



**Active Sales Associates, Inc. / Century PCB**

**Product Capability**

## 1. Introduction

### 1.1. Purpose

The purpose of this specification is to set a basis for product design in the absence of customer specification.

### 1.2. Spec.

- 1.2.1. Documentation precedence:
- I. Purchase Order
  - II. ECN
  - III. Drawing & Gerber File
  - IV. Customer Specification
  - V. This Specification
  - VI. Another Referenced Document.

1.2.2. PCB requirements not contained in this specification will conform to IPC-A-600 and IPC 6012 latest revision, Class 2 performance criteria

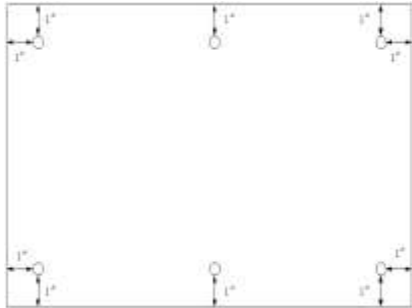
### 1.3. Reference

IPC-TM-650; IPC-A-600H (CLASS 2); IPC-SM-840; IPC-6012; IPC-6016; IPC-4101; ANSI/J-STD-003; IPC-2221

Item	Capability			Preferred			Remarks		
2. Base material									
2.1. Laminate Type	FR-4			FR-4			Try to get the UL approval for below material		
	Manufacturer	Type	Tg	Manufacturer	Type	Tg	Super/very low loss		
	ITEQ	IT-180TC	175±5°C	ITEQ	IT-180TC	175±5°C	Manufacturer	Type	Tg
	ITEQ	IT-180I	175±5°C	ITEQ	IT-180I	175±5°C	TUC	TU883	170±5°C
	ITEQ	IT-158	150±5°C	ITEQ	IT-158	150±5°C	TUC	TU933	170±5°C
	Nan Ya	NP-140TL	140±5°C	Nan Ya	NP-140TL	140±5°C	TUC	TU863+	170±5°C
	Nan Ya	FR-4-86PY(CTI600)	140±5°C	Nan Ya	FR-4-86PY(CTI600)	140±5°C	TUC	TU-1300E	170±5°C
	Nan Ya	NP-175F	175±5°C	Nan Ya	NP-175F	175±5°C	ISOLA	I-Tera -MT40	200 +/-5
	Isola	FR-408(LowDk)	180±5°C	Isola	FR-408(LowDk)	180±5°C			
	Isola	FR-408HR(LowDk)	180±5°C	Isola	FR-370HR	175±5°C			
	Isola	FR-370HR	175±5°C	Isola	FR-408HR(LowDk)	180±5°C			
	TUC	TU768	175±5°C	TUC	TU768	175±5°C			
	TUC	TU872LK(SLK)	180±5°C	TUC	TU872LK)	180±5°C			
	TUC	TU662	150±5°C	TUC	TU662	150±5°C			
	HET	HTE800	170±5°C	HET	HTE800	170±5°C			
	HET	HTE590-2	150±5°C	HET	HTE590-2	150±5°C			
	VENTEC	VT-42Black	140±5°C	VENTEC	VT-42Black	140±5°C			
	VENTEC	VT-47	170±5°C	VENTEC	VT-47	170±5°C			
	VENTEC	VT-481	150±5°C	VENTEC	VT-481	150±5°C			
		ISOLA	185HR	180 tg.					
	ISOLA	I-SPEED	180 tg.						
	ISOLA	I-Tera MT40	200 tg.						

2.1. Laminate Type

FR-5			Halogen Free		
Manufacturer	Type	Tg	Manufacturer	Type	Tg
Nan Ya	NP-180TL	175±5°C	Nan Ya	NPG-N	170±5°C
			TUC	TU862HF	170±5°C
Rogers			Rogers		
Manufacturer	Type	Tg	Manufacturer	Type	Tg
Rogers	RO-4350	280°C ↑	Rogers	RO-4350	280°C ↑
Rogers	RO-4003	280°C ↑	Rogers	RO-4003	280°C ↑
Rogers	RO-3000	280°C ↑	Rogers	RO-3000	280°C ↑
Getek			Getek		
Manufacturer	Type	Tg	Manufacturer	Type	Tg
General Electric	ML200+	175±5°C	General Electric	ML200+	175±5°C
General Electric	11633+	175±5°C			
General Electric	11635+	175±5°C			
Metal core					
Manufacturer	Type	Tg			
Alron	92ML	175±5°C			
Thermagon	1KA06, A08	175±5°C			

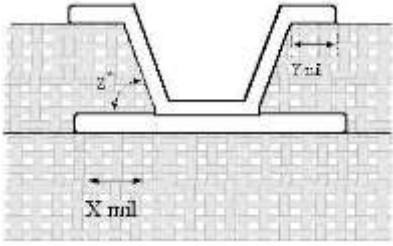
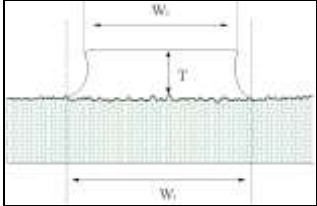
2.2 Copper Foil Weight and Thickness	Copper Foil Weight and Thickness				IPC-4101 1.1.3	
	Common usage	Metric		Non-metric		
		Area Weight (g/m <sup>2</sup> )	Thickness (μ/m)	Area Weight (oz/ft <sup>2</sup> )		Thickness (mils)
	1/2 OZ	152.5	17.1	0.5		0.67
	1 OZ	305.0	34.3	1.0		1.35
	2 OZ	610.0	68.6	2		2.70
	3 OZ	915.0	102.9	3		4.05
	4 OZ	1220.0	137.2	4		5.40
5 OZ	1525.0	171.5	5	6.75		
2.3 Copper Foil Thickness Tolerance	± 10 %				Century: CP-III-PC-002	
2.4 Flammability	UL 94V-0		UL 94V-0			
2.5 Thickness Tolerance of Lamination						
2.5.1 Thickness Tolerance of Laminate	Lam. Thickness ≤ 31 mil per IPC-4101 Class C (measured excluding copper foil)		Lam. Thickness ≤ 31 mil per IPC-4101 Class C (measured excluding copper foil)		<b>PC-4101 3.8.4.2</b> ※ Measurement Location: 3 points along both long sides of laminate, 1" from edge of material.  	
	Nominal Thickness mm(mil)	Tolerance mm(mil)	Nominal Thickness mm(mil)	Tolerance mm(mil)		
	0.025-0.119 (0.9-4.7)	±0.013 ±(0.5)	0.786-1.039 (30.9-40.9)	±0.075 ±(2.9)		
	0.120-0.164 (4.7-6.5)	±0.018 ±(0.7)	1.040-1.674 (40.9-65.9)	±0.075 ±(2.9)		
	0.165-0.299 (6.5-11.8)	±0.025 ±(0.9)	1.675-2.564 (65.9-100.9)	±0.10 ±(4)		
	0.300-0.499 (11.8-19.6)	±0.038 ±(1.5)	2.565-3.579 (100.9-140.9)	±0.13 ±(5.12)		
	0.500-0.785 (19.7-30.9)	±0.050 ±(1.9)	3.580-6.350 (140.9-250)	±0.15 ±(6)		

2.5.2 Thickness Tolerance of Special Laminate	Tolerance Range $R$ (mil)	$R > 7$	$6 < R \leq 7$	$4 < R \leq 6$	Century: CP-III-PC-002 (Base material for tight thickness tolerance is purchased in pre-sheared size, and are accompanied by 100% inspection at AQL=0.40at Century.) ※Measurement Location as for 2.5.1.		
	Thickness Tolerance(mil)	per IPC	$\pm 1.25$ mil	$\pm 1.0$ mil			
	Tolerance Range $R$ (mil)	$R = 4$	$R < 4$				
	Thickness Tolerance(mil)	$\pm 0.75$ mil	Out of Capability				
2.6. Dielectric Thickness (Before Laminate)	Nan Ya(NP-140B)					Century: CP-III-PE-013 # indicates special material, must be custom-made.	
	Type	1080	2113(#)	2116	2116HR		
	Thickness(mil)	$2.6 \pm 0.3$	$3.5 \pm 0.4$	$4.1 \pm 0.4$	$5.0 \pm 0.4$		
	Type	1506(#)	7628MF	7628HR	106(#)		
	Thickness(mil)	$6.0 \pm 0.4$	$7.1 \pm 0.4$	$7.9 \pm 0.4$	$1.8 \pm 0.4$		
2.6. Dielectric Thickness (Before Laminate)	ITEQ(TG = 175°C)(IT-180BS);TUC TU768;HTE HTE760, NP175F					Century: CP-III-PE-013 # indicates special material, must be custom-made.	
	Type	1080	2113(#)	2116	2116HR		106(#)
	Thickness(mil)	$3.0 \pm 0.5$	$4.0 \pm 0.5$	$4.5 \pm 0.5$	$5.4 \pm 0.5$		$2.2 \pm 0.3$
	Type	1506	7628MF	7628MR	7628HR		1080HR
	Thickness(mil)	$6.6 \pm 0.5$	$7.5 \pm 0.5$	$8.3 \pm 0.5$	$9.0 \pm 0.5$		$3.5 \pm 0.5$
	ISOLA(TG = 180°C)(370HR)						
	Type	1080	2113(#)	2116	2116HR		
	Thickness(mil)	$3.0 \pm 0.5$	$4.0 \pm 0.5$	$4.5 \pm 0.5$	$5.4 \pm 0.5$		
	Type	1506(#)	7628MF	1080HR	7628HR		
	Thickness(mil)	$6.6 \pm 0.5$	$7.5 \pm 0.5$	$3.5 \pm 0.5$	$9.0 \pm 0.5$		
	Isola (TG = 180°C)(FR-408, FR408HR) ;TU 872LK(DK:3.6)						
	Type	1080	2113(#)	2116	106(#)		
	Thickness(mil)	$2.8 \pm 0.4$	$3.6 \pm 0.4$	$4.6 \pm 0.4$	$2.5 \pm 0.4$		
	Type	1506(#)	2116HR	1080HR	7628HR		
	Thickness(mil)	$6.6 \pm 0.5$	$5.0 \pm 0.4$	$3.5 \pm 0.5$	$9.0 \pm 0.5$		
2.7. CTI (Comparative Tracking Index) Value	600max.		LEVEL 3 (175-249)		Nanya FR4-4-86 was CTI600 level 0		

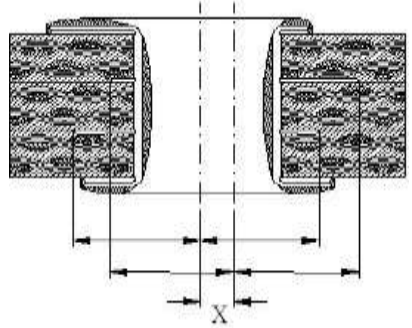
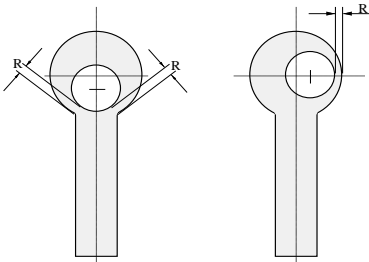
of Laminate															
2.8. Copper Foil Tolerance (For Lamination)	Copper Foil (OZ/ft <sup>2</sup> )		Weight (10 cm×10 cm)			The dimension min. and max. per IPC 6012 table 3-11 and 3-12									
	1/2 OZ		1.53 g ±0.15 g												
	1 OZ		3.05 g ±0.31 g												
	2 OZ		6.10 g ±0.61 g												
	3 OZ		9.15 g ±0.92 g												
	4 OZ		12.2 g ±1.22 g												
2.9. Thickness of Finished Board	<table border="1"> <tr> <td>min.</td> <td>2L : 10 mil. min. 4L: 17mil min. 6L: 24mil min. 8L: 31mil min.</td> </tr> <tr> <td>Max.</td> <td>186 mil. max.</td> </tr> </table>		min.	2L : 10 mil. min. 4L: 17mil min. 6L: 24mil min. 8L: 31mil min.	Max.	186 mil. max.	<table border="1"> <tr> <td>min.</td> <td>2L : 10 mil. min, 4L: 21mil min. 6L: 31mil min. 8L: 39mil min.</td> </tr> <tr> <td>Max.</td> <td>157 Mil. Max.</td> </tr> </table>			min.	2L : 10 mil. min, 4L: 21mil min. 6L: 31mil min. 8L: 39mil min.	Max.	157 Mil. Max.	<p>※MAX thickness for 2L -370HR and FR408 material was 0.059" only. The max core thickness for TU872LK and TU872SLK is 0.028". If customer needs the thickness which over 0.062" then we should laminate the material by ourselves.</p> <p>※condition for min. board thickness: 0.5oz start for each layer and layer to layer thickness can't follow IPC 6012, the dielectric 0.0035" min.</p>	
	min.	2L : 10 mil. min. 4L: 17mil min. 6L: 24mil min. 8L: 31mil min.													
Max.	186 mil. max.														
min.	2L : 10 mil. min, 4L: 21mil min. 6L: 31mil min. 8L: 39mil min.														
Max.	157 Mil. Max.														
2.10 Thickness Tolerance of Finished Board	Thickness (mil)	Under 30	31-55	56-65	66-75	Century: CP-III-PE-013									
	Tolerance (mil)	±3mil	±10%	±10%	±10%										
	Thickness (mil)	76-89	90-100	101-150											
	Tolerance (mil)	±10%	±10%	±10%											
2.11 Max. Layer Counter	36 Layers		Under 26 Layers												
3. Mechanically Drilled Holes (Below condition actually used for 0.062" thickness)															
3.1. Hole Size 3.1.1 - Castellated holes	6mil (0.15mm) min. 19.7 mils. Min.		8mil (0.2 mm)			The min. drill size 6 mil is used for the board thickness < 59mil									
	250mil (6.35mm) max.					The actually capability should check with aspect ratio									

3.2. Position Tolerance of Holes	±2mil	±3mil	
3.3. Tolerance of Hole Diameter (Finished Hole)			
3.3.1 Plated Hole	±3mil		
3.3.2 Non-Plated Hole	±2mil		
3.3.3 Pressfit Hole	±2mil		
3.4. Through via diameter(min)	6mil (0.15mm)	8mil (0.2 mm)	
3.5. Through via Aspect Ratio	10:1	Under 8:1	If the board thickness is 0.093" then the min. hole size can't smaller than 0.010" and pad size also can't smaller than 0.022".
3.6. Through via pad diameter (min)	16mil (0.4mm)	18mil (0.45mm)	If the finish hole size is 0.008" but the pad size is 0.024" then we also can accept due to we can drill 0.0118" or 0.0138" and let the aspect ratio control in 1:8
3.7. Min. Distance from Hole to Hole	5mil min. after compensating		
3.8. Min. via pad size	14 mil min.	18mil min.	
4. Laser Drilled Holes			
4.1. HDI Production Method	Sequential Lamination, Build-up Method (CO <sub>2</sub> Laser)	Sequential Lamination, Build-up Method (CO <sub>2</sub> Laser)	The microvias and blind, buried vias will plug with vacuum epoxy +cap plating; we can't support conductive fill
4.2. Microvia Formation Method	Direct Laser Drill, Conformal Window, Enlarged Window	Conformal Window	
4.3. Build-up Dielectric	FR4, RCC	FR4	
4.4. Microvia Laser Drill Size	4-6 mil	4 -6 mil	
4.5. Microvia Aspect Ratio	1:0.75 (Microvia 5mil; thickness of Layer to Layer is 4mil Max)	1:0.5 (Microvia 5mil; thickness of Layer to Layer is 2.5mil Max)	The prepreg which we use between two layers will be 2113 or 1080HR



Item	Capability	Preferred	Remarks
4.6. Microvia Position 	HDI: 1+N+1; 2+N+2 ; 3+N+3	HDI: 1+N+1; 2+N+2	If blind vias requested L1-3 and L(n-2)-Ln, we will run micro vias L2-3 , Ln-2~Ln-1 and L1-2 , Ln~Ln-1
4.6.1 Accuracy of Blind Hole to Target Pad (X)	2mil	Tangency may be required as a minimum.	*IPC-6012 3.4.2.1
4.6.2 Capture Pad A/R (Y)	2mil	*Breakout Not Allowed	*IPC-6012 3.4.3.1
4.7. Blind Hole and Target Pad Including Angle (Z)	75° +15°/-10°	75° +15°/-10°	
5. Conductive Pattern 			
5.1. Conductor Thickness (T)			
5.1.1 Inner Layer	0.5 OZ: 0.449 mil(11.4µm) min. 1 OZ: 0.980 mil (25µm) min. 2 OZ: 2.193 mil (55.7µm) min. 3 OZ: 3.409 mil (86.6µm) min. 4 OZ: 4.626 mil (117.5µm) min.		IPC-6012A 3.6.2.11
5.1.2 Outer Layer (Copper Plating +Copper Foil)	Class3 0.5 OZ :1.512 mil(38.4µm) min. 1 OZ: 2.083 mil(52.9µm) min. 2 OZ: 3.295 mil(83.7µm) min. 3 OZ: 4.472 mil (113.6µm) min. 4 OZ: 5.689 mil (144.5µm) min.	Class2 0.5 OZ :1.315 mil(33.4µm) min. 1 OZ: 1.889 mil(47.9µm) min. 2 OZ: 3.098 mil(78.7µm) min. 3 OZ: 4.276 mil (108.6µm) min. 4 OZ: 5.492mil (139.5µm) min.	IPC-6012A 3.6.2.12

Item	Capability	Preferred	Remarks
5.2. Conductor Width ( $W_1$ ) /spacing			
5.2.1 Inner Layer	0.5 OZ: 3/3MILS 1 OZ: 4/4MILS 2 OZ: 5/5MILS 3 OZ: 7/7MILS 4 OZ: 8/8 MILS 5 OZ: 10/10 MILS	0.5 OZ: 4/4MILS 1 OZ: 5/5MILS 2 OZ: 6/6MILS 3 OZ: 8/8MILS 4 OZ: 10/10 MILS 5 OZ: 12/12 MILS	
5.2.2 Outer Layer	1/3→1 OZ: 3 mil min. /3 mil 0.5→1 OZ: 4 mil min. /4 mil 0.5→1.5 OZ (1.8mils: 4.5 mil min. /4.5 mil 0.5→1.5 OZ min. (2.1mils): 5 mil min. /5 mil 1→2 OZ(2.4mils): 6 mil min. /6 mil 1→2 OZ min/(2.8mils): 7 mil min. /7 mil 1 - 2.5 oz. min. (3.0mils) 8 mil. min./ 8 mil. 2→3 OZ(3.651mils): 9 mil min. /9 mil 2→3 OZ min.(4.2mils): 10.5 mil min. /10.5 mil 3→4 OZ(4.868mils): 12 mil min. /12 mil 3→4 OZ min.(5.6mils): 14 mil min. /14 mil 4→5OZ(6.085mils): 15mil min./15mil 4→5OZ min.(7mils): 17.5mil min./17.5mil	1/3→1 OZ: 3 mil min. /3 mil 0.5→1 OZ: 4 mil min. /4 mil 0.5→1.5OZ(1.8mils): 4.5 mil min. /4.5 mil 1→2 OZ(2.4mils): 6 mil min. /6 mil 2→3 OZ(3.651mils): 9 mil min. /9 mil 3→4 OZ(4.868mils): 12 mil min. /12 mil 4→5OZ(6.085mils): 15mil min./15mil	Epoxy fill and cap plate - Min. Line and Space =4 mils.
5.3. Conductor Width, Spacing Tolerance	±20% or +/-0.001" (Trace width <=8mil)	±20%	IPC-6012A 3.5.2 ,3.5.3.1 Class 3
5.4. Conductor Width Measure Location	CSP, G/F: Conductor Top ( $W_1$ ); PCB: Conductor Bottom ( $W_2$ )	CSP, G/F: Conductor Top ( $W_1$ ); PCB: Conductor Bottom ( $W_2$ )	CSP: BGA, SMD, Wire Bonding

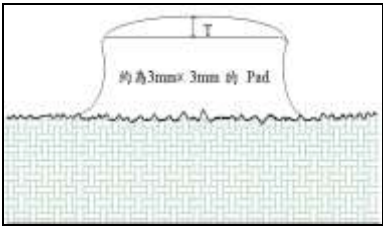
Item	Capability	Preferred	Remarks
5.5. Pattern Registration(X)(Layer to Layer)			
	±3mil (6mil)	±5mil (10mil)	Definition: Center of Hole to Hole.
5.6. Annular Ring (External)			
			
5.6.1 PTH	R: 1mil min. (Class 3)	90° Breakout Allowed (Class 2)	IPC-6012A 3.4.3.1
5.6.2 NPTH	R: 1mil min. (Class 3)	Breakout not Allowed (Class 2)	IPC-6012A 3.4.3.1
5.7. Adhesion (Peeling Stress)	0.5OZ: 6 lb/inch <sup>2</sup> ↑ 1OZ: 8 lb/ inch <sup>2</sup> ↑ 2OZ: 10 lb/ inch <sup>2</sup> ↑	0.5OZ: 6 lb/ inch <sup>2</sup> ↑ 1OZ: 8 lb/ inch <sup>2</sup> ↑ 2OZ: 10 lb/ inch <sup>2</sup> ↑	IPC-TM-650 2.4.8
5.8. Controlled Impedance Tolerance	7%	10%	
6. Copper Plating			
6.1. Surface Copper Thickness			
6.1.1 Average Thickness	0.984mil (25um) Class 3	0.787mil (20um) Class 2	IPC-6012A 3.2.6
6.1.2 Min. Thickness	0.787mil(20um) min. Class3	0.709mil (18um) min. Class2	IPC-6012A 3.2.6
6.2. Hole Wall Copper Thickness			

Item		Capability	Preferred	Remarks																	
6.2.1	Average Thickness	0.984mil (25um) Class3	0.787mil (20um) Class2	IPC-6012A 3.2.6																	
6.2.2	Tin area. Thickness	0.787mil (20um) min. Class3	0.709mil (18um) min. Class2	IPC-6012A 3.2.6																	
6.2.3	Warp	12µm (0.472mil) Class3	5µm (0.197mil) Class2																		
6.3. Microvia Hole Wall Copper Thickness																					
6.3.1	Average Thickness	12um* (0.472mil) Class3	12um* (0.472mil) Class2	*IPC-6012 3.2.6																	
6.3.2	Tin area. Thickness	10um* (0.394mil) Class3	10um* (0.394mil) Class2	*IPC-6012 3.2.6																	
6.3.3	Warp Plating	5µm (0.197mil) Class3	5µm (0.197mil) Class2																		
6.4 Buried Hole Wall Copper Thickness																					
6.4.1	Average Thickness	15um* (0.592mil) Class3	15um* (0.592mil) Class2	*IPC-6012 3.2.6																	
6.4.2	Tin area. Thickness	13um* (0.512mil) Class3	13um* (0.512mil) Class2	*IPC-6012 3.2.6																	
6.4.3	Warp Plating	7µm (0.276mil) Class3	5µm (0.197mil) Class2																		
6.5.	Adhesion	> 35kg/cm <sup>2</sup>	> 35kg/cm <sup>2</sup>	IPC-6012 3.7.3																	
6.6.	Endurance of Plating (Thermal Stress) --ROHS -Hi-Tg material	288±5°C,10sec.	288±5°C,10sec.	IPC-TM-650 2.6.8																	
7. Solder Mask																					
7.1.	Dielectric Strength	1000VDC/0.025mm min.	500VDC/0.025mm min.	IPC-SM-840 3.8.1																	
7.2.	Registration	±2mil	±3mil																		
7.3.	Max. Hole Diameter Plugging	19.7mil	15.7mil																		
7.4.	Adhesion (Tape Test)																				
	<table border="1"> <thead> <tr> <th rowspan="2">Surface</th> <th colspan="2">Max. percentage loss allowed</th> </tr> <tr> <th>Class2</th> <th>Class3</th> </tr> </thead> <tbody> <tr> <td>Bare Copper</td> <td>5</td> <td>0</td> </tr> <tr> <td>Gold and Nickel</td> <td>10</td> <td>5</td> </tr> <tr> <td>Base Laminate</td> <td>5</td> <td>0</td> </tr> <tr> <td>Melting Metals (Tin-lead plating)</td> <td>25</td> <td>10</td> </tr> </tbody> </table>	Surface	Max. percentage loss allowed		Class2	Class3	Bare Copper	5	0	Gold and Nickel	10	5	Base Laminate	5	0	Melting Metals (Tin-lead plating)	25	10	Class3	Class2	IPC-6012A 3.8.1
Surface	Max. percentage loss allowed																				
	Class2	Class3																			
Bare Copper	5	0																			
Gold and Nickel	10	5																			
Base Laminate	5	0																			
Melting Metals (Tin-lead plating)	25	10																			
7.5. Type																					

7.5.1 S/M Supplier	<table border="1"> <thead> <tr> <th colspan="2">Halogen Free Material</th> </tr> <tr> <th>Supplier</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>Taiyo</td> <td>PSR-4000DE</td> </tr> </tbody> </table>	Halogen Free Material		Supplier	Type	Taiyo	PSR-4000DE	<table border="1"> <thead> <tr> <th colspan="2">General Material</th> </tr> <tr> <th>Supplier</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>Taiyo</td> <td>PSR-2000AN</td> </tr> <tr> <td>Taiyo</td> <td>PSR-4000CA</td> </tr> <tr> <td>Taiyo</td> <td>PSR-4000EZ</td> </tr> <tr> <td>OTC</td> <td>R-500/HD-5</td> </tr> <tr> <td>* Advance</td> <td>GM2/AW72</td> </tr> </tbody> </table> <p>* Standard Mask</p>	General Material		Supplier	Type	Taiyo	PSR-2000AN	Taiyo	PSR-4000CA	Taiyo	PSR-4000EZ	OTC	R-500/HD-5	* Advance	GM2/AW72	<p>For white ink, if customer didn't indicate we will use Advance AW72 or PSR4000 WT02; If customer needs PSR4000 LEW1, LEW3, then should order from Japan and needs time to order (3 weeks min.) and customer should pay lot charge USD1200</p> <p>For other color which customer indicates PSR4000BN also should follow above result.</p>
	Halogen Free Material																						
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*ADVANCE	GM2/AW72																						
7.5.2 Color	Green, Red, Black, Blue, Yellow, White, Clear, Gray, purple	Green, Blue, Black, White	For full type please check Century solder mask type list																				
7.5.3 Surface Finish	Shine (Gloss), Matte, Semi-Matte	* Shine (Gloss)	*Gloss /shine is standard mask type.																				

7.6 S/M Thickness (Condition:0.5pz plate to 1oz (finish copper thickness is 1.4~1.8mils)) T: Top, A: Corner S: Base copper thickness

	<p>Coat one time: trace width <math>\geq</math> 5mils  A: 0.5mils min.  T: 0.8 mils min.</p>	<p>Coat one time: trace width <math>\geq</math> 5mils  A: 0.5mils min.  T: 0.8 mils min.  Coat two times: trace width <math>\geq</math> 5mils  A : 1 mils min.  T : 1.5mils min.</p> <p>Coat two times : trace width <math>&lt;</math> 5mil or 2oz copper finish  A : 0.7mils min.  T : 1.2 mils min.</p> <p>Coat two times : finish copper <math>\geq</math> 2oz  A : 0.5mils min.  T : 1.2 mils min.</p>	<p>Coat one time: trace width <math>\geq</math> 5mils  A: 0.5mils min.  T: 0.8 mils min.  Coat two times: trace width <math>\geq</math> 5mils  A : 1 mils min.  T : 1.5mils min.</p> <p>Coat two times : trace width <math>&lt;</math> 5mil or 2oz copper finish  A : 0.5mils min.  T : 1.4 mils min.</p> <p>Coat two times : finish copper <math>\geq</math> 2oz  A : 0.5mils min.  T : 1.2 mils mi</p> <p>Base material area: copper thickness+ T thickness</p>	<p>If customer requested Ave. 1mil min. then the mask should coat two times. BGA and SMD should allow with clearance for the second coated to avoid the thickness is too thicker than BGA pad thickness and cause solderability issue.</p> <p>※trace width and copper thickness will affect the solder mask thickness (CPC capability for one coat is 0.4~0.8mil and two coat was 0.5~2mils; max thickness can't allow over 2.5mils)</p> <p>※Trace width after etching <math>\leq</math> 4mils then the solder mask thickness will be 0.2~0.5mils for corner if coat one time and the thickness will be 0.5~1.0mils for coat two times.</p>	
	<p>Coat two times: trace width <math>\geq</math> 5mils  A : 1 mils min.  T : 1.5mils min.</p>				<p>Coat two times : trace width <math>&lt;</math> 5mil or 2oz copper finish  A : 0.5mils min.  T : 1.4 mils min.</p>
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	<p>Coat two times : finish copper <math>\geq</math> 2oz  A : 0.5mils min.  T : 1.2 mils min.</p>				<p>Base material area: copper thickness+ T thickness</p>

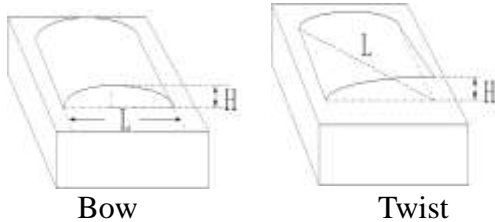
Item	Capability	Preferred	Remarks
7.7 Solder Dam (the capability was use for Green mask; different color had different distance)			
7.6.1 Solder Dam Width	3mil min	3 mil min	Matte or special color must to have 5 mil min. solder dam width
7.6.2 Distance Between the Solder Dam and the Pad	1.5mil min	2mil min	
7.6.3 Distance Between Pad and Pad	7mil min	10mil min	
8. Silkscreen			
8.1 Width of Legend	5mil	6mil	3 mil min. for laser jet print machine
8.2 Width of Height	32mil	35mil	Word's Area is 20*16 mil for laser jet print machine
8.3 Registration	±8mil	±12mil	
8.4 Color	Yellow, White, Black	White, Black	laser jet print machine only can print white color
8.5 Legend Type	Thermosetting, UV Type	UV Type	
9. Surface Finishes			
9.1 HASL (LF HASL)			
9.1.1 Thickness			
	100u"-1000u"	100u"-1000u"	※Using X-Ray. equipment. Measured on the Pad Center (approximate 3mm×3mm pad) .
9.1.2 Component (HASL)	63%Sn (±1%),37%Pb, Impurity < 0.4%	63%Sn (±1%),37%Pb, Impurity < 0.4%	ANSI/J-STD-003 3.2.1
9.1.3 Component (LF HASL)	100% Sn (Sn-Ag-Cu)	100% Sn (Sn-Ag-Cu)	
9.2 Immersion Gold Thickness			※Measurement method as for 9.1.1.
9.2.1 Gold Thickness	2-10u" max.	2u" Min.	
9.2.2 Nickel Thickness	200u" max.	118-u"	

Item	Capability	Preferred	Remarks
9.2.3 Hardness (GOLD)	560HV	560HV	
9.3 Gold Finger			※Measurement method as for 9.1.1.
9.3.1 Gold Thickness	51.5u" max.	10-31.5u"	
9.3.2 Nickel Thickness	200u" max. 118u" min.	150u" max. 118u" min.	
9.3.3 Hardness (Hard Gold)	260-270HV	260-270HV	
9.3.4 Min. Distance From G/F to Via	30mil	30mil	If the distance without 30mil, we suggest to plug the vias or print solder mask on the top fingers.
9.4 Immersion Tin	30-50 u"	40 u"	※Measurement method as for 9.1.1.
9.5 Immersion Silver	6-25 u"	6-8 u"	※Measurement method as for 9.1.1.
Storage	3 months	3 months	Estimate from customer receives date.
9.6 OSP (ENTEK)			
9.6.1 Thickness	0.3-0.5um	0.3-0.5um	
9.6.2 Type	Tamura WPF-207 Entek Cu106	Tamura WPF-207 Entek Cu106	
Storage	3 months	3 months	Estimate from customer receives date.
10. Peelable Solder Mask			
10.1 Type	Peters SD 2954/2955	* Peters SD 2955 (Green)	* Preferred for Wave solder line
10.2 Storage	6 months	6 months	Estimate from customer receives date.
10.3 Registration	±12mil	±12mil	
10.4 Thickness	10mil min.	12mil-24mil(0.3mm-0.6mm)	
10.5 Max. Hole Size for Tenting	6.35 mm max.	6.35 mm max.	

Item		Capability				Preferred			Remarks		
11. Manufacturing Identification (see our latest UL listing card attached below or research UL web set (UL number E189010))											
11.1	UL Logo		Clad Conductor Width		SS/DS	Max. Area Diameter	Sold Limits		Max Operating Temp	UL94 Flame Class	Meets UL796 DSR
			Min.	Min. Edge							
		Type	(Inch)	(Inch)		(Inch)	°C	Sec.	°C		
		Single layer Printed Wiring Boards									
		1	0.005	0.011	DS	2.0	260	10	130	94V-0	All
		1B	0.004	0.007	DS	2.0	270	10	130	94V-0	All
		Multilayer Printed Wiring Boards									
		4	0.004	0.009	DS	3.0	260	10	105	94V-0	All
		4B	0.004	0.007	DS	2.0	270	10	130	94V-0	All
5B	0.010	0.010	DS	2.0	270	10	130	94V-0	All		
11.2	Manufacturer Logo Formation Method	Etch, Legend, S/M				Etch, Legend					
11.3	Date Code Formation Method	Etch, Legend, S/M				Etch, Legend			Copper thickness $\geq$ 2oz suggest to add on the top silkscreen layer		
12. Profile & Dimension											
12.1	Slot Width										
	12.1.1 Routing	31 mil min.									
	12.1.2 Drill	18 mil min.				18 mil min.					
12.2	G/F Beveling Angle	20°,30°,45° ( $\pm 2^\circ$ )				30° ( $\pm 2^\circ$ )					
	12.2.1 Beveling depth	55mil,30mil,20mil ( $\pm 5$ mil)				30( $\pm 5$ mil)					
12.3	Profile Tolerance	Routing: $\pm 5$ mil min. Drill: $\pm 3$ mil min.				Routing: $\pm 5$ mil min. Drill: $\pm 3$ mil min.					
12.4	Controlled depth drilling depth tolerance (counter Board, counter sink)	$\pm 10$ mil				$\pm 10$ mil					
12.5	V-CUT										
	12.5.1 Angle	30°, 60° ( $\pm 2^\circ$ )				30° ( $\pm 2^\circ$ )					
Item		Capability				Preferred			Remarks		



12.5.2	Min. Board Thickness to V-Cut	16mil min.	20mil min.	
12.5.3	Min. Board Size to V-Cut	600mm×360mm max. 45mm×45mm min..	600mm×360mm max. 45mm×45mm min..	
12.5.4	Tolerance	Position: ±5mil Web Thickness: ±3mil Deviation Between Upper & Lower: ±4mil	Position: ±5mil Web Thickness: ±3mil Deviation Between Upper & Lower: ±4mil	
12.5.5	V-Cut web	0.011+/-0.002" (Hi-Tg); 0.017+/-0.003" (FR4) –THICK:62MIL	0.011+/-0.002" (Hi-Tg); 0.017+/-0.003" (FR4) –THICK:62MIL	
12.5.6	Note for Jump score design	<ol style="list-style-type: none"> <li>1. Jump score for G/F bevelè use rout bite -→the smallest rout bit is 3mm, so the slot width should be 3mm. min.</li> <li>2. Jump score for score line→ the distance between jump score line to jump score line should have 10mm min.</li> <li>3. The min. rail size for the board request jump score should have 0.400".</li> </ol>		
12.6	Min. distance conductor to board profile.	Routing: 10 mil V-Cut: 15mil (30 deg.) &20 mil (60 deg.) Punch: 20 mil	Routing: 10 mil V-Cut: 15 mil (30deg.) Punch: 20 mil	
12.7	Max. Finished Board Size	19.3" * 28"	19.3" * 22.3"	
13. Electrical Testing (Machine: Dedicate / Universal / Flying probe)				
13.1	Voltage	250 Voltage	250 Voltage	
13.2	Isolation Resistance	5-20MΩ	20MΩ	
13.3	Continuity Resistance	10-50Ω	50Ω	

13.4	Max. number of nets	34034 net max (ATG) 6144 net max (DT)	34034 net max (ATG) 6144 net max (DT)	Test net: Test Point/2
13.5	Min. Test pad size	3mil	3mil	
13.6	Min. Test pad pitch	8mil	9mil	
14.	Bow and Twist			
		H/L < 0.75%	H/L < 0.75%	IPC-6012A 3.4.4
15.	Inspection	Per Document : CP-III-PD-074	Per Document : CP-III-PD-074	
16.	Rework	Per Document : CP-III-PD-075	Per Document : CP-III-PD-075	
17.	Reliability	I. Solder Resist Cure & Adhesion II. Dielectric withstanding voltage III. Thermal Shock IV. Peel Strength V. Moisture insulation Resistance (SIR) VI. Through Hole Peel Strength VII. Impedance Test VIII. G/F porosity I. Solderability IX. Ionic	1. Solder Resist Cure & Adhesion 2. Dielectric withstanding voltage 3. Thermal Shock 4. Peel Strength 5. Moisture insulation Resistance (SIR) 6. Through Hole Peel Strength 7. Impedance Test 8. G/F porosity 9. Solderability 10. Ionic	Per Appendix 1
18.	Package	Per Appendix 2	Per Appendix 2	
19.	CARBON INK			
	19.1 Type	ASH TU-15ST	ASH TU-15ST	
	19.2 Storage	1 year	1 year	
	19.3 Registration	+/-12mils	+/-12mils	
	19.4 Thickness	0.5mils min.	0.5mils min.	
	19.5 distance between key pad to trace	20mils	20mils	

19.6 distance between pad to pad	10—15mils	10—15mils	
19.7 the pad size is different between carbon and trace pad	Min. 5mils per side	Min. 5mils per side	

20. **VIPPO/FVPO** (Via in-pad-plated over and filled-via-plated-over): Barrel fill and voids; barrel plating; copper wrap and copper cap plating thickness; and planarization per IPC 6012 Class 2 \* **Largest hole for Epoxy fill is 19.7 Mil. (Epoxy fill and cap plate -15 mil. to 125 mil. thick. 1:10 Aspect Ratio).**

20.1 Vacuum Epoxy fill	Type: SAN-EI KAGAKV PHP-900 IR-6P	Type: SAN-EI KAGAKV PHP-900 IR-6P	Out layer (start copper→finish copper →min. trace width and spacing 1/3oz→1oz (1.217mils min.) -→4/4mils 0.5oz→1.5oz (1.8mils min.-→5/5mils
20.2 Traditional Epoxy fill	Type: Taiyo THP-100 DRT	Type: Taiyo THP-100 DRT	

21. Out-going report (include FAI)	<ol style="list-style-type: none"> <li>1. Visual inspection</li> <li>2. Electrical test</li> <li>3. Physical dimensions</li> <li>4. Board thickness</li> <li>5. hole size &amp; hole status</li> <li>6. Tape test on gold plating and solder mask</li> <li>7. PTH Copper thickness and plating status</li> <li>8. Warpage check</li> <li>9. Layer to layer registration</li> <li>10. stack up verify</li> <li>11. Impedance Measurement</li> <li>12. fab note verify</li> </ol>		<ol style="list-style-type: none"> <li>1. The report will ship with each shipment</li> <li>2. IPC-6012 table 4-2 and 4-3</li> </ol>
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Quality Certification	ISO9001:2015; TS16949, AS9100:2016, ISO13485, ROHS, REACH, CMRT, Prop 65
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