

PCB FABRICATION & ASSEMBLY

SINCE 1985

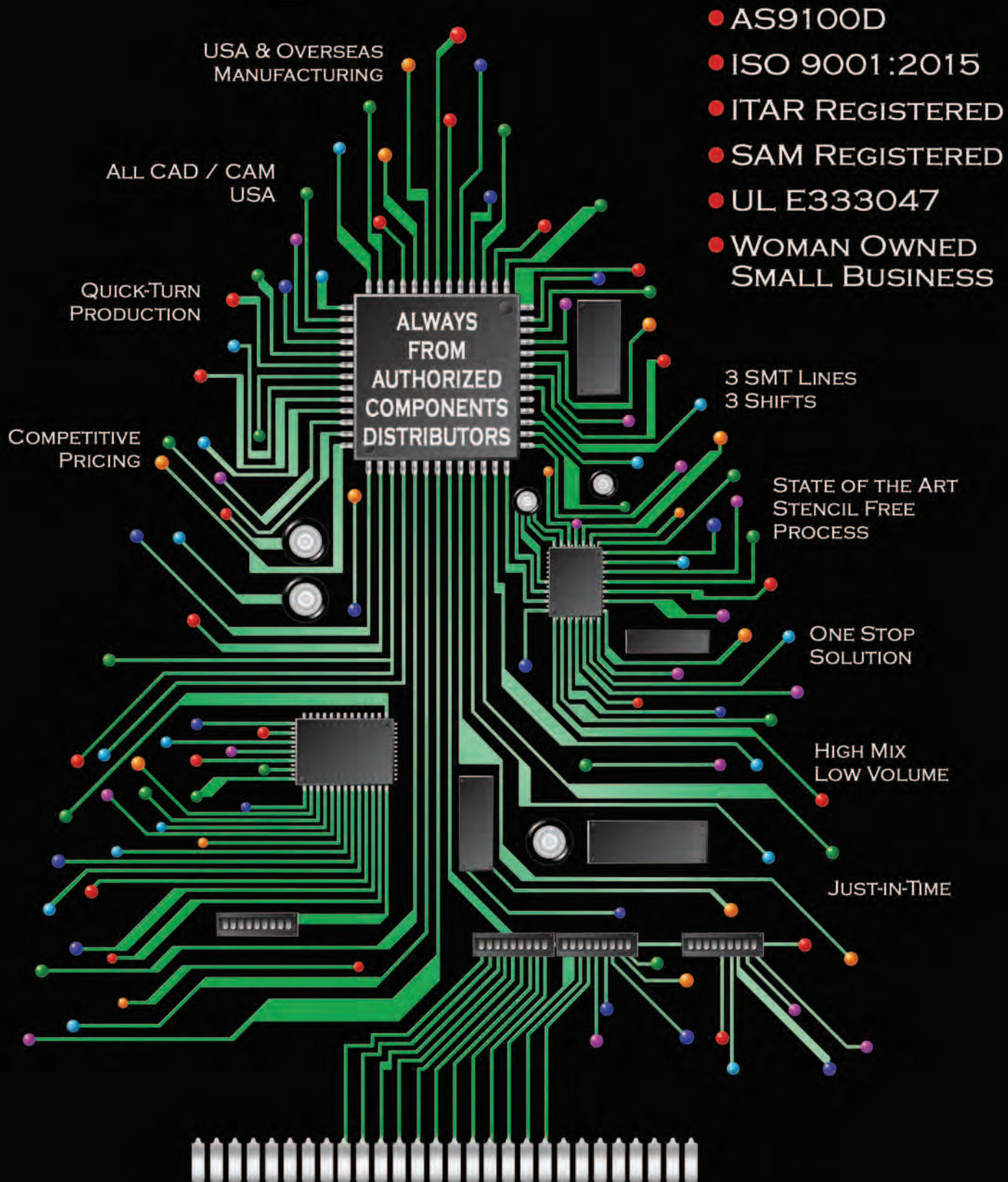
imagineering, inc.

PCB FABRICATION & ASSEMBLY

CLASS 3 RIGID - FLEX METAL CORE



imagineering inc



No.	Items	Prototype Capabilities	Production Capabilities
1	Normal FR4	Shengyi S1141(Not recommend it to lead free assembly process)	Shengyi S1141(Not recommend it to No-Pb assembly process)
2	Normal Tg FR4(Halogen free)	Shengyi S1155	Shengyi S1155
3	High Tg FR4(Halogen free)	Shengyi S1165	Shengyi S1165
4	HDI PCB material	LDPP(IT-180A 1037&1086), Normal PP 106&1080	LDPP(IT-180A 1037&1086), Normal PP 106&1080
5	High CTI	Shengyi S1600	Shengyi S1600
6	Material	High Tg FR4 FR408, FR408HR, IS410, FR406, GETEK, PCL-370HR;IT180A, IT-150DA;N4000-13, N4000-13EP, N4000-13SI, N4000-13EP SI;Megtron 4, Megtron 6(Panasonic);EM-827(Elite);GA-170(Grace Electron);NP-180(Nanya);TU-752, TU-662(Taiwan Union);MCL-BE-67G(H), MCL-E-679(W), MCL-E-679F(J)(Hitachi);VT-47(Ventec)	IT180A, GETEK, PCL-370HR, N4000-13, N4000-13EP, N4000-13SI, N4000-13EP SI
7	Ceramic Particle Filled Laminates	Rogers4350, Rogers4003, 25FR, 25N	Rogers4350, Rogers4003, 25FR, 25N
8	PTFE Laminates	Rogers series, Taconic series, Arlon series, Nelco series, Taizhou Wangling F4BK series, TP series;	Taconic (TLX, TLF, TLY, RF, TLC, TLG series);Arlon(Diclad, AD series)
9	PTFE PP	Taconic TP series, TPG series, TPN series, HT1.5(1.5mil), Fastrise series	/
10	Hybrid laminating	Rogers/Taconic/Arlon/Nelco laminate with FR-4 material(including partial Ro4350B hybrid laminating with FR-4)	Rogers/Taconic/Arlon/Nelco laminate with FR-4 material(including partial Ro4350B hybrid laminating with FR-4)
11	PCB Type	Rigid pcb	Backplane, HDI, High multi-layer blind&buried PCB, Embedded Capacitance, Embedded resistance board, Heavy copper power PCB, Backdrill, Semiconductor Test products.
12	HDI	Blind&buried via type	mechanical blind&buried vias with less than 3 times laminating
13	HDI PCB	1+n+1,1+1+n+1+1,2+n+2,3+n+3(n buried vias≤0.3mm),Laser blind via can be filling plating	1+n+1,1+1+n+1+1,2+n+2,3+n+3(n buried vias≤0.3mm),Laser blind via can be filling plating
14	Lead free	Flash gold(electroplated gold), ENIG, Hard gold, Flash gold, HASL Lead free, OSP, ENEPIG, Soft gold, Immersion silver, Immersion Tin, ENIG+OSP,ENIG+Gold finger,Flash gold(electroplated gold)+Gold finger,Immersion silver+Gold finger,Immersion Tin+Gold finger	Flash gold(electroplated gold), ENIG, Hard gold, Flash gold, HASL Lead free, OSP, ENEPIG, Soft gold, Immersion silver, Immersion Tin, ENIG+OSP,ENIG+Gold finger,Flash gold(electroplated gold)+Gold finger,Immersion silver+Gold finger,Immersion Tin+Gold finger
15	Leaded	Leaded HASL	Leaded HASL
16	aspect ratio	10:1(HASL Lead free, HASL Lead, ENIG, Immersion Tin, Immersion silver, ENEPIG);8:1(OSP)	10:1(HASL Lead free, HASL Lead, ENIG, Immersion Tin, Immersion silver, ENEPIG);8:1(OSP)
17	Finish	Max finished size	HASL Lead 22"*39"; HASL Lead free 22"*24"; Flash gold 24"*24"; Hard gold 24"*28"; ENIG 21"*27"; Flash gold(electroplated gold) 21"*48"; Immersion Tin 16"*21"; Immersion silver 16"*18"; OSP 24"*40";
18	MIN finished size	HASL Lead 5"*6"; HASL Lead free 10"*10"; Flash gold 12"*16"; Hard gold 3"*3"; Flash gold(electroplated gold) 8"*10"; Immersion Tin 2"*4"; Immersion silver 2"*4"; OSP 2"*2";	HASL Lead 5"*6"; HASL Lead free 10"*10"; Flash gold 12"*16"; Hard gold 3"*3"; Flash gold(electroplated gold) 8"*10"; Immersion Tin 2"*4"; Immersion silver 2"*4"; OSP 2"*2";
19	PCB thickness	HASL Lead 0.6-4.0mm; HASL Lead free 0.6-4.0mm; Flash gold 1.0-3.2mm; Hard gold 0.1-5.0mm; ENIG 0.2-7.0mm; Flash gold(electroplated gold) 0.15-5.0mm; Immersion Tin 0.4-5.0mm; Immersion silver 0.4-5.0mm; OSP 0.2-6.0mm;	HASL Lead 0.6-4.0mm; HASL Lead free 0.6-4.0mm; Flash gold 1.0-3.2mm; Hard gold 0.1-5.0mm; ENIG 0.2-7.0mm; Flash gold(electroplated gold) 0.15-5.0mm; Immersion Tin 0.4-5.0mm; Immersion silver 0.4-5.0mm; OSP 0.2-6.0mm;
20	MAX high to gold finger	1.5inch	1.5inch
21	Min space between gold fingers	6mil	8mil
22	Min block space to gold fingers	7.5mil	7.5mil
23	Tin thickness	2-40μm (0.4μm on large tin area of Leaded HASL, 1.5μm on large tin area of HASL lead free)	2-40μm (0.4μm on large tin area of Leaded HASL, 1.5μm on large tin area of HASL lead free)
24	OSP	0.2-0.6μm	0.2-0.6μm
25	ENIG	Ni: 3-8μm; Au: 0.05-0.1μm	Ni: 3-8μm; Au: 0.05-0.1μm
26	Immersion Silver	0.2-0.4μm	0.2-0.4μm
27	Immersion Tin	≥1.0	≥1.0
28	Hard gold	0.1-4.0μm	0.1-2.0μm
29	Soft gold	0.1-4.0μm	0.1-4.0μm
30	ENEPIG	Ni: 3-8μm, Pd:0.05-0.15μm, Au: 0.05-0.1μm	Ni: 3-8μm, Pd:0.05-0.15μm, Au: 0.05-0.1μm
31	Flash gold(electroplated gold)	Ni: ≥3μm ; Au: 0.025-0.1μm ;base copper≤1 oz	Ni: ≥3μm ; Au: 0.025-0.1μm ;base copper≤1 oz
32	electroplated Gold finger	Ni: ≥3μm ; Au: 0.25-1.5μm(The Thinnest point)	Ni: ≥3μm ; Au: 0.25-1.5μm(The Thinnest point)
33	Carbon	10-50μm	10-50μm
34	Soldermask	0.4-0.7mil (on copper area), 0.2-0.31mil(on via pad),≥0.2mil(on circuits around the corner, just for one-time print and copper thickness<48μm)	0.4-0.7mil (on copper area), 0.2-0.31mil(on via pad),≥0.2mil(on circuits around the corner, just for one-time print and copper thickness<48μm)
35	Blue plastic	8--31.5mil	8--16mil



No.	Items	Prototype Capabilities	Production Capabilities
36	MAX thickness of mechanical hole 4mil/6mil/8mi	31.5mil/59mil/100mil	24mil/47mil/63mil
37	Min laser drilling size	4mil	4mil
38	Max laser drilling size	6mil	6mil
39		4-244mil(corresponding drilling tool size 6-248mil)	5-244mil(corresponding drilling tool size 8-248mil)
40	Finshed mechanical hole size	A、 Min finished hole size for PTFE material and hybrid PCB is 10mil(corresponding drilling tool size 14mil)	A、 Min finished hole size for PTFE material and hybrid PCB is 12mil(corresponding drilling tool size 16mil)
41		B、 Max finished hole size for blind & buried via is 12mil(corresponding drilling tool size 16mil)	B、 Max finished hole size for blind & buried via is 12mil(corresponding drilling tool size 16mil)
42		C、 Max finished hole size for via-in-pad plugged with solder mask is 18mil(corresponding drilling tool size 21.65mil)	C、 Max finished hole size for via-in-pad plugged with solder mask is 12mil(corresponding drilling tool size 16mil)
43		D、 Min connecting hole size is 14mil(corresponding drilling tool size is 18mil)	D、 Min connecting hole size is 14mil(corresponding drilling tool size is 18mil)
44		E、 Min half-hole(pth)size is 12mil(corresponding drilling tool size is 16mil)	E、 Min half-hole(pth)size is 12mil(corresponding drilling tool size is 16mil)
45	MAX aspect ratio for Hole plate	20:1 (hole diameter>8mil)	10:1
46	Max aspect ratio for laser via filling plating	1:1(Dpeth included copper thickness)	0.9:1(Dpeth included copper thickness)
47	Max aspect ratio for mechanical depth-control drilling board(Blind hole drilling depth/blind hole size)	1.3:1(drilling tool size≤8mil),1.15:1(drilling tool size≥10mil)	0.8:1(drilling tool size≥10mil)
48	Min. depth of Mechanical depth-control(backdrill)	8mil	8mil
49	Min gap between hole wall and conductor (None blind and buried via PCB)	5.5mil(≤8L),6.5mil(10-14L),7mil(>14L)	7mil(≤8L),9mil(10-14L),10mil(>14L)
50	Min gap between hole wall conductor (Blind and buried via PCB)	7mil(1 time laminating), 8mil(2 times laminating), 9mil(3 times laminating)	8mil(1 times laminating),10mil(2 times laminating), 12mil(3 times laminating)
51	Min gab between hole wall conductor (Laser blind hole buried via PCB)	7mil (1+N+1) ; 8mil (1+1+N+1+1 or 2+N+2)	7mil (1+N+1) ; 8mil (1+1+N+1+1 or 2+N+2)
52	Min space between laser holes and conductor	5mil	6mil
53	Min space bwteen hole walls in different net	10mil	10mil
54	Min space bwteen hole walls in same net	6mil(thru-hole& laser hole PCB),10mil(Mechanical blind&buried PCB)	6mil(thru-hole& laser hole PCB),10mil(Mechanical blind&buried PCB)
55	Min space bwteen NPTH hole walls	8mil	8mil
56	Hole location tolerance	±2mil	±2mil
57	NPTH tolerance	±2mil	±2mil
58	Pressfit holes tolerance	±2mil	±2mil
59	Countersink depth tolerance	±6mil	±6mil
60	Countersink hole size tolerance	±6mil	±6mil
61	Min Pad size for laser drillings	10mil(for 4mil laser via),11mil(for 5mil laser via)	10mil(for 4mil laser via),11mil(for 5mil laser via)
62	Min Pad size for mechanical drillings	16mil(8mil drillings)	16mil(8mil drillings)
63	Min BGA pad size	HASL:10mil, LF HASL:12mil, other surface technics are 7mi	HASL:10mil, LF HASL:12mil, other surface technics are 10mil(7mil is ok for flash gold)
64	Pad size tolerance(BGA)	±1.2mil(pad size≤12mil);±10%(pad size≥12mil)	±1.5mil(pad size≤10mil);±15%(pad size>10mil)
65	Internal Layer	1/2OZ: 3/3mil	1/2OZ: 3/3mil
66		1OZ: 3/4mil	1OZ: 3/4mil
67		2OZ: 4/5mil	2OZ: 4/5.5mil
68		3OZ: 5/8mil	3OZ: 5/8mil
69		4OZ: 6/11mil	4OZ: 6/11mil
70		5OZ: 7/13.5mil	5OZ: 7/14mil
71		6OZ: 8/15mil	6OZ: 8/16mil
72		7OZ: 9/18mil	7OZ: 9/19mil
73		8OZ: 10/21mil	8OZ: 10/22mil
74		9OZ: 11/24mil	9OZ: 11/25mil
75		10OZ: 12/27mil	10OZ: 12/28mil



No.	Items	Prototype Capabilities	Production Capabilities
76	Width/Space	1/3OZ: 3/3mil	1/3OZ: 3.5/4mil
77		1/2OZ: 3.5/3.5mil	1/2OZ: 3.9/4.5mil
78		1OZ: 4.5/5mil	1OZ: 4.8/5.5mil
79		1.43OZ (positive) :4.5/6	1.43OZ (positive) :4.5/7
80		1.43OZ (negative) :5/7	1.43OZ (negative) :5/8
81		2OZ: 6/7mil	2OZ: 6/8mil
82		3OZ: 6/10mil	3OZ: 6/12mil
83		4OZ: 7.5/13mil	4OZ: 7.5/15mil
84		5OZ: 9/16mil	5OZ: 9/18mil
85		6OZ: 10/19mil	6OZ: 10/21mil
86		7OZ: 11/22mil	7OZ: 11/25mil
87		8OZ: 12/26mil	8OZ: 12/29mil
88		9OZ: 13/30mil	9OZ: 13/33mil
89		10OZ: 14/35mil	10OZ: 14/38mil
90	Width tolerance	≤10mil: +/-1.0mil	≤10mil: +/-20%
91		>10mil: +/-1.5mil	>10mil: +/-20%
92	Soldermask	MAX drilling tool size for via filled with Soldermask (single side)	35.4mil
93		Soldermask color	Green matte/glossy, Yellow, Black, Blue, Red, White, Purple
94		Silkscreen color	White, Yellow, Black
95		MAX hole size for via filled with Blue glue aluminium	197mil
96		Finish hole size for via filled with resin	4-25.4mil
97		Max aspect ratio for via filled with resin board	8:1
98		Base copper ≤0.5 oz, Immersion Tin: 7.5mil(Black), 5.5mil(Other color), 8mil(on copper area)	Base copper ≤0.5 oz, Immersion Tin: 7.5mil(Black), 5.5mil(Other color) , 8mil(on copper area)
99		Base copper ≤0.5 oz, Finish treatment not Immersion Tin: 5.5 mil(Black,extremity 5mil), 4mil(Other color,extremity 3.5mil), 8mil(on copper area)	Base copper ≤0.5 oz, Finish treatment not Immersion Tin: 5.5 mil(Black,extremity 5mil), 4mil(Other color,extremity 3.5mil) , 8mil(on copper area)
100		Base copper 1 oz: 4mil(Green), 5mil(Other color), 5.5mil(Black,extremity 5mil), 8mil(on copper area)	Base copper 1 oz: 4mil(Green), 5mil(Other color) , 5.5mil(Black,extremity 5mil),8mil(on copper area)
101		Base copper 1.43 oz: 4mil(Green), 5.5mil(Other color) , 6mil(Black), 8mil(on copper area)	Base copper 1.43 oz: 4mil(Green), 5.5mil(Other color) , 6mil(Black), 8mil(on copper area)
102		Base copper 2 oz-4 oz: 6mil, 8mil(on copper area)	Base copper 2 oz-4 oz: 6mil, 8mil(on copper area)
103	Routing	Min space of the V-CUT does not reveal the copper (Central Line of v-cut to internal/external circuits,H means board thickness)	H≤40mil: 12mil(20°mean V-CUT angle),13mil(30°),14.6mil(45°)
104		40<H≤63mil: 14.2mil(20°),16mil(30°),20mil(45°)	H≤40mil: 12mil(20°mean V-CUT angle),13mil(30°),14.6mil(45°)
105		63<H≤94.5mil: 16.5mil(20°), 20mil(30°),25.2mil(45°)	40<H≤63mil: 14.2mil(20°),16mil(30°),20mil(45°)
106		94.5<H≤118.1mil: 18.5mil(20°),23.2mil(30°),30.3(45°)	63<H≤94.5mil: 16.5mil(20°), 20mil(30°),25.2mil(45°)
107		V-CUT symmetrical tolerance	94.5<H≤118.1mil: 18.5mil(20°),23.2mil(30°),30.3(45°)
108		MAX V-CUT lines	±4mil
109		V-CUT angle tolerance	100
110		V-CUT angle	±5°
111		Gold finger bevelling	20, 30, 45°
112		Gold finger bevelling tolerance	20, 30, 45, 60°
113		Min space of gold finger chamfering noninterference tab	±5°
114		Min gap between the side of gold finger and the shape edge line	236mil
115		Depth tolerance of depth-control groove milling	275.6mil
116		routing tolerance (edge to edge)	10mil
117		Min tolerance for routing slot (PTH)	±4mil
118		Min tolerance for routing slot (NPTH)	±4mil
119		Min tolerance for drilling slot (PTH)	width/length tolerance ±5mil
120		Min tolerance for drilling slot (NPTH)	width/length tolerance ±4mil

No.		Items	Prototype Capabilities	Production Capabilities
121	Minimum Gap.	Min gap between mechanical hole wall and conductor (Local mixed pressure area)	12mil(local 10mil)	12mil(local 10mil)
122		Min gap between mechanical hole wall and the junction of local mixed pressure	10mil	10mil
123	Metal-substrate PCB	Layer counts	1-8L(Al-substrate, Cu-substrate);2-24L(Heatsink, Sweat bonding, Buried metal);1-2L(Ceramic-substrate)	1-8L(Al-substrate, Cu-substrate);2-24L(Heatsink, Sweat bonding, Buried metal);1-2L(Ceramic-substrate)
124		PCB size (Finished)	Max: 24"*24", Min: 0.2"*0.2" (Al-substrate, Cu-substrate, Heatsink, Sweat bonding, Buried metal)	Max: 24"*24", Min: 0.2"*0.2" (Al-substrate, Cu-substrate, Heatsink, Sweat bonding, Buried metal)
125		MAX PCB size(Ceramic-substrate PCB)	4" * 4"	4" * 4"
126		PCB thickness(Finished)	0.02"-0.2"	0.02"-0.2"
127		Copper thickness(Finished)	0.5-10 oz	0.5-10 oz
128		Metal thickness	0.02"-0.2"	0.02"-0.2"
129		Metal material type	AL:1100/1050/2124/5052/6061;Cu:c11000; Iron	AL:1100/1050/2124/5052/6061;Cu:c11000; Iron
130		Min finished hole size&tolerance	NPTH: 20±2mil; PTH: 40±4mil(for Al-substrate, Cu-substrate), 8±4mil(for Heatsink, Sweat bonding, Buried metal)	NPTH: 20±2mil; PTH: 40±4mil(for Al-substrate, Cu-substrate), 8±4mil(for Heatsink, Sweat bonding, Buried metal)
131		Dimension tolerance	±1.2mil	±2mil
132		PCB partial surface treatment	Leaded HASL/Lead free HASL; OSP; ENIG; ENEPIG ; Plating(Ni)Soft/Hard gold;Plating Sn	Leaded HASL/Lead free HASL; OSP; ENIG; ENEPIG ; Plating(Ni)Soft/Hard gold;Plating Sn
133		Metal partial surface treatment	Cu:Plating Ni&Au ; Al:Anodic oxidation, Hard anodic oxidation coating, Chemical passivation; Physical treatment:Sandblasting, Wire drawing	Cu:Plating Ni&Au ; Al:Anodic oxidation, Hard anodic oxidation coating, Chemical passivation; Physical treatment:Sandblasting, Wire drawing
134		Material	Metal PCB:Totking(T-110, T-111), Ventec(VT-4A1, VT-4A2, VT-4A3), Laird(1KA04), 1KA06);Bergquist(MP06503, HT04503), TACONIC(TLY-5, TLY-5F)	Metal PCB:Totking(T-110, T-111), Ventec(VT-4A1, VT-4A2, VT-4A3), Laird(1KA04, 1KA06);Bergquist(MP06503, HT04503), TACONIC(TLY-5, TLY-5F)
135		Thermal glue thickness (dielectric layer)	3-6mil	3-6mil
136		Buried copper block size	0.118" * 0.118" -- 2.756" * 3.15"	0.118"*0.118" -- 2.756"*3.15"
137		Buried copper block drop tolerance	±1.6mil	±1.6mil
138		Min gap between Buried copper block and hole wall	12mil	12mil
139		Thermal conductivity	0.3-3w/m.k(Heatsink, Al-substrate, Cu-substrate);8.33w/m.k(Sweat bonding);0.35-3w/m.k(Buried metal);24-180 w/m.k(Ceramic-substrate)	0.3-3w/m.k(Heatsink, Al-substrate, Cu-substrate);8.33w/m.k(Sweat bonding);0.35-3w/m.k(Buried metal);24-180 w/m.k(Ceramic-substrate)
140	Misc.	Max finished copper thickness to internal&external layer	Internal layer:10 oz; External layer:11 oz	Internal layer:4oz; External layer:5 oz
141		finished copper thickness to external layer	base copper 1/3 oz, 0.5 oz: ≥35.8μm (reference value: 35.8-42.5μm) ; ≥40.4μm (reference value: 40.4-48.5μm)	base copper 1/3 oz, 0.5 oz: ≥35.8μm (reference value: 35.8-42.5μm) ; ≥40.4μm (reference value: 40.4-48.5μm)
142			base copper 1 oz, 1.43 oz, 2 oz: ≥55.9μm; ≥70μm; ≥86.7μm	base copper 1 oz, 1.43 oz, 2 oz: ≥55.9μm; ≥70μm; ≥86.7μm
143			base copper 3oz, 4 oz: ≥117.6μm; ≥148.5μm	base copper 3oz, 4 oz: ≥117.6μm; ≥148.5μm
144		Layer count	1-50L	1-20L
145		PCB thickness	8 - 275.6mil(No Soldermask);15.7-275.6mil(Have Soldermask)	11.8-196.85mil(No Soldermask);15.7-196.85mil(Have Soldermask)
146		PCB thickness tolerance (Normal)	Thickness>40mil: ±10% ; Thickness≤40mil: ±4mil	Thickness>40mil: ±10% ; Thickness≤40mil: ±4mil
147		PCB thickness tolerance (Special)	Thickness≤80mil: ±4mil; 80mil<Thickness≤120mil: ±6mil	Thickness≤80mil: ±10% ; 80mil<Thickness≤120mil: ±6mil
148		Min finished PCB size	0.4" * 0.4"	2.0" * 4.0"
149		Max finished PCB size	23×35 inch(2L) ; 22.5*33.5 inch(4L); 22.5*30inch (≥6L)	20×30 inch(2L) ; 22.5*30 inch(4L); 16.5*22.5inch (≥6L)
150		ionic soil	≤1ug/cm2	≤1ug/cm2
151		Min bow&twist	0.1%(This ability request same laminated plate type, symmetry laminated construction, the difference of symmetry layer Copper area within 10%, uniformity wiring , excluding the large area of copper and base material ,haven't plate and single panel, and the long side size≤ 21 inch)	0.75%
152		Impedance tolerance	±5ohm(<50ohm), ±10%(≥50ohm)	±5ohm(<50ohm),±10%(≥50ohm)
153		Laser blind via size with filling plating	4-5mil(priority 4mil)	4-5mil(priority 4mil)
154		Max aspect ratio for laser via filling plating	1:1(Depth included copper thickness)	1:1(Depth included copper thickness)

Rigid-Flex Manufacturing Capabilities

No.	Item		Standard	Advanced	Comment
1	Material	FCCL（adhesive）	Shengyi SF305:PI=0.5mil,1mil and 2mil; Cu=0.33oz,0.5oz and 1oz	/	
2		FCCL（adhesiveless）	Panasonic R-F775:PI=1mil and 2mil; Cu=0.33oz, 0.5oz and 1oz	PI=1mil,2mil; Cu=2oz	
			DuPont Pyralux AP:PI=1mil, 2mil and 3mil; Cu=0.33oz, 0.5oz and 1oz	PI=1mil, 2mil, 3mil and 4mil; Cu=2oz	
3		Coverlay	Shengyi SF305C: 0515, 1025 and 2030	/	
			Taiflex FHK: 0515,1025 and 2035	/	
4		Adhesive	Taiflex BT: AD=10um, 25um and 40um	/	
5		PI stiffener	Taiflex MHK: PI=3mil, 5mil, 7mil and 9mil	/	
6		3M	9460, 9077, 9458, 468	/	
7		NO FLOW PP	Ventec:VT-47N. EMC:EM-37B(L)	Ventec:VT-901	
8	CCL	ITEQ: IT-180A; Shengyi: S1000-2	/		
9	Other CCL	Arlon: 85N; Rogers: RO4000 series; Nelco:N4000-13 series	Ventec:VT-901		
10	Others	Design software	CAM350、PROTEL、PADS、POWERPCB、AUTOCAD、GENESIS、ORCAD	/	
11		Gerber format	RS-274-D、RS-274-X	/	
12		Drill format	EXCELLON format	/	
13		Layer	2-10	11-20	
14		Board thickness	0.2mm-3.0mm	3.0mm-4.0mm	
15		Tolerance of board thickness(thickness>1.0mm)	±10%	/	
16		Tolerance of board thickness(thickness≤1.0mm)	±0.1mm	/	
17		Min. board size	10mm*15mm	/	
18		Max. board size	400mm*550mm	400mm*730mm	
19		Impedance control tolerance	Single-ended: ±5Ω(≤50Ω),±10%(>50Ω)	Single-ended: ±4Ω(≤50Ω),±8%(>50Ω)	
			Differential: ±5Ω(≤50Ω),±10%(>50Ω)	Differential: ±4Ω(≤50Ω),±8%(>50Ω)	
20		HDI	/	1+n+1(buried via≤0.4mm)	
21	Min. bow&twist	0.75%(symmetrical),2%(unsymmetrical)	1.5%(unsymmetrical)		

22	Inner layer	Min. line width/spacing (12,18um copper)	3.5/3.5mil (3.2/3.2mil)	3/3mil (2.8/2.8mil)	()=partly
23		Min. line width/spacing (35um copper)	4/4mil (3.5/3.5mil)	3.5/3.5mil (3/3mil)	()=partly
24		Min. line width/spacing (70um copper)	6/7mil (5.5/6.5mil)	5/6mil (4.5/5.5mil)	()=partly
25		Annular ring(blind via)	4mil	3mil	
26		Max. copper thickness	2oz	3oz	
27	Outer layer	Min. line width/spacing (18um copper)	4/4mil (3.5/3.5mil)	3.5/3.5mil (3/3mil)	()=partly
28		Min. line width/spacing (35um copper)	4.5/4.5mil (4/4mil)	4/4mil (3.5/3.5mil)	()=partly
29		Min. line width/spacing (70um copper)	6/9mil (5.5/8.5mil)	5.5/8.5mil (5/8mil)	()=partly
30		Min. line width/spacing (105um copper)	10/13mil (9.5/12.5mil)	9.5/12.5mil (9/12mil)	()=partly
31		Min. line width/spacing (18um copper,flex on the surface of board)	5/5mil (4.5/4.5mil)	4.5/4.5mil (4/4mil)	()=partly
32		Min. line width/spacing (35um copper,flex on the surface of board)	5.5/6mil (5/5.5mil)	5/5.5mil (4.5/5mil)	()=partly
33		Min. line width/spacing (70um copper,flex on the surface of board)	7.0/10mil (6.5/9.5mil)	6.5/9.5mil (6/9mil)	()=partly
34		Min. BGA pad size	12mil(8mil for electrical soft gold board)	10mil(7mil for electrical soft gold board)	
35		Max. finished copper thickness	3oz	5oz	
36	Drilling	Blind via	/	4mil-6mil(6mil preferable)	
37		Max. buried via	0.4mm	/	
38		Aspect ratio (mechanical drill)	10:1	12:1	
39		Aspect ratio (laser drill)	/	0.8:1	
40		Min. distance between via and conductors	6mil (≤6layer)	5mil (≤6layer)	
			8mil(7~11layer)	6mil(7~11layer)	
			12mil(≥12layer)	10mil(≥12layer)	
41		Min. distance between blind via and conductors	/	6mil	1 step HDI
42		Tolerance of non-plated holes	±2mil(limited is +0/-2mil or +2mil/-0)	/	

43	Solder mask and silk screen	Solder mask color	green,black,blue,red, matte green,white	/	
44		Min. solder dam (copper≤1oz)	4mil(green, red and blue), 5mil(black and white)	/	
45		Min. solder dam (copper2-4oz)	8mil	6mil	
46		Min. clearance	2.5mil (2.0mil)	2.0mil (1.5mil)	()=partly
47		Diameter of plugged hole	/	0.2-0.5mm	
48		Aspect ratio(hole plugged with non-conductive resin)	/	10:1	
49		silk color	white,yellow,black	/	
50	Surface treatment	Surface treatment	HASL/LF HASL, ENIG, ENEPIG, Electrolytic Nickel Gold, Soft Gold, Hard Gold, Immersion silver, Immersion tin and OSP	/	
51		Mixed surface treatment	ENIG+OSP,ENIG+Gold finger,Electrical gold+ Gold fingers	/	
52		Gold thickness (ENIG)	0.05-0.10um	/	
53		Nickel thickness (ENIG)	3-8um	/	
54		Gold thickness (ENEPIG)	0.05-0.10um	/	
55		Palladium thickness (ENEPIG)	0.05-0.15um	/	
56		Nickel thickness (ENEPIG)	3-8um	/	
57		Hard gold thickness(leadless)	0.1-1.5um	/	
58		Hard gold thickness(including lead)	0.1-4.0um	/	
59		Electrolytic Nickel thickness	≥3um	/	
60		Electrolytic Gold thickness	0.05-0.10um	/	
61		Immersion silver thickness	0.2-0.4um	/	
62		OSP thickness	0.1-0.3um	/	
63	Routing	Tolerance of board outline	±4mil(exclude complicated board outline and cutout)	/	

Standard=No need to special checks.

Advanced=It is controlled but needs special checks.



Assembly Capability Details

Inspection/Testing:

- Class II standard, Class III upon request
- Visual
- Automated optical
- Firmware Testing (Provided SOP and Testing Equipment)

Supported file formats:

- ODB++, CAD ASCII, IPC-2581
- BOM: .xls, .csv, .xlsx
- Gerber (RS-274X)
- Centroid (XY, Pick-n-Place)

Solder:

- No-Clean Flux is standard
- Selective Solder
- Lead-Free (RoHS)
- Leaded

Paste:

- Senju (lead-free)
- Senju (leaded)

Wire:

- AIM SN100C (lead-free)
- AIM SAC305 (leaded)

SMT Component Presentation:

- Cut Tape
- Partial Reel
- Full Reel
- Tube
- Tray

Depanelization

BGA Rework

Washing Machine (Aqua Rose)

Box Building

Supported Part Specs:

- 2-Sided SMT
- **SMT sizes:** 01005 or larger
- **Fine pitch:** 16 mil (.4 mm) or greater
- **BGA pitch:** 16 mil (.4 mm) or greater
- **BGA Ball count:** Up to 1932 *Call for larger parts*
- **Max size:** 2.2 in. X 2.2 in. X .06 in.

Supported PC Board Specs:

- **Min size:** 1.967 in. X 1.967 in
- **Max size:** 19.67 in. X 19.67 in.
- **Min thickness:** 4 mil
- **Max thickness:** 240 mil
- **Layer Count:** Up to 24
- **Finishes:** HASL, ENIG, Silver, SMOBC/HAL, *All Finishes acceptable*
- **Markings:** Silkscreen, Solder Mask (preferred)...not required on PCB, assembly drawings can work as a replacement to silk screen
- **Material:** Rigid, Rogers 4000, Flex, Rigid Flex, Metal Clad, Other
- **Copper Thickness:** < 2 oz. *Call for other options*



PERRY JOHNSON REGISTRARS, INC.

Certificate of Registration

Perry Johnson Registrars, Inc., has audited the Quality Management System of:

Imagineering, Inc.

2425 Touhy Avenue, Elk Grove Village, IL 60007 United States

*(Hereinafter called the Organization) and hereby declares that
Organization is in conformance with:*

ISO 9001:2015 and AS9100D

This Registration is in respect to the following scope:

Contract Manufacturing of Printed Circuit Boards and Assemblies

(The assessment was performed in accordance with AS9104/1:2012-01. PJR is accredited under the ICOP scheme)

*This Registration is granted subject to the system rules governing the Registration referred to above, and the
Organization hereby covenants with the Assessment body duty to observe and comply with the said rules.*



Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)
755 West Big Beaver Road, Suite 1340
Troy, Michigan 48084
(248) 358-3388

The validity of this certificate is dependent upon ongoing surveillance.

Effective Date:

January 9, 2017

Revision Date:

February 20, 2018

Expiration Date:

January 8, 2020

Certificate No.:

C2017-00283-R1



RCW183260
CERTIFICATION NUMBER

11/14/19
EXPIRATION DATE

Certifies that:

Imagineering, Inc.

has successfully met the requirements of the NWBOC
national certification program for certification as
a woman-owned and woman-controlled business.

The identified business has qualified as an eligible Woman Business Enterprise (WBE) as set forth in NWBOC standards and procedures.

PHYLLIS HILL SLATER
Board Chair, NWBOC

334519, 334412, 334418, 332510, 339999

NAICS Code(s)

11/15/18

Date

WWW.NWBOC.ORG

INFO@NWBOC.ORG | 800-794-6140 | 1101 East Cumberland Ave, Suite #301, Tampa, Florida 33602

TAMPERING OR ALTERING THIS CERTIFICATE IS, IN THE DISCRETION OF NWBOC, GROUNDS FOR TERMINATION OF CERTIFICATION.

RCWOSB183261

CERTIFICATION NUMBER

11/14/19

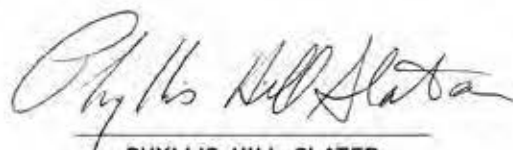
EXPIRATION DATE

Certifies that:

Imagineering, Inc.

has successfully met the requirements of the NWBOC
national certification program for certification as
a woman-owned and woman-controlled business.

The identified small business is an eligible WOSB for the WOSB Program, as set forth in 13 C.F.R. Part 127
and has been certified as such by NWBOC an SBA approved Third Party Certifier pursuant to the
Third Party Certifier Agreement, dated 06/30/11, and available at www.sba.gov/wosb.



PHYLLIS HILL SLATER
Board Chair, NWBOC

334519, 332510, 339999

NAICS Code(s)

11/15/18

Date

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Our philosophy for Imagineering, Inc. has not changed since inception over 34 years ago. Our number one priority remains, and will continue to be, the understanding of what our customer's value, to evaluate their needs and deliver the best in class service and products within the customers constraints.

We have successfully coupled a value driven philosophy with a high tech environment. During our infancy in the 1980's we established ourselves as the value driven prototype PCB fabricators. We are proud to say that we are now Electronic Contract Manufacturers capable of serving the Aerospace Industry, as per AS9100 guidelines, as well as many others.

We promise to continue to listen and work hard for your business; and we look forward to better serving all of your electronic contract manufacturing requirements. Whatever your needs, we'll be there along the way to listen, understand, and deliver in a timely manner.

Sincerely,

Khurrum Dhanji

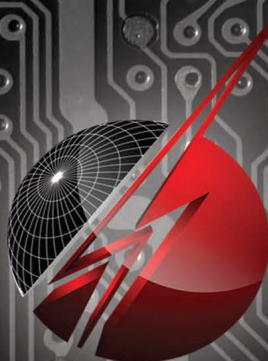
Khurrum Dhanji
CEO



President / CFO Parvin Dhanji, CEO Khurrum Dhanji, COO Sulaiman Roy



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