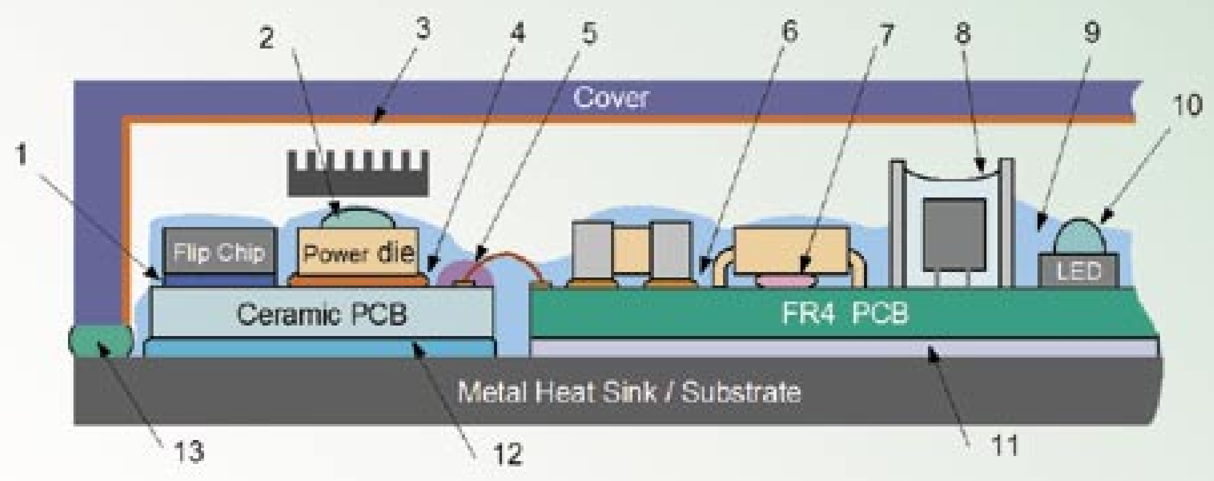
United
Adhesives
Aerospace
Automotives
Computers
Electronics
Green Energy
Semiconductors
Telecommunications

Welcome to United Adhesives, Inc.

United Adhesives Inc. formulates and manufactures special adhesives for applications in aerospace, automotives, computers, cellphones, electronics, semiconductors, and telecommunications. We are headquartered in Illinois, USA, at 85 Oakwood Road of the Industrial Park of Lake Zurich.

Over the last 10 years, we have been recognized as a global quality innovator, manufacturer and supplier of over 200 unique adhesive products including, but not limited to, the bonding adhesives, protective coatings, encapsulants, potting gels, sealants, thermally conductive adhesives, electrically conductive adhesives, and optical adhesives, etc. They are widely used for various electronic, semiconductor, and optoelectronic applications over the world.

Application Examples 应用实例



1. 底部填充或灌装粘合剂 (Underfills and Encapsulants)
2. 导热粘合剂 (Thermally Conductive Adhesives)
3. 电磁干挠的屏蔽和涂层 (EMI Shielding and Coating)
4. 导电粘合剂 或导热粘合剂 (Electrically or Thermally Conductive Adhesives)
5. 不流变热固化粘合剂或浇灌 剂 (Non-Sag Adhesives or Gels)
6. 导电粘合剂 (Electrically Conductive Adhesives)
7. 高性能环氧树脂 (High Performance Epoxy)或低热膨胀系数环氧树脂粘合剂 (Low CTE Epoxy)
8. 低热膨胀系数型粘合剂 (Low CTE Adhesives)
9. 保形涂层化合物 (Conformal Coating) 或全氟化涂层 / 浇灌 (Perfluoro coating or Encapsulation)
10. 特种用途的环氧树脂粘合剂, 例如LED (Epoxy Adhesives for Special Applications)
11. 界面和间隙导热填充材料 (Thermal Gap Filling Materials)
12. 导热粘合剂 (Thermally Conductive Adhesives)
13. 常温固化粘合剂和密封剂或热固化粘合剂和密封剂 (RTV or Heat Cure Adhesives & Sealants)

导电粘合剂
Electrically Conductive Adhesives

▶ 导电粘合剂 Electrically Conductive Adhesives

美国联合粘结剂公司提供两类导电胶 (ECA)，银填充的或镀银铜填充的硅胶 (Silductor系列), 和银填充的或镀银铜填充的环氧树脂 (Eposolder系列)。

它们有单组分，或双组分。这些粘合剂可用于点滴，模板或丝网印刷。

Silductor系列提供显著降低系统的热应力，同时保持高导电性和热导率。Eposolder系列提供了卓越的粘接强度，与常见的金属/合金表面形成良好的粘结，同时保持高导电性和热导率。

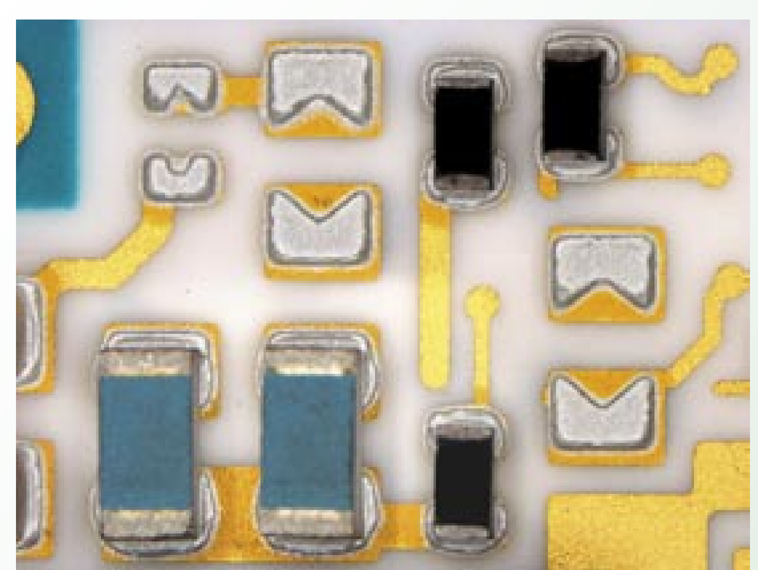
有各种可在室温和升高的温度下的固化条件可供选择。有些可在稍高温度下，几秒钟内迅速固化。

United Adhesives Inc. makes two categories of Electrically Conductive Adhesives (ECA), silver filled, or silver-coated-copper filled, silicones (Silductor series) and silver filled, or silver-coated-copper filled, epoxies (Eposolder series).

They are in either one-part or two-parts systems. They can be dispensable or screen /stencil printable.

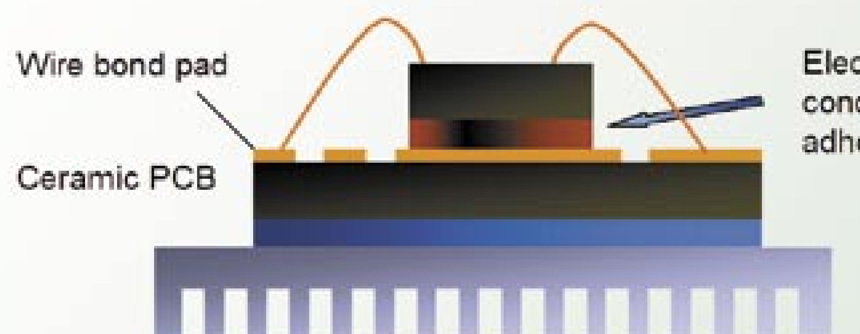
The Silductor series provide significant stress compliance while maintaining high electrical & thermal conductivity. The Eposolder series provides superior bonding strength to most common metal/alloy surfaces while maintaining high electrical & thermal conductivity.

Various cure profiles are available at room temperature and elevated temperature. Some can be snap-cured in seconds.

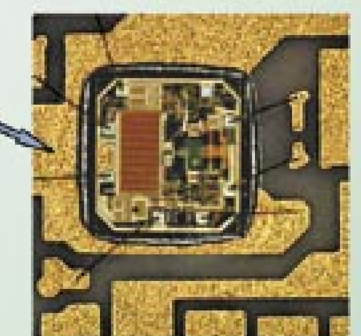


导电胶印刷在电路板上

Conductive Adhesive Printed on PCB



Electrically conductive adhesive



▶ 技术参数和特点 Technical Datasheets and Features

Name	Features / Advantages	Rheology	Part	Volume Resistivity (Ohm-cm)	Hardness / Modulus	Adhesion Al/Al, psi	Cure Rate
Silductor 6310	High conductivity. Low stress silicone based. High moisture resistance. Reworkable.	41,000 cPs	1-part	< 5x10^{-4}	Shore A = 45	>150	125°C 60 min, or 150°C 30 min
Silductor 6350	Low cost alternative with Ag coated Cu as conducting media	46,000 cPs	1-part	< 5x10^{-3}	Shore A = 68	>180	125°C 30 min, or 150°C 15 min
Silductor 6381	Low cost alternative with Ag and Cu hybrid as conducting media	85,000 cPs	1-part	< 2x10^{-3}	Shore A = 80	> 230	125°C 60 min
Eposolder 6510	High electrical conductivity. Strong bonding strength. Dispensable and printable	35,000 cPs	1-part	< 2x10^{-4}	Shore D = 78	> 1200	85°C 2hrs, or 125°C 1 hr
Eposolder 6537	Fast cure (snap cure) epoxy-silver. Strong bonding strength. Dispensable and printable	48,000 cPs	1-part	< 2x10^{-4}	Shore D = 85	> 1500	180°C 15 sec, 125°C 5 min
Eposolder 6763	Epoxy based low cost alternative with Ag coated Cu as conducting media	47,000 cPs	1-part	< 5x10^{-3}	Shore D = 60	> 800	125°C 60 min
Eposolder 6869	High electrical and thermal conductivity (11 W/mK). Strong bonding strength	98,000 cPs	1-part	< 1x10^{-4}	Shore A = 70	> 400	125°C 60 min
Other Products	Eposolder 6503, 6520, 6522, 6526, 6761 – One or two part epoxy based systems with various modifications E-Shielding products, including acrylic Ag-Cu based E-Shield 6037 and carbon based E-Shield 6410, provide conductive coating, RF / EMI shielding solutions Refer to: UnitedAdhesives.com for the property details						

特点

•优良的各向同性导电性。
•可供选择的固化条件。 有些可以在稍高温度下数秒内闪速固化。
•硅胶Silductor系列提供显著降低系统的热应力。
•环氧Eposolder系列提供了卓越的粘接强度。
•高可靠性和高温度稳定性
•良好的附着力，与PET，FR4，铝，铜，银等形成良好的粘结。
•低渗流无挥发性。

Features

• Excellent isotropic conductivity.
• Various choices of curing conditions. Some are curable in seconds.
• Silicone Silductor series offers significantly lower thermal stress.
• Epoxy Eposolder series provides excellent bonding strength.
• High reliability and high temperature stability
• Good adhesion to PET, FR4, aluminum, copper, silver, etc.
• Low flow and no volatility.

▶ 典型应用 Applications

典型的应用是热敏感元件与导电路径的安装粘结，如芯片的粘接，模块的连接，器件的接地。

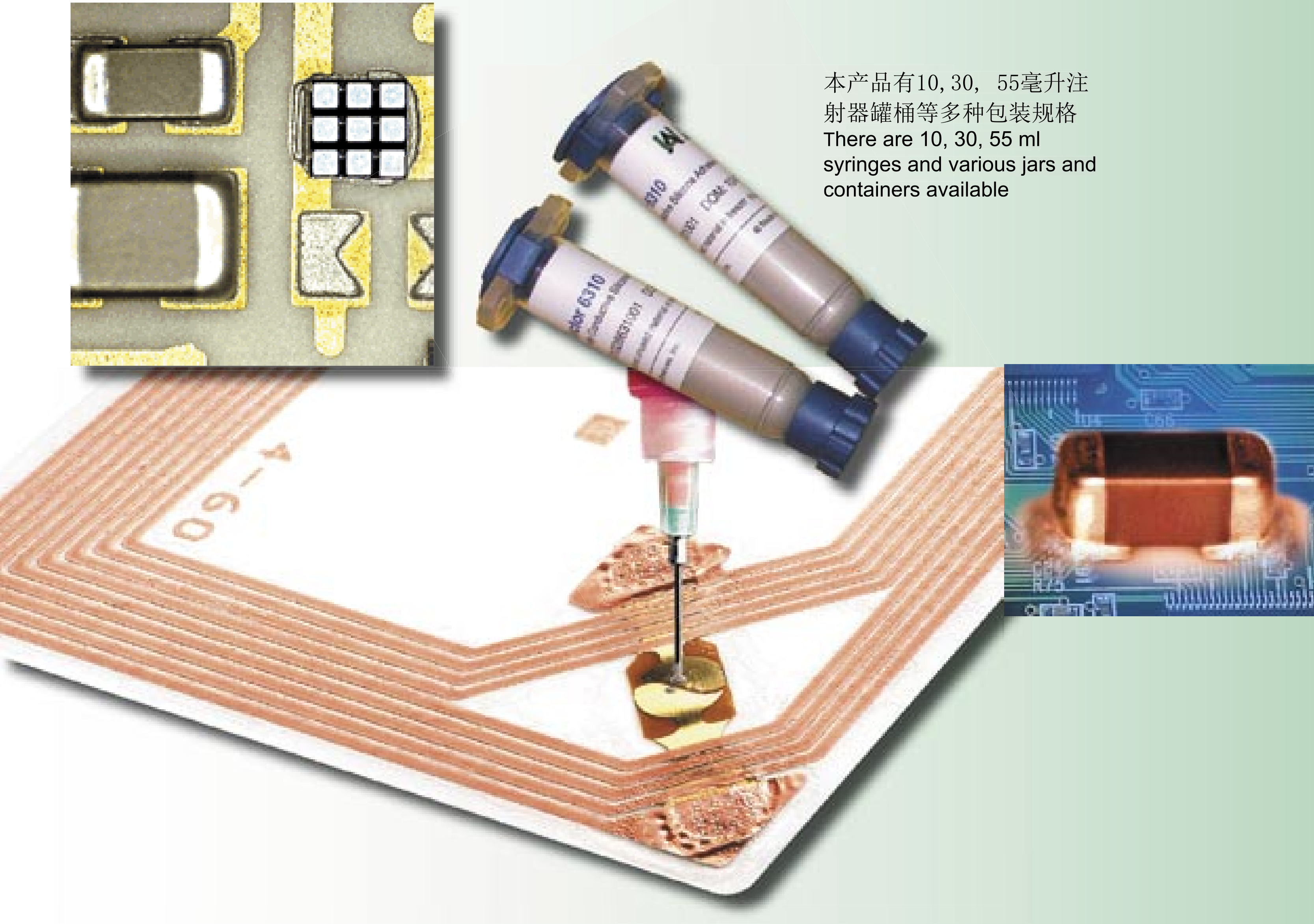
其它的应用在与传感器，磁盘驱动器，倒装芯片，芯片附着组装或包装，微机电系统，LED驱动IC，CCD芯片附着，晶片叠层，CSP，智能卡，相机模块，手机，薄膜太阳能电池，直接访问传感器，半导体封装和RFID标签， 等等。

硅胶型导电胶可以显著降低系统的热应力，而环氧基型导电胶则是焊锡更换，芯片键合，和引线端连接的替代品。

The typical applications are for mounting of heat sensitive components with electrically conductive path such as die attach, chip attach, and groundings.

Other applications are in sensors, disk drive, flip-chip, die attach assembly or packaging, MEMS, LED Driver IC's, CCD chip attach, wafer lamination, CSP, smart cards, camera modules, mobile phones, thin-film solar cells, direct access sensors, semiconductor packages and RFID tags.

Silicone-based ECAs provide significant stress compliance, while epoxy-based ECAs are alternatives for solder replacement, chip bonding, and lead terminations.



本产品有10, 30， 55毫升注射器罐桶等多种包装规格
There are 10, 30, 55 ml syringes and various jars and containers available

▶ 导电粘合剂使用流程指南 Process Guidance of ECA

使用指导

在使用之前，将导电胶从冰箱（或冷藏库）取出，并让它在室温下（例如，22至25℃）解冻。解冻时间随容器的大小而变。通常5至10毫升的注射器，解冻时间是30分钟。 30毫升的注射器，解冻时间为60分钟。罐或桶装，时间为1至2小时。接触表面必须清洁，无油，油脂和其他污染物，以达到最佳的粘接强度。

该粘合剂通常可以通过用针管点滴使用，亦还可以通过印刷方法来使用。对于点滴法，建议使用螺旋式的控制阀门。各种其它类型的阀门亦可以适用，例如时间压力阀; 线性活塞泵和喷射阀门等。但它们事先应为特定的应用进行测试。我们通常建议从黄色20号（ID0.6mm时，OD0.9毫米），以薰衣草30号（ID0.15毫米，OD0.30毫米）针头大小用于点滴。针尖到底板表面一般要控制在0.02至0.05毫米距离。

各种类型的自动液体分配滴灌设备可以用于这些粘合剂。它们包括：手工分配/时间压力阀;螺旋式的阀门;线性活塞泵和喷射阀。设备选型应以应用需求来决定。但有关设备选型和工艺优化，用户需从相应供应商的技术服务出取得建议。

将导电胶点滴（或印刷）到连接基板上。必须保证该导电胶层无气泡。取出和放置半导体芯片到导电胶上。根据粘合剂的TDS所列出的相应的温度和时间进行固化。一般对于有机硅产品，推荐在升高的温度下固化，以增强粘附力。

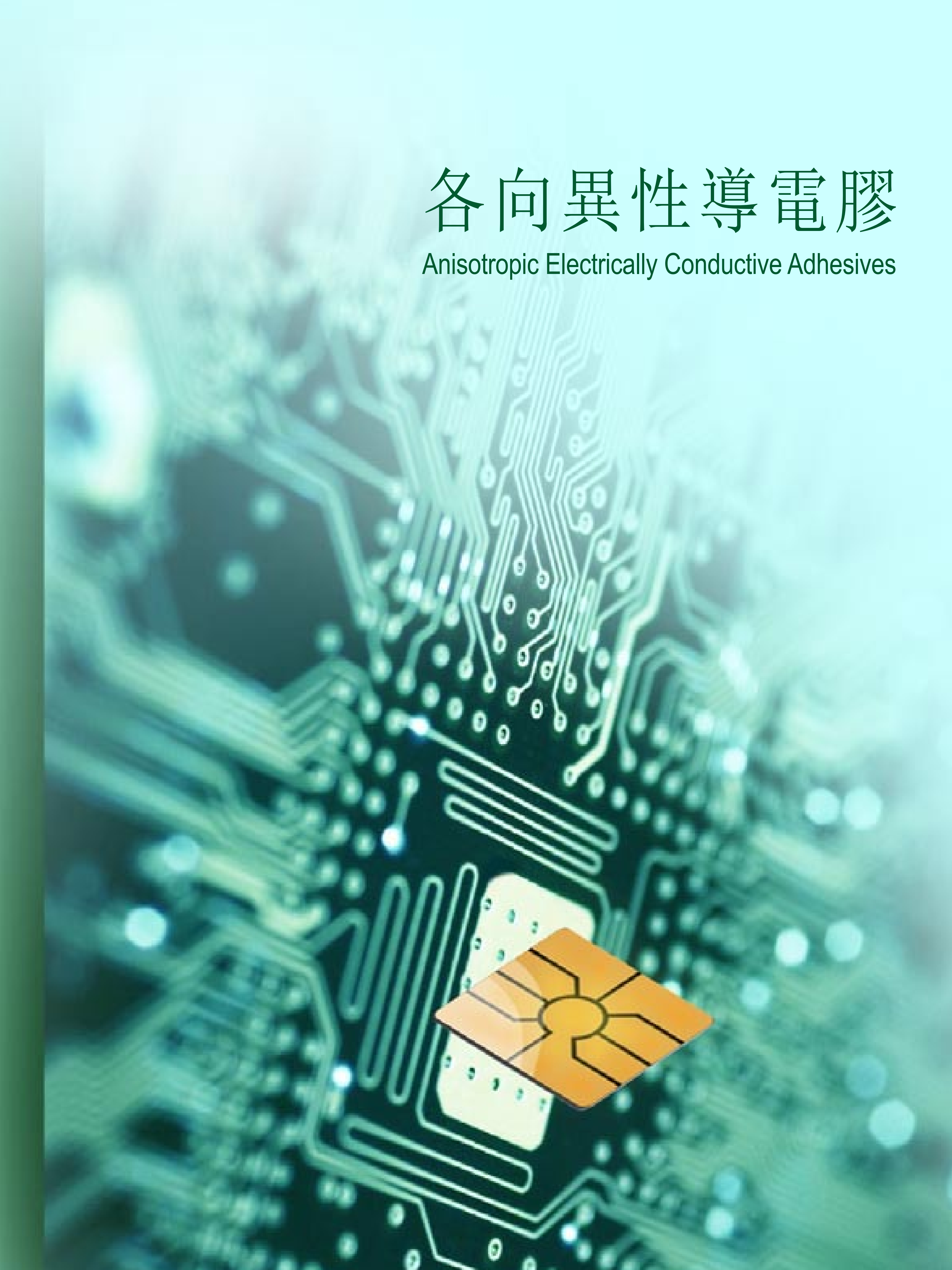
Application Guidance

Before use, pull out the adhesive from freezer (or refrigerator), and let it thaw to room temperature (e.g. 22 to 25 °C). Thaw time varies with container size. Typically for 5 to 10 ml syringe, the thaw time is 30 min. For 30ml syringe, the thaws time is 60 min. For jar or pail, the time is 1 to 2 hrs. The contact surfaces must be clean and free of oil, grease and other contaminations in order to achieve optimal bond strength.

The adhesives are normally applied by dispensing with needle, but also can be applied by printing. For dispensing, an auger style valve is recommended. A variety of other types valve may be suitable such as time pressure valve; linear piston pump and jet valve. They should be tested for the specific application in advance. We typically recommend needle size from yellow 20 gauge (ID 0.6 mm, OD 0.9mm) to Lavender 30 gauge (ID 0.15mm, OD 0.30mm) for dispensing the ECA. Ensure that needle tip is about 0.02 to 0.05 mm from substrate surface.

A variety of auto dispensing equipment types are suitable for applying these adhesives. They include: hand dispense / time pressure valve; auger style valve; linear piston pump and jet valve. Selection of equipment should be determined by application requirements. For advice on equipment selection and process optimization users should contact the corresponding supplier's Technical Services.

Dispense (or Print) the adhesive onto substrate. It must be ensured that the adhesive layer has no bubble. Pick and Place the semiconductor and register onto the adhesive. Cure the assembled part at corresponding temperature and time according to the TDS of the adhesives. Generally for silicone products, a cure at elevated temperature is recommended for adhesion enhancement.



各向異性導電膠

Anisotropic Electrically Conductive Adhesives

▶ 各向异性导电胶 Anisotropic Electrically Conductive Adhesives

美国联合粘合剂公司(United Adhesives Inc)所研发生产的各向异性导电胶（ACA），通过精确地控制导电填料（镀金或银粒子）在胶粘剂基体中的分布，从而达到只在z轴方向上的导电和粘结。而x，y方向上则形成良好的绝缘。

当受热和受压之后，导电粒子在芯片隆起焊盘与基板焊盘之间形成Z方向上的连续导通。而基板焊盘之间的区域，环氧基体与其余的颗粒则作为绝缘体，防止任何其他方向上的电流流过。

这些导电胶可用于点滴，模板或丝网印刷。固化可以在180℃，一定压力下，在7至11秒钟内完成。即便在高湿度和热循环时，金颗粒亦具有稳定的接触电阻及导电性。

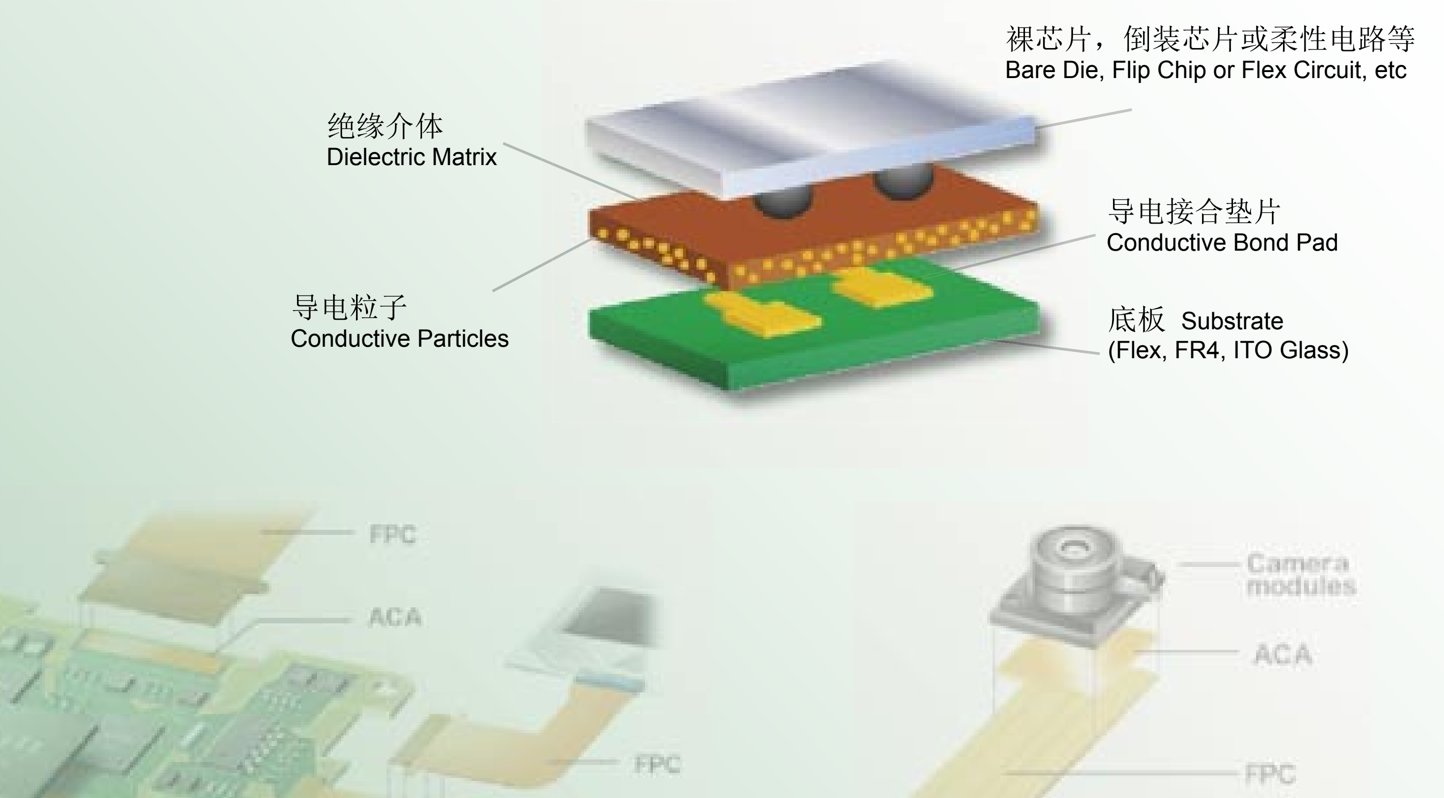
美国联合粘合剂公司的各向异性导电胶为精细电路间距，提供了强力的导电粘结，以及快速的组装过程。测试显示，80微米（70微米焊盘10微米间隔）的精细电路间距没有出现短路现象。

The Anisotropic Conductive Adhesives (ACA) made by United Adhesives conduct only in z-axis due to careful control of the distribution of the electrically conductive filler (gold coated, or silver particles) in the adhesive matrix.

Conductivity is achieved through continuous contact of the fillers with the bumps and bond pads of the opposing substrates after heat and pressure being applied to compress the entrapped conductive particles. The epoxy matrix with the remaining particles between the raised areas of the substrates acts as an insulator, preventing current flow in any other directions.

These adhesives can be applied with dispensing, stencil or screen-printing. Cure can be completed at 180°C under the compression force in 7 to 11 seconds. The gold particles have stable electrical contact resistance when subjected to humidity and thermal cycling.

United Adhesives provides strong bonds to fine pitches with very fast assembling process. Testing results show that pitches of 80 microns (70 micron bumps with 10 micron separation) showed no circuit short.



▶ 技术参数和特点 Technical Datasheets and Features

	具体技术参数 TDS	AE6080	AE6075	AE6025
固化前性能 Property Before cure	化学基础 Chemical Base	环氧树脂 Epoxy	环氧树脂 Epoxy	环氧树脂 Epoxy
	颜色/组分 Color / Component	深棕色 Dark Brown	深棕色 Dark Brown	浅棕色 Light Brown
	粘度 Viscosity at 25°C @10 1/s (cP.s)	26,000	25,000	25,000
	指数Thixtropic Index	2.5	1.5	1.5
	密度 Density (Gram /cc)	1.3	1.3	1.3
	导电颗粒型 Conductive Particle Type	Ni-Au	Ni-Au	Ag-Cu
	导电粒子的尺寸 Conductive Particle Size (um)	2.5	5.0	6.0
	固化中失重 Weight loss in cure (Weight %)	< 0.8 %	< 0.5 %	< 0.5 %
固化后性能 Property as Cured	颜色 Color	深棕色 Dark Brown	深棕色 Dark Brown	浅棕色 Light Brown
	硬度 Hardness (25 °C) (Shore D)	88	86	82
	接触电阻率 Contact Resistivity (z direction, 24°C) (Ohm/mm²)	< 0.1	< 0.1	< 0.5 >10E+12
	体积电阻率 Volume Resistivity, (x,y direction, 24°C)(Ohm-cm)	>10E+12	>10E+12	>10E+12
	热膨胀系数 Coefficient of Thermal Expansion (ppm/C)	< 160 (> Tg) < 60 (< Tg)	< 165 (> Tg) < 62 (< Tg)	< 162 (> Tg) < 65 (< Tg)
	附着力 Ahesive (Al/Al,lap shear), Psi	>1800	>1600	>1600
	Tg (°C) Ahesive (Al/Al,lap shear), Psi	125	125 - 135	125 - 135
	热稳定性 Thermal Stability (°C)	– 40 to 180	– 40 to 180	– 40 to 180
	提取离子含量 Extractable Ionic Content (Na+, K+, Cl-, ppm)	< 30	< 30	< 30
固化条件。 数据仅做参考，应通过调试来 决定适当的生产条件。 Cure Profile (as reference. Need to test for real conditions)	150 °C固化 Cure at 150 °C (Second)	15 ~ 30	15 ~ 30	15 ~ 30
	160 °C固化 Cure at 160 °C (Second)	9 ~ 12	9 ~ 12	9 ~ 12
	170 °C固化 Cure at 170 °C (Second)	7 ~ 9	7 ~ 9	7 ~ 9
	180 °C固化 Cure at 180 °C (Second)	6 ~ 7	6 ~ 7	6 ~ 7
	工作 Pot / Work Life at 25°C (weeks)	> 2	> 2	> 2
	保质期（在冰箱推荐存储) Shelf Life (recommended store in freezer (< -15°C) (Month)	12 @ -18°C	12 @ -18°C	12 @ -18°C

特点 Features

- 良好的z方向导电性（z方向, xy 方向绝缘）Excellent anisotropic electrical conductivity in z-direction (x,y dielectric)
- 快速固化。在180℃下固化7秒可固化。Extremely rapid cure at elevated temperature, e.g. 180°C 7 second cure.
- 在常温下较长的贮存期。30℃下2周的品质保证。减少设备的清扫次数。 Long pot life in room temperature
- 高可靠性。没有凝集物, 异物颗粒沉淀等。85℃/85%RH 500 小时稳定。 High reliability. No foreign materials
- 低吸湿性。85℃/85% RH吸湿< 0.1%. Low moisture absorption < 0.1% at 85C/85%RH
- 高温稳定性。 Tg125℃ High temperature stability. Tg = 125°C
- 良好的附着力。与PET，FR4，铝，铜，银等表面形成良好粘结。Strong bonding to PET, FR4, Al, Cu, Ag etc
- 低渗流无挥发性。 Low bleeding, no volatile

▶ 典型应用 Applications

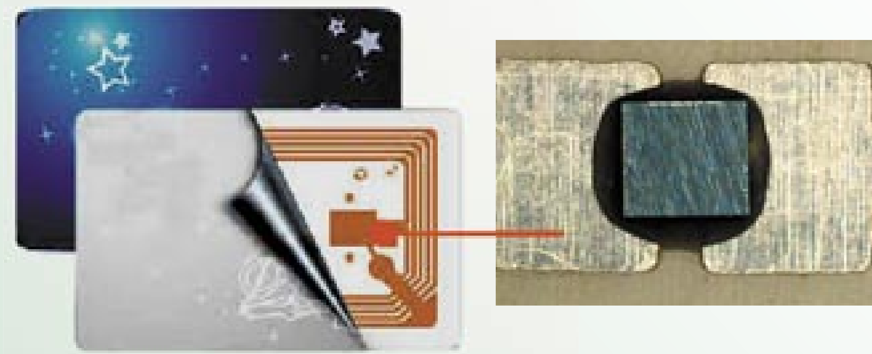
各向异性导电胶（ACA）为各种芯片部件提供z方向上的高速互连和导通, 这包括倒装芯片(Flip Chip)，细间距覆晶薄膜（COF)，和芯片在玻璃上（COG）的LCD的包装，柔性印刷电路（FPC）电缆，及各种细间距组件。它们经常被用作在主体应用方面的互连材料，如平板显示器，液晶显示器，智能标签，智能卡，相机模块，手机，薄膜太阳能电池，直接访问传感器，半导体封装和RFID标签等。

Anisotropic conductive adhesives (ACA) provide in z-direciton high-speed interconnection for flip chip, fine pitch chip-on-film (COF), and chip-on-glass (COG) LCD packaging, flexible printed circuits (FPC) cables, and various fine pitch assemblies. They are often used as interconnecting materials in mainstream applications such as flat panel displays, LCD, smart label, smart cards, camera modules, mobile phones, thin-film solar cells, direct access sensors, semiconductor packages and RFID tags.

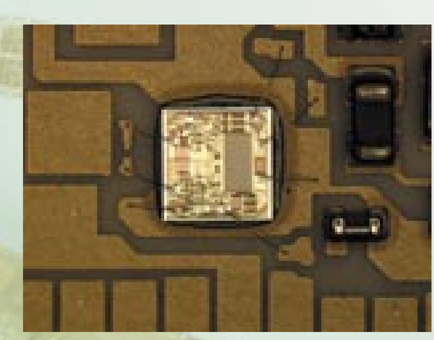
各向异性导电胶(ACA)

柔性电路板互连
Flexible circuit board interconnection

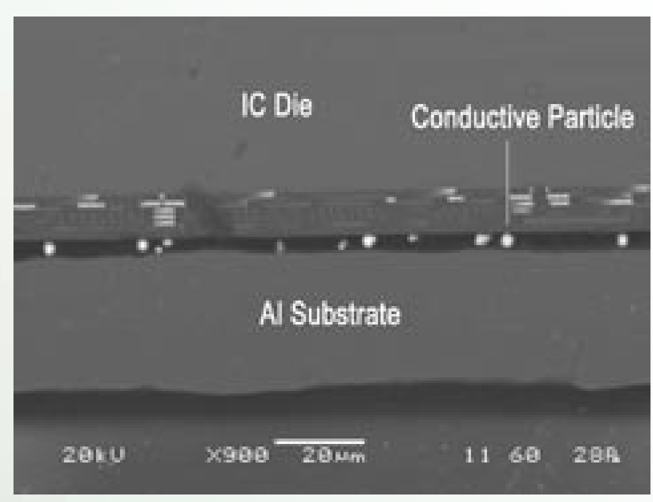
本产品有5, 10, 30毫升注射器三种规格
There are 5, 10, 30 ml syringes available



智能卡芯片封装后的显微照片
Microscope photo of IC die after bonding



芯片的绑定 Die Bonding



封装芯片断面SEM照片 SEM of cross-section of die

▶ 各向异性导电胶使用流程指南 ACA Process Guidance

使用准备

ACA导电胶要求存储在冰箱中（-18℃）。使用前需要在室温解冻（例如，22至25℃）。5至10毫升的注射器，解冻时间是30分钟。 30毫升的注射器，解冻时间为60分钟。接触表面必须清洁，无油，油脂和其他污染物，以达到最佳的粘接强度。

该导电胶通常可以通过用针管点滴使用，亦还可以通过印刷方法来使用。对于点滴法，建议使用螺旋式的控制阀门。各种其它类型的阀门亦可以适用，例如时间压力阀; 线性活塞泵和喷射阀门等。但它们事先应为特定的应用进行测试。

我们通常建议从黄色20号（ID 0.6mm时，OD 0.9毫米），以薰衣草(淡紫色)30号（ID 0.15毫米，OD 0.30毫米）针头大小用于点滴。针尖到底板表面要控制在0.02至0.05毫米距离。

使用过程

- 将导电胶点滴（或印刷）到连接基板上。必须保证该导电胶层无气泡。
- 取出和放置半导体芯片到导电胶上。
- 按一定的压力按压热电极（或IR）到半导体芯片上，并在160至170℃温度下保持7到11秒。热电极的压力通常为2至5千克/ cm^2左右。具体的压力，温度和保持时间，应该事先按照特定的应用情况进行测试，然后确定下来。
- 对于特别高的要求，推荐再加上140℃2分钟后的后续固化。
- 此过程可参考下面的示意图。

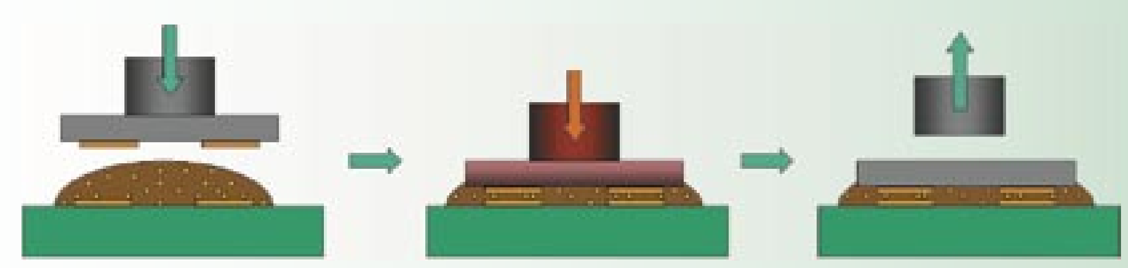
Preparation

ACAs are required to store at a freezer (-18°C). They need to thaw to room temperature (e.g. 22 to 25 °C) before use. For 5 to 10 ml syringe, the thaw time is 30 min. For 30ml syringe, the thaw time is 60 min. The contact surfaces must be clean and free of oil, grease and other contaminations in order to achieve optimal bond strength.

The adhesives are normally applied by dispensing with needle, but also can be applied by printing. For dispensing, an auger style valve is recommended. A variety of other type valves may be suitable such as time pressure valve; linear piston pump and jet valve. They should be tested for the specific application in advance. We typically recommend needle size from yellow 20 gauge (ID 0.6 mm, OD 0.9mm) to lavender 30 gauge (ID 0.15mm, OD 0.30mm) for dispensing the adhesives. Ensure that needle tip is about 0.02 to 0.05 mm from substrate surface.

Processing

- Apply adhesive onto substrate. It must be ensured that the adhesives layer has no bubble.
- Pick and Place the semiconductor (.e.g bare die) and register onto the adhesive
- Press the semiconductor with a thermode (or IR) under a defined pressure at temperatures of 160 to 180°C and hold for 7 to 11 seconds. The compressing force is typically 2 to 5 kg / cm^2. Exact compressing force, holding time and temperature should be tested for the specific application task in advance.
- By specifically high demands, a post curing of 2 min at 140°C is recommended.



导热粘合剂

Thermally Conductive Adhesives

▶ 硅胶导热粘合剂 Silicone Thermally Conductive Adhesives

美国联合胶粘剂公司生产各种有机硅类导热粘合剂（TCAs），它们广泛用于粘结电子器件同时提供良好的导热。它们具有以下特点：

- 高导热和散热能力
- 与常用的塑料和金属有高粘结合强度
- 灵活的固化条件。有些可以室温固化
- 可以自动滴注,或者印刷
- 柔软而有弹性从而耦合减少热应力，同时散热
- 高介电强度，良好的绝缘体

United Adhesives Inc. makes various silicone-based thermally conductive adhesives (TCAs) for bonding electronic devices with heat dissipations. They have the following features:

- Very high thermal conductivity.
- High bonding strength to most common plastics and aluminum and common metals.
- Soft rubber and flexible to couple thermal stress while dissipating heat. They are also reworkable.
- High dielectric strength for voltage insulation.

Name	Features / Advantages	Rheology	Part	Thermal Conductivity	Hardness / Modulus	Adhesion Al/Al, psi	Cure Rate
Thermobond 3513	Silicone with high bonding Strength. Low stress	Flowable 85,000 cPs	1-part	1.4 W/mK	Shore A =70	> 600	125°C 60 min
Thermobond 3517	Silicone with high thermal conductivity. Strong bonding. Non-Slumping	Thixotropic, 120,000 cPs	1-part	1.9 W/mK	Shore A = 90	> 550	125°C 60 min
Thermobond 3518	Silicone with high thermal conductivity. Strong bonding. Non-Slumping	Thixotropic, 120,000 cPs	2-part, 1:1 mix.	1.7 W/mK	Shore A = 65	> 400	125°C 30 min
Thermobond 3519	Strong bonding. High voltage insulation. Flowable	Flow 96,000 cPs	2-part 1:1 mix.	1.4 W/mK	Shore A = 45	> 400	125°C 30 min
Thermobond 3831	Boron nitride filled for very high thermal conductivity	Thixotropic, 230,000 cPs	1-part	3.2 W/mK	Shore A = 63	580	125°C 60 min
Silductor 6310	Silver filled silicone for very high thermal conductivity and low stress	41,000 cPs	1-part	> 4 W/mK	Shore A = 45	> 150	125°C 60 min
Silductor 6350	Silver-Copper filled silicone for high thermal conductivity and low stress	46,000 cPs	1-part	1.9 W/mK	Shore A = 68	> 180	125°C 30 min
Other Products	Silicones based Thermobond 3508, 3821, 3830, Silductor 6201, 6381 – One or two-pat silicone systems with various modifications Epoxy based ET1608, 1642, 1645NS, 1653BN, 1655, 1658 – One or two part epoxy systems with various modifications Refer to: UnitedAdhesives.com for the property details						

环氧树脂导热粘合剂 Epoxy Thermally Conductive Adhesives

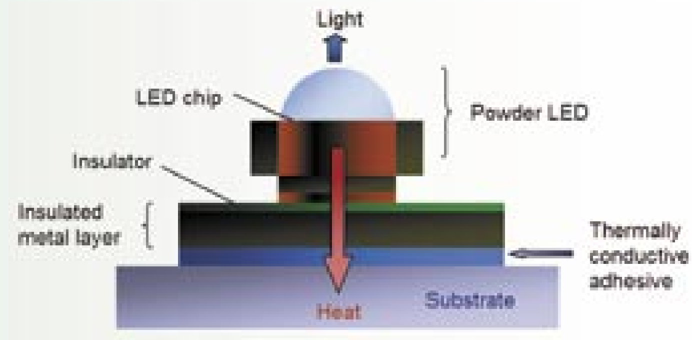
美国联合胶粘剂公司亦生产各种非有机硅类导热粘合剂，比如环氧树脂导热粘合剂，它们广泛用于粘结电子器件同时提供良好的导热。它们具有以下特点：

- 非常高的热导率。一些银填充环氧树脂有超过 10 W / mK的热导率。
- 对硅芯片，模块，以及大多数金属和通用塑料形成很高的粘合强度。
- 高的热稳定性。有些具有高Tg。它们可用于芯片的绑定粘结。
- 高介电强度， 良好的绝缘体性。
- 基于环氧树脂的导热粘合剂有较强的抗油和耐化学性腐蚀性。

United Adhesives Inc. also makes various nonsilicone-based thermally conductive adhesives (TCAs) for bonding electronic devices with heat dissipations. They have the following features:

- Very high thermal conductivity. Some silver-filled epoxies have over 10 W/mK conductivity.
- High bonding strength to silicon die, most metals and common plastics.
- High thermal stability. Some have high Tg. They are feasible for die attachments.
- High dielectric strength for voltage insulation.
- Epoxy based TCAs have strong oil and chemical resistance.

Name	Features / Advantages	Rheology	Part	Thermal Conductivity	Hardness / Modulus	Adhesion Al/Al, psi	Cure Rate
ET1628	High thermal conductivity. High bonding strength. Easy flow. Rmt curable.	160,000 cPs	2-part 2 : 1	2.3 W/mK	5.8 GPa	> 1500	25°C 8hrs, or 105°C 10 min
ET1643	High thermal conductivity. High bonding strength. Flowable. Low CTE.	210,000 cPs	2-part 1 : 1	2.0 W/mK	6.7 GPa	> 1800	25°C 18hrs, or 125°C 30 min
ET1645	High thermal conductivity. Good flow. High bonding Strength	50,000 cPs	1-part	1.5 W/mK	Shore D = 70	> 1000	150°C 45 min
ET1649	High thermal conductivity. Flowable High bonding strength. Low CTE	190,000 cPs	1-part	2.2 W/mK	Shore D = 90	> 1000	125°C 60 min 150°C 35 min
TF2619	High thermal conductivity gap filling silicone	Thixotropic, 260,000 cPs	1-part	2.0 W/mK	Shore OO = 40	N/A	125°C 45 min
TF2620	High thermal conductivity gap filling silicone, boron nitride filled	Thixotropic, 180,000 cPs	1-part	2.6 W/mK	Shore A = 15	N/A	125°C 30 min 150°C 15 min
Eposolder 6510	Silver filled epoxy for high thermal conductivity	35,000 cPs	1-part	> 5 W/mK	Shore D = 78	> 1200	85°C 120 min 125°C 60 min
Eposolder 6869	Silver filled epoxy for extremely high thermal conductivity	98,000 cPs	1-part	11 W/mK	Shore A = 70	> 400	125°C 60 min
Other Products	Silicones based Thermobond 3508, 3821, 3830, Silductor 6201, 6381 – One or two-pat silicone systems with various modifications Epoxy based ET1608, 1642, 1645NS, 1653BN, 1655, 1658 – One or two part epoxy systems with various modifications Refer to: UnitedAdhesives.com for the property details						



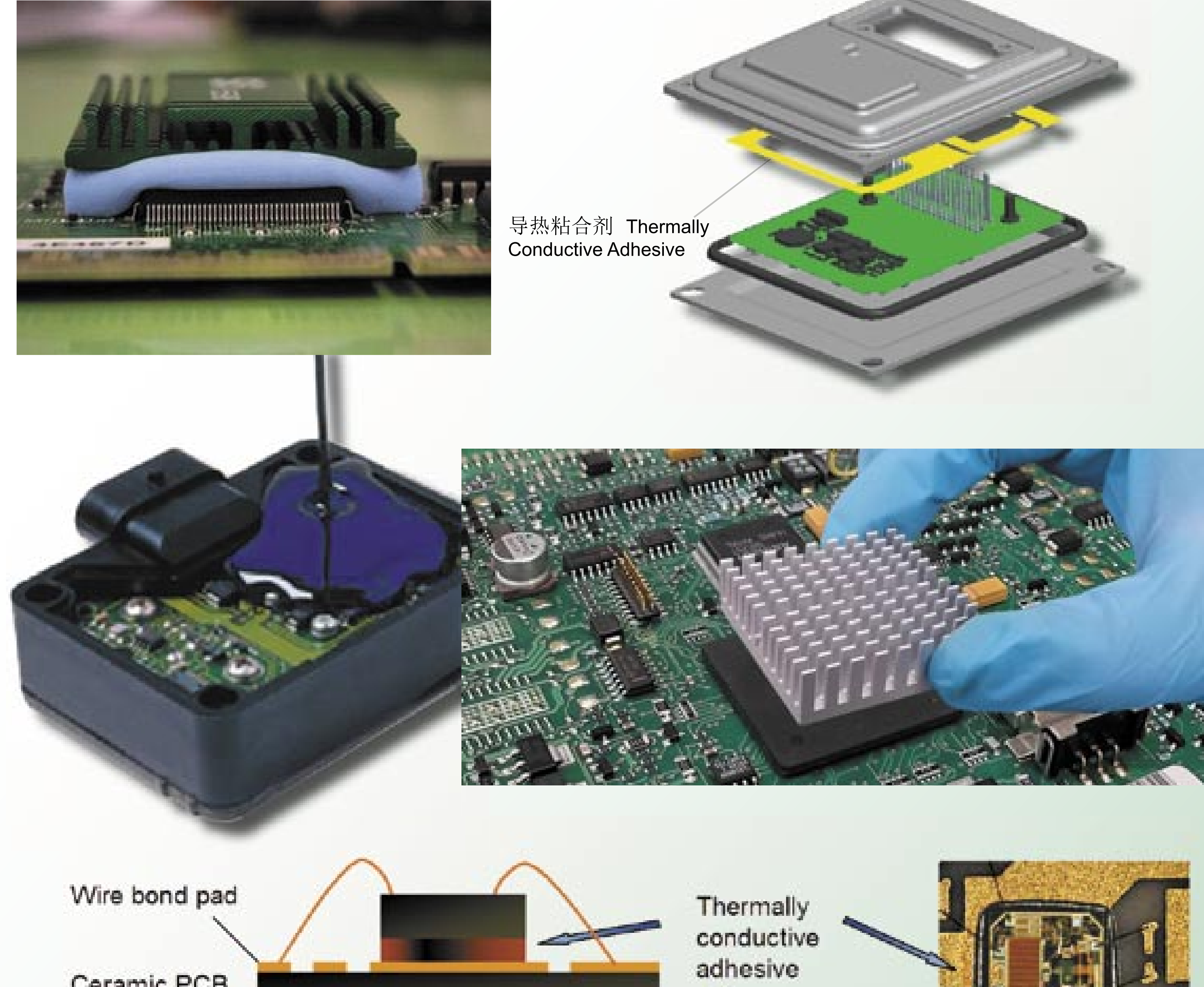
▶ 典型应用 Applications

【主要用途】

用于航空航天,汽车电子，半导体和电信等电子工业中的导热粘结。 通常用于高热功率器件和散热器件之间；或者用于需要热应力的耦合，同时散热，或者需要导热减震的任何地方；PCB板与散热基板之间的粘结，冷却风扇设备的粘接，或功率器件的粘结与封装。

【Potential Uses 】

For high heat dissipation and bonding in automotive electronics, semiconductors, and telecommunications, typically applied between a high heat power device and heat sink; any places that require coupling of thermal stress while dissipating heat, or require thermally conductive vibration dampening; attachment of PCB to heat sink, cooling fans to devices, bonding or encapsulation of power devices.



▶ 导热粘合剂使用流程指南 TCA Process Guidance

▶准备

对于50cc，200cc的连体双管，我们推荐使用EFD手动或气动涂胶枪和活塞。胶粘剂连体双管很容易装入涂胶枪，并通过静态混合管混合滴灌。这可以避免对粘合剂,封装剂，和涂料的称重及混合。

对于可以随时使用的单组分的注射器，罐装，桶装产品，从冰箱中取出来后，请先让它解冻到室温。

对于大量的应用，各种类型的自动液体分配滴灌设备可以用于这些粘合剂。它们包括：手工分配/时间压力阀;螺旋式的阀门;线性活塞泵和喷射阀。设备选型应以应用需求来决定。有关设备选型和工艺优化，用户应采纳相应供应商的技术服务的建议。

▶脱气

对于单组份产品，或用自动分配设备滴灌A / B胶时，只要没有气泡被截留在机械零件的下方，通常不需要脱气，因为它们出厂前预先被脱过气。

对于手工混合A / B胶时，脱气是必需的。可以是635毫米汞柱（25英寸汞柱）或更大的真空下脱气。真空脱气时，注意观察未固化流体的气泡形成,逐步增加真空度，以避免流体快速发泡溢出。保持真空度直至气泡在液体表面崩溃。

▶基材制备

基材应该免费灰尘，油污和指纹的脏污。使用适当的工业清洗技术用于清洁光电表面。如果使用烃类溶剂清洗（例如己烷，甲苯），建议再用试剂级异丙醇作最终漂洗干燥。如果使用含水洗涤剂清洗，建议再用去离子水作多次最终漂洗干燥,或用试剂级异丙醇作最终漂洗干燥。对于某些塑料，例如聚乙烯，聚丙烯和氟塑料的表面可以进行预处理，比如化学蚀刻或等离子蚀刻，以改善粘合剂的粘合性。

有机硅产品，应与清洁的基片材料固化粘结。避免使用在一些表面上含有诸如，硫，胺，磷，有机金属，酸和某些丁基，亚硝酸盐，氯化，和EPDM弹性体，某些塑料与浸出增塑剂，和某些粘合剂的固化残留物，包括紫外线固化环氧树脂和胺固化环氧树脂。可以在粘结表面某些施加涂层或粘合促进剂以增强粘合力。

▶固化时间

根据粘合剂的TDS所列出的相应的温度和时间进行固化。一般对于有机硅产品，推荐在升高的温度下固化，以增强粘附力。

▶Preparation

For 50cc, 200cc ducal cartridges, we recommend use EFD manual or pneumatic dispensing applicator and plunger. Adhesive filled with cartridges are easily loaded into the dispensing gun and dispensed through static mixers. This eliminates the need to weigh or mix adhesives, potting compounds, and coatings.

For products that is supplied in a ready-to-use one component syringe, jar, and pail, please let it thaw to room temperature after pull out from refrigerator.

For high volume application, a variety of auto dispensing equipment types are suitable for applying these adhesives. They include: hand dispense / time pressure valve; auger style valve; linear piston pump and jet valve. Selection of equipment should be determined by application requirements. For advice on equipment selection and process optimization users should contact the corresponding supplier's Technical Services.

▶De-aeration

De-aeration is typically not needed for one-component products, or auto dispensing with A/B parts, as long as no pockets of air are trapped beneath mechanical parts. For manually mixed A/B parts, the de-aeration is required. The assembly may be vacuum deaerated using a pressure of 635 mmHg (25 inHg) or greater. Apply the vacuum while observing the uncured fluid for presence of bubble formation and increase vacuum slowly enough to avoid rapid foaming. Hold vacuum until bubbles at the fluid surface collapse.

▶Substrate Preparation

Substrates should be free of dust, oil, and fingerprint soils. Use suitable industrial techniques for cleaning electro-optics. If using hydrocarbon solvent cleaning (e.g. hexane, toluene), a final rinse with reagent grade isopropanol is recommended. If using aqueous detergent cleaning, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol followed by drying is recommended. For certain plastics, such as polyethylene, polypropylene, and fluoroplastics, the surface may be pre-treated with chemical etching or plasma etching to improve the adhesion.

For silicones products, it needs to cure in contact with most properly cleaned substrate materials. Avoid using them on any place that contains sulfur, amine, phosphorous, organo-metals, acid, and certain butyl, nitrite, chlorinated, and EPDM elastomers, certain plastics with leachable plasticizers, and the cure residues of certain adhesives including UV-cured epoxies and amine-cured epoxies. A certain primer or adhesion promoter may be applied on bonding surfaces to enhance the adhesion.

▶Cure Schedule

Cure the assembled part at corresponding temperature and time according to the TDS of the adhesives. Generally for silicone products, a cure at elevated temperature is recommended for adhesion enhancement.

▶ 低热膨胀系数粘合剂 Low CTE Adhesives

United Adhesives Inc. makes high performance epoxy adhesives for electronic structural bonding, severe thermal shock and vibration bonding, and media resistance applications. Low CTE (coefficient of thermal expansion) epoxy will allow bonding of electronic components and devices with minimized thermal residual stress in thermal cycles and operations.

Here below are some features:

- Thixotropic bonding epoxy to anti-sag in processing.
- High Tg formulation for high temperature stability.
- Very low CTE formulation to minimize the thermal stress.
- High flow and penetration to fill micro cracks and voids.
- Some formulations can quickly cure in seconds at elevated
- temperature.
- Thermally conductive low CTE potting epoxy also available.

Name	Features / Advantages	Rheology	Hardness / Modulus	CTE (ppm/C)	Tg (°C)	Adhesion Al/Al, psi	Cure Profile
EP1640	Low CTE. Very strong bonding to many plastics and surfaces. Oil and chemical resistance	2-Part. A/B = 1: 1. Flow. 150,000 cps	8.5 Gpa	68 (above Tg) 19 (below Tg)	105	> 1800	25°C 18 hr 85°C 45 min
EP1641	Very Low CTE. Flowable epoxy. Strong oil and chemical resistance.	1-Part. Flowable and Dispensable. 25,000 cps	8.9 Gpa	68 (above Tg) 18 (below Tg)	150	> 1800	125°C 45 min
EP1637	Fast cure, Low CTE for stress compliance. High structural bonding strength	1-Part. Flowable. Dispensable. 60,000 cps	8.0 Gpa	89 (above Tg) 22 (below Tg)	145	> 2300	180°C 10 sec 150°C 1 min
EP1733	Instant cure at elevated temperature. Very stable at room temperature. Strong bonding to various substrates	1-Part. Flowable. Dispensable. 98,000 cps	Shore D = 92	75 (above Tg) 28 (below Tg)	145	> 1500	180°C 15 sec 150°C 1 min 125°C 3 min
UF1230	Low CTE, high Tg underfill. Excellent thermal stability. Capillary flow. Good Dielectric. Low current leakage.	1-part, Fast flow. dispensable 8,000 cPs	7.6 Gpa	80 (above Tg) 20 (below Tg)	150	> 1800	125°C 25 min
TUF1210	Thermally conductive underfill. Capillary Flow. Dielectric. Low thermal expansion and high Tg.	1-part, dispensable 15,000 cPs	7.0 Gpa	80 (above Tg) 23 (below Tg)	125	> 1800	125°C 25 min
Other Products	Other low CTE products are thixotropic (non-slumping) versions EP1640NS and EP1641NS Refer to: UnitedAdhesives.com for the property details						

底部填充与灌装粘合剂
Underfills and Encapsulants

▶ 底部填充与灌装粘合剂 Underfills and Encapsulants

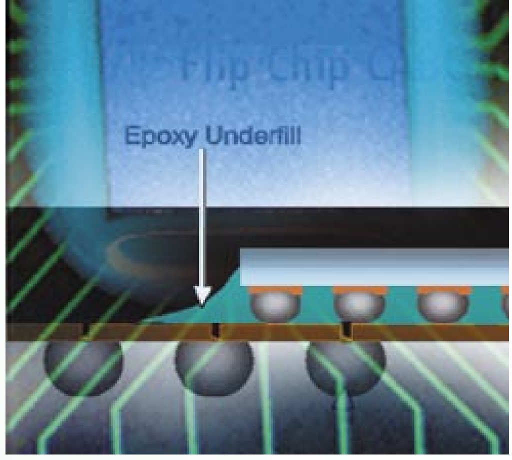
美国联合粘合剂公司(United Adhesives Inc)所研发生产的底部填充与灌装粘合剂以环氧树脂为基体的底部填充与灌装粘合剂(Underfill)主要应用于半导体工业，诸如裸芯片，晶片，BGA，flip-chip，CSP等的粘合或灌装，产品的高流动性使其用来填充芯片和底座间的空隙，或者用来将整个部位进行灌注或者覆盖。

产品具有以下特征：
- 优越的毛细流动能力。
- 高玻璃转化温度(High Tg)，具有高温稳定性。
- 很低的热膨胀系数(CTE)以减少热应力。
- 对高电压有优良的绝缘能力。对低电流有良好的防漏损能力。
- 对FR4，陶瓷，polyimide，金属和其他较难粘结的材料亦有良好的粘结性。
- 本公司同时也提供兼有导热能力的底部填充粘合剂。

Epoxy based underfill and encapsulant products from United Adhesives are for semiconductor applications such as to attach chip-on-board, bare die, BGA, flip-chip, CSP, etc, or to under-fill the gap between die /chip and substrate, or to encapsulate dies, chips, components, or powder devices.

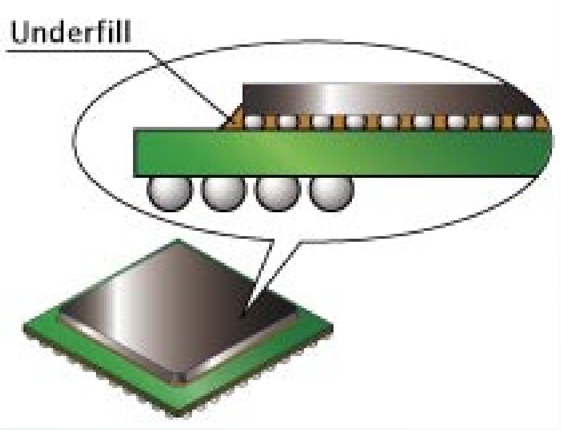
They provide various superior features such as:
- Excellent capillary flow capability.
- High Tg formulation for high temperature stability.
- Very low CTE formulation to minimize the thermal mismatch.
- High voltage insulation formulation.
- Strong bond to FR4, ceramic, polyimide, metals, and other difficult materials.
- Good dielectric property. Low current leakage.

Thermally conductive underfills are also available.



一些典型的底部填充与灌装粘合剂列于下表
Some typical underfills and encapsulatants are listed in following table

Applications	Products	Features / Advantages
Flip chip, BGA underfill	TUF1210 UF1230 UF1240 SE1260	Thermally conductive underfill Fast flow with low CTE low alpha emission Underfill with rubber toughen for high strength Flexible / soft underfill
Die attach	EP1637 EP1723 EP1678 Eposolder 6869	Snap cure in seconds, flowabe, 1-part Snap cure in seconds, non-slump, 1-part 2-part, room temperature curable epoxy Extremely high thermal conductivity k = 11 W/mK
Low CTE bonding and encapsulation	EP1640 EP1641 EP1641NS	2-part 1:1 mixing low CTE epoxy. Low T curable 1-part heat cure. High thermal stability 1-part non-slumping. High Tg
Flexible bonding & encapsulation	EP1346 EP1386 SE1262 BS8311 BS8460	2-part (2:1) flexible, room temp curable 2-part (1:1) flexible, room temp curable 2-part (1:1) flexible, heat cure 1-part silicone, heat cure 2-part silicone, room temp curable
Details of the properties these adhesives can be found on the website: http://www.unitedadhesives.com/underfill_pot.html		



▶ UF1230 技术参数和特点 Technical Datasheets and Features

性能 Property	单位Units	UF1230 (low CTE)	美国军标参考值 Reference value from MIL-I-16923H
材料化学特点 Material Chemistry		Epoxy, silica filler	Not Defined
组分Component		One	Not Defined
最大挥发物含量 Volatile content, maximum	Wt %	0.2	1.0
最低适用期在23℃ Pot life at 23C, minimum	min	24 hrs	30 – 45
最大粘度 Viscosity, maximum	cps	8,000	25,000
最小工作寿命 Working life, minimum	min	24 hrs	30
最大易燃性燃烧程度 Flammability, extent of burning, maximum	in	0.2	1.0
平均比重 Average specific gravity		1.67 +/- 0.02	+/- 0.1
最小平均硬度 Mean hardness, minimum	Shore D	90	75
最小平均拉伸强度 Average tensile strength, minimum	lb/in^2 (MPa)	9,800 (70)	7,000 (50)
最小平均伸长率 Average elongation, minimum	Percent	3.0	2.0
最大平均吸水率 Average water absorption, maximum	Percent	0.15	0.2
最小机械冲击 Mechanical shock, minimum	lb	N/A	3
最小平均缺口Izod冲击 Average notched Izod impact, minimum	ft-lb/in	0.5	0.3
最小热冲击 Thermal shock, minimum	Cycles	1000	10
最大平均热膨胀系数 Average thermal expansion coefficient, maximum	in/in/°C	19×10^{-6} (< Tg) 75×10^{-6} (> Tg)	30×10^{-5}
最小导热系数 Thermal conductivity coefficient, minimum	Cal cm/cm^2.sec°C (W/mK)	4.8×10^{-4} (0.3)	2.5×10^{-4} (0.11)
最小介电强度 Dielectric strength, minimum	Volts/mil	500	325
介电常数 Dielectric constant, maximum, At 60 Hz / At 1 MHz		4.0 / 3.5	5 / 4.5
耗散因数，最高在60赫兹频率为1MHz Dissipation factor, maximum At 60 Hz / At 1 MHz		0.01 / 0.01	0.04 / 0.05
最小耐电弧性 Arc resistance, minimum	Sec	3KV 60 sec, passed	50
最小体积电阻率 Volume resistivity, minimum	Ohm.cm	1×10^{14}	1×10^{13}
最大水解稳定性平均体积电阻率 Hydrolytic stability Average volume resistivity, maximum	Ohm.cm^2	N/A	
最小平均硬度 Average hardness, minimum	Percent reduction from control	N/A	10
真菌抵抗性 Fungus resistance		Grade 0	Grade 0
杨氏模量 Young's modulus	Gpa	7.6	Not Defined
玻璃化转变温度 Glass transition temperature	°C	150	Not Defined
α粒子发射量 Alpha particle emission	U (ppb)	< 0.2 ppb	Not Defined
离子含量 Ionic Content	(K^+, Na^+, Cl^-)	< 30 ppm	Not Defined
热稳定性 Thermal Stability	°C	-80 to 200	Not Defined
粘合力 Adhesion (Al/Al Lap Shear, psi)		> 1800 psi	Not Defined
固化条件 Cure Conditions 假如85°C， If 85°C 假如115°C，If 115°C 假如125°C，If 125°C 假如150°C，If 150°C	Minute	 120 50 25 15	Not Defined

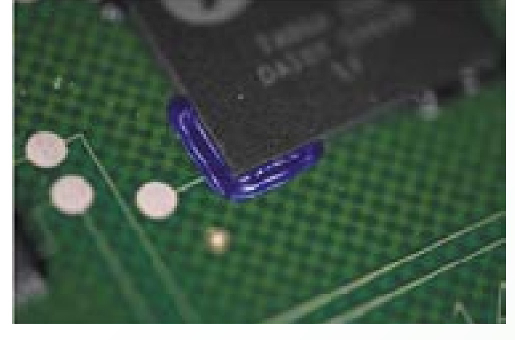
典型应用 Applications

尤其是我们的 UF1230 是环氧基的低热膨胀系数（CTE）的底部填充粘合剂。它是一种单组分，毛细流动制剂。在升高的温度下固化，对硅芯片，倒装芯片，BGA，陶瓷，FR4，低温共烧陶瓷，铝，铜，不锈钢等表面形成强力粘结，其非常低的热膨胀系数提供了较小的热应力和更好的热循环性能。

典型应用
- BGA的底部填充，裸芯片，倒装芯片，CSP
- 芯片上的电路板粘合/密封
- 模具粘接到各种基材，例如LTCC，HTCC，FR4 铝，铜等
- 高度可靠的电子应用，如航空航天，汽车，军工等工业
- 半导体和电信

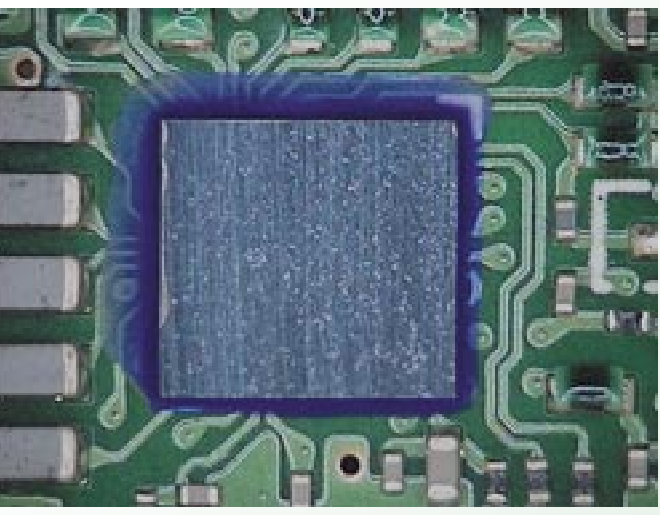
Specifically our UF 1230 is an epoxy-based low coefficient of thermal expansion (CTE) underfill. It is a one-part, capillary flow formulation that cures at elevated temperature to provide strong bonding to silicon, flip chip, BGA, ceramics, FR4, LTCC, aluminum, copper, stainless steel, etc. Its very low CTE formulation provides with minimized thermal mismatching stress and better thermal cycle performances.

Typical Applications
- Underfilling of BGA, Bare die, flip-chip, CSP
- Chip-on-board bonding / encapsulating
- Bonding of die to various substrates, e.g. LTCC, HTCC, FR4, Al, Cu, etc
- Highly reliable electronic applications such as in aerospace, automotive, and military, etc
- Semiconductor and Telecommunications

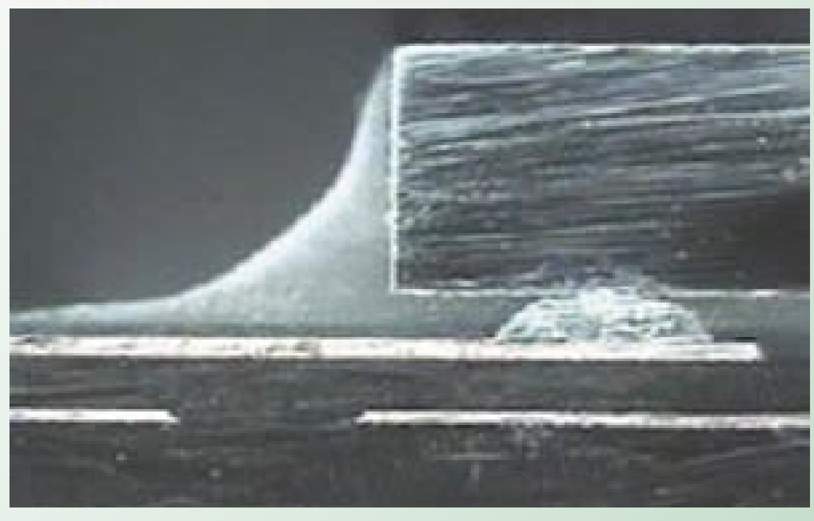


BGA芯片棱角底部填充后的显微照片
Microscope photo of BGA die after bonding around edge

本产品有10, 30, 55毫升注射器三种规格
There are 10, 30, 55 ml syringes available



芯片的底部填充 Die Underfilling



封装芯片断面SEM照片 SEM of cross-section of die

▶ 底部填充与灌装粘合剂使用流程指南 Underfill Process Guidance

使用指导

有多种应用设备类型可以选用，包括：手工分配/时间压力阀;螺旋式的阀门;线性活塞泵和喷射阀。设备选型应以应用需求来决定。

1.确保在设备调置过程中，不要使空气进入到产品。
2.将充装产品的针筒自冷冻箱中取出，并在室温下解冻30分钟（通常情况下）。

3.为了获得最佳效果，基板应先预热（通常在90至100℃下进行预热约20秒），以允许快速毛细流动和促进流平性。其滴注喷嘴也可以预先加热（30至50℃,最大值）以进一步增加毛细流动。

4. 滴注产品以中等速度（2.5至12.7毫米/秒）。确保针尖离基材表面约0.025至0.076毫米，并从芯片边缘滴注 – 这将确保最佳的流动条件以保证能够底部填充。

5. 滴注模式是通常的“I”沿一侧或“L”图案沿两侧，最后在拐角处汇合。应用程序应该离芯片中心位置最处从开始滴注 – 这有助于确保芯片下方没有截留空隙。滴注的“L”或“I”的长度不应超过其对应芯片边缘长度的80%。

6.在一些情况下有可能需要作第二次,或第三次滴注。

7.对于低粘度的 UF1230，我们通常建议用紫色的21号（ID0.5，外径0.8mm）针头来用于滴注。不过，根据芯片的尺寸，间隙高度，以及希望填补多久，可以从22到15号调整针头大小。

8.按照TDS的固化条件进行固化。用较低的温度对应更长的固化时间是可行的。但是，客户需要做一定的测试和试用，以确保适当的较低温度德固化条件。

Application Guidance

A variety of application equipment types are suitable and include: hand dispense / time pressure valve; auger style valve; linear piston pump and jet valve. Selection of equipment should be determined by application requirements.

1. Ensure that air is not introduced to product during equipment set-up.

2. Pull the syringe from freezer and allow thaw at room temperature for 30 min (typically).

3. For best results, the substrate should be pre-heated (typically to 90 to 100 °C for about 20 seconds) to allow fast capillary flow and facilitate leveling. The dispense nozzle may also be pre-heated (30 to 50 °C maximum) to further increase capillary flow.

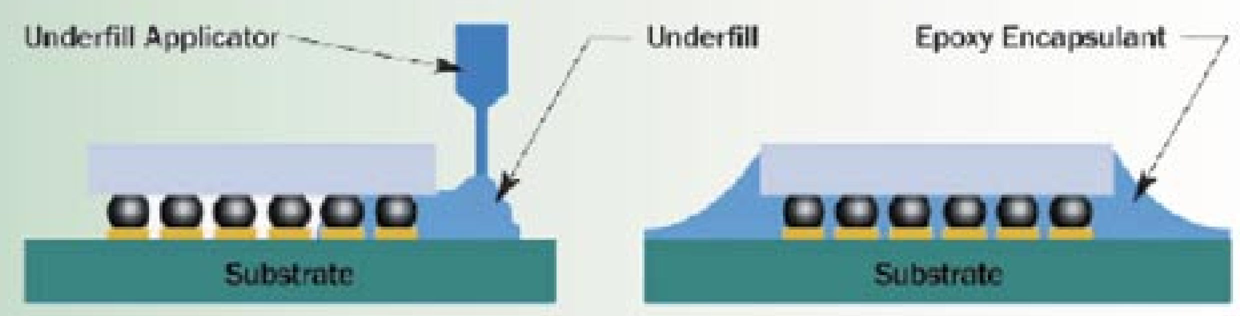
4. Dispense product at moderate speed (2.5 to 12.7 mm/s). Ensure that needle tip is about 0.025 to 0.076 mm from substrate surface and from chip edge - this will ensure optimal flow conditions for the Underfill.

5. The dispense pattern is typically "I" along one side or "L" pattern along two sides, focused at the corner. Application should start at the location furthest away from the chip center - this helps ensure a void free fill underneath the die. Each leg of the “L” or “I” pattern should not exceed 80 % of the length of each die edge being dispensed.

6. In some cases second or third application of product may be necessary.

7. For low viscosity one UF1230, we recommended: Purple one 21 gauge (ID 0.5, OD 0.8 mm). But based on your die size, gape height, and how long you want it to fill, you can adjust your needle size from 22 to 15 gauges.

8. Please follow the TDS for cure profile. Lower temperature with longer cure time is feasible. But customer will need to do test and trial to assure the proper lower temperature cure profile.



▶ 芯片级封装 Chip Scale Packagings

Driven by the demands of smaller size, yet more powerful packaging, United Adhesives has developed ground breaking adhesive technologies for chip scale packagings, including the low CTE adhesives and underfills, high temperature stable adhesives, high bonding strength epoxies and die attached adhesives. They minimize the thermal stress to yield significantly longer time of thermal cycles reliability (as shown in Table below).

Some metal filled conductive adhesives deliver extremely high thermal conductivity to ensure effective dissipation of internally generated heat.

The snap cure die attach adhesive make it possible to do die bonding by a compression heating process, or in reflow soldering process. This dramatically increases the through put in mass productions.

Daisy Chain Underfill Reliability Test	Pass Thermal Cycles
BGA Soldered on Standalone PCB	2120
Regular Epoxy (~ 5mil) (rigid bonding of PCB to Al base plate)	< 800
Silicone Thermally Conductive Adhesive (TCA) (~ 7 mil) (soft bonding of PCB to Al)	1950
Low CTE Epoxy (~ 6 mil)	1840
Silicone TCA + Underfill UF1230	> 3890

Test Conditions: Functional Test of BGA daisy chain
BGA: 329 from Infineon Tricore; PCB: FR4 Ni-Au (ENIG) finish, 2 mm thick;
Solder: Senju M31-GRN360-K1-V4; Regular epoxy: UA EP1636 (~ 5 mil)
Low CTE epoxy: UA ET1642; Silicone TCA: Thermobond 3519, 7mil; Underfill: UF1230;
Al base plate 4.8 mm thick. Thermal cycle: -40°C to 150°C, dwell time 30 min.

Applications	Products	Features / Advantages
Flip chip, BGA underfill	TUF1210 UF1230 UF1240 SE1260	Thermally conductive underfill Fast flow with low CTE, low alpha emission Rubber toughened underfill for high strength Flexible / soft underfill
Die attach	EP1637 EP1723 EP1678 Eposolder 6869 AE6062 AE6075	Snap cure in seconds, flowabe, 1-part, low CTE Snap cure in seconds, non-slumping, 1-part 2-part, room temperature curable epoxy Extremely high thermal conductivity k = 11 W/mK Anisotropic (z-dir) electrically conductive die attach epoxy Anisotropic (z-dir) electrically conductive die attach epoxy
Low CTE bonding and encapsulation	EP1640 EP1641 EP1641NS	2-part 1:1 mixing low CTE epoxy. Low T curable 1-part heat cure. High thermal stability 1-part non-slumping. High Tg
Flexible bonding & encapsulation	EP1346 EP1386 SE1262 BS8311 BS8460	2-part (2:1) flexible, room temperature curable 2-part (1:1) flexible, room temperature curable 2-part (1:1) flexible, heat cure 1-part silicone, heat cure 2-part silicone, room temperature curable

涂层与灌装胶粘剂
Coating and Potting Adhesives

▶ 保形涂层和灌封材料 Coating and Potting Materials

美国联合胶粘剂公司提供的各种介电绝缘保形涂层材料和灌封凝胶材料，有良好的抗潮湿和抗腐蚀性能力，可以保护电子产品免于湿气，腐蚀环境和灰尘等的影响。可广泛用于各类电子部件、设备的表面涂层保护，介电绝缘灌装密封，诸如芯片，硅片，模块，元器件，线焊接点等的涂层保护或全部灌装密封。
它们具有以下特点：
- 具有较高的介电强度，对电压有优良的介电绝缘能力。
- 有机硅为基质的灌装剂具有优良的柔软性，有效地降低热应力。
- 有些保形涂层材料可以室温的湿气固化，不需要加热固化过程
- 有些灌装剂提供优良的导热性能。
- 有些对高电压有优良的绝缘能力。
- 多数为中性、无腐蚀的粘合剂和密封剂。
- 有良好的对潮湿，油类和化学制品的抵抗能力。

Conformal coatings and potting adhesives from United Adhesives protect electronics and filling voids and cracks. They have excellent moisture and corrosion protection, and resistance to dust and dirt particles. They are very soft and flexible and form "stress-free" coating and encapsulating of electronic components and devices. They are used for coating electronic devices to protect chips, silicon dies, components, and wire bonds.
They have following categories and features:
- High dielectric strength. Some can provide high-voltage insulation
- Soft rubber and flexible to couple thermal stress
- Some products can provide high thermal conductivity
- Heat cure potting gels that provide best protection
- Most are neutral chemicals that have no corrosion
- Room temp moisture cure conformal coatings also available
- Epoxy coating and potting that provides oil & chemical resistance

Name	Features / Advantages	Rheology	Hardness / Modulus	Dielectric Strength	Adhesion Al/Al, psi	Cure Profile
Silcoat 7021	Moisture cure soft silicone gel. Sprayable & dispensable. Easy apply. Excellent protection of moisture, media, & corrosion.	1-part liquid 600 cPs	Shore A =32	450 V/mil	N/A	1.8mm / 24 hrs 2.5mm / 72 hrs @ 25°C 50%RH
Silcoat 8022	Soft coating and potting gel. Sprayable & dispensable. Excellent moisture & media resistance.	1:1 mixing, 3,000 cPs	Shore A = 35	450 V/mil	N/A	125°C 15 min
Silcoat 8026	Soft non-sag gel. Dispensable. Excellent moisture and media resistance	1:1 mixing, 25,000 cPs	Shore A = 40	450 V/mil	N/A	125°C 15 min
SP4011	Readily flowable. Thermal cure to form firm rubbery dielectric gel. Non-corrosive.	1-part gel 560 cPs	Shore A = 20	> 480 V/mil	N/A	125°C 60 min
SP4012	Readily flowable. Thermal cure to form firm rubbery dielectric gel. Non-corrosive.	2-part gel 450 cPs	Shore OO = 35	> 480 V/mil	N/A	25°C 12 hrs 125°C 30 min
EP1239	Low viscosity epoxy potting adhesive. Good bond to various substrates	2:1 mixing, 600 cPs	Shore A = 60	> 500 V/mil	> 1800	25°C 10 hrs; 80°C 60 min
Other Products	SP4017 is thixotropic version encapsulant. OE1582, OP4042 are optical encapsulants Refer to: UnitedAdhesives.com for the property details					

▶ 静电屏蔽和导电涂料 EMI / RFI Shielding and ESD Protection

United Adhesives engineered electrically conductive coatings and sealants for mission critical applications, such as the military, aerospace, semiconductor, communication, electronic and medical device industries, that require environmental and electromagnetic interference, electrostatic discharge, and radio frequency shielding.

Silductor 6310 and 6350 are conductive silicone rubber that can be used as an EMI/RFI shielding sealant, or forming conducting paths between circuitry and components. E-Shield 6037 and 6531 are the high performance EMI/RFI coatings with silver coated copper filled conductive powder. E-Shield 6410 and 6421 are low cost alternatives for purposes of grounding and electrostatic discharge (ESD). They can be spray-coated or painted on the internal walls of different components to achieve the requirement of shielding and insulating from electromagnetic wave. They form strong bonding to various plastics housings such as PBT, Nylon, PS, ABS, ceramic or composite materials.

美国联合粘合剂的导电涂料为电子产品能够避免电磁辐射和无线电频率的干挠（EMI/RFI）以及静电释放(ESD)的干挠等，提供有效的保护涂层. 广泛用于如军事，航空航天，半导体，通信，电子和医疗设备，等需要屏蔽环境和电磁干扰，静电放电和射频屏蔽等行业。

Silductor6310和6350为导电硅橡胶，可以用来作为EMI / RFI屏蔽的密封剂，或形成电路和元件之间导电路径。 E-Shield 6037是高性能EMI / RFI涂料，用镀银铜填充的导电粉末为导电媒介。 E- Shield 6410和6421顷为了接地和静电放电（ESD）的低成本替代品。它们可以是喷雾涂覆或已涂漆的不同部件的内壁上，以达到屏蔽和从电磁波的绝缘的要求。它们形成强结合到各种塑料外壳，如PBT，尼龙，PS，ABS，陶瓷或复合材料。

Name	Chemical Base	Features / Advantages	Rheology	Hardness / Modulus	Volume Resistivity (Ohm-cm)	Cure Profile
E-Shield 6037	Acrylic / Ag-Cu	Sprayable fluid. Good electrical conductivity. One-component. Low cost.	Paintable / Sprayable	Shore D > 80	Sheet Resistance <0.02 Ohm / inch^2	6 to 8 min @ 25°C
E-Shield 6421	Epoxy / Graphite	Electrically conductive coating with strong mechanical resistance. High temperature stability. No solvent.	Paintable	Shore D = 30	Sheet Resistance < 2 Ohm / in^2	85°C 60 min 125°C 30 min
E-Shield 6410	Glass / Graphite	Electrically conductive coating with strong mechanical resistance. Very high temp stability. Water based.	Paintable	Shore D > 80	Sheet Resistance < 50 Ohm / in^2	25°C 6 hrs 85°C 15 min
Silductor 6350	Silicone / Ag-Cu	Low cost alternative with Ag coated Cu as conducting media	Paintable / Dispensable	Shore A = 68	< $2x10^{-3}$	125°C 60 min
Silductor 6381	Silicone / Ag-Cu	Low cost alternative with Ag and Cu hybrid as conducting media	Paintable / Dispensable	Shore A = 68	< $2x10^{-3}$	125°C 60 min

▶ 一些特殊应用 Special Applications

United Adhesives Inc. makes high performance epoxy and silicone adhesives for electronic structural bonding, severe thermal shock and vibration bonding, and media resistance applications. Some epoxy adhesives can be used in other industries such as medical and construction.

- Thixotropic bonding epoxy to anti-sag in processing.
- High Tg formulation for high temperature stability.
- Very low CTE formulation to minimize the thermal mismatch induced stress.
- High flow and penetration to fill micro cracks and voids
- Very soft / flexible epoxy formulation offering rubbery flexibility.
- High voltage insulation formulation.
- Fast cure (snap cure) in seconds.

Applications	Products	Features / Advantages
High Tg Adhesive	EP1551 EP1635	High Tg over 150C. Non-slumping, low CTE High Tg over 150C. High thermal stability
High Voltage Resistance	EP1646 EP1660 BS8440	2-part, room temperature curable One or two part, heat cure. High Tg 2-part silicone, heat cure
High Thermal Conductivity	ET1642 ET1645 ET1653BN TB3508 TB3517 TB3830 Eposolder 6869	2-part epoxy, k=1.5W/mK, flowable 1-part epoxy, k = 2.0 W/mK 1-part epoxy, k =3 W/mK, boron nitride filled 1-part silicone, k =1W/mK, high bonding strength 1-part silicone, k= 2W/mK, high bonding strength 2-part silicone, k = 3.2 W/mK, boron nitride filled 1-part epoxy, k= 11W/mK, silver filled
High Chemical Resistance	EP1635 EP1636	1-part high Tg and low CTE, heat cure 2-part structural epoxy, heat cure
High Moisture Resistance	UF1225 MC7130 BS8350	1-part epoxy encapsulant Silicone moisture rubber adhesive Silicone heat cure runner adhesive
Fast cure	EP1678 EP1710 EP1733	Quick set epoxy, 2-part mixing Very fast cure. Cure at 185C for 5 to 7 seconds Snap cure low CTE epoxy. Cure in seconds
Please contact our sales representatives, or refer to: UnitedAdhesives.com for other products and their various special applications		

EP1660 Voltage Breakdown

Thickness	Initial After Cure	After Humidity Treatment (85C /85% RH 500 hrs)	After Thermal Aging (150C 500 hrs)
1 mil	1100	850	1300
2 mils	1800	1500	2000
5 mils	> 4000	> 4000	> 4000
Average	> 800 volts/mil	> 700 volts/mil	> 800 volts/mil

密封胶粘剂
Sealants & Adhesives

▶ 加热固化型胶粘剂密封剂 Heat Cure Adhesives & Sealants

本公司设计生产的加热固化粘合剂和密封剂主要有下列特征：

- 与铝、常规金属、常用塑料之间有很强的粘结力。
- 依据有机硅树脂粘合剂的优良的柔软性，有效地降低热应力。
- 多数为中性、无腐蚀的粘合剂和密封剂。
- 有良好的对潮湿，油类和化学制品的抵抗能力。

【应用领域】

它们可用于粘结和密封电子设备，部件，电源设备，电能和控制的连接部位，器件的封盖，等等。其中有机硅树脂密封剂系列(Bondseal)对高温度和高湿度可提供有效的抵抗性。而环氧树脂系列则提供高强度结构性粘结，同时能有效地抵抗震动的破坏，以及油类和化学品的侵蚀。

United Adhesives' heat cure version adhesives and sealants made from high performance silicones and epoxies provide following major features:

- Strong bonding to aluminum and most common metals.
- Strong bonding to most common plastics.
- Thermal stress compliant with silicone adhesives.
- Automated dispensable
- Non-corrosion sealants and adhesives
- Excellent moisture, oil and chemical resistance

They are used to bond and seal electronic devices, components, electrical equipment, power and control connections, cover plates, housings, etc. The silicone series, Bondseal, provides stress release and resistance to high temperature and humidity. The epoxy series provides strong structural bonding for vibration applications and resistance to oil and chemicals.

Name	Features / Advantages	Rheology	Hardness / Modulus	Elongation	Adhesion Al/Al, psi	Cure Profile
BS8311	Heat cure to form silicone rubber. Non-corrosion sealant. Strong bonding to most plastics	1-part, dispensable 25,000 cPs	Shore A = 47	280%	> 600	125°C 60 min
BS8350	Heat cure to form silicone rubber. Non-corrosion sealant. Strong bonding to most plastics	1-part paste non-sag 45,000 cPs	Shore A = 62	250%	550 psi	125°C 60 min
BS8440	Two part. Heat cure to form silicone rubber. Non-corrosion sealant / adhesive.	1:1 mixing 40,000 cPs	Shore A = 51	240%	> 550 psi	25°C 12 hrs 125°C 30 min
EP1611	Flexible epoxy, room temp curable	60,000 cPs	Shore A = 60	50%	> 1500	85°C 60 min 125°C 30 min
EP1646	High voltage resistant sealant based on non-slump epoxy	2-part (2:1) 22,000 cPs	6.2 GPa	N/A	> 1600	25°C 12 hrs 100°C 15 min 125°C 8 min

Typical adhesion to different substrates

Adhesion to Substrates	MC7010	MC7130	Bondseal 8440	EP1611
Aluminum	Excellent	Excellent	Excellent	Good
Cupper	Excellent	Excellent	Excellent	Good
PBT	Excellent	Fair	Good	Excellent
Nylon	Excellent	Good	Good	Excellent
PPS	Good	Fair	Fair	Excellent
Polycarbonate	Prohibit	Good	Excellent	Excellent
Epoxy Resin	Excellent	Excellent	Fair	Excellent
Silicone Rubber	Good	Fair	Fair	Fair

▶ 密封胶使用流程指南 Sealant Process Guidance

▶准备
对于50cc，200cc的连体双管，我们推荐使用EFD手动或气动涂胶枪和活塞。胶粘剂连体双管很容易装入涂胶枪，并通过静态混合管混合滴灌。这可以避免对粘合剂,封装剂，和涂料的称重及混合。对于可以随时使用的单组分的注射器，罐装，桶装产品，从冰箱中取出来后，请先让它解冻到室温。

对于大量的应用，各种类型的自动液体分配滴灌设备可以用于这些粘合剂。它们包括：手工分配/时间压力阀;螺旋式的阀门;线性活塞泵和喷射阀。设备选型应以应用需求来决定。有关设备选型和工艺优化，用户应采纳相应供应商的技术服务的建议。

▶脱气
对于单组份产品，或用自动分配设备滴灌A / B胶时，只要没有气泡被截留在机械零件的下方，通常不需要脱气，因为它们出厂前预先被脱过气。

对于手工混合A/B胶时，脱气是必需的。可以是635毫米汞柱或更大的真空下脱气。真空脱气时，注意观察未固化流体的气泡形成,逐步增加真空度，以避免流体快速发泡溢出。保持真空度直至气泡在液体表面崩溃。

▶基材制备
基材应该免费灰尘，油污和指纹的脏污。使用适当的工业清洗技术用于清洁光电表面。如果使用烃类溶剂清洗,例如已烷，甲苯，建议再用试剂级异丙醇作最终漂洗干燥。如果使用含水洗涤剂清洗，建议再用去离子水作多次最终漂洗干燥,或用试剂级异丙醇作最终漂洗干燥。对于某些塑料，例如聚乙烯，聚丙烯和氟塑料的表面可以进行预处理，比如化学蚀刻或等离子蚀刻，以改善粘合性。

有机硅产品，应与清洁的基片材料固化粘结。避免使用在一些表面上含有诸如，硫，胺，磷，有机金属，酸和某些丁基，亚硝酸盐，氯化，和EPDM弹性体，某些塑料与浸出增塑剂，和某些粘合剂的固化残留物，包括紫外线固化环氧树脂和胺固化环氧树脂。可以在粘结表面某些施加涂层或粘合促进剂以增强粘合力。

▶固化时间
根据粘合剂的TDS所列出的相应的温度和时间进行固化。一般对于有机硅产品，推荐在升高的温度下固化，以增强粘附力。

▶Preparation
For 50cc, 200cc ducal cartridges, we recommend use EFD manual or pneumatic dispensing applicator and plunger. Adhesive filled with cartridges are easily loaded into the dispensing gun and dispensed through static mixers. This eliminates the need to weigh or mix adhesives, potting compounds, and coatings.

For products that is supplied in a ready-to-use one component syringe, jar, and pail, please let it thaw to room temperature after pull out from refrigerator.

For high volume application, a variety of auto dispensing equipment types are suitable for applying these adhesives. They include: hand dispense / time pressure valve; auger style valve; linear piston pump and jet valve. Selection of equipment should be determined by application requirements. For advice on equipment selection and process optimization users should contact the corresponding supplier's Technical Services.

▶De-aeration
De-aeration is typically not needed for one-component products, or auto dispensing with A/B parts, as long as no pockets of air are trapped beneath mechanical parts. For manually mixed A/B parts, the de-aeration is required. The assembly may be vacuum deaerated using a pressure of 635 mmHg (25 inHg) or greater. Apply the vacuum while observing the uncured fluid for presence of bubble formation and increase vacuum slowly enough to avoid rapid foaming. Hold vacuum until bubbles at the fluid surface collapse.

▶Substrate Preparation
Substrates should be free of dust, oil, and fingerprint soils. Use suitable industrial techniques for cleaning electro-optics. If using hydrocarbon solvent cleaning (e.g. hexane, toluene), a final rinse with reagent grade isopropanol is recommended. If using aqueous detergent cleaning, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol followed by drying is recommended. For certain plastics, such as polyethylene, polypropylene, and fluoroplastics, the surface may be pre-treated with chemical etching or plasma etching to improve the adhesion.

For silicones products, it needs to cure in contact with most properly cleaned substrate materials. Avoid using them on any place that contains sulfur, amine, phosphorous, organo-metals, acid, and certain butyl, nitrite, chlorinated, and EPDM elastomers, certain plastics with leachable plasticizers, and the cure residues of certain adhesives including UV-cured epoxies and amine-cured epoxies. A certain primer or adhesion promoter may be applied on bonding surfaces to enhance the adhesion.

▶Cure Schedule
Cure the assembled part at corresponding temperature and time according to the TDS of the adhesives. Generally for silicone products, a cure at elevated temperature is recommended for adhesion enhancement.

▶ 常温固化型密封剂 RTV Adhesives and Sealants

Silicone rubber based RTV sealants / adhesives from United Adhesives Inc. provide strong bonding to most common plastics and metals with excellent thermal stress release and water resistance. Epoxy based sealants / adhesives provide strong structural bonding to most common plastics and metals with strong oil and chemical resistance.

Some major features are like this:

- Strong bonding to aluminum and most common plastics.
- Thermal stress compliant with silicone RTV sealants.
- Automated dispensable
- Excellent moisture resistance from RTV silicone sealant
- Excellent oil and chemical resistance from epoxy RTV

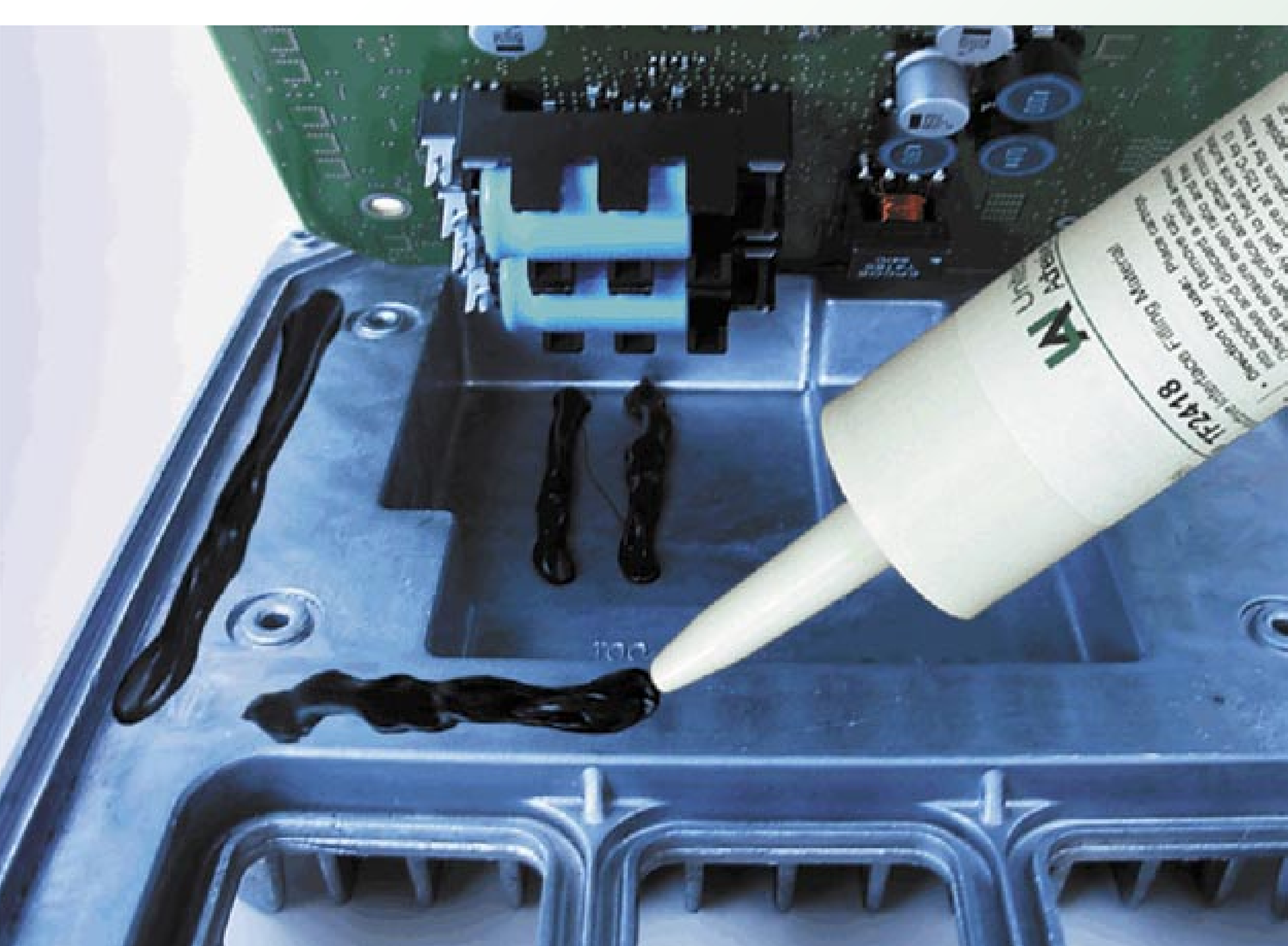
They are used to bond and seal electronic devices, components, equipment, connections, cover plates, housings, etc; make formed-in-place gaskets; assemble and repair electronic devices. They can also be applied as general-purpose sealants for other applications.

本公司设计生产的有机硅橡胶类常温固化粘合剂和密封剂（RTV）对常用塑料和金属有着较强的粘合力，有良好的抗水性和较小的热应力。而环氧树脂类常温固化粘合剂和密封剂对常用塑料和金属能提供强力结构性粘结。同时具有较强的抗油和抗化学品侵蚀的能力。

它们具有如下的一些主要的功能：

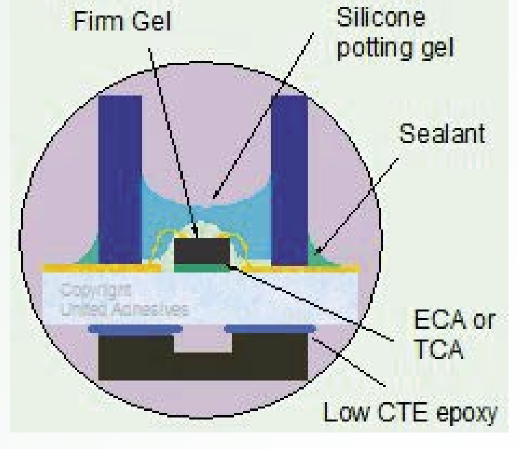
-对铝及其它一些金属和最常见的塑料具有强粘接力。
-有机硅RTV密封胶具有很小的热应力。
-有机硅RTV密封胶具有良好的防潮性。
-环氧树脂RTV具有优异的耐油和耐化学性。
-可以实现自动化上胶。

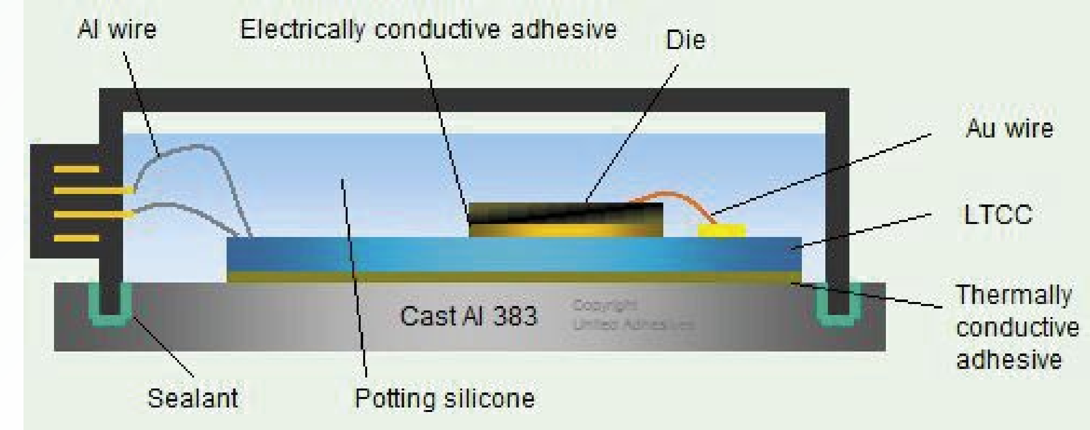
它们主要用于粘结和密封电子装置，构件，设备，接头接口，封盖，底座，等等；制作既成式(form-in-place)的垫圈；用来组合和修理电子设备等。它们也能够在其它工业和应用领域作为粘合剂和密封剂来使用。



▶ 常温固化型密封剂技术参数 RTV Sealant Technical Datasheets

性能 Property	单位Units	MC7010	MC7130
材料化学特点 Material Chemistry		Amine	Oxime
Color / Component 颜色/组件		Light Grey	Light Grey
Density 密度	Gram /cc	1.3	1.3
Extrusion Rate (3 mm nozzle, 0.62 Mpa, 24C) 挤出速率（3毫米喷嘴，0.62兆帕，24C）	Gram / sec	2 to 5	240
Skin Over Time (25°C 55%R.H.) 结皮的时间（25℃55%R.H.）	Min	20	18
Tack Free Time (25°C 55%R.H.)| 表干时间（25℃，55%R.H.）	Min	45	45
Weight loss in cure 固化过程中的失重	Weight %	< 5%	< 0.6%
Color after cure 固化后的颜色		Light Grey	Light Grey
Hardness 硬度	Shore A	43	18
Tensile Strength 抗拉强度	Mpa	2.5	1.3
Elongation 伸长率	%	300	600
Adhesion (Al/Al lap shear @25C) 附着力（铝/铝搭接剪切@25℃）	psi	150	140
Dielectric Constant介电常数	@100Hz	3	3
Dissipation Factor 耗散因数	@100 Hz	< 0.01	< 0.01
Dielectric Strength 介电强度	Volt/mil AC	> 400	> 420
Volume Resistivity 体电阻率	Ohm-cm	> 10E+13	> 10E+14
Tg	°C	-120	-120
Useful Temperature Range 有效使用温度范围	°C	-55 to 180	-55 to 200





▶ Snap Cure / Fast Cure Adhesives 瞬间快速固化粘合剂

美国联合胶粘剂公司提供能够迅速固化的环氧树脂粘合剂用于电子器件、部件之间的结构性粘结，薄膜压膜，抵抗热冲击和激烈的震动，以及媒介侵袭的粘结。部分树脂粘合剂能够在数秒钟内固化，比如EP1715， EP1723。 但它们仍然能在室温下保持较长的适用期。

这些粘合剂包括：
- 抗流变、抗触变环氧树脂粘合剂。
- 高玻璃转化温度Tg 以达到高温稳定性的粘合剂。
- 具有极低热膨胀系数的环氧树脂粘合剂。
- 导电的环氧树脂粘合剂。
- 柔软型环氧树脂粘合剂，类似于橡胶的柔软性。
- 高电压绝缘环氧树脂粘合剂。

United Adhesives Inc. makes fast cure / snap cure epoxy adhesives for electronic structural bonding, film lamination, severe thermal shock and vibration bonding, and media resistance applications. Some epoxy adhesives can be cured in seconds at elevated temperature, such as EP1715, EP1723, while they still keep long pot life at room temperature.

Following are some features:
- Structual bonding epoxy to anti-sag in processing.
- High Tg formulation for high temperature stability.
- Very low CTE formulation to minimize thermal mismatch.
- Electrically conductive bonding
- Very soft / flexible epoxy formulation offering rubbery flexibility.
- High voltage insulation formulation.

Name	Features / Advantages	Rheology	Hardness / Modulus	Dielectric Strength	Adhesion Al/Al, psi	Cure Profile
EP1715	Snap Cure epoxy. Good bonding to various substrates. Good for film lamination	1-part liquid 28,000 cPs	Shore D =87	> 400 V/mil	> 1800 psi	180C 10 sec 150C 30 sec
EP1715X	Snap Cure epoxy. Good bonding to various substrates. Good for film lamination	1-part liquid 20,000 cPs	Shore D = 85	> 400 V/mil	> 1800 psi	180C 10 sec 150C 30 sec
EP1723	Snap Cure epoxy. Non-slump. Good bonding to various substrates. Good for film lamination-	1-part liquid 45,000 cPs	ShoreD = 83	> 400 V/mil	> 1500 psi	185C 10 sec 155C 1 to 2 min 105C 15 min
EP1551	Fast Cure, High Tg, Non-Slumping. Strong bonding to various substances	1-part gel 26,000 cPs	7.8 GPa	500 V/mil	> 1800 psi	175C 5 min
EP1637	Sanp Cure. Low CTE. Very strong bonding to many plastics and surfaces. Oil and chemical resistance	1-part gel 60,000 cPs	8 GPa	500 V/mil	> 2300 psi	180C 10 sec 150C 1 min
EP1678	Quick Cure. Rmt curable. Very strong bonding to many plastics and surfaces.	1:1 mixing, 120,000 cPs	8.5 GPa	500 V/mil	> 1800 psi	25C 15 hr 85C 25 min 125C 5 min
Silductor 6503	Snap cure. High electrical & thermal conductivity. Very low out-gassing. Strong bonding strength.	1-part gel 65,000 cPs	ShoreD = 80	N/A	> 1100 psi	125C 12 min 185C 3 min

光学透明粘合剂
Liquid Optically Clear Adhesives

▶ 液体光学透明粘合剂 Liquid Optically Clear Adhesives

美国联合粘合剂公司配方并生产的液体光学透明粘合剂适用于光电应用。我们的创新解决方案基于光学级环氧树脂和硅胶密封剂，涂料，粘合剂和密封剂。

环氧树脂产品,因为具有高密度的芳香烃结构的交联网络结构,具有较高的折射率。用该产品进行封装后，光学装置表现出增强的光输出。

硅胶为基础的产品提供了柔性特点，能减少系统中的张力，减少机械冲击力和热冲击力，对水分和其他媒体的攻击敏感的光电子组件的提供优异的保护。

它们被用于粘结和灌封光纤电缆，连接器和端子，LCD背光，显示器，交通和其它照明，提高电光组件的振动和冲击阻力，胶结和涂覆光学部件，灌封LED器件，光学复制和涂层或灌封各种各样的电光学和激光元件。

United Adhesives Inc. formulates and manufactures liquid optically clear adhesives for optoelectronic applications. Our innovative solutions are with optical-grade epoxy and silicone encapsulants, coatings, adhesives, and sealants.

The epoxy-based products have a high refractive index of 1.6 resulting from the high density of aromatic structure in the cross-linked network. Packaged with this encapsulant, the optical device is shown to exhibit an increased light output. The silicone-based products provide flexibility to reduce stress in the system and superior protection of sensitive photonics assemblies from mechanical shock, thermal shock, moisture and other media attacks.

They are applied in bonding and potting fiber-optic cables, connectors and terminations, LCD backlighting, displays, traffic and other lightings, upgrading the vibration and shock resistance of electro-optic assemblies, cementing and coating optical parts, potting LED devices, optical replications, and coating or encapsulating a wide variety of electro-optic and laser components.

特点

- 优良的光传输特性。
- 低温快速固化环氧树脂灌封胶具有较高的折射率
- 优良的无黄变性能或抗黄变性能
- 基于硅胶的产品可以固化成低应力的弹性体
- 耐臭氧和紫外线降解
- 较宽的操作温度为-40至180℃
- 高附着力，高纯度，高耐湿性
- 有机硅胶产品可以返修
- 可在低温下进行固化，或在升高的温度下用较短的时间固化

Features

- Excellent light transmission characteristics.
- Low-temperature fast cure epoxy encapsulant with high refractive index
- Superior non-yellowing properties or anti-yellowing
- Silicone based system can cure to low-stress elastomer
- Resistance to ozone and UV Degradation
- Broad operating at temperatures of -40 to 180°C.
- High adhesion, high purity, moisture resistance
- Reworkable for silicones
- Can be cured at low temperature or cured at elevated temperature with short time

▶ 技术参数和特点 Technical Datasheets and Features

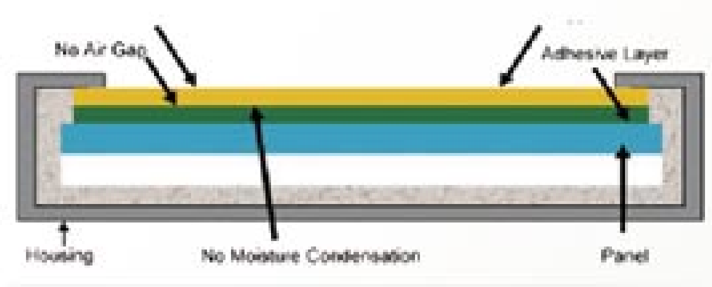
	具体技术参数 TDS	OP4035	OP4036	OP1581	OE1582
固化前性能 Property Before cure	化学基础 Chemical Base	硅胶 Silicone	硅胶Silicone	环氧树脂 Epoxy	环氧树脂 Epoxy
	颜色/组分 Color / Component	无色透明, 单组分 Clear transparent One Part	无色透明, 双组分 Clear transparent Two Part 1:1	无色透明, 单组分 Clear transparent One Part	无色透明, 双组分 Clear transparent Two Part 2:1
	粘度 Viscosity at 25°C @10 1/s (cP.s)	4,600	4,900	1,470	
	密度 Density (Gram /cc)	0.98	0.98	1.05	1.05
固化后性能 Property as Cured	颜色 Color	无色透明，Clear transparent	无色透明，Clear transparent	无色透明，Clear transparent	无色透明，Clear transparent
	硬度 Hardness (25 °C)	35 A	40 A	70 D	77 D
	折射率，589纳米 n_D (25°C) Refractive Index (589 nm)	1.41	1.41	1.564	1.564
	%透光率 % Transmittance (360 nm to 1000 nm), 1 mm Thick	97% to 99%	97% to 99%	95% to 99%	95% to 99%
	抗拉强度 Tensile Strength (Mpa)	4.2	4.8	N/A	N/A
	伸长率 Elongation (%)	160	140	N/A	N/A
	介电常数 Dielectric Constant @100Hz	2.5	2.5	N/A	N/A
	耗散因数 Dissipation Factor @100 Hz	< 0.003	< 0.003	N/A	N/A
	介电强度 Dielectric Strength (Volt/mil AC)	> 480	> 480	> 500	> 500
	体积电阻率 Volume Resistivity (Ohm-cm)	> 10^{14}	> 10^{14}	> 10^{12}	> 10^{12}
	柔性强度 Flexible Strength (MPa)	N/A	N/A	120	120
	压缩强度 Compress Strength (Mpa)	N/A	N/A	150	150
	粘结强度 Adhesion (Al / Al, Lap Shear, Psi)	N/A	N/A	> 800	> 1200
	热膨胀系数 Coefficient of Thermal Expansion (ppm/°C)	280	270	120 (> Tg) 60 (< Tg)	123 (> Tg) 58 (< Tg)
	Tg (°C)	-120	-120	75	80
	使用温度范围 Useful Temperature Range (°C)	-55 to 200	-55 to 200	-80 to 180	-80 to 180
	保质期 Shelf Life (Month)	6 at < 5°C	6 at < 25°C	6 at - 40°C	12 at < 25°C
固化条件 Cure Profile	125 °C固化 Cure at 125 °C (Minute)	20	5	30	15
	80 °C固化 Cure at 80 °C (Minute)	90	10	2 to 3 hrs	1 hr
	65 °C固化 Cure at 65 °C	2 to 5 hrs	20 min		2 hrs
	25 °C固化 Cure at 25 °C	N/A	4 to 6 hrs		24 hrs
	工作时效 Pot / Work Life at 25°C (weeks)	> 1	30 min after mix	> 8	> 8

▶ 典型应用 Applications

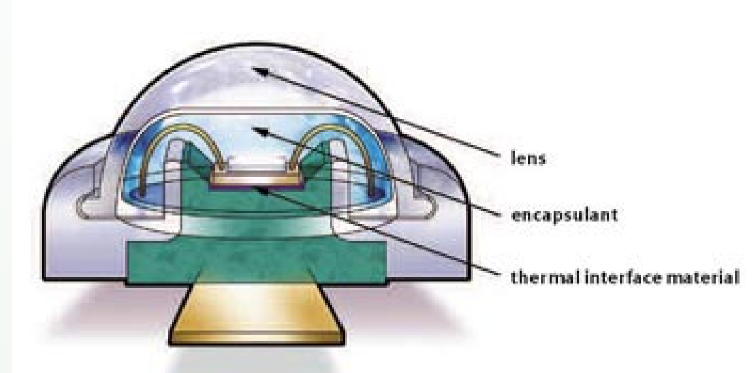
典型应用包括:

•封装光电电子零件，以保护免受振动，潮湿和污染。
•用于粘接和保护光纤电缆，连接器和终端，LCD背光源，显示屏，交通及其他照明。
•光学组装，如光电子，光电子，LED灯。太阳能电池板和电子设备。
•铸造和成型高性能光学元件
•作为粘合剂，底部填充剂，密封剂，或需要高光传输的光学电子应用
•为了提高电光组件的抗振动和抗冲击性。
•胶结和涂覆光学部件，灌封LED器件，光学复制和涂层或灌封各种各样的电光学和激光元件等等。

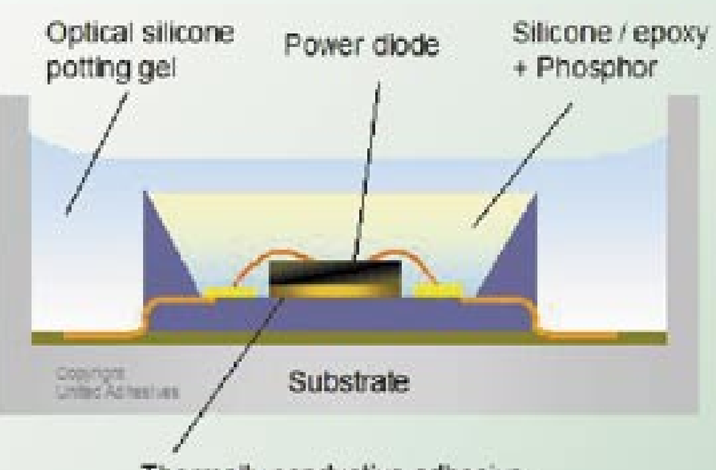
• Encapsulate opto-electronic parts to protect them from vibration, moisture & contaminants.
• For bonding and protection of fiber-optic cables, connectors and terminations, LCD backlighting, displays, traffic and other lightings.
• Optical assembly such as in opto-electronics, photonics, LEDs. Solar panels and electronic devices.
• For casting and molding high performance optical components
• As an adhesive, underfill, or encapsulant in optical electronic applications requiring high optical transmission
• For enhancing the vibration and shock resistance of electro-optic assemblies.
• Cementing and coating optical parts, potting LED devices, optical replications, and coating or encapsulating a wide variety of electro-optic and laser components.



光学绑定 Optical Bonding



LED 芯片的灌封 LED Potting



▶ 光学透明粘合剂使用流程指南 Optical Adhesive Process Guidance

▶准备

对于50cc，200cc的连体双管，我们推荐使用EFD手动或气动涂胶枪和活塞。胶粘剂连体双管很容易装入涂胶枪，并通过静态混合管混合滴灌。这可以避免对粘合剂,封装剂，和涂料的称重及混合。

对于可以随时使用的单组分的注射器，罐装，桶装产品，如OE1583，OP4035，从冰箱中取出来后，请先让它解冻到室温。解冻时间为，30毫升注射器约30分钟，1升大小的瓶子约60分钟，5加仑的桶约2小时。

对于大量的应用，各种类型的自动液体分配滴灌设备可以用于这些粘合剂。它们包括：手工分配/时间压力阀;螺旋式的阀门;线性活塞泵和喷射阀。设备选型应以应用需求来决定。有关设备选型和工艺优化，用户应采纳相应供应商的技术服务的建议。

▶脱气

对于单组份产品，或用自动分配设备滴灌A / B胶时，只要没有气泡被截留在机械零件的下方，通常不需要脱气，因为它们出厂前预先被脱过气，而且具有低粘度。

对于手工混合A / B胶时，脱气是必需的。可以是635毫米汞柱（25英寸汞柱）或更大的真空下脱气。真空脱气时，注意观察未固化流体的气泡形成,逐步增加真空度，以避免流体快速发泡溢出。保持真空度直至气泡在液体表面崩溃。

▶基材制备

基材应该免费灰尘，油污和指纹的脏污。使用适当的工业清洗技术用于清洁光电表面。如果使用烃类溶剂清洗（例如己烷，甲苯），建议再用试剂级异丙醇作最终漂洗干燥。如果使用含水洗涤剂清洗，建议再用去离子水作多次最终漂洗干燥,或用试剂级异丙醇作最终漂洗干燥。

对于某些塑料，例如聚乙烯，聚丙烯和氟塑料的表面可以进行预处理，比如化学蚀刻或等离子蚀刻，以改善粘合剂的粘合性。

有机硅产品（OP4035，4036），应与清洁的基片材料固化粘结，包括光学玻璃，光学塑料和光电半导体。避免使用在一些表面上含有诸如，硫，胺，磷，有机金属，酸和某些丁基，亚硝酸盐，氯化，和EPDM弹性体，某些塑料与浸出增塑剂，和某些粘合剂的固化残留物，包括紫外线固化环氧树脂和胺固化环氧树脂。可以在粘结表面某些施加涂层或粘合促进剂以增强粘合力。

▶固化时间

根据粘合剂的TDS所列出的相应的温度和时间进行固化。一般对于有机硅产品，推荐在升高的温度下固化，以增强粘附力。

▶Preparation

For 50cc, 200cc ducal cartridges, we recommend use EFD manual or pneumatic dispensing applicator and plunger. Adhesive filled with cartridges are easily loaded into the dispensing gun and dispensed through static mixers. This eliminates the need to weigh or mix adhesives, potting compounds, and coatings.

For products that is supplied in a ready-to-use one component syringe, jar, and pail, such as OE1583, OP4035, please let it thaw to room temperature after pull out from refrigerator. The thawing time is 30 min for 30cc syringe, and 60 min for 1 liter size jar and 2 hrs for the 5 gallon pails.

For high volume application, a variety of auto dispensing equipment types are suitable for applying these adhesives. They include: hand dispense / time pressure valve; auger style valve; linear piston pump and jet valve. Selection of equipment should be determined by application requirements. For advice on equipment selection and process optimization users should contact the corresponding supplier’s Technical Services.

▶De-aeration

De-aeration is typically not needed for one-component products, or auto dispensing with A/B parts, since they are pre-de-aired and their low viscosity as long as no pockets of air are trapped beneath mechanical parts.

For manually mixed A/B parts, the de-aeration is required. The assembly may be vacuum deaerated using a pressure of 635 mmHg (25 inHg) or greater. Apply the vacuum while observing the uncured fluid for presence of bubble formation and increase vacuum slowly enough to avoid rapid foaming. Hold vacuum until bubbles at the fluid surface collapse.

▶Substrate Preparation

Substrates should be free of dust, oil, and fingerprint soils. Use suitable industrial techniques for cleaning electro-optics. If using hydrocarbon solvent cleaning (e.g. hexane, toluene), a final rinse with reagent grade isopropanol is recommended. If using aqueous detergent cleaning, multiple final rinses with de-ionized water or a single rinse with reagent grade isopropanol followed by drying is recommended. For certain plastics, such as polyethylene, polypropylene, and fluoroplastics, the surface may be pre-treated with chemical etching or plasma etching to improve the adhesion.

For silicones products (OP4035, 4036) cures in contact with most properly cleaned substrate materials including optical glasses, optical plastics, and photonic semiconductors. Avoid using them on any place that contains sulfur, amine, phosphorous, organo-metals, acid, and certain butyl, nitrite, chlorinated, and EPDM elastomers, certain plastics with leachable plasticizers, and the cure residues of certain adhesives including UV-cured epoxies and amine-cured epoxies. A certain primer or adhesion promoter may be applied on bonding surfaces to enhance the adhesion.

▶Cure Schedule

Cure the assembled part at corresponding temperature and time according to the TDS of the adhesives. Generally for silicone products, a cure at elevated temperature is recommended for adhesion enhancement.

United Adhesives Inc. focuses on challenging technologies in electronic industries and produces custom formulations. We assure our customers the highest quality in adhesive products through dedications to our product manufacturing, performance, reliability, specifications, and timely delivery. We are committed to distinguishing ourselves as a reliable and responsive adhesives company for our global customers.

该材料中的数据是按照我们目前所知的状态提出的，不排除用户在收到后需要立刻仔细核对所有数据。我们保留随技术进步或者新产品研发而进行产品参数更新的权利。本小册子中提出的建议应该通过初步试验来检测， 这是因为我们无法控制用户的适用过程，特别是用户同时共用于其它公司的原材料。提出的这些建议不免除用户有义务调查是否可能会侵犯第三方权益的可能性，如果需要请澄清情况。使用建议不构成任何担保，不具有任何明示或暗示产品对于特定用途的适用性。对于技术，质量，还是产品的安全性问题，请直接联系到美国粘合剂公司。

The data presented in this leaflet are in accordance with the present state of our knowledge, but do not absolve the user from carefully checking all supplies immediately on receipt. We reserve the right to alter product constants within the scope of technical progress or new developments. The recommendations made in this leaflet should be checked by preliminary trials because of conditions during processing over which we have no control, especially where other companies' raw materials are also being used. The recommendations do not absolve the user from the obligation of investigating the possibility of infringement of third parties' rights and, if necessary, clarifying the position. Recommendations for use do not constitute a warranty, either express or implied, of the fitness or suitability of the products for a particular purpose. For technical, quality, or product safety questions, please contact directly to United Adhesives Inc.

For General Information
- Phone: +1 (224) 848 2348
- Fax: +1 (630) 621 4198
- Email: info@UnitedAdhesives.com

For Sales in North America, Europe, and Worldwide
318 Half Day Rd # 189, Buffalo Grove, IL 60089, USA
- Phone: +1 (224) 436 0077
- Fax: +1 (630) 621 4198
- Email: sales@UnitedAdhesives.com

For Sales in China and Asia
New & High Technology Industrial Development Park
6-1023 Tianzhu Rd. Hefei City, China
- Phone: +86 139 5605 4600
- Fax: +86 0551 267 5968
- Email: china@UnitedAdhesives.com

The information contained herein is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information, and recommendations contained herein are based on tests and data that we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto.

© United Adhesives, Inc. 2016