Power supply PCB product scheme

2025—03

Contents

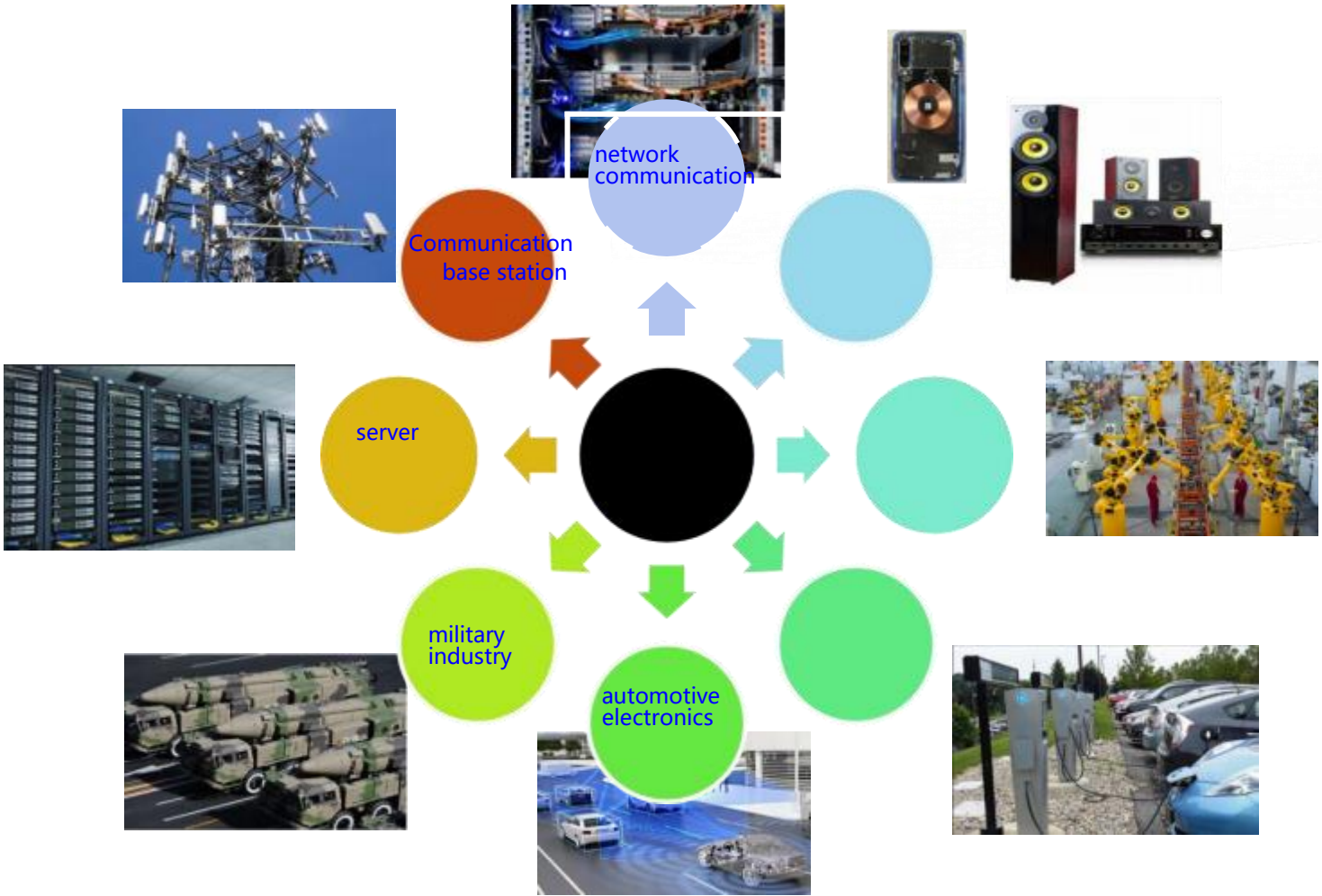
一、Classification and characteristics of power supply PCB application

Thick copper PCB board: refers to the PCB board with all layers inside and outside 2 OZ thick copper, thick copper PCB board is widely used for power supply circuit, also known as thick copper power board. As a high current substrate, it is mainly applied in two major fields: power module (power module) and automotive electronic components.

Power supply module

New energy vehicle charging module

一、Classification and characteristics of power supply PCB application



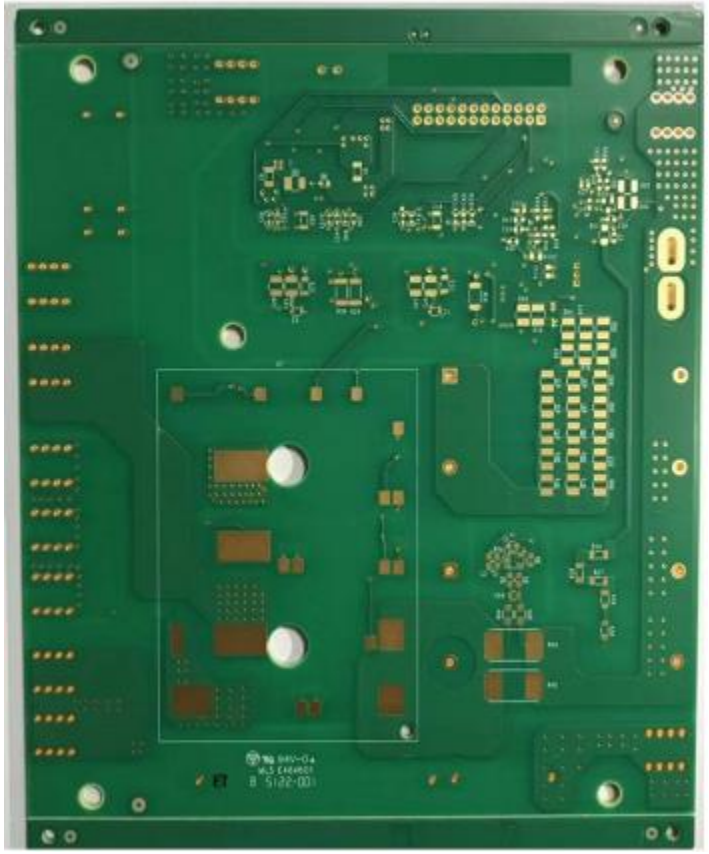
一、Classification and characteristics of power supply PCB application

Some thick copper PCB applications are the same as conventional PCB (such as portable consumer electronics, network products, base station equipment, etc.), the main effect is to constitute the transmission of information wire, some are different from conventional PCB, such as automobile, industrial control, power modules, etc.,

The main effect is to protect the carrying capacity of the current and make the power supply stable, and have high requirements for high voltage resistance and inductance performance.

一、Classification and characteristics of power supply PCB application

Union Gain Electronic Power Supply PCB Products (1):



元件面

L1 ———————————— 2oz+plating
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)

L2 3oz
生益 S1000-2M 介质厚度:0.15mm(不含铜芯板)
L3 3oz
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)

L4 3oz
生益 S1000-2M 介质厚度:0.15mm(不含铜芯板)
L5 3oz
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)

L6 3oz
生益 S1000-2M 介质厚度:0.15mm(不含铜芯板)
L7 3oz
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)

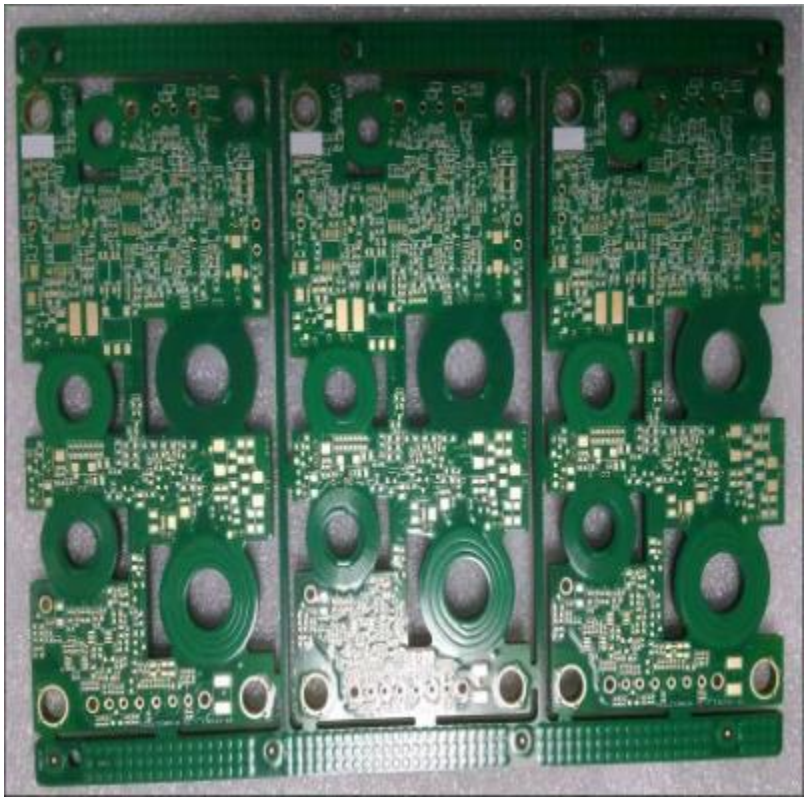
L8 3oz
生益 S1000-2M 介质厚度:0.15mm(不含铜芯板)
L9 3oz
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)
SY S1000-2MB 1080(65%) 3 +/-0.4(mil)(半固化片)
SY S1000-2MB 106(74%) 2 +/-0.4(mil)(半固化片)

L10 ———————————— 2oz+plating
焊接面

压合后厚度:2.30(+/-0.18) MM
最终成品厚:2.40(+0.24/-0.24) MM
板材类型:S1000-2M(TG170)

一、Classification and characteristics of power supply PCB application

Union Gain Electronic Power Supply PCB Products (2):



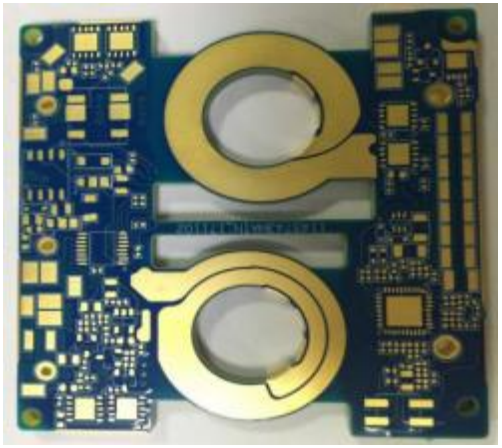
Lyr	Image	Name	备注
L1		Foil 2oz	2 oz+plating
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L2 L3		WAZAM H1170 Core 0.100MM 4/4	0.10MM 4/4 oz (不含铜)
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L4 L5		WAZAM H1170 Core 0.100MM 4/4	0.10MM 4/4 oz (不含铜)
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L6 L7		WAZAM H1170 Core 0.100MM 4/4	0.10MM 4/4 oz (不含铜)
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L8 L9		WAZAM H1170 Core 0.100MM 4/4	0.10MM 4/4 oz (不含铜)
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L10 L11		WAZAM H1170 Core 0.100MM 4/4	0.10MM 4/4 oz (不含铜)
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
		WAZAN H1170 1080 RC68%	3.4+/-0.34mil （半固化片）
L12		Foil 2oz	2 oz+plating

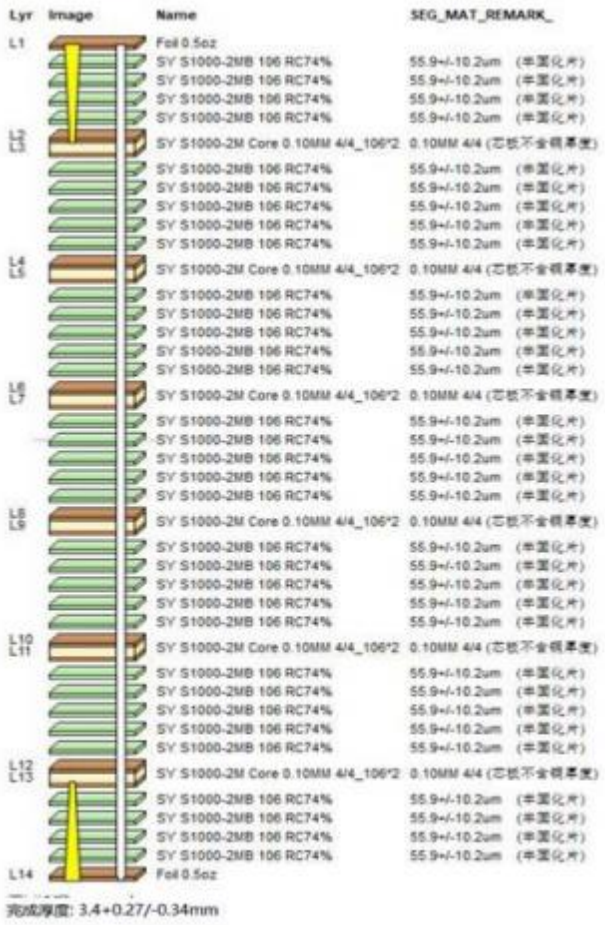
压合厚度：3.07+/-0.26mm
完成厚度：3.2+/-0.32mm

Inner layer 4OZ, outer layer 2OZ, 12L finished thickness 3.1mm

一、Classification and characteristics of power supply PCB application

Union Gain Electronic Power Supply PCB Products (3):

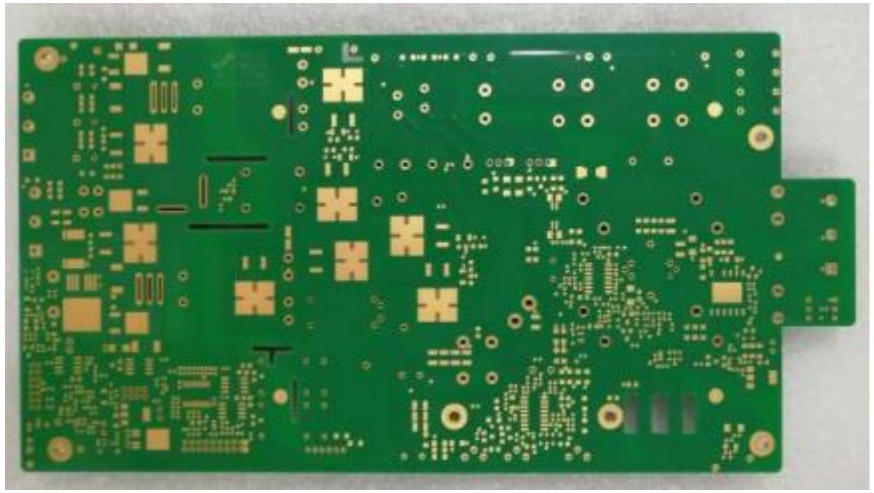




Inner 4 OZ, outer HOZ (system HDI, with laser) The 14L finished product is 3. 4 mm thick

一、Classification and characteristics of power supply PCB application

Union Gain Electronic Power Supply PCB Products (4):



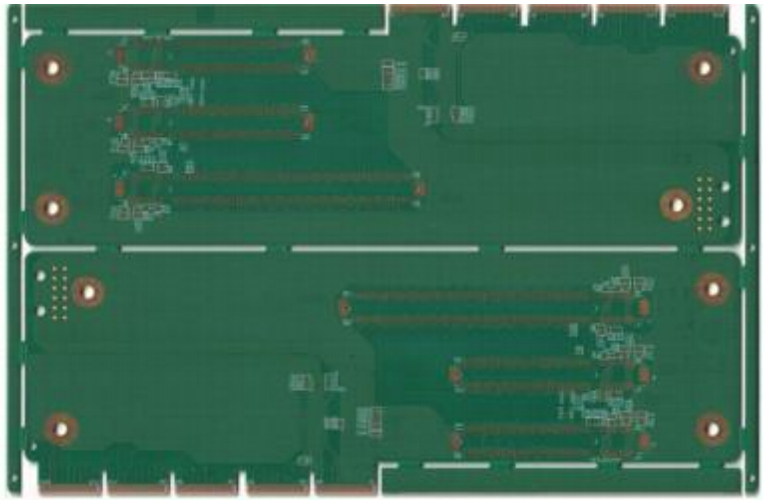
L1 2oz +电镀 完成 70um(min)
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
L2
FR-4.0 0.9mm 2/2oz(含铜厚)
L3
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
2116 RC:55%(4.8+/-0.48mil)-(半固化片)
L4 2oz +电镀 完成 70um(min)

压合厚度: 1.7+/-0.15mm
成品板厚: 1.8+/-0.2mm

Inner layer 2 OZ, outer layer 2 OZ 4 L
finished product thickness 1.8 mm

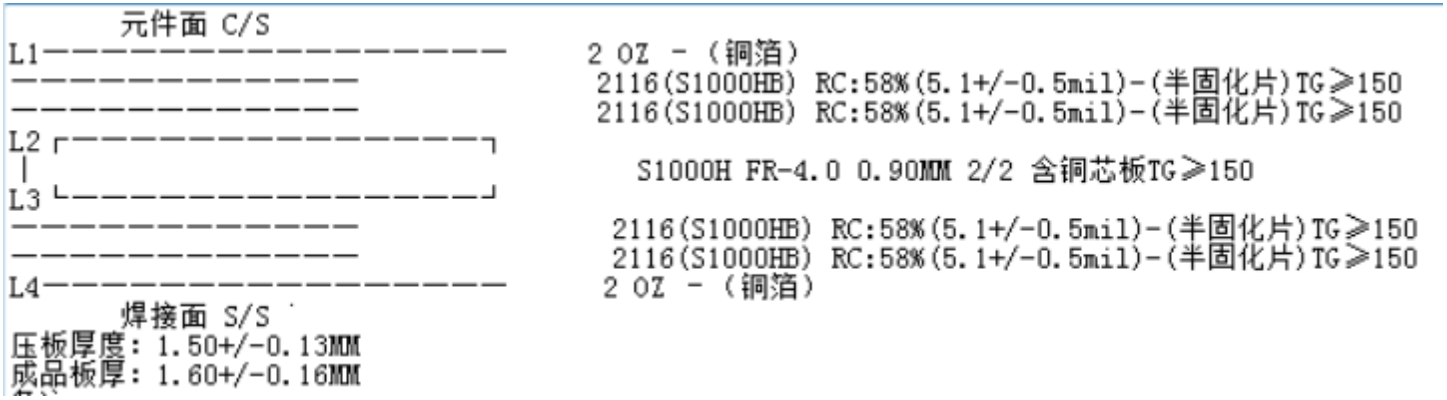
一、Classification and characteristics of power supply PCB application

Union Gain Electronic Power Supply PCB Products (5):



Segment gold fingers

Inner layer 2 OZ, outer layer 2 OZ 4 L finished product thickness 1.6 mm



二、Power supply PCB quality requirements and standards

order number	project	evaluation methodology	Determine the benchmark	Plant control capacity
1	Section inspection	Section confirmation: hole copper thickness, roughness of hole wall, nail head and overlapping structure Section observation: copper stripping of the hole wall, resin cavity, etc	According to the customer requirements, the hole is 30um thick, no other abnormal	Hole surface copper according to the customer's requirements The hole is 30um thick
2	heat stress	135 and 14℃ ± bake for 6H pretreatment 288℃ * 10 seconds * 3 times to confirm the appearance and section	Holless copper stripping, layering, etc., hole wall, tin on> 95%	288℃ * 10 seconds * 3 times of nonporous copper stripping, layering, etc
3	Stamped welding ink hardness	Flat the pencil head to 90 degrees and place it in the pencil scratch tester (To the sample 45 degrees) push forward above 10mm, in which hardness test when the sample is scarred or rupture, the hardness is the hardness	≥6H	≥6H
4	Voltage resistance test	1. Surface line: 1) Spacing of 0.10——0.13mm, plus voltage of 100V * 60 seconds; 2) Spacing of 0.13——0.25mm, add voltage of 200V * 60 seconds; 2. Interlayer voltage resistance: 1500V * current 0.1 mA, voltage climbing 500V to 1500V per second for 3~5 seconds, pressure 30 + 3 / ——0s	Do not appear flying arc, electric spark, breakdown and other phenomena	Interlayer resistance voltage of 1500V without breakdown
5	Stripping strength test	The test line width is 8mm, the vertical direction is stripping at 50mm / min speed, and the stripping length is greater than 20m m	Copper thickness 0.33 OZ: 0.88kgf / cm Copper thickness HOZ: 1.07kgf / cm	Thickness 0.33 OZ: 0.88kgf / cm Copper thick HOZ: 1.07 kgf / cm

order number	project	evaluation methodology	Determine the benchmark	Plant control capacity
6	Hot oil experiment	125 ± 5℃ was baked with 6H pretreatment 260℃/20S。20℃ / 20S, 1 cycle and 200 cycles	The rate of resistance change was <10% before and after testing Grid, appearance check no burst plate, layer, up Bubble, green oil fall off, etc	Resistance change rate is <8%, no layered burst plate
7	Resistant reflow welding solid examine	Peak temperature was 260℃ * 6 times	The rate of resistance change was <10% before and after testing Grid; appearance inspection without burst plate, layer, up Bubble, green oil fall off, etc	Return 5 times resistance change rate <8%, no points Layer burst board
8	solvent resistance	The samples were immersed in ethanol at room temperature for 30 minutes, washed and dried	No green foaming, peeling, light color in appearance Fuzzy, etc., tear the tape without ink and transfer to the tape	No abnormal appearance, no oil drop, etc
9	Hydrochloric acid resistance	Soak the sample at room temperature in a hydrochloric acid solution (hydrochloric acid concentration 3.8%) for 30 minutes, rinse water for 20 minutes,Wash and dry		
10	Sulphuric acid resistanc e	Soak the sample at room temperature in a sulfuric acid solution (sulfuric acid concentration 10%) for 30 minutes, running water for 20 minutes,Wash and dry		
11	resistanc e to alkali	Soak the sample in the sodium hydroxide (NaOH) solution at room temperature Medium (10%) for 30 minutes and rinse with running water For 20 minutes, wash and dry dry		

二、Power supply PCB quality requirements and standards

order number	project	evaluation methodology	Determine the benchmark	Plant control capacity
12	Hot and cold impact	Return 260℃ * 6 pretreatment, ——55 ± 3℃ / 30 points.125 ± 3℃ / 30 is divided into 1 cycle, run 700 cycles, measuring conduction, rate of resistance	On on resistivity 10%	250 cycles, resistance rate of change <8%
13	Resistance to ion mobility by CAF	Return 260℃ * 6 pretreatment, 85℃*85%*DC100V*1000H	Insulation resistance of 100 MΩ	>1200H
14	SIR	Return of 260℃ * 3 times of pretreatment, 85℃*85%*DC100V*168H	Insulation resistance of 100 MΩ	>200H
15	Long time aging (LTTA)	1) 85℃ * 85% * DC100V (or according to the operating voltage of the terminal product) * 3000H 2) 95℃ * 95% * DC100V (or according to the operating voltage of the terminal product) * 1000H	Insulation resistance of 100 MΩ	1) > 3000H 2) > 1000H

3.1 Quality control of substrate supply (IQC) ——

When purchasing the power board, specify the core plate matching on the purchase sheet. If the mixing structure with the thickness of 0.050——0.215 is only suitable for the copper foil specifications of 2 OZ and below, and 7628 cloth is not used above 2 OZ.

Dielectric layer thicknessmm	S1000H		S1000——2/2M		Dielectric layer thickness		IT158/IT180A/IT180I	
	copper foil < 2OZ	copper foil≥2OZ	copper foil < 2OZ	copper foil≥2OZ	mil	mm	copper foil < 2OZ	copper foil≥2OZ
					1.2	0.030	1x1017	
0.050---0.059	1×106	/	1×106	/	1.5	0.038	1×1027	/
0.060---0.070	1×1065	/	1×1065	/	1.8	0.046	1×1037	/
					2	0.051	1×106	/
0.071---0.088	1×1080	/	1×1080	/				
					2.3	0.058	1×1067	/
0.089---0.109	1×2313	2×106	1×3313	2×106	2.5	0.064	1×1078	/
								/
0.110---0.136	1×2116	2×106	1×2116	2×106				
0.137---0.149	2×1080	2×1080	2×1080	2×1080	4.5	0.114	1×3313	2×106
0.150---0.170	1×1506	2×1080	1×1500	2×1080	5.5	0.140	1×2116	2×1080
					6	0.152	1×1506	2×1080
0.171---0.215	1×7628	2×2313	1×7628	2×3313				
					6.5	0.165	1×1506	2×1080
0.216---0.264	2×2116		2×2116		7	0.178	1×7628	2×3313
0.265---0.280	1080+2116+1080		1080+2116+1080					
0.281---0.299	2116+1080+2116		2116+1080+2116		10	0.254	2×2116	
0.300---0.34	2×1500		1080+7628+1080		12.5	0.318	2×1506	
					14	0.356	2×7627	
0.35---0.42	2×7628		2×7628					
					15.5	0.394	2×7628	
0.43---0.46	7628+1080+7628		7628+1080+7628		17	0.432	1×7627+1×1080+1×7627	
					18	0.457	2×7628+1×1080	
0.47---0.52	7628+2116+7628		7628+2116+7628					
					19.5	0.495	1×7628+1×2116+1×7628	

三、The power supply PCB quality risk identification and control

3.1 Quality control of substrate supply (IQC) ——

In addition to the routine inspection items, IQC should check whether the incoming materials are consistent with the sample specified during the purchase, sample Hi——Pot high voltage test (0.1——0.15mm), the limit pressure resistance should be 800——1000V higher than the required pressure breakdown, and assess the pressure risk below the threshold.

三、The power supply PCB quality risk identification and control

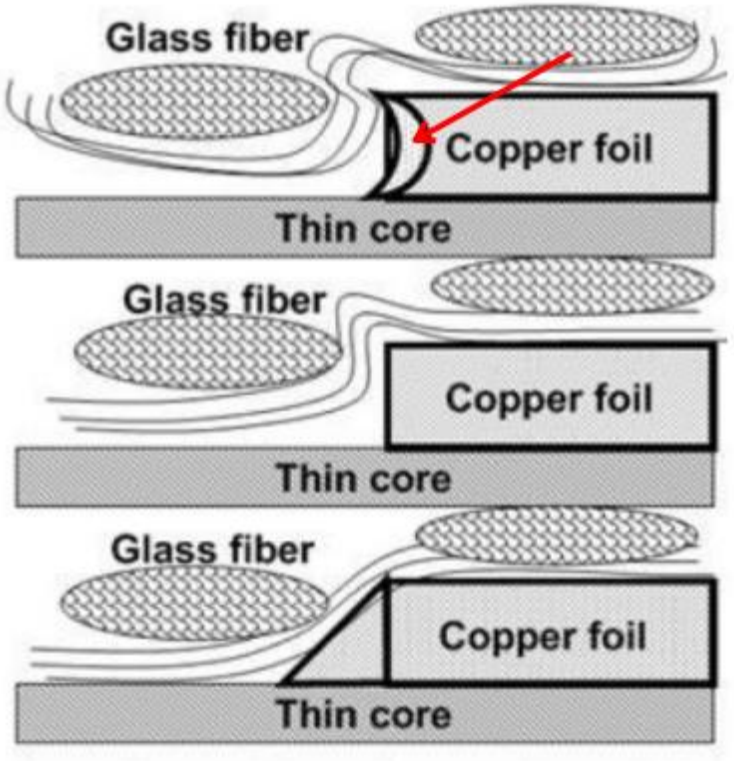
3.2 Etched line type (margin) control ——

When the inner layer is etched, the etching line directly affects the pressure filling and reliability. The inner layer of 3 OZ is produced by dry film, and the inner layer etching factor 3.0 is controlled.

★ Linear lateral erosion depression —— compression is not easy to fill the glue

★ General linear —— edge glass cloth rubbing brown layer

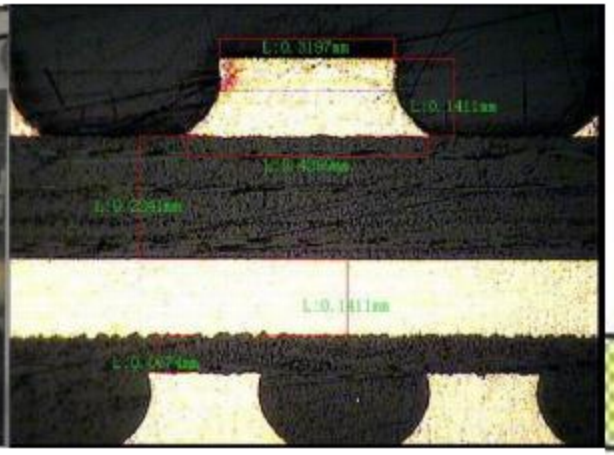
★ Optimal filling —— brown layer without glass cloth

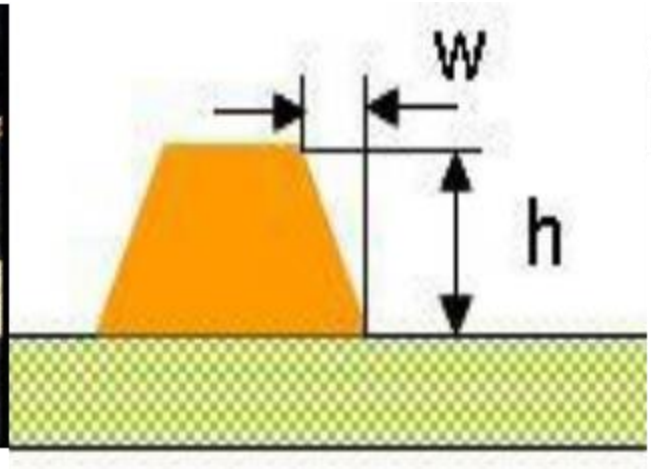


三、The power supply PCB quality risk identification and control

3.2 Etched line type (margin) control ——

When the inner layer is etched, the etching line directly affects the pressure filling and reliability. The inner layer of 3 OZ is produced by dry film, and the inner layer etching factor 3.0 is controlled.





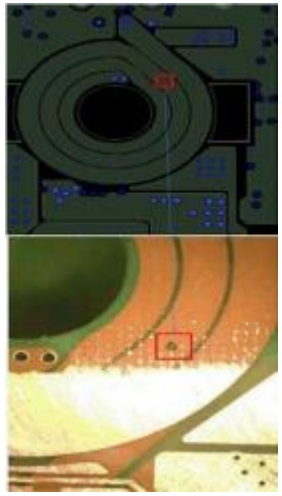
Vacuum two——fluid etching line　　Inner layer etch factor ≥3.0　　Etching factor a = h/w

三、The power supply PCB quality risk identification and control

3.2 Etched line type (margin) control ——

AOIs the most stringent parameters are scanned for maintenance, the second scan confirmation after maintenance (copper residue, copper slag, gap, opening short circuit in the coil plate and coil area are not repaired, scrapped), and the finished product before shipment 100% inductance and withstand voltage test.

AOI



bad coil position

100% automated inductance testing

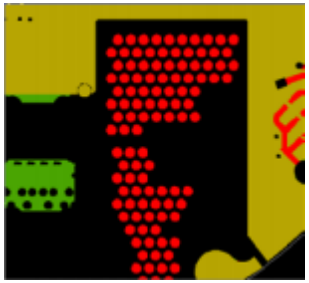
三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

The width of the blocking side of the plate is 15mm, designed as copper skin, the gong vacancy and broken side copper also add skin (flow blocking copper bean is added in the 1 "5" base area of the plate), a 2mm wide air guide should be opened every 100mm apart at the process side, and the air guide of the Panel plate is staggered from the air guide of the process side, so as to improve the glue filling and improve the uniformity of the intermediate thickness.

Substrate area too large for flow control

Pnl side spread copper skin + enlightening air tank



Copper beans for substrate area

三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

The brownalization parameters are adjusted from 3.5m / min of ordinary plate to 1.5m / min for thick copper, 120℃ (± 5℃) baking for 30min, and the special compression slow program of thick copper plate suitable for medium / high Tg, single sheet, multiple PP structure and 2 OZ inner copper thickness, to control the glue filling.

程式M3	热板温度(℃)	热板时间 (min)	压力 (kg/cm²)	压力时间(min)	叠板层数	周期
Step1	150	5	7	5	≦8层	共计时长160分钟
Step2	160	8	14	5		
Step3	170	10	25	5		
Step4	185	8	27	5		
Step5	200	5	30	20		
Step6	200	80	30	80		
Step7	180	20	23	15		
Step8	140	10	18	10		
Step9	140	14	14	15		
开始抽真空段数:1		停止抽真空段数:6		真空释放段数:6		
开始抽真空时间(min):0		停止抽真空时间(min):45		真空释放时间(min):70		
真空设定值(mmHg):740						
备注：上下使用全新牛皮纸						

Special press programme for thick copper plates (medium Tg slow programme M3)

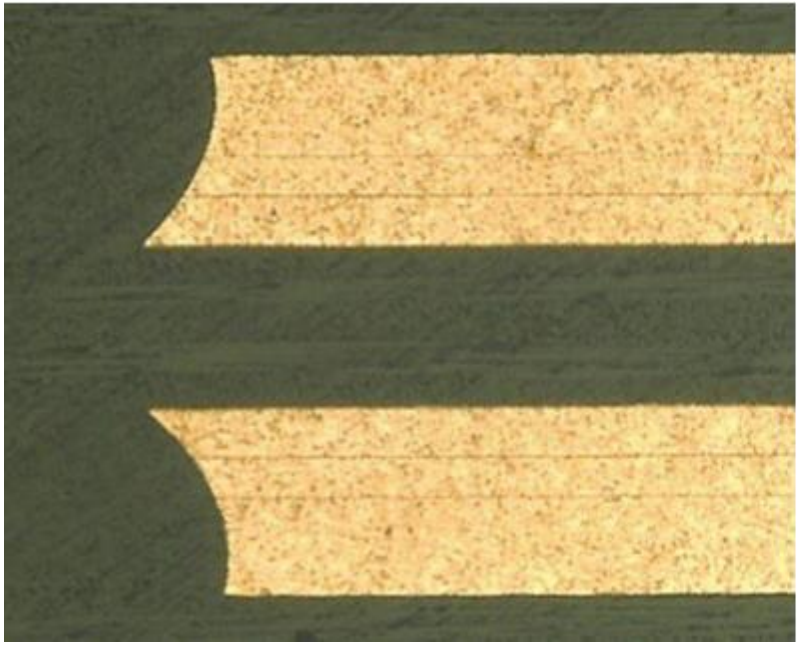
程式M4	热板温度(℃)	热板时间 (min)	压力 (kg/cm²)
Step1	150	5	14
Step2	160	7	18
Step3	170	8	23
Step4	185	9	25
Step5	200	5	28
Step6	210	96	28
Step7	210	10	28
Step8	180	20	23
Step9	140	10	18
Step10	140	10	14
开始抽真空段数:1		停止抽真空段数:6	
开始抽真空时间(min):0		停止抽真空时间(min):45	
真空设定值(mmHg):740			

Common medium Tg halogen free programme M4

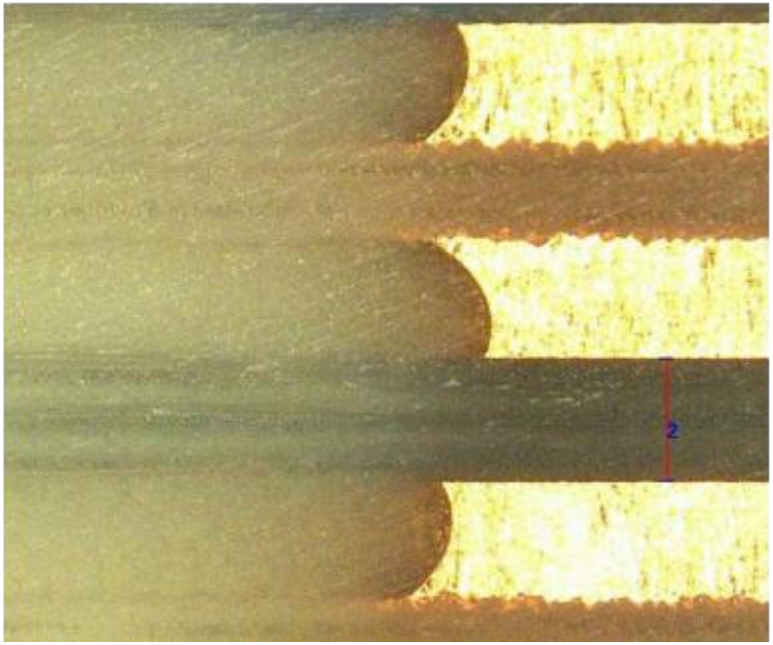
三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

The brownalization parameters are adjusted from 3.5m / min of ordinary plate to 1.5m / min for thick copper, 120℃ (± 5℃) baking for 30min, and the special compression slow program of thick copper plate suitable for medium / high Tg, single sheet, multiple PP structure and 2 OZ inner copper thickness, to control the glue filling.



Thick Copper Plate Filling



Thick Copper Plate Filling

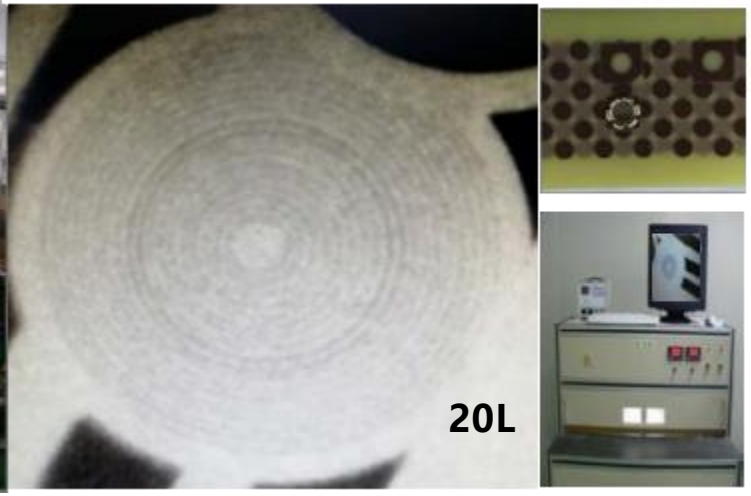
三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

Power board, thick copper plate, large resin flow, OPE punching + four sides fusion + rivets + kraft paper buffer control skateboard, press alignment 4 mil.

OPE Punching Machine

Four——side fusing machine

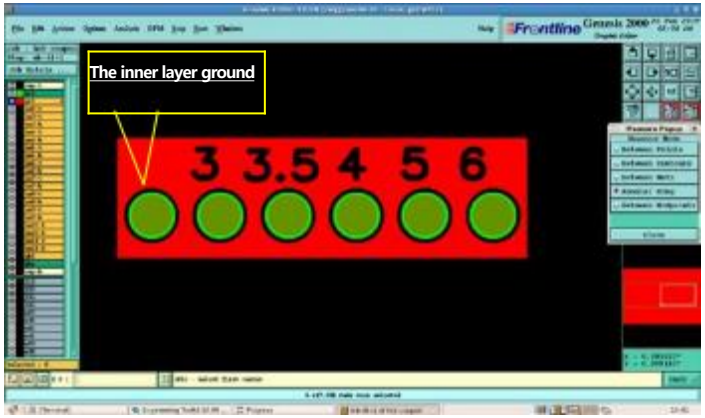


XRAY inspection machine
(inspection of concentric circles)

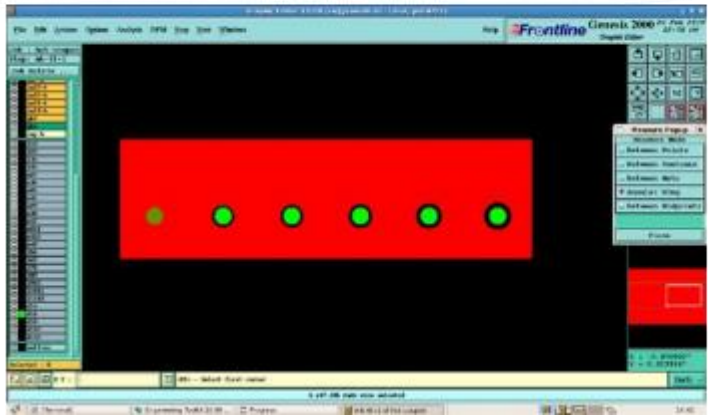
三、The power supply PCB quality risk identification and control

3.3 Press——fill and alignment control ——

SET process side to increase the layer bias test module, each SET 2, each module drilled six 0.50mm PTH holes, the outer layer of the independent window PAD, one of which is grounded in the inner layer, the other five holes from the inner layer of copper were 3mil, 3.5mil, 4mil, 5mil and 6mil. If the customer requires the layer bias to be controlled according to 3mil, the test process will be conducted according to 3mil needle test; if the customer does not require the layer bias control, the test process will be conducted according to the internal requirements of 4mil needle test.



Layer Bias Module Outer Layer Graphics

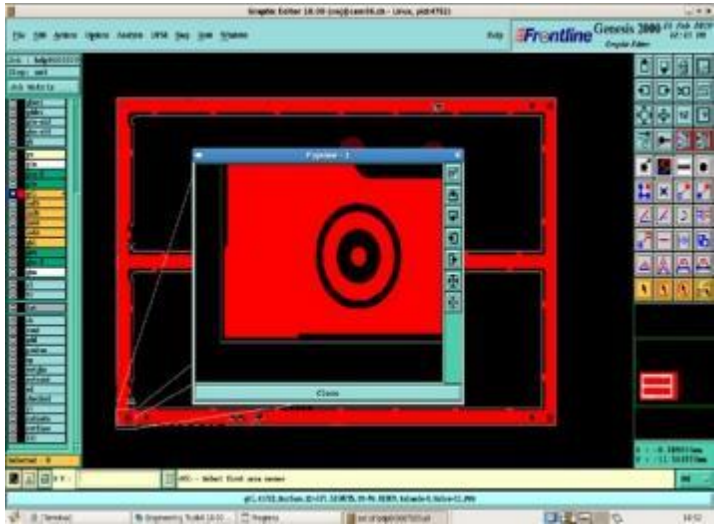


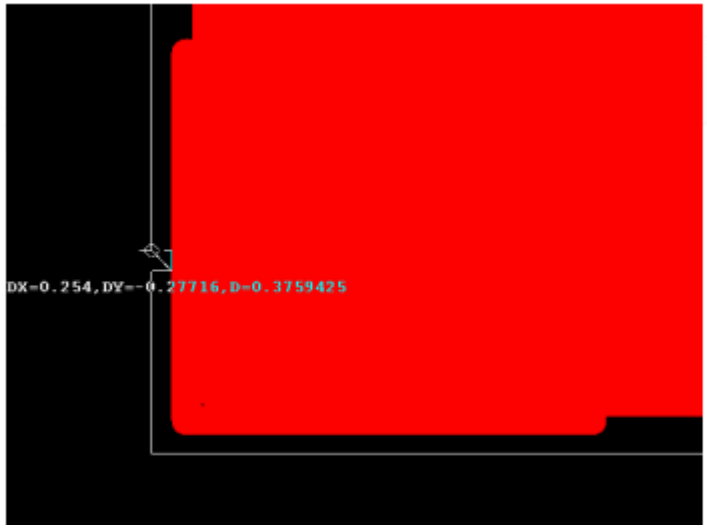
Layer Bias Module Outer Layer Graphics

三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

6L layer parts, add gong partial inspection module, add 5mm of copper strip at the corner or four edge of the process edge, 0.254mm away from the plate edge, add each layer in the same position to control the problem of forming gong partial copper exposure.





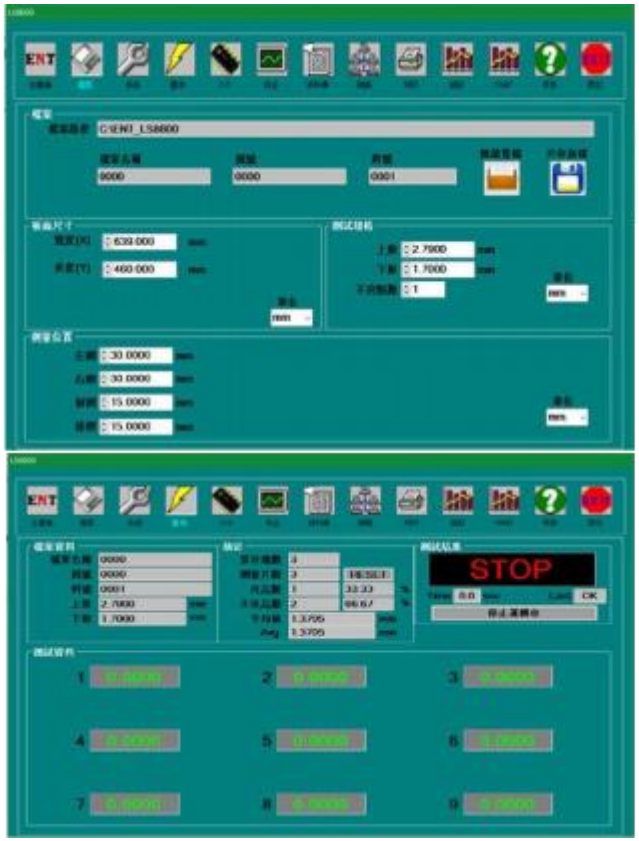
Gong deviation checking module

三、The power supply PCB quality risk identification and control

3. 3 Pressure filling glue and alignment control ——

After pressure closing, the plate thickness is measured by up to 15 points on a single plate.

Cutting board line —— laser plate thickness gauge



1.multi——point measurement of plate thickness, set up to 15 points

2. single——point set tolerance

3.can set the plate thickness over the internal control upper and lower limits allowed to collect the number of points

4.the measurement tolerance + / —— 0.008mm

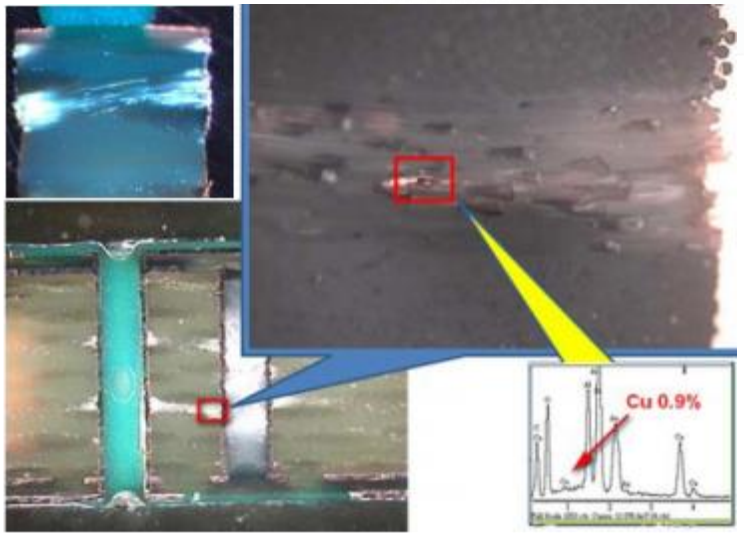
三、The power supply PCB quality risk identification and control

3. 4 Drilling front and CAF control ——

Single plate copper thickness 8 oz or inner core plate copper thickness 2 oz with thick copper plate parameters drilling, 70 hardness pad, drilling after sand grinding plate and high pressure washing, control the nail head and hole edge.pitch of holes < Make a 0.55mm hole with the minimum spacing of 5 holes, and grind 1 Or brand——new, to prevent the CAF.

直径 mm	转速 krpm	进刀 m/min	回刀 m/min	寿命 Hit	深度补偿 Z-DEPTH COMPENSATION(mm)
0.20	145	1.0	11	500	0.3
0.25	130	1.2	12	600	0.3
0.275	120	1.3	12	700	0.3
0.30	110	1.5	13	800	0.3
0.35	105	1.6	13	800	0.3
0.40	90	1.8	13	800	0.3
0.45	85	1.8	13	800	0.3
0.50	80	1.8	13	800	0.2
0.55	70	1.5	13	800	0.2
0.60	65	1.5	20	800	0.2
0.65	65	1.5	20	800	0.2
0.70-1.00	60	2.0	20	800	0.2
1.05-1.25	50	2.5	20	800	0.0
1.30-1.70	45	2.2	20	800	-0.1
1.75-2.00	35	2.2	20	800	-0.2
2.05-2.15	30	2.0	15	1000	-0.2
2.20-2.35	25	1.5	15	1000	-0.3
2.40-2.75	24	1.1	15	1000	-0.3
2.80-3.45	22	1.1	15	500	-0.1
3.50-5.50	24	0.5	15	500	-0.1
5.55-6.50	25	0.4	15	300	-0.1

Thick copper drilling special parameters

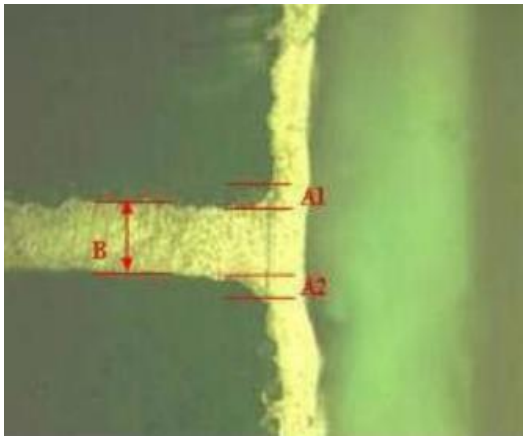


CAF

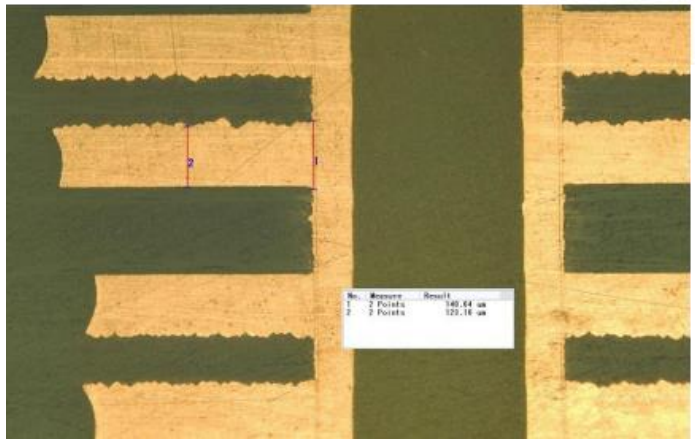
三、The power supply PCB quality risk identification and control

3.4 Drilling Phi and CAF control——

veneer copper thickness ≥ 8oz or inner core plate copper thickness ≥ 2oz with thick copper parameters, 70 hardness pads, after drilling through the abrasive belt grinding plate and high——pressure water washing, control nail head and hole Phi. Hole spacing <0.55mm holes for jump drilling production, jump hole spacing ≥ 5 holes of the minimum spacing, the choice of grinding 1 or new drilling nozzle to prevent CAF.



head of nail（A1+B+A2）/B ≤1.5

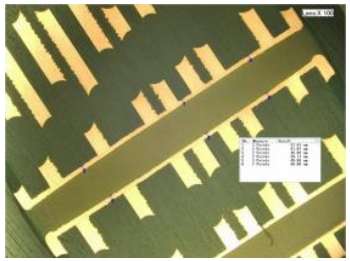


head of nail=1.14(140/123)

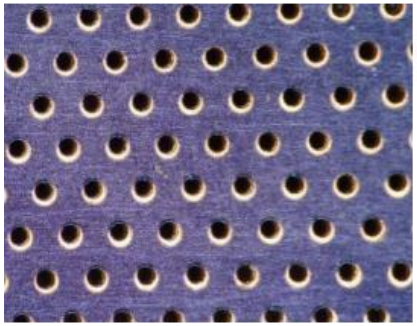
三、The power supply PCB quality risk identification and control

3.5 Electroplating copper thickness control ——

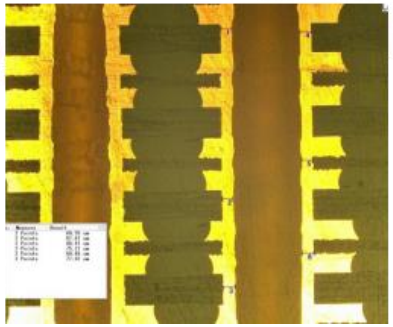
ordinary products hole copper generally requires 18/20um or less, thick copper products signal over——hole copper thickness generally requires 20/25um, local over——hole such as through——flow and heat dissipation over——hole copper thickness requirements Max 80um, the use of hole plating to ensure that the thickness of the hole copper to meet the customer's requirements.



Regular hole copper Min18/20um



perforated film

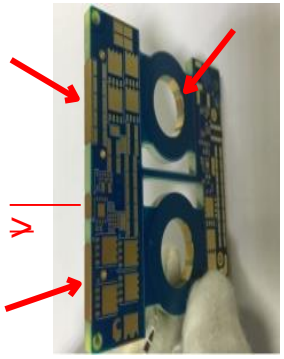


Plated hole copper Max 80um

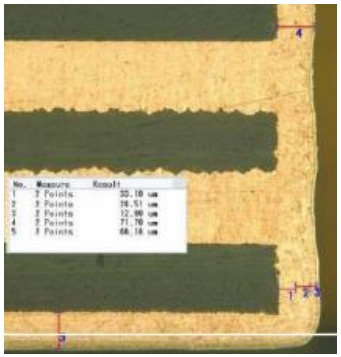
三、The power supply PCB quality risk identification and control

3.5 Electroplating Copper Thickness Control ——

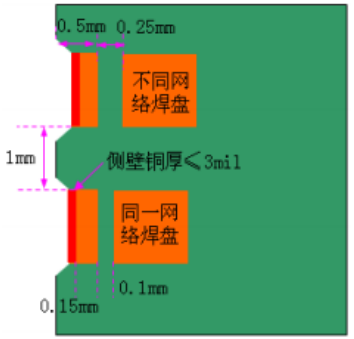
Sidewall plating of coil products adopts the method of ‘pre——grooving/pre——drilling —— copper plating —— ..... ——Second gong plate’ way to make, can ensure that the sidewall plating copper width tolerance ± 0.3mm, sidewall pad flatness ± 2mil, sidewall copper thickness Max ≤ 75um. suggested that different networks of the sidewall plating spacing ≥ 1mm, the inner layer of ≥ two layers of copper, the outer layer of copper and the sidewall connection, the minimum width of the copper 0.5mm, and the adjacent pads to retain solder resist bridge. The minimum width of copper skin is 0.5mm, and the solder resist bridge is retained between adjacent pads.



Multiple sidewall plating



Side wall copper plating thickness

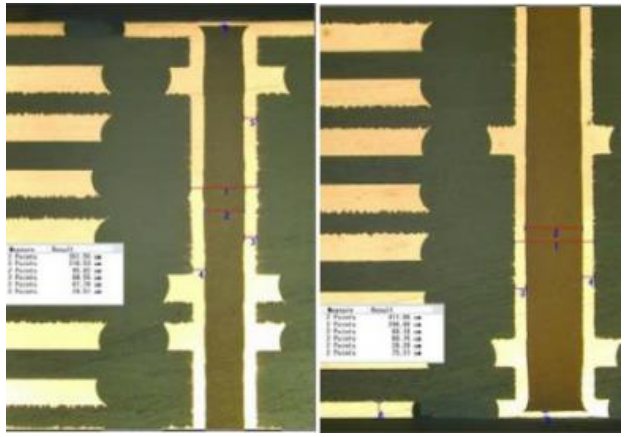


Sidewall plating capability

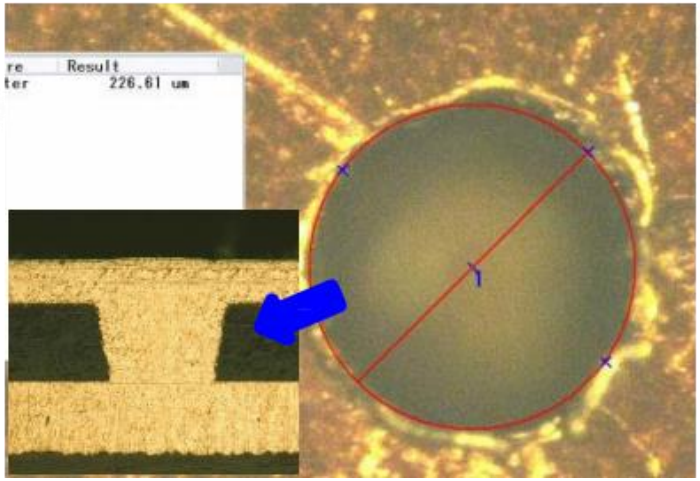
三、The power supply PCB quality risk identification and control

3.5 Electroplating copper thickness control——

for HDI thick copper power supply products, generally recommended laser aperture design ≥ 0.2mm, blind hole aspect ratio ≤ 1.0, laser using the reaming method of production, VCP fill hole to adjust the current density and time to control the fill hole Dimple ≤ 25um.



Through——hole POFV design

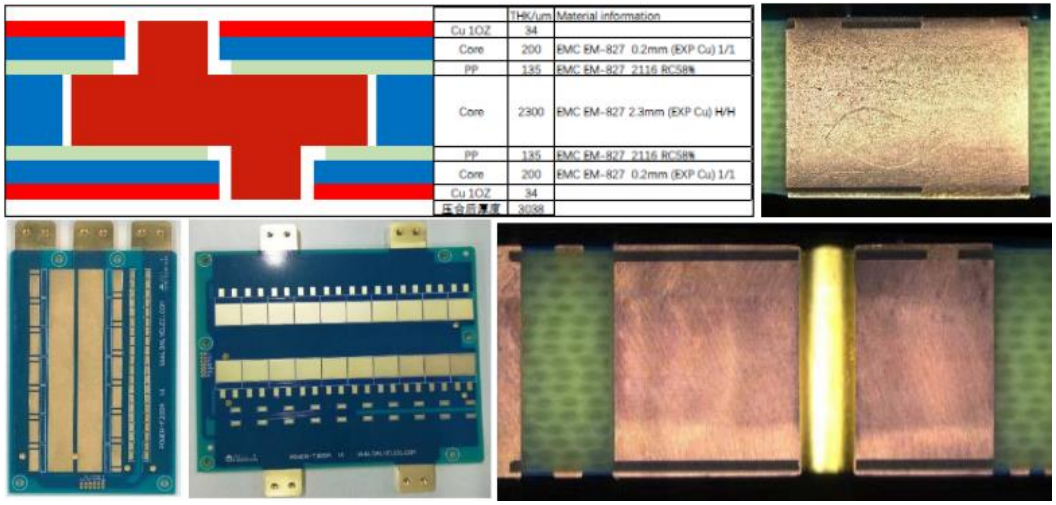


Thick Copper 0.225m Large Laser Reaming Production

三、The power supply PCB quality risk identification and control

3.5 Electroplating copper thickness control——

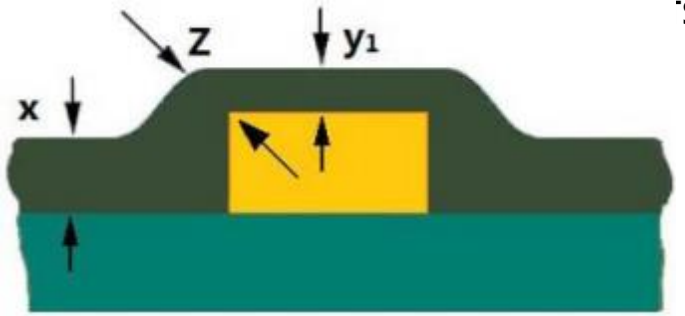
some thermoelectric separation design of new energy vehicle charging module, buried in the middle of the PCB board copper block, with excellent thermal conductivity, case: buried 3.0mm thick copper block conduction 300A high current, core board and PP milling groove, pressing the stacked plate into the copper block pressing, core board slotted than the copper block larger than the 4——8mil PP slotting is 2——4mil bigger than copper block, control glue filling, glue overflow and press——fit flatness ≤2mil;

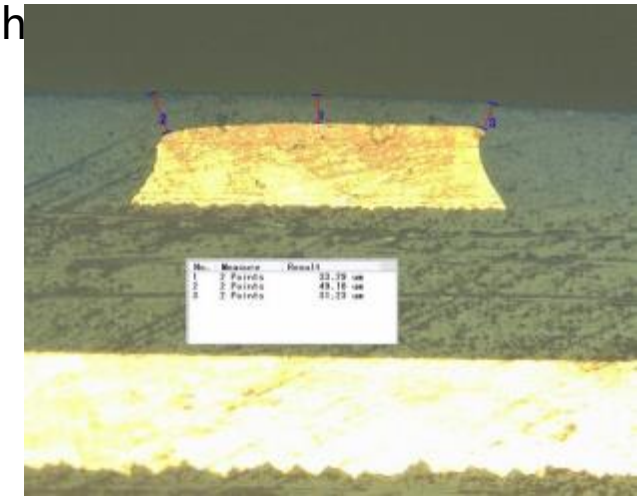


三、The power supply PCB quality risk identification and control

3. 6 Soldermask control ——

finished copper thickness ≥ 2OZ, soldermask secondary oil production: incoming material —— 1st pre——treatment grinding plate (volcanic grey) —— hole plugging / screen printing surface oil —— pre——bake —— exposure Developing —— post baking —— 2nd pretreatment (sandblasting) —— screen printing —— pre——baking —— exposure —— developing —— 2nd post baking. Bake, to ensure that the line corner oil thickness Z ≥ 10um. screen printing after the static ≥ 30Min to improve the bubble, exposure energy of 10——12 frames developing side etching control within 1mil, the second film window than the first time to i[illegible]ffset on th



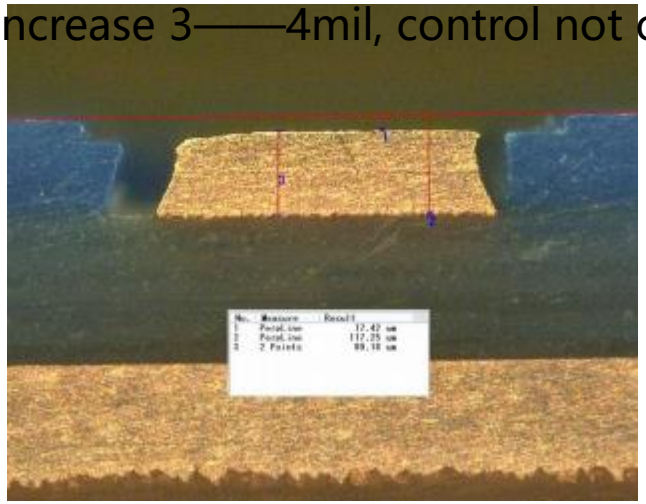


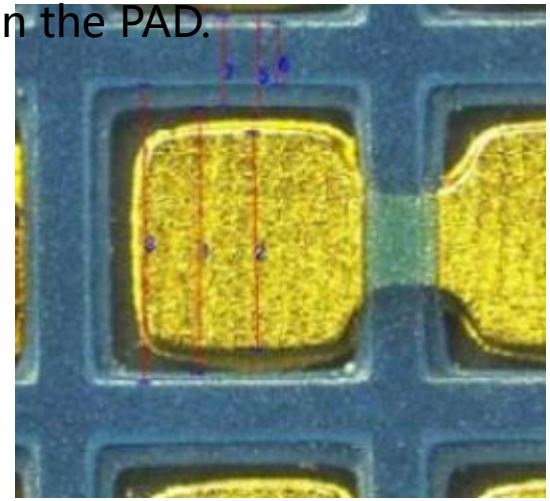
Line corner oil thickness Z≥10um

三、The power supply PCB quality risk identification and control

3. 6 Soldermask control ——

finished copper thickness ≥ 2OZ, soldermask secondary oil production: incoming material —— 1st pre——treatment grinding plate (volcanic grey) —— hole plugging / screen printing surface oil —— pre——bake —— exposure Developing —— post baking —— 2nd pretreatment (sandblasting) —— screen printing —— pre——baking —— exposure —— developing —— 2nd post baking. Bake, to ensure that the line corner oil thickness Z ≥ 10um. screen printing after the static ≥ 30Min to improve the bubble, exposure energy of 10——12 frames developing side etching control within 1mil, the second film window than the first time to increase 3——4mil, control not offset on the PAD.

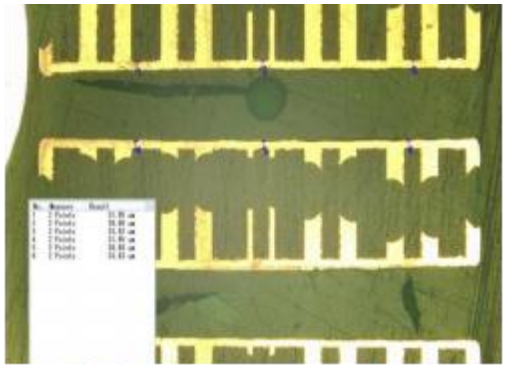




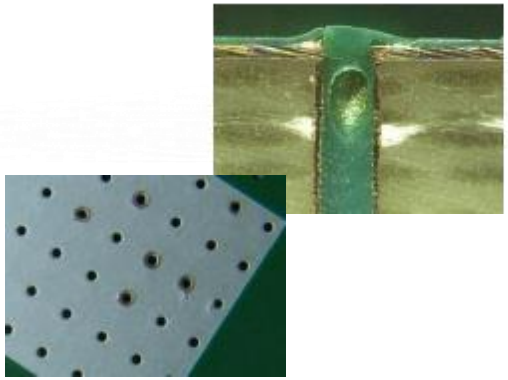
三、The power supply PCB quality risk identification and control

3.6 solder resist control ——

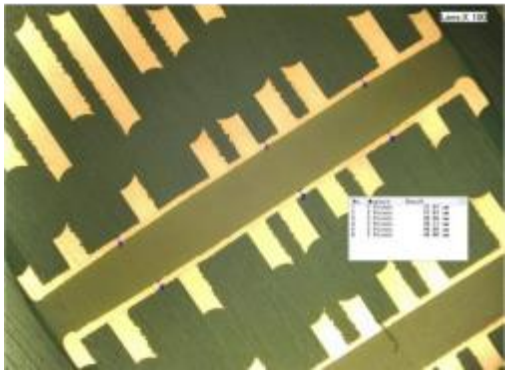
conventional green oil plug hole aperture 0.2——0.6mm, thick copper plate thickness is thicker, there is (half plug hole) plug hole oil, cracking risk, ink plug hole after 60 ℃ low—— temperature baking 120Min and then step up the temperature final curing to improve, or the use of resin plug holes to avoid this problem.



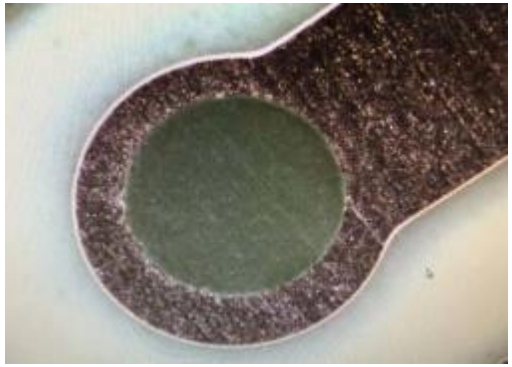
Soldermask plug holes (risk of cracking)



Soldermask plug holes vs. half plug holes (risk of oil bubbling)



Resin plug holes No cracking

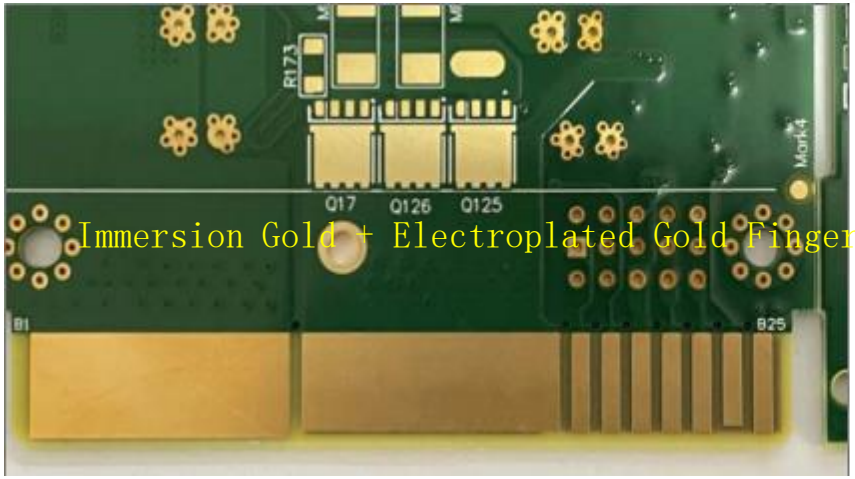


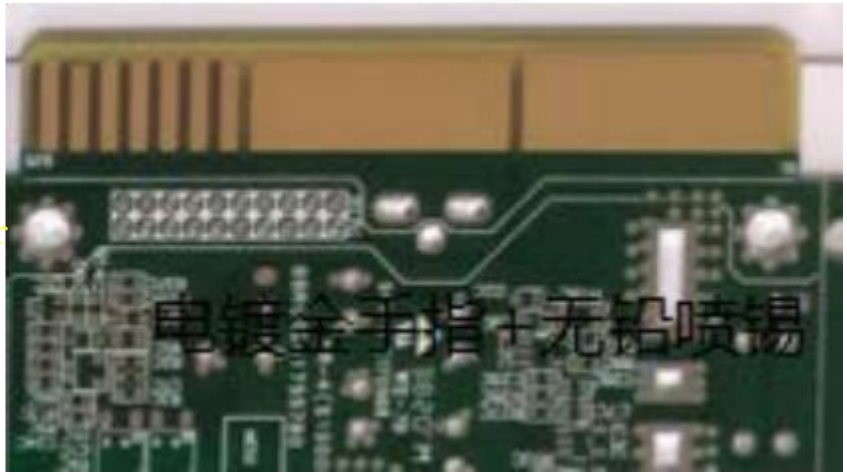
Resin plug hole No oil leakage

三、The power supply PCB quality risk identification and control

3.7 Gold finger control ——

some power supply products have gold finger design, usually ordinary gold finger or long and short gold finger, graded gold finger design is less. The main control of gold finger size / PAD - edge size / AB face alignment, key position appearance, lead residue, bevelled edge depth / angle, etc., gold finger position soldermask is generally designed according to the single side of the 2 mil larger open window.

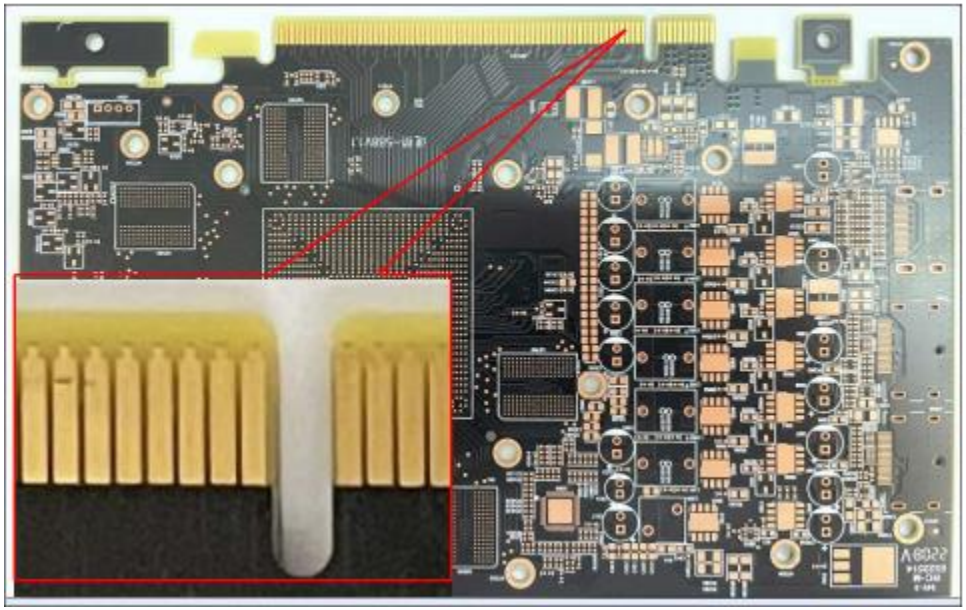




三、The power supply PCB quality risk identification and control

3. 7 Gold Finger Control ——

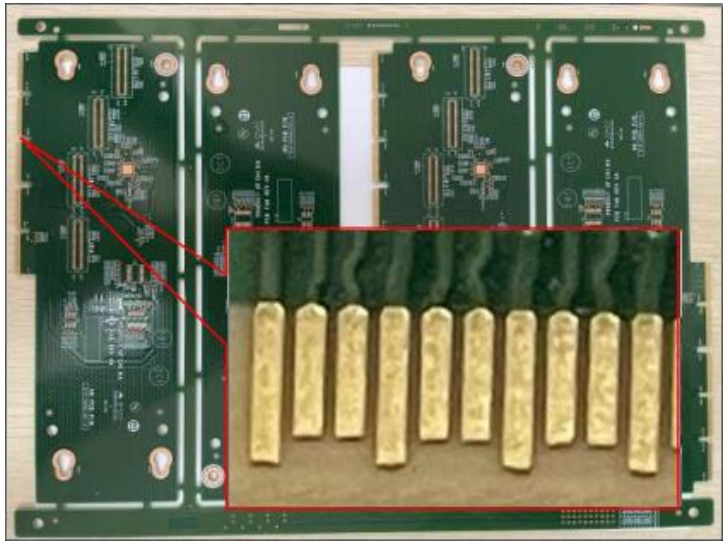
General Gold Finger Processing Flow: Pre-process - Gold Finger Plating - Gong Plate - Bevelled Edge - Post-process, after passing through the gong plate and bevelled edge, the gold-plated lead will be gonged without lead residue. -After the process, the gold-plated leads will be gonged off after passing through the gong plate and bevelled edges, and there is no lead residue.



三、The power supply PCB quality risk identification and control

3. 7 Gold finger control ——

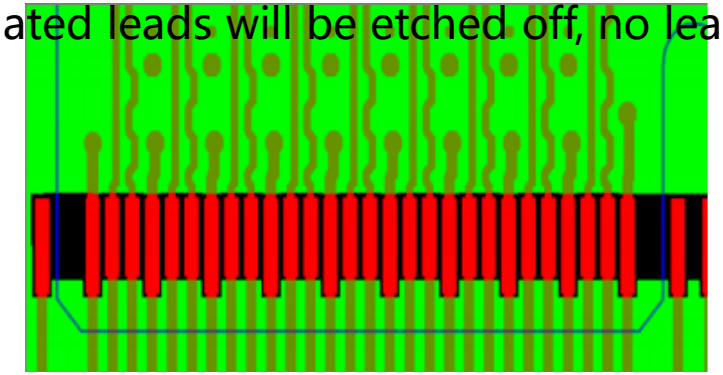
long and short gold finger processing flow: pre——processing —— secondary dry film —— electroplating gold finger ——Retreat dry film —— three times dry film —— etching lead —— retreat dry film —— —— gong plate —— bevelled edge —— after the process, through the second dry film. ——Gong board —— bevelled edge —— post——process, through the second dry film coverage, the gold finger position for local electroplating; through the third dry film coverage, the gold—— plated leads will be etched off, no lead residue.



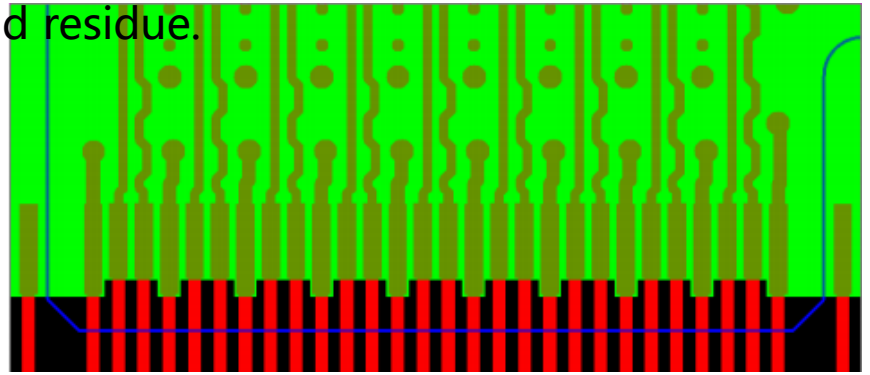
三、The power supply PCB quality risk identification and control

3. 7 Gold finger control——

long and short gold finger processing flow: pre——processing —— secondary dry film —— electroplating gold finger ——Retreat dry film —— three times dry film —— etching lead —— retreat dry film —— —— gong plate —— bevelled edge —— after the process, through the second dry film. ——Gong board —— bevelled edge —— post——process, through the second dry film coverage, the gold finger position for local electroplating; through the third dry film coverage, the gold——plated leads will be etched off, no lead residue.



The secondary dry film covers the gold-plated leads and other locations with dry film so that they are not gold-plated and only the gold finger locations are exposed.

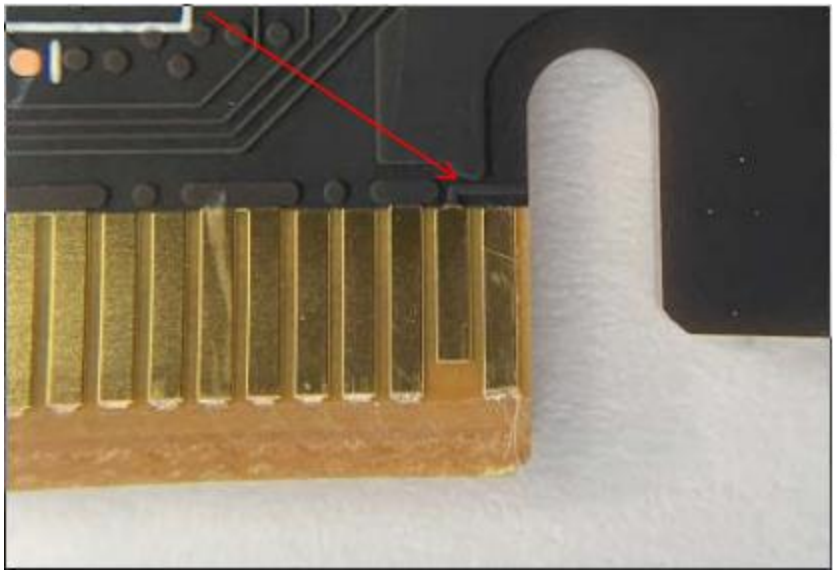


After the gold finger plating do three dry film, the plating lead will be exposed to etch off, all other positions are protected by dry film.

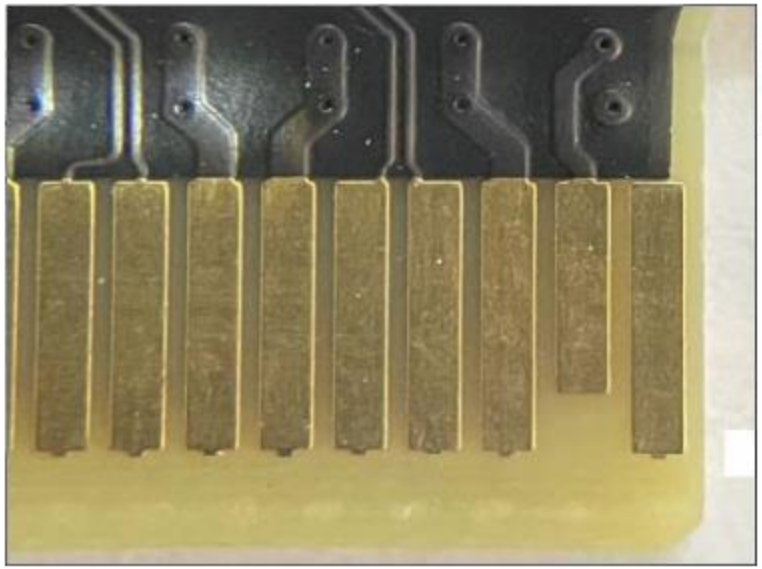
三、The power supply PCB quality risk identification and control

3.7 Gold Finger Control ——

For individual long and short gold fingers, the short gold finger can be connected through the hole and the inner layer of the line, and at the same time pull out the plating lead from the side to the outside of the board to complete.



Short fingers are gold plated by pulling the lead from the side, no lead remains after gong.



Short fingers pass through the holes and the inner layer of wiring and lead through to complete the gold plating, no lead residue.

三、The power supply PCB quality risk identification and control

3. 8 Reliability monitoring ——100% voltage and inductance testing of finished products, sampling for cold and thermal shock, hot oil, CAF, etc.

In-plant testable items					
number	project	Test content	number	project	Test content
1	Plate Tg Test	Curing degree test	10	Gum content test	PP Resin Content Measurement
2	SEM&EDS Electron Microscopy	Sample magnification and elemental analysis	11	Gel Time Test	PP gelation time test
3	Ion Migration Test	High temperature and high humidity environment adjacent to the line, the resistance value of the hole change	12	Dielectric Withstanding Voltage Test	Voltage resistance test for dielectric layer and solder resist ink
4	Reflow resistance test	Simulation of customer's on-line temperature, product tolerance test	13	Solderability Test	Test the solderability of each part to be soldered on the board surface.
5	High temperature and high humidity test	Product changes under high temperature and high humidity environment	14	Thermal stress test	Tests the resistance of PCBs to thermal processing or heat treatment such as assembly, re-soldering, and repair.
6	Cold and hot shock test	Change of resistance value of conduction line and hole chain under high and low temperature cycling.	15	Surface Coating Thickness Measurement	Surface coating thickness test (Au, Ni, Ag, Sn)
7	Hot oil test	Product resistance change under high and low temperature thermal oil circulation.	16	Impedance Test	Line impedance value test
8	Salt spray test	Product salt spray corrosion resistance test	17	RoHS testing	Testing of raw materials and hazardous substances in products
9	Ion contamination test	Ion residue test on board surface	18	Peel strength test	Testing of the bonding ability of copper foil to the substrate.

三、The power supply PCB quality risk identification and control

3. 8 Reliability monitoring ——100% voltage and inductance testing of finished products, sampling for cold and thermal shock, hot oil, CAF, etc.


CAF Resistance Tester


Automatic Inductance Tester

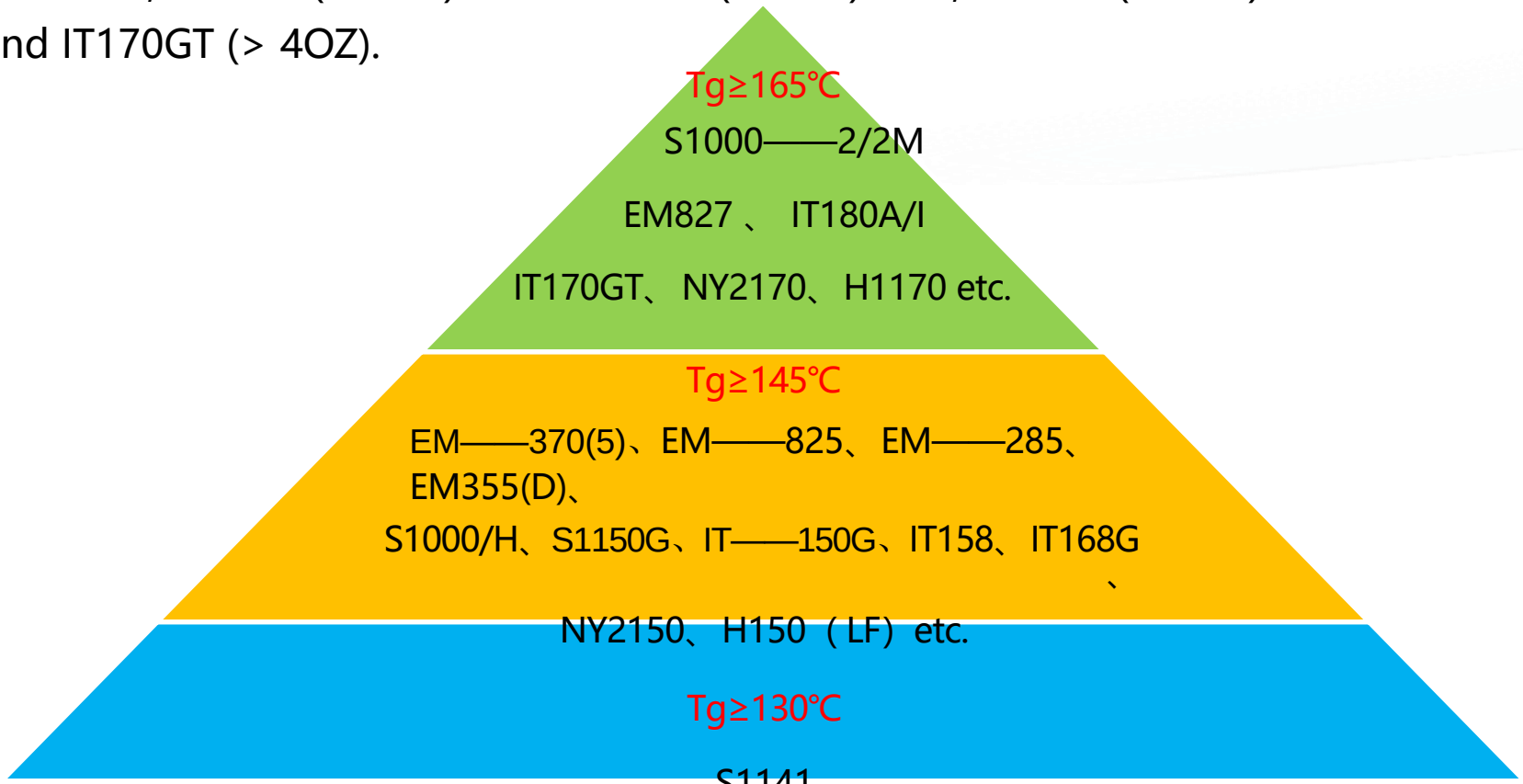

Hot and cold cycle test


Automatic Withstand Voltage Tester

四、 Power Supply PCB Engineering Design Recommendations

4.1 Selection of materials ——

when the hole wall distance ≤ 0.7mm, the recommended use of S1000H, S1000 - 2M; when the hole wall distance > 0.7mm, available EM - 825, IT180A (≤ 4OZ) and IT170GT (> 4OZ). 825, IT180A (≤ 4OZ) and IT170GT (> 4OZ).



四、 Power Supply PCB Engineering Design Recommendations

4.1 Selection of materials——

when the hole wall distance ≤ 0.7mm, the recommended use of S1000H, S1000 - 2M; when the hole wall distance > 0.7mm, can be used EM - 825, IT158 (≤ 3OZ), IT180A (≤ 4OZ) and IT170GT (> 4OZ).

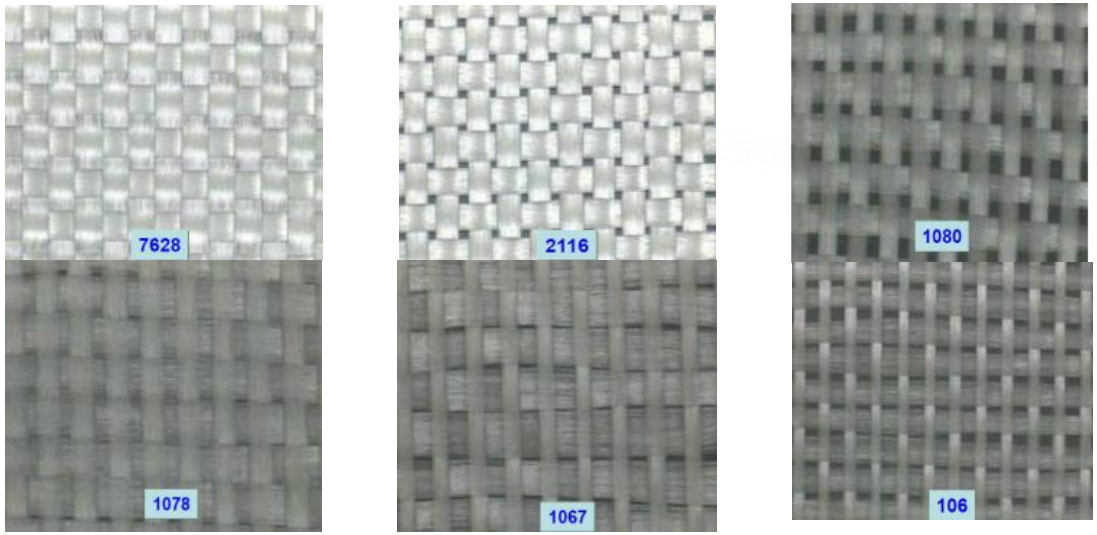
孔壁间距 / 材料 Ring 间距	8mil 2.5mil	9 mil 2.5mil	10 mil 3mil	12 mil 5 mil	14 mil 7mil
生益（S1000H）	Ok（1600）	Ok（1600）	Ok（1600）	Ok（1600）	Ok（1600）
联茂（IT158）	/	Ok（1600）	Ok（1600）	Ok（1600）	Ok（1600）

S1000H and IT158 material drilling 1600 holes limit, hole wall spacing Min 9mil, 85 ℃, 85% RH, DC100V, 168H CAF resistance test without exception.

四、 Power Supply PCB Engineering Design Recommendations

4.1 Selection of materials——

thick copper favouring the use of a number of thin cloth combinations, pressing the use of glass cloth gaps between each other penetrate the resin to achieve the role of filling the thick copper, generally do not recommend more than 2116 thickness of PP.



1. 7628 cloth is basically no gap, not recommended for use in thick copper power products, 2116 can be used conditionally;

2.1078 and 1067 as a high open fibre cloth, the gap is small, is not recommended, it is recommended to use 1080 and 106 cloth;

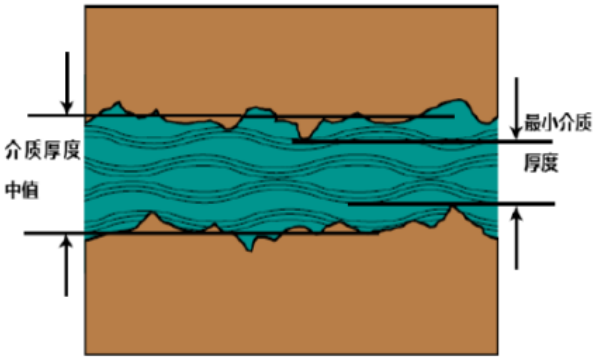
四、 Power Supply PCB Engineering Design Recommendations

4.2 withstand voltage —— the same layer line spacing voltage withstand design and copper thickness, the thicker the copper under the same voltage requirements of the larger the spacing, according to the etching factor ≥ 3, 2/3/4OZ line burr unilateral ≤ 22/35/45um, the proposed engineering production of film different voltage withstand requirements are designed as follows:

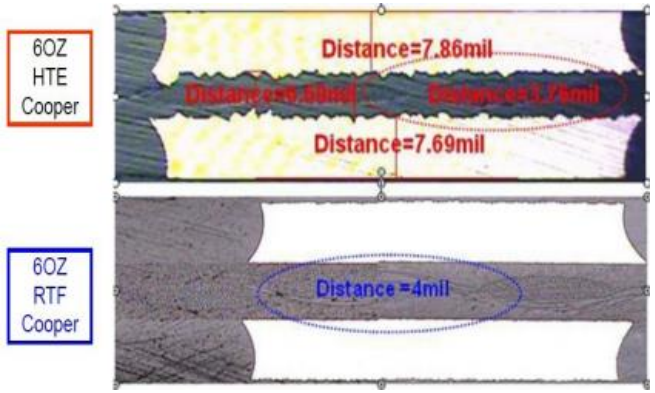
Thickness of base copper	Minimum spacing design for production film					
	500V	1000V	1500V	2000V	2500V	3000V
2OZ	3mil	6mil	12mil	18mil	24mil	> 30mil
3OZ	3mil	7mil	14mil	20mil	26mil	> 36mil
4OZ	3mil	8mil	16mil	22mil	> 30mil	> 40mil

四、 Power Supply PCB Engineering Design Recommendations

4.2 withstand voltage ——interlayer withstand voltage test 2OZ, 3OZ and 4OZ dielectric thickness Min ≥ 3.5 mil after pressing, taking into account the uniformity of pressing, it is recommended that the minimum thickness of the dielectric layer of thick copper plate after pressing design > 0.1mm; RTF copper foil copper teeth are smaller, the thin plate Hi-Pot risk is smaller than the HTE foil, but the RTF copper foil peeling resistance is not as high as the HTE foil. RTF copper foil has less anti-peeling strength, which needs to be considered comprehensively.



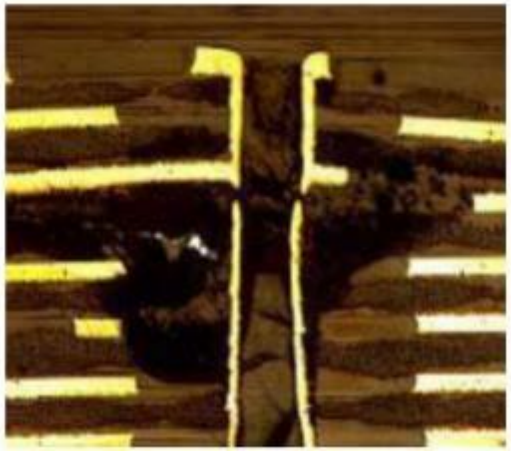
Power supply board dielectric thickness Min ≥ 3.5 mil



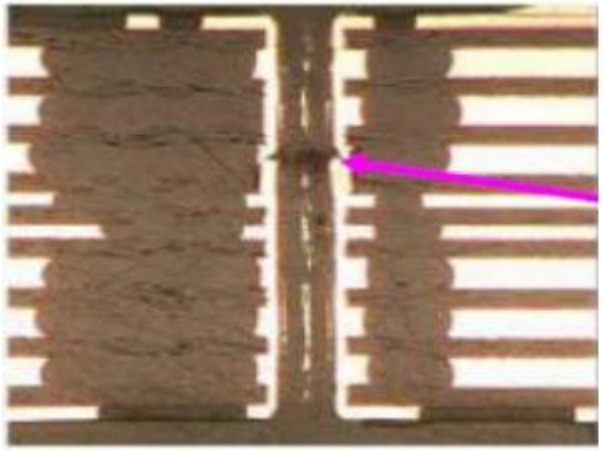
RTFcopper foil under the dielectric thickness Hi-Pot risk is smaller

四、 Power Supply PCB Engineering Design Recommendations

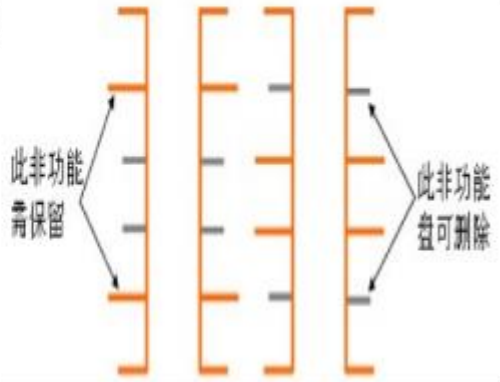
4.3 Non-functional PAD —— non-functional PAD refers to the inner layer of the hole in the hole corresponding to the disc, without any electrical function, only used to connect the hole, to strengthen the role of the hole or to prevent PCB processing due to the flow of glue due to the lack of delamination, but the thick copper plate non-functional disc retained too much, will affect the quality of the hole drilling, and it is recommended that the design into a compartmentalised retention.



No non-functional PAD perforation fracture



The base copper is 2OZ and 5OZ. The failure position is at 5OZ, which is a non-functional PAD location.



Non-functional PAD Design Optimization

四、 Power Supply PCB Engineering Design Recommendations

4.4 Power supply board key process capabilities ——

Process Characteristics	Process Capability	Process Characteristics	Process Capability
Number of layers	2 ~ 20L(HDI)	Warpage of finished product	≤0.7%
Plate thickness	0.6 ~ 4.0mm	Tolerance of plating length of plate edge	±0.3mm
Aspect ratio	12：1	Tolerance of plating flatness of plate edge	±2mil
Interlayer Alignment	±4mil	Min hole to inner copper	0.175mm(≤12L)
Min hole diameter	0.25mm	Maximum Size	500mm*600mm
Min core plate thickness	0.1mm (without copper)	Finished Size Tolerance	±4mil（<300mm)
Copper thickness	2～6oz	Impedance Control Tolerance	±10%
Hole Copper	As per customer's request	Plug Hole Diameter	0.2——0.6mm
Line width/spacing	0.10/0.10mm	Plug Hole	Resin / Soldermask
Auto test voltage withstand	500——3000V	Ink Thickness	Wire Angle Min10um
Automatic inductance test	Y	Surface Treatment	Immersion gold, tin spray, OSP

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