

CHC



LEADING THE FUTURE OF NEW MATERIAL

AMB Design rules

Version V3/2025 issued in April 2025.



CONTENT

AMB Design rules

1. Material

1.01. Available ceramic types and thicknesses	02
1.02. Copper thicknesses (OFH-Cu)	02

2. AMB design features

2.01. Combinations	03
2.02. Layout design rules	03
2.03. Tolerance	04
2.04. Etching properties	04
2.05. Mismatch copper pattern front/back	04
2.06. Laser scribing and holes	05
2.07. Chipping at ceramic edge	05
2.08. Warpage	05

3. Additional

3.01. Ni/Ag/NIAG/ENIG/ ENEPIG	06
3.02. Surface roughness	06
3.03. Solder mask	06
3.04. Half etching	07
3.05. Grinding	07
3.06. QR Code	07

4. Quality properties

4.01. Solderability	08
4.02. Wire bondability	08
4.03. Temperature cycle	08
4.04. Other physical properties	09



1 Material

1.01. Available ceramic types and thicknesses

Types	Ceramic thickness (mm)				
	0.25	0.32	0.38	0.635	1.0
AlN			√	√	√
Si ₃ N ₄	√	Δ			

Note:

Other thicknesses on request.

1.02. Copper thicknesses (OFH-Cu)

Copper thickness (mm)				
0.2	0.25	0.3	0.4	0.5
				0.8

2 AMB design features

2.01. Combinations

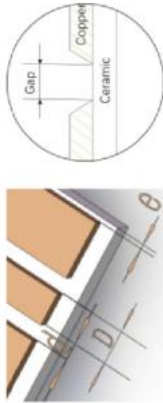
- Standard Mastercard dimension: 138x190.5±2mm

Ceramic Thicknesses mm	Copper thicknesses (mm)							
	0.2	0.25	0.30	0.4	0.5	0.8		
0.25	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄
0.32	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄
0.38	AlN	AlN	AlN	AlN				
0.635	AlN	AlN	AlN	AlN				
1.0	AlN	AlN	AlN	AlN				

2.02. Layout design rules

- Max. usable Cu area: 127X178mm (standard)

Item	Copper thicknesses (mm)							
	0.20	0.25	0.30	0.40	0.50	0.80		
Min. Conductor width (D)	0.40	0.50	0.50	0.60	0.60	1.0		
Min. Spacing (d)	0.35	0.50	0.50	0.60	0.60	1.0		
Min. Copper free perimeter (e)	0.30	0.30	0.30	0.40	0.45	0.5		



Note:

All measurements are taken at ceramic and copper interface unless otherwise noted.

2.03. Tolerance

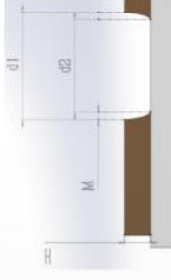
Item	Copper thicknesses (mm)							
	0.20	0.25	0.30	0.40	0.50	0.80		
Layout tolerance	±0.15	±0.20	±0.20	±0.25	±0.30	±0.35		

Item	Ceramic thicknesses (mm)				
	0.25	0.32	0.38	0.635	1
Thickness tolerance		±0.04		±0.07	±0.1
Laser hole tolerance			±0.15		

Item	Product tolerance (mm)	
	-0.05mm~+0.2mm	-10% ~ +7%
overall dimension		
Total thickness tolerance		

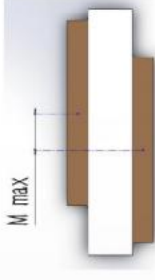
2.04. Etching properties

Etching factor	=H/M	
	≥2	



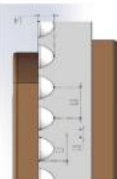
2.05. Mismatch copper pattern front/back

Item	Mismatch copper pattern front/back (center)	
	Mmax	≤0.15mm

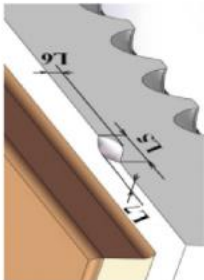


2.06. Laser scribing and holes

- Laser scribing

Type	Code name				Figure
L1	L2	L3	L4		
Typical value (mm)					
Fiber laser	≤0.10	0	0.06±0.02	0.25* $T_{\text{ceramic}} \geq L4$ ≥0.45* T_{ceramic}	
● Drilled holes					
Type	Code name				Figure
L8					
Typical value (mm)					
drilled hole diameters	≥0.5mm				

2.07. Chipping at ceramic edge

	Length L5	max. 1 x ceramic thickness
	Width L7	max. 1/2 x copper free perimeter
	Depth L6	max. 1/2 x ceramic thickness

2.08. Warpage

- The warpage value of single substrate cannot be guaranteed in advance due to the impact from various pattern design. Typical value shall be determined by both parties after sample delivery.

3 Additional

3.01. Ni/Ag/NIAG/ENIG/ENEPIG

Item	Thickness
Ni	3-7um (8% ±2% P)
Ag	0.1-0.6um
NiAg	Ni: 3-7um (8% ±2% P) Ag: 0.3-0.6um
ENIG	Ni: 3-7um (8% ±2% P) Au: 0.01-0.05um
ENEPIG	Ni: 3-7um (8% ±2% P) Pd: 0.05-0.18um ; Au: 0.05-0.15um

Note:

Other surface treatments are available on request, such as partial electroless plating.

3.02. Surface roughness

Item	Value
Ra	< 1.5um
Rz	< 10 μm
Rmax	50um

Note:

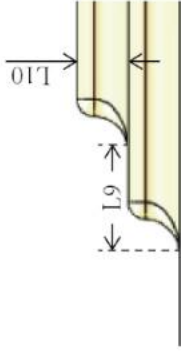
Customized roughness on request.

3.03. Solder mask

Min.	Location tolerance	Size tolerance	Condition
0.3mm@Typical	±0.2mm	±0.10mm	Typical 288°C 10s
0.4mm@Cu edge	±0.2mm	±0.20mm	Optional 350°C 60s

3.04. Half etching

Min.(L9)	Location tolerance	Size tolerance	Depth& tolerance (L10)
0.2mm@Typical	±0.1mm	±0.15mm	50%*Copper thicknesses &±0.05mm
0.3mm@Cu edge			



3.05. Grinding

Item	Value
Ra	0.1 um~1 um

Note:

Customized roughness on request.

3.06. QR Code

QR Code Size	Size tolerance	Location tolerance	Depth	Condition
>2.5*2.5mm <5.0*5.0mm	±0.15mm	±0.15mm	5~20um	(Cu edge@>0.2mm)

4 Quality properties

4.01. Solderability

Standard



- >95% Solder preforms Sn / Ag 3.5 / Cu0.5+Ni, Ge 100% H₂

4.02. Wire bondability

Standard (pull-test)



- 300µm Aluminium wire AH11
- shear speed 500µm/s
- shear height 10µm
- shear force ≥1000gf
- 50% Aluminium residue on AMB after shear test

4.03. Temperature cycle

Ceramic	Combination	Cycles	Condition
AlN	0.30/0.635/0.30	≥60*	-55°C, +150°C
Si3N4	0.30/0.32/0.30	≥4000*	

*with CHC Standard AMB layout.

4.04. Other physical properties

Physical properties		Si ₃ N ₄	AlN
Copper peeling strength (typical Cu@0.3mm)		>10.0N/mm @50mm/min	>10.0N/mm @50mm/min
Application temperature		-55°C to +650°C depending on atmosphere (critical at H ₂ with >400°C)	
Bending strength (blank ceramic)		>700N/mm ²	>350N/mm ²
E-Modul (blank ceramic)		300Gpa	320Gpa
Coefficient of linear thermal expansion (blank ceramic)		2.5 ppm/K @ 40°C - 400°C	4.8 ppm/K @ 40°C - 400°C
Thermal conductivity		80W/mK@25°C	170-180W/mK@25°C
Volume resistivity		>10 ¹⁴ Ωcm@25°C	>10 ¹⁴ Ωcm@25°C
Dielectric constant		8.0±10%@1MHz	9.0±10%@1MHz
Dielectric loss		0.001@23°C, 1MHz	0.003@23°C, 1MHz
Dielectric strength (DC)		>20kV/mm	>20kV/mm
Electrical conductivity of copper surface		58x10 ⁶ S/m	

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