

Hysol®

LOCTITE®

Multicore®

Henkel **Electronic Solutions**



Henkel

Henkel

WORLDWIDE MANUFACTURING & ORGANIZATION

ELECTRONICS GROUP OF HENKEL



★ Headquarters/Product Development
■ Product Development/Manufacturing

● Product Development
▲ Manufacturing

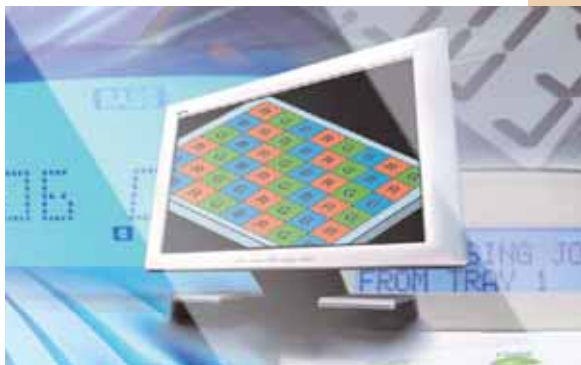
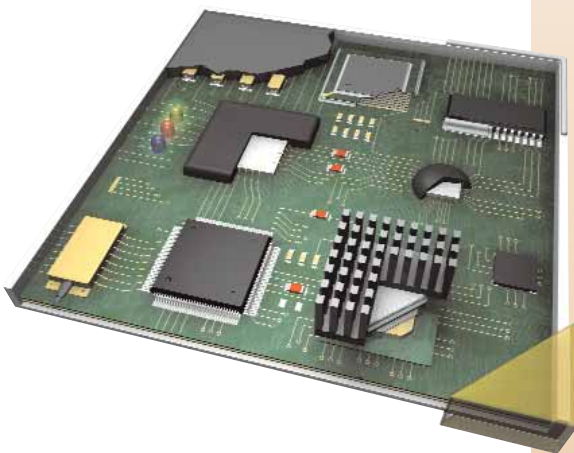
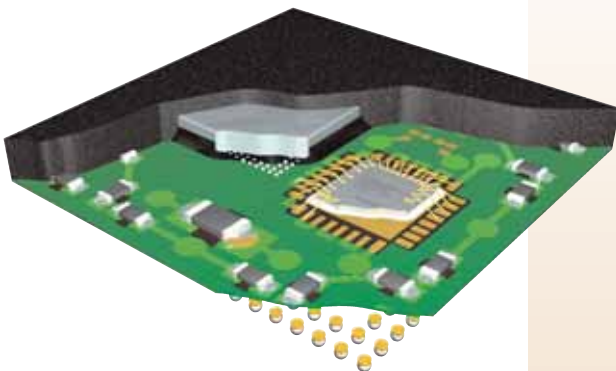
Corporate Profile – Henkel Corporation

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.

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



CONTENTS



Semiconductor Market Solutions

Discrete Components	5
Quad Flat Pack (QFP)	9
Quad Flat No-Lead (QFN)	11
Ball Grid Array/Chip Scale Package (BGA/CSP)	14
System-in-Package (SiP)	18
Flash Memory	21

Semiconductor Materials

Hysol® Die Attach Adhesives	23
Hysol® Semiconductor Underfills	29
Hysol® Semiconductor Encapsulants	32
Hysol® Thermal Compression Materials	34
Hysol® Coating Powders	36
Hysol® Electronic Molding Compounds	37
Hysol® and Hysol® Huawei™ Semiconductor Molding Compounds	39
Multicore® Accurus™ Solder Spheres	47

Printed Circuit Board (PCB) Assembly Materials

Multicore® Solder Paste	50
Multicore® Fluxes	52
Multicore® Cored Wire	54
Multicore® Solder Accessories	55
Chip on Board Encapsulant Materials	56
Loctite® Board Level Underfills	59
Loctite® Thermal Management Materials	61
Loctite® Electrically Conductive Adhesives	64
Loctite® Chipbonder™ Surface Mount Adhesives ...	66
Circuit Board Protection Solutions	68

Flat Panel Display Materials

Flat Panel Display Solutions	79
------------------------------------	----

Semiconductor Solutions	84
-------------------------------	----

Solutions Across the Board	86
----------------------------------	----

Periodic Table of Elements	88
----------------------------------	----

MATERIAL SOLUTIONS FOR ELECTRONIC PACKAGING AND ASSEMBLY

SEMICONDUCTOR MATERIALS

**Die Attach
Adhesives**

**Semiconductor
Underfills**

**Semiconductor
Encapsulants**

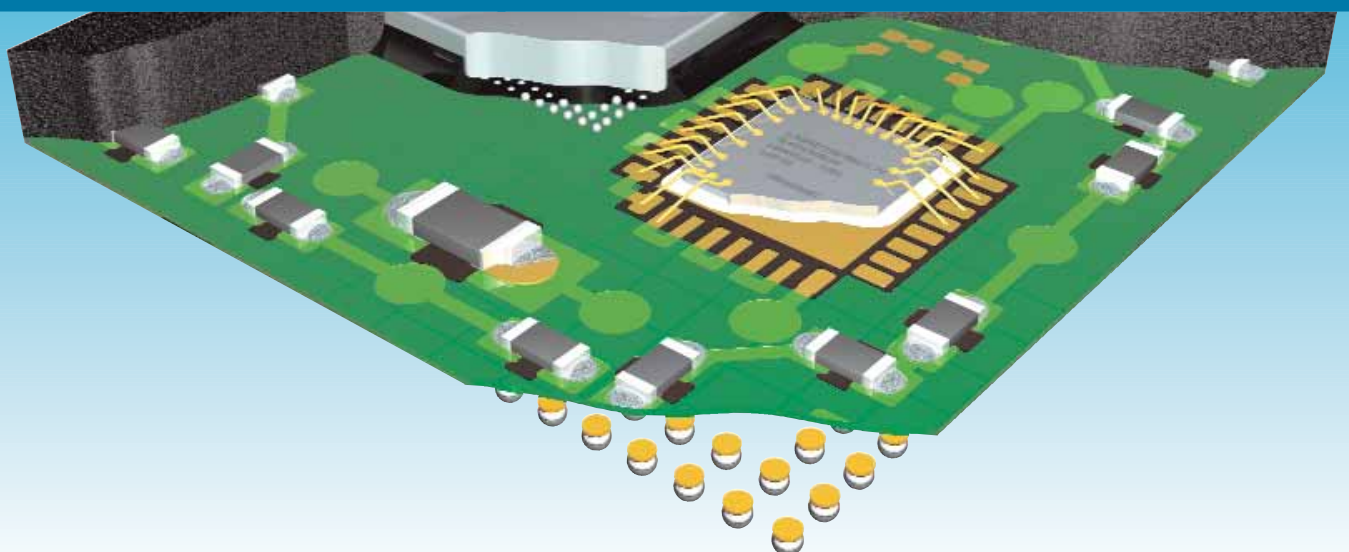
**Thermal
Compression
Materials**

Coating Powders

**Electronic Molding
Compounds**

**Semiconductor
Molding
Compounds**

**Solder and Flux
Materials**





PCB ASSEMBLY MATERIALS

**FLAT PANEL
DISPLAY
MATERIALS**

**Solder and Flux
Materials**

**Chip on Board
Encapsulant Materials**

**Board Level
Underfills**

**Thermal Management
Materials**

**Electrically
Conductive Adhesives**

**Surface Mount
Adhesives**

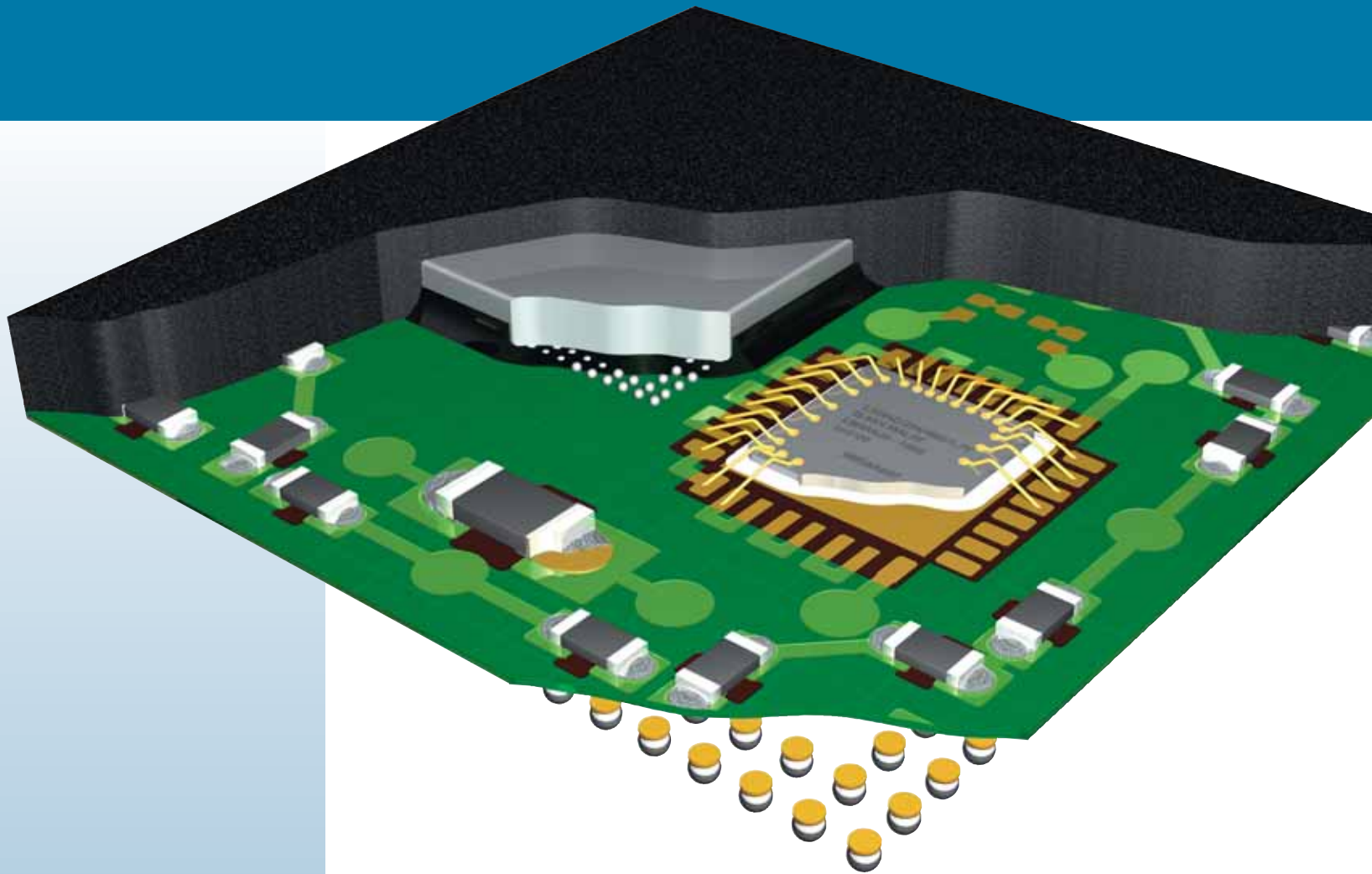
**Circuit Board
Protection Solutions**

Adhesives

**Cleaners, Developers
and Strippers**



SEMICONDUCTOR MARKET SOLUTIONS

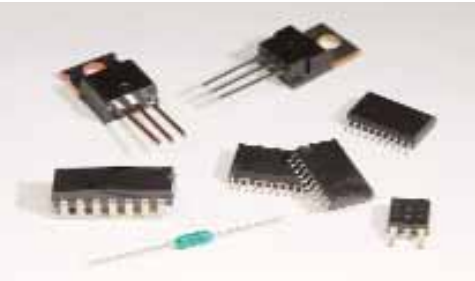


Hysol[®] **Huawei[™]**

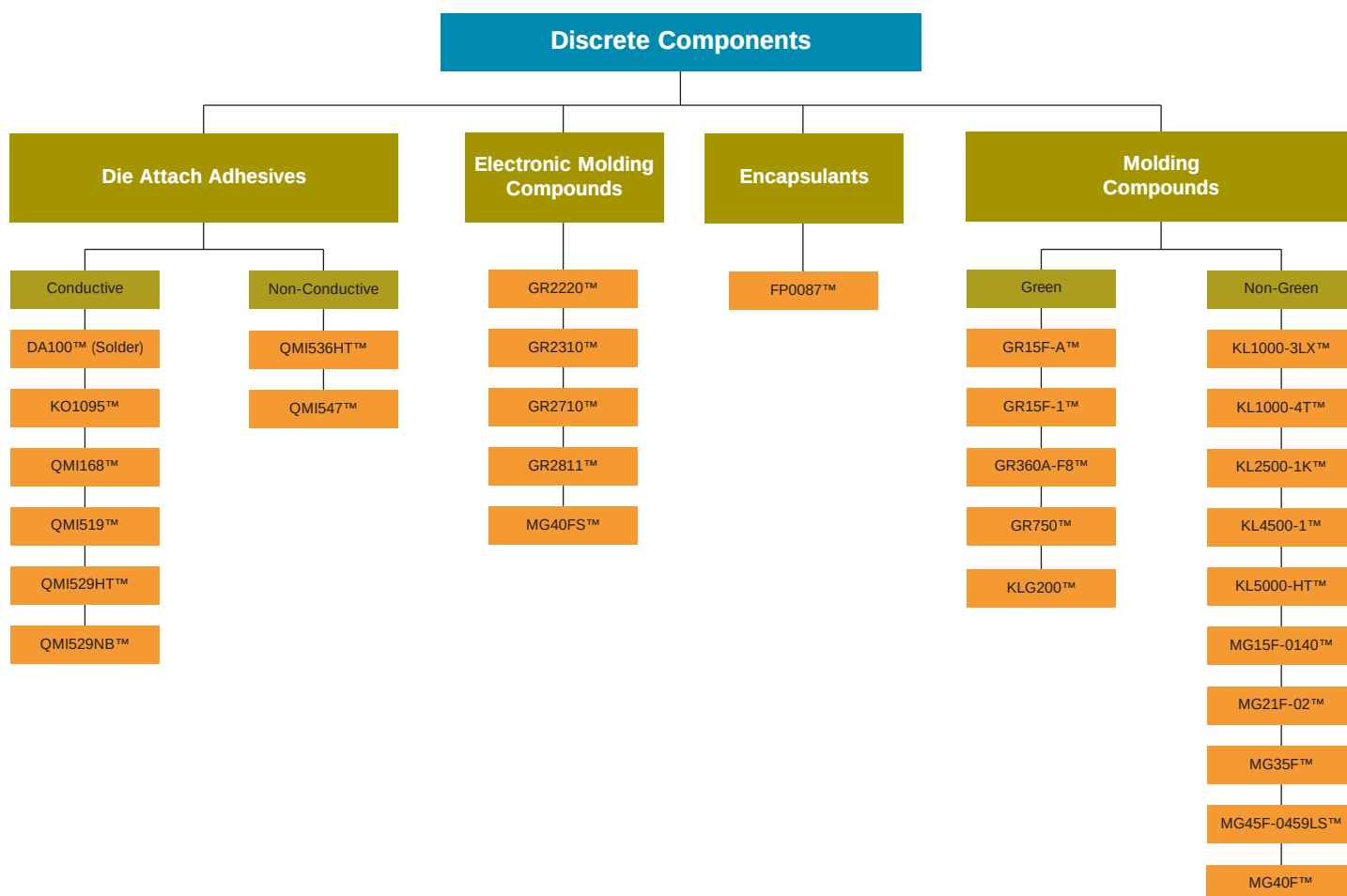
Across the Board,  Around the Globe.
www.henkel.com/electronics

Multicore[®] **Accurus[™]** 

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
KO1095™	Epoxy-based die attach paste	Cu	L4 - 220	1×10^{-3}	Very Good	30 min @ 165°C (Oven)	2.1
QMI168™	Similar properties to QMI519™, manufactured in our Yantai plant.	Ag, Au	L3 - 260	3×10^{-4}	Good	≥ 10 seconds @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	3.8
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for 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 then (SkipCure™) 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 (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™ for use on NiPdAu, and alloy 42 applications.	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8

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	ROLO

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 (SkipCure™) 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 (SkipCure™) 15 min @ 150°C (Oven)	0.3

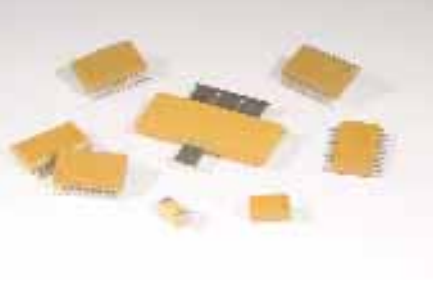
ELECTRONIC MOLDING COMPOUNDS

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	CTE _{a1} , ppm/°C	CTE _{a2} , 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 _{a1} , 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



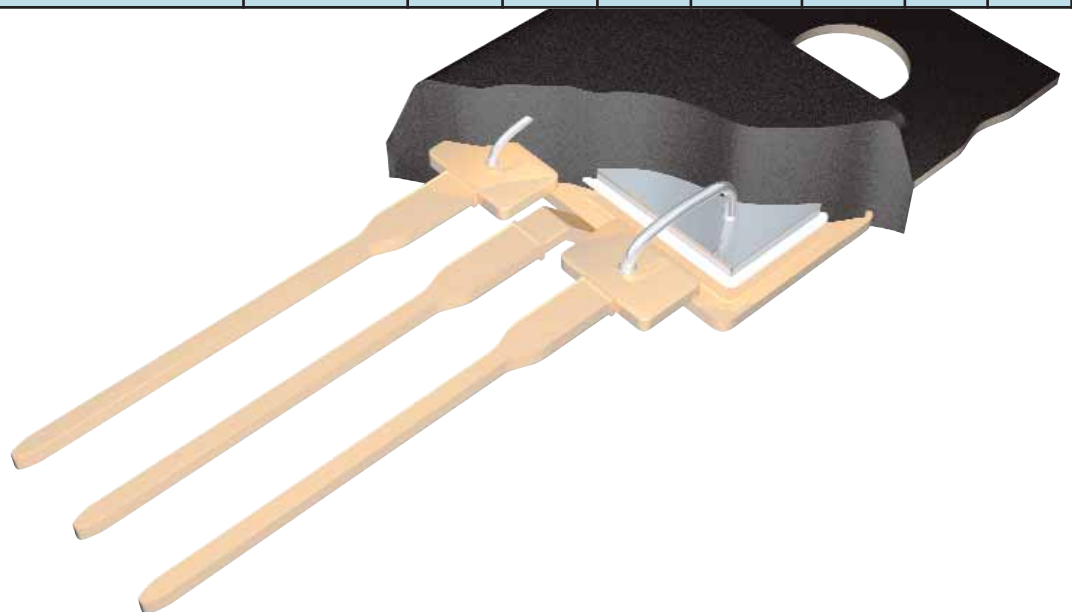
DISCRETE COMPONENTS

MOLDING COMPOUNDS: GREEN

PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC PERMITTIVITY, ROOM TEMP	IONIC PERMITTIVITY, 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.	2.1W/m.K	Y	65	30	Alumina/ Crystalline	23	160

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.	0.9W/m.K	L3/260°C	Y	65	35	Fused	16	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.	0.9W/m.K	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 _{a1} , 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.	1.3W/m.K	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.	1.3W/m.K	L4/220°C	N	85	23	Crystalline	24	160
KL2500-1K™	Low stress molding compound and is suitable for TO and DIP packages and provides superior moldability and reliability	0.9W/m.K	L3/260°C	N	100	22	Fused	19	145
KL4500-1™	High Tg, low stress and high purity characteristics enables packaging of high reliability devices in TO, DIP and SOP format. Its low viscosity properties enable low wire sweep.	0.9W/m.K	L1/260°C	N	90	25	Fused	16	160

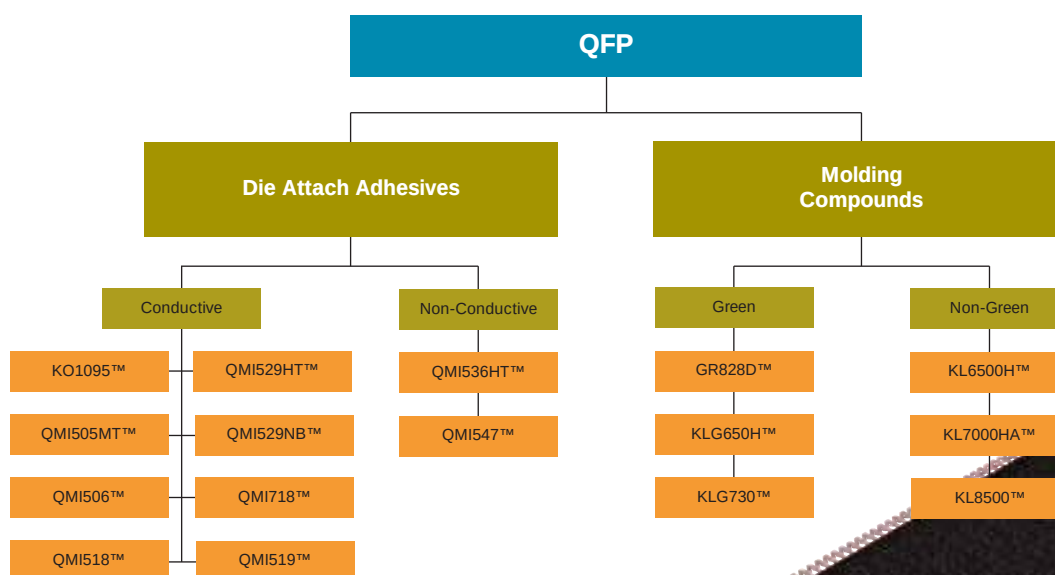
PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mk	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	CTE _{a1} , ppm/°C	Tg, °C
KL5000-HT™	Has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. KL5000-HT's low moisture absorption and low thermal expansion is suitable for stress sensitive devices.	2.1W/m.K	N	60	32	Alumina/ Crystalline	22	155
MG35F™	Suitable for discrete semiconductors requiring improvement in heat dissipation. MG35F™ provides high productivity for power transistors.	1.3W/m.K	N	70	30	Crystalline	24	160
MG45F-0459LS™	Has alumina fillers and delivers a high thermal conductive solution for TO-220F/3PF's thermal requirements. MG45F-0459LS™'s low moisture absorption and low thermal expansion is suitable for stress sensitive devices.	2.1W/m.K	N	60	30	Alumina/ Crystalline	23	160

PRODUCT	DESCRIPTION	VOLTAGE RATING	IONIC PERMITTIVITY, ROOM TEMP	IONIC PERMITTIVITY, 150°C	MSL	GREEN	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
MG15F-0140™	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
MG21F-02™	ECN base molding compound suitable for medium voltage applications. MG21F-02™ has excellent moldability on bridge and axial packages.	> 700V discrete, > 200V IC	3.8	11	L1/235°C	N	80	20	170

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	MAX FILLER SIZE, µm	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
MG40F™	High productivity molding compound for high volume encapsulation of SOT and DIP.	Ag, Cu	L1/260°C	N	75	55	21	165

SEMICONDUCTOR MARKET SOLUTIONS

QFP



DIE ATTACH ADHESIVES: CONDUCTIVE

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mk
KO1095™	Epoxy-based die attach paste	Cu	L4 - 220	1×10^{-3}	Good	≥ 30 min @ 165°C (Oven)	2.1
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 (SkipCure™) 30 min @ 200°C (Oven)	2.4
QMI506™	Low stress conductive die attach paste for QFPs and TSOPs	Au	L3 - 260	1	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	1.1
QMI518™	Very low stress conductive die attach	Ag, Au	L3 - 260	1	Good	≥ 6 sec @ 260°C (SkipCure™) 15 min @ 180°C (Oven)	1.4
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for 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 (SkipCure™) 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 (SkipCure™) 30 min @ 185°C (Oven)	7
QMI529NB™	No bleed version of QMI519™ for use on NiPdAu, and alloy 42 applications	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8
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

SEMICONDUCTOR MARKET SOLUTIONS

OFP

DIE ATTACH: NON-CONDUCTIVE

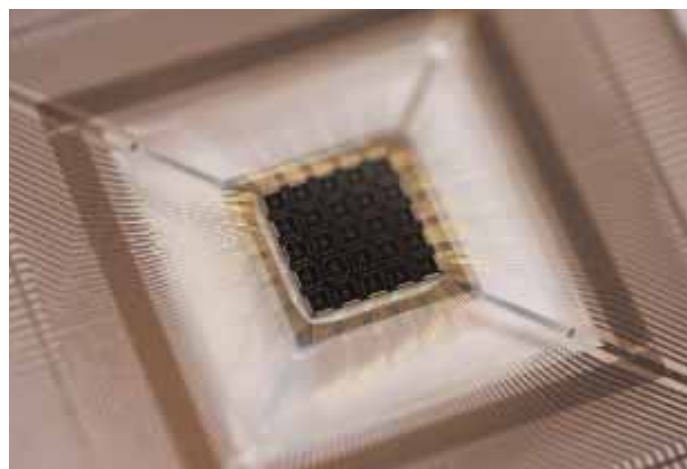
PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mk
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1 x 10 ⁻¹³	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 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 (SkipCure™) 15 min @ 150°C (Oven)	0.3

MOLDING COMPOUNDS: GREEN

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{a1} , 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
KL650H™	Low stress, high adhesion green molding compound suitable for SOIC and QFP packages.	PPF, Ag	< 14 x 20 mm QFP	L3/ 260°C	Y	84	95	10	120
KL730™	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

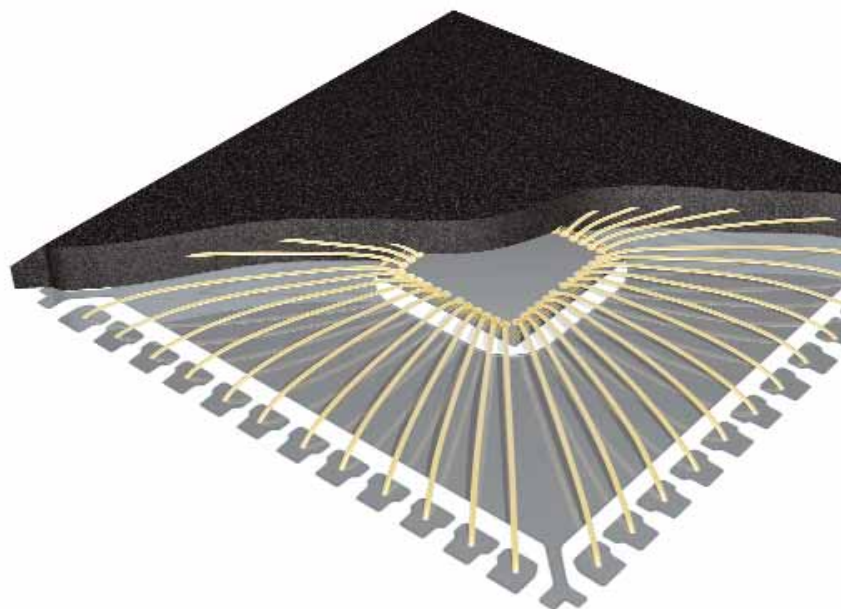
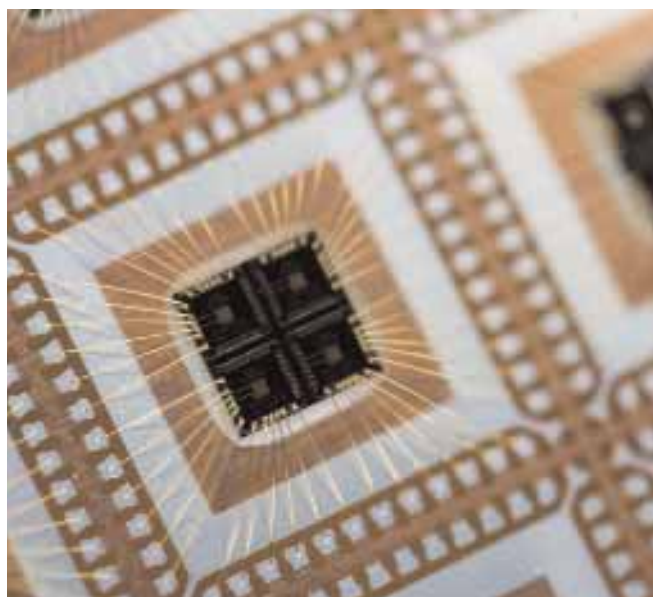
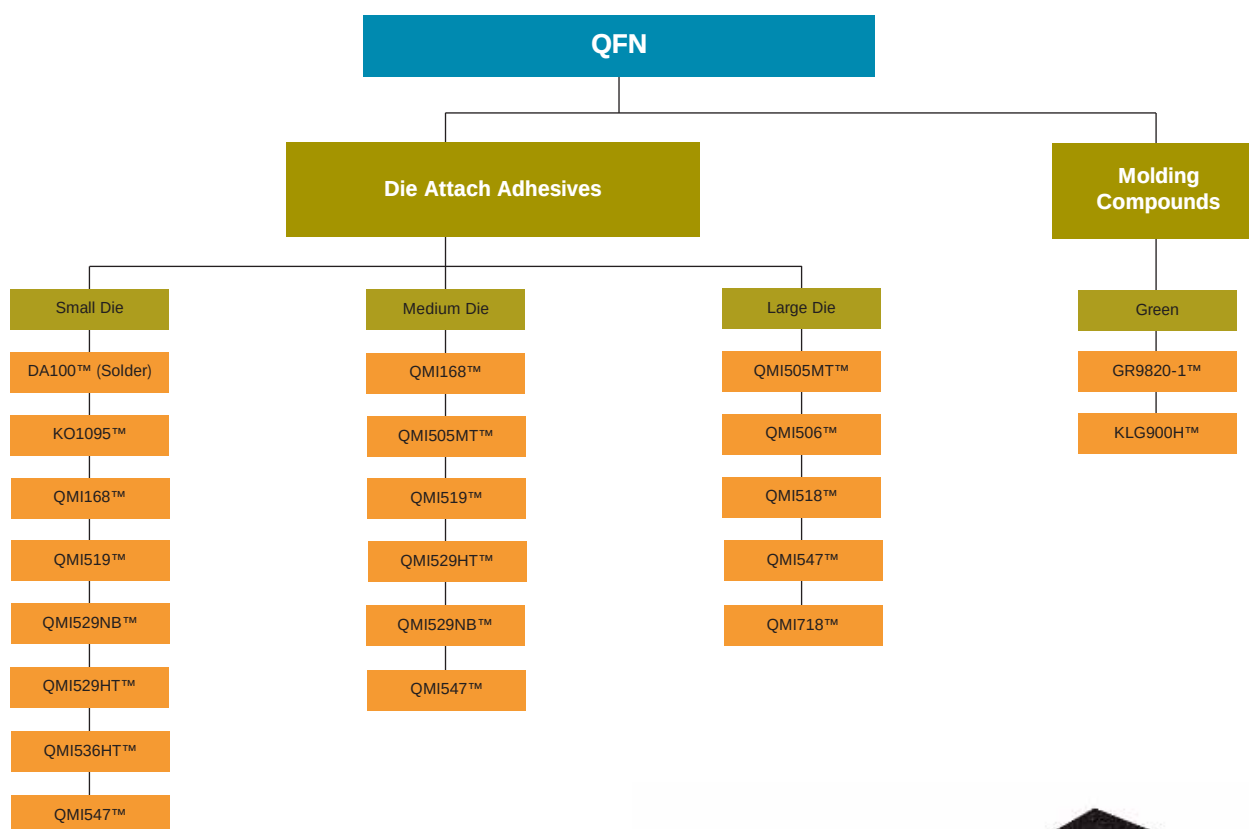
MOLDING COMPOUNDS: NON-GREEN

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
KL6500H™	Low stress, high adhesion green molding compound suitable for SOIC and QFP packages.	PPF, Ag	< 14 x 20 mm QFP	L3/ 260°C	N	80	105	12	130
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
KL8500™	Pure biphenyl formulation and superior adhesion technology ensures zero delamination performance for SOT and SOIC packages. It offers enhanced reliability performance for T/LQFP packages.	PPF, Ag	all qfp	L3/ 260°C	N	85	110	9	115



SEMICONDUCTOR MARKET SOLUTIONS

QFN



SEMICONDUCTOR MARKET SOLUTIONS

QFN

DIE ATTACH ADHESIVES: SMALL DIE, ≤ 2.5 MM X 2.5 MM

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mk
KO1095™	Epoxy-based die attach paste	Cu	L4 - 220	1×10^{-3}	Very Good	≥ 30 min @ 165°C	2.1
QMI168™	Similar properties to QMI519™ manufactured in our Yantai plant.	Ag, Au	L3 - 260	3×10^{-4}	Good	≥ 10 sec @ 200°C 30 min @ 200°C (Oven)	3.8
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for 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 (SkipCure™) 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 (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™ for use on NiPdAu, and alloy 42 applications	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8
QMI536HT™	Ideal for mixed stacked die applications. Non-die damaging filler.	Ag, Au	L3 - 260	1×10^{13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications	Cu, Ag, Au	L3 - 260	1×10^{13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.3

DIE ATTACH ADHESIVES: SMALL DIE, 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	ROLO

DIE ATTACH ADHESIVES: MEDIUM DIE, 2.5 MM X 2.5 MM TO 5 MM X 5 MM

PRODUCT	DESCRIPTION	FINISH (Ag, Cu, Ni)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mk
QMI168™	Similar properties to QMI519™, manufactured in our Yantai plant.	Cu, Ag, Au	L3 - 260	3×10^{-4}	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	3.8
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 (SkipCure™) 30 min @ 200°C (Oven)	2.4
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Good for all preplated leadframes and bare copper. High adhesion, excellent electrical and thermal performance.	Cu, Ag, Au	L1 - 260	1×10^{-4}	Very Good	≥ 10 sec @ 200°C (SkipCure™) 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.	Cu, Ag, Au	L1 - 260	4×10^{-5}	Fair	≥ 60 sec @ 185°C (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™, for use on NiPdAu, and alloy 42 applications	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8
QMI547™	Non-conductive paste for leadframe applications	Cu, Ag, Au	L3 - 260	1×10^{13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.3

SEMICONDUCTOR MARKET SOLUTIONS



QFN

DIE ATTACH ADHESIVES: LARGE DIE, $\geq 5 \text{ MM} \times 5 \text{ MM}$

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	$\geq 10 \text{ sec @ } 200^\circ\text{C}$ (SkipCure™) 30 min @ 200°C (Oven)	2.4
QMI506™	Low stress conductive die attach paste for QFPs and TSOPs	Au	L3 - 260	1	Good	$\geq 8 \text{ sec @ } 150^\circ\text{C}$ (SkipCure™) 15 min @ 150°C (Oven)	1.1
QMI518™	Low stress conductive die attach	Ag, Au	L3 - 260	1	Good	$\geq 6 \text{ sec @ } 260^\circ\text{C}$ (SkipCure™) 15 min @ 180°C (Oven)	1.4
QMI547™	Non-conductive paste for leadframe applications	Cu, Ag, Au	L3 - 260	1×10^{-13}	Good	$\geq 8 \text{ sec @ } 150^\circ\text{C}$ (SkipCure™) 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

MOLDING COMPOUNDS: GREEN

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
GR9820-1™	A technologically advanced epoxy molding compound 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 260°C reflow temperature.	PBGA 37.5 x 37.5 mm, CSP Panel 50 x 60 mm	Package warpage: < 4 mils, Panel warpage: < 6 mils	L3/260°C	Y	85	120	11	200

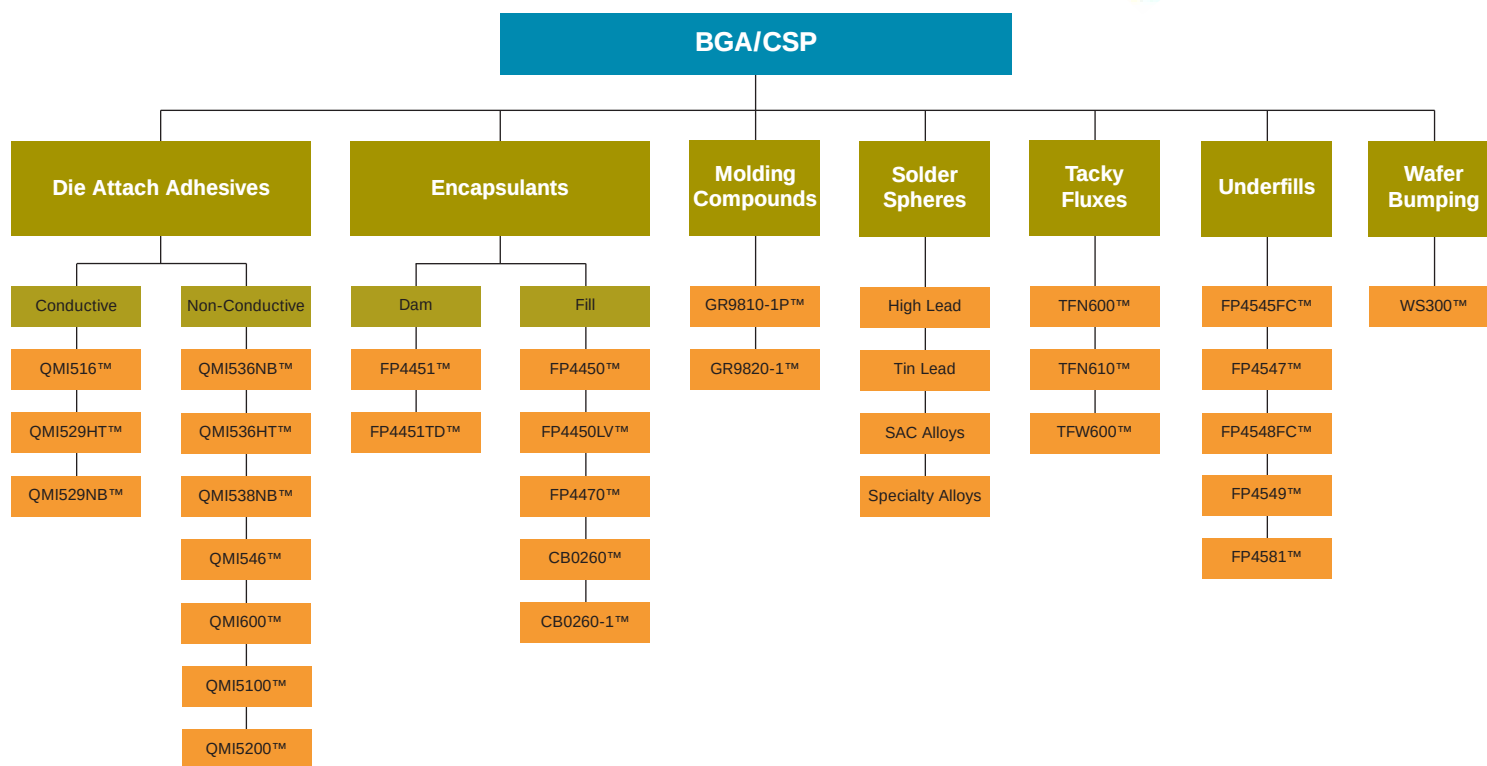
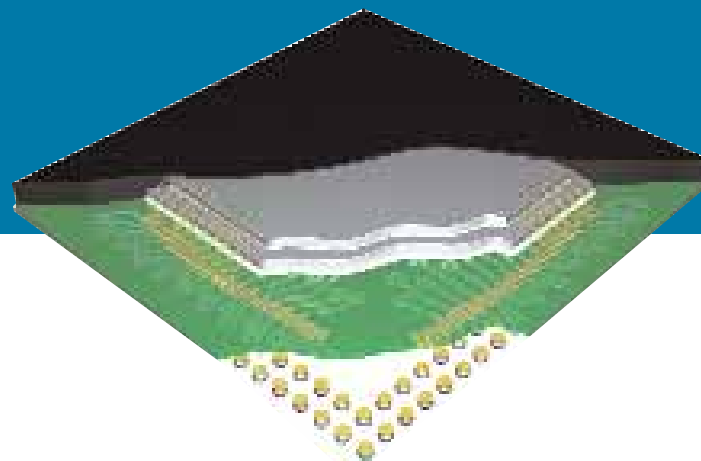
PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
KL900H™	Suitable for QFN packages with its low wire sweep and warpage performance. KL900H™, with its low CTE offers high reliability performance and moldability on thin panels, could not be easier.	PPF, Ag	L1/260°C	Y	88	90	8	148

Hysol® **Huawei™**

Multicore® **Accurus** 

SEMICONDUCTOR MARKET SOLUTIONS

BGA/CSP



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 (SkipCure™) 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 (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™, for use on NiPdAu, and alloy 42 applications	L2 - 260	5×10^{-4}	Good	≥ 30 min @ 170°C (Oven)	3.8

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 (SkipCure™) 30 min @ 150°C (Oven)	0.3
QMI546™	Smooth flowing and easy to use paste for the first die as well as die stacking	L3 - 260	1 x 10 ¹³	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.2
QMI600™	For stacked die applications where the bonding wires are covered by both the die attach paste and the mold compound	L3 - 260	1 x 10 ¹³	Good	≥ 10 sec @ 175°C (SkipCure™) 30 min @ 175°C (Oven)	0.6
QMI536HT™	Ideal for mixed stacked die applications. Non-die damaging filler.	L3 - 260	1 x 10 ¹³	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.9
QMI538NB™	No bleed, large die non-conductive, very low stress for die sizes greater than 500 x 500 mil./13 x 13 mm.	L2 - 260	1 x 10 ¹³	Excellent	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 175°C (Oven)	0.4
QMI5100™ (Film)	Nonconductive 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 10 microns.	L2 - 260	Non-Conductive	N/A	N/A	< 0.2
QMI5200™ (Film)	Nonconductive 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	N/A	N/A	< 0.2

ENCAPSULANTS: DAM

PRODUCT	DESCRIPTION	RECOMMENDED CURE	VISCOSITY, cPs	Tg, °C	CTE _{a1} , 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 _{a1} , 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
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	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{ΔT} , ppm/°C	T _g , °C
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. GR9810-1P™ is "green" without any flame retardants and is capable of 1/4" flammability rating.	FBGA 15 x 15 mm	L2/ 260°C	Y	86	120	11	185

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN NON-GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE _{ΔT} , ppm/°C	T _g , °C
GR9820-1™	Technologically advanced, epoxy molding compound 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 260°C reflow temperature.	PBGA 37.5 x 37.5 mm CSP Panel 50 x 60 mm	Package Warpage < 4 mils Panel Warpage < 6 mils	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-Pb Series Sn63-Pb37 Sn10-Pb90 Sn5-Pb95 Sn62-Pb36-Ag2 Sn63-Pb34.5-Ag2-Sb0.5 Sn-Ag-Cu Series Sn96.5-Ag3.5 Sn-Ag1-Cu0.5 Sn-Ag2.6-Cu0.6 Sn-Ag3-Cu0.5* Sn-Ag3.2-Cu0.5* Sn-Ag3.5-Cu0.75† Sn-Ag3.8-Cu0.7† Sn-Ag4-Cu0.5† Sn-Ag-Cu-Ni-Ge Series Sn-Ag1-Cu0.5-Ni0.05-Ge†† Sn-Ag1.2-Cu0.5-Ni0.02-Ge†† Sn-Ag3-Cu0.5-Ni0.05-Ge†† CASTIN Series CASTIN125 ^{®†} CASTIN258 ^{®†} CASTIN305 ^{®†} Sn-Zn Series Sn91-Zn9 Sn-Zn8-Ag0.5-Al0.01-Ga0.1	0.889	0.020	≥ 1.33	250,000	200	2,500,000			
	0.760			500,000		5,000,000			
	0.640				100		10,000,000		
	0.630								
	0.600								
	0.550	0.015			1,000,000	40	20,000,000		
	0.508								
	0.500			25					
	0.450								
	0.406								
	0.400	0.010				10			
	0.350								
	0.304					10			
	0.300								
	0.250								
	0.200	0.005				10			
	0.180								
	0.150								
	0.100								
	0.080								
	0.060								

Patent No: †ISURF-U.S 5,527,628 *SENJU-JP3,027,441 †AIM-U.S5,352,407 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/mm ²	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	ROLO
TFN610™	Low viscosity; no clean tacky flux	Spraying, jetting and dipping	25,000	Very Pale Yellow	133	116	66	ROLO
TFW600™	Standard viscosity; water wash tacky flux	Printing (screen and stencil); pin transfer and dispensing	550,000	Brown	132	30	80	ORH1

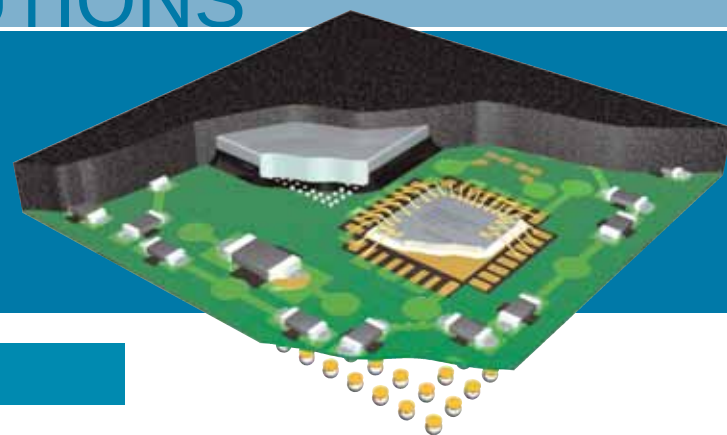
UNDERFILLS

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	Tg, °C	CTE _{a1} , 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
FP4547™	Fast-flowing, low stress underfill for fine-pitch flip-chip applications	Medium	18,000	135	80	11	69	60 min @ 165°C
FP4545FC™	Low viscosity version of FP4548FC™	Fast	6,500	120	28	7.1	55	60 min @ 165°C
FP4549™	For fine-pitch flip-chip applications. Fast flowing, low stress underfill	Very Fast	2,300	140	45	5.5	50	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

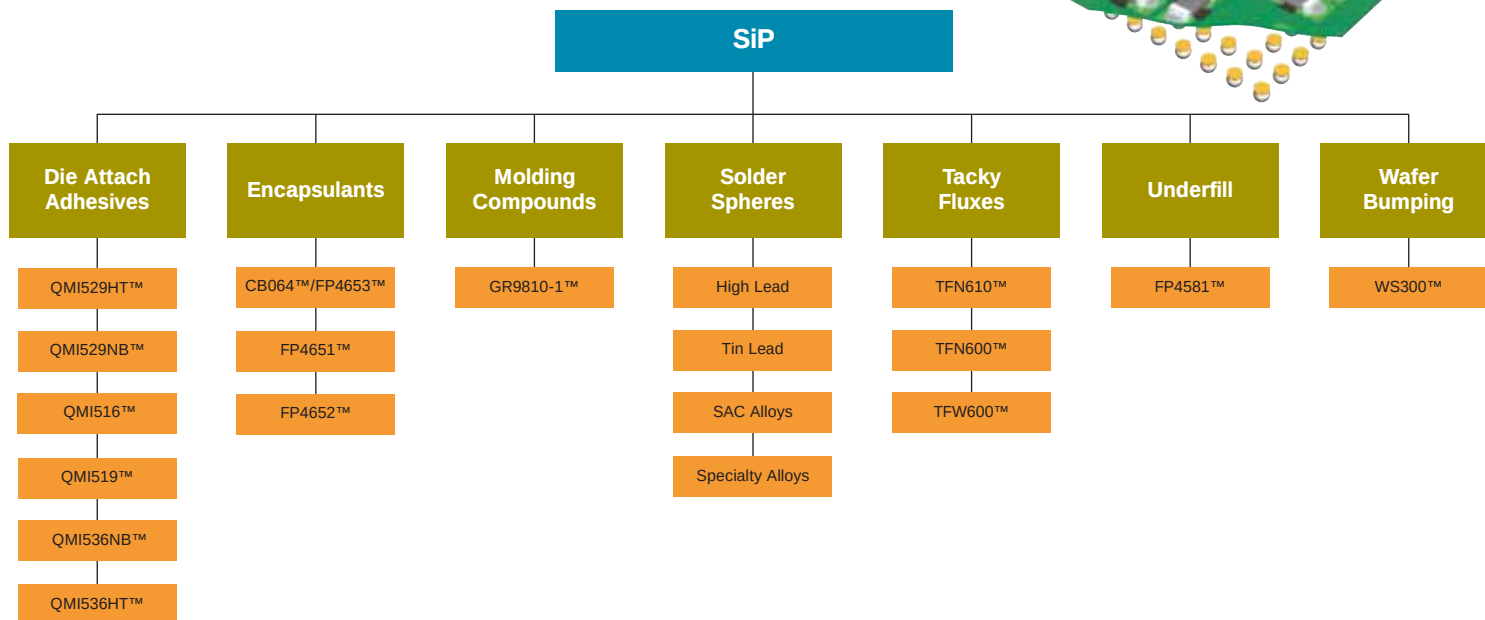
WAFER BUMPING

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	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

SEMICONDUCTOR MARKET SOLUTIONS



SiP



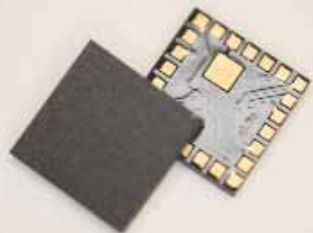
DIE ATTACH ADHESIVES

PRODUCT	DESCRIPTION	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.	L1 - 260	4×10^{-5}	Fair	≥ 60 sec @ 185°C (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™, for use on NiPdAu, and alloy 42 applications	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8
QMI516™	Conductive paste for PBGA and SBGA packages	L3 - 260	2×10^{-3}	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	4.2
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for preplated finishes. Exceptional performance on clean uncoated silver-plated finishes. High adhesion, excellent electrical and thermal performance.	L1 - 260	1×10^{-4}	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	3.8
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}	Excellent	≥ 10 sec @ 150°C (SkipCure™) 30 min @ 150°C (Oven)	0.3
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	L3 - 260	1×10^{13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.9

ENCAPSULANTS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	T _g , °C	CTE _{a1} , 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 stress, low viscosity 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

SEMICONDUCTOR MARKET SOLUTIONS



SiP

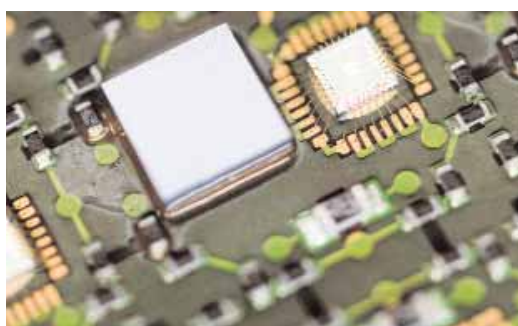
MOLDING COMPOUND

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT, %	SPIRAL FLOW, cm	CTE ₂₁ , ppm/°C	Tg, °C
GR9810-1™	A technologically advanced, fine filler epoxy molding compound 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 60mm	Panel Warpage < 6 mils	L2/260°C	Y	85	100	10	200

SOLDER SPHERES

ALLOY	DIAMETER, mm	TOLERANCES ± mm	C _{pk}	PACKAGE SIZE		
				SPHERES/BOTTLE	BOTTLE SIZE, CC	SPHERES/BOX
Sn-Pb Series	0.889	0.020	≥ 1.33	250,000	200	2,500,000
Sn63-Pb37	0.760			500,000		5,000,000
Sn10-Pb90	0.640					
Sn5-Pb95	0.630					
Sn62-Pb36-Ag2	0.600					
Sn63-Pb34.5-Ag2-Sb0.5	0.550	100		10,000,000		
Sn-Ag-Cu Series	0.508					
Sn96.5-Ag3.5	0.500					
Sn-Ag1-Cu0.5	0.450					
Sn-Ag2.6-Cu0.6	0.406					
Sn-Ag3-Cu0.5*	0.400					
Sn-Ag3.2-Cu0.5*	0.015	40				
Sn-Ag3.5-Cu0.75†						
Sn-Ag3.8-Cu0.7†						
Sn-Ag4-Cu0.5†						
Sn-Ag-Cu-Ni-Ge Series		0.350		25		
Sn-Ag1-Cu0.5-Ni0.05-Ge††	0.304	20,000,000				
Sn-Ag1.2-Cu0.5-Ni0.02-Ge††	0.300					
Sn-Ag3-Cu0.5-Ni0.05-Ge††	0.250					
CASTIN Series	0.200					
CASTIN125 [®]	0.180					
CASTIN258 [®]	0.150					
CASTIN305 [®]	0.100	10				
Sn-Zn Series	0.080					
Sn91-Zn9	0.060					
Sn-Zn8-Ag0.5-Al0.01-Ga0.1						

Patent No: †ISURF-U.S. 5,527,628 *SENJU-JP3,027,441 †AIM-U.S.5,352,407 U.S.5,405,577 JP2,752,258
††FUJII-U.S.6,179,935 JP3,296,289 Other alloys and sizes are available upon request.



SEMICONDUCTOR MARKET SOLUTIONS

SiP

TACKY FLUXES

PRODUCT	DESCRIPTION	APPLICATION	VISCOSITY, cPs	COLOR	TACK, g/mm ²	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
TFW600™	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 _{a1} , 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

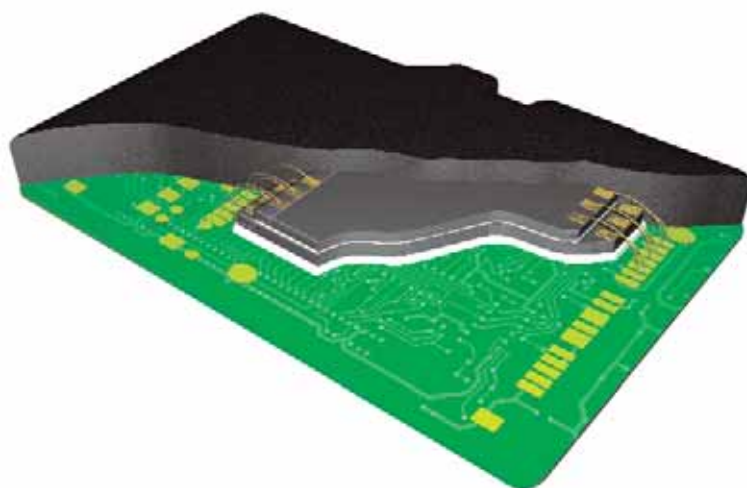
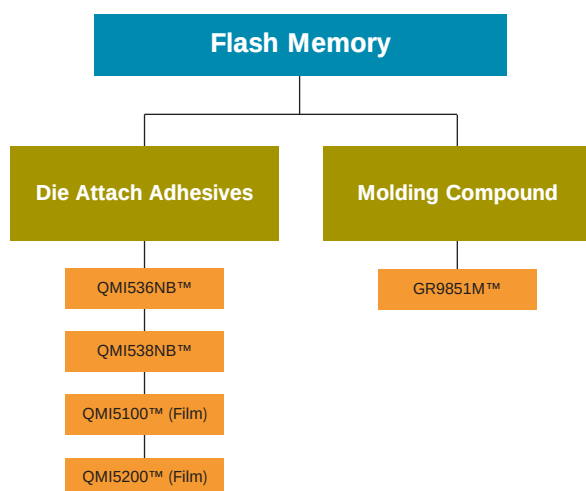
WAFER BUMPING

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	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

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 (SkipCure™) 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 (SkipCure™) 15 min @ 150°C (Oven)	0.3

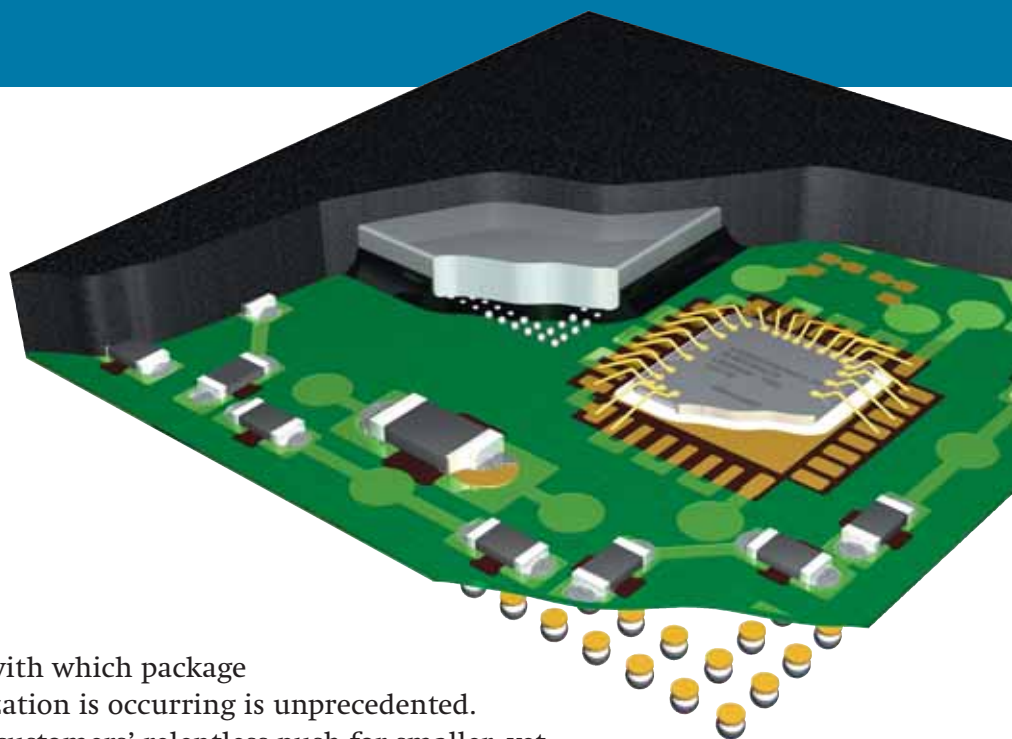
DIE ATTACH FILM

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY, W/mk
QMI5100™ (Film)	Nonconductive 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 10 microns.	L2 - 260	Non-Conductive	N/A	N/A	< 0.2
QMI5200™ (Film)	2-in-1 Dicing Die Attach Film with good bondline thickness control, no bleeding, dielectric and no die Nonconductive 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	N/A	N/A	< 0.2

MOLDING COMPOUND: GREEN

PRODUCT	DESCRIPTION	SUBSTRATE THICKNESS	STRIP WARPAGE	GREEN NON/GREEN	SPIRAL FLOW, cm	% FILLER	CTE _{all} , 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, and is 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 optimized package functionality as well. 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 Hysol® and Accurus™ brand of 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 Hysol® brand die attach adhesives, package level underfills, encapsulants, mold compounds and non-conductive pastes (NCPs), as well as Accurus™ brand solder spheres and tacky fluxes.

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

SEMICONDUCTOR MATERIALS



HYSOL® 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.

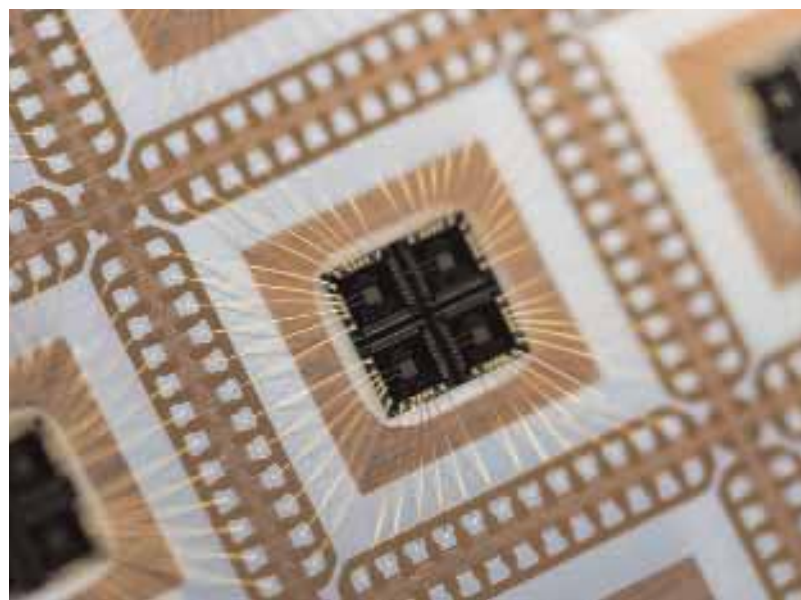
Through the use of Henkel's patented Bismaleimide (BMI) chemistry, superior lead-free processing is achieved. Because the chemistry is ultra-hydrophobic, Hysol® die attach adhesives deliver superior adhesive strength, elongation at break, and cohesive energy at high reflow temperatures. These characteristics enable Hysol® 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: Hysol® 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 SkipCure™, 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 dicing die attach film (DDF) is required.

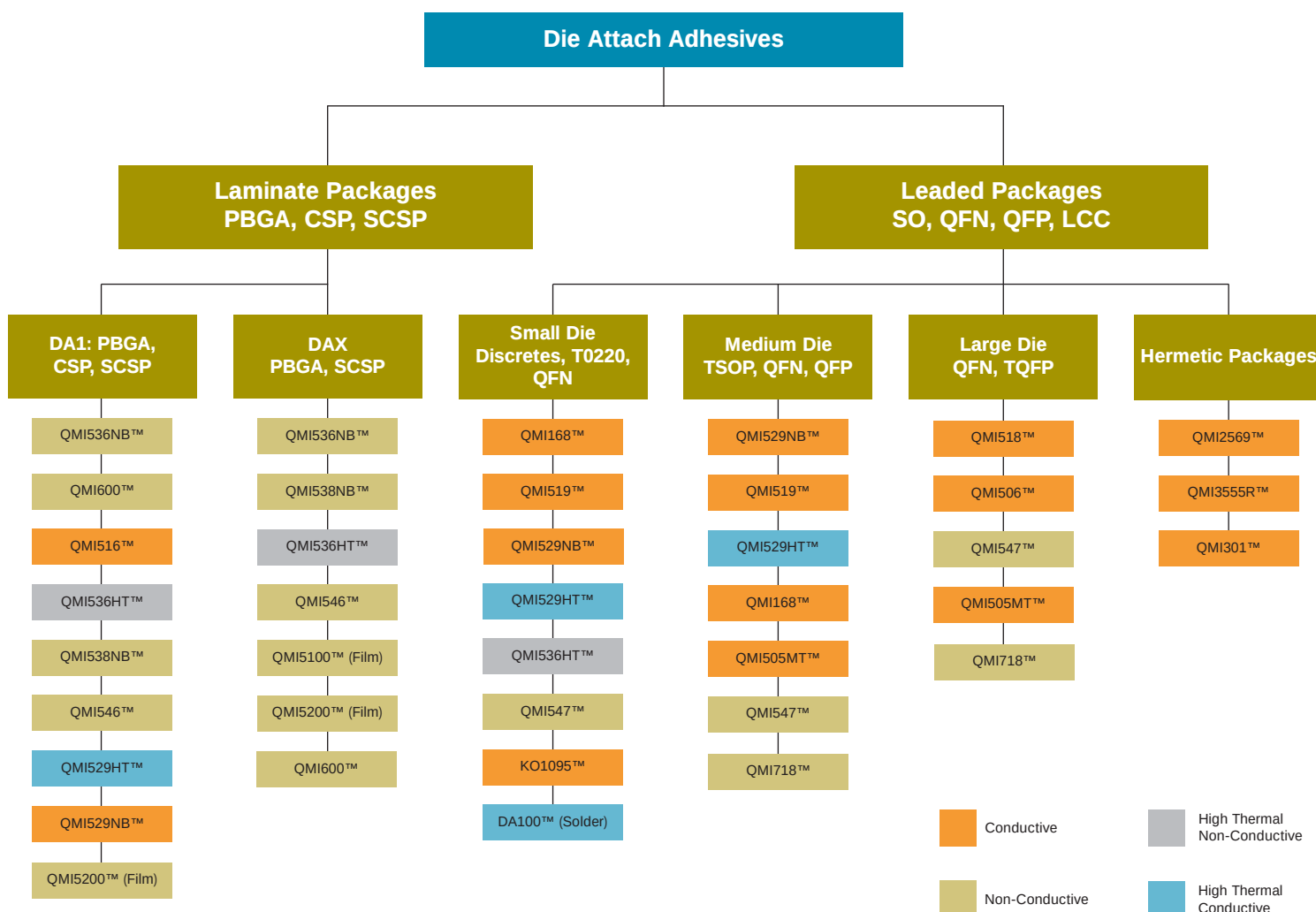
Henkel's Hysol® QMI5100™ and QMI5200™ die attach films combine the properties and functions of die attach film and dicing tape into one product and eliminate the need for any dispensing or curing equipment or processes, as curing takes place during the molding process.

For 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.



SEMICONDUCTOR MATERIALS

HYSOL® DIE ATTACH ADHESIVES



LAMINATE PACKAGES

DIE ATTACH FILM

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY
QMI5100™ (Film)	Nonconductive 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 10 microns.	L2 - 260	Non-Conductive	N/A	N/A	< 0.2
QMI5200™ (Film)	Nonconductive 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	N/A	N/A	< 0.2

SEMICONDUCTOR MATERIALS



HYSOL® DIE ATTACH ADHESIVES

LAMINATE PACKAGES

DA1: PBGA, CSP, SCSP

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	WARPAGE, m	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY
QMI516™	Conductive paste for PBGA and SBGA packages	L3 - 260	2×10^{-3}	0.7	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	4.2
QMI538NB™	Non-conductive paste for leadframe applications	L2 - 260	1×10^{-3}	1.0	Excellent	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 175°C (Oven)	0.4
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^{-3}	1.0	Excellent	≥ 10 sec @ 150°C (SkipCure™) 30 min @ 150°C (Oven)	0.3
QMI536HT™	High thermal version of QMI536™, ideal for mixed stacked die applications. Non-die damaging filler.	L3 - 260	1×10^{-3}	1.6	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.9
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^{-3}	0.5	Good	≥ 10 sec @ 175°C (SkipCure™) 30 min @ 175°C (Oven)	0.6
QMI546™	Smooth flowing and easy-to-use paste for the first die, as well as die stacking	L3 - 260	1×10^{-3}	1.3	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.2
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}	1.2	Fair	≥ 60 sec @ 185°C (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™, for use on NiPdAu, and alloy 42 applications	L2 - 260	5×10^{-4}	0.3	Good	30 min @ 170°C (Oven)	NT
QMI5200™ (Film)	Nonconductive 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	N/A	N/A	N/A	0.2

DAX: PBGA, SCSP

PRODUCT	DESCRIPTION	MRT	ELECTRICAL CONDUCTIVITY	WARPAGE, m	FLOW	CURE SCHEDULE	THERMAL CONDUCTIVITY
QMI546™	Smooth flowing and easy-to-use paste for the first die, as well as die stacking	No Data	1×10^{-3}	1.3	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	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^{-3}	1.0	Good	≥ 10 sec @ 150°C (SkipCure™) 30 min @ 150°C (Oven)	0.3
QMI538NB™	No bleed, large die, non-conductive, very low stress for die sizes up to 500x500 mil./13x13 mm.	L2 - 260	1×10^{-3}	1.0	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 175°C (Oven)	0.4
QMI536HT™	Ideal for mixed stacked die applications. Non-die damaging filler.	No Data	1×10^{-3}	1.6	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.9
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^{-3}	NT	Good	≥ 10 sec @ 175°C (SkipCure™) 30 min @ 175°C (Oven)	0.6

SEMICONDUCTOR MATERIALS

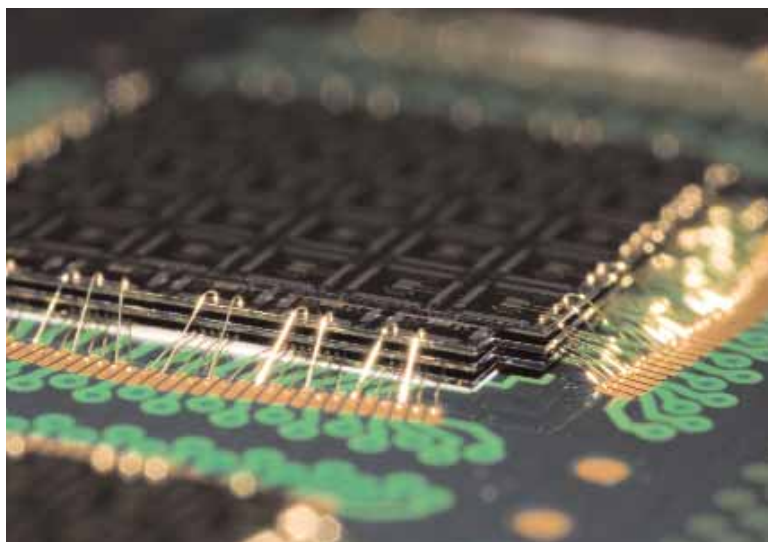
HYSOL® DIE ATTACH ADHESIVES

LEADED PACKAGES

SMALL DIE: DISCRETES, T0220, QFN

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY
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 (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	Non-bleeding QMI paste for use with high adhesion to NiPdAu flash.	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	3.8
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for 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 (SkipCure™) 30 min @ 200°C (Oven)	3.8
QMI168™	Similar properties to QMI519™, manufactured in our Yantai plant.	Ag, Au	L3 - 260	3×10^{-4}	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	3.8
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 (SkipCure™) 15 min @ 150°C (Oven)	0.9
QMI547™	Non-conductive paste for leadframe applications	Au, Ag, Cu	L3 - 260	1×10^{13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.3
KO1095™	Epoxy-based die attach paste	Cu	L4 - 220/ L3 - 260	1×10^{-3}	Very Good	30 min @ 165°C (Oven)	2.1

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	ROLO



SEMICONDUCTOR MATERIALS



HYSOL® DIE ATTACH ADHESIVES

LEADED PACKAGES

MEDIUM DIE: TSOP, QFN, QFP

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY
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 (SkipCure™) 30 min @ 185°C (Oven)	7.0
QMI529NB™	No bleed version of QMI519™, for use on NiPdAu, and alloy 42 applications	Ag, Au	L2 - 260	5×10^{-4}	Good	30 min @ 170°C (Oven)	NT
QMI519™	JEDEC L1 260°C for SOIC, industry standard for QFN packages. Industry standard for 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 (SkipCure™) 30 min @ 200°C (Oven)	3.8
QM168™	Similar properties to QMI519™, manufactured in our Yantai plant.	Ag, Au	L3 - 260	3×10^{-4}	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	3.8
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 (SkipCure™) 30 min @ 200°C (Oven)	2.4
QMI547™	Non-conductive paste for leadframe applications	Cu, Ag, Au	L3 - 260	1×10^{-13}	Excellent	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	0.3
QMI718™	Designed to deliver exceptional JEDEC performance in SOIC packages using copper finished leadframes.	Cu	L2 - 260	1×10^{-13}	Fair	30 min @ 165°C (Oven)	2.7

LARGE DIE: QFN, TQFP

PRODUCT	DESCRIPTION	FINISH (Cu, Ag, Au)	MRT	ELECTRICAL CONDUCTIVITY	DISPENSABILITY	CURE SCHEDULE	THERMAL CONDUCTIVITY
QMI505MT™	Lower stress BMI based paste for preplated, alloy 42 and black oxide finishes	Ag, Au	L3 - 260	2×10^{-3}	Good	≥ 10 sec @ 200°C (SkipCure™) 30 min @ 200°C (Oven)	2.4
QMI506™	Low stress conductive die attach paste for QFPs and TSOPs	Au	L3 - 260	1	Good	≥ 8 sec @ 150°C (SkipCure™) 15 min @ 150°C (Oven)	1.1
QMI518™	Very low stress conductive die attach	Ag, Au	L3 - 260	1	Good	≥ 6 sec @ 260°C (SkipCure™) 15 min @ 180°C (Oven)	1.4
QMI547™	Non-conductive paste for leadframe applications	Au, Ag, Cu	L3 - 260	1×10^{-13}	Good	≥ 8 sec @ 150°C (SkipCure™) 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

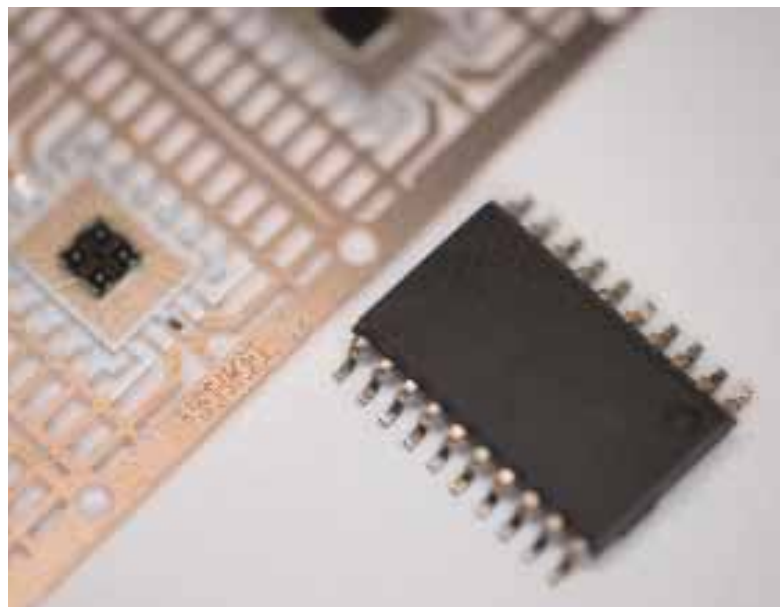
SEMICONDUCTOR MATERIALS

HYSOL® DIE ATTACH ADHESIVES

LEADED PACKAGES

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.	N/A	150°C - 200°C (Oven)	1.9	Yes	Yes	No



SEMICONDUCTOR MATERIALS

HYSOL® SEMICONDUCTOR UNDERFILLS

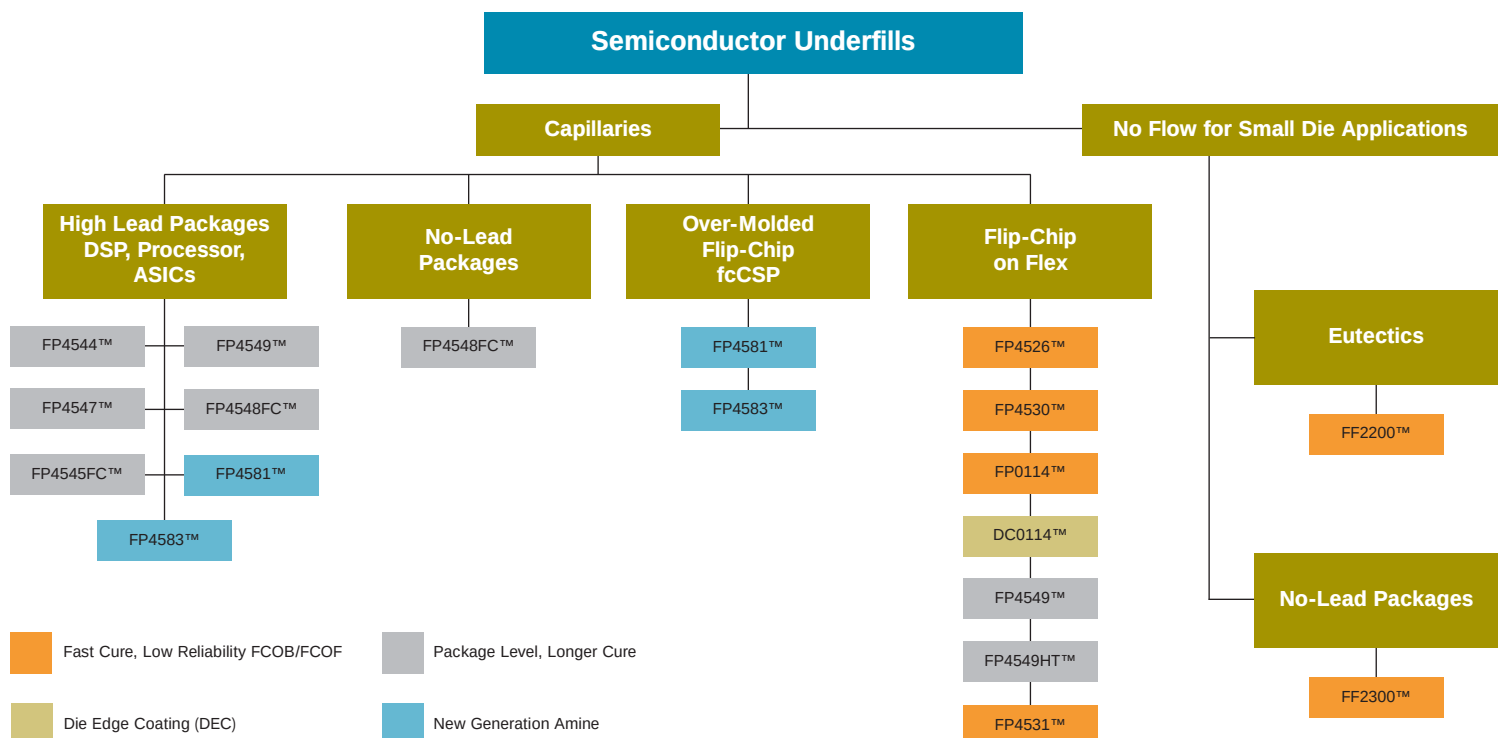
The shrinking footprint of today's handheld devices in tandem with the higher temperature processing demands for advanced devices has given rise to new underfill technologies that deliver improved shock resistance and enhanced device reliability.

Hysol® 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 Hysol® 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, Hysol® underfills have emerged as the premiere industry standard for flip-chip 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, Hysol® 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 MARKET SOLUTIONS

HYSOL® SEMICONDUCTOR UNDERFILLS

CAPILLARIES: HIGH LEAD PACKAGES: DSP, PROCESSOR, ASICs

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	T _g , °C	CTE _{a1} , 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	28 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	6,500	120	28	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	86	33	7.6	55	120 min @ 165°C
FP4583™	High purity, FC underfill, high lead applications	500 mil flow, 2 mil gap @ 110°C : 40 sec.	14,000	79	40	6.9	55	120 min @ 165°C

CAPILLARIES: NO-LEAD PACKAGES

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	T _g , °C	CTE _{a1} , 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

OVER-MOLDED FLIP-CHIP FCCSP

PRODUCT	DESCRIPTION	FLOW SPEED	VISCOSITY, cPs	T _g , °C	CTE _{a1} , 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	500mil flow, 2mil gap @ 110°C: 40sec.	14,000	79	40	6.9	55	120 min @ 165°C

SEMICONDUCTOR MARKET SOLUTIONS



HYSOL® 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	N/A	20,000	135	70	N/A	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	Eutectic Reflow

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 MATERIALS

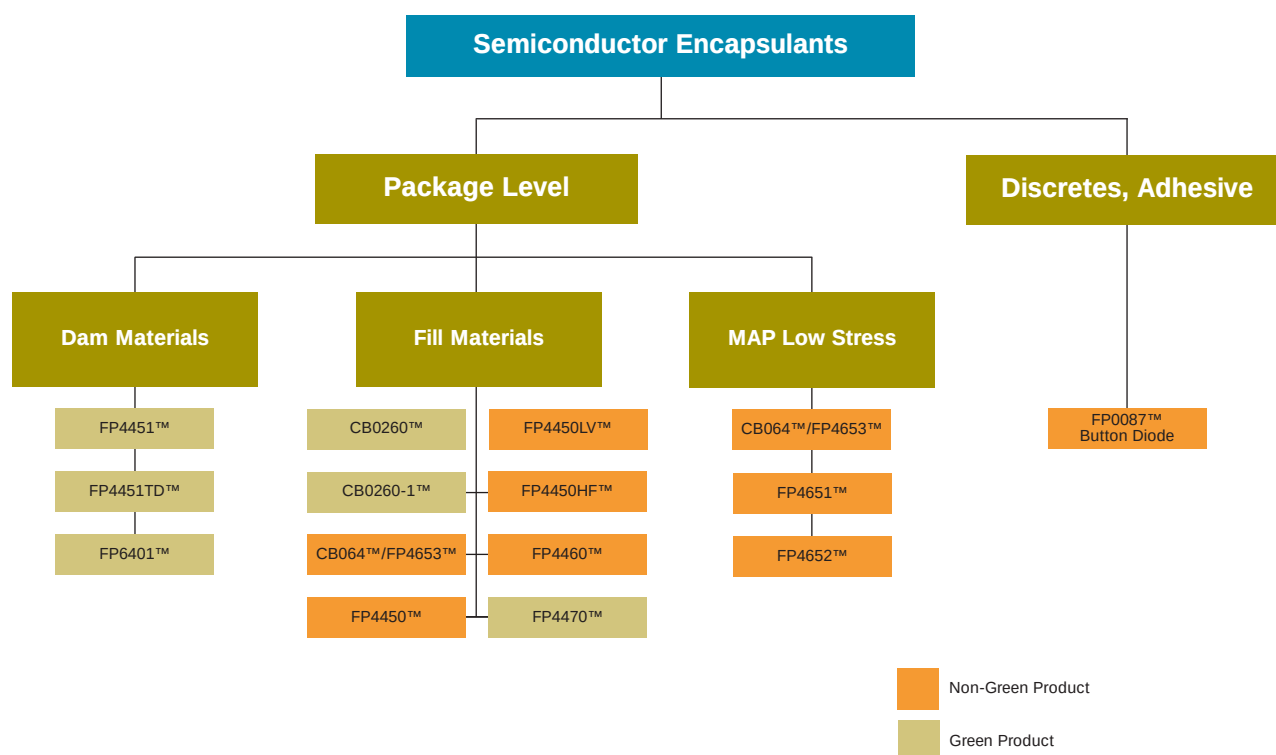
HYSOL® SEMICONDUCTOR ENCAPSULANTS

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 MATERIALS

HYSOL® SEMICONDUCTOR ENCAPSULANTS

PACKAGE LEVEL: DAM MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	CTE _{a1} , ppm/°C	% FILLER
FP4451™	Industry standard damming material for BGAs	30 min @ 125°C + 90 min @ 165°C	N/A	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	N/A	300,000	150	21	73
FP6401™	Zero stress dam for ceramic or large array packages	30 min @ 125°C	N/A	3,700	15	80	9

PACKAGE LEVEL: FILL MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	CTE _{a1} , 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 _{a1} , 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 _{a1} , 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

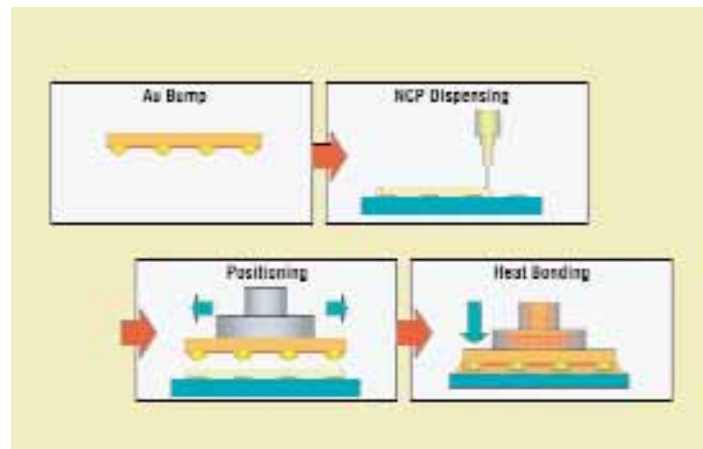
SEMICONDUCTOR MATERIALS

HYSOL® THERMAL COMPRESSION MATERIALS

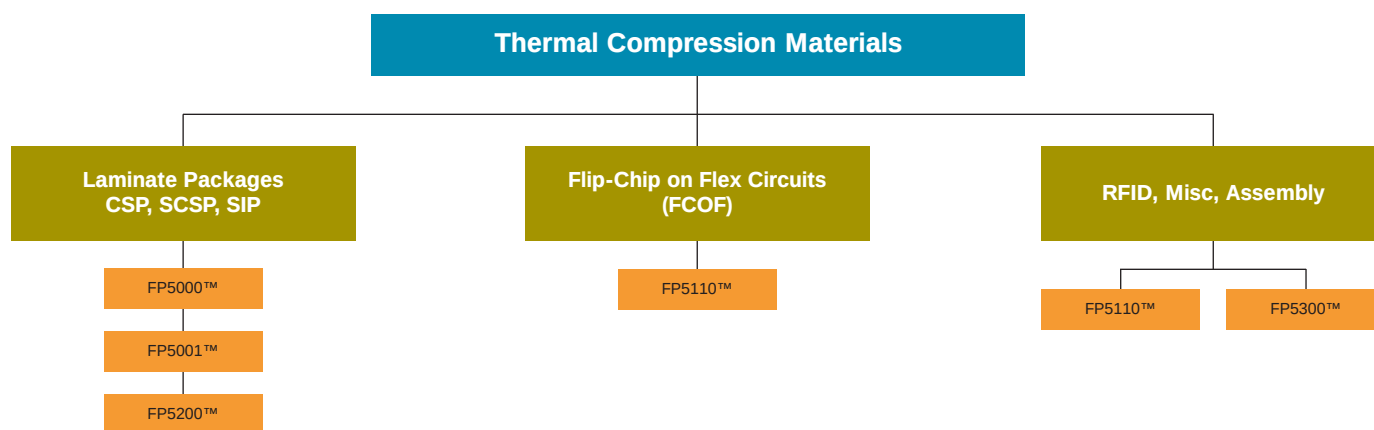
All Hysol® non-conductive paste (NCP) encapsulants are designed to deliver exceptionally high reliability for flip-chip in package applications. The materials provide superior moisture and thermal cycling resistance for thermal compression bonding processes and meet stringent JEDEC level testing standards, 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.



SEMICONDUCTOR MATERIALS



HYSOL® THERMAL COMPRESSION MATERIALS

LAMINATE PACKAGES: CSP, SCSP, SIP

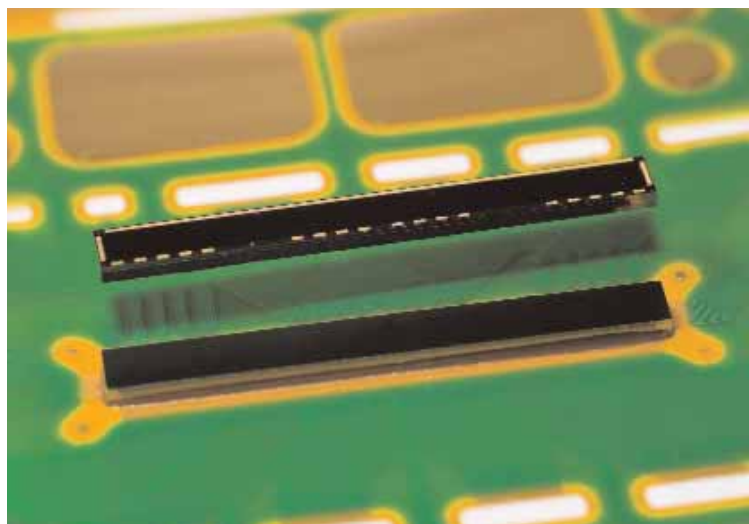
PRODUCT	DESCRIPTION	VISCOSITY, cPs	SUBSTRATE	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	MODULUS, DMA	STORAGE TEMP	SHELF LIFE
FP5000™	Excellent MSL and PCT resistance. Compatible with both constant and pulse heat tool. Recommended for gold / gold assembly joint.	80,000 - 15,000	Laminate	4 sec @ 240°C	150	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 circuit. 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)

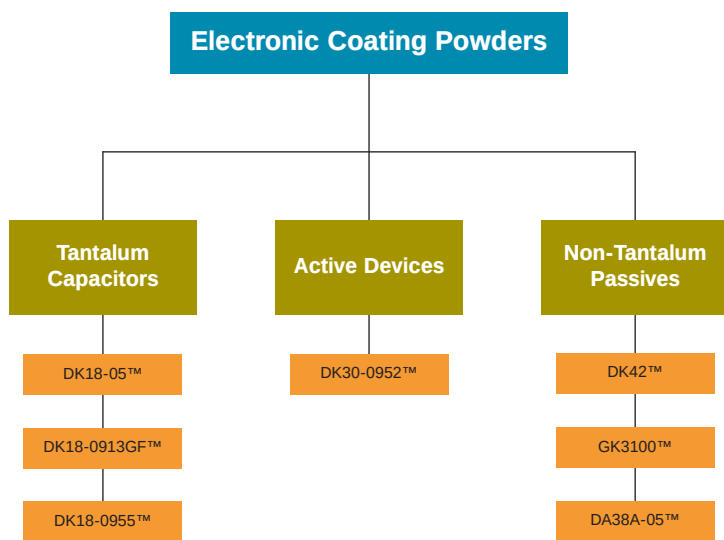
RFID, MISC ASSEMBLY

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 circuit. 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	1100	60 min @110°C
DK18-0913™ *New Green	All capacitor types, thermistors, resistors	Yes	38	25	1000	60 min @110°C
DK18-0955 Blue™	All capacitor types, thermistors, resistors	Yes	30	25	1000	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	1100	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	1400	30 min @150°C
GK3100 Gold™ *New Green	Passive components including all capacitor types	Yes	35	18	1000	30 min @150°C
DK38A-05™ *New Green	Passive components including all capacitor types	Yes	35	18	1200	30 min @150°C

SEMICONDUCTOR MATERIALS



HYSOL® ELECTRONIC MOLDING COMPOUNDS

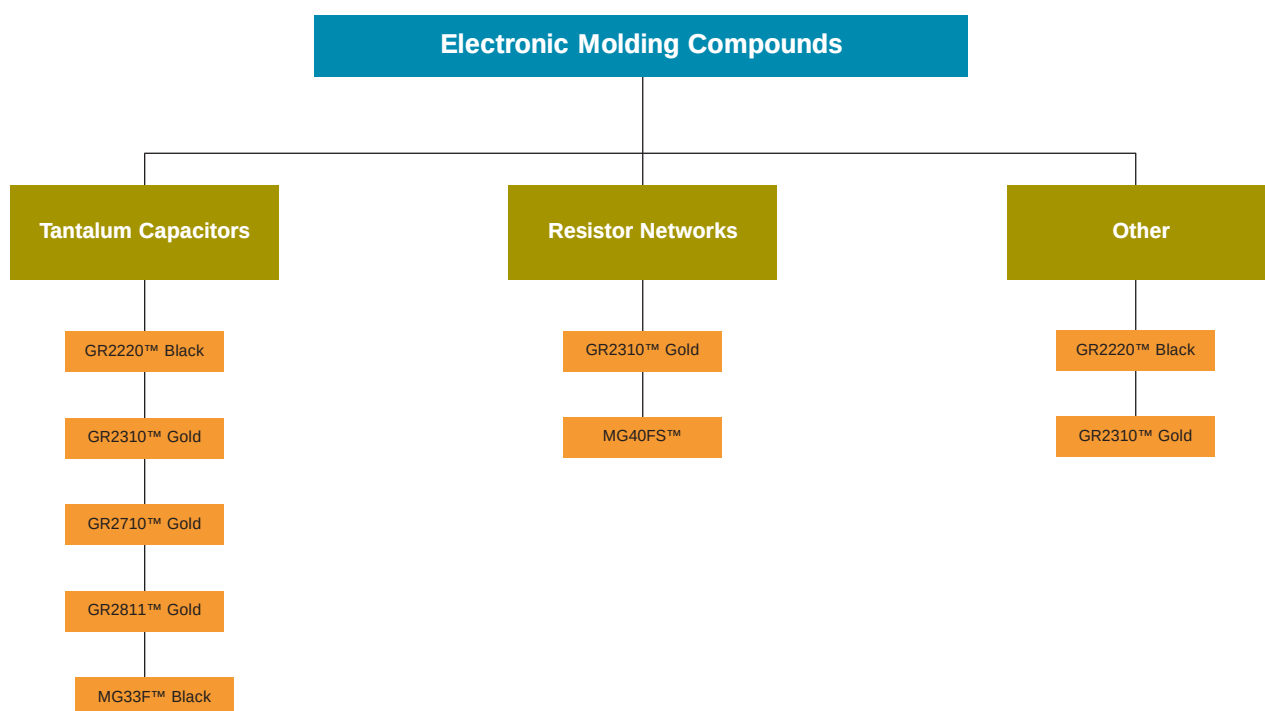
Hysol® Electronic Molding Compounds protect passive components, such as ceramic and tantalum capacitors and resistors, and are designed for both automolds and conventional molds.

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.



SEMICONDUCTOR MATERIALS

HYSOL® ELECTRONIC MOLDING COMPOUNDS

TANTALUM CAPACITORS

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	CTE _{a1} , ppm/°C	CTE _{a2} , 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 x 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 x 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 x 10 ⁶	Y
GR2220™	Black / conventional molding of MnO caps	Conv	40	162	19	60	30 - 45 sec	18,500	2.4 x 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 x 10 ⁶	Y

RESISTOR NETWORKS

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	CTE _{a1} , ppm/°C	CTE _{a2} , 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 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	2.6 x 10 ⁶	N

OTHER

PRODUCT	DESCRIPTION	CONVENTIONAL MOLD	SPIRAL FLOW in, @ 177°C	Tg, °C	CTE _{a1} , ppm/°C	CTE _{a2} , 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 x 10 ⁶	Y
GR2220™	Black / non-halogenated conventional molding of leaded components	Conv	40	162	19	60	30 - 45 sec	18,500	2.4 x 10 ⁶	N



SEMICONDUCTOR MATERIALS



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/m-K with the ability to go as high as 3 W/m-K.

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.

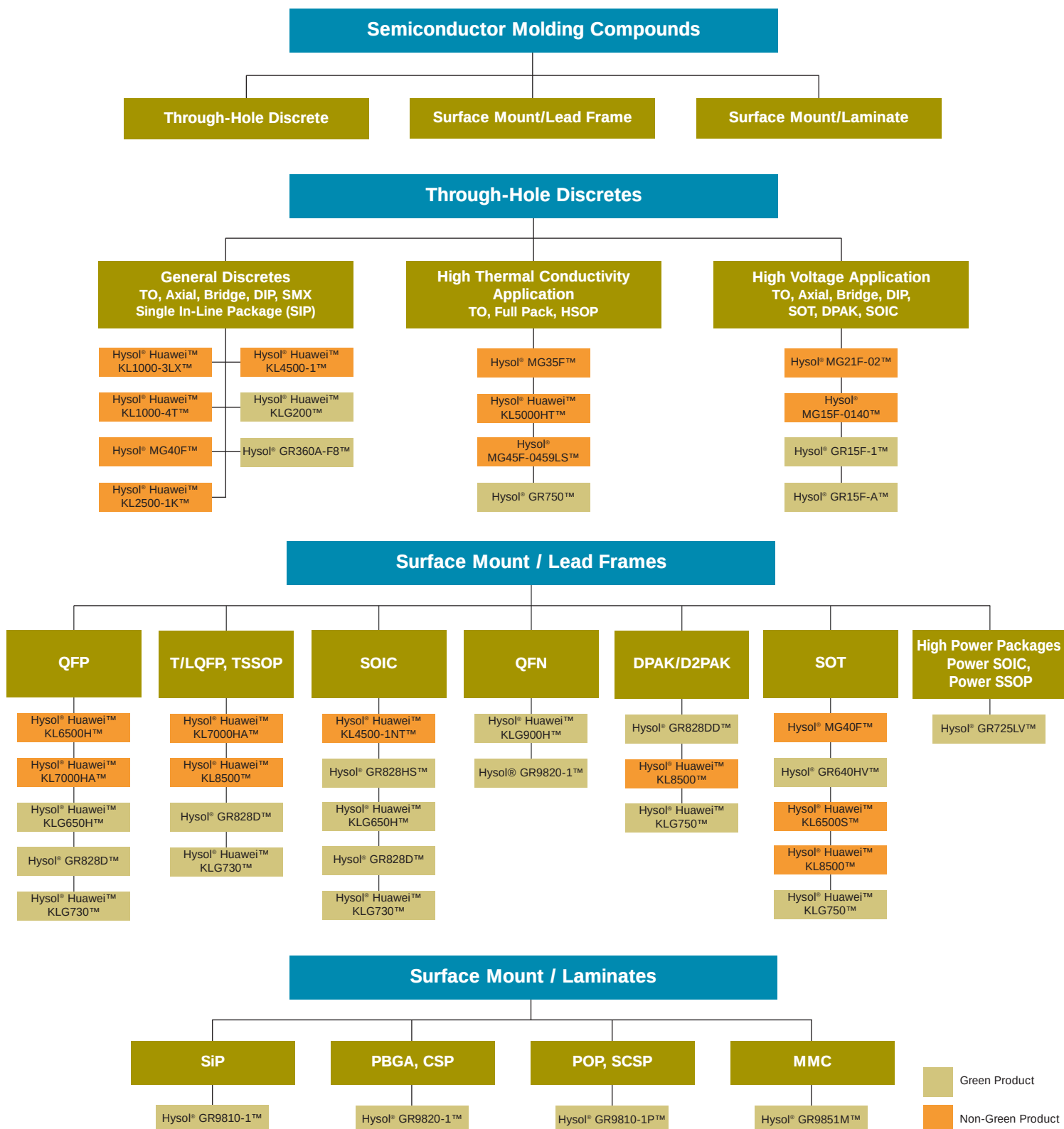
For packaging specialists building surface-mounted laminate packages such as BGAs and CSPs, Henkel has developed a wide range of state-of-the-art mold



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.

SEMICONDUCTOR MATERIALS

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS



SEMICONDUCTOR MATERIALS



HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

THROUGH-HOLE DISCRETES/GENERAL

TO, AXIAL, BRIDGE, SIP (SINGLE IN-LINE PACKAGE), DIP, SMX

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY	MSL	GREEN	SPIRAL FLOW, cm	HOT PLATE GEL TIME, SEC	FILLER TYPE	CTE _{a1} , 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® MG40F™	High productivity molding compound for high volume encapsulation of SOT and DIP.	0.9 W/mK	L3/220°C	N	55	16	Fused	21	165
Hysol® Huawei™ KL2500-1K™	Low stress molding compound and is suitable for TO and DIP packages and provides superior moldability and reliability.	0.9 W/mK	L3/260°C	N	100	22	Fused	19	145
Hysol® Huawei™ KL4500-1™	High Tg, low stress and high purity characteristics enable packaging of high reliability devices in TO, DIP and SOP format. Its low viscosity properties enable low wire sweep.	0.9 W/mK	L1/260°C	N	90	25	Fused	16	160
Hysol® Huawei™ KLG200™	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/mK	L3/260°C	Y	80	23	Crystalline Fused	22	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 _{a1} , ppm/°C	Tg, °C
Hysol® MG35F™	Suitable for discrete semiconductors requiring improvement in heat dissipation. Provides high productivity for power transistors.	1.3 W/mK	N	70	30	Crystalline	24	160
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® MG45F-0459LS™	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	30	Alumina/ Crystalline	23	160
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

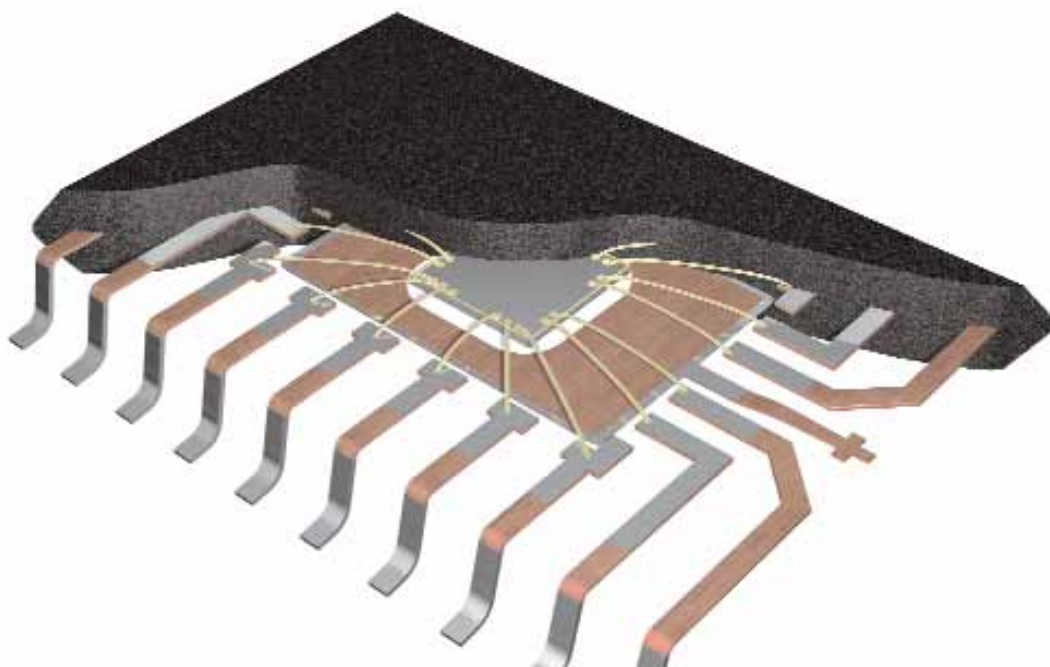
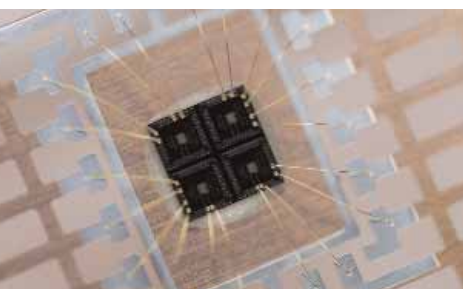
SEMICONDUCTOR MATERIALS

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

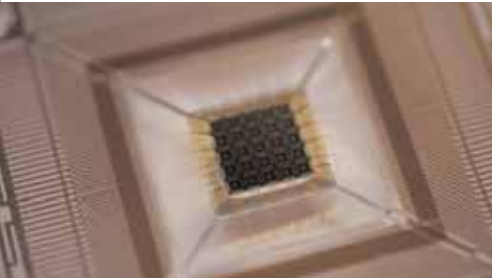
DISCRETES/HIGH VOLTAGE APPLICATIONS

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 _{a1} , ppm/°C	Tg, °C
Hysol® MG21F-02™	ECN base molding compound suitable for medium voltage applications. Hysol® MG21F-02™ has excellent moldability on bridge and axial packages.	> 700 V discrete, > 200 V IC	3.8	11	L1/235°C	N	80	20	170
Hysol® MG15F-0140™	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® 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. The lower stress levels inherent in Hysol® GR15F-A™ also allow for superior performance on very large, thin devices. The combination of high temperature stability, low stress and superior adhesion results in power cycling performance on high frequency devices three times better than the nearest competitor. Molding this anhydride chemistry material has never been easier in terms of productivity and yield.	> 900 V discrete, > 400 V IC	3.7	5.5	L1/260°C	Y	80	10	185



SEMICONDUCTOR MATERIALS



HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

SURFACE MOUNT/LEAD FRAMES

QFP

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® Huawei™ KL6500H™	Low stress, high adhesion molding compound suitable for SOIC and QFP packages.	PPF, Ag	< 14 x 20 mm QFP	L3/260°C	N	80	105	12	130
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.	PPF, Ag	all QFP	L3/260°C	N	84	110	9	130
Hysol® Huawei™ KLG650H™	Low stress, high adhesion green molding compound suitable for SOIC and QFP packages.	PPF, Ag	< 14 x 20 mm QFP	L3/260°C	Y	84	95	10	120
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 QFP	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 QFP	L3/260°C	Y	87	129	7	130

T/LQFP, TSSOP

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	CTE _{a1} , 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® 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.	PPF, Ag	all T/LQFP	L3/260°C	N	85	110	9	115
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

SEMICONDUCTOR MATERIALS

HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

SURFACE MOUNT/LEAD FRAMES

SOIC

PRODUCT	DESCRIPTION	SURFACE FINISH	PACKAGE SIZE	MSL	GREEN	% FILLER	SPIRAL FLOW, cm	CTE _{a1} , 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® GR828HS™	Low stress, green molding compound especially designed for SOIC package with Ni/Pd lead frames.	PPF	< 16L Narrow body SOIC	L1/260°C	Y	84	90	12	135
Hysol® Huawei™ KL6650H™	Low stress, high adhesion green molding compound suitable for SOIC and QFP packages.	PPF, Ag	< 16L Narrow body SOIC	L1/260°C	Y	84	95	10	120
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

QFN

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® Huawei™ KL9000H™	Suitable for QFN packages with its low wire sweep and warpage performance. Hysol® Huawei™ KL-G900H™, with its low CTE offering high reliability performance and moldability on thin panels, could not be easier.	PPF, Ag	L1/260°C	Y	88	90	8	148
Hysol® GR9820-1™	Technologically advanced, green epoxy molding compound designed for use on QFN packages. This material exhibits ultra low warpage using its flexible hardener technology.	PPF	L1/260°C	Y	85	120	11	200

DPAK/D2PAK

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® GR828DD™	Green, semiconductor grade, low stress and high adhesion molding compound. It's especially designed for DPAK/D2PAK packages with Ni and copper/Ag plating lead frames.	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. Offers enhanced reliability performance for T/LQFP packages.	Ag, Ni, Cu	L1/260°C	Y	86	110	9	130

SEMICONDUCTOR MATERIALS



HYSOL® AND HYSOL® HUAWEI™ SEMICONDUCTOR MOLDING COMPOUNDS

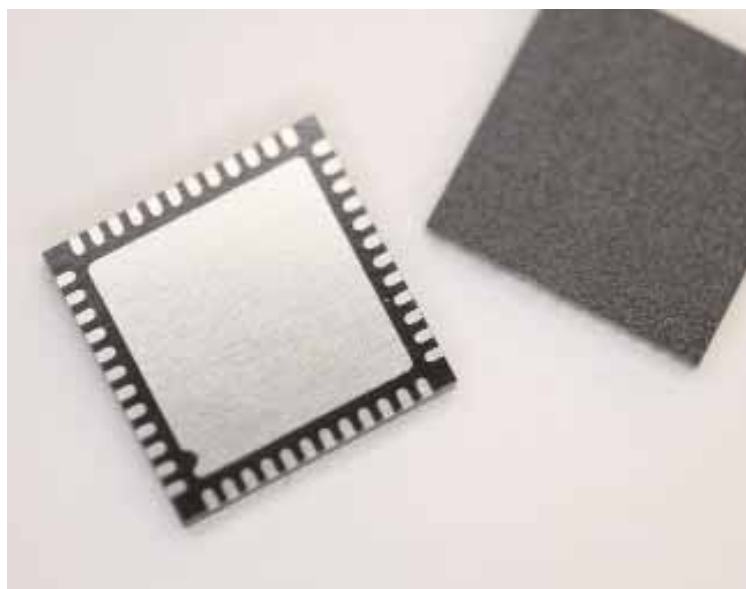
SURFACE MOUNT/LEAD FRAMES

SOT

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	MAX FILLER SIZE, μm	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® MG40F™	High productivity molding compound for high volume encapsulation of SOT and DIP.	Ag, Cu	L1/260°C	N	75	55	21	165
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™ 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	75	110	9	115
Hysol® Huawei™ KL6750™	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

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

PRODUCT	DESCRIPTION	SURFACE FINISH	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE _{a1} , 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 3000 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 _{a1} , ppm/°C	Tg, °C
Hysol® GR9810-1™	Technologically advanced, fine filler epoxy molding compound 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	Panel warpage < 6 mils	L2/260°C	Y	85	100	10	200

PBGA, CSP

PRODUCT	DESCRIPTION	PACKAGE SIZE	WARPAGE, m	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® GR9820-1™	Technologically advanced, epoxy molding compound 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 260°C reflow temperature.	PBGA 37.5 x 37.5 mm CSP Panel 50 x 60 mm	Package warpage < 4 mils Panel warpage < 6 mils	L3/260°C	Y	85	120	11	200

POP, SCSP

PRODUCT	DESCRIPTION	PACKAGE SIZE	MSL	GREEN	FILLER CONTENT %	SPIRAL FLOW, cm	CTE _{a1} , ppm/°C	Tg, °C
Hysol® GR9810-1P™	State-of-the-art epoxy molding compound developed to meet the stringent encapsulation requirements of package-on-package (POP) devices. This compound exhibits advanced warpage control characteristics; these properties can be tuned to match the package requirements through variations in the base resin chemistry to provide optimum warpage characteristics across a broad range of package geometries. The compound exhibits long spiral flow and excellent room temperature working life, significantly increased beyond that of standard green compound chemistry. 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 _{a1} , 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 and 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

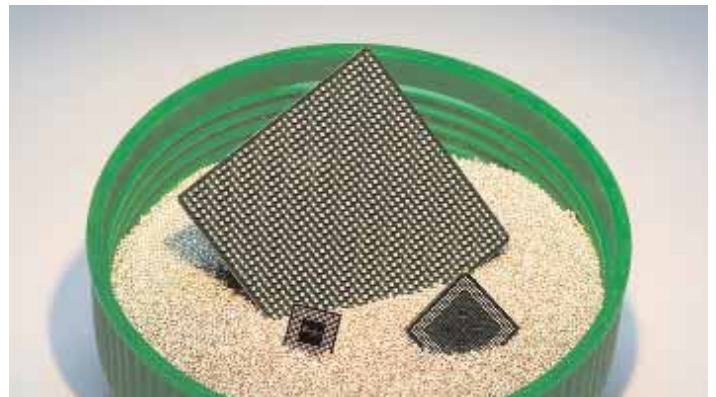
SEMICONDUCTOR MATERIALS

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 1.9 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 SPHERES

SOLDER SPHERES

ALLOY	DIAMETER, mm	TOLERANCES ± mm	C _{pk}	PACKAGE SIZE		
				SPHERES/BOTTLE	BOTTLE SIZE, CC	SPHERES/BOX
Sn-Pb Series	0.889	0.020	≥ 1.33	250,000	200	2,500,000
Sn63-Pb37	0.760			500,000		5,000,000
Sn10-Pb90	0.640					
Sn5-Pb95	0.630					
Sn62-Pb36-Ag2	0.600					
Sn63-Pb34.5-Ag2-Sb0.5	0.550	0.015		100	10,000,000	
Sn-Ag-Cu Series	0.508					
Sn96.5-Ag3.5	0.500					
Sn-Ag1-Cu0.5	0.450					
Sn-Ag2.6-Cu0.6	0.406					
Sn-Ag3-Cu0.5*	0.400			40		
Sn-Ag3.2-Cu0.5*						
Sn-Ag3.5-Cu0.75†						
Sn-Ag3.8-Cu0.7†		25				
Sn-Ag4-Cu0.5‡						
Sn-Ag-Cu-Ni-Ge Series	0.350			1,000,000	20,000,000	
Sn-Ag1-Cu0.5-Ni0.05-Ge††	0.304					
Sn-Ag1.2-Cu0.5-Ni0.02-Ge††	0.300					
Sn-Ag3-Cu0.5-Ni0.05-Ge††	0.250					
CASTIN Series	0.200					
CASTIN125®±	0.180					
CASTIN258®±	0.150					
CASTIN305®±	0.100					
Sn-Zn Series	0.080					
Sn91-Zn9	0.060					
Sn-Zn8-Ag0.5-Al0.01-Ga0.1						

Patent No: †ISURF-U.S. 5,527,628 *SENJU-JP3,027,441 ‡AIM-U.S.5,352,407 U.S.5,405,577 JP2,752,258 ††FUJI-U.S.6,179,935 JP3,296,289 Other alloys and sizes are available upon request.

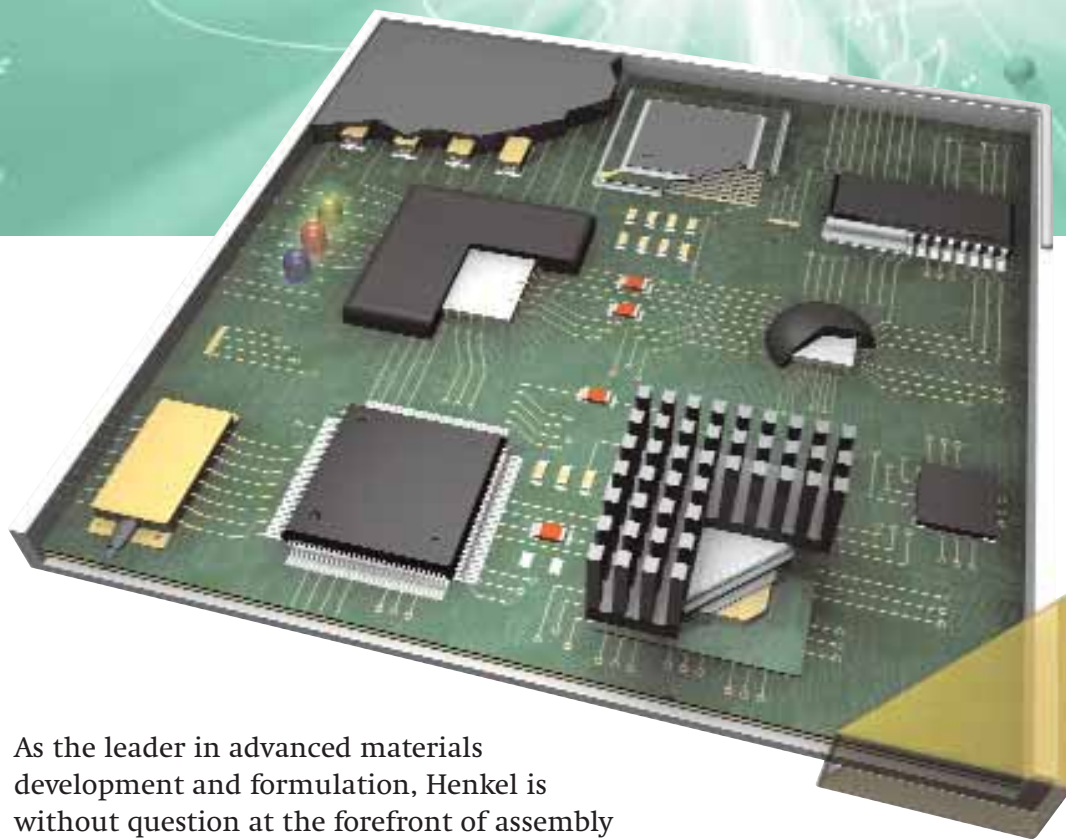
TACKY FLUXES

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	ROLO
TFN610™	Low viscosity; no clean tacky flux	Spraying, jetting and dipping	25,000	Very Pale Yellow	133	116	66	ROLO
TFW600™	Standard viscosity; water wash tacky flux	Printing (screen and stencil); pin transfer and dispensing	550,000	Brown	132	30	80	ORH1

WAFER 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	N²	ORH1

PCB ASSEMBLY MATERIALS



Multicore

Hysol

Macromelt

LOCTITE

As the leader in advanced materials development and formulation, Henkel is without question at the forefront of assembly materials technology. A pioneer in lead-free solder paste materials and lead-free capable supporting materials like underfills and surface mount adhesives (SMA), Henkel has led the global charge with leading-edge, high-performance assembly products. Our line of RoHS compliant and traditional SnPb assembly materials deliver the performance, reliability and material compatibility required to meet the diverse manufacturing needs of today's leading electronics companies.

Through Henkel's portfolio of Multicore® Solder Materials, Loctite® Chipbonder™ adhesives and Loctite® CSP underfills, we are leading the way for next-generation product development. Whether your

process requires a wide process window or a crossover solder material, the Multicore® solder product portfolio provides solutions to even the most demanding manufacturing challenges. And, Loctite® Chipbonder™ adhesives ensure a robust and Pb-free compliant solution for mixed-technology or double-sided surface-mount applications. Though lead-free manufacturing is in full-swing worldwide, there are still reliability issues to be addressed. Loctite® CSP underfills are answering the call, providing increased reliability for Pb-free solder joints. With traditional capillary flow underfills or

Henkel's patented Cornerbond™ technology, which allows for self-centering during reflow, the Loctite® brand of underfills provides cost-effective solutions for varying manufacturing conditions.

Henkel's unique material solutions philosophy ensures that all of our materials are designed with compatibility in mind. Both in process and in the field, our products give you the performance and reliability you demand and the peace of mind that comes with global 24/7 support and top-notch engineering expertise.



PCB ASSEMBLY MATERIALS

MULTICORE® SOLDER PASTE

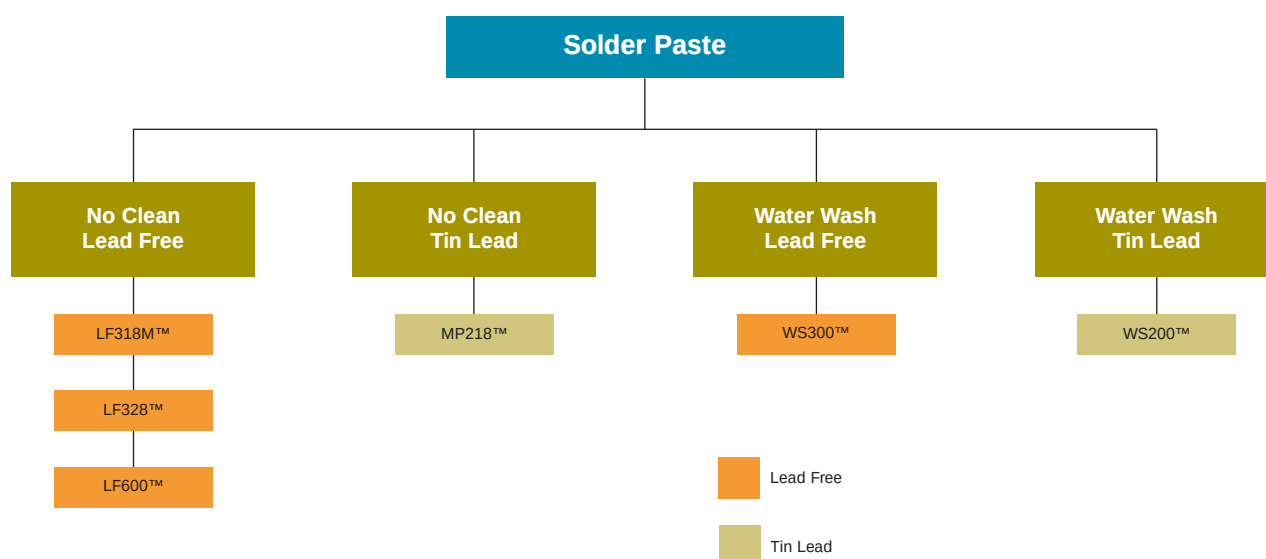
As the world's leading developer of advanced solder paste materials, Henkel delivers decades of technology and expertise for optimized process performance. With groundbreaking new formulations to provide an easy transition to lead-free as well as proven, traditional tin-lead formulations, Multicore® brand solder materials are enabling the production of some of today's most advanced products.

Our portfolio of solder paste materials addresses a variety of manufacturing requirements and offers performance characteristics unmatched by any other materials supplier. Low-voiding lead-free solder pastes, no-clean pastes, water-wash pastes and cross-over pastes for mixed-metal manufacturing are all part of our vast offering. Supporting ultra-fine pitch printing at high speed, delivering long-open and abandon times and pin-testability across all types of assemblies and surface finishes, Multicore® pastes deliver the flexibility modern electronics firms require to stay competitive. Our materials also offer outstanding resistance to high temperature and high humidity, providing multinational firms

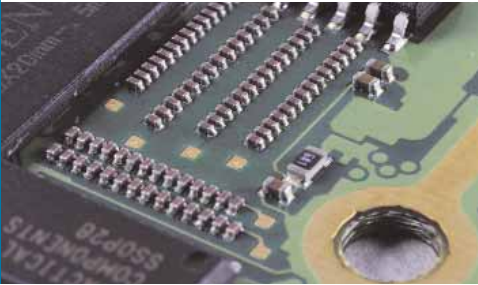


with the confidence they need to deploy Multicore® materials on a global level with consistent performance.

Plus, all of our products are supported locally with outstanding technical expertise and are backed by Henkel's global infrastructure and inimitable resource base.



PCB ASSEMBLY MATERIALS



MULTICORE® SOLDER PASTE

NO CLEAN, LEAD FREE

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
LF318™	A halide-free no-clean Pb-free solder paste that has excellent humidity resistance and a broad process window for both reflow and printing. Offers high tack to resist component movement during high-speed placement, long printer abandon times and excellent solderability over a wide range of reflow profiles in air and N2 reflow ovens and across a wide range of surface finishes including Ni/Au, immersion Sn, Immersion Ag and OSP Cu. Proflow compatible. Available with both AGS (20-45µm, equivalent to IPC type 3) and DAP (20-38µm, equivalent to IPC type 4) powder.	96SC (95.5Sn 3.8Ag 0.7Cu, SAC387, 217C) 97SC (96.5Sn 3.0Ag 0.5Cu, SAC305, 217C)	88.5% and 89.0%	1.8 AGS (Type 3 powder) 2.3 DAP (Type 4 powder)	25 -150	ROLO
LF328™	A halide-free no-clean Pb-free solder paste. It has been formulated to give excellent printing characteristics on 0.4 mm pitch CSP processing with DAP (IPC type 4 equivalent) powder. LF328 has a between-print abandon time of 2 hours and gives ultra-low voiding even with via-in-pad type PCB designs. It has good resistance to humidity and a broad reflow process window. It is available in both AGS and DAP powder and is proflow compatible.	96SC (95.5Sn 3.8Ag 0.7Cu, SAC387, 217C) 97SC (96.5Sn 3.0Ag 0.5Cu, SAC305, 217C)	88.0% and 88.5%	1.8 AGS (Type 3 powder) 2.3 DAP (Type 4 powder)	25 -150	ROLO
LF600™	A halide-free no-clean solder paste that exhibits excellent thermal stability; it is capable of being print cycled on 0.5 mm pitch CSP apertures for 24 hours in conditions of 33C/75%RH. LF600 also shows almost zero hot slump, reducing the likelihood of bridging and mid-chip solder balling. It has > 4 hours abandon time and is available in both type 3 and type 4 powder. Proflow compatible.	96SC (95.5Sn 3.8Ag 0.7Cu, SAC387, 217C) 97SC (96.5Sn 3.0Ag 0.5Cu, SAC305, 217C)	88.5% and 89.0%	1.8 AGS (Type 3 powder) 2.3 DAP (Type 4 powder)	25 -150	ROLO

NO CLEAN, TIN LEAD

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
MP218™	Halide-free, no clean, pin-testable solder paste, which has excellent humidity resistance and a broad process window, both for reflow and printing.	Sn62/Sn63/63S4 (Anti-Tombstoning)	89.5% - 90.0%	1.60	25 - 100	ROLO

WATER WASH, LEAD FREE

PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
WS300™	A flux system specially formulated for 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%	0.8	25 - 100	ORH1

WATER WASH, TIN LEAD

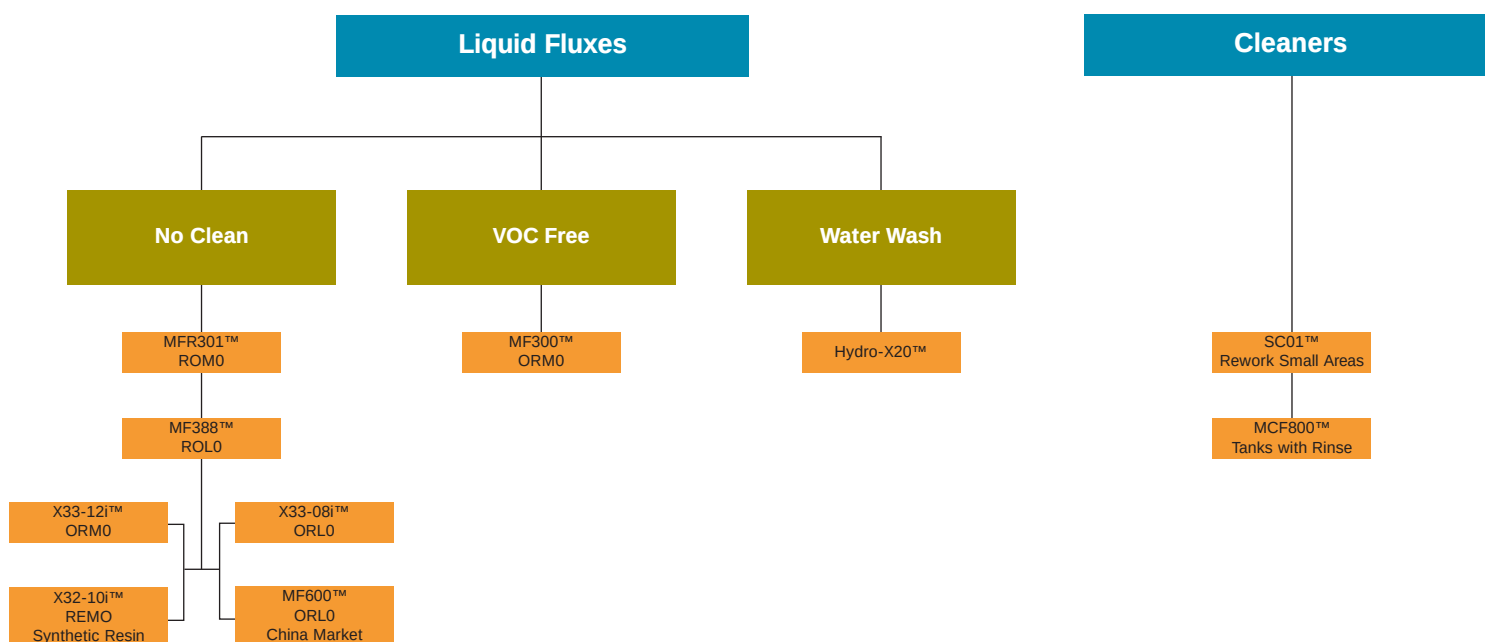
PRODUCT	DESCRIPTION	ALLOY	% METAL LOADING	TACK, g/mm ²	PRINT SPEED, mm/s	IPC/J-STD-004 CLASSIFICATION
WS200™	High performance, water-washable solder paste. Residues are readily removed with DI water, without the need for a saponifier. WS200™ has good open time with excellent print definition and soldering activity.	Sn62/Sn63/63S4 (Anti-Tombstoning)	90.5%	0.8	25 - 100	ORH1

PCB ASSEMBLY MATERIALS

MULTICORE® FLUXES

With a variety of formulations for various wave soldering processes, Multicore® brand high-performance liquid flux technology is compatible with dual-wave and lead-free processes, delivering outstanding results. From no-clean to low-residue to VOC-free, Multicore® brand fluxes deliver unique properties for individualized manufacturing needs.

Henkel's flux formulation teams are tops when it comes to expertise and ingenuity – two characteristics that are essential to the development of modern, lead-free and environmentally friendly processes. Through careful process analysis and a complete understanding of chemical interactions and manufacturing requirements, Henkel has developed a broad range of Multicore® brand liquid fluxes to suit a variety of applications.



PCB ASSEMBLY MATERIALS



MULTICORE® FLUXES

LIQUID FLUXES – NO CLEAN

PRODUCT	DESCRIPTION	SOLIDS CONTENT, %	ACID VALUE, mg KOH/g	IPC/J-STD-004 CLASSIFICATION	APPLICATION
MF388™	Sustained activity in high preheats for dual wave and lead-free processes. High PTH fill, low residues. High reliability. Solvent-based flux may be thinned with IPA.	3.5	23	ROLO	Spray
MFR301™	Higher solids, halide-free flux for better wetting on reduced solderability surfaces and to minimize bridging on complex geometries. Fully lead-free and dual wave compatible. Solvent-based flux may be thinned with IPA.	6.5	41	ROM0	Spray/Foam
MF600™	This general purpose, sustained activity flux is designed to meet the demanding requirements of Asian PCB manufacturers. Its ORLO rating combines sustained activity with excellent board finish and the highest electrical reliability requirements for global demand.	3.9	19	ORLO	Spray
X33-12i™	General purpose, ORM0-rated flux with ultra low residues. Sustained activity to extend flux life in dual wave and LF wave soldering applications. Good PTH fill even on oxidized copper.	2.9	22.5	ORM0	Spray/Foam
X32-10i™	Low solids synthetic resin flux meets global demand for ultra low residue medium activity flux.	2.5	16	REM0	Spray/Foam
X33-08i™	The balance between soldering performance and on-board reliability, does not have to be a compromise. Multicore® X33-08i™ medium activity flux can solder difficult substrates while meeting the highest specifications of reliability, such as Telcordia GR-78-COR™.	1.6	17.5	ORLO	Spray/Foam

VOC-FREE

PRODUCT	DESCRIPTION	SOLIDS CONTENT, %	ACID VALUE, mg KOH/g	IPC/J-STD-004 CLASSIFICATION	APPLICATION
MF300™	General purpose, VOC-free (water-based), no-clean, halide-free and resin-free flux with special formulation to minimize solder balling. Compatible with lead-free processes.	4.6	37	ROM0	Spray/Foam

LIQUID FLUX – WATER WASH

PRODUCT	DESCRIPTION	SOLIDS CONTENT, %	ACID VALUE, mg KOH/g	IPC/J-STD-004 CLASSIFICATION	APPLICATION
Hydro-X20™	A high activity, water washable flux designed for the soldering of the most difficult electronic assemblies. Unique activator package enables a wider process window and the soldering of all common electronic surfaces with ease. Residues are readily and completely removable by water wash after soldering.	20	24	ORH1	Spray/Foam

CLEANERS



PRODUCT	DESCRIPTION
SC01™	Designed for the stencil cleaning and hand cleaning of process soldering residues. A highly effective cleaner that dries rapidly (fast evaporation).
MCF800™	Designed for the effective removal of all types of soldering process residues from circuit boards, screens, fixtures, and equipment. Flash point of 105°C makes it ideal for use in heated cleaning systems.

PCB ASSEMBLY MATERIALS

MULTICORE® CORED WIRE

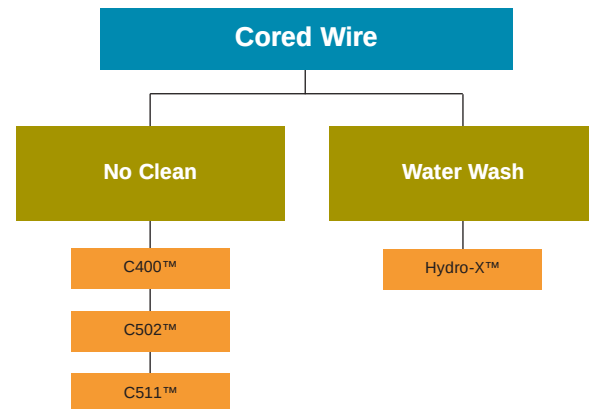
The Multicore® portfolio of cored solder wire features the award-winning multiple flux core technology that ensures the even and consistent distribution of flux throughout the solder wire. This mainstay in Henkel's line of solder products delivers ease of use and outstanding performance for today's delicate hand soldering assembly and re-work operations. Formulated with a variety of different alloy selections, Multicore® cored wires support

traditional tin-lead manufacturing operations as well as modern lead-free processes. Our fast-wetting materials deliver excellent solder joint integrity and outstanding long-term performance.



CONVERSION TABLE

INCH	METRIC	STANDARD WIRE GAUGE
0.010	0.25 mm	30
0.015	0.40 mm	28
0.020	0.50 mm	25
0.025	0.64 mm	23
0.031	0.80 mm	21
0.040	1.00 mm	19
0.050	1.30 mm	18
0.062	1.50 mm	16
0.093	2.50 mm	13
0.125	3.20 mm	10



NO CLEAN

PRODUCT	DESCRIPTION	IPC/J-STD-004 CLASSIFICATION	ALLOY OPTIONS (Tin/Lead)	ALLOY OPTIONS* (LEAD FREE)
C400™	Halide-free, no-clean, clear residue, increased flux content for improved wetting.	ROL0	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C
C502™	No-clean, clear residue, medium activity flux with good wetting on difficult substrates.	ROM1	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C
C511™	No-clean, clear residue, high activity flux with excellent wetting on difficult substrates.	ROM1	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C

WATER WASH

PRODUCT	DESCRIPTION	IPC/J-STD-004 CLASSIFICATION	ALLOY OPTIONS (Tin/Lead)	ALLOY OPTIONS* (LEAD FREE)
Hydro-X™	High activity, water washable flux with excellent wetting on difficult substrates.	ORH1	SN62 60/40 63/37	SAC305 (97SC) SAC387 (96SC) 99C

*SAC387/96SC alloy: Sn 95.5, Ag 3.8, Cu 0.7 with melting point of 217°C

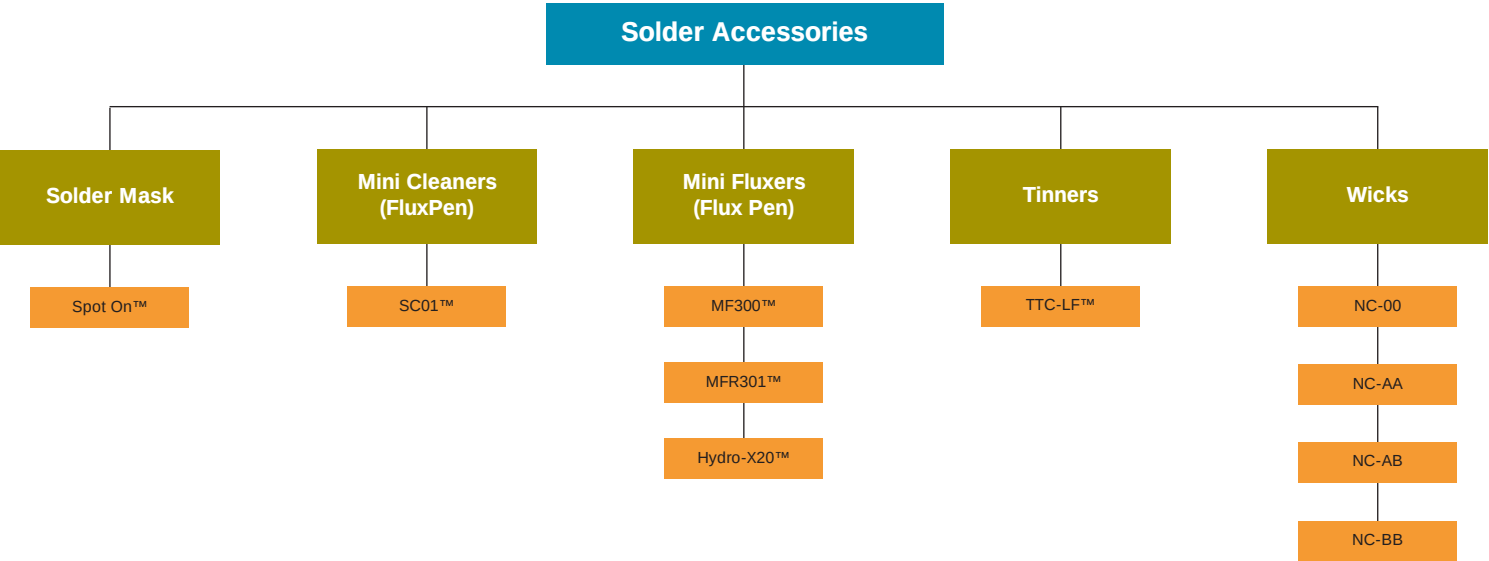
SAC305/97SC alloy: Sn 96.5, Ag 3.0, Cu 0.5 with a melt point of 217°C

99C alloy: Cu 1.0 with melting point of 227°C

PCB ASSEMBLY MATERIALS



MULTICORE® SOLDER ACCESSORIES



WICKS

SIZE REFERENCE	APPROXIMATE WIDTH
NC-00	0.8 mm (0.03 in.)
NC-AA	1.5 mm (0.06 in.)
NC-AB	2.2 mm (0.08 in.)
NC-BB	2.7 mm (0.10 in.)

SOLDER MASK

PRODUCT	DESCRIPTION
Spot On™	Temporary solder used with circuit boards prior to soldering. Will withstand flux and soldering. Suitable for use with hand or pneumatic applications.

TIP TINNER

PRODUCT	DESCRIPTION
TTC-LF™ Lead-Free Tip Tinner	Handy, non-abrasive, solder iron tip tinner. Easily wets hot solder irons leaving a brightly tinned tip. Improves hand soldering efficiency and extends tip life. Adhesive pad allows easy mounting on or near the solder iron holder.

MINI FLUXERS / MINI CLEANER (FLUX PENS)

PRODUCT	DESCRIPTION
Flux Pen MF300™ Flux Pen MFR301™ Flux Pen Hydro-X20™ Flux Pen SC-01™ (Cleaner)	Controlled release flux and cleaner pen applicators. Range of compatible flux types available. Ideal for controlled applications of flux when carrying out SMT rework. Cleaner pen easily removes residues.



PCB ASSEMBLY MATERIALS

CHIP ON BOARD ENCAPSULANT MATERIALS

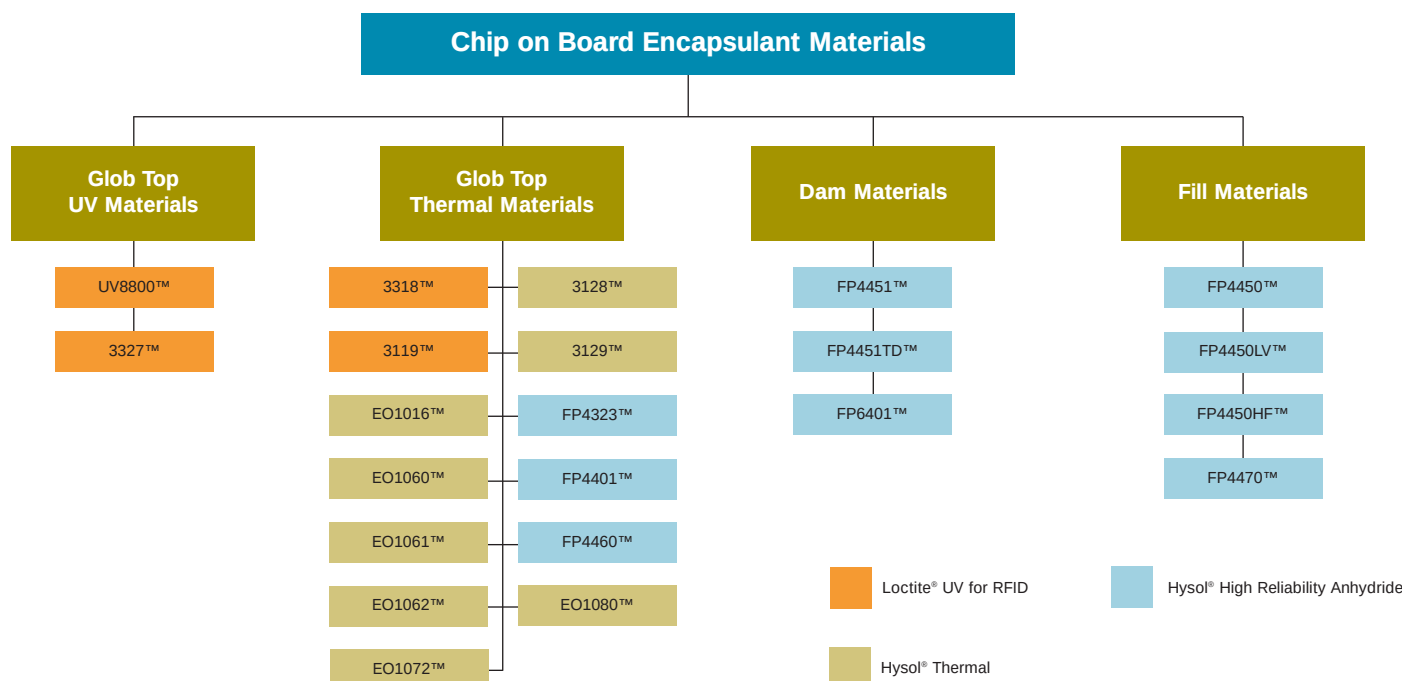
As today's consumer products continue to become smaller, thinner and lighter, the devices inside these electronics products must also follow suit. In order to achieve these requirements, Henkel has developed a suite of new Hysol® brand encapsulation materials that support high-throughput, low-cost assembly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

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 and device protection, Hysol® products high-purity liquid epoxy encapsulants work together as dam-and-fill materials for bare chip encapsulation, providing gold wire, aluminum, and silicon die protection from the effects of mechanical damage, corrosion, and other environmental hazards. 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), ASICs, and chip on board applications. 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. Materials for chip on board applications are designed to be stored at refrigerated temperatures and cure quickly to fit easily within high-speed processes.

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.



PCB ASSEMBLY MATERIALS



CHIP ON BOARD ENCAPSULANT MATERIALS

GLOB TOP MATERIALS – UV

PRODUCT	DESCRIPTION	POT LIFE @ 25°C	RECOMMENDED CURE	Tg, °C	CTE _{ai} , ppm/°C	FILLER TYPE	STORAGE TEMP
UV8800™	Smart card encapsulant	7 days	UV 30 sec @ 100 mW/cm²	50	42	Silica	5°C
3327™	Smart card encapsulant	7 days	UV 30 sec @ 100 mW/cm²	110	45	Silica	5°C

GLOB TOP MATERIALS – THERMAL

PRODUCT	DESCRIPTION	POT LIFE @ 25°C	RECOMMENDED CURE	Tg, °C	CTE _{ai} , ppm/°C	FILLER TYPE	STORAGE TEMP
3118™	Image sensor adhesive, white	2 weeks	20 min @ 80°C 60 min @ 60°C	45	40	Calcium Carbonate	-40°C
3119™	Image sensor adhesive	1 week	20 min @ 80°C 60 min @ 60°C	110	65	Calcium Carbonate	-15°C
3128™	Image sensor adhesive, black	3 weeks	20 min @ 80°C 60 min @ 60°C	45	40	Calcium Carbonate	-15°C
3129™	Image sensor adhesive	3 weeks	10 min @ 80°C 30 min @ 60°C	41	45	Calcium Carbonate	-15°C
EO1016™	UL94V-0 encapsulant for Smartcards and watch ICs. Nonabrasive filler allows for grinding if necessary.	3 months	20 min @ 150°C	126	46	Calcium Carbonate	4°C
EO1060™	Low glob formulation for lower CTE and lower ionic than EO1016™ content for more demanding applications.	25 days	4 - 6 hrs @ 125°C	125	40	Calcium Carbonate	4°C
EO1061™	Medium glob formulation for lower CTE and lower ionic than EO1016™ content for more demanding applications.	25 days	4 - 6 hrs @ 125°C	125	40	Calcium Carbonate	4°C
EO1062™	High glob version of EO1061™.	25 days	4 - 6 hrs @ 125°C	125	40	Calcium Carbonate	4°C
EO1072™	One-component, high performance epoxy encapsulant with high Tg and low extractable ionics.	30 days	5 min @ 140°C	135	43	Calcium Carbonate	4°C
EO1080™	Low CTE version of EO1016™.	3 months	20 min @ 150°C	121	35	Silica	4°C
FP4323™	High purity liquid epoxy encapsulant for chip on board (plastic substrate) and plastic PGA applications.	2 days	3 hrs @ 170°C	174	28	Silica	-40°C
FP4401™	Low flow, high purity liquid epoxy encapsulant.	1 day	6 hrs @ 150°C	171	20	Silica	-40°C
FP4460™	High purity, low stress glob top semiconductor encapsulant with improved moisture resistance and working life compared to earlier generation products.	2 days	3 hrs @ 150°C	171	20	Silica	-40°C

PCB ASSEMBLY MATERIALS

CHIP ON BOARD ENCAPSULANT MATERIALS

DAM MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	VISCOSITY, cPs	Tg, °C	CTE _{a1} , 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
FP6401™	High purity, liquid flexible damming material	30 min @ 165°C	300,000	0	77	9

FILL MATERIALS

PRODUCT	DESCRIPTION	RECOMMENDED CURE	FLOW SPEED	VISCOSITY, cPs	Tg, °C	CTE _{a1} , ppm/°C	% FILLER
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, high purity, low stress liquid encapsulant	30 min @ 125°C 90 min @ 165°C	Not Tested	35,000	160	18	72.5
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
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



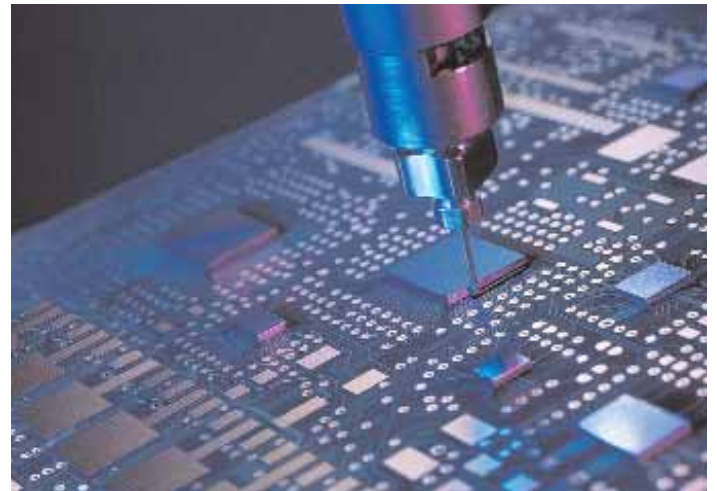
PCB ASSEMBLY MATERIALS



LOCTITE® BOARD LEVEL UNDERFILLS

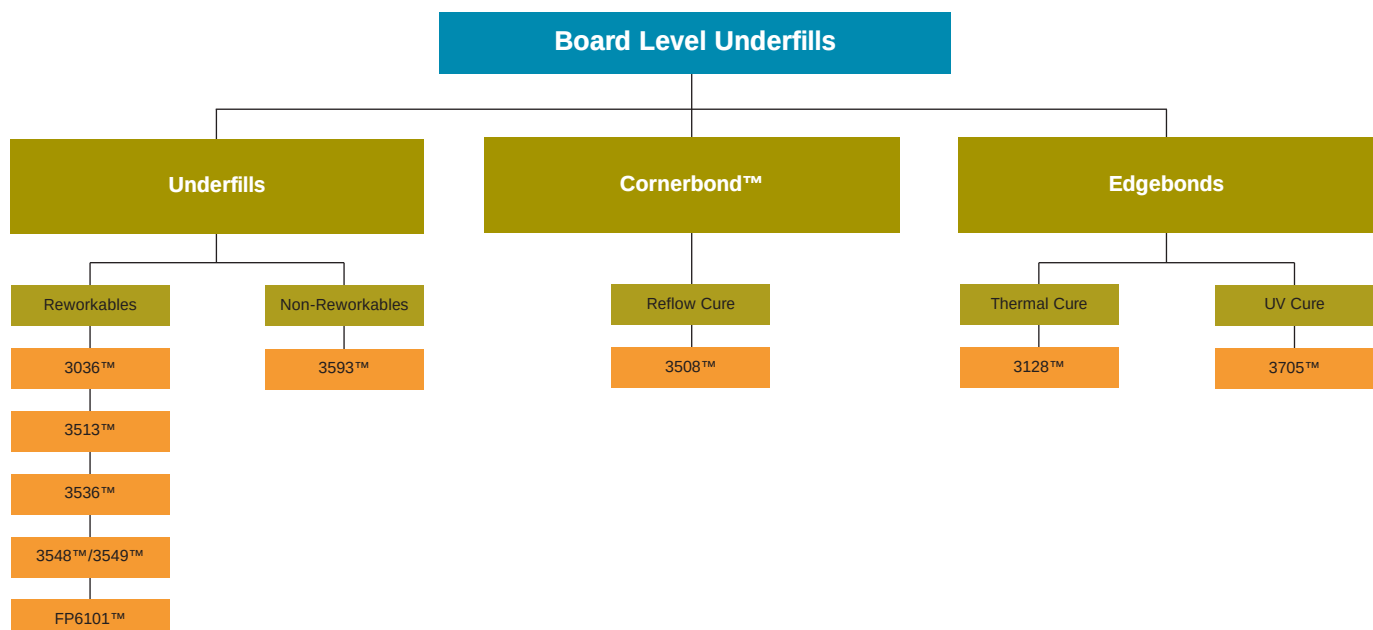
While underfills were first developed to compensate for the device stress induced by Coefficient of Thermal Expansions (CTE) mismatches, the rapid development of smaller and thinner handheld products in tandem with new lead-free requirements has given rise to new uses for advanced underfill systems. Newer generation underfills are delivering unprecedented reliability for today's handheld products, ensuring manufacturing confidence and end-user peace of mind.

Loctite® CSP and BGA underfill systems have been developed to accommodate a variety of applications and processing requirements. Our industry-leading capillary flow underfills provide measurable advantages such as fast flow, fast cure, and long pot life. Plus, these materials offer easy reworkability in addition to outstanding vibration and shock resistance. For certain mobile devices such as laptops and gaming consoles, Loctite® Cornerbond™ technology delivers a cost-effective underfill alternative. Applied at the four corners of the CSP pad site using a standard dispensing system and cured during normal solder reflow, Loctite®



Cornerbond™ allows for complete in-line processing and requires no additional equipment investment. The material's self-centering characteristic ensures high assembly reliability and outstanding yield rates.

As device footprints continue to shrink and pitches become ever finer, Henkel's advanced underfill technology will be essential to ensuring component protection and long-term, in-field reliability.



PCB ASSEMBLY MATERIALS

LOCTITE® BOARD LEVEL UNDERFILLS

UNDERFILLS: REWORKABLE

PRODUCT	DESCRIPTION	VISCOSITY, cPs	POT LIFE @ 25°C	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	CAPILLARY FLOW	STORAGE TEMP
3036™	Low CTE and low temperature cure reworkable underfill. Excellent compatibility with ALIVH PCBs.	5,600	> 12 days	30 min @ 100°C	22	29	Medium	15°C
3513™	Single-component epoxy used as a reworkable underfill for CSP or BGAs.	4,000	48 hrs	10 min @ 150°C 15 min @ 120°C 30 min @ 100°C	69	63	Fast	2°C - 8°C
3536™	CSP/BGA reworkable underfill designed to cure rapidly at low temperatures. Once cured provides excellent protection for solder joints against mechanical stress such as shock, drop and vibration.	1,800	14 days	5 min @ 120°C 2 min @ 130°C	53	63	Fast	2°C - 8°C
3548™ / 3549™	Next generation reworkable underfill for thermal and mechanical reliability. Designed to SnapCure™ at low temperature to minimize thermal stress on PCBs. Fast flow for improved process time.	2,200	14 days	5 min @ 120°C 3 min @ 130°C	26	67	Fast	2°C - 8°C
FP6101™	Reworkable underfill for improvement of mechanical reliability. Fast flow and snap cure for improved process time.	3,700	14 days	5 min @ 165°C 10 min @ 150°C	15	80	Fast	-20°C

UNDERFILLS: NON-REWORKABLE

PRODUCT	DESCRIPTION	VISCOSITY, cPs	POT LIFE @ 25°C	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	CAPILLARY FLOW	STORAGE TEMP
3593™	Non-reworkable underfill for high mechanical reliability. Fast flow and snap cure for improved process time.	4,500	7 days	5 min @ 150°C	110	50	Fast	2°C - 8°C

CORNERBOND: REFLOW CURE

PRODUCT	DESCRIPTION	VISCOSITY, cPs	POT LIFE @ 25°C	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	CAPILLARY FLOW	STORAGE TEMP
3508™	Lead-free, one-component epoxy corner bond adhesive. Applied pre-reflow and allows self-alignment of SMT components during reflow operation. Used for lead-free applications.	50,000	30 days	Lead-free profile	155	55	None	2°C - 8°C

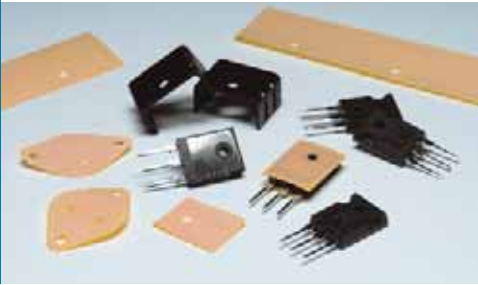
EDGE BONDS: POST REFLOW CURE

PRODUCT	DESCRIPTION	VISCOSITY, cPs	POT LIFE @ 25°C	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	CAPILLARY FLOW	STORAGE TEMP
3128™	One-component heat-cured epoxy adhesive designed to cure at low temperatures. Gives excellent adhesion on a wide range of materials.	Casson Viscosity 12 Pa-s	2 weeks	20 min @ 80°C 60 min @ 60°C	45	40	None	-15°C

EDGE BONDS: UV CURE

PRODUCT	DESCRIPTION	VISCOSITY, cPs	POT LIFE @ 25°C	CURE SCHEDULE	Tg, °C	CTE _{a1} , ppm/°C	CAPILLARY FLOW	STORAGE TEMP
3705™	UV-cured adhesive designed for bonding electronics components on PCBs. Thixotropic nature reduces migration of product. Excellent adhesion to a wide range of substrate. Bonds in seconds upon exposure to UV light.	40,000	30 days	UV Cured	-44	157	None	2°C - 8°C

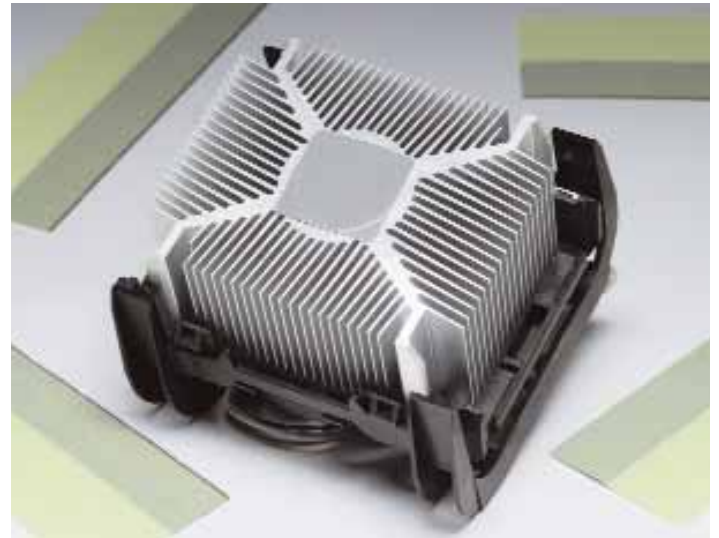
PCB ASSEMBLY MATERIALS



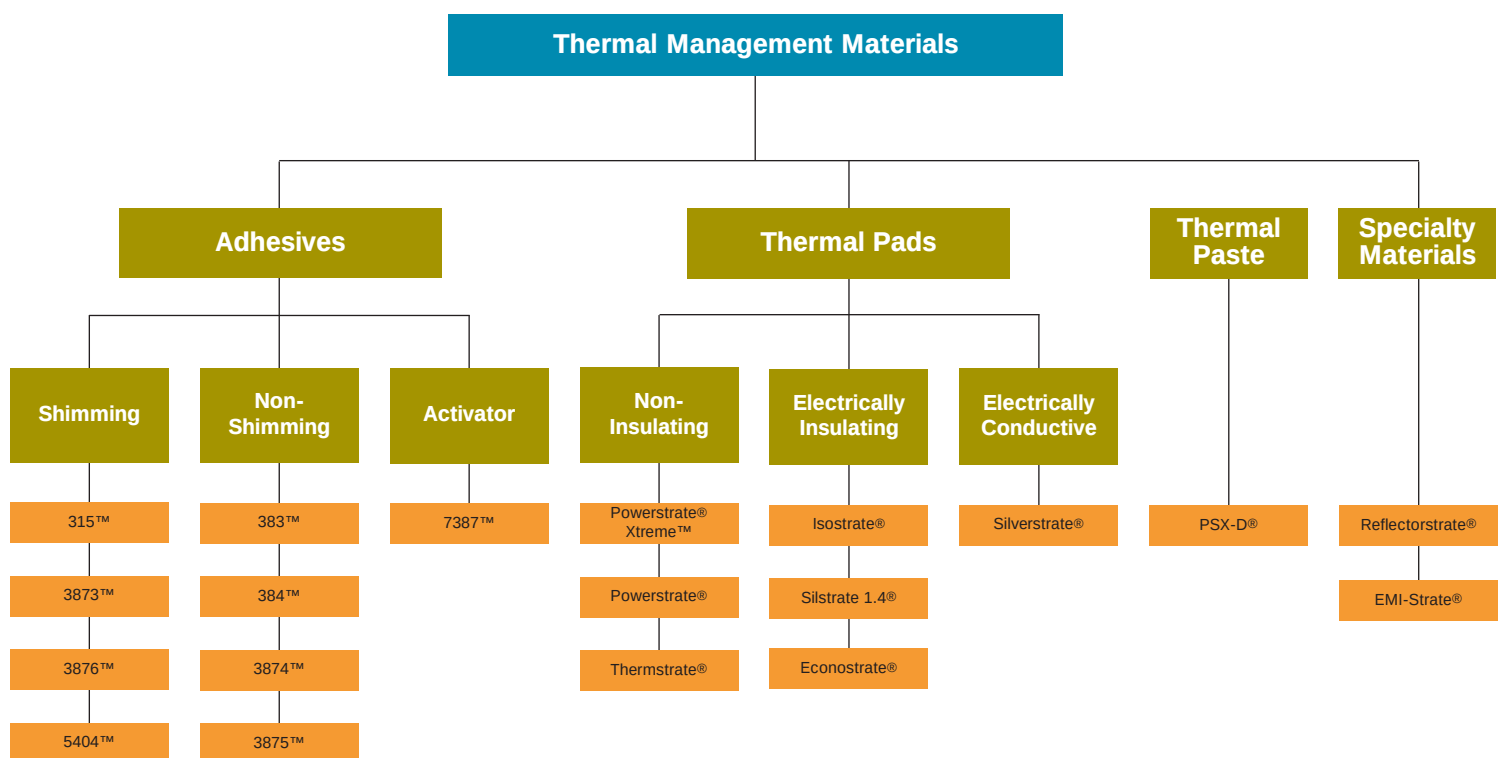
LOCTITE® THERMAL MANAGEMENT MATERIALS

Henkel's thermal materials scientists have developed some unique and user-friendly products to address these thermal transfer priorities. The Loctite® line of Phase Change Thermal Interface Materials (PCTIM) offers exceptionally low thermal impedance between heat dissipating devices and the surface to which the component is mounted. The premiere product in this line-up, Loctite® Powerstrate® Xtreme™ adheres to heat sinks or components without heating, delivering amazing ease-of-use without compromising thermal performance.

For applications where the need for process convenience outweighs the need for PCTIM's extremely high thermal performance, Henkel's portfolio of Loctite® brand thermally conductive adhesives delivers user-friendly functionality with outstanding thermal conductivity. Advances in this technology have yielded the award-winning Loctite®



"Bead-on-Bead" solution, a two-part, no-mix, no-measure adhesive system, that is providing cost and process efficiencies to manufacturers worldwide.



PCB ASSEMBLY MATERIALS

LOCTITE® THERMAL MANAGEMENT MATERIALS

ADHESIVES: SHIMMING

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	TENSILE STRENGTH, psi	CURE METHOD	FIXTURE/ CURE TIME	SHELF LIFE
315™	Self-shimming for electrical isolation; room-temperature curing adhesive.	0.8 W/mK	2,180 psi	Activator or Heat	5 min / 24-72 hrs @ 20°C	9 months @ 5°C
3873™	Fast-curing, high-conductivity, self-shimming for bonding heat-generated devices to thermal spreader.	1.25 W/mK	1,400 psi	Activator or Heat	5 min / 24-72 hrs @ 20°C	21 months @ 5°C
5404™	Self-shimming, flexible silicone adhesive for demanding parts such as ceramic boards.	1.0 W/mK	> 188 psi	Heat	10 min @ 150°C	5 months @ 5°C
3876™	Highest conductivity, self-shimming, room temperature cure system.	1.75 W/mK	2,400 psi	Two Components / Room Temperature	3-5 min / 24-72 hrs @ 20°C	9 months @ 5°C

ADHESIVES: NON-SHIMMING

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	TENSILE STRENGTH, psi	CURE METHOD	FIXTURE/ CURE TIME	SHELF LIFE
383™	High-strength, room temperature-curing adhesive for permanent assemblies.	0.6 W/mK	2,320 psi	Activator or Heat	5 min / 24-72 hrs @ 20°C	9 months @ 5°C
384™	Repairable, room temperature-curing adhesive utilized for parts subject to disassembly.	0.76 W/mK	1,800 psi	Activator or Heat	5 min / 24-72 hrs @ 20°C	9 months @ 5°C
3874™	Fast-curing, high-conductivity for bonding heat-generated devices to thermal spreader "without glass beads."	1.25 W/mK	> 1,000 psi	Activator or Heat	5 min / 24-72 hrs @ 20°C	9 months @ 5°C
3875™	Highest conductivity room temperature cure system.	1.75 W/mK	2,400 psi	Two Components / Room Temperature	3-5 min / 24-72 hrs @ 20°C	9 months @ 5°C

ADHESIVES: ACTIVATOR

PRODUCT	DESCRIPTION	THERMAL CONDUCTIVITY, W/mK	ADHESION STRENGTH	CURE METHOD	CURE SCHEDULE	SHELF LIFE
7387™	Activator for use with Loctite® brand 315™, 383™, 384™, 3873™ and 3874™ output adhesives.	N/A	N/A	N/A	N/A	24 months

PCB ASSEMBLY MATERIALS

LOCTITE® THERMAL MANAGEMENT MATERIALS

THERMAL PADS: NON-INSULATING

PRODUCT	DESCRIPTION	THERMAL IMPEDANCE, °C-in. ² /W @ 80 psi	THERMAL IMPEDANCE, °C-cm. ² /W @ 550 kPa	THERMAL CONDUCTIVITY, W/mk	PHASE CHANGE TEMP, °C	VOLUME RESISTIVITY, ohm-cm	DIELECTRIC STRENGTH, V/mil	TOTAL THICKNESS, in
Powerstrate® Xtreme™	Unsupported film with superior thermal performance even at low pressure. Direct attach to heat sink at room temperature without adhesive.	0.003	0.022	3.4	45	N/A	N/A	0.008
Powerstrate®	Low thermal impedance. Suitable for a wide range of applications on bare die processors and other electronics devices.	0.008	0.052	3.0	51 or 60	5.9 x 10 ⁹	N/A	0.0025 - 0.004
Thermstrate®	Industry standard phase change preform. Suitable for power IGBTs, semiconductors, DC-DC converters and other electrically isolated packages.	0.022	0.143	1.0	60	10 ¹²	N/A	0.0025 - 0.008

THERMAL PADS: ELECTRICALLY INSULATING

Product	Description	THERMAL IMPEDANCE, °C-in. ² /W @ 80 psi	THERMAL IMPEDANCE, °C-cm. ² /W @ 550 kPa	THERMAL CONDUCTIVITY, W/mk	PHASE CHANGE TEMP, °C	VOLUME RESISTIVITY, ohm-cm	DIELECTRIC STRENGTH, V/mil	TOTAL THICKNESS, in
Isostrate®	Industry standard electrically insulating phase change material	0.12	0.78	0.45	60	N/A	4,500 minimum	0.002 - 0.006
Silstrate 1.4®	Conformable silicone rubber pad offering high dielectric strength and excellent cut-through resistance	0.316	2.04	1.4	N/A	N/A	900 minimum	0.008
Econostrate®	Low cost electrically isolating phase change thermal interface material	0.262	1.69	0.4	60	N/A	2000+	0.003

THERMAL PADS: ELECTRICALLY CONDUCTIVE

Product	Description	THERMAL IMPEDANCE, °C-in. ² /W @ 80 psi	THERMAL IMPEDANCE, °C-cm. ² /W @ 550 kPa	THERMAL CONDUCTIVITY, W/mk	PHASE CHANGE TEMP, °C	VOLUME RESISTIVITY, ohm-cm	DIELECTRIC STRENGTH, V/mil	TOTAL THICKNESS, in
Silverstrate®	Excellent thermal performance, particularly at higher pressures. Typically used on RF devices and SCRs where electrical conductivity is required (silver-filled).	0.003	0.022	3.14	51	2	N/A	0.004

THERMAL PASTE

Product	Description	THERMAL IMPEDANCE, °C-in. ² /W @ 80 psi	THERMAL IMPEDANCE, °C-cm. ² /W @ 550 kPa	THERMAL CONDUCTIVITY, W/mk	PHASE CHANGE TEMP, °C	VOLUME RESISTIVITY, ohm-cm	DIELECTRIC STRENGTH, V/mil	TOTAL THICKNESS, in
PSX-D®	High performance dispensable, reworkable and repeatable phase change thermal interface material. Supplied as a paste that can be stenciled, needle dispensed, screen printed, or applied manually onto a heat sink, baseplate or other surfaces.	0.003	0.022	3.4	45	N/A	N/A	0.0005 - 0.010+

SPECIALTY MATERIALS

Product	Description	THERMAL IMPEDANCE, °C-in. ² /W @ 80 psi	THERMAL IMPEDANCE, °C-cm. ² /W @ 550 kPa	THERMAL CONDUCTIVITY, W/mk	PHASE CHANGE TEMP, °C	VOLUME RESISTIVITY, ohm-cm	DIELECTRIC STRENGTH, V/mil	TOTAL THICKNESS, in
EMI-Strate®	Unique combination of thermal and EMI management. Excellent choice for radiated EMI control.	0.4	2.6	0.69	60	N/A	4,500 minimum	See Data Sheet
Reflectorstrate®	High temperature adhesive-backed thermal insulation pad, laminated with a metalized heat reflective film. Suitable for applications where unwanted radiated heat needs to be redirected to another location.	N/A	N/A	N/A	N/A	N/A	N/A	0.001 - 0.010

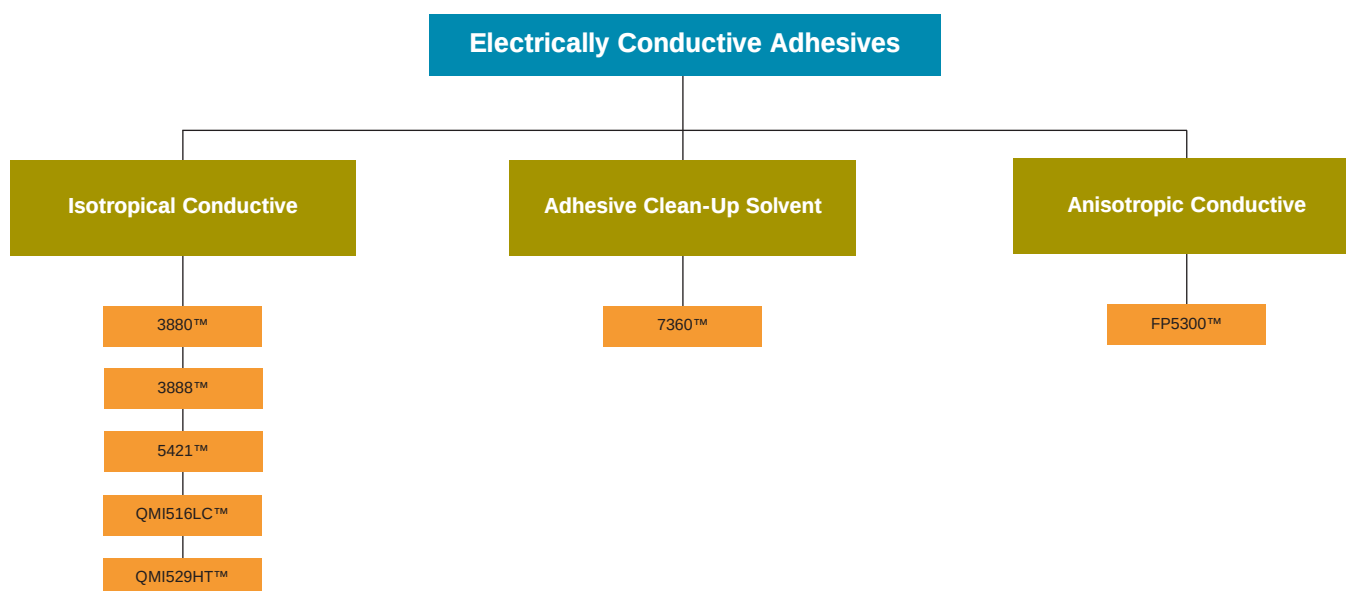
PCB ASSEMBLY MATERIALS

LOCTITE® ELECTRICALLY CONDUCTIVE ADHESIVES

With a strong mechanical bond and a low-impedance electrical interconnection, Loctite® brand electrically conductive adhesives deliver an alternative to solder. They are lead-free capable and cure quickly, delivering outstanding manufacturability and high throughput.

Understanding that manufacturers require process flexibility for changing manufacturing conditions, Henkel Loctite® brand adhesives provide curing alternatives that allow cure at room temperature or processing more quickly at temperatures between 100°C and 150°C. These products are an excellent option for the bonding of temperature-sensitive components, allowing the use of non-solderable substrates such as plastic or glass. Plus, the versatility of the materials allows for easy assembly and repair of flexible circuits, as well as the bonding of flexible substrates and connectors.

Henkel adhesives are extensively tested in the lab and in-process to ensure maximum performance for modern manufacturing conditions.



PCB ASSEMBLY MATERIALS

LOCTITE® ELECTRICALLY CONDUCTIVE ADHESIVES

ISOTROPICAL CONDUCTIVE

PRODUCT	DESCRIPTION	CURE	SHELF LIFE	CURE SCHEDULES	T _g , °C	CTE _{a1} , ppm/°C	VOLUME RESISTIVITY, ohm-cm	WORK LIFE @ ROOM TEMP
3880™	Syringe or stencil dispense, silver conductive adhesive for solder replacement. Long work life. Can be stored in conventional refrigerator (-40°C freezer not required).	Heat Cure	3 months @ 1°C	10 min @ 125°C 6 min @ 150°C 3 min @ 175°C	40	45	< 0.0005	7 days
3888™	Room temperature cure adhesive for applications requiring a combination of good mechanical and electrical properties.	Room Temp. Cure	12 months @ 21°C - 25°C	24 hrs @ 23°C 1 hr @ 125°C 30 min @ 155°C	50	> 50	< 0.001	90 min
5421™	RTV silicone provides EMI / RFI shielding on electronic device enclosures.	Moisture Cure	6 months @ 5°C	24 hrs @ 25°C	N/A	N/A	0.005	30 min Open Time
QMI516LC™	Low temperature cure, silver-filled adhesive	Heat Cure	12 months @ -40°C	90 min @ 80°C	17	69	< 0.01	4 hrs
QMI529HT™	For component or die attach where very high electrical and thermal conductivity are required. Suitable for high heat dissipation devices and solder replacement applications.	Heat Cure	12 months @ -40°C	30 min @ 185°C (Oven) 60 sec @ 185°C (SkipCure™)	3.3	53	7.0	24 hrs

ADHESIVE CLEAN-UP SOLVENT

PRODUCT	DESCRIPTION	SOLVENT TYPE	FLASH POINT	CORROSIVE PROPERTIES	OZONE DEPLETION POTENTIAL
7360™	Clean up and removal of uncured adhesive.	Aliphatic Ester Blend	100°C	None	None

ANISOTROPIC CONDUCTIVE

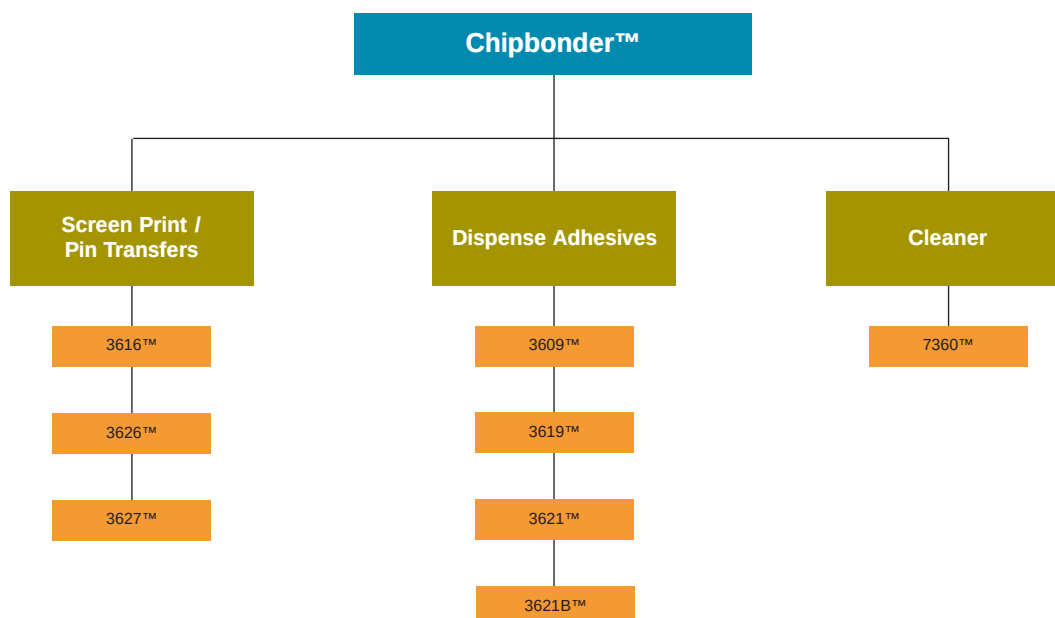
PRODUCT	DESCRIPTION	VISCOSITY, cPs	SUBSTRATE	CURE SCHEDULE	T _g , °C	CTE _{a1} , ppm/°C	MODULUS, DMA	STORAGE TEMP	SHELF LIFE
FP5300™	Excellent adhesion strength to 2- and 3-layer flex and laminates. Low temp cure ACP.	61,000	Laminates and flexible printed circuits	8 sec @ 180°C	126	47 ppm	5.9 GPa	-15°C	6 months

PCB ASSEMBLY MATERIALS

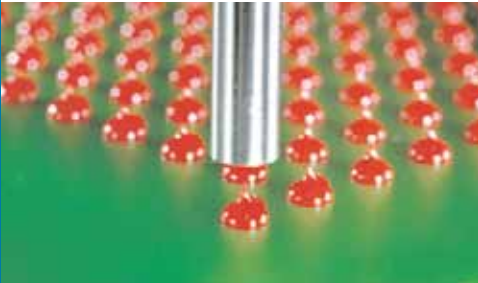
LOCTITE® CHIPBONDER™ SURFACE MOUNT ADHESIVES

As the first commercially available adhesive to address the emerging surface-mount market in the 1980s, Loctite® Chipbonder™ products today are the industry standard for mixed-technology and double-sided SMT applications.

Henkel offers a wide range of Chipbonder™ products to meet the diversity and challenges of today's manufacturing requirements. Developed using in-process analysis ensures that Henkel's Loctite® Chipbonder™ adhesives can address high-speed assembly processes while delivering lead-free compatibility with no loss in productivity. The portfolio includes formulations for low-temperature, screen printing and dispensing.



PCB ASSEMBLY MATERIALS



LOCTITE® CHIPBONDER™ SURFACE MOUNT ADHESIVES

SCREEN PRINT/PIN TRANSFER

PRODUCT	DESCRIPTION	COLOR	CURE SCHEDULE	PROCESS METHOD	STORAGE TEMP	SHELF LIFE
3616™	High speed stencil print adhesive. Compatible with DEK® Proflow® and MPM® Rheopump®. Ultra low moisture pick-up. Pin transfer capable also.	Red	90 sec @ 150°C 2-3 min @ 125°C	Stencil Print (60 - 150 mm/s)	5°C ± 3°C	9 months
3627™	High speed stencil print adhesive. Compatible with DEK® Proflow® and MPM® Rheopump®. Recommended product for DEK® Proflow® Pumprint process	Red	90 sec @ 150°C 3-4 min @ 125°C	Stencil Print (60 - 150 mm/s)	5°C ± 3°C	6 months
3626™	Hand print adhesive for use with manual stencil. Viscosity ensures repeatable printing every time. Low moisture pick-up for high on-board reliability	Red	90 sec @ 150°C 3-4 min @ 125°C	Manual Application with Hand Squeegee	5°C ± 3°C	6 months

DISPENSE ADHESIVES

PRODUCT	DESCRIPTION	COLOR	CURE SCHEDULE	PROCESS METHOD	STORAGE TEMP	SHELF LIFE
3609™	For medium to high speed dispense applications. Excellent green strength for large components.	Red	90 sec @ 150°C 2-3 min @ 125°C	General Purpose Syringe Dispense	5°C ± 3°C	6 months
3619™	Ultra low temperature cure, high speed syringe dispense	Red	100 sec @ 100°C 4-5 min @ 85°C	High Speed Syringe Dispense 40,000+ DPH Capable	5°C ± 3°C	10 months
3621™	High performance for ultra high-speed syringe dispense. Recommended product for Dispense Jet. Superior humidity resistance and electrical properties. Room temperature storage capable.	Red	90 sec @ 150°C 3-4 min @ 125°C	Very High Speed Syringe Dispense 47,000 DPH Capable – Jettable	5°C ± 3°C or 8°C - 21°C for 30 days	10 months
3621B™	Black version of 3621™ with same dispense and reliability characteristics. Suitable for staking and reinforcing components.	Black	90 sec @ 150°C 3-4 min @ 125°C	Very High Speed Syringe Dispense 47,000 DPH Capable – Jettable	5°C ± 3°C or 8°C - 21°C for 30 days	10 months

CLEANER

PRODUCT	DESCRIPTION	SOLVENT TYPE	FLASH POINT	CORROSIVE PROPERTIES	OZONE DEPLETION POTENTIAL
7360™	Nozzle and dispense machine component cleaner. Excellent for removal of uncured adhesive from the board without causing the adhesive to gel. Available in eco-friendly pumpspray non-aerosol can for nozzle cleaning.	Aliphatic Ester Blend	100°C	None	None

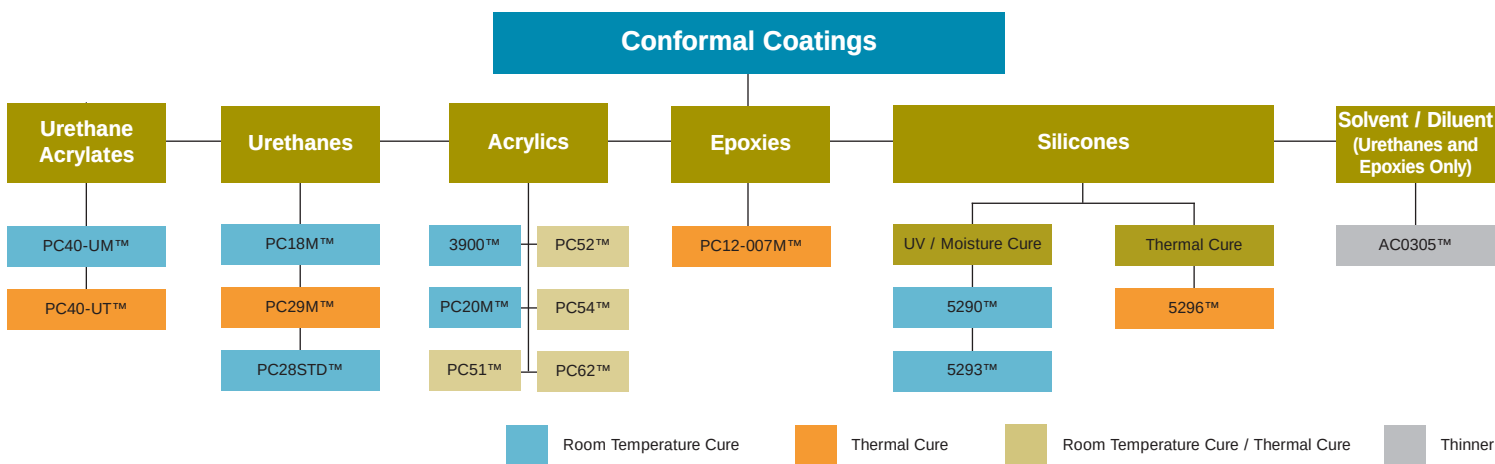
PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

While Henkel is providing the leading materials used inside advanced packages and on sophisticated assemblies, we also deliver next-generation Loctite® brand conformal coating materials to ensure superior product protection. Many applications expose printed circuit boards (PCBs) to harsh environments and Henkel is committed to delivering materials that provide extraordinary environmental and thermal cycling protection.

Our advanced conformal coating materials protect PCBs from thermal shock, moisture corrosive

materials, and a variety of other adverse conditions to ensure long product life cycles in harsh marine, automotive, aerospace and consumer electronics applications. We also keep the environment top of mind with every formulation, which is why Henkel has migrated to solvent-free, low-VOC materials and processes. Loctite® conformal coatings are available in solvent-free and fast cure materials, enabling process efficiency and environmental friendliness.



URETHANE ACRYLATES

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	CURE TYPE	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	TEMP RANGE
PC40-UT™	Solvent-free, low-viscosity, rapid gel, UV-thermal cure one component conformal coating	Urethane Acrylate One-Component	110	UV / Thermal	10 sec UV + 20 min @ 150°C	2,000	- 40°C to +135°C
PC40-UM™	Solvent-free, low-viscosity, rapid gel, UV-moisture cure one component conformal coating	Urethane Acrylate One-Component	1100	UV / Moisture	10 sec UV + 3 days @ RT	2,000	- 40°C to +135°C

URETHANES

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	MIX RATIO	TEMP RANGE
PC18M™	Flexible solvent-based, one-component urethane coating. Provides good thermal shock resistance. MIL-I-46058C.	Urethane One-Component	350	2 hrs @ 60°C	1,200	N/A	Continuous up to 110°C
PC28STD™	Convenient aerosol packaging, oxygen-cure, printed circuit board coating system.	Urethane One-Component	35	2 hrs @ 60°C	1,500	N/A	Continuous up to 110°C
PC29M™	Thin-film printed circuit board coating with good toughness and high flexibility. Note: Not sold in Europe.	Urethane Two-Component	225	2 hrs @ 100°C	1,500	N/A	Continuous up to 125°C

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

CONFORMAL COATINGS

ACRYLICS

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	TEMP RANGE
3900™	This air-dry coating is designed for small production runs. It may be applied by spray, dip or brush procedures. Aerosol – fast cure. Note: Not sold in Europe.	Acrylic One-Component	Aerosol	Air Dry: 5 min	1,652	-40°C - 125°C
PC20M™	Repairable, stable, good moisture, and environmental protection, superior toughness. MIL-I-46058C. Note: Not sold in Europe.	Acrylic One-Component	2,000	45 min @ 75°C	2,000	Continuous up to 110°C
PC51™	Rapid drying, one-component for acrylic dipping applications. Provides excellent vibration resistance and toughness. Can be removed for repair. Note: Not sold in the U.S.	Acrylic One-Component	140	45 min @ 75°C	2,000	Continuous up to 125°C
PC52™	Rapid drying, one-component acrylic for selective coating applications. Provides excellent vibration resistance and toughness. Can be removed for repair. Note: Not sold in the U.S.	Acrylic One-Component	70	45 min @ 75°C	2,000	Continuous up to 125°C
PC54™	Rapid drying, one-component for acrylic non-atomized spray coating applications. Provides excellent vibration resistance and toughness. Can be removed for repair.	Acrylic One-Component	75	45 min @ 75°C	2,000	Continuous up to 125°C
PC62™	Non-toluene based rapid drying one-component acrylic for non-atomized spraying applications.	Acrylic One-Component	50	45 min @ 75°C	2,000	- 40°C to +125°C

EPOXIES

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	MIX RATIO	TEMP RANGE
PC12-007M™	General purpose, 100% solids, epoxy printed circuit board with maximum electrical and ruggedization properties. Suitable for continuous operation up to 125°C. MIL-I-46058 and IPC-CC-830	Epoxy Two-Component	Medium	2 hrs @ 75°C	1,500	100/60	Continuous up to 125°C

SILICONES, UV / MOISTURE CURE

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	MIX RATIO	TEMP RANGE
5290™	Solvent-free, low viscosity UV / moisture cure silicone, suited to brush, dip and selective coating.	Silicone One-Component	300	20 sec @ 70 mW/cm² + 72 hrs RTH.	500	One-Component	-55°C - 205°C
5293™	Repairable, solvent-free, medium viscosity, UV / moisture cure silicone, suited to brush, dip and selective coating.	Silicone One-Component	600	20 sec @ 70 mW/cm² + 72 hrs RTH.	406	One-Component	-40°C - 204°C

SILICONES, THERMAL CURE

PRODUCT	DESCRIPTION	TYPE	VISCOSITY, cPs	RECOMMENDED CURE	DIELECTRIC STRENGTH, V/mil	MIX RATIO	TEMP RANGE
5296™	Heat cure silicone can be applied with brush, dip, or spray. High reliability automotive. Clear.	Silicone One-Component	150 - 235	Heat 7 min @ 125°C	524	One-Component	-40°C - 204°C

SOLVENT / DILUENT (URETHANES AND EPOXIES ONLY)

PRODUCT	DESCRIPTION	TYPE
AC0305™	Special blend of solvents, has moderately slow evaporation, used for adjustment of viscosity and / or film thickness on printed circuit coatings. Can be used with all the conformal coating materials above, except with acrylic and silicone systems.	Thinner

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

Ensuring that electronics products function as they are designed to is just one piece of the materials solution Henkel delivers. Protecting printed circuit boards and electronic assemblies from thermal cycling and adverse environmental conditions is the other critical component for product durability and reliability.

Under the leading Loctite® brand, Henkel offers several PCB protection products to minimize external product stress and maximize performance. Our portfolio of conformal coatings keep moisture, humidity and other adverse conditions from deteriorating printed circuit boards used in harsh marine, automotive, aerospace and consumer electronics applications. Henkel also strives to keep environmental consciousness at the forefront of all our product development efforts, which is why we have moved toward solvent-free, low VOC materials and processes.

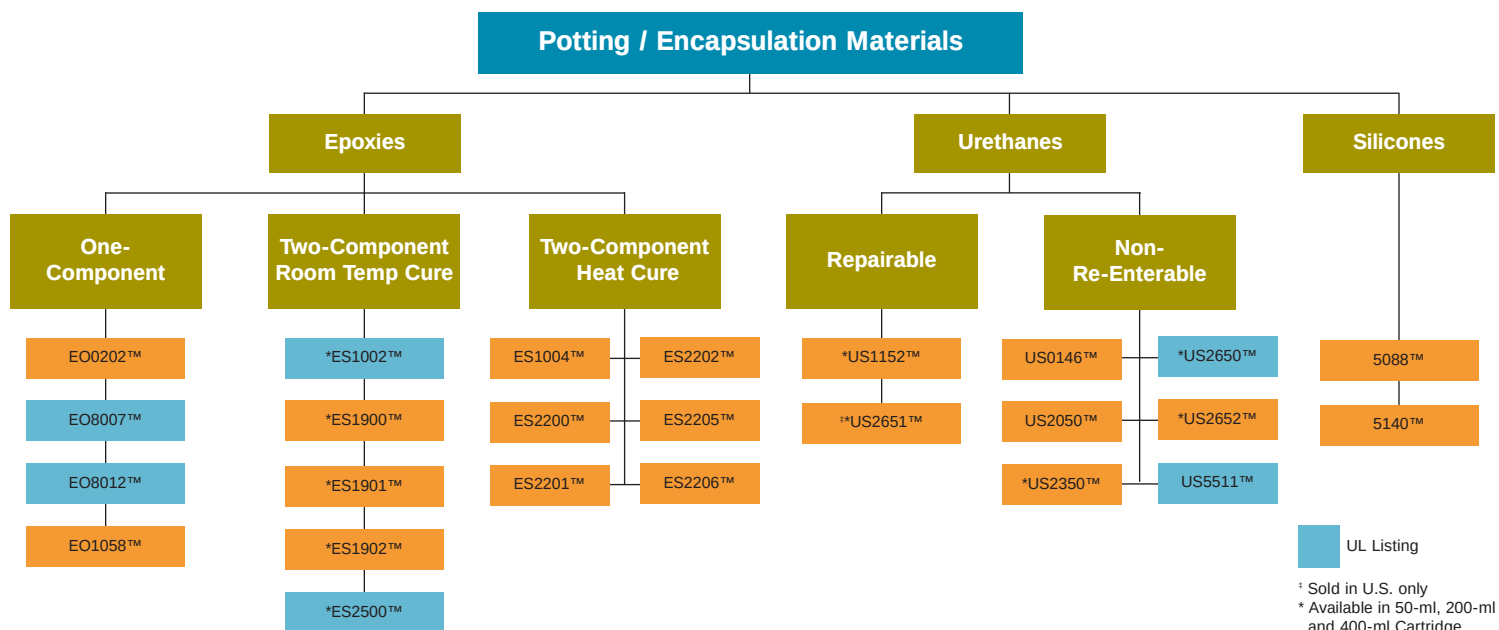
Loctite® silicone gasketing materials offer precise, reliable sealing for electronic enclosures, ensuring that housing modules are tightly secured and componentry is protected.

Henkel's potting and encapsulation compounds protect

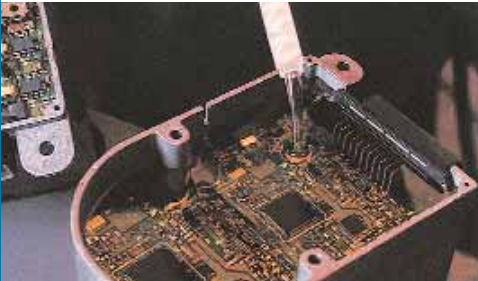
PCBs and electrical devices by enhancing mechanical strength, offering electrical insulation and protecting against vibration and shock. Loctite silicone encapsulants are specially formulated to isolate sensitive fine-pitch leads from potentially damaging thermal cycling conditions. Likewise, our silicone gasket materials deliver precise, reliable sealing for electronic enclosures. Like all Henkel products, these materials have been designed for ease-of-use and are conveniently packaged for dispense operations.

Our renowned Macromelt® low-pressure molding solution is delivering superior sealing adhesion and excellent temperature and solvent resistance. The simplicity of these materials are their advantage: because the entire Macromelt operation takes place at low pressure, cycle time is short and fine or fragile circuitry is not damaged, delivering measurable improvements over that of traditional potting or encapsulating processes.

PCB and circuitry protection is essential in modern, challenging applications and Henkel delivers manufacturers with proven, reliable solutions and peace-of-mind.



PCB ASSEMBLY MATERIALS



CIRCUIT BOARD PROTECTION SOLUTIONS

POTTING/ENCAPSULANT MATERIALS

SILICONES

	5088	5140
Chemical Type	Alkoxy Silicone	Alkoxy Silicone
Appearance (uncured)	Straw colored liquid	Translucent milky liquid
Specific Gravity	1.02	1.05
Viscosity, cps	50,000 to 80,000	30,000 to 140,000
Primary Cure	UV	RTV
Secondary Cure	Moisture	N/A
Recommended Cure	UV 60 sec 40 mW/cm ² plus 72 hrs at 25°C	Moisture, 24 hrs at 25°C
Tack free Time	14 min	3 hr (skin over)
CTE, ppm /°C	289	290
Water Vapor Transmission Rate, g/hm ²	0.455	1.5
Dielectric Constant: 100Hz	2.9	3.05
100kHz	2.88	N/A
Dissipation Factor: 100Hz	0.002	0.015
100kHz	0.003	N/A
Volume Resistivity	8.3 x 10 ¹³	7.0 x 10 ¹⁶
Shore Hardness, A	25	15
Elongation, %	135	150
Tensile Strength, psi	145	145
Tear Strength, lb/in	9.7	100

EPOXIES – ONE COMPONENT

	E00202	E08007	E08012	E01058
Viscosity, cps @ 25°C	22,000	300	8,000	50,000
Working Time @ 25°C	6 mon	1 mon	1 mon	10 days
Gel Time	90 sec @ 177°C	30 min @ 121°C	30 min @ 121°C	12 min @ 121°C
Recommended Cure Cycle	30 min at 110°C	2 hrs @ 121°C plus 4 hrs at 148°C	2 hrs @ 121°C	2 hrs @ 140°C
Alternate Cure Cycle	30 min @ 125°C	8 hrs @ 121°C	5 hrs @ 104°C	3 hrs @ 125°C
Color	White	Amber	Black	Black
Specific Gravity	1.63	1.02	1.60	1.65
Hardness, Shore D	92	45	85	90
Tg, °C	62	38	49	140
CTE below Tg, ppm/°C	43	101	48	24
CTE above Tg, ppm/°C	155	232	115	150
Tensile Strength, psi	7,800	440	2,540	10,000
Elongation, %	1.5	63	N/A	1.96
Dielectric Strength, v/mil	1,400	1,103	949	579
Volume Resistivity, ohm-cm: @ 25°C	2 x 10 ¹⁶	2.8 x 10 ¹⁵	3.3 x 10 ¹⁵	1.4 x 10 ¹⁶
@ 125°C	1 x 10 ¹¹	7.6 x 10 ¹¹	1.8 x 10 ¹²	9.5 x 10 ¹⁴
Dielectric Constant, 25°C: 1 kHz	5.2	3.3	4	3.8
100 kHz	5.0	3.0	3.8	3.7
Dissipation Factor, 25°C: 1 kHz	0.004	0.028	0.02	0.1
100 kHz	0.01	0.024	0.02	0.013
Dielectric Constant, 125°C: 1 kHz	8.6	4.1	4.8	4.27
100 kHz	6.5	3.9	4.4	3.78
Dissipation Factor, 125°C: 1 kHz	0.004	0.006	0.036	0.008
100 kHz	0.013	0.032	0.032	0.012
Flammability Rating	N/A	Varnish MW28 @ 130°C E120738	94V-0 @ 3mm E94621	N/A

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

POTTING/ENCAPSULANT MATERIALS

EPOXIES – TWO COMPONENT, ROOM TEMPERATURE CURE

		ES1002	ES1900	ES1901	ES1902	ES2500
Viscosity, cps:	@ 25°C EA (Resin)	28,000	8,350	1,900	4,700	11,000
	@ 25°C EB (Hardener)	6,300	3,000	2,800	50	170
	@ 25°C ES (Mixed)	19,500	6,000	2,350	290	1,500
Pot Life @ 25°C		90 min	9 min	1.25 min	90 min	10 min
Gel Time @ 25°C		5 hrs	13 min	3 min	10 sec UV	25 min
Recommended Cure Cycle		36 to 48 hrs @ 25°C	12 to 24 hrs @ 25°C	24 Hrs @ 25°C	24 Hrs @ 25°C	16 hrs @ 25°C
Alternate Cure Cycle		3 hrs @ 60°C	1hr @ 100°C	N/A	2 hrs @ 60°C	2 hrs @ 66°C
Color:	EA (Resin)	Black	Clear	Clear	Water White	Black
	EB (Hardener)	Tan	Clear	Clear	Light Amber	Amber
	ES (Mixed)	Black	Clear	Clear	Water White	Black
Mix Ratio:	By Weight (R:H)	100 : 100	100 : 46	100 : 105	100 : 41.7	100 : 29.5
	By Volume (R:H)	1 : 1	2 : 1	1 : 1	2 : 1	2 : 1
Specific Gravity		1.55	1.12	1.13	1.09	1.41
Hardness, Shore D		88	90	55	80	70
Tg, °C		50	80	14	44	14
CTE below Tg, ppm / °C		66	68	66	68	47
CTE above Tg, ppm / °C		150	190	205	199	167
Tensile Strength, psi		2,670	9,900	270	7,900	1,300
Elongation, %		6	6	80	4	37
Flexural Strength, psi		4,975	14,500	N/A	10,000	N/A
Dielectric Strength, v/mil		1,135	1,640	400	1,390	410
Volume Resistivity, ohm-cm:	@ 25°C	6.38 x 10 ¹⁴	3 x 10 ¹⁶	2.8 x 10 ¹¹	1.27 x 10 ¹⁶	1.5 x 10 ¹⁴
	@ 105°C	9.28 x 10 ¹⁰	2.5 x 10 ¹²	2.5 x 10 ⁷	6.4 x 10 ¹¹	3.4 x 10 ¹⁰
Dielectric Constant, 25°C:	1 kHz	4.60	3.97	6.59	3.64	5.01
	100 kHz	4.20	3.74	1.92	3.49	4.48
Dissipation Factor, 25°C:	1 kHz	0.030	0.011	0.261	0.009	0.040
	100 kHz	0.020	0.031	0.089	0.022	0.036
Dielectric Constant, 105°C:	1 kHz	8.6	5.7	N/A	6.47	10.75
	100 kHz	7.00	4.75	N/A	5.89	5.55
Dissipation Factor, 105°C:	1 kHz	0.3	0.101	N/A	0.062	0.686
	100 kHz	0.09	0.043	N/A	0.067	0.063
Flammability Rating		94 V-0 @ 3.3 mm E34947	N/A	N/A	N/A	94-HB @ 1.5mm E94621

EPOXIES – TWO COMPONENT HEAT CURE

	ES1004	ES2200	ES2201	ES2202	ES2205	ES2206	
Viscosity, cps:	@ 25°C EA (Resin)	30,000	12,500	12,500	12,500	80,000	14,000
	@ 25°C EB (Hardener)	550	25	20	550	550	400
	@ 25°C ES	26,000	3,500	600	10,000	25,000	1,820
Pot Life @ 25°C	8 hrs	20 min	35 min	7 hrs	7 hrs		
Gel Time @ 25°C	80 min @ 80°C	30 min @ 25°C	50 min @ 25°C	25 min @ 121°C	22 min @ 121°C	90 min @ 25°C	
Recommended Cure Cycle	2 hrs @ 80°C + 2 hrs @ 150°C	2 hrs @ 60°C	3 hrs @ 60°C	2 hrs @ 80°C + 2 hrs @ 150°C	2 hrs @ 80°C + 2 hrs @ 150°C	5 hrs @ 85°C	
Alternate Cure Cycle	N/A	24 hrs @ 25C	24 hrs @ 25 C	N/A	N/A	N/A	
Color:	EA (Resin)	Black	Water White	Water White	Water White	Black	Black
	EB (Hardener)	Dark Red	Amber	Amber	Amber	Red	Amber
	ES (Mixed)	Black	Amber	Amber	Amber	Black	Black
Mix Ratio By:	Weight (R:H)	100 : 13	100 : 11	100 : 33	100 : 25	100 : 12.5	100 : 49
	Volume (R:H)	4 : 1	100 : 13	100 : 30	100 : 28	100 : 19	100 : 86
Specific Gravity		1.28	1.11	1.08	1.13	1.51	1.35
Hardness, Shore D		88	85	77	82	82	55A
Tg, °C		52	52	65	140	108	-20
CTE below Tg, ppm / °C		62	78	89	77	54	49
CTE above Tg, ppm / °C		110	156	129	198	132	190
Elongation, %		1.5	2.6	4.1	2.9	1.8	42
Flexural Strength, psi		11,300	19,400	13,800	17,500	17,500	N/A
Dielectric Strength, v/mil		900	1,500	1,800	1,650	1,400	934
Volume Resistivity, ohm-cm:	@ 25°C	1 x 10 ¹⁶	4 x 10 ¹⁶	4 x 10 ¹⁴	1 x 10 ¹⁷	2 x 10 ¹⁶	1.18 x 10 ¹⁶
	@ 105°C	1 x 10 ¹⁴	5 x 10 ¹⁵	4 x 10 ¹¹	1 x 10 ¹⁴	1 x 10 ¹⁵	N/A
Dielectric Constant, 25°C:	1 kHz	4.3	3.8	5.0	4.3	4.4	7.7
	100 kHz	4.1	3.5	4.6	4.0	4.1	N/A
Dissipation Factor, 25°C:	1 kHz	0.011	0.007	0.008	0.009	0.008	0.043
	100 kHz	0.015	0.022	0.048	0.033	0.025	N/A
Flammability Rating		passes @ 6.5 mm	N/A	N/A	N/A	N/A	passes @ 6.5mm

PCB ASSEMBLY MATERIALS



CIRCUIT BOARD PROTECTION SOLUTIONS

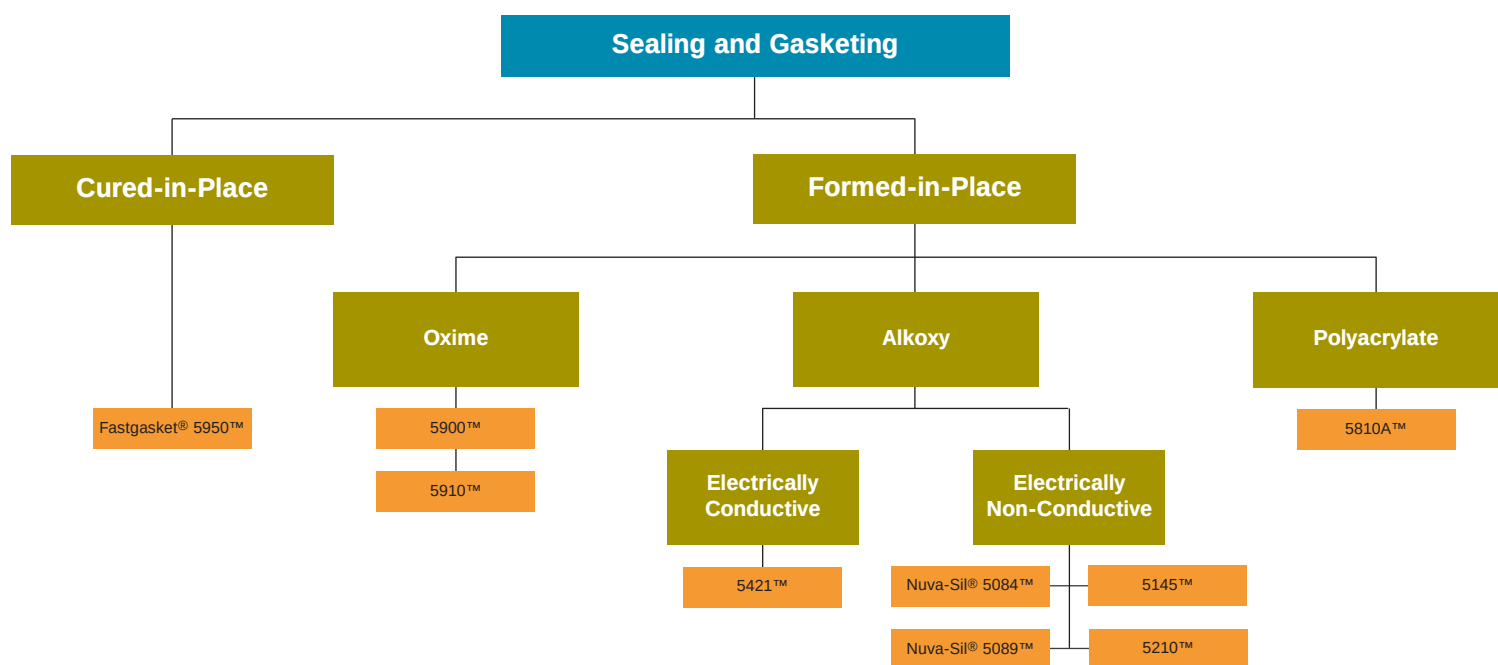
POTTING/ENCAPSULANT MATERIALS

URETHANES

		US2651	US1152	US0146	US2650	US2350	US5511	US2050	US2652
Viscosity, cps, @ 25°C:	UA (Resin)	130	60	40	200	55	50	2,000	200
	UB (Hardener)	3,200	650	940	7,500	1,300	9,000	500	3,320
	US (Mixed)	1,000	450	205	3,500	2,400	2,000	1,500	2,750
Working Time @ 25°C		10	25	35	10	45	10	3	8
Gel Time @ 25°C		25	45	60	25	90	20	5	11
Recommended Cure Cycle		16 hr @ 25°C	24 hr @ 25°C	4 hr @ 85°C	16 hr @ 25°C	24 hr @ 23°C	24 hr @ 25°C	48 hr @ 25°C	1 hr @ 25°C
Alternate Cure Cycle		2 hr @ 70°C	1 hr @ 85°C	48 hr @ 25°C	1 hr @ 85°C	1 hr @ 85°C	1 hr @ 85°C	1 hr @ 85°C	1 hr @ 60°C
Color:	UA (Resin)	Brown	Brown	Amber	Amber	Brown	Brown	Clear	Brown
	UB (Hardener)	White	Black	Amber	White	Black	White	Clear	White
	US (Mixed)	Amber	Black	Amber	Tan	Black	White	Clear	White
Mix Ratio:	By Weight (R:H)	52:3 : 47.7	52:6 : 100	100:100	21.1 : 100	21.2 : 100	15 : 85	100 : 55	23.5 : 100
	By Volume (R:H)	1 : 1	1 : 2	1 :1.1	1 : 4	1 : 4	1 : 4.81	1.78 : 1	1 : 4
Specific Gravity		0.99	1.01	1.04	1.38	1.4	1.4	1.05	1.34
Hardness		15A	30A	50A	83A	85A	88A	90A	90A
Tg, °C		-60	-52	-21	0	0	-4	5	15
CTE below Tg, ppm / °C		82	79	147	109	115	110	55	90
CTE above Tg, ppm / °C		197	247	230	153	155	150	230	149
Tensile Strength, psi		34	161	185	321	476	590	2500	340
Elongation, %		250	160	140	40	65	60	170	50
Moisture Absorption, 24 hr., %		0.22	0.67	0.11	0.01	0.09	0.01	0.66	0.18
Weight loss after 168 hrs. @ 105°C, %		0.47	0.41	0.53	0.52	0.19	0.005	0.41	0.26
Dielectric Strength, v/mil		1,050	1,001	1,175	942	954	1,977	1,050	1,127
Volume Resistivity, ohm-cm @ 25°C		5.30 x 10 ¹¹	1.57 x 10 ¹²	4.20 x 10 ¹³	1.05 x 10 ¹⁴	6.12 x 10 ¹³	3.40 x 10 ¹⁴	3.30 x 10 ¹⁴	6.59 x 10 ¹⁴
Dielectric Constant, 25°C: 1 kHz		4.7	5.9	6.8	6.0	5.1	5.0	2.4	4.4
Dissipation Factor, 25°C: 1 kHz		0.009	0.300	0.171	0.1277	0.132	0.172	0.070	0.086
Flammability Rating		N/A	N/A	N/A	N/A	94V-2 @ 6.1mm	94V-1 @ 9.5mm	N/A	N/A

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS



PCB ASSEMBLY MATERIALS



CIRCUIT BOARD PROTECTION SOLUTIONS

SEALING AND GASKETING

CURED-IN-PLACE

PRODUCT	DESCRIPTION	TYPE	CURE SCHEDULE	EXTRUSION, RATE (gpm)	TENSILE PSI/KPA	ELONGATION, %	SHORE A HARDNESS
Fastgasket® 5950™	Cured in place UV / moisture cure; black / clear in color	Acetoxy	UV Moisture 60 sec @ 40 mW/cm²	250 - 425	> 148	> 180	20 - 33

FORMED-IN-PLACE, OXIME

PRODUCT	DESCRIPTION	TYPE	CURE SCHEDULE	VISCOSITY, cPs	TENSILE STRENGTH, psi	ELONGATION, %	SHORE A HARDNESS
5900™	Formed-in-place, noncorrosive, black silicone paste provides excellent oil resistance, superior flexibility, and green strength.	Oxime	10 days RTH	Paste	246	400	35A
5910™	Formed-in-place, noncorrosive, black silicone paste provides excellent fluid resistance with superior flexibility and adhesion.	Oxime	10 days RTH	> 300	247	> 400	30

FORMED-IN-PLACE, ALKOXY ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	TYPE	CURE SCHEDULE	VISCOSITY, cPs	TENSILE STRENGTH, psi	ELONGATION, %	SHORE A HARDNESS
5421™	Electrically conductive silver-filled material provides EMI / RFI shielding on electronic device enclosures.	Alkoxy	Moisture 24 hrs @ 25°C	N/A	102	> 40	50 - 65A

FORMED-IN-PLACE, ALKOXY, NON-ELECTRICALLY CONDUCTIVE

PRODUCT	DESCRIPTION	TYPE	CURE SCHEDULE	VISCOSITY, cPs	TENSILE STRENGTH, psi	ELONGATION, %	SHORE A HARDNESS
Nuva-Sil® 5084™	Noncorrosive, nonslumping, UV silicone for gasketing and sealing devices. Provides severe environmental protection.	Alkoxy	UV Moisture 60 sec @ 40 mW/cm²	N/A	550/80	200	45A
Nuva-Sil® 5089™	UV-curing silicone for electronics module sealing. Ideal for high-speed potting. On-line pressure testing possible immediately after cure.	Alkoxy	UV Moisture 60 sec @ 40 mW/cm²	1,000,000	145	190	> 25A
5145™	Bonding, sealing, and coating electronic devices. Ideal for reinforcing and strain-relieving delicate components. Meets Mil-A46146B.	Alkoxy	Moisture 24 hrs @ 25°C	N/A	493	> 500	25A
5210™	An ultra fast-curing, noncorrosive RTV silicone designed for potting, wire tracking, selective sealing, vibration dampening, and repair/rework applications on PCBs.	Alkoxy	Moisture 24 hrs @ 25°C	N/A	410	230	48A

FORMED-IN-PLACE, POLYACRYLATE

PRODUCT	DESCRIPTION	TYPE	CURE SCHEDULE	EXTRUSION RATE (gpm)	TENSILE STRENGTH, psi	ELONGATION, %	SHORE A HARDNESS
5810A™	Single-component, non-silicone, oxime-free, polyacrylate-based adhesive/sealant that cures with moisture at room temperature. Primarily designed for flange sealing with excellent oil resistance.	Polyacrylate	7 days RT	25 - 65	140	> 150	30A

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

These products provide good adhesion, an excellent environmental seal, high in-service temperature resistance and good resistance to solvents. The low melt viscosity of these materials allow for low capital equipment cost and low molding pressure that will not damage delicate electronic surface mount components.

Low pressure molding is the solution to production issues associated with traditional high pressure injection molding over sensitive electronic components or circuit boards. The polyamide hot melt adhesive material may actually be used to mold-in mounting studs or eyes, eliminate injection molded housings and covers, and replace epoxy potting operations all in one simple process. The materials also provide great strain relief in molded grommets and connectors.

The low viscosity of the Macromelt® material allows for insert molding at pressures as low as 1.8 bar (25 psi). The low molding pressure is critical when over-molding and sealing fragile surface mount

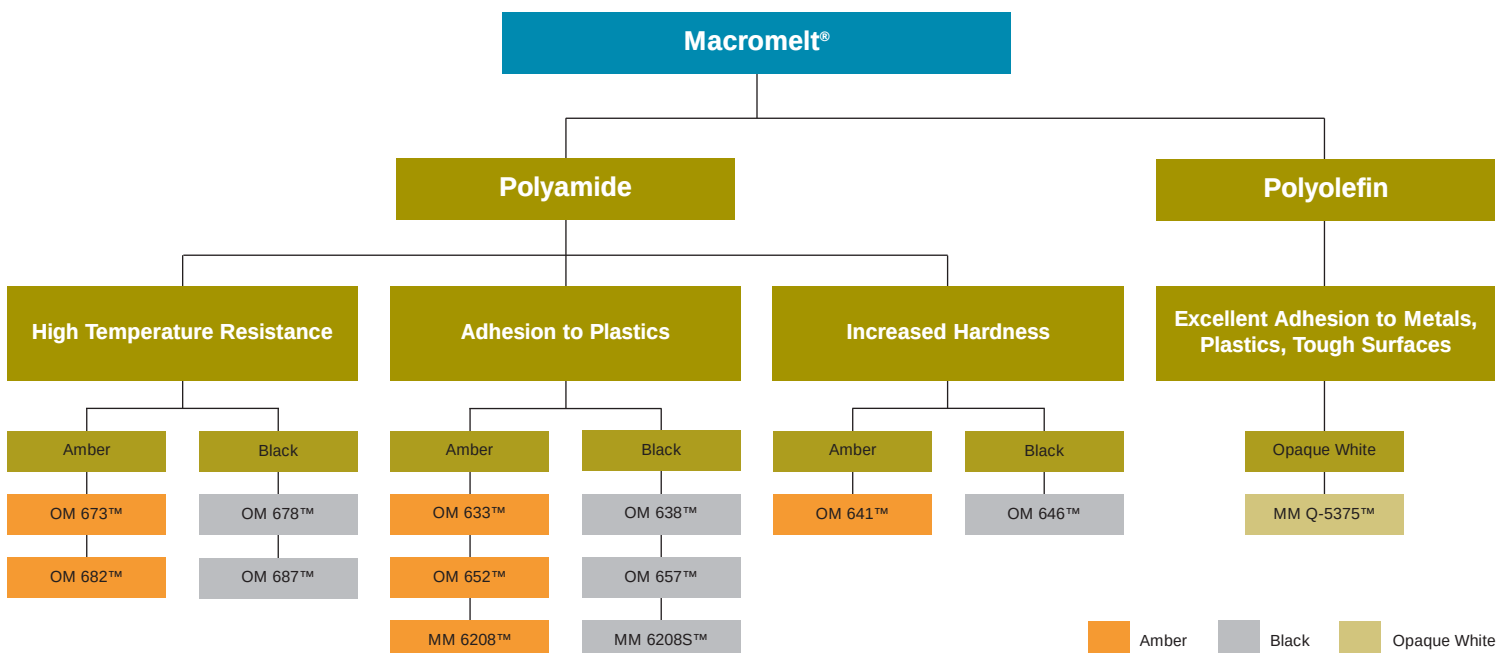
components, wire bonds and solder joints. With a short cycle time of 15 to 45 seconds, injection-molding results in very high production rates compared to a generic 24-hour cure, two-component urethane, or epoxy potting operations.

Advantages:

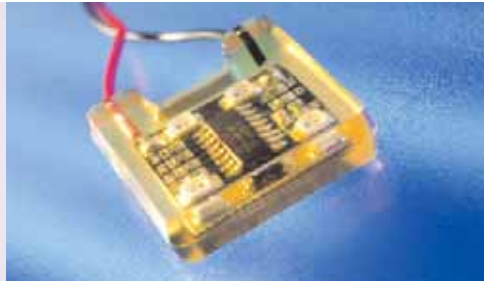
- Complete water tight encapsulation
- Fast cycle time (15 to 45 seconds)
- Low capital equipment costs
- Safe, one-component, UL 94V-0 approved
- Low pressure and high speed molding for electronics encapsulation

Applications:

- Automotive sensors
- Hall effect sensors
- Circuit board protection
- Strain relief
- Switches
- Battery sealing



PCB ASSEMBLY MATERIALS



CIRCUIT BOARD PROTECTION SOLUTIONS

MACROMELT® LOW PRESSURE MOLDING

POLYAMIDE, HIGH TEMPERATURE RESISTANCE

PRODUCT	DESCRIPTION	COLOR	PERFORMANCE TEMP	SHORE A HARDNESS	SOFTENING POINT
OM 673™	Moldable polyamide with good adhesion for higher temperature applications such as in an automotive under-hood.	Amber	-40°C - 140°C	90	187°C ± 5°C
OM 678™		Black			
OM 682™	Moldable polyamide for the most demanding high humidity applications such as on the inside of an automobile tire. Formulated for very low water vapor transmission.	Amber	-40°C - 140°C	88	188°C ± 5°C
OM 687™		Black			

POLYAMIDE, ADHESION TO PLASTICS

PRODUCT	DESCRIPTION	COLOR	PERFORMANCE TEMP	SHORE A HARDNESS	SOFTENING POINT
OM 633™	Moldable polyamide with service temperature up to 125°C such as in an automotive firewall.	Amber	-40°C - 130°C	90	175°C ± 5°C
OM 638™		Black			
OM 652™	Moldable polyamide where excellent adhesion and cold temperature flexibility are important, such as in an automotive exterior. Also used extensively in white goods.	Amber	-40°C - 100°C	77	157°C to 165°C
OM 657™		Black			
MM 6208™	Moldable polyamide with excellent adhesion to tough substrates. Great flexibility offers incredible strain relief on cables and wires. Ideal for encapsulation of heat producing components in appliance and consumer electronics. UL RTI 95°C	Amber	-40°C - 110°C	78	155°C ± 5°C
MM 6208S™		Black			

POLYAMIDE, INCREASED HARDNESS

PRODUCT	DESCRIPTION	COLOR	PERFORMANCE TEMP	SHORE A HARDNESS	SOFTENING POINT
QM 641™	Moldable polyamide where strength and hardness are needed such as in memory sticks and computer connectors.	Amber	-40°C - 130°C	92	175°C ± 5°C
QM 646™		Black			

POLYOLEFIN, EXCELLENT ADHESION TO METALS, PLASTICS, TOUGH SURFACES

PRODUCT	DESCRIPTION	COLOR	PERFORMANCE TEMP	SHORE A HARDNESS	SOFTENING POINT
MM Q-5375™	Moldable polyolefin for demanding moisture and solvent resistance. Excellent adhesion to the most difficult substrates.	Opaque White	-30°C - 100°C	55	139°C ± 5°C

PCB ASSEMBLY MATERIALS

CIRCUIT BOARD PROTECTION SOLUTIONS

MACROMELT® LOW PRESSURE MOLDING

PHYSICAL PROPERTIES

PRODUCT	COLOR	COLD FLEXIBILITY	FLAMMABILITY RATING	INJECTION TEMP	PERFORMANCE TEMP	DENSITY	SOFTENING POINT	VISCOSITY @ 210°C
Macromelt® OM 633™ / OM 638™	Amber / Black	-40°C	UL 94V-0	200°C - 225°C	-40°C - 130°C	0.98	175°C ± 5°C	3500
Macromelt® OM 641™ / OM 646™	Amber / Black	-40°C	UL 94V-0	200°C - 225°C	-40°C - 130°C	0.98	175°C ± 5°C	4500
Macromelt® OM 652™ / OM 657™	Amber / Black	-40°C	UL 94V-0	180°C - 225°C	-40°C - 100°C	0.98	157°C ± 5°C	3900
Macromelt® OM 673™ / OM 678™	Amber / Black	-40°C	UL 94V-0	210°C - 225°C	-40°C - 140°C	0.98	187°C ± 5°C	3400
Macromelt® OM 682™ / OM 687™	Amber / Black	-40°C	UL 94V-0	200°C - 240°C	-40°C - 140°C	0.98	188°C ± 5°C	4500
Macromelt® MM 6208™ / MM 6208S™	Amber / Black	-40°C	UL 94V-0	200°C - 225°C	-40°C - 110°C	0.98	155°C ± 5°C	3600
Macromelt® MM Q-5375™	Opaque White	-30°C	None	190°C - 210°C	-30°C - 100°C	0.94	139°C ± 5°C	2000

ELECTRICAL PROPERTIES

PRODUCT	DIELECTRIC CONSTANT	DIELECTRIC STRENGTH 5.3/5.5
Macromelt® OM 633™ / OM 638™	4.5 / 4.7	24 / 19
Macromelt® OM 641™ / OM 646™	5.1 / 5.5	25 / 22
Macromelt® OM 652™ / OM 657™	6.2 / 6.3	14 / 15
Macromelt® OM 673™ / OM 678™	4.9 / 4.9	20 / 20
Macromelt® OM 682™ / OM 687™	5.3 / 5.5	18 / 16
Macromelt® MM 6208™ / MM 6208S™	6.1 / 6.3	23 / 23
Macromelt® MM Q-5375™	N/A	N/A

MECHANICAL PROPERTIES

PRODUCT	ELONGATION AT RUPTURE	SHORE A HARDNESS	SHORE D HARDNESS	TENSILE STRENGTH AT RUPTURE	THERMAL EXPANSION COEFFICIENT
Macromelt® OM 633™ / OM 638™	400	90	56	4.5	5E -04
Macromelt® OM 641™ / OM 646™	800	92	59	11	5E -04
Macromelt® OM 652™ / OM 657™	400	77	41	2.7	5E -04
Macromelt® OM 673™ / OM 678™	500	88	51	5.7	5E -04
Macromelt® OM 682™ / OM 687™	550	88	57	5	5E -04
Macromelt® MM 6208™ / MM 6208S™	600	78	43	3.2	5E -04
Macromelt® MM Q-5375™	480	55	15	0.76	N/A

FLAT PANEL DISPLAY MATERIALS



FLAT PANEL DISPLAY SOLUTIONS

With materials solutions for many facets of flat panel display (FPD) production, Henkel delivers a wide range of Loctite®, Hysol® and P3® branded products that enable highly efficient manufacturing and excellent reliability.

For color filter production, the P3® line of cleaners, developers and strippers ensures that the essential FPD color filters are prepared properly and are very stable for the subsequent module assembly process. With both off-the-shelf and custom-developed materials, Henkel's FPD line of materials enable highly efficient, advanced product manufacture.

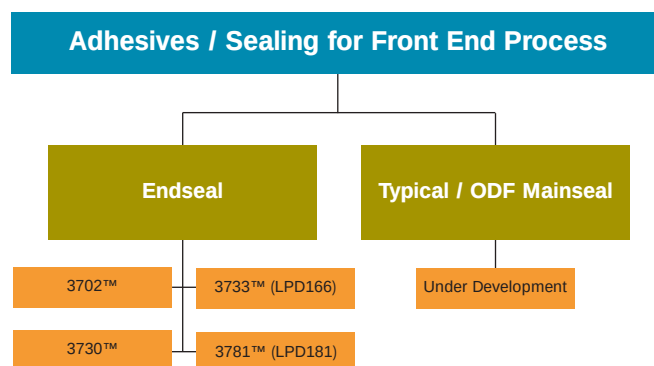
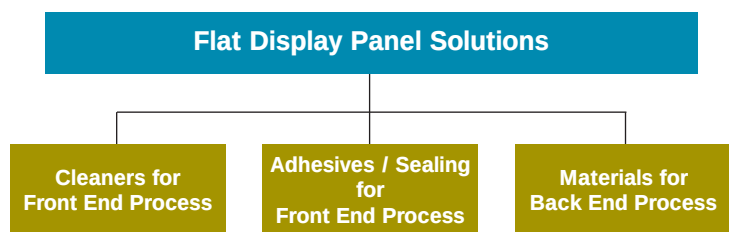
Module or panel assembly materials are also part of Henkel's core competency. Loctite® brand temporary bonding, temporary overcoat, and endseal materials are used to deliver a robust, complete panel assembly. In addition, Henkel has developed pin

LOCTITE®



terminal bonding and flexible printed circuit (FPC) materials to help reinforce and facilitate exceptional and reliable product-to-host connection. The Hysol® line of NCP and ACP products offer superior properties to achieve highly reliable electrical interconnection for fine-pitch applications in FPDs.

Like all Henkel products, the materials manufactured for every phase of FPD production ensure the highest level of quality and reliability. Because non-optimized materials may adversely affect final product performance, ensuring that all materials are manufactured with the most advanced techniques delivers an excellent result.

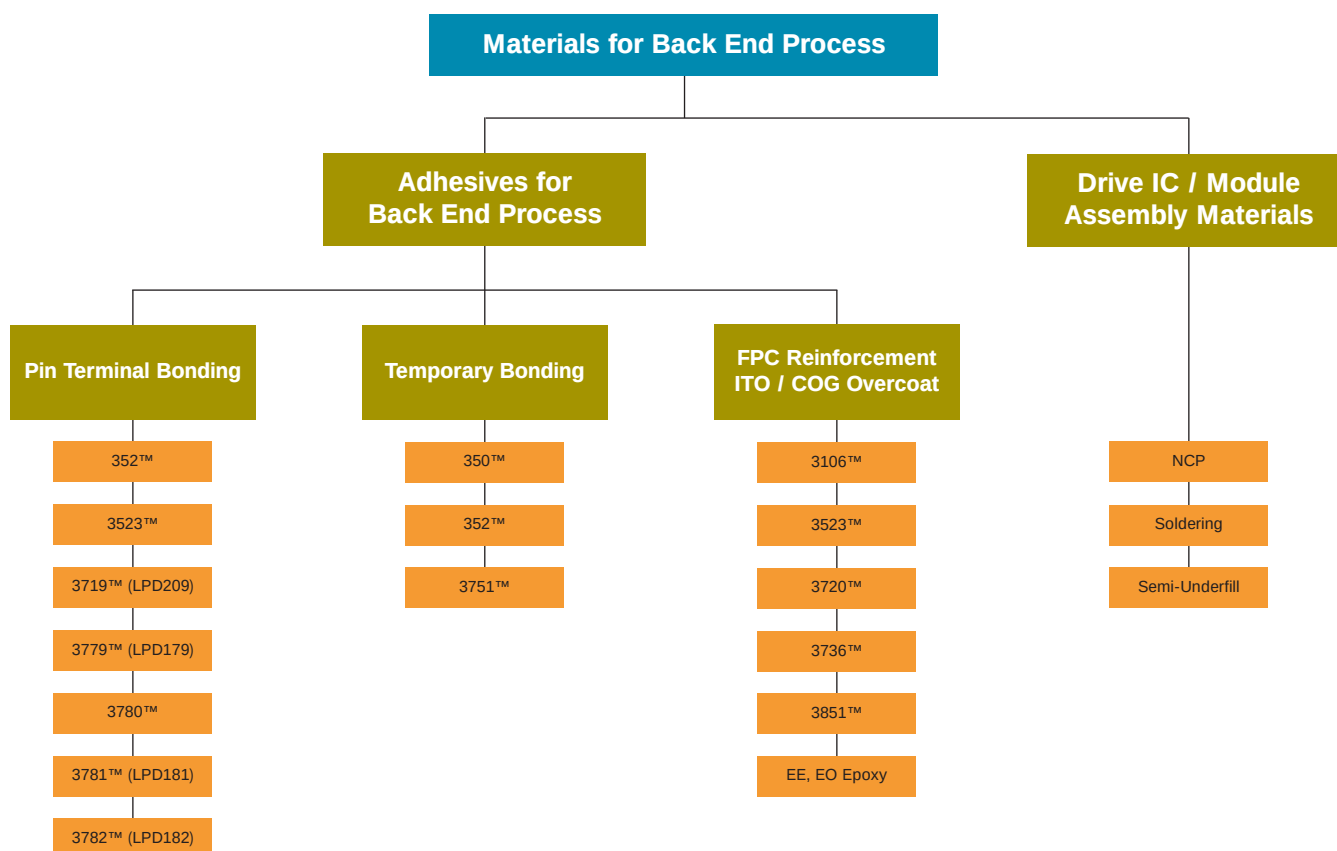
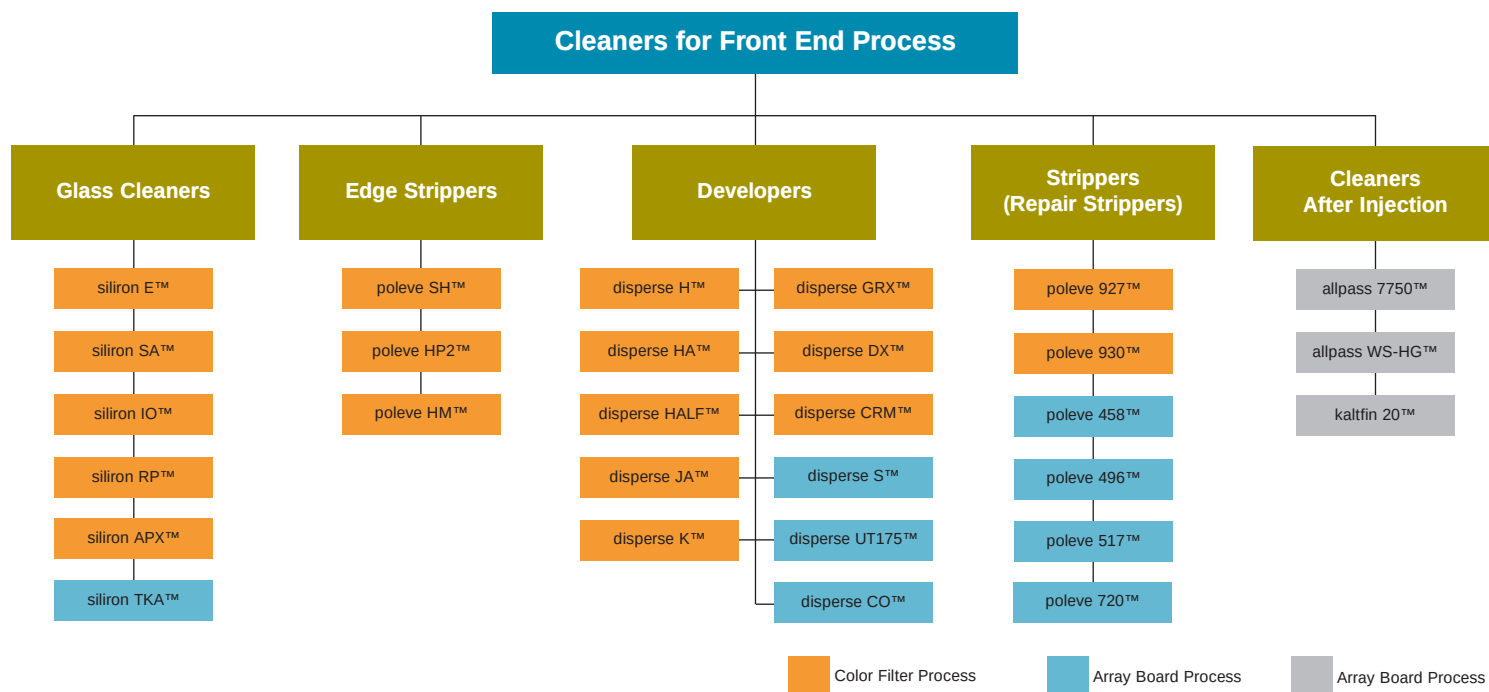


ENDSEAL

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg, °C	SHORE D HARDNESS	WATER ABSORPTION 23°C - 25°C FOR 24 HRS %
			TIME, sec	CURING CONDITION, mW/cm²	DEPTH, mm	TIME AT CURING CONDITION			
3702™	TFT	12,000	4	40	4.4	50 sec @ 40 mW/cm²	92 (DMA)	87	3.3
3730™	TFT	25,000	≤ 15	40	2.5	50 sec @ 40 mW/cm²	80 (DMA)	82	0.55
3733™ (LPD166)	TN/STN	13,000	≤ 15	40	≥ 2.5	20 sec @ 100 mW/cm²	97 (DMA)	86	1.5
3781™ (LPD181)	TN/STN	12,000	2	100	3.7	20 sec @ 100 mW/cm²	68 (DMA)	82	1.7

FLAT PANEL DISPLAY MATERIALS

FLAT PANEL DISPLAY SOLUTIONS



FLAT PANEL DISPLAY MATERIALS



FLAT PANEL DISPLAY SOLUTIONS

P3 CLEANERS FOR FRONT END PROCESS

GLASS CLEANERS

PRODUCT	DESCRIPTION	TYPE	pH, 3% 20°C	TEMP, °C	CONCENTRATION, %	USAGE
siliron E™	Low foaming, glass substrate for flat panel display (FPD)	Inorganic	11.5	Room Temp - 70°C	1- 5	US, Dipping, Shower, Brush
siliron SA™	Low foaming, glass substrate for FPD; strong alkaline	Inorganic	13.5	Room Temp - 60°C	1- 5	US, Dipping, Shower, Brush
siliron IO™	Low foaming, glass substrate for FPD; non-nitrogen	Inorganic	12.5	Room Temp - 60°C	1- 5	US, Dipping, Shower, Brush
siliron RP™	Glass substrate for FPD; after-polishing cleaner	Organic	12.5	Room Temp - 60°C	1- 5	US, Dipping, Shower, Brush
siliron TKA™	Glass substrate for FPD; pre-cleaning of deposition	Organic	12.5	45°C - 60°C	1- 5	US, Dipping, Shower, Brush
siliron APX™	Neutral type; low damage to glass	Neutral	8.5	40°C - 60°C	1- 10	US, Dipping, Shower, Brush

EDGE STRIPPERS

PRODUCT	DESCRIPTION	TYPE	pH	TEMP, °C	CONCENTRATION, %	USAGE
poleve SH™	Edge stripper	Organic	12 <	Room Temp - 60°C	10	EDR
poleve HP2™	Edge stripper	Organic	12 <	Room Temp - 60°C	10	EDR
poleve HM™	Edge stripper	Organic	12 <	Room Temp - 60°C	10	EDR

DEVELOPERS

PRODUCT	DESCRIPTION	TYPE	pH	TEMP, °C	CONCENTRATION, %	USAGE
disperse H™	Developer for negative-type photo resist, strong alkaline, standard color filter	Inorganic	> 12	Room Temp	1	Spray
disperse HA™	Developer for negative-type photo resist, strong alkaline, high-concentrate type, color filter	Inorganic	> 12	Room Temp	1	Spray
disperse HALF™	Developer for negative-type photo resist, strong alkaline, low-foaming, color filter, high-concentrate type	Inorganic	> 12	Room Temp	1	Spray
disperse JA™	Developer for negative-type photo resist, weak alkaline, color filter	Inorganic	9-11	Room Temp	5	Spray
disperse K™	Developer for negative-type photo resist, weak alkaline, color filter	Inorganic	9-11	Room Temp	5	Spray
disperse GRX™	Developer for negative-type photo resist, weak alkaline, high-concentrate type, color filter	Inorganic	2.5	Room Temp	3	Spray
disperse DX™	Developer for negative-type photo resist, high concentrate, on array color filter	Organic	> 12	Room Temp	1	Spray
disperse CRM™	Developer for positive-type photo resist, standard	Inorganic	> 12	Room Temp	6	Spray
disperse S™	Developer for positive-type photo resist, preventing Al corrosion	Inorganic	> 12	Room Temp	50	Spray
disperse UT175™	Developer for positive-type photo resist with surfactant, array board, or semiconductor	Organic	> 12	Room Temp	Undiluted Solution	Spray
disperse CO™	Developer for positive-type photo, preventing Al corrosion	Organic	> 12	Room Temp	Undiluted Solution	Spray

FLAT PANEL DISPLAY MATERIALS

FLAT PANEL DISPLAY SOLUTIONS

P3 CLEANERS FOR FRONT END PROCESS

STRIPPERS

GRADE	APPLICATION	TYPE	pH	TEMP, °C	CONCENTRATION, %	USAGE
poleve 927™	Negative-type photo resist for color filter and for rework	Inorganic	12 - 14	50°C - 80°C	Undiluted Solution	US, Dipping, Shower, Brush
poleve 930™	Negative-type photo resist for color filter and for rework	Inorganic	12 - 14	50°C - 80°C	Undiluted Solution	US, Dipping, Shower, Brush
poleve 458™	Positive-type photo resist stripper for color filter, array board	Organic Solvent	N/A	50°C - 80°C	Undiluted Solution	US, Dipping, Shower
poleve 496™	Positive-type photo resist stripper for array board or semiconductor	Organic Semi-Aqua	12 - 14	50°C - 80°C	Undiluted Solution	Dipping, Shower
poleve 517™	Positive-type photo resist stripper for array board	Organic Semi-Aqua	12 - 14	50°C - 80°C	Undiluted Solution	Dipping, Shower
poleve 720™	Positive-type photo resist stripper for array board or semiconductor	Organic Aqua	12 - 14	50°C - 80°C	Undiluted Solution	Dipping, Shower

CLEANERS AFTER INJECTION

GRADE	APPLICATION	TYPE	pH	TEMP, °C	CONCENTRATION, %	USAGE
allpass 7750™	Cleaner for after liquid crystal injection	Semi-Aqua	Neutral	40°C - 60°C	Undiluted Solution	Ultrasonic Dipping, Water Flushing
allpass WS-HG™	Cleaner for after liquid crystal injection and particle	Water	Neutral	40°C - 60°C	Undiluted Solution	Ultrasonic Dipping, Water Flushing
kaltfin 20™	Cleaner after liquid crystal injection	Solvent	Neutral	Room Temp - 40°C	Concentrated Solution	



FLAT PANEL DISPLAY MATERIALS

FLAT PANEL DISPLAY SOLUTIONS

MATERIALS FOR BACK END PROCESS

PIN TERMINAL BONDING

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg, °C	SHORE D HARDNESS	WATER ABSORPTION 23°C - 25°C FOR 24 HRS %
			TIME, sec	CURING CONDITION, mW/cm ²	DEPTH, mm	TIME AT CURING CONDITION			
352™	TN / STN	20,500	< 10	100	3.0	30 sec @ 100 mW/cm ²	45 (TMA)	60	8.7
3523™	TN / STN	20,000	< 20	100	2.2	15 sec @ 100 mW/cm ²	45 (TMA)	70	2.6
3719™ (LPD209)	TN / STN	13,000	3	40	2.1	50 sec @ 40 mW/cm ²	77 (DMA)	84	2
3779™ (LPD179)	TN / STN	12,000	7	100	2.0	20 sec @ 100 mW/cm ²	93 (DMA)	75	1.4
3780™	TN / STN	11,000	8	100	1.9	20 sec @ 100 mW/cm ²	92 (DMA)	73	1.5
3781™ (LPD181)	TN / STN	12,000	2	100	3.7	20 sec @ 100 mW/cm ²	68 (DMA)	82	1.7
3782™ (LPD182)	TN / STN	13,000	10	100	2.3	20 sec @ 100 mW/cm ²	110 (DMA)	76	0.98

TEMPORARY BONDING

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg, °C	SHORE D HARDNESS	WATER ABSORPTION 23°C - 25°C FOR 24 HRS %
			TIME, sec	CURING CONDITION, mW/cm ²	DEPTH, mm	TIME AT CURING CONDITION			
350™	TN / STN	5,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A
352™	TN / STN	20,500	< 10	100	3.0	30 sec @ 100 mW/cm ²	45 (TMA)	60	8.7
3751™	TN / STN	4,000	N/A	N/A	3.8	10 sec @ 80 mW/cm ²	N/A	73	N/A

FPC REINFORCEMENT AND ITO/COG OVERCOAT

PRODUCT	DESCRIPTION	VISCOSITY, cPs	TACK-FREE PERFORMANCE		DEPTH OF CURE		Tg, °C	SHORE D HARDNESS	WATER ABSORPTION 23°C - 25°C FOR 24 HRS %
			TIME, sec	CURING CONDITION, mW/cm ²	DEPTH, mm	TIME AT CURING CONDITION			
3106™	TN / STN	5,000	90	100	6.0	30 sec @ 100 mW/cm ²	116 (DMA)	53	3.18
3523™	TN / STN	20,000	< 20	100	2.2	15 sec @ 100 mW/cm ²	45 (TMA)	70	2.6
3720™	TN / STN	2,600	10	100	6.6	20 sec @ 100 mW/cm ²	28 (DMA)	38	0.79
3736™	TN / STN	500	15	100	3.0	20 sec @ 100 mW/cm ²	27 (DMA)	36	0.5
3851™	TN / STN	5,000	20	100	1.2	30 sec @ 100 mW/cm ²		60 (Shore A)	0.9

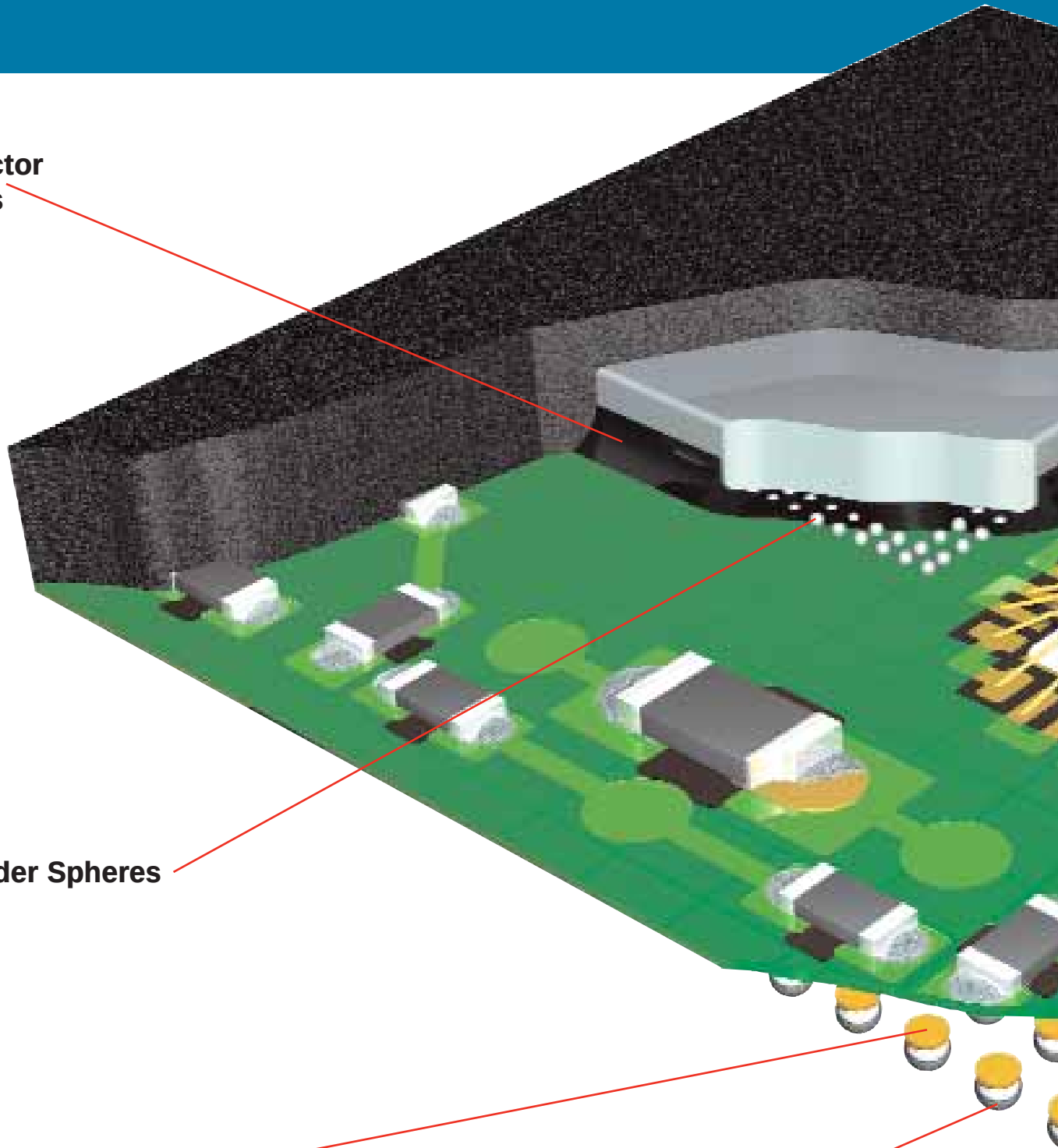
SEMICONDUCTOR SOLUTIONS

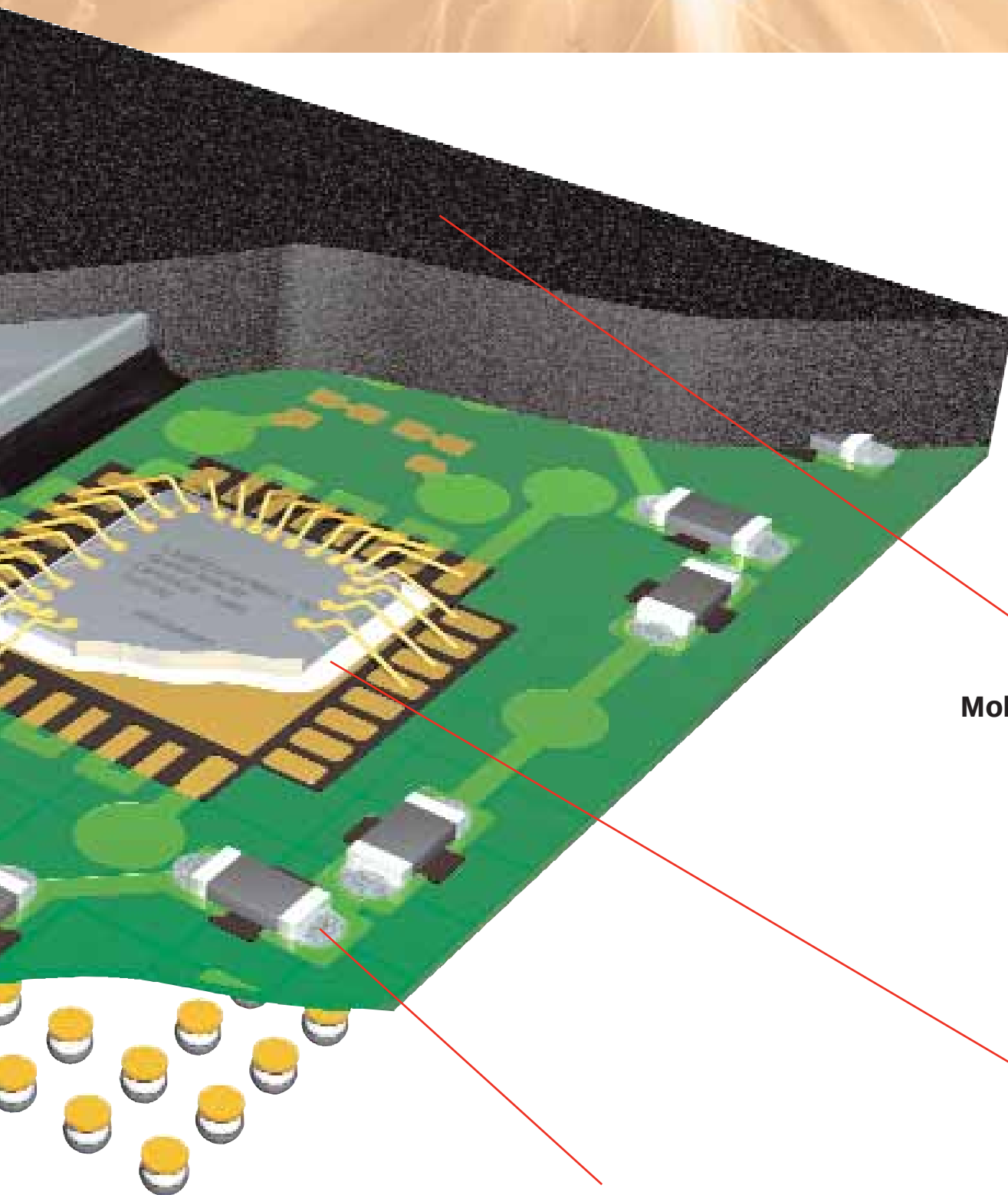
**Semiconductor
Underfills**

Solder Spheres

Tacky Fluxes

Solder Spheres



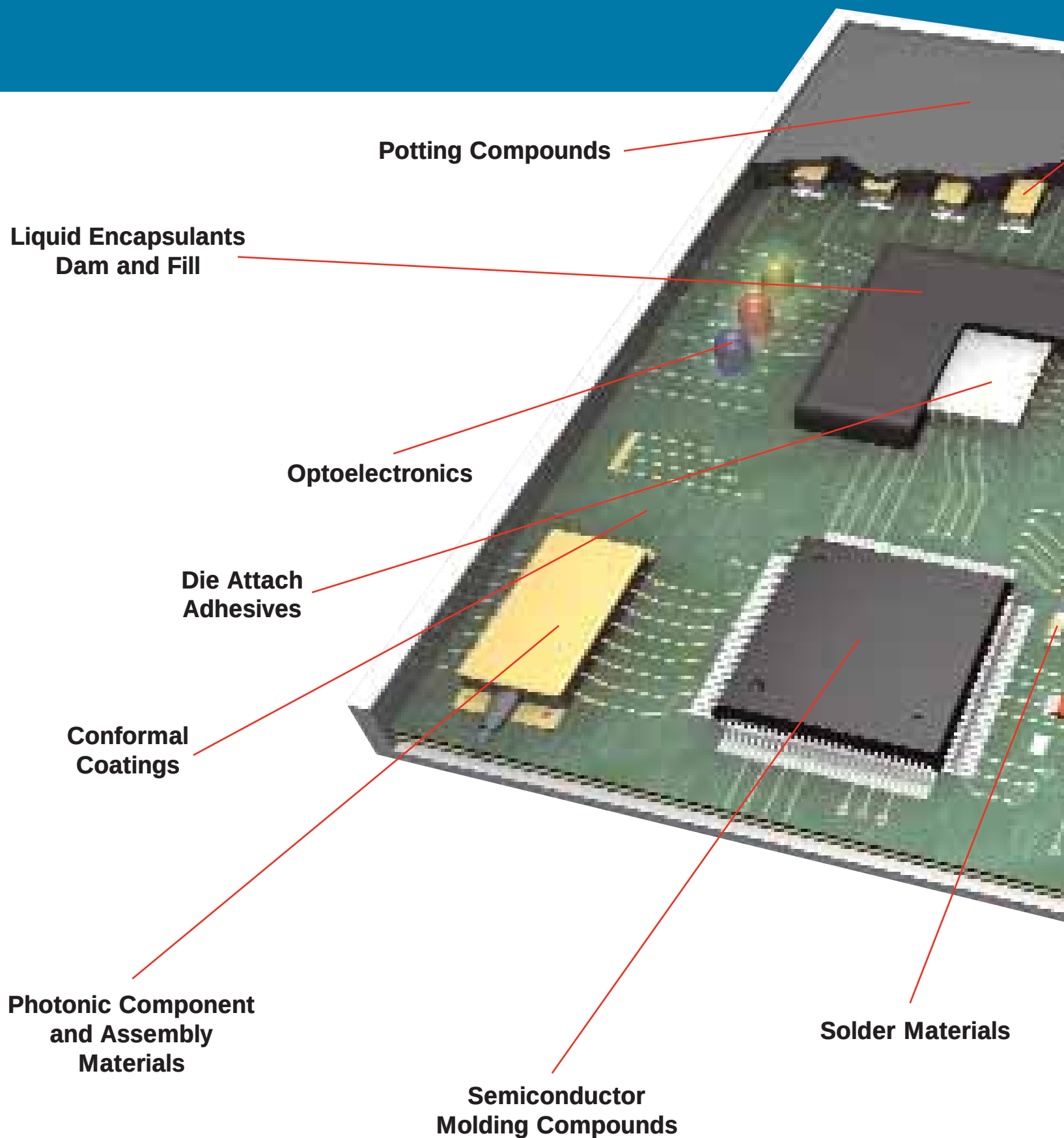


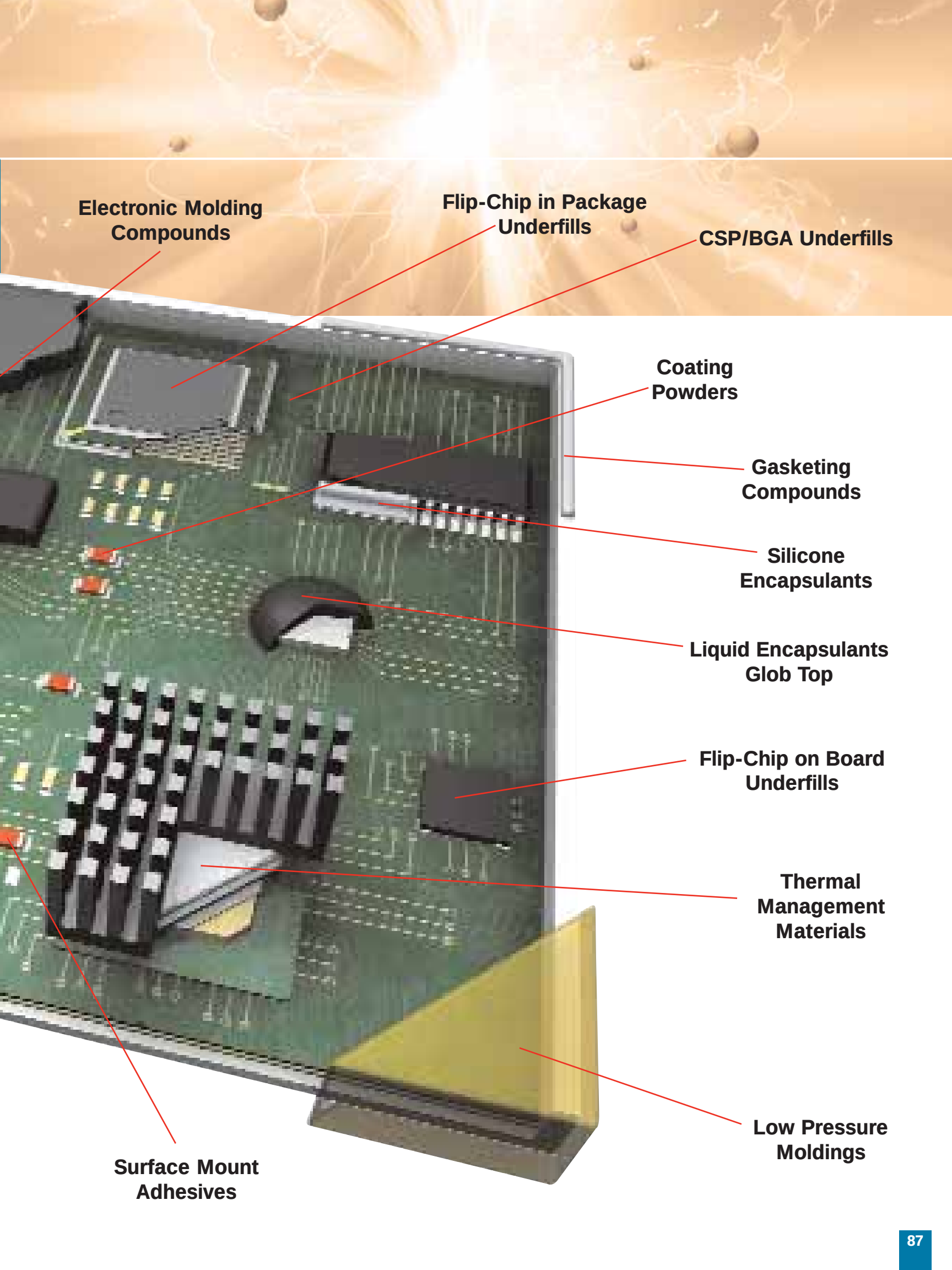
Molding Compounds

**Die Attach
Adhesives**

Solder Paste

SOLUTIONS ACROSS THE BOARD





Electronic Molding Compounds

Flip-Chip in Package Underfills

CSP/BGA Underfills

Coating Powders

Gasketing Compounds

Silicone Encapsulants

Liquid Encapsulants Glob Top

Flip-Chip on Board Underfills

Thermal Management Materials

Low Pressure Moldings

Surface Mount Adhesives

PERIODIC TABLE OF ELEMENTS

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	*	57 Hf	58 Ta	59 W	60 Re	61 Os	62 Ir	63 Pt	64 Au	65 Hg	66 Tl	67 Pb	68 Bi	69 Po	70 At	71 Rn
87 Fr	88 Ra	**	103 Rf	104 Ha	105 Sg	106 Bh	107 Hs	108 Mt	109 Ds	110 Rg	111 Uub	112 Uut	113 Uuq	114 Uup	115 Uuh	116 Uus	117 Uuo
* Lanthanide Series		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
** Actinide Series		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

Non-Metals

Alkali Metals

Alkali Earth Metals

Transition Metals

Other Metals

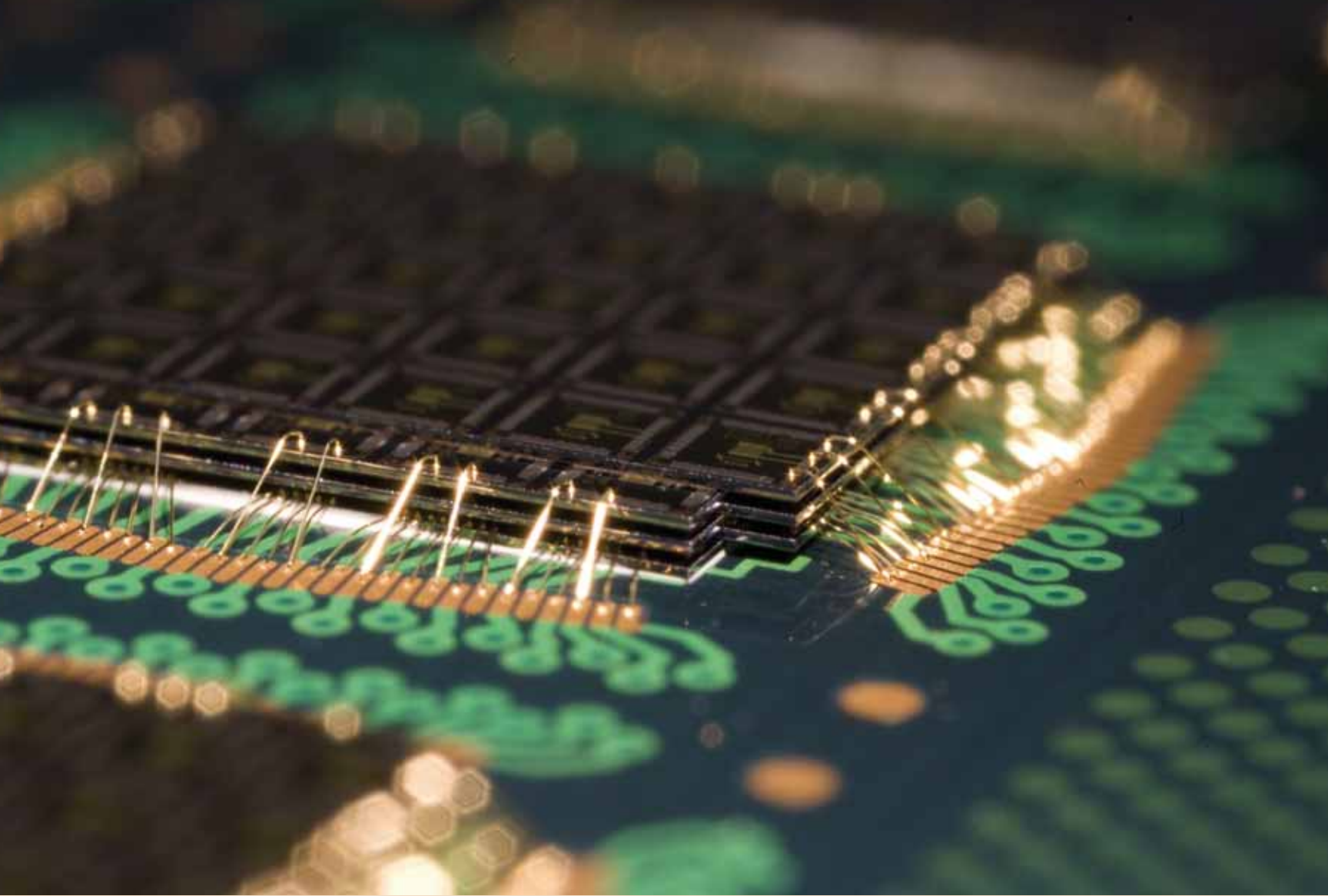
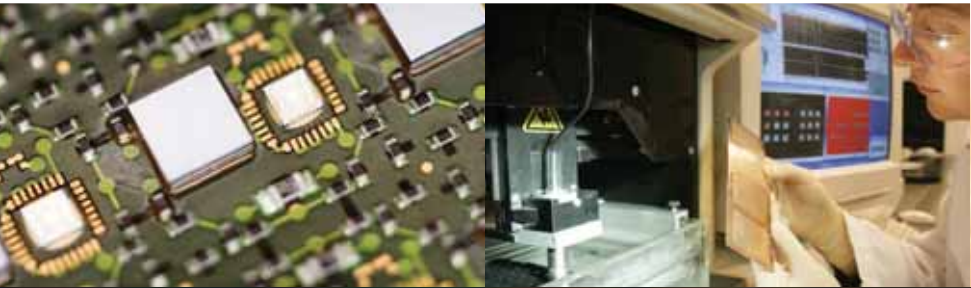
Inert Elements

Halogens

Rare Earth Metals

NOTES:

[illegible]





Henkel – Your partner worldwide

AMERICAS

HEADQUARTERS: UNITED STATES

15350 Barranca Parkway
Irvine, CA 92618
Tel: 1-949-789-2500
Tel: 1-800-562-8483

CANADA

2225 Meadowpine Blvd.
Mississauga, Ontario L5N 7P2
Tel: 1-905-814-6511
Tel: 1-800-263-5043
(within Canada)

BRAZIL

Av. Prof. Vernon Kriebler, 91
06690-250 Itapevi, Sao Paulo,
Brazil
Tel: +55 11 41 43 7000

MEXICO

Henkel Mexicana
Boulevard Magnocentro No. 8
Centro Urbano Interlomas, 52760
Huixquilucan, Edo. de Mexico
Tel: +52 55 3300 3000

ASIA

HEADQUARTERS: ASIA

928 Zhangheng Road,
Zhangjiang Hi-Tech Park,
Pudong New District,
Shanghai, 201203, P. R. China
Tel: +86 21 2891 8000

AUSTRALIA

Unit 29 38-46 South Street,
Rydalmere 2216, Sydney,
Australia
Tel: +61 2 8844 4700

CHINA

928 Zhangheng Road,
Zhangjiang Hi-Tech Park,
Pudong New District,
Shanghai, 201203, P. R. China
Tel: +86 21 2891 8000

INDIA

No.1, Airport Service Road,
Domlur Layout,
Bangalore-560 071,
India
Tel: +91 80 2535 7771

INDONESIA

Jalan Raya Jakarta Bogor
KM31.2,
Cimanggis Depok 16953,
Indonesia
Tel: +62 21 8775 2196

JAPAN

27-7 Shin Isogo-cho, Isogo-ku,
Yokohama, Japan 235-0017
Tel: +81 45 758 1800

KOREA

1st Floor, Mapo-tower,
418, Mapo-dong, Mapo-gu,
121-734 Seoul, Korea
Tel: +82 2 3279 1730

MALAYSIA

Lot 973, Jalan Kampung
Baru Hicom,
Persiaran Tengku Ampuan,
Lion Industrial Park, Sek 26,
Shah Alam, 40400 Selangor,
Malaysia
Tel: +60 3 5192 6200

PHILIPPINES

21/F, Asia Star Building,
2402-2404 Asean Drive,
Filinvest Corporate City,
Alabang, Muntinlupa City 1781,
Philippines
Tel: +632 859 3100

SINGAPORE

401, Commonwealth Drive
#03-01/02,
Haw Par Techno Centre,
Singapore 149598
Tel: +65 6266 0100

TAIWAN

10/F, No.866, ZhongZheng Road,
ZhongHe City, Taipei County 235,
Taiwan
Tel: +886 2 2227 1988

Henkel Accurus

508-51, Wen-sien Road, Section 1
Jen-der, Tainan County
Taiwan 717
Tel: +886 6 366 1288

THAILAND

Centralworld, 35th Floor,
999/9 Rama 1 Road,
Patumwan, Bangkok, 10330,
Thailand
Tel: +66 2 209 8000

EUROPE

AUSTRIA

See Henkel Germany

BELGIUM

Henkel Belgium N.V.
Havenlaan 16
B-1080 Brussel
Tel: +32-(0)2-42125 55

BULGARIA

Henkel Bulgaria E.O.O.D.
Business Park Sofia
Block 2, 4th floor
BG-1715 Sofia
Tel: +359 2 9151010

CZECH REPUBLIC

Henkel CR, spol. s r.o.
U Pruhonu 10
CZ-170 04 Praha 7
Tel: +420 2 20101401

CROATIA

Henkel Croatia d.o.o.
Budmanijeva 1
HR-10000 Zagreb
Tel: +85 1 6008-161

DENMARK

Henkel Norden AB,
Copenhagen
Horskaetten 3
DK-2630 Taastrup
Tel: +45 43 30 13 01

FINLAND

Henkel Norden Oy
Ayritie 12 a
01510 Vantaa
Tel: +358 020 122 311

FRANCE

Henkel Loctite® France
10, Avenue Eugene Gazeau
BP 40090
F-60304 Senlis-Cedex
Tel: +33 0344 216600

GERMANY

Henkel KGaA
Gutenbergstrasse 3
85748 Garching
Tel: +49 (0)89 92680

HUNGARY

Henkel Magyarország Kft.
H-1113 Budapest
David Ferenc u. 6
Tel: +36 30 9192883

ITALY

Henkel Loctite® Adesivi S.r.l.
Via Talete 56
20047 Brugherio (MI)
Tel: +39 039 21251

NETHERLANDS

Henkel Nederland B.V.
Henkel Technologies
Postbus 2100
3430 CM Nieuwegein
Tel: +31 030 607 38 50

NORWAY

Postboks:
6405 Etterstad
0604 Oslo
Tel: +47 23 37 15 20

POLAND

Henkel Polska S.A.
Domaniewska 41
PL-02-672 Warszawa
Tel: +48 22 5656200

ROMANIA

See Henkel Hungary

RUSSIA

RUSHENK
Bakhrushina Ul., 32, Building 1
RU-113054 Moscow
Tel: +7 095 7452318

SLOVAKIA

Henkel Slovensko s.r.o.
Zahradnicka 91
P.O. Box 66
SK-821 08 BRATISLAVA
Tel: +421 2 50246402, 111

SPAIN

Henkel Iberica, S.A.
Pol. Ind. Alparache
Camino de Villaviciosa, 18 y 20
28600 Navalcarnero,
Madrid
Tel: +34 91 860 90 00

SWEDEN

Henkel Norden AB
P.O. Box 120 80,
SE-102 22 Stockholm,
Sweden
Tel: +46 863443800

SWITZERLAND

See Henkel Germany

TURKEY

Türk Henkel Kimya Sanayi ve
Ticaret A.Ş.
Kayisdagi CadKaraman Ciftligi
YoluKar Plaz D Blok
34752 Icerenköy - Istanbul,
Turkey
Tel: 0090 216 579 4000
Fax: 0090 216 579 4092

UKRAINE

POW Henkel Ukraine
Silver Centre
4, Lepse Blvd.
UA-03067 Kiev
Tel: +38 044 20145 77

IRELAND AND UK

Henkel Loctite®
Adhesives Limited
Technologies House
Wood Lane End,
Hemel Hempstead
Hertfordshire HP2 4RQ
Technologies House
Tel: +44 (0)1442 278000

Henkel Corporation
15350 Barranca Parkway
Irvine, CA 92618
1-949-789-2500
1-800-562-8483

Across the Board,
Around the Globe.

www.henkel.com/electronics

® and ™ designate trademarks of Henkel Corporation or its Affiliates. ® = registered in the U.S. Patent and Trademark Office.
© Henkel Corporation, 2008. All rights reserved. 4531/LT-4842 (1/2008)