

**RAYBEN PRINTED CIRCUIT BOARD (ZHUHAI) LTD.
PROCESS CAPABILITY**

1. 产品/PRODUCT

项目 Item	内容 Content		常规 Normal	特殊 Special
1	层数 No.Of Layer		2~10	12
2	完成板尺寸 (最大) Finished Board Size (Max)		20"×24.5" (508mm×622mm)	
3	完成板尺寸 (最小) Finished Board Size (Min)		3.9"×3.9" (99mm×99mm)	
4	板厚度 (最大) Board Thickness (Max)		0.126" (3.2mm)	
5	板厚度 (最小) Board Thickness (Min)		0.016" (0.4mm)	
6	芯板厚度 (最小) T/C Thickness (Min)		0.0039" (0.1mm)	0.0029"
7	绝缘层厚度(最小) Inner Layer Dielectric Thickness (Min)		0.0029" (0.075mm)	
8	绝缘层厚度公差 Inner Layer Dielectric Thickness Tolerance		±10%	
9	成品厚度公差 Finished Board Thickness Tolerance	成品板厚 Finished Board Thickness	0.4≤T<0.8mm	±0.076
			0.8≤T<1.0mm	±0.1
			T≥1.0mm	±10%
10	板曲(最小) Warpage (Min)		0.75%	0.50%
11	机械钻孔孔径(最大) Mechanical Drill Hole Diameter (Max)		0.252" (6.4mm)	
12	机械钻孔孔径(最小) Mechanical Drill Hole Diameter (Min)		0.0098" (0.25mm)	0.008" (0.20mm)
13	外层底铜厚度(最小) Outer Layer Base Copper Thickness (Min)		1/3 OZ (0.012mm)	
14	外层底铜厚度(最大) Outer Layer Base Copper Thickness (Max)		4 OZ (0.142mm)	
15	内层底铜厚度(最小) Inner Layer Base Copper Thickness (Min)		1/2 OZ (0.016mm)	
16	内层底铜厚度(最大) Inner Layer Base Copper Thickness (Max)		4 OZ (0.142mm)	
17	内层孔到线间距(最小) Inner Layer Hole To Line Spacing(minimum)	层数 No. Of Layer	4	7mil
			6	8mil
			8-12	9mil

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18	内层隔离环宽度(最小) Inner Layer Clearance Width(Minimum)	层数 No. Of Layer	4	8mil		
			6	8.5mil		
			8-12	9mil		
19	板料类型 Dielectric Material				CEM-3、CEM-1	
					FR4(Normal Tg)	
					FR4(High Tg)	
					Lead Free	
					Halogen Free	
			Aluminum Base			
20	孔电镀纵横比(最大) Hole Plating Aspect Ratio (Max)			7:1	10:1	
21	孔径公差(镀通孔) Hole Diameter Tolerance (PTH)			±3mil (±0.076mm)	±2mil	
22	孔径公差(非镀通孔) Hole Diameter Tolerance (NPTH)			±2mil (±0.051mm)		
23	孔位公差(与 CAD 数相比) Hole Position Tolerance (Compared With CAD Data)			±3mil (±0.076mm)	±2mil	
24	孔壁铜厚(SMOBC) PTH Hole Copper Thickness(SMOBC)			≥1mil (≥0.025mm)		
25	孔壁铜厚 (全板镀金板) PTH Hole Copper Thickness (Flash Gold Plating Board)			≥0.4mil (≥0.010mm)		
26	外层设计线宽/间距 (最小) Outer Layer Design Line Width/Spacing(Min)	基铜厚 Base Copper Thickness	H OZ	5mil/5mil	4mil/4mil	
			1 OZ	6mil/6mil		
			2 OZ	8mil/8mil		
			3 OZ	10mil/10mil		
			4 OZ	12mil/12mil		
27	内层设计线宽/间距 (最小) Inner Layer Design Line Width/Spacing(Min)	基铜厚 Base Copper Thickness	H OZ	4mil/4mil		
			1 OZ	5mil/5mil		
			2 OZ	6mil/6mil		
			3 OZ	8mil/8mil		
			4 OZ	10mil/10mil		
28	图形对图形精度 (最小) Image To Image Tolerance (Min)			±5mil (±0.127mm)		
29	外层图形对孔位精度 (最小) Image To Image Tolerance (Min)			±3mil (0.076mm)		
30	孔位对板边精度(最小) Hole To Edge Tolerance			±4mil (±0.1mm)	±3mil	
31	非沉铜孔壁对外形边间距 (最小) Hole(NPTH) Wall To Edge Spacing(Min)			10mil (0.254mm)		

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32	钻孔孔壁对钻孔孔壁间距 (最小) Hole(NPTH) Wall To Hole(NPTH) Wall Spacing(Min)		8mil (0.20mm)	
33	阻焊对位精度公差 Soldermask Registration		±3mil (±0.076mm)	±2mil (±0.05mm)
34	阻焊厚度 (最小) Soldermask Thickness (Min)	线面 Surface Of Line	10um	
		线角位 Corner of Line	5um	
		基材面 Surface Of Base Materials	15um	
35	阻焊桥宽 (最小) Soldermask Dam (Min)	基铜厚 Base Copper Thickness	H OZ	3mil
			1 OZ	4mil
			2 OZ	5mil
			3 OZ or 4 OZ	6mil
36	阻焊塞孔孔径 (最大) Soldermask Plug Hole Diameter(Max)	板厚 Board Thickness	≤1.0mm	0.45mm
			>1.0mm	0.65mm
37	字符宽度/间距 (最小) C/M Line Width/Spacing (Min)	正字 Positive	6mil/6mil	4mil/5mil
		负字 Negative	10mil/6mil	8mil/6mil
38	字符对位精度公差 C/M Registration		±5mil (±0.127mm)	
39	蓝胶厚度 Peelable Soldermask Thickness		8mil-16mil (0.2mm-0.4mm)	
40	蓝胶塞孔孔径 (最大) Peelable Soldermask Plug Hole Diameter(Max)		80mil (2.0mm)	
41	金插头镀镍厚度 (最薄点) (最大) Gold Finger Nickel Thickness(Measured At The Minimum Point) (Max)		200µin (5µm)	
42	金插头镀金厚度 (最薄点) (最大) Gold Finger Gold Thickness (Measured At The Minimum Point) (Max)		60µin (1.5µm)	
43	金插头倒边深度公差 (最小) Tolerance Of Chamfer Depth (Min)		±8mil (±0.2mm)	
44	金插头倒边角度及公差 Range Of Chamfer Angle & Tolerance		20°/30°/45° ±5°	
45	沉镍/金镍厚 (最薄点) (最大) Nickel Thickness For Electroless Nickel And Immersion Gold(Measured At The Minimum Point) (Max)		150µin (3.8µm)	
46	沉镍/金厚 (最薄点) (最大) Gold Thickness For Electroless Nickel And Immersion Gold(Measured At The Minimum Point) (Max)		1µin (0.0254µm)	

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47	全板镀金（薄金）镍厚（最薄点）（最大） Nickel Thickness For Flash Gold Plating(Soft Gold) (Measured At The Minimum Point) (Max)			100μin (2.54μm)	
48	全板镀金（薄金）金厚（最薄点）（最大） Gold Thickness For Flash Gold Plating(Soft Gold) (Measured At The Minimum Point) (Max)			0.5μin (0.0127μm)	
49	全板镀金（厚金）镍厚（最薄点）（最大） Nickel Thickness For Flash Gold Plating(Hard Gold) (Measured At The Minimum Point) (Max)			200μin (5μm)	
50	全板镀金（厚金）金厚（最薄点）（最大） Gold Thickness For Flash Gold Plating(Hard Gold) (Measured At The Minimum Point) (Max)			4μin (0.1μm)	
51	锡厚（热风整平）（最大） Solder Thickness On XFP (HAL) (Max)			1575μin (40μm)	
52	锡厚（热风整平）（最小） Solder Thickness On Pads Except XFP.(Min)			40μin (1.0μm)	
53	碳油阻抗 Carbon Ink Resistance			25Ω	
54	碳油间距（最小） Spacing For Carbon Conductor (Min)	基铜厚 Base Copper Thickness	H OZ	14mil	
			1 OZ	20mil	
55	冲外形公差（边到边）（最小） Punching Dimension Tolerance (Edge To Edge) (Min)			±8mil (±0.20mm)	±6mil (±0.15mm)
56	冲外形公差（孔到边）（最小） Punching Dimension Tolerance (Hole To Edge) (Min)			±5mil (±0.127mm)	
57	冲外形板厚（最大） Punching Board Thickness (Max)			80mil (2.0mm)	
58	铣外形公差（边到边）（最小） Routing Dimension Tolerance (Edge To Edge) (Min)			±5mil (±0.127mm)	±4mil (±0.1mm)
59	铣外形公差（孔到边）（最小） Routing Dimension Tolerance(Hole To Edge) (Min)			±4mil (±0.1mm)	±3mil (±0.076m m)
60	铣外形圆弧（内角）（最小） Radius By Routing (Internal Angle) (Min)			R≥16mil (0.4mm)	
61	长槽宽度（最小） Slot Width (Min)			21.65mil (0.55mm)	
62	长槽形状公差(当长度>2×宽度+0.15mm) Slot Tolerance (L>2W+0.15mm)		PTH	±3mil (±0.076mm)	
			NPTH	±2mil (±0.05mm)	

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63	短槽形状公差(当长度 $\leq 2 \times$ 宽度+0.15mm) Slot Tolerance ($L \leq 2W + 0.15\text{mm}$)	PTH	$\pm 4\text{mil}$ ($\pm 0.10\text{mm}$)	
		NPTH	$\pm 3\text{mil}$ ($\pm 0.076\text{mm}$)	
64	V-槽筋厚公差 (最小) V-CUT Remaining Thickness Tolerance(Min)	自动 Automatic	$\pm 4\text{mil}$ ($\pm 0.10\text{mm}$)	
		手动 By hand	$\pm 5\text{mil}$ ($\pm 0.127\text{mm}$)	
65	V-槽角度及公差 V-CUT Angle & Tolerance		$30^\circ/45^\circ/60^\circ$ $\pm 5^\circ$	
66	V-槽错位度 (最小) V-CUT Misregistration (Min)		$\pm 5\text{mil}$ ($\pm 0.127\text{mm}$)	
67	切割 V-槽的板厚度 (最小) Board Thickness That Can Be V-CUT(Min)		32mil (0.8mm)	
68	切割 V-槽的板厚度 (最大) Board Thickness That Can Be V-CUT(Max)		126mil (3.2mm)	
69	V-槽对孔公差 (最小) V-CUT To Hole Tolerance (Min)		$\pm 5\text{mil}$ ($\pm 0.127\text{mm}$)	
70	V-槽对 V-槽位置公差 (最小) V-CUT To V-CUT Location Tolerance(Min)	自动 Automatic	$\pm 4\text{mil}$ ($\pm 0.100\text{mm}$)	
		手动 By hand	$\pm 6\text{mil}$ ($\pm 0.152\text{mm}$)	
71	V-槽对板边公差 (最小) V-CUT To Edge Tolerance(Min)	自动 Automatic	$\pm 4\text{mil}$ ($\pm 0.100\text{mm}$)	
		手动 By hand	$\pm 6\text{mil}$ ($\pm 0.152\text{mm}$)	
72	V-槽加工板尺寸 (最大) V-CUT Board Size (Max)		15"×24.5" (380mm×635mm)	
73	V-槽加工板尺寸 (最小) V-CUT Board Size (Min)		1.57"×3" (40mm×75mm)	
74	阻抗公差 (最小) Impedance Tolerance(Min)		$\pm 10\%$	$\pm 8\%$
75	有机涂布膜厚 (范围) Organic Solder Protection Solder Thickness(Range)		7.8 μin -23.6 μin (0.2 μm -0.6 μm)	

2 制程/PROCESS

项目 Item	内容 Content	常规 Normal
1	表面处理 Metal Finishes	a.垂直喷锡 VHAL
		b.有机涂布(OSP)
		c.沉镍/金 Electroless Nickel/Immersion Gold

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		d.全板镀金(软金)Flash Gold (Soft Gold)
		e.蓝胶 Peelable Solder Mask
		f.碳油 Carbon Ink
2	Inner Layer Treatment	a.棕化 Oxide Replacement
3	镀通孔 PTH	a.无电沉铜 Electroless Copper
4	图形电镀 Pattern Plating	a.图形电镀 Pattern Plating

3 其他/OTHER

项目 Item	内容 Content	常规 Normal
1	通断路测试电压 E-Test Voltage	50-300V
2	短路电阻 Continuity Resistance	2Ω-8000Ω
3	开路电阻 Isolation Resisitance	5Ω-250Ω
4	铜线抗剥强度 Copper Trace Peel Strength	≥1.1N/mm
5	阻焊硬度 Soldermask Hardness	≥6H
6	热应力测试 Thermal Stress Test	288℃×10sec 1次通过 288℃×10sec Pass Once Time
7	自燃性 Flammability	94V-0
8	离子污染 Ionic Contamination	≤10.06μg/in2 (≤1.56μg/cm2)