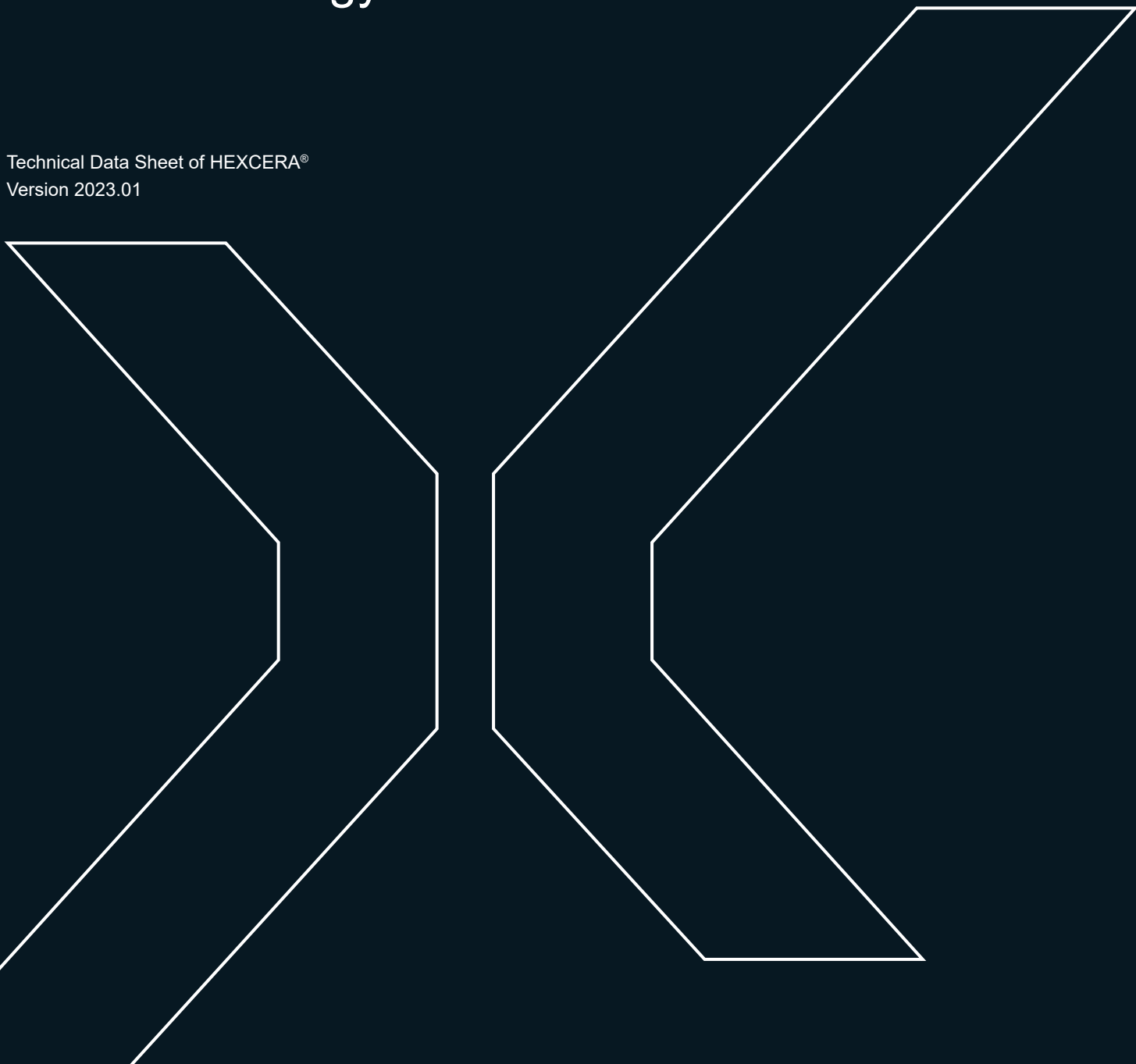


HEXCERA® 瀚思瑞

HEXCERA® Ceramic Substrate

AMB Technology

Technical Data Sheet of HEXCERA®
Version 2023.01



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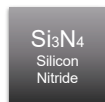
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I 01 Available Materials

1.01 Available Ceramic Materials / Thicknesses



0.25 0.32



0.38 0.63 1.00

* Unit: mm

* For special thicknesses, pls on request.

1.02 Available Copper (Standard)



0.20 0.25 0.30 0.40 0.50 0.80































0.20 0.25 0.30 0.40




* Unit: mm

* For special thicknesses, pls on request.

I 01 Available Materials

1.03 Copper / Ceramic Combination Matrix

		Ceramic Thicknesses (Unit:mm)				
		0.25	0.32	0.38	0.63	1.00
Copper Thicknesses (Unit:mm)	0.20					
	0.25					
	0.30		 	 	 	
	0.40			-		
	0.50			-	-	
	0.80		 	-	-	-

 Si₃N₄
 AlN
 Standard Combinations

* For the difference between front and back copper thicknesses shall not exceed 0.15mm@ Si₃N₄ cluster; 0.10mm@ AlN cluster.

* For special combinations, pls contact us.

I 02 General Tolerances

2.01 Dimension Tolerances

Ceramic Dimension	±1.5% @width & length
Product Dimension	+0.2/-0.05mm
Total Thickness	+7%/-10%
General Etching Spacings	Refer to 3.06 for details
Copper free Edge Perimeter	Refer to 3.02 for details
Solder Stop Pattern	±0.2mm
Solder Stop Position	±0.2mm
Laser Scribing Through Hole	±0.15mm @Ceramic thickness≤0.63mm ±0.20mm @Ceramic thickness>0.63mm

2.02 Max. Usable Area

Laser Scribed	127*178mm
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* For dimension may exceed 127mm or 178mm, pls on request.

2.03 Delivery Form

Master Card	Laser scribed 127*178mm
	Laser scribed 138*190mm without margin separation
Single Snap	Min.15*15mm, smaller on request

2.04 Warpage

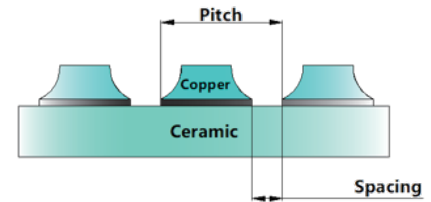
Warpage cannot be guaranteed due to different pattern layout, warpage can be specified after first batch sample delivery, for ultimate warpage control value, which needs sufficient data support (to be determined after 4-5 lots).

I 03 Design Features

3.01 Conductor Dimensions Width/Pitch

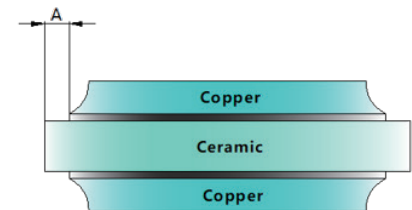
Cu-Thickness	Spacings	Min.Pitch
0.20mm	0.35mm	0.70mm
0.25mm	0.40mm	0.80mm
0.30mm	0.45mm	0.90mm
0.40mm	0.50mm	1.00mm
0.50mm	0.60mm	1.20mm
0.80mm	1.00mm	2.00mm

* Above values were measured at the interface of ceramic and solder layer.
For upper copper surface dimension which would follow 3.03 etching factor principle, for upper copper surface dimension pls contact us.



3.02 Copper Free Edge Perimeter

Cu-Thickness	A
0.20mm	$A \geq 0.2\text{mm}$
0.25mm	$A \geq 0.25\text{mm}$
0.30mm	$A \geq 0.30\text{mm}$
0.40mm	$A \geq 0.40\text{mm}$
0.50mm	$A \geq 0.45\text{mm}$
0.80mm	$A \geq 0.50\text{mm}$

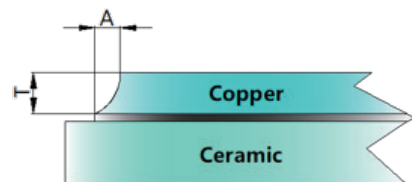


* Above values were measured at the interface of ceramic and solder layer.

3.03 Etching Factor

Etching Factor	$F = T/A > 2$
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* Above values were measured at the interface of ceramic and solder layer.

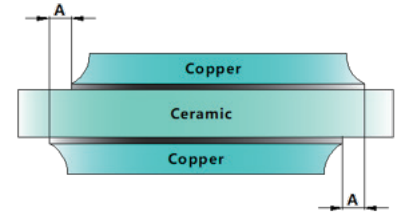


I 03 Design Features

3.04 Positional Misalignment Front/Back

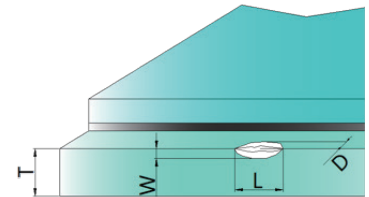
Distance (A)	$A \leq 0.2\text{mm}$
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* Above values were measured at the interface of ceramic and solder layer.



3.05 Ceramic Edge Chip Off

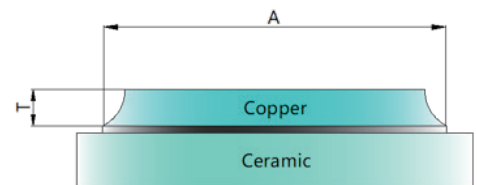
Items	T (Ceramic Thickness)
Length(L)	Max. $1\text{mm} \cdot T$
Width(W)	Max. $1/2\text{mm} \cdot T$
Depth(D)	Max. $1/2\text{mm} \cdot T$



3.06 General Etching Tolerance

Cu-Thickness	A
0.20mm	$\pm 0.15\text{mm}$
0.25mm	$\pm 0.20\text{mm}$
0.30mm	$\pm 0.20\text{mm}$
0.40mm	$\pm 0.25\text{mm}$
0.50mm	$\pm 0.30\text{mm}$
0.80mm	$\pm 0.35\text{mm}$

* Above values were measured at the interface of ceramic and solder layer.



I 04 Surface Properties

4.01 Roughness

Ra	≤1.5μm
Rz	≤10μm
Rmax	≤50μm

* Lower Roughness on request.

4.02 Surface Plating

Available Surface Treatment	Available Range	Proposal Thickness
Bare Copper	—	—
Anti-Oxidation Layer	—	—
Electroless Ni	2-10μm (5-9%P content)	3-7μm (5-9%P content)
Electroless Au/Ni	Au:0.01-0.1μm Ni:2-10μm	Au:0.03-0.08μm Ni:3-7μm
Electroless Ag	0.3-1.0μm	0.3-0.6μm

4.03 Solder stop

Pattern Min. Width	0.3mm
Min Spacing between Solder stop patterns	0.4mm
Temperature resistance	≤320°C/10s (test in acc. with IPC-TM-650,2.6.8)
Min Spacing between pattern edge to Copper edge	≥0.2mm

* Solder stop design is based on copper surface dimension reference, for design reference point at the interface of ceramic and copper, pls be aware of min. spacing between pattern edge to copper edge due to the etching factor influence.

I 05 Performance Index

5.01 Peeling Strength

Si ₃ N ₄	>10N/mm
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AlN >10N/mm

* Hexcera test condition: @50mm/min @0.4mm Cu-thickness.

5.02 Application Temperature

Temperature Range	-55°C — +650°C
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* Depending on different time and atmosphere.

5.03 Solderability

Criteria	Condition
>95%	95.5%Sn/4.0%Ag/0.5%Cu under N ₂ +HCOOH

5.04 Lifetime with Different Design

Material	Test Combination	Normal Pattern	With edge steps
Si ₃ N ₄	0.3/0.32/0.3	5000	TBD
AlN	0.3/0.63/0.3	100	TBD

* Test Condition -55°C~+150°C,hot/cold chamber system,15min at min/max. Transfer time <30s. Above results were tested under using Hexcera internal layout, different design layout may influence the test results.

5.05 Thick Wire Bondability

Criteria	Condition
Shearing strength≥1000gf Aluminium residue after shearing≥50%	Al wire 300um, Shear speed 500um/s, Shear height≤30um

I 05 Performance Index

5.06 Ceramic Physical Performance

Items/Materials	Si ₃ N ₄	AlN	Unit
Density	3.22	3.3	g/cm ²
Thermal Conductivity	≥80	≥170	W/m.k
Coefficient of thermal expansion	2.5@20~300°C	4.7@500°C	×10 ⁻⁶ /K
Dielectric Loss	≤10×10 ⁻⁴	≤5×10 ⁻⁴	1MHz
Dielectric Constant	8.0	9.0	1MHz
Dielectric Strength	≥20	≥20	KV/mm
Electrical resistivity	>10 ¹⁴	>10 ¹⁴	Ω-cm
E-Modulus	320	300	Gpa
Bending Strength(Σ0,M>10)	≥700	≥350	Mpa

5.07 Copper Physical Performance

Items	Parameter	Unit
Purity	99.99	%
O ₂ Content	OFHC	—
Hardness	60-110	HV
Electric Conductivity	58.6	MS/m

* Hardness item is being monitored at raw material period.

I 05 Performance Index

5.08 Shelf Life and Storage Condition

Shelf Life	Proposal Storage Condition
180 days	room temperature (20°C—30°C) Humidity (40%—60%) Vaccum package

* Package unsealed products, due to variouty enviornmental conditions, pls use them ASAP.
For unsealed products, N2 gas cabinet is recommended for storage.

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