AMB (Active metal Brazing) Load Substrate

1. Raw Material Performance

1.1 Ceramic Chip

Item	Unit	Si_3N_4	AlN	WITH ZTA	BeO
Density	g/m³	3.2	3.3	4.0	3.0
Heat conductivity	W/m.K@25℃	≥80	≥170	≥27	≥250
Coefficient of linear expansion	$X10^{-6}$/K (20℃-300℃)	≤2.6	≤4.3	≤7.5	≤9
Flexural strength	MPa	≥700	≥450	≥500	≥190
Dielectric strength	KV/mm	≥15	≥15	≥15	≥15
Dielectric loss	1MHz	0.0003	0.0003	0.0003	0.0003
Dielectric constant	1MHz	9	9	10.5	6.9
Resistivity	Ω·cm@ 20 °C	10^{14}	10^{14}	10^{14}	10^{14}
Young modulus	Gpa	320	320	310	-

1.2 Copper Sheet

Item	Unit	Function
Thickness	mm	0.127/0.2/0.25/0.3/0.4/0.5/0.8
Oxygen content	%	≤0.001
Surface hardness	HV3	90-120（After covering copper：45-55）
Conductivity	MS/m	58.6

1.3 Standard Material Thickness Combination

	0.127mm	0.2mm	0.25mm	0.3mm	0.4mm	0.5mm	0.8mm
0.25mm	AlN/Si3N4	AlN/Si3N4	AlN/Si3N4	AlN/Si3N4	AlN/Si3N4	AlN/Si3N4	AlN/Si3N4
0.32mm	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA	AlN/Si3N4/ZTA
0.38mm	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO
0.635mm	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO
1.0mm	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO
2.0mm	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO	AlN/Si3N4/BeO

*Si_3N_4 ceramic thickness can be customized.

Copper sheet thickness

Ceramic chip thickness

2 AMB Load Substate Performance and Specification

2.1 AMB Load Substrate Performance

Item	Unit	Performance	Noted
Firing cavity rate	%	0.5%	The resolution is 350 μm
Copper foil peeling strength	N/mm	⩾10	—
Surface roughness （Ra）	μm	Ra⩽1.5μm ; Rz⩽10μm ; Rmax=50μm	—
Surface coating	μm	OSP：Nanoscale organic antioxidant film which does not change the copper color Chemical nickel:Nickel-thick 2-8um(Medium phosphorus is 6% -10%) Chemical silver:0.1-1um Nickel gold: nickel thickness 2-8um; gold thickness: 0.01-0.1um Nickel-palladium: nickel thickness 2-8um (medium-phosphorus 6% -10%); Palladium thickness: 0.05-0.15um; gold thickness: 0.01-0.1um	
Circuit Area Insulation Voltage	KV	≥3.5（AC)	In the transformer oil, the copper layer spacing is 1mm
Insulation resistance	GΩ	≥10	—
Thermal shock	cycle index	Other coppered ceramic AMB is not less than 100 times, @ test condition-45°C - 125°C -30min (1hr / cycle) Coppered Si_3N_4 AMB is not less than 3000 times @ Test condition-55°C - 150°C -30min (1hr / cycle)	Use the company's internal figure for measurement, and different graphic designs may affect the test results.

2.2 Delivery Method

Monomer	Minimum size 4 * 4mm edge length which can be adjusted according to the requirements
Big board	Laser cut or non-cut; defective mark, 178X127 ± 0.1 (edge removal), 138 * 190 ± 0.1 (no edge)

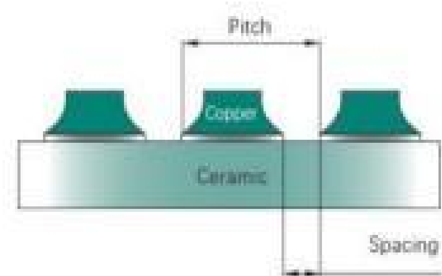
2.3 Welding

Graphics width	Minimum 0.3mm (± 0. 15mm)
Position tolerance	±0.1mm
Minimum spacing between weld resistance figures	⩾0.3mm
Minimum distance between weld resistance edge and copper sheet edge	⩾0.1mm
Thermostability	Not more than 320°C -10s (tested according to IPC-TM-650,2.6.8)

3.Design Features

3.1 Drawing Minimum Width / Spacing Size / Etching Factor

Copper thickness	Width(mm)		Space（mm)		Etching factor	Pitch(mm)
	Top width	Bottom width	Top space	底距 Bottom space		
0.127	0.10	0.20	0.25	0.20	≥3	0.40
0.2	0. 12	0.25	0.35	0.30	≥5	0.60
0.3	0.15	0.35	0.50	0.40	≥5	0.80
0.4	0.20	0.40	0.60	0.45	≥3.5	0.90
0.5	0.25	0.50	0.75	0.50	≥3	1.0
0.8	0.30	0.50	1.10	0.80	≥3	1.6



3.2 Etching Tolerance

Copper thickness（mm)	Etching tolerance
0.1~0.2	±0.15mm
0.3~0.4	±0.2mm
≥0.5	±0.25mm

3.3 Minimum-Value Aperture

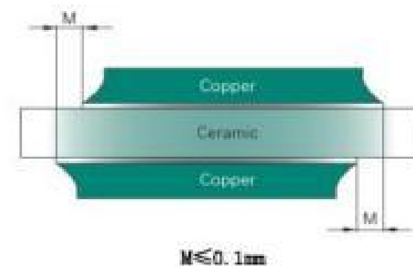
Copper thickness	Aperture**(mm)**-Top size	
	Full penetration	Without full penetration
0.127	≥0.25	≤0.10
0.2	≥0.45	≤0.30
0.3	≥0.60	≤0.40
0.4	≥0.80	≤0.60
0.5	≥1.0	≤0.7
0.8	≥1.6	≤1.0

3.4 Ceramic Blank

Copper thickness	Blank space size A(mm)
≤0.2mm	A≥0.2mm
≤0.3	A≥0.3mm
≥0.4	A≥0.4mm

3.5 Misaligned Copper Graphic Front And Back

Misaligned front and back
M≤0.1mm



3.6 Ceramic Rounded Corners / Chamfer Minimum Size

Rounded corners	Minimum size	Chamfer	Minimum size
	≥0.5mm		≥0.5*0.5mm

3.7 Dimensional Tolerance

Length and width dimensions tolerance	±0.1mm
Main board dimension	138*190mm +/-1.5%
Distance between copper edge to ceramic edge	±0.1mm
Aggregate thickness	+/-6%
Laser through-hole diameter	±0.05mm
Laser line depth	+/-30um

3.8 Warping tolerance

The warping of AMB small or parent version cannot be guaranteed,and based on the combination of copper / porcelain thickness, the volume ratio of copper pieces on front and back, and the aspect ratio of different sizes. Warping (not 100% inspection) can only be determined after the first sample shipment.

Remarks:

1) If warping is important to the product, please indicate it on the drawings or inform us.

2) If the initial number of samples is insufficient for analysis, it is recommended to determine after collecting more than two batches of data.

3) Warping (not 100% inspection) can only be determined after the first sample shipment.