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	0.004"	0.002"
Finished Hole Size	0.006"	0.004"
Surface Finishes	HASL, ENIG, Hard Gold, Soft Gold (see all below)	ENEPIG, OSP (see all below)
Materials	FR-4, High Temp FR-4, Isola, Rogers, see material library for all	PTFE/Duroid, Polyimide, Flex, see material library for all
Controlled Impedance	+/- 10%	+/- 5%
Annular Ring	0.005" At drilled size, class 2	0.003" Mechanical, 0.001" Laser
Outer Layers Finished Copper	1 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	0.008"	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 External Copper	0.008"	0.005"
Plated Hole to Internal Copper	0.0105"	0.008"
Clearance – Copper to Edge of Board	Outer Layer Rout – 0.010" Outer Layer V-Score – 0.015" Inner Layer – 0.015"	Outer Layer Rout – 0.005" Inner Layer Rout – 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)	0.005"	0.003"
Soldermask Swell	0.003"	0.001"
Silkscreen Width	0.003"	0.003"

Inspection & Testing Criteria		
IPC Class 2	Yes	Yes
IPC Class 3	No	Yes
Netlist Generation and Netlist Compare	Yes	Yes
Trace / Space		
Outer Layers (finished copper)	1 oz Cu Min Trace/Space .004"	1 oz Cu Min Trace/Space .002"
	2 oz Cu Min Trace/Space .006"	2 oz Cu Min Trace/Space .005"
	3 oz Cu Min Trace/Space .008"	3 oz Cu Min Trace/Space .008"
	4 oz Cu Min Trace/Space .012"	4 oz Cu Min Trace .011" Space .012"
		5 oz Cu Min Trace/Space .016"
Inner Layers		0.3 oz Cu Min Trace/Space .002"
	0.5 oz Cu Min Trace/Space .0035"	
	1 oz Cu Min Trace/Space .005"	1 oz Cu Min Trace .004" Space .005"
	2 oz Cu Min Trace .006" Space .008"	2 oz Cu Min Trace .005 Space .007"
		3 oz Cu Min Trace .009" Space .010"
		4 oz Cu Min Trace .012" Space .015"
Drilling		
Min drilled diameter, final board thickness 0.031" or less	0.006"	0.004"
Min drilled diameter, final board thickness between 0.031" and 0.062"	0.008"	0.006"
Min drilled diameter, final board thickness between 0.062" and 0.093"	0.010"	0.010"
Min drilled diameter, final board thickness between 0.093" and 0.125"	0.0145"	0.012"
Min / Max laser drilled dielectrics	N/A	1.5 mil/6 mil
Min / Max micro via diameter -as ablated-	N/A	2.5 mil/8 mil
Min micro via capture/landing pad annular ring	N/A	2 mil
Micro Via Depth to Diameter Aspect Ratio	No	0.75:1 Greater upon review.
Pre-drilled core blind vias	No	Yes
Sublamination blind vias	No	Yes
HDI Via Structures	No	4+N+4 Greater or anylayer upon review
Buried vias	No	Yes
Filled vias	Non-Conductive fill	Non-Conductive or Conductive fill
Nibbling	No	Yes
Largest hole	0.247" plated, 0.250" non-plated	No maximum
Slots	Plated or non-plated, routed	Plated or non-plated, routed or nibbled
Plating in holes	0.0008"	0.0015"
Plated hole to copper	0.008"	0.005"

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
Immersion Silver	Yes	Yes
Hard Gold Fingers with ENIG	Yes	Yes
Hard Gold Fingers with HASL	Yes	Yes
Electrolytic Hard Gold	Yes	Yes
Electrolytic Soft Gold	Yes	Yes
Electroless Nickel Electroless Palladium Immersion Gold (ENEPIG)	No	Yes
Organic Surface Protectant (OSP)	Yes	Yes
Bare Copper	Yes	Yes
Electroless Palladium Immersion Gold (EPIG)	No	No
Tin Nickel	No	Yes
White Tin	Yes	Yes
Carbon Ink	No	Yes
Soldermask		
Colors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
Finish/Texture	Semi-gloss, Matte	Semi-gloss, Matte
Tented Vias	No	Yes
Soldermask Plugged Vias	Yes	Yes
Soldermask Thickness over Copper	5 micron to 25 micron	5 micron to 25 micron
Soldermask Web	5 mil	3 mil
Soldermask Gap to Pad	4 mil	2 mil
Copper Ring Under Mask-Defined Pad	3 mil	1 mil
Peelable Soldermask	No	Yes
LPI Soldermask	Yes	Yes
Dry Film Soldermask	No	Yes
Silkscreen		
Colors	Green, Black, Blue, Red, White, Clear, Custom	Yellow, Custom
Minimum Legend Width/Height	.003"/.027"	.003"/.024"
Space between Silkscreen and Pad	5 mil	4 mil
Controlled Impedance		
Layers	2-16 Layers	0-30 Layers
Impedance Tolerance -SE, Differential Pairs or Coplanar-	+/- 10%	+/- 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 .068" / Max .200"	Min .062" | Max .250"
Laminate Materials		
View our Material Library for details		
CNC / Routing / Score / Mechanical Rules		
Router Bit Size	.045", .062", .078" & .093"	Min .020", Max .093"
Spacing for Tab Rout Array	0.100"	
Standard V- Score Angle	30°	20°, 30°, 45°, 60°
V-Score 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	82, 90 & 100 Degree Countersink	60, 82, 90, 100 Degree Countersink **
Counterbores	Yes	Yes
Edge Castellations	No	Min Castellated Hole Size .020"
Plated Edges	No	Yes
Cross Section	Level 1	Level 1, Level 2, Level 3