

Electronics Materials

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Through offering a wide variety of products including silicones, rare earth magnets, and liquid fluoroelastomers, we are making a contribution to achieving higher performance and functionality as well as improved reliability of various products, such as consumer electronics, communication devices, and computers.

[Magnetic materials]



Rare earths



Rare earth products are not directly visible, but they have excellent chemical properties and are used in various areas mainly in electronics. So far, industries have paid attention only to the chemical properties of rare earths, but Shin-Etsu Chemical has taken notice also the physical properties. Using data accumulated over many years and our original process technology, we succeeded to control the size and shape of oxide grains. We now have a complete lineup of products, including spherical ultra-fine particles of $0.1\mu\text{m}$.

- Features
- Our manufacture, sales and research divisions cooperate to supply rare earth products that meet exactly the market needs.
 - Control of material properties such as nano powder and spherical powder is possible.
 - Our capabilities of stable supply and technical development are well received both in Japan and abroad.
- Lineup and applications
- Rare earth oxides are used in the red phosphor of the color Braun tube, high performance 3-wavelength luminescent lamp, X-ray intensifying agent, fine ceramics, optical glass, electronic parts, etc.
 - Rare earth metals are used in rare earth magnet, magnetic optical disk, mini disk for music, super-magnetostriction materials, etc.



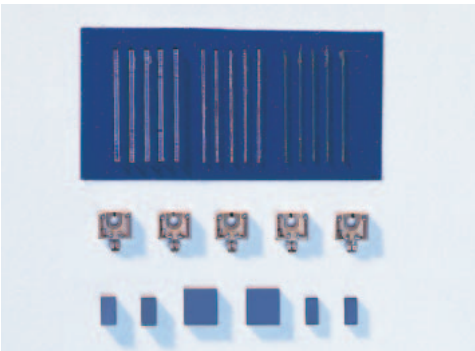
Rare earth magnets



Rare earth magnets are high performance permanent magnets using rare earths as the raw material, produced by an integrated system that handles all processes from the separation and refinement of rare earth elements to manufacturing of magnets. We supply various kinds of magnets and also support the application and development of various kinds of magnetic circuits.

- Features
- We are the only company in the world that manufactures three kinds of rare earth magnets: the neodymium (Nd) magnets, samarium (Sm) magnets, and cerium (Ce) magnets.
 - Our magnets cover a wide range of properties with maximum energy-products ranging from about 10 MGOe to 52MGOe.
 - The development of the highly heat-resistant neodymium rare earth magnets permits use in high temperature environment.

- Applications
- All uses related to magnetism in small and high-output motors, computers, mechatronics, household electric appliances, transportations, communication, measurements, and other applications



Single crystal ferrites



Mn-Zn single crystal ferrites are high-quality, high-performance head material free of foreign matter or distortion.

- Features
- It has superior high-frequency characteristics.

- Applications
- Head materials for VTR, 8mm VTR, DAT, and computers

[Crystal materials]



Oxide single crystals (Lithium Tantalate: LT)

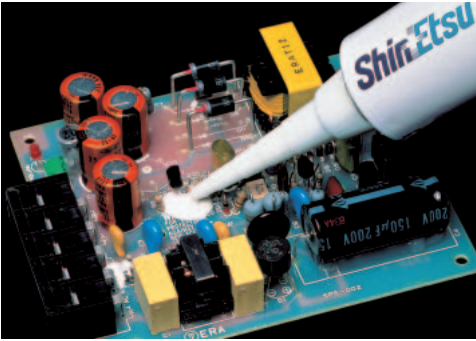


Oxide single crystals (LT) are used in SAW devices that filters microwaves and picks up only specific frequencies, which are used in mobile communications devices and TV and VTR tuners. Stable composition crystals are made by controlling the lattice constant. This assures small difference in SAW velocity, which leads to a high yield in device production.

- Features
- Strict control in crystal growing realizes a high precision composition.
 - High precise wafer process corresponds with delicate device patterns.

- Lineup and applications
- The X cut - SAW device for TV and VTR
 - The 36° Y cut - SAW filter for pocket pager, mobile telephone and other mobile communications
 - The Z cut - Nonlinear optics components and pyroelectric devices

[Rubbers, Plastics and Others]



Silicone RTV rubber



Liquid or paste silicone RTV rubber was developed for use in adhesion, coating and potting of electrical or electronic parts.

- Features
- Silicone RTV rubber is divided into two types, one-component type and two-component type.
 - Curing system is divided into two types, condensation type and addition type.
 - Excellent adhesion property is exhibited for glass, tiles, metals, plastics, and many other materials.
 - The electrical characteristics are stable against temperature, humidity and other environmental fluctuations.
 - After hardening, the superior rubber elasticity absorbs vibration and impact.

Applications ● Adhesion, coating and potting of electric or electronic parts



Silicone gel



Unlike the conventional silicone RTV rubber, this product becomes a gel after curing. After curing, it exhibits superior cold/heat resistance, electrical insulation, and transparency, similar to silicone rubber.

- Features
- It has excellent fluidity and is able to fill fine spaces.
 - It features superior viscosity, adhesiveness, sealing property, moisture resistance, and shock absorbance.
 - Being soft, the shape can be changed by application of a small weight or pressure.
 - Because of the low elasticity, stress caused by thermal expansion is reduced.

Applications ● Encapsulation or protection of various power modules. Filling material for light path.
 ● Encapsulation or protection of hybrid IC for electric automotive parts (such as regulator, igniter, various control units, and sensor). Vibration-proof product, etc.



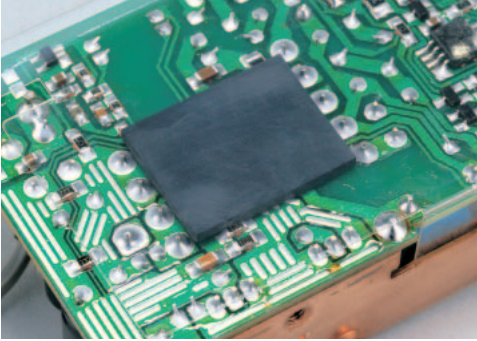
Thermally conductive silicone fluid compounds



This product has heat resistance and electrical characteristics intrinsic to silicone. Moreover, it also has excellent thermally conductive property. By rapidly dissipating the heat generated by various kinds of electronics products, this product prevents heat-related troubles, and improves the reliability of equipment. Thermally conductive silicone fluid compounds are most suitable for dissipating heat generated from the CPU for personal computers, which requires especially high thermal conductivity.

- Features ● It has excellent thermal conductivity.

Applications ● Heat dissipation of CPU
 ● Heat dissipation of other semiconductor elements and transistors

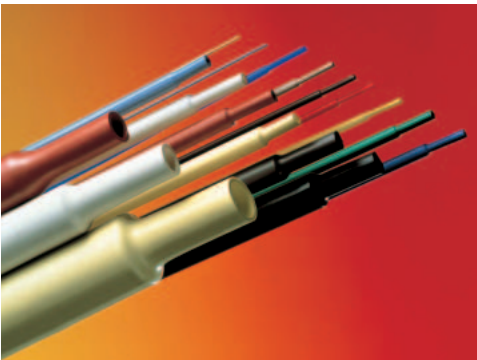


Thermally conductive silicone rubber products 1

This series include low hardness type, phase change sheet (PCS) type, and electromagnetic wave absorptive and thermally conductive type, and other types. They are effective for heat dissipation of electronics products.

- Features
- Being soft and highly adhesive, the products stick fast even on even very rough surfaces.
 - It is superior in thermal conductivity and flame resistance.
 - It can be used over a wide range of temperatures (-60°C to +180°C).

- Applications
- Heat dissipation of MPU used for computers etc.
 - Heat dissipation of the heat-generating semiconductor elements

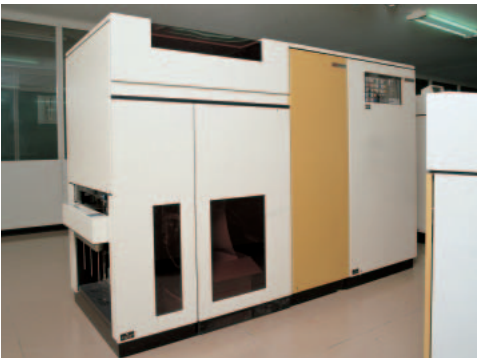


Heat shrinkable silicone rubber tubing 1

By heating this silicone rubber tube, the internal diameter contracts easily to one half of its original size. It is used for insulation, protection and covering.

- Features
- The internal diameter contracts within a short time by heating, thus saves time and labor.
 - It has excellent electrical characteristics, heat resistance, and cold resistance.
 - When the elastic rubber tube contracts, the stress produced tightly covers the sheathed object and increases the air-tightness of the sheath.

- Applications
- Insulating coating for risers and bus bars
 - Protection of lead wires
 - Treatment of terminals in various wire harnesses



Electrically conductive silicone rubber products 1

This product has heat resistance and electrical characteristics intrinsic to silicone. Moreover, it also has excellent electrical conductivity. It is most suitable for use as control measure to prevent electromagnetic waves of computer, OA equipment, and medical equipment, as well as static electricity from various electric and electronic equipment.

- Features
- It is highly conductive both electrically and thermally.
 - It has excellent cold-, heat- and weather-resistance.

- Applications
- Packing for computer housings, mobile phone, cordless telephone, walkie-talkie, various medical equipment
 - Electromagnetic shield of windows of computer rooms
 - Polarizing electrode of ceramic vibrator and electrode of medical equipment
 - Heat-conduction medium for hold and cooling of a compound semiconductor wafers
 - Alternative materials for spring contacts and soldering
 - Sensor components utilizing electric resistance fluctuation
 - Conductive and semi-conductive rolls for OA equipment



Pure sealant

For inquiry 3

Pure sealant is suitable for sealing the joints, space around air filters and piping of clean rooms for semiconductor production processes.

- Features
- There is almost no emission of low-molecule siloxane.
 - It has excellent adhesive property and is compatible with almost all kinds of adherend.
 - It is highly durable, as well as heat- and weather-resistant.
 - The one-component type sealant is easy to handle.

- Applications
- Sealant of joints, space around air filters and piping of clean rooms for the production and processing of semiconductors and various precision electronic materials
 - Adhesion seal of various parts for the electric systems of precision machines



Liquid fluoroelastomers "SHIN-ETSU SIFEL" For inquiry 14

SHIN-ETSU SIFEL is a novel fluoroelastomer that revolutionizes the image of conventional fluororubber. In addition to the conventional use for molding, it can be used for sealing, coating and potting of electronic parts, which were unthinkable in the past.

- Features
- Availability in a wide range of viscosities from low to high viscosity
 - No erosion by various solvents and oils
 - Excellent low-temperature properties
 - Excellent electrical characteristics
 - Durability to harsh chemicals

- Applications
- Sealing and potting of vehicle-mounted electric parts
 - Adhesion and encapsulation of various kinds of pressure sensor elements
 - Protection of high-frequency devices
 - Protection of circuits and elements of various electronic equipment
 - O-ring, diaphragm and other mold products



Cyanoresin

For inquiry 9

The molecular structure of Cyanoresin has cyano groups with high polarity. It forms large dipoles in electric field with high dielectric constant. Two types of Cyanoresin are available; polymer type and plasticizer type.

- Features
- The polymer type can be dissolved in various organic solvents and molded into film sheets.
 - The plasticizer type (CR-U) is a viscous liquid. It can be added to the polymer type to improve film suppleness and curl-resistance.

- Applications
- Electric or electronic equipment, such as organic dispersion electroluminescent panel that requires a high dielectric material



Shin-Etsu SOLEANA

For inquiry 10

SOLEANA is a high-performance solvent with a methylene chloride base. Because of the excellent properties of methylenechloride, it is useful for cleaning various electronic equipment, not only playing a role in control quality but also contributing to improve production efficiency.

- Features
- It is the most powerful organic solvent.
 - It is chemically stable, and liquid management is easy due to low deterioration rate
 - It can be distilled, regenerated and reused.
 - Because of low boiling point, low-temperature treatment permits speedy processing. Moreover, an economical effect can be expected due to a high recycling rate by distillation and regeneration.

- Lineup
- Shin-Etsu SOLEANA VDA is a high-performance steam cleansing agent to degrease various metals for electronics, glass parts, ceramic parts, etc.
 - Shin-Etsu SOLEANA HS is a high-performance agent to remove water from various metals for electronics, glass parts, ceramic parts, etc.
 - The Shin-Etsu SOLEANA L series is a precision cleansing agent for frames used to manufacture optical plastic lens.



Shin-Etsu keypad FB type

For inquiry 18

The FB type is a key pad using a molded film as a surface of key tops. It is available in two types; the key tops and silicone rubber integrated type and the hard key type.

- Features
- Since printing is done on the back surface of the film, the prints are semi-permanently durable.
 - The key-top part feels solid and reduces adhesion of dust and dirt.
 - Printing on the film permits use of multi-colors for the key-top part. Application to character-illuminated products increases the freedom of design (color, shape, etc.).
 - Prevents penetration of grease and oil through the key-top part
 - Enables designers to make thinner and lighter keys



Shin-Etsu keypad AP-I type

For inquiry 18

The AP-I type is composed of two materials. A highly transparent hard resin key-tops with printing on the back side are bonded to a semitransparent silicone key pad. Incorporation of a PET dome or a metal dome is also possible.

- Features
- Because printing is made on the back surface of a key top, the prints are semi-permanently durable.
 - The key-top part feels solid and reduces adhesion of dust and dirt.
 - The material of the key-top part is highly transparent, and imparts a unique appearance.
 - Prevents penetration of grease and oil through the key-top part
 - The key-top part and the silicone key pad are firmly bonded by adhesives and they do not separate under normal use.



Shin-Etsu keypad PB type

For inquiry 18

Only the key-top part is made of plastics material, and it is linked to a silicone rubber base.

- Features
- The key-top part feels solid like the conventional resin key top, and reduces adhesion of dust and dirt.
 - The key-top part and the silicone key rubber base are linked by chemical reaction. Since they are joined more firmly than the conventional adhesion products, this prevents separation by stress or environmental changes during use.
 - It is easy to use multi-colors and change color scheme of the key-top part.
 - The material of the key-top part is highly transparent, and colors are brightly presented.
 - Prevents penetration of grease and oil through the key-top part.
 - Printing of characters, numerals, etc. on the key-top surface is possible. The anti-wear quality has improved remarkably compared with conventional products.

- Lineup
- Two types are available; N type with improved hardness of base materials, and U type that is flame-resistant (equivalent to UL-HB).



Shin-Etsu keypad HG type

For inquiry 18

Only the characters of the key tops transmit light from backside light source. Shin-Etsu Polymer was the first in the world to develop this type of key pads.

- Features
- Compared with conventional light-illuminating type key pad (clear type), the characters are more easily visible in the dark.
 - The highly reliable silicone key pad is coated with a light-shielding layer, and then the character parts are cut. This unique technique is well received in the fields of mobile communications and car audio.

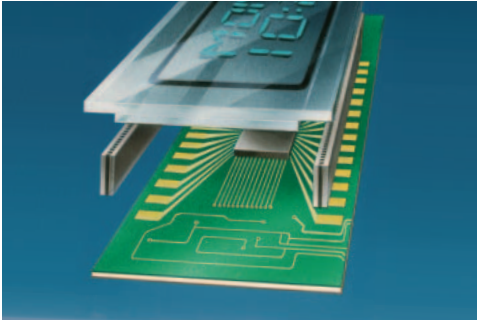


Shin-Etsu keypad KTP type

For inquiry 18

Shin-Etsu key pad is a high-performance part for input, in which the electrically conductive silicone rubber is used as the switching element. Especially, the KTP type has incorporated a key top, and this type integrates the switching function, the spring function, and the operation button function on a single sheet of silicone rubber. The key top-part has printed characters and figures.

- Features
- The hardness and coloring of the key-top part can be selected.
 - Printing of characters and figures on the front face of the key top is possible within the standard variations of Shin-Etsu Polymer.
 - Assembly, die making, and other production and management processes are rationalized remarkably.
 - Multiple key shapes and operation touches can be incorporated in a single key sheet.
 - Silicone type printing ink is used, which has excellent heat- and cold-resistance as well as other environmental characteristics.
 - The KTP-SH type is also available, in which wear-resistance and touch are improved by a coating layer.



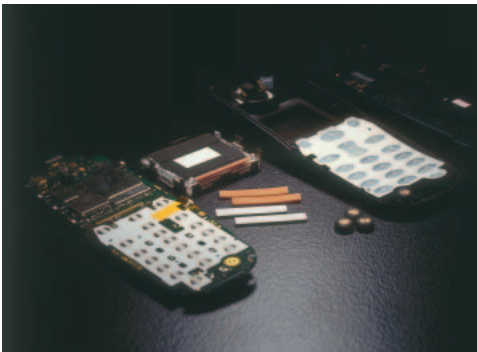
Interconnectors for LCD

For inquiry 17

These interconnectors combine low cost and high reliability, and are used in various displays. An example is an electrically conductive rubber pressure type connector, which can be connected just by inserting between electrodes and apply pressure. Another example is a heat-seal connector with a high degree of freedom in design.

Features ● High reliability and effective cost reduction

Applications ● LCD, EL, PDP etc., for mobile telephone, electronic dictionary, automobile, OA equipment, electronic calculator, clock, etc.



Low-resistance interconnectors

For inquiry 17

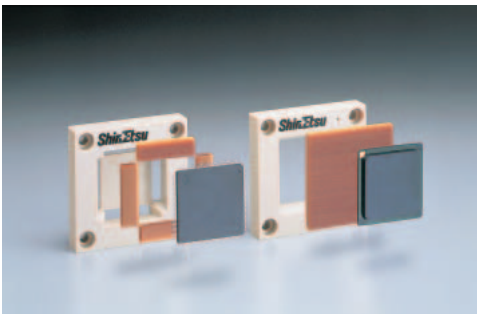
The pressure type connector uses thin metal wires, metal particles, and metal pins. It accomplishes highly reliable low-resistance connection between PCBs and between substrates and parts, and involves a simple assembly process. By using this product, achieves solderless processes and absorbs the dimensional tolerance. By incorporating the frame and holder, the number of parts is reduced, which may lead to a reduction of total costs.

Features ● It increases reliability of high-density mounting.

● Low-resistance connection is possible.

● It promotes solderless processes.

Applications ● Mounting of various displays (LCD, EL, PDP), microphones, motors, sensors and other device parts in the market of electronic equipment

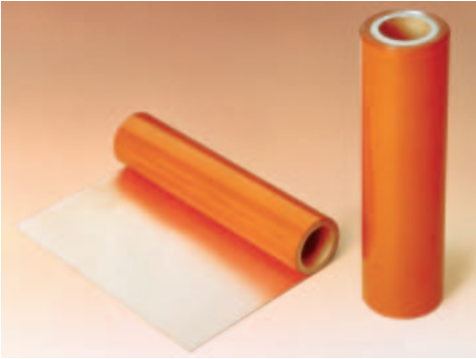


Semiconductor interconnectors for inspection For inquiry 17

The anisotropic conductive rubber sheet has thin metal wires arranged at high density. Using this conductor, devices with electrodes arranged in narrow pitches, such as a flip chips, can be connected simply and reliably. Due to its low inductance, the connector does not affect the performance of RF-IC and high-frequency electronic parts.

Features ● It has high-frequency transmission characteristics, and provides superior resolution and stability of connection.

Applications ● Functional inspection etc. of flip chip, LSI package (BGA, CSP, QFN), and high-frequency electronic parts



Flexible copper-clad laminates

For inquiry 11

Through special technology to improve film surface and development of original adhesives and lamination technology, Flexible copper-clad laminate(FCLs) and Coverlay film(CL) was developed with the following features.

- Features**
- Using special treatment to improve the film quality together with advanced lamination technology, excellent dimensional stability is achieved.
 - FCLs can withstand the solder heat-proof temperature of 330°C for 30 seconds or longer.
 - FCLs of polyimide film 12.5μm base has especially superior flexibility.
- Lineup**
- We supply FCLs made of various combinations of polyimide films (12.5μm to 75μm) and copper foils (9μm to 35μm), various polyimide film base CL, and bonding sheets.
 - All the products, except bonding sheets, use the flame-resistant type epoxy adhesives, and they are UL-certified.
 - FCLs are available in 42 series for general use, 47 series of high flexibility grade, 5 series of high-temperature peel, high-density adherence grade, and 6 series of high Tg grade.
 - CL is suitable for any types of copper-clad laminate. High Tg grade is also available.
 - Type E is a bonding sheet.



Shin-Etsu PP films type R

For inquiry 20

It is a dielectric material for capacitors, manufactured by the simultaneous biaxial-stretching method using inflation method. It contributes to improve the reliability and compactness of capacitors for super-high voltage. It is used also for the all-film capacitor with single capacity of 30 Mvar, the highest in the world.

- Features**
- The film surface is patterned with a uniform network structure and has superior oil impregnating ability. It is most suitable as dielectrics of all-film capacitors.
 - Carefully selected raw materials together with strict quality control accomplish the outstanding electric characteristics and reliability.
- Applications**
- All-film capacitors for electric power use and household use

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