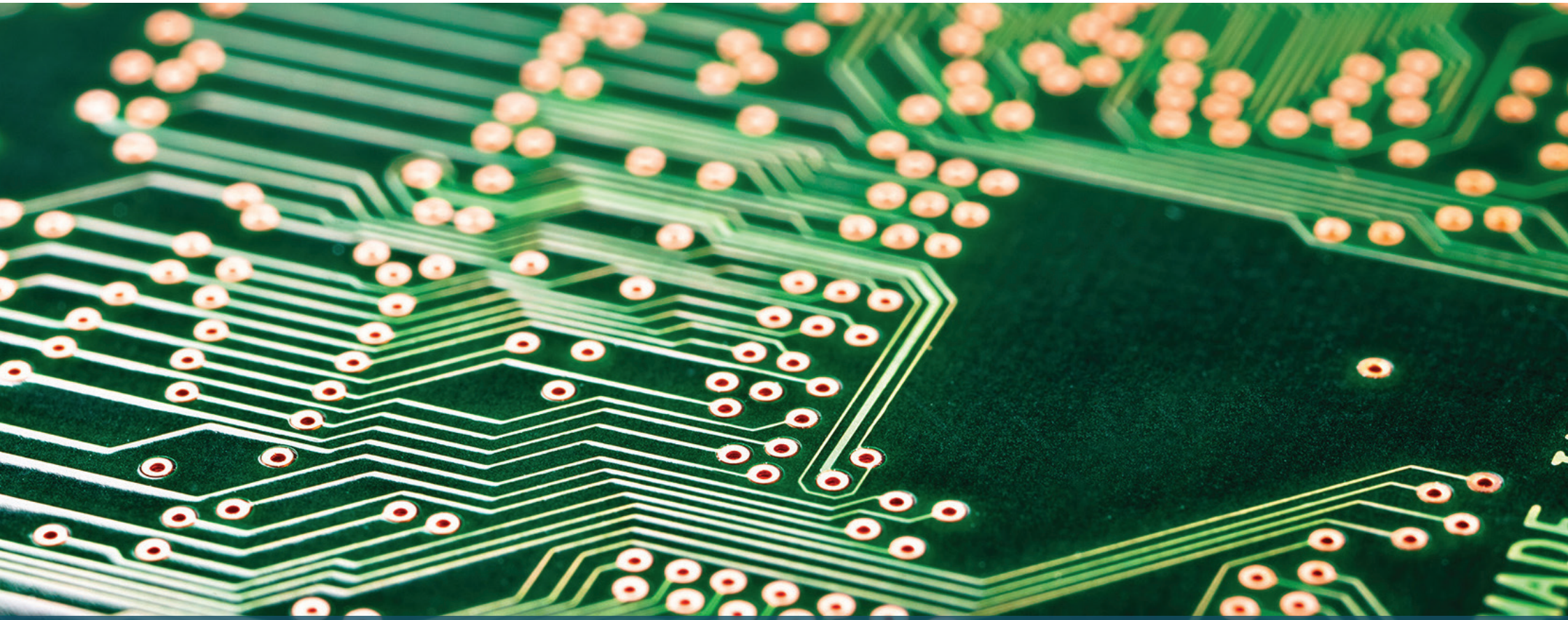


PCB CAPABILITIES

2021

PRECISION
ELECTRONIC TECHNOLOGIES

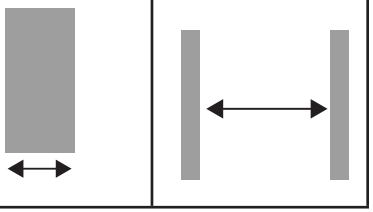
RIGID PCB CAPABILITIES

NO.	TYPE	ITEM	CAPABILITIES
1	Material	We offer normal Metal-substrate PCBs, TG FR4, HIGH TG FR4, Halogen free material, HGIH CTI material including ITEQ, Taiwan Union, Nanya, Shengyi, Panasonic, Ventec, Roger and Isola material.	We offer PCBs made up out of various materials such as e.g. Metal-substrate, FR4 (std, mid, high), Halogen free material, High CTI material, RF material. The brands we work with are for example (but not limited to) Iteq, Taiwan Union, Nanya, Shengyi, Panasonic, Ventec, Rogers and Isola.
2	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.
3	Buildings	Blind & buried via type	Mechanical blind & burried vias with less than 3 times laminating
		HDI PCB	• 1+n+1 • 1+1+n+1+1 • 2+n+2 • 3+n+3 (n buried vias ≤ 0.3 mm) • Laser blind via can be filling plating
4	Finish Treatment	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
		Leaded	Leaded HASL
		Aspect ratio	• 10:1 (HASL Lead free, HASL Lead, ENIG ,Immersion Tin, Immersion silver, ENEPIG) • 8:1 (OSP)
		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”
		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”
		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
		MIN space between gold fingers	6 mil
		MIN block space to gold fingers	7.5 mil
5	Plating/coating thickness	Tin thickness	2 - 40 µm (0.4 µm on large tin area of Leaded HASL, 1.5 µm on large tin area of HASL lead free)
		OSP	0.2 - 0.6 µm
		ENIG	Ni: 3 - 8 µm Au: 0.05 - 0.1 µm
		Immersion Silver	0.2 - 0.4 µm

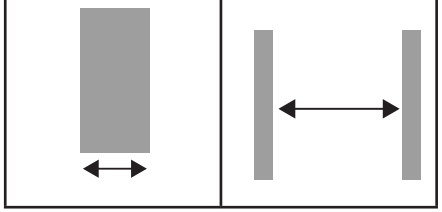
NO.	TYPE	ITEM	CAPABILITIES
5 (contd)	Plating/coating thickness (continued)	Immersion Tin	≥ 1.0
		Hard gold	0.1 - 4.0 μm
		Soft gold	0.1 - 4.0 μm
		ENEPIG	Ni: 3 - 8 μm Pd: 0.05 - 0.15 μm Au: 0.05 - 0.1 μm
		Flash gold(electroplated gold)	Ni: ≥ 3 μm Au: 0.025 - 0.1 μm Base copper ≤ 1 oz
		Electroplated Gold finger	Ni: ≥ 3 μm Au: 0.25 - 1.5 μm (the thinnest point)
		Carbon	10 - 50 μm
		Soldermask	0.4 - 0.7 mil (on copper area) 0.2 - 0.31 mil (on via pad) ≥ 0.2 mil (on circuits around the corner, just for one-time print and copper thickness < 48 um)
		Blue plastic	8 - 31.5 mil
6	Hole*	MAX thickness of mechanical hole: 4 mil / 6 mil / 8 mil	31.5 mil / 59 mil / 100 mil
		MIN laser drilling size	4 mil
		MAX laser drilling size	6 mil
		Finshed mechanical hole size	4 - 244 mil (corresponding drilling tool size 6 - 248 mil)
			A: MIN finished hole size for PTFE material and hybrid PCB is 10 mil (corresponding drilling tool size 14 mil)
			B: MAX finished hole size for blind & buried via is 12 mil (corresponding drilling tool size 16 mil)
			C: MAX finished hole size for via-in-pad pluged with solder mask is 18 mil (corresponding drilling tool size 21.65 mil)
			D: MIN connecting hole size is 14 mil(corresponding drilling tool size is 18 mil)
			E: MIN half-hole (pth) size is 12 mil (corresponding drilling tool size is 16 mil)
		MAX aspect ratio for hole plate	20:1 (hole diameter > 8 mil)
		MAX aspect ratio for laser via filling plating	1:1 Depth including copper thickness)
		MAX aspect ratio for mechanical depth-control drilling board (Blind hole drilling depth/blind hole size)	1.3:1 (drilling tool size ≤ 8 mil) 1.15:1 (drilling tool size ≥ 10 mil)
		MIN depth of Mechanical depth-control (backdrill)	8 mil
		MIN gap between hole wall and conductor (None blind and buried via PCB)	5.5 mil (≤ 8 L) 6.5 mil (10 - 14 L) 7 mil (> 14 L)
		MIN gap between hole wall conductor (Blind and buried via PCB)	7 mil (1 time laminating) 8 mil (2 times laminating) 9 mil(3 times laminating)
		MIN gab between hole wall conductor (Laser blind hole buried via PCB)	7 mil (1+N+1) 8 mil (1+1+N+1+1 or 2+N+2)
		MIN space between laser holes and conductor	5 mil
		MIN space between hole walls in different net	10 mil
	*refer to page 6 for more information	MIN space bewteen hole walls in same net	6 mil (through hole & laser hole PCB) 10 mil (Mechanical blind & buried PCB)

NO.	TYPE	ITEM	CAPABILITIES
6	Hole* (continued)	MIN space bwteen NPTH hole walls	8 mil
		Hole location tolerance	± 2 mil
		NPTH tolerance	± 2 mil
		Pressfit holes tolerance	± 2 mil
		Countersink depth tolerance	± 6 mil
		Countersink hole size tolerance	± 6 mil
7	Pad (ring)	MIN Pad size for laser drillings	10 mil (for 4 mil laser via),11 mil (for 5 mil laser via)
		MIN Pad size for mechanical drillings	16 mil (8 mil drillings)
		MIN BGA pad size	HASL: 10 mil LF HASL: 12mil Other surface technics are 7 mil
		Pad size tolerance(BGA)	±1.2 mil (pad size ≤ 12 mil) ±10% (pad size ≥ 12 mil)
8	Width/Space		

Inner Layer Copper Thickness (min)	Min Trace Width	Min Trace Space
1/2 oz (0.6 mil / 0.01524 mm)	≥ 3 mil / 0.0762 mm	≥ 3 mil / 0.0762 mm
1 oz (1.2 mil / 0.03048 mm)	≥ 3 mil / 0.0762 mm	≥ 4 mil / 0.1016 mm
2 oz (2.6 mil / 0.06604 mm)	≥ 4 mil / 0.1016 mm	≥ 5 mil / 0.1270 mm
3 oz (3.8 mil / 0.09652 mm)	≥ 5 mil / 0.1270 mm	≥ 8 mil / 0.2032 mm
4 oz (5.1 mil / 0.12954 mm)	≥ 6 mil / 0.1524 mm	≥ 11 mil / 0.2794 mm
5 oz (6.3 mil / 0.1600 mm)	≥ 7 mil / 0.1778 mm	≥ 14 mil / 0.3556 mm
6 oz (7.6 mil / 0.1930 mm)	≥ 8 mil / 0.2032 mm	≥ 15 mil / 0.3810 mm
7 oz (8.9 mil / 0.2261 mm)	≥ 9 mil / 0.2286 mm	≥ 18 mil / 0.4572 mm
8 oz (10.2 mil / 0.2591 mm)	≥ 10 mil / 0.2540 mm	≥ 21 mil / 0.5334 mm



Outer Layer Copper Thickness (min)	Min Trace Width	Min Trace Space
1/2 oz (0.6 mil / 0.01524 mm)	≥ 3.5 mil / 0.0889 mm	≥ 3.5 mil / 0.0889 mm
1 oz (1.2 mil / 0.03048 mm)	≥ 4.5 mil / 0.1143 mm	≥ 5 mil / 0.1270 mm
2 oz (2.6 mil / 0.06604 mm)	≥ 6 mil / 0.1524 mm	≥ 7 mil / 0.1778 mm
3 oz (3.8 mil / 0.09652 mm)	≥ 6 mil / 0.1524 mm	≥ 10 mil / 0.2540 mm
4 oz (5.1 mil / 0.12954 mm)	≥ 8 mil / 0.2032 mm	≥ 13 mil / 0.3302 mm
5 oz (6.3 mil / 0.1600 mm)	≥ 9 mil / 0.2286 mm	≥ 16 mil / 0.4064 mm
6 oz (7.6 mil / 0.1930 mm)	≥ 10 mil / 0.2540 mm	≥ 19 mil / 0.4826 mm
7 oz (8.9 mil / 0.2261 mm)	≥ 11 mil / 0.2794 mm	≥ 22 mil / 0.5588 mm
8 oz (10.2 mil / 0.2591 mm)	≥ 12 mil / 0.3048 mm	≥ 26 mil / 0.6604 mm



9	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 ≤ 40 mil: 12 mil (20° mean V-CUT angle), 13 mil (30°), 14.6 mil (45°)
			40 < H ≤ 63 mil: 14.2 mil (20°),16 mil (30°), 20 mil (45°)
			63 < H ≤ 94.5 mil: 16.5 mil (20°), 20 mil (30°), 25.2 mil (45°)
			94.5 < H ≤ 118.1 mil: 18.5 mil (20°), 23.2 mil (30°), 30.3 (45°)
		V-CUT symmetrical tolerance	±4 mil
		MAX V-CUT lines	100
		V-CUT angle tolerance	±5°
	*refer to page 6 for more information	V-CUT angle	20°, 30°, 45°

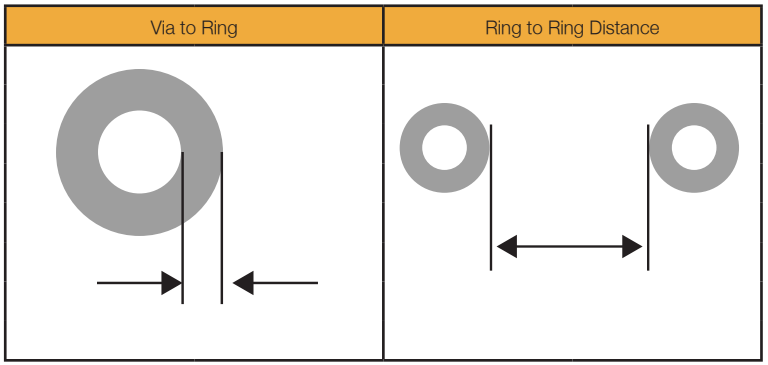
NO.	TYPE	ITEM	CAPABILITIES
9	Routing* (continued) *refer to page 6 for more information	Gold finger bevelling	20°, 30°, 45°, 60°
		Gold finger bevelling tolerance	±5°
		MIN space of gold finger chamfering non interference tab	236 mil
		MIN gap between the side of gold finger and the shape edge line	8 mil
		Depth tolerance of depth-control groove milling	±4 mil
		Routing tolerance (edge to edge)	±4 mil
		MIN tolerance for routing slot (PTH)	Width/length tolerance: ±5 mil
		MIN tolerance for routing slot (NPTH)	Width/length tolerance: ± 4mil
		MIN tolerance for drilling slot (PTH)	Width tolerance ±3 mil Length/width ≥ 2, length tolerance ±3 mil Length/width < 2, length tolerance ±4 mil
		MIN tolerance for drilling slot (NPTH)	Width tolerance ±2 mil Length/width ≥ 2, length tolerance is ±2 mil Length/width < 2, width and length tolerance ±3 mil
10	Soldermask	MAX drilling tool size for via filled with Soldermask (single side)	35.4 mil
		Soldermask color	Green matte/glossy, Yellow, Black, Blue, Red, White, Purple
		Silkscreen color	White, Yellow, Black
		MAX hole size for via filled with Blue glue aluminium	197 mil
		Finish hole size for via filled with resin	4 - 25.4 mil
		MAX aspect ratio for via filled with resin board	12:1
		MIN width of soldermask bridge	Base copper ≤ 0.5 oz Immersion Tin: 7.5 mil (Black), 5.5 mil (Other color), 8 mil (on copper area)
			Base copper ≤ 0.5 oz Finish treatment not Immersion Tin: 5.5 mil (Black, extremity 5 mil), 4mil (Other color, extremity 3.5 mil), 8 mil (on copper area)
			Base copper 1 oz: 4 mil (Green), 5 mil (Other color), 5.5 mil (Black, extremity 5 mil), 8 mil (on copper area)
			Base copper 1.43 oz: 4 mil (Green), 5.5 mil (Other color), 6 mil (Black), 8 mil (on copper area)
			Base copper 2 oz - 4 oz: 6 mil, 8 mil (on copper area)
11	Others	MAX finished copper thickness to internal&external layer"	Internal layer: 10 oz External layer: 11 oz
		Finished copper thickness to external layer	Base copper 1/3 oz: ≥ 35.8 µm (reference value: 35.8-42.5 µm) 0.5 oz: ≥ 40.4 µm (reference value: 40.4-48.5 µm)
			Base copper 1 oz: ≥ 55.9 µm 1.43 oz: ≥ 70 µm 2 oz: ≥ 86.7 µm
			Base copper 3 oz: ≥ 117.6 µm 4 oz: ≥ 148.5 µm
		Layer count	1 - 40 L
		PCB thickness	8 - 275.6 mil (No Soldermask) 15.7 - 275.6 mil (With Soldermask)

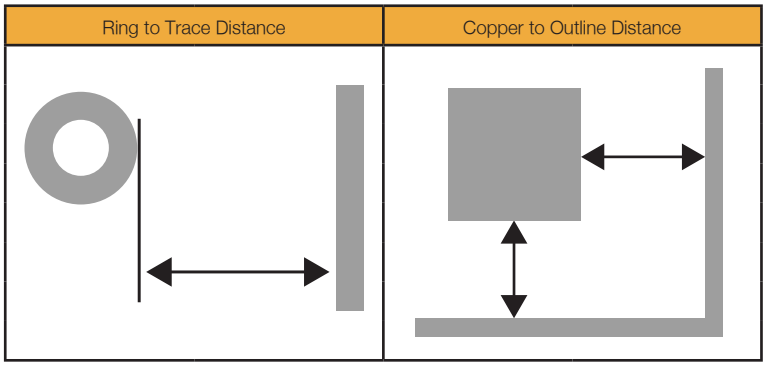
NO.	TYPE	ITEM	CAPABILITIES
11	Others (continued)	PCB thickness tolerance (Normal)	Thickness > 40 mil: ±10% Thickness ≤ 40 mil: ±4 mil
		PCB thickness tolerance (Special)	Thickness ≤ 80 mil: ±4 mil 80 mil < Thickness ≤ 120 mil: ±6 mil
		MIN finished PCB size	0.4" * 0.4"
		MAX finished PCB size	23 x 35 inch (2L) 22.5 x 33.5 inch (4L) 22.5 x 30 inch (≥ 6L)
		Ionic soil	≤1ug/cm2
		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)
		Impedance tolerance	±5 ohm (< 50 ohm) ±10% (≥ 50 ohm)
		Laser blind via size with filling plating	4 - 5 mil (priority 4 mil)
		MAX aspect ratio for laser via filling plating	1:1 (Depth included copper thickness)

*Additional information for Hole & Routing:

Inner Layer Copper Thickness (min)	Via to Ring (min)	Ring to Ring Distance	Ring to Trace Distance	Copper to Outline Distance
1 oz (1.2 mil / 0.03048 mm)	≥ 4 mil / 0.0762 mm	≥ 10 mil / 0.2540 mm	≥ 8 mil / 0.2032 mm	≥ 10 mil / 0.2540 mm
2 oz (2.6 mil / 0.06604 mm)	≥ 5 mil / 0.1270 mm	≥ 12 mil / 0.3048 mm	≥ 10 mil / 0.2540 mm	≥ 12 mil / 0.3048 mm
3 oz (3.8 mil / 0.09652 mm)	≥ 6 mil / 0.1524 mm	≥ 14 mil / 0.3556 mm	≥ 12 mil / 0.3048 mm	≥ 14 mil / 0.3556 mm
4 oz (5.1 mil / 0.12954 mm)	≥ 7 mil / 0.1778 mm	≥ 16 mil / 0.4064 mm	≥ 14 mil / 0.3556 mm	≥ 16 mil / 0.4064 mm
5 oz (6.3 mil / 0.1600 mm)	≥ 8 mil / 0.2032 mm	≥ 18 mil / 0.4572 mm	≥ 16 mil / 0.4064 mm	≥ 18 mil / 0.4572 mm
6 oz (7.6 mil / 0.1930 mm)	≥ 9 mil / 0.2286 mm	≥ 20 mil / 0.5080 mm	≥ 18 mil / 0.4572 mm	≥ 20 mil / 0.5080 mm
7 oz (8.9 mil / 0.2261 mm)	≥ 10 mil / 0.2540 mm	≥ 22 mil / 0.5588 mm	≥ 20 mil / 0.5080 mm	≥ 22 mil / 0.5588 mm
8 oz (10.2 mil / 0.2591 mm)	≥ 11 mil / 0.2794 mm	≥ 24 mil / 0.6096 mm	≥ 22 mil / 0.5588 mm	≥ 24 mil / 0.6096 mm

Outer Layer Copper Thickness (min)	Via to Ring (min)	Ring to Ring Distance	Ring to Trace Distance	Copper to Outline Distance
1 oz (1.2 mil / 0.03048 mm)	≥ 4 mil / 0.0762 mm	≥ 10 mil / 0.2540 mm	≥ 8 mil / 0.2032 mm	≥ 10 mil / 0.2540 mm
2 oz (2.6 mil / 0.06604 mm)	≥ 5 mil / 0.1270 mm	≥ 12 mil / 0.3048 mm	≥ 10 mil / 0.2540 mm	≥ 12 mil / 0.3048 mm
3 oz (3.8 mil / 0.09652 mm)	≥ 6 mil / 0.1524 mm	≥ 14 mil / 0.3556 mm	≥ 12 mil / 0.3048 mm	≥ 14 mil / 0.3556 mm
4 oz (5.1 mil / 0.12954 mm)	≥ 7 mil / 0.1778 mm	≥ 16 mil / 0.4064 mm	≥ 14 mil / 0.3556 mm	≥ 16 mil / 0.4064 mm
5 oz (6.3 mil / 0.1600 mm)	≥ 8 mil / 0.2032 mm	≥ 18 mil / 0.4572 mm	≥ 16 mil / 0.4064 mm	≥ 18 mil / 0.4572 mm
6 oz (7.6 mil / 0.1930 mm)	≥ 9 mil / 0.2286 mm	≥ 20 mil / 0.5080 mm	≥ 18 mil / 0.4572 mm	≥ 20 mil / 0.5080 mm
7 oz (8.9 mil / 0.2261 mm)	≥ 10 mil / 0.2540 mm	≥ 22 mil / 0.5588 mm	≥ 20 mil / 0.5080 mm	≥ 22 mil / 0.5588 mm
8 oz (10.2 mil / 0.2591 mm)	≥ 11 mil / 0.2794 mm	≥ 24 mil / 0.6096 mm	≥ 22 mil / 0.5588 mm	≥ 24 mil / 0.6096 mm





FLEX PCB CAPABILITIES

NO.	TYPE	ITEM	CAPABILITIES
1	Material	FCCL (adhesive)	Shengyi SF305: PI = 0.5 mi I& 1 mil & 2 mil; Cu = 0.33 oz & 0.5 oz & 1 oz
		FCCL (adhesive less)	Panasonic R-F775: PI = 1 mil & 2 mil & 3 mil; Cu = 0.5 oz & 1 oz PI = 3 mil; Cu = 2 oz
			Taiflex MHK: PI = 1 mil & 2 mil; Cu = 0.33 oz & 0.5 oz & 1 oz
			DuPont Pyralux AP: PI = 1 mil & 2 mil & 3 mil; Cu = 0.5 oz & 1 oz PI = 4 mil; Cu = 2 oz
		Coverlay	Shengyi SF305C: 0515 & 0525 & 1025 & 2030
			Taiflex FHK: 1025 & 2035
		Adhesive	Taiflex BT: AD = 10 um, 25 um and 40 um
		PI stiffener	Taiflex MHK: PI = 3 mil & 5 mil & 7 mil & 9 mil
		3M	9077 & 6677 & 9058
2	Inner layer	MIN line width/spacing (12/18 um copper)	3.0 / 3.2 mil (loop lines 6.0 / 6.2 mil) 2.8 / 2.7 mil (loop lines 5 / 5.2 mil)
		MIN line width/spacing (35 um copper)	4.0 / 4.0 mil (loop lines 8.0 / 8.0 mil) 3.5 / 3.5 mil (loop lines 7 / 7 mil)
		MIN line width/spacing (70 um copper)	6 / 6.5 mil (loop lines 10 / 10.5 mil) 5 / 6 mil (loop lines 9 / 9.5 mil)
		MAX copper thickness	2oz 3oz
3	Outer layer	MIN line width/spacing (18 um copper)	3 / 3.2 mil (loop lines 6 / 6 mil) 2.8 / 2.7 mil (loop lines 5.5 / 5.5 mil)
		MIN line width/spacing (35 um copper)	4 / 4.5 mil (loop lines 8 / 8.5 mil) 3.5 / 3.5 mil (loop lines 7.5 / 7.5 mil)
		MIN line width/spacing (70 um copper)	6 / 7 mil (loop lines 10 / 11 mil) 5.5 / 8.5 mil (loop lines 9.5 / 10.0 mil)
		MIN line width/spacing (105 um copper)	10 / 13 mil (loop lines 12 / 15 mil) 9.5 / 12.5 mil (loop lines 11.5 / 14.5 mil)
		MAX finished copper thickness	3oz 5oz
4	Drilling	MIN distance between via and conductors	6 mil (< 4 layer) 5 mil (< 4 layer)
			8 mil (4 ~ 6 layer) 7 mil (4 ~ 6 layer)

NO.	TYPE	ITEM	CAPABILITIES
4	Drilling (continued)	MIN distance between via and conductors (continued)	12 mil (7 - 8 layer) 10 mil (7 - 8 layer)
		MIN mechanical drill hole	6 mil 4 mil
5	Solder mask and silk screen	Solder mask color	Green
		MIN solder dam (base copper ≤ 1 oz)	4 mil (green) 8.0 mil (solder dam on the large copper)
		MIN clearance	3 mil (part for 2.5 mil)
		Silk color	White, yellow
6	Surface treatment	Surface treatment	HASL, ENIG, ENEPIG, Electrolytic Nickel Gold, Soft gold, Hard gold, Immersion silver and OSP, Immersion tin
		Mixed surface treatment	ENIG + OSP ENIG + G/F
		Gold thickness (ENIG)	0.05 - 0.10 um
		Nickel thickness (ENIG)	3 - 6 um
		Gold thickness (ENEPIG)	0.05 - 0.10 um
		Palladium thickness (ENEPIG)	0.05 - 0.15 um
		Nickel thickness (ENEPIG)	3 - 6 um
		Electrolytic Nickel thickness	3 - 6 um
		Electrolytic Gold thickness	0.05 - 0.10 um
		Hard gold thickness(including lead)	0.1 - 1.5 um
		OSP thickness	0.1 - 0.3 um
		Immersion silver thickness	0.2 - 0.4 um
7	Routing	Laser accuracy	±0.05 mm
		Punch accuracy	±0.05 mm - ± 0.15 mm
8	Others	Layer	1-4 5-8
		Board thickness (without stiffener)	0.05 - 0.5 mm 0.5 - 0.8 mm
		Tolerance of single layer (without stiffener)	±0.05 mm ±0.03 mm
		Tolerance of double-layer (≤ 0.3 mm) (without stiffener)	±0.05 mm ±0.03 mm
		Tolerance of multi-layer(< 0.3 mm) (without stiffener)	±0.05 mm ±0.03 mm
		Tolerance of multi-layer (0.3 mm - 0.8 mm) (without stiffener)	±0.1 mm ±10%
		Tolerance of board thickness(including PI stiffener)	±0.05mm ±10%
		Tolerance of board thickness(including FR4 stiffener)	±0.1mm ±10%

NO.	TYPE	ITEM	CAPABILITIES
8	Others (continued)	MIN board size	5*10 mm (without birdge); 10 mm*10 mm (with bridge) 4*8 mm (without bridge); 8 mm*8 mm (with bridge)
		MAX board size	9*14 inch 9*23 inch (PI ≥ 1 mil)
		Impedance control tolerance	Single-ended: ±5 Ω (≤ 50 Ω), ±10% (> 50 Ω) Single-ended: ±3 Ω (≤ 50 Ω), ±8% (> 50 Ω)
			Differential: ±5 Ω (≤ 50 Ω), ±10% (> 50 Ω) Differential: ±4 Ω (≤ 50 Ω), ±8% (> 50 Ω)
		MIN coverlay bridge	8 mil
		MIN bend radius of single layer	3-6 times of board thickness
		MIN bend radius of double-layer	6-10 times of board thickness
		MIN bend radius of multi-layer	10-15 times of board thickness
		MIN dynamic bend radius (single layer)	20-40 times of board thickness