

## 品质承认书 Quality specification

客户 Customer:		
供应商: 广东东溢新材料科技有限公司 Supplier: GUANGDONG DONGYI HIGH-TECH MATERIAL SCIENCE&TECHNOLOGY CO., LTD.		
产品类型 Product type: 高频覆盖膜 LOW DK/DFCoverlay		
材料品名 Material name: DCIL		
编号 No:C074 版本 Ver: B2 制作日期 Date of production:2024/01/16		
客户确认 Customer:		
采购 Purchase:	品质 Quality:	工程 Engineering:
职务 Position:	职务 Position:	职务 Position:
备注 Note: (盖章 Seal)		
广东东溢新材料科技有限公司 GUANGDONG DONGYI HIGH-TECH MATERIAL SCIENCE&TECHNOLOGY CO., LTD.		
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## 产品名称 Product name

序号 No	东溢型号 DY model	PI 厚度(um) PI thickness	胶厚(um) AD Thickness	包装规格 Packaging
1	DCIL01561K	12.5	15	250mm*200m
2	DCIL02061K	12.5	25	250mm*200m
3	DCIL02561K	12.5	25	250mm*200m
4	DCIL01561J	12.5	15	250mm*200m
5	DCIL01561N	12.5	15	250mm*200m
6	DCIL12561L	25	25	250mm*200m
7	DCIL13561L	25	35	250mm*200m
8	DCILT1561R	7.5	15	250mm*200m

## ●产品特性 Product Features

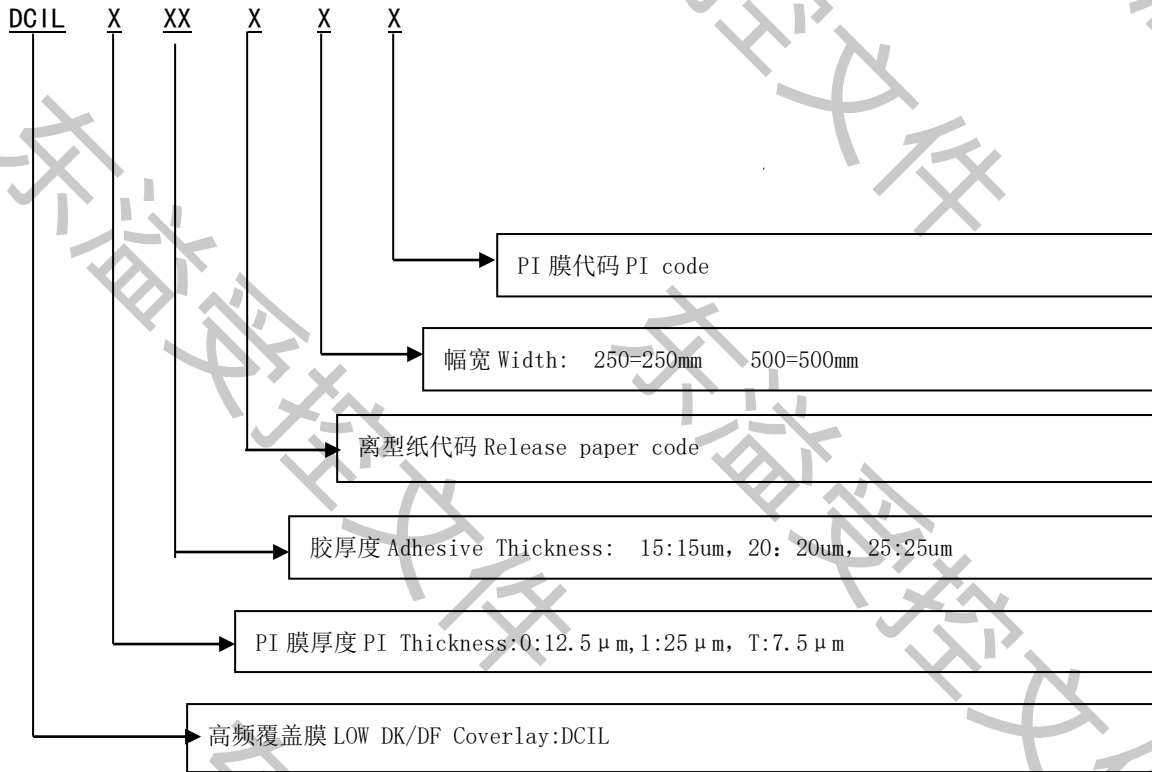
- 极低的介电常数和损耗因子 Very low DK and DF
- 卓越的电性能和绝缘性 Fine electrical performance and insulation performance
- 良好的尺寸稳定性 Good dimensional stability
- 优异的高温高湿性能 High temperature and high humidity performance
- 无卤无锑，符合 ROHS 环保指令 Halogen & antimony free, ROHS compliant

## ●产品结构 Product Structure

PI膜 PI film
改性MPI 胶粘剂 Modified MPI Adhesive
离型纸 Release paper

### ● 编码原则 Product coding principle

品名示意图如下 The diagram as follows:



### ● 物性指标 General Properties

序号 Item	性能项目 Test Item	单位 Unit	测试条件 TestCondition	标准 Standard	测试方法 Test Method
1	厚度 Thickness	um	厚度 < 30um	±3	东溢规范 DongyiMethod
			厚度 ≥ 100um	±10%	
2	幅宽 Width	mm	A	标准 Standard+2/-0	东溢规范 DongyiMethod
3	剥离强度 Peel Strength	kgf/cm	A	≥0.7	IPC-TM-650-2.4.9
4	耐化学品性 Chemical Resistance	%	HCl&NaOH 2mol/L	≤20	IPC-TM-650-2.3.2
5	焊锡耐热性 Solder Resistance	---	288℃/10S	无分层、起泡 No delamination, sparkling	IPC-TM-650-2.4.13

6	溢胶量 Resin Flow	mm	180°C/10s /100kgf/90s	0.05~0.30	IPC-TM-650-2.3.17.1
7	尺寸稳定性 Dimensional stability	%	Method - B	≅ ±0.15	IPC-TM-650-2.2.4
8	表面电阻 Surface Resistance	Ω	C-96/23/65	≅ 10 <sup>10</sup>	IPC-TM-650-2.5.17
9	体积电阻 Volume Resistance	Ω.cm	C-96/23/65	≅ 10 <sup>12</sup>	IPC-TM-650-2.5.17
10	介电常数 Dielectric Constant	---	25°C, 55%RH ,10GHz	≅ 3.3	SPDR
11	消耗因素 Dissipation Factor	---		≅ 0.015	

注 Note : A 代表常态 “A” Means normal.

### ● 外观管控 Appearance requirement

异常类型 Exception classes	异常大小 Abnormal size	允许个数 Allowed value (250*400mm)
杂质 Impurity	0.1~0.5mm	≅ 8 个 dots
垫伤 Pad injury	0.5~1mm	≅ 1 个 dots
气泡 Bubble	≅ 1mm	不允许 Not allowed
接头 Joint		≅ 3 个

注 Note: 产品边缘 3mm 以内异常, 不作管控要求 From the product within 3 mm of the edge of exception, don't do control requirements.

### ● 储存 Storage

温度 < 10°C、湿度 < 70% RH、真空包装、无腐蚀性气体的室内, 制造日期后保存 3 个月。Temperature < 10°C, humidity < 70% RH, airproofvacuumedpackaging, no corrosive gas chamber for 3 months.

### ● 包装 Packing

- 每一卷成品用纸管卷取。每批出货的每个规格提供一份品质检验报告 Each volume of finished paper tube winding.
- 每一卷成品用纸箱包装, 避免在运输上碰撞。产品采用防潮、干燥、密封包装, 成卷装入纸箱 Each volume of finished carton packaging, in the transport collision avoidance. Products using moistureproof, dry, sealed packaging, rolls into cartons.

3. 包箱标签 Package box label

无卤标签 Halogen free label: 环保标签 Green label: 合格标签 Inspection tag:



唛头 Shipping mark:

 广东东溢新材料科技有限公司 <small>GUANGDONG DONGYI HIGH-TECH MATERIAL SCIENCE&amp;TECHNOLOGY CO., LTD.</small>	
<b>覆盖膜</b>	
订单号 Order:	
型号 Type:	
宽度 Width: mm	
长度 Length: m	
面积 Area: m <sup>2</sup>	
接头 Splice: m	
批号 Lot. NO:	
生产日期 Production date:	
保质期至 Shelf life:	
储存环境 Storage : <10℃, <70%RH	

月份标签 Month label:

一月 Jan.	二月 Feb.	三月 Mar.	四月 Apr.	五月 May.	六月 June.	七月 July.	八月 Aug.	九月 Sept.	十月 Oct.	十一月 Nov.	十二月 Dec.
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>

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## ● 装运 Shipment

每批提供一份质量检验报告，如下表（报告模版仅供参考）：Each shipment of each specification provides a quality inspection report. The following table (Report format for reference only):

 <b>广东东溢新材料科技有限公司</b> <small>GUANGDONG DONGYI HIGH-TECH MATERIAL SCIENCE&amp;TECHNOLOGY CO., LTD.</small>			
覆盖膜出厂检验报告			编号: JL-Q-02-004-09
日期 (Date) :		客户 (customer) :	
品名 (Material spec)			
批号 (Lot No.)			
PI厚度 (PI thickness) Unit: μm			
接着剂厚度 (Adhesive thickness) Unit: μm			
保存期限 (Shelf life)		<10℃, <70%RH 保存3个月 ( Below 10℃, 70%RH for 3 months)	
检验项目 (Test item)	检验方法 (Test method)	品质标准 (Quality Spec)	测试结果 (Test Result)
PI+Adhesive厚度 (PI+Adhesive thickness)	东溢规范 (Unit: μm)	±3	
幅宽 (width)	东溢规范 (Unit: mm)	250 +2/-0	
溢胶量 (Resin flow)	IPC-TM-650/2.3.17.1 (Unit: mm)	0.05-0.15	
剥离强度 (Peel Strength)	IPC-TM-650 2.4.9 (Unit: kgf/cm)	≥ 0.7	
尺寸安定性 (Dimension Stability)	MD	IPC-TM-650 2.2.4 method B Unit: %	±0.15
	TD		
表面电阻 (Surface Resistivity)	IPC-TM-650 2.5.17 (Unit : Ω)	≥10 <sup>10</sup>	
体积电阻 (Volume Resistance)	IPC-TM-650 2.5.17 (Unit : Ω.cm)	≥10 <sup>12</sup>	
焊锡耐热性 (Solder Float Resistance) 288℃/10sec	IPC-TM-650 2.4.13	无分层起泡 (No Blistering or Delamination )	
产品判定结果			

**备注:**

1. 以上测试数据仅供参考。
2. 上述产品不含 [RoHS] 所规定的禁用物质。
3. 90度垂直拉铜面测试剥离标准: ≥0.7kgf/cm。
4. 如产品被放置在低温下储存环境 (尤其是冬季) 建议客户在使用前将产品静置回暖直至产品温度回升至室温 (20-30℃) 后方可使用, 以确保最佳产品使用特性, 同时也应避免放置在阳光直接照射及高温环境下。
5. 建议开料后的覆盖膜在所有制程流转中加装在密封袋中保存, 尽量控制在5天内完成压合工序, 防止覆盖膜受潮影响涨缩或是溢胶量变化。
6. 压合后的产品建议使用千层架烘烤, 如无千层架建议叠层张数不超过20PNL, 以避免叠层太多而影响产品固化效果。

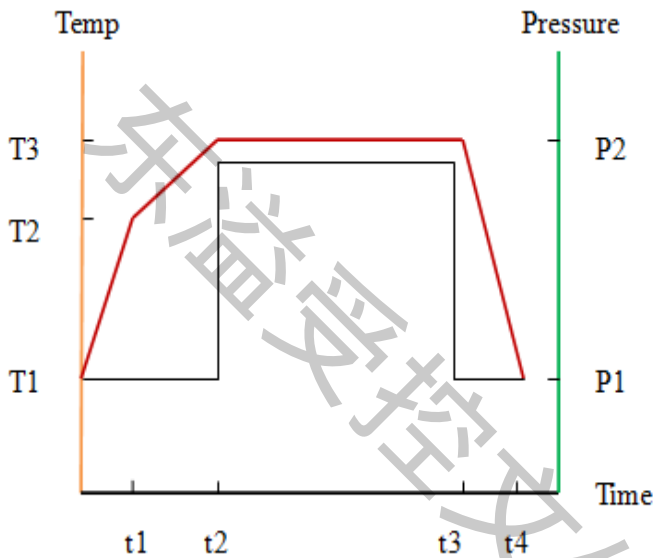
地址: 广东省中山市南区昌盛路22号 电话: 0760-23338784 传真: 0760-23336588 邮编: 528455

审核 (APPROVED BY): 李松梅

检验员 (CHECKED BY): 陈景玲

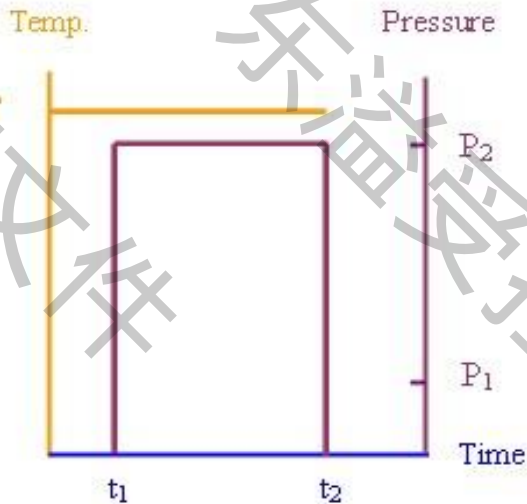
### ● 建议压合工艺 Recommendations for pressing process

温度 Temp 压力 Pressure



#### 传压工艺 Traditional pressing:

- 第一段: 温度 Temp T1~T2 50°C ~ 120°C  
压力 Pressure P1 10~20kgf/cm<sup>2</sup>  
时间 Time t1 10~20min
- 第二段: 温度 Temp T2~T3 120~160~170°C  
压力 Pressure P2 10~20kgf/cm<sup>2</sup>  
时间 Time t2 20~30 min
- 第三段: 温度 Temp T3 160~170°C  
压力 Pressure P2 30~40kgf/cm<sup>2</sup>  
时间 Time t2~t3 60~90 min
- 第四段: 温度 Temp T2~T1 160~170°C ~ 50°C  
压力 Pressure P1 10~20kgf/cm<sup>2</sup>  
时间 Time t3~t4 30~60 min



#### 快压工艺 The quick pressing:

- 第一段: 温度 Temp: 180±5°C  
Stage I 压力 Pressure: 0Kgf/cm<sup>2</sup>  
时间 Time: 5~20Sec
- 第二段: 温度 Temp: 180°C  
Stage II 压力 Pressure: 100~120Kgf/cm<sup>2</sup>  
时间 Time: 120~150Sec
- 固化 Curing Process:  
温度 Temp: 160~170°C;  
时间 Time: 60~120min.

注 Note: 以上建议压合参数, 鉴于各厂家机台及生产工艺差异, 故仅供参考。建议尽量使用传统压合工艺。Customers can according to their own technology, equipment conditions and performance requirements, through the test to determine the appropriate operating conditions. It is recommended that the traditional pressing process be used as far as possible.

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## ●使用注意事项 Matters needing attention

1. 如产品被放置在低于 10 度以下储存环境，建议客户在使用前将产品静置 4 小时以上回暖直至产品温度回升至室温温度（20--30℃）后方才使用、以确保最佳产品使用特性，同时也应避免放置在阳光直接照射及高温环境下 if product was placed in under Temperature 10℃for storage, the product should be placed in the room temperature 20~30℃ more than 4 hours before using, in order to make the product temperature up to 20~30℃, to ensure the best product features. At the same time should also avoid placing it in direct sunlight and high temperature environment.
2. 在背胶前，如接触界面做表面清洁，须保证接触界面干燥及不残留溶剂（如酸碱、油污等）。Before lamination, such as contact interface makes the surface cleaning, must also ensure that the contact interface and not dry residual solvents (such as acid and alkali, oil etc.).
3. 压合后的产品建议使用千层架烘烤，如无千层架建议叠层张数不超过 20PNL，以避免叠层太多而影响产品固化效果。Pressing products recommend the use of multi-layer frame, such as no proposal for multi-layer frame lamination number no more than 20 PNL, to avoid the laminated too much and influence product curing effect.
7. 此规格书中表述的所有测试数据以及建议之工艺条件和参数仅供参考，产品使用方需要按照自身实际生产设备及产品要求等因素自行确认最优生产工艺及作业参数。特此声明！

Hereby declared that all test data and recommended process conditions and operating parameters presented in this technical datasheet are for informational purposes only. Product users need to confirm the optimal production process and operating parameters according to their actual production equipment and product requirements.

## ●物性测试方法 Properties Test Method

### 剥离强度检验方法 Peel Test Method

#### 1、范围 The range:

本检验方法适用本公司覆盖膜产品剥离强度之量测。This test method for coverlay measurement of peel strength.

#### 2、检测仪器 Testing instruments:

剥离强度测试仪 Peel strength testing instruments



## 3、样品制作 The sample:

a) 将覆盖膜切成 10cm×10cm 大小, 与大小一致的纯铜箔贴合(胶厚 $\geq 25 \mu\text{m}$ , 用 10Z ED 铜箔贴合; 胶厚 $< 25 \mu\text{m}$ , 用 1/20Z ED 铜箔贴合)。Coverlay cut into 10 cm by 10 cm size, consistent with the size of copper foil laminating ( $\geq 25 \mu\text{m}$ , with 10Z ED copper foil laminating;  $< 25 \mu\text{m}$ , 1/20Z ED with copper foil laminating).

b) 将覆盖膜平放在铜箔光面上, 放入 100℃ 过塑机过一遍。Coverlay on the smooth surface of copper foil, in the 100 °C molding machine again.

c) 快压: 温度 180℃、压力 100kgf/cm<sup>2</sup>、预热 10s、成型 90s; 熟化: 160 °C × 60min; Quick pressure: temperature 180°C, pressure 100 kgf/cm<sup>2</sup>, Time 10 s, 90 s; Cure: 160 °C x 60 min.

## 4、样品测试 The sample test:

a) 取熟化过后之样片, 裁切 1cm 宽度, 烧开使得 PI 与铜箔分开然后用手撕开约 3cm。Take samples after curing, cutting 1 cm width to boil make PI is separated from copper foil.

b) 把样品 PI 膜面用双面胶固定在测试仪的滚轮上, 用夹具夹住铜箔一端, 与滚轮垂直, 然后匀速上升, 每隔 1 秒, 按打印机一次, 共打印出 15~30 个数据即可, 取打印数据的平均值作为此条样品的剥离强度值。The samples PI surface with double-sided adhesive fixed on the roller tester, fixture for clipping the copper foil at one end, and vertical roller, and then rising at a constant speed, every 1 second, print 1 data, print out together 15 ~ 30 data, take the print data as the average of the peel strength value of this sample.

c) 注意事项: 剥离机上升速度: 50mm/min, 剥离距离: 10~20mm; 拉铜箔、样品与滚轮垂直。Note: machine rise: 50 mm/min, stripping distance: 10 ~ 20 mm; Pull copper foil, samples and vertical roller.

## 5、公式计算 Formula to calculate:

$$\text{剥离强度 Peel strength} = \frac{\text{拉力 Tensile force (kgf)}}{\text{宽度 The width (cm)}}$$

注: 以上规范参考 IPC-TM-650, Method 2.4.9. Note: The above specification reference IPC - TM - 650, Method 2.4.9.

## 溢胶量检验方法 Resin Flow Test Method

## 1. 范围 The range:

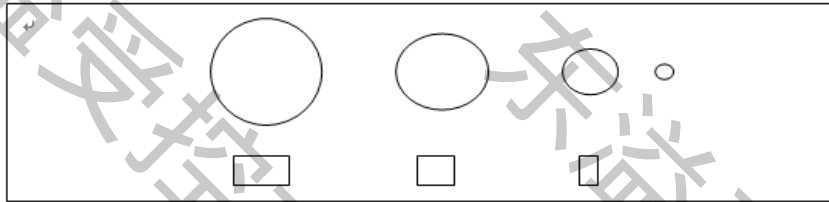
本检验方法适用于本公司产品中覆盖膜溢胶量之量测。This test method for coverlay measurement of resin flow.

2. 检测设备 Testing instruments:

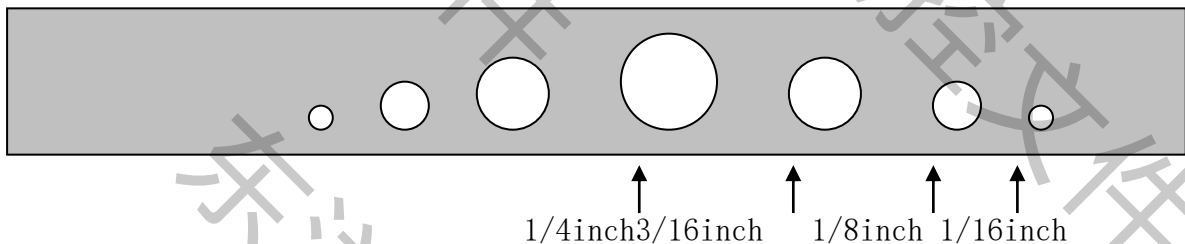
冲孔机、过塑机、快压机、镜像显微镜。Punching machine, laminator, press, microscope.

3. 样品制作 The sample:

取试样尺寸 25mm\*40mm, 依次冲出  $\Phi 6.4\text{mm}$ 、 $\Phi 4.8\text{mm}$ 、 $\Phi 2.4\text{mm}$ 、 $\Phi 1.6\text{mm}$  的四个圆孔, 同时在孔下方再依次冲出  $3\text{mm} \times 2\text{mm}$ 、 $2\text{mm} \times 2\text{mm}$ 、 $1\text{mm} \times 2\text{mm}$  的三个方孔, 如下图所示: Take the sample size 25mm\*40mm, punching  $\Phi 6.4\text{mm}$ ,  $\Phi 4.8\text{mm}$ ,  $\Phi 2.4\text{mm}$ ,  $\Phi 1.6\text{mm}$  four holes, and then punching  $3\text{mm} \times 2\text{mm}$ ,  $2\text{mm} \times 2\text{mm}$ ,  $1\text{mm} \times 2\text{mm}$  three square holes, as shown below:



如有条件, 可按 IPC-TM-650, Method 2.3.17.1 制图: If there are conditions, according to Method, 2.3.17.1 IPC-TM-650 to make samples:



4. 压合方法 Pressing method:

a) 将覆盖膜样品与半对半双面压延覆铜箔帖合, 然后用  $100^\circ\text{C}$  过塑机过一遍。Coverlay on the smooth surface of copper foil, in the  $100^\circ\text{C}$  molding machine again.

b) 放入快压机时, 垫上绿硅胶, 上下用  $25\mu\text{m}$  离型膜夹住样品, 快压: 温度  $180^\circ\text{C}$ 、压力  $100\text{ kg f/cm}^2$ 、预压 10s、成型 90s。Quick pressure: temperature  $180^\circ\text{C}$ , pressure  $100\text{ kgf/cm}^2$ , Time 10 s, 90 s; Cure:  $160^\circ\text{C} \times 60\text{ min}$ .

5. 溢胶量判定 Determination of resin flow:

利用镜像显微镜量测覆盖膜之接着剂溢胶情况, 利用接目镜 10 倍数和接物镜 3.5 倍数来测试。分别观测并记录不同孔径之最大溢胶刻度值, 再取各孔径平均值即为测试值。By microscope measurements resin flow, the eyepiece and objective 10times to 3.5 times. Observed and recorded the biggest different aperture of resin flow scale value, then the aperture average is the test value.

注: 以上规范参考 IPC-TM-650, Method 2.3.17.1; Note: The above specification

reference IPC - TM - 650, Method 2.3.17.1.

### 尺寸安定性检验方法 Dimensional Stability Test Method

1. 范围 The range:

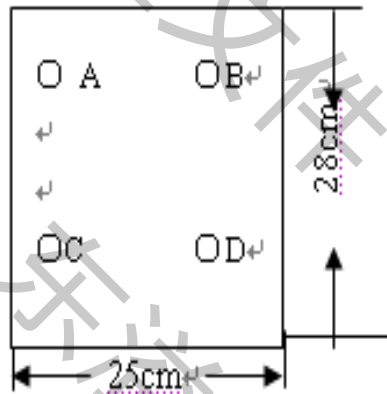
本检验方法适用于本公司产品中覆盖膜尺寸安定性之量测。This test method for coverlay measurement of dimensional stability.

2. 检测设备 Testing instruments:

二次元坐标仪、冲孔机、烘箱 Two dimensional coordinate system, punching machine, oven

3. 样品制作 The sample:

裁切尺寸 MD28±1cm×TD25±1cm，并在四个角位置用冲孔机打出四个孔，其尺寸如图所示。Cutting size MD28±1cm×TD25±1cm, and in the four angular position with a punch press four holes, whose dimensions are shown in Figure:



4. 测量 Measure:

a) 覆盖膜冲切如上图大小尺寸，没撕离型纸前，测试；撕开离型纸（撕离型纸）后放置 10 分钟，再测。Punch such as the size of the image above, did not tear off the type of paper, testing; tear off type paper (tear off type paper) after placement for 10 minutes, and then measured.

b) 用二次元测量 A. B. C. D. 四孔之间的距离并记录。Measure the distance between the A. B. C. D. four holes in the two dimension and record.

公式计算 Formula to calculate:

$$TD = \frac{\left[ \frac{(A-B)_F - (A-B)_I}{(A-B)_I} + \frac{(C-D)_F - (C-D)_I}{(C-D)_I} \right]}{2} \times 100\%$$

$$\left[ \frac{(A-C)_F - (A-C)_I}{(A-C)_I} + \frac{(B-D)_F - (B-D)_I}{(B-D)_I} \right]$$

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$$MD = \frac{\quad}{2} \times 100\%$$

TD : 横向尺寸变化百分率 Percentage change in lateral dimension

MD : 纵向尺寸变化百分率 Longitudinal dimension variation

I : 起初(第一次)之距离读数 First distance readings

F : 撕开离型纸(第二次)之距离读数 Tear off the type of paper (second times) the distance readings

E: 每个样品分别测量三组, 然后取其平均值作为判定标准。Each sample was measured in three groups, and then the average value was taken as the criterion.

注: 以上规范参考 IPC-TM-650, Method 2.2.4; Note: The above specification reference IPC - TM - 650, Method 2.2.4.

### 焊锡耐热性检验方法 Solder Resistance Test Method

#### 1. 范围 The range:

本检验方法适用于东溢公司覆盖膜产品焊锡耐热性之量测。The test method for coverlay measurement of solder resistance.

#### 2. 检测设备 Testing instruments:

锡炉。Wave solder

#### 3. 样品制作 The sample:

3.1 将样片切成 23cm×14cm 大小, 与 25cm×16cm 大小的单面覆铜箔(ED 铜)铜箔面过塑贴合。Cut samples in 23cm×14cm, with the size of 25cm×16cm of one-side copper (ED) copper-clad copper foil surface plastic laminating.

3.2 将过塑好的样品用快压机压合, 压合好后使用烘箱进行熟化。Will have plastic samples with quick press press, pressing after used for curing oven.

a. 压合参数为: 温度 180±5℃、压力 120bar、预热 10s、成型 90s。Pressing parameters: temperature 180 + 5 °C, pressure of 120 bar, preheat 10 s, 90 s.

b. 熟化参数为: 160℃/1H。Curing parameters for: 160 °C / 1 h

3.3 将熟化完成的样品裁剪成剪取 5±1cm × 5±1cm 立即进行浸锡测试; 如无法立刻测试的, 先将样品密封放置于干燥器中, 在进行焊锡耐热性测试前, 先将试样放入空气循环烘箱, 用 135±10℃ 温度烘 1 小时, 样品取出后立即进行测试以免因受潮影响测试误判。Will complete the samples of the slaking tailoring shearing 5 + / - 1 cm x 5 + 1 cm immersion tin test immediately; As can't test at once, the first sample of the seal is placed in the dryer, before solder heat resistance test, the sample into the first air circulation drying oven, with 135 plus or minus 10 °C temperature bake for 1 hour, to take out the sample immediately after testing in order to avoid because of be affected with damp be affected with damp impact test

miscalculation.

4. 样品测试 The sample test:

用镊子夹住样品浸入恒温焊锡液中，焊锡液温度 $288 \pm 5^{\circ}\text{C}$ ，每个样品浸锡10S，然后拿出观察其表面是否有分层或起泡。Using tweezers samples immersed in a constant temperature liquid solder, solder liquid temperature  $288 \pm 5^{\circ}\text{C}$ , each sample dipping 10S, then take out to observe the surface whether delamination or blistering.

注：以上参考 IPC-TM-650，Method 2.4.13。Note: The above specification reference IPC - TM - 650, Method 2.4.13.