

General	
Number of Layers	<ul style="list-style-type: none"> ◆ 1 - 20 Layers
Special Treatment	<ul style="list-style-type: none"> ◆ Gold finger ◆ Tented Via ◆ Blind & Buried Via ◆ Impedance Control ◆ Carbon Ink ◆ Peelable Mask / Kapton ◆ Counter Sink
Material	
Base Material	<ul style="list-style-type: none"> ◆ CEM-3 ◆ FR-4 (TG > 130 °C) ◆ FR-4 (TG > 150 °C) ◆ FR-4 (TG > 170 °C)
Current Suppliers	<ul style="list-style-type: none"> ◆ KINGBOARD ◆ SHENGYI ◆ KB6160 ◆ S1141
Dimension & Thickness	
<u>Board Size</u>	<ul style="list-style-type: none"> ◆ Maximum
	◆ 584mm X 813mm (23" X 32")
<u>Board Thickness</u>	<ul style="list-style-type: none"> ◆ Maximum ◆ Minimum
	<ul style="list-style-type: none"> ◆ 3.2mm (0.126") ◆ 0.4mm (0.016")
<u>Finished Board Thickness Tolerance</u>	<ul style="list-style-type: none"> ◆ Board Thickness ≥ 0.8 mm ◆ 0.4 mm ≤ Board Thickness < 0.8 mm
	<ul style="list-style-type: none"> ◆ ± 10% ◆ ± 0.076mm (± 3mil)
Minimum Core Thickness	◆ 0.1mm (0.0039")
Minimum Dielectric Thickness of Inner Layer	◆ ± 0.076mm (± 3mil)
Maximum Warp & Twist	◆ ≤ 0.7%
Hole & Slot	
<u>Drilling Diameter</u>	<ul style="list-style-type: none"> ◆ Maximum ◆ Minimum
	<ul style="list-style-type: none"> ◆ 6.4mm (0.252") ◆ 0.20mm (0.0079")
<u>Finished Diameter</u>	<ul style="list-style-type: none"> ◆ Minimum
	◆ 0.102mm (4mil)
<u>Hole Diameter Tolerance</u>	<ul style="list-style-type: none"> ◆ PTH ◆ NPTH
	<ul style="list-style-type: none"> ◆ ± 0.076mm (± 3mil) ◆ ± 0.051mm (± 2mil)
Minimum Hole to Hole Distance	◆ 0.305mm (12 mil)
<u>Slot Width</u>	<ul style="list-style-type: none"> ◆ Minimum
	◆ 0.5mm (0.020")

Hole & Slot	
Maximum Countersink Diameter (When Top Angle is 165°)	◆ 6.35mm (0.25")
<u>Hole Position Tolerance</u>	
◆ Compared with CAD data	◆ ± 0.076mm (± 3mil)
◆ Hole to Hole with $\Phi < 1.0\text{mm}$	◆ ± 0.102mm (± 4mil)
◆ Hole to Hole with $\Phi \geq 1.0\text{mm}$	◆ ± 0.076mm (± 3mil)
◆ Hole to Edge with $\Phi < 1.0\text{mm}$	◆ ± 0.204mm (± 8mil)
◆ Hole to Edge with $\Phi \geq 1.0\text{mm}$	◆ ± 0.152mm (± 6mil)
<u>Slot Tolerance</u>	
◆ PTH with Length $\geq 2 \times \text{Width} + 0.15\text{mm}$	◆ ± 0.102mm (± 4mil)
◆ PTH with Length $< 2 \times \text{Width} + 0.15\text{mm}$	◆ ± 0.127mm (± 5mil)
◆ NPTH	◆ ± 0.076mm (± 3mil)
Maximum Aspect Ratio of Plated Hole	◆ 8 : 1
Copper Thickness	
<u>Base Copper Thickness of Outer Layer</u>	
◆ Maximum	◆ 0.102mm (3oz)
◆ Minimum	◆ 0.012mm (1/3oz)
<u>Base Copper Thickness of Inner Layer</u>	
◆ Maximum	◆ 0.175mm (5oz)
◆ Minimum	◆ 0.017mm (1/2oz)
Copper Thickness of PTH Wall (SMOBC)	◆ $\geq 0.020\text{mm}$ ($\geq 0.8\text{mil}$)
Circuitry	
<u>Minimum Design Line Width / Space in Outer Layer</u>	
◆ T / T oz (1/3 oz)	◆ 0.089mm / 0.089mm (3.5mil / 3.5mil)
◆ H / H oz (1/2 oz)	◆ 0.089mm / 0.089mm (3.5mil / 3.5mil)
◆ 1 / 1 oz	◆ 0.102mm / 0.102mm (4mil / 4mil)
◆ 2 / 2 oz	◆ 0.127mm / 0.127mm (5mil / 5mil)
◆ 3 / 3 oz	◆ 0.152mm / 0.152mm (6mil / 6mil)
<u>Minimum Design Line Width / Space in Inner Layer</u>	
◆ H / H oz (1/2 oz)	◆ 0.089mm / 0.089mm (3.5mil / 3.5mil)
◆ 1 / 1 oz	◆ 0.102mm / 0.102mm (4mil / 4mil)
◆ 2 / 2 oz	◆ 0.127mm / 0.127mm (5mil / 5mil)
◆ 3 / 3 oz	◆ 0.152mm / 0.152mm (6mil / 6mil)
◆ 5 / 5 oz	◆ 0.229mm / 0.229mm (9mil / 9mil)
<u>Tolerance After Etching</u>	
◆ H / H oz (1/2 oz)	◆ $\geq \pm 10\%$
◆ 1 / 1 oz	◆ $\geq \pm 20\%$
<u>Impedance Tolerance</u>	
◆ $\leq 50 \Omega$	◆ $\pm 5\Omega$
◆ $> 50 \Omega$	◆ $\pm 10\%$

Circuitry	
<u>Position Tolerance (Minimum)</u>	
◆ Image to Image	◆ ± 0.127mm (± 5mil)
◆ Image to Hole	◆ ± 0.102mm (± 4mil)
◆ Image to Outline (Outer Layer)	◆ ± 0.152mm (± 6mil)
◆ Image to Outline (Inner Layer)	◆ ± 0.254mm (± 10mil)
Soldermask	
Colors	◆ Green ◆ Black Glossy ◆ Black Matt ◆ White ◆ Red ◆ Blue ◆ Yellow
Soldermask Registration	◆ ± 0.05mm (± 2mil)
Minimum Soldermask Thickness	◆ ≥ 10µm
<u>Soldermask Plugging Hole Diameter</u>	
◆ Φ > 0.75mm	◆ Soldermask in Hole
◆ 0.55mm > Φ ≥ 0.75mm	◆ Solder Ball on One Side
◆ Φ ≤ 0.55mm	◆ No Solder Ball
Minimum Soldermask Bridge	◆ 0.076mm (3mil)
Legend	
Colors	◆ White ◆ Black ◆ Yellow
Legend Registration	◆ 0.102mm (4mil)
Legend Line Width	◆ 0.102mm (4mil)
<u>Legend on Circuit</u>	
◆ Height	◆ 0.635mm (25mil)
◆ Width	◆ 0.381mm (15mil)
<u>Legend on Large Copper or Lamination</u>	
◆ Height	◆ 0.559mm (22mil)
◆ Width	◆ 0.330mm (13mil)
Minimum Letter Width of Soldermask Opening	◆ 0.127mm (5mil)
Plating	
<u>Thickness for ENIG (Measured at the Minimum Point)</u>	
◆ Nickel (Ni)	◆ 2.54 - 5µm (102 - 200µin)
◆ Gold (Au)	◆ 0.0254 - 0.102µm (1 - 4µin)
◆ Silver (Ag)	◆ 0.15 - 0.3µm (6 - 12µin)
Sn Thickness for HAL or LF-HAL (Measured at the Minimum Point)	◆ 0.5 - 40µm (20 - 1600µin)
Thickness for OSP (Measured at the Minimum Point)	◆ 0.2 - 0.3µm (8 - 12µin)

Plating	
Carbon Ink Resistance	◆ 20Ω / cm ²
Minimum Space for Carbon Conductor	◆ 0.375mm (15mil)
E-test	
<u>Minimum Test PAD Width</u>	
◆ Flying Probe Machine	◆ 0.076mm (3mil)
◆ E-tester Machine	◆ 0.203mm (8mil)
Minimum AOI Test Line	◆ 0.05mm (2mil)
Maximum AOI Test Dimension	◆ 620mm X 650mm (24.4" x 25.6")
Punching & Routing & V-cut	
<u>Minimum Punching Dimension Tolerance</u>	
◆ Edge to Edge	◆ ± 0.203mm (± 8mil)
◆ Hole to Edge	◆ ± 0.178mm (± 7mil)
<u>Minimum Routing Dimension Tolerance</u>	
◆ Edge to Edge	◆ ± 0.102mm (± 4mil)
◆ Hole to Edge	◆ ± 0.102mm (± 4mil)
Minimum Radius by Routing (Internal Angle)	◆ ≥ 0.40mm (≥ 16mil)
Minimum Board Thickness that can be V-cut	◆ 0.61mm (24mil)
<u>V-cut Tolerance (Minimum)</u>	
◆ Angle (30° - 60°)	◆ ± 5°
◆ Remaining Thickness	◆ ± 0.102mm (± 4mil)
◆ Mis-Registration	◆ ± 0.127mm (± 5mil)
◆ V-cut to Hole	◆ ± 0.152mm (± 6mil)
◆ V-cut to V-cut	◆ ± 0.127mm (± 5mil)
Maximum Distance between V-cut and Board Edge	◆ 457mm (18")