



GRAPHIC MANUFACTURING CAPABILITY

Q217-15

All features are design dependent and may not be achievable in combination
 All development items and items not listed are open for discussion

Product Range	Single and Double Sided Rigid
	Single and Double Sided Flexibles
	Multilayer
	Multilayer Flexibles
	Multilayer Flexi-rigid
Additional Features	Controlled Impedance
	Controlled Expansion
	Blind Vias
	Buried Vias
	Blind Micro-Vias - laser
	Blind Micro-Vias - mechanical
	Copper Filled Micro-Vias
	Resin Filled Vias (by design and depends on IPC class)
	Stacked Vias
	Sequential Build-Up - mechanical drill
	- laser drill
	Buried Resistance
	Buried Capacitance
	Bonded Heatsinks
Materials	FR4 - Low TG (IPC 4101 / 21) - check availability
	FR4 - High Tg (IPC 4101 / 24, 26, 98, 99, 126)
	Polyimide, BT and Cyanate Ester (glass reinforced)
	PTFE (various types - check availability)
	High Speed / Low Loss Materials - check availability
	Polyimide Film (flexible material) adhesiveless
	Polyimide Film (flexible material) with adhesive
	Advanced / other substrates (check list)
	Copper-Invar-Copper
	Carbon Fibre (Stablcor)

Development	Reduced Yield	Standard
		x
		x
		x
		x
		x
	By design	By design
		By design
		x
		x
		x
	x	By design
		x
	x	x
		x
		x
By design	By design	By design
By design	By design	x
		x
		Non-preferred
	Less than 75 micron	75 micron or thicker
	Less than 75 micron	75 micron or thicker
By design	By design	By design
	Less than 75 micron	75 micron or thicker
Less than 25 micron	Less than 50 micron	50 micron or thicker
	Non-preferred	
By design	By design	By design
		x
		By design

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		Development	Reduced Yield	Standard
Construction	Finished Board Thickness	< 6.00 mm	< 5.00 mm	< 4.00 mm
	Thinnest glass reinforced layer		50 micron	75 micron
	Thinnest Layer		25 micron	50 micron
	Max buried assembly thickness without resin fill (design dependant)			
	Buried single assembly			1.0 mm
	Buried multiple assemblies			By design
	Blind assemblies			0.8 mm
Feature Sizes	Blind micro-via stop pad (u-via = 125 micron)	0.200 mm	0.225 mm	0.250 mm
	Blind micro-via top pad (u-via = 125 micron)	0.250 mm	0.300 mm	0.350 mm
	Single Bond, Rigid Only, Similar Materials			
	Minimum Design Annular Ring	< 0.090 mm	0.090 mm	0.100 mm
	Minimum Design Annular Ring (end result 90°breako ut - IPC class 2)	< 0.100 mm	* 0.100 mm	0.125 mm
	Minimum Design Annular Ring (end result tangency)	< 0.125 mm	0.125 mm	0.150 mm
	Minimum Design Annular Ring (end result 0.025 mm - IPC class 3)	0.125 mm	0.150 mm	0.175 mm
	Minimum Design Annular Ring (end result 0.05 mm - MIL)	0.150 mm	0.175 mm	0.200 mm
	Drill to isolated copper	0.125 mm	0.150 mm	0.175 mm
	1 of Multiple Bond, Flexible component or mixed materials / copper			
	Minimum Design Annular Ring	< 0.075 mm	0.10 mm	0.125 mm
	Minimum Design Annular Ring (end result 90°breako ut - IPC class 2)	< 0.100 mm	* 0.125 mm	0.150 mm
	Minimum Design Annular Ring (end result tangency)	< 0.125 mm	* 0.15 mm	0.175 mm
	Minimum Design Annular Ring (end result 0.025 mm - IPC class 3)	0.150 mm	0.175 mm	0.200 mm
	Minimum Design Annular Ring (end result 0.05 mm - MIL)	0.175 mm	0.20 mm	0.225 mm
	Drill to isolated copper	0.150 mm	0.175 mm	0.200 mm
	> 1 of Multiple Bond, Flexible component or mixed materials / copper			
	Minimum Design Annular Ring	< 0.100 mm	0.125 mm	0.150 mm
	Minimum Design Annular Ring (end result 90°break out - IPC class 2)	< 0.125 mm	* 0.150 mm	0.175 mm
	Minimum Design Annular Ring (end result tangency)	< 0.150 mm	* 0.175 mm	0.200 mm
	Minimum Design Annular Ring (end result 0.025 mm - IPC class 3)	0.175 mm	0.200 mm	0.225 mm
	Minimum Design Annular Ring (end result 0.05 mm - MIL)	0.200 mm	0.225 mm	0.250 mm
Drill to isolated copper	0.175 mm	0.200 mm	0.225 mm	

Multiple levels of micro-via and through / buried drill structures may affect these figures.

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Conductor spacing to solderable feature - affects solder mask aperture)

- # @ Conductor Width - print and etch (assumes 12um starting foil)
- # @ Conductor Width - plated (assumes 12 um starting foil)
- # @ Conductor Spacing - print and etch (assumes 12um starting foil)
- # @ Conductor Spacing - plated (assumes 12 um starting foil)

- # @ Conductor Width - print and etch (assumes 17um starting foil)
- # @ Conductor Width - plated (assumes 17 um starting foil)
- # @ Conductor Spacing - print and etch (assumes 17um starting foil)
- # @ Conductor Spacing - plated (assumes 17 um starting foil)

- # @ Conductor Width - print and etch (assumes 35um starting foil)
- # @ Conductor Width - plated (assumes 35 um starting foil)
- # @ Conductor Spacing - print and etch (assumes 35 um starting foil)
- # @ Conductor Spacing - plated (assumes 35 um starting foil)

- # @ Conductor Width - print and etch (assumes 70um starting foil)
- # @ Conductor Width - plated (assumes 70 um starting foil)
- # @ Conductor Spacing - print and etch (assumes 70 um starting foil)
- # @ Conductor Spacing - plated (assumes 70 um starting foil)

Anti-pad clearance (moat) and Spacing for thermals

print and etch
plated

Drawn hatch - line
Drawn hatch - pitch

Surface Feature to Flexible Hinge - min (Construction dependent)
Plated Hole to Flexible Hinge - min
Solder Mask Radial Clearance
Solder Mask Feature

HASL / Ag / Entek
Ni / Au
Sn
White
Other colour

Ident Text Line Width - Font dependent

Text Clip

Development	Reduced Yield	Standard
< 0.100 mm	0.100 mm	0.125 mm
< 0.050 mm	0.050 mm	0.060 mm
0.060 mm	0.075 mm	0.090 mm
0.050 mm	0.060 mm	0.075 mm
0.075 mm	0.090 mm	0.100 mm
0.050 mm	0.060 mm	0.075 mm
0.075 mm	0.090 mm	0.100 mm
0.050 mm	0.075 mm	0.090 mm
0.075 mm	0.090 mm	0.100 mm
0.075 mm	0.090 mm	0.100 mm
0.090 mm	0.100 mm	0.125 mm
0.090 mm	0.100 mm	0.110 mm
0.100 mm	0.110 mm	0.125 mm
0.100 mm	0.110 mm	0.125 mm
0.110 mm	0.125 mm	0.150 mm
0.110 mm	0.125 mm	0.150 mm
0.175 mm	0.200 mm	0.225 mm
0.075 mm	0.100 mm	0.125 mm
0.100 mm	0.125 mm	0.150 mm
	0.200mm minimum	0.250mm minimum
	0.400mm minimum	0.500mm minimum
	0.200 mm	0.250 mm
0.500 mm	0.800 mm	1.00 mm
feature + 0.025 mm	feature + 0.035 mm	feature + 0.050 mm
	0.062 mm	0.075 mm
	0.075 mm	0.090 mm
	0.075 mm	0.090 mm
		0.1mm
		0.15mm
		Solder Mask + 0.075 mm

Nominal starting foil thickness stated. In practise this is normally less and foil treatment has to be taken into consideration (I.e. 35 um ~ 30 um)
Nominal surface plating for IPC class 3 adds 25 - 30 microns copper to starting foil. If requirement is greater, reduced yield or thicker starting foil required.

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Development	Reduced Yield	Standard
0.3 / 3.5	0.3 / 3.0	0.3 / 2.4
0.25 / 2.4	0.25 / 2.2	0.25 / 1.8
	0.2 / 1.6	0.2 / 1.4
	0.15 / 0.2	0.15 / 0.15
	0.07 / 0.10	0.10 / 0.15
12:1	10:1	9:1
10:1	9:1	8:1
9:1	8:1	7:1
1 : 1	1 : 0.9	1 : 0.8
+ / - 0.04 mm	+ / - 0.05 mm	+/- 0.07 mm
	By design	+/- 0.05 mm
< 0.05 mm	0.05 mm	0.07 mm
< 0.07 mm	0.07 mm	0.1 mm
< 0.07 mm	0.07 mm	0.1 mm
< 0.10 mm	0.10 mm	0.125 mm
		x
		x
		x
		x
		Dependent on circuit size
		x
		x
	x	
		x
		x
		x
		x
x		
		White
	Various colours	

Drilling Minimum Drilled Hole Mechanical - drill / thickness
 (Buried pairs - mechanical)
 (Buried pairs - laser)
 Aspect Ratio > 0.5mm
 (includes blind and buried assemblies) 0.3 - 0.5mm
 < 0.3 mm
 Blind micro-via (hole : dielectric + copper)
 Plated Hole Diameter Tolerance HASL
 Ni / Au

Positional Accuracy Hole to Hole (diameter)
 Hole to Image
 Image to Edge
 Image to Image

Finishes Hot Air Solder Level (**SnPb not RoHS compliant**)
 Hot Air Solder Level (**RoHS compliant - sub-contact**)
 Electroless Nickel / Immersion Gold
 \$ Electroless Nickel / Electroless Palladium / Immersion Gold (s-c)
 \$ OSP [Entek (Lead free assembly compatible) sub-contract]
 Hard Gold (Edge Connector Finish)
 \$ Soft Gold (sub-contract)
 \$ All-over gold (electroplate - hard or soft - sub-contract)
 Unfused Tin-Lead
 Fused Tin-Lead
 \$ Immersion Tin (sub-contract)
 \$ Immersion Silver (sub-contract)
 \$ Others (by request)

\$ Sub-contract surface finishes will add to lead time and may not be available continuously.

Via Fill Conductive DuPont CB100
 Copper (Blind Microvia only)
 Peters PP 2795
 Non-conductive

Solder Mask Liquid Photoimagable : (Green)
 Liquid Photoimagable : (Other)
 Screen Printed Two Part Epoxies :
 Electra EMP 110
 Sun XV501T / Electra EMP 110
 Various colours

Notation Ink Inkjet
 Screen Print

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Data Required ODB++ (.TGZ) preferred
 Extended Gerber - RS274X
 Standard Gerber - RS274D
Netlist Data IPC-D-356 or Mentor Neutral File

Development	Reduced Yield	Standard
		x
		x
	x	non-preferred
	If not supplied	x

Data Transmission Details on request

Standard Panels 304 x 280mm (12 x 11")
 406 x 304mm (16 x 12")
 457 x 355mm (18 x 14")
 406 x 520mm (16 x 21")
 608 x 457mm (24 x 18")
 608 x 304mm (24 x 12")
 304 x 457mm (18 x 12")
 608 x 608mm (24 x 24")
 Others

Development	Reduced Yield	Standard
		Non-preferred
		x
		x
		x
		x
		x
		x
		x
		x
	x	Design dependent
On request		

Electrical Test Maximum Test Area 609 x 609mm
 Maximum Test Voltage 500 Volts
 Maximum Isolation Threshold 500 Mohm
 Minimum Continuity Threshold 2 ohm
 Minimum Test Point Pitch 0.10 mm
 Automated Test Voltage - up to 500 Volts x
 Hi-Pot Test - up to 5000 Volts x

Controlled Impedance
 @ TDR Measurement
 Impedance Prediction

Development	Reduced Yield	Standard
+ / - 5%	+ / - 7%	+ / - 10%

Polar SI 8000

Optical Inspection Inner Layers 100% AOI
 Outer Layers AOI as required
 Surface blind vias - laser drilled 100 % AOI

For requirements outside of Standard Capability, please contact an applications engineer

All features are design dependent and may not be achievable in combination

@ Dependent on design, conductor thickness and etch compensation space availability - copper foil thickness may affect capability

* Contract review required for all reduced yield except those marked " * " for which production to be advised

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Types of Material

Material availability may affect delivery

Glass reinforced		Flexible		Miscellaneous	
Standard FR4	Isola 370HR	Polyimide Film	DuPont AP series	PTFE	Rogers 5000 series
	Arlon 49N		DuPont LF series		Rogers 6000 series
	Arlon 51N				
	Others on request - check availability		DuPont FR series		Taconic TLC
					Taconic TLE
Halogen Free	Panasonic R1566				Taconic TLT
		Coverlayer	DuPont LF series		Taconic TLX
Polyimide glass	Arlon 85N		DuPont FR series		Taconic TLY
	Arlon 33N Non-preferred				(Others on request)
	Arlon 35N	Adhesive material	DuPont LF series		
	Arlon 37N		DuPont FR series		
	Arlon 38N			Thermal Management	Stablcor
	Nelco N7000-2 Non-preferred				Copper Invar Copper
	Isola P97 Non-preferred				
	Ventec VT 901				
BT	Isola G200			Active materials	Arlon AD10
	Nelco N5000				Ohmega Ply
Cyanate Ester	Nelco N8000				
High Speed					
	Nelco N4000-12 / -12 SI (Non-preferred for multiple bond constructions)				
	Isola Getek				
	Rogers 4000				
	Arlon 25FR				
	Isola FR408HR (Under qualification)				