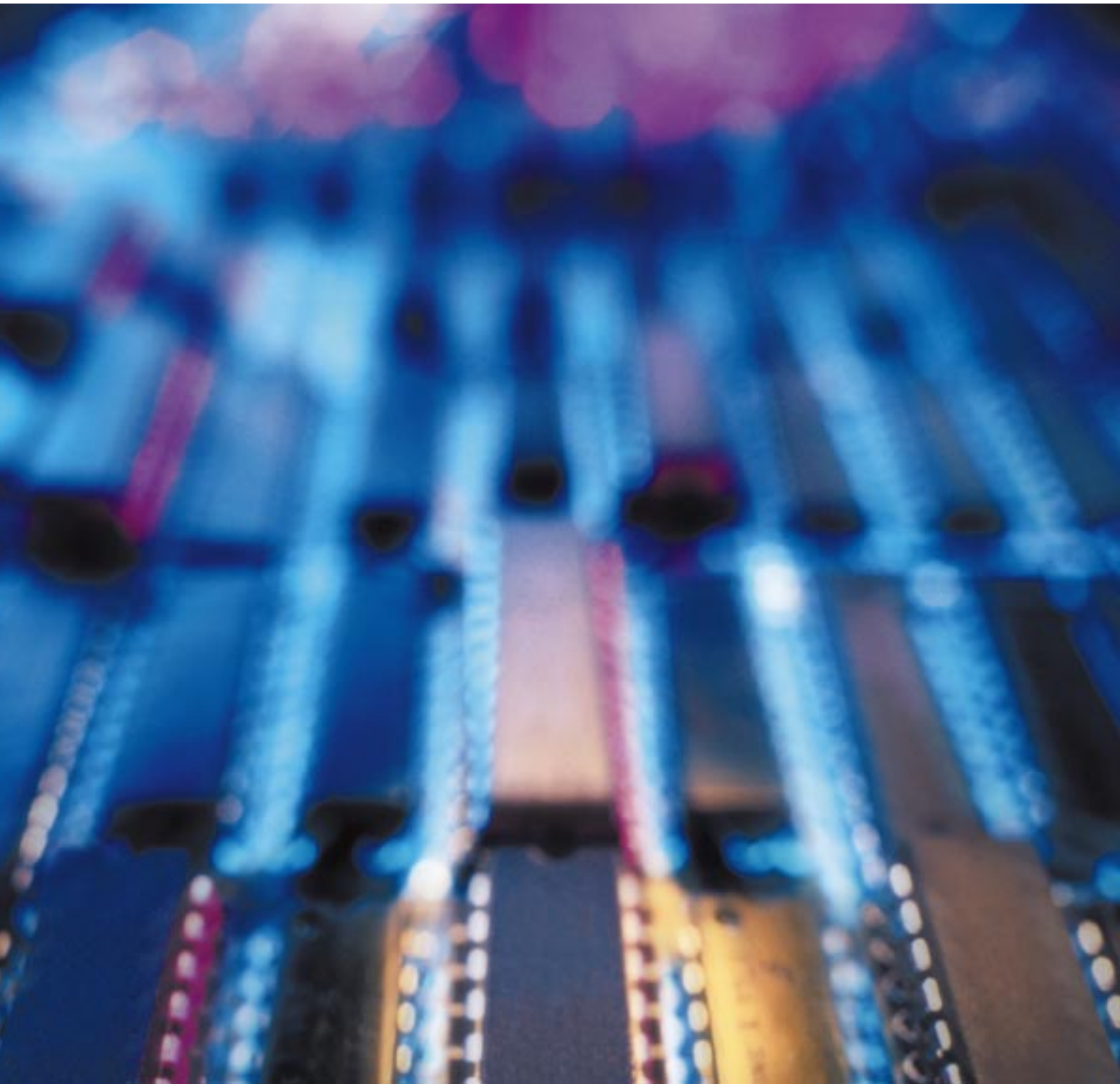




Shin-Etsu Epoxy Molding Compounds

KMC Series



KMC Series

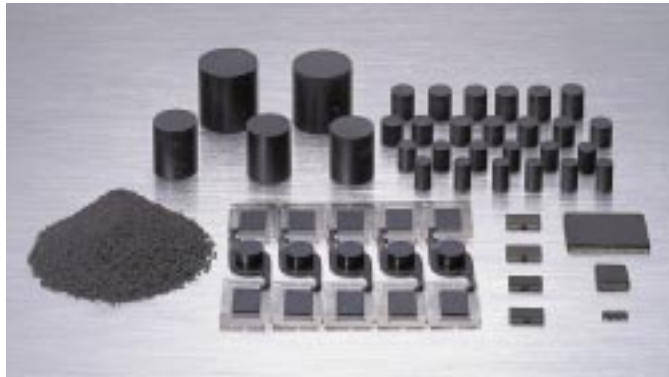
Advanced packaging material for encapsulating all types of semiconductor devices

Broad product line-up, especially for the most advanced field

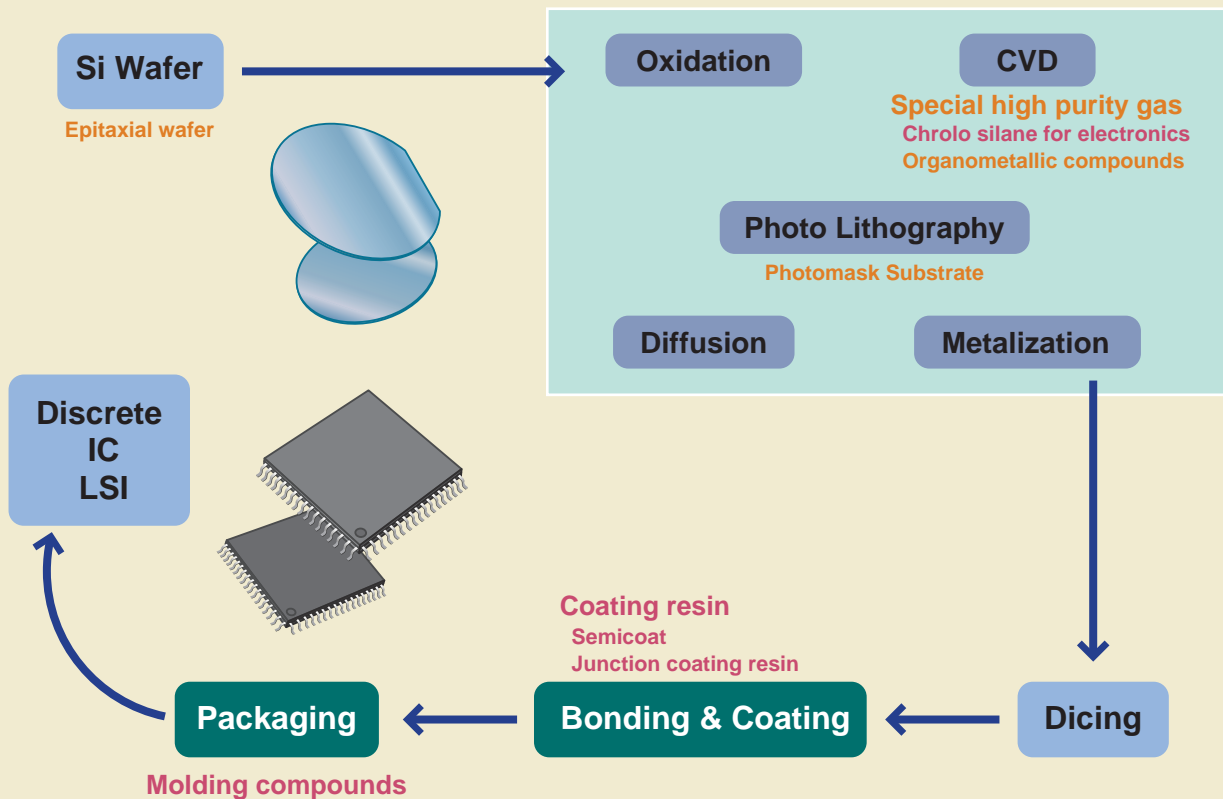
Standard, Low stress, High thermal conductive, Low alpha, Low warpage, Liquid epoxy.

Main Features

- Excellent reliability
- Ultra low internal stress
- Low levels of ionics
- Excellent moldability
- Nonflammability
- Low particle
- Sb/Br free (green compound)



Shin-Etsu electronics materials are contributing to the development of the semiconductor industry



Shin-Etsu Chemical Products
Products of Shin-Etsu's the Organic Electronics Materials Dept.

Shin-Etsu is a world leader in epoxy molding compound technology

Excellent R&D capability and strong future product pipeline

Leading company of Silicone technology and product (Nearly half a century experience in the field of silicones and one of the largest manufacturers in the world)

Patent holder of the basic catalyst of epoxy molding compounds — USP 4328150

Patent holder of the basic silicone softener technology for epoxy molding compounds — USP 4902732 and 4877822

Key raw materials and element technology

In-house made silicone softener, silicone coupling agent

Special spherical silica (From an affiliated company, Admatechs Co.,Ltd.)

Synthetic silica and aluminum oxide

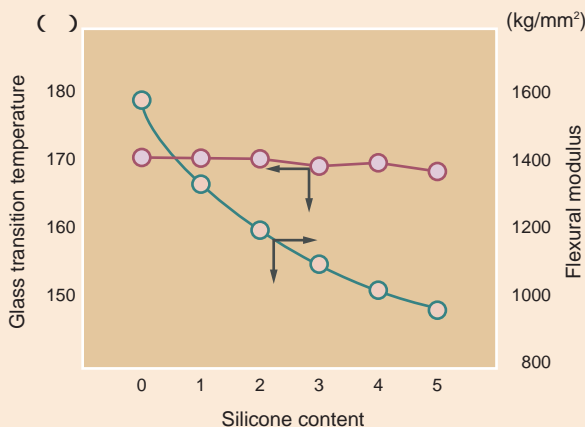
Silicone Magic

Fine sea-island structure

Shin-Etsu was granted the prize of the minister of international trade and industry in the national invention awards 1991 in Japan for technology for stress reduction of epoxy resin. By utilizing controlled silicone to form the fine sea-island structure arbitrarily into epoxy resin matrix, it is possible to reduce the number of flexural modulus, maintain good heat resistance and high glass transition temperature, thus reducing the total internal stress.

As a result of this new technology, the long term reliability of semiconductor devices encapsulated with Shin-Etsu epoxy molding compounds based on this technology has been drastically improved.

Properties of the Molding Compound vs Silicone Content



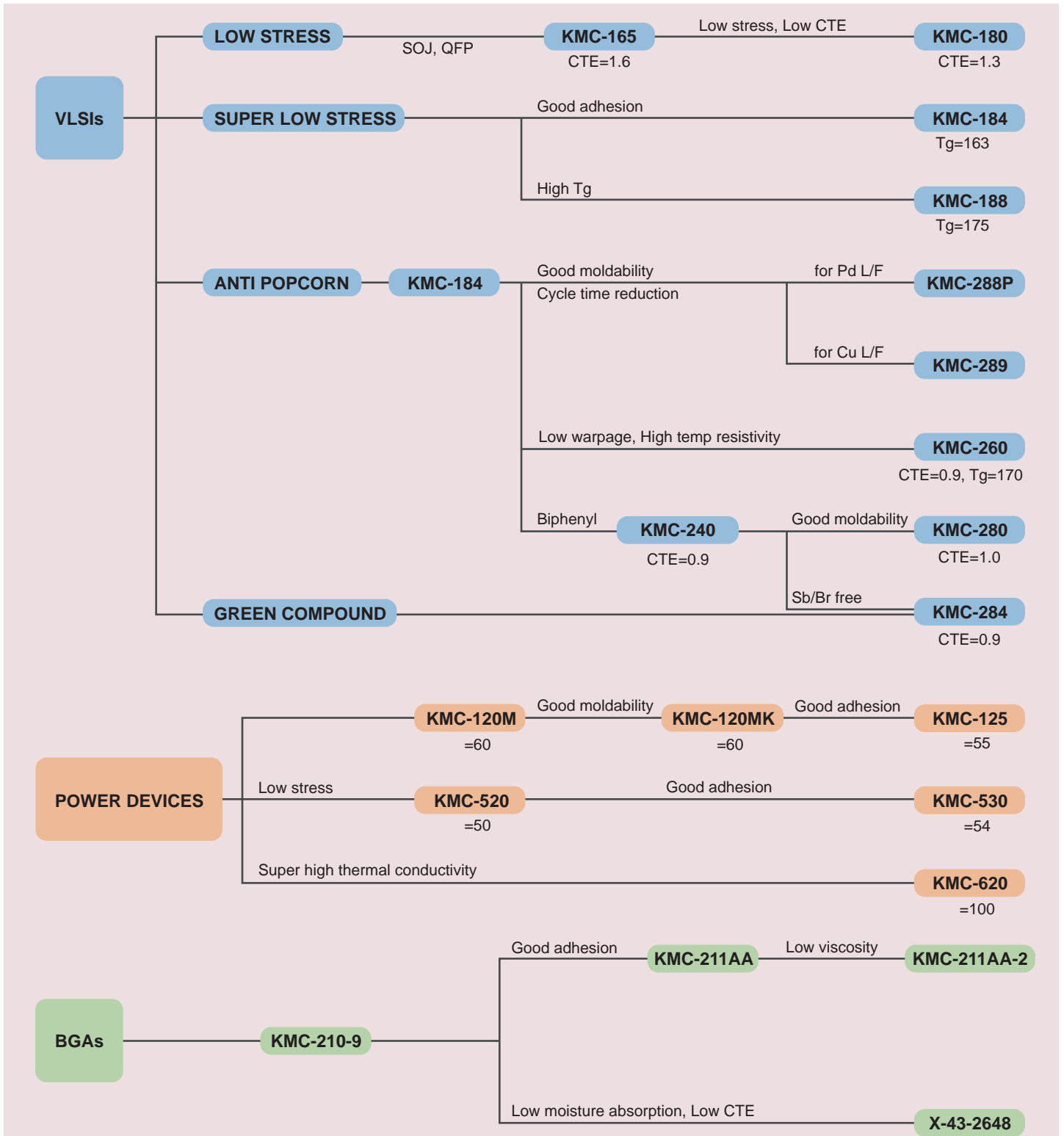
Security as great as the number of islands in the sea
This is the Shin-Etsu fine sea-island structure



Fine sea-island structure means, just like islands in the sea, silicone is dispersed equally in epoxy resin. If there is distortion, that silicone islands will absorb it.

KMC Series

Broad product line-up for all types of semiconductor devices and packages



...for VLSIs

...for Power devices

...for BGAs

	General properties	Unit	KMC-165	KMC-180	KMC-184	KMC-188	KMC-260	KMC-280	
Moldability	Spiral flow	cm	70	62	77	85	100	110	
	Gelation time (175)	sec	18	20	20	15	16	19	
	Molding shrinkage	%	0.5	0.4	0.4	0.4	0.2	0.2	
Physical and mechanical properties	Flexural strength	N/mm ²	127	127	127	127	147	147	
	Flexural modulus	N/mm ²	11278	12749	12847	12749	24026	22555	
	Specific gravity		1.8	1.9	1.9	1.9	2.0	2.0	
	Coefficient of thermal expansion	1	l/ × 10 ⁻⁵	1.6	1.3	1.3	1.3	0.9	1.0
		2	l/ × 10 ⁻⁵	7.4	6.0	5.6	5.8	3.5	3.5
	Glass transition temp.		165	165	163	175	170	125	
	Thermal conductivity	W/m·K	0.6	0.6	0.6	0.6	0.7	0.7	
Electric properties	Volume resistivity	25	·m	5 × 10 ¹⁴	5 × 10 ¹⁴	5 × 10 ¹⁴	5 × 10 ¹⁴	5 × 10 ¹⁴	2 × 10 ¹⁵
		150	·m	5 × 10 ¹¹	5 × 10 ¹¹	5 × 10 ¹¹	5 × 10 ¹¹	4 × 10 ⁹	2 × 10 ¹⁰
	Dielectric constant	(1MHz)	4.0	4.0	4.0	4.0	4.0	4.0	
	Dissipation factor	(1MHz)	0.01	0.01	0.01	0.01	0.01	0.01	
Chemical properties	Cl ⁻	ppm	5	1	5	5	5	5	
	Na ⁺	ppm	1 >	1 >	1 >	1 >	1 >	1 >	
	Electric conductivities	S/cm	30	30	30	30	50	50	
	pH		4.5	4.5	4.5	4.5	4.0	5.5	
	Water absorption (PCT)	%	0.6	0.5	0.6	0.6	0.3	0.3	
Others	Flammability		V-0	V-0	V-0	V-0	(V-0)	V-0	

	General properties	Unit	KMC-284	KMC-288P	KMC-289	KMC-530	KMC-620	KMC-211AA-2	
Moldability	Spiral flow	cm	110	80	100	61	89	140	
	Gelation time (175)	sec	19	15	16	24	21	17	
	Molding shrinkage	%	0.2	0.2	0.2	0.4	0.4	0.1	
Physical and mechanical properties	Flexural strength	N/mm ²	147	147	147	137	147	147	
	Flexural modulus	N/mm ²	24017	23536	23536	20202	23928	20104	
	Specific gravity		2.0	2.0	2.0	2.2	2.9	2.0	
	Coefficient of thermal expansion	1	l/ × 10 ⁻⁵	0.9	1.0	1.1	1.9	1.3	1.3
		2	l/ × 10 ⁻⁵	3.5	4.0	4.5	5.0	4.6	4.1
	Glass transition temp.		125	145	140	140	140	183	
	Thermal conductivity	W/m·K	0.7	0.7	0.7	2.3	3.3	0.9	
Electric properties	Volume resistivity	25	·m	2 × 10 ¹⁵	7 × 10 ¹⁴	7 × 10 ¹⁴	3 × 10 ¹³	7 × 10 ¹³	3 × 10 ¹⁴
		150	·m	2 × 10 ¹⁰	3 × 10 ¹¹	3 × 10 ¹¹	6 × 10 ¹⁰	1 × 10 ¹¹	5 × 10 ⁹
	Dielectric constant	(1MHz)	4.0	4.0	4.0	4.5	7.0	4.0	
	Dissipation factor	(1MHz)	0.01	0.01	0.01	0.01	0.01	0.01	
Chemical properties	Cl ⁻	ppm	5	5	5	3	3	13	
	Na ⁺	ppm	1 >	1 >	1 >	1	9	1	
	Electric conductivities	S/cm	50	45	45	50	51	40	
	pH		5.5	6.0	6.0	4.0	5.4	6.3	
	Water absorption (PCT)	%	0.3	0.4	0.4	0.5	0.2	0.4	
Others	Flammability		V-0	V-0	(V-0)	(V-0)	(V-0)	(V-0)	

(V-0)V-0 equivalent
Molding condition:175 /2 min.
Post cure:180 /5 hours

KMC Series

High Quality and On-time Delivery

Guaranteed by close integration of production, quality assurance, technical support and marketing



Gunma Complex
ISO 9001, ISO 14001



Silicones-Electronics Materials Research Center



Headquarters in Tokyo



Shin-Etsu Electronics Materials
Singapore Pte. Ltd.



Shin-Etsu Electronics (Malaysia) Sdn. Bhd.
ISO 9002



General Guidance for Product Handling

Molding conditions

Optimum molding conditions are greatly affected by the size and the design of the mold; the shape and the length of runners; the dimensions and the shapes of gate, and the number and configuration of the cavity, charge and many other parameters.

Parameter	Unit	Low stress grade		HC grade
		KMC-165	KMC-180	KMC-125
Molding temperature		175	175	175
Transfer speed	sec	15 ~ 20	15 ~ 20	15 ~ 20
Transfer pressure	kg/cm ²	70	70	70
Molding cycle time	sec	90	90	90
Post cure time	/hr	180/4	180/4	180/4

Tablet size

Standard tablet

Diameter (mm)	Standard weight range (g)
25	10 ~ 20
35	18 ~ 50
40	30 ~ 80
48	40 ~ 125
50	40 ~ 135
55	65 ~ 165
58	80 ~ 185
65	107 ~ 230

Miniature tablet

Diameter (mm)	Standard weight range (g)
9.8	1.5 ~ 2.0
11	2.1 ~ 2.8
13	2.9 ~ 4.7
14	3.7 ~ 5.9
16	4.4 ~ 8.2
18	6.2 ~ 10.9

Storage

KMC Series should be stored below 5 °C. At this temperature, KMC Series in an unopened can will remain usable for 6 months.

Handling

Prior to opening a container, remove it from cold storage and leave it at ambient temperature for at least 16 hours before opening it in a dry atmosphere. Avoid moisture contamination.

Keep the product and assembled device dry for optimum performance. Moisture contamination may cause voids and degrade other important characteristics such as moldability and adhesion to chip surface and lead frame.

For safe handling, avoid skin contact and breathing vapor or dust during the use of this product. It is recommended to wear proper safety gears. If skin contact occurs, wash thoroughly with soap and water.



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