Shin-Etsu Chemical to launch newly developed advanced materials for 5G related products

Date: 4/21/2020

Shin-Etsu Chemical Co., Ltd. (Head Office: Tokyo; President: Yasuhiko Saitoh) is launching a number of new products in order to take advantage of surging demand for highly advanced materials in the coming 5G era (Fifth Generation Telecommunication).

Shin-Etsu has newly developed a “Quartz Cloth” and a “Thermoset Ultra-low Dielectric Resin” ideal for electronics devices, printed circuit boards, IC substrates, antennas, and radar domes that will be used in 5G high-frequency (including millimeter-wave) communication. Furthermore, we are expanding our lineup of heat dissipation products.

In connection with these newly developed products, Shin-Etsu concluded a licensing agreement with Novoset, LLC (Head Office: Peapack, New Jersey; CEO Sajal Das) regarding the manufacturing and sales of high-performance thermoset ultra-low dielectric resins that Novoset has developed.

The details of each new 5G-related Shin-Etsu product are as follows:

1) Quartz Cloth (Product name: SQX Series)

It has immensely superior characteristics concerning transmission loss (degree of degradation of the electrical signal), such as a Dk (dielectric constant) of less than 3.7, a Df (dissipation factor) of less than 0.001, and a linear expansion coefficient of less than 1ppm/°C.

Its low-loss capabilities are most suitable for applications such as a circuit board’s core material to provide key support for next-generation 5G requirements for very high-speed communications materials, and it also demonstrates its vastly superior characteristics for antennas and radar domes’ fiber-reinforced plastic parts material.

The Quartz Cloth consists of very thin quartz threads, whose thickness can be made even under 20μm, and it can match the new demand for thinner laminated circuit boards.

In addition, quartz has the characteristic of having very few occurrences of α-rays and it can prevent the malfunctioning of devices due to radiation rays.

2) Thermoset Ultra-Low Dielectric Resin (Product name: SLK Series)

This product has low dielectric characteristics close to those of fluorocarbon resins as well as high strength and high elasticity. The lowest level dielectric properties with a dielectric constant of less than 2.5 in the high-frequency band (10~80GHz) and a dielectric dissipation factor of less than 0.0025 are achieved by this thermoset resin.

Because it has the properties of low moisture uptake and high adhesive strength to low profile copper (low roughness copper foils) as well, it is suitable for usage in such areas as FCCL (flexible copper clad laminates) and as an adhesive agent.

We are also planning to develop low dielectric encapsulant materials and low dielectric high-thermal conductivity adhesives.

Shin-Etsu has reached a license agreement with Novoset, LLC regarding ultra low-loss dielectric resin with high-temperature resistance and very low moisture absorbency. Adding these products to our product line-up will strengthen our market position in CCL (copper-clad laminates), rigid laminated circuit boards (multilayer IC substrates), antennas and radar domes for communication base stations that require high heat resistance and reliability.

3) Heat Dissipation Sheet (Product name: SAHF Series)

In order to meet increasing market demand for 5G, we have relaunched newly developed sticky sheet products onto the market, sheet that is combined with heat dissipation material and a hot melting adhesive sheet.

Shin-Etsu's products offer a wide range of thermal conductivity from 5W/mK to 100W/mK, making them very suitable in applications for power semiconductors and automotive fields where high reliability is required.

Shin-Etsu will contribute to the realization and improvement of 5G by developing advanced high-performance materials and meeting the requests of our customers. To lead in this area, we will aggressively pursue the development and introduction of new products and technologies.

About Shin-Etsu:

Shin-Etsu Chemical Co., Ltd., the Tokyo based chemical company, is the world's largest supplier of semiconductor materials, semiconductor silicon, PVC resin, synthetic quartz glass and methylcellulose and is a major producer of materials including silicones and rare earth magnets. Shin-Etsu Chemical's stock (TSE: 4063) is listed on three markets: The Tokyo, Osaka and Nagoya Exchanges in Japan.

http://www.shinetsu.co.jp

About Shin-Etsu MicroSi:

Shin-Etsu MicroSi Inc. is a wholly owned subsidiary of Shin-Etsu Chemical Co., Ltd. With its headquarters in Phoenix, Arizona, Shin-Etsu MicroSi provides high performance products and materials, specifically designed to address today's photolithography, packaging, solar and flexible printed circuit requirements.

www.microsi.com

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Shin-Etsu MicroSi®

Shin-Etsu Packaging Materials

Product Description

Shin-Etsu is a leader in developing advanced, semiconductor packaging materials for encapsulating all types of semiconductor devices. This broad line of products is made of silicone molding compounds and epoxy molding compounds that offer low stress, very low warpage, and high thermal conductivity.

Molding Compounds

- Low Internal Stress
- Stable at High Heat & Voltage
- High Thermally Conductive Formulations

Silicone Die Attach Materials

- Low Internal Stress
- High Adhesive Strength
- Less Contamination

Wafer Backside Coating Materials

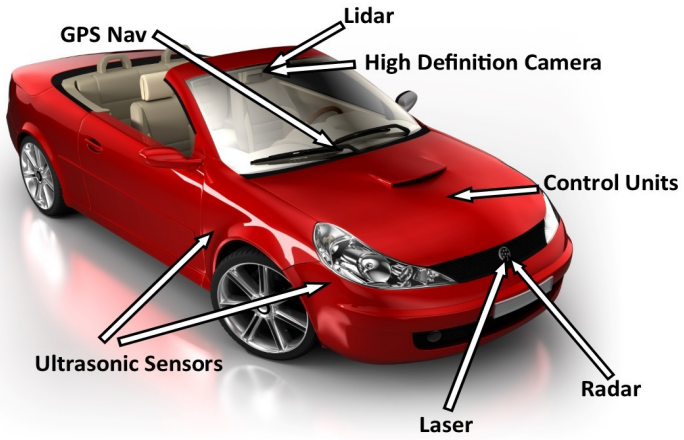
- Smooth Surface After Printing
- Good Dicing Performance
- No Die Motion During Wire Bonding

Polyimide Silicone Chip Coating Materials

- High Adhesive Stability
- High Electrical Insulative Properties

Thermally Conductive Silicone Adhesives

- Thermoset Adhesive
- High Adhesive Strength
- Low Temperature Cure Adhesive
- No Induced Stress by Heating
- Conformal Film Adhesive



Liquid Epoxy Encapsulants

- Low Internal Stress
- Stable in Harsh Environments
- Oil, Chemical & Thermal Shock Resistance

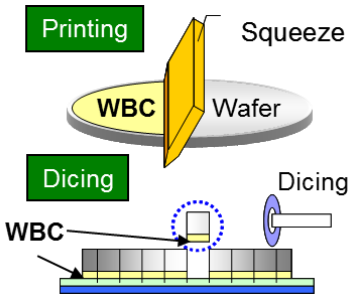
Shin-Etsu Packaging Materials

Epoxy Die Attach Materials

Grade	Wafer Backside Coating		Dispense	
	Standard	Low Modulus	Standard	High Tg
	SFX524G2D	SFX524G2C	SFX-530C	SFX-530D
Viscosity (Pa*s)	40	20	65	60
Tg (°C)	190	145	130	220
CTE (ppm/°C)	30	65	40	25
Flexural Modulus GPa)	6	2	6	8

Silicone Die Attach Material

Grade	LPS-8448X	LPS-8420	LPS-8421	KJR-9602-5WH	KJR-9602-5
Color	Transparent	Transparent	Transparent	White	Black
Viscosity (Pa*s)	12	10	10	1,700	1,700
Hardness	D60	A70	A40	A40	A35
Elongation (%)	10	100	120	400	300



Liquid Epoxy Materials

Grade	Standard		High Thermal Conductive (2.5W/mk)	Electrically Conductive	2nd Underfill	
	Potting	DAM			Standard	High Tg
	SMC-762NN	SMC-762D	SMC-762HCLL	SFX-5603-7AQ	SMC-365	SMC-375X9A
Viscosity (Pa*s)	30	250	50	80	2	65
Tg (°C)	145	145	145	150	140	200
CTE (ppm/°C)	14	16	17	35	30	22
Flexural Modulus GPa)	15	12	16	8	6	9

Thermally Conductive Silicone Adhesives

Grade	LPS-AF500TC	LPS-AF500EC	KJR 9080S-6	KJR-9080S-13-1	KJC-5080L-1
Thermal Conductivity (W/mk)	2.9	13	4	3	1.5
Application	Film	Film	Dispense	Dispense	Dispense
Cure Temperature (°C)	150	150	150	150	23
Hardness	D40	D40	D60	A60	A60
BLT (µm)	50	50	90	150	50

Molding Compounds

Grade	KMC-2520L-M1	KMC- 2280H	KMC- 8000X
Flame retardant	Green	Green	Green
Flexural Strength (MPa)	130	100	120
Flexural Modulus (GPa)	20	13	12
Tg (°C)	163	190	225
CTE 1 (ppm/°C)	11	15	16
CTE 2 (ppm/°C)	45	54	38

Polyimide Silicone Materials (Adhesion & Insulation Improvement)

Grade	KJR-651E	KJR-655E	KJR-657E
Features	Standard	Thin Film	Thick Film
Solvent	NM2P	NM2P	NM2P/MeOH
Storage Temp. (°C)	5	5	5
Dielectric Breakdown V/0.1mm	13	13	12
Young's Modulus GPa	2.4	2.4	2.3
Tg (°C)	255	255	230