

PENCHEM®

The Leading Brand of Electronics Protection Material Solution

Note : The information in this document is subject to change without notice



20 Years of Experiences

- ✦ Founded in 1999
- ✦ No. 1 Optoelectronics and Electronics Adhesive Manufacturer in Malaysia and South East Asia
- ✦ Developed a wide range of High Performance Adhesives for LED, Fiber Optic and General Electronic applications (>600 products)
- ✦ PENCHEM TECHNOLOGIES has a network of distributors and customer base in 21 countries including China, US, Europe, India, Taiwan, Russia, Australia and South East Asia.



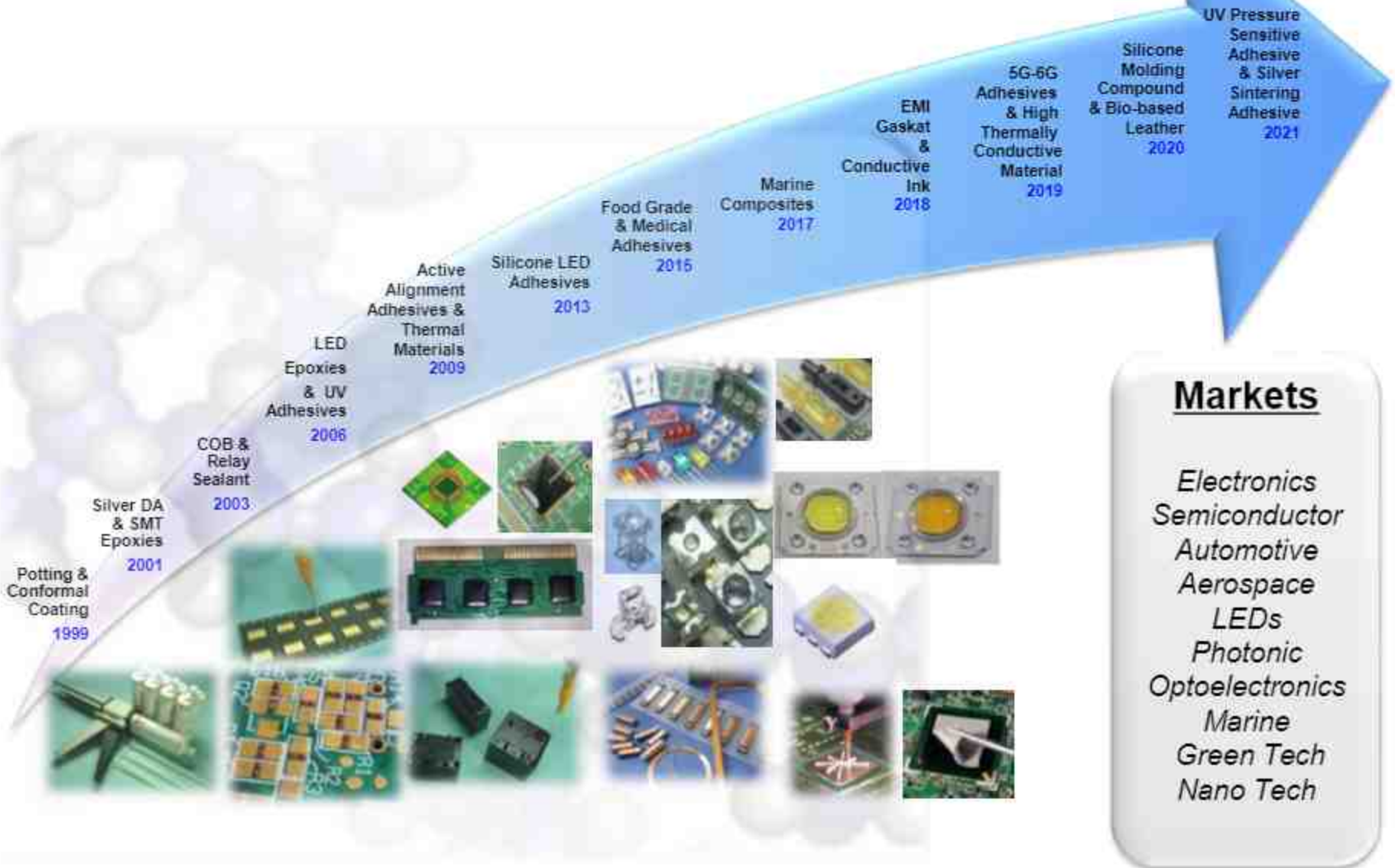
1-Stop Solution for Advance Material



PENCHEM®

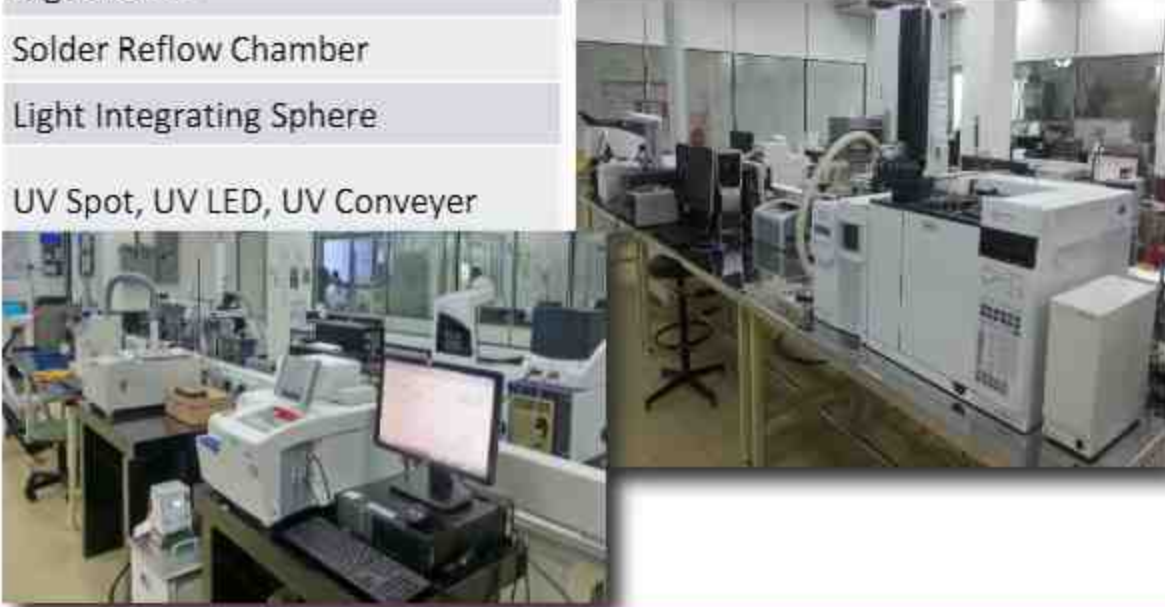
- ✦ Operation capacity:
> 40 tonnes/year, ~7millions syringes/year
- ✦ Market Served: Fiber Optic, LED, Automotive, Semiconductor, EMS, and Medical
- ✦ Certification: ISO 9001:2015, IATF 16949:2016, ISO 14001:2015
- ✦ Invested heavily R&D resources and testing equipments

Penchem's Product Portfolio & Markets



Strong in Analytical Capability and Services

Thermal, Optical and Physical Analysis	Electrical, Reliability & Curing Analysis	Chemical and Molecular Analysis
TGA	Resistivity Meter	Pyr-GC-MS
TMA	Hot Plate	GPC
DMA	Humidity Chamber	MICRO-FTIR
DSC/UV-DSC	Digital Programmable Oven	NMR
Tensile Tester	Digital Oven	
Hardness Tester	Solder Reflow Chamber	
Viscometer	Light Integrating Sphere	
Refractor Meter	UV Spot, UV LED, UV Conveyor	
Colour Assessment Chamber		
Digital Balance		
Flow Tester		
Density Meter		
LP and HP Microscopes		
Thermal Conductivity Meter		



>> We provide services on Material Analysis, Failure Analysis and Reliability Analysis <<

The Malaysian Most Innovative SME

PENCHEM

SOLUTIONS

PROVIDING THE FINEST OF INNOVATION



PENCHEM Technologies Sdn Bhd, a Malaysian manufacturer of specialty chemicals, glasses and industrial equipment, is proud to provide the finest of innovation for industry and laboratory solutions.

NOTED PRODUCTS AND SERVICES

Some of their chemical products are the TopCoat® series (TCS) which has exceptional (high) mechanical properties and adhesion strength for maximum protection to the equipment. PPT series which is formulated for high speed cleaning with optimum (10 to 17) pH. Auto-cleaning. This provides fast and efficient, and UV series, which is designed and optimized to bond fine particle materials, ASD series and various parts.

Along with the electronic components, Penchem also offers various other high quality products for various industries. Components are designed that comply with strict ISO 9001. All their products need to be tested more often. The Special Thermal Part series is a high speed curing epoxy used in high power motor and IC's. High speed curing epoxy can be used to 200°C.

Product Features

- Strong, flexible, resistant
- Excellent
- Excellent quality and adhesion
- Comprehensive service
- Full support
- Industry leading price
- ISO 9001:2015
- Research and development, technical support

Achievements

- ISO 9001:2015 certified
- ISO 14001:2015 certified
- Malaysia SME Excellence 2017
- Malaysia SME Excellence 2018
- Malaysia SME Excellence 2019

Certification

- ISO 9001:2015
- ISO 14001:2015
- ISO 45001:2018

COMMITTING CUSTOMER'S TRUST

The company maintains a strong and successful track with their customers in order to design a comprehensive understanding of their requirements. For this reason, Penchem has supported more than 70% of their manufacturing products overseas across the US, China, Europe, Taiwan, Thailand, Malaysia and the Philippines.

PENCHEM TECHNOLOGIES SDN BHD

2010, Jalan Perakutuan, Bukit Mertajam 1, 14000, Malaysia

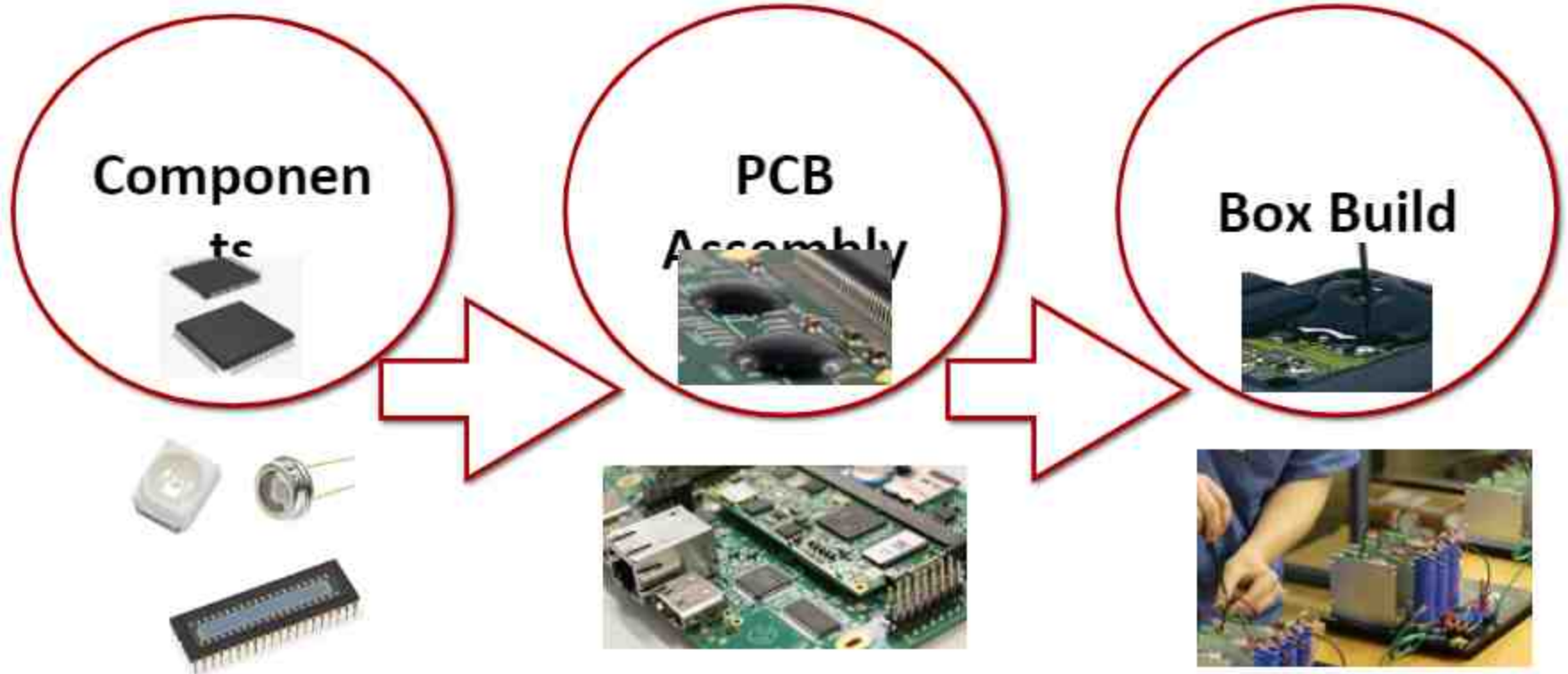
So, visit our site: www.penchem.com
Email: Sales@penchem.com
Contact: 04-29101011
Website: www.penchem.com

PENCHEM

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Market Segments



PRODUCT INTRODUCTION

Component Packaging

★ Adhesive / Encapsulation Solution

- ★ Silver Epoxy [5]
- ★ TIM 1 [1]
- ★ Lid Cover Attach [3]
- ★ UV System
- ★ Encapsulation

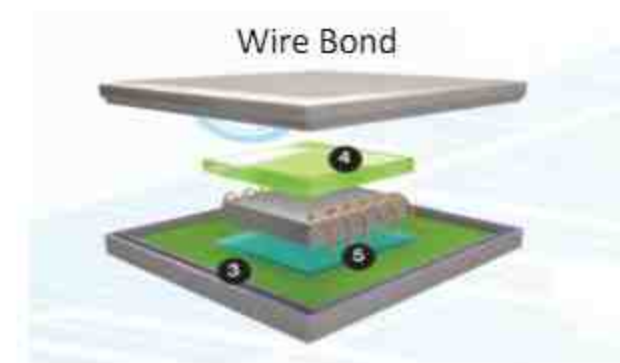
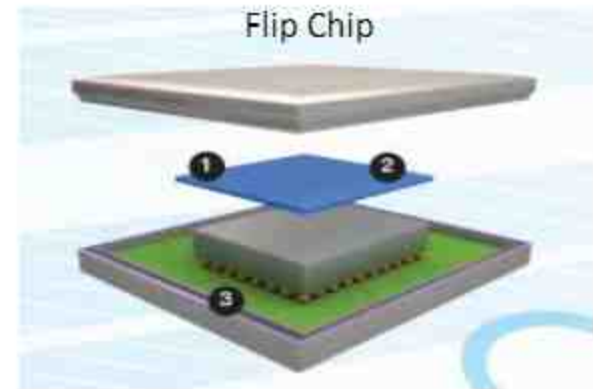


★ PCBA Solution

- ★ Globe Top
- ★ SMT Epoxy
- ★ Underfill
- ★ Dispensing Solution

★ Potting / Coating Solution

★ Thermal Interface Solution



Component Assembly

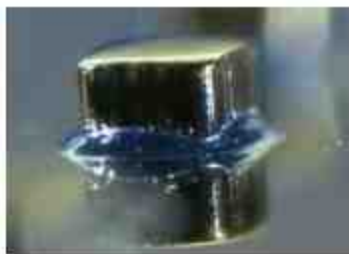
Silver Epoxy (Die Attach)

AG 803 is a one-part silver conductive adhesive based on epoxy resins.

It is formulated for very good electrical and thermal conductive properties.

It has long pot life can be cured and hardened at high temperatures. **It is solvent-free, has little volatiles during cure and very low shrinkage.**

It has great adhesion and good thermal shock performance.



Recommended Cure

Schedule	Temp.	Cure Time
A	120 °C	2 hours
B	150 °C	1 hour
C	170 °C	30 min

Properties

Property	Test Method	Unit	Typical Value
Chemical type			Epoxy
Appearance	Pen 10		Silver paste
Mix ratio, by weight			One component
Density	Pen 14	g/cm ³	2.34
Shelf life, -20°C	Pen 26	Month	6
Shelf life, -40°C	Pen 26	Month	12
Pot life, 25°C	Pen 57	Week	1
Viscosity, CAP2000+ viscometer, cap-06, 30rpm, 25°C	Pen 44	cP	25,000
Hardness, cured 150°C /1 hr	Pen 29	Shore D	86
Die Shear Strength	Pen 36	kgf	5.7
Lap Shear Strength	Pen 43	kgf/cm ²	112
Volume Resistivity	Pen 65	ohm.cm	0.0004
Glass transition temperature, Tg			68
Coef. of thermal expansion alpha-1	Pen 64	ppm/K	45
alpha-2			220
Conducting medium			Silver

TIM 1 (Thermal Conductive Epoxy)

TH 737-1 is a one-part thermally conductive adhesive based on epoxy resins.

It has high thermal conductivity and has **excellent adhesion** to most PCB and electronic components.

It can be **cured rapidly at relatively low temperature** 90°C, 15 minutes. It has no sagging.

Properties

Property	Test Method	Unit	Typical value
Chemical type	-	-	Epoxy
Color (uncure)			Light yellowish
Mix ratio, by weight	-	-	One component
Shelf life, -20°C	PEN 26	Month	6
Pot life, 25°C	PEN 26	Day	1
Viscosity, CAP 2000+ viscometer, C06, 20rpm, 25°C	PEN 44	cP	36,400
Specific gravity	PEN 14	-	2.7
Thermal conductivity	ASTM D5470	W/mK	2.6
Hardness, cured at 150°C/10min	ASTM D2240-97	Shore D	94
Glass Transition Temperature	PEN 64	°C	132
CTE before Tg	PEN 64	ppm/K	23
CTE after Tg	PEN 64	ppm/K	96
Die shear adhesion, cure @90°C/15min, on aluminum	PEN 42	kgf/cm ²	133
Operating temperature	PEN 92	°C	-40 to 200

* The values above are tested based on batch to batch basis. These values are not use as a basis for preparing specifications.



Dispensable and Screen Printable

Recommended Cure

Temp.	Cure Time
90 °C	15min

Adhesive Epoxy (Lid Cover Attach)

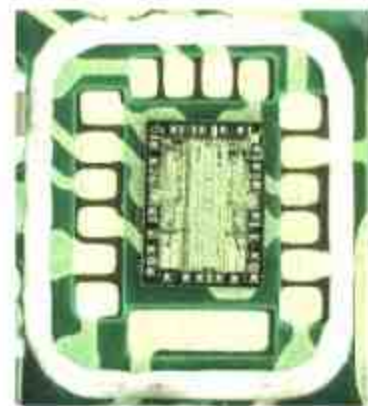
GL 614-4 is a one-part off white adhesive based on epoxy resins. It cures fast at elevated temperatures and has **Excellent Adhesion** to most PCB and electronic components.

It has no sagging. It has a stable pot life and **Long Shelf Life** at room temperature of 25°C. It has been designed especially for bonding electronic components. It has **High Thixotropic** which can control the flow of the adhesive.

Property	Test Method	Unit	Typical Value
Chemical type			Epoxy
Appearance	Pen 10		Off white paste
Mix ratio, by weight			One component
Shelf life, -20°C	Pen 26	Month	6
Pot life, 25°C	Pen 26	Week	1
Viscosity, CAP 2000+ viscometer, 25°C Cap-06@100rpm	Pen 44	cps	42,000
Thixotropic Index	Pen 37		2.4
Hardness, cured 150°C for 15 min	Pen 29	Shore D	83
Shear Strength	Pen 36	kgcm ⁻²	55
Tg, DSC, cured 150°C for 15 min	Pen 19	°C	121
Specific gravity	Pen 14		1.3
CTE, alpha-1	Pen 64	ppm/°C	59
, alpha-2	Pen 64	ppm/°C	151

Recommended Cure

T(°C)	Gel time	Cure time
150	5 min	15 min
160	2 min	5 min



UV Adhesive

PENCHEM[®]

UV777-1 is a flowable UV heat curable epoxy acrylate system.

The cured material has **good toughness and flexibility**.

The **viscosity is high**. It is suitable for sealing or lens attached application.

It has **excellent moisture resistance**

Recommended Cure

UV Cure condition: 2W/cm² for 15 sec

Post cure condition: 100°C and above for 1 hour

Cure time will be varying at different temperature.

Storage & Shelf Life

This product has a 6 month shelf life from date of manufacturing, unless otherwise specified, when stored at -20±3°C in the original and unopened container.



Uncured Properties	Typical Value	Unit	Test Method
Color	Translucent amber	-	PEN 10
Viscosity at 25°C	123,000	cP	ASTM D4287
Pot life at 25°C	>7	day	PEN 26
Cured Properties	Typical Value	Unit	Test Method
Density	1.219	g/cm ³	PEN 61
Hardness	77	Shore D	ASTM D2240
Glass Transition Temperature	53	°C	ASTM D7028-07
Storage modulus @ -40°C	2933	MPa	ASTM E2254 - 18
Storage modulus @ 30°C	1808	MPa	ASTM E2254 - 18
Storage modulus @ 120°C	18	MPa	ASTM E2254 - 18
CTE, α1	38	ppm/°C	ASTM E831-03
CTE, α2	186	ppm/°C	ASTM E831-03
Die Shear Strength_ UV _ ceramic chip to glass	48	kgf/cm ²	PEN 36
Die Shear Strength_ UV+Heat			
a) Ceramic chip to glass	250	kgf/cm ²	PEN 36
b) Kovar to glass	252	kgf/cm ²	PEN 36
c) Nickel to glass	276	kgf/cm ²	PEN 36
d) Gold to glass	109	kgf/cm ²	PEN 36
Die Shear Strength_ PCT 121°C, 100%RH, 2atm, 48 hours			
a) Ceramic chip to glass	83	kgf/cm ²	PEN 36
b) Kovar to glass	38	kgf/cm ²	PEN 36
c) Nickel to glass	20	kgf/cm ²	PEN 36
d) Gold to glass	96	kgf/cm ²	PEN 36
Die Shear Strength_ MSL 65°C/85%RH 1000 hours _ ceramic chip to glass	161	kgf/cm ²	PEN 36
Weight loss @ 30-100°C	0.25	%	ASTM E1131

UV Encapsulation (NEW !)

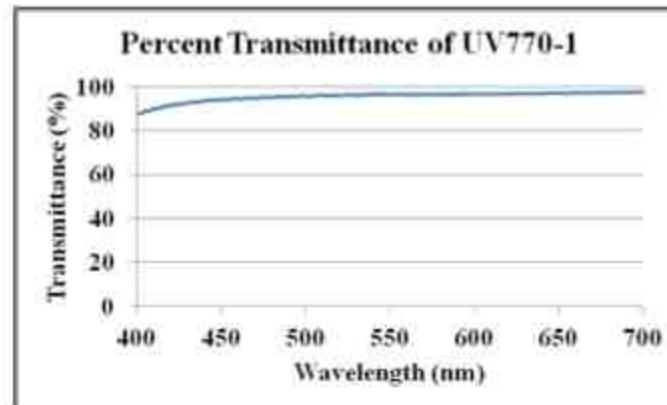
UV 770-1 is a **fast cure, low viscosity** UV and heat curable epoxy system.

The cured material has good toughness and good adhesion that **suitable for encapsulation of high performance optoelectronic devices.**

It is not inhibited by oxygen during UV cure and **good resistance to yellowing.**



Property	Test Method	Unit	Typical Value
Chemical type			Epoxy
Appearance	Pen 10		Clear liquid
Mix ratio, by weight			One component
Shelf life, -20°C	Pen 26	Month	6
Pot life, 25°C	Pen 26	Day	7
Viscosity, 25°C	Pen 44	cps	371
Refractive index, 25°C, 589 nm	Pen 28		1.49
Percentage of transmittance after cure, 450nm	Pen 40	%	>90
Hardness, UV cure	Pen 29	Shore D	72
Glass transition temperature	Pen 64	°C	90
Coefficient of thermal expansion, alpha 1	Pen 64	ppm/K	53
Coefficient of thermal expansion, alpha 2	Pen 64	ppm/K	205



Recommended Cure

Cure Types	Cure time
UV Hg lamp, 100mW/cm ²	1 minute
LED 365 nm, 100mW/cm ²	1 minute
Thermal Cure (120°C)	1 hour

Component Packaging Solution

	Heat Cure	UV Cure	2 Parts (Room Temp Storage)
Soft	GL901-5	UV777-1	TH833 (Thermal)
Hard	EN418-2 TH737-1 (Thermal) AG803 (Conductive)	UV768 (Optical Coupler) UV566-24 (UV+Heat) UV770-1 (Encap)	GL904-2 (Fast Cure) GL104-2
High Thixo	GL614-4, GL616, GL168, GL158 GL107 (Food Grade) GL107-2 (Food Grade High Tg) GL108 series(LCP)	UV760-2 UV768-2	



Increasing thixotropy →

PRODUCT INTRODUCTION

★ Adhesive / Encapsulation

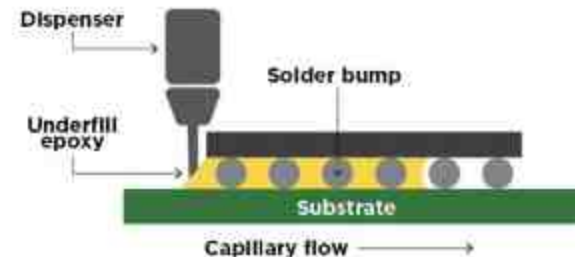
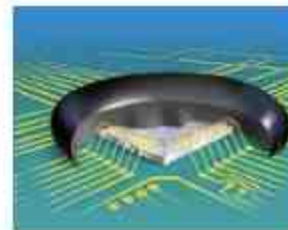
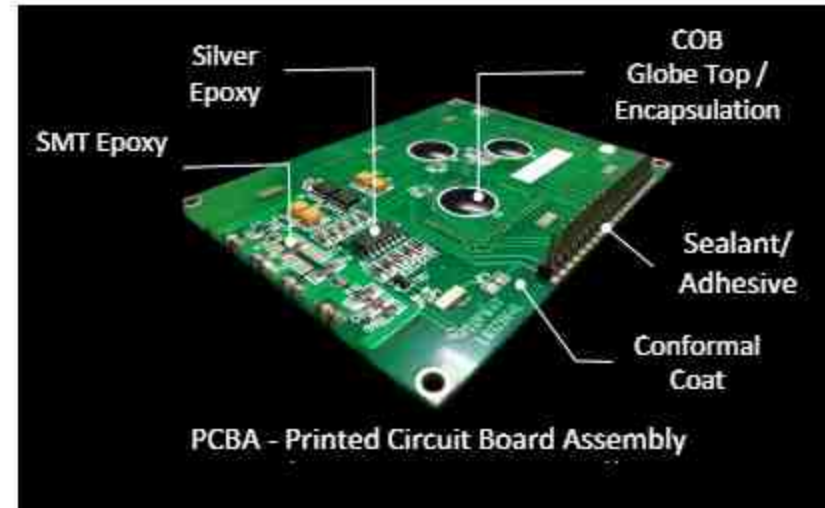
- ★ Silver Epoxy
- ★ TIM
- ★ Lid Cover Attach
- ★ UV System
- ★ Encapsulation

★ PCBA Solution

- ★ Globe Top
- ★ SMT Epoxy
- ★ Underfill
- ★ Dispensing Solution

★ Potting / Coating Solution

★ Thermal Interface Solution



Globe-Top Material



Epoxy

Cost Effective

Excellent Mechanical Protection

- EN485(Black)
- EN525 (Higher Globe Height)
- EN453 (Clear)

Silicone

Excellent UV Resistance
High Operation Temperature

Soft and Flexible

- EN943-19(Black)
 - OP955-4(Clear)
- Suitable for optoelectronics component



SMT Epoxy (Halogen Free)

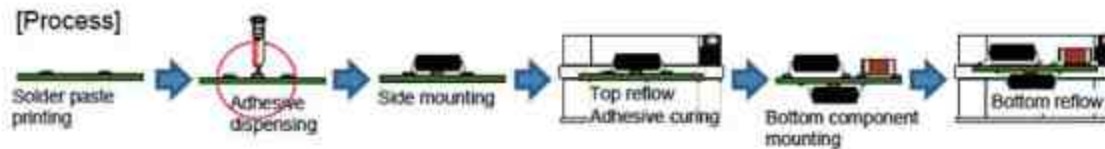
CB 648-2 is a one-part red adhesive based on epoxy resins. It **cures fast** at high temperatures.

It has excellent adhesion to most printed circuit boards and electronic components.

It has a **long pot life** at room temperature of 25°C.

The **high thixo** has been adjusted to prevent sagging.

Application :
Double sided board



Through holes board



Recommended Cure

Schedule	Temp.	Cure Time
A	150 °C	90 sec
B	80 °C	2 hrs



Property	Test Method	Unit	Typical Value
Chemical type	-	-	Epoxy
Appearance	Pen 10	-	Red paste
Mix ratio, by weight	-	-	One component
Shelf life, -20°C	Pen 26	Month	12
Pot life, 25°C	Pen 26	Week	1
Viscosity(Brookfield CAP 2000)	Pen 44	cP	227,000
Viscosity, Brookfield RVT, 25°C	Pen 11	cP	5,000,000
Thixotropy Index	Pen 44	cP	2.3
Density	Pen 61	g/cm ³	1.336
Hardness	Pen 29	Shore D	84
CTE before Tg	Pen 64	ppm/K	55
CTE after Tg	Pen 64	ppm/K	165
Glass Transition Temperature	Pen 19	°C	101
Moisture Absorption	Pen 35	%	1.18
Water Absorption	Pen 52	%	0.38
Dielectric Breakdown	Pen 60	Volt/mm (μA)	3579(0.07)
Tensile strength	Pen 41	kgcm ⁻²	414
Shear strength	Pen 36	kgcm ⁻²	126
Water boil, wt gain, 1 hr	Pen 21	%	0.43
Volume resistivity, 25°C	ASTM D257	ohm.cm	6.6 x 10 ¹⁵
Tg, DSC, cured 150°C for 1 hr	Pen 19	°C	135

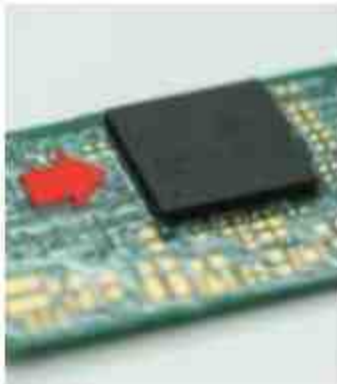
The values above are tested based on batch to batch basis. These values are not use as a basis for preparing specifications.

Underfill Epoxy

UF 256-2 is a one part low temperature cure epoxy resin for **BGA and CSP Underfill** application.

It has low viscosity and **Good Capillary** flow. The underfill epoxy can be cured at 85°C and above.

The cured underfill epoxy has **Low Shrinkage, Low Coefficient of Expansion** and good adhesion to organic substrate, such as FR-4 PCB.



Properties

Property	Test Method	Unit	Typical Value
Chemical type	-	-	Epoxy
Appearance	Pen 10	-	Black colored
Specific gravity	Pen 61	-	1.33
Viscosity, CAP2000+, C01, 50rpm, 25°C	Pen 44	cP	2,000
Pot life, 25°C	Pen 26	Hour	24
Hardness	Pen 29	Shore D	86
Tg	Pen 64	°C	120
CTE before Tg	Pen 64	ppm/°C	62
CTE after Tg	Pen 64	ppm/°C	130
Lap shear strength	Pen 43	kgf/cm ²	30

1. Most of the test methods correspond to American Standard Test Methods (ASTM).

2. The values above are tested based on batch to batch basis. These values are not used as a basis for preparing specifications.

Dispensing Solution

CHEMBOT Mk3 is a compact and economically priced desktop dispenser. Designed by retrofitting our proprietary dispenser onto the famous 3D printer in the market in order to enable liquid 3D printing. This printer comes with open sourced software to get 2D/ 3D liquid printing kick start right the way.

Specifications

Machine Size	: 540 x 680 x 450 mm
Build Area	: 420 x 400 x 100 mm
Layer Resolution	: 0.1 mm
Setting Accuracy	: XY: 0.1 Z: 0.02 mm
Syringe Heater	: 80 °C
Nozzle Heating	: 100 °C
Operation Speed	: 60mm/s
Travel Speed	: 100mm/s
Chassis	: & Acrylic
Frame	: Aluminium
XYZ Rail	: V slot
Stepper Motor	: 1.8° 1/16
Syringe Size	: 30cc
Dispense Pattern	: Dot, Line, Arc, Rec, Circle

Electrical Parameters

Storage Temperature	: 0 - 32 °C
Operating Temperature	: 15 - 32 °C
Input Voltage	: 50 / 60 Hz 220 / 110 V
Output Voltage	: 12 V
Maximum Power	: 360 W

Software

Teaching Software	: Chembot Control
File Format	: G-Code
Operating System	: Windows
Connection Mode	: USB
LCD Display & Control	: YES
SD Card Operation	: YES 8GB



Motor Drive System
Air Free dispensing, no external compressed air is required. Reduce build up components and maintenance.



Innovative cartridge replacement

2 simple steps to change cartridge. Reduce downtime, increase productivity.



PRODUCT INTRODUCTION

✦ Adhesive / Encapsulation Solution

✦ SMT Solution

- ✦ Globe Top
- ✦ SMT Epoxy
- ✦ Underfill
- ✦ Dispensing Solution

Box Build

✦ Potting / Coating Solution

- ✦ Potting > 1.0mm
- ✦ Coating < 1.0mm

✦ Thermal Interface Solution

Box Build



WHICH IS BETTER...

COATING

- Improve Reliability
- Less Weight
- Rework-able
- Less Stress



POTTING

- Excellent Protection
- Weight Increase
- Improve Heat Dissipation
- Water Proof



Coating Material

Acrylic

Cost Effective

Hard

- CT682 (*UV Trace)
- CT682-1(Spray)
- CT684



Full



Selective

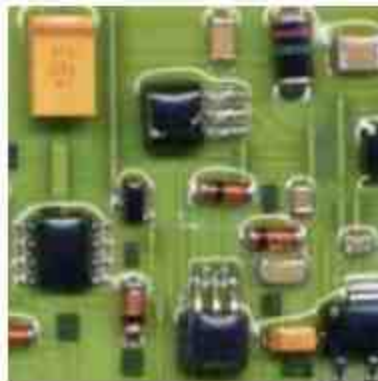
UV Trace Coating

Silicone

Excellent UV Resistance
High Operation Temperature

Soft and Flexible
Short Shelf Life

- CT985-3
- PT910-9 (2 Parts)



Silicone Coating

Functional

Able to withstand upto
300°C reflow condition

High Reflective

- OP957-5W6

Conformal Coating Application

Application Method	Advantages	Disadvantages
<p>Dipping</p> 	<ul style="list-style-type: none"> • Moderate Volume • Good Consistent Coating 	<ul style="list-style-type: none"> • Need process control due to pot life issue • Require masking
<p>Brushing</p> 	<ul style="list-style-type: none"> • Low Cost 	<ul style="list-style-type: none"> • Inconsistent • Labour intensive • Low Volume
<p>Manual Spray</p> 	<ul style="list-style-type: none"> • Low investment cost • Efficient material control 	<ul style="list-style-type: none"> • Labour dependent
<p>Automated Spray</p> 	<ul style="list-style-type: none"> • Highest Volume • Excellent Consistent Coating • Eliminate masking for selective coating 	<ul style="list-style-type: none"> • High investment cost

Potting Material

Epoxy : 2 Parts

Cost Effective
Easy to Handle

Excellent Protection

- PT365 (Black)
- PT319-2 (Clear)
(Low Outgassing)
- PT380-1 (White)
- PT605-3 (Thermal
Conductive /Flexible)

PU : 2 Parts

Flexible

Not Exceed 110°C
Need Special Handling

Polyurethane

- PT303-1 (Black)

Silicone : 2 Parts

Excellent UV Resistance
High Operation Temperature

Soft

- PT912-1
(Black and Thermally Conductive)
- PT882
(Grey, low viscosity)
- PT910-6 (Clear)



Flexible Epoxy Potting - Thermal Conductive

PT 605-3 is a two-part flexible black potting compound based on low viscosity epoxy resins.

When fully cured the surface is glossy, blush free and soft. It has very good scratch and water resistance.

This system has enhanced adhesion on glass, ceramics, most plastics and metals .

Property	Test Method	Unit	Typical Value		
			Part A Resin	Part B Hardener	Mixed
Chemical type	-	-	Epoxy	Amine	
Appearance	Pen 10	-	Black liquid	Yellowish Clear	
Mix ratio, by weight	-	-	2.0	1.0	
Shelf life, 25°C	Pen 26	Month	12	12	
Pot life, 25°C	Pen 57	Hour			1.5
Viscosity, CAP2000+ viscometer, 25°C	Pen 44	cP	22,200	140	1,700
Hardness, cured 50°C for 4 hours	Pen 29	Shore A			80
Water boil, wt gain, 24 hr	Pen 21	%			1.0
Ionic Content, Cl	-	ppm			>500
, K	-	ppm			N.D
, Na	-	ppm			N.D
Thermal conductivity	ISO/DIS 22007	Wm ⁻¹ K ⁻¹			1.1
Electrical resistivity	-	ohm.cm			10 ¹⁰
Filler type	-	-	Metal oxide		



Low Stress

*2x thermal conductive
Cooling down your system*

Fast Cure Flexible Epoxy Potting

PENCHEM[®]

PT 399-1 is a two-part black potting compound based on epoxy resins. When fully cured the surface is flexible and glossy.

It has very good scratch and water resistance. This system has enhanced adhesion.

It is specially developed for low stress bonding, potting and encapsulation of electronic components.

Fast curing is optimised for high volume production setup.

Property	Test Method	Unit	Typical Value		
			Part A Resin	Part B Hardener	Mixed
Chemical type	-	-	Epoxy	Amine	-
Appearance	Pen 10	-	Black liquid	Clear yellowish liquid	Black liquid
Mix ratio, by weight	-	-	2	1	-
Shelf life, 25°C	Pen 26	Month	12	12	-
Viscosity, CAP 2000+ Viscometer, 25°C	Pen 44	cP	750	50	-
Working hour, 25°C	Pen 26	Minute	-	-	30
Gel time, 25°C	-	Minute	-	-	150
Hardness, fully cured	Pen 29	Shore A	-	-	60

Recommended Cure

Temp.	Cure Time
25°C	> 2.5 hours
50°C	> 1 hours

Fast Cure

Flexible

The values above are tested based on batch to batch basis. These values are not use as a basis for preparing specifications.

Clear Epoxy Potting

PT 319-2 is a two-part clear potting resins with **1:1 Mixing Ratio**.

When fully cured, the surface is **glossy, blush free and scratch proof**.

It has very **good adhesion** and provide **water resistance**.

The mixed epoxy has **optimum viscosity** to ensure good flow and minimal trapping of bubbles.

It is specially developed for **low stress** and **low outgassing** potting application.

Recommended Cure

Temp.	Cure Time
60 °C	60mins

Property	Test Method	Unit	Typical Value		
			Part A Resin	Part B Hardener	Mixed
Chemical type	-	-	Epoxy	Amine	
Appearance	Pen 10	-	Clear liquid	Clear yellowish liquid	Clear liquid
Mix ratio, by weight	-	-	1.0	1.0	
Shelf life, 25°C	Pen 26	Month	12	12	
Pot life, 25°C	Pen 26	min			60
Viscosity, CAP 2000+ Viscometer, 25°C	Pen 44	cP	9,260	4,300	5,600
Density	Pen 61	g/cm ³	1.15	0.98	1.12
Working Life, 25°C		Hour			1.5-2.0
Hardness, cured 60°C for 60 mins	Pen 29	Shore D			65
Time to Handling Strength, 25°C	-	Hour			12-16
Glass Transition	PEN 64	°C			55
Thermal Conductivity	PEN 104	w/mK			0.49
Outgassing Properties (Un cured Material, 30-100°C)	PEN 92	%			0.35
Lap Shear Strength (Polycarbonate to Polycarbonate)	PEN 43	kgf/cm ²			63
Tensile strength	Pen 41	kgf/cm ²			63
Stiffnes	Pen 116	N/m			24,177
Flexural Rigidity	Pen 116	Nm ²			0.032
Young Modulus of Bending	Pen 116	Mpa			1263
Maximum Bending Stress at Maximum Load	Pen 116	Mpa			48
Water boil, wt gain, 1 hr	Pen 21	%			1.19
CTE 1	Pen 64	ppm/K			55
CTE 2	Pen 64	ppm/K			214

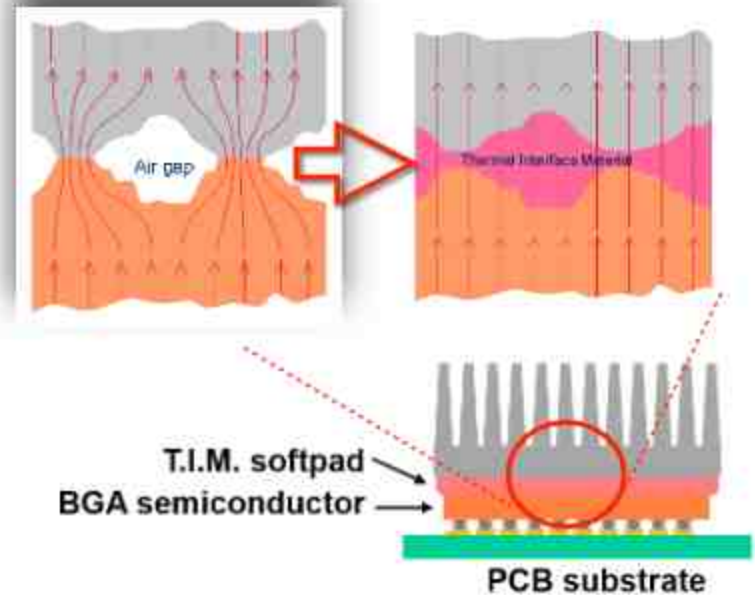
Potting Solution

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Suggested Process Condition	Shore A	Shore A Silicone	Shore D 60-75	Shore D >75
~15 Min Work Time / 4 hr Harden Time (Auto Mix /Dispensing)	PT399-1 Black PT399-2 White (NEW)		PT300 Clear (3:1)	PT365-6 Grey PT365-8 Black (10:1)
~30 min Work Time / 8 hr Harden Time			PT365-4 Black (3:1)	
~1 hr Work Time / 12 hr Harden Time	PT605-3 Black, Thermal (2:1) PT605-4 Grey (2:1) PT605-6 Translucent (1:1)		PT430-1 Clear (2:1)	PT365 Black (2:1) PT366 Black (2:1) PT380-1 White (2:1)
~2hrs Work Time / 24 hr Harden time	PT605 Black, Thermal (2:1)	PT910-9 Translucent (1:1) PT910-10 Clear (1:1) PT912-1 Black, Thermal (1:1)	PT319-2 Clear(1:1)	PT497 Clear (3:1) PT497-2 High Thixo, Translucent(3:1)

PENCHEM GENERAL ELECTRONIC PRODUCT INTRODUCTION

- ✦ Adhesive Solution
- ✦ SMT Solution
 - ✦ Globe Top
 - ✦ SMT Epoxy
 - ✦ Underfill
 - ✦ Dispensing Solution
- ✦ Potting / Coating Solution
- ✦ Thermal Interface Solution
 - ✦ Thermal Pad
 - ✦ Thermal Grease / Putty



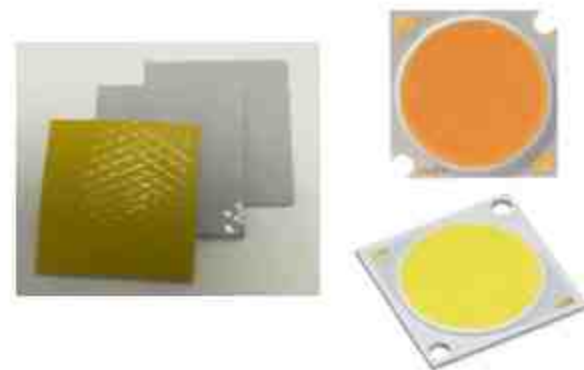
Thermal Pad (for Super High Power Application)

TH994 is silicone thermal pad. It is light grey color and both side tacky, therefore, suitable for use as thermal interface material to dissipate the heat from electronic devices, especially in Super High Power COB LEDs package.

This thermal pad has low hardness and flexible to match with uneven surface, and yet provides *extremely high thermal conductivity* and good electrical insulation.

Property	Test Method	Unit	Typical value
Binder	-	-	Silicone
Color	PEN 10	-	Light grey
Reinforcement	-	-	None
Surface tacky	-	-	Yes, both side tacky
Specific gravity	-	-	3.3
Thermal conductivity	ASTM D5470	W/m.K	8.0
Hardness	PEN 29	Shore OO	80
Flammability	UL 94	-	V-0
Operating temperature	PEN 92	°C	-40 to 200

1. Most of the test methods correspond to American Standard Test Methods (ASTM).
2. The values above are tested based on batch to batch basis. These values are not use as a basis for preparing specifications.



Designed for COB - 80W and above

Silicone Thermal Putty (New !)

TH 855-1 is a dispensable silicone putty with *extremely high thermal conductivity*.

It has *high extrusion rate* and non-flowable.

It is designed for *very low bleed* with *high electrical insulation*.



Properties

Property	Test Method	Unit	Typical Value
Chemical type	-	-	Silicone
Appearance	PEN 10	-	Light grey
Extrusion rate, GA15, 50psi, 25°C	PEN 107	g/min	0.35
Flow test, 45° incline	PEN 15	mm	Non flow
Specific gravity, 25°C	PEN 14	-	3.25
Thermal conductivity	ASTM D5470	W/mK	7.50
Volume resistivity	ASTM D257	Ohm-cm	>10 ¹⁴
Volatile content @ 100°C @ 150°C @ 200°C	MIL-STD-883	%	0.10 0.15 0.40
Operating temperature	PEN 92	-	-60 to 200°C
Resin separation test, 100°C/100h, blot width	PEN 99	mm	7.0
Compression deflection, @ 10% @ 20% @ 30% @ 40% @ 50%	PEN 109	psi	0.00 0.00 0.44 0.51 0.68

* The values above are tested based on batch to batch basis. These values are not use as a basis for preparing specifications.

Thermal Interface Solution



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Thermal Conductivity	Thermal Pad / Tape	Thermal Grease / Putty	Others
High >5W/mK	TH994	TH855-1 Putty	
Medium 2.5~5W/mK	TH935-2 TH832 Soft	TH836 Grease TH235-2 Non Silicone	
<2.5W/mK	TH212 Non Silicone TH731 Tape	TH976-1 Grease	Thermal Adhesive TH996-2 Phase Change Material TH711
			Thermal Conductive Potting Material PT912-1 (Silicone) PT610 (Epoxy)

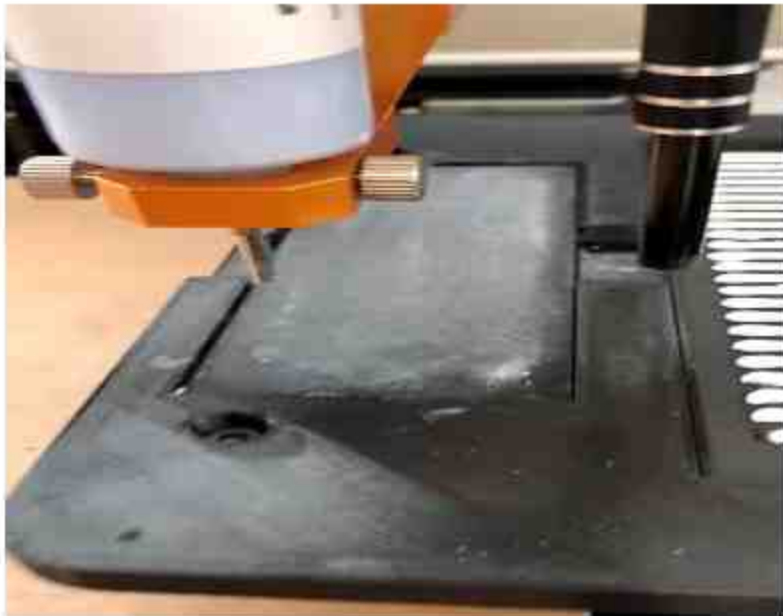
Note : Thermal Interface Material Selection Criteria : Application, Heat Dissipation Rate, Contact Surface, Operation Temperature Range, Process Method, Reliability, Cost, etc...

Thermal Putty Dispensing Solution (Industry 4.0)

Ease of Use

Excellent Consistency

Save Inventory Cost





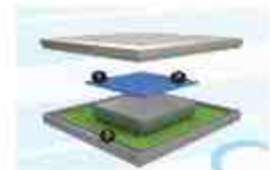
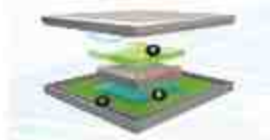
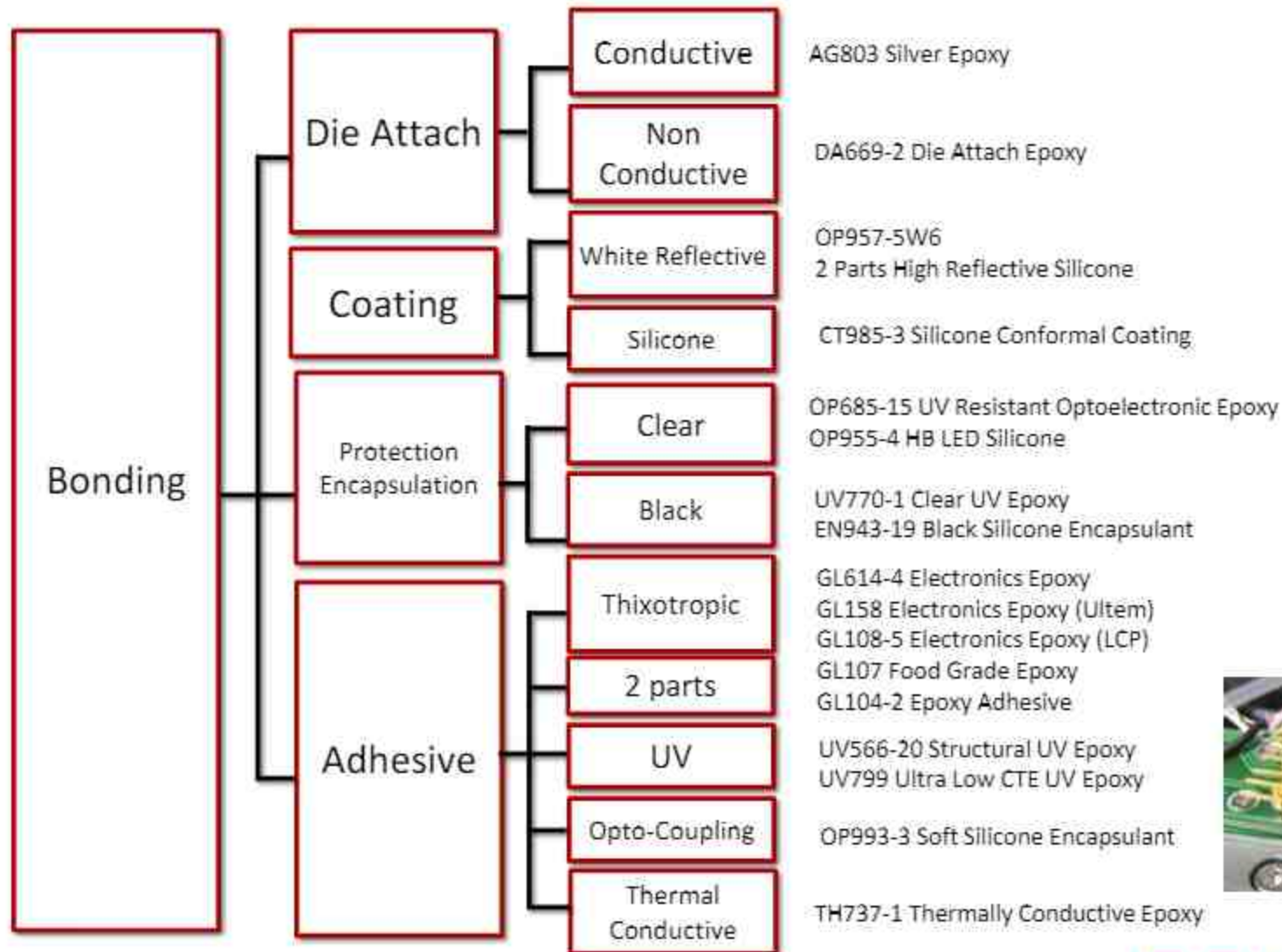
Can the SCREW still fit in
Miniature Electronic Device ?



Screw Assembly or Liquid Dispensing ?
How to Simplify the Design /Assembly Process ?
Improve Productivity?

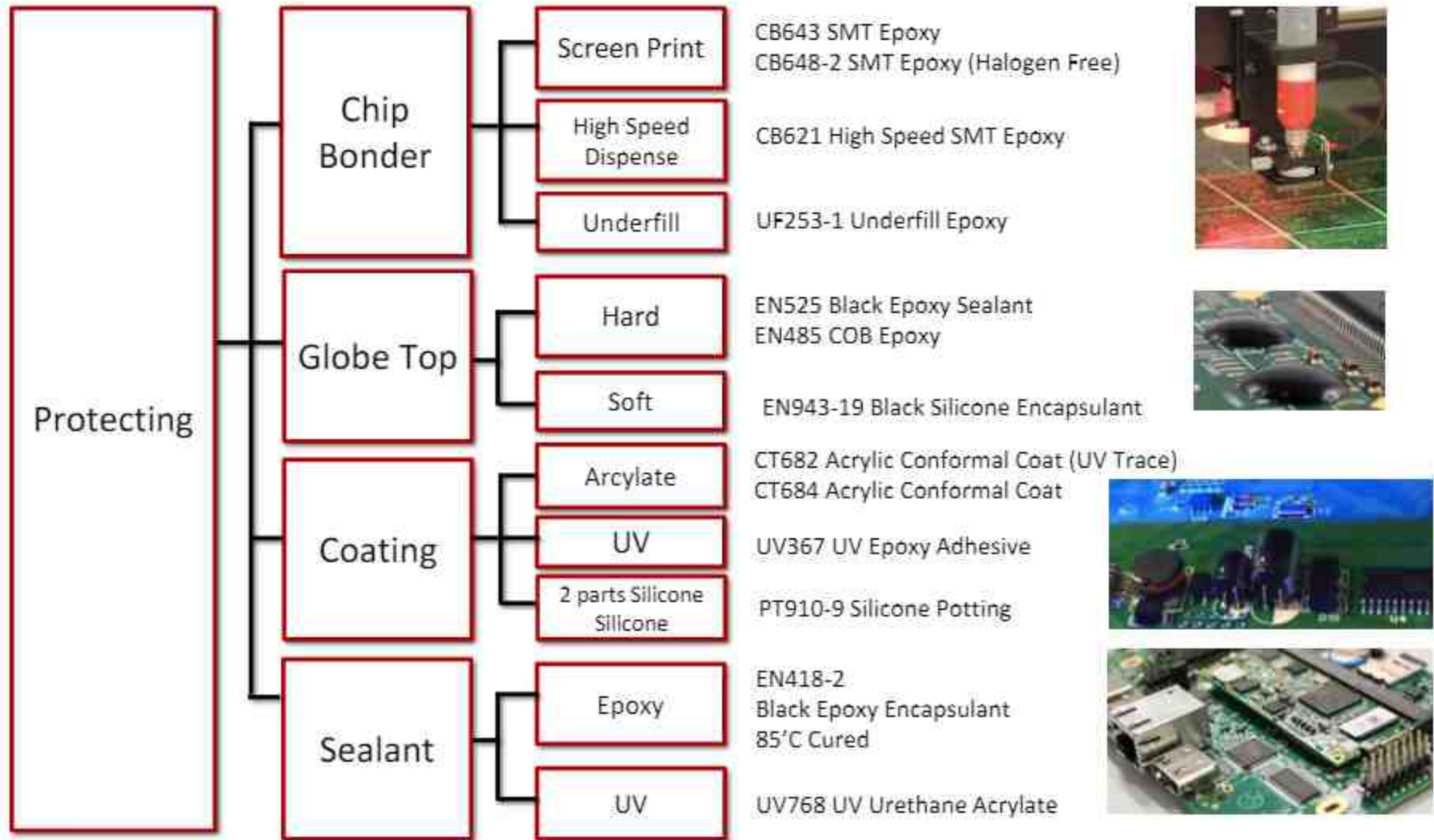


Electronic Component Assembly

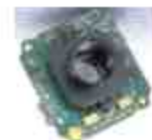
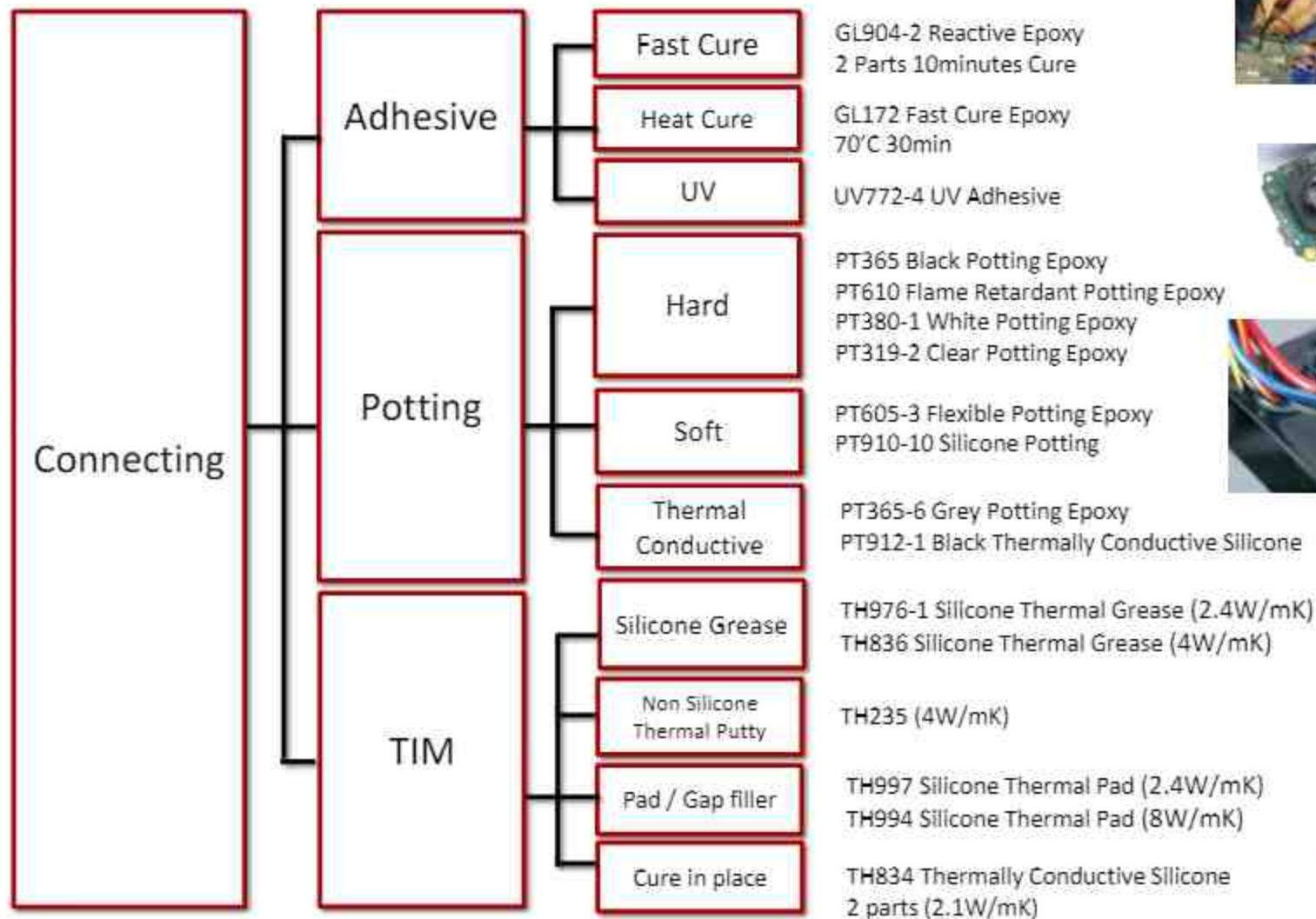


PCB Assembly

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Box Build Assembly



Lighting



□ Thermal Grease

- TH976-1 Low viscosity suitable for MCPCB to Heat Sink attachment.
- TH837 Low bleeding optimised for high power density and tight space constrain.

□ Thermal Pad

- TH994 High thermal conductivity and Ease of use for extreme high power COB application.



□ Epoxy Potting

- PT605-3 Thermal Conductive and Flexible suitable for power supply potting
- PT356-8 Fast cure to reduce the assembly process turn around time.
- PT319-2 Low outgassing clear potting epoxy to minimise the chemical attack risk to LED.



□ Silicone Potting

- PT910-10 High UV resistance clear silicone potting and Sealing for outdoor application.



□ Optical Grade Encapsulation Epoxy

- OP201-1 High transmission rate clear encapsulation for Indoor/outdoor application.

Automotive



□ Silicone Potting Material

- TH832-2 High Thermal Conductive Silicone Material for Battery Pack.

□ Flexible / Potting Material

- PT605 Flexible potting epoxy for reverse sensor / transducer application.
- PT912-1 Soft potting silicone for reverse sensor / transducer application.



□ Epoxy Potting Material

- PT365 potting epoxy for LED signal lamp waterproofing.
- PT365-8 fast cure epoxy for car camera sealant.



□ Coating Material

- CT682 Acrylate coating material for protecting PCBA against moisture and enhance reliability.



□ Adhesive

- GL172 Low temperature heat cure epoxy for car camera application.
- GL901-5 Heat cure silicone for car audio assemble application.



PENCHEM's Core Strengths

PENCHEM®

- **Wide range of high quality and performance products**
- **Custom formulations and solutions**
- **Cost effective alternatives**
 - *Industry leading price and performance*
 - *Small Minimum Order Quantity, MOQ*
 - *Design and Synthesis of key raw materials / specialties materials*
- **Strong and comprehensive technical support**
 - *Provide competitors evaluations, incorporate with professional system/equipment manufacturer to provide total solutions, materials failure analysis and process trouble shooting*
- **RoHS compliant** (*test report issue by SGS and accredited test labs*)



PENCHEM Customers Footprint



THANK YOU!

For more information, please contact our technical and commercial team, who will be always pleased to help.

PENCHEM®

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