

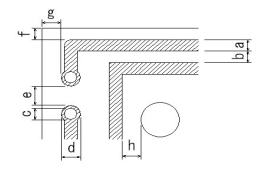
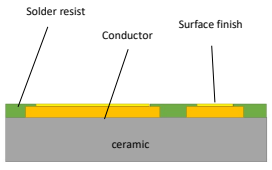
Design rules & specifications ceramic & glass PCB



Last update: May 2021

Alumina 96% | Aluminum Oxide 96% | Al2O3 96%

Volume	C-Proto: Prototypes & small volume		C-Production: All volumes (Medium to High)	
	1-5 panels	>5 panels / order	>50 panels / order	>50 panels / order
Manufacturing process	DPC	Thick film	DPC	Thick Film
Tooling & NRE?	No	No	Limited	Yes
Lead time	Standard Special	5-15 working days 3 working days (*)	5-15 working days 3 working days (*)	4-6 weeks 6-8 weeks
Dimensions & thickness				
Panel Dimensions (a)x(b)				
Standard	metric	100mmx80mm	100mmx80mm	120mmx120mm up to 175 mm x 125mm
Special				up to 125mm x 125mm
Standard	imperial	3.9" x 3.1"	3.9" x 3.1"	4.7" x 4.7"
Special				up to 7" x 5"
Special				up to 5" x 5"
Thickness (e)				
Standard	metric	0.38 1.0 mm	0.38 0.5 0.76 1.0 2.0 mm	0.25 0.38 0.5 0.63 0.76 1.0 1.5mm
Special				0.1 mm or up to 1.5 mm
Standard	imperial	15 39 mil	15 20 30 39 mil	10 15 20 25 30 39 50mil
Special				4 mil or up to 79 mil
Special				15 mil
Metalization & finish				
Conductor				
Standard		Copper - Cu	Silver - Ag	Copper - Cu
Special			Silver-Palladium - AgPd	Silver-Palladium - AgPd
Conductor thickness				
Standard	metric	35um	10-12um	18um-35um-70um
Special			20-24um	up to 350um
Standard	imperial	Cu 1oz	0.4-0.8 mil	0.5oz-1oz-2oz
Special				up to 10oz
Special				1.5oz
Surface finish				
Standard		Immersion Tin (Sn), None, ENIG (**), None (Ag or AgPd), ENIG (**)	OSP, Imm. Ag, ENIG, ENEPIG	None (Ag, AgPd)
Special		Hard gold (**)	Hard Gold (**), please enquire	ENIG
Solder resist				
Standard		Green, White, Black, High reflective white	Glass coating: green & blue	Solder resist: green, white, red, blue, black, yellow
Special				other colors
Special				high reflective white
Solder resist minimum opening				
Standard		0.2mm	0.2mm	0.2mm
Special		0.1mm	0.1mm	0.1mm
Solder resist minimum pad overlap				
Standard		0.1mm	0.1mm	0.1mm
Special		0.05mm	0.05mm	0.1mm
Silk screen / legend				
Standard		Engraving only	Engraving only	black, white
Special				red, blue, yellow
Layers				
Standard		single or double sided	single, 2 layers (single sided)	single - double sided
Special			double sided, up to 4 layers	multilayer - up to 6 layers
Spacing & vias				
Min. line width (a)				
Standard		0.2mm / 8 mil	0.2mm / 8 mil	0.15mm / 6 mil
Special		0.1mm / 4 mil	0.15mm / 6 mil	0.08mm / 3 mil
Special				0.08mm / 3.1 mil
Min. line spacing (b)				
Standard		0.2mm / 8 mil	0.2mm / 8 mil	0.15mm / 6 mil
Special		0.1mm / 4 mil	0.1mm / 4 mil	0.12mm / 5 mil
Special				0.1mm / 4 mil
Line/pad to edge spacing (f)				
Standard		0.2mm / 8 mil	0.2mm / 8 mil	0.2mm / 8 mil
Special				0.1mm / 4 mil
Special				0.15mm / 6 mil
Special				0.1mm / 4 mil
Via specifications				
Via diameter (c)		0.38mm-0.8mm / 15 mil-30 mil	0.38mm-0.8mm / 15 mil-30 mil	0.15mm-0.3mm / 6 mil-12 mil
Min. via spacing (b)		1mm / 39 mil	1mm / 39 mil	0.3mm / 12 mil
Via/hole to edge spacing		3 x via diameter	3 x via diameter	3 x via diameter
Through hole metallisation		Filled vias	Filled vias	Plated through hole (PTH)
Special				Silver (Ag) Filled vias
Annular ring specifications				
Min. annular ring diameter (d)		via diameter +0.4mm / 8 mil	via diameter +0.4mm / 8 mil	0.2mm / 8 mil
Min. annular ring spacing (e)		0.2mm / 8 mil	0.2mm / 8 mil	0.15mm / 6 mil
Annular ring to edge spacing (g)		0.2mm / 8 mil	0.2mm / 8 mil	0.15mm / 6 mil
Line to hole/via spacing (h)				
Standard		0.2mm / 8 mil	0.2mm / 8 mil	0.2mm / 8 mil
Special				0.1mm / 4 mil
Special				0.15mm / 8 mil
Special				0.1mm / 4 mil
Edge metalization				
Standard		no	yes, please enquire	yes, please enquire
Special				yes, please enquire
Tolerance				



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Manufacturing process	DPC	Thick film	DPC	Thick Film
Dimensional tolerance				
Standard	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil
Special	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil
Thickness tolerance				
Standard	+/-10%	+/-10%	+/-10%	+/-10%
Special	+/-5%	+/-5%	+/-5%	+/-5%
Hole tolerance				
Standard	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil
Special	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil
Pad to hole/via tolerance				
Standard	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil	+/- 100µm / 4 mil
Special	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/- 50µm / 2 mil
Conductor thickness tolerance				
Standard			+/-10%	+/-20%
Line/Space width tolerance				
Standard	+/- 50µm / 2 mil	+/- 50µm / 2 mil	+/-20% or 25µm @ 1oz	+/- 50µm / 2 mil
Special	+/- 40µm / 1.5 mil	+/- 40µm / 1.5 mil		+/- 40µm / 1.5 mil
Surface roughnes ceramic (Ra)				
Standard			Ra≤0.3µm; Rz≤2µm	≤0.5µm
Special			Ra≤0.3µm; Rz≤2µm	
Misalignment (only for double sided)				
Standard	≤200µm / 8 mil	≤200µm / 8 mil	≤100µm / 4 mil	≤100µm / 4 mil
Special			≤50µm / 2 mil	≤50µm / 2 mil



(*) 3 days only possible when no surface finish or immersion tin is chosen
 (**) outsourced process, add +/- 10 working days