

HEXCERA® 瀚思瑞

HEXCERA® Ceramic Substrate

DCB Technology

Technical Data Sheet of HEXCERA®
Version 2023.01



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01 Available Materials

1.01 Available Ceramic Materials / Thicknesses



0.25 0.38 0.50 0.63 0.76 1.00



0.25 0.32



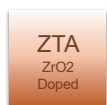
0.38 0.50 0.63 1.00

*Unit: mm

1.02 Available Copper (Standard)



0.127 0.20 0.25 0.30 0.40



0.127 0.20 0.25 0.30 0.40



0.127 0.20 0.25 0.30

*Unit: mm

I 01 Available Materials

1.03 Copper / Ceramic Combination Matrix

		Ceramic Thicknesses (Unit:mm)								
		0.25	0.32	0.38	0.50	0.63	0.76	1.00		
Copper Thicknesses (Unit:mm)	0.127	 	 	 	 	 		 	 	
	0.2	 	 	 	 	 		 	 	
	0.25	 	 	 	 	 		 	 	
	0.30	 	  	  	 	  		 	 	
	0.40	-		-				 	 	

* For the difference between front and back copper thicknesses shall not exceed 0.1mm.
For special combinations, pls contact us.

I 02 General Tolerances

2.01 Dimension Tolerances

Ceramic Dimension	$\pm 1.5\%$ @width & length
Product Dimension	+0.2/-0.05mm
Copper Thickness	+/-0.02mm
Total Thickness	+7%/-10%
General Etching Spacings	$\pm 0.15\text{mm}$ @Copper thickness $\leq 0.3\text{mm}$
	$\pm 0.20\text{mm}$ @Copper thickness=0.4mm
Copper free Edge Perimeter	$\pm 0.15\text{mm}$ @Copper thickness $\leq 0.3\text{mm}$
	$\pm 0.20\text{mm}$ @Copper thickness=0.4mm
Solder Stop Pattern	$\pm 0.2\text{mm}$
Solder Stop Position	$\pm 0.2\text{mm}$
Laser Scribing Through Hole	$\pm 0.15\text{mm}$ @Ceramic thickness $\leq 0.63\text{mm}$
	$\pm 0.20\text{mm}$ @Ceramic thickness $> 0.63\text{mm}$

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

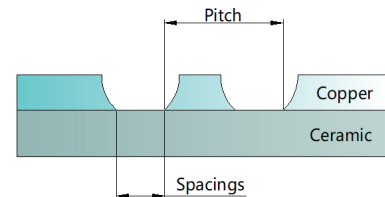
Warpage cannot be guaranteed due to different pattern layout, warpage can be specified after first batch sample delivery, for ultimate warpage control value, which needs sufficient data support (to be determined after 4-5 lots).

03 Design Features

3.01 Conductor Dimensions Width/Pitch

Cu-Thickness	Spacings	Min.Pitch
0.127mm	0.35mm	0.70mm
0.20mm	0.40mm	0.80mm
0.25mm	0.45mm	0.90mm
0.30mm	0.50mm	1.00mm
0.40mm	0.60mm	1.20mm

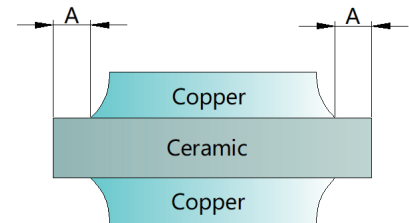
* Above values were measured at the interface of ceramic and copper.
For upper copper surface dimension which would follow 3.03 etching factor principle,
for upper copper surface dimension pls contact us.



3.02 Copper Free Edge Perimeter

Cu-Thickness	A
≤0.20mm	≥0.2mm
≤0.30mm	≥0.3mm
≤0.40mm	≥0.4mm

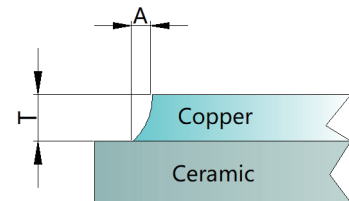
* Above values were measured at the interface of ceramic and copper.



3.03 Etching Factor

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

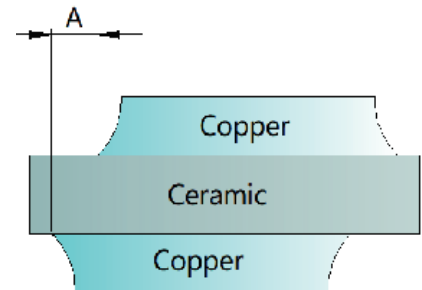


I 03 Design Features

3.04 Positional Misalignment Front/Back

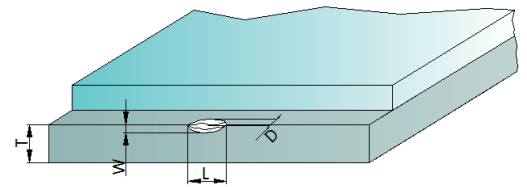
Distance (A) $A \leq 0.2\text{mm}$

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



3.05 Ceramic Edge Chip Off

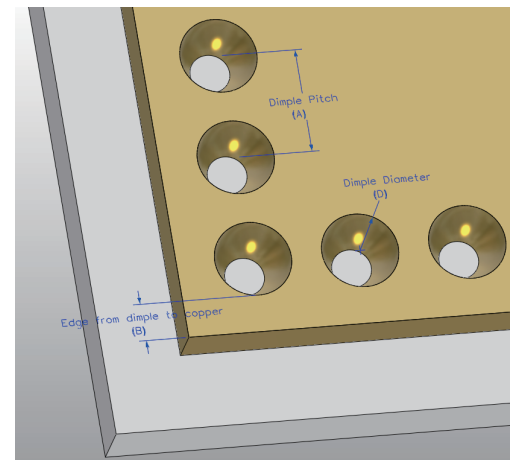
Items	T (Ceramic Thickness)
Length(L)	Max. $1\text{mm} \times T$
Width(W)	Max. $1/2\text{mm} \times T$
Depth(D)	Max. $1/2\text{mm} \times T$



3.06 Dimple Design

Cu-Thickness	D	A	B
0.127mm	0.35mm	0.50mm	0.18mm
0.20mm	0.45mm	0.65mm	0.20mm
0.25mm	0.50mm	0.70mm	0.20mm
0.30mm	0.60mm	0.80mm	0.20mm
0.40mm	0.70mm	1.00mm	0.25mm

* Dimple design is for lengthening life cycles, for individual damage would not influence life time, damage within 3% is acceptable, any special request pls on request.



I 04 Surface Properties

4.01 Roughness

Ra	≤3μm
Rz	≤16μm
Rmax	≤50μm

* Lower Roughness on request.

4.02 Surface Plating

Available Surface Treatment	Available Range	Proposal Thickness
Bare Copper	—	—
Anti-Oxidation Layer	—	—
Electroless Ni	2-8μm (6-10%P content)	3-7μm (6-10%P content)
Electroless Au/Ni	Au:0.01-0.1μm Ni:2-8μm	Au:0.03-0.08μm Ni:3-7μm
Electroless Ag	0.1-0.6μm	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, please 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

Al ₂ O ₃	>5N/mm
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AlN >4N/mm

* Hexcera test condition: @50mm/min @0.3mm Cu-thickness.

5.02 Application Temperature

Temperature Range	-55°C — +850°C
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* Depending on different time and atmosphere, critical at H₂ with >400°C

5.03 Void

Layout Side	No visible void at bonding area Void diameter ≤φ2mm at soldering area
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Back Side Void diameter ≤φ3mm

5.04 Solderability

Criteria	Condition
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>95% 95.5%Sn/4.0%Ag/0.5%Cu under N₂+HCOOH

5.05 Lifetime with Different Design

Material	Test Combination	w/o dimple	With Dimple	With edge steps
Al ₂ O ₃	0.3/0.38/0.3	50	70	550
ZTA	0.3/0.32/0.3	150	250	1200+
AlN	0.3/0.63/0.3	35	50	200+

* 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.

I 05 Performance Index

5.06 Thick Wire Bondability

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

5.07 Ceramic Physical Performance

Items/Materials	Al ₂ O ₃	ZTA	AlN	Unit
Content	96	85-90% Al ₂ O ₃ 10% ZrO ₂	—	%
Density	3.7	3.95	3.3	g/cm ²
Thermal Conductivity	>24	>27	>170	W/m.k
Coefficient of thermal expansion	6.2—6.8 @200°C 7.0—7.4 @400°C	<7.1 @20—300°C <8.0 @300—600°C	4.5—5.5 @500°C	×10 ⁻⁶ /K
Dielectric Loss	$\leq 3 \times 10^{-4}$	$\leq 3 \times 10^{-4}$	$\leq 4.5 \times 10^{-4}$	1MHz
Dielectric Constant	9-10	10-12	8.5-9.5	1MHz
Dielectric Strength	≥ 20	≥ 20	≥ 20	KV/mm
Electrical resistivity	$> 10^{14}$	$> 10^{14}$	$> 10^{14}$	Ω-cm
E-Modulus	340	310	320	Gpa
Bending Strength ($\Sigma 0, M > 10$)	≥ 400 @thickness ≤ 0.635 ≥ 300 @thickness > 0.635	≥ 625	≥ 350	Mpa

I 05 Performance Index

5.08 Copper Physical Performance

Items	Parameter	Unit
Purity	99.99	%
O ₂ Content	OFHC	—
Hardness	90-110	HV
Electric Conductivity	58.6	MS/m

* Hardness item is being monitored at raw material period.

5.09 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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