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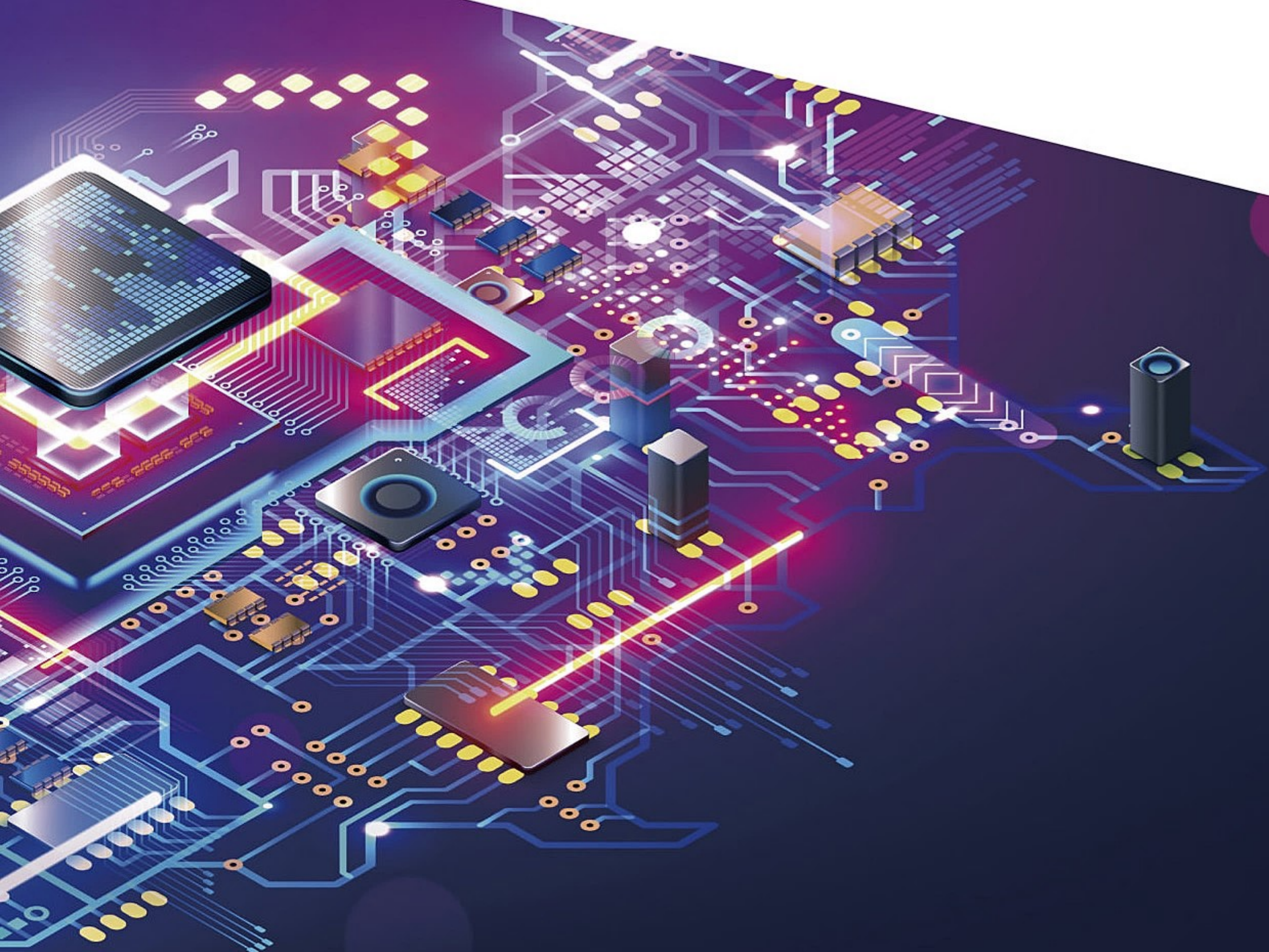


Circuit Board Multiple Applications

Sealant, Bonding, Reinforcement, Underfill, etc.

ISO Quality & EHS Management System

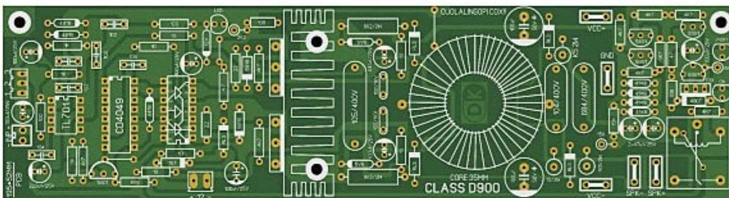
Adhesive Technology Introduction
Mutiple Application of Printed Circuit Board:
Bonding, Reinforcement, Underfill, Coating, etc.

Printed Circuit Board (PCB) is the base plate used for assembling electronic components. The main products are copper foil substrate, rigid printed circuit board, flexible printed circuit board and IC carrier board. It is an indispensable basic part of electronic products.

The base material is generally classified according to the insulation, material composition or flame resistance of the substrate. The common raw materials are bakelite, glass fiber, and various plastic boards. Manufacturers of PCB substrates generally use an insulating prepreg (Prepreg) composed of glass fiber non-woven fabrics and epoxy resins, then press them with copper foil to form a copper foil substrate for use.

Types of PCB substrate:

FR4: Glass fiber + epoxy resin. It is the most commonly used PCB material but the glass transition temperature is approximately 130°C. If the product's subsequent processing environment or operating environment in high temperature, high Tg FR-4 is recommended.
High Tg FR4: Glass fiber + epoxy resin, the most common use is second only to normal FR-4. It has a high Tg above 150°C.
CEM-1: It is a base material for printed circuit boards made of laminated paper which impregnated with epoxy and one outer layer of glass fabric.
CEM-6: The center is glass non-woven cloth, and the surface is covered with glass cloth + epoxy resin.
Ceramic PCB: Ceramic powder + glass fiber.
Teflon PCB: Teflon + glass fiber.



The printed circuit board (PCB) structure can be divided into these following three types

Single-Layer PCB: Only one side of the circuit board has copper foil conductors and the other side has no copper foil conductors at all. The circuits of electronic products were simple, only one side of the board needed the conducting material and the other side is used for incorporating different electronic components on the board.

Double-Layer PCB: There are copper foil conductors on both sides of the circuit board. Top layer and bottom layer can be connected to each other through vias. It can be connected to the other side through the holes and it is more suitable for more complicated circuits than the single-layer board. The design is to place the part on the front, and the back is the welding surface of the part foot.

Multi-Layer PCB: Multi-Layer PCB is made of multiple etched double-sided boards, an insulating layer (Prepreg) is stacked between the boards, and copper foil is laid on both sides of the outermost layer and then pressed together. Since multiple double-sided laminates are used, the number of layers is usually an even number. The copper foil layer that is pressed inside can be a conduction layer, a signal layer, a power layer or a ground layer. The multi-layer board can theoretically reach more than 50 layers, but the practical application surface is currently up to about 30 layers.

Printed circuit board (PCB) have a wide range of applications, such as IC substrates in 5G, high-performance computing and artificial intelligence, tablets, laptops, game consoles and servers, automotive electronics, cloud services and other related applications. With the development of terminal product technology, it will be greatly adjusted, and the rigid board requirements of antennas, power amplifiers, and cabinet communication backplanes required for Substrate-Like-PCB (SLP) and chip on film (COF) base stations will be added.

The Introduction of Conformal Coating on Circuit Boards

The (conformal coating) adhesive is a transparent polymer film on the printed circuit board, which will maintain the shape of the printed circuit board and protect the electronic components on the printed circuit board. The thickness of the conformal coating is generally 25-250 μm (microns). The conformal coating will prevent the electronic circuit from moisture, dust, and chemicals. If the electronic equipment operates in a harsh environment, additional protection is required. Generally, the circuit board will be coated with conformal coating adhesive instead of the adhesive for potting application.

The conformal coating adhesive prevent corrosion on solder joints and conductors because of the humidity. Moreover, it can shield and eliminate certain electromagnetic interference, and can also play a role in insulation. In addition, the component also has wear resistance and solvent resistance. It can be slow down the stress which caused by high and low temperature changes.

The conformal coating adhesive has various characteristics, it uses in some products that need to be exposed to extremely harsh environments such as many chemical acid and alkali gases, oil mist, high pollution, dusty environments, high humidity environment, and extremely high or low-temperature environments. In consumer electronic products, it is often used to protect or insulate electrical products or electronic components, such as motors, generators, transformers, solenoid valve switches, etc.

The cause of fire or explosion may result in the possible loss of human life, therefore the products that used in gas stations or aviation aircraft are required to comply with ATEX specifications that the conformal coating is one of its requirements. The purpose is to avoid short circuits and sparks that might be caused by any electronic products in some special environments.

Conformal Coating Adhesive:

The Silicone material usually presents transparent colors and elastic rubber state after curing, which is more effective in shockproof and can stand with severe stress changes (-40°C~200°C) caused by large high and low-temperature changes. Silicone has a very good waterproof, but there may be gaps on the coated interface, which is unfavorable for protection in environments with high moisture or corrosive concentrations.

Acrylic material usually presents a transparent and hard coating after curing, with low hygroscopicity and fast curing time, so it can generally be cured at room temperature, and the curing time can also be increased by raising the temperature. It has good abrasion resistance and insulation. Acrylic material is low solvent resistant, it is possible to use solvent to remove adhesive in the workpieces.

Urethane material usually presents a transparent and hard coating after curing, with excellent wear resistance and good moisture resistance, especially stable performance in low temperature environment, but less resistant to high temperature.

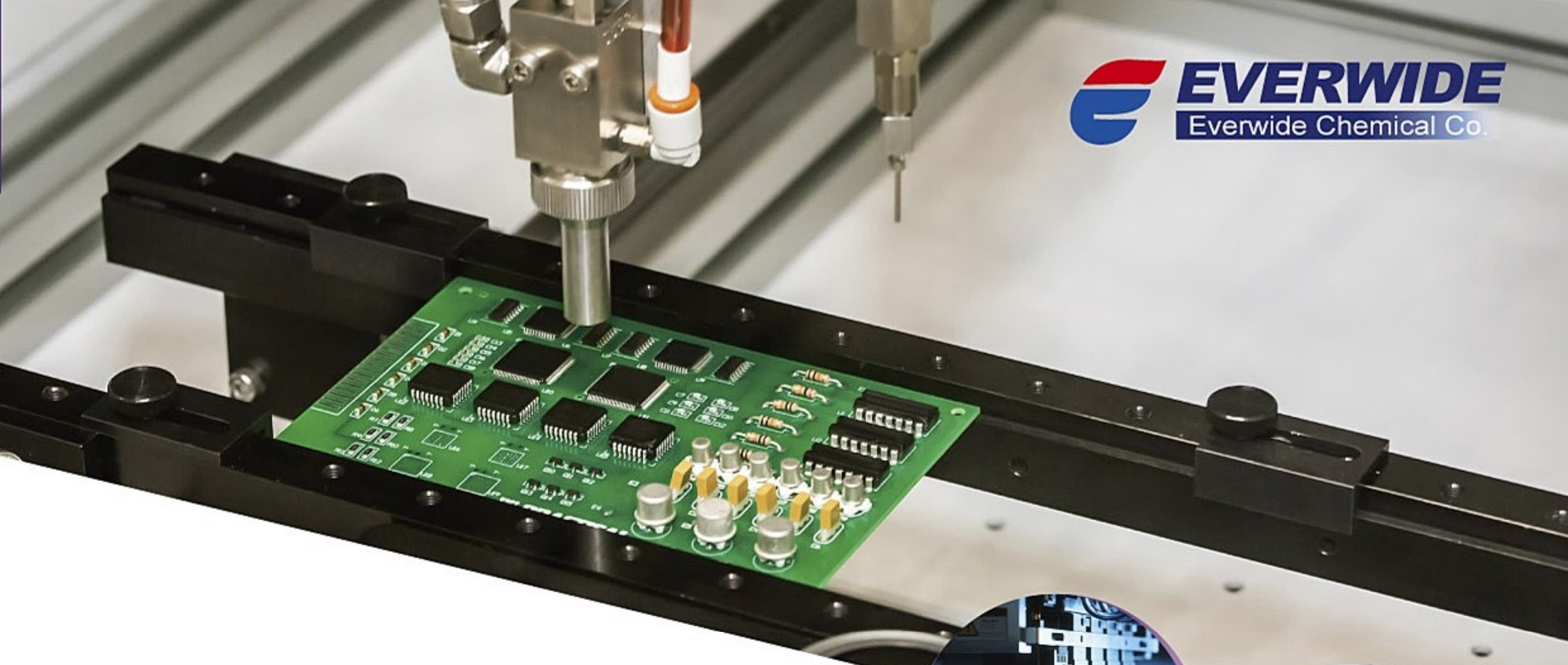
Epoxy based coating material is usually presents opaque colors with strong adhesion. It has very good moisture resistance, chemical corrosion resistance, and dielectric properties. Two-component epoxy resin is generally used for encapsulation the electronic parts but the thickness is not easy to control.

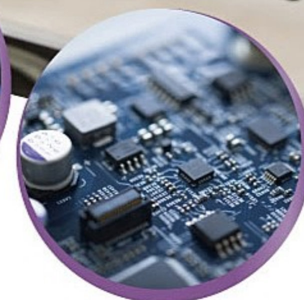
Polyurethane can be adjusted by formula to make its cured performance from very soft and tough to very hard and brittle, chemical and non-chemical resistance. It is a very flexible material. PU is sprayed for protection to improve the wear resistance printed on the keyboard. PU usually needs to use a hardener to cure, which is an irreversible reaction and has better protection for the product, but the manufacturing process is more troublesome, and heavy work becomes tougher.

Paraxylylene(XY) is a special vapor deposition material. Its advantage is that the coating is very uniform, but the disadvantage is the area that does not need to be coated must be tightly shielded and protected because vacuum operation is required, mass production is difficult and the construction period is relatively long. So this kind of material to heavy industry is honestly inconvenient, It may be necessary to consider using other materials for heavy industry to meet the demand.

Ultra-Thin(UT) is a new type of conformal coating introduced by CC-830 standard, which requires the coating thickness of the conformal coating to be below 12.5μm because it is so thin, spraying may have to use liquid, vapor, or vacuum plasma deposition methods.

This kind of component contain is too thin and not suitable for use as wear-resistant or to increase the dielectric strength, The insulation protection is not good and it can only be used as moisture-proof. So it is more suitable for use in mobile on consumer products such as headphones (such as TWS) or microphones.





Everwide has developed potting epoxy resin for a long time and recently also developed a series of two-component epoxy resin products with adjustable hardness, which can have excellent conformal coating performance.

Everwide Epoxy Resin Product Features:

1. Low viscosity and good self-defoaming.
2. Low water absorption rate, it can effectively prevent moisture with a flexible formula to protect electronic components which will not cause excessive stress and cause damage to parts.
3. The hardness and softness can be adjusted by 3 different proportions which can be flexibly applied to various needs.

Product No.	Liquid State Color	Viscosity, mPa.s	Mixing Ratio	Mixing Viscosity, mPa.	Pot Life, hr	Speed up Curing Time	Hardness (SHORE)	Glass Transition Temperature, °C	Water Absorption 25°C*24hr, %	Impact Strength (Izod), J/m	Temperature Range, °C
JE179AB	Colorless/Colorless	1,200 / 35	2:1	-	4	100°C*2hr	D52	13	0.89	6.3	-40~100
JE245AB	Colorless/Colorless	13,000 / 25,000	1:1	17,500	2	80°C*1hr	D77	-	-	-	-40~120
			1:2	19,430	2	80°C*1hr	D53	-	-	-	-40~100
			1:3	20,000	2	80°C*1hr	A48	-	-	-	-55~100
JE245-1AB	Black/Colorless	13,000 / 25,000	1:1	17,500	2	80°C*1hr	D77	-	-	-	-40~120
			1:2	19,430	2	80°C*1hr	D53	-	-	-	-40~110
			1:3	20,000	2	80°C*1hr	A48	-	-	-	-55~100

In the above table, the chemical category is two components epoxy resin.

Everwide also extended the existing UV adhesive into a product that can be cured by moisture in the complex area after UV light curing. It meets VOC requirements, 100% solid content, and UL94V-0 flame retardant grade.

Everwide Acrylic Polyurethane UV Moisture Product Features:

1. Low viscosity, good defoaming, suitable to use in screen printing and spraying application.
2. Flat surface, fluorescence inspection, it can automatically detect the effect of spraying with the machine.

Product No.	Liquid State Color	Viscosity, mPa.s	Curing Condition	Hardness (SHORE)	Glass Transition Temperature, °C	Water Absorption 25°C*24hr, %	Tensile strength 25 °C, kgf/cm²	Flexural modulus, Mpa, 25°C	Volume Resistivity, ohm-cm	Dielectric Strength, KV/mm	Temperature Range, °C
FU0041	Colorless	130~300	365nm 3000mj /cm²	D77	100	1.51	PMMA+PMMA 63	312	$1.6*10^{14}$	17	-40~150

In the above table, the chemical category is acrylic resin.

Wafer Underfill Process Description

With the advent of new substrate materials, flip-chip technology faces new challenges and engineers have to find the solution for the problem caused by differences in thermal expansion coefficients between die and substrate to avoid cracking of joint edges during reflow soldering processes.

Among various advanced die attach technologies, flip-chip technology is more suitable for 6C small electronic products. With the increase in the size of high-efficiency chips and the adoption of non-ceramic new materials in flip chip mounting, the traditional technology that has been used for 20 years facing new challenges. The main problem is the difference in the coefficient of thermal expansion (CTE) between the chip and the non-inorganic material substrate. Because the thermal expansion coefficient of the flip-chip made of silicone material is much lower than the general substrate (PCB) material, therefore the thermal cycle test there are often relative displacements, which lead to mechanical fatigue and cause solder joints to fall off or break. Nowaday, this technology was applied to some BGA and CSP chips to improve their reliability when falling/dropping.

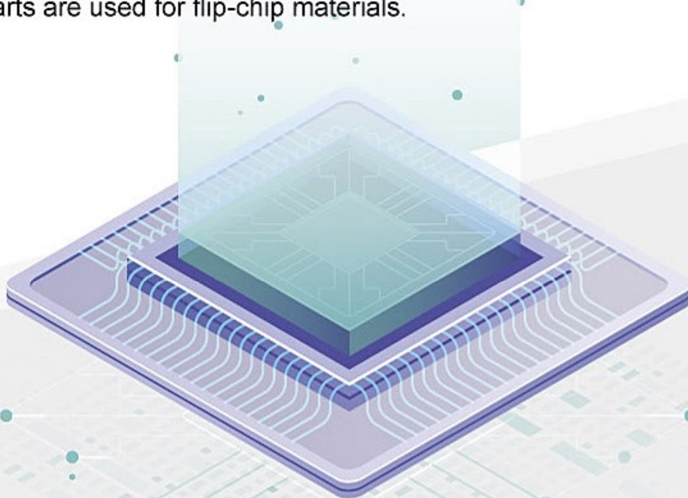
Epoxy resin usually uses for underfill application. The epoxy resin applied to the edge of the chip to penetrate into the bottom of the flip chip or BGA then cured by heating, it can effectively improve the mechanical strength of the solder joints and increasing the life of the wafer. The products currently used in some handheld devices such as the circuit board design of mobile phones. Because handheld devices must pass several drop and rolling tests, many BGA solder joints can hardly pass such harsh conditions, especially ENIG's board.

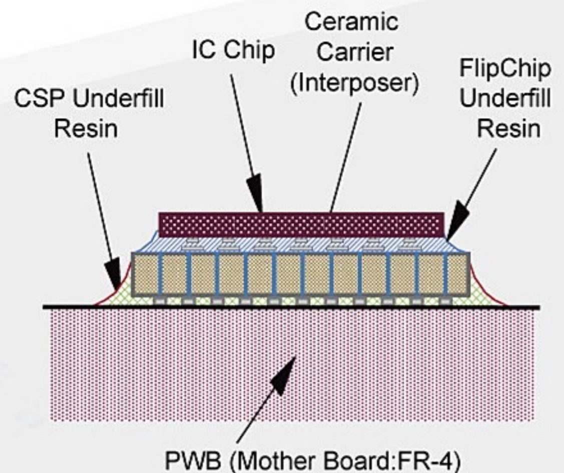
The step of adding underfill is usually scheduled after the circuit board assembly is completed. When the underfill is performed, subsequent wafers are difficult to repair or rework, therefore when the SMT, wave solder and hand soldered parts are completed, its must pass the electrical test to confirm that the board functions without problems.

When the underfill material is applied to the substrate, the temperature of the substrate surface and die should be in the range 70°C to 90°C which will generate upward airflow from under the wafer and the substrate surface, this surface energy change can reduce the bottom of the wafer. Filling bubbles are generated to avoid paint failure in long-term use and it can ensure the appropriate filling of the filling material under the die. Different temperature will lead to the cause the air to sink to form bubbles. During the high-temperature baking (Reflow) in the next stage, the solder balls will cause the phenomenon of tin stringing and may cause the problem of current leakage.

Everwide's epoxy resin for flip chip encapsulation meets the needs of lead-free products and can be cured by high temperature or low temperature . The whole series of products are in compliance with environmental such as RoHS, Halogen Free, REACH, GP, etc require. This series of resins have low curing shrinkage, low ion volatilization rate, high glass transition temperature, low thermal expansion coefficient, high elastic modulus, low post-curing latent stress, and can provide wafers good bonding strength with high reliability after curing.

In addition, in order to facilitate the development of microchip bonding and copper pillar bump packaging technology, this series of resins regardless have high or low powder content and it suitable applied to very small gaps and extremely small gaps. This resins have fast flow between the balls gap and show good performent of electrical properties such as low dielectric constant, high dielectric strength, good chemical resistance characteristics. Its fully compatible with wafer level and BGA, CSP parts are used for flip-chip materials.





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On the underfilling stage of encapsulation process, generally only the L-shaped path is filled with epoxy resin on the adjacent two sides of the wafer. The steps as follows:

1. The product must be stored in the environment specified by the manufacturer, generally in a low temperature environment from -20°C~-40°C. Before using, placed the products in refrigerator in temperature about 2°C~10°C for about 1~2 hours, then put it back to room temperature 20°C~30°C(preferably in a dehumidifier) at least 1 hour, let the glue completely return to 25°C before it can be used normally.
2. When dispensing and filling, the circuit board under the chip needs to be preheated (refer to the physical properties of the adhesive for temperature) to increase the flow rate.
3. Begin to make the first dispensing of the I-shaped or L-shaped path on the BGA wafer, the glue is dotted at about 0.3~0.5mm at the edge of the BGA wafer.
4. Wait until the glue penetrate to the bottom of the BGA then do the second dispensing with the amount of glue should be less than the first time. After that wait and observe whether the glue spreads to the opposite side of the BGA and around it and forms a slope to cover the chip (This purpose is to ensure that the chip bottom filled with minimal air bubbles or voids).
5. After confirming that the underfill is finished, put the circuit board in the oven for reaction curing according to the specified temperature of the product.

Wafer Underfill Product Introduction

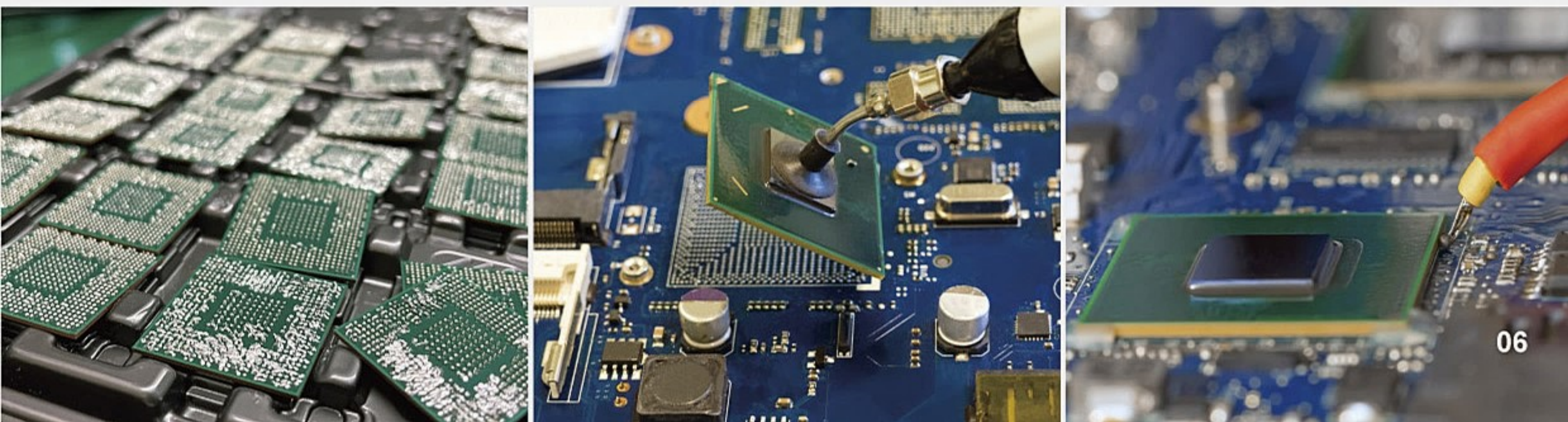
Product Feature:

1. Low viscosity, high fluidity and easy operation.
2. The surface of the hardened product of this series will not appear greasy and low gloss.
3. This series of resins has a high degree of repeated flexibility, fatigue resistance and resistance to cracking.
4. Excellent flexibility, it will not cause excessive stress to electronic components and avoid damage to parts.
5. This product can be cured quickly to increase capacity utilization.
6. This product can be reworked and repaired without hurting the pads. It can easily remove the residual glue and then place a new chip on it.

Product Parameters:

Product No.	Liquid State Color	Viscosity, mPa.s	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength Al vs. Al, kgf/cm²	Tensile Modulus, Mpa	Temperature Range,°C
							25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JC738-8	Black	500~650	130°C*10min	Matte black	85	D83	0.95	4.33	1.95	204	1600	-40~120
JC823-4	Colorless	2,700~3,100	80°C*30min	Colorless	50	D80	0.95	2.4	1.89	173	950	-40~120
JC823-6	Black	2,500~4,000	80°C*30min	Glossy black	50	D80	0.95	2.4	1.89	173	980	-40~120
JD642-14	Black	200	130°C*20min	Matte black	82	D80	0.46	2.88	3.23	171	2500	-40~120
JD642-6	Black	240~450	130°C*10min	Glossy black	103	D80	0.21	3.52	1.83	198	2700	-40~120
JD831-1	Black	290~430	130°C*10min	Glossy black	113	D85	0.21	3.52	1.83	199	2700	-40~120
JD835	Black	550~850	80°C*30min	Glossy black	35	A88	1.22	3.99	2.41	165	980	-40~120
JD835-7	Colorless	550~850	80°C*30min	Colorless	35	A88	1.22	3.99	2.41	165	1010	-40~120
JD922-18	Black	1,000~2,000	80°C*60min	Matte black	45	D53	0.43	0.79	0.77	85	2400	-40~120

In the above table, the chemical category is one component epoxy resin.



Rework Process Suggestion:

1. Stripping the component

To reduce the damage of substrate which caused by rework process, the solder joint must be heated to a high temperature than the reflow temperature before stripping off the components.Once the temperature is higher than the melting point of the solder ball which is about 220~240°C, the adhesive will be getting soft at the same time, it will be easily peeled off the components by rotating them or by using vacuum pick up the components. Slowly heating or overheating may pull out the metal pads on the substrate.

2. Prepare the component holder

After removing the component, please follow two methods to remove the residue on the part.

2.1 Scraping method:

Heat up the soldering iron to 250~300°C then carefully scrape off the residue or heat up the substrate before using the brush to clean up the residue.

2.2 Rotary brush:

Apply pressure to the rotary brush to remove any remaining primer. During the cleaning process, do not apply excessive pressure to avoid abrasion of the brush head or damage to the substrate.The type of component or the composition of the solder balls will determine whether to use solder paste or flux.

3.Component attachment

After cleaning the substrate, the user can use isopropyl alcohol (IPA) or flux pen to check whether there is any residual adhesive on the substrate. Brush the solder paste flux on the substrate, arrange the new component, use a vacuum pick-up tool, hot air reflow then apply the primer. Re-attach the chip on the PCB, which is the complete process.

Product No.	Liquid State Color	Viscosity, mPa.s	Filler Content, %	Filler Size, μm	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength Al vs. Al, kgf/cm²	Tensile Modulus, Mpa	Temperature Range, °C
									25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JD100-1	Black	5,500~7,500	55	2~10	150°C*20min	Matte black	124	D90	0.1	0.6	0.2	111	8000	-40~150
JD100-8	Black	25,000~45,000	60	2~10	150°C*120min	Glossy black	98	D90	0.2	1.1	0.5	138	8500	-40~150
JD370-8	Black	4,000~7,000	60	2~10	150°C*30min	Matte black	93	D90	0.3	1.2	0.6	123	8000	-40~150
JD918-1	Black	5,000~9,000	60	2~10	150°C*30min	-	80	D85	0.5	1.5	0.8	128	8000	-40~150

In the above table, the chemical category is one component epoxy resin.

Corner Bonding Reinforcement Product Introduction

This series of products are suitable for reinforcement applications such as corner bonds and fixation of CSP or BGA. This photo-curing adhesive has good adhesion to PCB substrates. After the resin is cured, it has excellent flexibility, toughness, and also endures dimensional differences caused by temperature changes. It has the characteristics of good thermal shock resistance and low heat reaction. At high temperatures, it has the original elongation and low stress. These product series are suitable for rework applications, it hardly damages the surface of the substrate.

Product Feature:

1. High viscosity and anti-sag.
2. Excellent flexibility, it will not generate excessive stress and damage the electronic components.
3. It can be used for a long time at room temperature.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Hardness (SHORE)	Glass Transition Temperature, °C	Water Absorption 25°C*24hr, %	Shear Strength (25 °C), kgf/cm²	Tensile strength (25 °C), kgf/cm²	Elongation, %	Temperature Range, °C
FK1000-1	White	61,000~94,000 Ti 4	365nm, 2000mj/cm²	D88	41	3.1	PC+PC, 27	35	154	-20~80
FK862	Opaque	4,500~6,100 Ti 4.5~6.0	365nm, 2000mj/cm²	D76	86	3.21	PC+PC, 63	184	56	-40~100
FP5202	Colorless	15,000~20,000	365nm, 2000mj/cm²	D45	19	27	Glass+Glass, 11	-	145	-20~100
HD1232UL	Light yellow	10,000~15,000 Ti 2.9~4.5	365nm, 2000mj/cm²	D55	41	4.1	PC+PC, 21	27	154	-20~80

In the above table, the chemical category is acrylic resin.

COB-Chip on Board

The chip is directly implanted on the circuit board, which is a method of integrated circuit packaging.
COB method is directly attaches the chip to the circuit board or substrate with these three basic processes.

(1) Chip bonding.
(2) Wire connection.
(3) Sealing technology to effectively transfer the packaging and testing steps in the IC manufacturing process to the circuit board assembly stage.

Nowadays, the IC semiconductor chip packaging process mostly uses a transfer molding compound as the packaging material, using a specific mold to preheat the plastic material and inject it into the mold containing the IC chip lead frame to achieve packaging. However, the development trend of wafer thinning, high pin count, and modularization of semiconductor chips, especially in recent years, in addition to the original hybrid component packaging applications, the development of COB, TAB, PBGA, and Flip chip packaging technologies. The liquid encapsulant has been gradually selected, the liquid encapsulant is injected into the semiconductor wafer through a dispenser to achieve the protection function.

Glob-Top

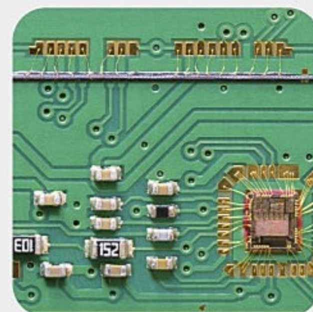
Product Feature:

1. Good formability.
2. Excellent adhesion on FR4, FR5, BT, and FPC. It can achieve breaking strength.
3. Good self-leveling ability.
4. The products can achieve reliability test, thermal cycle test, thermal shock test, high humidity-temperature test, and high temperature resistance.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength (25 °C), kgf/cm²	Flame Retardant Classification	Temperature Range, °C
							25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JC349-4	Black	45,000~85,000	120 °C *40min	Matte black	130	D89	0.59	2.06	0.84	Glass+FR4, 87	UL 94 V-0	-40~150

In the above table, the chemical category is one component epoxy resin.

Dam&Fill



Product Feature:

1. Good compatibility between Dam & Fill adhesive.
2. Excellent adhesion on FR4, FR5, BT, and FPC. It can achieve breaking strength.
3. Easy to operation.
4. The products can achieve reliability test, thermal cycle test, thermal shock test, high humidity-temperature test, and high temperature resistance.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength (25 °C), kgf/cm²	Flame Retardant Classification	Temperature Range, °C
							25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JC349-4	Black	45,000~85,000	120 °C *40min	Matte black	130	D89	0.59	2.06	0.84	Glass+FR4,87	UL 94 V-0	-40~150
JC349-8	Black	270,000~460,000 Ti 4~6	120 °C *40min	Matte black	131	D90	0.59	2.06	0.84	Glass+FR4, 91	UL 94 V-0	-40~150

In the above table, the chemical category is one component epoxy resin.

Surface Mount Technology (SMT) Product Introduction

Surface-Mount Technology (SMT) is a technology for attaching electronic components to circuit boards. This technology originated in the 1960s and was initially developed by a well-known American company, and then gradually matured in the late 1980s. This technology combines electronic components such as resistors, capacitors, inductors, connectors, chips, etc., on a printed circuit board and conducts electricity in the circuit through tin solder. The other one was called Surface-Mount Devices (SMD), which is different from SMT. The biggest difference from the automatic insertion technology is that the surface mount technology does not need to reserve corresponding through holes for the pins of the component, and the component size of the surface mount technology is much smaller than the automatic insertion technology. Surface-mount technology application can increase the speed of applying the components, but there is the risk of defective board increase according to the miniaturization and density of the part.

To achieve the customer process evolution, Everwide Chemical continuously research and develop stable products to meet customer's requirement, therefore we have launched the following product line with different adhesive technologies.

Screen Printing Adhesive Type Introduction

Low-halogen, one-component epoxy adhesive with strong uncured properties adhesion due to high viscosity and high thixotropic index, especially formulated for steel plate printing process, and it can obtain good formability and effectively prevent the adhesive overflow after patching. This product complies with the latest RoHS, REACH, and HF requirements, it is suitable for the soldering process of lead-free solder paste with high-temperature heat resistance.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength (25 °C), kgf/cm²	Thrust Strength (25°C),kgf	Temperature Range, °C
							25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JC711-20	Red	120,000~180,000 Ti 6~7	150 °C *2~3min	Dark red	98	D87	0.23	1.5	0.4	Cu+Al, 316. (120°C*10min)	MLCC+FR4 3.7	-40~150
JD459-3	Red	450,000~750,000 Ti 7~8.2	130 °C *2~3min	Dark red	121	D89	0.17	1.76	0.77	Cu+Al,320 (130°C*30min)	MLCC+FR4 4.2	-40~150

In the above table, the chemical category is one component epoxy resin.

High Speed Dispensing Adhesive Type Introduction

It is characteristic of high viscosity which is suitable for ultra-high-speed dispensing machines on SMT applications (syringes type). The products can be used in high-speed dispensing such as jet dispensing without wire-drawing problems, it is consistent and smooth. This product series complies with the latest RoHS, REACH, HF requirements and is suitable for the high-temperature heat-resistant lead-free solder paste soldering process.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Solid State Color	Glass Transition Temperature, °C	Hardness (SHORE)	Water Absorption			Shear Strength (25 °C), kgf/cm²	Thrust Strength (25°C),kgf	Temperature Range, °C
							25°C*24hr, %	80°C*24hr, %	97°C*2hr, %			
JC711-6	Red	>550,000 Ti>7.5	150 °C *2~3min	Dark red	125	D86	0.23	1.5	0.6	Cu+Al,332. (120°C*30min)	MLCC+FR4 3.8	-40~150
JC711-13	Red	80,000~150,000 Ti >6	150 °C *2~3min	Dark red	125	D86	0.23	1.5	0.6	Cu+Al,319. (120°C*30min)	MLCC+FR4 3.7	-40~150
JC711-17	Red	70,000~120,000 Ti >2.5	150 °C *2~3min	Dark red	125	D86	0.23	1.5	0.6	Cu+Al,316. (120°C*30min)	MLCC+FR4 3.7	-40~150
JC812-2	Red	200,000~400,000 Ti >6.5	90 °C *3~5min	Red	28	D73	0.38	2.59	1.82	Cu+Al,320. (90°C*30min)	MLCC+FR4 2.6	-40~150
JC812-3	Black	200,000~400,000 Ti >6.5	90 °C *3~5min	Black	28	D73	0.38	2.59	1.82	Cu+Al,320 (90°C*30min)	MLCC+FR4 2.7	-40~150

In the above table, the chemical category is one component epoxy resin.

Thermal Paste and Thermal Adhesive Product Introduction

Thermal paste is a thermal interface material (TIM), which is coated between electronic components such as various computer CPU&GPU, high-power chips, LED lamps, and heat sink. In order to fill the gap to form a good thermal conduction channel, the device's operating temperature can be reduced below the critical point to prolong the service life of electronic components.

Product No.	Liquid State Color	Viscosity, mPa.s	Mixing Ratio	Mixing Viscosity, mPa.	Pot Life, hr	Speed up Curing Time	Hardness (SHORE)	Glass Transition Temperature, °C	Thermal Conductivity, W/mK	Temperature Range, °C
JD173-2AB	Grey/White	32,000~55,000/ 130,000~230,000	2:1	100,000~ 170,000	1	80 °C*1hr	D88	44	2	-40~105

In the above table, the chemical category is two component epoxy.

Product No.	Chemical Type	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Specific Gravity	Maximum Continuous Use Temperature, °C	Bleed 150°C *24hr, %	Thermal Conductivity, W/mK	Thermal Coefficient of Resistance, m^2K/W	Temperature Range, °C
JA447	Silicone thermal grease	White	2,000,000~8,000,000, Ti 5	2.1~2.15	200	nil	1.5	$1.37*10^{-3}$	-40~200
JA447-6	Silicone thermal grease	White	1,500,000~3,500,000	2.4	200	nil	2.5	$0.8*10^{-3}$	-40~200
JA447-19	Non-silicone thermal gel	Orange	>7,000,000	2.86	180	nil	4.2	$2.42*10^{-3}$	-40~200
JA447-20	Non-silicone thermal gel	White	>6,000,000	2.86	200	nil	3.8	$2.42*10^{-3}$	-40~200
JA447-22	Silicone thermal grease	White	350,000	3.01	200	nil	4.5	$1.58*10^{-3}$	-40~200
JA447-23	Silicone thermal grease	White	>7,500,000	3.1	200	nil	4.9	$1.62*10^{-3}$	-40~200
JA447-24	Silicone thermal grease	White	291,000	2.89	200	nil	4	$1.98*10^{-3}$	-40~200
JA447-25	Silicone thermal grease	White	>7,000,000	2.81	180	nil	5.3	$1.34*10^{-3}$	-40~200
JA447-26	Silicone thermal grease	White	500,000~750,000	3.03	180	nil	5	$1.47*10^{-3}$	-40~200

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Curing Condition	Hardness (SHORE)	Glass Transition Temperature, °C	Water Absorption 25°C*24hr, %	Shear Strength (25 °C), kgf/cm^2	Thermal Conductivity, W/mK	Thermal Coefficient of Resistance, m^2K/W	Temperature Range, °C
JB688-28	Grey	150,000~230,000 Ti >2.2	150 °C *1hr	D90	99	0.13	Cu+Al, 258	3	$90*10^{-3}$	-40~150

In the above table, the chemical category is one component epoxy.

Product No.	Liquid State Color	Viscosity, mPa.s Thixotropic Index (Ti)	Surface Dry Time, min	Full Curing Time, days	Hardness (SHORE)	Water Absorption 25°C*24hr, %	Young's Modulus, MPa	Shear Strength (25 °C), kgf/cm^2	Thermal Conductivity, W/mK	Temperature Range, °C
FS168B11	Black	35,000~65,000 Ti >2.2	8	3~5	A86	1.18	3.32	Al+Al,28	0.8	-40~100
FS168W11	White	40,000~60,000 Ti >2.5	7	3~5	A80	1.15	3.17	Al+Al,28	0.8	-40~100
FS198BL1	Black	100,000~200,000 Ti >2	10	3~5	A83	0.5	-	Al+Al,26	1.7	-40~120
FS198W1	White	100,000~200,000 Ti >2	10	3~5	A83	0.5	-	Al+Al,26	1.7	-40~120
FX172G1	Grey-black	60,000~80,000 Ti >2	-	150 °C *30min	A95	0.04	7	Al+Al,42	2.95	-55~200
FX172W2	White	60,000~80,000 Ti >2	-	150 °C *30min	A95	0.04	7	Al+Al,42	2.95	-55~200
FX196BL	Black	80,000~100,000 Ti >2	5	3~5	A50	0.24	2.9	Al+Al,20	1.8	-40~200
FX196W1	White	100,000~200,000 Ti >3	3	3~5	A50	0.24	1.4	Al+Al,20	2	-40~200

In the above table, the chemical category is polyether resin.

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