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Henkel
Semiconductor Solutions

Henkel

WORLDWIDE MANUFACTURING & ORGANIZATION

ELECTRONICS GROUP OF HENKEL

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Corporate Profile – Henkel Corporation

Henkel is the world's leading and most progressive provider of qualified, compatible material sets for semiconductor packaging, printed circuit board (PCB) assembly and advanced soldering solutions. As the only materials developer and formulator with vast technical expertise for all materials required for package production and assembly, Henkel is uniquely positioned to deliver world-class materials products, process expertise and total solutions across the board to enable tomorrow's electronic industry.

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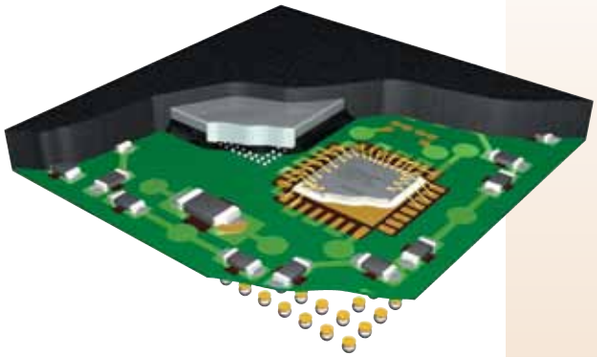
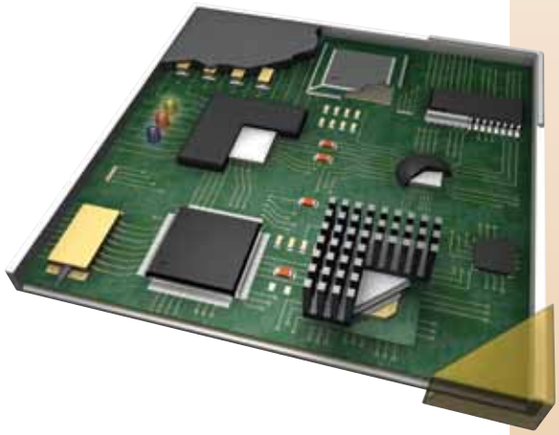
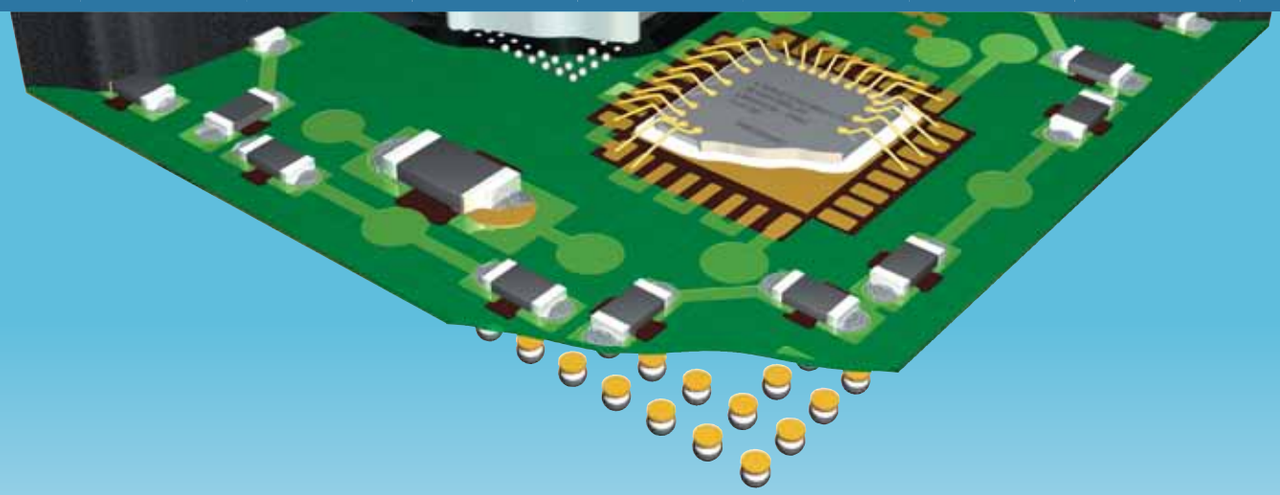




MATERIAL SOLUTIONS FOR ELECTRONIC PACKAGING AND ASSEMBLY

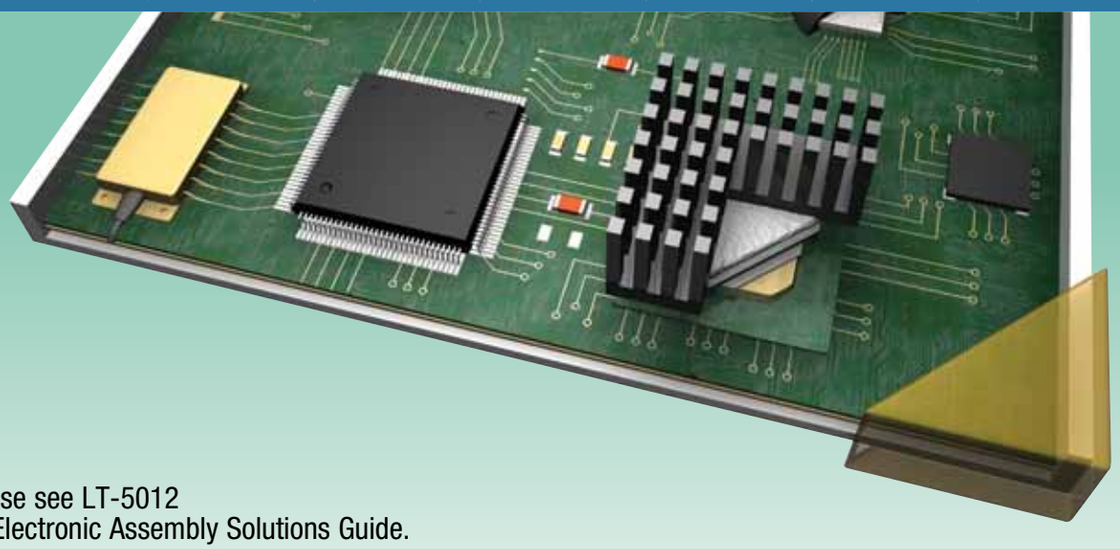
SEMICONDUCTOR ASSEMBLY MATERIALS

- Die Attach Paste Adhesives
- Die Attach Film Adhesives
- Conductive Pastes and Coatings
- Underfills
- Encapsulants
- Photonics
- Electronic Molding Compounds
- Molding Compounds
- Solder Materials



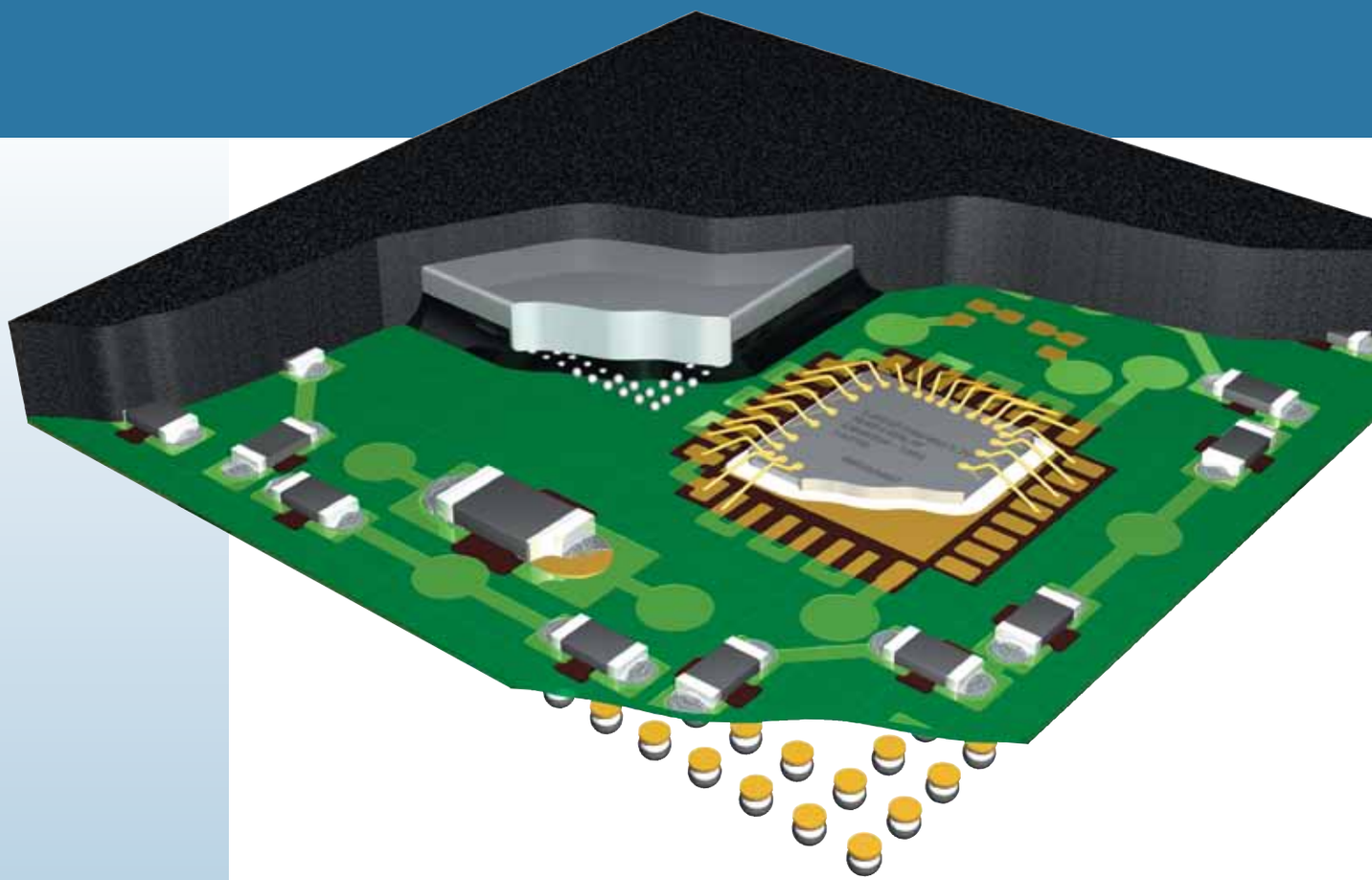
ELECTRONIC ASSEMBLY MATERIALS

- Adhesives
- Display Materials
- Inks and Coatings
- Board Level Underfills
- Chip on Board Encapsulants
- Circuit Board Protection Materials
- Solder and Flux Materials
- Surface Mount Adhesives
- Thermal Management Materials



Please see LT-5012
for Electronic Assembly Solutions Guide.

SEMICONDUCTOR MARKET SOLUTIONS



Device miniaturization and the need for improved reliability continue to drive advances in semiconductor materials technology. The relentless push for smaller yet more powerful and less costly products requires semiconductor specialists to constantly push the envelope when it comes to device packaging.

This is precisely why Henkel's commitment to innovation and materials technology leadership is a critical component for packaging success. The never-ending demands imposed by today's advanced products mean there is no room for error – materials have to perform as expected the first time. Because of Henkel's inimitable materials development methodology, where complete packages are built and various materials combinations are tested for compatibility and in-field performance, we can ensure not only outstanding materials performance but also optimized package functionality. We take the guesswork out of the process and deliver tested, reliable and guaranteed compatible materials for the most demanding applications.

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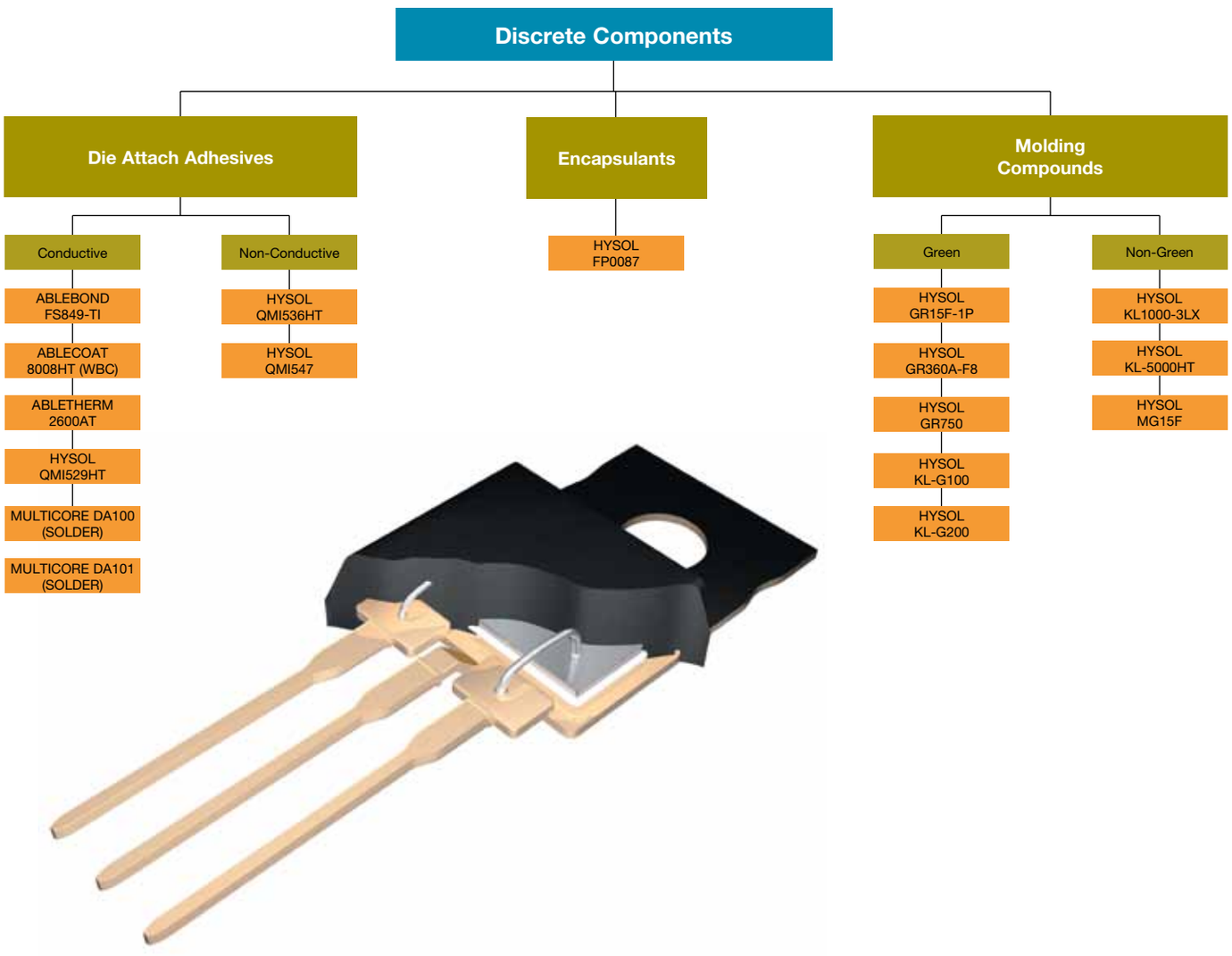
SEMICONDUCTOR MARKET SOLUTIONS

DISCRETE COMPONENTS

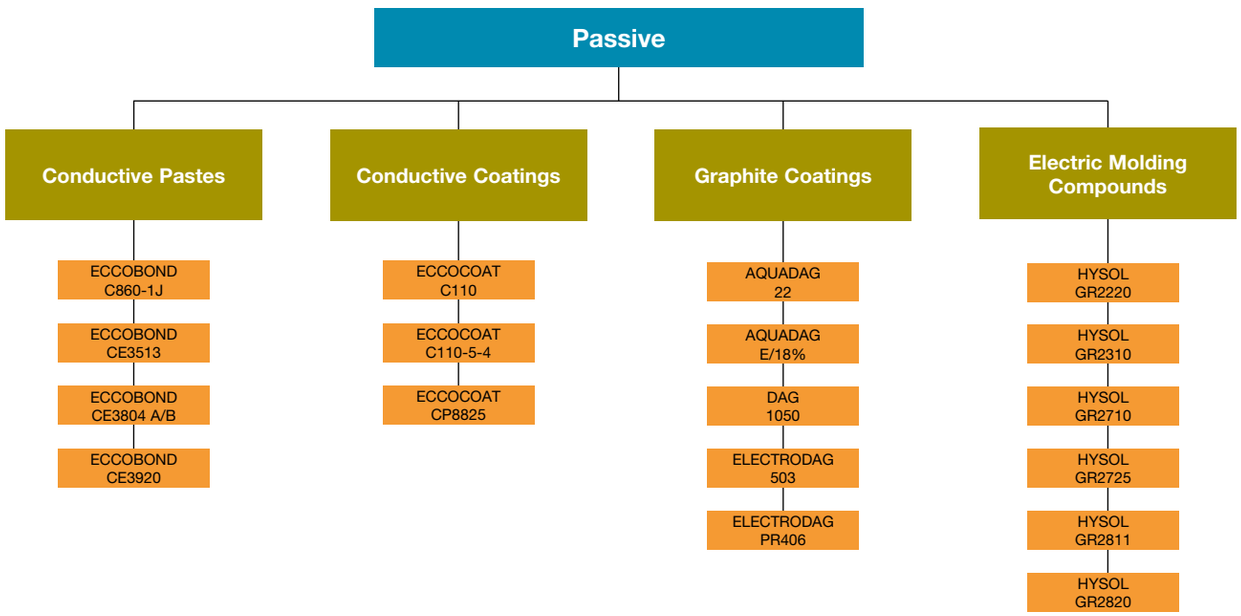
Discrete components form by far the largest number of components in any electrical or electronic application. Despite the expansion of any number of integrated circuits, there is always a need for supporting discrete packages, especially where high power is needed. As with almost all semiconductor devices, environmental protection is mostly afforded by epoxy-based mold compounds with typical packages including TO, SOT, DAK, etc. Depending upon the component, internal die placement is generally with a solder or silver die attach material, with non-conductive pastes also being used in selected areas.

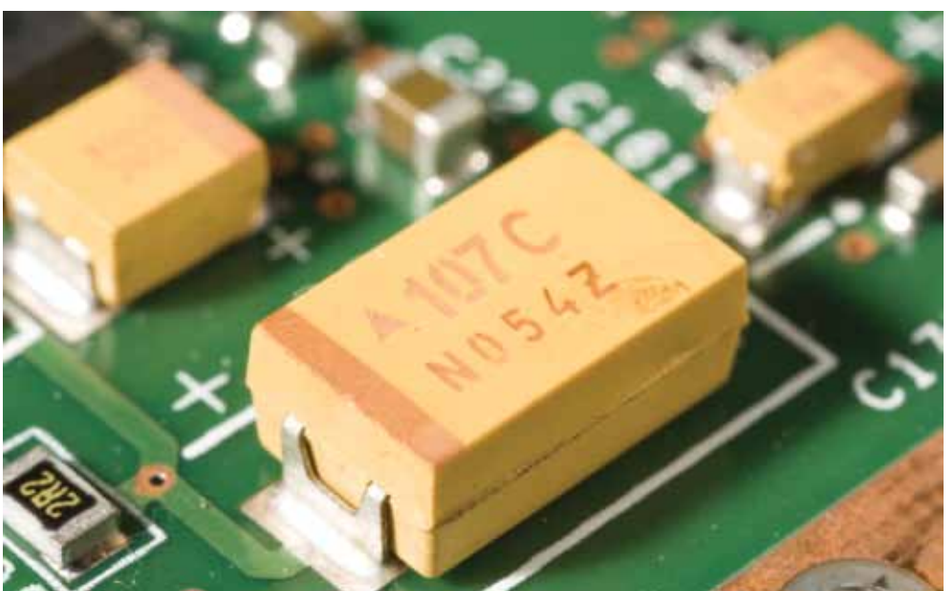


SEMICONDUCTOR MARKET SOLUTIONS

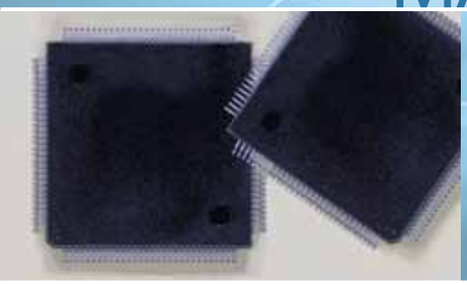
PASSIVE COMPONENTS

Passive components include capacitors, resistors and inductors of various designs. These range from micro-miniature surface mount Tantalum (Ta) capacitors up through power resistors and complete resistor networks. In each area, encapsulants such as liquid Potting and powder Molding Compounds are used. In addition, Silver (Ag) and graphite-based materials are widely used for termination and both internal and external connections.



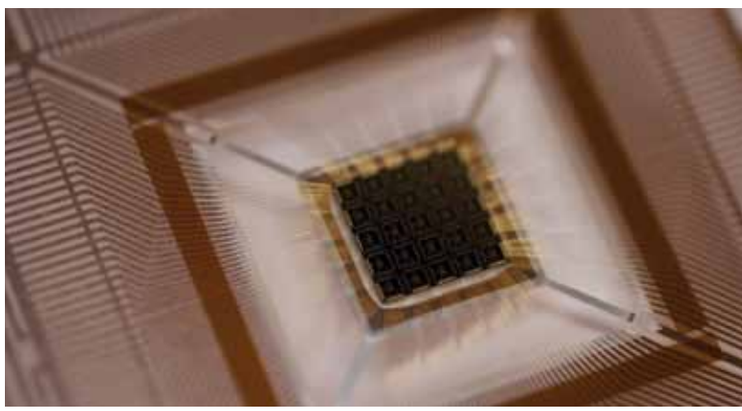


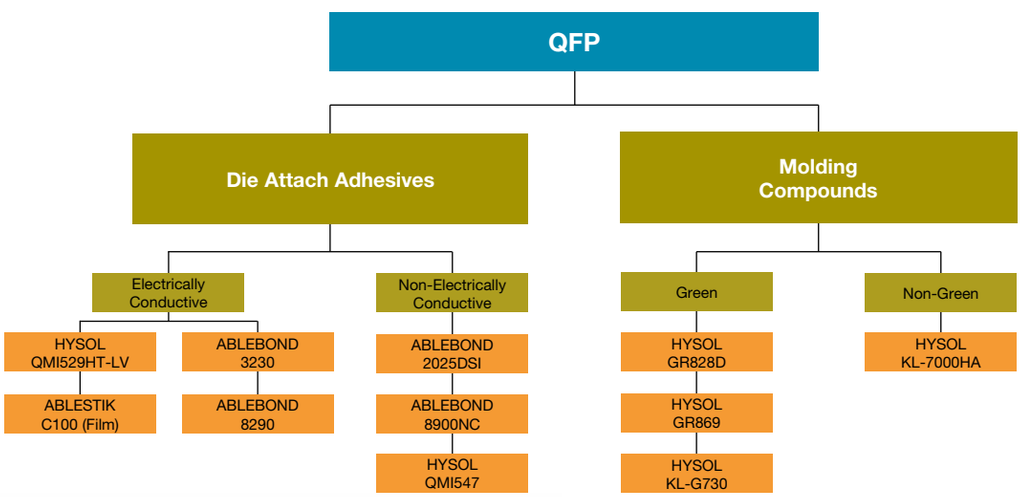
SEMICONDUCTOR MARKET SOLUTIONS

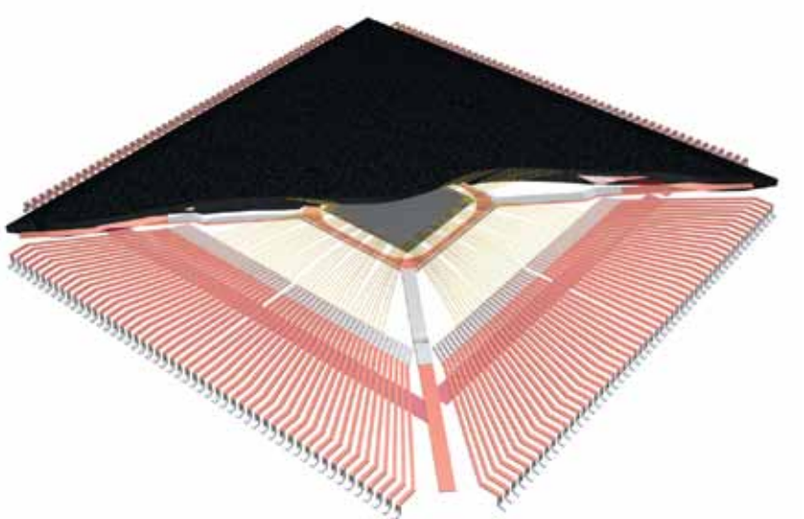


QFP

Quad Flat Pack (QFP) devices are leadframe-type packages in which leads protrude from the Molding Compound from all four sides. Though most QFP structures are similar, Die Attach material requirements for this type of package may vary based on the leadframe finish or Integrated Chip (IC) size. QFN device size may also dictate the use of different Die Attach formulations and Molding Compounds.



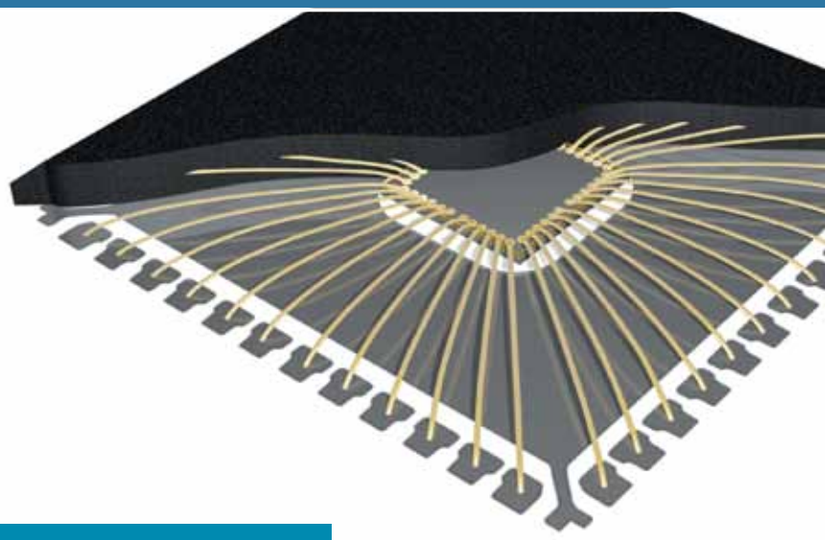


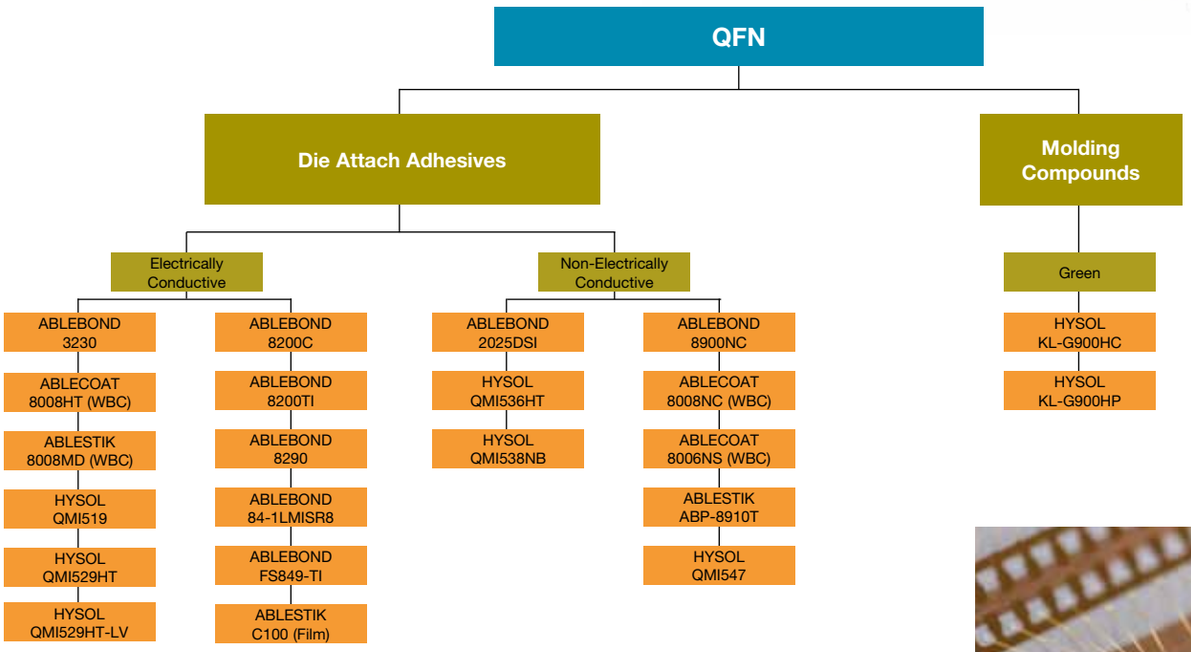


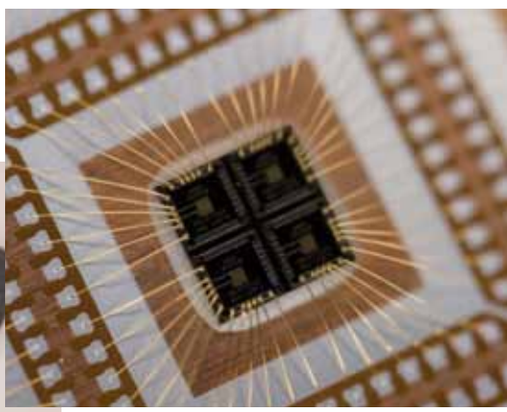
SEMICONDUCTOR MARKET SOLUTIONS

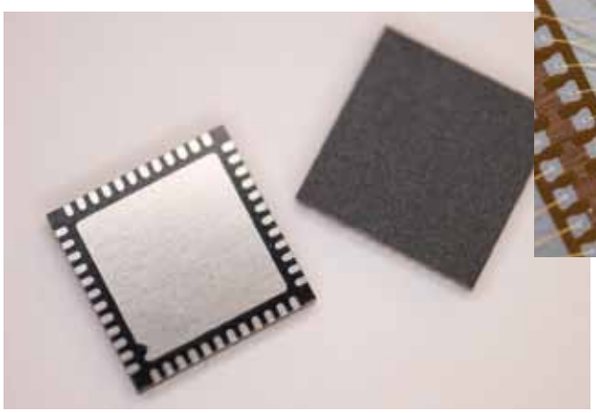
QFN

Though they share similar names, the Quad Flat No-Lead (QFN) package differs from the QFP in its lead structure. With the QFN, the leads are located underneath the device as opposed to protruding from the sides. The QFN package also includes an exposed thermal pad, which enhances the ability of this package to remove heat from the IC. As this package is designed to manage heat dissipation, the Die Attach materials employed will most likely be thermally conductive.

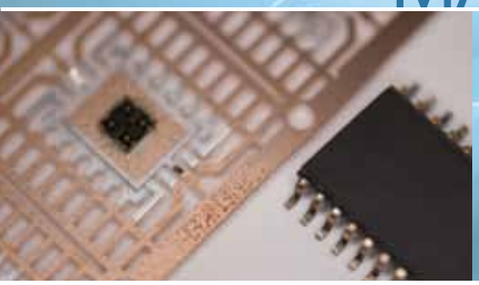






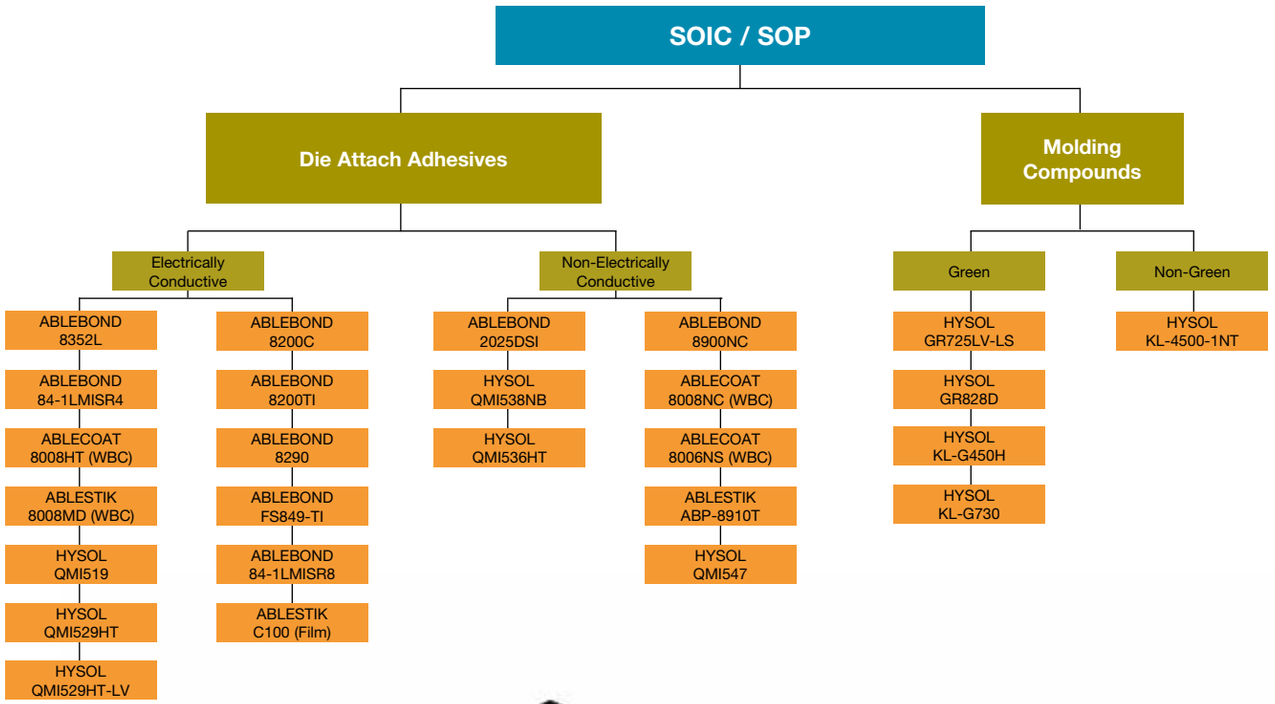


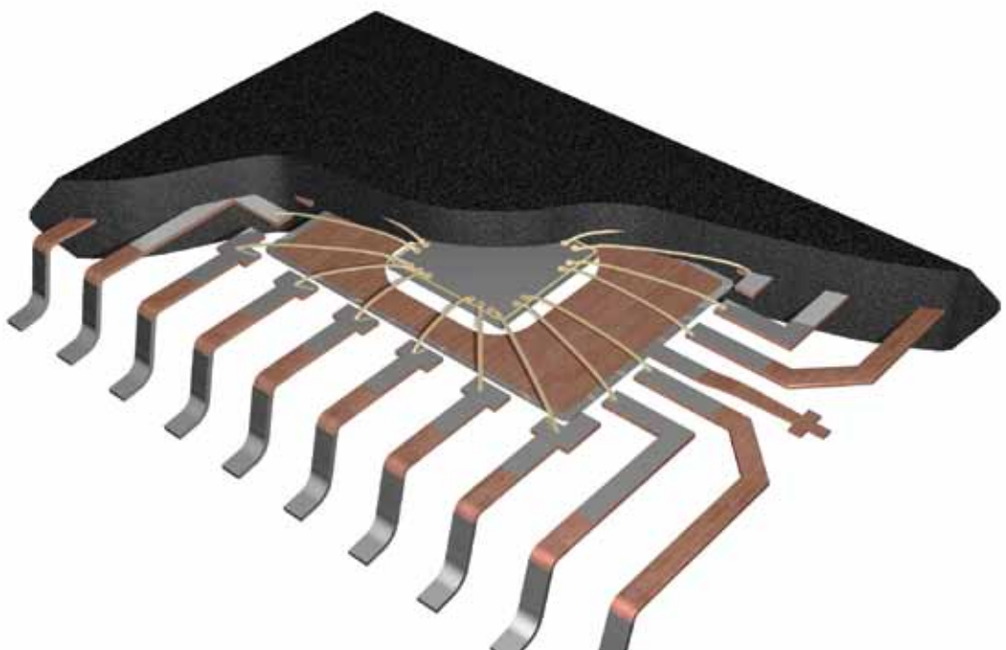
SEMICONDUCTOR MARKET SOLUTIONS



SOIC / SOP

The Small Outline Integrated Circuit (SOIC) and Small Outline Package (SOP) are arguably the most common package types used today. Similar to the QFP and QFN, the SOIC ands SOP are leadframe-type packages, with leadframe finish dictating the Die Attach and Molding Compound requirements.

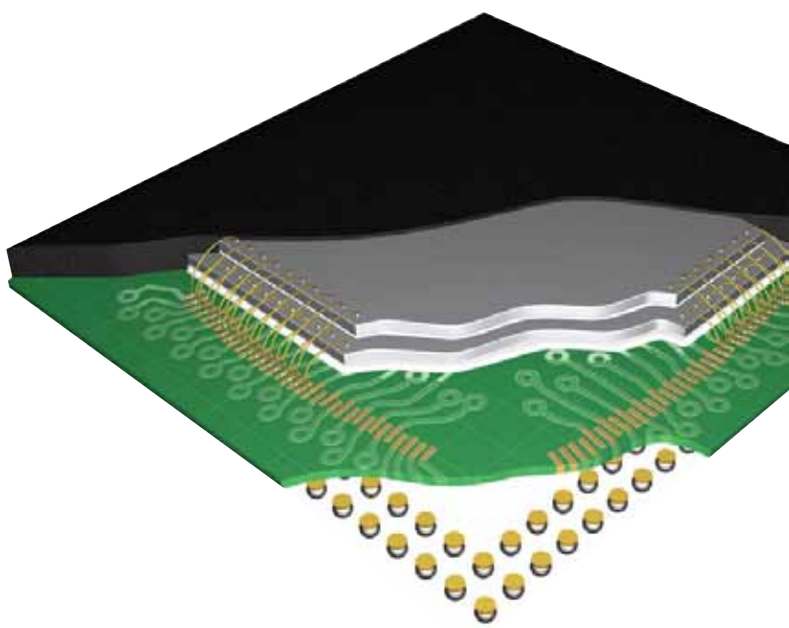


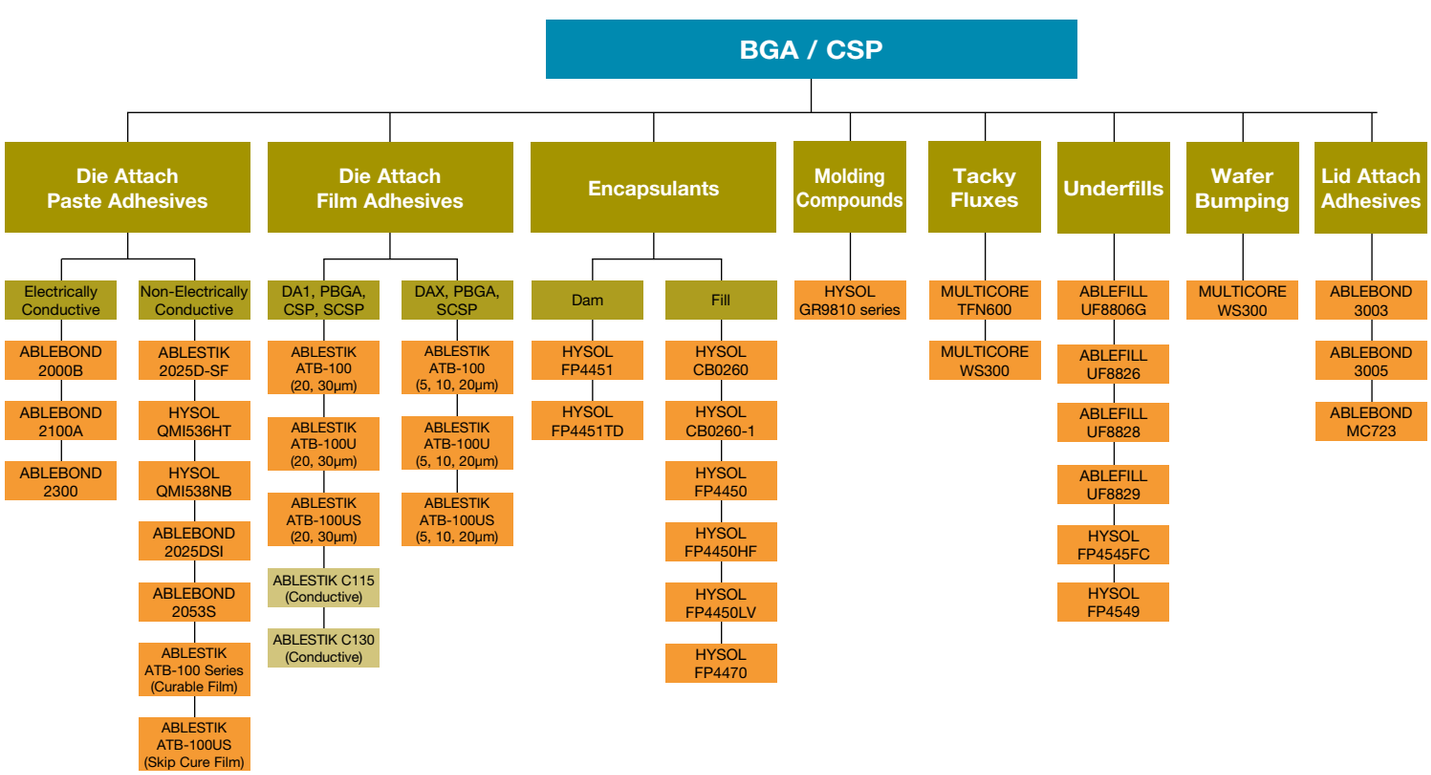


SEMICONDUCTOR MARKET SOLUTIONS

BGA / CSP

Ball Grid Arrays (BGAs) and Chip Scale Packages (CSPs) are laminate-based devices, which means they are essentially micro printed circuit boards (PCBs) on which ICs are mounted. Some BGA-type packages may alternatively use flip-chip ICs for interconnecting instead of wirebonds. In this case, the flip-chip mounted device dictates an assembly process change in which Wafer Bumping Solder Paste or Tacky Flux is used to attach the die instead of traditional die attach materials. Additionally, Underfills are used to protect the solder connections.

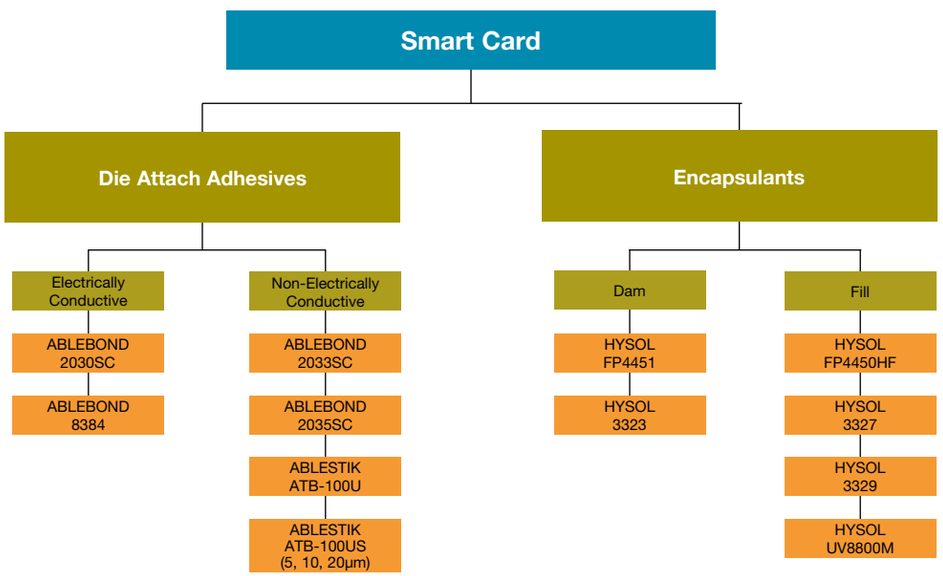


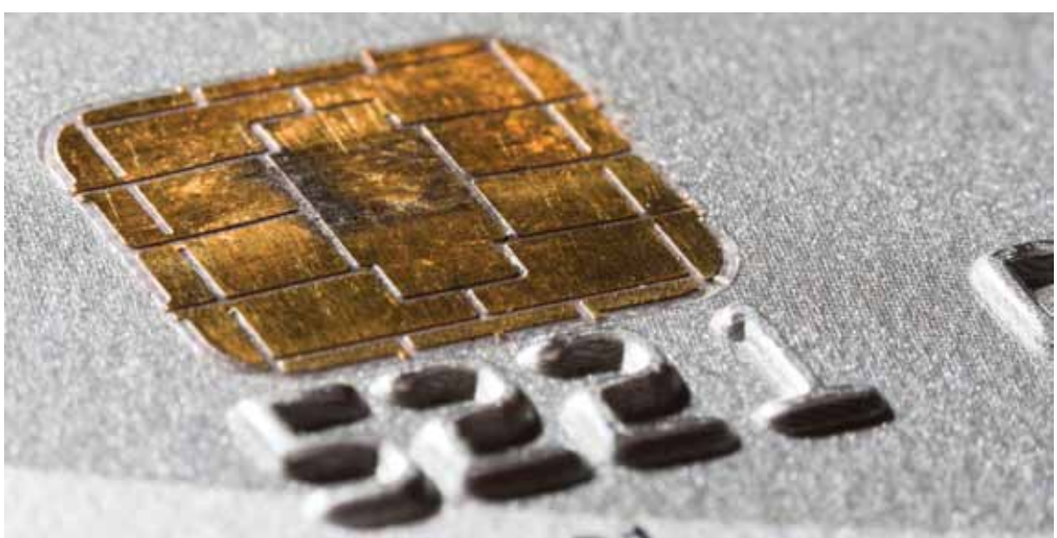


SEMICONDUCTOR MARKET SOLUTIONS

SMART CARDS

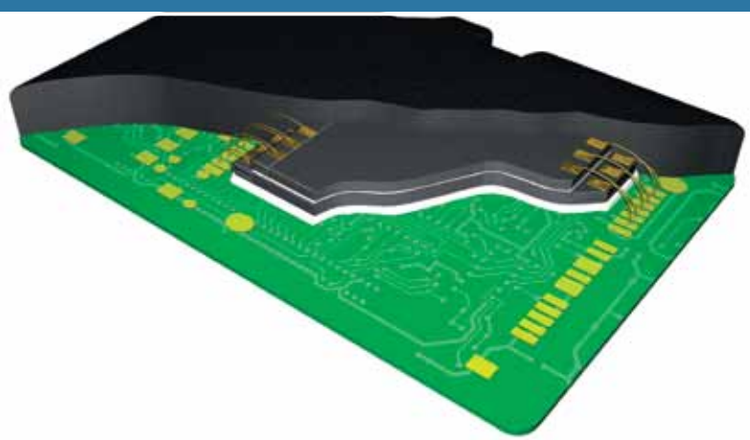
Smart cards are very popular in Europe and Asia due to the ability to securely store information on standard size credit cards. Embedded microprocessors enable information to be stored directly on these credit cards. Die Attach materials are used to attach the microprocessors, and Encapsulants are used to protect the electronic assembly.



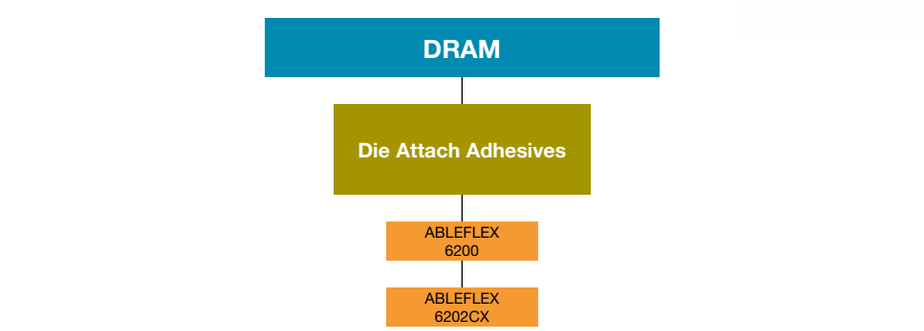


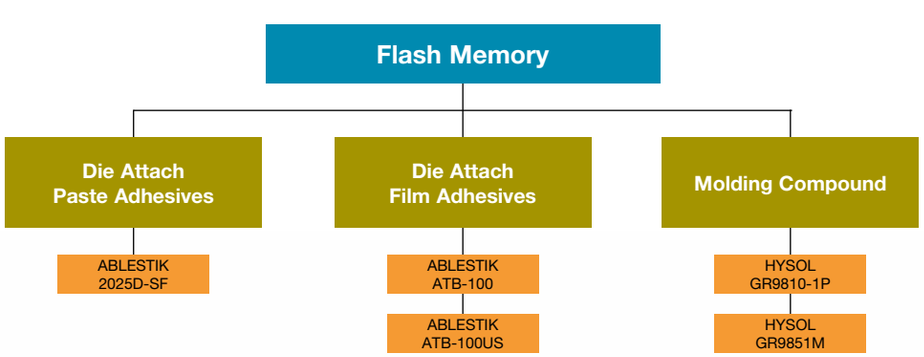
SEMICONDUCTOR MARKET SOLUTIONS

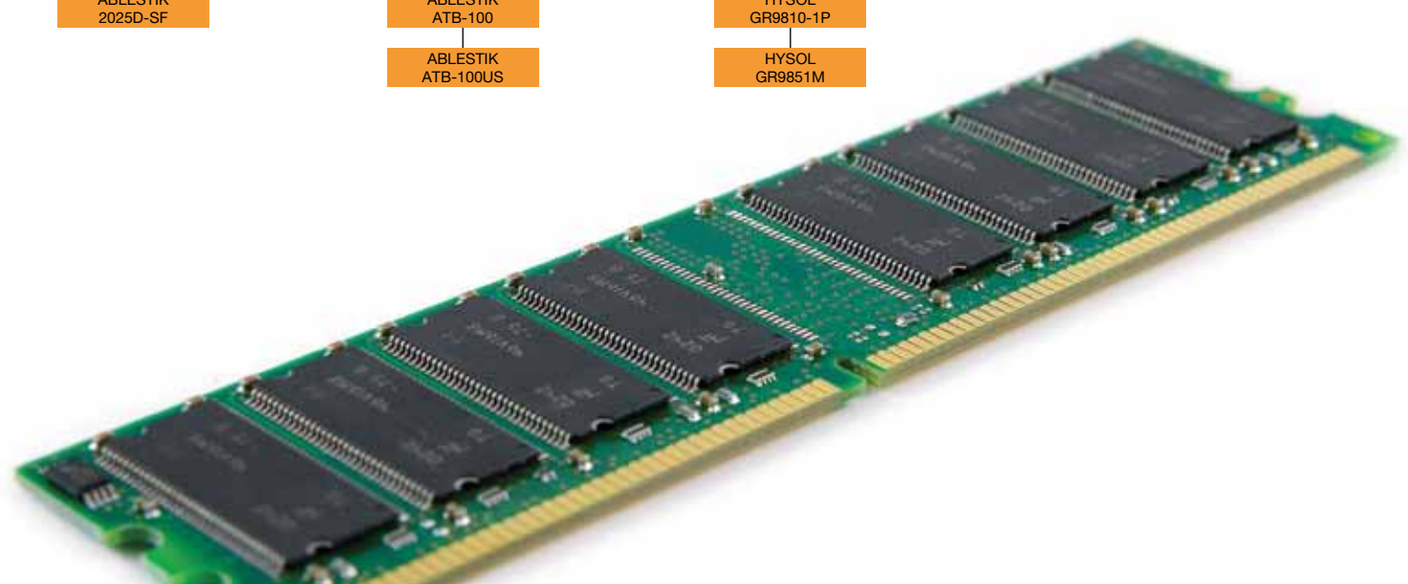
MEMORY



Memory and data storage are the key drivers of change in the Electronics industry. Semiconductor materials used in DRAM or flash memory devices include: Molding Compounds, Die Attach Pastes and Die Attach Films (for stack die applications).





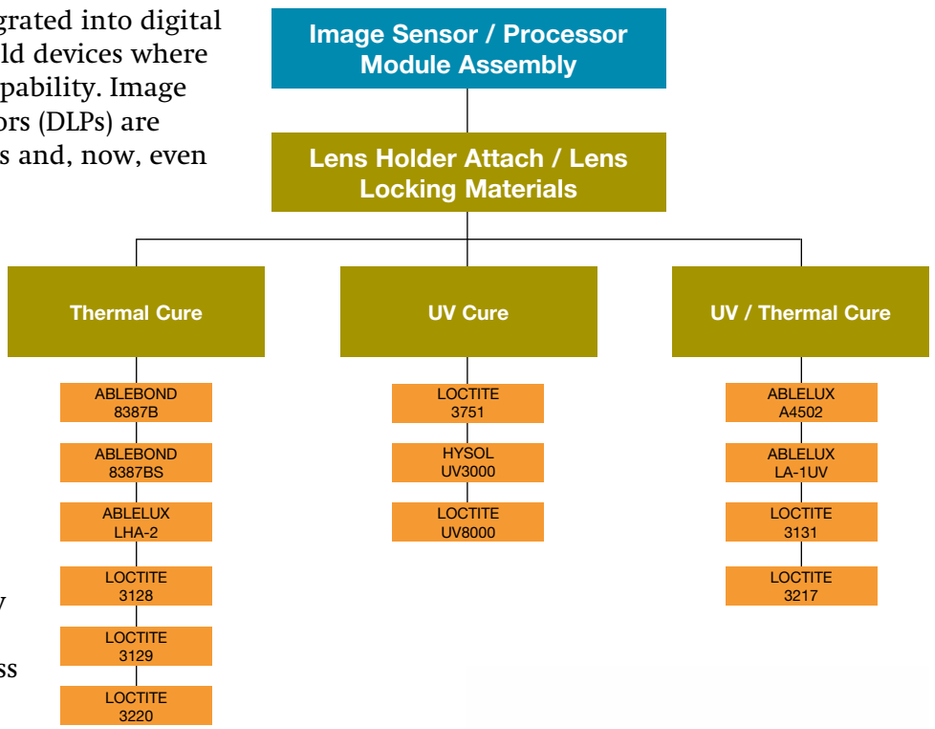


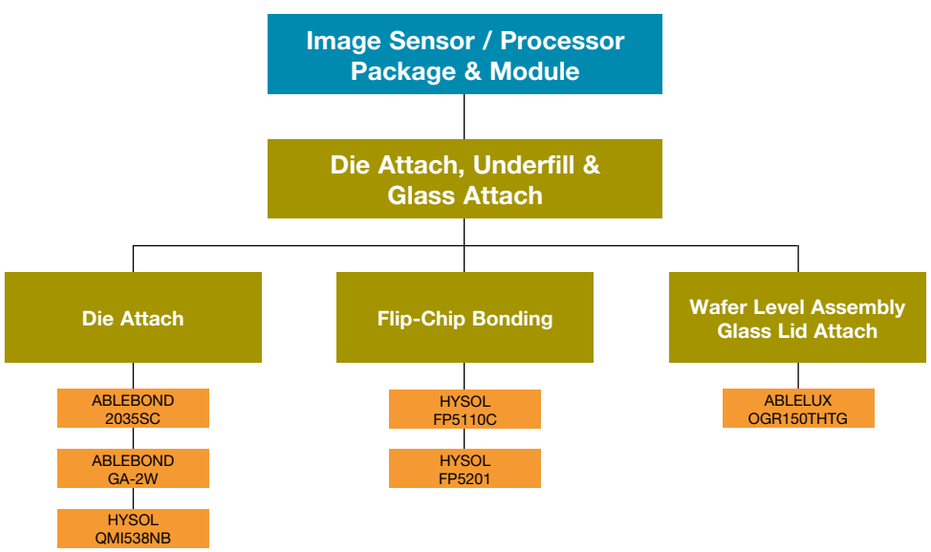
SEMICONDUCTOR MARKET SOLUTIONS

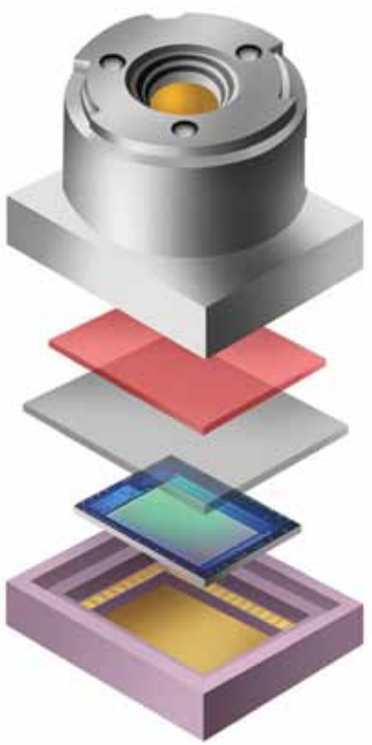
IMAGE SENSORS

Image sensors are devices that are integrated into digital cameras, cell phones and other handheld devices where functionality dictates image capture capability. Image processors such as digital light processors (DLPs) are incorporated into projectors, televisions and, now, even into cell phones.

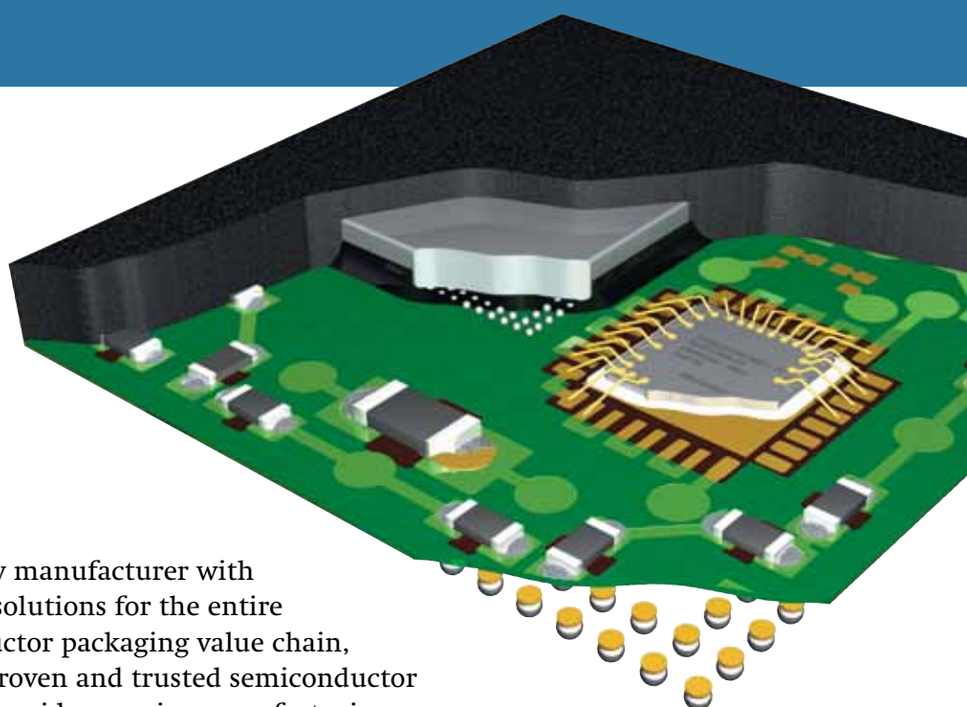
Like all electronics, the trend in image sensor technology is the drive toward miniaturization, and also combines requirements for automatic focus and consumer affordability. From a materials point of view, image sensor assembly processes call for Adhesives that offer low temperature and fast cure, precise position and bondline control, and, in some cases, UV and transparency properties. Through the use of rheology control and filler technology, unique Adhesives have been designed to address the emerging requirements of image sensor assembly.





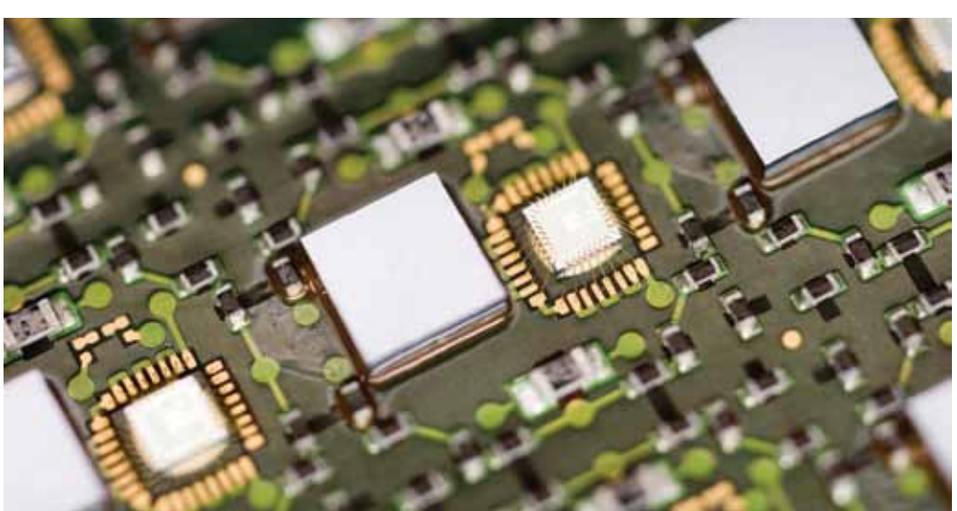


SEMICONDUCTOR MATERIALS



As the only manufacturer with materials solutions for the entire semiconductor packaging value chain, Henkel's proven and trusted semiconductor products provide superior manufacturing advantages. We simplify the supply chain by delivering exceptionally engineered products and a low-risk partnership proposition. Our forward-looking, innovative philosophy and global presence further enable your business by delivering next-generation technologies today and supporting them with knowledgeable, experienced worldwide staff.

The full line of Henkel packaging materials includes Die Attach Paste Adhesives, Dicing Die Attach Films and Flow-Over-Wire (FOW) Films, Wafer Backside Coating (WBC) Die Attach Materials, Package Level Underfills, Encapsulants, Molding Compounds, Non-Conductive Pastes (NCPs) and Tacky Fluxes.



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SEMICONDUCTOR MATERIALS

DIE ATTACH PASTE ADHESIVES

Die Attach Paste Adhesives

Laminate Packages
BGA, CSP, DRAM, Smart Card

Electrically Conductive

- ABLEBOND 2000B
- ABLEBOND 2030SC
- ABLEBOND 2100A
- ABLEBOND 2300
- ABLEBOND 8384
- ABLEBOND 8387B
- ABLEBOND 8387BS

Non-Electrically Conductive

- ABLEBOND 2025DSI
- ABLEBOND 2033SC
- ABLEBOND 2035SC
- ABLESTIK 2025D-SF
- ABLEBOND 2053S
- ABLEFLEX 6200
- ABLEFLEX 6202CX
- ABLEBOND GA-2W
- HYSOL QMI536HT
- HYSOL QMI538NB

Leaded Packages
SOIC, SOP, QFN, QFP, Discretes

Electrically Conductive

- ABLEBOND 84-1LMISR4
- ABLEBOND 84-1LMISR8
- ABLEBOND 3230
- ABLECOAT 8008HT (WBC)
- ABLESTIK 8008MD (WBC)
- ABLEBOND 8200C
- ABLEBOND 8200TI
- ABLEBOND 8290
- ABLEBOND 8352L
- ABLEBOND FS849-TI
- ABLETHERM 2600AT
- HYSOL QMI519
- HYSOL QMI529HT
- HYSOL QMI529HT-LV

Non-Electrically Conductive

- ABLEBOND 2025DSI
- ABLECOAT 8006NS (WBC)
- ABLECOAT 8008NC (WBC)
- ABLEBOND 8900NC
- ABLESTIK ABP-8910T
- HYSOL QMI536HT
- HYSOL QMI547

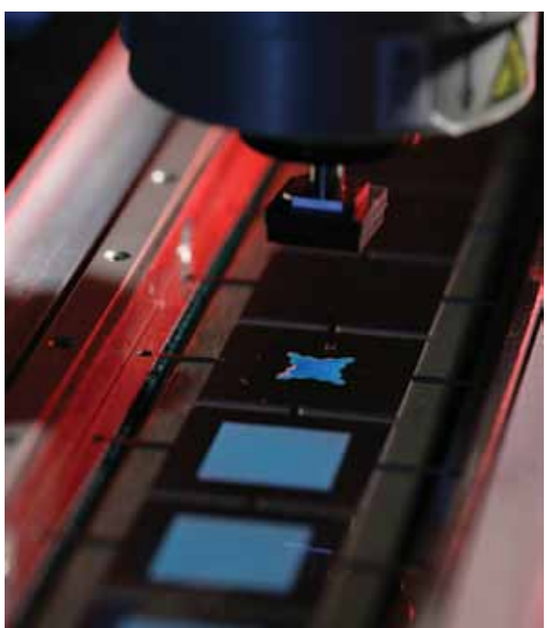
Die Attach Solder Paste

Dispensable

- MULTICORE DA100

Printable

- MULTICORE DA101



(WBC) = Wafer-Backside Coating

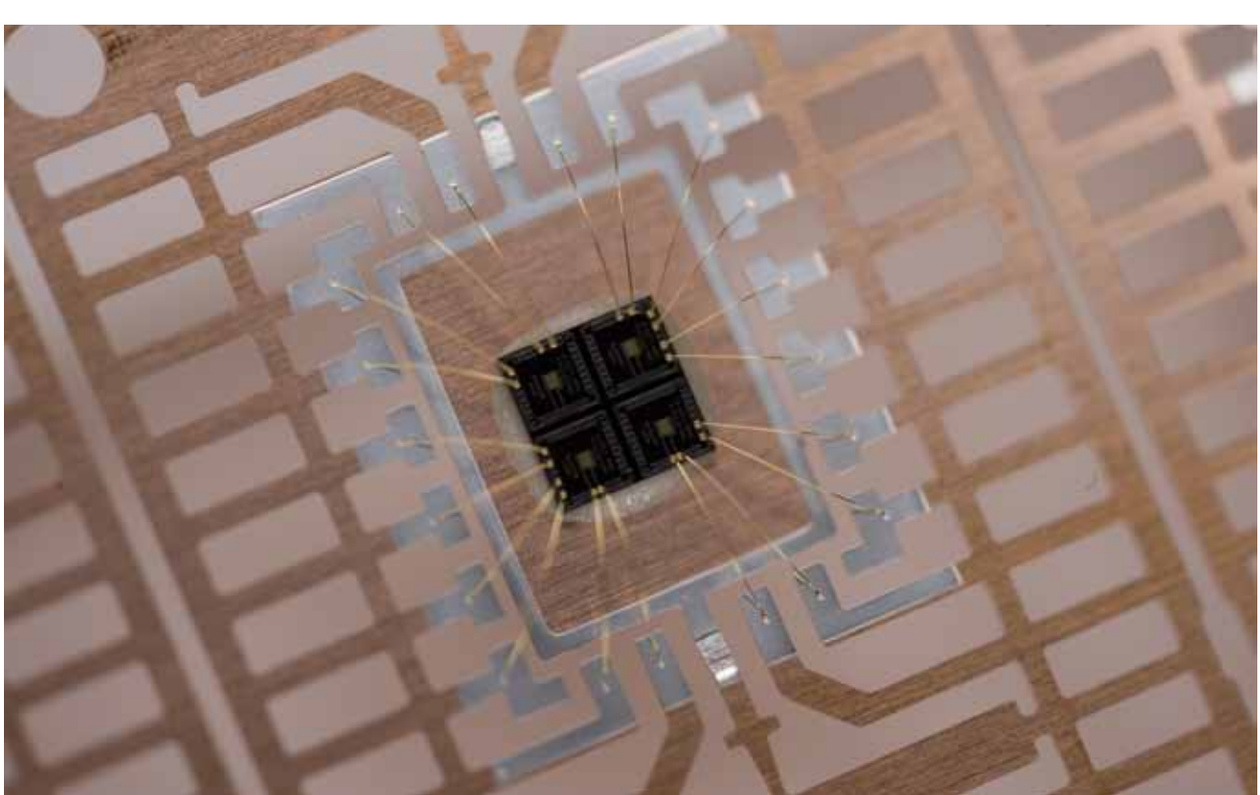
SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

As higher-temperature processes are now the norm, semiconductor packaging materials must be able to withstand these stressful conditions while still maintaining their integrity and performance. To this end, Henkel has developed a full suite of Die Attach products that address the needs of varying die size and stack requirements, as well as Pb-free capability. Through the use of Henkel's patented Bismaleimide (BMI) chemistry, superior Pb-free processing is achieved. Because the chemistry is ultrahydrophobic, Henkel's Die Attach Adhesives deliver superior adhesive strength, elongation at break, and cohesive energy at high reflow temperatures. These characteristics enable Henkel's Die Attach products to maintain adhesive strength and structural integrity during moisture soak and alleviate stresses induced by deformations associated with higher-temperature Pb-free reflow processing.

Henkel's advancements in materials technology have enabled the development of some revolutionary new Die Attach products with unprecedented performance characteristics.

Ablestik Die Attach Paste Adhesives have been formulated to address multiple process conditions and application-specific requirements. From our traditional Ablestik Die Attach Pastes to Self-Filleting materials and controlled flow technique, as well as award-winning Wafer-Backside Coating (WBC) technologies and Multicore Die Attach Solder Paste for semiconductor power devices, Henkel's Die Attach Paste solutions are unmatched.



SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

LAMINATE PACKAGES: PBGA, CSP, DRAM, SMART CARD

LAMINATE PACKAGES: ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	WARPAGE, m	MRT	ELECTRICAL CONDUCTIVITY	THERMAL CONDUCTIVITY, W/mK	DISPENSABILITY	CURE SCHEDULE
ABLEBOND 2000B	Electrically conductive Die Attach Adhesive able to withstand high reflow temperatures.	36 microns, PBGA, 500 x 500 x 15 mils	L3/L2-260	0.05	1.0	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 2030SC	Die Attach Adhesive formulated for use in high throughput die attach applications.	N/A	No JEDEC requirement	2×10^{-4}	2.3	Good	90 sec. @ 110°C
ABLEBOND 2100A	Die Attach Adhesive designed for Pb-free array packaging.	17 microns, PBGA, 500 x 500 x 15 mils	L3 - 260	0.05	1.2	Good	30 min. @ 175°C + 15 min. @ 175°C
ABLEBOND 2300	Ultra-low moisture absorption, low stress adhesive.	37 microns, PBGA, 500 x 500 x 15 mils	L3/ L2 - 260	5×10^{-4}	0.8	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 8384	Die Attach Adhesive designed for smart card applications.	45 microns, PBGA, 500 x 500 x 15 mils	N/A	0.03	1.1	Excellent	3 min. @ 130°C
ABLEBOND 8387B	For use in high throughput die attach applications.	35 microns, PBGA, 500 x 500 x 15 mils	N/A	N/A	N/A	Good	2 min. @ 150°C
ABLEBOND 8387BS	Single component Adhesive for high throughput bonding applications. It contains spacers 45um maximum for improved bondline control.	N/A	N/A	N/A	N/A	Good	2 min. @ 150°C

LAMINATE PACKAGES: NON-ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	WARPAGE, m	MRT	ELECTRICAL CONDUCTIVITY	THERMAL CONDUCTIVITY, W/mK	DISPENSABILITY	CURE SCHEDULE
ABLEBOND 2025DSI	Non-conductive, low bleed Adhesive.	Good	L2 - 260	N/A	0.4	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 2033SC	Die Attach Adhesive for high throughput smart card bonding applications.	N/A	N/A	N/A	0.35	Good	90 sec. @ 110°C
ABLEBOND 2035SC	Die Attach Adhesive for use in high throughput die attach applications.	34 microns, PBGA, 500 x 500 x 15 mils	N/A	N/A	0.35	Good	90 sec. @ 110°C
ABLESTIK 2025D-SF	NC Die Attach for use in controlled flow applications, e.g., FOW.	4 x 300 x 300 mil Si die on PBGA - 14 MICRONS	L2 - 260	N/A	0.4	Average	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 2053S	Low stress Adhesive for die-to-substrate applications.	N/A	L2 - 260	N/A	N/A	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND GA-2W	Single component Adhesive is designed for CCD/CMOS die attach bonding applications. Unique properties include ultra-low modulus for low stress and chip warpage.	N/A	N/A	N/A	N/A	Excellent	30 min. ramp + 15 min. @ 175ºC
ABLEFLEX 6200	B-Stageable, Printable Paste with low moisture uptake and bleed.	N/A	L2 - 260	N/A	N/A	N/A	B-stage + 60 min. @ 175°C
ABLEFLEX 6202CX	B-Stageable Adhesive for use in laminate-based packages and stencil printing.	N/A	L3 - 260	N/A	N/A	N/A	30 min. ramp from 30°C to 90°C, hold 60 min.
HYSOL QMI536HT	Ideal for mixed stacked die applications. Non-die damaging filler.	N/A	L3 - 260	1×10^{13}	0.9	Excellent	≥ 8 sec. @ 150°C (SkipCure) 15 min. @ 150°C (Oven)
HYSOL QMI538NB	Non-conductive Paste for leadframe applications.	N/A	L2 - 260	1×10^{13}	0.4	Excellent	≥ 10 sec. @ 200°C (SkipCure) 30 min. @ 175°C (Oven)

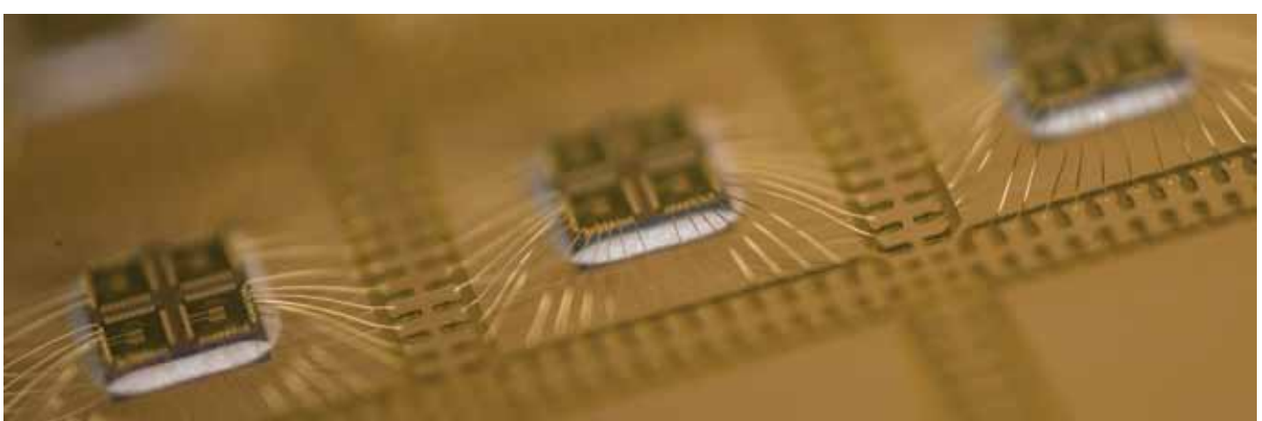
SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

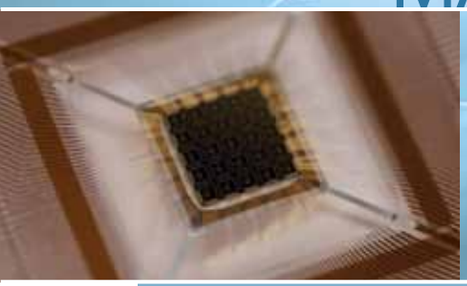
LEADED PACKAGES: SOP, SOIC, QFN, QFP, DISCRETES

LEADED PACKAGES: ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	FINISH (Ag, Cu, Au)	MRT	ELECTRICAL CONDUCTIVITY	THERMAL CONDUCTIVITY, W/mK	DISPENSABILITY	CURE SCHEDULE
ABLEBOND 84-1LMISR4	Industry standard Die Attach Adhesive.	Ag, Cu, Au	L3 - 260	1×10^{-4}	2.5	Excellent	60 min. @ 175°C
ABLEBOND 84-1LMISR8	Electrically Conductive Adhesive designed for power applications that use Cu leadframes.	Cu	L1 - 260	4.8×10^{-5}	6.85	Excellent	1 hour @ 175°C
ABLEBOND 3230	Low stress epoxy Die Attach Adhesive suitable for various package sizes.	Cu	L3 - 260	5×10^{-2}	0.3	Good	≥ 8 sec. @ 150°C (SkipCure) 15 min. @ 150°C (Oven)
ABLECOAT 8008HT (WBC)	High electrical and thermal conductivity die attach adhesive. Excellent temperature resistance.	Ag, Cu, Au	L1 - 260	6×10^{-5}	11	Stencil Print	B-stage + 20 sec. @ 280°C
ABLESTIK 8008MD (WBC)	Adhesive designed for medium Die Attach applications	Ag, Au	L1 - 260	5×10^{-4}	6	Stencil Print	B-stage + 60 min. @ 175°C
ABLEBOND 8200C	Low bleed Adhesive for pre-plated and Silver (Ag) leadframe.	Ag, Cu, Au	L1 - 260	2×10^{-4}	1.2	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 8200TI	8200C with higher thermal conductivity and optimized adhesion on Nickel-Palladium-Gold (NiPdAu) leadframe.	Ag, Cu, Au	L1 - 260	5×10^{-5}	3.5	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLEBOND 8290	Low stress Die Attach Adhesive suitable for die size <200 mil.	Ag, Cu, Au	L3 - 260	8×10^{4}	0.9	Good	≥ 8 sec. @ 150°C (SkipCure) 15 min. @ 150°C (Oven)
ABLEBOND 8352L	High reliability version of SR4 designed for use on Cu LDFs.	Cu	L2 - 260	5×10^{-4}	5.6	Good	1 hour @ 175°C
ABLEBOND FS849-TI	High thermal conductivity Adhesive with low electrical resistance.	Ag, Au	L2 - 260	2×10^{-5}	7.8	Good	15 min. ramp to 175°C + 30 min. @ 175°C
ABLETHERM 2600AT	High thermal conductivity Adhesive for thermal management applications.	Cu, Ag, Au	L2 - 260	5×10^{-4}	20	Fair	30 min. ramp to 200°C + 15 min. @ 200°C
HYSOL QMI519	JEDEC L1 260°C for SOIC, QFN packages and pre-plated finishes. Exceptional performance on clean, uncoated, Ag-plated finishes. High adhesion, excellent electrical and thermal performance.	Ag, Au	L1 - 260	1×10^{-4}	3.8	Very Good	≥10 sec. @ 200°C (SkipCure) 30 min. @ 200°C (Oven)
HYSOL QMI529HT	For component or die attach where very high electrical and thermal conductivity is required. Suitable for high heat dissipation devices and solder replacement applications.	Au, Ag	L1 - 260	4×10^{-5}	7	Fair	≥ 60 sec. @ 185°C (SkipCure) 30 min. @ 185°C (Oven)
HYSOL QMI529HT-LV	Conductive Die Attach Adhesive for use in high throughput die attach applications.	Au, Ag	L1 - 260	4×10^{-5}	8	Good	30 min. ramp to 175°C + 1 hour hold @ 175°C



SEMICONDUCTOR MATERIALS



DIE ATTACH ADHESIVES

LEADED PACKAGES: SOP, SOIC, QFN, QFP, DISCRETES

LEADED PACKAGES: NON-ELECTRICALLY CONDUCTIVE

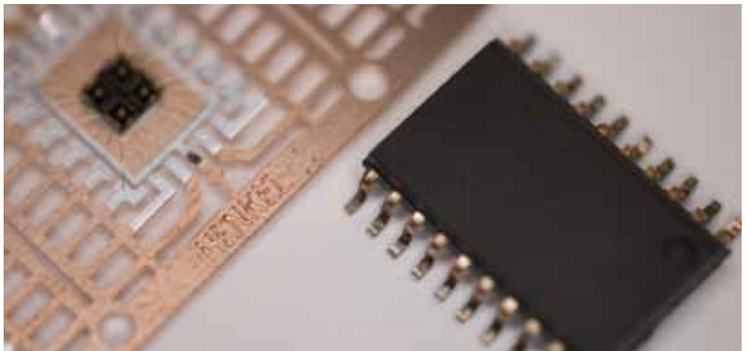
PRODUCT	DESCRIPTION	FINISH (Ag, Cu, Au)	MRT	ELECTRICAL CONDUCTIVITY	THERMAL CONDUCTIVITY, W/mK	DISPENSABILITY	CURE SCHEDULE
ABLEBOND 2025DSI	Non-conductive, low bleed Adhesive.	Ag, Cu, Au	L2 - 260	N/A	0.4	Good	30 min. ramp to 175°C + 15 min. @ 175°C
ABLECOAT 8006NS (WBC)	Non-conductive, oven cure Adhesive utilizing WBC technology.	Ag, Cu, Au	L1 - 260	N/A	0.4	Screen or Stencil Print	B-stage + 120 min. @ 160°C
ABLECOAT 8008NC (WBC)	Non-conductive, snap cure Adhesive utilizing WBC technology.	Ag, Cu, Au	L1 - 260	N/A	0.5	Stencil Print	B-stage + 60 sec. @ 230°C
ABLEBOND 8900NC	Non-conductive, epoxy Die Attach Adhesive is designed for in-line snap cure processing or fast cure operations in conventional box ovens. This high strength Adhesive is moderately stress-absorbing, and intended for small-to-medium size packages.	Ag, Cu, PdCu	N/A	2.3×10^{13}	0.3	Excellent	30 min. ramp to 175°C + 15 min. @ 175°C
ABLESTIK ABP-8910T	Self-filleting Adhesive for same die stacking applications that require 100% coverage.	N/A	L3 - 260	1×10^{13}	0.3	Excellent	30 min. ramp to 150°C + 30 min. @ 150°C
HYSOL QMI536HT	For component or die attach where very high electrical and thermal conductivity is required. Suitable for high heat dissipation devices and solder replacement applications.	Ag, Au	L1 - 260	4×10^{-5}	7	Fair	≥ 60 sec. @ 185°C (SkipCure) 30 min. @ 185°C (Oven)
HYSOL QMI547	Fluoropolymer-filled, Non-conductive Adhesive.	Au, Ag, Cu	L3 - 260	1×10^{13}	0.3	Excellent	≥8 sec. @ 150°C (SkipCure) 15 min. @ 150°C (Oven)

DIE ATTACH SOLDER PASTE: DISPENSABLE

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	ALLOY	REFLOW	CLEANABILITY	IPC/J-STD-004 CLASSIFICATION
MULTICORE DA100	Flux designed for Solder Die Attach Paste applications. Effective thermal control for Cu leadframe power semiconductor devices, such as rectifiers, power transistors, and for automotive and consumer packages.	Dispensing	250,000	High Pb	Forming Fast	Excellent	ROL0

DIE ATTACH SOLDER PASTE: PRINTABLE

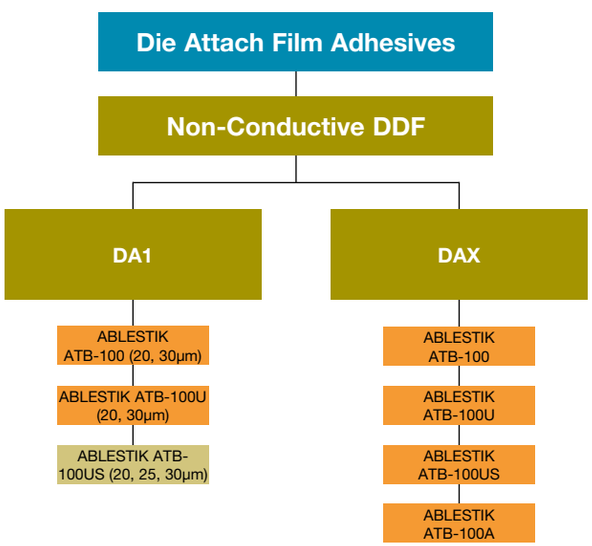
PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	ALLOY	REFLOW	CLEANABILITY	IPC/J-STD-004 CLASSIFICATION
MULTICORE DA101	Flux designed for Solder Die Attach Paste applications. Effective thermal control for Cu leadframe power semiconductor devices, such as rectifiers, power transistors, and for automotive and consumer packages.	Printing	250,000	High Pb	Forming Fast	Excellent	ROL0

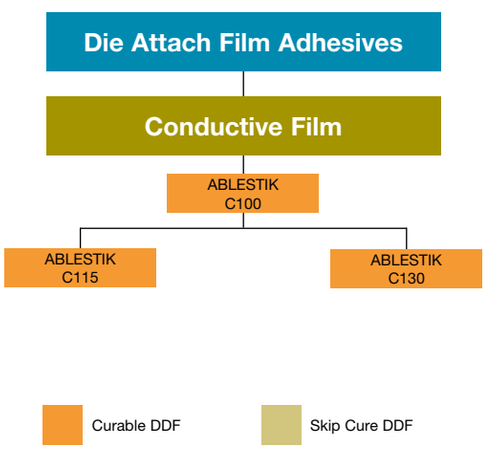


DIE ATTACH FILMS

As die become thinner and stacked die applications continue to grow, even more advanced technology in the form of Die Attach Film is required. Henkel's Non-conductive Die Attach Films combine the properties and functions of Die Attach Film and dicing tape into a single product and eliminate the need for any dispensing or curing equipment or processes, as curing takes place during the molding process.

The control, uniformity and wafer stability film processes offered for emerging thinned wafer applications are unmatched, and Henkel's Ablestik products are leading the way. In fact, our development efforts have recently enabled a breakthrough formulation for Conductive Die Attach Film. The Ablestik C100 series of Conductive Films allow leadframe package manufacturers to enjoy the same advantages that film-based products offer in comparison to traditional paste processes. Proven on die sizes ranging from less than 0.5mm x 0.5mm up to 6mm x 6mm for a variety of package types including both QFNs and QFPs, Ablestik C100 Die Attach Films will deliver the processing support and stability required for today's thinner die.





SEMICONDUCTOR MATERIALS

DIE ATTACH FILMS

NON-CONDUCTIVE DDF: DA1

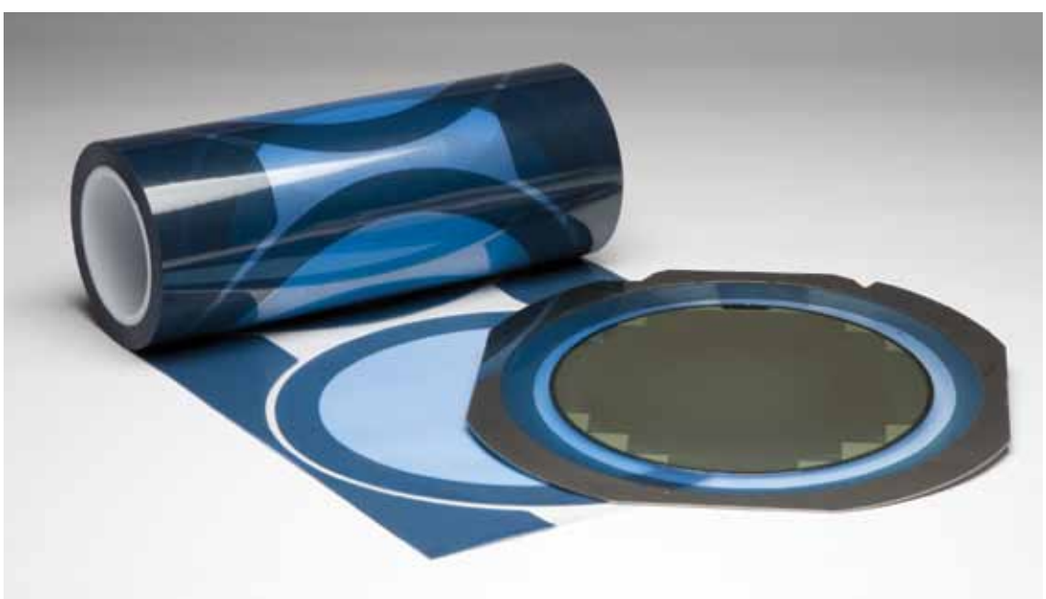
PRODUCT	DESCRIPTION	FILM THICKNESS, µm	UV DICING TAPE	MRT	CTE °C (BELOW Tg/ABOVE Tg)	CURE TYPE	CURE SCHEDULE
ABLESTIK ATB-100	Single layer format.	30, 40	No	L3 - 260	46/139	Cure	30 min. @ 100°C + 30 min. @ 120°C
ABLESTIK ATB-100U	Single layer format, fast cure and high flowability for DA on rough surface application.	20, 30	No	L2 - 260	63/238	Cure	30 min. @ 120°C
ABLESTIK ATB-100US	Non-conductive 2-in-1 Dicing Tape Die Attach Film with good bondline thickness control. Will not bleed and does not require cure prior wirebonding. Excellent thin die pickup.	20, 25, 30	No	L2-260	81/N/A	SkipCure	N/A

NON-CONDUCTIVE DDF: DAX

PRODUCT	DESCRIPTION	FILM THICKNESS, µm	UV DICING TAPE	MRT	CTE °C (BELOW Tg/ABOVE Tg)	CURE TYPE	CURE SCHEDULE
ABLESTIK ATB-100	Single layer format.	20	No	L2 - 260	46/139	Cure	30 min. @ 100°C + 30 min. @ 120°C
ABLESTIK ATB-100A	Excellent pick-up performance with PSA D/T and controlled flow for die stacking.	5, 10, 20	No	L2 - 260	62/224	Cure	30 min. @ 100°C + 30 min. @ 120°C
ABLESTIK ATB-100U	Single layer format with fast cure.	5, 10, 20	No	L2 - 260	63/238	Cure	30 min. @ 120°C
ABLESTIK ATB-100US	Non-conductive 2-in-1 Dicing Tape Die Attach Film with good bondline thickness control. Will not bleed and does not require cure prior wirebonding. Excellent thin die pickup.	5, 10, 15, 20	No	L2-260	81/N/A	SkipCure	N/A

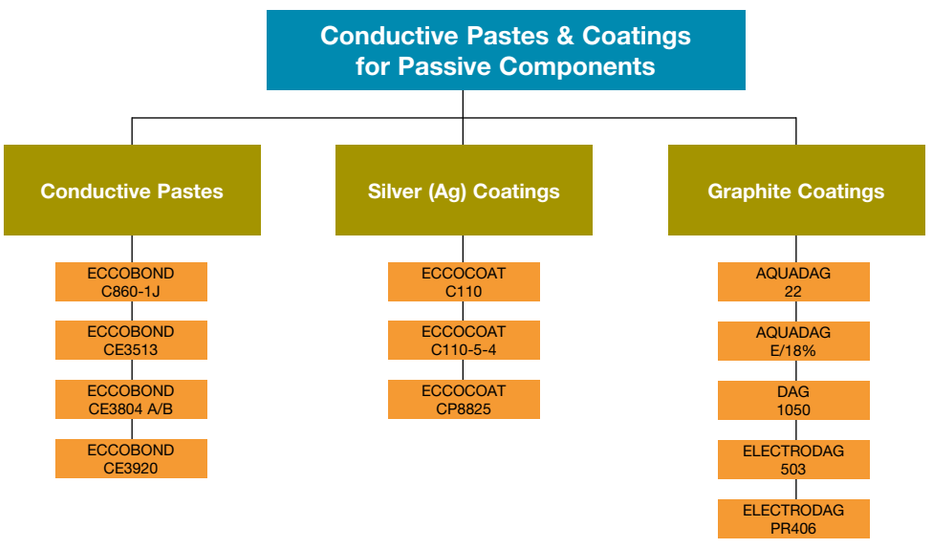
CONDUCTIVE FILMS

PRODUCT	DESCRIPTION	FILM THICKNESS, µm	UV DICING TAPE	MRT	CTE °C (BELOW Tg/ABOVE Tg)	CURE TYPE	CURE SCHEDULE
ABLESTIK C115	Die Attach Adhesive Film is suitable for tight geometry (<100µm) leadframe packages where high electrical performance is required.	15	No	L1 - 260	47.2/119.8	Cure	30 min. ramp to 150°C + 1 hour @ 150°C
ABLESTIK C130	Die Attach Adhesive Film is suitable for tight geometry (<100µm) leadframe packages where high electrical performance is required.	30	No	L1 - 260	47.2/119.8	Cure	30 min. ramp to 200°C + 1 hour @ 200°C



CONDUCTIVE PASTES AND COATINGS

Henkel offers a wide range of electrically Conductive Paste Adhesives, Silver (Ag)-filled Coatings and graphite-filled Coatings for passive component assembly. These Adhesives and Coatings provide the performance and reliability needed to withstand the high thermal and physical stresses experienced during both assembly and operation. We offer two-part Conductive Paste Adhesives that provide long shelf life at room temperature, as well as one-part Conductive Paste Adhesives that provide the convenience of a pre-mixed reactive system. Our Adhesives are commonly used to form the bond between the leadframe and the capacitor itself. We also offer high performance Silver (Ag)-filled coatings and graphite-filled coatings. These coatings are typically used to form a contact layer, usually applied by dipping. We have the most extensive product range of any supplier to satisfy the widest range of application requirements.



SEMICONDUCTOR MATERIALS

CONDUCTIVE PASTES AND COATINGS

CONDUCTIVE PASTES

PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
ECCOBOND C860-1J	One component, Ag-filled Epoxy Adhesive.	Heat Cure	15 - 60 min. @ 180°C - 240°C	56,000	1.4×10^{-4}	6 months @ 0°C	3 weeks
ECCOBOND CE3513	One component, Ag-filled Epoxy Adhesive.	Heat Cure	20 min. @ 150°C	35,000 - 45,000	2×10^{-4}	6 months @ -18°C - 40°C	>2 weeks @ 18°C - 25°C
ECCOBOND CE3804 A/B	Electrically Conductive Epoxy Adhesive for microelectronics.	Heat Cure	30 min. @ R.T. + 30 min. @ 170°C + 30 - 60 min. @ 150°C	7,000	6.4×10^{-4}	Part A- 5 months @ R.T. Part B 6 months in refrigerator	N/A
ECCOBOND CE3920	Electrically Conductive Adhesive for thin film PV assembly with superior contact resistance stability. Viscosity optimized for dispensing.	Heat Cure	3 min. @ 150°C	26,000	8.0×10^{-4}	Part A- 5 months @ R.T.	3 days

SILVER (Ag) COATINGS

PRODUCT	DESCRIPTION	CURE TYPE	CURE SCHEDULES	VISCOSITY (cPs)	VOLUME RESISTIVITY (OHM.CM)	SHELF LIFE	POT LIFE
ECCOCOAT C110	One component, non-bleeding, solvent-based, flexible, Ag-filled Epoxy Coating.	Heat Cure	60 min. @ 150°C	27,000 - 33,000	4×10^{-4}	12 months @ 0°C - 8°C	2 months
ECCOCOAT C110-5-4	Lower viscosity version of C110.	Heat Cure	60 min. @ 150°C	1,600 - 1,900	9×10^{-5}	12 months @ 0°C - 8°C	2 months
ECCOCOAT CP8825	Electrically conducting, acrylic, Ag Coating.	Heat Cure	N/A	N/A	5×10^{-4}	6 months	N/A

GRAPHITE COATINGS

PRODUCT	DESCRIPTION	APPLICATION	CURE SCHEDULES	SHEET RESISTANCE - OHM/SQUARE/25µ	SHELF LIFE
AQUADAG 22	Colloidal graphite in water.	Electrically Conductive Coatings for electrical and electronic uses	4 min. @ 200°C	500 Ohm/square	12 months
AQUADAG E/18%	Outstanding film-forming properties on a wide variety of materials.	Impregnation or coating of gaskets for antiherent properties	5 min. @ 150°C	30 Ohm/square	24 months
DAG 1050	Aqueous dispersion of high purity micro-graphite for applications in the manufacturing of capacitors and batteries.	Capacitors and batteries	N/A	N/A	12 months
ELECTRODAG 503	Specially designed for use as a counter electrode Ag paint for solid Ta capacitors in high temperature applications.	Solid Ta capacitors	Air dry for four hours	0.05	24 months
ELECTRODAG PR406	Carbon polymer, thick film ink. Excellent solder resistance, cohesion, solvent resistance.	Cu contact protection, conductive pads and jumpers, printed resistors	30 min. @ 150°C	<10	12 months

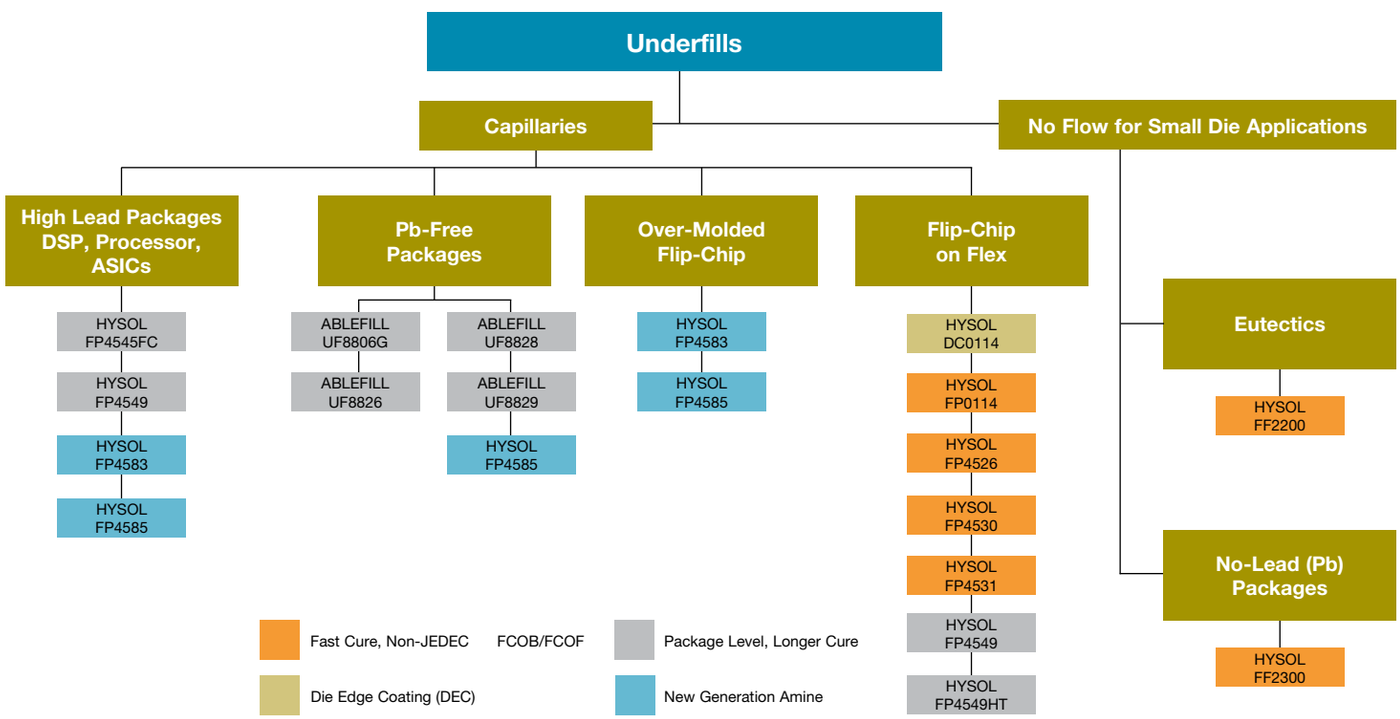
SEMICONDUCTOR MATERIALS

UNDERFILLS

The shrinking footprint of modern handheld and mobile products in tandem with the higher temperature processing demands for advanced devices has necessitated development of new underfill technologies that deliver improved shock resistance and enhanced device reliability.

Henkel's package-level Underfill systems have been engineered to deliver robust performance characteristics while meeting stringent JEDEC testing requirements and ensuring Pb-free compatibility. With an unyielding focus on quality and performance, all Hysol Underfills are developed for demanding end-use requirements including low warpage/low stress, fine pitch, high reliability and high adhesion. With a wide variety of formulations from which to choose, Hysol Underfills have emerged as the premier industry standard for flip-chip (FC) applications, and are used in devices such as FC CSPs and FC BGAs for ASICs, chipsets, graphic chips, microprocessors and digital signal processors. Formulated with superior characteristics like fast flow and excellent adhesion, Henkel's Underfills exhibit no cracking after thermal shock or thermal cycling.

With Underfills for low Potassium/Copper (K/Cu) die, materials with tremendously long working lives, SnapCure processing alternatives, fluxing no-flow Underfills and high thermal Underfills, our portfolio of leading edge products continues to get broader and deeper. The next generation of amine-based Underfill systems have been introduced and the advantages are many: Henkel's amine Underfill systems deliver excellent adhesion to Silicon Nitrogen (SiN) and polyimide and, when tested against competitive Underfills, provided superior performance. These next-generation Underfill systems are designed to deliver lower stress with a unique combination of thermal mechanical characteristics to prevent delamination, bump fatigue and Under Bump Metallization (UBM) failure.



SEMICONDUCTOR MATERIALS

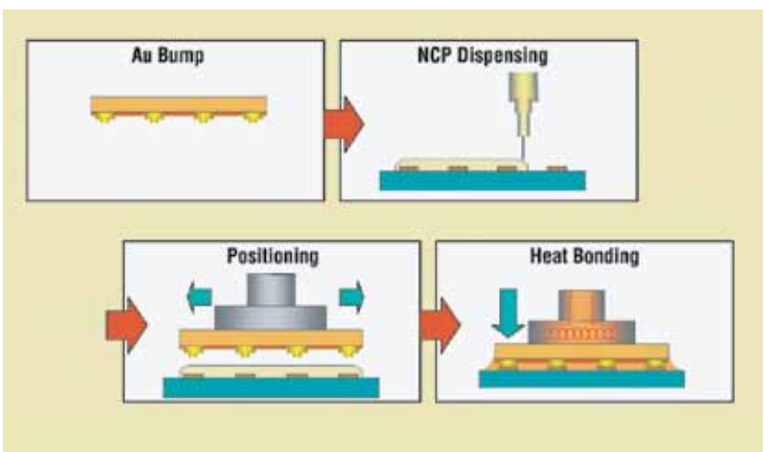
UNDERFILLS

CAPILLARY

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
HYSOL FP4545FC	Flux Compatible, high purity, Flip-Chip Underfill for high Pb applications.	Fast	9,000	115	30	7.1	55	60 min. @ 165°C
HYSOL FP4549	Fast-flowing, low stress Underfill for fine-pitch flip-chip applications.	Very Fast	2,300	140	45	5.5	50	30 min. @ 165°C
HYSOL FP4583	High purity, FC Underfill, high Pb applications.	Fast	14,000	79	40	6.9	57	120 min. @ 165°C
ABLEFILL UF8806G	Moisture resistant. For die sizes <25 mm and ceramic packages. Ultra low alpha emissions.	Fast	4,500	136	27	7.9	60	60 min. @ 195°C
ABLEFILL UF8826	For eutectic Pb-free or high Pb, low K applications. Medium modulus, low CTE.	Fast	16,000	132	40	3.4	30	90 min. @ 165°C
ABLEFILL UF8828	For eutectic Pb-free and low K applications. Higher modulus.	Fast	15,000	128	30	6.5	50	90 min. @ 165°C
ABLEFILL UF8829	For small die in Pb-free and low K applications. Higher modulus, lowest CTE.	Fast	10,000	122	28	7.5	60	90 min. @ 165°C
HYSOL FP4585	High purity, FC Underfill, high Pb and no-Pb applications.	Fast	40,000	94	25	7.3	60	120 min. @ 165°C
HYSOL DC0114	Die edge coating to prevent silicon chipping in HDD applications.	N/A	20,000	135	70	N/A	13	30 min. @ 165°C
HYSOL FP0114	Fine filler version of FP4526 for gap size down to 25 microns.	Fast	5,000	135	33	8.5	63	30 min. @ 165°C
HYSOL FP4526	Ceramic packages and FC on flex, eutectic, high-Pb and no-Pb applications; not for JEDEC performance.	Fast	4,700	133	33	8.5	63	30 min. @ 165°C
HYSOL FP4530	SnapCure flip-chip Underfill for FC on flex. Designed for gap size down to 25 microns.	Very Fast	3,000	148	44	5.5	50	7 min. @ 160°C
HYSOL FP4531	SnapCure flip-chip Underfill for FC on flex applications with gap.	Fast	10,000	161	28	7.6	60	7 min. @ 160°C
HYSOL FP4549HT	Al nitride-filled version of FP4549 for high thermal applications.	Fast	17,500	128	26	8.5	66.5	60 min. @ 165°C

NO FLOW FOR SMALL DIE APPLICATION

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
HYSOL FF2200	No-flow Underfill for eutectic applications.	No Flow	3,600	128	75	2.8	Unfilled	Eutectic Reflow
HYSOL FF2300	No-flow Underfill for eutectic and Pb-free applications.	No Flow	3,100	81	75	2.6	Unfilled	Eutectic or Pb-free reflow

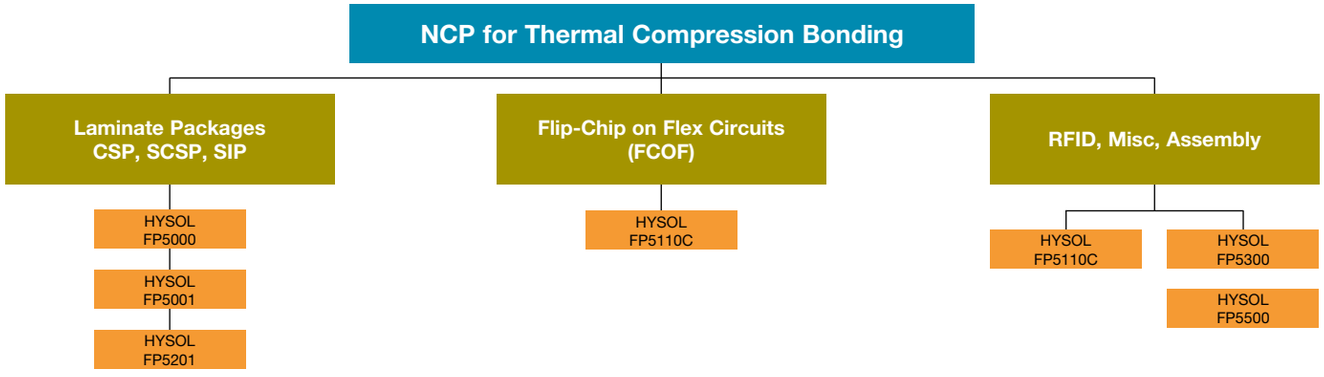


UNDERFILLS

All Hysol Non-Conductive Paste (NCP) Encapsulants are designed to deliver exceptionally high reliability for flip-chip in package applications. The materials provide superior moisture and thermal cycling resistance for thermal compression bonding processes and meet stringent JEDEC level testing standards, while allowing for outstanding performance even in high temperature Pb-free environments.

The inherent benefits of thermal compression bonding using Henkel's unique NCP technology are many. NCP enables an alternative to traditional Controlled Collapse Chip Connection (C4) soldering by bonding bumps to the substrate through an innovative Pb-free compatible thermal compression process, thus simplifying flip-chip assembly by eliminating the need for flux application, reflow and cleaning in most cases.

And now, through a new Henkel-patented process called Accelerated Cooling (AC), the effectiveness of Hysol NCPs are further enhanced. Unlike conventional thermal compression processes where the NCP material is applied onto the substrate and subsequent heating and compressing of the device occur, Henkel's AC process heats the device while it is secured by the flip-chip bonder head and then is rapidly cooled during compression onto the NCP-coated substrate. This rapid cooling process enables assembly completion prior to any excess heat exposure and, consequently, reduces package warpage, voids caused by moisture, and assembly cycle time.



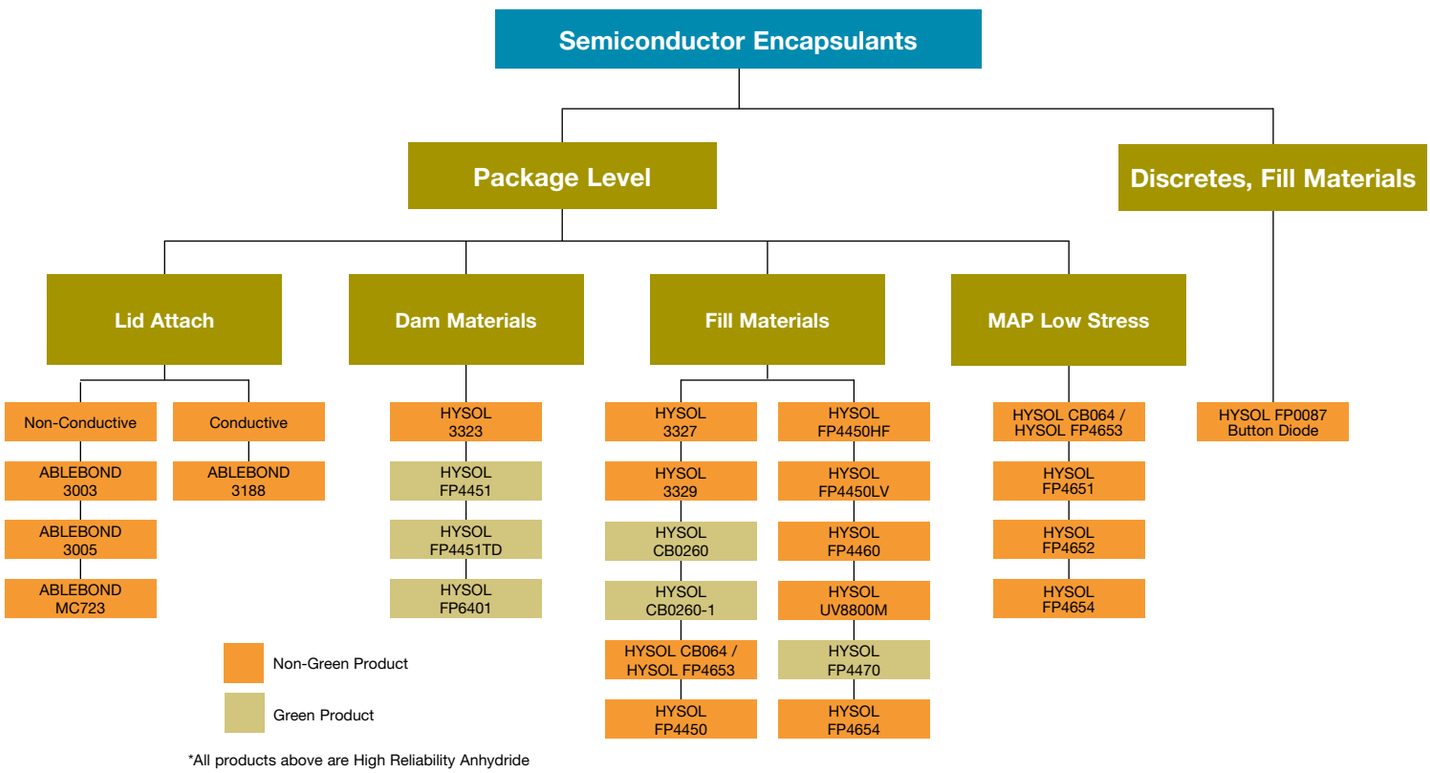
LAMINATE PACKAGES: CSP, SCSP,SIP

PRODUCT	DESCRIPTION	SUBSTRATE	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	MODULUS, DMA	CURE SCHEDULE	STORAGE TEMP	SHELF LIFE
HYSOL FP5000	Excellent MSL and PCT resistance. Compatible with both constant and pulse heat tool. Recommended for Au/Au assembly joint.	Laminate	80,000 15,000	150	20 - 50 ppm	8.2 GPa	4 sec. @ 240°C	-15°C	12 months
HYSOL FP5001	Excellent thermal cycling resistance. Compatible with both constant and pulse heat tool. Recommended for Au/Au assembly joint.	Laminate	25,000 75,000	150	15 - 45 ppm	7.9 GPa	4 sec. @ 240°C	-15°C	12 months
HYSOL FP5201	Designed for laminate assembly using Cu pillar interconnect.	Laminate	21,000	87	31 ppm	5.8 GPa	4 sec. @ 240°C	-15°C	6 months
HYSOL 5110C	Heat cure material designed for FCOF applications using both plated and stud bump.	Flexible Printed Circuits	28,000	111	54 ppm	4.0 GPa	4 sec. @ 250°C	-15°C	6 months
HYSOL FP5300	Excellent adhesion strength to 2- and 3-layer flexible printed circuits as well as laminates. Low temperature cure ACP.	Flexible Printed Circuits and Laminates	61,000	126	47 ppm	5.9 GPa	8 sec. @ 180°C	-15°C	6 months
HYSOL FP5500	Heat cure material designed for ACP process by thermal compression.	RFID, Flip-Chip on Laminate, Flex on Laminate	40,000	121	51 ppm	4.6 GPa	4 sec. @ 200°C	-15°C	6 months

SEMICONDUCTOR MATERIALS

ENCAPSULANTS

Ease of use is a hallmark of all of Henkel's Hysol brand encapsulation materials, ensuring in-process simplicity and outstanding long-term performance. Delivering the ultimate in chip protection, Hysol's high purity liquid epoxy encapsulants work together as dam-and-fill materials for bare chip encapsulation, providing Gold (Au) wire, Aluminum (Al), Silicon (Si) die and low-Potassium (K) die protection from the effects of mechanical damage and corrosion. For manufacturing environments that require single material solutions, we have also formulated a variety of single material glob tops. Hysol high-purity Encapsulants are available as self-leveling materials that deliver unmatched performance for a variety of products including transistors, System-in-Package (SiP), microprocessors and ASICs. When there is not a strict limit on overall package height, cycle time and costs can be reduced through the use of Hysol single material glob tops. Like all Henkel materials, Hysol liquid Encapsulants are formulated and tested in-process, and in the context of full package assembly. They meet the most stringent JEDEC-level testing requirements and are developed to deliver outstanding performance within high temperature, Pb-free environments. Ever-conscious of environmental regulations and end-use requirements, Hysol green Encapsulant materials have been engineered to meet the needs of demanding applications.



*All products above are High Reliability Anhydride

SEMICONDUCTOR MATERIALS

ENCAPSULANTS

PACKAGE LEVEL: LID ATTACH-CONDUCTIVE

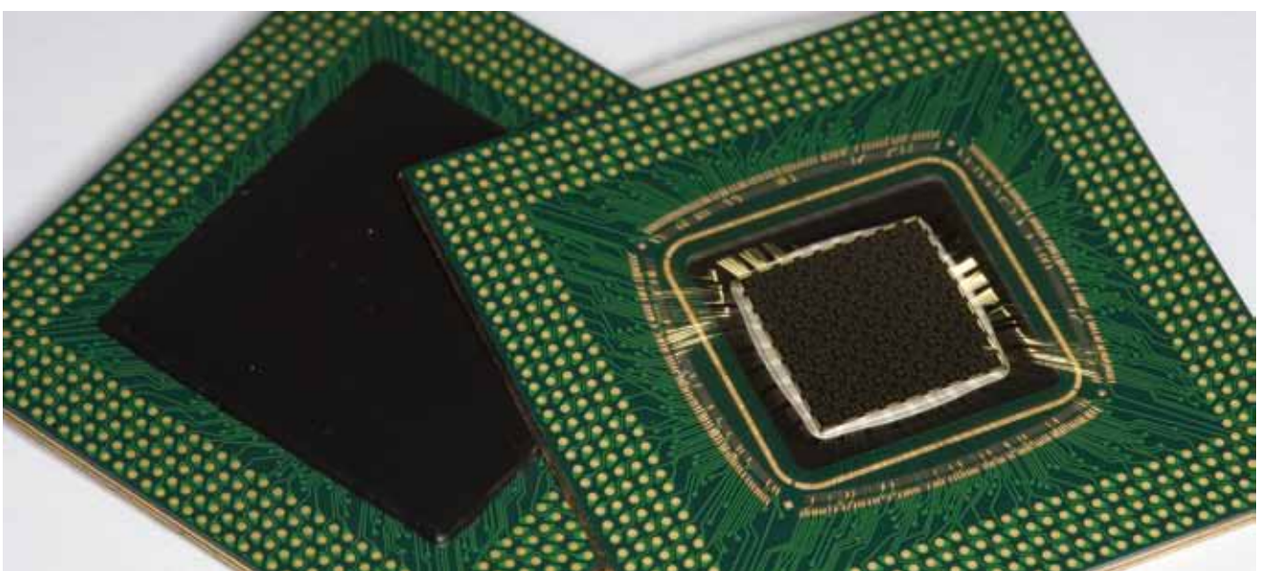
PRODUCT	DESCRIPTION	VISCOSITY, CPS	Tg, °C	THERMAL CONDUCTIVITY,W/MK	MODULUS, GPA	RECOMMENDED CURE
ABLEBOND 3188	Low modulus, Ag-filled, high thermal lid attach material.	15,000	-41	5.4	3	90 min. @ 100°C + 60 min. @ 150°C

PACKAGE LEVEL: LID ATTACH-NON-CONDUCTIVE

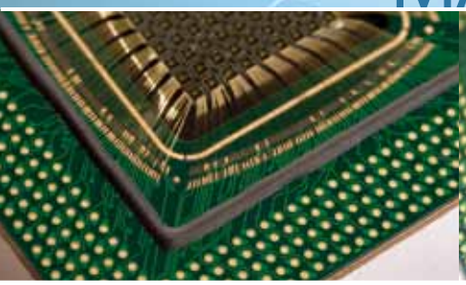
PRODUCT	DESCRIPTION	VISCOSITY, CPS	Tg, °C	THERMAL CONDUCTIVITY,W/MK	MODULUS, GPA	RECOMMENDED CURE
ABLEBOND 3003	Low modulus, high adhesion, ultra-low moisture lid attach material.	35,000	N/A	1.0	4	90 min. @ 100°C + 60 min. @ 150°C
ABLEBOND 3005	Low modulus, high adhesion, ultra-low moisture, long work life, lid attach material.	37,000	-15	0.5	0.4	Ramp 30 min. to 150°C + 30 min. hold @ 150°C
ABLEBOND MC723	Fast cure, high adhesion, ultra-low moisture, long work life, lid attach material.	57,000	N/A	8	3.3	Ramp 30 min. to 150°C + 30 min. hold @ 150°C

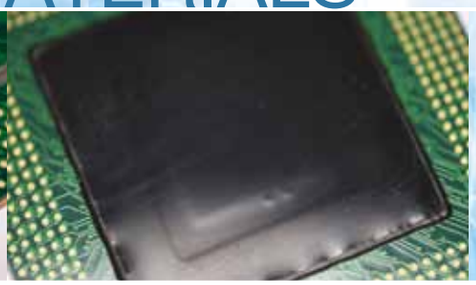
PACKAGE LEVEL: DAM MATERIALS

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	% FILLER	RECOMMENDED CURE
HYSOL 3323	Developed for encapsulation of wire bonded dies, used for Smart Card IC modules. It is designed for use only with Hysol UV fill encapsulants, such as Hysol 3327 and 3329.	N/A	27,500	140	45	43	30 sec. @ 365 nm (UVA)
HYSOL FP4451	Industry standard damming material for BGAs.	N/A	860,000	155	22	72	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP4451TD	Tall dam version of FP4451 for applications requiring a taller, narrower dam. Ionically cleaner also.	N/A	300,000	150	21	73	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP6401	Zero stress dam for ceramic or large array packages.	N/A	300,000	15	77	9	30 min. @ 125°C



SEMICONDUCTOR MATERIALS





ENCAPSULANTS

PACKAGE LEVEL: FILL MATERIALS

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	% FILLER	RECOMMENDED CURE
HYSOL 3327	Developed for encapsulation of wire bonded dies, used for Smart Card IC modules. It is designed for use only with Hysol UV dam encapsulants, such as Hysol 3323.	N/A	8,000	110	45	40	30 sec. @ 365 nm (UVA)
HYSOL 3329	Developed for encapsulation of wire bonded dies, used for Smart Card IC modules. It is designed for use only with Hysol UV dam encapsulants, such as Hysol 3323.	N/A	8,000	150	45	40	30 sec. @ 365 nm (UVA)
HYSOL CB0260	High adhesion version of FP4450 for 260°C L3 JEDEC performance.	High	40,000	145	18	74	1 hr. @ 110°C + 2 hrs. @ 160°C
HYSOL CB0260-1	High adhesion version of FP4450 for 260°C L2A JEDEC performance.	High	40,000	149	18	74	30 min. @ 125°C + 90 min. @ 165°C
HYSOL CB064 / FP4653	Ultra low CTE, low stress version of FP4450 for large array packages.	Low	80,000	150	8	86	2 hrs. @ 110°C + 2 hrs. @ 160°C
HYSOL FP4450	Industry standard fill material for dam and fill or cavity down BGAs.	Medium	43,900	155	22	73	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP4450HF	High flow version of FP4450LV using synthetic filler for use in fine wire and low alpha application.	Very High	32,000	164	21	73	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP4450LV	Low viscosity version of FP4450 incorporating cleaner resins.	High	35,000	160	22	72	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP4460	Glob top version of FP4450.	Low	300,000	173	20	75	1 hr. @ 125°C + 2 hrs. @ 160°C
HYSOL FP4470	High adhesion version of FP4450 for 260°C L3 JEDEC performance.	High	48,000	148	18	75	30 min. @ 125°C + 90 min. @ 165°C
HYSOL FP4654	Low viscosity, high adhesion, version of FP4653 for large array packages.	Medium	32,000	146	13	80	30 min. @ 125°C + 90 min. @ 165°C
HYSOL UV8800M	UV cure Encapsulant for smart card and other COB applications.	Medium	3,500	29	41	54	30 sec. @ 315 - 400 nm (UVA)

PACKAGE LEVEL: MAP LOW STRESS

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	% FILLER	RECOMMENDED CURE
HYSOL FP4651	Low viscosity version of FP4650 for large array packages.	Medium	130,000	150	11	82	1 hr. @ 125°C + 90 min. @ 165°C
HYSOL FP4652	Fast cure, low stress version of FP4450 for large array packages.	Medium	180,000	150	14	80	15 min. @ 110°C + 30 min. @ 165°C
HYSOL CB064 / FP4653	Ultra low CTE, low stress version of FP4450 for large array packages.	Low	80,000	150	8	86	2 hrs. @ 110°C + 2 hrs. @ 160°C
HYSOL FP4654	Low viscosity, high adhesion, version of FP4653 for large array packages.	Medium	32,000	146	13	80	30 min. @ 125°C + 90 min. @ 165°C

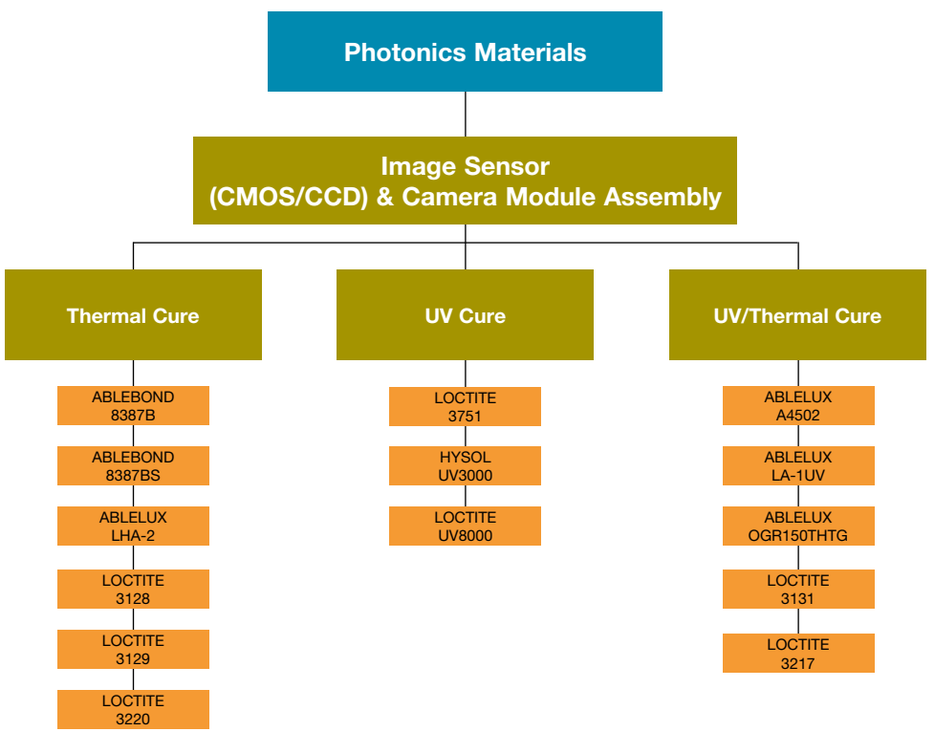
DISCRETES, FILL MATERIAL

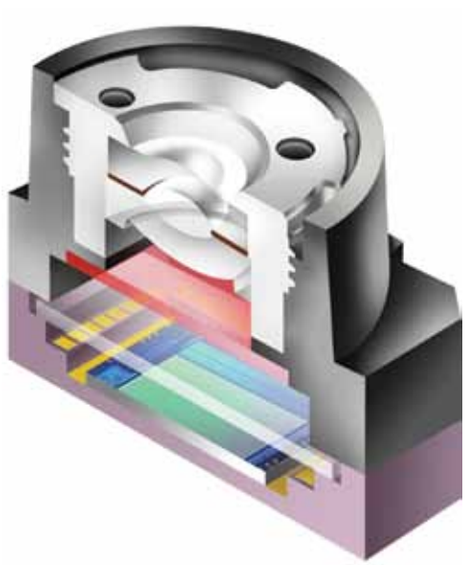
PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	% FILLER	RECOMMENDED CURE
HYSOL FP0087	Low stress fill for potting automated sensor and diodes; high Tg.	High	20,000	175	18	76	1 hr. @ 125°C + 1 hr. @ 180°C

PHOTONICS

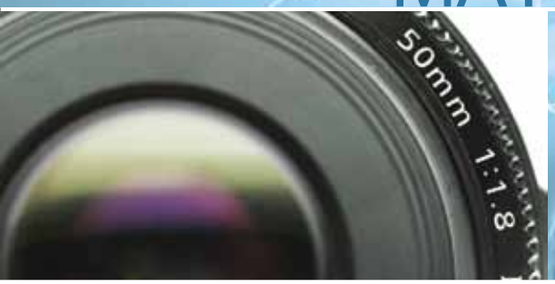
Henkel offers a various products to be used in the assembly of a variety of fiber optic components. These components may consist of Complementary Metal-Oxide-Semiconductor (CMOS) Vision Pack, Charge-Coupled Device (CCD), Display, Laser, Light-Emitting-Diode (LED), Transceivers, Couplers, Splitters as well as Wave Division Multiplexing. These adhesives are used for applications such as Fiber pig tailing, Fiber termination, Fiber splicing, Fiber array assembly and Fiber bonding. The Fiber bonding may be into V-grooves, into ferrules or onto Silicon supports as in coupler assemblies. Other applications could include active alignment of transceiver packages, WDM component assembly, integrated optics, lens mounting, Gradient-index optics (GRIN) lens attach, optical interconnects and lid sealing CCD packages.

Henkel products are cured by UV or visible light, heat cure or a combination depending on your package requirements. These products are developed to be low out-gassing, low warpage, high shear strength, low ionics and auto dispensable.





SEMICONDUCTOR MATERIALS



PHOTONICS

THERMAL CURE

PRODUCT	DESCRIPTION	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	Modulus, Gpa	RECOMMENDED CURE
ABLEBOND 8387B	One-component, low temperature cure for high throughput bonding.	9,500	96	94	1.4	2 min. @ 150°C
ABLEBOND 8387BS	One-component, low temperature cure for high throughput bonding, 30µm glass spacers.	14,250	122	N/A	1.9	60 min. @ 100°C
ABLELUX LHA-2	One-component, low temperature cure for lens holder attach.	16,000	110	45	6.0	60 min. @ 100°C
LOCTITE 3128	One-component, low temperature cure with excellent adhesion on wide range of materials.	15,000	45	40	3.9	20 min. @ 80°C bondline temp.
LOCTITE 3129	One-component, low temperature cure, snap cure with excellent adhesion on wide range of materials.	4,200	35	47	5.4	5-10 min. @ 80°C
LOCTITE 3220	One-component, low temperature cure, snap cure with excellent adhesion on wide range of materials.	3,000	26	61	0.6	5-10 min. @ 80°C

UV CURE

PRODUCT	DESCRIPTION	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	Modulus, Gpa	RECOMMENDED CURE
HYSOL UV3000	High strength, chemical resistant, low outgassing polymer system.	5,300	150	75	N/A	200 mW/cm² for 20 sec.
LOCTITE 3751	Designed for tacking, bonding, encapsulating, coating and sealing applications.	8,000	N/A	N/A	0.6	30 mW/cm² for 120 sec. per side
LOCTITE UV8000	UV-curable cationic epoxy Adhesive. It is designed for use in sealing glass lid of packages of area image sensors such as CCD and CMOS.	27,000	136	N/A	5.0	100 mW/cm² for 30 sec. + 30 min. @ 100°C

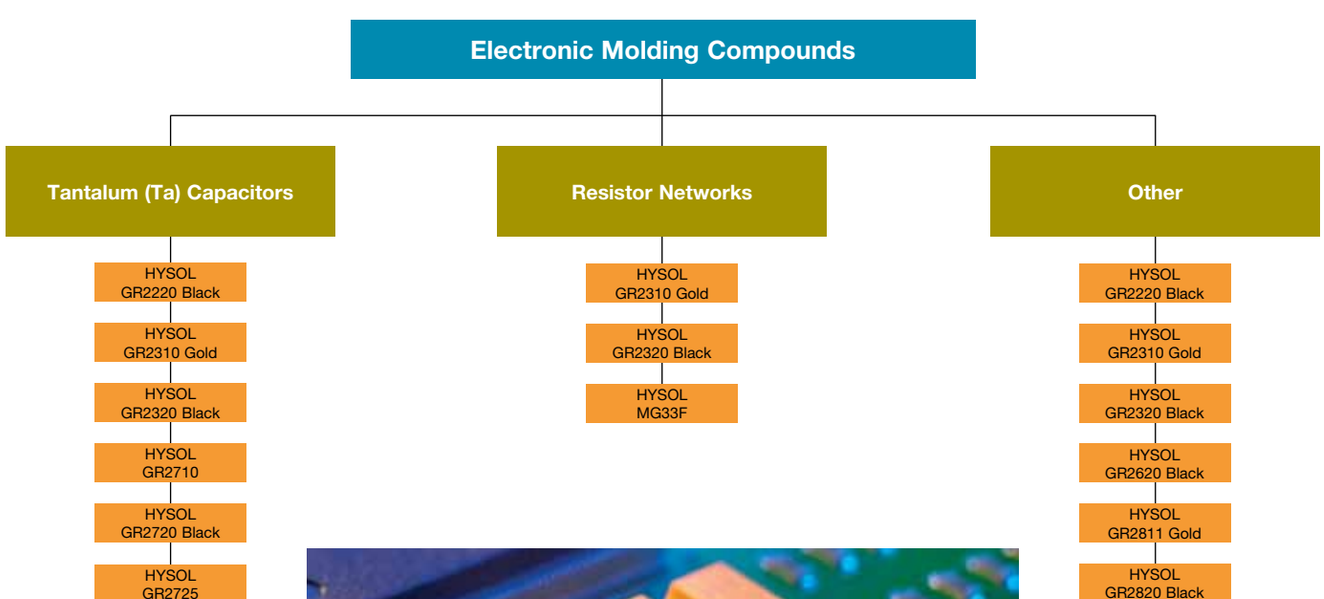
THERMAL / UV CURE

PRODUCT	DESCRIPTION	VISCOSITY, CPS	Tg, °C	CTEa1, ppm/°C	Modulus, Gpa	RECOMMENDED CURE
ABLELUX A4502	One-component, photo or heat-cure Adhesive for high throughput assembly process.	20,000	110	52	2.1	500 mW/cm² for 10 sec. + 15 min. @ 100°C
ABLELUX LA-1UV	One-component, photocurable Adhesive designed for bonding camera module assemblies.	7,000	86	62	1.2	500 mW/cm² for 10 sec. + 60 min. @ 150°C
ABLELUX OGR150THTG	One-component, photo or heat cure Adhesive for high throughput assembly process.	1,000	145	61	1.3	800 mW/cm² for 5 sec. + 1 hour @ 110°C
LOCTITE 3131	One-component UV and heat dual cure Adhesive for assembly of temperature sensitive electronic components.	14,000	87	51	2.46	100 mW/cm² for 2 sec. + 30 min. @ 80°C
LOCTITE 3217	One-component UV and heat dual cure Adhesive for assembly of temperature sensitive electronic components.	10,000	82	53	N/A	100 mW/cm² for 5 sec. + 30 min. @ 80°C

ELECTRONIC MOLDING COMPOUNDS

Hysol Electronic Molding Compounds protect passive components, such as ceramic and Tantalum (Ta) capacitors and resistors, and are designed for both automolds and conventional molds. Our unique Gold (Au) compounds are ideal for high contrast laser marking and are available in fast cure versions for high productivity. Cutting-edge low stress compounds, capable of thin wall designs for today's relentless demands to miniaturize every component, are also available.

Next-generation molding powders have been designed to meet the Electronics industry's need for plastics that are environmentally responsible and resistant to cracking after 260°C IR reflow. New blends of proprietary flame retardants are used to replace the traditional Antimony (Sb) oxide/ halogenated resin flame-out systems. The materials pass UL standards and meet the EU's environmental requirements (i.e., no Halogens, no heavy metals). Combining these flame retardants with new resin technology and filler blends has produced a series of ultra low stress materials that resist cracking after exposure to 260°C IR reflow conditions.



Hysol

SEMICONDUCTOR MATERIALS

ELECTRONIC MOLDING COMPOUNDS

TANTALUM (TA) CAPACITORS

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	$CTE_{\alpha 2}$, ppm/°C	CURE TIME @ 177°C	FLEXURAL STRENGTH, psi	FLEXURAL MODULUS, psi	LASER MARKABLE
HYSOL GR2220	Black/conventional molding of MnO caps.	Conventional	40	162	19	60	30 - 45 sec.	18,500	2.4×10^6	N
HYSOL GR2310	Au/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	166	22	75	30 - 45 sec.	20,500	2.1×10^6	Y
HYSOL GR2320	Black/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	172	22	82	N/A	20,300	N/A	Y
HYSOL GR2710	Au/low stress/non-flame retarded molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	35	161	13	45	45 - 60 sec.	19,000	2.6×10^6	Y
HYSOL GR2720	Black/low stress/non-flame retarded molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	35	165	18	63	N/A	18,000	N/A	Y
HYSOL GR2725	Black low stress epoxy mold compound. Especially designed for low ESR on conductive polymer Ta and AO capacitors.	Conventional/Auto	55	170	17	60	30 - 45 sec.	20,000	2.2×10^6	Y
HYSOL GR2811	Au/thin wall-crack-resistant, low stress, fast cycle time.	Conventional/Auto	34	162	13	45	30 - 45 sec.	20,000	2.9×10^6	Y
HYSOL MG33F	Black, environmentally responsible, "green," Molding Compound designed especially for the encapsulation of Ta capacitors. Low moisture absorption, excellent moldability with fast cycle times, especially auto-mold applications.	Conventional/Auto	28	175	19	61	30 - 45 sec.	20,000	2.2×10^6	Y

RESISTOR NETWORKS

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	$CTE_{\alpha 2}$, ppm/°C	CURE TIME @ 177°C	FLEXURAL STRENGTH, psi	FLEXURAL MODULUS, psi	LASER MARKABLE
HYSOL GR2310	Au/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	166	22	75	30 - 45 sec.	20,500	2.1×10^6	Y
HYSOL GR2320	Black/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	172	22	82	N/A	20,300	N/A	Y
HYSOL MG33F	Black, environmentally responsible, "green," Molding Compound designed especially for the encapsulation of Ta capacitors. Low moisture absorption, excellent moldability with fast cycle times, especially auto-mold applications.	Conventional/Auto	28	175	19	61	30 - 45 sec.	20,000	2.2×10^6	Y

OTHER

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	$CTE_{\alpha 2}$, ppm/°C	CURE TIME @ 177°C	FLEXURAL STRENGTH, psi	FLEXURAL MODULUS, psi	LASER MARKABLE
HYSOL GR2220	Black/conventional molding of MnO caps.	Conventional	40	162	19	60	30 - 45 sec.	18,500	2.4×10^6	N
HYSOL GR2310	Au/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	166	22	75	30 - 45 sec.	20,500	2.1×10^6	Y
HYSOL GR2320	Black/non-halogenated molding powder, Ta and ceramic capacitors, leaded or surface-mounted sensors.	Conventional/Auto	27	172	22	82	N/A	20,300	N/A	Y
HYSOL GR2620	General-purpose, good moldability, and high Tg.	Conventional	35	145	32	87	N/A	20,000	N/A	N
HYSOL GR2811	Au/thin wall-crack-resistant, low stress, fast cycle time.	Conventional/Auto	34	162	13	45	30 - 45 sec.	20,000	2.9×10^6	Y
HYSOL GR2820	Au/thin wall-crack-resistant, low stress, fast cycle time.	Conventional/Auto	25	153	12	50	N/A	17,000	N/A	Y

MOLDING COMPOUNDS

From through-hole discrete components to the most advanced surface mount devices, Henkel's Hysol brand Molding Compounds deliver the outstanding performance and ease of use you'd expect from a world leader in materials technology. Combining low stress and low moisture absorption with high physical strength, all of Henkel's Molding Compounds ensure an optimized process at high yields even in the most demanding Pb-free environments. Formulated for the varying requirements of today's discrete components, Hysol products' high performance Molding Compounds offer the ultimate in manufacturing value for general discretes. With fast cycle times, a robust process window and the ability to run in excess of 700 cycles prior to mold cleaning, these materials deliver exceptional results. For more demanding high voltage applications, Hysol materials have been formulated to provide low dielectric properties at high temperatures. Henkel has also developed Molding Compounds for thermally conductive discretes that provide excellent thermal characteristics, offering up to 2.1 W/mK with the ability to go as high as 3 W/mK. The low moisture absorption and low stress properties of Hysol Molding Compounds for surface-mounted leadframe devices all pass stringent JEDEC Level 1, 260°C testing. All Hysol Molding Compounds are green materials, which are halide-free and Pb-free compatible and meet RoHS requirements, while delivering superior performance even in high temperature reflow conditions.

With materials solutions for QFPs, SoPs, SOICs, QFNs, SOTs and DPAKs, the Hysol line of Molding Compounds are formulated for package-specific demands and deliver exceptional adhesion for a variety of leadframe finishes. For packaging

specialists building surface-mounted laminate packages such as BGAs and CSPs, Henkel has developed a wide range of state-of-the-art Molding Compound materials utilizing our unique flexible hardener technology. Maintaining package flatness throughout package assembly and subsequent PCB assembly processes is essential for ensuring high reliability. Henkel's flexible hardener technology enables package-specific Molding Compound formulations that counter-correct any warpage that may occur during second level reflow processes, thus ensuring high performance and long-term reliability. In addition, we have developed innovative Molding Compound materials for use with today's multifunctional memory card (MMC) and Package-on-Package (PoP) applications. Hysol MMC and PoP Molding Compounds deliver the robust performance characteristics and exceptionally low warpage required for these devices.

Hysol

SEMICONDUCTOR MATERIALS

MOLDING COMPOUNDS

Semiconductor Molding Compounds

- Through-Hole Discrete
- Surface Mount / Lead Frame
- Surface Mount / Laminate

Through-Hole Discretes

General Discretes
TO, Axial, Bridge, Single In-Line Package (SIP)

- HYSOL KL1000-3LX
- HYSOL KL-2500-1K
- HYSOL KL-4500-1
- HYSOL GR360A-F8
- HYSOL KL-G100
- HYSOL KL-G150
- HYSOL KL-G200

High Thermal Conductivity Application
TO, Full Pack, HSOP

- HYSOL KL-5000HT
- HYSOL KL-G500HT
- HYSOL GR750
- HYSOL GR750HT-25
- HYSOL GR750-SC

High Voltage Application
TO, Axial, Bridge, DIP,

- HYSOL MG15F
- HYSOL GR15F-1P

Surface Mount / Lead Frames

QFP, T/LQFP, TSSOP

- HYSOL GR869
- HYSOL KL-7000HA
- HYSOL KL-G730

SOIC

- HYSOL GR828D
- HYSOL GR869
- HYSOL KL-4500-1NT
- HYSOL KL-G450H
- HYSOL KL-G730

QFN

- HYSOL KL-G900HC
- HYSOL KL-G900HP

DPAK/D2PAK

- HYSOL GR838LC
- HYSOL GR828DD

SOT/SMX

- HYSOL GR640HV-L1
- HYSOL KL-6500S
- HYSOL KL-G200S
- HYSOL KL-G450S
- HYSOL KL-G800H

High Power Packages Power SOIC, Power SSOP

- HYSOL GR725LV-LS

Surface Mount / Laminates

SIP

- HYSOL GR9810 Series

PBGA, CSP

- HYSOL GR9810 Series

PoP, SCSP

- HYSOL GR9810-1P

MMC

- HYSOL GR9810-1P
- HYSOL GR9851M

Green Product

Non-Green Product

SEMICONDUCTOR MATERIALS

MOLDING COMPOUNDS

THROUGH-HOLE DISCRETES

GENERAL DISCRETES, TO, AXIAL, BRIDGE, SIP (SINGLE IN-LINE PACKAGE)

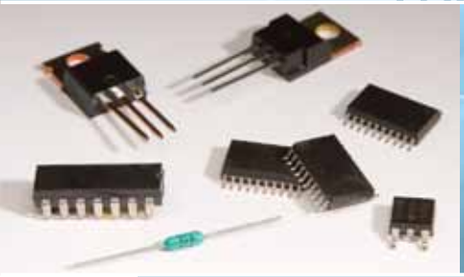
PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY	MSL	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC.	FILLER TYPE	CTEa1, ppm/°C	Tg, °C
HYSOL GR360A-F8	Good electrical stability at high temperature.	0.8 W/mK	N/A	Y	70	28	Fused	13	163
HYSOL KL1000-3LX	Provides the lowest cost of ownership with superior moldability and reliability. Extremely suitable for bridge, axial and TO packages.	1.3 W/mK	L4/220°C	N	75	23	Crystalline	24	165
HYSOL KL-2500-1K	Low stress Molding Compound and is suitable for TO and DIP packages and provides superior moldability and reliability.	0.9 W/mK	L3/260°C	N	100	22	Fused	19	145
HYSOL KL-4500-1	Low stress, low viscosity.	0.75 W/mK	L1/260°C	N	91	25	Fused	16	160
HYSOL KL-G100	Green Molding Compound with 1/4 inch flammability rating suitable for bridge, axial and TO packages. Offers superior moldability with lowest cost of ownership.	0.9 W/m.K	L3/260°C	Y	80	23	Crystalline	22	165
HYSOL KL-G150	Green Molding Compound with 1/4 inch flammability rating suitable for bridge and TO packages. Offers superior moldability.	0.9 W/m.K	L3/260°C	Y	80	20	Crystalline	18	165
HYSOL KL-G200	Green Molding Compound with 1/4 inch flammability rating suitable for bridge, axial and TO packages. Offers superior moldability with lowest cost of ownership.	0.9 W/mK	L3/260°C	Y	80	23	Crystalline Fused	22	165

THROUGH-HOLE DISCRETES / HIGH THERMAL CONDUCTIVITY

TO, FULL PACK, HSOP

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC.	FILLER TYPE	CTEa1, ppm/°C	Tg, °C
HYSOL GR750	Has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. Low moisture absorption and low thermal expansion are suitable for stress sensitive devices.	2.1 W/mK	Y	65	30	Alumina/ Crystalline	23	160
HYSOL GR750HT-25	A high thermal conductivity Molding Compound using fully alumina fillers designed to improve thermal management for semiconductor devices. It exhibits high adhesion to Cu and Cu alloys. This material is specifically recommended for isolated power transistors, which require high heat dissipation.	2.1 W/mK	Y	65	30	Alumina/ Crystalline	23	160
HYSOL GR750-SC	A high thermal conductivity Molding Compound using fully rounded spherical crystalline fillers designed to improve thermal management for semiconductor devices. It exhibits high adhesion to Cu and Cu alloys. This material is specifically recommended for isolated power transistors.	2.1 W/mK	Y	45	26	Crystalline	20	155
HYSOL KL-5000HT	Has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. Low moisture absorption and low thermal expansion are suitable for stress-sensitive devices.	2.1 W/mK	N	60	32	Alumina/ Crystalline	22	155
HYSOL KL-G500HT	High thermal conductivity, for TO-220F/3PF packages.	1.92 W/mK	Y	60	40	Fused/Crystal	20	175

SEMICONDUCTOR MATERIALS



MOLDING COMPOUNDS

DISCRETES / HIGH VOLTAGE APPLICATIONS

TO, AXIAL, BRIDGE, DIP

PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC CONDUCTIVITY, ROOM TEMP.	IONIC CONDUCTIVITY, 150°C	MSL	GREEN	SPIRAL FLOW, cm	CTEa1, ppm/°C	Tg, °C
HYSOL GR15F-1P	Green, anhydride-cured Molding Compound contains spherical filler and is designed for high voltage applications. This product has excellent moldability performance with high yield rates.	>900 V discrete, >400 V IC	3.6	5.2	L1/235°C	N	65	23	160
HYSOL MG15F	Anhydride-cured Molding Compound designed specifically for use in high voltage power applications requiring good electrical stability at high temperature. This material is specifically recommended for power discrete, high voltage rectifier and other applications where up until now only silicone Molding Compounds have been satisfactory.	>900 V discrete, >400 V IC	3.6	5.2	L1/235°C	N	65	23	160

SEMICONDUCTOR MATERIALS

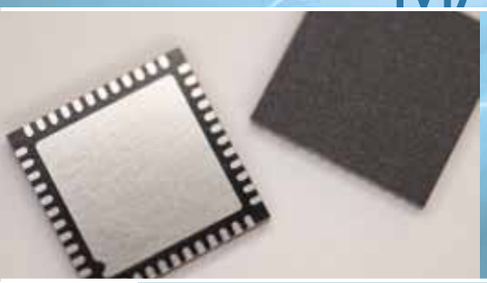
MOLDING COMPOUNDS

SURFACE MOUNT / LEADFRAMES

QFP, T/LQFP, TSSOP

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	CTEa1, ppm/°C	Tg, °C
HYSOL GR869	Green, ultra low stress and high adhesion Molding Compound designed for QFP packages with Pb-free finishing. HYSOL GR869 provides wide molding process window and robust reliability performance.	Ag, Cu, Ni	all T/LQFP	L3/260°C	Y	86.5	102	9	124
HYSOL KL-7000HA	High adhesion and high strength Molding Compound suitable for SOT, SSOP and QFP packages. Provides ultra low stress, low moisture absorption, high purity and high reliability. Its low viscosity properties enable low wire sweep.	all QFP	< 14 x 14 mm T/ LQFP	L3/260°C	N	84	110	9	130
HYSOL KL-G730	High adhesion, ultra low stress and green Molding Compound suitable for SOIC, TSOP, D/D2PAK, QFP, L/TQFP. Its low viscosity properties enable low wire sweep molding with a large operating window. It has no flame retardants but offers a 1/8 inch flammability rating.	PPF, Ag	all SOIC	L1/260°C	Y	87	129	7	130

SEMICONDUCTOR MATERIALS



MOLDING COMPOUNDS

SURFACE MOUNT / LEADFRAMES

SOIC

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	CTEa1, ppm/°C	Tg, °C
HYSOL GR828D	Green, ultra-low stress and high adhesion Molding Compound designed for SOIC, TSOP and QFP packages with Pb-free finishing. Targets package finishings that require Ag adhesion molding with a large operating window.	PPF, Ag	all T/LQFP	L3/260°C	Y	88	100	9	135
HYSOL GR869	Green, ultra low stress and high adhesion Molding Compound designed for QFP packages with Pb-free finishing. Provides wide molding process window and robust reliability performance.	Ag, Cu, Ni	all T/LQFP	L3/260°C	Y	86.5	102	9	124
HYSOL KL-4500-1NT	Low stress and high reliability Molding Compound suitable for SOIC packages. Its low viscosity properties enable low wire sweep molding with a large operating window.	PPF, Ag	< 16L Narrow body SOIC	L1/260°C	N	78	90	14	150
HYSOL KL-G450H	Low stress, green Molding Compound, suitable for SOP, SSOP, SOJ packages, low-cost ownership.	Ag, Cu, Ni	SOP, SSOP, SOJ	L3/260°C	Y	81	96	16	135
HYSOL KL-G730	High adhesion, ultra-low stress and green Molding Compound suitable for SOIC, TSOP, D/D2PAK, QFP, L/TQFP. Its low viscosity properties enable low wire sweep molding with a large operating window. It has no flame retardants but offers a 1/8 inch flammability rating.	PPF, Ag	all T/LQFP	L3/260°C	Y	87	129	7	130

QFN

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL KL-G900HC	Suitable for Ag/Cu QFN packages with its low wire sweep and excellent warpage performance. Offers high reliability performance and moldability on thin panels, and map molding could not be easier.	Ag	L2/260°C (7 x 7 mm)	Y	88	85	7	105
HYSOL KL-G900HP	Suitable for PPF QFN packages with its low wire sweep and excellent warpage performance. Offers high reliability performance and moldability on thin panels, and map molding could not be easier. Its unique low stress property at high temperature enables passing L1/260°C on PPF packages.	PPF	L1/260°C (7 x 7 mm)	Y	88.5	82	9	100

DPAK/D2PAK

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL GR828DD	Green, semiconductor grade, low stress and high adhesion Molding Compound. It's especially designed for DPAK/D2PAK packages with Ni and Cu/Ag plating lead frames.	Ag, Ni, Cu	L1/260°C	Y	88	90	9	135
HYSOL GR838LC	Low stress, excellent gate leakage performance.	Ag, Cu	L1/260°C	Y	83	90	8.8	125

MOLDING COMPOUNDS

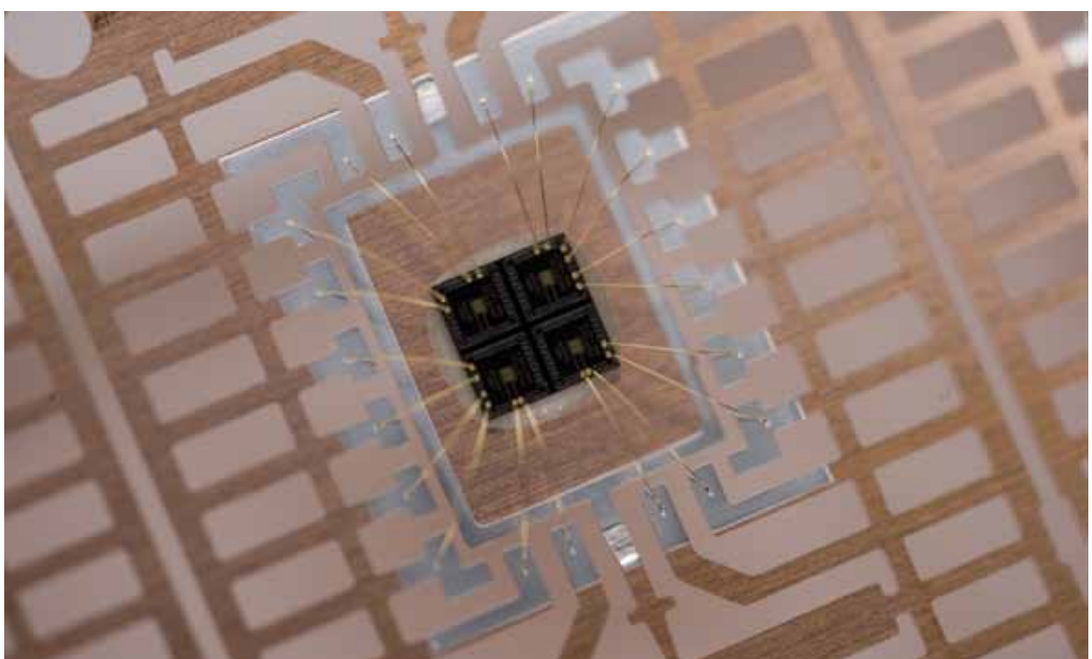
SURFACE MOUNT / LEADFRAMES

SOT/SMX

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	MAX FILLER SIZE, µm	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
HYSOL GR640HV-L1	Low stress Molding Compound suitable for SOT, SOD packages, GR640HV-L1 provides good workability and high reliability.	Ag, Cu	L1/260°C	Y	75	69	15	160
HYSOL KL-6500S	Low stress molding compound suitable for SOT, SOD and SOIC packages, HYSOL KL6500S provides good workability and high reliability.	Ag, Cu	L1/260°C	N	75	110	14	150
HYSOL KL-G200S	Green, super moldability for SMX packages.	Ag, Cu	L1/260°C	Y	125	20	20	175
HYSOL KL-G450S	High adhesion, low stress green EMC.	Ag, Cu	L1/260°C	Y	75	100	11	112
HYSOL KL-G800H	High adhesion, ultra-low stress, low viscosity.	Ag, Cu	L2/260°C	Y	75	115	7.5	125

HIGH POWER PACKAGES, POWER SOIC, POWER SSOP

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, C
HYSOL GR725LV-LS	Green Molding Compound. Designed for power SO and surface mount discrete packages.	Ag, Cu, Ni	L1/260°C	Y	84	130	11	150



SEMICONDUCTOR MATERIALS

MOLDING COMPOUNDS

SURFACE MOUNT / LAMINATES

SiP

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL GR9810 series	Advanced epoxy Molding Compounds designed for use as an overmold on a wide variety of BGA and CSP. The series' flexible hardener technology enables ultra-low warpage. HYSOL GR9820-1 is a "green" (non Sb, Br, P) Molding Compound and is capable of achieving JEDEC Level 3, at 260ºC reflow temperature.	PBGA 37.5 x 37.5 mm CSP Panel 50 x 60 mm	<4 <6	L3/260°C	Y	85	120	11	200

PBGA, CSP

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL GR9810 series	Advanced epoxy Molding Compounds designed for use as an overmold on a wide variety of BGA and CSP. The series' flexible hardener technology enables ultra-low warpage. HYSOL GR9820-1 is a "green" (non Sb, Br, P) Molding Compound and is capable of achieving JEDEC Level 3, at 260ºC reflow temperature.	PBGA 37.5 x 37.5 mm CSP Panel 50 x 60 mm	<4 <6	L3/260°C	Y	85	120	11	200

PoP, SCSP

PRODUCT	DESCRIPTION	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL GR9810-1P	State-of-the-art epoxy Molding Compound developed to meet the stringent encapsulation requirements of package-on-package (PoP) devices. This compound exhibits advanced warpage control characteristics; these properties can be tuned to match the package requirements through variations in the base resin chemistry to provide optimum warpage characteristics across a broad range of package geometries. The compound exhibits long spiral flow and excellent room temperature working life, significantly increased beyond that of standard green compound chemistry. "Green" without any flame retardants and is capable of a 1/4 inch flammability rating.	15 x 15 mm FBGA	L3/260°C	Y	86	120	11	185

MMC

PRODUCT	DESCRIPTION	SUBSTRATE THICKNESS	STRIP WARPAGE	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE_{a1}, ppm/°C	Tg, °C
HYSOL GR9810-1P	State-of-the-art epoxy Molding Compound developed to meet the stringent encapsulation requirements of package-on-package (PoP) devices. This compound exhibits advanced warpage control characteristics; these properties can be tuned to match the package requirements through variations in the base resin chemistry to provide optimum warpage characteristics across a broad range of package geometries. The compound exhibits long spiral flow and excellent room temperature working life, significantly increased beyond that of standard green compound chemistry. "Green" without any flame retardants and is capable of a 1/4 inch flammability rating.	15 x 15 mm FBGA	L3/260°C	Y	86	120	11	185
HYSOL GR9851M	State-of-the-art epoxy Molding Compound developed to meet the encapsulation requirements of memory card devices. This compound exhibits outstanding warpage control, long spiral flow and very low wire sweep characteristics. "Green" without any flame retardants and is capable of a 1/4 inch flammability rating. It has excellent shrinkage characteristics, high glass transition temperature (Tg), and suitable for use in applications where excellent dimensional stability is required.	0.18 mm 0.2 mm	< 2 mm smiling	Y	88	120	10	205

SOLDER MATERIALS

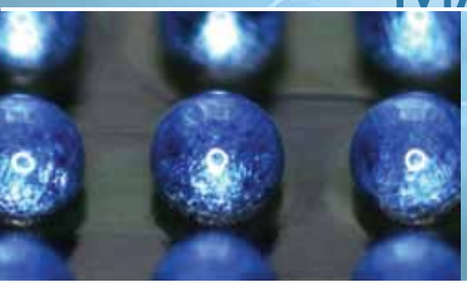
PoP Tacky Fluxes
As Package-on-Package (PoP) devices have gained favor in recent years, it has become increasingly evident that the requirements of the technology are certainly unique. This is true for many materials used to manufacture and assemble PoPs, but particularly for the tacky fluxes needed for both ball attach and for device stacking. That's why Henkel, the leader in solder innovation, has formulated a series of Tacky Flux systems to address the demands of PoP production.

PoP Epoxy Flux
Combining both flux functionality and underfill protection into a single formulation, Hysol FF6000 takes PoP manufacturing flexibility to a whole new level. Traditional underfill application methodologies simply don't work for top package assembly, but Hysol FF6000 has solved this problem by incorporating a flux component that provides the action necessary for solder joint formation and an epoxy that encapsulates each solder sphere, delivering added support and protection. This streamlined approach effectively eliminates the need for dispensing equipment and the time required for underfill application and cure. But that's not all: Hysol FF6000 has also been proven to provide improved protection – as compared to traditional flux materials – for solder sphere attach during package production as well.

PoP Solder Paste
When either the top or bottom package of a PoP is warped, co-planarity of the stacked packages becomes a challenge. One method used to overcome co-planarity challenges is solder paste dipping, where the top package is dipped into solder paste. Not only does the extra metallization reduce the possibility of non- co-planar induced solder joints, but it improves the joint reliability by increasing the component stand-off. The metal loading and particle size distribution of Henkel's Multicore LF730 Solder Paste have been optimized for package stacking.

Die Attach Solder Paste
Multicore DA100 and Multicore DA101 have been designed to provide the thermal management necessary for today's smaller outline, higher-functioning semiconductor power devices, while also delivering the processability and versatility associated with solder paste materials. These products offer robust options for application-specific thermal requirements and overcome many of the issues historically associated with alternative products such as silver (Ag)-based Die Attach Adhesives and solder wire, neither of which is ideal for modern semiconductor power device production. The robust nature of the flux formulas provides customers the flexibility to alter alloys based on process requirements.

SEMICONDUCTOR MATERIALS



SOLDER MATERIALS

PoP TACKY FLUXES

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY	COLOR	TACK, g/mm²	ACID VALUE	SOLIDS CONTENT, %
MULTICORE TFN600	No-clean Tacky Flux for sphere attach.	Printing (screen and stencil); pin transfer and dispensing	480,000	Brown	130	70	49
MULTICORE TFN700B	Newtonian No-clean Tacky Flux for PoP.	Dipping, jetting	47,000	Blue	175	108	80
MULTICORE TFN800HF-Blue	A non-Newtonian, no-clean, halogen-free, Tacky Flux intended for use in application such PoP and Flip-Chip.	Dipping, jetting	33,000	Blue	160	N/A	75
MULTICORE WS300	Standard viscosity; water-wash Tacky Flux.	Printing (screen and stencil); pin transfer and dispensing	550,000	Brown	132	30	80

PoP EPOXY FLUXES

PRODUCT	DESCRIPTION	VISCOSITY	POT LIFE	CURE SCHEDULES	Tg (°C)	CTE (PPM/°C)
HYSOL FF6000	A Tacky Flux with the additional features and benefits of an epoxy. It is formulated to provide both fluxing action during reflow and a cured adhesive bond after reflow in a Pb-free process – with no additional processing.	4,600	24 hrs.	Pb-free solder reflow profile @ 260°C	30	88

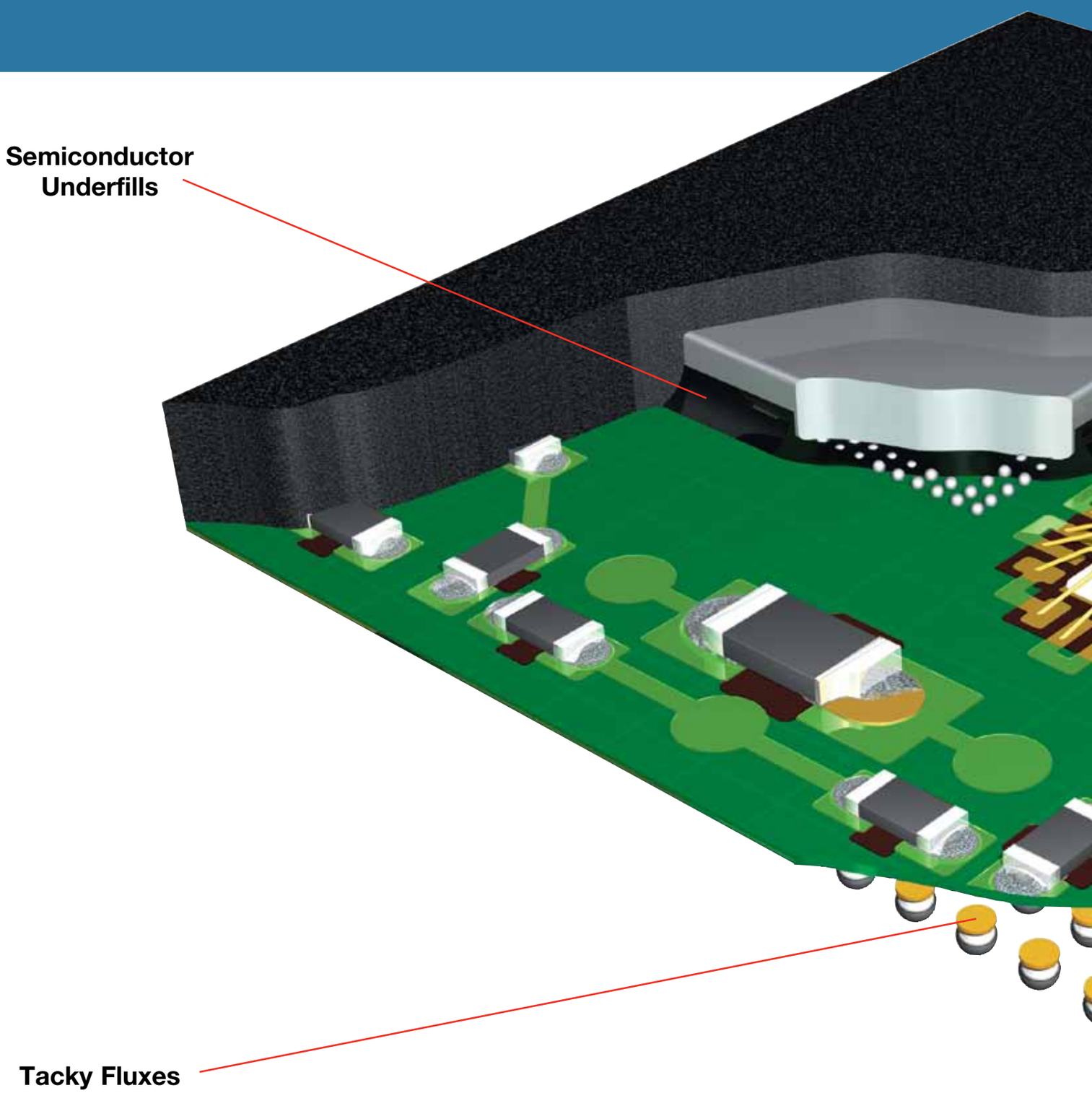
SOLDER PASTE

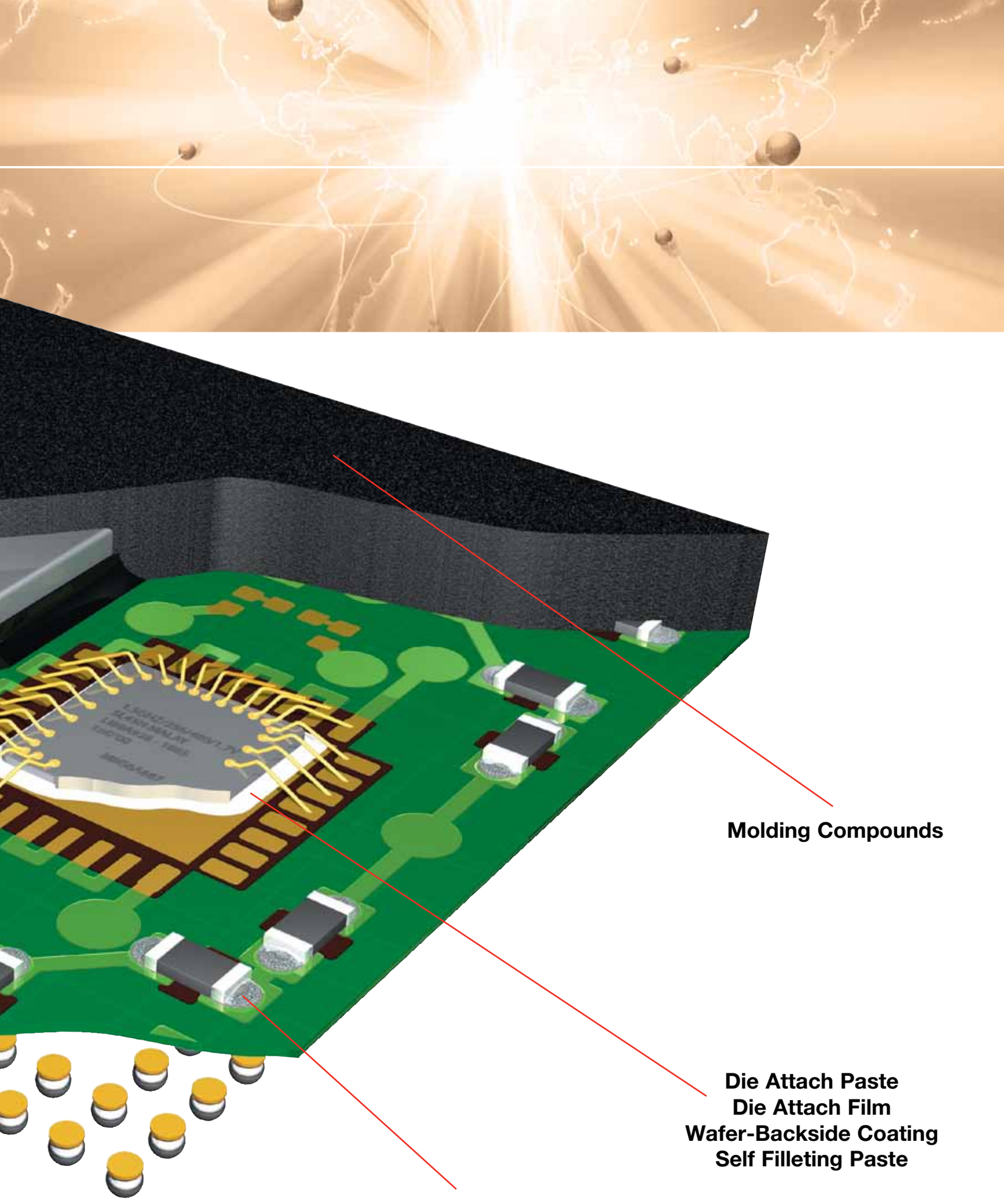
PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
MULTICORE LF730	A halide-free, no-clean, low voiding, Pb-Free solder paste, which has excellent humidity resistance and a broad process window both for printing and reflow.	96SC, 97SC	88.5	2.4	70 - 130	ROL0

DIE ATTACH SOLDER PASTE

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	ALLOY	REFLOW	CLEANABILITY	IPC/J-STD-004 CLASSIFICATION
MULTICORE DA100	Flux designed for Solder Die Attach Paste applications. Effective thermal control for Cu leadframe power semiconductor devices, such as rectifiers, power transistors, and for automotive and consumer packages.	Dispensing	250,000	High Pb	Forming Fast	Excellent	ROL0
MULTICORE DA101	Flux designed for Solder Die Attach Paste applications. Effective thermal control for Cu leadframe power semiconductor devices, such as rectifiers, power transistors, and for automotive and consumer packages.	Printing	250,000	High Pb	Forming Fast	Excellent	ROL0

SEMICONDUCTOR SOLUTIONS




Molding Compounds
Die Attach Paste
Die Attach Film
Wafer-Backside Coating
Self Filleting Paste
Solder Paste

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SEMICONDUCTOR MARKET SOLUTIONS

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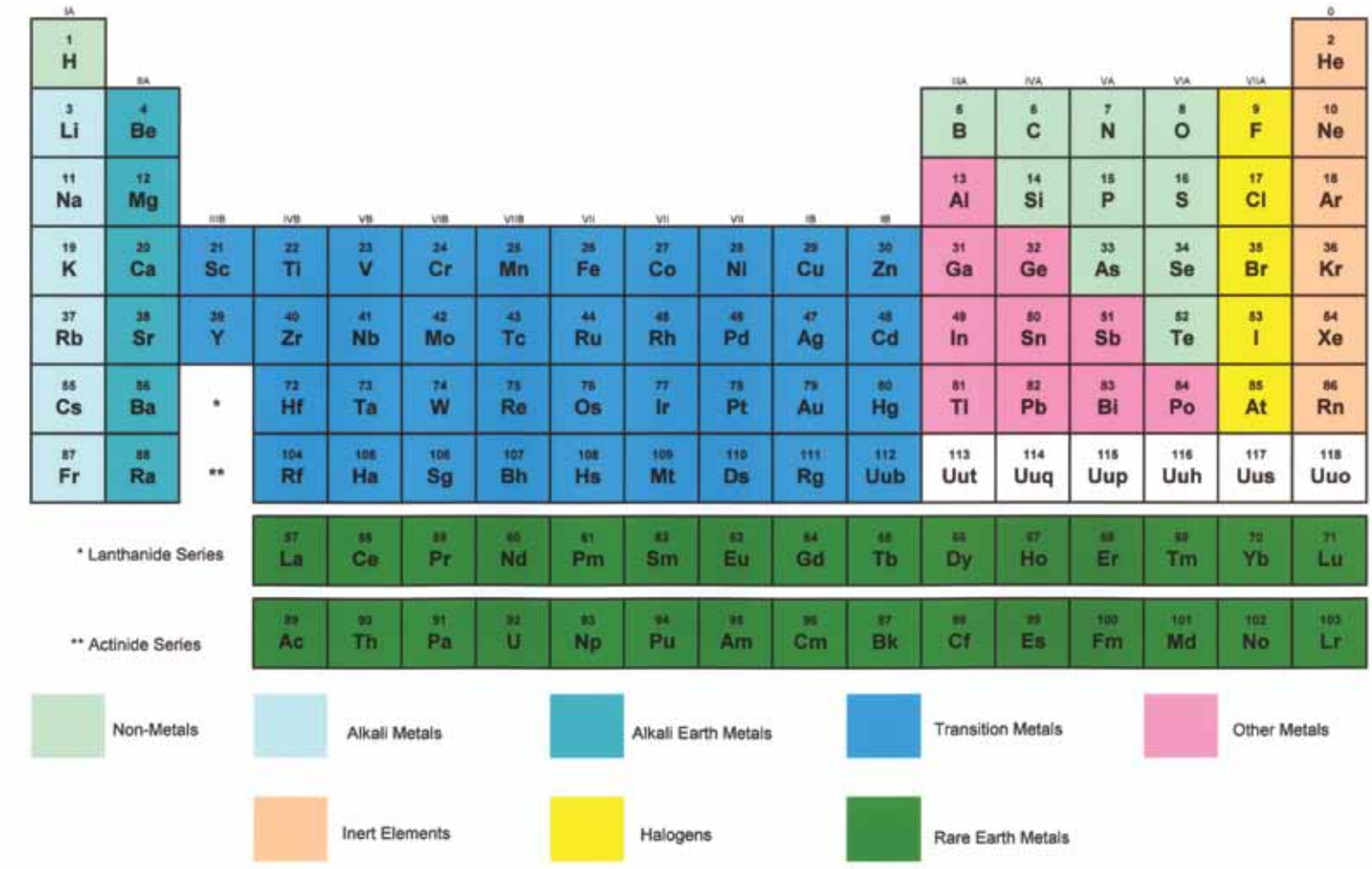

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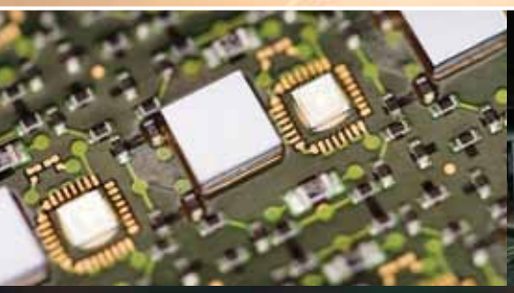

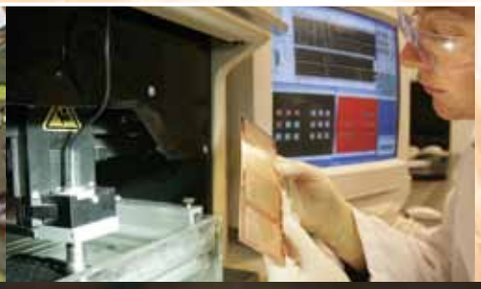

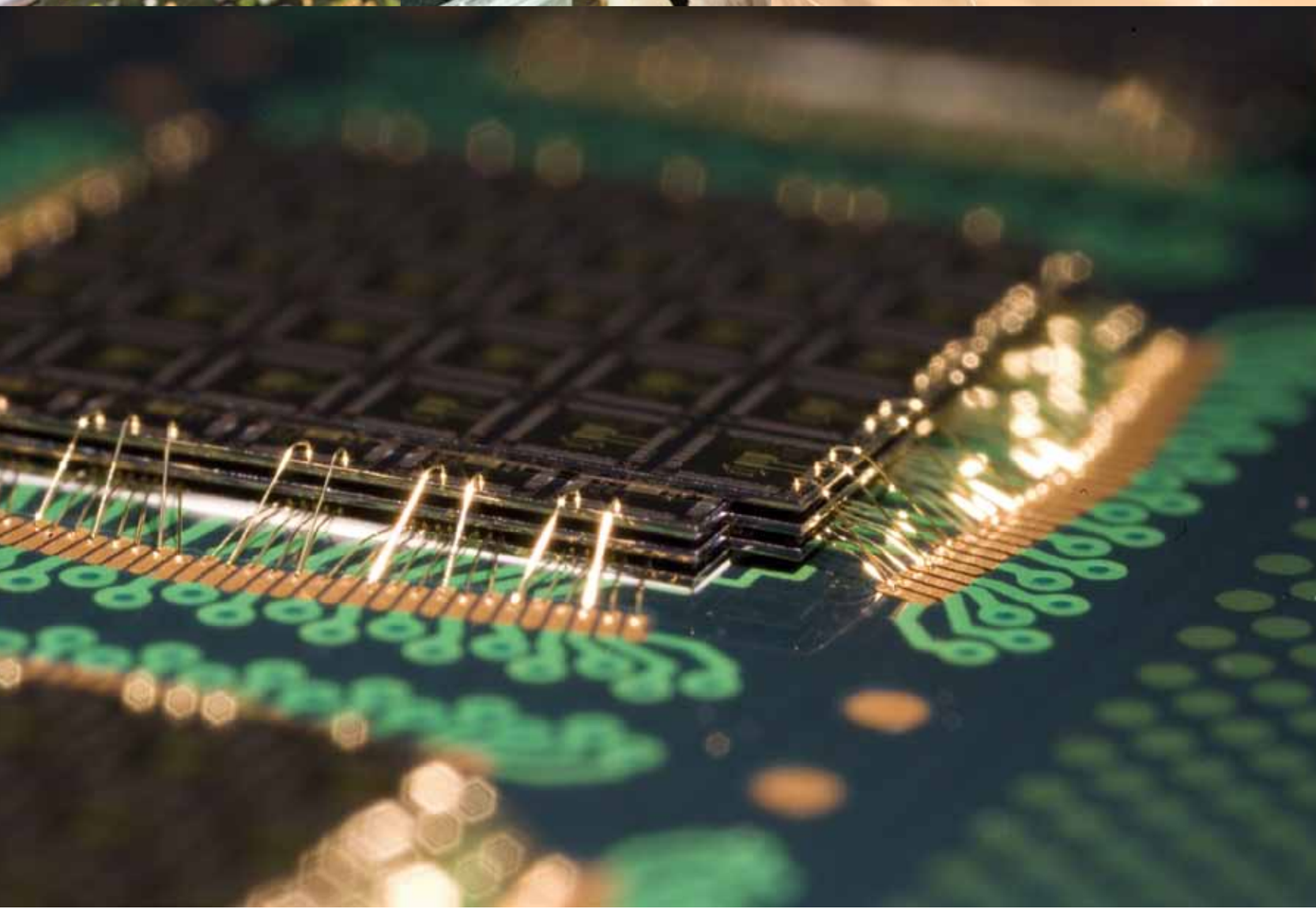

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