



FINELINE
DEFINING EXCELLENCE

Multilayers: Design Rules

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Copper weight-line-space

Board thickness & length (mm)		Standard	Advanced	R&D	line/Space (mil)	Standard	Advanced	R&D	
Finish boards thickness	Max thickness	3.2	6	10	Inner Layer Line/Space (Based copper thickness)	1/2OZ	3/3 (0.075/0.075mm)	2/2 (0.05/0.05mm)	1.6/1.6 (0.04/0.04mm)
	Min thickness	0.4	0.2	0.12		1OZ	4/4 (0.1/0.1mm)	3/3 (0.075/0.075mm)	2.5/2.5 (0.06/0.06mm)
	Tolerance	+/-0.1 / 10%	+/-0.075 / 7.5%	+/-0.05 / 5%		2OZ	5/5 (0.125/0.125mm)	4/4 (0.1/0.1mm)	3/4 (0.075/0.1mm)
Board length	max length	600	800	1500		3OZ	8/8 (0.2/0.2mm)	6/8 (0.15/0.2mm)	4/5 (0.1/0.125mm)
	min length	50	10	3		4OZ	10/10 (0.25/0.25mm)	8/9 (0.2/0.23mm)	5/6 (0.125/0.15mm)
Board Width	max width	500	600	800	External Layer Line/Space (Based copper thickness)	1/3OZ	3.5/3.5 (0.09/0.09 mm)	3/3 (0.075/0.075mm)	2/2 (0.05/0.05mm)
	min width	20	10	3		1/2OZ	4/4 (0.1/0.1mm)	3.5/3.5 (0.09/0.09 mm)	2/2 (0.05/0.05mm)
						1OZ	5/5 (0.125/0.125mm)	4/4 (0.1/0.1mm)	3/3 (0.075/0.075mm)
						2OZ	8/8 (0.2/0.2mm)	7/7 (0.175/0.175 mm)	6/6 (0.15/0.15mm)
						3OZ	12/12 (0.3/0.3mm)	10/10 (0.25/0.25 mm)	8/8 (0.2/0.2mm)
						4OZ	14/14 (0.35/0.35mm)	12/12 (0.3/0.3 mm)	9/9 (0.225/0.225mm)

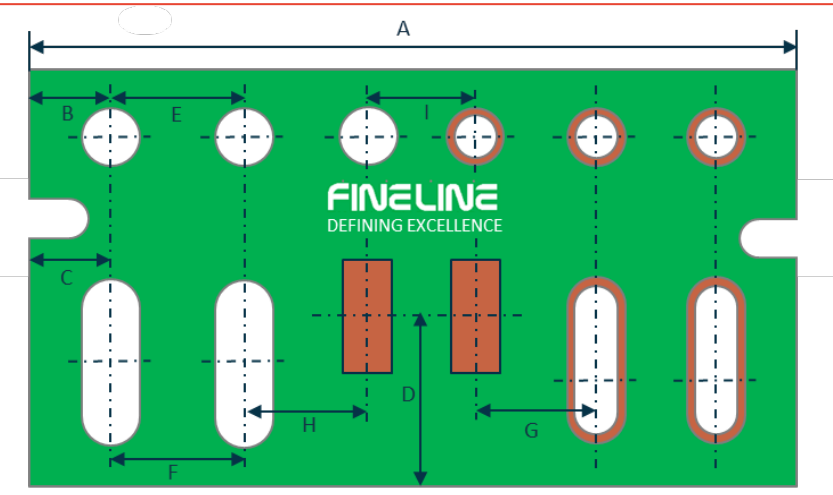
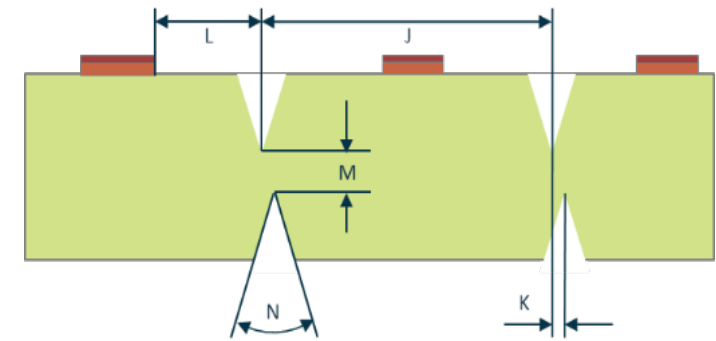
Drilling

Drilling	Standard	Advanced	R&D	Counter sink	Standard	Advanced	R&D	Backdrill	Standard	Advanced	R&D			
Finished mechanical hole size	0.15-6.1	0.1-6.1		Countersink depth tolerance	±0.1	±0.075	±0.05	Drill hole size for backdrill	0.5	0.4	0.35			
Min half-hole(pth)size	0.5	0.3	0.25	Countersink size and angle	PTH and NPTH, Special tools:82°、90°、120°、135°(countersink drillingsize 12-393.7mil)	NA	NA	Min. depth of backdrill	0.2	0.15	0.1			
MAX aspect ratio for PTH hole	12:1 hole diameter > 0.2mm)	20:1 hole diameter > 0.2mm)	>20:1					PTH and NPTH, Standard:Angle1 30°(drilling sizes≤125mil)、165°(drillingsize 125--248mil)	NA	NA	Insulation thickness between backdrill layers (backdrill target layer (must cut layre)& next layer (must not cut layer)	≥0.2	≥0.15	≥0.1
Hole location tolerance	±0.075	±0.05	±0.025					Countersink angle tolerance	±10°	NA	NA	Depth tolerance to Backdrill	±0.1	±0.1
NPTH tolerance	±0.05	±0.025	±0.015					Stub	±0.125	±0.1	±0.075			
Pressfit holes tolerance	±0.05	±0.035	±0.025											

Mechanical tolerances

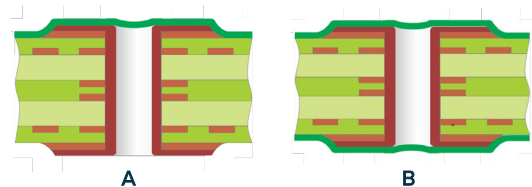
Item	Description	Standard (mm)	Advanced (mm)	R&D(mm)
A	Outline dimension PCB	± 0,15	± 0,1	± 0,075
B	Edge PCB - NPTH Hole	± 0,1	± 0,075	± 0,05
C	Edge PCB - NPTH Slot	± 0,1	± 0,075	± 0,05
D	Edge PCB - Pattern	± 0,125	± 0,1	± 0,075
E	NPTH Hole - NPTH Hole	± 0,1	± 0,075	± 0,05
F	NPTH Slot - NPTH Slot	± 0,1	± 0,075	± 0,05
G	PTH Slot - Pattern	± 0,1	± 0,075	± 0,05
H	NPTH Slot - Pattern	± 0,125	± 0,1	± 0,075
I	NPTH Hole - PTH Hole	± 0,125	± 0,1	± 0,075
J	Outline dimension PCB	± 0,15	± 0,125	± 0,1
K	Scoring offset top/bottom	± 0,15	± 0,125	± 0,1
L	Scoring - pattern	± 0,5	± 0,45	± 0,4
M	Web thickness	± 0,5	± 0,45	± 0,4
N	Scoring angle	±5 degree	±5 degree	±5 degree

Fineline Design Rules V-Cut



Via filling&plugging

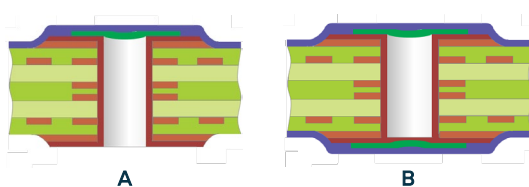
IPC-4761 Type "I"-Tenting



A
Not recommended, Not used more by Finline suppliers
Long term reliability risk

B
Dimples maybe a concern

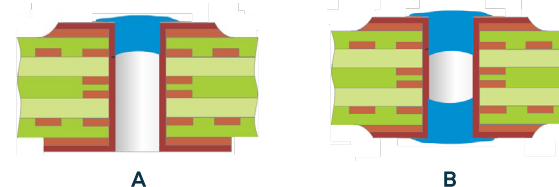
IPC-4761 Type "II" Tenting and Covering



A
Not recommended, Not used more by Finline suppliers
Long term reliability risk

B
Dimples maybe a concern

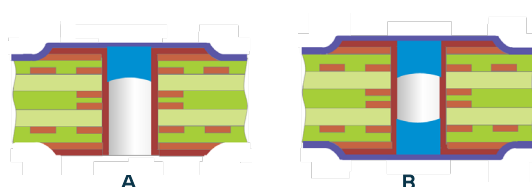
IPC-4761 Type "III" Plugging



A
Not recommended, not used more by Finline suppliers
Long term reliability risk

B
Solder Mask partially covers the annular rings

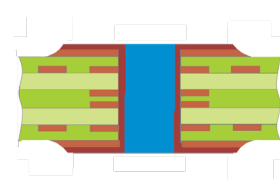
IPC-4761 Type "IV" Plugging and Covering



A
Not recommended
Long term reliability risk

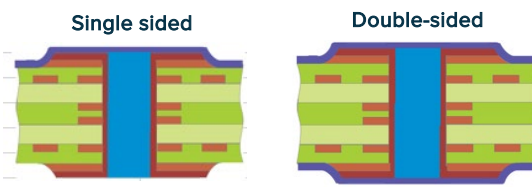
B
Recommended

IPC-4761 Type "V" Filling



Recommended

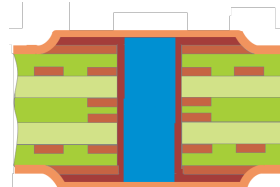
IPC-4761 Type "V" Filling and Covering




A
Recommended

B
Recommended

IPC-4761 Type "VII" Filling and Capping



Recommended

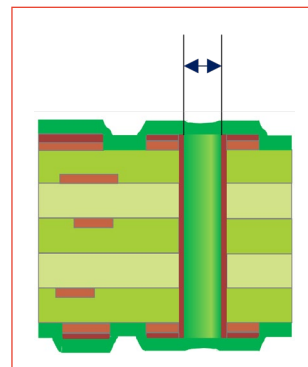


Solder mask

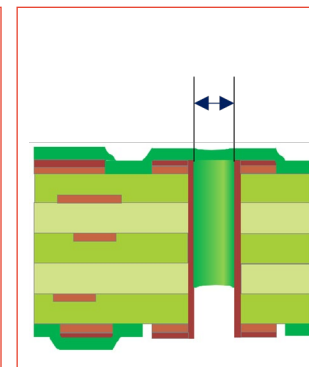
Solder mask

(mm)	Standard	Advanced	R&D
Max finished hole size for solder mask full-plugging (both sides without solder mask opening)	0.7	0.5	0.2
Max finished hole size for solder mask half-pugging (one side without solder mask opening)	0.5	0.4	0.35
Minimum thickness of solder mask at the knee of a trace	0.007	NA	NA
Min width of solder mask bridge	0.1	0.08	0.075
Solder mask thickness	According to IPC-840		

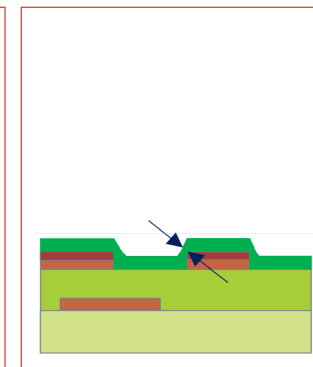
Max. finished hole size for solder mask Full-plugging



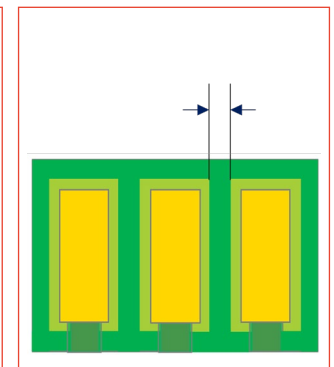
Max. finished hole size for solder mask half-plugging



Solder mask thickness Above knee of a trace



Min width of solder mask bridge



The values above are related to green solder mask and 1 oz copper, for different colors/ copper thickness please contact Finline



Surface finish

Surface finish

Properties	HASL leaded	HASL lead free	OSP	ENIG	ENEPIG	Immersion tin	Immersion silver	Soft gold	Hard gold
Planarity	Poor	Poor	Good	Good	Good	Good	Good	Good	Good
Thickness of deposit (µm)	1-40	1-40	0.2-0.6	Ni = 3-8 Au = 0.05-0.1	Ni: 3-8 Pd:0.05-0.15 Au: 0.05-0.1	1-1.2	0.15-0.4	Class 1,2 Ni Min 2µm Au Min 0.8µm Class 3 Ni Min 2.5µm Au Min 1.25µm	Class 1,2 Ni Min 3µm Au Min 0.3µm Class 3 Ni Min 3µm Au Min 0.8µm
Solderability	Good	Good	Limited	Good	Good	Good	Good	Good	Poor
Handling concerns	NA	NA	NA	NA	NA	Yes	Yes	NA	NA
Shelf life (months)	12	12	6	12	12	6	6	12	12
Press fit	Limited	Limited	Limited	Limited	Limited	Yes	Yes	Limited	Limited
Fine Pitch/small BGA	Not recommended	Not recommended	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HDI	Not recommended	Not recommended	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wire bonding Al	No	No	No	Yes	Yes	No	No	Yes	No
Wire bonding Au	No	No	No	No	Yes	No	No	Yes	No
Rigid-flex	Not recommended	Not recommended	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pre-baking (Assembly)	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes