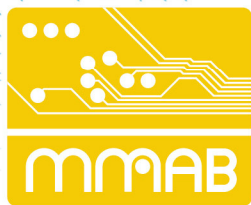


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BASIC INFORMATION	Standard	Prototype	Comments
Layer count	1-8	10-12	14-18 layer after confirmation
Blind via	No	Yes	After confirmation
High frequency	Yes	Yes	Multilayer & mixed dielectric
Metal based boards	Yes	Yes	Aluminum single sided
Impedance control	Yes +/-10%	Yes +/-10%	+/-10% after adjust. 40-120 Ω
Heavy copper	Yes	Yes	210-405 μm
Antennas & domes	No	Yes	Up to 2500 mm in length
Step plating	No	Yes	Step cu two different thickness
Semi-flex	No	Yes	Z-axis routing in STG FR-4
BASE MATERIAL	Standard	Prototype	Comments
FR-4 STG Tg 130°C	Yes	Yes	UL MOT 120 (Isola DE104)
FR-4 MTG Tg 150°C	Yes	Yes	UL MOT 130 (Shengyi S1000H)
FR-4 HTG Tg 170°C	Yes	Yes	UL MOT 130 (Isola 370HR)
FR-4 Halogen free Tg 150°C	Yes	Yes	UL MOT 120 (Shengyi S1151)
CEM 3	Yes	Yes	Thermal conductive *
Aluminum base material	Yes	Yes	2-4 W/mK Single sided*
FR 408 Isola	Yes	Yes	High frequency *
IS 680 Isola	Yes	Yes	High frequency*
IS 400 Isola	Yes	Yes	UL MOT 130
Astra MT 77 Isola	Yes	Yes	High frequency*
RO 4003 Rogers	Yes	Yes	High frequency*
RO 4350 Rogers	Yes	Yes	High frequency*
RO 4725 Rogers	Yes	Yes	High frequency*
RO 4730 Rogers	Yes	Yes	High frequency*
RO 4835 Rogers	Yes	Yes	High frequency*
AD255 PTFE	Yes	Yes	High frequency*
GF255 Shengyi	Yes	Yes	High frequency*
Aerowave 255 Shengyi	Yes	Yes	High frequency*
Mixed dielectric	No	Yes	High frequency material + FR-4
STG = Standard Tg	MTG = Medium Tg	HTG = High Tg	*Only flammability UL94V-0
DIMENSIONS	Standard	Prototype	Comments
Thickness tolerance	+/-10%	+/-10%	Single & double sided ref IPC4101
Board size max	433x565 mm	433x565 mm	Double sided
Board size max	427x565 mm	427x565 mm	Multilayer
Routing tolerance	+/-0,15 mm	+/-0,1 mm	Special details +/-0,05 mm
Board thickness min. 1-2 lay	0,3 mm	0,1 mm	UL-approved for min. 0,56 mm
Board thickness max.	3,2 mm	3,2 mm	Special stack up for >3,2 mm
Board thickness 4 layer	0,8 mm	0,4 mm	UL-approved for min. 0,56 mm
Board thickness 6 layer	1,0 mm	0,8 mm	
Board thickness 8 layer	1,6 mm	1,2 mm	
Board thickness 10 layer	1,6 mm	1,4 mm	
Board thickness 12 layer	1,6 mm	1,6 mm	
Dielectric minimum	0,2 mm	0,065 mm	UL-approved min. 0,05 mm

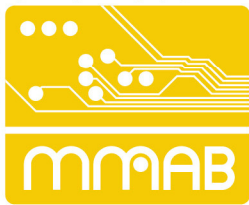


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TRACK & GAP	Standard	Prototype	Comments
Track & gap outer layer 35 µm finished Cu	0,12/0,12 mm	0,1/0,1 mm	Limited traces down to 0,075 mm after confirmation
Track & gap outer layer 70 µm finished Cu	0,25/0,25 mm	0,2/0,2 mm	0,17/0,17 mm only after confirmation.
Track & gap outer layer 105 µm finished Cu	0,3/0,3 mm	0,25/0,25 mm	0,22/0,22 mm only after confirmation.
Track & gap outer layer 140 µm finished Cu	0,4/0,4 mm	0,3/0,3 mm	0,27/0,27 mm only after confirmation.
Track & gap inner layer 18 µm cu foil	0,1/0,1 mm	0,1/0,1 mm	Limited traces down to 0,075 mm after confirmation
Track & gap inner layer 35 µm cu foil	0,127/0,127 mm	0,1/0,1 mm	Limited traces down to 0,075 mm after confirmation
Track & gap inner layer 70 µm cu foil	0,2/0,25 mm	0,15/0,2 mm	0,15/0,15 mm only after confirmation.
Track & gap inner layer 105 µm cu foil	0,3/0,3 mm	0,2/0,25 mm	0,2/0,2 mm only after confirmation.
Track & gap inner layer 140 µm cu foil	0,4/0,4 mm	0,3/0,3 mm	0,25/0,25 mm only after confirmation.
Etch tolerance	+/-50 µm	+/-25 µm	Depends on copper thickness
Under etch	10-30 µm	10-30 µm	Depends on copper thickness
UL-approval min. track	0,075 mm	0,075 mm	Applies to 18/35 µm cu
COPPER THICKNESS	Standard	Prototype	Comments
Copper thickness outer layer minimum	35 µm min.	35 µm min.	Tolerance +20/-5 µm
Copper thickness outer layer maximum	140 µm	210-405 µm	Tolerance +/-20 µm
Copper thickness inner layer minimum	18 µm	12 µm	Tolerance +/-5 µm
Copper thickness inner layer maximum	105 µm	210 µm	Tolerance +/-15 µm
UL-approval inner layer	99 µm (105 µm)	99 µm	Maximum copper foil
UL-approval outer layer	105 µm	105 µm	Maximum base copper ex. plating

All copper thicknesses refer to finished copper thickness outer layer and copper foil inner layer.

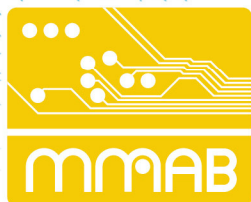
Finished copper thickness 35 µm = 18 µm base copper. Finished copper thickness 70 µm = 35 µm base copper.



Capability – Malmö Mönsterkort factory, Sweden

FINAL FINISH	Standard	Special	Comments
HASL Lead-free	Yes	Yes	SN100C. Min. 0,8 mm thickness
HASL Sn-Pb	No	Yes	After confirmation
ENIG (Immersion Nickel-Gold)	Yes	Yes	3-5 µm Ni + 0,05-0,1 µm Au
OSP (Organic Preservative)	Yes	Yes	Uyemura Mecseal CL-5018
ENEPIG (Imm Ni Pd Gold)	No	Yes	After confirmation
EPIG (Imm Palladium Gold)	No	Yes	After confirmation
DIG (Direct Immersion Gold)	No	Yes	After confirmation
Hard gold	Yes	Yes	After confirmation
Carbon print	No	Yes	SD 2841 IR, Peters Lackwerke
Immersion silver	No	Yes	After confirmation
Rhodium selective electroplate	No	Yes	After confirmation
Nickel up to 50 µm	No	Yes	After confirmation
Silver selective electroplated	No	Yes	After confirmation

SOLDERMASK	Standard	Prototype	Comments
Soldermask regular	Green, black, white	Red, blue, transp matte/glossy	Glossy green standard. Taiyo PSR-4000 GP01EU DI
Soldermask custom color		Pink, sky blue	After confirmation
Soldermask white	White LED	White LED	Taiyo PSR-4000 LEW1
Soldermask thickness	8-40 µm	8-40 µm	Average 15 µm at 35 µm cu
Soldermask bridge/dam 35 µm copper Green mask	0,1 mm	0,1 mm	Applies for Green soldermask. Increase +0,05 mm for White
Soldermask bridge/dam 35 µm copper White mask	0,15 mm	0,15 mm	Applies for White soldermask.
Soldermask clearance 35 µm copper.	0,075 mm	0,05 mm	Clearance pad to soldermask 0,035 mm using MDI exposure
Soldermask bridge/dam 70 µm copper Green mask	0,2 mm	0,15 mm	Applies for Green soldermask.
Soldermask bridge/dam 70 µm copper White mask	0,25 mm	0,2 mm	Applies for White soldermask.
Legend/ silk screen	White, black	Yellow	High resolution
Hole plugging	Yes	Yes	Partial soldermask plugging
Temporary peelable mask	Yes	Yes	Peters SD-2955
Kapton tape masking	Yes	Yes	



Capability – Malmö Mönsterkort factory, Sweden

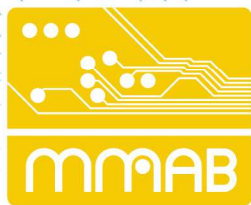
HOLE & ROUTING	Standard	Prototype	Comments
Hole diameter final min. (Hole diameter drill min.)	0,3 mm (0,35 mm)	0,2 mm (0,25 mm)	0,15 mm diam after confirmation (0,2 mm) Valid for 1,6 mm PCB
Hole aspect ratio	6:1	8:1	10:1 after confirmation
Hole tolerance	+/-0,1 mm	+/-0,05 mm	Press-fit after confirmation
Via pad diameter min.	0,6 mm	0,5 mm	0,45 mm after confirmation Valid for 35 µm copper
Annular ring min.	0,15 mm	0,1 mm	Finished annular ring after plating
Blind via diameter min.	0,25 mm	0,2 mm	0,15 mm diameter after confirm
Via pad diameter min.	0,6 mm	0,5 mm	0,45 mm after confirmation
Blind via aspect ratio	0,5:1	0,8:1	1:1 after confirmation
Z-axis controlled drilling	No	Yes	+/-0,1 mm after confirmation
Backdrilling of vias	No	Yes	After confirmation
Countersunk holes	Yes	Yes	After confirmation
Edge plating	Yes	Yes	
Half plated holes	Yes	Yes	
Z-axis cavity ENIG plating	No	Yes	After confirmation
Bevelled edges	No	Yes	30-45 deg bevel angle
Routing tolerance	+/-0,15 mm	+/-0,1 mm	Special details +/-0,05 mm
Routed slot width	2,4 mm	0,8 mm min.	
Routing radius	1,2 mm	0,4 mm	
Scoring V-cut angle	30°	30°	
Plug & overplate via type VII	No	Yes	After confirmation

TEST & APPROVAL	Standard	Special	Comments
Electrical test	Yes	Yes	100%
AOI	Yes	Yes	Inner- and outer layer
UL-approval	Yes	Yes	UL-796 and UL94-V0 (E102144)
UL Canada and USA	Yes	Yes	UL _{US} UL _C
UL CTI	Yes	Yes	CTI PLC 3 175-249 V
Solderability test	No	Yes	IPC-J-STD 003 solder float, reflow
Dyne soldermask wetting	No	Yes	Conformal coating Dyne
IPC	Class 2	Class 3	Class 3 with 2 microsections
ISO, PPAP, EX	Yes	Yes	ISO 9001:2015
Medical products	Yes	Yes	Control plan for medtech
Defence & aerospace	No	Yes	Strategic products registered
GHz, radar, Gigabit	Yes	Yes	Get in touch with our sales
Impedance measurement	Yes	Yes	Measurement result as additional
Low resistance MilliOhm	No	Yes	Measurement as additional
High voltage test	No	Yes	Up to 12 kV after confirmation

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Capability – Technical PCB properties for MMAB Group

BASIC INFORMATION	Standard	Special- Advanced
Layer count rigid boards	1-12 layer	14-32 layer
Base material rigid boards	FR-4 low, mid, high Tg Halogen free, Aluminium	RF-material PTFE, thermoset ceramic filled, mixed dielectric polyimide, FR2, CEM3, Glass
Flex & Flex-rigid	2-6 layers	6-14 layers
Mixed dielectric	Yes FR4+thermoset	Yes FR4, thermoset, PTFE
Aluminum based pcb	Single sided IMS 2-4 W/mK	
Copper based pcb	Single sided up to 390 W/m-k	
CEM3 White	Thermal conductive 1-2 W/m-k	
Antennas & domes	Yes	3000 mm in length
DIMENSIONS	Standard	Special- Advanced
Dielectric innerlayer min.	0,1 mm	0,05 mm
Board thickness	0,4-2,4 mm	0,1-7,0 mm
Board thickness tolerance	+/-10%	+/-10%
Board size max	500x600 mm	600x1000 mm
COPPER & PATTERN	Standard	Special- Advanced
Track & gap ($\leq 35 \mu\text{m}$ cu)	0,1/0,1 – 0,15/0,15 mm	0,05/0,05 – 0,075/0,075 mm
Copper thickness innerlayer	Nom. 18 μm , 35 μm , 70 μm	Nom. 105 μm , 120 μm , 140 μm
Copper thickness outerlayer	Nom. 35 μm , 70 μm , 105 μm	Nom. 120 μm , 140 μm , 210 μm
Min. BGA pitch	0,65 mm	0,4 mm
FINAL FINISH	Standard	Special- Advanced
Final finish	HASL, OSP, ENIG, Hard gold, Immersion tin, Immersion silver	ENEPIG, Flash gold, Carbon ink Selective ENIG+OSP, Ni-Pa
SOLDERMASK	Standard	Special- Advanced
Soldermask	Green, black, white	Yellow, red, blue, matte/glossy
Soldermask thickness	8-40 μm	8-40 μm
Soldermask bridge/dam	0,1 mm	0,05 mm
Legend/ silk screen	White, black	Yellow
Hole plugging	Soldermask plugging	Epoxy resin plugging
Temporary masking	Kapton tape, peelable mask	Kapton tape, peelable mask

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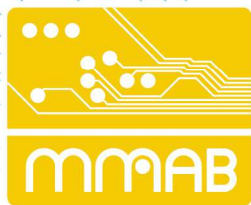
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Capability – Technical PCB properties for MMAB Group

VIAHOLES	Standard	Special- Advanced
Via through hole finished	0,2-0,3 mm	0,15 mm
Via through hole tolerance	+/-0,1 mm	+/-0,05 mm
Aspect ratio through hole	8:1	12:1
Blind & buried vias	Yes	Staggered, stacked
HDI microvia rigid boards	2 + n + 2	4 + n + 4
Microvia diameter	0,1 – 0,15 mm	0,075-0,05 mm
Cap plated vias – via in pad	No	Plugged overplated IPC type VII
Copper filled microvia	No	Yes
MECHANICAL	Standard	Special- Advanced
Routing tolerance	+/-0,15 mm	+/-0,1 mm
Routing radius	1,2 mm (2,4 mm router bit)	0,4 mm min (0,8 mm router bit)
V-cut tolerance	+/-0,15 mm	+/-0,1 mm
V-cut angle	30°	20°, 30°, 45°, 60°
Edge plating and slots	Yes	Min. 0,45 mm width
Z-axis routed cavities	Yes	Yes
Countersunk holes	Yes	Yes
Bevelled edges	Yes	Yes
FLEX & FLEX-RIGID	Standard	Special- Advanced
Flex layer count	1-2 layers	4-10 layers
Flex-rigid layer count	4-6 layers	14 layers
Flex & flex-rigid microvia	No	Yes
Flex thickness minimum	0,1-0,3 mm	0,05 mm
TEST & APPROVALS	Standard	Special- Advanced
Impedance control	+/-10%	+/-5%
UL-approval	Yes	UL Canada
IPC	Class 2	Class 3
Quality management	ISO9001, 14001, TS16949	ISO9001, 14001, TS16949,13485

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