# 产品规格书(AMB)
# Product Specification (AMB)

外发文件

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外发文件

## 材料介绍 Material

### 1.1.瓷片 Ceramic

| 项目<br>Items | 单位<br>Unit | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|---|
| 密度<br>Density | $g/cm^3$ | ≥3.3 | ≥3.22 |
| 粗糙度<br>Roughness　(Ra) | μm | ≤0.6 | ≤0.7 |
| 抗弯强度<br>Bending strength | Mpa | ≥450 | ≥700 |
| 线膨胀系数<br>Coefficient of thermal expansion | $10^{-6}$/K | 4.6~5.2<br>(40-400℃) | 2.5~3.1<br>(40-400℃) |
| 热传导率<br>Thermal conductivity | W/(m*K) | ≥170<br>(25℃) | ≥80<br>(25℃) |
| 介电常数<br>Dielectric constant | 1MHz | 9 | 9 |
| 介电损耗<br>Dielectric loss | 1MHz | $2*10^{-4}$ | $2*10^{-4}$ |
| 体阻抗<br>Volume resistivity | Ω*cm | $>10^{14}$<br>(25℃) | $>10^{14}$<br>(25℃) |
| 绝缘耐压<br>Dielectric strength | kV/mm | >20 | >15 |

### 1.2.物料厚度组合 Material thickness combination

| | | 铜箔 Copper thickness | | | | |
|---|---|---|---|---|---|---|
| | | 0.15mm | 0.25mm | 0.30mm | 0.50mm | 0.80mm |
| 瓷片<br>Ceramic thickness | 0.25mm | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ | - |
| | 0.32mm | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ | $Si_3N_4$ |
| | 0.38mm | AlN | AlN | AlN | - | - |
| | 0.50mm | AlN | AlN | AlN | - | - |
| | 0.63mm | AlN | AlN | AlN | - | - |
| | 1.00mm | AlN | AlN | AlN | - | - |

## 2 覆铜衬板 AMB Substrate

### 2.1.耐温特性 Temperature resistance characteristics

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|
| 化学镀层<br>Electroless plating | 410±10℃，5min | |
| 阻焊层<br>Solder mask | 320℃，60sec | |

### 2.2.温度循环 Temperature cycle

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|
| 温度冲击<br>Temperature shock | ＞500<br>（1mmAlN/0.3Cu,无孔<br>without dimple） | ＞3000<br>（0.32mm $Si_3N_4$/0.3Cu，无孔<br>without dimple） |

Note：-40℃~150℃、Transfer time＜30min；

### 2.3.其它物理特性Other physical properties

| 项目<br>Items | 单位<br>Unit | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|---|
| 表面粗糙度<br>Surface roughness | μm | Ra≤1.5μm，Rz≤10μm，Rmax≤50μm | |
| 剥离强度<br>Peeling strength | N/mm | ≥9.0<br>（50mm/min） | ≥10.0<br>（50mm/min） |
| 焊接润湿性<br>Solder wettability | % | ≥95（Sn/0.7Cu） | |
| 空洞率（超声扫描）<br>Void content（C-SAM） | - | ≤3% | |

### 2.4.交付样式 Delivery form

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|
| 母版<br>Master card | 139.7*190.5mm | |
| 单颗<br>Single parts | 根据客户需求<br>According to customer requirements | |

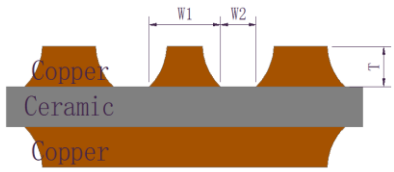
# 3 设计特性 Design features

## 3.1. 铜层 Copper layer design

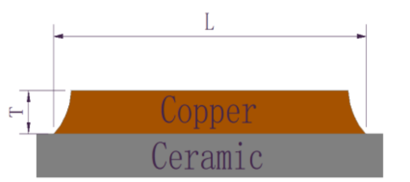
### 3.1.1. 厚度公差 Thickness tolerance

| 铜厚(T)<br>Thickness Cu | 公差<br>Tolerance | 示意图<br>Diagram |
|---|---|---|
| 0.15mm | ±0.01mm |  |
| 0.25mm | ±0.012mm | |
| 0.3mm | ±0.012mm | |
| 0.5mm | ±0.015mm | |
| 0.8mm | ±0.015mm | |

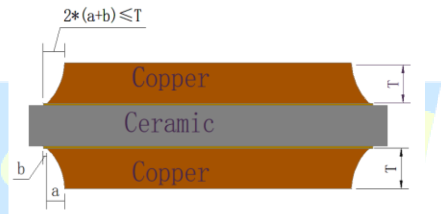
### 3.1.2. 线宽线距 Line width line spacing

| 铜厚(T)<br>Thickness Cu | 尺寸（W1/W2）<br>Size | 示意图<br>Diagram |
|---|---|---|
| 0.15mm | 0.3mm /0.3mm |  |
| 0.25mm | 0.5mm /0.5mm | |
| 0.3mm | 0.6mm /0.6mm | |
| 0.5mm | 0.8mm /0.8mm | |
| 0.8mm | 1.0mm /1.0mm | |

### 3.1.3. 蚀刻公差 Etching tolerance

| 铜厚(T)<br>Thickness Cu | 公差(L)<br>Tolerance | 示意图<br>Diagram |
|---|---|---|
| 0.15mm | ±0.127mm |  |
| 0.25mm | ±0.2mm | |
| 0.3mm | ±0.2mm | |
| 0.5mm | ±0.25mm | |
| 0.8mm | ±0.3mm | |

3.1.4. 侧蚀量 Sidewall of etched pattern

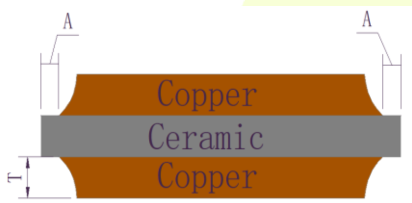
| 铜厚(T)<br>Thickness Cu | 尺寸(a+b)<br>Size | 示意图<br>Diagram |
|---|---|---|
| 0.15~0.8mm | ≤1/2 *Cu-thickness |  |

Note: Etching factor＞2（Typ.6）；

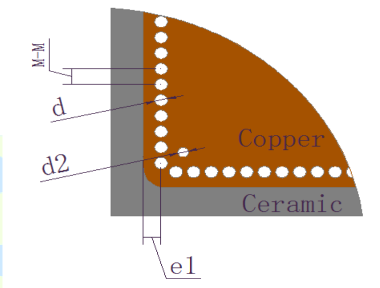
3.1.5. 正背面铜箔对位公差 Mismatch copper pattern front/back

| 铜厚<br>Thickness Cu | 尺寸<br>Size | 示意图<br>Diagram |
|---|---|---|
| 0.15~0.8mm | ≤0.2mm |  |

3.1.6. 铜自由区 Copper free area

| 铜厚(T)<br>Thickness Cu | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ | 示意图<br>Diagram |
|---|---|---|---|
| 0.15mm | ≥0.2mm | ≥0.2mm |  |
| 0.25mm | ≥0.5mm | ≥0.25mm | |
| 0.3mm | ≥0.5mm | ≥0.3mm | |
| 0.5mm | ≥0.5mm | ≥0.5mm | |
| 0.8mm | ≥0.5mm | ≥0.5mm | |

3.1.7. 钉孔 Dimple

| 项目<br>Items | 尺寸<br>Size | 示意图<br>Diagram |
|---|---|---|
| 孔与金属边间距 (e1)<br>Dimple area | 0.6mm |  |
| 孔径(d)<br>Dimple diameter | Φ0.6mm | |
| 孔径 (d2)<br>Corner dimple diameter | Φ0.5mm | |
| 孔间距(M-M)<br>Dimple pitch | 0.8mm | |

3.2. 铜层表面处理 Copper surface treatment

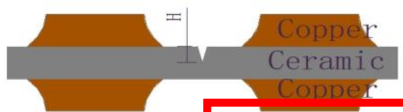
| 项目<br>Items | 厚度<br>Thickness |
|---|---|
| Ni | 2.5~7.5μm |
| Ni-Au | 2.5~7.5μm/0.05~0.15μm |
| Ni-Pd-Au | 2.5~7.5μm/0.03~0.1μm /0.05~0.15μm |
| Ag | 0.3~1.0μm |

3.3. 阻焊 Solder mask

| 项目<br>Items | 尺寸<br>Size | 示意图<br>Diagram |
|---|---|---|
| 线宽/线距<br>Line width, Line space | ≥0.2mm |  |
| 位置公差<br>Tolerance | ±0.15mm | |
| 厚度<br>Thickness | 5~30μm | |

3.4. 激光切割Laser cutting

3.4.1. 划线 Scribing

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ | 示意图<br>Diagram |
|---|---|---|---|
| 深度 (H)<br>Depth | 根据客户需求<br>According to customer requirements | |  |

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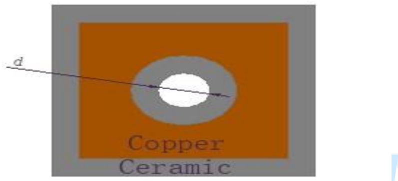
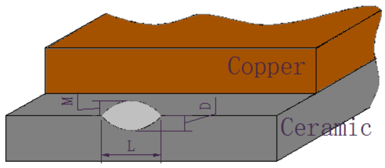
3.4.2.　孔 Holes

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ | 示意图<br>Diagram |
|---|---|---|---|
| 孔直径<br>Hole diameter | 根据客户需求<br>According to customer requirements | |  |

3.4.3.　陶瓷崩边 Chip-off at ceramic edge

| 项目<br>Items | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ | 示意图<br>Diagram |
|---|---|---|---|
| 长度<br>Length | ≤1×ceramic thickness | |  |
| 宽度<br>Width | ≤1/2×ceramic thickness | | |
| 深度<br>Depth | ≤1/2×ceramic thickness | | |

## 3.5. 其它设计特性 Other design features

| 项目<br>Items | 单位<br>Unit | 氮化铝<br>AlN | 氮化硅<br>$Si_3N_4$ |
|---|---|---|---|
| 母版<br>Master card dimension tolerances | mm | ±1% | |
| 单颗<br>Single parts dimension tolerance | mm | ±0.1 | |
| 翘曲度<br>Single parts camber | _ | 根据样件尺寸<br>According to sample size | |
| 总厚<br>Total thickness tolerance | mm | ±0.1mm | ±7% |
| 瓷片<br>Ceramic thickness tolerance | mm | ≤10%* ceramic thickness | ±0.05 |
| 最大利用面积<br>Max usable area | mm | 127*178 | |

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