

CAPABILITIES

The following standard and advanced capabilities will assist printed circuit board (PCB) designers in setting up their basic design checks. Full capabilities for printed circuit board manufacturing may extend beyond the rules below but often times involve additional processes and costs to achieve the desired results. It is recommended that designers who require capabilities beyond what is described below contact us to help maximize the effectiveness of the design and the printed circuit board manufacturing process.

	Standard Capability	Advanced Capability
Overview		
Minimum Layer Count	1	1
Maximum Layer Count	16	30
Trace/Space	0.006"	0.002"
Finished Hole Size	0.010"	0.004"
Surface Finishes	HASL, ENIG, Hard Gold, Soft Gold (see all below)	ENEPIG, OSP, EPIG (see all below)
Materials	FR-4, High Temp FR-4, Isola, <u>Rogers</u> , see <u>material library</u> for all	PTFE/Duroid, Polyimide, Flex, see material library for all
Controlled Impedance	+/- 10%	+/- 5%
Annular Ring	0.006"	0.003" Mechanical, 0.001" Laser
Outer Layers Finished Copper	1.5 oz to 2 oz	1 oz to 5 oz
Inner Layers Finished Copper	0.5 oz to 2 oz	0.3 oz to 4 oz
Soldermask Colors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
Silkscreen Colors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
Filled Vias	Non-Conductive Fill	Non-Conductive Fill or Conductive Fill
Smallest Mechanical Drill Diameter	0.010"	0.004"
Smallest Laser Drill Diameter	N/A	0.003"
Blind Vias	No	Yes
Buried Vias	No	Yes
Aspect Ratio	10:1	15:1
Plated Hole to Copper	0.008"	0.005"
Clearance – Copper to Edge of Board	Outer Layer – 0.010" Inner Layer – 0.015"	Outer Layer – 0.005" Inner Layer – 0.005"
Minimum Panel Size	9" x 12"	8" x 8"
Maximum Panel Size	18" x 24"	24" x 36"
Plated Slots	Routed	Routed or Nibbled
Non-Plated Slots	Routed	Routed or Nibbled
Plating in Holes	0.0008"	0.0015"
Web (or Mask Width)	0.006"	0.003"
Soldermask Swell	0.003"	0.001"
Silkscreen Width	0.003"	0.003"

Yes No Yes	In an action O Taction Cuitoria		
No	Inspection & Testing Criteria	\ <u>\</u>	\.
Netlist Generation and Netlist Compare			
Trace / Space			
1 oz. Cu - Min .005" Trace/Space 2 oz. Cu - Min .002" Trace/Space 2 oz. Cu - Min .008" Trace/Space 2 oz. Cu - Min .008" Trace/Space 3 oz. Cu - Min .008" Trace/Space 4 oz. Cu - Min .008" Trace/Space 5 oz. Cu - Min .008" Trace/Space 5 oz. Cu - Min .008" Trace/Space 5 oz. Cu - Min .002" Trace/Space 1 oz. Cu - Min .005" Trace/Space 1 oz. Cu - Min .006" Trace/Space 1 oz. Cu - Min .006" Trace/Space 1 oz. Cu - Min .008" Trace/Space 2 oz. Cu - Min	Netlist Generation and Netlist Compare	Yes	Yes
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A OZ. Cu - Min. 0.14" Trace/Space	Outer Layers (finished conner)	3 oz. Cu – Min .012" Trace/Space	3 oz. Cu – Min .008" Trace/Space
Inner Layers	Outer Layers (missiled copper)	4 oz. Cu – Min .014" Trace/Space	4 oz. Cu – Min .012" Trace/Space
No. 1			5 oz. Cu – Min .016" Trace/Space
No. 1			
1 oz. Cu - Min. 006" Trace/Space 2 oz. Cu - Min. 005" Trace/Space 2 oz. Cu - Min. 008" Trace/Space 2 oz. Cu - Min. 012" Trace/Space 3 oz. Cu - Min. 012" Trace/Space 3 oz. Cu - Min. 012" Trace/Space 4 oz. Cu - Min. 016" Trace/Space 5 oz. Cu - Min			0.3 oz Cu – Min .002" Trace/Space
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Flateu Hole to toppel 0.000 0.000	-		
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Surface Finish		
Hot Air Solder Level (HASL – Lead)	Yes	Yes
Hot Air Solder Level (HASL – Lead-Free)	Yes	Yes
Electroless Nickel Immersion Gold (ENIG)	Yes	Yes
mmersion Silver	Yes	Yes
lard Gold Fingers with ENIG	Yes	Yes
lard Gold Fingers with HASL	Yes	Yes
lectrolytic Hard Gold	Yes	Yes
lectrolytic Soft Gold	Yes	Yes
lectroless Nickel Electroless Palladium mmersion Gold (<u>ENEPIG</u>)	No	Yes
Organic Surface Protectant (OSP)	Yes	Yes
Bare Copper	Yes	Yes
lectroless Palladium Immersion Gold EPIG)	No	Yes
in Nickel	No	Yes
White Tin	Yes	Yes
Carbon Ink	No	Yes
oldermask		
olors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
inish/Texture	Semi-gloss, Matte	Semi-gloss, Matte
ented Vias	Yes	Yes
oldermask Plugged Vias	Yes	Yes
oldermask Thickness over Copper	5 micron to 25 micron	5 micron to 25 micron
oldermask Web	5 mil	3 mil
oldermask Gap to Pad	4 mil	2 mil
opper Ring Under Mask-Defined Pad	3 mil	1 mil
eelable Soldermask	No	Yes
<u>PI Soldermask</u>	Yes	Yes
Pry Film Soldermask	No	Yes
ilkscreen		
Colors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
Minimum Legend Width	3 mil	3 mil
pace between Silkscreen and Pad	5 mil	4 mil
Controlled Impedance		
ayers	0-10 Layers	0-30 Layers
mpedance Tolerance	Single-ended +/- 10%	Single-ended +/- 5%
mpedance Tolerance	Differential Pairs +/- 10%	Differential Pairs +/- 5%
mpedance Tolerance	Coplanar Waveguide +/- 10%	Coplanar Waveguide +/- 5%
TDR Testing	Yes, Included	Yes, Included

Board Thickness		
1-Layer or 2-Layer	Min .015" Max .200"	Min .008" Max .250"
4-Layer	Min .020" Max .200"	Min .015" Max .250"
6-Layer	Min .031" Max .200"	Min .025" Max .250"
8-Layer	Min .047" Max .200"	Min .031" Max .250"
10-Layer	Min .062" Max .200"	Min .040" Max .250"
12-Layer	Min .062" Max .200"	Min .047" Max .250"
14-Layer	Min .062" Max .200"	Min .054" Max .250"
16-Layer	Min .062" Max .200"	Min .062" Max .250"

Laminate Materials

View our <u>Material Library</u> for details

CNC / Routing / Score / Mechanical	Kules	
Router Bit Size	0.078"	Min 0.021", Max. 0.078"
Spacing for Tab Rout <u>Array</u>	0.100"	
Standard <u>V- Score</u> Angle	30°	20°, 30°, 45°, 60°
<u>V-Score</u> Depth	One third of board thickness (min 0.010")	
Jump Score	No	Yes, overshoot up to 0.35"
Scoring Direction	Vertical and Horizontal	Routed Scoring
Bevel Angle	20, 30, 45, or 60 Degree Gold Finger Bevel	Milling/Offset or Recessed Beveling
Countersinks	60, 82, 90, 100 Degree Countersink **	60, 82, 90, 100 Degree Countersinl
Counterbores	Yes	Yes
Edge Castellations	No	Castellated Edges Min .040"
Plated Edges	No	Yes
Cross Section	Level 1	Level 1, Level 2, Level 3

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