

**Aluminum Nitride Ceramic  
Substrates  
SPECIFICATIONS**

**氮化铝陶瓷基板规格书**

## 1. Purpose 目的范围

This specification sheet is intended to describe the quality characteristics requirements of aluminum nitride ceramic substrates. The product characteristic parameters in this specification sheet are the company's internal control standards and are for customer reference.

本规格书旨在说明氮化铝陶瓷基板品质特性要求，本规格书中的产品特性参数是本企业的内控标准，供客户参考。

## 2. Specifications and Dimensions 规格尺寸

Table 1 Dimensions and Specifications of Aluminum Nitride Ceramic Substrates  
表 1 氮化铝陶瓷基板尺寸规格表

Thickness (mm) 厚度 Size (mm) 尺寸	0.25	0.38	0.5	0.635	0.76	1.0	1.2	1.5	2.0
101.6*101.6	√	√	√	√	√	√	√	√	√
114.3*114.3	√	√	√	√	√	√	√	√	√
120*120	√	√	√	√	√	√	√	√	√
138*190			√	√	√	√	√	√	√

### 3. Material 材料

3.1 Material composition: Main component AlN 材料成分：主要成分 AlN

3.2 Material Properties 材料特性

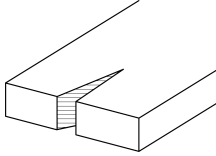
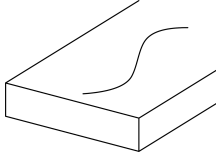
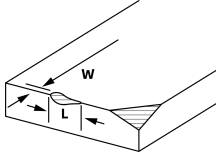
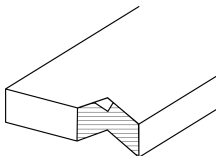
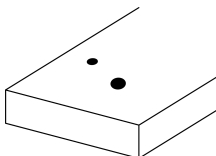

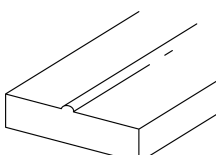
Table 2 Aluminum Nitride Ceramic Substrate Material Performance Standard  
表 2 氮化铝陶瓷基板材料性能标准表

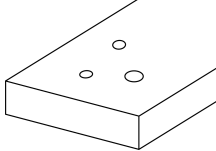
Properties 性能参数				
Item 项目	Test Condition 测试条件	Unit 单位	Value 指标值	
Size 尺寸规格	Customized Max 138*190mm 可根据客户要求定制各种尺寸规格或激光划线基板（常规最大尺寸 138*190mm）			
Tolerance 尺寸公差	±0.5% (最小Min 0.15mm)			
Thickness 厚度规格	Customized 0.25~2.0mm 可根据客户定做 0.25~2.0mm 任意厚度			
Thickness Tolerance 厚度公差	±5% (Min 最小 0.03mm)			
Warpage 翘曲度	< 0.3%			
Physical Properties 物理性能	Surface Roughness 表面粗糙度	Ra	μm	0.2~0.5
	Density 体积密度	-	g/cm <sup>3</sup>	≥3.3
	Flexure Strength 抗弯强度	Three-point Bending Resistance 3点抗弯	MPa	≥380
	Vickers Hardness 维氏硬度	Load 负荷 4.9	GPa	≥10

Thermal Properties 热性能	CTE 热膨胀系数	500°C	$1 \times 10^{-6}$ mm/°C	2~3
		800°C		2.5~3.5
	Thermal Conductivity 热导率	25°C	W/(m·k)	≥170
	Thermal Shock Resistance 抗热震性	800°C	Time 次	>10 <sup>10</sup>
	Volume Resistivity 体积电阻率	25°C	Ω·cm	>10 <sup>14</sup>
	Breakdow Voltage 击穿电压	-	KV/mm	15
	Dielectric Constant 介电常数	1MHz/25°C	-	8.7
	Dielectric Loss 介电损耗	1MHz/25°C	$\times 10^{-4}$	2
	Reflectivity 反射率	Reflectivity Meter 反射率仪	%	-
	Whiteness 白度	Whitenesss Meter 白度计	-	Gray 灰色

## 4. Appearance Standards 外观标准

Table 3 Appearance Standards of Aluminum Nitride Ceramic Substrates  
表 3 氮化铝陶瓷基板外观标准表

Item 项目	Sample 图示	Standard 标准
Crack 裂纹		No Crack 无裂纹
Scratch 划痕		Depth 深度 $\leq 0.015\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$
Defect 缺损		Width 宽度 $\leq 0.5\text{mm}$ Length 长度 $\leq 3.0\text{mm}$
Pit 凹坑		$\varphi \leq 0.18\text{mm}$ $H < 0.08\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$
Spot 斑点		$\varphi \leq 0.3\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$
Blister 瓷疱		$H \leq 0.025\text{mm}$ $\varphi \leq 0.25\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$
Bulge 突起		$H \leq 0.025\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$

Item 项目	Sample 图示	Standard 标准
Clay Particle 粘粒		$H \leq 0.01\text{mm}$ $\varphi \leq 0.5\text{mm}$ Less than one 限 $\leq 1$ 个/ $10\text{cm}^2$

## 5. Inspection Rules and Methods for Products 产品的检验规则与检验方法

### 5.1 Inspection Batch 检验批

An inspection batch shall consist of ceramic substrates produced under basically the same conditions according to the same formula and submitted for inspection at the same time.

一个检验批应由按同一配方，在基本相同条件下生产，并在同一时间内提交检验的陶瓷基板组成。

### 5.2 Period Inspection 周期性检验

**5.2.1** Periodic inspection shall be carried out in accordance with the inspection items, inspection standards and technical indicators stipulated in 3.2. Periodic inspections are carried out by qualified third-party institutions.

周期检验应按 3.2 规定的检验项目、检验标准和技术指标进行。周期检验由有资质的第三方机构进行。

**5.2.2** The interval period for periodic inspection is generally one year. It should also be carried out when there are significant changes in the main raw materials and manufacturing processes.

周期检验的间隔期一般为一年。当主要原材料和制程有重大变更时，也要进行。

**5.2.3** In principle, the performance parameters of the substrate are given based on the periodic inspection report.

原则上基板的性能参数根据周期性检验报告给出。

**5.2.4** If the performance parameters fail the inspection, the goods cannot be dispatched.

如果性能参数检验不合格，不可发货。

### 5.3 Routine Test 出厂检验

**5.3.1** Each batch of products shall undergo factory inspection in accordance with the inspection items, inspection rules, inspection methods and judgment standards stipulated in the following table.

每批产品应按下表规定的检验项目、检验规则、检验方法和判定标准进行出厂检验。

**5.3.2** If the product fails the factory inspection, then the entire batch of products should be reselected and resubmitted for inspection. The re-submission for inspection must be carried out as follows: Conduct the inspection using a more stringent AQL (Acceptance Quality Limit) level. If any non-conformities are still found, the batch of products cannot be shipped.

若出厂检验不合格，则该批产品应进行全部检选后重新提交检验。重新提交检验必须使用更加严格的 AQL 检查水平来进行检验，如仍有不合格情况，则该批产品不能发货。

Table 4 Inspection Specification Table of Aluminum Nitride Ceramic Substrate

表 4 氮化铝陶瓷基板检验规格表

NO. 序号	Test Item 检验项目		Test Methods 检验方法	Qualification Criteria 合格判据
1	Appearance 外观	/	Visual inspection (use a film ruler for measurement if there are discrepancies). 目检 (有分歧时使用菲林尺测量)	Meet the requirements of 4 满足 4 之要求
2	Size 尺寸	Length and width 长、宽	Measure with a vernier caliper with an accuracy of 0.02mm 用精度为 0.02mm 的游标卡尺进行测量	Meet the requirements of 3.2 满足 3.2 之要求
3		Thickness 厚度	Measure with a vernier caliper with an accuracy of 0.01mm 用精度为 0.01mm 的测厚规进行测量	
4	Warpage 翘曲度		The warpage meter (parallel plate method) was used for measurement 用翘曲度仪 (平行板法) 进行测量	Meet the requirements of 3.2 满足 3.2 之要求
5	Surface Roughness 表面粗糙度		Conduct the inspection with a roughness tester 用粗糙度测试仪进行检验	Meet the requirements of 3.2 满足 3.2 之要求

### 6. Inspection Report 检验报告

The inspection report format is as follows 检验报告格式如下所示：

The following takes the aluminum nitride substrate specification 120\*120\*0.5mm as an example 以下以氮化铝基板规格 120\*120\*0.5mm 为例：

产品检验报告/PRODUCT INSPECTION REPORT

<input type="checkbox"/> 样品		<input type="checkbox"/> 入库/PQC		<input type="checkbox"/> 出厂/OQC		<input type="checkbox"/> 功能加严		<input type="checkbox"/> 外观加严									
客户/BUYER:	/			产品料号/PRODUCT ID:				产品名称/PRODUCT NAME:	氮化铝基板120*120*0.5								
订单号/ORDER NO:	生产批号/LOT NO:			AMZF-2403001			周期码/Cycle code:	批量/QTY: 5 只/PCS									
温度T & 湿度H:	25℃/57%		特殊要求/SPECIAL REQUIREMENT:			成分			-								
检验项目/INSPECTION ITEM	标准参数/STD. PARAMETER	检查水平 INSPECTION LEVEL	AQL	判据 CRITERION		样本数 SAMPLE SIZE	不合格数	样品编号/SAMPLE NO.									
				Ac	Ra			Pn	1	2	3	4	5	6	7	8	9
外观	表面光滑, 无毛刺斑点, 无裂纹	II	1.0	0	1	5	0	OK	OK	OK	OK	OK	-	-	-	-	-
包装	符合包装要求	II	1.0	0	1	5	0	OK	OK	OK	OK	OK	-	-	-	-	-
翘曲度	≤0.2%	II	0.65	0	1	5	0	OK	OK	OK	OK	OK	-	-	-	-	-
热导率	≥170w/(mK)	S-2	0.65	0	1	2	0	OK	OK	-	-	-	-	-	-	-	-
外形尺寸/OUTLINE DIMENSION	长(L): 120±2/-1 mm								长(L): 120.55-121.47 mm								
	宽(W): 120±2/-1 mm				0	1	8	0	宽(W): 120.68-121.41 mm								
	厚(H): 0.5±0.03 mm								厚(H): 0.498-0.51 mm								
检验结论/INSPECTION CONCLUSION: 合格																	

检验员/INSPECTOR:  检验日期/INSPECTION DATE: 2024.05.07 (YY.MM.DD) 检验主管: 编号/NO.:

## 7、Product Storage 产品贮存

### 7.1 Storage Conditions 贮存条件:

Temperature: 22°C±5°C, humidity: ≤50%, in a dry storage room without acidic, alkaline, and other harmful substances (unopened package).

温度 22°C±5°C , 湿度为≤50% , 周围无酸性、碱性以及其他有害物质的干燥库房中 (未开包装) 。

7.2 Storage Period: 12 months from the date of shipment (subject to storage conditions).

保存期限: 自出货后起 12 个月内 (根据贮存条件) 。

7.3 When handling the product, please handle it with care to avoid any collisions.

接触产品请轻拿轻放, 防止碰撞。