



## TECHNOLOGY MATRIX 2017

ATTRIBUTES	STANDARD	ADVANCED
Line/Space	.005 / .005	.003 / .003
Copper Foil. Oz. Min/Max	½ / 2	3 / 8
Pad Size Int. (dia over Drill)	.014	.008
Pad Size Ext. (dia over Drill)	.012	.008
Drill-to-Metal (Relief dia over Drill)	.020	.014
Drill Size Min. (After Plating)	.008	.004
Drill Aspect Ratio	8-1	14-1
Slot Size Min	.031	.021
Hole Location Tolerance (TP)	+/- .005	+/- .003
Hole-to-Image Tolerance	+/- .005	+/- .003
Hole Plated Size Tolerance	+/- .003	+/- .002
Hole Non-Plated Size Tolerance	+/- .002	+/- .001
Panel/Board Size, Multilayer	18x24 / 16x22	18x24 / 16.25x16.25
Panel/Board Size, Double Sided)	18x24 / 16.5x22.5	18x24 / 16.5x22.5
Thickness, Finished Max	.062	.250
Thickness, Finished Min	.014	.008
Thickness, Finished Tolerance	+/- .007	+/- .005
Layers, Number Max	14	24
Dielectric, Min	.004	.002
Warpage, per Inch	.010	.005
Material	FR4, Cem 1, FR1	Rogers, Halogen-Free Teflon / HighTemp. Polyimide 170-200
SMT Center-to-Center, Min	.020	.008
SolderMask Dam, Min	.004	.003
SolderMask Clearance, Min	.004	.002
SolderMask Colors	Green	Yellow, White, Black, Red, Blue, Amber, Clear
Silkscreen Line, Min	.007	.04
Silkscreen Colors	White	Black, Yellow
Finishes	Hot Air Solder Level, ENIG, Hard Gold, ENEPIG	Carbon Ink, Immer. Silver, Immersion Tin, Lead Free Solder
Rout Dimension Tolerance	+/- .005	+/- .003
Internal Radius, Min	.030	.015
Vscore Depth Tolerance	+/- .005	+/- .003
Electrical Test: Pitch/Feature Min.	.008 / .004	.006 / .003
Electrical Test Voltage	100 Volt	1000 Volt
Impedance Tolerance	+/- 10%	+/- 5%
Via Fill Hole / Conductivity	.008 / Non-Conductive	.010 / Conductive



## MANUFACTURING CAPABILITIES

### MULTI-LAYER CONSTRUCTION

ATTRIBUTES	STANDARD	ADVANCED	LIMITED RUN
Rigid Max Layers	12	16	24
Rigid-Flex Max Layers	6	10	12
Flex	2-4	6	8
Flex: Single & Double Layer	.005	.004	.003
Flex: Multi-Layer	.009	.008	.007
Rigid Max. Thickness	Up to .125	.125-.200	= > .250
Min Thickness Tolerance	+/- 10%	+/- 7%	+/- 5%
Blind and Buried via	Yes	Yes	Yes
Controlled Dielectrics Thickness	+/- .003	+/- .002	+/- .001
Layer to Layer Registration	+/- .005	+/- .003	+/- .003
Bow & Twist (Inch per Inch)	> .007	> .005	> .004

### DRILLING

Min Drill Size-Mechanical	.008	.007	.006
Controlled Depth Drilling	Yes	Yes	Yes
Drill Position (RTP)	+/- .003	+/- .003	+/- .002
Flex Hole Edge to Rigid-Flex Interface	.050	.049-.025	< .025

### ELECTROLYTIC PLATING (COPPER & GOLD)

Max Aspect Ratio, Copper (Thru Holes)	9:1	10:1	12:1
Max Aspect Ratio, Copper (Micro via)	.5:1	.75:1	.85:1
Plasma Etch-Back	Yes	Yes	Yes
Electrolytic Hard Gold, Tips, Selective	Yes	Yes	Yes
Electrolytic Soft Gold	Yes	Yes	Yes
Conductive Silver Via Fill (Via in Pad)	-	Yes	Yes
Edge Plating	Yes	Yes	Yes



## MANUFACTURING CAPABILITIES

### SOLDER MARK & LEGEND

ATTRIBUTES	STANDARD	ADVANCED	LIMITED RUN
Solder Mask Type (LPISM)	Taiyo PSR-4000	PSR-9000	PSR-9000
Solder Mask Type	-		Flex Mask
Colors	Green	-	-
Min Solder Mask Dams	.004	.0035	.003
Min Solder Mask Clearance	.004	.003	.002
Legend Colors	White	-	-
Via Fill (Conductive / Non-Conductive)	Yes	Yes	Yes
Via Tent (Dry Film)	Yes	Yes	Yes
Conductive Paste/Ink	Yes	Yes	Yes
Carbon Paste	Yes	Yes	Yes
Dry Film Solder Mask	Available	Available	Available

### SURFACE FINISHES

Hot Air Solder Leveling (Leaded & UnLeaded)	Yes	Yes	Yes
ENIG	Yes	Yes	Yes
ENEPIG	Yes	Yes	Yes
Hard Gold	Yes	Yes	Yes
Soft Gold	Yes	Yes	Yes
Immersion Tin	Yes	Yes	Yes
Immersion Silver	Yes	Yes	Yes

### FABRICATION

Fabricated Dimensions-Routing	+/- .005	+/- .004	+/- .004
Fabrication Radius	+/- 5 degrees	+/- .005 degrees	+/- .005 degrees
Fabricated Dimensions-Scoring, X,Y	+/- .010	+/- .005	+/- .005
Fabricated Dimensions – Scoring, Z	+/- .005	+/- .004	+/- .004
Beveling	Yes	Yes	Yes
Edge Milling	Yes	Yes	Yes
Counter – Sink/Bore	Yes	Yes	Yes
Precision Controlled Depth			



## MANUFACTURING CAPABILITIES

### TESTING-ELECTRICAL & IMPEDANCE

ATTRIBUTES	STANDARD	ADVANCED	LIMITED RUN
Single Sided Grid (.100)	Yes	Yes	Yes
Flying Probe (Fixture Less)	Yes	Yes	Yes
Impedance-Single Ended, Differential, Broad-Side Coupled, Edge Coupled, Co-Planar	Yes	Yes	Yes
Impedance Tolerance	+/- 10%	+/- 10%	+/- 8%

### PANEL SIZES

12"x18", 16"x18", 18"x24"	All	All	All
Flex Min 12"x9" – Max 16"x18"	All	All	All
Max Board Size	16.5"x22.5"	16.5"x22.5"	16.5"x22.5"

### MATERIALS

FR-4 140 Tg	Yes (single & double layers)	-	-
FR-4, 170 Tg	Yes	-	-
FR-4, > 170Tg	-	Available	Available
Polyimide, 260Tg	Available	Available	Available
Teflon	-	Available	Available
Rogers 4000 & Duriod 5800	Available	Available	Available
Lead-Free Temp Rated	Available	Available	Available
Ceramic	Available	Available	Available
Low Loss	-	Available	Available
Halogen-Free	Available	Available	Available
Flex Pyralux Flexible Polyimide	Available	Available	Available
Flex Copper (Rolled Annealed, E.D)	Available	Available	Available



## MANUFACTURING CAPABILITIES

### INNER LAYERS

Min Core Dielectric	= > .002	.001	.001
Min Line ½ Copper	= > .0035	.003	.002
Min Space ½ Copper	=>.00375	.0035	.003
Min Line 1 oz. Copper	.004	.00375	.0035
Min Space 1 oz. Copper	.004	.00375	.0035
Min Line 2 oz. Copper	.005	.004	.00375
Min Space 2 oz. Copper	.005	.004	.00375
Min Pad Size Over Drill (Overall)	.012 (.006 per side)	.010 (.005 per side)	.008 (.004 per side)
FlexMin Pad Size Over Drill (Overall)	.020 (.010 per side)	.014 (.007 per side)	.010 (.005 per side)
Min Plane Clearance Diameter over Drilled Hole (Overall)	.020 (.010 per side)	.016 (.008 per side)	.012 (.006 per side)
FlexMin Plane Clearance Diameter over Drilled Hole (Overall)	.024 (.012 per side)	.020 (.010 per side)	.016 (.008 per side)

### OUTER LAYERS

Min. Line 1 oz. Copper	.004	.00375	.0035
Min Space 1 oz Copper	.004	.00375	.0035
Min Line 2 oz Copper	.006	.005	.004
Min Space 2 oz Copper	.006	.005	.005
Min Line 3 oz Copper	.008	.007	.006
Min Space 3 oz Copper	.008	.007	.006
Base Copper Foil	0.5 oz	0.375 oz	0.25 oz
Min Pad Over Drill (Overall)	.012 (.006 per side)	.010 (.005 per side)	.008 (.004 per side)