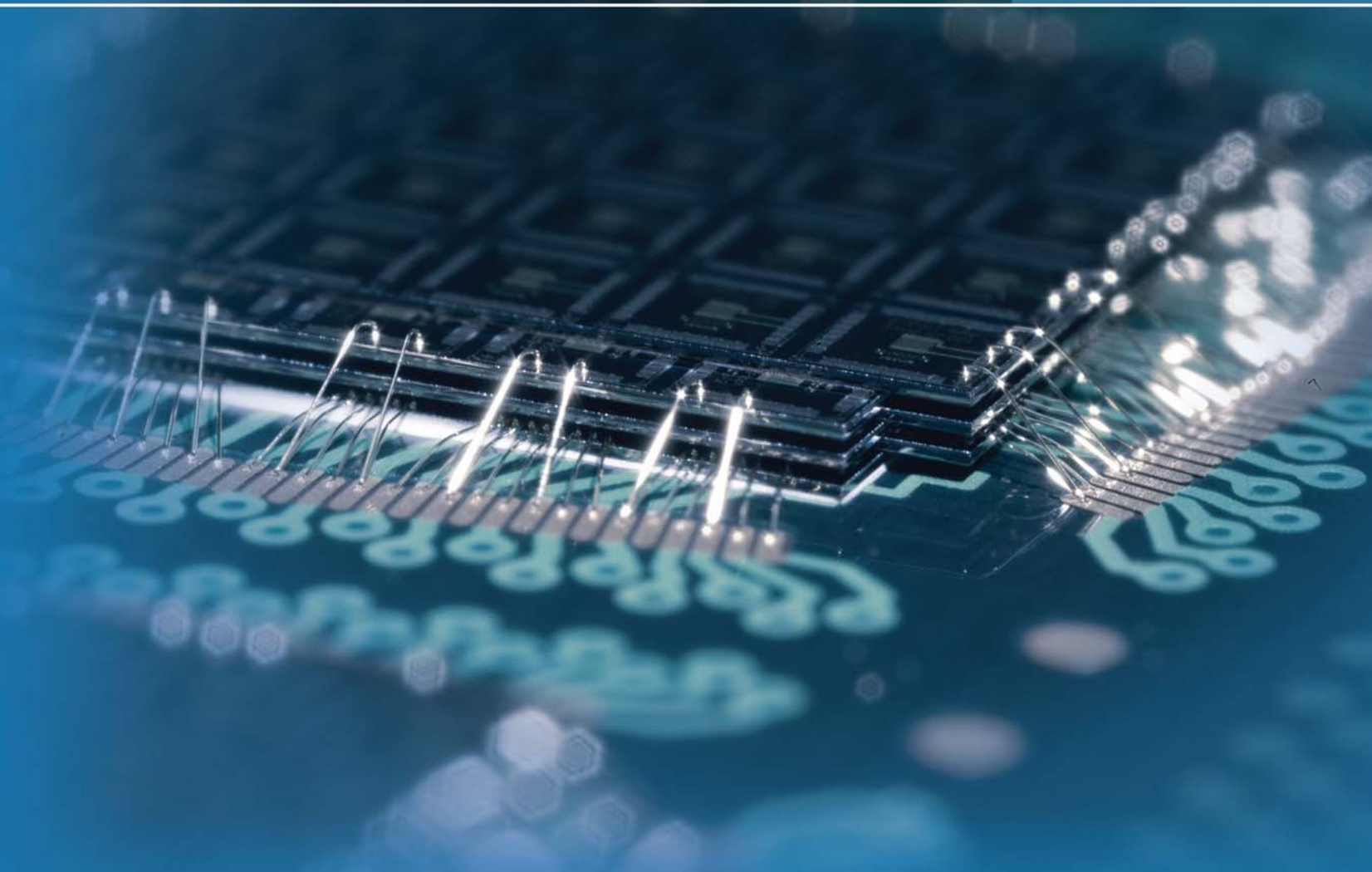
Ablestik™ Hysol® Multicore®

Henkel
Semiconductor Solutions

Henkel



WORLDWIDE MANUFACTURING & ORGANIZATION

ELECTRONICS GROUP OF HENKEL

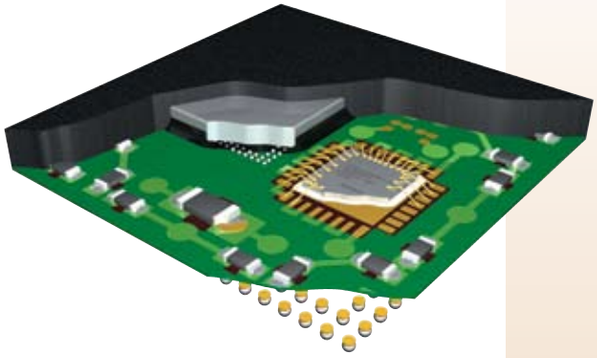
★ Headquarters/Product Development
■ Product Development/Manufacturing
● Product Development
▲ Manufacturing

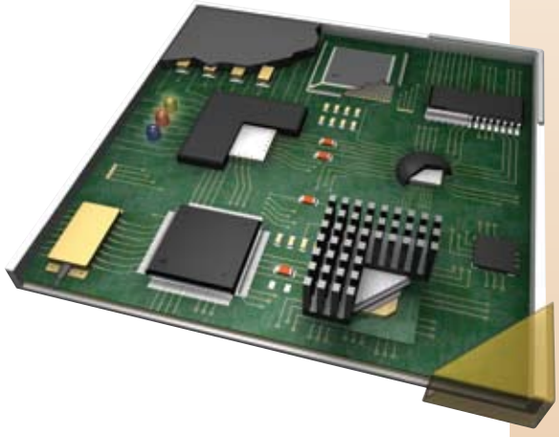
Across the Board, Around the Globe.
www.henkel.com/electronics

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.

CONTENTS

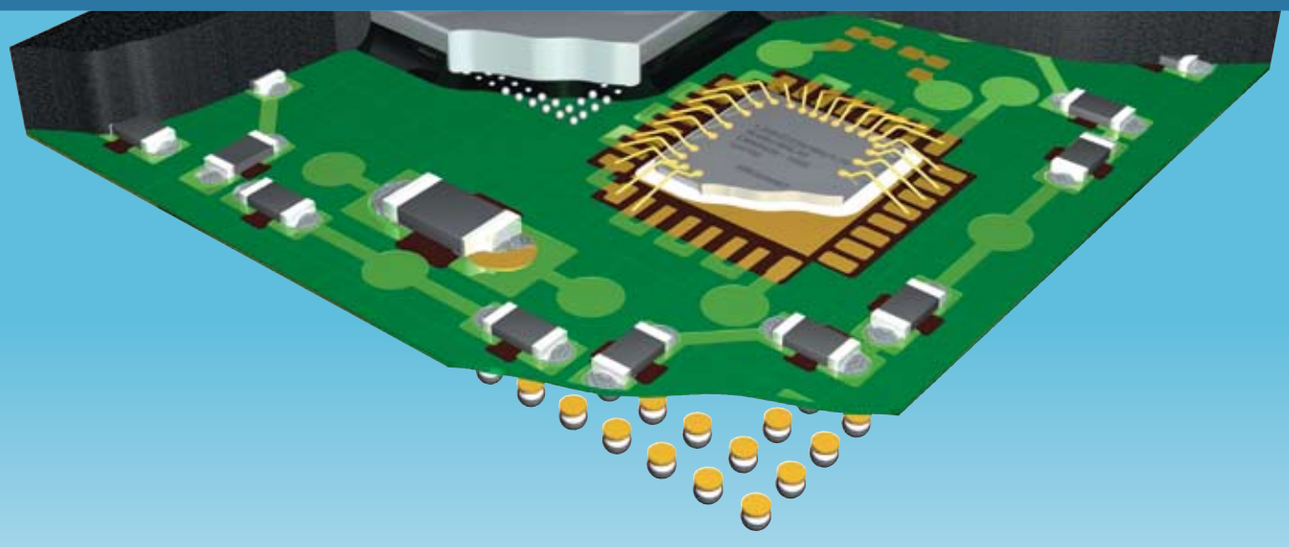




MATERIAL SOLUTIONS FOR ELECTRONIC PACKAGING AND ASSEMBLY

SEMICONDUCTOR MATERIALS

- Die Attach Adhesives
- Semiconductor Underfills
- Semiconductor Encapsulants
- Thermal Compression Materials
- Coating Powders
- Electronic Molding Compounds
- Semiconductor Molding Compounds
- Solder and Flux Materials



PCB ASSEMBLY MATERIALS

- Solder and Flux Materials
- Chip on Board Encapsulant Materials
- Board Level Underfills
- Thermal Management Materials
- Electrically Conductive Adhesives
- Surface Mount Adhesives
- Circuit Board Protection Solutions

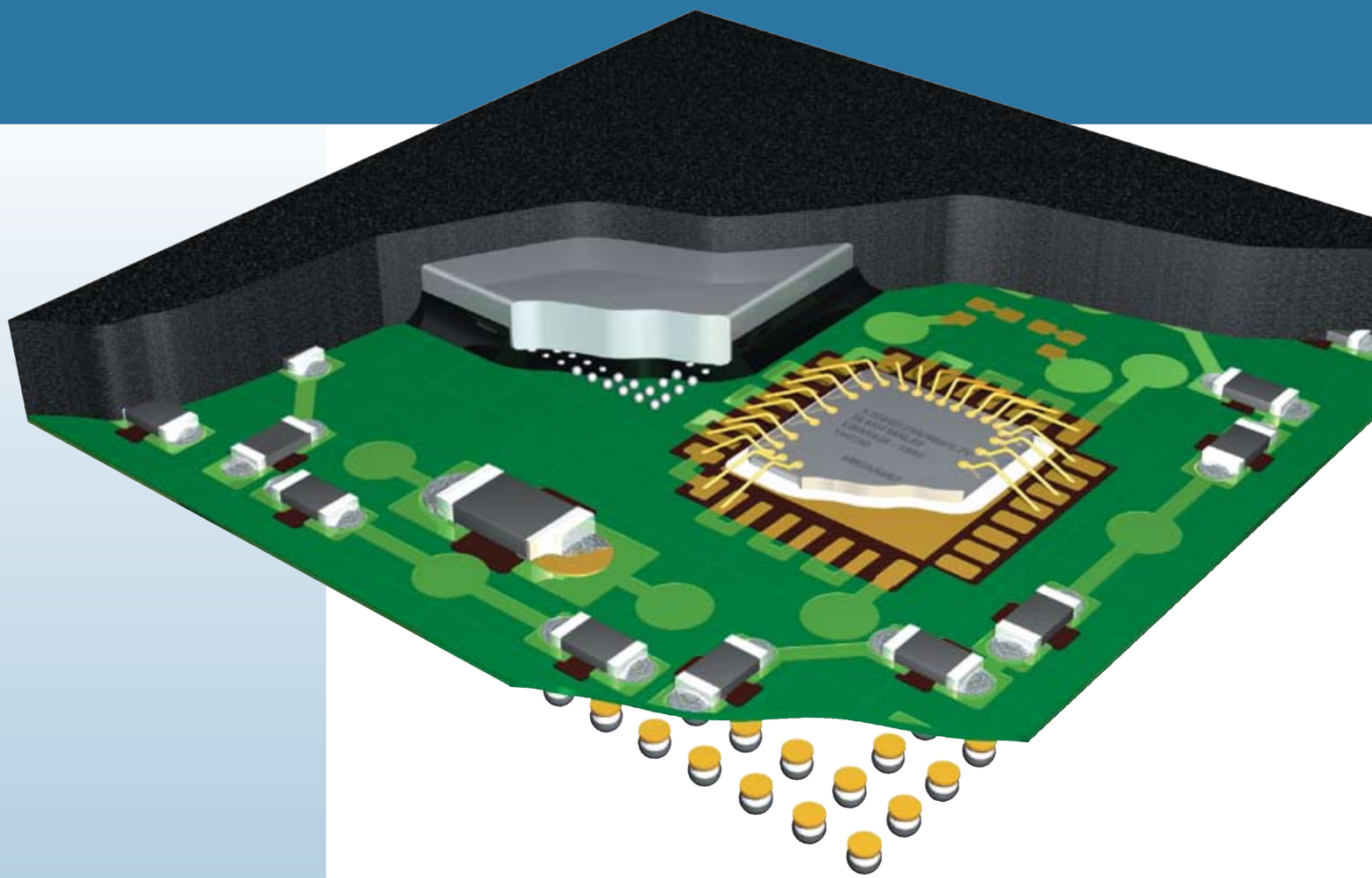
Please see LT-5012
for PCB Assembly Solutions Guide

FLAT PANEL DISPLAY MATERIALS

- Adhesives
- Cleaners, Developers and Strippers

Please see LT-5014 for
Flat Panel Display Solutions Guide

SEMICONDUCTOR MARKET SOLUTIONS



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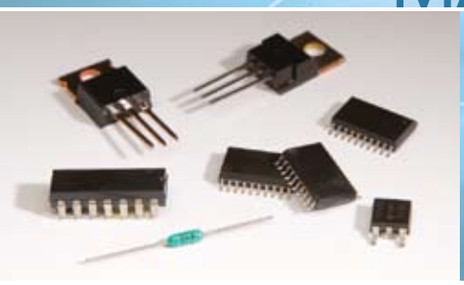
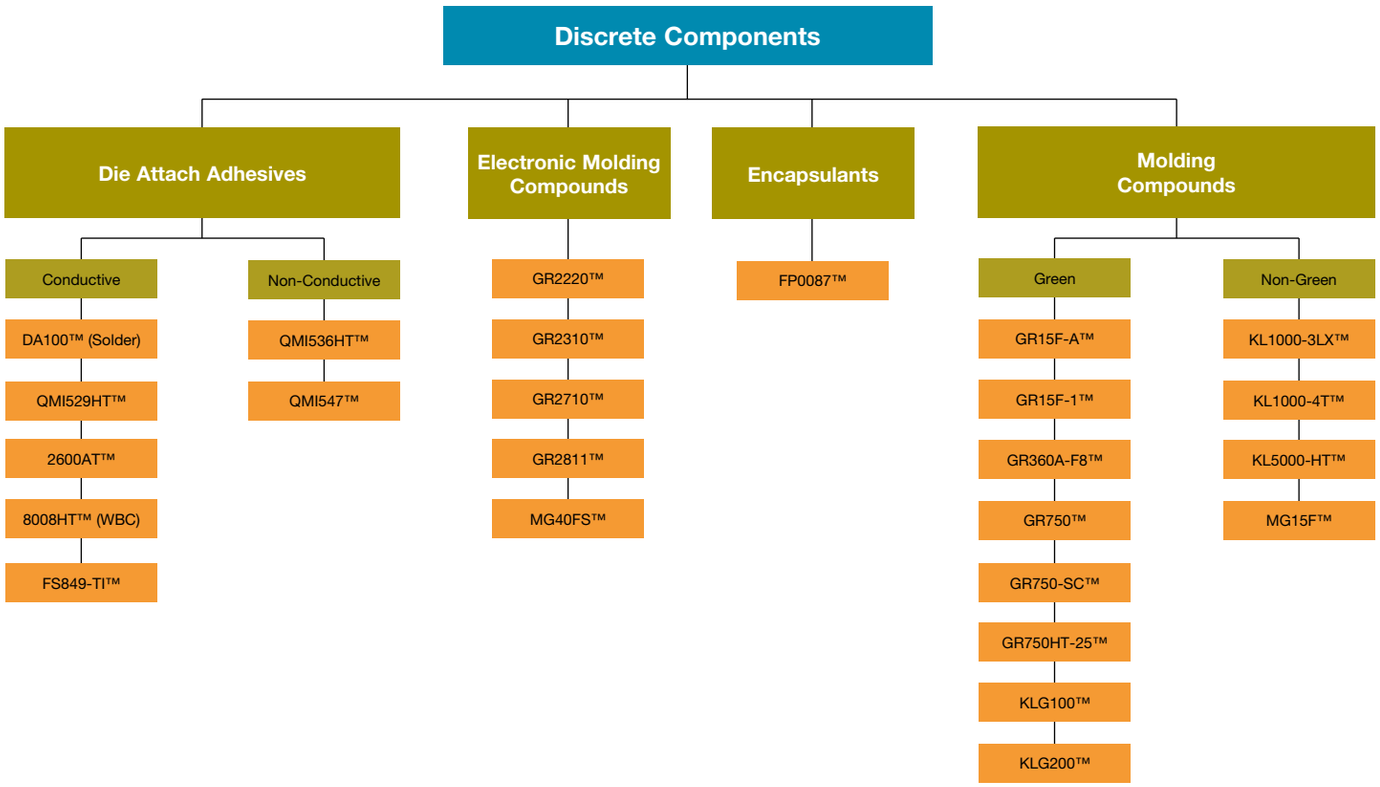
SEMICONDUCTOR MARKET SOLUTIONS



DISCRETE COMPONENTS



DIE ATTACH ADHESIVES: CONDUCTIVE

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
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.	Ag, Au	L1 - 260	4 x 10^{-5}	Fair	≥ 60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7.0
2600AT™	High thermal conductivity adhesive for thermal management applications.	Cu, Ag, Au	L3 - 260	5 x 10^{-5}	Fair	30 min ramp to 200°C + 15 min @ 200°C	20
8008HT™ (WBC)	High electrical and thermal conductivity die attach. Excellent temperature resistance.	Ag, Cu, Au	L1 - 260	6 x 10^{-5}	NA	B-stage + 20 sec @ 280°C	11
FS849-TI™	High thermal conductivity adhesive with low electrical resistance.	Ag, Au	L2 - 260	2 x 10^{-5}	Good	15 min ramp to 175°C + 30 min @ 175C	7.8

SEMICONDUCTOR MARKET SOLUTIONS

DISCRETE COMPONENTS

DIE ATTACH: CONDUCTIVE SOLDER

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	ALLOY	REFLOW	CLEANABILITY	VOID LEVELS	IPC/J-STD-004 CLASSIFICATION
DA100™ (Solder)	Flux designed for solder die attach paste applications.	Dispensing	250,000	High Pb	Forming Gas	Excellent	Very Low	ROL0

DIE ATTACH ADHESIVES: NON-CONDUCTIVE

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications.	Au, Ag, Cu	L3 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3

ELECTRONIC MOLDING COMPOUNDS

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
GR2220™	Black/conventional molding of MnO caps.	Conv	40	162	13	60	30 - 45 sec	18,500	2.4 x 10^{6}	N
GR2310™	Gold/non-halogenated molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Auto/Conv	27	166	22	75	30 - 45 sec	20,500	2.1 x 10^{6}	Y
GR2710™	Gold/low stress/non-flame retarded molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Auto/Conv	35	161	13	45	45 - 60 sec	19,000	2.6 x 10^{6}	Y
GR2811™	Gold/thin wall-crack resistant, low stress, fast cycle time.	Auto/Conv	34	162	13	45	30 - 45 sec	20,000	2.9 x 10^{6}	Y
MG40FS™	Black/conventional molding of SMD and SIP networks. Gold version MG40F-0526™ available.	Conv	35	160	20	75	60 - 90 sec	19,000	2.4 x 10^{6}	N

ENCAPSULANTS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY 25°C, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
FP0087™	Low stress fill for potting automated sensor and diodes, high Tg.	1 hr @ 125°C + 1 hr @ 180°C	High	20,000	175	18	76

SEMICONDUCTOR MARKET SOLUTIONS

DISCRETE COMPONENTS

MOLDING COMPOUNDS: GREEN

PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC PERMITIVITY, ROOM TEMP	IONIC PERMITIVITY, 150°C	MSL	GREEN	SPIRAL FLOW, CM	CTE_{a1}, ppm/°C	Tg, °C
GR15F-A™	Very high Tg, low stress, green semiconductor grade epoxy molding compound designed specifically for high voltage applications. It also boasts superior performance for high temperature power applications due to its high Tg and use of advanced Sigma Technology.	>900V discrete, >400V IC	3.7	5.5	L1/260°C	Y	80	10	185
GR15F-1™	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.	>900V discrete, >400V IC	3.7	5.8	L1/235°C	Y	80	18	210

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	CTE_{a1}, ppm/°C	Tg, °C
GR750™	GR750™ has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. GR750™'s low moisture absorption and low thermal expansion is suitable for stress sensitive devices. GR750™ is a green solution.	2.1 W/mK	Y	65	30	Alumina/ Crystalline	23	160
GR750-SC™	GR750-SC™ is 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 copper and copper alloys. This material is specifically recommended for isolated Power Transistors.	2.1 W/mK	Y	45	26	Crystalline	20	155
GR750HT-25™	GR750HT-25™ is a high thermal conductivity molding compound using fully alumina fillers designed to improve thermal management for semiconductor devices. It exhibits high adhesion to copper and copper alloys. This material is specifically recommended for isolated Power Transistors, which require high heat dissipation.	2.7 W/mK	Y	55	34	Alumina	15	140

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	MSL	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	CTE_{a1}, ppm/°C	Tg, °C
GR360A-F8™	Green mold compound with 1/8" flammability rating suitable for bridge, axial and TO packages. GR360A-F8™ offers good moldability with lowest cost of ownership.	0.9 W/mK	L3/260°C	Y	65	35	Fused	16	165
KLG100™	Green mold compound with 1/4" 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
KLG200™	Green mold compound with 1/4" flammability rating suitable for bridge, axial and TO packages. KLG200™ offers superior moldability with lowest cost of ownership.	0.9 W/mK	L3/260°C	Y	80	23	Crystalline/ Fused	22	165

SEMICONDUCTOR MARKET SOLUTIONS

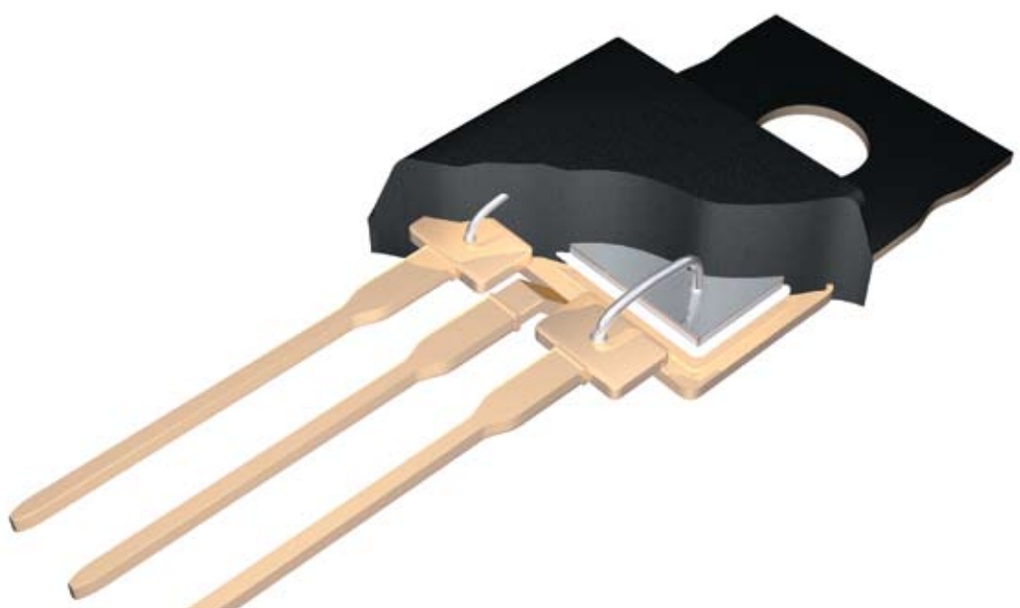
DISCRETE COMPONENTS

MOLDING COMPOUNDS: NON-GREEN

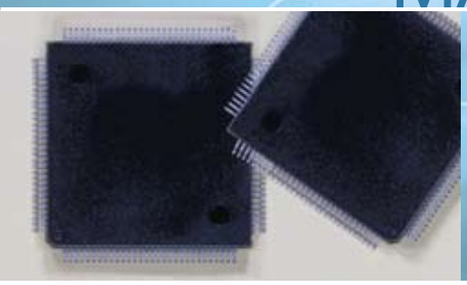
PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	MSL	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
KL1000-3LX™	Provides the lowest cost of ownership with superior moldability and reliability. KL1000-3LX™ is extremely suitable for bridge, axial and TO packages.	1.3 W/mK	L4/220°C	N	75	23	Crystalline	24	165
KL1000-4T™	Provides the lowest cost of ownership with superior moldability and reliability. KL1000-4T™ is extremely suitable for DIP packages.	1.3 W/mK	L4/220°C	N	85	23	Crystalline	24	160

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
KL5000-HT™	Has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. KL5000-HT™'s low moisture absorption and low thermal expansion is suitable for stress sensitive devices.	2.1 W/mK	N	60	32	Alumina/ Crystalline	22	155

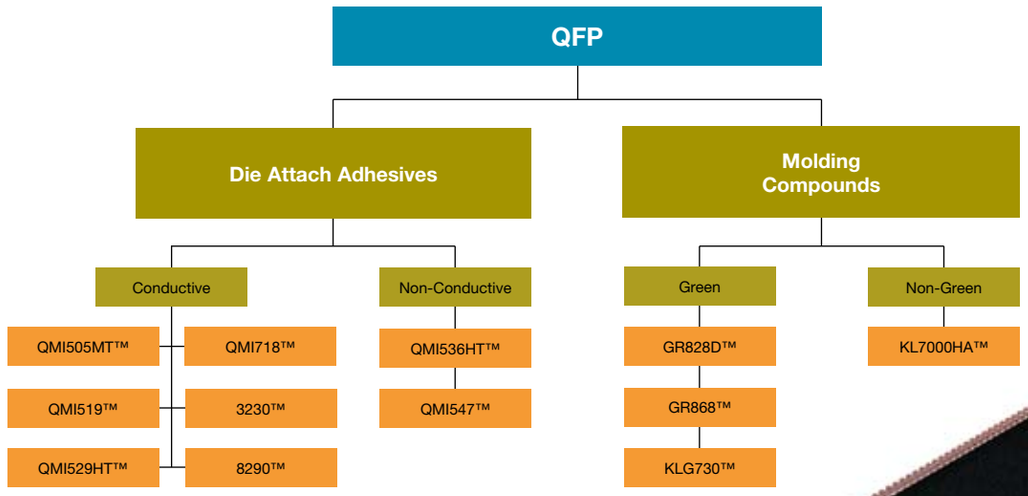
PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC PERMITIVITY, ROOM TEMP	IONIC PERMITIVITY, 150°C	MSL	GREEN	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
MG15F™	An anhydride-cured molding compound designed specifically for use in high voltage power applications requiring good electrical stability at high temperature. 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.	>900V discrete, >400V IC	3.6	5.2	L1/235°C	N	65	23	160

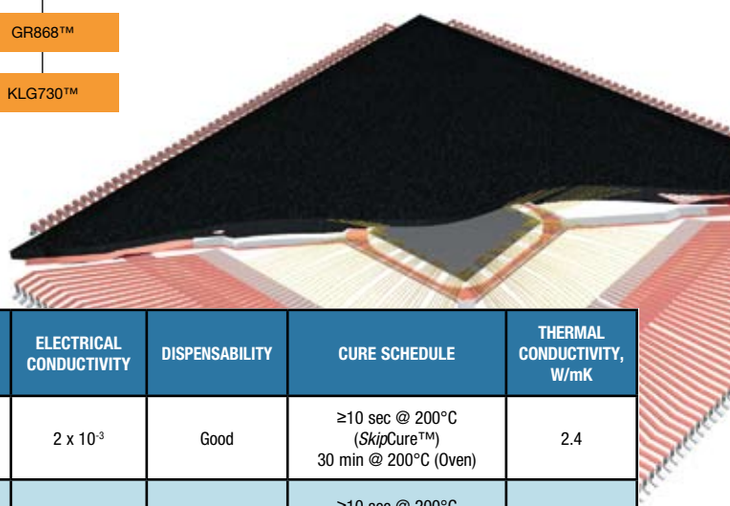


SEMICONDUCTOR MARKET SOLUTIONS



QFP





DIE ATTACH ADHESIVES: CONDUCTIVE

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI505MT™	Lower stress BMI-based paste for preplated, alloy 42 and black oxide finishes.	Au	L3 - 260	2×10^{-3}	Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	2.4
QMI519™	JEDEC L1 260°C for SOIC, QFN packages, and preplated finishes. Exceptional performance on clean uncoated silver-plated finishes. High adhesion, excellent electrical and thermal performance.	Ag, Au	L1 - 260	1×10^{-4}	Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	3.8
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.	Ag, Au	L1 - 260	4×10^{-5}	Fair	≥60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7
QMI718™	Designed to deliver exceptional JEDEC performance in SOIC packages using copper finished leadframes.	Cu	L2 - 260	1×10^{-3}	Fair	60 min @ 175°C (Oven)	2.7
3230™	Low stress epoxy die attach adhesive suitable for various package sizes.	Cu	L3 - 260	5×10^{-2}	Fair	30 min ramp to 175°C + 15 min @ 175°C	0.6
8290™	Low stress die attach adhesive suitable for die size <200 mil.	Ag, Cu, Au	L3 - 260	8×10^{-3}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.6

SEMICONDUCTOR MARKET SOLUTIONS

QFP

DIE ATTACH: NON-CONDUCTIVE

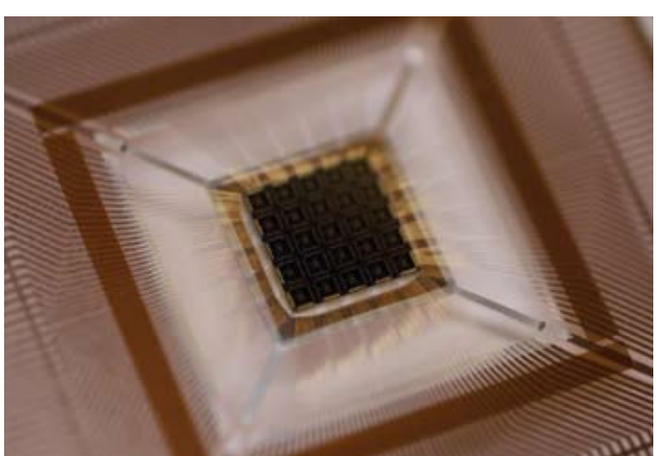
PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications.	Cu, Ag, Au	L3 - 260	1 x 10^{13}	Good	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3

MOLDING COMPOUNDS: GREEN

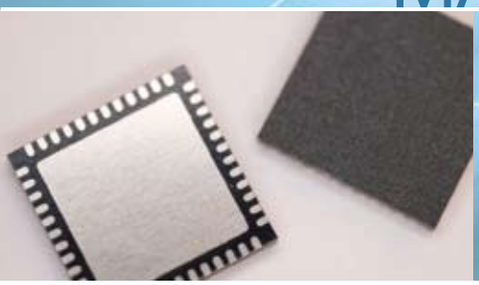
PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
GR828D™	Green, ultra low stress and high adhesion molding compound designed for SOIC, TSOP and QFP packages with leadfree finishing. GR828D™ targets package finishings that require Ag adhesion retention after MSL soaking and IR reflow process.	PPF, Ag	all QFP	L3/ 260°C	Y	88	100	9	135
GR868™	GR868™ (C102924-129) is a green (non-Bromine/Antimony and Phosphorus) semiconductor grade low stress, low moisture absorption, and high adhesion molding compound. It is especially designed for all large and thin packages with highest MSL performance possible on Ni/Pd and Cu/Ag leadframes. It is unique as it offers the highest retention of adhesion even after the harshest reflow condition due to its low modulus at high temperature. It is especially suitable for TQFP and low k packages.	PPF, Ag	all QFP/ LQFP/ TQFP	L2/ 260°C	Y	87	105	10	110
KLG730™	High adhesion, ultra low stress and green mold 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 1/8" flammability rating.	PPF, Ag	all QFP	L1/ 260°C	Y	87	129	7	130

MOLDING COMPOUNDS: NON-GREEN

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
KL7000HA™	High adhesion and high strength molding compound suitable for SOT, SSOP, and QFP packages. It provides ultra low stress, low moisture absorption, high purity and high reliability. Its low viscosity properties enable low wire sweep molding with a large operating window.	PPF, Ag	<14 x 14 mm T/LQFP	L3/ 260°C	N	84	110	9	130

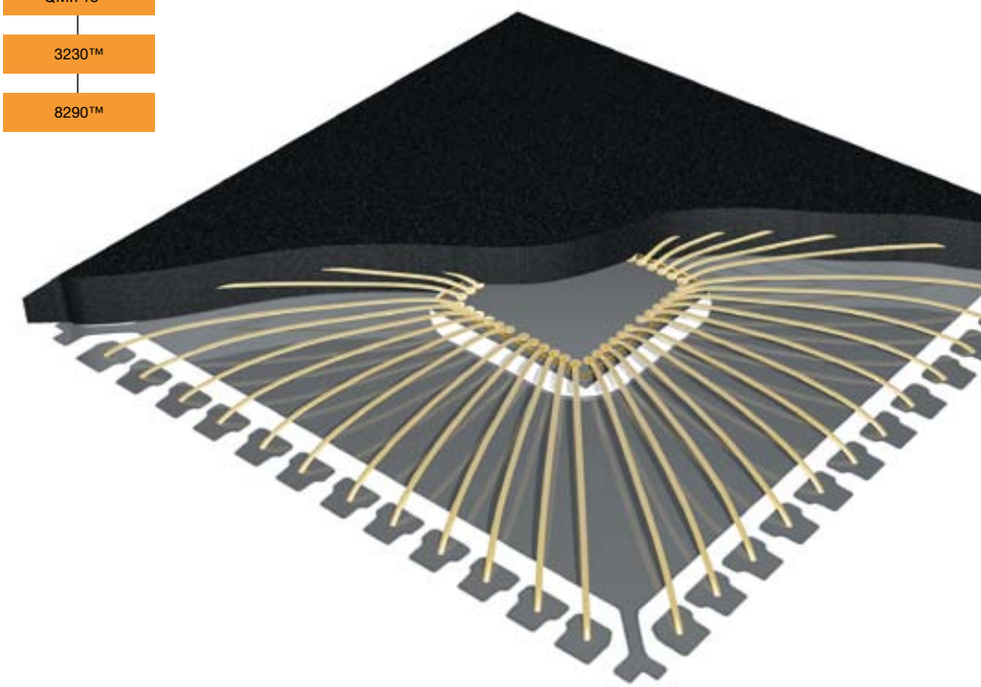


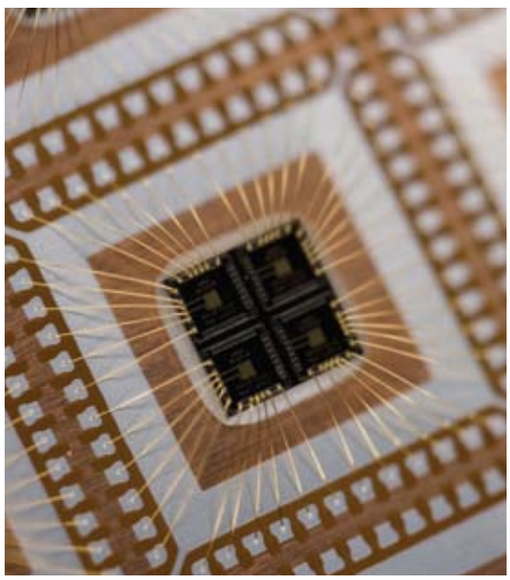
SEMICONDUCTOR MARKET SOLUTIONS



QFN

- **QFN**
  - **Die Attach Adhesives**
    - Small Die
      - QMI519™
      - QMI529HT™
      - QMI547™
      - 8200C™
      - 8200TI™
      - 8352L™
      - 84-1LMISR4™
      - 8006NS™ (WBC)
      - 8008™ (WBC)
      - 8008HT™ (WBC)
      - 8008NC™ (WBC)
      - FS849-TI™
    - Large Die
      - QMI505MT™
      - QMI536HT™
      - QMI547™
      - QMI718™
      - 3230™
      - 8290™
  - **Molding Compounds**
    - Green
      - KLG900HC™
      - KLG900HP™





SEMICONDUCTOR MARKET SOLUTIONS

QFN

DIE ATTACH ADHESIVES: SMALL DIE, ≤5.0 MM X 5.0 MM

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI519™	JEDEC L1 260°C for SOIC, QFN packages, and preplated finishes. Exceptional performance on clean uncoated silver-plated finishes. High adhesion, excellent electrical and thermal performance.	Ag, Au	L1 - 260	1 x 10^{-4}	Very Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	3.8
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.	Ag, Au	L1 - 260	4 x 10^{-5}	Fair	≥60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7.0
QMI547™	Non-conductive paste for leadframe applications.	Cu, Ag, Au	L3 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3
8006NS™ (WBC)	Non-conductive oven cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	NA	NA	B-stage + 120 min @ 160°C	0.4
8008™ (WBC)	Electrically conductive snap cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	1 x 10^{-4}	NA	B-stage + 60 sec @ 230°C	2.1
8008HT™ (WBC)	High thermal conductivity snap cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	5 x 10^{-5}	NA	B-stage + 20 sec @ 280°C	11
8008NC™ (WBC)	Non-conductive snap cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	NA	NA	B-stage + 60 sec @ 250°C	0.5
8200C™	Low bleed adhesive for pre-plated and silver leadframe.	Ag, Cu, Au	L1 - 260	2 x 10^{-4}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.2
8200TI™	8200C™ with higher thermal conductivity and optimized adhesion on NiPdAu leadframe.	Ag, Cu, Au	L1 - 260	5 x 10^{-5}	Good	30 min ramp to 175°C + 15 min @ 175°C	3.5
8352L™	High electrical and thermal conductivity die attach.	Ag, Au	L3 - 260	5 x 10^{-6}	Good	30 min ramp to 175°C + 60 min @ 200°C	5.5
84-1LMISR4™	Industry standard die attach adhesive.	Ag, Cu, Au	L3 - 260	1 x 10^{-4}	Excellent	60 min @ 175°C	2.5
FS849-TI™	High thermal conductivity adhesive with low electrical resistance.	Ag, Au	L2 - 260	2 x 10^{-5}	Good	15 min ramp to 175°C + 30 min @ 175°C	7.8

SEMICONDUCTOR MARKET SOLUTIONS

QFN

DIE ATTACH ADHESIVES: LARGE DIE, ≥5 MM X 5 MM

PRODUCT	DESCRIPTION	FINISH (Ag, Cu, Ni)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI505MT™	Lower stress BMI-based paste for preplated, alloy 42 and black oxide finishes.	Au	L3 - 260	2×10^{-3}	Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	2.4
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1×10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications.	Cu, Ag, Au	L3 - 260	1×10^{13}	Good	≥8 sec @150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3
QMI718™	Designed to deliver exceptional JEDEC performance in SOIC packages using copper-finished leadframes.	Cu	L2 - 260	2×10^{-3}	Fair	60 min @ 175°C (Oven)	2.7
3230™	Low stress epoxy die attach adhesive suitable for various package sizes.	Cu	L3 - 260	5×10^{-2}	Fair	30 min ramp to 175°C + 15 min @ 175°C	0.6
8290™	Low stress die attach adhesive suitable for die size <200 mil.	Ag, Cu, Au	L2 - 260	8×10^{-3}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.6

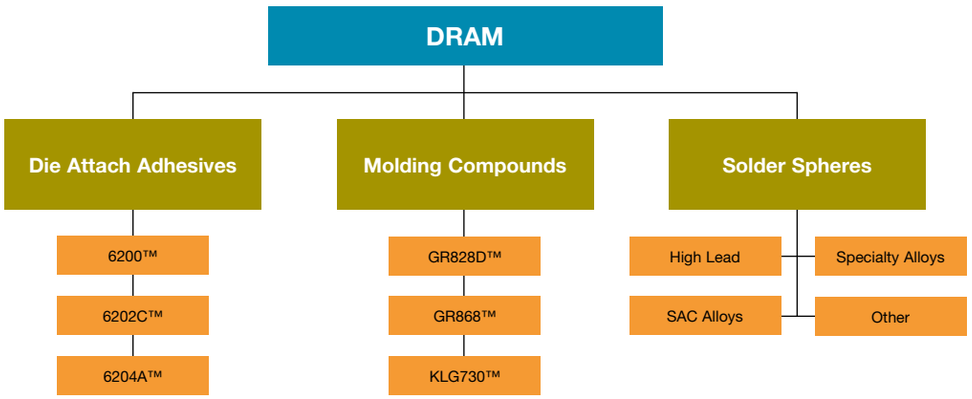
MOLDING COMPOUNDS: GREEN

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
KLG900HC™	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
KLG900HP™	KLG900HP™ is suitable for PPF QFN packages with its low wire sweep and excellent warpage performance. KLG900HP™ offers high reliability performance and moldability on thin panels, and map molding could not be easier. Its unique low stress property at high temperatures enables passing L1/260°C on PPF packages	PPF	L1/260°C (7 x 7 mm)	Y	88.5	82	9	100

Ablestik™ Hysol® Multicore®

SEMICONDUCTOR MARKET SOLUTIONS

DRAM



DIE ATTACH ADHESIVES

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
6200™	B-stageable printable paste with low moisture uptake and bleed.	L2 - 260	NA	NA	B-stage + 60 min @ 175°C	NA
6202C™	B-stageable printable paste with low moisture uptake and bleed.	L2 - 260	NA	NA	B-stage + 30 min @ 90°C + 60 min @ 175°C	NA
6204A™	Fast B-stageable printable paste with no die attach cure required. Low outgassing.	L2 - 260	NA	NA	None	NA

MOLDING COMPOUNDS

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$ ppm/°C	Tg, °C
GR828D™	Green, ultra low stress and high adhesion molding compound designed for SOIC, TSOP and QFP packages with lead-free finishing. GR828D™ targets package finishings that require Ag adhesion retention after MSL soaking and IR reflow process.	PPF, Ag	all QFP	L3/ 260°C	Y	88	100	9	135
GR868™	GR868™ (C102924-129) is a green (non-bromine/antimony and phosphorus) semiconductor grade low stress, low moisture absorption and high adhesion molding compound. It is especially designed for all large and thin packages with highest MSL performance possible on Ni/Pd and Cu/Ag leadframes. It is unique as it offers the highest retention of adhesion even after the harshest reflow condition due to its low modulus at high temperature. It is especially suitable for TQFP and low k packages.	PPF, Ag	all QFP/ LQFP/ TQFP	L2/ 260°C	Y	87	105	10	110
KLG730™	High adhesion, ultra low stress and green mold compound suitable for SOIC, TSOP, D/D2PAK, QFP, L/TQFP. Its low viscosity properties enables low wire sweep molding with a large operating window. It has no flame retardants but offers 1/8" flammability rating.	PPF, Ag	all QFP	L1/ 260°C	Y	87	129	7	130

SOLDER SPHERES

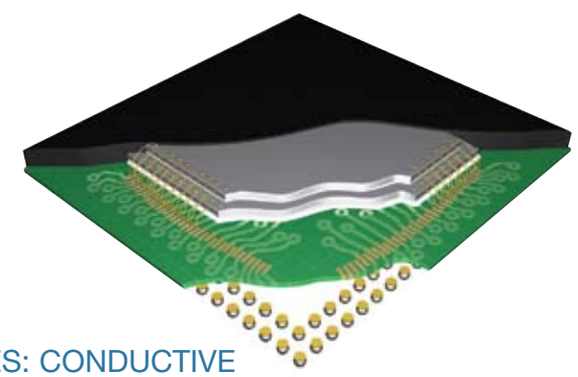
ALLOY	DIAMETER, mm	TOLERANCES ± mm	C_{pk}	PACKAGE SIZE		
				SPHERES/BOTTLE	BOTTLE SIZE, CC	SPHERES/BOX
Sn-Ag-Cu Series	0.500	0.015	≥1.33	500,000	100	10,000,000
Sn96.5-Ag3.5	0.450				40	
Sn-Ag1-Cu0.5	0.406					
Sn-Ag2.6-Cu0.6	0.400					
Sn-Ag3-Cu0.5*	0.350	0.010		1,000,000		20,000,000
Sn-Ag3.8-Cu0.7†	0.304					
Sn-Ag4-Cu0.5†	0.300					
Sn-Ag-Cu-Ni-Ge Series	0.250				25	
Sn-Ag1-Cu0.5-Ni0.05-Ge††	0.200					
Sn-Ag1.2-Cu0.5-Ni0.02-Ge††	0.180	0.005			10	
Sn-Ag3-Cu0.5-Ni0.05-Ge††	0.150					
CASTIN Series	0.100					
CASTIN125®‡	0.080					
CASTIN258®‡	0.050					
CASTIN305®‡						
Sn-Zn Series						
Sn91-Zn9						
Sn-Zn8-Ag0.5-Al0.01-Ga0.1						

Patent No: †ISURF-U.S 5,527,628 *SENJU-JP3,027,441 ‡AIM-U.S5,352407 U.S5,405,577 JP2,752,258 ††FUJI-U.S6,179,935 JP3,296,289 Other alloys and sizes are available upon request.

SEMICONDUCTOR MARKET SOLUTIONS

BGA/CSP

- **BGA/CSP**
  - **Die Attach Adhesives**
    - Conductive
      - QMI516™
      - QMI529HT™
      - 2300™
      - 2000T™
      - 2100A™
      - 2700B™
    - Non-Conductive
      - QMI536NB™
      - QMI5200™ (Film)
      - 2025Dsi™
      - 2053S™
      - AAA-3320™
      - AAA-3300™
      - ATB-S100™ (Film)
      - ATB-120T™ (Film)
  - **Encapsulants**
    - Dam
      - FP4451™
      - FP4451TD™
    - Fill
      - FP4450™
      - FP4450LV™
      - FP4470™
      - FP4450HF™
      - CB0260™
      - CB0260-1™
  - **Molding Compounds**
    - GR9810™ series
  - **Solder Spheres**
    - High Lead
      - SAC Alloys
      - Specialty Alloys
      - Other
  - **Tacky Fluxes**
    - TFN600™
      - TFN610™
      - WS300™
  - **Underfills**
    - FP4545FC™
      - FP4547™
      - FP4548FC™
      - FP4549™
      - FP4581™
      - UF8826™
      - UF8826TI™
      - UF8828™
      - UF8829™
      - UF8806J™
      - UF8806G™
  - **Wafer Bumping**
    - WS300™
  - **Lid Attach Adhesives**
    - 3003™
      - 3005™
      - MC723™



DIE ATTACH ADHESIVES: CONDUCTIVE

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI516™	Conductive paste for PBGA and SBGA packages.	L3 - 260	2×10^{-3}	Good	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	4.2
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.	L1 - 260	4×10^{-5}	Fair	≥60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7.0
2300™	Ultra low moisture absorption, low stress adhesive.	L3 / L2 - 260	5×10^{-1}	Good	30 min ramp to 175°C + 15 min @ 175°C	0.6
2000T™	High thermal conductivity adhesive with good adhesion to variety of substrates. Low bleed on silver substrates.	L3 / L2 - 260	4×10^{-4}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.5
2100A™	Ultra low moisture absorption adhesive with high hot/wet die shear strength. For lead-free packaging.	L3 / L2 - 260	5×10^{-2}	Excellent	30 min ramp to 175°C + 15 min @ 175°C	1.2
2700B™	Very high thermal conductivity adhesive with excellent bleed performance on gold.	L3 / L2 - 260	3×10^{-5}	Excellent	30 min ramp to 175°C + 15 min @ 175°C	8.0

SEMICONDUCTOR MARKET SOLUTIONS

BGA/CSP

DIE ATTACH: NON-CONDUCTIVE

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI536NB™	High JEDEC performance for first die and die-to-die bonding. Non-conductive and non-damaging to the die face. Can be cured as low as 80°C. No bleed.	L1 - 260	1 x 10^{13}	Excellent	≥10 sec @ 150°C (*Skip*Cure™) 30 min @ 150°C (Oven)	0.3
QMI5200™ (Film)	Non-conductive 2-in-1 dicing die attach film with good bondline thickness control. Will not bleed and does not require cure prior to wirebonding. Film thickness is 20 microns.	L2 - 260	Non-Conductive	NA	NA	<0.2
2025Dsi™	Non-conductive low bleed adhesive.	L2 - 260	NA	Good	30 min ramp to 175°C + 15 min @ 175°C	0.4
2053S™	Low stress adhesive for die-to-substrate applications.	L2 - 260	NA	Good	30 min ramp to 175°C + 15 min @ 175°C	NA
AAA-3320™	Self-filleting™ adhesive for same die stacking applications that require 100% coverage.	NA	1 x 10^{13}	Fair	30 min @ 150°C	0.3
AAA-3300™	Self-fillelting™ low modulus adhesive for attaching large thin die on thin organic substrates.	NA	1 x 10^{13}	Fair	30 min @ 150°C	0.3
ATB-S100™ (Film)	Single layer adhesive film for mother/daughter die stacking applications. Co-curable with molding process.	L2 - 260	NA	NA	30 min @ 100°C + 30 min @ 125°C	NA
ATB-120T™ (Film)	Single layer adhesive film for die to die or die to substrate stacking applications.	L2 - 260	NA	NA	1 hour @ 100°C + 1 hour @ 150°C	NA

ENCAPSULANTS: DAM

PRODUCT	DESCRIPTION	RECOMMENDED CURE	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
FP4451™	Industry standard damming material for BGAs.	30 min @ 125°C + 90 min @ 165°C	900,000	145	24	72
FP4451TD™	Tall dam version of FP4451™ for applications requiring a taller, narrower dam. Ionically cleaner also.	30 min @ 125°C + 90 min @ 165°C	300,000	150	21	73

ENCAPSULANTS: FILL

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY @ 25°C, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
CB0260™	High adhesion version of FP4450™ for 260°C L3 JEDEC performance.	1 hr @ 110°C + 2 hrs @ 160°C	High	40,000	145	18	74
CB0260-1™	High adhesion version of FP4450™ for 260°C L2A JEDEC performance.	30 min @ 125°C + 90 min @ 165°C	High	40,000	149	18	74
FP4450™	Industry standard fill material for dam and fill or cavity down BGAs.	30 min @ 125°C + 90 min @ 165°C	Medium	50,000	155	22	73
FP4450HF™	High flow version of FP4450LV™ using synthetic filler for use in fine wire and low alpha application.	30 min @ 125°C + 90 min @ 165°C	Very High	32,000	160	19	73
FP4450LV™	Low viscosity version of FP4450™ incorporating cleaner resins.	30 min @ 125°C + 90 min @ 165°C	High	35,000	155	22	72
FP4470™	High adhesion version of FP4450™ for 260°C L3 JEDEC performance.	30 min @ 125°C + 90 min @ 165°C	High	48,000	148	18	75

SEMICONDUCTOR MARKET SOLUTIONS

BGA/CSP

MOLDING COMPOUND

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
GR9810™ series	Hysol® GR9810™ series are technologically advanced epoxy molding compounds designed for use as an overmold on a wide variety of BGA and CSP. Its flexible hardener technology enables ultra low warpage. Hysol® GR9820-1™ is a "green" (non-antimony/bromine/phosphorous) 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

SOLDER SPHERES

ALLOY	DIAMETER, mm	TOLERANCES ± mm	C_{pk}	PACKAGE SIZE		
				SPHERES/BOTTLE	BOTTLE SIZE, CC	SPHERES/BOX
Sn-Ag-Cu Series	0.500	0.015	≥1.33	500,000	100	10,000,000
Sn96.5-Ag3.5	0.450				40	
Sn-Ag1-Cu0.5	0.406					
Sn-Ag2.6-Cu0.6						
Sn-Ag3-Cu0.5*	0.400					
Sn-Ag3.8-Cu0.7†	0.350	0.010		1,000,000		20,000,000
Sn-Ag4-Cu0.5†	0.304					
Sn-Ag-Cu-Ni-Ge Series						
Sn-Ag1-Cu0.5-Ni0.05-Ge††	0.300					
Sn-Ag1.2-Cu0.5-Ni0.02-Ge††	0.250				25	
Sn-Ag3-Cu0.5-Ni0.05-Ge††	0.200					
CASTIN Series						
CASTIN125®‡	0.180	0.005			10	
CASTIN258®‡	0.150					
CASTIN305®‡	0.100					
Sn-Zn Series						
Sn91-Zn9	0.080					
Sn-Zn8-Ag0.5-Al0.01-Ga0.1	0.050					

Patent No: †ISURF-U.S 5,527,628 *SENJU-JP3,027,441 ‡AIM-U.S5,352407 U.S5,405,577 JP2,752,258 ††FUJI-U.S6,179,935 JP3,296,289 Other alloys and sizes are available upon request.

SEMICONDUCTOR MARKET SOLUTIONS

BGA/CSP

TACKY FLUXES

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	COLOR	TACK, g/mm²	ACID VALUE	SOLIDS CONTENT, %	IPC/J-STD-004 CLASSIFICATION
TFN600™	Standard viscosity; no clean tacky flux.	Printing (screen and stencil); pin transfer and dispensing.	300,000	Brown	130	76	49	ROL0
TFN610™	Low viscosity; no clean tacky flux .	Spraying, jetting and dipping.	25,000	Very Pale Yellow	133	116	66	ROL0
WS300™	Standard viscosity; water wash tacky flux.	Printing (screen and stencil); pin transfer and dispensing.	550,000	Brown	132	30	80	ORH1

UNDERFILLS

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
FP4545FC™	Low viscosity version of FP4548FC™.	Fast	9,000	115	30	7.1	55	60 min @ 165°C
FP4547™	Fast-flowing, low stress underfill for fine-pitch flip-chip applications.	Medium	18,000	135	80	11	69	60 min @ 165°C
FP4548FC™	Lead-free flip-chip packages (L3/260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	Medium	25,000	115	22	9.5	65	60 min @ 165°C
FP4549™	For fine-pitch flip-chip applications. Fast flowing, low stress underfill.	Very Fast	2,300	65	38	5.5	57	28 min @ 165°C
FP4581™	Lead-free flip-chip packages (L3/260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	Fast	17,000	86	33	7.6	55	120 min @ 165°C
UF8806J™	For large flip chip in package applications. Ultra low alpha emissions.	Fast	1,200	140	46	5.3	40	90 min @ 165°C
UF8806G™	Moisture resistant. For die sizes <25mm. Ultra low alpha emissions.	Fast	4,500	136	27	7.9	60	60 min @ 195°C
UF8826™	For eutectic high lead low k applications. Medium modulus, low CTE.	Fast	16,000	132	40	3.4	30	90 min @ 165°C
UF8826TI™	For lead-free packaging. Optimized modulus and self-filleting properties.	Fast	15,000	128	40	4.6	30	90 min @ 165°C
UF8828™	For eutectic, high lead or lead-free packaging. Higher modulus.	Fast	15,000	128	30	6.5	50	90 min @ 165°C
UF8829™	For small die in lead-free and low k applications. Higher modulus, lowest CTE.	Fast	10,000	122	28	7.5	60	90 min @ 165°C

WAFER BUMPING: SOLDER PASTE

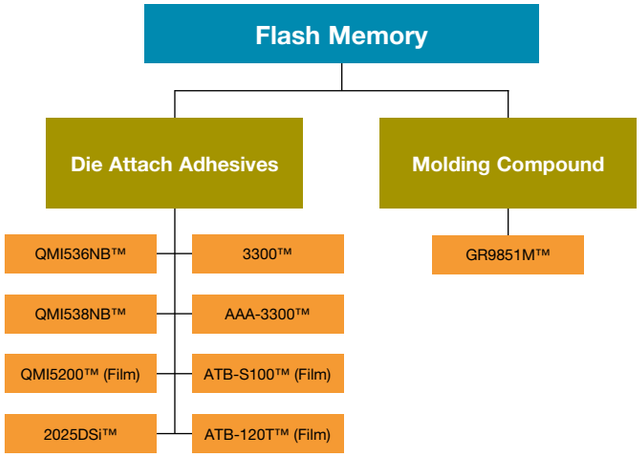
PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm²	PRINT SPEED, mm/s	REFLOW ATMOSPHERE	IPC/J-STD-004 CLASSIFICATION
WS300™	A water wash flux system specially formulated with fine-powder lead-free alloys. High performance, water washable solder paste. Residues are easily removed with DI water, without the need for a saponifier. Good open time with excellent print definition and soldering.	96SC (SAC387) 97SC (SAC305)	89	0.8	25 - 100	N^2	ORH1

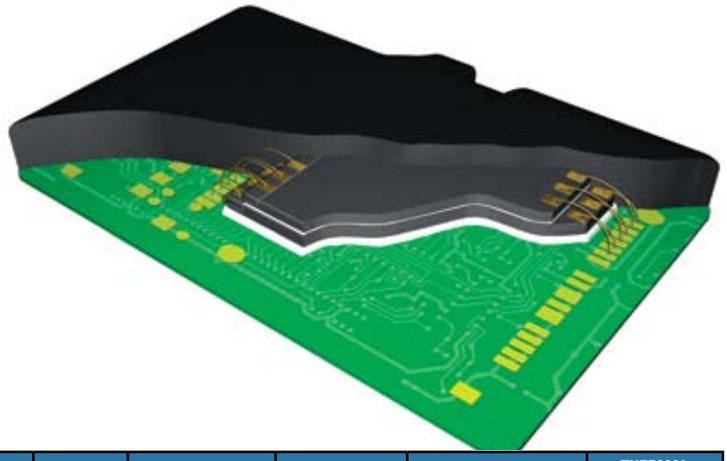
LID ATTACH

PRODUCT	DESCRIPTION	VISCOSITY, CPS	TG, °C	THERMAL CONDUCTIVITY W/MK	MODULUS, GPA	RECOMMENDED CURE
3003™	Best balance of toughness, adhesion and modulus for most applications. Compatible with silicone TIM.	35,000	49	1.0	4.0	60 min @ 150°C + 30 min @ 175°C
3005™	For large packages and lead-free applications. Stress absorbing, fast cure, high temperature.	37,000	-15	0.5	0.3	30 min ramp @ 150°C + 30 min @ 150°C
MC723™	Bondline control achieved with 75 micron spacers. Compatible with silicone TIM.	57,000	42	0.8	3.3	30 min @ 150°C + 30 min @ 165°C

SEMICONDUCTOR MARKET SOLUTIONS

FLASH MEMORY





DIE ATTACH ADHESIVES

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI538NB-1A2™,1A3™, 1A4™	No bleed, large die, non-conductive, very low stress QMI538NB-1A2™,1A3™,1A4™ for die sizes greater than 500 x 500 mil. / 13 x 13 mm.	L2 - 260	1 x 10^{13}	Excellent	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 175°C (Oven)	0.4
QMI536NB-1A2™,1A3™, 1A4™	High JEDEC performance for first die and die-to-die bonding. Non-conductive and non-damaging to the die face. Can be cured as low as 80°C. No bleed.	L1 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3
2025DSi™	Low stress, low moisture absorption adhesive for die to die stacking applications.	L2 - 260	NA	Good	30 min ramp to 175°C + 15 min @ 175°C	0.4
AAA-3300™	Self-filleting™ low modulus adhesive for attaching large thin die on thin organic substrates.	NA	1 x 10^{13}	Fair	30 min @ 150°C	0.3

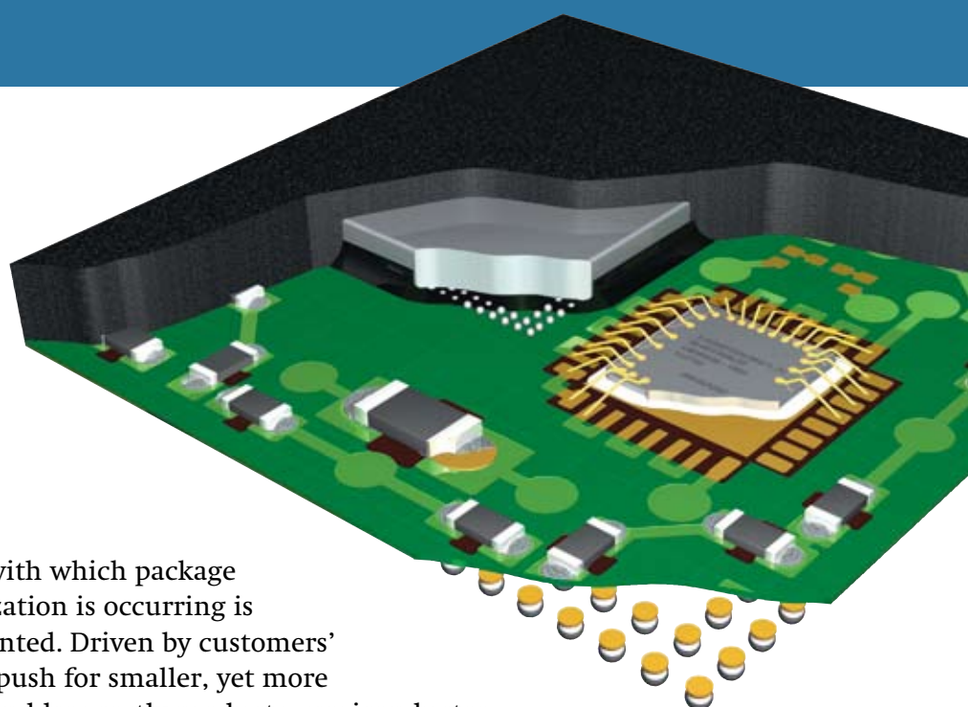
DIE ATTACH FILM

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI5200™ (Film)	Non-conductive 2-in-1 dicing die attach film with good bondline thickness control. Will not bleed and does not require cure prior to wirebonding. Film thickness is 20 microns.	L2 - 260	Non-Conductive	NA	NA	< 0.2
ATB-S100™ (Film)	Single layer adhesive film for mother/daughter die stacking applications. Co-curable with molding process.	L2 - 260	NA	NA	*Skip*Cure™	NA
ATB-120T™ (Film)	Single layer adhesive film for die to die or die to substrate stacking applications.	L2 - 260	NA	NA	1 hour @ 100°C + 1 hour @ 150°C	NA

MOLDING COMPOUND: GREEN

PRODUCT	DESCRIPTION	SUBSTRATE THICKNESS	STRIP WARPAGE	GREEN	SPIRAL FLOW, cm	% FILLER	$CTE_{\alpha 1}$, ppm/°C	TG, °C
GR9851M™	A 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. GR9851M™ is "green" without any flame retardants and is capable of 1/4" flammability rating. It has excellent shrinkage characteristics and high glass transition temperature. Suitable for use in applications where excellent dimensional stability is required.	0.18 - 0.2 mm	<2 mm smiling	Y	120	88	10	205

SEMICONDUCTOR MATERIALS



The pace with which package miniaturization is occurring is unprecedented. Driven by customers' relentless push for smaller, yet more powerful and less costly products, semiconductor specialists are constantly pushing the envelope when it comes to device packaging.

And, it's why Henkel is also breaking new ground in materials technology with our unique approach to delivering consistent, unrivaled performance in packaging materials. 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 material sets for the most demanding applications. Through materials that are specifically designed to work in concert with one another, packages are manufactured at high yield and low cost.

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 and simplify the supply chain by delivering exceptionally engineered products and a single-source partner. The full line of Henkel packaging materials include die attach adhesives, dicing die attach films (DDAFs) and flow-over-wire (FOW) films, wafer backside coating (WBC) die attach materials, package level underfills, encapsulants, mold compounds and non-conductive pastes (NCPs), as well as solder spheres and tacky fluxes.

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 lead-free capability.

Through the use of Henkel's patented Bismaleimide (BMI) chemistry, superior lead-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 lead-free reflow processing.

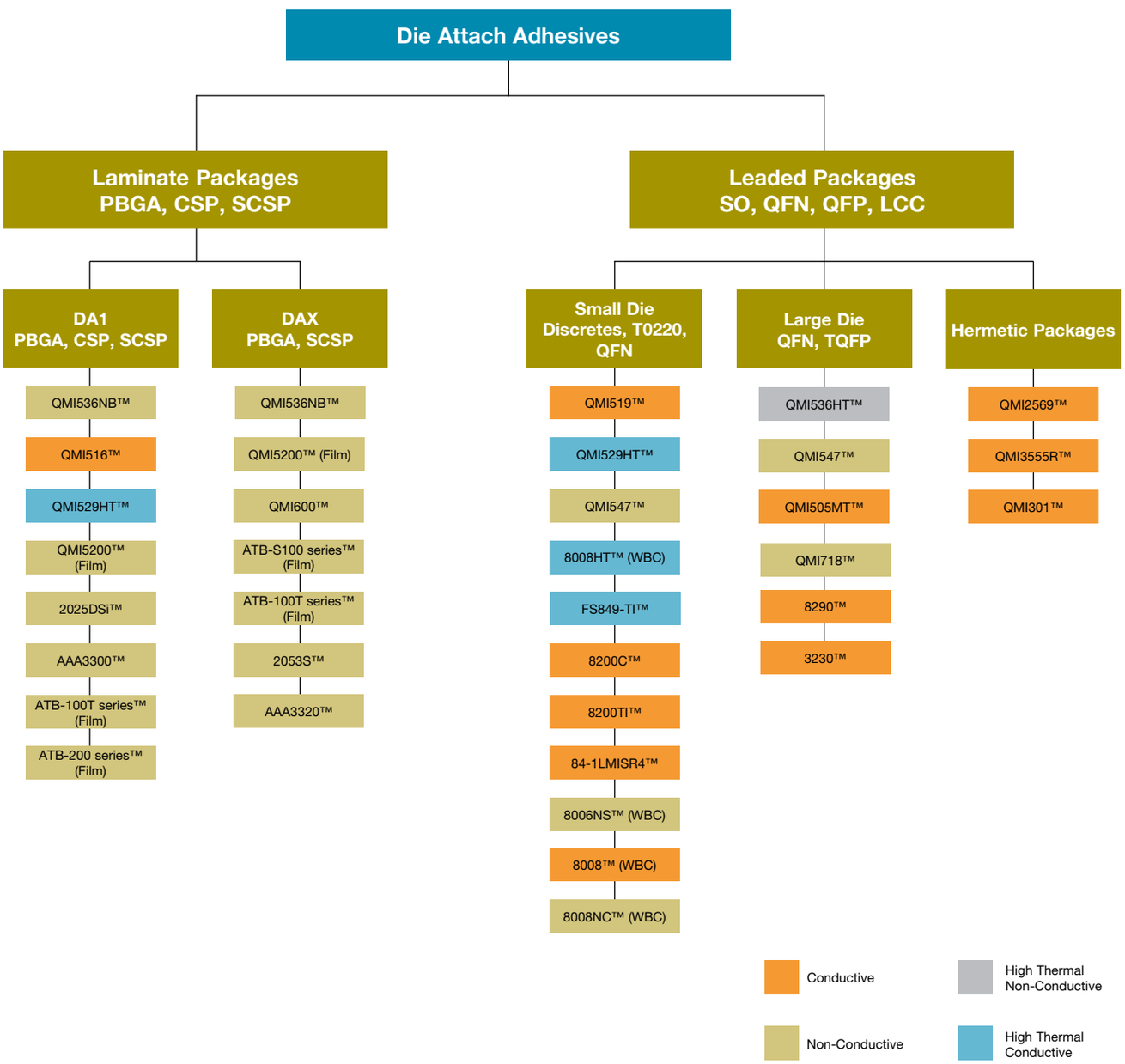
Henkel's advancements in materials technology have enabled the development of some revolutionary new die attach products with unprecedented performance characteristics. Some of these most recent innovations include: Henkel's QMI536NB™, a no-bleed, non-conductive PTFE material that can be used on both mother and daughter die, allowing manufacturers to simplify the supply chain and source a single material; unique PMMA spacer technology that is gentle on the die face, provides excellent bondline thickness control and eliminates the costs and process steps associated with the use of dummy die; and new high performance copper leadframe die attach adhesives. All Henkel die attach adhesive materials are compatible with conventional oven cure as well as *Skip*Cure™, so that packaging specialists have the flexibility to control UPH for their specific requirements.

As die become thinner and stack die applications continue to grow, even more advanced technology in the form of DDAF is required. Henkel's die attach films combine the properties and functions of die attach film and dicing tape into one product and eliminate the need for any dispensing or curing equipment or processes, as curing takes place during the molding process.

For cost-sensitive products that demand high-throughput solutions and precise material control, Henkel has developed a unique portfolio of WBC die attach materials that offer maximum efficiency and superior performance. With WBC technology, the proven materials deposition techniques of screen printing, stencil printing or spin coating are used to precisely coat the backside of the wafer with coatings as thin as 20 microns. Advantages of this technology include reduced costs, increased units per hour (UPH), tighter material control and the maximization of die footprint area through elimination of the fillet.

To address the requirements of power devices that have high thermal power dissipation, Henkel has developed solder die attach materials to deliver high thermal conductivity to ensure effective dissipation of internally generated heat. Power semiconductor packages are becoming more demanding and require solutions like Henkel's Multicore® DA100™ soft solder die attach materials, which deliver excellent wetting characteristics and very low voiding.

DIE ATTACH ADHESIVES



SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

LAMINATE PACKAGES

DIE ATTACH FILM

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI5200™ (Film)	Non-conductive 2-in-1 dicing die attach film with good bondline thickness control. Will not bleed and does not require cure prior to wirebonding. Film thickness is 20 microns.	L2 - 260	Non-Conductive	NA	NA	<0.2
ATB-100T series™ (Film)	Single layer format, low modulus adhesive for chip-stacking applications.	L2 - 260	NA	NA	60 min @ 100°C + 60 min @ 150°C	NA
ATB-200 series™ (Film)	Dual layer format. Low warpage adhesive. Excellent wettability.	L2 - 260	NA	NA	30 min @ 100°C + 30 min @ 150°C	NA

DA1: PBGA, CSP, SCSP

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	WARPAGE, m	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI516™	Conductive paste for PBGA and SBGA packages.	L3- 260	2×10^{-3}	0.7	Good	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	4.2
QMI536NB™	High JEDEC performance for first die and die-to-die bonding. Non-conductive and non-damaging to the die face. Can be cured as low as 80°C.	L1 - 260	1×10^{13}	1.0	Excellent	≥10 sec @ 150°C (*Skip*Cure™) 30 min @ 150°C (Oven)	0.3
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.	L1 - 260	4×10^{-5}	1.2	Fair	≥60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7.0
QMI5200™ (Film)	Non-conductive 2-in-1 dicing die attach film with good bondline thickness control. Will not bleed and does not require cure prior to wirebonding. Film thickness is 20 microns.	L2 - 260	Non-Conductive	NA	NA	NA	0.2
2025DSi™	Non-conductive low bleed adhesive.	L2 - 260	NA	Good	Good	30 min ramp to 175°C + 15 min @ 175°C	0.4
AAA3300™	Self-filleting adhesive for die-to-substrate applications	L2 - 260	1×10^{13}	Very good	Excellent	30 min @ 175°C	0.3
ATB-100T series™ (Film)	Single layer format, low modulus adhesive for chip-stacking applications.	L2 - 260	NA	Very good	NA	60 min @ 100°C + 60 min @ 150°C	NA
ATB-200 series™ (Film)	Dual layer format. Low warpage adhesive. Excellent wettability.	L2 - 260	NA	Excellent	NA	30 min @ 100°C + 30 min @ 150°C	NA

DAX: PBGA, SCSP

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	WARPAGE, m	FLOW	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI5200™ (Film)	Non-conductive 2-in-1 dicing die attach film with good bondline thickness control. Will not bleed and does not require cure prior to wirebonding. Film thickness is 20 microns.	L2 - 260	Non-Conductive	NA	NA	NA	<0.2
QMI536NB™	High JEDEC performance for first die and die-to-die bonding. Non-conductive and non-damaging to the die face. Can be cured as low as 80°C. No bleed.	L1 - 260	1×10^{13}	1.0	Good	≥10 sec @ 150°C (*Skip*Cure™) 30 min @ 150°C (Oven)	0.3
QMI600™	For stacked die applications where the bonding wires are covered by both the die attach paste and the mold compound	L3 - 260	1×10^{13}	0.5	Good	≥10 sec @ 175°C (*Skip*Cure™) 30 min @ 175°C (Oven)	0.6

SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

LEADED PACKAGES

DAX: PBGA, SCSP *(cont'd from page 23)*

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	WARPAGE, m	FLOW	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
ATB-S100™ series (Film)	Single layer format, low modulus adhesive for chip-stacking applications.	L2 - 260C	NA	Good	NA	30 min @ 100°C + 30 min @ 125°C	NA
ATB-100T™ series (Film)	Single layer format, low modulus adhesive for chip-stacking applications.	L2 - 260C	NA	Very good	NA	60 min @ 100°C + 60 min @ 150°C	NA
2053S™	Low stress adhesive for low warpage die to substrate.	L2 - 260C	NA	Good	Good	30 min ramp to 175°C + 15 min @ 175°C	NA
AAA3320™	Self-Filleting™ adhesive for die-to-substrate applications.	L3 - 260C	1×10^{13}	Good	Excellent	30 min ramp to 150°C + 30 min @ 150°C	0.3

SMALL DIE: DISCRETES, T0220, QFN, LED

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
FS849-TI™	High thermal conductivity adhesive with low electrical resistance.	Ag, Au	L2 - 260	2×10^{-5}	Good	15 min ramp to 175°C + 30 min @ 175°C	7.8
QMI519™	JEDEC L1 260°C for SOIC, QFN packages, and preplated finishes. Exceptional performance on clean uncoated silver-plated finishes. High adhesion, excellent electrical and thermal performance.	Ag, Au	L1 - 260	1×10^{-4}	Very Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	3.8
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.	Ag, Au	L1 - 260	4×10^{-5}	Fair	≥60 sec @ 185°C (*Skip*Cure™) 30 min @ 185°C (Oven)	7.0
QMI547™	Non-conductive paste for leadframe applications.	Au, Ag, Cu	L3 - 260	1×10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3
8006NS™ (WBC)	Non-conductive oven cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	NA	NA	B-stage + 120 min @ 160°C	0.4
8008™ (WBC)	Electrically conductive snap cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	1×10^{-4}	NA	B-stage + 60 sec @ 230°C	2.1
8008HT™ (WBC)	High electrical and thermal conductivity die attach. Excellent temperature resistance.	Ag, Cu, Au	L1 - 260	6×10^{-5}	NA	B-stage + 20 sec @ 280°C	11.0
8008NC™ (WBC)	Non-conductive snap cure adhesive utilizing wafer backside coating technology.	Ag, Cu, Au	L1 - 260	NA	NA	B-stage + 60 sec @ 280°C	0.5
8200C™	Low bleed adhesive for pre-plated and silver leadframe.	Ag, Cu, Au	L1 - 260	2×10^{-4}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.2
8200TI™	8200C™ with higher thermal conductivity and optimized adhesion on NiPdAu leadframe.	Ag, Cu, Au	L1 - 260	5×10^{-5}	Good	30 min ramp to 175°C + 15 min @ 175°C	3.5
84-1LMISR4™	Industry standard die attach adhesive.	Ag, Cu, Au	L3 - 260	1×10^{-4}	Excellent	60 min @ 175°C	2.5

SEMICONDUCTOR MATERIALS

DIE ATTACH ADHESIVES

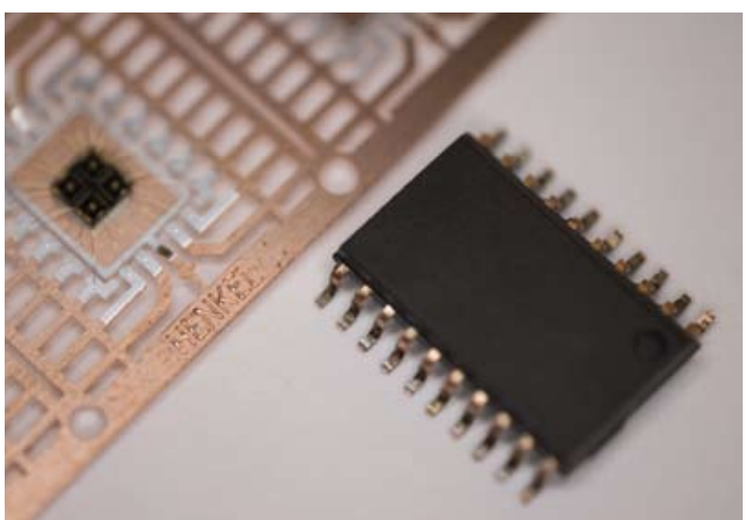
LEADED PACKAGES

LARGE DIE: QFN, TQFP

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK
QMI505MT™	Lower stress BMI-based paste for preplated, alloy 42 and black oxide finishes.	Ag, Au	L3 - 260	2 x 10^{-3}	Good	≥10 sec @ 200°C (*Skip*Cure™) 30 min @ 200°C (Oven)	2.4
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1 x 10^{13}	Excellent	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications.	Au, Ag, Cu	L3 - 260	1 x 10^{13}	Good	≥8 sec @ 150°C (*Skip*Cure™) 15 min @ 150°C (Oven)	0.3
QMI718™	Designed to deliver exceptional JEDEC performance in SOIC packages using copper-finished leadframes.	Cu	L2 - 260	2 x 10^{-3}	Fair	60 min @ 175°C (Oven)	2.7
3230™	Low stress epoxy die attach adhesive suitable for various package sizes.	Cu	L3 - 260	5 x 10^{-2}	Fair	30 min ramp to 175°C + 15 min @ 175°C	0.6
8290™	Low stress die attach adhesive suitable for die size <200 mil.	Ag, Cu, Au	L2 - 260	8 x 10^{-3}	Good	30 min ramp to 175°C + 15 min @ 175°C	1.6

HERMETIC PACKAGES

PRODUCT	DESCRIPTION	ELECTRICAL CONDUCTIVITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mK	SEAM SEAL	SOLDER SEAL	GLASS SEAL
QMI2569™	No-dry Ag/glass die attach for glass, solder, and seamed sealed packages. Very high thermal conductivity applications for die as large as 0.80 in^2.	15 x 5^{-5}	380°C - 440°C	>60	Yes	Yes	Yes
QMI3555R™	No-dry Ag/glass die attach for glass, solder and seamed sealed packages. Very high thermal conductivity and >450°C temperature resistance for glass-sealed hermetic packages.	15 x 5^{-5}	330°C - 450°C	>80	Yes	Yes	Yes
QMI301™	Solder and seamed-sealed packages. Low temperature cure material with very high adhesion and >340°C temperature resistance for solder-sealed hermetic packages.	NA	150°C - 200°C (Oven)	1.9	Yes	Yes	No



SEMICONDUCTOR MATERIALS

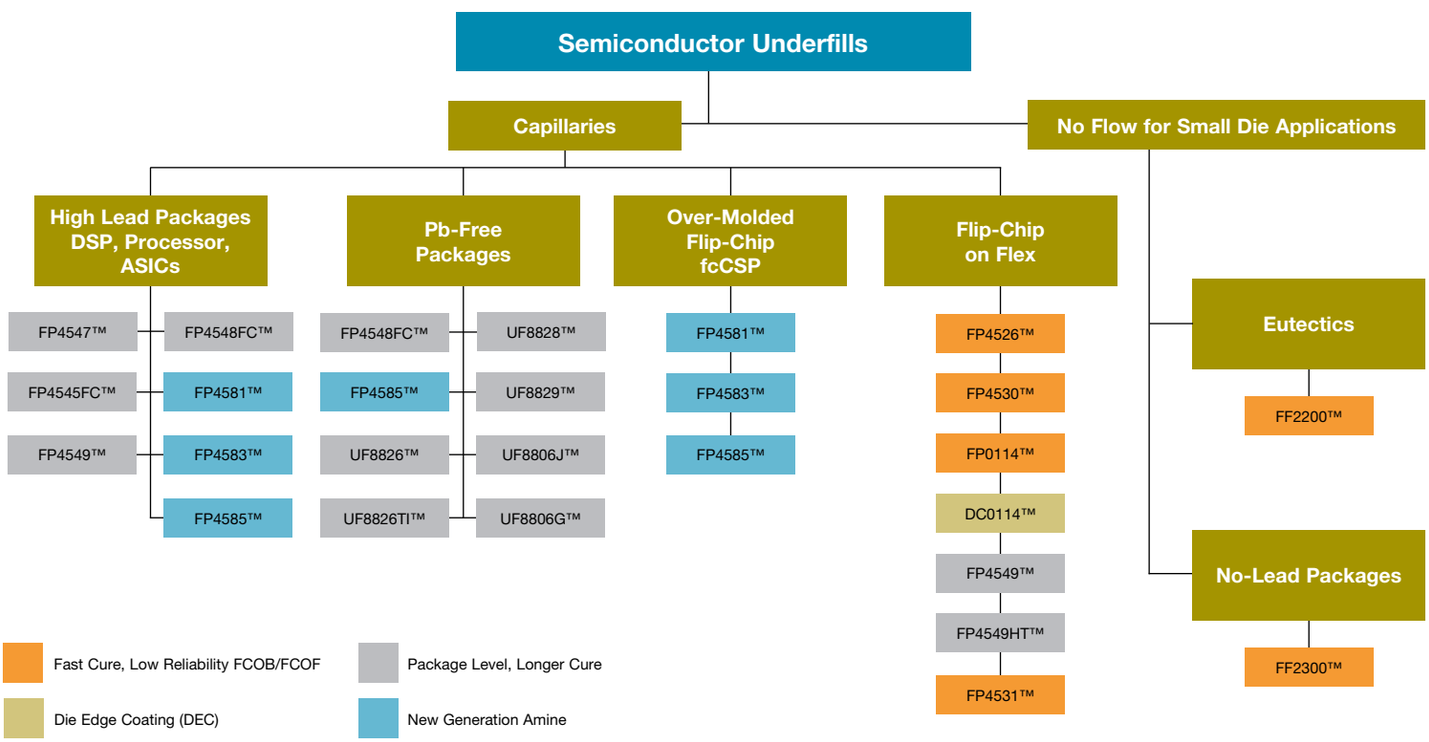
SEMICONDUCTOR UNDERFILLS

The shrinking footprint of today's handheld devices in tandem with the higher temperature processing demands for advanced devices has given rise to 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 lead-free compatibility. With an unyielding focus on quality and performance, all Henkel's brand 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, Henkel's underfills have emerged as the premiere industry standard for flip-chip (FP) applications and are used in devices such as FC CSPs and FC BGAs for ASICs, chipsets, graphics 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 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 are on the horizon and the advantages are many: Henkel's amine underfill system delivers excellent adhesion to 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 Metalization (UBM) failure.



SEMICONDUCTOR MATERIALS

SEMICONDUCTOR UNDERFILLS

CAPILLARIES: HIGH LEAD PACKAGES: DSP, PROCESSOR, ASICs

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
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
FP4547™	Fast-flowing, low stress underfill for fine-pitch flip-chip applications.	Medium	18,000	135	80	11	69	60 min @ 165°C
FP4548FC™	Lead-free flip-chip packages (L3 - 260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	Medium	25,000	115	22	9.5	65	60 min @ 165°C
FP4545FC™	Low viscosity version of FP4548FC™.	Fast	9,000	115	30	7.1	55	60 min @ 165°C
FP4581™	Lead-free flip-chip packages (L3 - 260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	Fast	17,000	65	38	7.6	57	120 min @ 165°C
FP4583™	High purity, FC underfill, high lead applications.	Fast	14,000	79	40	6.9	57	120 min @ 165°C
FP4585™	High purity, FC underfill, high lead and no-lead applications.	Fast	40,000	94	25	7.3	60	120 min @ 165°C

CAPILLARIES: Pb-FREE PACKAGES

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
FP4548FC™	Lead-free flip-chip packages (L3 - 260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	Medium	25,000	115	22	9.5	65	60 min @ 165°C
FP4585™	High purity, FC underfill, high lead and no-lead applications.	Fast	40,000	94	25	7.3	60	120 min @ 165°C
UF8806J™	For large flip chip in package applications. Ultra low alpha emissions.	Fast	1,200	140	46	5.3	40.0	90 min @ 165°C
UF8806G™	Moisture resistant. For die sizes <25 mm and ceramic packages. Ultra low alpha emissions.	Fast	4,500	136	27	7.9	60.0	60 min @ 195°C
UF8826™	For eutectic lead-free or high lead low k applications. Medium modulus, low CTE.	Fast	16,000	132	40	3.4	30.0	90 min @ 165°C
UF8826TI™	For lead-free packaging. Optimized modulus and self-filleting properties.	Fast	15,000	128	40	4.6	30.0	90 min @ 165°C
UF8828™	For eutectic lead-free and low k applications. Higher modulus.	Fast	15,000	128	30	6.5	50.0	90 min @ 165°C
UF8829™	For small die in lead-free and low k applications. Higher modulus, lowest CTE.	Fast	10,000	122	28	7.5	60.0	90 min @ 165°C

OVER-MOLDED FLIP-CHIP FCCSP

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	MODULUS, GPa	% Filler	RECOMMENDED CURE
FP4581™	Lead-free flip-chip packages (L3 - 260°C); low-k/Cu flip-chip packages with Hi-Pb bumps, flux compatible.	High	17,000	86	33	7.6	55	120 min @ 165°C
FP4583™	High purity, FC underfill, high lead applications.	Fast	14,000	79	40	6.9	55	120 min @ 165°C
FP4585™	High purity, FC underfill, high lead and no-lead applications.	Fast	40,000	94	25	7.3	60	120 min @ 165°C

SEMICONDUCTOR MARKET SOLUTIONS

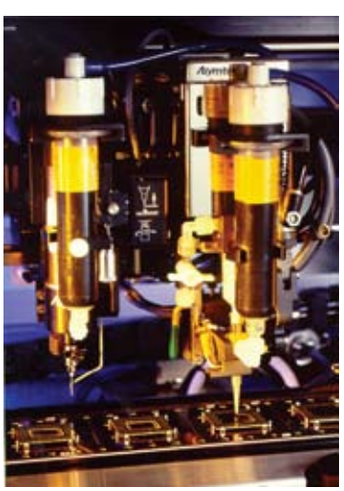
SEMICONDUCTOR UNDERFILLS

FLIP-CHIP ON FLEX

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
FP4526™	Ceramic packages and FC on flex, eutectic, Hi-Pb and no-lead applications; not for JEDEC performance.	Fast	4,700	133	33	8.5	63	30 min @ 165°C
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
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
FP0114™	Fine filler version of FP4526™ for gap of 1 mil.	Fast	5,000	135	33	8.5	63	30 min @ 165°C
DC0114™	Die edge coating to prevent silicon chipping in HDD applications.	NA	20,000	135	70	NA	13	30 min @ 165°C
FP4549HT™	Aluminum nitride-filled version of FP4549™ for high thermal applications.	Fast	17,500	128	26	8.5	66.5	60 min @ 165°C
FP4531™	SnapCure™ fast flow underfill for CSP applications.	Not Tested	10,000	161	28	7.6	62	7 min @ 165°C

NO FLOW FOR SMALL DIE APPLICATIONS: EUTECTIC

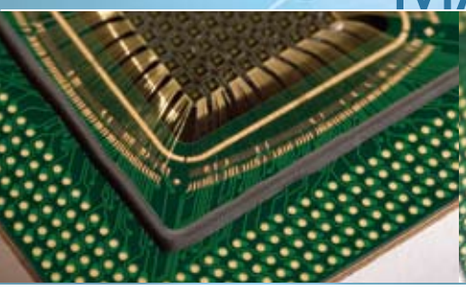
PRODUCT	DESCRIPTION	VISCOSITY, cPs	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
FF2200™	No-flow underfill for Eutectic applications.	3,600	128	75	2.8	Unfilled	Reflow leaded alloys



NO FLOW FOR SMALL DIE APPLICATIONS: NO-LEAD PACKAGES

PRODUCT	DESCRIPTION	VISCOSITY, cPs	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, GPa	% FILLER	RECOMMENDED CURE
FF2300™	No-flow underfill for Eutectic and lead-free applications.	3,100	81	75	2.6	Unfilled	Eutectic or lead-free reflow

SEMICONDUCTOR MARKET SOLUTIONS



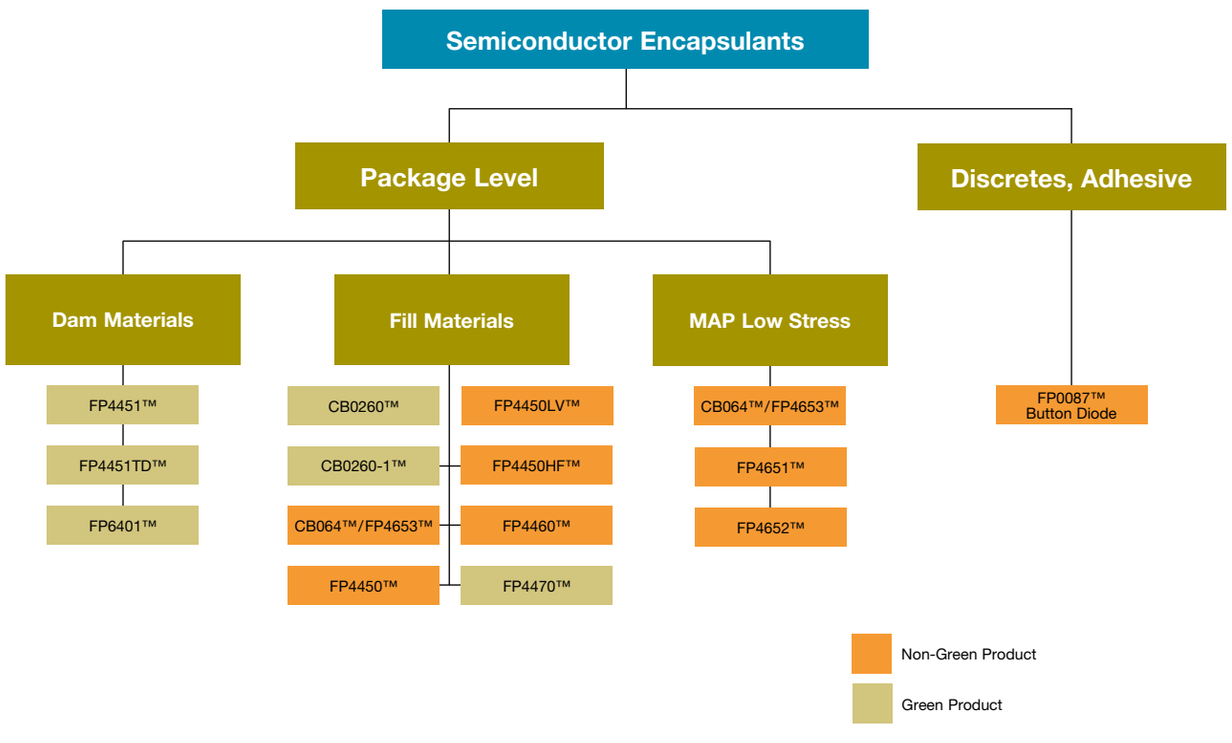
HYSOL® SEMICONDUCTOR ENCAPSULANTS

As today's consumer products continue to become smaller, thinner and lighter, the devices inside these electronics products must also follow suit. In order to achieve these requirements, Henkel has developed a suite of new Hysol® brand encapsulation materials that support high-throughput, low-cost package assembly processes.

Ease of use is a hallmark of all of our 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 wire, aluminum, silicon die and low-k die protection from the effects of mechanical damage and corrosion. For manufacturing environments that require it, we have also formulated a variety of single material solution 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 lead-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 ENCAPSULANTS

PACKAGE LEVEL: DAM MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
FP4451™	Industry standard damming material for BGAs.	30 min @ 125°C + 90 min @ 165°C	NA	900,000	145	24	72
FP4451TD™	Tall dam version of FP4451™ for applications requiring a taller, narrower dam. Ionically cleaner also.	30 min @ 125°C + 90 min @ 165°C	NA	300,000	150	21	73
FP6401™	Zero stress dam for ceramic or large array packages.	30 min @ 125°C	NA	3,700	15	80	9

PACKAGE LEVEL: FILL MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
CB0260™	High adhesion version of FP4450™ for 260°C L3 JEDEC performance.	1 hr @ 110°C + 2 hrs @ 160°C	High	40,000	145	18	74
CB0260-1™	High adhesion version of FP4450™ for 260°C L2A JEDEC performance.	30 min @ 125°C + 90 min @ 165°C	High	40,000	149	18	74
CB064™/ FP4653™	Ultra low CTE, low stress version of FP4450™ for large array packages.	2 hrs @ 110°C + 2 hrs @ 160°C	Low	80,000	150	8	86
FP4450™	Industry standard fill material for dam and fill or cavity down BGAs.	30 min @ 125°C + 90 min @ 165°C	Medium	50,000	155	22	73
FP4450LV™	Low viscosity version of FP4450™ incorporating cleaner resins.	30 min @ 125°C + 90 min @ 165°C	High	35,000	155	22	72
FP4450HF™	High flow version of FP4450LV™ using synthetic filler for use in fine wire and low alpha application.	30 min @ 125°C + 90 min @ 165°C	Very High	32,000	160	19	73
FP4460™	Glob top version of FP4450™.	1 hr @ 125°C + 2 hrs @ 160°C	Low	300,000	170	20	75
FP4470™	High adhesion version of FP4450™ for 260°C L3 JEDEC performance.	30 min @ 125°C + 90 min @ 165°C	High	48,000	148	18	75

PACKAGE LEVEL: MAP LOW STRESS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
CB064™/ FP4653™	Ultra low CTE, low stress version of FP4450™ for large array packages.	2 hrs @ 110°C + 2 hrs @ 160°C	Low	80,000	150	8	86
FP4651™	Low viscosity version of FP4650™ for large array packages.	1 hr @ 125°C + 90 min @ 165°C	Medium	130,000	150	11	82
FP4652™	Fast cure, low stress version of FP4450™ for large array packages.	15 min @ 110°C + 30 min @ 165°C	Medium	180,000	150	14	80

DISCRETES, ADHESIVE

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	% FILLER
FP0087™	Low stress fill for potting automated sensor and diodes; high Tg.	1 hr @ 125°C + 1 hr @ 180°C	High	20,000	175	18	76

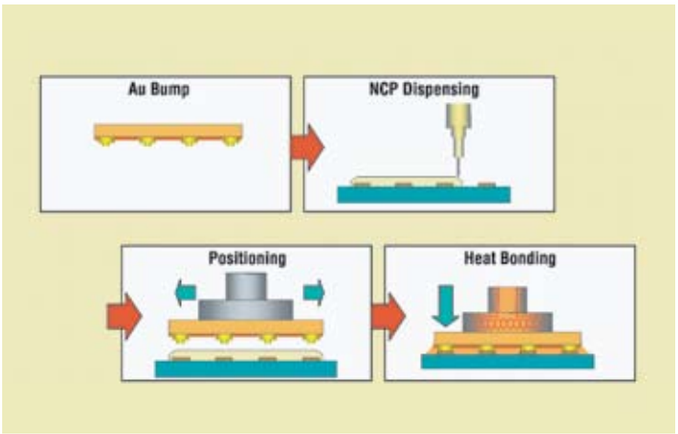
SEMICONDUCTOR MATERIALS

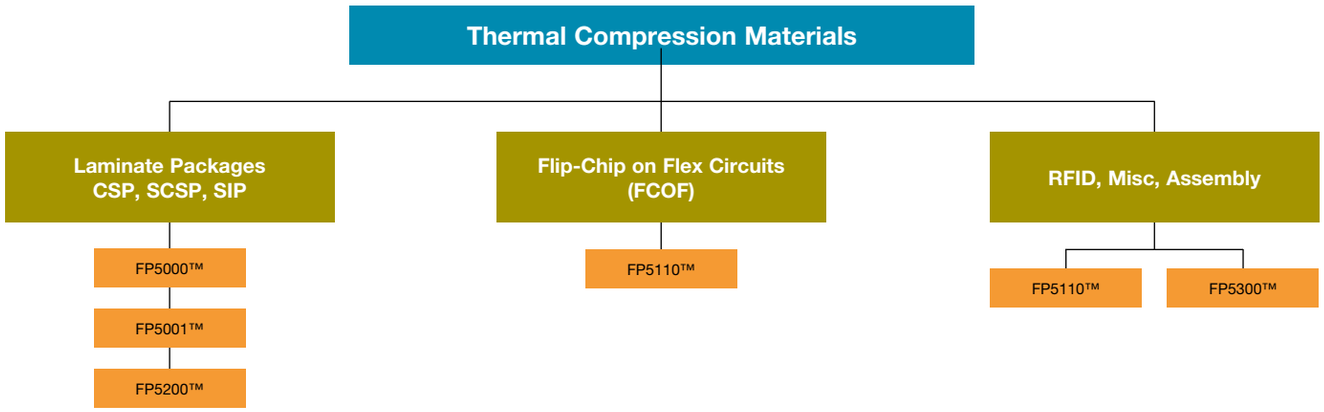
HYSOL® THERMAL COMPRESSION MATERIALS

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 lead-free environments.

The inherent benefits of thermal compression bonding using Henkel's unique NCP technology are many. NCP enables an alternative to traditional C4 soldering by bonding bumps to the substrate through an innovative lead-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.





HYSOL® THERMAL COMPRESSION MATERIALS

LAMINATE PACKAGES: CSP, SCSP, SIP

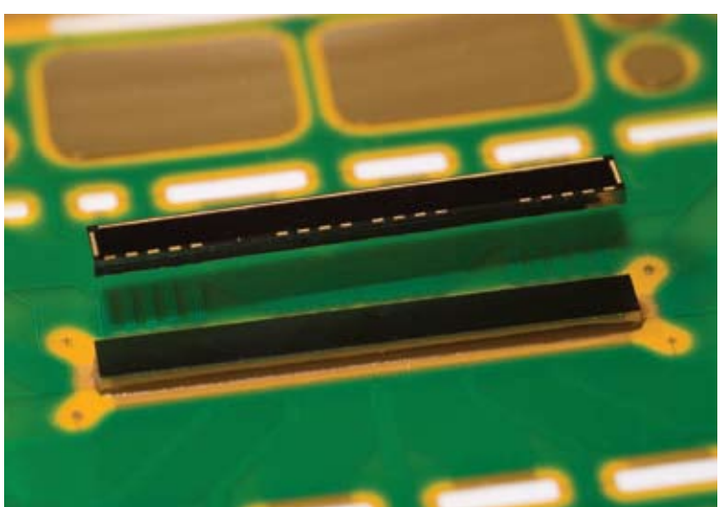
PRODUCT	DESCRIPTION	VISCOSITY, cPs	SUBSTRATE	CURE SCHEDULE	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, DMA	STORAGE TEMP	SHELF LIFE
FP5000™	Excellent MSL and PCT resistance. Compatible with both constant and pulse heat tool. Recommended for gold / gold assembly joint.	80,000 - 15,000	Laminate	4 sec @ 240°C	150	20 - 50 ppm	8.2 GPa	-15°C	12 months
FP5001™	Excellent thermal cycling resistance. Compatible with both constant and pulse heat tool. Recommended for gold / gold assembly joint.	25,000 - 75,000	Laminate	4 sec @ 240°C	150	15 - 45 ppm	7.9 GPa	-15°C	12 months
FP5200™	Excellent JEDEC MSL performance. Compatible with bump assembly. Recommended for gold / gold and gold / SAC alloy solder joint.	83,000	Laminate	6 sec @ 240°C	171	36 ppm	10.4 GPa	-15°C	6 months (tentative)

FLIP-CHIP ON FLEX CIRCUITS (FCOF)

PRODUCT	DESCRIPTION	VISCOSITY, cPs	SUBSTRATE	CURE SCHEDULE	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, DMA	STORAGE TEMP	SHELF LIFE
FP5110™	Excellent adhesion strength to 2- and 3-layer flexible printed circuits. Low temperature cure NCP. Recommended for gold / gold joints.	21,000	Flexible Printed Circuits	8 sec @ 200°C	103	50 ppm	4.8 GPa	-15°C	3 months (tentative)

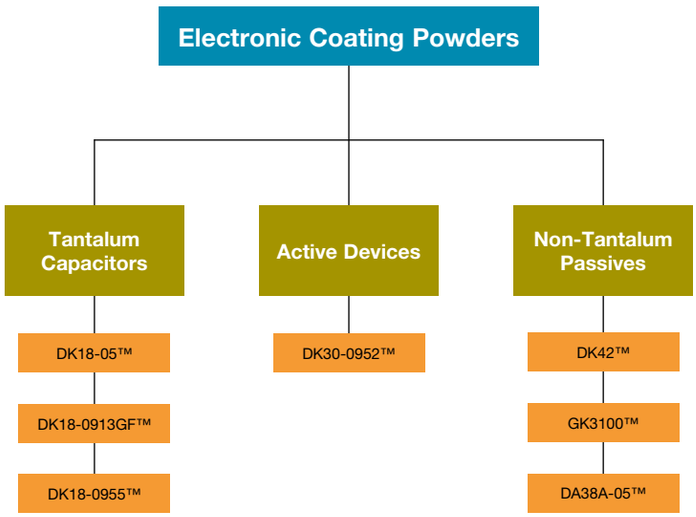
RFID, MISC ASSEMBLY

PRODUCT	DESCRIPTION	VISCOSITY, cPs	SUBSTRATE	CURE SCHEDULE	Tg, °C	CTE_{a1}, ppm/°C	MODULUS, DMA	STORAGE TEMP	SHELF LIFE
FP5110™	Excellent adhesion strength to 2- and 3-layer flexible printed circuits. Low temperature cure NCP. Recommended for gold / gold joints.	21,000	Flexible Printed Circuits	8 sec @ 200°C	103	50 ppm	4.8 GPa	-15°C	3 months (tentative)
FP5300™	Excellent adhesion strength to 2- and 3-layer flexible printed circuits as well as laminates. Low temp cure ACP.	61,000	Flexible Printed Circuits and Laminates	8 sec @ 180°C	126	47 ppm	5.9 GPa	-15°C	6 months



SEMICONDUCTOR MATERIALS

HYSOL® COATING POWDERS



Hysol® Electronic Coating Powders enable the encapsulation of active and passive components that require reliable moisture protection and maximum performance. These materials are designed for dispensing through a full range of powder application equipment. Standard fluid bed machines, including small manual or large fully automated equipment, apply the powder with minimal dusting. In cascaded machines, Henkel's powders transport well and coat thoroughly. Our environmentally-friendly "green" coating powders offer the best-in-class performance without antimony or brominated flame retardants.

TANTALUM CAPACITORS

PRODUCT	DESCRIPTION	UL 94V-0	GLASS PLATE FLOW, mm	GEL TIME, 160°C	DIELECTRIC STRENGTH, V/mil	CURE SCHEDULE
DK18-05 Blue and Gold™	All capacitor types, thermistors, resistors.	Yes	35	25	1,100	60 min @110°C
DK18-0913™ *New Green	All capacitor types, thermistors, resistors.	Yes	38	25	1,000	60 min @110°C
DK18-0955 Blue™	All capacitor types, thermistors, resistors.	Yes	30	25	1,000	60 min @110°C

ACTIVE DEVICES

PRODUCT	DESCRIPTION	UL 94V-0	GLASS PLATE FLOW, mm	GEL TIME, 160°C	DIELECTRIC STRENGTH, V/mil	CURE SCHEDULE
DK30-0952™	Microelectronic grade powder for use on active components like transistors.	No	35	17	1,100	30 min @150°C

NON-TANTALUM PASSIVES

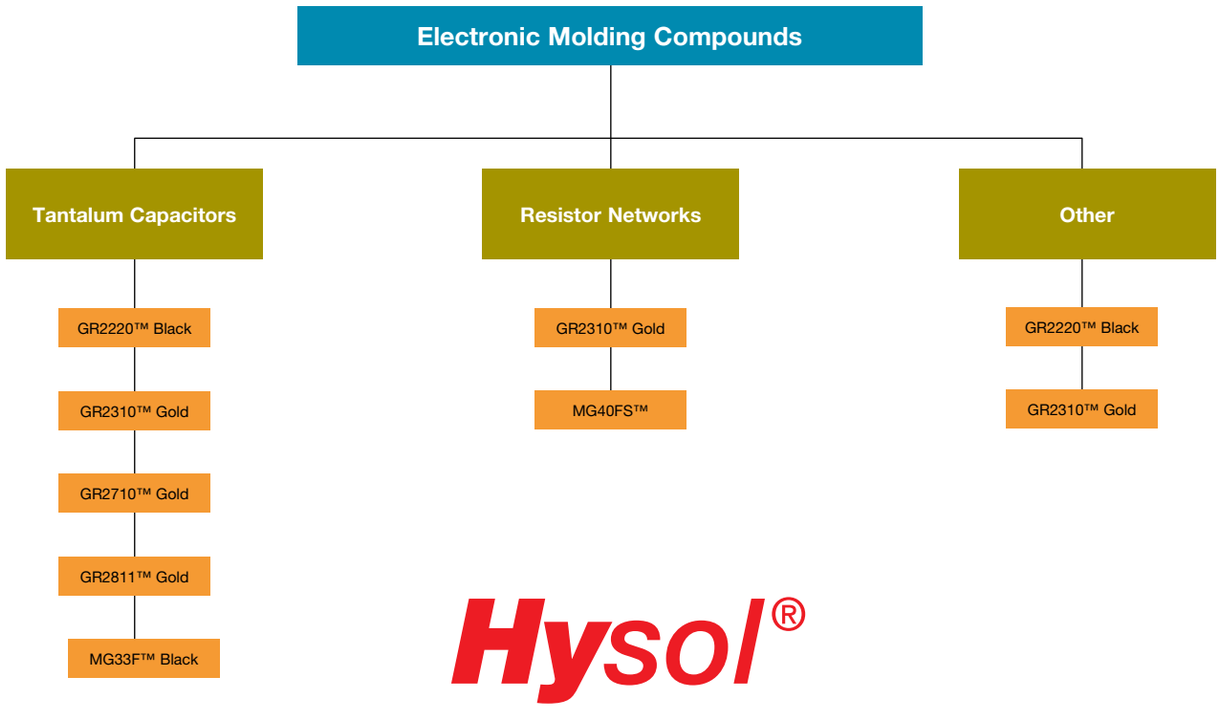
PRODUCT	DESCRIPTION	UL 94V-0	GLASS PLATE FLOW, mm	GEL TIME, 160°C	DIELECTRIC STRENGTH, V/mil	CURE SCHEDULE
DK42 Gold™	Passive components including all capacitor types.	Yes	35	35	1,400	30 min @150°C
GK3100 Gold™ *New Green	Passive components including all capacitor types.	Yes	35	18	1,000	30 min @150°C
DK38A-05™ *New Green	Passive components including all capacitor types.	Yes	35	18	1,200	30 min @150°C

HYSOL® ELECTRONIC MOLDING COMPOUNDS

Hysol® Electronic Molding Compounds protect passive components, such as ceramic and tantalum capacitors and resistors, and are designed for both automolds and conventional molds.

Our unique gold compounds are ideal for high contrast laser marking and are available in fast cure versions for high productivity. You can also choose from cutting-edge low stress compounds, capable of thin wall designs for today's relentless demands to miniaturize every component.

New generation molding powders have been designed to meet electronics industry's need for plastics that are environmentally friendly and resistant to cracking after 260°C IR reflow. New blends of proprietary flame retardants are used to replace the traditional antimony oxide/halogenated resin flame-out systems. The materials are a new family that pass UL standards and meet the EU's environmental requirements (i.e., no halogens, no heavy metals). Combining these new 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

HYSOL® ELECTRONIC MOLDING COMPOUNDS

TANTALUM CAPACITORS

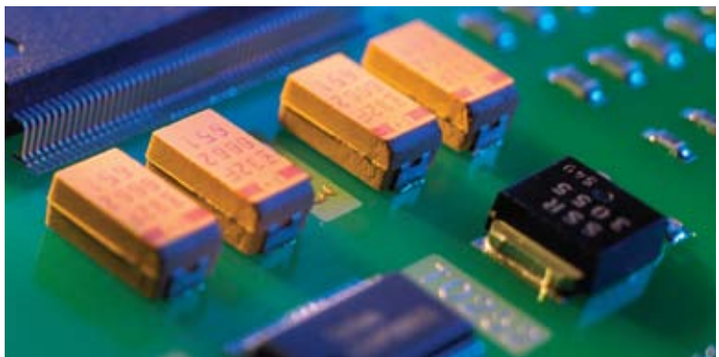
PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	$CTE_{\alpha 1}$, ppm/°C	$CTE_{\alpha 2}$, ppm/°C	CURE TIME @ 177°C	FLEXURAL STRENGTH, psi	FLEXURAL MODULUS, psi	LASER MARKABLE
GR2310™	Gold/non-halogenated molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Conv/Auto	27	166	22	75	30 - 45 sec	20,500	2.1×10^6	Y
GR2710™	Gold/low stress/non-flame retarded molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Conv/Auto	35	161	13	45	45 - 60 sec	19,000	2.6×10^6	Y
GR2811™	Gold/thin wall – crack resistant, low stress, fast cycle time.	Conv/Auto	34	162	13	45	30 - 45 sec	20,000	2.9×10^6	Y
GR2220™	Black/conventional molding of MnO caps.	Conv	40	162	19	60	30 - 45 sec	18,500	2.4×10^6	N
MG33F™	Black environmentally-friendly "green" molding compound designed especially for the encapsulation of tantalum capacitors. Low moisture absorption, excellent moldability with fast cycle times, especially auto-mold applications.	Conv/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
GR2310™	Gold/non-halogenated molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Auto/Conv	27	166	22	75	30 - 45 sec	20,500	2.1×10^6	Y
MG40FS™	Black/conventional molding of SMD and SIP networks; gold version MG40F-0526™ available.	Conv	35	160	20	75	60 - 90 sec	19,000	2.6×10^6	N

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
GR2310™	Gold/non-halogenated molding powder, tantalum and ceramic capacitors, leaded or surface-mounted sensors.	Conv/Auto	27	166	22	75	30 - 45 sec	20,500	2.1×10^6	Y
GR2220™	Black/non-halogenated conventional molding of leaded components.	Conv	40	162	19	60	30 - 45 sec	18,500	2.4×10^6	N



HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

From through-hole discrete components to the most advanced surface mount devices, Henkel's Hysol® and Hysol® Huawei™ 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 mold compounds ensure an optimized process at high yields even in the most demanding lead-free environments.

Formulated for the varying requirements of today's discrete components, Hysol® products' high performance mold 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® mold compounds for surface-mounted leadframe devices all pass stringent JEDEC Level 1, 260°C testing. As "green" materials, these unique formulations are halide-free and lead-free compatible, meeting RoHS requirements and delivering superior performance even in high-temperature reflow conditions. With materials solutions for QFPs, SoPs, SOICs, QFNs, SOTs and DPAKs, the Hysol® line of mold 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 mold 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 mold 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 mold compound materials for use with today's multifunctional memory card (MMC) and Package-on-Package (POP) applications. Hysol® MMC and POP mold compounds deliver the robust performance characteristics and exceptionally low warpage required for these devices.

Hysol® Huawei™

SEMICONDUCTOR MATERIALS

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

Semiconductor Molding Compounds

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

Through-Hole Discretes

- **General Discretes** TO, Axial, Bridge, DIP, SMX Single In-Line Package (SIP)
  - Hysol® Huawei™ KL1000-3LX™
  - Hysol® Huawei™ KL1000-4T™
  - Hysol® Huawei™ KLG100™
  - Hysol® Huawei™ KLG200™
  - Hysol® GR360A-F8™
- **High Thermal Conductivity Application** TO, Full Pack, HSOP
  - Hysol® Huawei™ KL5000HT™
  - Hysol® GR750™
  - Hysol® GR750-SC™
  - Hysol® GR750HT-25™
- **High Voltage Application** TO, Axial, Bridge, DIP, SOT, DPAK, SOIC
  - Hysol® MG15F™
  - Hysol® GR15F-1™

Surface Mount / Lead Frames

- **QFP, T/LQFP, TSSOP**
  - Hysol® Huawei™ KL7000HA™
  - Hysol® GR828D™
  - Hysol® Huawei™ KLG730™
  - Hysol® GR868™
- **SOIC**
  - Hysol® Huawei™ KL4500-1NT™
  - Hysol® GR828D™
  - Hysol® Huawei™ KLG730™
  - Hysol® GR868™
- **QFN**
  - Hysol® Huawei™ KLG900HC™
  - Hysol® Huawei™ KLG900HP™
- **DPAK/D2PAK**
  - Hysol® GR828DD™
  - Hysol® Huawei™ KL8500™
  - Hysol® Huawei™ KLG750™
- **SOT/SMX**
  - Hysol® GR640HV™
  - Hysol® Huawei™ KL6500S™
  - Hysol® Huawei™ KLG750™
  - Hysol® Huawei™ KLG200S™
- **High Power Packages Power SOIC, Power SSOP**
  - Hysol® GR725LV™

Surface Mount / Laminates

- **SiP**
  - Hysol® GR9810™ series
- **PBGA, CSP**
  - Hysol® GR9810™ series
- **POP, SCSP**
  - Hysol® GR9810-1P™
- **MMC**
  - Hysol® GR9851M™

Green Product

Non-Green Product

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

THROUGH-HOLE DISCRETES/GENERAL

TO, AXIAL, BRIDGE, SIP, DIP, SMX

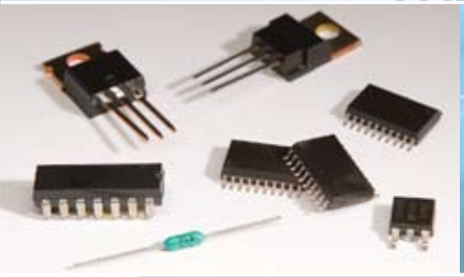
PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY	MSL	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® Huawei™ KL1000-3LX™	Provides the lowest cost of ownership with superior moldability and reliability. Extremely suitable for bridge, axial and TO packages.	1.3 W/mK	L4/220°C	N	75	23	Crystalline	24	165
Hysol® Huawei™ KL1000-4T™	Provides the lowest cost of ownership with superior moldability and reliability. Extremely suitable for DIP packages.	1.3 W/mK	L4/220°C	N	85	23	Crystalline	24	160
Hysol® Huawei™ KLG100™	Green mold compound with 1/4" 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® Huawei™ KLG200™	Green mold compound with 1/4" flammability rating suitable for large TO packages. Offers superior moldability with low cost of ownership.	0.9 W/mK	L3/260°C	Y	85	25	Crystalline Fused	20	165
Hysol® GR360A-F8™	Green mold compound with 1/8" flammability rating suitable for bridge, axial and TO packages. Offers good moldability with lowest cost of ownership.	0.9 W/mK	L3/260°C	Y	65	35	Fused	16	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	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® Huawei™ KL5000HT™	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® 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® GR750-SC™	GR750-SC™ is 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 copper and copper alloys. This material is specifically recommended for isolated power transistors.	2.1 W/mK	Y	45	26	Crystalline	20	155
Hysol® GR750HT-25™	GR750HT-25™ is a high thermal conductivity molding compound using fully alumina fillers designed to improve thermal management for semiconductor devices. It exhibits high adhesion to copper and copper alloys. This material is specifically recommended for isolated power transistors, which require high heat dissipation.	2.7 W/mK	Y	55	34	Alumina	15	140

SEMICONDUCTOR MATERIALS

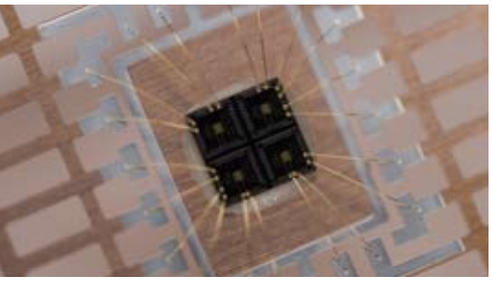


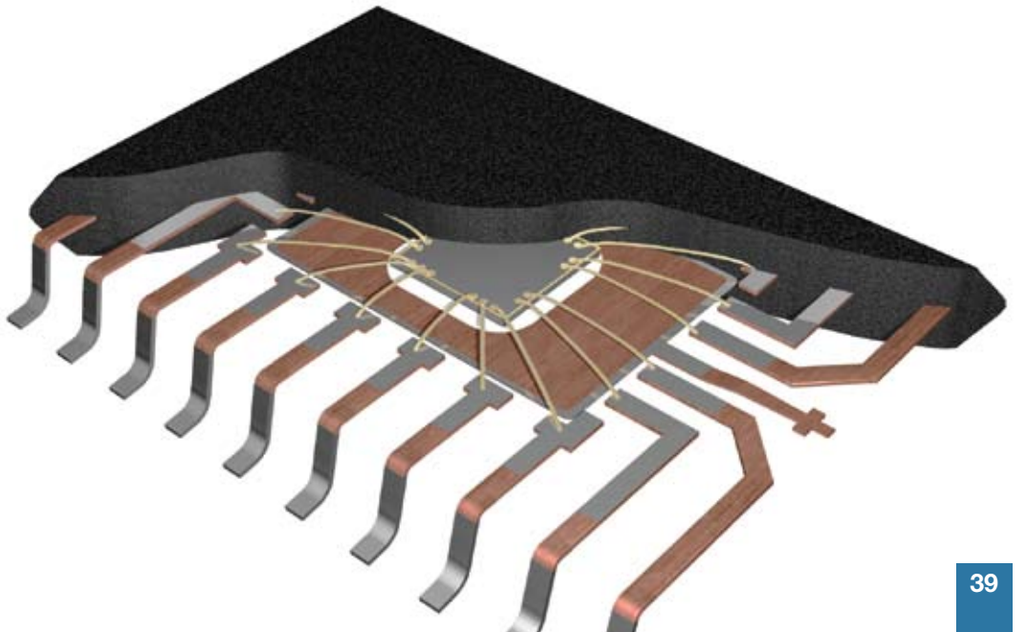
HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

DISCRETES/HIGH VOLTAGE APPLICATIONS

TO, AXIAL, BRIDGE, DIP, SOT, DPAK, SOIC

PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC CONDUCTIVITY, ROOM TEMP	IONIC CONDUCTIVITY, 150°C	MSL	GREEN	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
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
Hysol® GR15F-1™	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	3.7	5.8	L1/235°C	Y	80	18	210





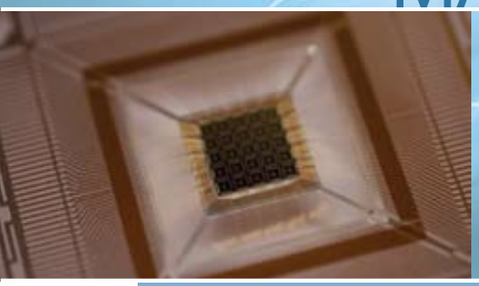
HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

SURFACE MOUNT/LEADFRAMES

QFP, T/LQFP, TSOP

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® Huawei™ KL7000HA™	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 molding with a large operating window.	all QFP	<14 x 14 mm T/LQFP	L3/260°C	N	84	110	9	130
Hysol® GR828D™	Green, ultra low stress and high adhesion molding compound designed for SOIC, TSOP and QFP packages with lead-free finishing. Hysol® GR828D™ targets package finishings that require Ag adhesion retention after MSL soaking and IR reflow process.	PPF, Ag	all T/LQFP	L3/260°C	Y	88	100	9	135
Hysol® Huawei™ KLG730™	High adhesion, ultra low stress and green mold 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" flammability rating.	PPF, Ag	all T/LQFP	L3/260°C	Y	87	129	7	130
Hysol® GR868™	GR868™ (C102924-129) is a green (non-bromine/antimony and phosphorus) semiconductor grade low stress, low moisture absorption and high adhesion molding compound. It is especially designed for all large and thin packages with highest MSL performance possible on Ni/Pd and Cu/Ag leadframes. It is unique as it offers the highest retention of adhesion even after the harshest reflow condition due to its low modulus at high temperature. It is especially suitable for TQFP and low k packages.	PPF, Ag	all QFP/ LQFP/ TQFP	L2/260°C	Y	87	105	10	110

SEMICONDUCTOR MATERIALS



HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

SURFACE MOUNT/LEADFRAMES

SOIC

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® Huawei™ KL4500-1NT™	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® GR828D™	Green, ultra low stress and high adhesion molding compound designed for SOIC, TSOP and QFP packages with lead-free finishing. Hysol® GR828D™ targets package finishings that require Ag adhesion retention after MSL soaking and IR reflow process.	PPF, Ag	all SOIC	L1/260°C	Y	88	100	9	135
Hysol® Huawei™ KLG730™	High adhesion, ultra low stress and green mold 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" flammability rating.	PPF, Ag	all SOIC	L1/260°C	Y	87	129	7	130
Hysol® GR868™	GR868™ (C102924-129) is a green (non-bromine, antimony and phosphorus) semiconductor grade low stress, low moisture absorption and high adhesion molding compound. It is especially designed for all large and thin packages with highest MSL performance possible on Ni/Pd and Cu/Ag leadframes. It is unique as it offers the highest retention of adhesion even after the harshest reflow condition due to its low modulus at high temperature. It is especially suitable for TQFP and low k packages.	PPF, Ag	all QFP/ LQFP/ TQFP	L2/260°C	Y	87	105	10	110

QFN

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® Huawei™ KLG900HC™	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® Huawei™ KLG900HP™	KL-G900HP™ is suitable for PPF QFN packages with its low wire sweep and excellent warpage performance. KL-G900HP™ 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	$CTE_{\alpha 1}$, 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 leadframes.	Ag, Ni, Cu	L1/260°C	Y	88	90	9	135
Hysol® Huawei™ KL8500™	Pure biphenyl formulation and superior adhesion technology ensure zero delamination performance for SOT and SOIC packages. Offers enhanced reliability performance for T/LQFP packages.	Ag, Ni, Cu	L1/260°C	N	85	110	9	115
Hysol® Huawei™ KLG750™	Superior adhesion technology ensures zero delamination performance for SOT and SOIC packages. It offers enhanced reliability performance for T/LQFP packages.	Ag, Ni, Cu	L1/260°C	Y	75	110	9	130

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

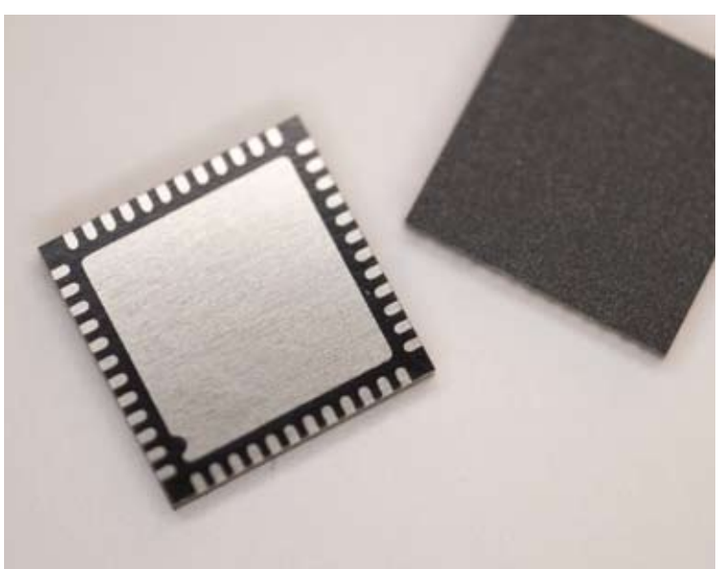
SURFACE MOUNT/LEADFRAMES

SOT/SMX

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	MAX FILLER SIZE, µm	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® GR640HV™	Low stress, green molding compound suitable for SOT package. Hysol® GR640HV™ provides superior moldability and reliability with lowest cost of ownership.	Ag, Cu	L1/260°C	Y	65	55	16	155
Hysol® Huawei™ KL6500S™	Low stress molding compound suitable for SOT, SOD and SOIC packages, Hysol® Huawei™ KL6500S™ provides good workability and high reliability.	Ag, Cu	L1/260°C	N	75	110	14	150
Hysol® Huawei™ KLG750™	Superior adhesion technology ensures zero delamination performance for SOT and SOIC packages. It offers enhanced reliability performance for T/LQFP packages.	Ag, Ni, Cu	L1/260°C	Y	75	110	9	130
Hysol® Huawei™ KLG200S™	Designed for superior moldability for SMX packages with good reliability performance.	Ag, Ni, Cu	L1/260°C	Y	75	80	20	175

HIGH POWER (HIGH CURRENT) PACKAGES, POWER SOIC, POWER SSOP (SMALL BODY)

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, C
Hysol® GR725LV™	Green, semiconductor grade, low stress, and high adhesion molding compound. Its patented sigma technology enables extremely high performance for power packages (high current), passing 3,000 hours at 200°C HTSL reliability test.	Ag, Cu	L1/260°C	Y	84	105	10	140



SEMICONDUCTOR MATERIALS

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

SURFACE MOUNT/LAMINATES

SiP

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® GR9810™ series	Hysol® GR9810™ series are technologically advanced, fine filler epoxy molding compounds designed for use as an overmold on a wide variety of laminate-based molded array packages including SIP and flip-chip array packages that have been conventionally underfilled. Its flexible hardener technology enables ultra low warpage. Hysol® GR9810-1™ is a "green" (non-antimony, bromine, phosphorous) molding compound and is capable of achieving JEDEC Level 2 requirements (substrate dependent), at 260°C reflow temperature.	Panel 50 x 60 mm	<6	L2/260°C	Y	85	100	10	200

PBGA, CSP

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
Hysol® GR9810™ series	Hysol® GR9810™ series are technologically advanced epoxy molding compounds designed for use as an overmold on a wide variety of BGA and CSP. It's flexible hardener technology enables ultra low warpage. Hysol® GR9820-1™ is a "green" (non-antimony, bromine, phosphorous) molding compound and is capable of achieving JEDEC Level 3, at 260°C 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	$CTE_{\alpha 1}$, 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. Hysol® GR9810-1P™ is "green" without any flame retardants and is capable of a 1/4" flammability rating.	15 x 15 mm FBGA	L3/260°C	Y	86	120	11	185

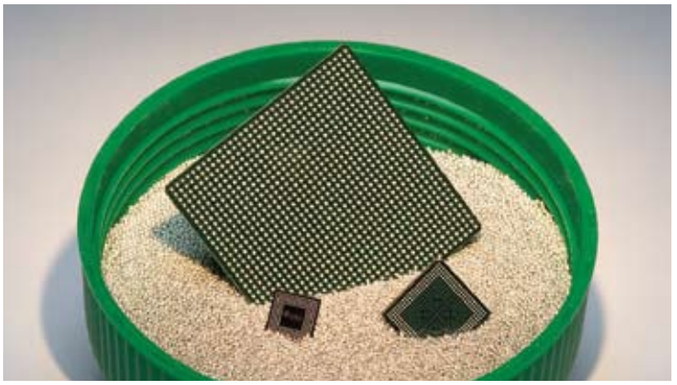
MMC

PRODUCT	DESCRIPTION	SUBSTRATE THICKNESS	STRIP WARPAGE	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	$CTE_{\alpha 1}$, ppm/°C	Tg, °C
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. Hysol® GR9851M™ is "green" without any flame retardants and is capable of a 1/4" flammability rating. It has excellent shrinkage characteristics, high glass transition temperature, and is 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

MULTICORE® ACCURUS™ SOLDER SPHERES

The extraordinary Henkel technology behind Multicore® Accurus™ solder spheres is what enables high yield, highly repeatable and accurate array package production. With our solder spheres, packaging specialists worldwide have the confidence that only our proprietary technology can provide: the industry's lowest oxidation levels, superior solderability, highest repeatability and unmatched quality assurance. Multicore® Accurus™ solder spheres define perfection.

Unlike other sphere production methods that rely on rudimentary machine-cutting or punching procedures, the unique mechanical jetting and sphere sorting methodology of Accurus™ results in spheres of superior quality that deliver yields higher than competitive products. With sphere sizes ranging from 0.05 mm to 0.50 mm in diameter, Accurus™ has sphere solutions for the emerging wafer-level bumping market all the way through to mainstream BGA and CSP applications. The incredibly low oxidation levels, combined with the industry's highest repeatability and precision control, make Accurus™ solder spheres the only choice for specialists who require unmatched quality and long-term package reliability. Multicore® Accurus™ spheres can be supplied in patented alloy formulations.



SEMICONDUCTOR MATERIALS

MULTICORE® ACCURUS™ SOLDER MATERIALS

SOLDER SPHERES

ALLOY	DIAMETER, mm	TOLERANCES ± mm	C_{pk}	PACKAGE SIZE		
				SPHERES/BOTTLE	BOTTLE SIZE, CC	SPHERES/BOX
Sn-Ag-Cu Series	0.500	0.015	≥1.33	500,000	100	10,000,000
Sn96.5-Ag3.5	0.450				40	
Sn-Ag1-Cu0.5	0.406					
Sn-Ag2.6-Cu0.6	0.400					
Sn-Ag3-Cu0.5*	0.350	0.010		1,000,000		20,000,000
Sn-Ag3.8-Cu0.7†	0.304					
Sn-Ag4-Cu0.5†	0.300					
Sn-Ag-Cu-Ni-Ge Series	0.250				25	
Sn-Ag1-Cu0.5-Ni0.05-Ge††	0.200					
Sn-Ag1.2-Cu0.5-Ni0.02-Ge††	0.180	0.005			10	
Sn-Ag3-Cu0.5-Ni0.05-Ge††	0.150					
CASTIN Series	0.100					
CASTIN125®‡	0.080					
CASTIN258®‡	0.050					
CASTIN305®‡						
Sn-Zn Series						
Sn91-Zn9						
Sn-Zn8-Ag0.5-Al0.01-Ga0.1						

Patent No: †ISURF-U.S 5,527,628 *SENJU-JP3,027,441 ‡AIM-U.S5,352407 U.S5,405,577 JP2,752,258 ††FUJI-U.S6,179,935 JP3,296,289 Other alloys and sizes are available upon request.

TACKY FLUXES

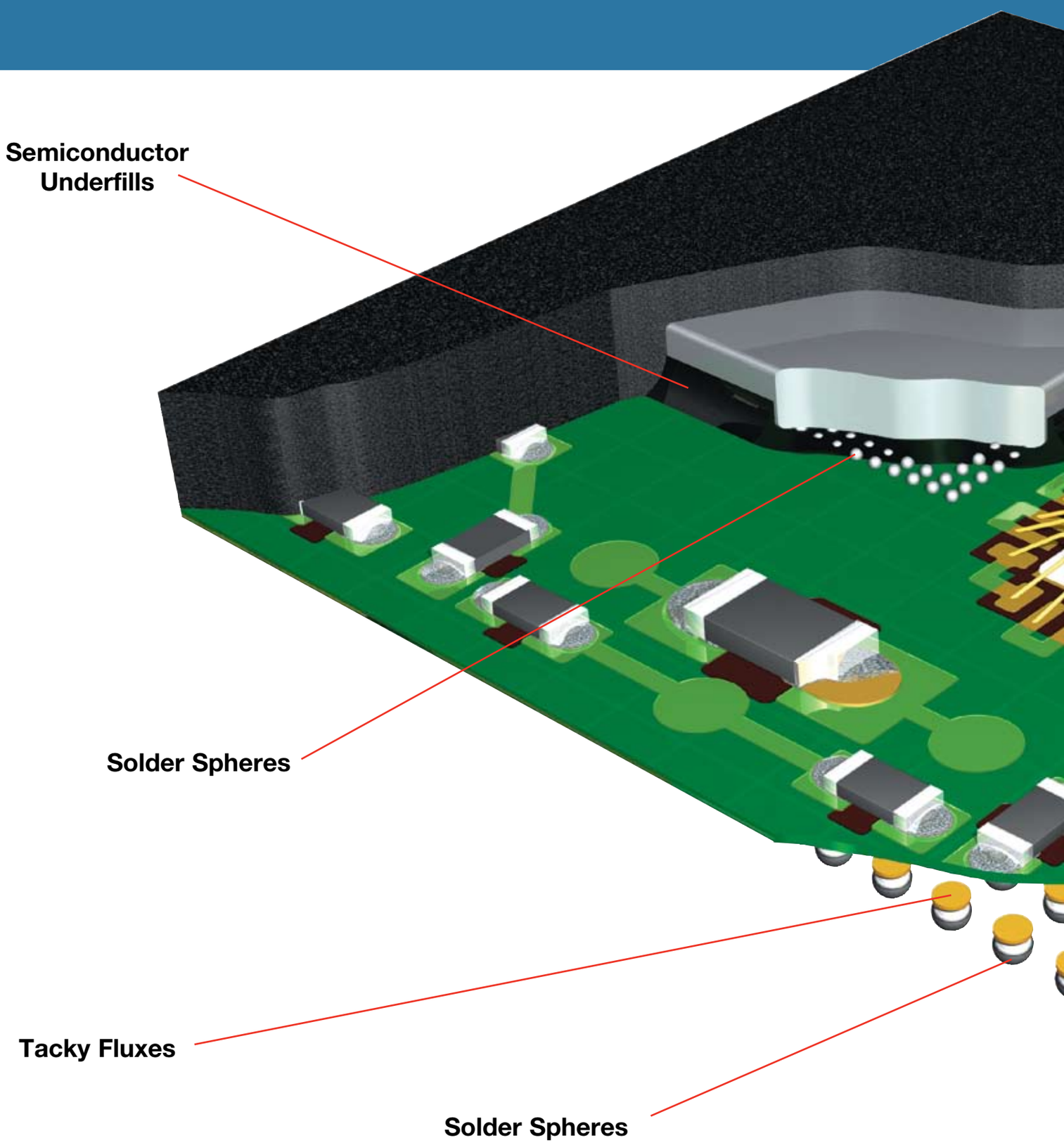
PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY	COLOR	TACK, g/mm²	ACID VALUE	SOLIDS CONTENT, %	IPC/J-STD-004 CLASSIFICATION
TFN600™	Standard viscosity; no clean tacky flux.	Printing (screen and stencil); pin transfer and dispensing.	300,000	Brown	130	76	49	ROL0
TFN610™	Low viscosity; no clean tacky flux.	Spraying, jetting and dipping.	25,000	Very Pale Yellow	133	116	66	ROL0
WS300™	Standard viscosity; water wash tacky flux.	Printing (screen and stencil); pin transfer and dispensing.	550,000	Brown	132	30	80	ORH1

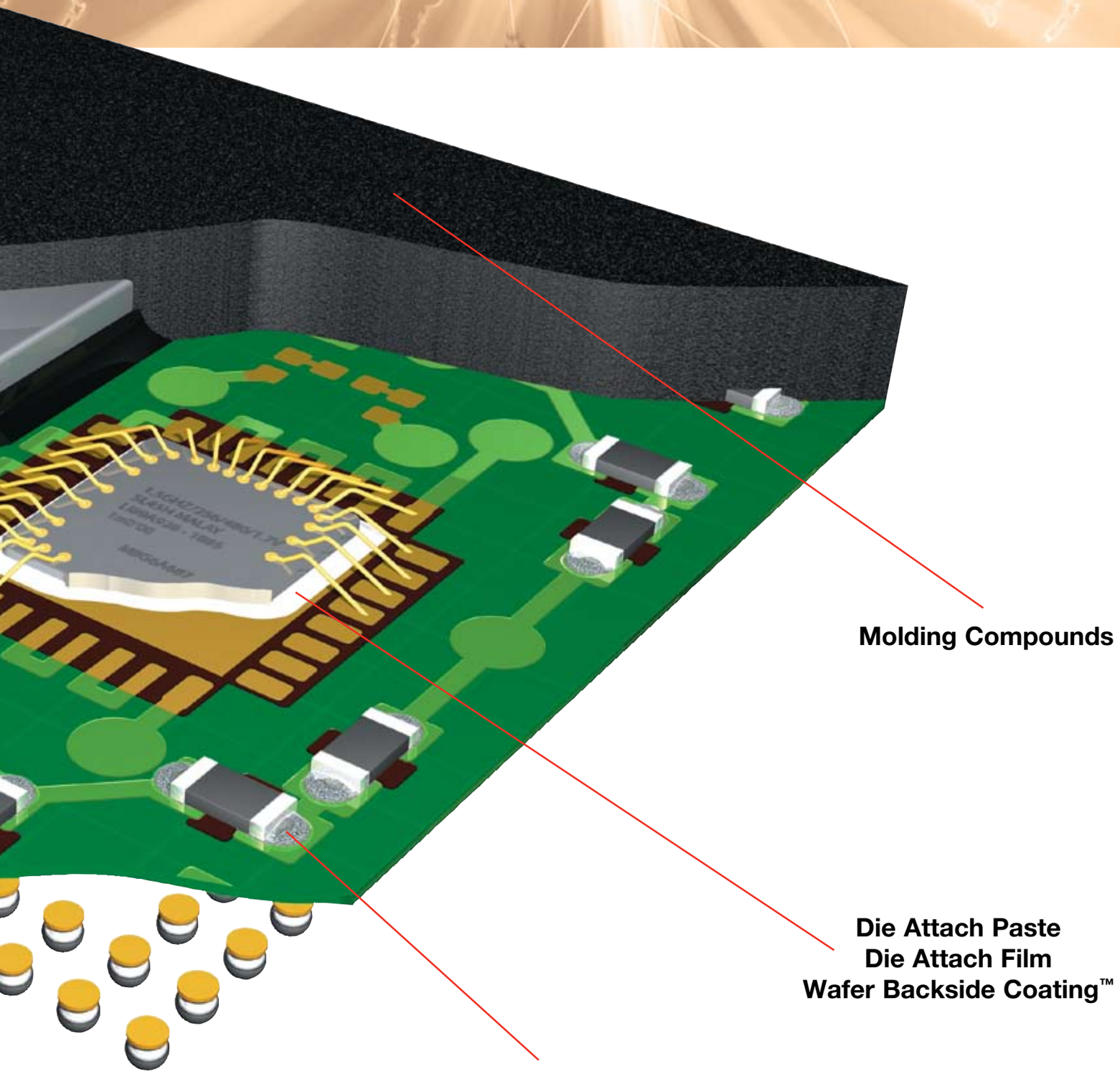
WAFER BUMPING SOLDER PASTE

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm²	PRINT SPEED, mm/s	REFLOW ATMOSPHERE	IPC/J-STD-004 CLASSIFICATION
WS300™	A water wash flux system specially formulated with fine-powder lead-free alloys. High performance, water-washable solder paste. Residues are easily removed with DI water without the need for a saponifier. Good open time with excellent print definition and soldering.	96SC (SAC387) 97SC (SAC305)	89	0.8	25 - 100	N^2	ORH1

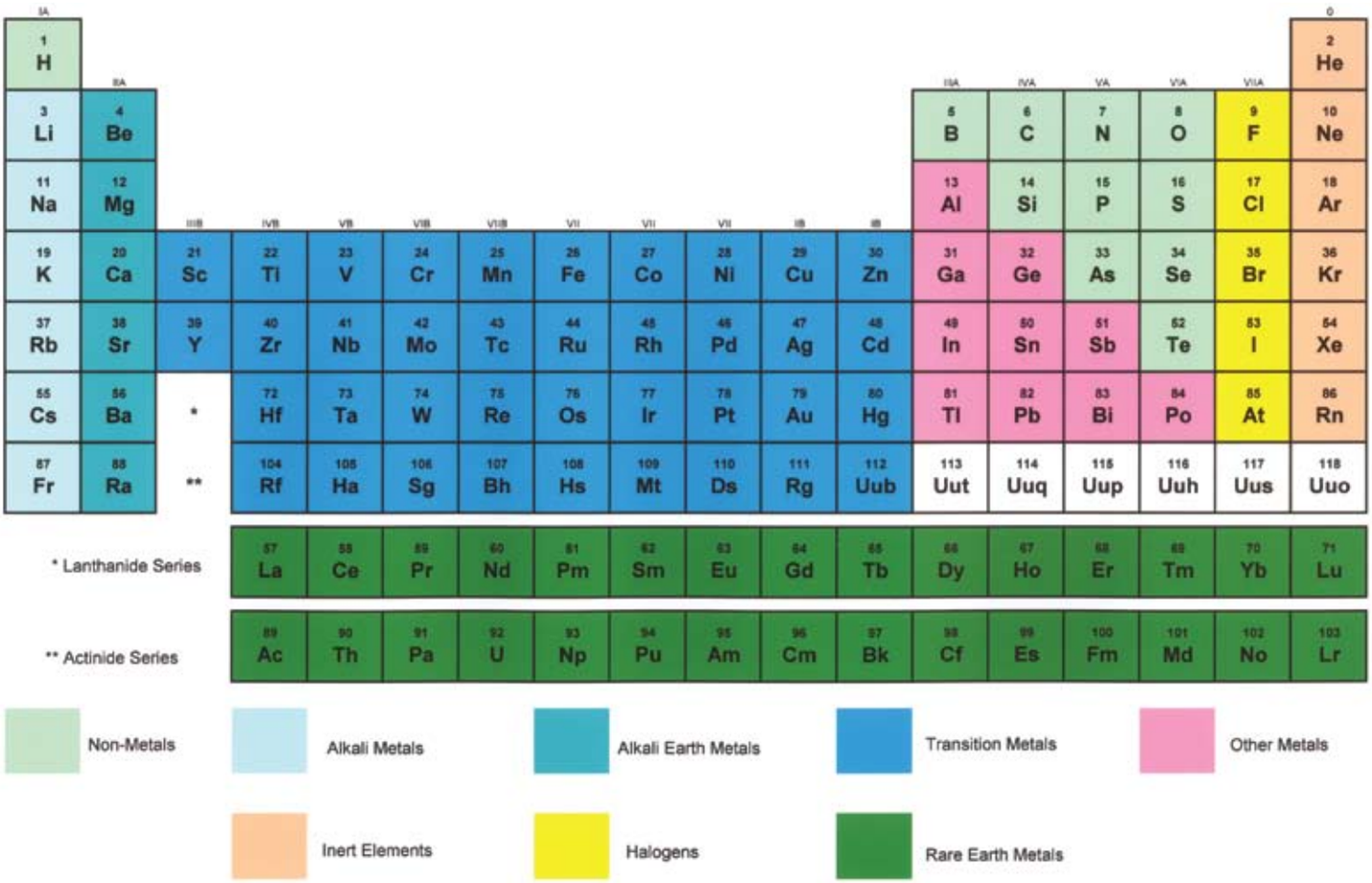
Multicore® Accurus™

SEMICONDUCTOR SOLUTIONS




Molding Compounds
Die Attach Paste
Die Attach Film
Wafer Backside Coating™
Solder Paste

PERIODIC TABLE OF ELEMENTS



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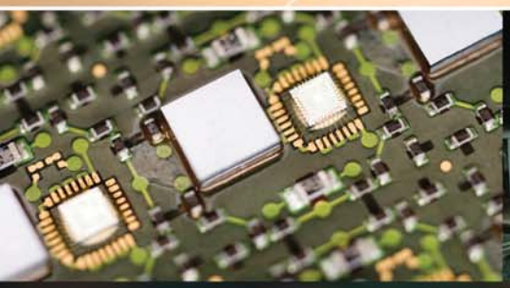

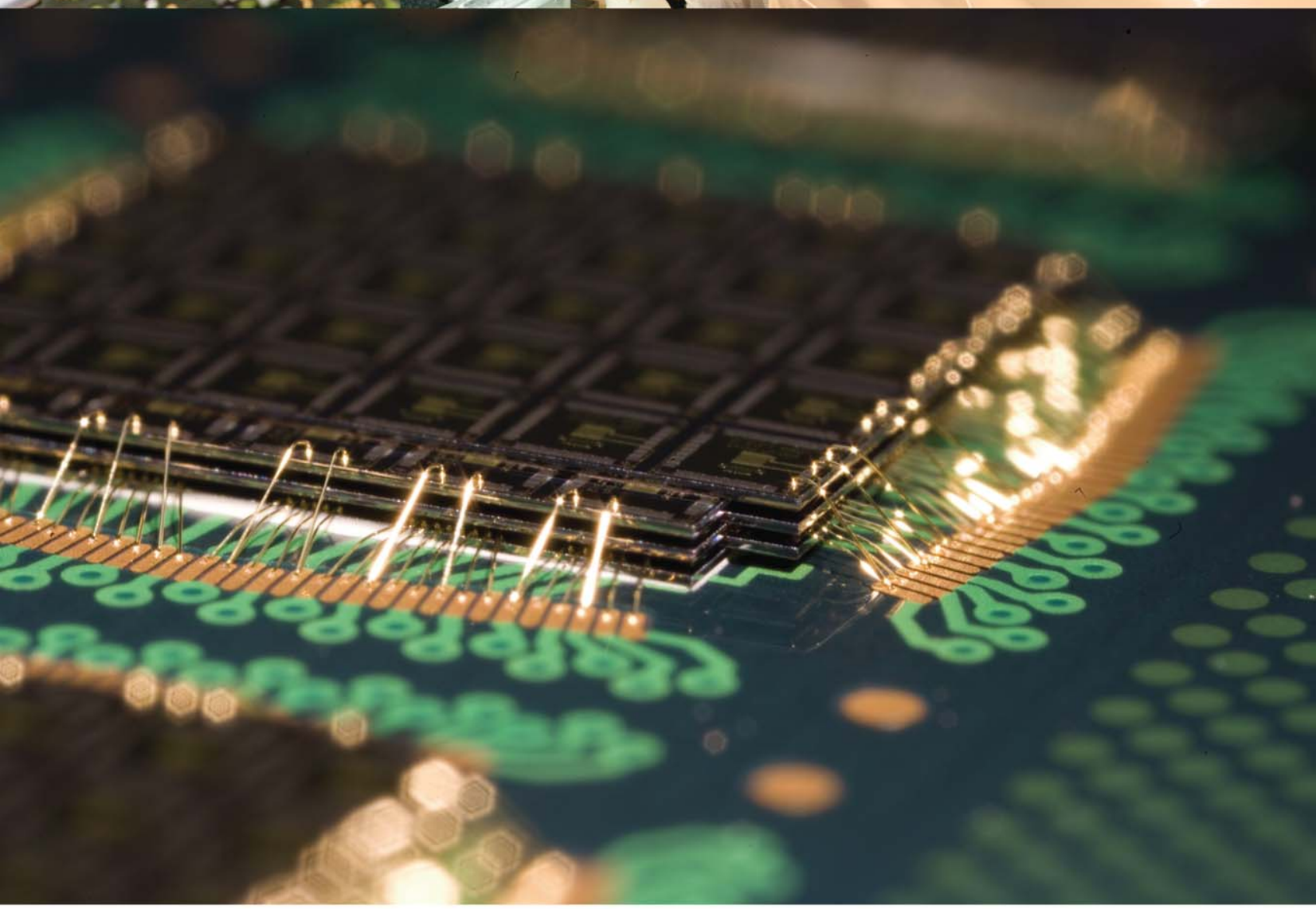

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