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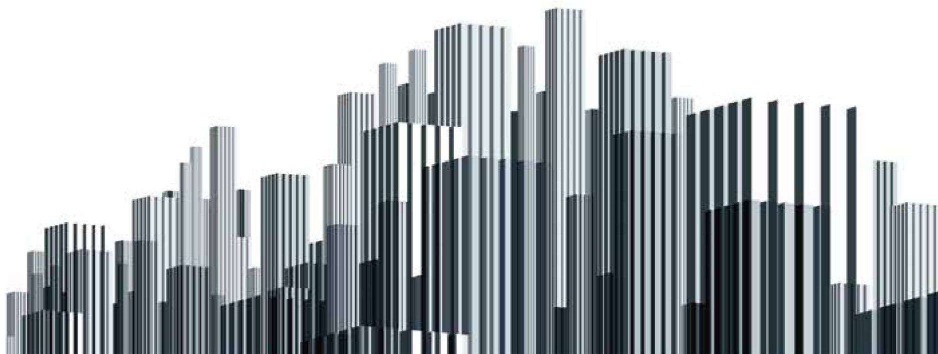
Milestone

- Feb 12, 2004 Shanghai Fairfield Electronic Technology Co.,Ltd.
- Jan 28, 2006 Shenzhen Fairfield Electronic Technology Co.,Ltd.
- Feb 1, 2007 Fairfield Hong Kong Holdings Limited.
- Apr 7, 2011 Changzhou Fairfield Office
- Sep 26, 2011 Beijing Fairfield Electronic Technology Co.,Ltd.
- Jul 12, 2013 Chengdu Fairfield Electronic Technology Co.,Ltd.
- Jul 1, 2019 American Fairfield Inc.
- Dec 25, 2019 Xi'an Fairfield Electronic Technology Co.,Ltd.
- May 25,2020 Jiangyin Fairfield Office



Shanghai Fairfield Electronic Technology Co.,Ltd. is a high-tech material trading company engaged in sales of imported semiconductor packaging materials, providing process design and solutions, and strong technical support.

Shanghai Fairfield Electronic Technology Co., Ltd. has been developing at a high speed since its establishment in 2004. We have made considerable progress benefited from the country's great efforts to develop semiconductors and high-tech industries. And we have established branches and offices in the United States, Beijing, Shenzhen, Chengdu, Changzhou, Xi'an, Jiangyin, etc.

Shanghai Fairfield Electronic Technology Co.,Ltd. covers six major industries: hermetic packaging, optic communication, LED packaging and lighting, semiconductor packaging,electornic and assembly, industrial and engineering. Typical products include silicon aluminum,graphite copper, conductive silver paste and nanoscale silver paste, insulating paste, thermally conductive potting & encapsulation, structural adhesive, etc.

Shanghai Fairfield Electronic Technology Co.,Ltd. invested in Jiangsu Everstar Electronics Co.,Ltd. in Tianmuhu Town, Liyang City, Changzhou, Jiangsu Province in 2010. The company is mainly engaged in LED packaging, focusing on the packaging of special devices such as indicator, infrared, and UV. The company is also developing the psckaging of RFID, MEMs, microwave, and optpelectronic devices.

Shanghai Fairfield Electronic Technology Co.,Ltd. established a failure analysis and reliability test laboratory in Shanghai in 2017, and established collaborative relationships with R&D institutions in Japan, Europe and the United States to provide strong technical support for our sales.

In the past eighteen years of unremitting development, with the efforts of a group of dedicated employees, we have accumulated a wealth of experience in the development, application, and sales of materials. With deeper alliances, we believe that the company will probably be considerably extended.

Electronic Potting & Encapsulation Materials

We can provide all knids of potting & encapsulation matterials including epoxies,urethanes.

- Epoxies encapsulant: confirming to UL rating, low modulus, high temperature resistance, high thermal conductivity for ordinary encapsulating, ignition coil encapsulating, power module encapsulating, magnetic induction coil encapsulating, various types of sensor encapsulating, etc.
- Silicones encapsulant: confirming to UL rating, low modulus, low viscosity, high thermal conductivity (0.8-3.2w/mk) for general encapsulating, power module encapsulating, and various types of sensor encapsulating.
- Urethanes encapsulant: suitable for encapsulating of various electronic products.

Epoxy Encapsulant

Product	Viscosity (cps)	Mix Ratio (by weight)	Cure Schedule	Hardness	Strength	Characteristic
CIRCALOK 6007	R:15,000 H:80-105	100 : 5.5	12-16 hr@25℃ 2 hr@65℃	85D	8,400psi	high thermal conductivity, high strength, low exotherm, low shrinkage, UL94-V0 certified
CIRCALOK 6035	12,000	100 : 100	24 hr@25℃ 2 hr@65℃	75D	5,000psi	high thermal conductivity, medium strength, UL94-V0 certified, red and green available
CIRCALOK 6037	500,000	100 : 3.4	24 hr@25℃ 2 hr@65℃	93D	50MPa	low stress, low shrinkage, excellent adhesion
		100 : 7.1		92D	60MPa	
300	68,000	100 : 7 - 100 : 100	24 hr@25℃ 2 hr@100℃	65D-90D	2,200-9,800psi	can be mixed to give different hardness and strength
340	7,000-60,000	100 : 3.5 - 100 : 7.0	24 hr@25℃ + 2 hr@150℃	90D-95D	6,300-9,400psi	high thermal conductivity, medium strength, UL94-HB
600	1,200-10,000	100 : 24 - 100 : 100	24 hr@25℃ 2 hr@100℃	60D-92D	2,300-10,900psi	can be mixed to give different hardness,strength and color, conforming to food safety certification
ES-100	1,200	100 : 100	3-4 hr@80℃	Shore OO 70	0.44MPa	low viscosity, low stress, chemically resistant, environmentally resistant
EL-636	50,000	100 : 1	16-24 hr@50℃-60℃ + 2 hr@95℃/150℃/205℃	95D	42.7MPa	durable, environmentally resistant, maintains electrical insulation stability at extremely high temperatures
EP-20	13,000	1 : 2 flexible bond 2 : 1 rigid bond	See TDS	60-92D	See TDS	low viscosity, low exotherm, excellent heat resistance, chemically resistant, environmentally resistant
EP-96	145,000	-	30 min@121℃	90D	1,600psi	fast cure, excellent thermal stability, chemically resistant, shape to be maintained after dispensing(non-sag)
EP-6150	145,000	-	30 min@121℃ 10 min@177℃	90D	>1,600psi	fast cure, excellent thermal stability, chemically resistant, shape to be maintained after dispensing(non-sag)
EP-2000	1,300	100 : 100	2 hr@120℃/150℃/180℃/210℃	85D	-	excellent heat dissipation, low viscosity, durable
EP-3500	11,700	100 : 100	2 hr@120℃/150℃/180℃/210℃	90D	-	excellent heat dissipation, low viscosity, durable

Silicone Encapsulant

Product	Viscosity (cps)	Mix Ratio (by weight)	Cure Schedule	Hardness	CTE (ppm)	Strength (psi)	Thermal Conductivity	Characteristic
CIRCALOK 6702	30,000	100 : 100	16-24 hr@85℃	65A	-	600	1.46	thermally conductive silicone encapsulant, red liquid, high thermal conductivity, excellent thermal shock resistance, UL94-V0 certified
CIRCALOK 6703	8,000	100 : 100	4 hr@65℃	60A	220	200	0.8	thermally conductive silicone encapsulant, low modulus, excellent insulation properties, light gray liquid, UL94-V0 certified
CIRCALOK 6705	2,500	100 : 100	2 hr@65℃	60A	100	300	0.4	silocone encapsulant for electronics components, low viscosity, excellent insulation properties, black liqiud, UL94-V0 certified
SC-300M	160	100 : 100	24 hr@25℃ or 16 hr@25℃ + 2 hr@100℃	soft gel	326	-	0.2	low stress, excellent adhesion, durable, excellent electrical insulation properties
SC-305	4,000-7,000	100 : 100	24 hr@25℃ 2 hr@60℃	60A	200	80	0.7	thermally conductive silicone encapsulant, high thermal conductivity, excellent thermal shock resistance, gray liquid, UL94-V0 certified
SC-309	3,600	100 : 100	15 min@100℃ 10 min@120℃	45A	190	50	1.0	thermally conductive silicone encapsulant, low modulus, low viscosity, excellent elecriacal insulation properties, light gray liquid, UL94-V0 certified
SC-315	resin: 4,000 hardner: 4,000	100 : 100	24 hr@25℃ 30 min@80℃	60A	160	110	1.5	thermally conductive silicone encapsulant, low stress, durable, low viscosity, excellent thermal shock resistance, gray liquid, UL94-V0 certified
SC-320	resin: 25,000 hardener: 20,000	100 : 100	60 min@125℃	60A	110	300	3.2	thermally conductive silicone encapsulant, light pink liquid, high thermal conductive, excellent thermal shock resitance, UL94-V0 certified
SC-320LVH	-	100 : 100	30 min@80℃ 24 hr@25℃	50A	160	100	2.1	a two-component system designed to provide excellent thermal conductivity for electrical/ electronic encapsulating applications
SC-324	resin: 35,000 hardener: 35,000	100 : 100	24 hr@25℃ 60 min@125℃	50A	105	119	4.0	low stress, low viscosity, light pink liquid, durable, excellent thermal shock resistance

Urethane Encapsulant

Product	Color	Viscosity (cps)	Mix Ratio (by weight)	Cure Schedule	Hardness	Strength (psi)	Characteristic
UR-312	Clear	1,500	100 : 55	7 days@25℃ 2 hr@85℃	50 Shore OO	50	low modulus system designed for encapsulation of fragile, pressure-sensitive microelectronic components
UR-322	Clear	750	100 : 107	30 min@25℃	12A	100	low modulus
UR-325	Black	4,000	100 : 25	24 hr@25℃	60A	770	good adhesion, excellent thermal shock resistance
UR-340	Clear	450	100 : 104	24 hr@25℃	30A	63	low viscosity

Structural Adhesives

Product	Appearance	Operation Time (min)	Initial Curing Time (min)	Complete Curing Time (hr)	Typical Viscosity centipoise(cp)	Density Range (lb/gal)(kg/m³)	Description
403	Gray-white to brown paste	2-4	4-6	24	100,000-280,000	9.25-9.55(1108-1144)	The 400 series acrylic adhesive have extremely high impact strength and peel strength to bond metals and plastics with only minimal treatment and achieve high shear strength. Excellent environmentally resistance and chemically resistance.
406	Gray-white to brown paste	6-10	12-17	24	100,000-300,000	9.1-9.7(1090-1162)	
606	Gray-white to white paste	6-10	16-24	24	100,000-300,000	8.7-9.7(1042-1162)	The 600 series acrylic adhesive can bond substrate with minimal surface treatment, no sagging, cross-bonding of FRP and multiple metals.

Product	Appearance	Operation Time (min)	Initial Curing Time (min)	Complete Curing Time (hr)	Mix Ration (by volume)	Component	Typical Viscosity centipoise(cp)	Density Range (lb/gal)(kg/m³)	Description
320/322	Gray Paste	20-40	2-4	24	1 : 1	320 resin	300,000-1MM	12.5-12.9 (1498-1546)	expoxy adhesive, general type, can be used for composite materials, wide temperature range, high viscosity
						322 black hardener	450,000-2MM	10.33-10.54 (1238-1263)	
7542	Tan Liquid			24	1 : 1	7542-A resin	1,500-4,500	11.45-11.75 (1372-1408)	equal-mix, two-component urethane adhesive system used to bond FRP, SMC and other plastics with little surface preparation
	Tan Liquid	4-7	1-2			7542-B hardener	7,000-14,000	10.3-10.6 (1234-1270)	
	Tan Liquid	11-15	2			7542-C hardener	7,000-14,000	10.3-10.6 (1234-1270)	
	Tan Liquid	20-30	3			7542-D hardener	5,000-14,000	10.3-10.6 (1234-1270)	
	Tan Liquid	50-60	4			7542-E hardener	5,000-18,000	10.3-10.6 (1234-1270)	
7545	Brown Paste			24	1 : 1	7545-A resin	25,000-70,000	12.5-12.8 (1498-1534)	equal-mix, two-component urethane adhesive, non-sag, durable,non-flammable, environmentally recommended, environmentally resistant, chemically resistant
	Off-white Paste	6-8	1			7545-C hardener	230,000-650,000	10.8-11.2 (1294-1342)	
	Off-white Paste or Black Paste	11-18	1.5			7545-D hardener	230,000-650,000	10.6-11.0 (1270-1318)	
	Off-white Paste	22-38	2-3			7545-E hardener	230,000-650,000	10.6-11.0 (1270-1318)	
	Off-white Paste	45-65	4-5			7545-F hardener	230,000-650,000	10.5-11.1 (1258-1330)	
	Black Paste	1.5	10 min			7545-G hardener	230,000-650,000	10.8-11.2 (1294-1342)	
7555	Translucent Paste				1 : 1	7555-A resin	40,000-160,000	9.64-10.04 (1155-1203)	urethane adhesives, two-component, equal-mix, non-slumping, fast cure, non-flammable, environmentally recommended, environmentally resistant/UV resistant, chemically resistant
	White Paste	3-5	2-3 min	1		7555-C hardener	130,000-230,000	9.95-10.25 (1192-1228)	
	White Paste	45	10-15 min	5-6		7555-E hardener	130,000-230,000	9.95-10.25 (1192-1228)	
7650	Honey Liquid	15-30	24	24-72	N/A	7650	400-2,000	7.8-8.4 (935-1007)	urethane adhesives, single component, high stickiness, low viscosity, moisture cure

Electronic Materials

Bare Chip Bonding

We offer one-component / two-component, conductive / insulating, high thermal conductive, fast curing, low temperature curing, and chip bonding materials. Can be used for bonding of LED, COB, or various IC packaging.

Product	Viscosity (cps)	Work Life	Cure Schedule	Volume Resistance (ohm-cm)	Tg (℃)	Characteristic
MD-130	60,000		8-24 min@150℃ 160 min@100℃	1×10^{15}	140	designed for a variety of semiconductor IC packaging applications where electrical conductivity is not required
MD-140	36,000	3 days	5-10 min@120℃ 3-5 min@150℃ 1-3 min@180℃	0.9×10^{-4}	82	silver-filled conductive adhesive, excellent thermal conductivity, fast cure, suitable for use in thermally demanding die attach applications such as microprocessor, power semiconductor and VLSI assembly
MD-161	40,000	5 days	60 min@150℃	0.001	55	excellent electrical conductivity, designed for dispensing through small nozzles

Chip Encapsulation

We offer encapsulating materials that meet the requirements of consumer or semiconductor grades, which are characterized by their ease of operation, high reliability, low stress, etc. They can be used for wire-bonding chip encapsulation, smart card encapsulation, or component mounting.

Chip-on-Board(COB) Encapsulants

Product	Viscosity (cps)	Work Life	Cure Schedule	Hardness (Shore)	CTE (ppm)	Characteristic
EP-937	47,900	7 days	20 min@150℃	88-94D	45	one-component epoxy specifically designed to meet the needs of coating semiconductor devices on printed circuit boards, fast cure,
ME-430	317,000	24 hr	30 min@150℃	91-98D	19	one-component, semiconductor grade epoxy designed for the encapsulation of Chip-on-Board (COB) devices

Dam & Fill Encapsulants

Product	Viscosity (cps)	Cure Schedule	CTE (ppm)	Tg (℃)	Characteristic
ME-455	19,000	30 min@150℃	19	135	Material filling, fast cure
ME-456	90,000-1,500,000	30 min@150℃	19	135	Material lining, fast cure

Underfills

We offer underfill material that meet PCB assembly or semiconductor grade requirements, with high flow, high thermal conductivity, high reliability, acid anhydride / non-acid anhydride, suitable for chip size.

Product	Viscosity (cps)	Cure Schedule	CTE (ppm)	Tg (℃)	Characteristic
ME-525	6,000	30 min@150℃ 15 min@165℃	α1: 23 α2: 85	120	suitable for high-end ceramic packaging and automotive electronics applications, the underfill of small size chips
ME-531	4,000	30 min@150℃ 15 min@165℃	α1: 21 α2: 85	140	suitable for consumer grade and PCB applications, the underfill of small size chips
ME-532	3,000	90 min@150℃ 60 min@165℃	α1: 32 α2: 100	135	suitable for the underfill of large size, fine pitch chips
ME-541	35,000	90 min@150℃ 60 min@165℃	α1: 32 α2: 100	145	suitable for the underfill of large size, fine pitch chips
ME-542	20,000	90 min@150℃ 60 min@165℃	α1: 30 α2: 120	135	high thermal conductive underfill
ME-543	21,000	7-20 min@165℃	α1: 27 α2: 95	135	untra-high thermal conductivity, underfill, lead-free reflow soldering
ME-588	13,000	7-20 min@165℃	α1: 32 α2: 117	139	suitable for encapsulation of high-density circuit areas in flip-chip packaged devices
ME-588BK	15,000	7-20 min@165℃	α1: 44 α2: 100	148	suitable for encapsulation of high-density circuit areas in flip-chip packaged devices

Thermal Conductive Materials

We offer a wide range of thermal adhesives, thermal gels and thermal greases for heat dissipation (heat conduction) applications of circuit boards and chips.

Thermal Conductive Adhesives

We offer epoxy, silicone, and special resin heat conductive adhesives, with constant temperature / low temperature curing, high strength, high thermal conductivity conductive / non conductive suitable for the application of heat dissipation, such as heat sink, flip chip, transformer, high power LED, etc. for bonding of various materials.

Product	Color	Cure Schedule	Work Life	Thermal Conductivity (w/mK)	Lap Shear	Characteristic
CIRCALOK 6037	Black Green	24 hr@25℃	2-3 hr	>1	25MPa	two-component thermal conductive adhesive, room temperature curing, high adhesive strength, suitable for bonding of different materials
CIRCALOK 6151	Gray	30 min@121℃ 10 min@177℃	30 days	0.6	20MPa	single-component epoxy thermal conductive adhesive, fast cure, suitable for acidic or firm surfaces
MT-125	Gray	30 min@100℃ 8 min@150℃	14 days	2.35	21MPa	fast cure, high adhesive strength, suitable for bonding of different materials
MT-220	Gray	30 min@125℃ 10 min@150℃	7 days	4.2	6MPa	high thermal conductivity, low stress, direct bonding with silicon
MT-315	Sliver grey	50 min@125℃ 30 min@150℃	24 hr	11.3	6MPa	ultra high thermal conductivity, suitable for high power applications and bonding of different materials
MT-322	Gray	60 min@120℃ 30 min@150℃	30 days	1.7	2MPa	low stress, long working life, excellent dispensing performance, suitable for packaging of various large size chips
MT-328	Gray	60 min@120℃ 30 min@150℃	16 hr	3.3	1.35MPa	single-component, insulating silicone with high thermal conductivity, can be used for bonding heat sinks, with flexibility after curing
MT-815	Gray	60 min@125℃	24 hr	12	5000psi	low modulus, high thermal conductivity, LED, semiconductor grade packaging

Thermal Conductive Grease

We offer epoxy and silicone thermal conductive grease with high thermal conductivity, high temperature resistance, high reliability, simple operation, suitable for various processes, can be used for the applications requiring heat dissipation such as heat sinks, flip chips, transformer, high power LED, etc.

Product	Color	Viscosity (cps)	Working Temperature (℃)	Thermal Conductivity (w/mK)	Weight Loss (%)	Characteristic
SG-21	White	1,800,000	200	0.8	0.8 (24hr@200℃)	high thermal conductivity, high insulation strength, typically applied to heat transfer between power components and semiconductor devices and heat sinks
TC-208	White	500,000	80	1.2	20 (1hr@300℃)	washable thermal conductive grease, suitable for low power and medium power
TC-228	Blue	350,000	200	1.1	1.7 (1hr@300℃)	high temperature resistance, can be cleaned with alcohol, suitable for low power and medium power
TC-350	Gray	250,000	200	4.0	<0.5 (1hr@300℃)	good temperature resistance, suitable for high speed dispensing and printing
TC-404	Gray	141,800	200	4.3	<3 (24hr@150℃)	ultra high thermal conductive silicone resin, easy cleaning, high reliability
TC-405	Gray	125,000	200	5.0	<0.5 (24hr@150℃)	ultra high thermal conductive silicone grease, suitable for high power applications
TC-501	Gray	128,400	-	3.6	Nil	ultra high thermal conductive silicone grease, low thermal resistance, no loss, suitable for semiconductor packaging

Thermal Conductive Gap Filler

Product	Viscosity (cps)	Mix Ratio (by weight)	Cure Schedule	Hardness	Tensile Strength (psi)	Thermal Conductivity (W/m•K)	Characteristic
SC-1200	resin: 75,000 hardener: 75,000	100 : 100	24 hr@25℃ 60 min@120℃	Shore OO 82	45	2.0	thermally conductive silicone gap filler, low stress, durable, environmentally resistant, UL94 V0 certified, gray paste
SC-1500	resin: 147,000 hardener: 87,000	100 : 100	24 hr@25℃ 30 min@100℃	Shore OO 80	58	3.8	thermally conductive silicone gap filler, low stress, durable, environmentally resistant, light pink paste
SC-1600	10/sec Shear Rate resin: 114,000 hardener: 75,000 1/sec Shear Rate resin: 318,000 hardener: 205,000	100 : 100	24 hr@25℃ 30 min@100℃	Shore OO 89	68.17	Hot Disc Transient Method ISO 22007-2: 3.7	thermally conductive silicone gap filler, low stress, durable, environmentally resistant, UL94 V0 certified, light pink paste
SC-3500	resin: 114,000 hardener: 80,000	100 : 100	24 hr@25℃ 60 min@80℃	Shore OO 80	33	3.5	thermally conductive silicone gap filler, low stress, durable, environmentally resistant, UL94 V0 certified, light pink paste
SC-3502	resin: 97,000 hardener: 85,000	100 : 100	24 hr@25℃ 60 min@120℃	Shore OO 55	29	3.5	thermally conductive silicone gap filler, low stress, durable, environmentally resistant, UL94 V0 certified, light pink paste
UR-2002	resin: 230,000 hardener: 300,000	100 : 125	24 hr@25℃ 2 hr@65℃	Shore OO 78	-	2.0	thermally conductive urethane gap filler, thixotropic viscosity, flame retardant, room temperature cure, reworkable, light gray paste

Magnet Coating

LORD® JMC-700K Protection Coating

LORD® JMC-700K coating is a thermal-cure epoxy resin specially designed for thin film coating of heat sinks and magnets. LORD JMC-700K coating provides electrical insulation, heat resistance, and oil resistance with a singlecoat application. This coating can be used in a variety of automotive applications including cooling plates, heat sinks and motor magnets used in electric vehicles, as well as automotive parts and industrial machine applications.

Features & Benefits

Good Adhesion - provides strong adhesion to substrate.
Broad Temperature Range - can be used on parts and devices that experience operating temperatures from -40°C to +180°C.
Environmentally Resistant - provides excellent resistance to heat, oil and moisture.

	JMC-700K
Heat Resistance Test 180℃ x 1500 hr	Pass
Cycle Test -40℃ ~ +170℃ , 1500 cycles	Pass
Oil Resistance Test 150℃ x 2000 hr	Pass
Humidity Resistance Test 85℃, 85% RH x 2000 hr	Pass

Typical Properties

Apperance	Black Liquid
Viscosity, mPa•s @ 25℃	6000
Specific Gravity	1.07
Solids Content by Weight, %	39.5

*Data is typical and not to be used for specification purposes.

Typical Cured Properties

Thermal Conductivity, W/m•K	0.52
Volume Resistivity, ohm-cm	1.1×10^{15}
Dielelctric Strength, kV/mm(V/mil) @ 25 um	40(1016)
Dielectric Constant	3.79
Dissipation Factor	0.0092

*Data is typical and not to be used for specification purposes.

Additional JMC Neodymium Magnet Coating Properties

- Excellent SST/PCT performance and high temp resistance
- Excellent adhesion (RT/HT) with magnet substrate and structural adhesive
- 5H-6H hardness to keep scratch away during assembly Low DFT
- High insulation performance to keep eddy current away
- Easy process, high productivity, lower total cost
- Excellent surface properties
- Over 10 year application experience

Thick Film Materials

We offer a variety of polymer thick film materials including silver conductors, polymer resistors, protective coatings, marking inks, solvents, carbon resistors, and conductive coatings. These products are electrically conductive and are used in a variety of electronics applications.

Chip-to-Lead Frame Adhesive

Product	Viscosity	Cure Condition	Resistivity Ω-cm	Characteristic
6144	5-7kcps	125℃ 15min	< 0.0002	one-component, thermosetting conductive epoxy, chip-to-lead frame adhesive for tantalum capacitors
6148S	9-11kcps	125℃ 15min	≤ 0.00021	one-component, thermosetting conductive epoxy, a chip-to-lead frame adhesive for tantalum capacitors

Silver Conductive Coating

Product	Viscosity	Cure Condition	Resistivity Ω-cm	Characteristic
PC11159	600-700cps	Drying: 150℃ 10min Curing: 210℃ 10min	< 0.0002	a thermo-setting epoxy body silver coating designned primarily for use as a conductive electrode for tantalum capacitors, electromagnetic shielding, low ESR
K611-14	500cps	Curing: 100℃ 10min	0.0001	silver-filled, thermoplastic resin used for coating tantalum anodes, Excellent Conductivity, good strength and resistance to thermal shock

Conductive Ink

Product	Viscosity	Cure Condition	Resistivity Ω-cm	Characteristic
CIRCALOK 6971	-	Curing: 100℃ 10min	< 0.2	one-component, carbon/graphite filled screen printable polymer featuring long open time and excellent adhesion to mylar

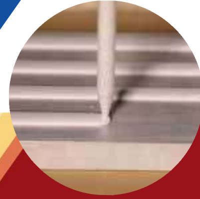
Protective Coating

Product	Color	Dielectric Strength	Cure Condition	Characteristic
PC10882	Dark Blue	>500V/mil	245℃ 30min	mineral-filled, epoxy dielectric material designed for screen print application as a protective coating for trimmed resistors and general circuit protection

Thermal Management Materials

Potting & Encapsulation

Gap Filler



LORD CoolTherm® Potting & Encapsulation

LORD CoolTherm® thermally conductive epoxy and silicone encapsulants help manage heat, enabling you to increase the power density and life of your motor.

- **Improve Performance**
  LORD encapsulants facilitate optimum heat transfer because of their high thermal conductivity and low viscosity.
- **Protect Electronics**
  LORD potting compounds provide protection from dust and moisture and reduce vibrations.
- **Reduce Component Stress**
  LORD encapsulants exhibit low shrinkage upon curing.

LORD CoolTherm® Gap Fillers:

Thermally conductive gap fillers get the best performance out of your components by filling in crevices and minute spaces that create inefficiencies. They are a stay-in-place solution and cure as a gel, easing the stresses caused by thermal differences and flex.

- **Low-outgas Options**
  LORD offers low-ppm siloxane solutions for sensitive electronic applications.
- **Shock Protection**
  LORD gap fillers remain tacky and soft to damp vibration.

Potting & Encapsulation	Product	Chemical Category	Thermal Conductivity (W/mK)	Viscosity (CPS@25℃)	Specific Gravity (g/cm³)
	CoolTherm SC-305	Silicone	0.7	4000	1.5
	CoolTherm SC-309	Silicone	1.0	3600	1.7
	CoolTherm SC-315	Silicone	1.5	4000	2.6
	CoolTherm SC-320LVH	Silicone	2.1	-	3.1
	CoolTherm SC-320	Silicone	3.2	22000	3.1
	CoolTherm SC-324	Silicone	4.0	30000	3.2

- Two-component system
- Room temperature cured or heat cured
- Electric insulation
- 1:1 mix ratio

Gap Fillers	Product	Chemical Category	Thermal Conductivity (W/m•K)	Hardness Shore (OO)	Specific Gravity (g/cm³)
	CoolTherm®SC-1200	Silicone	2.0	80	2.9
	CoolTherm SC-3500	Silicone	3.5	80	3.3
	CoolTherm SC-1600	Silicone	3.7	85	3.3
	CoolTherm SC-1500	Silicone	3.8	80	3.3
	CoolTherm UR-2002	Silicone	2.0	75	2.7
	CoolTherm UR-2000	Silicone	2.0	D55	2.6

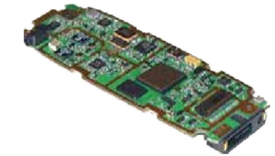
- Two-component system
- Low volatile
- Room temperature cured or heat cured
- Electric insulation
- 1:1 mix ratio

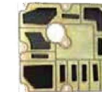
Microwave Absorber Materials

CHO-MUTE™ 9005 & 9025

Product Feature

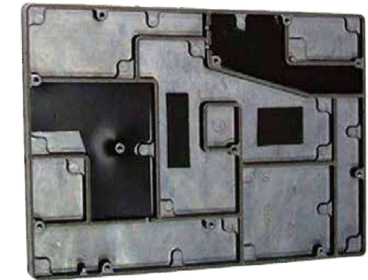
- Microwave absorption material covering a wide range of frequencies
- Up to 20 dB RF absorption
- Available in six standard thicknesses
- Flexible
- RoHS Compliant
- Global product availability
- UL 94V-0 certified



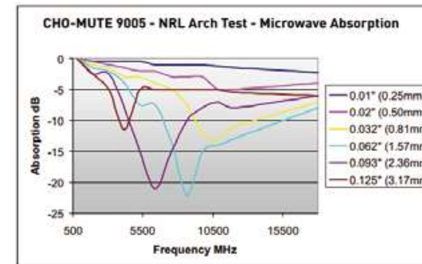


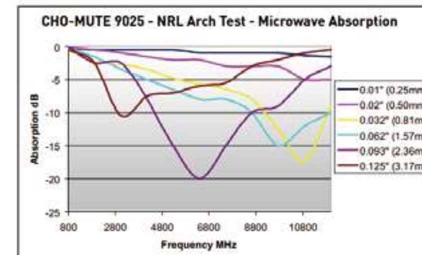
Typical Application

- Hand held electronics
- Wireless voice or data telecommunication
- Military electronics
- GPS
- Ruggedized computers
- Night vision equipment
- Telecommunication infrastructure equipment



Product Information





Property	Test Method	Units	Value
Composition			
Ferrous	--	--	--
Electrical			
Surface Resistance Initial	CEPS-0002	Ω/square	>1M
Bulk Volume Resistivity Initial	CEPS-0002	Ω•cm	>1M
Permeability	ASTM D2520	--	1.76
Magnetic Loss Tangent	ASTM D2520	--	0.602
Permittivity	ASTM D2520	--	13.8
Dielectric Loss Tangent	ASTM D2520	--	0.15
Mechanical			
Operating Temperature Range	--	--	-50°C to 160°C
Tensile Strength	ASTM D412	PSI (MPa)	500 (3.44)
Elongation	ASTM D412	(% min)	200
Hardness	ASTM D2240	Shore A	55
Tear Strength	ASTM D624	Lb/in (N/m)	60 (10.5k)
Thermal			
Thermal Conductivity	ASTM D5470	W/m-K	9005 = 0.56 9025 = 0.87
Physical			
Specific Gravity	--	--	3.4

Anisotropic Conductive Paste & Non-Conductive Paste

Anisotropic conductive paste(ACP) made of metal plating particles. It can be provided according to customer requirements and specifications of special products.

Advantages

- High adhesion: aluminum, copper, PET film, silver paste
- Rapid hardening: hardening within 7-8 seconds at 170℃
- Low impedance: original conductive particles
- High quality: no agglutination, no large particles, no foreign matter, no particle setting
- Long-life ACP: 2 weeks of quality assurance at 30℃, reducing the frequency of cleaning of the equipment
- Suitable for all ACP coating systems: frictioning, dispensing, spraying
- High reliability: small change in Q value after reliability test
- A liquid epoxy resin adhesive

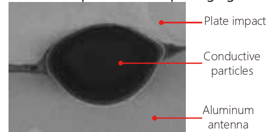
The conductive particles are made by electroplating high quality metals on the core material without electrolysis. The conductive particles are made by coating one or two metal layers on various substrates such as high performance resin particles and metal particles. Customers can choose conductive particles according to their requirements.

		RL0407 Standard Product	RL0507 High Reliability	NF0306 Fast Cure Paste Under development
Conductive Particles	core material	Resin	Resin	Nickel
	plated metal	Ni/Au	Ni/Au	Au
	particle diameter	3 μm	3 μm	2.5 μm
Viscosity (viscometer)	1[1/s]	40 Pa·s	40 Pa·s	40 Pa·s
Thixotropic Index (viscometer)	1[1/s] / 10[1/s]	2.2	2.2	3.0
Gel Time	150 ℃	20 sec.	20 sec.	8 sec.
Tg（DSC）		125 ℃	125 ℃	128 ℃
CTE	α1	68 ppm	68 ppm	88 ppm
	α2	180 ppm	180 ppm	181 ppm
Young's Modulus		2990 MPa	2990 MPa	—
Density		1.2 g/m^3	1.2 g/m^3	1.5 g/m^3
Water Absorption	boiling 2 hr	0.4%	0.4%	0.2%
Total Chlorine		under 700ppm	under 700ppm	—
Work Life	25℃	10 days	10 days	3 ~ 4 days
Shelf Life	under 0℃	6 months	6 months	6 months
UHF Tag Performance Test				
Cure Condition		170℃/8sec.	170℃/8sec.	180℃/2sec.
IC : MonzaR6 antenna : Al / PET frequency range 800MHz ~ 1000MHz	Adhesive Strength	above 12N	above 12N	above 12N
	85℃/85%RH/336Hrs.	±2dBm	±2dBm	±2dBm
	-40℃/30min.⇔85℃/30min. 336 Cycle	±2dBm	±2dBm	±2dBm
	121℃/100%RH/10Hrs.	±2dBm	±2dBm	±2dBm

Enlarged photograph of the outer tangent circle

IC: I-CODE SLI
Antennas: Aluminum
ACP: RL0407
(Au-coated resin particles)
Production conditions:
170℃/170℃, 2.5N, 10sec

SEM image of the cross section of the conductive particles after packaging



- High reliability is exhibited on various labels such as HF AND UHF.
- High adhesion and high reliability are exhibited on various antennas such as copper, aluminum, and silver paste.
- In the high temperature and high humidity reliability test (85℃/85%RH/168 hrs) using an HF antenna, a small change rate in Q value was also obtained.
- After the reliability test, the change rate of Q is below 10% on average.

DO/Al composites: suitable for microelectronics and optoelectronic products.

Suitable for the manufacture of heat sinks, flanges, housings, laser covers and base plates.
Excellent heat dissipation combined with high thermal expansion of semiconductor chips makes DO/Al materials very suitable for use in packaging of microelectronics and optoelectronic products required for high thermal conductivity.
Because the thermal conductivity is as high as 500W/mK and the coefficient of thermal expansion is only 6.1 ppm/K (40 to 100℃), the DO/Al heat sink can provide a very attractive solution for most packaging types.
The thermal expansion coefficient of the DO/Al heat sink is perfectly matched to semiconductor chip materials such as Si, GaN, GaAs, and SiC.

Advantage

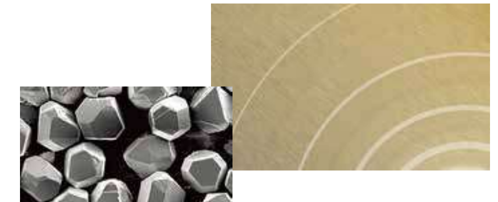
Thermal conductivity 500W/mK
- Coefficient of thermal expansion(CTE) matches with different semiconductor materials
- Heat sink can be nickel plated or chemical plated
- Very high maching accuracy and excellent surface planarization
- Easy processing guarantees rapid sample preparation and sample reworkability.
- Specialized engineering and technical personnel assist costomers in designing application components.
- Plane, irregular shape, step geometry processing can be completed.

Application

- Power device packaging
- RF, microwave,centimeter wave products
  - LDMOS FET - HBT - MESFET
  - Bipolar - HEMT - MMIC
- Laser diode
  - Pluse - CW - Single Emitters Bars
- Complex machined housing for the production of optoelectronic products
  - Amplifiers - Receiver - Transmitters
  - Tunable Lasers Modulators
- Light-emitting diodes and detectors

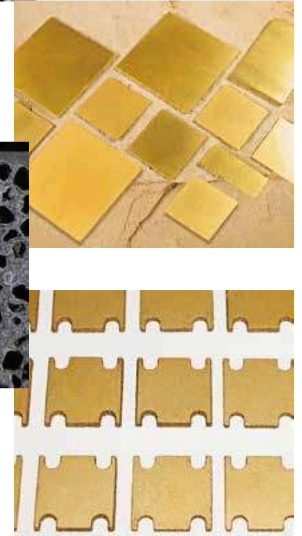
DO/Al Material Property

Thermal conductivity: 500W/mK
Coefficient of thermal expansion(CTE)
40-100℃: 6.1 ppm/K
40-200℃: 7.1 ppm/K
40-300℃: 7.9 ppm/K
Density: 3.17 g/cc
Flex strength: 206 MPa
Modulus: 309 GPa
Specific heat: 0.62 J/gK
Conductivity: 3.7 x 10^{-7}ohm•m
Melting point: 570℃
Diamond content: 57(Vol%)



Precision Machining Property

Tolerance
Plane direction ±0.1-0.15mm
Thickness direction ±0.1mm
Surface planarization(Ra)
0.30μm before electroplating
0.40μm after electroplating



Metallization Property

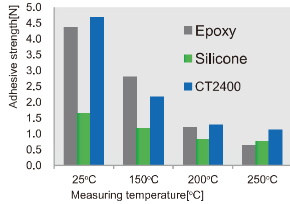
Bottom plating
Chemical nickel-plating 1-10μm±0.5μm
Outer plating
Chemical gold-plating 0.03-0.1μm
Gold plating 0.5-5μm±0.5μm

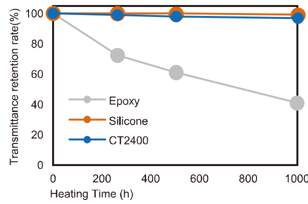
Transparent Adhesive for LEDs

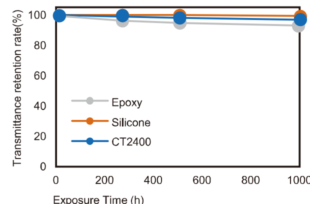
With excellent transparency and high bonding characteristics compared with epoxy resin adhesive

Applications

- With unique formula of silicon resin
- With high adhesion as well as high heat resistance and UV resistance







Test condition:
Die:0.3mm Si
Lead frame: Ag-plated Cu frame
Cure condition:150°C, 2.0h
Die shear strength with Ag-plated Cu

Test condition:
Thickness:1mm
Cure condition:150°C, 2.0h
Transmittance:400nm
Aging condition:150°C in Air
Transmittance aster 150°C aging

Test condition:
Thickness: 1mm
Cure condition: 150°C, 2.0h
Transmittance:400nm
UV irradiator: High pressure mercury lamp
300nm <, 20nw/cm²
Transmittance aster UV aging

Siliver Paste for LEDs

Standard adhesive for LED chips

Item	Expoxy adhesive	Expoxy silicon	Silicones	CT2400
Transparency	X	O	◎	◎
Temperature resistance	X	X	◎	◎
UV resistance	X	X	◎	◎ λ < 300nm NG
Adhesion	◎	O	X	◎
Cost	◎	O	X	O

Comparison of the properties of new silica gel

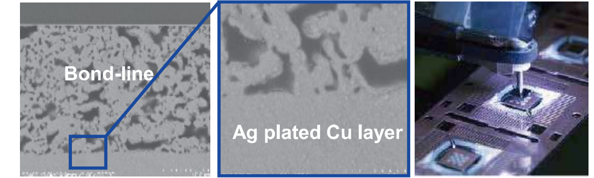
Item			Unit	CT220HK-S1	CT227L	CT285	CT285LT	CT2400	CT2403	Conditions
Characteristic			-	Standard	High adhesive strength	High thermal conductivity	High thermal conductivity & Low temperature	High adhesive strength	Low Viscosity	
Cure condition			-	150℃@1.5h	150℃@1.5h	150℃@0.5h/ 200℃@1.5h	160℃@1.5h	150℃@2h/ 180℃@1h	160℃@2h	Oven
Liquid	Viscosity		Pa•s	115	85	100	100	40	32	$0.5min^{-1}$
	Thixotropic index		-	5.0	7.0	6.0	6.5	3.3	3.0	$0.5/5min^{-1}$
Cured	Volume resistivity		ohm.cm	$1x10^{-4}$	$7x10^{-5}$	$9x10^{-6}$	$3x10^{-5}$	-	-	R.T.
	Modulus		Gpa	6.3	6.5	16.5	15.0	2.0	2.0	DMA(25℃)
	Tg		℃	115	140	160	110	164	132	DMA
	Thermal conductivity		W/mK	2	2	25	25	0.15	0.2	Laser flash
	Die shear strength	25℃	N	1.9	30	40	50	4.7	7.3	
		260℃		1.0(350)℃	10	25(300)℃	25	1.2	1.4(200)℃	
				0.3X0.3mm die Ag plated Cu	1X1mm die Ag plated Cu	2X2mm die Ag plated Cu	2X2mm die Ag plated Cu	0.3X0.3mm die PPF	0.3X0.3mm die Ag plated Cu	
Application			-	LED	LED	LED/Power IC	LED/Power IC	LED	LED	

Sintered Nano-Silver Paste CT2700R7S

• High thermal conductivity • Electrical conductivity • Semiconductor devices bonding materials

Applications
- Bonding materials for power devices
- Bonding materials for high power LEDs
- Bonding material replacing high temperature lead solder

Features
- Can achieve high thermal conductivity of 200W/m•K or more
- Can be bonded by low temperature pressure free process



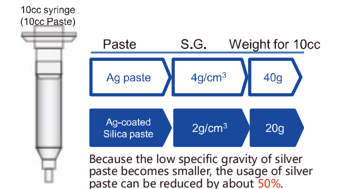
Items	Data	Description
Cure condition	200 ℃, 90 min	No pressure in air
Viscosity	91 Pa.s	E type viscometer 0.5rpm @25°C
Elastic modulus	21.6 GPa	Tensile test
Coefficient of thermal expansion	20 ppm / °C	TMA method
Thermal conductivity	200 W/mK	Laser flash method
Volume resistivity	4.2μΩcm	Four point probe method
Shear strength at 260 °C	> 30MPa	Die back side Au/Ag plated Cu LF
Applicable adhered: Ag, Au, Bare Cu		

Low-Stress Silver Paste CT2001E

Use low-stress, low specific gravity silicon oxide filling and silver plating conductivity to achieve lightweight and high reliability.

- **Low moisture absorption**
- **High adhesive strength**
- **Low stress**

In order to improve reliability, starting from the above three points, aiming at improving reliability, the formulation of the resin has been optimized and the reliability of the original product has been improved.



Because the low specific gravity of silver paste becomes smaller, the usage of silver paste can be reduced by about 50%.

Reliability

<Test condition>
Package：LQFP100pin(Lead Frame Cu)
Die:7x7mm(Si)
Cure Condition:Ramp up 30min to 135deg.C,holding 2h
Reflow:260deg.C x 3 times
TCT(1500cycles)High Temp:150deg.C/10min
Low Temp:-50deg.C/10min
HTS(1,500h)Temp:150deg.C

General Property

Typical Cure Condition（标准条件）：
Ramp up 30min to 135deg.C,holding 120min

Alternative Cure Condition（替代条件）：
Ramp up 30min to 150deg.C,holding 60min

Item/项目		Unit	CT2001E	Test method
Filler Type/粉料类型		-	Ag coated Silica	-
Specific Gravity(paste)/胶比重		-	1.7	-
Viscosity*1/粘度		Pa•s	30	E-type viscometer $0.5min^{-1}$(3°cone)
Thixotropic Index*2/触变性		-	2.0	
Vertical Volume Resistivity/体积电阻率		Ω•cm	$6x10^{-1}$	-
Thermal Conductivity/热传导率		W/m•K	0.5	-
Dielectric Constant/介电常数		-	-	(Ref;Conductive)
Ionics 离子不纯物	Na	ppm	3.0	Atomic absorption
	Cl		20.0	Icon chromatography
Moisture Absorption*3/吸湿率		vol%	1.6	-
Adhesive strength*4 接着强度	25deg.C	N/4x4mm	>19.6	Pull Strength
	260deg.C		7.6	
Elastic Modulus 弹性模量	25deg.C	Mpa	6,700	DMA
	260deg.C		30	
Tg		deg.C	50	
CTE 热膨胀系数	α1	ppm/deg.C	30	TMA
	α2		90	

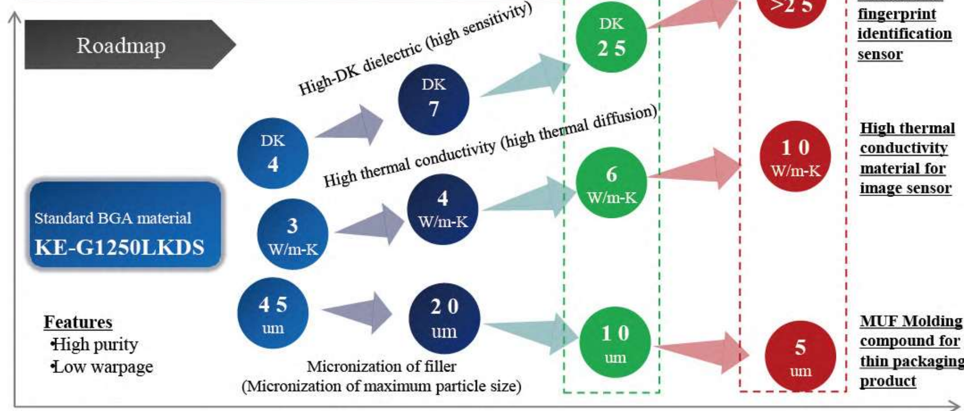
*1：$0.5min^{-1}$ *2：$0.5min^{-1}/5.0min^{-1}$ *3：85deg.C/85%RH *4：Lead Frame：Bare Cu

Molding Compound for BGA

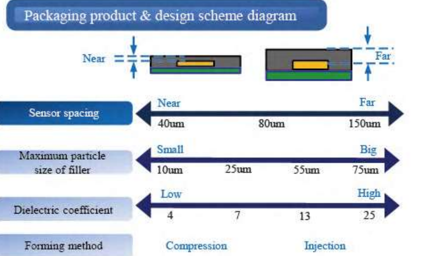
High Reliability & Low Warpage Molding Compound for BGA

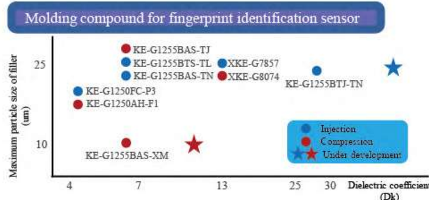
Features

High-purity molding compound for silver & copper threads and wires
- Unique forming shrinkage control technology for low warpage;
- Corresponding design schemes as needed:
  - High-DK dielectric constant type for fingerprint identification;
  - High thermal conductivity type (6W/mK) with high thermal dissipation;
  - Most proper filler particle size selected for thin packaging products;
  - Type for MUF

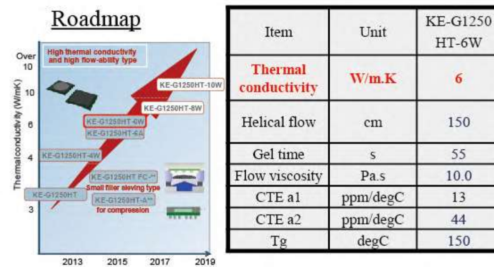


High-DK Delectric Molding Compound for Fingerprint Identification





High Thermal Conductivity Molding Compound for Image Sensor



Item	Unit	KE-G1250 HT-6W
Thermal conductivity	W/m.K	6
Helical flow	cm	150
Gel time	s	55
Flow viscosity	Pa.s	10.0
CTE a1	ppm/degC	13
CTE a2	ppm/degC	44
Tg	degC	150

Reliability	KE-G1250 HT-6W
HAST (130ºC/85%RH/192h)	Pass
TCT (-55ºC ~ 125ºC/1000 cycles)	Pass
PCT (121ºC, 100%RH/96h)	Pass

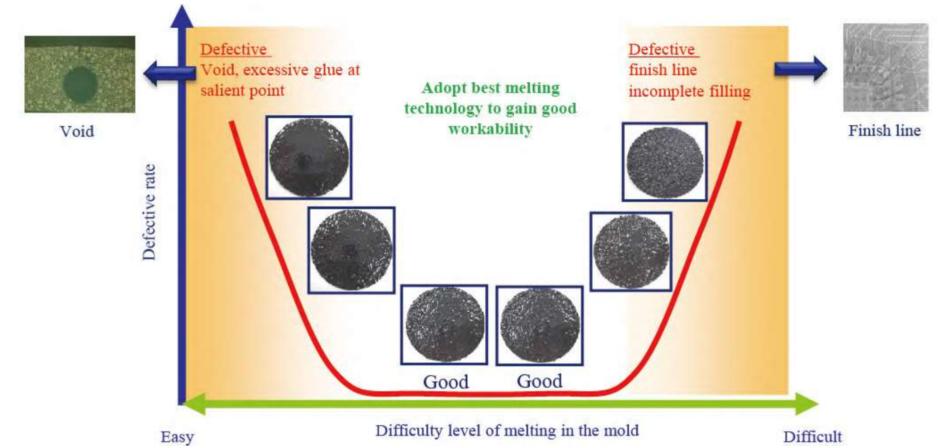
Molding Compound for Compression

Supported By Technology of Melting Control for Good Molding

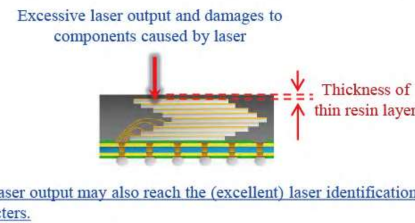
Features

- Supported by technology of melting control for good packaging and molding;
- Supported by unique technology of shrinkage control for low warpage;

- Corresponding design schemes as needed:
  - High-DK dielectric constant type for fingerprint identification;
  - Most proper filler particle size selected for thin packaging products;
  - Type for MUF, SIP module

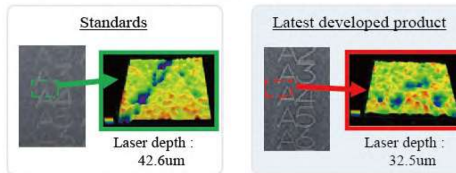


Promotion of Laser Identification Characters of Thin Packaging Products



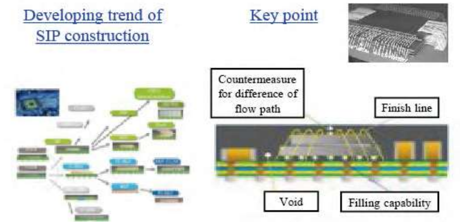
Low laser output may also reach the (excellent) laser identification characters.

Improvement of laser identification



Even low laser output may reach good identification characters.

Materials for SIP Module



Item	Filling Capability	Void	Warpage
Reason	Difference of flow path in packaging product Narrow flow path		High-density packaging of internal component
Countermeasure	Optimization and high flow of filler particle		Optimization and low elasticity of filler
Confirmation	Simulation	Viscosity property	Simulation

Molding Compound for Discrete Device

Development Roadmaps Due to Rich Environment-Friendly Materials

Features

- Various types of environment-friendly materials for discrete device;
- Favorable reliability for SiC product (especially excellent reliability under high temperature);
- Thorough desulphurization for good surface packaging and reliability (for DPAK/D2PAK)

Package	TO	Diode , TO-92	DIP	Small Signal	Full Pack	DPAK
EMC	KE-G300BH KE-G300S-1 KE-G300HV	KE-G300HV KE-G300FA	XKE-G7039	KE-G300FF KE-G300FR KE-G300FY	KE-850 KE-G850 KE-G1250HT	KE-G3000DMX KE-G8503
Feature	- High adhesion for Ni-plate - Halogen Free -Good moldability	- Halogen Free - Good moldability	- Halogen Free - Good moldability - High reliability	- Halogen Free -Good moldability - High reliability	- Thermal conductivity -Halogen Free - Good moldability - High reliability	- High adhesion -Low water absorption - Low stress

Molding Compound for SiC

Device feature:

- Special for high-power device;
- Higher working temperature;
- Higher voltage endurance

Requirements for features of molding compound:

- High thermal conductivity;
- High voltage endurance

KE-G300S-1 is featured by high purity and high adhesion .

Molding Compound for DPAK/D2PAK

Device feature:

- Special for high-power device;
- Corresponding surface packaging;
- High reliability (for vehicle-mounted)

Requirements for features of molding compound:

- High reflux endurance (MSL 1)
- Low impurity (ion) rate

XKE-G8503 has newly developed materials of low chlorine ion, complete removal of sulphur-containing substance and excellent reflow endurance.

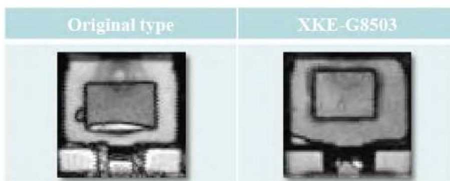
■ Reliability (KE-G300S-1)

Packaging product; TO-247 Chip; SiC

Reliability	Condition	Result
HTRB	Tj = 200℃, Bias = 960V	Pass
HTGB	Tj = 200℃, Bias = 22V	Pass
HTSL	TA = 200℃	Pass
AC	Pa = 2 atm / TA = 121℃	Pass
TC	TA = -65 ℃~ 150℃	Pass

■ Reflow endurance (XKE-G8503)

Condition: 85℃/85%/168h 260℃ max 3 times

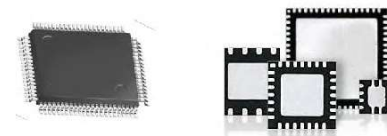


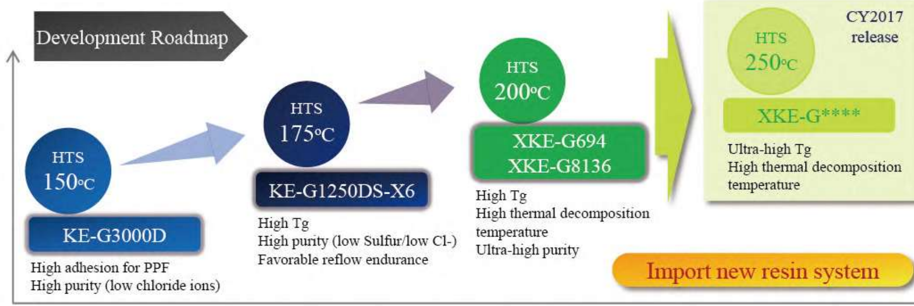
Molding Compound for High-Reliability L/F

Special for Automotive

Features

- Thermal endurance enhanced for higher reliability under high temperature;
- Thorough desulphurization for improving HTS performance;
- Corresponding design schemes as needed:
  - Copper wire (high purity);
  - QFN (low warpage);
  - High adhesion for L/F





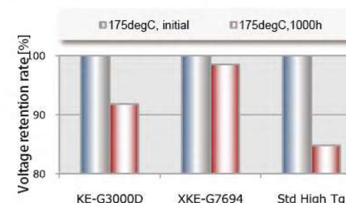
Molding Compound of High Thermal Endurance Ability

		KE-G3000D	XKE-G7694	XKE-G8136
Melting viscosity	Pa s	9	10	7
Helical flow	cm	120	150	200
Gel time	sec	20	35	40
Modulus of elasticity (260℃)	GPa	0.9	1.2	0.9
Tg	℃	125	175	170
MSL (Cu frame)	-	MSL2	MSL2	MSL1
Chloride ion concentration	ppm	8	8	8

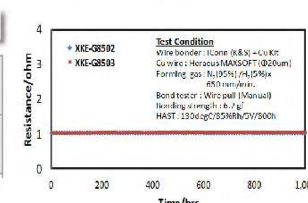
Desulphurized Molding Compound

		XKE-G8502	Kyocera existing products
Melting viscosity	Pa s	7	13
Helical flow	cm	180	195
Gel time	sec	34	31
Modulus of elasticity (260℃)	GPa	0.5	0.7
Tg	℃	120	118
MSL (Cu frame)	-	MSL1	MSL2
Chloride ion concentration	ppm	3	7

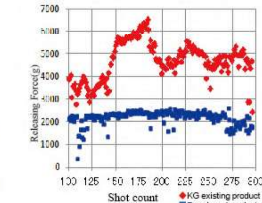
■ **Reliability data (HTRB: 175℃, Voltage: 1200V)**



■ **Reliability data (HAST)**



■ **Workability**



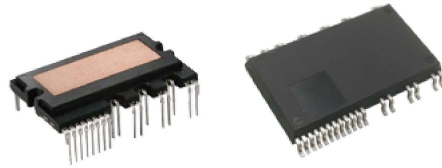
Molding Compound for IPM

Well-formed molding compound for IPM obtained by controlling the melting property

Advantage

- The optimal EMC matching warpage and encapsulation stress was obtained by simulation system
- The ability to adjust the fluidity and melting characteristics through technology
- High Tg(~210℃) and adjustable CTE, bending modulus and shrinkage rate were obtained by technology

Application



General Property

EMC		KE-G1270-T	KE-G1250LM-S	KE-G3000HT-N	KE-G1220AM-4F	KE-G4800HT	KE-G3000HT-5N
Molding type		Transfer	Transfer	Transfer	Transfer	Transfer	Transfer
Tablet/powder		Tablet	Tablet	Tablet	Tablet	Tablet	Tablet
Formulation							
Resin system	—	Modified Multifunctional	Modified Multifunctional	Hydrophobic	Modified Multifunctional	Modified Multifunctional	Hydrophobic
Filler content	WT%	86%	90%	90%	90%	90%	92%
Filler shape	Spherical / Crush	Spherical	Spherical	Spherical	Spherical	Spherical	Spherical
Filler Average Size	um	75	75	75	55	75	75
Filler Size	um	15	17	12	12	10	12
Properties							
Spiral flow (100kgf)	cm	125	90	—	120	120	—
Spiral flow (70kgf)	cm	—	—	185	—	—	120
Gel time	s	40	35	55	32	20	50
Flow viscosity	Pa.s	15	22	7	17	15	15
CTE a1	10-6/℃	10	7	12	8	13	12
CTE a2	10-6/℃	40	27	42	27	51	38
Tg	℃	185	155	145	145	180	160
Flexural strength 25℃	Mpa	175	185	175	180	110	150
Flexural strength 260℃	Mpa	—	—	21	—	—	22
Flexural modulus 25℃	Gpa	20	25	32	28	27	36
Flexural modulus 260℃	Gpa	—	—	0.8	—	—	1.3
Hot hardness Barcol	—	84	84	84	84	84	84
Specific gravity	—	1.95	2.03	2.87	3.1	3.1	3.15
Water absorption PCT	%	0.4	0.3	0.27	0.35	0.35	0.27
Water absorption Boiling	%	0.25	0.16	0.15	0.18	0.21	0.15
Mold shrinkag	%	0.07	0.04	0.25	0.05	0.12	0.13
Volume resistivity @150℃	Ω cm	5.00E+12	5.00E+12	5.00E+12	5.00E+12	5.00E+12	5.00E+12
Thermal conductivity	**W/mK**	**0.9**	**1**	**3**	**0.9**	**4.3**	**5**
Impurity							
Cl-	ppm	15	15	10	15	20	10
Na+	ppm	2	2	10	2	15	10
pH	—	5	5.5	6	6	6.5	6
Ec	ms/m	3	3	5	5	4	5

Molding Compound for MUF SiP

High reliability and multiple product series are available

Advantage

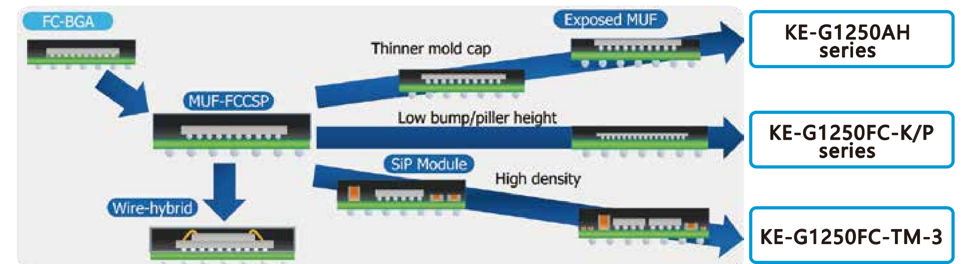
- Filler Size as low as 5μm
- Good adhesion between substrate and component
- Match with gold, silver and copper wire
- Thermal conductivity MUF type optional
- Transfer & Compression multi-process Products available

SiP (Filler size : 20um)
Main uses : Package with various components

KE-G1250FC-20G
For wire-hybrid

KE-G1250FC-K series
For FC with component

KE-G1250FC-EH series
For wire-hybrid with component



Reliability

Test PKG: FC-BGA
Die Size: 7 x 5 mm
Bump height: 58μm

Condition	KE-G1250FC-K	KE-G1250FC-K2	KE-G1250FC-K3
L2a	0/20	0/20	0/20
L3 + uHAST 192hrs	0/20	0/20	0/20
L3 + TC x 500 x 1000	0/20	0/20	0/20
L3 + HTST 500hrs 1000Hrs	0/20	0/20	0/20

Reliability test result showed that no abnormality was found.

Metal Hydroxide Flame Retardant Type for General SMD

KE-G7530 series
KE-G320 series

- OCN type resin
- Excellent reliability(MSL,HTSL)

Flame Retardant Free Type High Reflow Resistance

KE-G280 series

- UL94 V-0
- Excellent reliability(MSL,HTSL)
- High adhesion strength to leadframe

Legend: ● Existing Customer ● Suitable ▲ Applicable ✖ Not Suitable

Tantalum Capacitor	Niobium Capacitor	Aluminum Capacitor	Ceramic Capacitor	Product	Notes
Existing Customer	Existing Customer	Applicable	Suitable	KE-G7530B7	55um Filler Cut Size; High Tg
Existing Customer	Not Suitable	Applicable	Suitable	KE-G7530Y7S	Gold Colour EMC
Existing Customer	Suitable	Applicable	Suitable	KE-G320FR7	75um Filler Cut Size
				KE-G320FR7	45um Filler Cut Size
Existing Customer	Suitable	Existing Customer	Existing Customer	KE-G320L	High Flowability
				XKE-G320L-Imp4	Low Modulus Type
Existing Customer	Suitable	Suitable	Suitable	KE-G280P	Low CTE; Low Moisture Absorption; MSL1

Advantage

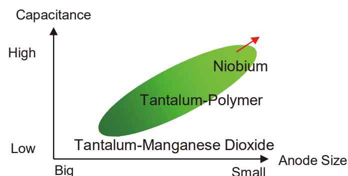
Requirement to Capacitor → Requirement to EMC

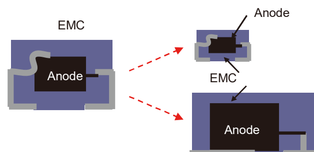
Electrical Characteristics:
Low ESR fluctuation

Capacitance
High
Niobium
Tantalum-Polymer
Low
Tantalum-Manganese Dioxide
Anode Size
Big
Small

➢Reduce internal stress to anode
Low CTE
Low moisture absorption
Low viscosity

Package Trend:
Miniaturization
Bottom electrode





➢Good fillability in narrow place
(Small silica cut size is available)

➢Good crack resistance in thin mold cap

Epoxy Molding Compound for Capacitors

Product Name	Viscosity (Pa s)	Tg (°C)	CTE α1 (ppm)	CTE α2 (ppm)	Water Absorption (%)
KE-G7530B7	30	181	22	66	0.81
KE-G320L	15	160	10	42	0.38
KE-G280P	20	125	9	33	0.32
	Low Viscosity		Low CTE		Low Absorption

General Properties

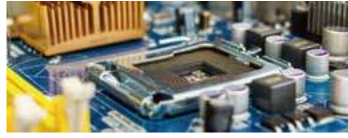
Model Type	Epoxy Resin	Hardener	Filler			Flame Retardant	Spiral Flow	Gel Time	Flow Viscosity	Specific Gravity	CTE1	CTE2	Tg	Flexural Strength	Flexural Modulus	Water Absorption	Mold Shrinkage	MSL
	Type	Type	Content	Shape	Sieve Size	Type	175 °C	175 °C	175 °C	-	α1	α2	Tg	25 °C	25 °C	PCT	Aft PMC	
							[cm]	[s]	[Pa.s]	[-]	[ppm]	[ppm]	[°C]	[MPa]	[GPa]	[%]	[%]	
KE-G280 P	OCN + Hydrophobic	PN + Hydrophobic	88%	Spherical	75um	No	85	24	20	2.00	9	33	124	170	27	0.32	0.25	MSL1
KE-G320 FR4	OCN	PN + Hydrophobic	83%	Spherical	45um	Metal Hydroxide	90	23	14	1.94	14	48	146	140	19	0.55	0.32	MSL 2A
KE-G320 FR7	OCN	PN + Hydrophobic	83%	Spherical	75um	Metal Hydroxide	92	23	11	1.94	14	46	149	140	19	0.53	0.32	MSL 2A
KE-G320 L	OCN	PN + Hydrophobic	86%	Spherical	75um	Metal Hydroxide	120	24	15	1.96	10	42	160	143	22	0.38	0.23	MSL 2A
XKE-G320 L-Imp4	OCN	Hydrophobic	78%	Spherical	75um	Metal Hydroxide	110	21	8	1.86	18	63	152	154	14	0.50	0.48	MSL 2A
KE-G7530 B7	OCN	PN	71%	Spherical + Crush	55um	Metal Hydroxide	81	20	30	1.78	22	66	181	152	13	0.81	0.43	MSL 3
KE-G7530 Y7S	OCN	PN	71%	Spherical + Crush	55um	Metal Hydroxide	80	20	30	1.81	22	68	180	144	14	0.75	0.48	MSL 3

1、This data is given for reference only.
Kyocera reserves the right to change / modify the product without prior notice.
Full TDS will be provided upon request.
2、Recommended post mold cure time (PMC) is 175℃ / 8 hours.
3、Thaw for 24 hours based on per 15kg(one carton).
4、Worke life is 48 hours @ 25℃.
5、Shelf life is 6 months when storage conditon is under 5℃.
6、All products are UL94 V-0 certified.

Die Attach Epoxy Adhesive

Die Attach Epoxy Adhesive

We can provide all kinds of epoxy and cyanate adhesive, which can be applied to all kinds of substrate and components, chip bonding; Compatible with a variety of mismatched CTE materials. Formulations can be developed and customized according to customers' specific application requirements.



High Temperature Stability Series

Product	Dielectric Strength (Volts/mil)	Tg (℃)	Lap-Shear Strength (psi)	Device Push-off Strength (psi)	Hardness (Shore)	Thermal Conductivity (W/m-℃)	Linear Thermal Expansion Coeff. (ppm/℃)	Maximum Continuous Operation Temp. (℃)	Avg. Viscosity	Characteristics
MC7865	>1000	220	>1000	>2500	95D	>1.8	28	<200	20,000cp (5.0rpm,25℃)	low CTE, low dielectric constant and loss, high thermal conductivity
MC7883	>750	240	>1000	>2500	95D	>1.0	29	<300	20,000cp (5.0rpm,25℃)	low CTE, low ionic impurities, high temperature stability
MC7885	>1000	240	>1000	>2500	95D	>1.8	19	<300	20,000cp (5.0rpm,25℃)	low CTE, low ionic impurities, high thermal conductivity
MC8880	-	240	>1000	>2500	80D	>9.0	23	<300	65,000cp (5.0rpm,25℃)	low CTE, high thermal conductivity, high electrical conductivity
MC8880-S	-	240	>1000	>2500	80D	>9.0	23	<300	10,000cp (5.0rpm,25℃)	low CTE, high thermal conductivity, high electrical conductivity

High Thermal Conductivity Series

Product	Dielectric Strength (Volts/mil)	Tg (℃)	Lap-Shear Strength (psi)	Device Push-off Strength (psi)	Hardness (Shore)	Thermal Conductivity (W/m-℃)	Linear Thermal Expansion Coeff. (ppm/℃)	Maximum Continuous Operation Temp. (℃)	Avg. Viscosity	Characteristics
ME7155-AN	>750	-25	>900	>1800	80A	3.6	120	<150	240,000cp (0.5rpm,24℃)	stress Free, electrically insulating and ultra high thermally conductive
ME7155-CD	>750	-25	>1000	>1800	80A	11.4	120	<150	230,000cp (0.5rpm,24℃)	solvent Free, reworkable, ultra high thermally conductive, electrically insulating
MC8880-FPSR	-	240	>1000	>2500	80D	>21.6	23	<300	100,000cp (5.0rpm,25℃)	low CTE, low moisture absorption, low ionic impurities, high electrical conductivity

High Electrical Conductivity Series

Product	Dielectric Strength (Volts/mil)	Tg (℃)	Lap-Shear Strength (psi)	Device Push-off Strength (psi)	Hardness (Shore)	Thermal Conductivity (W/m-℃)	Linear Thermal Expansion Coeff. (ppm/℃)	Maximum Continuous Operation Temp. (℃)	Avg. Viscosity	Characteristics
ME8512	-	52	>1200	>2400	-	7.9	40	<150	15,000cp (5rpm,25℃)	high strength, solvent free, electrically conductive
ME8550	-	30	>900	>1800	90A	7.9	120	<150	40,000cp (5.0rpm,24℃)	low ionic silver filled, reworkable, electrically and thermally conductive flexible

Low Stress Series

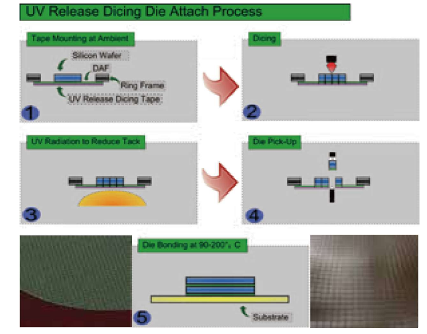
Product	Dielectric Strength (Volts/mil)	Tg (℃)	Lap-Shear Strength (psi)	Device Push-off Strength (psi)	Hardness (Shore)	Thermal Conductivity (W/m-℃)	Linear Thermal Expansion Coeff. (ppm/℃)	Maximum Continuous Operation Temp. (℃)	Avg. Viscosity	Characteristics
ME7150	>750	-25	>1000	>1800	80A	0.17	180	<150	50,000cp (0.5rpm,24℃)	tough and reworkable, solvent free, flexible and good electrical insulation
ME7150-SC	>750	-20	>1500	>2400	80A	0.2	120	<150	20,000cp (5.0rpm,25℃)	molecularly flexible, solvent free, snap curable, insulating
ME7155-DA	>750	-25	>1000	>2000	80A	1.7	120	<150	20,000cp (5.0rpm,25℃)	stress free, reworkable, thermally conductive, electrically insulating
ME7155-M	>750	-25	>1000	>1800	80A	1.7	120	<150	33,000cp (5.0rpm,25℃)	stress free, reworkable, thermally conductive, electrically insulating
ME7156	>750	-25	>1000	>2400	80A	1.7	120	<150	144,000cp (0.5rpm,24℃)	stress free, reworkable, thermally conductive, electrically insulating
ME7159-M	>750	-40	>1000	>1500	80A	21	120	<150	50,000cp (5.0rpm,25℃)	molecularly flexible,low thermal resistance,ultra high thermal conductivity
ME8456	-	-20	>1000	>2500	80A	7.9	130	<150	130,000cp (0.5rpm,25℃)	stress free, reworkable, electrically conductive
ME8456-DA	-	-20	>1000	>2000	80A	7.9	100	<150	20,000cp (5.0rpm,25℃)	flexible, low temperature curable, electrically conductive

Die Attach Film & Dicing Die Attach Film

Die Attach Film(DAF)

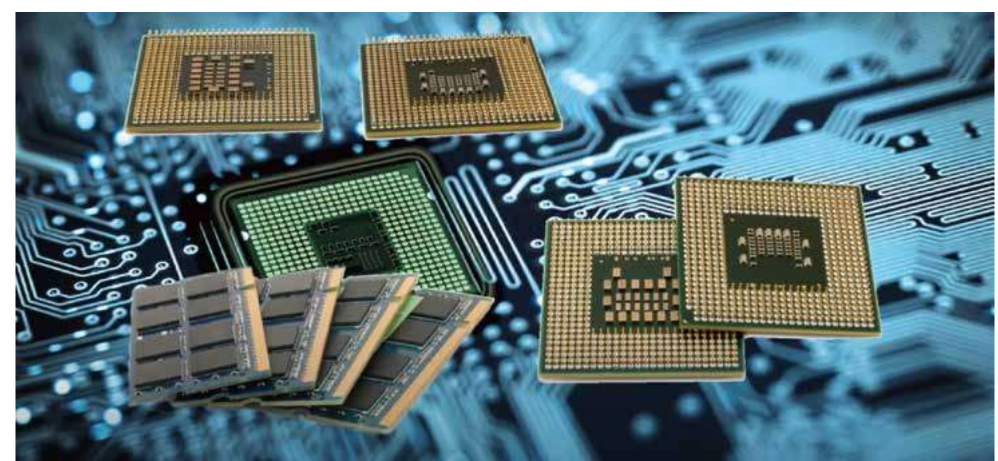
Dicing Die Attach Film(DDAF)

The flash memory 3D packaging suitable for laminated chip process can realize an ultra large capacity, and die attach film (DAF) has become increasingly popular even necessary in laminated chip process. The main driving force comes from the fact that die attach film(DAF) can provide thinner insulating attached layers and can improve the interfacial stress of laminated chips with bond-line pitches of 8-10 microns or less to achieve a more miniaturized scheme or mobile devices.



Physical Characteristics of Die Attach Film(DAF)

Product	Features	Resistivity (ohm-cm)	Thermal Conductivity (W/m•℃)	Shear Force (psi)	Glass Transition Temperature (℃)	Thickness
ESP7660-HK	Vuring does not require external pressure and fixtures, Meeting MIL-STD-883F 5011.4 Passed the reliability test of laminated chips	>1 x 10^{14}	>0.3	>2,500	175	10µ 20µ 40µ
ESP7666-HK	Vuring does not require external pressure and fixtures, meeting MIL-STD-883F 5011.4 Low thermal resistance, high moisture resistance	>5 x 10^{14}	>4.0	>2,500	175	20µ 40µ
ESP8660-HK	Vuring does not require external pressure and fixtures, meeting MIL-STD-883F 5011.4 Low thermal resistance, high moisture resistance	>4 x 10^{-4}	>8.0	>2,500	175	20µ 40µ
ESP8450	Superior flexibility and strength Suitable for ultra-large chips Meeting MIL-STD-883F 5011.4 Low thermal resistance, high moisture resistance	>3 x 10^{-4}	>6.4	>1,500	-60 / 50	20µ 40µ



Solder Wire

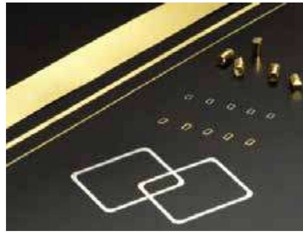
In the assembly of semiconductor packages, including power transistors, intergrated circuits and optical and microwave devices, using a variety of solder / brazing materials based on gold, tin and other materials, we offer a variety of high quality solders to achieve low void bongding, to form strips, lines, wafers, balls and other shapes through precision finishing.

Hard Solder

Wafers(disks or frames, etc.), strips, balls, lines, spindles, etc.

Applications

- Sealed ceramic packaging
- Bonding of compound semiconductor chips
- Bonding of ceramic substrate and heat sink
- Used as evaporation material on the back of the chip



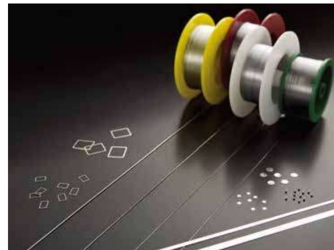
Au	
Au-Sn System	Au/20Sn（E）, Sn/10Au（E）
Au-Ge System	Au/7.4Ge, Au/12Ge
Au-Si System	Au/1Si, Au/2Si, Au/3.15Si（E）
Au-Sb System	Au/1Sb
Al-Si System	Al/12Si

Soft Solder

Lines, strips, balls, wafers, spindles, etc.

Applications

- Chip bonding of power devices
- Chip bonding and component assembly of compound semiconductors and optics
- Sealing of multiple packaging



Pb-Sn System※	Pb/3Sn, Pb/5Sn, Pb/10Sn
Pb-Sn-Ag System※	Pb/5Sn/1.5Ag（E）, Pb/2.5Ag/2Sn, Pb/10Sn/2Ag
Pb-In-Ag System※	Pb/5In/2.5Ag
Sn-Sb System	Sn/3.5Sb, Sn/8.5Sb
Sn-Ag System	Sn/3.5Ag（E）, Sn/5Ag, Sn/10Ag
In-Sn System	In/48Sn（E）
In-Ag System	In/3Ag（E）, In/10Ag

STAYDRY® Hydrogen Getter & Moisture Absorber

-Designed for-

- Hermetic packages
- Withstand harsh service environments
- High reliability applications
- Protect sensitive electronics from moisture & hydrogen

Hydrogen Getter

STAYDRY® H2-3000
Film form hydrogen absorber with high capacity

STAYDRY® H2-3000PSA
Film version with Pressure Sensitive Adhesive (PSA) for easier attach.

Key Features

- Eliminates RV attach and primer process
- Eliminates squeeze out of RTV silicone
- Reduces ~ 16-24 hours of staging/curing and production time
- Meets MIL – STD 883 Method 5011 testing
- Passes ASTM E595 outgassing
- Standards thickness available: 8, 10, 20, 30 mil
- Special thicknesses, custom preforms, and laser cut preforms are available upon request

Moisture Absorber

STAYDRY® Z20
Fast absorbing space grade film absorber with PSA attach adhesive - NEW PRODUCT

STAYDRY® HiCap™ 2000
Leading moisture getter for telecom and medical applications.

Key Features

- High adhesive strength to: stainlesssteel, titanium, Kovar, gold plated Kovar, nickel plated Kovar, polyimide, aluminum, ABS, acrylic, polystyrene, polycarbonate, polypropylene, silicone rubber & PET
- High heat resistance
- Low outgassing
- Low ionics
- RoHS & REACH compliant
- Excellent chemical resistance
- High level of environmental performance

Product Information

Product Name	Format	Deposition Method			Activation Require	Getter Type			Application
		Pick & Place	Dispense	Print		Hydrogen	Moisture	Particle	
STAYDRY® H2-3000PSA	Film	o			o	o	o		Hi Rel Hermetic Packages: Defense, Military, Aerospace, Telecom
STAYDRY® H2-3000	Film	o			o	o	o		Hi Rel Hermetic Packages: Defense, Military, Aerospace, Telecom
STAYDRY® HiCap™ 2000	Paste		o	o			o		Hi Rel Hermetic Packages: Military, Defense, Telecom and Medical
STAYDRY® GA2000-2	Paste		o	o	o		o	o	Hi Rel Hermetic Packages: Military, Defense, Aerospace and Telecom
STAYDRY® Z20	Film	o			o		o		Hi Rel Hermetic Packages: Military, Defense, Aerospace and Telecom

Tacky Solder Flux

TSF-6522RH is a rosin based, no-clean tacky soldering flux formula designed to be compliant with IEC 61249-2-21 definition for halide-free materials and features:

- Highly active and good solderability performance
- High tack values and long tack life
- 6 month shelf life
- Halogen-Free formulation
- Can reflow in air and nitrogen environments
- Designed for printing and dipping applications

TSF-ULR18 is a no-clean, ultra-low residue tacky flux featuring:

- Supports Flip Chip on Lead Frame, Ultra Fine Pitch Cu Pillar Bump and Micro-Solder Bump, 2.5D, 3D Packaging
- Room temperature storage condition (0-30°C)
- Post reflow residue of below 10% wt
- Halogen-Free and Zero-Halogen formulations
- Long pot life (24 hours)
- 12 month shelf life
- Underfill and mold compound compatible
- Good wetting, solderability and solder bridging performance

TSF-WS917 is a water-soluble tacky soldering flux formula with a unique halogen-free activator system featuring:

- 12 month shelf life
- 24 hour pot life
- Room temperature storage conditions (0-30°C)
- Halogen-Free (no intentionally added halogens)
- Reflowable in air and nitrogen
- Post reflow residues are easily removed with hot DI water (40°C)
- Highly active and strong solderability performance
- Designed to attain stable viscosity even at high temperature staging(up to 50°C)

Applications

After Die Shear

After Cleaning

After Cross-section

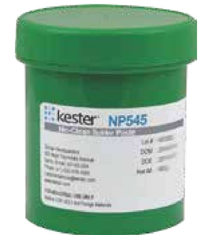
Solder Paste

NP560 IS A NO-CLEAN, LEAD-FREE, HALOGEN-FREE SOLDER PASTE FEATURING:

- Classified as ROL0 per J-STD-004B
- Halogen-Free
- Low voiding potential under QFNs
- Excellent activity and printability
- Very low graping
- Reflowable in air and nitrogen conditions
- Wide reflow profile window with good solderability on various PCB surface finish

NP545 IS A ZERO-HALOGEN, LEAD-FREE, NO-CLEAN SOLDER PASTE FORMULA DESIGNED FOR CONSISTENCY AND REPEATABILITY FEATURING:

- Zero-Halogen (none intentionally added)
- Consistent print performance to 0.5AR
- Low QFN/BGA voiding
- Excellent shelf life, 1 year in both refrigerated and room temperature
- Exceptional printing relax & recovery, and printer friendly
- Reflowable in air and nitrogen conditions
- Wide reflow profile window with good solderability on various PCB surface finishes
- Excellent cosmetics and a clear residue

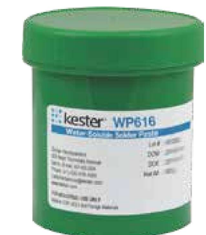


NP505-HR IS A ZERO-HALOGEN, LEAD-FREE, NO-CLEAN SOLDER PASTE FORMULA DEVELOPED SPECIFICALLY FOR HIGH-RELIABILITY APPLICATIONS FEATURING:

- Zero-halogen (none intentionally added)
- Reliable residues in harsh modified SIR testing with forced condensation points
- Reflowable in air and nitrogen
- Consistent print performance to 0.55AR
- Low QFN/BGA voiding
- Excellent solderability across wide variety of profiles
- Compatible with most conformal coating materials
- Stable paste properties, with 12 month shelf life

WP616 IS A ZERO-HALOGEN, LEAD-FREE, WATER-SOLUBLE SOLDER PASTE FORMULA FOR BOTH NITROGEN AND AIR REFLOW APPLICATIONS FEATURING:

- Superior reflow characteristics
- Classified as ORM0 per J-STD-004B
- Excellent activity and printability
- Zero-Halogen (none intentionally added)
- Wide reflow profile window with good solderability
- Reflowable in air and nitrogen conditions
- Cleaning can be accomplished with heated de-ionized water



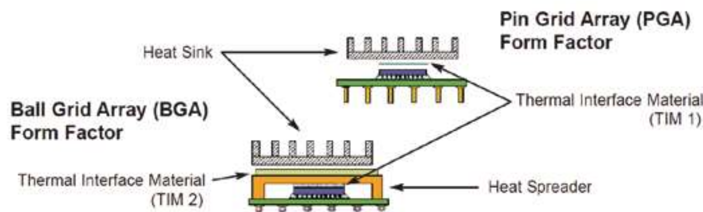
TIMS Thermal Interface Materials Solutions

TIMS Thermal Interface Materials Solutions

NON-ADHESIVE OR ONO-ORGANIC INTERCONNECT SOLUTIONS | **IN SUPPORT OF REVOLUTIONARY IMPROVEMENTS IN THERMAL DISSIPATION**

As junction resistance values steadily decrease, high performance power applications that use traditional organic based TIMs are quickly approaching their limitations.
Solder based TIMs have the high thermal conductivity properties for the next significant TIM interconnect solutions.
Whether your thermal dissipation improvements focus at the die level (TIM1) or at the interface between the heat spreader/lid to the active or passive heat sink(TIM2), Kester has created interconnect solutions to enable your next generation applications.
Kester is a global solutions supplier to the Semiconductor Packaging Sector and recently has been a recipient of Intel's prestigious Supplier Continuous Quality Improvement (SCQI) for thermal interface materials.

Common Microprocessor Package Types



Material Selection Aids

Table is a listing of the thermal conductivity of a variety of common materials used in the microelectronic and electronic assembly industries. Metal or solder based interconnect materials are currently being utilized in the most demanding thermal interface applications.

Material	Thermal Conductivity (Wmk-1)	Material	Thermal Conductivity (Wmk-1)	Material	Thermal Conductivity (Wmk-1)	Material	Thermal Conductivity (Wmk-1)
In	82	Sn60 Pb40	49.8	Sn10 Pb90	35.8	Silver Filled Phase Change	3-8
Pd	72	Sn50 Pb50	46.7	Pb	35	Boron Nitride Filled Silicone	6
In90 Ag10	67	Sn62 Pb36 Ag2	49	Al2O3(96%)	35	Ag-Filled Die Attach	1.3-5
Sn	66	Sn40 Pb60	43.6	Sn96.5 Ag3.5	33		
Au80 Sn20	57	Sn30 Pb70	40.5	Sn95 Sb5	28		
Sn63 Pb37	50.9	Sn20 Pb80	37.4	Alloy 42	15.6		

Typical Materials For TIM1 and TIM2

Melt Range		Alloy	
℉	℃	Pb-Containing	Pb-Free
450-464	232-240		Sn95 Sb5
430	221		Sn96.5 Ag3.5
354-372	179-189	Sn62 Pb36 Ag02	
361	183	Sn63 Pb37	
313	156		In99

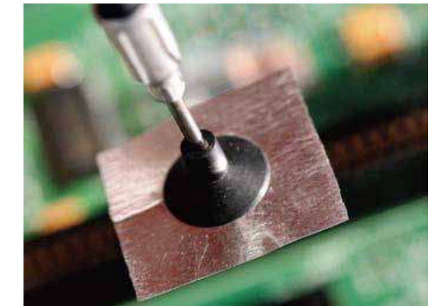
Indium Thermal Interface Materials(TIM)

Indium Thermal Interface Materials(TIM)

Thermal interface materials are useful for a variety of applications, but solder thermal interface materials(sTIM) are especially suited to high-end device cooling. To improve package reliability, it is especially important to choose the right alloy. Indium, in particular, should be considered as a sTIM because of its high thermal conductivity, compressibility (SMA-TIM), and ease of application.

Specifications

Indium Purity(%)	>99.99%
Thermal Conductivity (W/m•K)(在85℃时)	82
Melting Point(℃)	156.7℃
Dimensions(mm)	Varies by part
Peel Force(gm)	Varies by part
UV-Vis	Varies by part



Applications

Indium Preforms may be used in a variety of processes.

- Compressed Between Two Surfaces Without Reflow
  (SMA-TIM) Soft Metal Alloy-TIM
  The extreme malleability of indium allows it to minimize surface resistance – thereby increasing heat flow. The graph below demonstrates this phenomenon.
- Soldered Between Two Surfaces
  (sTIM) Solder-TIM
  Used to further improve thermal resistance, this application may require the use of a flux to reduce oxides on soldering surfaces.
- Cold-Welding
  Another process that is used to create a thermal interface involves reflowing indium preforms onto each solderable surface. The indium-coated surfaces should be cleaned and pressed together to form a fluxless cold-weld solder joint.

No-Clean Soldering Flux for Indium Solder Thermal Interface Material SE-CURE 9665(Preliminary)

- Excellent soldering especially for Indium solder preforms
- Very low voiding even after multiple reflows for Indium TIM application
- Classified as ROL0 per J-STD-004

Silicon - Aluminuim Alloy

Hermetic encapsulation for radar, high frequency and high power applications:
- CTE range from 7 to 11 ppm/deg•C
- High thermal conductivity
- Simple machining can provide precise tolerances
- Plating for soldered leads - sealing
- Soldering for sealed encapsulation

High-speed machines and meters:
- Provide low CTE for greater accuracy over a larger temperature range
- High specific stiffness can control positioning at high speeds
- Can be processed into complex shapes
- Good wear resistance, stable thermal performance

Assembly of high brightness LED wafer substrate
- CTE maching with sapphire and gallium arsenide
- High thermal conductivity
- Wafer diameter up to 300mm, polished to 10nm Ra
- Available with gold bonding layer wafer

Optical applications (laser substrates, reflectors, optical systems)
- CTE maching with different laser materials
- High thermal conductivity
- Can manufacture hermetic encapsulation
- High-precision reflector whose CTE maching with Nickel surface, possibility of internal water cooling in high power applications

	CE7	CE9	CE11	CE13	CE17	CE17M
SI CONTENT %	70	60	50	42	27	27
DENSITY g/cm3	2.40	2.45	2.50	2.55	2.60	2.60
TENSILE STRENGTH MPa	100	134	138	176	236	380
YIELD STRENGTH MPa	100	134	125	155	183	
BEND STRENGTH MPa	143	140	172	213	210	
ELASTIC MODULUS GPa	129	124	121	107	92	92
RIGIDITY MODULUS GPa	51	49	49	42	36	36
POISSON'S RATIO	0.26	0.25	0.25	0.27	0.28	0.28

Heat Spreader - CUDA & SbS-Dia

Application

- Heat spreader for RF device & electrical vehicle

Feature

- High TC: >700W/mK
- Low CTE: <9ppm/K
- High reliability:
  Thermal conductivity does not decrease after thermal shock test.

Key Technology

- Dimamond Coating Technology
- 3-D dispersion technology
- Multi-layer bonding technology
- Laser & water jet cutting technology
- Machined into holes or ears shape

Performance

Product		SbS_Mo%	SbS-Dia (New)	CUDA (New)
Structure		Cu/CuMo	Cu/CuMo/CUDA	Cu-Diamond
		Cu / CuMo / Cu / CuMo / Cu	Cu / CuMo / Cu-Dia / CuMo / Cu	Cu-Dia
CTE (ppm/K)	RT~200 ℃	11.88	9.67	10.23
	RT~400 ℃	8.65	9.57	11.66
	RT~800 ℃	6.95	8.25	14.07
Thermal Conductivity (W/m-K)		350±10%	550 ±10%	700±10%
Conclusion		• Low thermal expansion coefficient at high brazing temperature		• High thermal conductivity, conducive to heat dissipation • Low thermal expansion coefficient & high thermal conductivity in low temperature zone • All specifications can be customized, such as size, thickness and shape • Surface treatment: nickel, copper or gold plating according to customer's requirements

Heat Spreader - SbS

SbS：Strain-balanced Structure

Application

- Heat spreader for RF device & elecrical vehicle

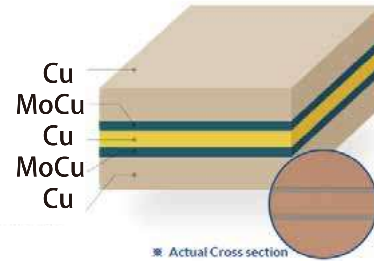
Dimension

- Plate size：112 x 115 mm²
- Thickness：0.3 ~ 5 mm

Feature

- High TC & Low CTE
- Designable TC & CTE for customizing
- Isotropic properties for TC & CTE

Structure



Performance

Properties	SbS8%	SbS16%	SbS21%	SbS32%
TC xy (W/mK)	376	352	337	304
TC z (W/mK)	348	315	295	250
CTE (ppm/K) @ 800℃	6.95	6.95	7.98	6.76
CTE (ppm/K) @ 400℃	8.65	7.44	8.29	6.87
CTE (ppm/K) @ 200℃	11.88	8.41	9.11	7.15
Electrical Conductivity (%IACS)	93.6	87.2	83.2	74.4
Density (g/cm³)	9.06	9.16	9.22	9.36
Tensile Strength (Mpa)	249	294	322	384

* % indicates the weight % of Molybdenum in the total volume of the heat spreader.

Surface Finishing：Cu、Ni、Au

Heat Spreader - CNG

CNG：Copper and Graphite

Application

- Heat spreader for RF device & elecrical vehicle

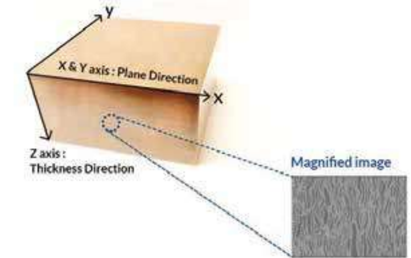
Dimension

- Bulk size：115 mm³

Feature

- High TC & Low CTE in two axes
- Anisotropic properties for TC & CTE

Structure



Performance

Properties	Values
TC x (W/mK)	40
TC y (W/mK)	630
TC z (W/mK)	630
CTE x (ppm/K) @ 800℃	25.59
CTE y (ppm/K) @ 800℃	5.96
CTE z (ppm/K) @ 800℃	5.96
Density (g/cm³)	4.10

CNG Products

Surface finishing：CNG as-surface、Cu、Ni、Au

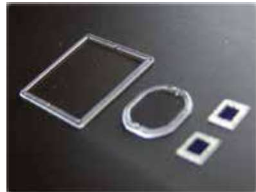
Characterization

▲ Adhesive Performance

- Tomoegawa has special designed adhesive for airtightness, resistance against humidity, heat resistance, reflow characteristics-resistant.
- Adhesive is controlled half-hardening state that handling is easy for tack-free.
- Shelf life of adhesive is possible to three-month in room temperature

▲ Coating Technology

- Coating processes are possible to optimized for customer design.
- Every designs are possible by the various precision technology such as dicing process



▲ Adding Property

- Dustness control is possible for high clean technology.
- Coating of various films, and adding of optical characteristic by vapor deposition process.

Adhesive Coating Process

Coating Process	Characteristic	Coating Width (mm)	Coating Thickness (mm)
Dispense	• Support in specially and complicated design • Suitable for special article	0.15~1.2	0.04~0.25
Screen Print	• Support in collective coating processing and low cost	0.5~	0.05~0.3
Stamp Print	• Support in special shape for a cap form	Depend on shape	0.05~0.15

* 0.1 mm=0.00394 inch

【Various LID substrates are possible】

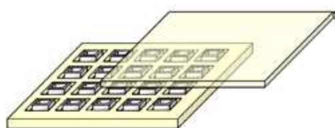
Coating to special shape parts such as a cap and various substrate (glass, plastic, metal, ceramic,and LCP).

【Various LID size & adhesive shape is possible】

Dicing to the LID size depend on a customer's process.
And propose the adhesive coating design which matched with LID shape.

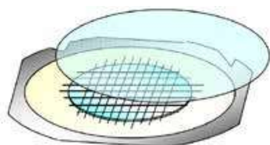
Supply Form

Tray



Produce the exclusive tray which matched with substrate shape.

Wafer



Fixed in SUS ring with the adhesion sheet
* Packaging os operated in a clean room and supply with a vacuum package.

Optics Film Laminating Processing

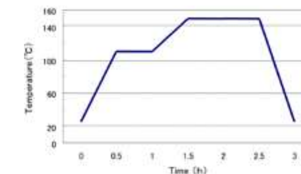
It is possible to laminate of various functional films (ex ; polarization films) with optics pressure sensitive adhesive (PSA) with the results in the field of display.
Tomoegawa supply to Multifunctional optical components of excellent optics characterization by collective laminating and dicing process on the optics substrate (glass, special glass, optics crystal)

Recommended Condition

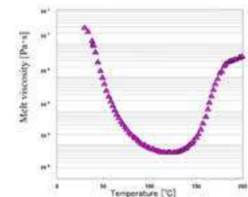
Condition		ELEPHANE CS
Shelf Life		About three month in room temperature*1
Processing Condition	Hardening Temperature	110℃ / 30 min + 150℃ / 60 min*2
	Hardening Time	
	Pressure Condition	Different by substrate

*1 Unopened state
*2 110℃ / 30 min: Pre-adhesion process
150℃ / 60 min: Full hardening process
Viscosity falls at 110℃ and gets pre-adhesion effect for substrate.

Recommended Temperature Profile



Melting Behavior



Other Characteristics

Characterization Maters		Test Method or Condition	Unit	Measurement Value
Coefficient of Linear Expansion	α_1*1	TMA method	1 / ℃	6.4 x 10^{-5}
	α_2*2			1.9 x 10^{-4}
Hardening Shrinkage Rate			%	2.5
Glass Transition Temperature		Dynamic mechanical method(DMA)	℃	196
Young's Modulus	Room Temperature	Dynamic mechanical method(DMA)	dyne / cm^2	2.34 x 10^{10}
	150℃		dyne / cm^2	1.43 x 10^{10}
Water absorption Rate		Measurement: JIS K 7209	%	1.06
Steam Transmission Factor t=0.09mm		Differential pressure method: 40℃•90%	g/m^2•24h	3.4
Oxygen Transmission Factot t=0.09mm		Differential pressure method(JIS K 7126): 40℃•0%	CC/M^2•24h•atm	62.6
Airtightness (He leak test)		Condition: 2 atm pressure / 2h 5mm □size ceramic package	atm•cc / s He	1.0 x 10^{-9}
High Temperature High Humidity Examination (85℃ / 85%•500h)		Cloudy examination in a package 100℃ hot plate, See it for five seconds	PASS / Total	10 / 10
Adhesion Strength Shear Power Examination(50mm / min)	After hardening	LID size: 2.7 x 2.7mm x t=0.5 Substrate: Low alkali glass	N	79
	Solder heat resistance	Dip three times(280℃ / 10s)	N	89

*1: This value is lower than glass transition temperature
*2: This value is higher than glass transition temperature
※ This data is standard, not specification.

EAGLE ALLOYS CORPORATION Global Material Solutions

Aluminum is remarkable for its low density and its ability to resist corrosion through the phenomenon of passivization.
Aluminum and its alloys are vital to the aerospace industry and important in transportation and building industries, such as building facades and window frames.
The oxides and sulfates are the most useful compounds of aluminum.

4047 Aluminum Alloy

4047 Aluminum Alloy is an aluminum silicon brazing or filler alloy with good corrosion resistance. The main difference between alloy 4047 and it's AL4043 counterpart is its higher silicon content. With 11-13% silicon, AL 4047 is generally used when high fluidity and reduced shrinkage and hot cracking is needed for specific repairs or manufacturing.

Aluminum 4047 Nominal Composition	
Silicon(Si)	11.0-12.0%
Iron(Fe)	0.8% Max
Copper(Cu)	0.3% Max
Zinc(Zn)	0.2% Max
Manganese(Mn)	0.15% Max
Magnesium(Mg)	0.1% Max
Remainder Each	0.05% Max
Remainder Total	0.15% Max
Aluminum(Al)	Balance

Applications		
Liners	Laser Welded Cover for Microwave Integrated Circuits	Joining Material
Housing	Automotive	Engine Blocks
Welding Filler Wires	Leak Tight Joints	

Aluminum 4047 Physical Properties	
Solidus	1065℉ (574℃)
Liquidus	1170℉ (632℃)
Brazing Temperature Range	1080-1120℉ (582-604℃)
Density	0.097 LBS / CU IN
Color	Grey

Eagle Alloys Aluminum 4047 Capabilities

Form	Min Size	Max Size	Typical Stock Size
Foil	0.003'' Thk	0.020'' Thk	4-12''w x 12-72'' L
Sheet	0.003'' Thk	4'' Thk	0.190'' Thk x 24'' x 72''
Strip	0.003'' Thk	4'' Thk	4-12''w x 12-72'' L
Plate	0.188'' Thk	4'' Thk	0.190'' Thk x 24'' x 72''
Rod / Round Bar / Wire	0.010'' Dia	6'' Dia	72'' Long

* Custom sizes upon request

EAGLE ALLOYS CORPORATION Global Material Solutions

4032 Aluminum Alloy

4032 Aluminum Alloy has excellent machinability and drilling characteristics produced by a winning combination of controlled composition and cold finishing.
Unique combination of in-service performance and manufacturing productivity that ensure superior wear resistance, tighter tolerances, exemplary surface finish and consistency.
4032 Aluminum eliminates the need for hard coat anodizing used in high temperature forging applications.

Advantage		
high wear resistance	low coefficient of thermal expansion	good weldability
good corrosion resistance	has the ability to replace 12L14 steel based on wear resistance	reduce product flow time (elimination of anodizing)
eliminate the environmental issues associated with anodizing		

Applications		
Master Brake Cylinders	Transmission Valves	Copier Parts
Bushings for Rack & Pinion Steering Systems	Sound Recording Devices	Bearings & Hydraulic Applications
Forged Pistons		

Aluminum 4032 Nominal Composition	
Silicon(Si)	11.0-13.5%
Iron(Fe)	1.0% Max
Copper(Cu)	0.50-1.3%
Magnesium(Mg)	0.8-1.3%
Chromium(Cr)	0.10% Max

Aluminum 4032 Physical Properties	
Density LBS/CU IN	0.097

Eagle Alloys Aluminum 4032 Capabilities

Form	Min Size	Max Size	Typical Stock Size
Foil / Sheet / Strip / Plate	0.010'' Thk	8'' Thk	6''-12''w x 12-24''lg
Rod / Round Bar	0.500'' Dia	23'' Dia	6' & 12' Lengths

* Custom sizes upon request

Infrared Packages, Headers & Dewar Assemblies

AMETEK ECP designs and manufactures a wide range of infrared packages, headers and Dewar assemblies using HTCC and GTMS technologies for various military and commercial applications.

Key Features

- ▲ In-house package and Dewar design
- ▲ Circuit routing
- ▲ Uncooled cavity packages
- ▲ Tombstone-type feedthroughs
- ▲ Circular headers
- ▲ Hermeticity to 1 x 10^{-13} STD CC He/sec
- ▲ Shortest time to market
- ▲ Superior design system
- ▲ Lowest package development cost
- ▲ In-house tooling
- ▲ Ceramic green wafer tooling
- ▲ Braze integration tooling
- ▲ Leveraged process support
- ▲ Precision laser machining (ceramic)
- ▲ Precision diamond dicing (ceramic)
- ▲ Selective masking and plating
- ▲ Electron beam welding (coldfi ngers)
- ▲ Vacuum brazing (Titanium)
- ▲ Production capability
- ▲ Leveraged capacity support

Note:
GTMS technology (matched seals, not compression seals) meets the same hermeticity standard as HTCC. GTMS is more cost effective.

However, the GTMS solution is not as mechanically robust when exposed to mechanical shock, gunfire shock, and vibration.

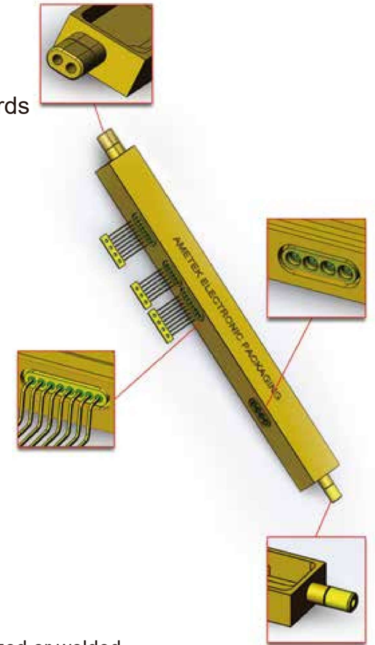
Optical Modulator Housing

AMETEK ECP's modulator housing design offers versatility and reliability for today's high-performanceoptical equipment. The housing is designed to enable optical devices used for 100G and 400G applications for long-haul, metro and data center interfaces.

A Small Form Factor (SFF) housing footprint compliant to the **OIF 100G Implementation Agreement** is also available.

Key Features

- ▲ Hermetic housing
- ▲ Rugged design
- ▲ Various RF connectivity options including the newlypatented ***S-BEND Ceramic Feedthrough*** (in development)
- ▲ Bandwidth performance to 400G
- ▲ Various body material and plating options
- ▲ Performance that meets or exceeds industry standards



Housing

Material: Stainless steel, cold-rolled steel, Kovar, high-Nickel alloys (Monel, Inconel, Hymu-80)
Construction: Single piece machined, multi-piece machined

DC Connectors

Construction: Direct seal, brazed terminals, welded connector
Insulator: Glass, alumina
Leads: Flat or round, straight or gull-winged

RF Connectors

Construction: Direct seal, brazed terminals, welded connector
Insulator: Glass, alumina
Inside Termination: Rounded end, straight cut, turned down, flattened
Outside Termination: SMA series, SMPx series, FPC, ***S-BEND Ceramic Feedthrough (in development)***

Input/Output Ports

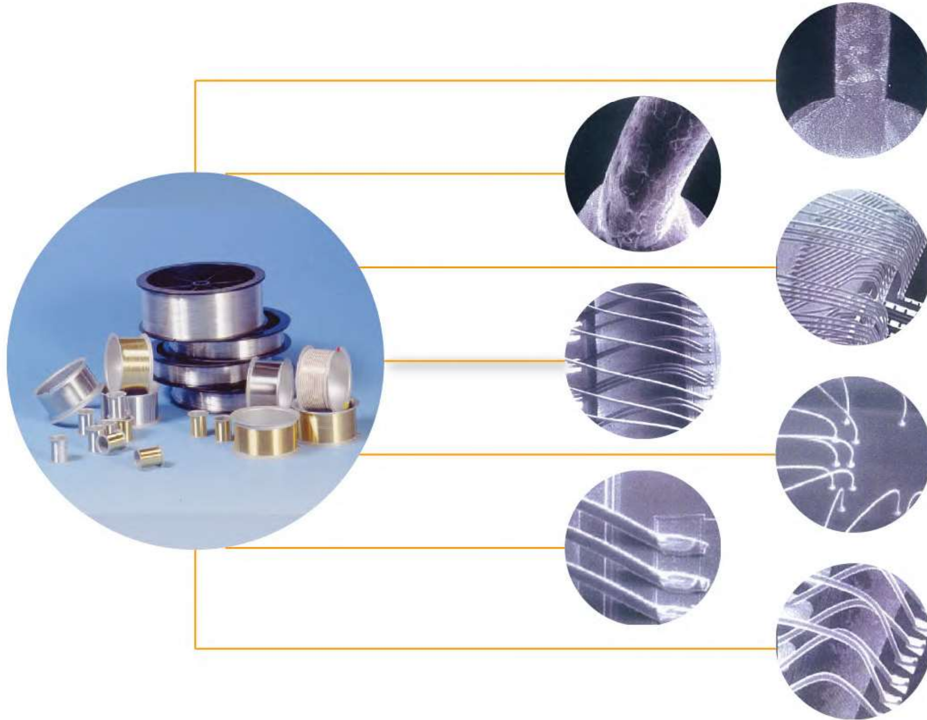
Construction: Integrally machined in the housing, multi-piece brazed or welded
Design: Straight, angled, single or dual, round or square or rectangular, slots or holes provided for soldering
Plating: General, selective

Plating

Metals: Ni (electrolytic or electroless), Au (electrolytic or electroless), Ag, Pd
Type: General, selective

Workmanship and Performance Standards

- JEDEC Standard 9
- Mil-Std-883
- Mil-Std-202
- Telcordia



Silicon-aluminium wire

Types	Diameter		Extension rate (%)	Tensile force (g)	Tempering conditions
	Inch	Micron			
1%SiAl	0.0007	18	0.5-2.5	8min.	Hardening
			0.5 - 3.0	4 - 6	Annealing
1%SiAl	0.001	25	0.5-2.5	20	Hardening
			1-4	16 - 18	Annealing
			1-4	14 - 16	Annealing
1%SiAl	0.00125	32	0.5-3.0	28 min.	Hardening
			1-4	23 - 25	Stress relieving
			1-4	21 - 23	Annealing
			1-4	19 - 21	Annealing
1%SiAl	0.0015	38	0.5-3.0	38 min.	Hardening
			1-4	33 - 38	Stress relieving
			1-4	26 - 33	Annealing
1%SiAl	0.002	50	1-4	65 min.	Hardening
			2-6	55 - 65	Stress relieving
			2-6	45 - 55	Annealing

Aluminum Wire / Strip & Gold Wire / Strip
AMETEK®

Thick aluminum wire

Types	Diameter		Extension rate (%)	Tensile force (g)	Tempering conditions
	Inch	Micron			
99.999% Al	0.010	250	10 - 18	200	Annealing
	0.012	300	5 - 12	200	Over-annealing
			10 - 18	300	Annealing
	0.015	375	8 - 15	350	Over-annealing
			10 - 18	450	Annealing
	0.020	500	8 - 15	625	Over-annealing
			15 - 25	750	Annealing
99.99% Al+Ni	0.005	125	5 - 12	100	Annealing
	0.008	200	8 - 15	300	Annealing
	0.010	250	10 - 18	425	Annealing
	0.012	300	12 - 20	600	Annealing
	0.015	375	15 - 25	900	Annealing
	0.020	500	20 - 30	1300	Annealing
0.5% Mg/Al+Ni	0.005	125	7 - 12	150	Annealing
	0.007	175	10 - 16	300	Annealing
	0.008	200	10 - 16	400	Annealing
	0.010	250	10 - 16	550	Annealing

Aluminum strip

Types	Typical parameters	Rolling/Cutting type	Size range
SiAl	.0005 x .010	SiAl	.001 - .010 x .040 - .100
SiAl	.001 x .020	Pure Al	.001 - .010 x .040 - .100
SiAl	.002 x .040		
Pure Al	.001 x .020	SiAl or Pure Al can be determined according to the actual needs of customers.	
Pure Al	.002 x .040		

Gold wire

Diameter		Extension rate (%)	Minimum breaking load (g)	Minimum breaking load (g)	Tempering conditions
Inch	Micron		Type B1	Type B2	
0.0005	12.5	0.5 - 1.5	5	N/A	Hardening
		2.0 - 5.0	2	N/A	Annealing
0.0007	18	0.5 - 2.0	9.5	8	Hardening
		1.0 - 3.0	5	4	Stress relieving
		3.0 - 5.0	3	2.5	Annealing
0.0008	20	0.5 - 2.0	12.5	10	Hardening
		1.0 - 3.0	6	5	Stress relieving
		4.0 - 6.0	4	3	Annealing
0.001	25	0.5 - 2.5	21	20	Hardening
		1.0 - 3.0	11	10	Stress relieving
		4.0 - 6.0	8	7	Annealing
0.0013	33	0.5 - 2.5	33	30	Hardening
		1.0 - 3.0	17	15	Stress relieving
		5.0 - 7.0	12	10	Annealing
0.0015	38	0.8 - 3.0	45	40	Hardening
		1.0 - 3.0	24	20	Stress relieving
		6.0 - 8.0	18	16	Annealing
0.002	50	1.0 - 3.0	75	70	Hardening
		1.0 - 3.5	45	40	Stress relieving
		8.0 - 2.0	30	25	Annealing

Gold strip

Types	Width (Inch)	Thickness (Inch)
ROLLED NARROW	.002-.010	.00025-.002
SLIT	.025-.100	.0005 - .002
ROLLED WIDE	.010-.025	.0005 - .003
TOLERANCE	+/- 3%	+/- 10%

SMT Stencil Nano-Coatings

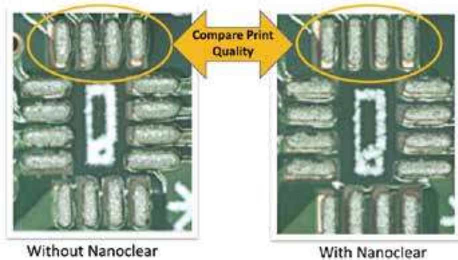
Aculon® NanoClear® SMT Stencil Nano-Coating is the world's premier stencil coating. With an extremely simple, quick, and effective coating process, NanoClear® will improve print quality, increase throughput, reduce defects and enhance printing with small apertures.

Performance you can trust

Faster release and improved print resolution is achieved as the paste is more easily released from the aperture walls due to the fluxophobic nature of the SMT stencil nano-coating.

As can be seen in the image the QFN printed with a Nanoclear stencils is drastically improved over uncoated.

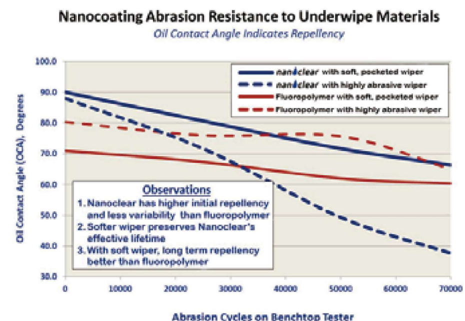
0.4 QFN in production (100µm stencil)



NanoClear SMT Stencil Durability

NanoClear® is robust and can withstand significant use and abrasion from repeated printing and cleaning cycles. Independent testing proves that NanoClear® offers best-in-class durable performance. The ability of an SMT stencil treated with NanoClear far outperforms the initial performance of all competitive materials.

NanoClear's ability to repel flux is maintained for over 100,000 abrasion cycles after treatment, while the performance of competitive spray applied material quickly falls off quickly from an already weak, barely fluxophobic starting point.



NanoClear® Application Process

Application of NanoClear® SMT Stencil Nano-Coating couldn't be easier. With a NanoClear® dual wipe, water source, and just five minutes of time you can have an SMT stencil that has been properly treated with a robust and high performing coating of NanoClear®.
Follow these simple steps:

1、Start with a visibly clean & degreased SMT stencil
2、Using heavy pressure scrub the Part A cleaner onto the bottom side of the SMT stencil for 60 seconds
3、Rinse with running DI (ideal) or tap water until all cleaner is thoroughly removed (Critical step!)
4、Dry SMT stencil after rinsing
5、Using heavy pressure scrub the Part B treatment onto the bottom side of the SMT stencil for 60 seconds

NanoClear® is now available in convenient spray form!!

Our spray kit includes all you need to treat 200 Stencils, including an HVLP sprayer and cleaning solution.

PCB Waterproofing Protection

Aculoin's NanoProof ® Series offers customers a range of easy-to-apply PCB waterproofing solutions.

Protect PCBs from accidental water damage to IPX-7 (immersion in water at one meter depth for 30 minutes), and up to full barrier properties.

Benefits

1、Improved Device Reliability Due To Protection Of PCBs From Water Damage
2、From Accidental Submersion (IPX-4), Immersion For 30 Minutes (IPX-7) To Prolonged Immersion (IPX-8)*
3、Reduced Product Returns Due To Device Failures
4、Reduced Cost As No Masking Required
5、Improved Yields As The Coating Enables Rework After Application
6、Can Be Applied Via Spray,Dip, Or Dispense, Eliminating Need For Costly Vacuum Equioment
7、Save Energy Compared To Vacuum Equipment
8、Improve Throughput As It Does Not Require Batch Production
9、Safe For Use In Factory Equipment - Non Toxic
10、Electrical Connection Unimpacted - No Impact On Signal Strength, Antenna Or Acoustic Performance
11、Flexible Coatings Resist Cracking/Flaking

Features

1、Liquid At Room Temperature
2、Ability To Protect Many Substrates On A PCB
3、Post Treatment Water Contact Angle From 100°-120°
4、Post Treatment Oil Contact Angle Up To 76°
5、Push Through Connectivity On Some Products
6、Dry Time From 5-60 Minutes At Room Temperature
7、No Cure Required
8、UV Tracer

Advantages over Conformal Coatings

1、Provides Effective Water Protection-Full Submersion
2、Flexible Application Process: Spray, Dip, Dispense
3、Minimal Capital Equipment Required
4、Production Is Continuous Process, Not Batch
5、Treatment Allows Push Through Connectivity
6、Treatment Enables Rework - Lowers Internal Rejection Rate
7、No Masking Required - Can Even Coat Batteries
8、Fast Cycle Times: <1Minute Vs1-5 Hours In Chamber
9、Safe. Non-Toxic

Characteristics

	NanoProof®1.0	NanoProof®2.0	NanoProof®2.1	NanoProof®4.0	NanoProof®5.0*	NanoProof®7.0*	NanoProof®8.0
NanoProof®Common Features: Hydrophobic Coating,Uniform Thickness,High Temp Resistance,UV Traceable (easy inspect),No CuringNeeded ProductionReadiness: Ranges From Low Cost Hand Held Spray Equipment To High Throughput In-line ProductionEquipment w/High Accuracy							
System Level Water Protection	IPX3	IPX3	IPX8	IPX4	IPX5	IPX7，IPX8	IPX7，IPX8
Applications	motherboard flex circuits	motherboard flex circuits	motherboard flex circuits	motherboard flex circuits	motherboard	motherboard	motherboard flex circuits
Application Methods & Thickness Ranges	spray: 100nm to 1µm	spray: 5 to 15µm	dispense: 30 to 50µm	spray: 5 to 15µm	spray or jet: 5 to 15µm	jet, dispense: 30 to 50µm	spray, jet, dispense: 30 to 50µm
Push-Through Connectivity® (Apply To Connectors)	yes	yes	no	yes	no	no	yes
Flexibility	180 degree bend	180 degree bend	180 degree bend	yes	no	no	180 degree bend

* NanoProof® 5 & 7 also provide protectionfrom oil

Spin-on-Glass Materials

PiBond

Spin-on-Glass Materials for Intermetal Dielectrics and Etch Back Planarization.

- Crack-free planarization of 4:1 (SG 200), 5:1 (SG 300) and 7:1 (SG 400) aspect ratio features
- Can be easily double-coated for improved planarization of larger topography
- Formulated for pump or pressurized dispense systems
- Filtration to 0.04 µm for low particles
- Trace metals < 5 ppb per metal
- Bottle sizes from 500 ml to 4000 ml

Parameter	SG 200	SG 300	SG 400
Dielectric constant	4.05	3.80	3.50
Refract ve index @ 633nm	1.412	1.399	1.388
Ext nct on coefficient (visible λ)	0	0	0
Crack threshold, single coat (nm)	~600	>600	>1600
Water contact angle	75	85	95
% Film shrinkage (bake to cure)	6	9	3
Film stress (MPa)	140	85	39
Shelf life @ 4°C (months)	8	6	6
Track life (days)	7	7	7

Key Advantages

- Designed for easy insertion into Partial Etch Back, Total Etch Back planarization, and passivation processes found in both BEOL and FEOL Applications.
- Water-free film after cure. Low organic content to facilitate etch back planarization selectivity to CVD SiO_2.
- Low COO dielectric for BEOL sub-Al integration at device generations larger than 0.18 µm.

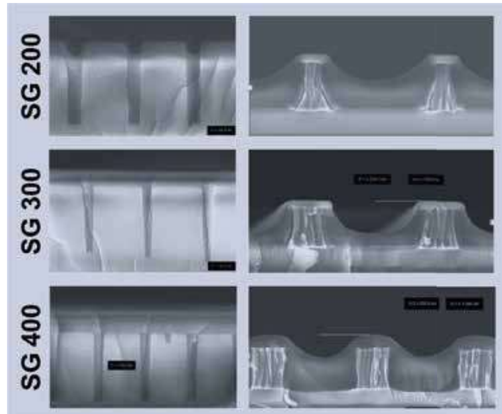


Figure:
Left: SG Products gap fill of 5:1 aspect ratio vias (Ø100nm)
Right: Example of local planarization studies.

Materials in Product Family

SG series are currently produced in the three sub-series: SG 200, SG 300 and SG 400.
The materials are offered in different formulations (e.g. viscosity and solid content) in order to meet application specific thickness requirements.
PiBond has also developed thick SiO_2 replacements and high thermal stability, directly patternable SiO_2 dielectrics.

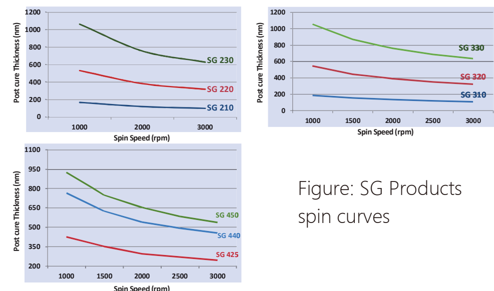


Figure: SG Products spin curves

Process Flow

SG series materials are coated using conventional coater tracks equipped with spin-on cup and hot plates.
Final cure bake is done at 425 °C in horizontal or vertical furnace under nitrogen atmosphere.

Double Coating Photopatternable Dielectric

PiBond

SX 800P is a negative tone photopatternable dielectric allowing CVD, etch and strip process replacement with single lithography pass.

Key Advantages

- Sub 1 µm resolution with high sensitivity
- High temperature resistance with no pattern reflow
- Low dielectric constant (k=2.9) and leakage current
- Low shrinkage and stress after cure
- Excellent transmittance across visible and IR wavelengths allowing use also in optical applications
- Good chemical resistance
- Process comparable to positive tone photoresists

<SX 800P patterning performance at 1µm film thickness is shown in Figures 1 and 2>

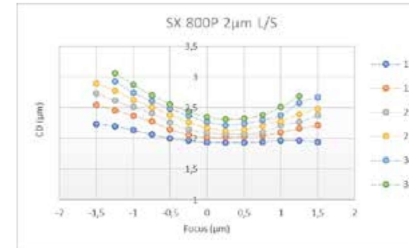


Figure 1. SX 800P Bossung plot

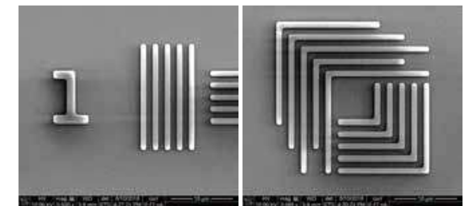
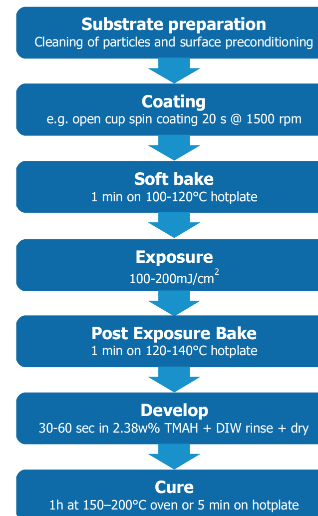


Figure 2. SX 800P patterns at 1µm resolution

Typical process flow for SX 800P



Recommended warm up times for SX 800P

Bottle size [liter]	Warm up time [hours]
< 1	5
1	12
4	24

SX 800P spin coating recipe

	Dispense	Wet	Spin	EBR	BSR	Dry
Time [sec.]	3	1	20	7	7	7
Rotation [rpm]	30	500	1000-3000	1200	1200	1200

MY-130 UV Cured Optical Adhesives & Coatings

The MY-130 products are used for recoating and encapsulation in the manufacturing of photonic devices, such as pump power combiners, splitters, couplers, connectors, etc.

Enabling breakthrough in efficiency, MY-133-V2000, MY-133-EA, MY-132, MY-132A, MY-131 and MY-130 are becoming an important competitive tool in the photonics industry. The low Refractive Index of 1.30 to 1.33 reduces light leakage in various applications, enabling both higher efficiency and higher reliability. These products are field proven. The pioneering MY-133, has been in the field from 2004.

The best-selling products in this line are MY-133-V2000, and MY-136-V2000, followed by the newer MY-136, MY-132, MY-130, and MY-133-EA that has an integrated adhesion primer.

Material Name	RI at 589 nm	RI at 950 nm	Cure	Adhesion gr/cm	Elastic Modulus Mpa	Viscosity CPS	Tensile Strength Mpa	Elongation At Break %	Hardness Shore	Shelf Life Months
MY-130	1.308	1.303	UV	Low	<1	120	<0.2	<10	na	12
MY-131	1.314	1.311	UV	Low	<1.5	150	<0.2	<10	na	12
MY-132	1.324	1.320	UV	3	2.5	200	na	<10	65A	12
MY-132-A	1.326	1.322	UV	7	0.4	2600	0.3	80	30A	12
MY-132-V15K	1.327	1.322	UV	40	very low	14500	na	na	7	12
MY-133	1.336	1.331	UV	3	4.0	700	0.4	12	73A	12
MY-133-V2000	1.333	1.329	UV	9	5.2	2900	2.4	60	70A	12
MY-133-EA*	1.338	1.333	UV	27	3.6	2300	1.0	45	62A	6
MY-134	1.344	1.338	UV	6	5.6	5000	1.8	40	70A	12
MY-135	1.345	1.352	UV	40	na	1600	na	na	na	12
MY-136	1.364	1.360	UV	110	20	750	4.7	83	85A	12
MY-136-V2000	1.369	1.363	UV	50	53	1700	6.0	50	93A	12
MY-1375	1.379	1.375	UV	60	108	4200	9.5	52	52D	12
MY-1375-V2000	1.38	1.375	UV	60	110	2000	9.0	40	95A	12
MY-138	1.388	1.382	UV	60	250	4000	12.0	62	60D	12
MY-139	1.393	1.388	UV	88	350	3500	11.5	40	60D	12

* Improved adhesion under wet conditions

MY-140 UV Cured Optical Adhesives & Coatings

Distinguished by their strong adhesion and their robustness, the MY-140 products are used wherever there is a need for high bonding strength, coupled with low refractive index.

Typical applications are for bonding of optical components, for re-coating cascaded Cladding Light Strippers.

The MY-140 product line technology is used in the field since the year 2000.

Material Name	RI at 589 nm	RI at 950 nm	Cure	Adhesion gr/cm	Elastic Modulus Mpa	Viscosity CPS	Tensile Strength Mpa	Elongation At Break %	Hardness Shore	Shelf Life Months
MY-140	1.407	1.401	UV	270	500	4200	17	30	65D	12
MY-141	1.414	1.409	UV	350	530	4000	17	45	68D	12
MY-142	1.420	1.416	UV	95	5.3	1050	3.7	100	70A	12
MY-142-C	1.419	1.413	UV	250	500	2200	22	10	69D	12
MY-143*	1.436	1.428	UV	1000	25	1200	3.1	71	80A	12
MY-145	1.450	1.445	UV	600	300	300	11.4	150	97A/64D	12
MY-146	1.461	1.456	UV	1400	515	150	17.4	22	95A/64D	12
MY-146-LM1	1.459	1.453	UV	500	na	465	na	na	65A	12
MY-146-EA1*	1.459	1.452	UV	>1500	na	140	na	na	90A	12
MY-146-R2	1.466	1.460	UV	>1500	1600	3800	37	3	80D	12
MY-1465	1.465	1.460	UV	800	160	160	10.6	140	87A	12
MY-147	1.470	1.465	UV	1000	270	250	11.6	174	64D	12
MY-1473	1.474	1.469	UV	1700	555	290	14.8	90	60D	12
MY-148	1.480	1.474	UV	830	580	185	16.7	90	65D	12
MY-148-EA*	1.487	1.480	UV	v.high*	5	1200	2	>300	85A	6
MY-149	1.492	1.485	UV	600	4.6	1000	1.3	370	na	12
MY-150	1.496	1.477	UV	1600	23	1800	4	450	na	12

* Improved adhesion under wet conditions

Optical Fiber Coatings & Optical Adhesives

OF Product Line for Optical Fiber Primary Coatings

Our OF low Refractive Index primary coatings are distinguished by their carefully balanced combination of high adhesion to the core, and high modulus. The majority of our OF products include a proprietary adhesion promoter that dramatically improves adhesion to the core, especially under wet conditions. A special feature of our adhesion promoter is that it allows a relatively long shelf life of 6 months.

Our best-selling OF-136 (RI=1.36) is used by the majority of specialty optical fibers manufacturers. Its adhesion was optimized carefully for the highest value, while making sure it is not too high, to allow stripping.

OF-133-V2 (RI=1.33) enables a breakthrough Numerical Aperture of 0.6. Its close relative, OF-134-V2, couples a low index of 1.34 with a relatively high modulus of 20 MPa.
The high NA of these products can significantly increase the efficiency of optical amplifiers and fiber lasers.

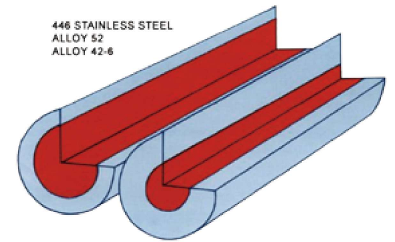
For demanding applications, customers choose the combination of very high modulus and very high adhesion offered by OF-138(index 1.38), OF-139-N, and OF-140-N. These tough coatings are preferred for fibers that are subjected to high mechanical stresses and high temperatures.

Another notable product is OF-HC-14, which is our only secondary hard coat.
The adhesion of OF-HC-14 to our primary coatings is about an order of magnitude higher, compared to similar commercially available hard coats.

Material Name	RI at 589 nm	RI at 950 nm	Cure	Adhesion gr/cm	Elastic Modulus Mpa	Viscosity CPS	Tensile Strength Mpa	Elongation At Break %	Hardness Shore	Shelf Life Months
OF-133-V3	1.337	1.333	UV	11	4	2400	1.3	50	60A	6
OF-134-V2	1.346	1.341	UV	28	17	2500	3.2	36	86A	6
OF-135	1.357	1.352	UV	45	30	2400	5.0	40	88A	6
OF-136	1.369	1.363	UV	64	85	2200	8.0	50	95A	6
OF-136-FC	1.369	1.363	UV	70	60	4000	5.6	50	95A	6
OF-136-N	1.369	1.363	UV	50	55	3200	6.0	52	95A	12
OF-137	1.372	1.368	UV	65	120	3300	8.0	48	95A	6
OF-1375-A	1.377	1.372	UV	70	155	3700	8.3	54	95A	6
OF-1375-N	1.379	1.375	UV	65	108	4200	9.0	42	95A	12
OF-138	1.384	1.379	UV	120	230	3300	10.0	62	52D	6
OF-138-N	1.388	1.382	UV	60	250	4000	12.0	62	60D	12
OF-139-N	1.393	1.388	UV	88	350	3500	11.5	40	60D	12
OF-140-N / N1	1.407	1.401	UV	170	560	3200	17	32	65D	12
OF-141-N	1.414	1.409	UV	350	530	4000	17	45	68D	12
OF-142-N	1.425	1.418	UV	500	650	4000	18	20	70D	12
OF-143-N	1.435	1.428	UV	700	800	3500	26	8	72D	12
OF-144-N	1.447	1.440	UV	770	900	3000	25	5	73D	12
OF-145-N	1.455	1.448	UV	800	1100	3000	30	13	75D	12
OF-146-N	1.467	1.460	UV	>1500	1600	3800	37	3	80D	12
OF-HC-14 Hard Coat	1.468	1.462	UV	na	1400	3700	40	3.5	82D	12

Copper Cored Glass-to-Metal Sealing Alloys

- Complete Metallurgical Bond
- Provides complete hermetic sealing between the metals.
- Excellent mechanical strength, ductility and greater reliability.
- Permits simple electrical connections and greater conductivity which allows a smaller conductor than solid for the same power requirements.
- Unique processing allows any ratio of 446SS (Stainless), Alloy 52, Alloy 42-6, or Kovar® to copper can be made.
- Temper, surface finish, and packaging may all be customized to your specific requirements.



Product	Alloy to Copper Ratio	Resistivity		CTE		
		Ω.cmil/ft	μΩ.cm	50-200℃	50-400℃	50-900℃
Alloy 42-6 (Cu Cored)	2:1	39.08	6.49	3.64	3.94	6.15
	3:1	81	13.5	3.7	4	6
Alloy 52(Cu Cored) / 4J50(Cu Cored)	2:1	36.79	6.11	4.8	5.2	5.5
	3:1	70.3	11.7	5.5	5.5	5.6
Kovar / 4J29(Cu Cored)	3:1	72.4	12	13.7	14.1	/
446 Stainless Steel (Cu Cored)	2:1	40.68	6.75	5.6	6	6.1
	3:1	89.7	14.9	5.8	5.9	6.2

Product	Diameter(inch)	Diameter(mm)	Maximum Tolerance Electric Current(A)
Alloy 52(Cu Cored) / 4J50(Cu Cored)	0.02	0.51	3
	0.03	0.76	9
	0.04	1	14
	0.04	1.02	15
	0.05	1.27	24
	0.06	1.5	34
	0.06	1.52	35
	0.08	2	50
	0.08	2.03	52
	0.09	2.29	65

Note: Kovar / 4J29(Cu Cored) 's tolerance electric current basically the same as Alloy 52(Cu Cored) / 4J50(Cu Cored).

Application

Backside Protection Film(BSP)：AWD11

Advantage

- Simple application
- Uniform thickness
- Transmission of IR wavelength
- Good laser marking performance
- Consistent bond line control
- Thin wafer handling
  No chip damage during dicing
  Good pick up yield
- Clean dry process
  Eliminated fillet and zero bleed

Physical Property

Physical property	Unit	AWD11	Remarks
Color	-	Black	
Filler	%	53	By TGA
Tg	℃	179.6	By DMA
Young's Modulus	Mpa	1313	By UTM(15mm*100μm, 5mm/min)
Transmittance	%	<50	Wavelength range(190~3100nm)
Adhesion	N/10mm	3.5	By TXA(50mm/min, 180deg)
CTE	ppm/℃	α1: 78, α2: 122	By TMA
Warpage	mm	<1	8inch 250μm wafer(at 23℃)
Moisture absorption	%	0.7	85℃/85% 24hr
Modulus @ 150℃	Mpa	491	By DMA
Modulus @ 250℃	Mpa	149	By DMA
Heavy peeling side	mN/25mm	25	By TXA(300mm/min, 180deg)
Light peeling side	mN/25mm	10	By TXA(300mm/min, 180deg)
Pick up height	μm / 5x5mm / wafer 200μm	650(10/10)	SPA-210

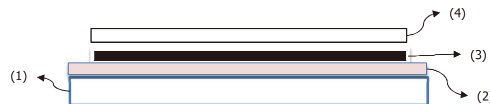
※Thermal curing condition : 130℃ / 4hrs, in oven

Backside Protection Film(BSP)：AWU325

Advantage

- Dicing film & backside protection film
- Excellent dicing and pick-up performance
- Thermal curing type, high adhesive strength
- Strong resistance against humid circumstance
- Good laser marking
- Dicing film has good heat resistance.

Structure

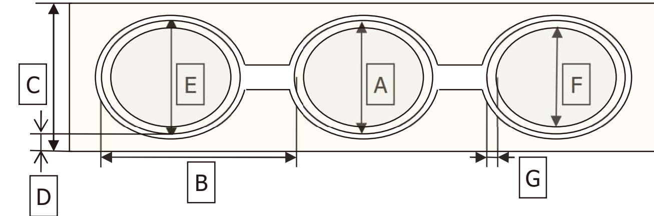


WBL

(1) Base Film(70μm)
(2) Adhesive Layer(30μm)
(3) Backside protection layer(25μm)
(4) Protective Film(38μm)

Backside Protection Film(BSP)：AWU325

Pre-cut Style



	A	B	C	D	E	F	G
8 inch	260±1	279.4±1.5	290±2	15±2	267±1	220±1	20±5
8 inch	270±1	279.4±1.5	290±2	10±2	277±1	220±1	25±5
12 inch	370±1	378.5±1.5	390±2	10±2	377±1	320±1	25±5

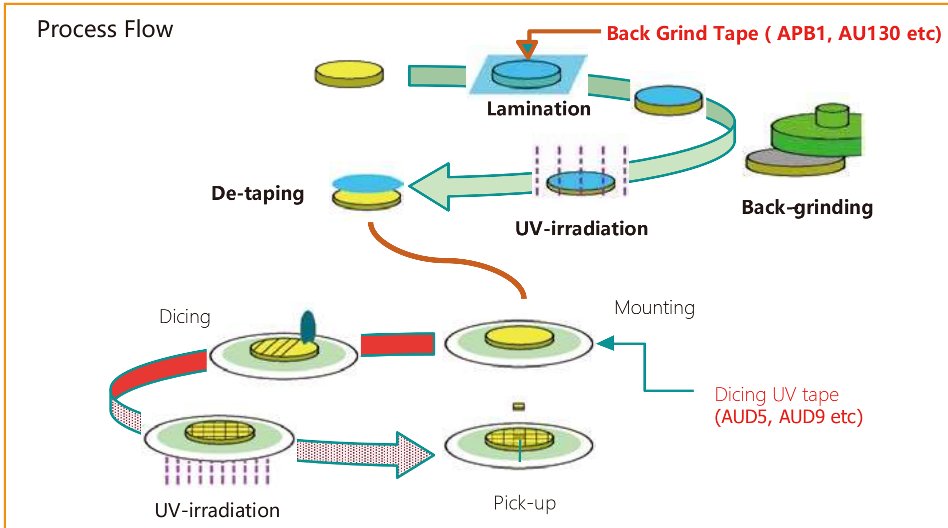
Specification

	Item	AWU325	Remarks
Appearance	Base film(PO)	70	Lite-Matic
	Adhesive layer	30	Lite-Matic
	Backside protection(BSP)layer	25	Lite-Matic
	Protection film(PET)	38	Lite-Matic
	Total thickness(μm)	163	Lite-Matic
Properties	Backside Protection(BSP) layer Color	Black	-
	Peel strength of DCT/BSP (N/25mm)	0.15	
	Young's modulus(MPa)	1313	By UTM(15mm*100μm, 5mm/min)
	Enthalpy(J/g)	34.9	By DSC
	Transmittance(%)	<50	Wavelength range(190~3100nm)
	Adhesion(N/10mm)	3.5	By TXA(50mm/min, 180deg)
	CTE	α1: 78.1 α2: 122.3	By TMA
	Modulus @150℃(Mpa)	491	By DMA
	Modulus @250℃(Mpa)	149	By DMA
	Tg(℃)	180	By DMA
	Wafer Warpage(mm)	<1	8inch 250μm wafer(at 23℃)
	Moisture absorption(%)	0.7	85℃/85% 24hr
	Lamination temp.(℃)	70-80	
	Cure condition		Ramp-up 30min at 130℃ and 3hr at 130℃

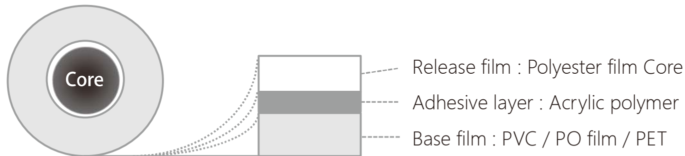
Expiration time: 12 months after production (-5 ~ 5°C), 4 weeks after opening

Back Grind Tape

Back Grind Tape



Structure



Physical Property

Item	Base Film	Color	Thickness	Adhesive Strength (gf/25mm)	Charateristics
APB1	PO	Light Blue	130μm	100	Normal wafer Back Grinding
APB2	PO	Light Blue	150μm	150	Small size chip (under 2mm)
APB5	PO	Light Blue	170μm	135	Small size chip (under 2mm)
AP205	PO	Light Blue	205μm	150	Small size chip (under 2mm)
AU130-SC	PO	Light Blue	130μm	330(30)	Normal wafer Back Grinding
AUB4	PO	Milky White	130μm	1,000(20)	Small size chip (under 2mm)

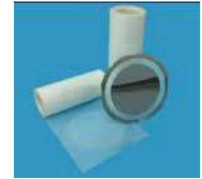
*.( ) refers to adhesive strength after UV

Die Attach Film(DAF)

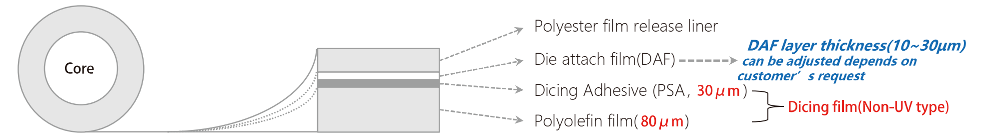
Die Attach Film(DAF)

AMC DAF Product Line

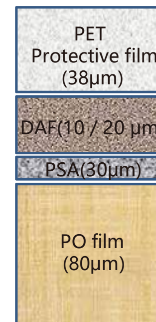
Device	Type	Item	Application
DAF	Non UV type	AWP2	Small Chip
		AWP3	Normal Chip
	UV type	ES-229NS	Small Chip
		ES-229N	Normal Chip



DAF Structure (Non-UV type)



Specification (Non-UV type)

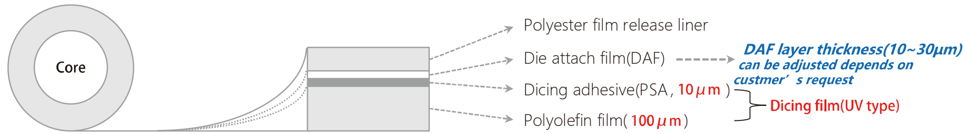


Properties			Unit	AWP2	AWP3
Modulus (DMA)	After Full Cure	50~300℃	Mpa	354.5(@150℃) 214.4(@250℃)	8.44(@150℃) 6.35(@250℃)
Die Shear Strength	Full Cure	@Room temp	Mpa	9.3	39.5
		@260℃	Mpa	4.8	11.7
CTE	α1		ppm	58.4	213
	α2		ppm	170.1	259.7
DSC Data	Before Cure	On-set Temp	℃	176.7	189.3
		Delta H	J/g	45	38.79
Tg(DMA)	After Full Cure	Tg	℃	200.2	239.3
Tensile Properties	Adhesive Layer	5% Modulus(MD)	MPa	9.54	4.67
		Elongation(MD)	%	26	268
	Dicing Tape	5% Modulus(MD)	MPa	5.03	
		5% Modulus(TD)	MPa	4.83	
		Elongation(MD)	%	636	
		Elongation(TD)	%	545	
180° Peel Strength	WBL Tape (DAF-Dicing)	before UV	N/25mm	0.25	
	WBL-Wafer	mount 60℃/70℃	N/25mm	0.72 / 1.08	0.76 / 1.14
Water Absorption	under 85℃/85%	after 24hr	wt%	0.75	0.86

● AWP2 series : under die size 3*3mm ● AWP3 series : over die size 3*3mm

Die Attach Film(DAF)

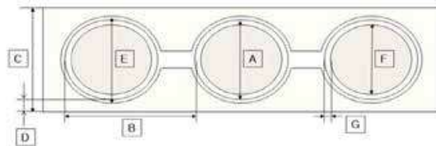
DAF Structure (UV type)



Specification (UV type)

PET Protective film (38μm)
DAF(10 / 20 μm)
PSA(10μm)
PO film (100μm)

Characteristic		Spec	Unit	Comment
Roll Width Size		390±2	mm	For 12 inch wafer
		290±2	mm	For 8 inch wafer
Sheets / Roll		200	片	Can be decided according to customer's request
Thickness of Dicing Film		110±7	μm	Polyolefin Film(100μm) + Dicing Layer(10μm)
Thickness of DAF Layer		10±2	μm	DAF layer only Actural manufacturing under ±1μm range
Thickness of Dicing Die Attach Film		120±10	μm	DAF layer + Dicing layer + Polyolefin film
Dicing Film/DAF Peel Strength	before UV	110±50	gf/25mm	Peel strength between Dicing & DAF layer
	after UV	≤20	gf/25mm	
Adhesion Strength		≥500	N/m	-
Tg (after UV)		≥150	℃	-
Dicing Film Elongation		MD: 600±200 TD: 900±200	%	-

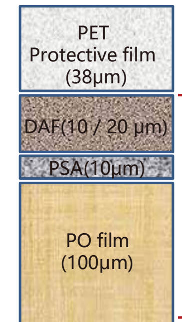


(Unit: μm)

	A	B	C	D	E	F	G
8 inch	270±1	279.5±1.5	290±2	10±2	277±1	220±1	25±5
12 inch	370±1	378.5±1.5	390±2	10±2	377±1	320±1	25±5

Die Attach Film(DAF)

Specification (UV type)



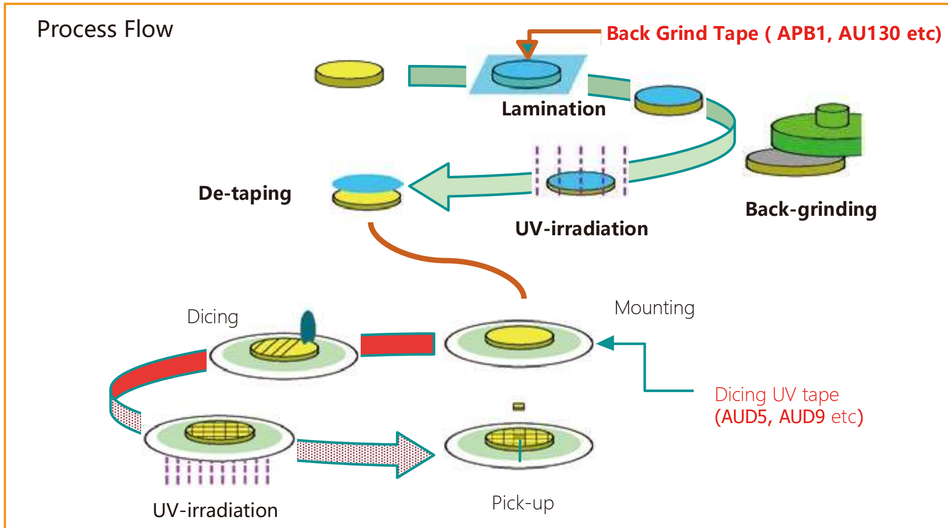
Properties			Unit	Result
Modulus (DMA)	Non Cure	Room temp.~200℃	Mpa	88.2(@150℃)
	After Full Cure			8.44(@150℃) 6.35(@250℃)
Die Shear Strength	After Pre-cure 30 min @ 135℃	@180℃	Mpa	3.55
	Full Cure + After MRT(0, 12, 24h)	@Room temp.	Mpa	39.5 / 32.8 / 27.8
		@260℃	Mpa	11.7 / 12.4 / 11.6
CTE	α1		ppm	213
	α2		ppm	259.7
DSC Data	Before Cure	On-set Temp	℃	189.3
		Delta H	J/g	38.79
Tg(DMA)	After Full Cure	Tg	℃	239.3
Tensile Properties	Adhesive Layer	5% Modulus(MD)	MPa	4.67
		Elongation(MD)	%	268
	Dicing Tape	5% Modulus(MD)	MPa	6.8
		5% Modulus(TD)	MPa	5.5
		Elongation(MD)	%	684
		Elongation(TD)	%	754
180° Peel Strength	WBL Tape (DAF-Dicing)	before UV	gf/25mm	113.4
		after UV	gf/25mm	12.9
	WBL-Wafer	mount 60℃/70℃	N/25mm	0.76 / 1.14
Water Absorption	under 85℃/85%	after 24hr	wt%	0.86
VOC 1hr @ 150℃			wt%	0.71
Ionic Impurities	Cl		ppm	8.25

Product Line

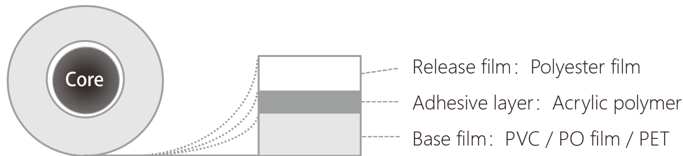
Series	Product	Applicable Process
ES-229D Series	ES-229D-10 (~30)	DBG(Dicing Before Grinding) & SDBG(Stealth DBG)Process
ES-229N Series	ES-229N-10 (~30)	Normal & DBG Process

- DAF layer thickness can be adjusted by customers' request. 10/15/20/25/30μm DAF layer
- According to customers' process type, AMC can suggest suitable product. For normal blade dicing process For DBG/SDBG sawing process

Dicing Tape



Structure



Physical Property

Item	Base Film	Color	Thickness	Adhesive Strength (gf/25mm)	Characteristics
AUD1	PVC	Milky White	90µm	80(10)	Normal wafer sawing
AUD5	PVC	Milky White	90µm	80(7)	CIS(CMOS image sensor)
AUD7	PVC	Light Blue	90µm	120(13)	Small size chip(under 1mm)
AUF3	PO	Milky White	90µm	1000(8)	PCB sawing
AU105-HA	PO	Milky White	105µm	550(12)	Wafer sawing, Glass protect
AU165-HC	PO	Milky White	165µm	1700(30)	Small PKG sawing
AU170-HC	PO	Milky White	170µm	1800(30)	Normal PKG sawing
AUP1	PO	Milky White	175µm	2200(40)	Power QFN Package
AUP4	PO	Milky White	170µm	1900(30)	No odor after UV
AUG2	PET	Transparent	150µm	1800(10)	Glass sawing

*( ) refers to adhesive strength after UV

Dicing Tape

AUD1: Normal dicing PVC tape

- AUD1 is a general purpose wafer dicing tape.
- Prevent seepage, chip flying, chipping and easy to pick up after UV irradiation.

AUD5: CIS(CMOS Image sensor)dicing PVC tape

- This tape is widely used in South Korea because there are good yield for CIS chip.
- Prevent seepage, chip flying, chipping and easy to pick up after UV irradiation.

AUD7: Small die chip dicing PVC tape

- PVC dicing tape with blue color for Small chip dicing.
- Good to mark by laser through the tape.

AUF3: PCB & wafer dicing PO tape

- Tape with strong adhesion and suitable for PCB dicing.
- Good to Environment because of using PO film.

AU105-HA: Wafer dicing & glass filter protection PO tape

- PO tape for wafer dicing and suitable for a packing glass during long time.
- Especially after UV, no residue and smudges although long-term keeping.

AUP165-HC: Small die chip dicing tape & excellent marking readability

- The high permeability of the tape makes the barcodes more readable.
- It is possible to saw PACKAGE CHIP as small as 0.6 * 0.3mm without any problems.

AUP170-HC: Normal PKG dicing tape

- This is a general package dicing tape which has high adhesion.
- After UV irradiation, Chip can be easily released from the tape without any residue.

AUP1: Power QFN dicing tape

- AUP1 can be kept holding while sawing the thick package like a PQFN, Ceramic etc.
- After UV irradiation, Chip can be easily released from the tape without any residue.

AUP4: Small die package dicing tape & low odor type

- This product is applicable to products with a packaging size of 3 * 3mm or less.
- Provides a comfortable working environment with less odor after UV irradiation

AUG2: Glass & LED dicing PO tape

- This tape has a strong adhesion using PET FILM.
- It can be applied to materials that more require firmly keeping the chip during sawing, such as GLASS or LED material.

General Purpose Filler Metals

Available in cadmium bearing and cadmium free alloys, silver brazing alloys braze ferrous and non-ferrous base metals and are the standard in brazing. Their versatility, high strength, and low melting temperatures offer a wide variety of applications and uses. Silver brazing alloys meet AWS, AMS, Military and Federal specifications, and can be provided with a certificate of conformance, compliance, and actual chemistries.

Cadmium Free Silver Brazing Alloys

Nominal Composition %									Melting Range °F		Application
Product	AWS A5.8	AMS	Ag	Cu	Zn	Ni	Sn	Mn	Solidus	Liquidus	Description
SILVERBRAZ 25Sn2	BAg-37	-	25	40	33	-	2	-	1270	1435	Filler metal used for joining copper, brass, nickel-silver, bronze, steel and stainless steel.
SILVERBRAZ 30	BAg-20	-	30	38	32	-	-	-	1250	1410	General purpose brazing alloys for use on copper, brass, nickel-silver, bronze, steel and other nonferrous alloy.
SILVERBRAZ 35	-	-	35	32	33	-	-	-	1265	1390	General purpose, low temperature alloy for ferrous and non-ferrous metals.
SILVERBRAZ 38	BAg-34	4761	38	32	28	-	2	-	1200	1330	General purpose filler metal for use in air conditioning and refrigeration to join steel, copper, copper alloys and nickel alloys.
SILVERBRAZ 40	-	-	40	36	24	-	-	-	1235	1415	General purpose alloy for use on copper, brass, nickel-silver, bronze, steel and other non-ferrous alloys.
SILVERBRAZ 40Ni2	BAg-4	-	40	30	28	2	-	-	1220	1435	For use on stainless steels, carbide, and non-ferrous alloys. Useful for brazing food handling equipment.
SILVERBRAZ 45	BAg-5	-	45	30	25	-	-	-	1225	1370	Good general purpose alloy where a high strength, ductile joint is required.
SILVERBRAZ 45T	BAg-36	-	45	27	25	-	3	-	1185	1260	Good flow properties for lower brazing temperature. Good for copper, brass and steel.
SILVERBRAZ 49Ni4	BAg-22	-	49	16	23	4.5	-	7.5	1260	1290	Used for brazing tungsten carbide inserts to cutting tools and rock drills because of its wetting properties. May be used to join stainless steel and carbon steel.
SILVERBRAZ 50	BAg-6	-	50	34	16	-	-	-	1250	1425	High tensile and good corrosion resistance.
SILVERBRAZ 50Ni2	BAg-24	4788	50	20	28	2	-	-	1220	1305	Used to fill long narrow joints.
SILVERBRAZ 54	BAg-13	4772	54	40	5	1	-	-	1340	1575	For high temperature service applications and atmospheric furnace brazing.
SILVERBRAZ 56Ni2	BAg-13a	4765	56	42	-	2	-	-	1420	1640	Used for atmospheric furnace brazing where zinc fumes are objectionable.
SILVERBRAZ 56	BAg-7	4763	56	22	17	-	5	-	1145	1205	Used for all ferrous and non-ferrous alloys
SILVERBRAZ 60Sn10	BAg-18	4773	60	30	-	-	10	-	1115	1325	Good for torch and atmosphere brazing, Used on copper, nickel and steel.
SILVERBRAZ 63	BAg-21	4774	63	28.5	-	2.5	6	-	1275	1475	Good for corrosion resistance to moisture. Used on 400 series stainless steel.
SILVERBRAZ 65	BAg-9	-	65	20	15	-	-	-	1240	1325	Used for ferrous alloys.
SILVERBRAZ 72	BAg-8	-	72	28	-	-	-	-	1435	1435	Used to join copper-nickel and iron-base alloys. Quickly flows into long narrow joints. Available in "Vacuum Tube Grade"

Cadmium Bearing Silver Brazing Alloys

Product	AWS A5.8	AMS	Ag	Cu	Zn	Cd	Ni	Solidus	Liquidus	Application
SILVERALOY 30	BAg-2a		30	27	23	20	-	1125	1310	Used for general purposes.
SILVERALOY 35	BAg-2	4768	35	26	21	18	-	1125	1295	Used to join large joint clearances and for joining dissimilar combinations.
SILVERALOY 45	BAg-1	4769	45	15	16	24	-	1125	1145	Used to join ferrous and non-ferrous close fitting joints. Used in refrigeration and electrical components.
SILVERALOY 50	BAg-1a	4770	50	15.5	16.5	18	-	1160	1175	For use on same base metals. Has a narrow melting range.
SILVERALOY 50Ni3	BAg-3	4771	50	15.5	15.5	16	3	1170	1270	Used for joining tungsten carbide tips and stainless steel. Good for large gaps and poor fitting joints.

Many additional alloys upon request.

General Purpose Filler Metals

High Temperature Alloys - Bronze Alloys

Mainly used for high strength and stress.

Nominal Composition %										Melting Range °F		Application
Product	AWS-ASTM	Cu	Sn	Al	P	Ni	Si	MN	Zn	Solidus	Liquidus	
CDA 521	RCuSn-C	92	7.7	-	.35	-	-	-	-	1620	1880	Copper-to-steel in brazing furnace
CDA 681	RBCuZn-C	58	.95	-	-	-	.1	.3	BAL	1595	1620	Steel-to-steel with torch or induction
CDA 773	RBCuZn-D	48	-	-	.2	10	.1	-	BAL	1690	1715	Carbide-to-steel
X-55	-	55	-	-	-	6	.15	4	BAL	1615	1685	Carbide-to-steel

Alloys Containing Aluminum

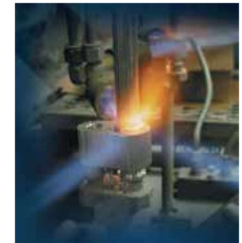
Widely used in automotive and refrigeration. Available in wire, strip and a variety of preformed shapes.

Nominal Composition %											Melting Range °F		Application
Product	AMS	AWS-ASTM	Si	Cu	Fe	Zn	Mg	Mn	Cr	Al	Solidus	Liquidus	Aluminum-to-aluminum
AL 718	4047	BAISi-4	12	.3	.8	.2	.1	.15	-	BAL	1070	1080	

Copper Alloys

Pure Copper - Has excellent corrosion resistance and high electrical and thermal conductivity. Oxygen-Free is also available.

Nominal Composition %			Melting Range °F		Application
Product	AWS A5.8	Cu	Solidus	Liquidus	
CDA 102	-	99.95	1981	1981	OFHC (Oxygen Free High Conductivity) High purity copper for furnace and vacuum brazing.
CDA 110	BCu-1	99.90	1949	1981	Used extensively for brazing steel, stainless and nickel alloys in a controlled furnace (CAB)



ADDITIONAL COPPER ALLOYS AVAILABLE UPON REQUEST

Brazing Alloys Containing Phosphorous

Copper Phosphorous Alloys - Widely used alloys for copper-to-copper brazing because of the self-fluxing properties from the phosphorous content. Not for use with ferrous or nickel based materials.

Nominal Composition %					Melting Range °F		Application
Product	AWS A5.8	Ag	Cu	P	Solidus	Liquidus	
PHOSCOPPER 0	BCuP-2	0	92.9	7.1	1310	1475	Non-silver alloy. Fast flow. Recommended joint clearance: .001" to .003" Withstands mild vibration
SILVERPHOS 2	BCuP-6	2	91.0	7.0	1190	1450	Similar to Phoscopper 0 but medium flow with joint clearances of .001" to .005"
SILVERPHOS 5	BCuP-3	5	89.0	6.0	1190	1500	Slow flow. Will fill gaps and form fillets. Joint clearances of .003" to .005"
SILVERPHOS 6		6	87.5	6.5	1190	1425	Similar to Silverphos 5
SILVERPHOS 6HP	BCuP-4	6	86.8	7.2	1190	1335	Fast flow. Lower melting point. Joint clearances of .003" to .005"
SILVERPHOS 15	BCuP-5	15	80.0	5.0	1190	1480	Slow flow. Brazed joint is ductile to withstand vibration. Only alloy in this group available in strip form. Joint clearances of .002" to .005"
SILVERPHOS 18	-	18	74.8	7.2	1190	1190	Lowest temperature and fastest flow of this group. Joint clearances of .001" to .003"

Gold Alloys

Excellent for brazing iron, nickel, and cobalt based metals where resistance to oxidation or corrosion is required. These alloys have high strength, and are primarily used in furnace (Vacuum) brazing applications.

Nominal Composition %							Melting Range °F	
Product	AWS A5.8	AMS	Au	Cu	Pd	Ni	Solidus	Liquidus
GOLDBRAZ 5050	-	-	50	50	-	-	1751	1778
GOLDBRAZ 5025	-	4784	50	-	25	25	2016	2050
GOLDBRAZ 8218	BAu-4	4787	82	-	-	18	1742	1742
GOLDBRAZ 7008	BAu-6	4786	70	-	8	22	1841	1899
GOLDBRAZ 35623	BAu-3	-	35	62	-	3	1832	1886
GOLDBRAZ 3565	-	-	35	65	-	-	1814	1850
GOLDBRAZ 8116	-	-	81.5	16.5	-	2	1670	1697
GOLDBRAZ 8020	BAu-2	-	80	20	-	-	1666	1670
*PURE GOLD (99.9% Minimum Purity)	-	-	99.99	-	-	-	1945	1945

Many additional alloys upon request.

High Silver Alloys Vacuum Grade

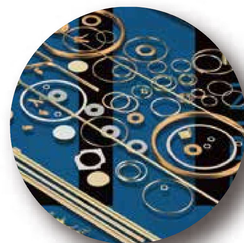
High purity alloys are used for the brazing of carbides, steel, cast irons, and other ferrous alloys. Vacuum grade filler metals are fabricated for use in high purity atmosphere of vacuum furnaces.

成分组成 %						Melting Range °F	
Product	AWS A5.8	AMS	Ag	Cu	Pd	Solidus	Liquidus
SILVERBRAZ 72	BVAg-8	-	72	28	-	1435	1435
PAL 5	BVAg-30	-	68.5	26.8	4.7	1463	1490
PAL 10	BVAg-31	-	58.5	31.8	9.7	1490	1535
PAL 15	-	-	65.0	20.3	14.7	1562	1652
*PURE GOLD (99.9% Minimum Purity)	BVAg-0	-	99.99	-	-	1761	1761

Nickel Alloys

Mainly used in controlled atmosphere furnace brazing of stainless steel and is readily available in powder, paste, foil and transfer tape.

Nominal Composition %										
Product	AWS A5.8	AMS	Ni	Si	Cr	B	Fe	Pd	Co	W
AMS 4776	BNi-1a	4776	Bal	4.5	14	3.1	4.5	-	-	-
AMS 4777	BNi-2	4777	Bal	4.5	7	3.1	3	-	-	-
AMS 4778	BNi-3	4778	Bal	4.5	-	3.1	-	-	-	-
AMS 4779	BNi-4	4779	Bal	3.5	-	1.8	-	-	-	-
AMS 4782	BNi-5	4782	Bal	10	19	-	-	-	-	-
AMS 4783	BCo-1	4783	17	8	19	.8	-	-	Bal	4



Brazing Powder & Paste

Most brazing alloys are available in paste and powder form. The paste consists of powder, flux, and binder which can be customized to suit your applications and automation systems. Many packaging options are available.

Brazing & Soldering Flux

Flux removes oxides that form during the brazing process. Flux must be used when brazing unless in a controlled atmosphere. Fluxes are supplied in paste, liquid and dry form, including several for spray dispensing. We carry a wide range of flux and flux remover for every brazing and soldering application.

Standard Fluxes		Application
White Flux	AMS 3410	Low temperature
Black Flux	AMS 3411	High temperature

Soft Solder

Federal Specification QQ-S-571E(Tin Lead Silver Alloys)

Soft Solder alloys are ideal for low temperature metal joining. Lead based and lead-free solders in over 100 different alloys available with solid, acid or rosin cores. Soldering flux also available.

Nominal Composition %						Melt Range °F	
Alloy Name	Ag	Cu	Pb	Sb	Sn	Solidus	Liquidus
Sn96Ag04	3.7	-	-	-	96	430	430
Sn95Sb05	-	-	-	5	95	455	464
Sn63Pb37	-	-	37	-	63	361	361
Sn60Pb40	-	-	40	-	60	361	376
Sn50Pb50	-	-	50	-	50	361	421
Sn40Pb60	-	-	60	-	40	361	460
Sn05Pb95	-	-	95	-	5	586	594

NuTEC

Providing high purity products to the aerospace,medical, and electronic industries.

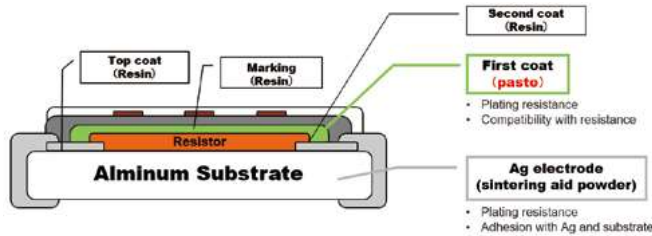
To support our manufacturing and material products, the NuTEC Group added a Document Control Department to focus on customer specific material control. Today, The NuTEC group is audited to the AS 9000 standards. Fine wire diameters below ten-thousandths, ring diameters below fifteen thousandths, and strip thickness below two thousandths are common products for the NuTEC Group.

Standard Material

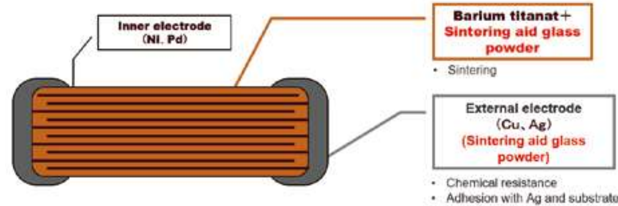
Platinum	Au/Ag
Pt 99.95% ASTM B 561	Au 99.99% ASTM B 562
Pt/10%Ir	Ag 99.99%
Pt/20%Ir	
Pt/10%Ni	
Pt/8%W	

Optional form: Thin/super thin wire rod
Cut tube foil/piece

Chip Resistor



Multilayer Ceramic Capacitor



Lead Free Glass Paste for chip resister G1: P LFOC-1804

Standard Property

Color	Green
Viscosity at 25±1℃	150±30 Pa·s
Component	Non-Crystal Glass, SiO_2-Bi_2O_3-B_2O_3

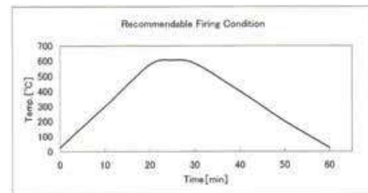
Viscosity: Measured by Brookfield Viscometer DV-II,
No.14 spindle, 10rpm

Advantages

1. Alkali-less & Lead free Glass
2. Less influence on resistive paste
3. Good printing ability
4. Excellent levelling ability during firing
5. Suitable for thin printing

Recommended Profile

Coating Method	Screen Printing 200~325 mesh/inch
Drying	130℃~150℃ × 10~15 min
Firing	Firing Speed: 20-30℃/min Peak Temp.: 600-620℃ Holding Time: 5-10 min Cooling Speed: 20-30℃/min



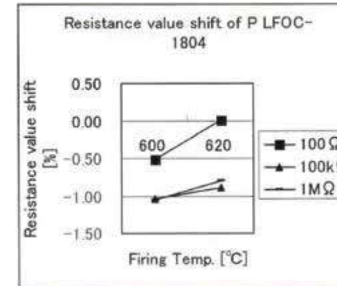
"Glass Frits" & "Pastes"
For Electronics & Components

Lead Free Glass Paste for chip resister G1: P LFOC-1804

Thermal Properties

Liner Thermal Expansion Coefficient	(68±5)×10^{-7}/℃
Glass Transition Point	504±15℃
Yield Point	544±15℃

Resistance Value Shift



Resistance	Firing Temp.	Resistance Value Shift ⊿R [%]	Standard Deviation
100Ω	600℃	-0.52	0.07
	620℃	0.01	0.11
100kΩ	600℃	-1.04	0.07
	620℃	-0.89	0.06
1MΩ	600℃	-1.05	0.03
	620℃	-0.80	0.10

*⊿R: Changing rate of resistance value between before and after firing,
article is applied by P LFOC-1804 on resistance. (n=6)

Protection Glass Paste for Chip Resistor G1: POC-1660

Standard Property

Color of Paste	Green
Product Viscosity*1 (at 25±1℃)	200 ~ 260 Pa·s
Glass Composition	P_bO-SiO_2-B_2O_3

※1 Evaluated by Brookfield style viscometer,
Model: DV-11, Spindle No. 14, 10rpm, 1 min

Advantages

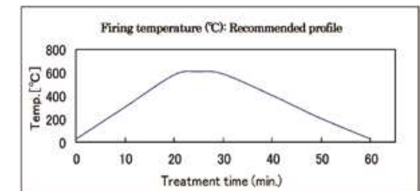
1. Less influence on resistor
2. User-friendly product, easily applicable to screen printing
3. Prevent damage against electrodes
4. Excellent chemical durability
5. Developed for thick printing

Thermal Properties

CTE (Coefficient of Thermal Expansion)	61 ~ 67 × 10^{-7}/℃
Glass Transition Point	480 ~ 500℃
Yield Point	520 ~ 540℃

Recommended Profile

Usage	Screen Printing Screen: 200 ~ 325 mesh/inch
Drying Condition	Peak Temperature: 130 ~ 150℃ Retaining Time: 10 ~ 15 min
Firing Condition	Temperature Rising Condition: 20 ~ 40℃/min Maximum Temperature: 600 ~ 620℃ Retaining Time: 5 ~ 10 min Temperature Dropping Condition: 20 ~ 30℃/min



"Glass Frits" & "Pastes"

Glass Types **For Electronics & Components**

- Bismuth glass
  Bismuth glass shows the second lowest softening temperature next to lead.

- Zinc glass
  Zinc glass shows the third lowest softening temperature next to lead and bismuth.
  In general, zinc glass indicates relatively higher softening temperature than bismuth glass.

- Silica glass
  Silica glass shows high softening temperature.
  It is excellent in the stability at a high temperature, and chemical resistance; besides,
  it shows a low permittivity.

Low Expansion Glass

Suitable for low thermal expansion materials such as quartz or aluminum nitride.
Excellent in thermal resistance, plating resistance.
Can fire at lower temperature than that of conventional products (fired at 900℃).

	ProGlass LE-1064	ProGlass LE-0565	ProGlass LE-1075
Appearance	White		
Glass type	Zinc glass		
CTE ($\times10^{-7}$ / ℃)	10	1	12
Tc (℃)	649	660	754
Acid resistance	Not good	Not good	Good
Desired firing temperature(℃)	640 to 680	650 to 690	750 to 780

High Expansion Glass

Suitable for high thermal expansion materials such as metals or ferrite.
Can use at higher heat temperature, and minimize the damage by heat treatment.

	ProGlass HE-10068	ProGlass HE-13065
Appearance	Light-pink	
Glass type	Bismuth glass	
CTE ($\times10^{-7}$ / ℃)	106	132
Tc (℃)	684	644
Desired firing temperature(℃)	680 to 720	640 to 680

Decorative Color

Decorative Color "Nanosmart SK" **For Electronics & Components**

TiO_2 paste for screen printing "Nanosmart SK"

Coloring technology without using
thin-film interference(dye, pigment)

Property

- Can form permeable reflective film by screen printing and firing
- Designable film (color is changed by film thickness)
- Low cost compared with PVD

Design

Can make metallic logo, pattern and figure by screen printing

"Nanosmart SK"

【Contents】
・TiO2 Sol
・Resin and solvent

Paste technology to control thickness at nano-level by screen printing method

Sreenprinting → Drying (150℃) → Firing (Over 500℃)

Thickness	80nm	120nm	160nm	200nm	240nm	
on glass						
Thickness	40nm	60nm	80nm	140nm	180nm	260nm
on SUS						

<Reference Products>

High Corrosion Resistance Coatings

High Corrosion Resistance Coating Solutions" Protector Series"

For Electronics Parts & Components

Property

- Have a high rust prevention effect for Aluminum or Magnesium.
- Insulating property and abrasion resistance can also be added.

Design

Inorganic coating using Sol-Gel method

Film forming temp :

Low under 150℃(302℉)

Film Property

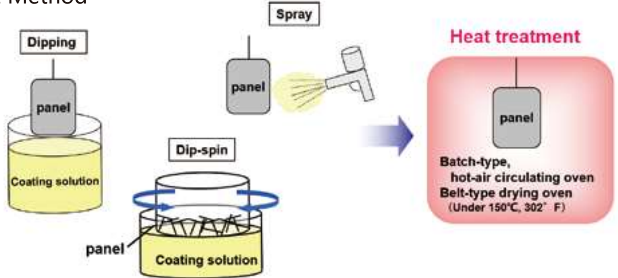
Substrate: soda lime glass
Heat treatment conditions: 150℃(302°F)×15min

Type		Inorganic type Protector S	Organic-inorganic Hybrid type Protector HB
Film hardness*1	Scratching resistance	5H	3H
	Fracture strength'	Over 9H	5H
Adhesion*2		100/100	100/100
Transmittance		93%	93%
Haze		0.10%	0.10%
Limited film thickness		Below 1μm	Below 20μm
Heat resistance		Up to 1000℃	Up to 300℃

*1 Measured in pencil hardness test (According to JIS K5600-5-4)
*2 Measured in cross-cut peeling test with a tape

Coating Process

- Coating Solution : Use low viscosity sol (1 to 10 mPa·s)
- Treatment Method



Product Line Up

Type	Inorganic type		Organic-inorganic Hybrid type		
Product	S-6140	S-IC1	HB-7000	HB-LTC2	HB-7550
Feature	High hardness High heat resistance	High rust prevention	High adhesion	Two component mixing	
Main application	Prevent rust on Zn material		Prevent rust on metal material excluding Zn	Prevent rust on Anodized-, bare aluminum	Prevent rust on magnesium
Operation method	Dipping, Dip-spin		Dipping, Dip-spin Spray	Spray	
Recommended heating conditions	150℃×15min		180℃×15min	100℃×20min	150℃×20min
Remarks	Transparent, no-color		Black type Protector BK-P2	Black, shiny type Protector BK-4300 Black, dull Protector BK-4400M White, dull Protector WH-4320M	

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