



广州宏庆电子有限公司  
GUANGZHOU HONGQING ELECTRONIC CO. LTD

# EMI Sheilding Film HCF-6000G

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# 产品特性

## PRODUCT FEATURES

HCF-6000G is researched and developed by Hongqing independently. It is a kind of electrical functional film produced by PVD (Physical Vapor Deposition) and appropriate stacking technologies, which combined advantages of high-performance shielding effectiveness, excellent softness properties, excellent peel strength , excellent electrical conductivity and being able to be marked together. It is widely used on flexible printed circuit board,it's Three-layer Structure, the shielding layer structure is silver.

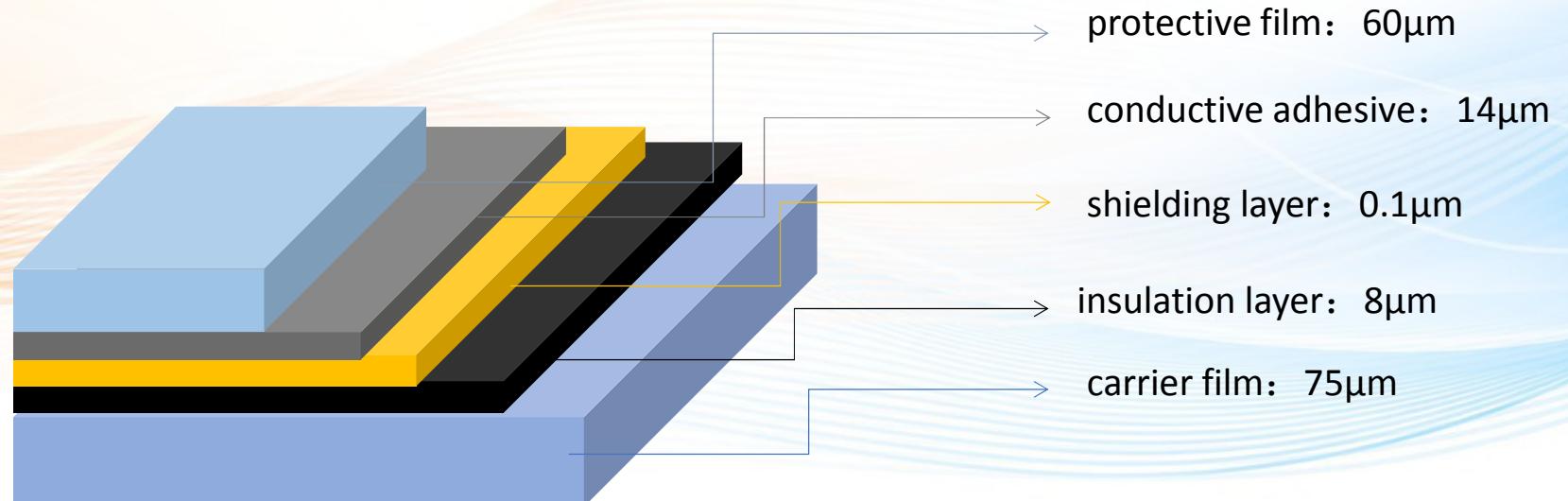
- 1 High-performance shielding effectiveness.
- 2 It can realize impedance control and excellent grounding property.
- 3 Easy and efficient to operate.
- 4 Good oxidation resistance, high temperature resistance and salt spray resistance .
- 5 Meet environmental requirements (no halogen, ROHS2.0, REACH 175).
- 6 Without brominated flame retardants, chlorinated flame retardants and phosphorus containing flame retardants
- 7 Excellent surface adhesion (up to 34 dyne)



# 产品结构规格

## PRODUCT STRUCTURE AND SPECIFICATION

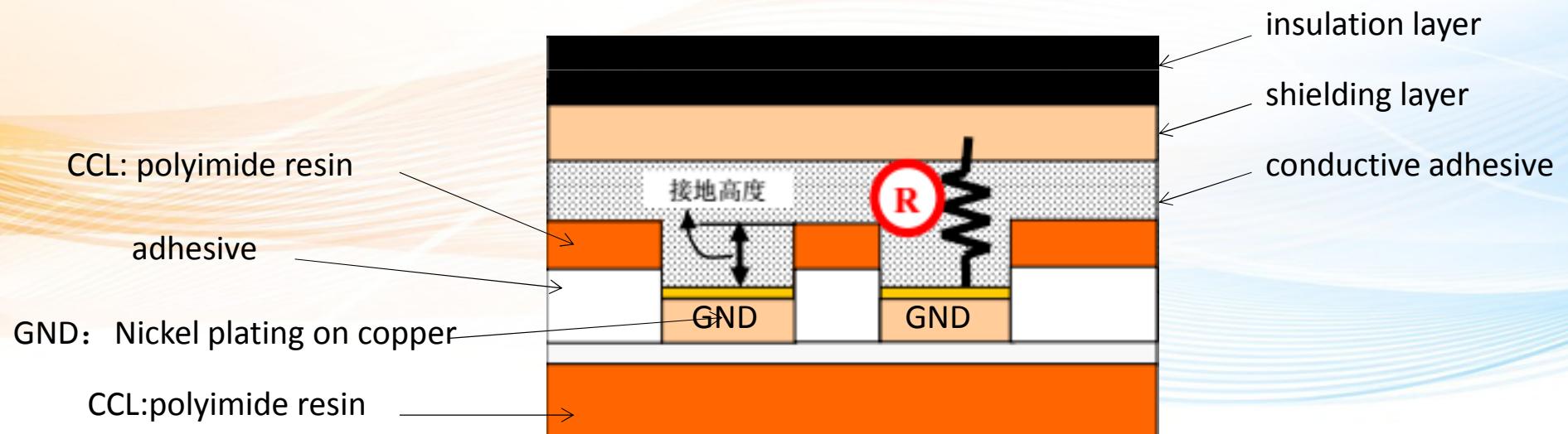
### ◆ Product Structure



# 产品结构规格

## PRODUCT STRUCTURE AND SPECIFICATION

### ◆ Product use profile



# 屏蔽膜之核心功能：屏蔽效能（屏蔽性能）

CORE FUNCTION OF SHIELDING FILM: SHIELDING EFFECTIVENESS

- ◆ **Principle:** As an EMI shielding product for FPC, the core function of HCF-6000G is containing continuous of compact alloy layers which could weaken the electromagnetic interference by absorbing energy , reflecting energy and counteracting energy .
- ◆ **The third party testing organization :** Shanghai institute of measurement and testing technology
- ◆ **Testing technical specifications:** GB/T 30142-2013
- ◆ **Measuring instrument:** Signal Generator/E8257D   Spectrum Analyzer/FSU26



# 屏蔽性能的简易评估方法：表面方阻

SIMPLE EVALUATION METHOD OF SHIELDING EFFECTIVENESS: SURFACE SQUARE RESISTANCE

◆ **Test method:** Measure the surface resistance of conductive adhesive

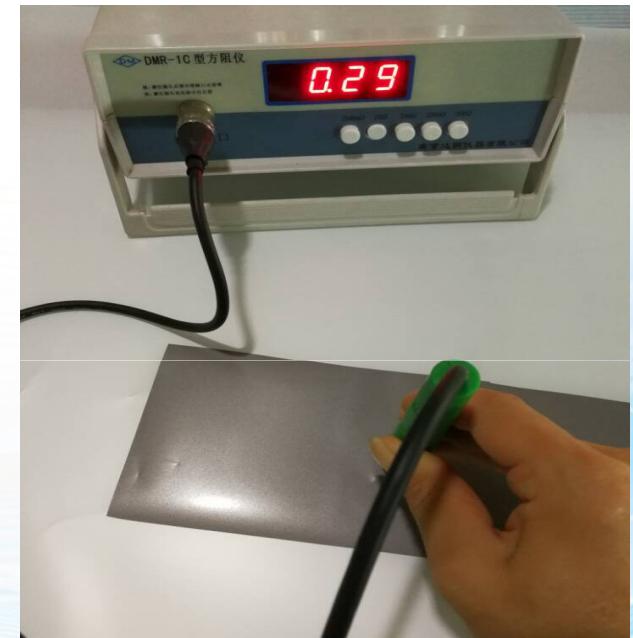
surface of electromagnetic film by square resistance meter.

1. Remove the protective film

2. Measure the surface resistance of conductive adhesive surface as  
the right picture.

◆ **Evaluation criteria:**  $<1\Omega/\square$

◆ **Test result :**  $<0.5\Omega/\square$



number	1	2	3	4	5
Measured value	0.29	0.32	0.27	0.38	0.31

# 绝缘电阻测试

INSULATION RESISTANCE TEST

## ◆ The test method:

Laminate the EMI film on the cover film of FPC, remove the carrier film and place two small pieces of steel on the surface (spacing of 1cm), Use a multimeter to test the resistance between steel pieces. (Pressing parameters, Quick press temperature:  $180 \pm 5^\circ\text{C}$ , pressure  $120\text{kg}/\text{cm}^2$ , prepress 10s, press 120s, Curing time  $160^\circ\text{C}$  1 hour)

ps: All pressure curing parameters of this PPT are the same.

## ◆Evaluation criteria: $>1\times10^8\Omega$

## ◆Test result: Insulation resistance $>2\times10^8\Omega$

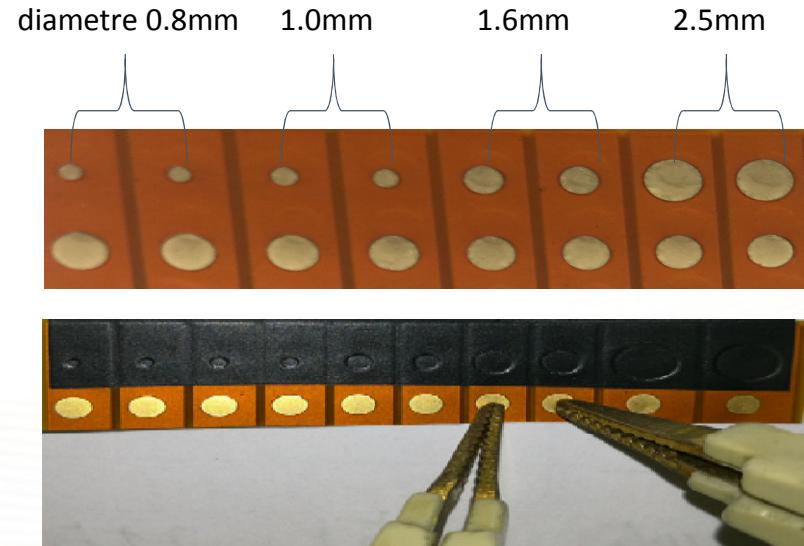


# 接地电阻测试

EARTHING RESISTANCE TEST

## ◆ Test method:

Design a earthing PAD with different holes(0.8mm、1.0mm、1.6mm and 2.6mm)



Measuring the earthing resistance of the different grounded apertures

of the electromagnetic film after the Pressing cured and solder float of

288°C

◆ Evaluation criteria:  $<1\Omega$

◆ Test result (As shown in the right)

projects	Hot Pressing curing				solder float 288 °C*10s*3times			
	PAD diameter/mm	0.8	1.0	1.6	2.5	0.8	1.0	1.6
resistance/ $\Omega$	0.63	0.58	0.46	0.42	0.89	0.81	0.69	0.56

# 对阻抗影响

## EFFECTS ON IMPEDANCE CONTROL

### ◆ Test the influence of impedance of HCF-6000G electromagnetic film.

The following table is the influence of electromagnetic film on impedance value (require  $100 \pm 10 \Omega$ )

Reference layer	lineair	HCF-6000G		
		Maximum	Minimum	Average
grid	differential	99.98	94.542	97.502
		98.255	95.187	96.772
	single-ended	39.626	38.083	38.681
		36.455	34.32	35.117
Solid copper	differential	91.614	87.814	89.609
		94.263	88.968	91.906
	single-ended	34.336	32.834	33.333
		34.618	32.897	33.458
PI	differential	121.84	115.44	119.42
		120.86	113.6	117.77
	single-ended	54.56	52.346	53.649
		55.674	53.17	54.924

# 对阻抗影响

## EFFECTS ON IMPEDANCE

### ◆ Test impedance line width: (unit: mm)

Line width	PI		Solid copper		grid		Average	Maximum	Minimum
single-ended	0.085	0.084	0.082	0.083	0.082	0.085	0.084	0.085	0.082
differential	0.041	0.041	0.041	0.039	0.037	0.04	0.040	0.041	0.037
	0.04	0.041	0.038	0.038	0.041	0.041	0.040	0.041	0.038

The single-end line width is designed 0.1mm, after etching is 0.082-0.085mm, the average is 0.084mm

The differential line width is 0.057mm, after etching is 0.038-0.041mm, the average is 0.04mm.

### ◆ Impedance test analysis:

The influence of HCF-6000G on impedance can be controlled within the required range.

# 环保特性

## ENVIRONMENTAL PROTECTION FEATURE

### ◆Environment friendly:

Test projects	ROHS 2.0	halogen-free	REACH 175	Flame retardant
The third party testing organization	SGS	TUV	TUV	UL
Test date	2017-8-3	2017-8-29	2017-9-21	2017-7-19
Test result	qualified	qualified	qualified	VTM-0
Number	CANEC1714873501	0164103691a001	0164105557a001	20170719-E491076

# 耐热冲击性

Heat resistance test

◆ **Test method:**

Laminate EMI film on FPC and cure , then make solder float test.

◆ **Evaluation criteria:** no layered and blister

◆ **Test result:** no layered and blister



# 表面硬度

SURFACE HARDNESS

- ◆ **Test method:** According to JIS K5400 standard, the surface hardness of the electromagnetic film is tested
- ◆ **Testing standard:** Load to  $500 + 10$  g, pencil Angle  $45^\circ$ , traction speed is  $0.5\text{--}1.0$  mm/s .
- ◆ **Test result:** no scratches were found on the 3H、4H pencil test.

Pencil hardness	test apparent	Test result
3H		no scratch
4H		no scratch

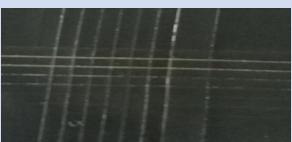


# 耐溶剂性能

## SOLVENT RESISTANCE

- ◆ **Test method:** Quick press EMI film on FPC and cure.
- ◆ **Solvent resistance test:** Firstly, soak samples into the solvent at normal temperature for 5 minutes. Secondly, take out samples and dry off. Lastly, observe whether surface appearance change color, and use 3M tape to do the peel test.
- ◆ **Wipe Test:** At normal temperature, use non-dust cloth which dipped in solvent to wipe the EMI film surface alternatively for 10 times with appropriate strength which the same as the strength of wiping products during assembly manufacturing. Dry off samples and observe EMI film appearance and whether the non-dust cloth change color.

◆ **HCF-6000G test result:** All qualified non-discoloration phenomenon, shedding phenomenon. (As shown in the right)

solvent	Ethyl alcohol	butanone	acetone
simlple			
result	no discoloration	no discoloration	no discoloration

# 耐酸碱性能

## ACID ALKALI RESISTANCE

- ◆ **Test method:** Quick press EMI film on FPC and cure.
- ◆ **Soak and peel test:** Firstly, soak samples into the solvent at normal temperature for 5 minutes. Secondly, take out samples and dry off. Lastly, observe whether surface appearance change color, and use 3M tape to do the peel test.
- ◆ **HCF-6000G test result:** the test of HCl, NaOH and H<sub>2</sub>SO<sub>4</sub> were all qualified (as shown as below)

solvent	5%HCl	5%NAOH	5%H <sub>2</sub> SO <sub>4</sub>
simple			
result	no discoloration	no discoloration	no discoloration

# 表面补强剥离强度

SURFACE PEEL STRENGTH

## ◆ Test method:

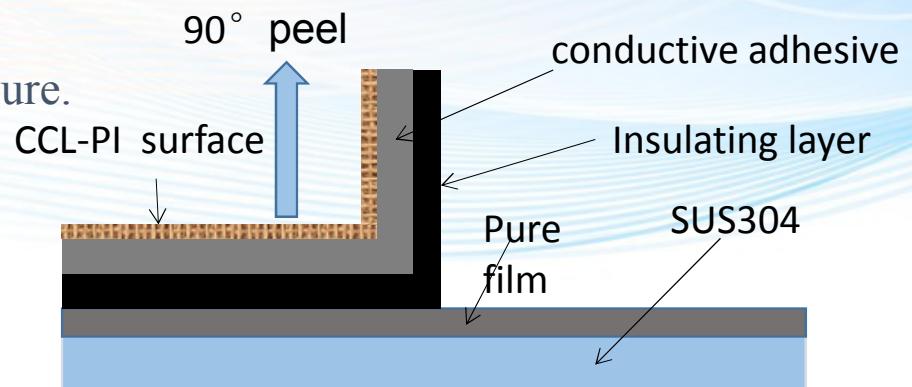
Clean the film surface, strengthen it by the 130um PI, 20um epoxy hot solid glue, and laminate EMI film on FPC and cure, the PI reinforcement scissors. Cut the width 10mm. When stripping test, hold PI reinforcement. (the Angle is 90 °, 50.8 mm/min)

## ◆ Test equipment: peel strength tester.

## ◆ Sample preparation: Quick press EMI film on FPC and cure.

## ◆ Test result: Peel strength>7N/CM

HCF-6000G Peel strength				
number	1	2	3	average
Peel strength (N/cm)	7.52	7.61	7.45	7.53



# 表面张力

## SURFACE TENSION

### ◆ Test method:

Laminate EMI film on FPC and cure, and  
measure surface tension by means of a dyen pen

### ◆ Evaluation criteria: >32Dn

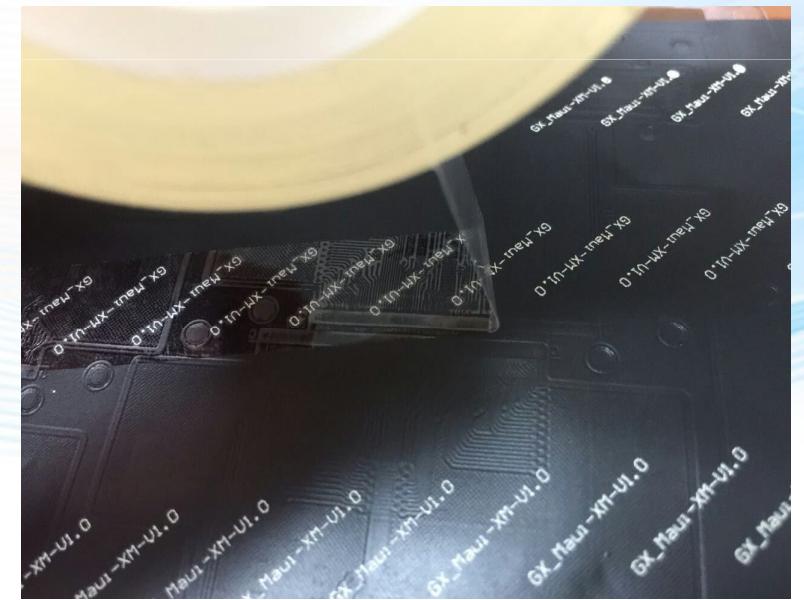
### ◆ Test result: 36Dn

Dyne value	Sample test appearance
30 Dn	
32 Dn	
34 Dn	
36 Dn	
38 Dn	

# 文字印刷性

## PRINGTING PERFORMANCE

- ◆ **Test method:** Laminate EMI film on FPC and cure and clean, print ink characters on the surface of the electromagnetic film about 0.1mm wide, and test after curing.
  - ◆ **Evaluation project:** 3M600 peel test, no shedding.
  - ◆ **Test result:** no shedding.



# 尺寸稳定性测试

## DIMENSIONAL STABILITY TEST

### ◆ Test method:

1. Test the most remote two PADs on FPC, and test spacing by image measuring instrument
2. Laminate EMI film on the marked FPC: 185°C\*120S\*120KG/cm<sup>2</sup>。
3. Measure the distance between two PADs of EMI film (Do not cover PAD marks when pressing) .
4. cure: measure spacing between two PADs after 160°C\*1H.

### ◆ Evaluation criteria: hot-shrinkage rate $\leq 2\%$

#### Test result

project	hot-shrinkage rate (After pressing)	hot-shrinkage rate (After curing)
MDdirection	<1%	<1%
TDdirection	<1%	<1%



# 吸水率测试

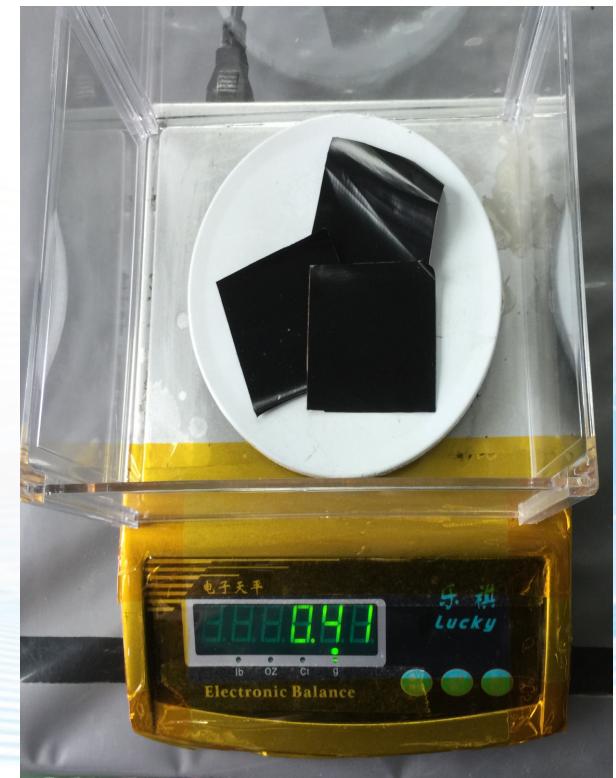
## WATER IMBIBITION TEST

### ◆ Test method:

According to IPC-TM- 650-2.6.2.1, press both side of the EMI film and cure on the two-sided FCCL, with 50.8\*50.8 mm, measure weight. Soak the distilled water for 24 hours in normal temperature and then calculate the water absorption rate after drying.

### ◆ Evaluation criteria: <0.5%

### ◆ Test result: absorption rate<0.42%



# 耐弯折性能

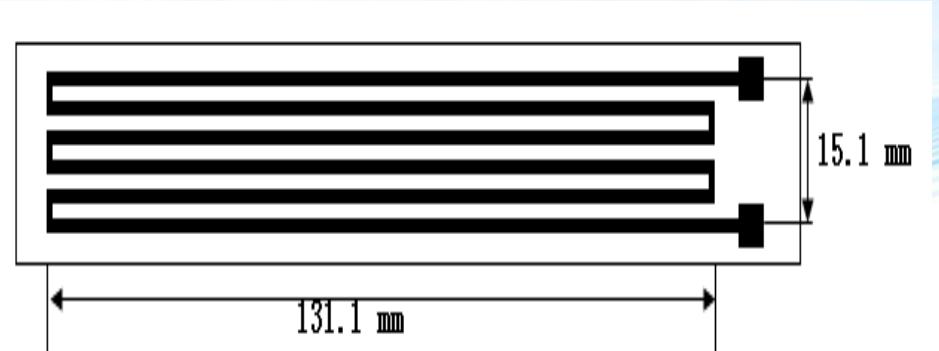
## BENDING PROPERTY

### ◆ Test method:

EMI film /20PI/12 copper /15 glue /12.5 PI/EMI film; Line width: 1mm/ 1mm; Sample size 131.1mm\*15.1 mm; Bending radius: 0.8mm.

Taihong basic, Taihong covering film, electromagnetic film HCF-6000G

### ◆ Test result: It can bend 15,000 times



# 使用步骤与储存条件

## APPLICATION STEPS AND STORAGE CONDITION

1

**Cutting:** Operation temperature below 23°C, RH <= 70%

3

**Die-cut:** Operation temperature below 23°C,  
RH <= 70%

5

**Quick Lamination:** 175-185°C, laminate 5-10 secs,  
mold more than 120 secs, pressures 100-120kg/cm<sup>2</sup>)

**Drilling Holes:** Operation temperature below 23°C,  
RH <= 70%

2

**Alignment and Attaching:** First remove the  
transparent protective film, then laminate the  
peel off the surface with the surface with a film  
of FPC on the manual hot plate.

4

**curing:** 160-170°C, 1-2 hours

6

# 使用步骤与储存条件

APPLICATION STEPS AND STORAGE CONDITION

## ◆ Storage condition

Products should be sealed in the environment with the temperature between 2°C to 10°C, and relative humidity (RH) ≤70%, and the guarantee period is 6 months.

# 注意事项

## ATTENTION

1

make sure temperature is return to normal temperature before use. Avoid frost to affect product quality, until the final compression process requires at least 6 hours

3

If it is not fit tightly, the film in the transmission may loosen, resulting in the heat contraction of the quick lamination step electromagnetic film, resulting in a poor offset

5

Please confirm the hot pressing process (temperature/pressure/time) in accordance with the appearance, filling and earthing resistance of the product.

2

After cutting, the quick lamination and curing step should be completed within 7 days. the glue out of date may have an aging problem

4

Please in the temporary fixed 1 hours to quick lamination (at this time, please put the film on  $20 + / - 5$  °C environment preservation, avoid high temperature aging)

6

Increasing the grounding diameter, increasing locations and the plane grounding is the best method to strengthen the grounding effect.

# 注意事项

## ATTENTION

7

Please avoid the surface of EMI film with ink print or PI lamination, before curing , and avoid contact with any solvent or rubber materials in order to avoid surface erosion of electromagnetic film, causing appearance abnormalities.

8

After drying the product, it is also to avoid the use of strong corrosive solvent to wipe back and forth, so as to avoid the corrosion products caused the appearance and performance anomalies

9

Curing is not in a timely manner after the assembly, the assembly before SMT need to 1 hour at 160 °C baking to tide, in order to avoid product put out moisture absorption in SMT stratification occur.

10

The PTH/NPTH hole of the covered film should be avoided by using the electromagnetic film to avoid the hole rupture of the hole. If this design cannot be avoided, the solution is to reduce the pressure (30kgf/cm<sup>2</sup> and below) by using a vacuum fast compressor.

11

The cutting material has not been used up for more than a week. It needs to be sealed in the refrigerator. Store as little as one month.



# Thanks !