

Specification	dimension	Fig. Ref.	Rigid Basic	Rigid Advanced	Remarks						
Materials & stack up											
Material			FR4, Teflon, Ceramic	Polyimide	See additional specifications						
Base Cu Thickness Inner Layer	µm	A	18, 35, 70								
Base Cu Thickness Foils Outer	µm	B	12, 18, 35, 70								
Min board thickness	mm	D	0,80	0,50							
Max board thickness	mm	D	3,20	3,80	measured over base material +						
Min inner layer thickness	µm	C	100	50							
Max inner layer thickness	µm	C	710	1500							
ML thickness tolerance	%		10		On the calculated thickness						
Min Prepreg thickness	µm	X	80	69	Blind via's aspect ratio						
Max. Layer Count	number		12	16							
Build-up ML			Cores + foil	Cores	see stack -ups						
Panel sizes	mm		610 x 530/455								
Board Size Rigid	mm		575 x 504/429	575 to 610* x 504 to 530* 420 x 275	* If Ramaer tooling area can be used in customer part tooling area max size is close to max panel size of 610 x 530. (Min. distance between arrays 5 mm)						
Max. Board Size Flex - Rigid	mm		420 x 265	575 x 429							
Max Bow and Twist	%		0,75		IPC-6012						
Min. Line & Space Inner Layer					According to IPC class 2	Capability refers to customer design width values!!!					
@ Final Cu thickness 18 µm	µm	E/F	100	75*	* Dep. on density and board size	15µm	width compensation leads to production artwork width of				
@ Final Cu thickness 35 µm	µm	E/F	125	100*	* Dep. on density and board size	30µm	width compensation leads to production artwork width of				
@ Final Cu thickness 70 µm	µm	E/F	175	150*	* Dep. on density and board size	50µm	width compensation leads to production artwork width of				
Min. Line & Space Outer Layer					According to IPC class 2						
@ Final Cu thickness 30 µm	µm	G/H, O/P	100	80*	* Dep. on density and board size						
@ Final Cu thickness 35 µm	µm	G/H, O/P	125	100*	* Dep. on density and board size						
@ Final Cu thickness 50 µm	µm	G/H, O/P	150	125*	* Dep. on density and board size						
@ Final Cu thickness 85 µm	µm	G/H, O/P	200	200*	* Dep. on density and board size						
Holes Non Plated											
Min drilled Hole	µm	K, S	200	150	Related to Aspect Ratio and Hole type						
Hole location tolerance	+/- µm		100		Hole to hole, first drilling						
Max Reference Hole	mm		6,00		For min position tolerance						
Hole tolerance	+/- µm		20								
Hole Depth tolerance	+/- µm	W	30		Drilled Blind Via						
Min Hole to Pattern @ 100 µm											
Isolation distance	µm	I	225								
Min Hole to Pattern	µm		200		For tenting over @ first drilling.						
Holes Plated											
Aspect Ratio	number	J/K, Q/R	8*	10*	For drill size ≥ 0.20 mm						
Hole tolerance	+/- µm		100								
Min Blind Micro Via Drilled	µm		150	150							
Aspect Ratio Micro Blind Via drilled	number	V	1.00	1,20	Drilled						
Min. Dielectric distance for through shoot micro via drill	µm		200	<200	Special depends on diameter and position of contact-layer						
Min µVia Size Laser	µm				75µm as special						
Aspect Ratio Micro Via Laser	number										
Min Hole to Pattern @ 100 µm											
Isolation distance	µm	I	300								
Min plating thickness	µm		Class 2	Others	According to IPC-6012						
Filled and Cu Plated Via's											
Through hole				yes	Dep. on aspect ratio differences						
Blind Micro Via Drilled				yes	Dep. on aspect ratio differences, sequential buildup, epoxy filled.						
Blind Micro Via Laser											
Filled via			no								
Landsize Inner Layers											
@ Final Cu thickness 18 - 35 µm					Finish to Drill, for 0 annular ring						
Min Landsize ML≤4	µm	M	Drill Size + 300	Drill Size + 250							
Min Landsize ML>4	µm	M	Drill Size + 350	Drill Size + 300							
Landing pad size laser micro via		UL									
Landsize Outer Layers											
Min Landsize					Finish to Drill, for 0 annular ring						
@ Final Cu thickness 30 - 35 µm	µm	L	Drill Size + 250	Drill Size + 200	Finish to Drill, for 0 annular ring						
Min Landsize					Finish to Drill, for 0 annular ring						
@ Final Cu thickness >35 - 50 µm	µm	L	Drill Size + 275	Drill Size + 225	Finish to Drill, for 0 annular ring						
Min Landsize					Finish to Drill, for 0 annular ring						
@ Final Cu thickness >50 - 85 µm	µm	L	Drill Size + 300	Drill Size + 250	Finish to Drill, for 0 annular ring						
Capture pad size laser via		TL									
Soldermask											
General											
Solder Mask Registration	+/- µm		50 (film exposure)	<50 LDI exposure	W.Peters GL2467 NB-Matt						
Solder Mask Via Closed	µm		200 / 250 / 300		Special only in small volumes!						
Solder Mask Via Open min	µm		250		< 250=100% 300 = 95% closed						
Solder Mask SMD Clearance	µm		Land Size + 100		and / or A.R. < 6,4 and class 2 plating						
Solder Mask Dam Min	µm		80								
Legend Print					White, yellow, black						
Legend Line Width	µm		125								
Legend to Soldermask	µm		200								
Barcode					only white						
Surface finish					See additional specification						
HASL PbSn Thickness	µm		0,5 - 40		Alpha Hiflo						
HASL Sn Thickness	µm		0,5 - 40		Felder Sn99Ag+						
Chem. NiAu Thickness	µm		4 - 8 / 0.05 - 0.125		MacDermid Planar						
Imm Sn Thickness	µm		>1,0		MacDermid MacStan						
Imm Ag Thickness	µm		0,15-0,6		MacDermid Sterling						
OSP Thickness	µm										
Galvanic NiAu Thickness	µm		4.0 / 1.0		Other thicknesses on customer request						
					NOTE; blind via's and micro-via's may not be coated!						
Carbon finish (key contacts)					i.e. contact purposes						

Specification	dimension	Fig. Ref.	Rigid Basic	Rigid Advanced	Remarks						
General					Tamura MRX-713J 20-40 Ohm/sq						
Thickness	µm										
Min Spacing	µm		300								
Min Width	µm		300								
Location tolerance	%										
Min overhang	µm		300								
Peel able mask											
General					W.Peters SD2955 - lead free version						
Min Thickness	µm		250								
Min Width	µm										
Max coverable Hole Size	mm		2.0								
Via plug											
General					SD2361, for vacuum closed via's						
Max overhang land	µm										
Max Height with open soldermask	µm		50		Open Via						
Max Height closed soldermask	µm		100		Covered Via with soldermask						
Routing, Scoring and Beveling											
Routing Tolerance	+/- µm		200		other on request						
Routing to Hole Tolerance	+/- µm		200								
Min Routing clearance to pattern. For 0 clearance innerlayer to contour with standard rigid basic !	µm		575	350	< 400µm leads to edge conductor limitations (see UL file)						
Min Scoring clearance to pattern	µm		575		dependent on panel thickness						
Max Scoring tolerance											
Max board thickness scoring	mm		2,8								
Beveling (Chamfering) tolerance	%										
Electrical testing											
Max Testing area	mm		400 x 600								
Min Pitch / Pad size	µm		635	0	pad size 300µm Adapter fixture pad size 100µm - Probe						
Max number Test Points / sq inch	number		200		Top or Bottom						
Test voltage (volt) parallel	volt		100	Other	10 mOhm - 50 Ohm						
Test voltage (volt) probe	volt		40	Other	10 mOhm - 10 Ohm						
Impedance Tolerance	%		10	8							
UL Flammability											
Flammability rating			V-0		E 44697 Category ZPMV2 E 335592 Category ZPXK2 (Flexible material constructions)						