solid resins) and lower cross-linking, resulting in high toughness that increases adhesion and MSL performance. LOCTITE® ABLESTIK ABP 100GL provides high reliability for a wide range of packages based on different leadframe surfaces/ substrates and wide range of die size up to 8 x 8 mm.

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.

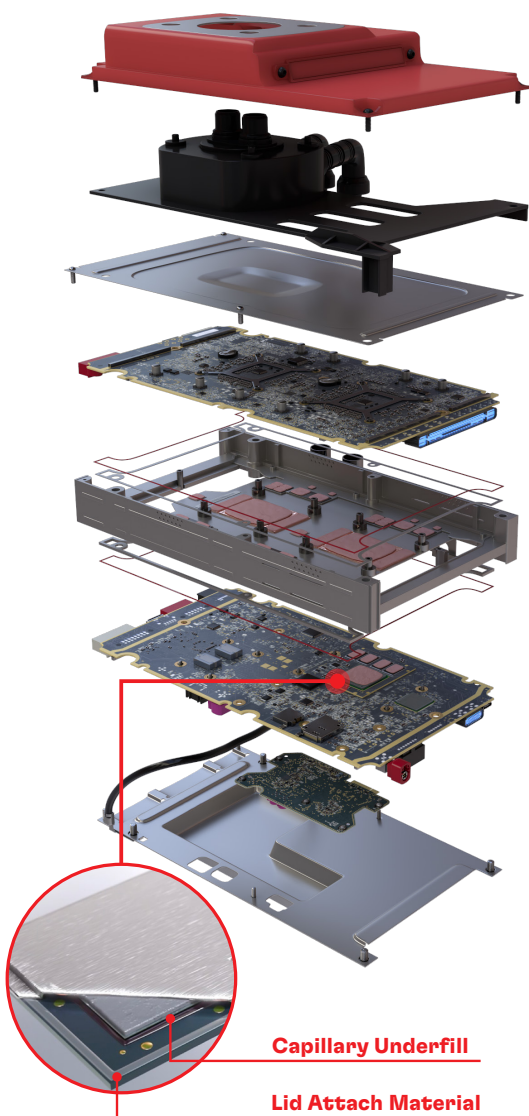
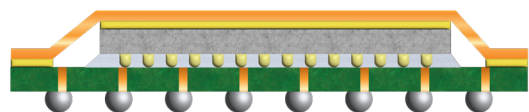


SYSTEM-ON-CHIP (SOC) PACKAGING



In 2019, domain controller units (DCUs) made up less than 1% of the combined ECU/DCU market, but that number is expected to increase to 43% by 2030.¹ The centralization of the electrical/electronic (E/E) architecture will continue to drive demand for more complex and powerful DCUs at the expense of traditional ECUs.

CAPILLARY UNDERFILL



Capillary Underfill

Lid Attach Material

LOCTITE® ECCOBOND UF 9000AG

New

LOCTITE® ECCOBOND UF 9000AG breaks past conventional formulation paradigms, balancing high filler loading and fast flow capability to meet the extreme reliability and volume demands of next-generation semiconductor device packaging. The material enables advanced silicon (Si) node flip-chip integration by providing robust interconnect protection and compatibility with high-volume manufacturing environments.

LOCTITE® ECCOBOND UF 9000AE (Coming soon)

LOCTITE® ECCOBOND UF 9000AE is designed using highly-filled systems from resins and hardeners in the capillary underfill platform for $> 20 \times 20 \text{ mm}^2$ die flip-chip. The underfill encapsulant has fast flow for high UPH, a long stage life for large package applications, low CTE, and high toughness for excellent reliability performance.

LID ATTACH

LOCTITE® ECCOBOND CE 3920

LOCTITE® ABLESTIK CE 3920 is an electrically-conductive lid attach adhesive designed for dispense applications. The material has excellent adhesion to different metal lid surfaces such as nickel, and boasts high thermal conductivity and low volume resistivity.

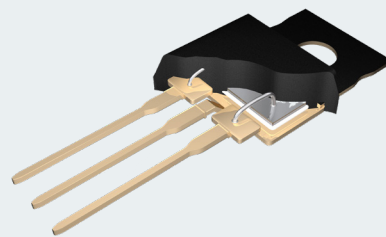
LOCTITE® ECCOBOND MC 723

LOCTITE® ECCOBOND MC 723 is a non-conductive lid attach adhesive based on Henkel's proprietary silicone technology. It has low viscosity for easy dispensing, high adhesion, and ultra-low moisture absorption to ensure excellent reliability performance.

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.

POWER FETS

Silicon-based power devices have dominated the power electronics market for decades. But, with a drive toward greater efficiency, silicon-carbide (SiC)- and gallium-nitride (GaN)-based wide band gap (WBG) materials are increasingly being used for MOSFETs and modules within high-frequency and high-power applications. SiC has an advantage in high power switching performance and power density, while GaN provides superior switching performance that results in higher efficiency and lower system cost. Si, which is still less costly than WBG, will remain competitive in many applications where top performance and form factor are secondary.



PRESSURE-LESS SINTERING

LOCTITE® ABLESTIK 8068TI

New

Compatible with traditional Si and newer SiC and GaN WBG semiconductors, LOCTITE® ABLESTIK 8068TI delivers remarkable thermal performance at 165 W/m-K bulk thermal conductivity. Processed as a standard die attach adhesive, no pressure is required to achieve its robust structure. The material has demonstrated excellent adhesion on Cu, PPF, Ag, and Au leadframes, robust electrical conductivity and stable RDS (on) after 1,000 hours of thermal cycling, and high reliability. Well-suited for dies measuring 3 x 3 mm or less.

LOCTITE® ABLESTIK 8068TL (Coming soon)

LOCTITE® ABLESTIK 8068TL provides ultra-high, 200 W/m-K bulk thermal conductivity for the most demanding applications. The versatility of the material enables use with Si, SiC, and GaN back-side metallized (BSM) die, and is suitable for dies measuring up to 8 x 8 mm. With good adhesion on PPF and AG leadframes, excellent electrical conductivity, stable RDS (on) after 1,000 thermal cycles, and demonstrated high-reliability performance, LOCTITE® ABLESTIK 8068TL sets a new benchmark for pressure-less sintering adhesive performance.

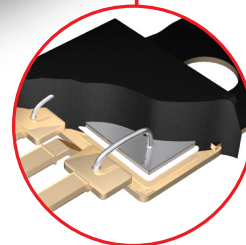
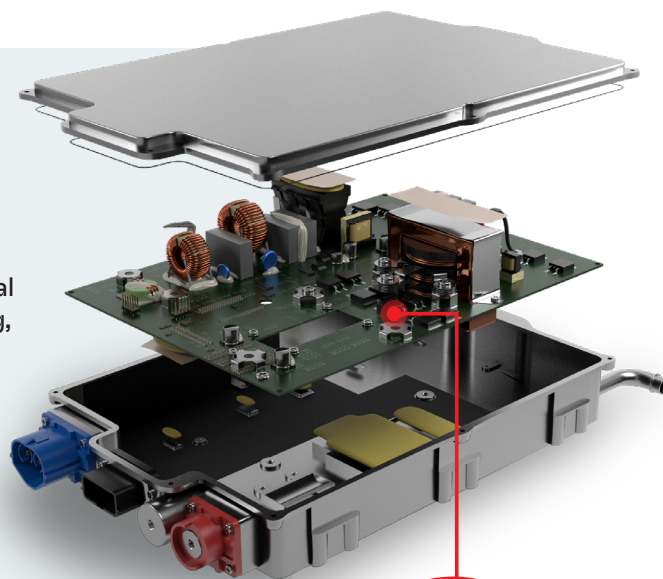
LOCTITE® ABLESTIK 8068TC (Coming soon)

Designed for use with bare Cu, PPF, and Ag leadframes, this pressure-less sintering die attach adhesive provides bulk thermal conductivity ranging from 140 to 170 W/m-K. Consistent with all pressure-less sintering materials in the portfolio, LOCTITE® ABLESTIK 8058TC delivers RDS (on) stability and good electrical conductivity, requires no pressure for processing, and, with superb reliability, is well-suited for automotive semiconductor packaging applications. The material can be used with dies measuring 5 x 5 mm or less.

LOCTITE® ABLESTIK 8068TD

New

For Cu, Ag/PPF leadframes without die back-side metallization (BSM), LOCTITE® ABLESTIK 8068TD is formulated with a proprietary epoxy-resin system that delivers high bulk thermal conductivity of 50 W/m-K through unique silver particle density. The pressure-less die attach adhesive passes automotive grade 0 requirements with various leadframes and die back-side surface finishes, and is designed for die measuring 0.5 x 0.5 mm to 3 x 3 mm.



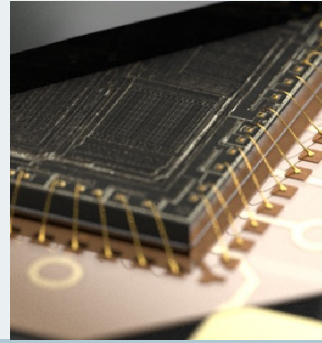
Pressure-less
Sintering

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.

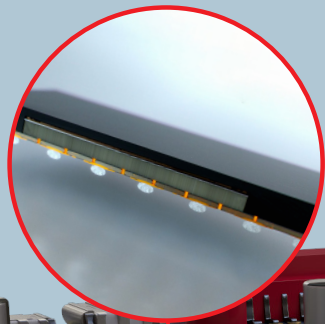
ANALOG IC INCLUDING POWER IC PACKAGING

Analog ICs can be classified into three general categories: power management ICs (26% of all Analog), Application-specific Analog (60% of all Analog) and General-purpose Analog (14% of all Analog). For power ICs, important packaging trends include driver integration with FETs, isolated drivers, Fan-in/Fan-out, and embedded packaging that target smaller form factors. The demand for these devices is driven by automotive innovation that includes electrification, connectivity, and the Internet of Things (IoT).

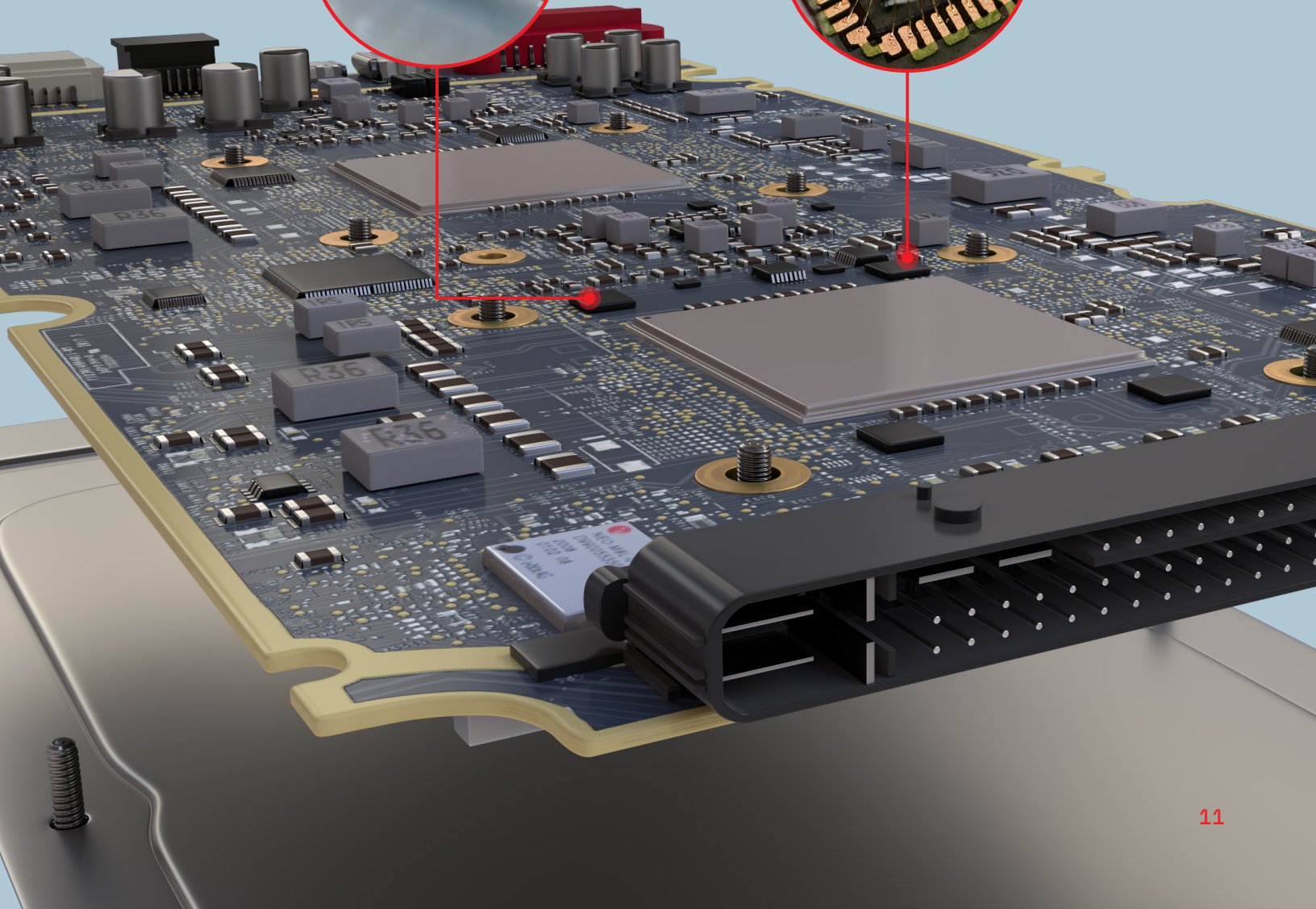
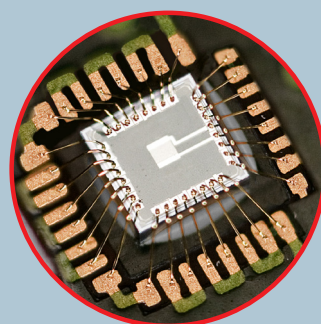
As thermal control becomes increasingly vital with the industry moving toward higher power Analog process nodes and the resulting smaller die, Henkel's emphasis is on die attach paste and film solutions that enable excellent mechanisms to dissipate heat.



Liquid Molding Compound



Die Attach Paste



CONDUCTIVE DIE ATTACH PASTE

LOCTITE® ABLESTIK 84-1LMISR4-GR

New

With the increasing requirements in more stringent customer applications, LOCTITE® ABLESTIK 84-1LMISR4-GR is designed to improve the reliability performance of LOCTITE® ABLESTIK 84-1LMISR4. This material is silver-filled epoxy system and performs well on various leadframe finishes such as bare Cu, Ag spot and PPF. This adhesive maintains the excellent dispensing and workability performance of its predecessor. LOCTITE® ABLESTIK 84-1LMISR4-GR has excellent RBO performance, and is ideal for high-density leadframe design due to its long open and stage time. It meets MSL1 and automotive Grade 0 reliability performance standards.

LOCTITE® ABLESTIK ABP 6389

New

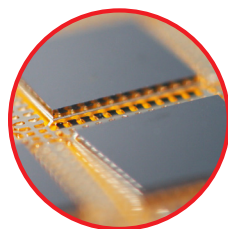
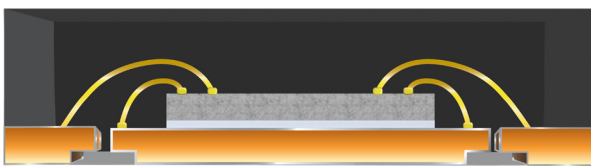
This die attach paste is designed for Cu and Ag/PPF leadframes with or without die back-side metallization (BSM). Its proprietary, epoxy-resin system delivers high bulk thermal conductivity through high-density silver particles. The material is automotive Grade 0 capable with various leadframes and die back side finishes. The thermal conductivity is 8 W/m-K, it can be used on a wide die size range, has robust RDS (on) and meets MSL1/MSL2 reliability standards.

LOCTITE® ABLESTIK ABP 6395T

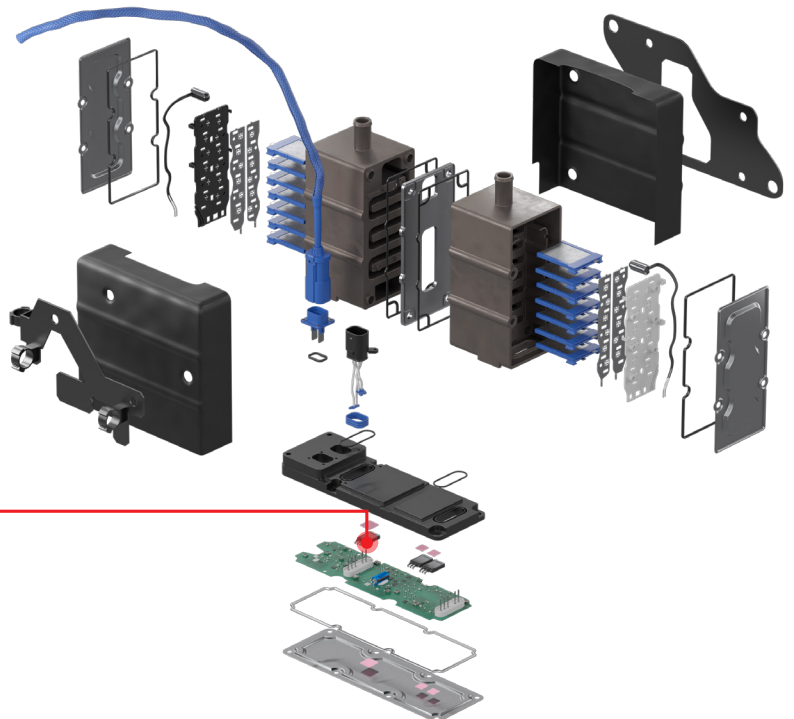
New

With 30 W/m-K thermal conductivity, LOCTITE® ABLESTIK ABP 6395T is among the market's highest thermal performance non-sintering die attach materials. The high-reliability material meets stringent automotive Grade 0 and MSL 1 standards, allows integration of back-side metallized (BSM) or bare Si die. It has a long work life and no resin bleed out. It is compatible with various leadframe finishes such as bare Cu, Ag spot and PPF.

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.



Die Attach
Paste



NON-CONDUCTIVE DIE ATTACH FILM

LOCTITE® ABLESTIK ATB 100GR

A versatile non-conductive die attach film, LOCTITE® ABLESTIK ATB 100GR can be used with Ag, Cu and PPF leadframes, as well as laminate packages. Well-suited for high-density designs and challenging dimensions, the film die attach provides controlled thickness and flow, no resin bleed out, uniform fillet formation and bond line stability. LOCTITE® ABLESTIK ATB 100GR is compatible with a wide die size range, delivers automotive Grade 0 reliability performance, low modulus and low coefficient of thermal expansion (CTE) properties at room temperature, with a high modulus at wire bonding temperature.



LIQUID MOLDING COMPOUNDS

LOCTITE® ABLESTIK LCM 1000AF

LOCTITE® ECCOBOND LCM 1000AF is formulated for use in liquid compression molding processes. It is designed to reduce warpage in various advanced wafer-level packaging applications. The material is a fine-filler LCM with good flowability to provide excellent molding quality, and has a high T_g and ultra-low CTE that provides good reliability performance.

Fan-In WLCSP



Fan-Out WLCSP



Die Attach Paste

Highlighted products and applications are not exhaustive. Please refer to product portfolio (p. 14 – 19) for a complete list.

SEMICONDUCTOR MATERIAL SOLUTIONS

CONDUCTIVE DIE ATTACH ADHESIVES

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Thermal Conductivity (W/mK)	Recommended Cure
LOCTITE® ABLESTIK 8200T	Electrically-conductive die attach adhesive	• Excellent adhesion to Ag plated LF • Oven curable • Snap curable • Low bleed • Automotive grade 0 capable	≤ 5 x 5	Cu, Ag or PPF	L1 260°C capable	2.5	30 min. ramp to 175°C + 15 min. at 175°C in N2 oven
LOCTITE® ABLESTIK 2100A	Electrically-conductive die attach adhesive	• High hot/wet adhesion • Low stress • Ultra-low moisture absorption • Excellent dispensing • Low bleed • Laminate substrate • Automotive grade 1 capable	≤ 8 x 8	Solder mask, Au	L3 260°C capable	1.2	30 min. ramp to 175°C + 15 min. at 175°C in N2 oven
LOCTITE® ABLESTIK QMI519	Electrically-conductive die attach adhesive	• Electrically conductive and thermally conductive • Void-free bondline • Hydrophobic • Stable at high temperatures • High resistance to delamination • Automotive grade 0 capable	≤ 5 x 5	Ag, PPF	L1 260°C capable	3.8	30 min. ramp to 185°C + 15 min. at 185°C in N2 oven
LOCTITE® ABLESTIK 84-1LMISR4-GR	Ag-filled, epoxy die attach adhesive	• Good workability • High reliability • Good electrical and thermal conductivity • Good adhesion to Cu, Ag and PPF • Low stress, low outgassing • Automotive grade 0 capable	≤ 3 x 3	Cu, Ag, PPF	L1 260°C capable	5.0	30 min. ramp to 175°C + 30 min. at 175°C in air or N2 oven
LOCTITE® ABLESTIK ABP 8303A	Electrically-conductive die attach adhesive	• One component, low outgassing, low stress • High reliability, high die shear strength • Ideal for large die sizes • Minimal RBO • Automotive grade 0 capable	≤ 8 x 8	Cu, Ag or PPF	L1 260°C capable	1.5	30 min. ramp to 175°C plus 60 min. at 175°C in N2 oven
LOCTITE® ABLESTIK ABP 6389	Ag-filled, epoxy die attach adhesive	• Good workability • Good electrical and thermal conductivity • Good adhesion to Cu, Ag and PPF • Low stress, low outgassing • Automotive grade 0 capable	≤ 3 x 3	Cu, Ag or PPF	L1 260°C capable	8.0	30 min. ramp to 175°C + 60 min. at 175°C in air or N2 oven

CONDUCTIVE DIE ATTACH ADHESIVES – CONTINUED

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Thermal Conductivity (W/mK)	Recommended Cure
LOCTITE® ABLESTIK QMI529HT-LV	Electrically conductive die attach adhesive	• Good dispensing characteristics • Hydrophobic • Stable at high temperatures • Low moisture absorption • Excellent adhesion • Thermally stable at 260°C reflow • Automotive grade 0 capable	≤ 8 x 8	Ag, PPF	L1 260°C capable	8.0	30 min. ramp to 175°C + 60 min. at 17°C in N2 oven
LOCTITE® ABLESTIK ABP 6293TEA*	Electrically conductive die attach adhesive	• High electrical conductivity • High thermal conductivity • Good adhesion to Cu, Ag and PPF • Good stress management • Automotive grade 0 capable	≤ 8 x 8	Cu, Ag or PPF	L1 260°C capable	9.0	20 min. ramp and 30 min. hold at 130°C, 15 min. ramp and hold 1 hr. at 200°C
LOCTITE® ABLESTIK ABP 6395T	Ag-filled, epoxy die attach adhesive	• Compatible with Cu leadframe • For small die • Ultra-high thermal • Automotive grade 0 capable	≤ 3 x 3	Cu, Ag or PPF	L1 260°C capable	30.0	30 min. ramp to 200°C + 30 min. at 200°C in air or N2 oven

**Coming Soon. Restricted sampling only.*

NON-CONDUCTIVE DIE ATTACH ADHESIVES – CONTINUED

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Thermal Conductivity (W/mK)	Recommended Cure
LOCTITE® ABLESTIK 2053S	Polymer-filled epoxy die attach adhesive	• Non-conductive • Low Stress • Red Color • Automotive grade 1 capable	≤ 5 x 5	Solder mask or Au	L3 260°C capable	0.34	30 min. ramp to 175°C + 15 min. at 175°C in air or N2 oven
LOCTITE® ABLESTIK 8290TC	Alumina-filled, die attach adhesive	• Non-conductive • High thermal • Good insulation • High reliability • Automotive grade 0 capable	≤ 3 x 3	Cu, Ag or PPF	L1 260°C capable	3.0	30 min. ramp to 175°C + 60 min. at 175°C in N2 oven

SEMICONDUCTOR MATERIAL SOLUTIONS

PRESSURE-LESS SINTERING DIE ATTACH

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Thermal Conductivity (W/mK)	Recommended Cure
LOCTITE® ABLESTIK ABP 8068TI	High thermal, automotive grade 0 capability	• High thermal conductivity, • High reliability, high die shear strength	≤ 3 x 3	Ag or PPF	L3 260°C capable	150	20 min. ramp to 130°C, hold for 30 min., 15 min. ramp to 200°C, hold for 1 hr. in air or N2
LOCTITE® ABLESTIK ABP 8068TL*	High thermal, automotive grade 0 capability	• Capable for wide die size range • Unique stress release mechanism, especially for large die • High thermal conductivity • High reliability, high die shear strength	≤ 8 x 8	Ag or PPF	L3 260°C capable	175 – 200	20 min. ramp to 130°C, hold for 30 min., 15 min. ramp to 200°C, hold for 1 hr. in air or N2
LOCTITE® ABLESTIK ABP 8068TC*	High thermal, automotive grade 0 capability	• Unique stress release mechanism • Good adhesion on bare Cu • High thermal conductivity, • High reliability, high die shear strength	≤ 5 x 5	Cu, Ag or PPF	L3 260°C capable	130	20 min. ramp to 130°C, hold for 30 min., 15 minutes ramp to 200°C, hold for 1 hr. in air or N2
LOCTITE® ABLESTIK ABP 8068TD	Electrically conductive die attach adhesive	• Good workability • High reliability • Good electrical and thermal conductivity • Good adhesion to Cu, Ag and PPF; and Non-BSM and BSM die • Low stress, low outgassing	≤ 3 x 3	SOIC, SOP, QFP, and QFN	L1 260°C capable	8	30 min. ramp to 175°C + 60 min. at 175°C, in N2 or air

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CONDUCTIVE DIE ATTACH FILM

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Thermal Conductivity (W/mK)	Recommended Cure
LOCTITE® ABLESTIK CDF 200	Pre-cut format film, automotive grade reliability	• MSL1 capable for small die • MSL2 capable for larger die size • Compatible with various die BSM and LDF surface	≤ 5 x 5	Cu, Ag or PPF	L1 or L2 260°C capable	2	30 min. ramp to 175°C plus 60 min. at 175°C in N2 or air
LOCTITE® ABLESTIK CDF 500	Pre-cut format film, automotive grade 1 capability	• Capable for wide die size range • Compatible with various die BSM and LDF surface	≤ 10 x 10	Cu, Ag or PPF	L1 or L2 260°C capable	2	30 min. ramp to 175°C plus 60 min. at 175°C in N2 or air
LOCTITE® ABLESTIK CDF 625	Pre-cut format film, automotive grade reliability	• Capable for wide die size range • Compatible with both LDF and laminate substrate	≤ 10 x 10	Cu, Ag, PPF or laminate	L1 or L2 260°C capable	1	30 min. ramp to 100°C + 30 min. at 100°C + 30 min. ramp to 175°C + 1 hr. at 175°C
LOCTITE® ABLESTIK CDF 900*	Pre-cut format, high thermal conductivity	• Capable for wide die size range • Compatible with Cu LDF	≤ 8 x 8	Cu, Ag and PPF metal leadframes and laminate substrates	L2 260°C capable	9	30 min. ramp to 175°C + 1 hr. at 175°C

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NON-CONDUCTIVE DIE ATTACH FILM

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Moisture Sensitivity Level, MSL	Moisture Sensitivity (W/mK)	Recommended Cure
LOCTITE® ABLESTK ATB100GR	High reliability, high adhesion on different surfaces	• Excellent workability • Low modulus at room temp and low CTE • High modulus at wire bonding temperature • Excellent adhesion on multiple substrate and high reliability	≤ 3 x 3	Cu, Ag, PPF or laminate substrate	L3 260°C capable	0.34	30 min. ramp to 175°C + 60 min. at 175°C, in N2 or air
LOCTITE® ABLESTK ATB-125GL*	High reliability, high adhesion of die sizes on different surfaces	• Capable for wide die size range • Excellent workability • Excellent adhesion on multiple substrate and high reliability	≤ 8 x 8	Cu, Ag, PPF or laminate substrate	L2 260°C capable	0.34	30 min. ramp to 175°C + 60 min. at 175°C, in N2 or air

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ENCAPSULATION

Product Name	Description	Key Attributes	Filler Loading	Filler Size (Max) μm	Viscosity, mPas (cP) at 10 rpm	Coefficient of Thermal Expansion by TMA, ppm/ $^{\circ}\text{C}$	Glass Transition Temperature by TMA, $^{\circ}\text{C}$	Flexural Modulus at 25 $^{\circ}\text{C}$ MPa	Cure Condition
LOCTITE® ECCOBOND FP4802	Liquid encapsulant	• High purity • MSL2 capable • Automotive grade 2 capable • SVHC free • Excellent flow	72%	30	80,000	20/100	50	13,000	30 min. ramp and 60 min. hold at 120 $^{\circ}\text{C}$, 30 min. ramp and hold 120 min. at 165 $^{\circ}\text{C}$
LOCTITE® ECCOBOND FP4803*	Liquid encapsulant	• High purity • MSL2 capable • Automotive grade 2 capable • SVHC free • Excellent flow • Low CTE	78%	30	100,000 at 5 rpm	15/45	50	19,780	30 min. ramp and 2 hr. hold at 100 $^{\circ}\text{C}$, 30 min. ramp and hold 1 hr. at 150 $^{\circ}\text{C}$
LOCTITE® ECCOBOND FP4661*	Dam and fill – wire bond IC encapsulant	• Minimal ionic content • Improved aging stress	81%	35	126,000 at 5 rpm	14/63	140	19,800	30 min. ramp and 30 min. hold at 125 $^{\circ}\text{C}$, 30 min. ramp and hold 90 min. at 165 $^{\circ}\text{C}$

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GLASS ATTACH

Product Name	Description	Key Attributes	Die Size (mm)	Substrate Finish	Viscosity, mPas (cP) at 10 rpm	Moisture Sensitivity Level, MSL	Recommended Cure
LOCTITE® ABLESTIK NCA 01 UV LV	UV-curable adhesive	• Full one step UV cure adhesive • High T_g and low CTE • Low shrinkage • CMR and SVHC free	$\leq 15 \times 15$	Glass, Si die	13,800 at 15rpm	L3 260 $^{\circ}\text{C}$ capable	• UV wavelength, nm 365 • Irradiance at bond line, mW/cm^2 1,000 • Recommended dose, seconds 3
LOCTITE® ABLESTIK 8387B	Non-conductive adhesive	• Non-conductive • Fast cure • Black pigmentation for blocking stray light	$\leq 15 \times 15$	Glass, Si die	9,500 at 5rpm	L3 260 $^{\circ}\text{C}$ capable	30 min. ramp and 30 min. hold at 100 $^{\circ}\text{C}$

LIQUID MOLDING COMPOUND

Product Name	Reach Compliance Resin	Warpage	Gap Fill and Trench Fill	Solvent-Free (Printable En)	Higher Uph	Chemical Resistance	Viscosity Stability
LOCTITE® ECCOBOND LCM 1000AF	Anhydride-Free REACH compliant	> 70% reduction (per LCM customers)	Excellent for narrow gap filling and thin mold cap	No solvent; Intrinsically no voids	4 min at 120°C (LCM) 1 hr. at 150°C	Survive 8% TMAH / DMSO 80°C / 1 hr.	> 24 hr.

CAPILLARY UNDERFILL

Product Name	Feature	Filler Loading (wt%)	Filler Size (Max) μm	Viscosity at 5 rpm (mPas)	Thixotropic Index (TI)	T_g TMA DMA (°C)		CTE $< T_g / > T_g$ (ppm/°C)	Storage Modulus at 25°C/250°C (GPa)	Toughness K1c (MPa√m)	Cure Condition
LOCTITE® ECCOBOND UF 9000AG	- Advanced Si node - High T_g - Ultra-low CTE	72	5	11,930	1	135	160	19/62	15/.4	3	165°C/ 2 hr.
LOCTITE® ECCOBOND UF 8830S	FCCSP/ Autograde	60	3	22,120	1	118	126	25/100	12/.3	2	150°C/ 2 hr.
LOCTITE® ECCOBOND UF 9000AE*	- FCBGA > 20 x 20 mm die - Fast flow and long stage life	68	5	8,285	0.7	97	99	23/84	–	2.9	160°C/ 2 hr.

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LID ATTACH

Product Name	Technology	Viscosity at 5 rpm (mPas)	Thixotropic Index (TI)	Volume Resistivity ($\Omega\text{-cm}$)	T_g by Post Mold Cure TMA (°C)	CTE $< T_g / > T_g$ (ppm/°C)	Storage Modulus at 25°C/250°C (GPa)	Thermal Conductivity	Cure Condition
LOCTITE® ABLESTIK CE 3920	Epoxy	26,100	6	3×10^{-4}	119	29/30	5/.1	3	150°C/ 5 min.
LOCTITE® ECCOBOND MC 723	Epoxy	57,000	2	–	42	28/101	3/4	1	30 min. ramp to 150°C + 30 min.



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