

CAPABILITIES

Specifications Vary By Manufacturing Locations

Material	
FR4	Number of Conductive Layers
Standard FR4	28
Isola FR406	28
RoHS	
Isola 370HR	28
Isola IS410 (CAF Resistant)	28
Isola FR408	28
Nelco 4000-29	28
Nelco 4000-13& 13SI	28
Nelco 4000- 13EP and EPSI	28
Isola IS415 (CAF Resistant)	28
GETEK	28
Polyimide	28
Rogers 4350/4450	20
RF Materials	
Rogers 3000 Series	20
Rogers 4000 Series	20
Taconic RF Materials	2
Advanced RF Materials	
Nelco 9000 Series (PTFE)	2
Rogers 6000 Series	2
Rogers 5000 Series	2
Aluminum Clad Thermal Substrate	
Bergquist HT-04530	1
Panel Sizes and Useable Area	
Multilayer Panel Sizes	9x12", 12x18", 18x24", 18x26"
Non Usable Border on Panel	
Double Sided Boards	.75" per side
Multilayer Boards	1.50" per side
Spacing Between Boards: (Routing Process)	
Double Sided and Multilayer Boards	.250" Standard, .100" non-std
Stack-Ups	
Overall Thickness Range and Tolerances	
Overall Board Thickness	.008-.220"
Overall Board Thickness Tolerance	
<.020"	+/- .003"
.031"	+/- .003"
.062"	+/- .005"
.093"	+/- .007"
.125"	+/- .010"
.187"	+/- .014"
Flatness Spec	
Flatness (Warp per inch)	.010" thru hole & .007" SMT
Thinnest Dielectric Finished	
Thin Board Overall Thickness	.008"
Thinnest Plated Core	.004"
Mechanical Capabilities	
Machining Drill Capabilities	
Primary Drilled Hole Location Tolerance to Datum (Hole) Zero (DTP)	.005"
2 nd Drill Hole Location Tolerance to Datum Zero (DTP)	.005"



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Minimum Clearance from Copper Conductor to Mechanical Drilled Hole	.007"
Minimum Clearance from Copper Conductor to a Laser Drilled Hole	.005"
Plated Through Hole Capabilities	
Smallest Plated Thru Hole Size: (Finished Via Size with Finished Hole Size – 1 mil Min. Ave. Copper Requirement)	
Finished Panel Thickness <.020"	.006" Drill .003" Finished
Finished Panel Thickness .031"	.006" Drill .003" Finished
Finished Panel Thickness .062"	.006" Drill .003" Finished
Finished Panel Thickness .093"	.010" Drill .006" Finished
Finished Panel Thickness .125"	.0125" Drill .009" Finished
Finished Panel Thickness .187"	.016" Drill .011" Finished
Plated Hole Tolerance	+/- .002"
Aspect Ratio (with 10 mil drill)	11 to 1
Plated hole Spacing Minimum (Drilled hole to hole)	.007"
Non Plated Through Holes	
Smallest Non Plated Hole Size: (Finished)	.0059"
Largest Non-Plated Hole Size Routed	No limit
Largest Primary Drilled and Tented Non-Plated Hole	.175" diameter
Non-Plated Routed Hole Tolerance	+/- .003"
Minimum NPTH to Edge of Board Spacing	.010"
Micro Via (µVia) Capabilities	
Smallest Laser µVia Hole Size (Via Size with 0.4 mil Copper Requirement)	.004"
Largest Drilled Laser Via	.008"
Via Aspect Ratio	.5:1 std. .8:1 advanced
Capture Pad Size	µVia + .010
Landing Pad Size	µVia + .010
Stacked Via	No
Type I Capabilities	Yes
Type II Capabilities	Yes
Type III Capabilities	No
Copper-Filled Microvia	Yes, MacDermid VF100
Control Depth Drill Capabilities	
Smallest Control Depth Drill	.008"
Largest Control Depth Drill	No Limit
Minimum Backside Dielectric Separation	.010"
Control Depth Drill Tolerance	+/- .004"
Back Drilling Capabilities	
Minimum Back Drill Drilled Diameter	.014"
Drilled Hole Over Finished Hole Size	.010"
Drill Depth Tolerance	+/- .004"
Scoring Capabilities	
Angles	30 degrees
Offset Tolerance	.003"
Optimum Remaining Web Thickness	1/3 of distance, .020" standard
Remaining Web Tolerance	+/- .005"
True Position Tolerance	+/- .003"
Edge Connector Bevel Capabilities	
Finger Tip Angle	20, 30, 45, 70 degrees
Bevel Depth Tolerance	+/- .005"
Profile Capabilities	
Standard Router Bit Diameter	.093", .062", .031"
Routed Profile Tolerance : (18"x24" Panel)	+/- .005"
Routed Cutout Tolerance : (0. 50" x 0.50")	+/- .005"
Minimum Internal Rout Radius	.015"
Minimum Routed Slot Width	.020"



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Feature Size Capabilities	
Innerlayer Capabilities	
Minimum Conductor Width	
Internal Starting Copper Weight ½ oz	.003"
Internal Starting Copper Weight 1 oz	.005"
Internal Starting Copper Weight 2 oz	.008"
Internal Starting Copper Weight 3 oz	.012"
Minimum Conductor Spacing : (Airgap)	
Internal Starting Copper Weight ½ oz	.003"
Internal Starting Copper Weight 1 oz	.005"
Internal Starting Copper Weight 2 oz	.008"
Internal Starting Copper Weight 3 oz	.012"
Outerlayer Capabilities (Finished Cu Thick)	
	(Finished Copper Thickness with Base Foil and Plating)
Minimum Conductor Width	
External Copper Thickness 1.5 mil	.003"
External Copper Thickness 2.0 mil	.005"
External Copper Thickness 2.5 mil	.008"
External Copper Thickness 3.0 mil	.012"
Minimum Conductor Spacing : (Airgap)	(Finished Copper Thickness with Base Foil and Plating)
External Copper Thickness 1.5 mil	.003"
External Copper Thickness 2.0 mil	.005"
External Copper Thickness 2.5 mil	.008"
External Copper Thickness 3.0 mil	.012"
Pad Diameter to Finished Hole Size	
Conventional Drilling	Drill size plus .015"
Minimum Pad / Drill / Plated Hole	Drill size plus .008"
(Pad Size for <i>Tangency</i> . Add 2X minimum annular ring as needed)	PAD / DRILL / HOLE
.062 Thick Board	.014" / .006" / .003"
.093 Thick Board	.020" / .011" / .008"
.125 Thick Board	.022" / .013" / .009"
.150 Thick Board	.025" / .016" / .011"
.187 Thick Board	.025" / .018" / .014"
Micro Drilling : Laser Via	
Blind Via	.010" / .004" / .000"
Micro Drilling : Mechanical Via	
Blind Via	.015" / .006" / .002"
Solder Mask and Silkscreen	
Solder Mask	
Minimum Solder Mask Clearance : (LPI)	.002"
Pad Size larger than NPTH	.005"
Over Surface Image (pad relief)	.005"
Web Between Surface Mount Pads	.005" preferred, .003" min.
Solder Mask Thickness Over Metal	IPC SPEC COVERAGE (SPC RANGES .0002 - .003 TYPICAL = .0007 over conductor)
Solder Mask Colors	Green, Blue, Red, Black, Yellow, Clear
Solder Mask Type	Taiyo BSN4000
Minimum Mask Defined Pad Diameter	.006"
Mask Defined Pad Minimum Overlap of Copper	.002"
Silkscreen	
Minimum Stroke/Width Screened Legend	.005"
LPI Legend Capability	Yes
Minimum Stroke/Width LPI Legend	.002"
Screened/LPI Legend Colors	White, Black, Yellow
Digital Legend	Yes
Minimum Stroke/Width Digital Legend	.004"
Digital Legend Colors	White Only



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Via-in-Pad - HDI	
Epoxy Filled – Non Conductive	
Epoxy Filled Thru Hole Capability	Yes
Epoxy Filled Thru Hole Minimum	.008"
Epoxy Filled Thru Hole Maximum	.020"
Epoxy Filled μ Via Process	No. Copper filled : See Microvia
Epoxy Filled μ Via Hole Minimum	.008"
Minimum Board Thickness	.020"
Maximum Board Thickness	> .187"
Via Fill Aspect Ratio	18x24"
Maximum Panel Size for μ Via	12x18"
Outerlayer Trace Widths/Spacing	.003"/.003"
Conductive VIP Options	DuPont CB100
Non-Conductive VIP Options	SanEi PHP900, Peters PP2795
Copper Plated/Filled	
Copper Filled μ Via Process	MacDermid MacuSpec VF100
Copper Filled μ Via Hole Minimum	.003" Blind
Copper Filled μ Via Hole Maximum	.006" Blind
Via Fill Aspect Ratio	.5:1
Outerlayer Trace Widths/Spacing	.003"/.003"
Combined with other fill technologies	.003"/.003"
Military	
Etch Back	
2 Pt. Connection	Yes
3 Pt. Connection (glass etch)	Yes
Surface Finishes Options	
Surface Finishes Selection	
Hot Air Solder Level	Yes
Immersion Silver	Yes, MacDermid Sterling
Lead Free OSP	No
Electroless Nickel Immersion Gold	Yes, MacDermid Planar
Immersion Tin	Outsource
Full Body Gold	Yes
Bondable Gold	Outsource
Mixed Finishes	
Immersion Silver with Selective Hard Gold	Yes
HASL with Selective Gold	Yes
Dual Gold Plating	Yes
Immersion Gold with Selective Hard Gold	Yes
Recessed Fingers	Yes
Lead-Free Surface Finishes	
Immersion Silver	Yes, MacDermid Sterling
Lead Free OSP	No
Lead Free HASL	No
Electroless Nickel Immersion Gold	Yes, MacDermid Planar
Immersion Tin	Outsource
Full Body Gold	Yes
Testing Capabilities	
Minimum Test Continuity Resistance	5 ohms
Maximum Test Voltage	1000 volts
Maximum Test Isolated Resistance	1200.4 mOhms
Largest Test Bed Fixtured	10.00 x 10.00"
Largest Test Bed Flying Probe	18 x 24"
Largest Test Pitch (Fixture Test)	0.007"
Electrical Test Pitch (Flying Probe Test)	0.02"
DC Line Resistance Testing	Yes



ADVANCED CIRCUITS

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Prop Delay	250 Volts- 15 min, 1000V 90 Mins
Electrical Performance	
TDR Test Tolerance (Print and Etch)	Standard 10%, Adv, 5%
TDR Test Tolerance (Plated Copper)	Standard 10%, Adv, 5%
TDR Test Tolerance Differential Measurements	Standard 10%, Adv, 5%
TDR Tolerance Single Ended Tolerance	Standard 10%, Adv, 5%
HiPot Testing (AC & DC)	Yes, DC
Data & Documentation	
Tooling Formats	
Film Data Formats	DXF, 274, 274X, ODB++
Drill Data Formats	DXF, 274, 274X, ODB++
Route Data Formats	DXF, 274, 274X, ODB++
Electrical Data Formats	IPC D356
Netlist Compare Formats	IPC D356
Tooling Communication	
Media Types & Data Transfer	Film, Email, Other Electronic Transfer
Compression Formats	ZIP, TAR, TGZ
Secured Data Transfer Methods	Secure Data Transfer, FTP, PGP

Subject to change without prior notice.

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