

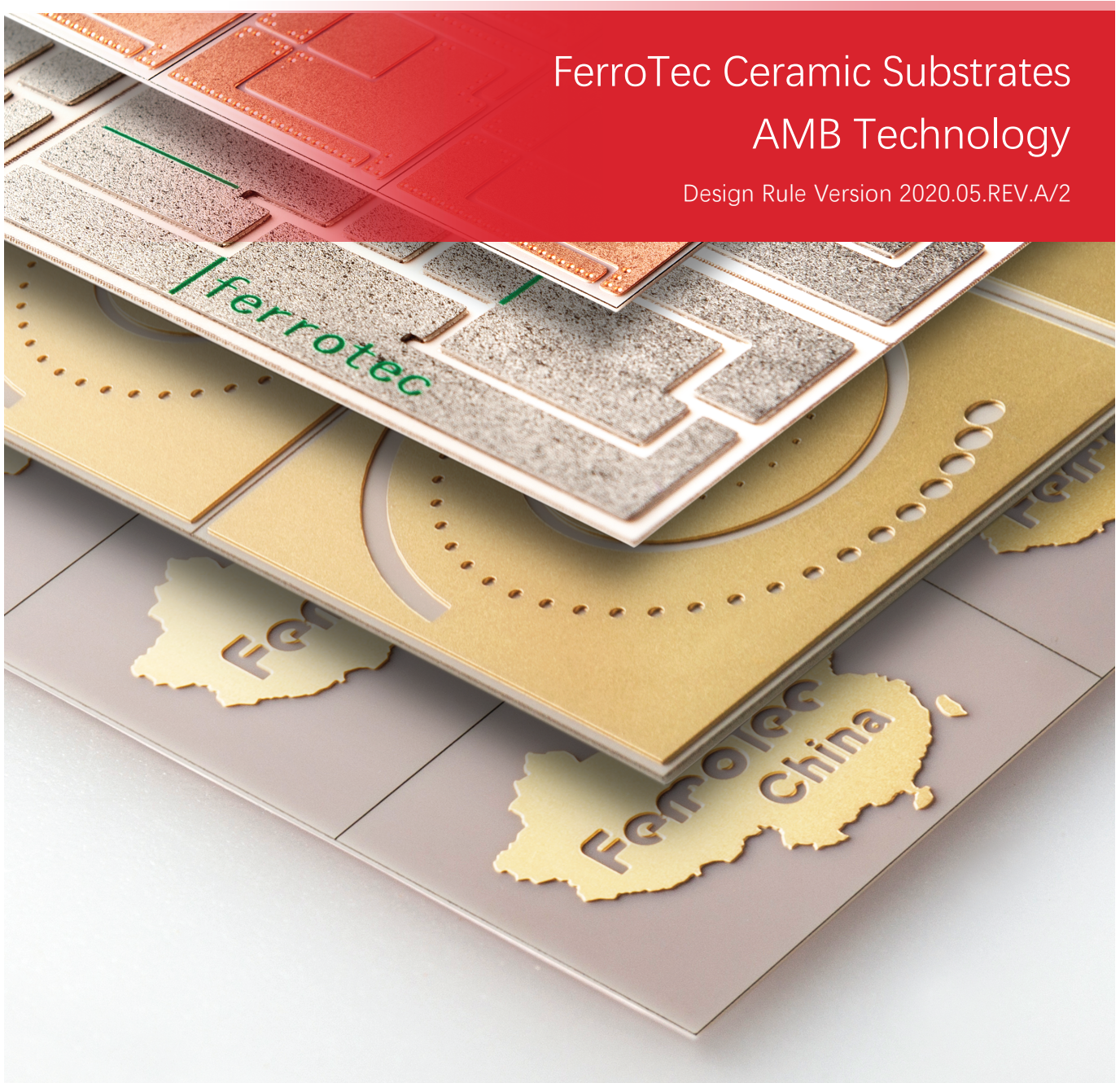
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Made in China



FerroTec Ceramic Substrates AMB Technology

Design Rule Version 2020.05.REV.A/2



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MATERIAL PROPERTIES

— 1.01 AVAILABLE CERAMIC TYPES AND PROPERTIES

Items/Types	AlN Aluminum Nitride	Si ₃ N ₄ Silicon Nitride	Unit
Density	3.3	3.22	g/m ³
Thermal Conductivity	>170	80	W/m.K
Coefficient of Thermal Expansion	4.7 (20°C~300°C)	2.5 (20°C~300°C)	x10 ⁻⁶ /K
Bending Strength (Σ0,M>10)	>350	>700	MPa
Dielectric Loss	0.0005	<0.001	1MHz
Dielectric Constant	9.0	8.0	1Mhz
Dielectric Strength	>20	>20	KV/mm
Electrical Resistivity	>10 ¹⁴	>10 ¹⁴	Ω·cm
E-Modulus	320	300	Gpa

— 1.02 COPPER PROPERTIES

Items	Parameters	Unit
Purity	99.99	%
O ₂ Content	OFHC	-
Hardness	60~110	HV
Electrical Conductivity	58.6	MS/m

— 1.03 AVAILABLE CERAMIC TYPES/THICKNESSES

	AlN	Si ₃ N ₄
0.25mm	✓	✓
0.32mm		✓
0.38mm	✓	
0.63mm	✓	
1.0mm	✓	

— 1.04 COPPER THICKNESSES

0.20mm 0.25mm 0.30mm 0.40mm 0.50mm 0.80mm

— 1.05 AVAILABLE MATERIAL THICKNESS COMBINATIONS

	0.20mm	0.25mm	0.30mm	0.40mm	0.50mm	0.80mm	
0.25mm	Si ₃ N ₄ AlN	Si ₃ N ₄ AlN	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	CERAMIC THICKNESS
0.32mm	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	Si ₃ N ₄	COPPER THICKNESS
0.38mm	AlN	AlN	AlN	-	-	-	
0.63mm	AlN	AlN	AlN	AlN	AlN	-	
1.00mm	AlN	AlN	AlN	AlN	AlN	AlN	

Si₃N₄ Silicon Nitride
AlN Aluminium Nitride

Note:

*For discrepant copper thickness combination, on request.

*Front and back copper thickness discrepancy must less than 0.15mm.

GENERAL PROPERTIES

— 2.01 DIMENSIONAL TOLERANCES

Dimension Tolerance	+0.2/-0.05mm
Master Card	138*190mm +/-1.5%
Copper Edge to Ceramic Edge	+/-0.15mm
Total Thickness	+/-7%
Laser Through Hole Diameter	+/-0.1mm
Laser Depth	+/-30µm

— 2.02 MAX USABLE AREA

Laser scribed 127×178mm

— 2.03 DELIVERY FORM

Single Parts	Minimum dimension 15×15mm edge length,smaller on request
Master Card	With or without laser scribing; defect parts marked

— 2.04 WARPAGE

Warpage of single AMB or master cards cannot be guaranteed , due to several uncertain factors , e.g. copper/ceramic combinations , front and back side copper coverage , different aspect ratio of dimensions . Warpage (not 100% inspected) can be determined after initial sample delivery.

Note:

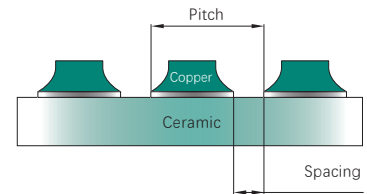
*If warpage is critical for products, please kindly remark on drawings or inform us.

*For the ultimate warpage, eg initial sample quantity is insufficient,not enough for analysis,FTS propose which will be determined after following two or three batches data being collected.

DESIGN FEATURES

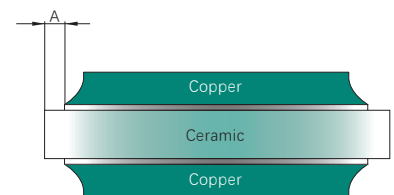
— 3.01 PATTERN MIN. WIDTH/SPACING DIMENSION

COPPER THICKNESS	MIN. SPACINGS	MIN. PITCH
0.20mm	0.35mm	0.7mm
0.25mm	0.40mm	0.8mm
0.30mm	0.50mm	1.0mm
0.40mm	0.60mm	1.2mm
0.50mm	0.70mm	1.4mm
0.80mm	1.00mm	2.0mm



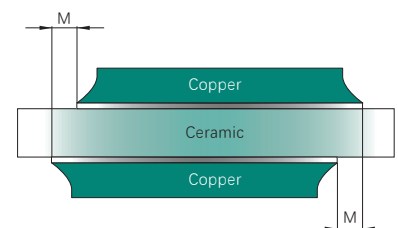
— 3.02 CERAMIC EDGE PERIMETER

COPPER THICKNESS	DISTANCE
0.20mm	$A \geq 0.20\text{mm}$
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	$A \geq 0.50\text{mm}$



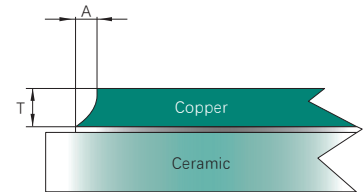
— 3.03 MISALIGNMENT COPPER PATTERN FRONT/BACK

DISTANCE
$M \leq 0.2\text{mm}$



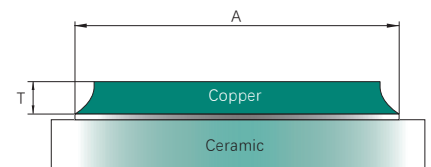
— 3.04 ETCHING FACTOR

ETCHING FACTOR
$F=T/A>2$



— 3.05 ETCHING TOLERANCE

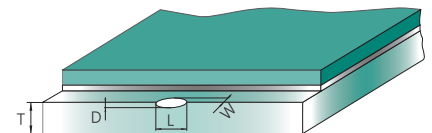
$A \pm 0.15\text{mm}$	@ $T \leq 0.20\text{mm}$
$A \pm 0.20\text{mm}$	@ $T \leq 0.25\text{mm}$
$A \pm 0.20\text{mm}$	@ $T \leq 0.30\text{mm}$
$A \pm 0.25\text{mm}$	@ $T \leq 0.40\text{mm}$
$A \pm 0.30\text{mm}$	@ $T \leq 0.50\text{mm}$
$A \pm 0.35\text{mm}$	@ $T \leq 0.80\text{mm}$



Note: Reference point is measured at bottom side of the copper.

— 3.06 CERAMIC EDGE CHIP OFF

Length: MAX. $1 \times T$
Width: MAX. $1/2 \times T$
Depth: MAX. $1/2 \times T$



— 3.07 CERAMIC THROUGH HOLE/CONTOUR

Min. hole diameter 1mm, smaller on request
Ceramic Arc shape or special contour on request

SURFACE PROPERTIES

— 4.01 COPPER SURFACE

SURFACE ROUGHNESS
$R_a \leq 1.5\mu\text{m}$; $R_z \leq 10\mu\text{m}$; $R_{\text{max}} = 50\mu\text{m}$

Note: Lower roughness on request.

— 4.02 SURFACE FINISH

Bare copper	-
Anti-oxidation	-
Electroless Ni	2~8 μm (6~10% P content)
Electroless NiAu	Au: 0.01~0.1 μm ; Ni: 2~8 μm
Electroless Ag	Ag: 0.1~0.6 μm

Note: Other thickness or special plating on request.

— 4.03 SOLDERMASK

Pattern width	Min. 0.3mm +/-0.2mm
Position tolerance	+/-0.2mm
Min. spacing between soldermask pattern	$\geq 0.3\text{mm}$
Min. Distance from soldermask edge to copper edge	$\geq 0\text{ mm}$ [copper thickness $\leq 0.3\text{mm}$] $\geq 1\text{mm}$ [copper thickness $> 0.4\text{mm}$]
Temperature resistance	$\leq 320^\circ\text{C}/10\text{s}$ (test in acc.with IPC-TM-650,2.6.8)

AMB SUBSTRATE PROPERTIES

— 5.01 PEELING STRENGTH

>10N/mm on AlN and Si₃N₄

Note: Ferrotec internal Test condition @ 50mm/min @0.4mm Cu-thickness.

— 5.02 APPLICATION TEMPERATURE

-55°C~+650°C depending on time and atmosphere

— 5.03 THERMAL CYCLE

>60cycles @AlN thickness 0.635mm; Copper thickness≤0.3mm

>2000cycles @Si₃N₄ thickness 0.32mm; Copper thickness 0.3mm

Condition: -55°C~+150°C,hot/cold chamber system,15min at min/max. Transfer time <30s.

Note: Tested by using Ferrotec internal layout,different design layout may influence the test result.

— 5.04 SOLDERABILITY

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

— 5.05 WIRE BONDING

Shearing strength≥1000gf
Aluminium Residue after shearing≥50%

Condition: Al wire 300μm; Shear speed 500μm/s; Shear height≤30μm.



Tel: +86-021-36160564

Fax: +86-021-36160484

This specification is only a reference for customized designs.
The parameters are standard . For any special needs please contact with us

Issued and designed by Chester Graces
Approved by Richard Zhou / Dr.Wang