High Thermal Conductive Silver Adhesive

高导热率银胶

Product Code 产品代码: TS-3332LD、TS-3601LD

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[Manufacturer 制造商: Tanaka Kikinzoku Kogyo K.K. (Japan 日本)]

【High Thermal Conductive Silver Adhesive for Die Attach】

用于晶片粘结的高导热率银胶

Product Code 产品代号: **TS-3332LD**、**TS-3601LD**

The rate of heat generation is getting higher in the latest circuit design of semiconductor, for the both requirements of higher speed and smaller space. When designing the thermal structure, it is difficult to manage with conventional silver die attach adhesives due to its low thermal conductivity. High Thermal Conductive Silver Adhesive by Tanaka Kikinzoku is the solution of high thermal conductivity and low electric resistivity.

现代半导体电路的高频和高集成性产生了更大的热量，令传统的低导热率晶片粘结银胶无法解决散热问题, 而需要使用具有高导热率和低电阻率的田中晶片粘结银胶.

[Applications 应用]

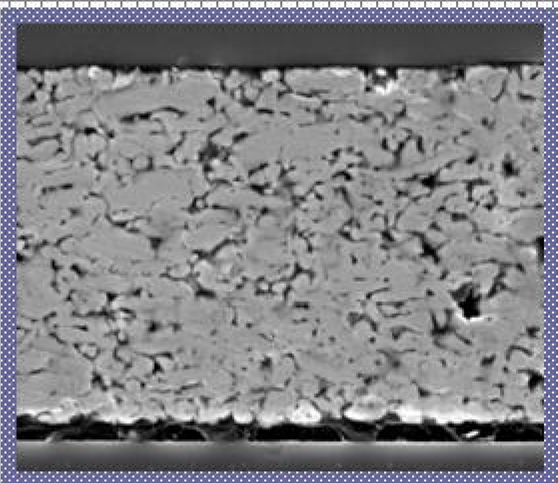
- Power Semiconductor Device: Substitute for conventional die attach materials of epoxy silver and lead solder etc.
  功率半导体器件: 取代传统的晶片粘合环氧基银和焊接材料
- Compound Semiconductor device: Power amplifier of mobile phones and high luminescence LED, etc.
  复合半导体器件: 移动电话的功率放大器, 和高亮度LED
- Build-up Printed Circuit Board: Filler of thermal via holes, Adhesives of heat spreader, etc.
  印刷电路板: 洞孔的填剂, 或散热器的粘合
- And more applications which requires high thermal conductivity.
  其它散热的应用

Main Features 主要特征

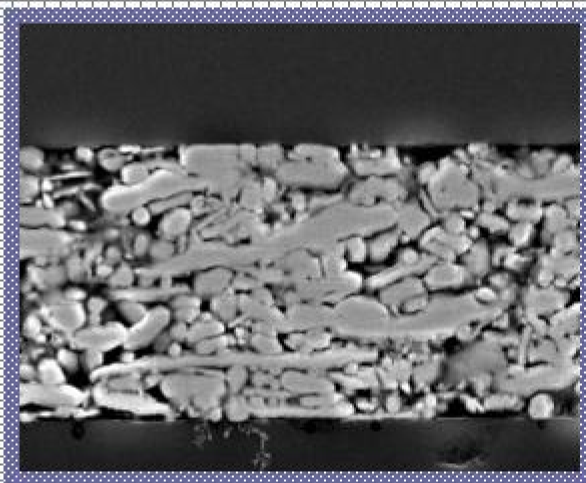
1. 低体积电阻率，相当于传统银胶的百分之五 。...
   Low electrical volume resistance as 1/20 to conventional Silver adhesive Paste .
2. 高导热率，相当于传统银胶浆的20~26倍。 ...
   High thermal conductivity as 20~60 times to conventional Silver adhesive Paste .
3. 容易储存，可以在室温下储存而不会有不良反应。 ... **Easy care storage, can be store at room temperature without harden reaction .**

Comparison of Cross Section after cure process
固化后的剖面比较

TS-3601LD



TS-3332LD



Conventional Epoxy Ag
传统的环氧基银

(High Density of Silver 银的高密度)

Comparison of Performance 表现比较

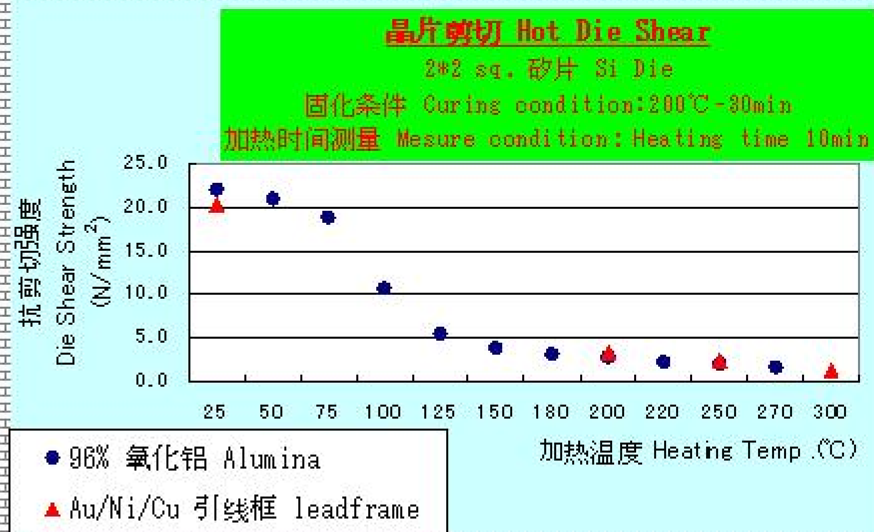
Item 物项 \ Paste 胶浆		TS360LD	TS3332LD	Conventional Epoxy Ag 传统环氧基银
Volume Resistivity 体积电阻率	μΩ·cm	10.5	24.2	474.3
Metal Content 金属成分	wt.%	84.5	81.2	74.9
Die Shear Strength 晶片抗剪切强度	N/2*2mm²	106.6	103.2	110.2
Thermal Conductivity 导热率	W/m·K	65.9	23.0	1.2

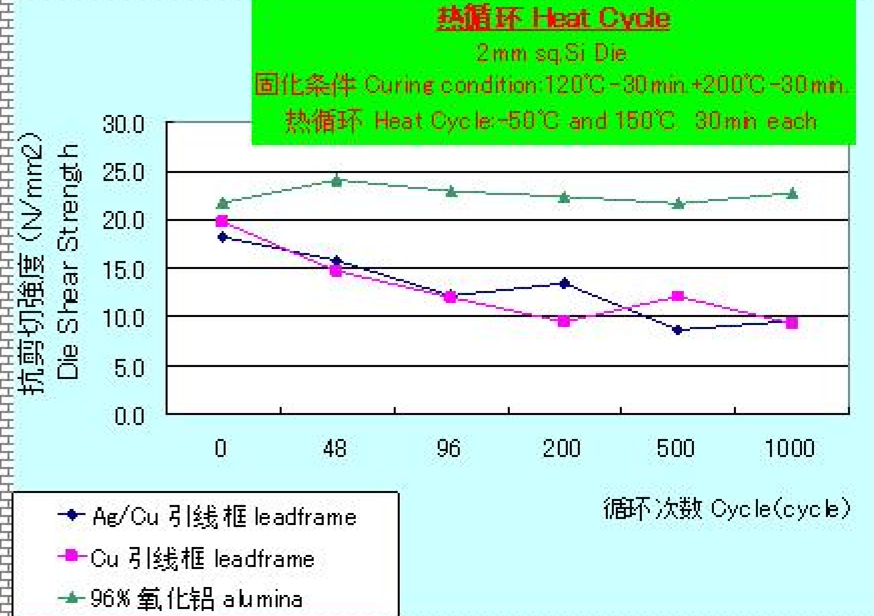
(High Thermal Conductivity and Low Volume resistivity
高导热率和低体积电阻率)

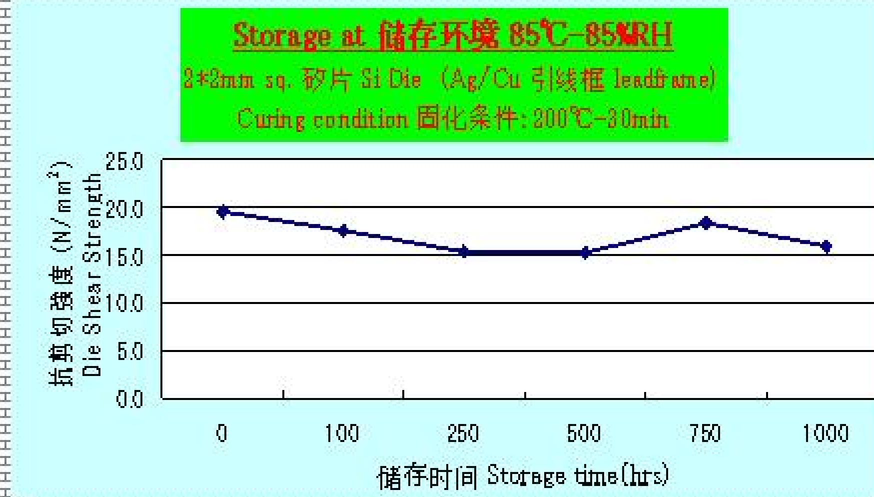
Comparison of Physical Properties

特性 Characteristics	TS3601LD	TS3332LD
固化反应温度 (℃) Curing reaction Temp.	165	170
密度 Density (g/cc)	4.4	3.5
热膨胀系数 T.C.E (ppm) 室温 … [Room Temp.~]	26	19
弹性系数 Elastic Constant (MPa)	3100	2500
离子污染 Ion contamination 钠,钾,氯,氟等的总和 Na,K,Cl,F total	<30ppm	

晶片抗剪切强度数据
Data of Die shear Strength (TS-3332LD)



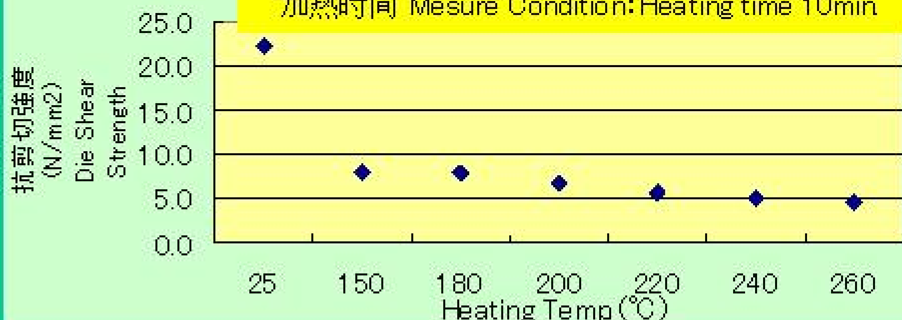


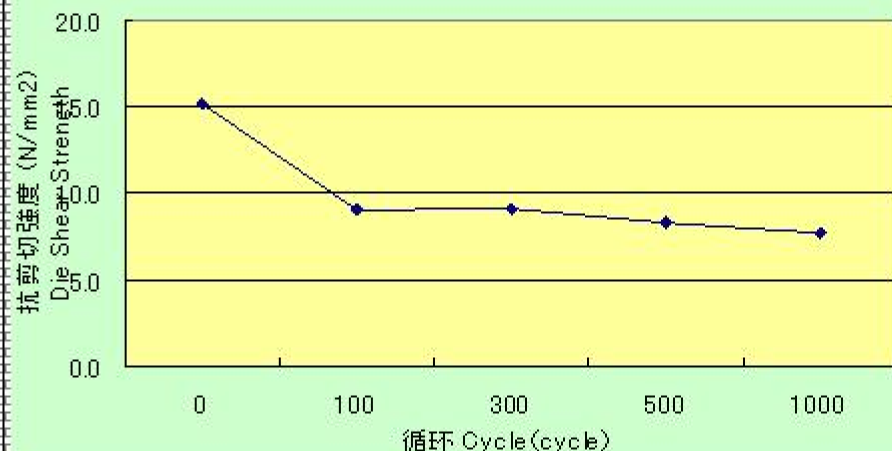


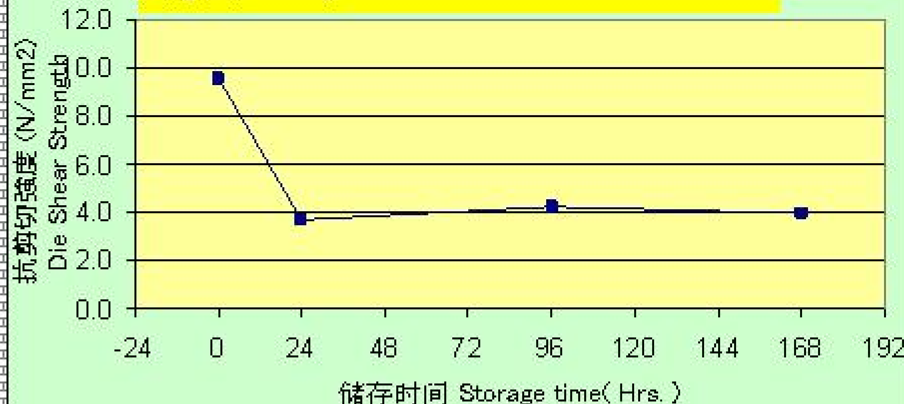
・热朔性树脂令晶片抗剪切强度在加热中变小, 可是在常温中会恢复。… Since thermoplastic resin used, Die Shear Strength becomes weak while heating. But Die Shear Strength is recovered at Room Temp.

・在温度为250℃的焊线中晶片不移位或剥脱。… When Wire Bond at 250℃, Die does not move or not peel .

晶片抗剪切强度数据
Data of Die shear Strength (TS-3601LD)



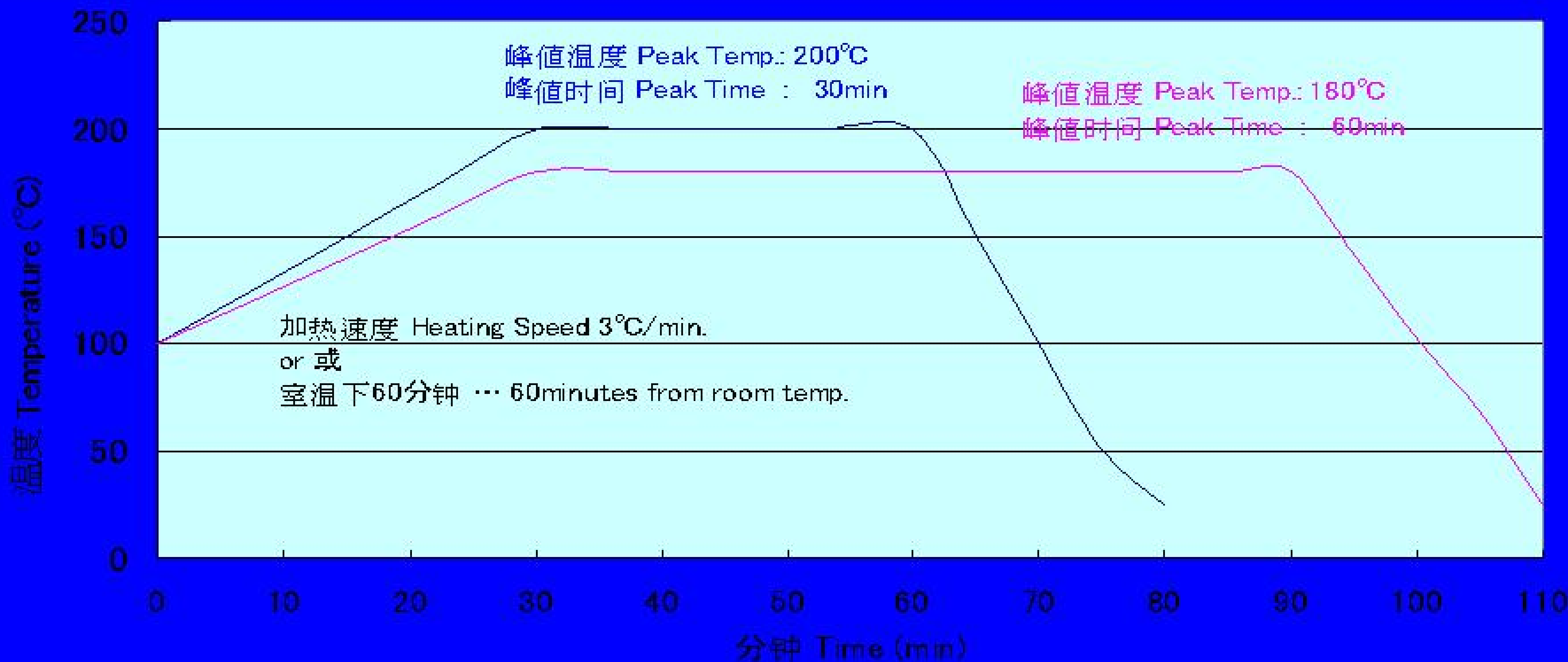




Curing Profile 固化圖表 TS-3332LD

for Die size less than 晶片尺寸小於 6.4X6.4mm

固化 200℃ peak（峰值）30min or 180℃ peak（峰值） 60min

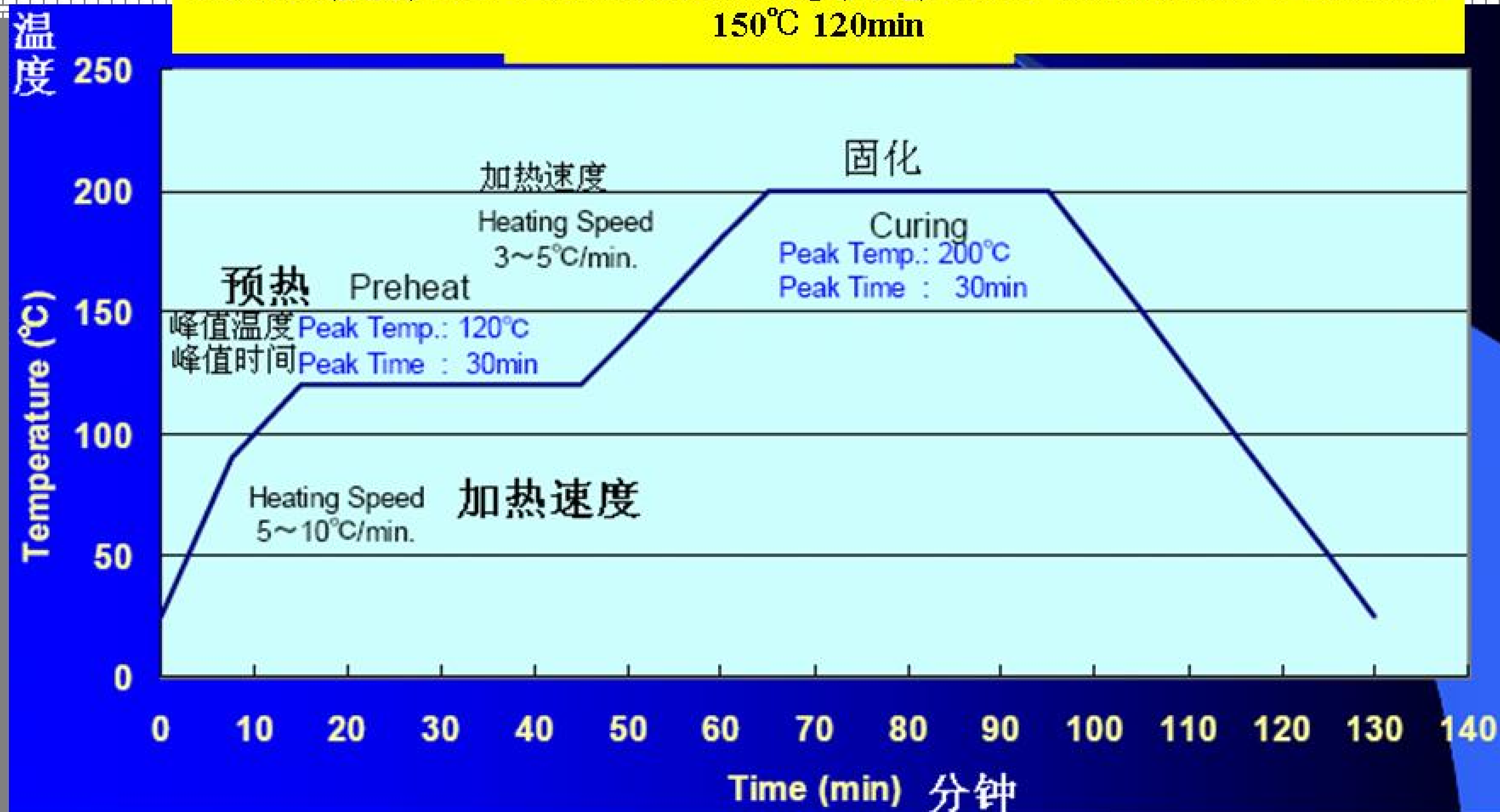


For 150℃ curing, we will recommend TS-3334LD. And Curing Profile for TS-3334LD is 150℃ 120min.
当固化温度为150℃时，建议用TS-3334LD，图表曲线为150℃ 120min.

Slower heating speed will be recommended to minimize voids and larger die.
建议用较慢的加热速度来减低废品或制造较大的晶片

Curing Profile 固化圖表 TS-3601LD

for Die size less than 晶片尺寸小於 6.4X6.4mm



Basic process (基本處理) TS-3332LD (1)

(in case of Bottle Delivery 瓶裝)

- **Stock in sealed bottle at room temperature (6 months shelf life)**
  密封瓶子並儲存在室溫內 (6個月有效期)
- **Re-mixing by spatula more than 2minutes**
  使用前先用攪棍攪拌至少兩分鐘
- **Fill in syringe for dispensing or put in squeegee unit for stamping**
  裝入注入器, 或使用橡皮刮板涂抹
- **Dispense or stamp on substrate or leadframe (3days work life after every re-mixing)**
  注入或涂抹下层或引线框 （3天工作, 每次均要搅拌）
- **Mount IC chip within 15minutes for avoiding surface drying**
  将晶片固定15分钟, 避免表面干掉
- **Cure in recommended profile**
  按照建议的图表指示将晶片固定
- **Do not refreeze**
  不要冷藏
- **Recommendatory thickness is more than 15 μm**
  建议的涂胶厚度多于15微米

Basic process using 基本处理 TS-3332LD (2)
（Syringe Delivery 注入筒)

- Stock in syringe at less than –10℃ w/syringe tip down (6 months shelf life)
  储存温度不低于零下10 ℃，尖端向下 （6个月有效）
- Keep syringe tip down any time at thawing, keeping and using
  不论是解冻，储存或使用，都要尖端向下
- Melt in room temperature over 1hr
  在室内温度下解冻超过一小时
- Set syringe on dispenser or put in squeegee unit for stamping
  装入注入器, 或使用橡皮刮板涂抹
- Dispense or stamp on substrate or leadframe (3days work life)
  注入或涂抹下层或引线框 （3天工作）
- Mount IC chip within 15minutes for avoiding surface drying
  将晶片固定15分钟, 避免表面干掉
- Cure in recommended profile
  按照建议的图表指示将晶片固定
- Do not refreeze
  不要冷藏
- Recommendatory thickness is more than 15 μ m
  建议的涂胶厚度多于15微米

Basic process (基本处理) TS-3601LD(1)

(in case of Bottle Delivery, 瓶装)

- Stock in sealed bottle at room temperature (6 months shelf life)
  密封，储藏于室温下 （6个月有效期）
- Re-mixing by spatula more than 2minutes
  使用前先用攪棍攪拌至少兩分鐘
- Fill in syringe for dispensing or put in squeegee unit for stamping
  装入注入器, 或使用橡皮刮板涂抹
- Dispense or stamp on substrate or lead frame (48 hrs work life after every re-mixing at least)
  注入或涂抹下层或引线框 （至少48小时工作直至搅均）
- Mount IC chip within 10minutes for avoiding surface drying
  将晶片固定10分钟, 避免表面干掉
- Cure in recommended profile
  按照建议的图表指示将晶片固定
- Do not refreeze
  不要冷藏
- Recommendatory thickness is more than 15 μ m
  建议的涂胶厚度多于15微米

Basic process （基本处理） TS-3601LD(2)
（in case of Syringe Delivery，注入筒)

- Stock in syringe at less than –10℃with syringe tip down (6 months shelf life)
  储存温度不低于零下10 ℃，尖端向下 （6个月有效）
- Keep syringe tip down any time at thawing, keeping and using
  不论是解冻，储存或使用，都要尖端向下
- Melt in room temperature over 1hr
  在室内温度下解冻超过一小时
- Set syringe on dispenser or put in squeegee unit for stamping
  装入注入器, 或使用橡皮刮板涂抹
- Dispense or stamp on substrate or leadframe (48hrs work life at least)
  注入或涂抹下层或引线框 （至少48小时工作）
- Mount IC chip within 10minutes for avoiding surface drying
  将晶片固定10分钟, 避免表面干掉
- Cure in recommended profile
  按照建议的图表指示将晶片固定
- Do not refreeze不要冷藏
- Recommendatory thickness is more than 15 μm
  建议的涂胶厚度多于15微米

Ptototype for Short Time Curing 快速固化的模式

编号 Code name	TS360LD	TS361 LD	
模式 Prototype	CA	D	D5
用途 Aim of Prototype	Low Solvent 低溶性	Solvent Free 不溶性	Solvent Free & Low Volume Resistivity 低溶和低的体积电阻
黏度 Viscosity（Pa·s）	32	43	51
银含量 Ag Content (wt%) [Cured]	80.3	84.1	86.1
导热率 Thermal Conductivity（W/m·K）	6	8	10
体积电阻率 Volume Resistivity（μΩ·cm）	63.1	49.8	36.0
晶片抗剪切强度Die Shear Strength（N/2mm□）	50.5	31.9	40.3
固化条件 Curing Condition	220℃-1 min(on the Hotplate 热盘中)		

Recommended cured thickness is more than 15μm

建议固化后的厚度大于15微米

Balanced Short Time Curing & Low Volume Resistivity 平衡的快速固化和低体积电阻 (TS-361LD-D5)

Feature of TS-361LD-D5 for Short Time Curing
TS361LD-D5 快速固化的特性