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. Dielektic 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					Finish to Drill, for 0 annular ring		
Min Landsize @ Final Cu thickness 30 - 35 µm	µm	L	Drill Size + 250	Drill Size + 200	Finish to Drill, for 0 annular ring		
Min Landsize @ Final Cu thickness >35 - 50 µm	µm	L	Drill Size + 275	Drill Size + 225	Finish to Drill, for 0 annular ring		
Min Landsize @ 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					According to IPC-840		
General					W.Peters GL2467 NB-Matt		
Solder Mask Registration	+/- µm		50 (film exposure)	<50 LDI exposure	Special only in small volumes!		
Solder Mask Via Closed	µm		200 / 250 / 300		< 250=100% 300 = 95% closed		
Solder Mask Via Open min	µm		250		and / or A.R. < 6,4 and class 2 plating		
Solder Mask SMD Clearance	µm		Land Size + 100				
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)