

Thin Film Circuit

◆ Product Characteristics

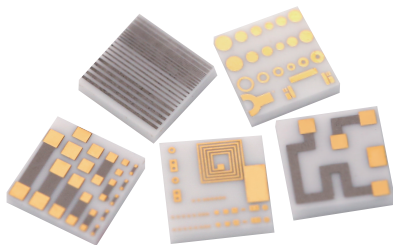
1. Sputtering technology, high reliability and ultra-stable performance, good consistency.
2. Designed and processed with 99.6% pure Al_2O_3 substrate, which has excellent insulation performance and low loss at high frequency.
3. Designed and processed with high-purity AlN substrate, which has excellent thermal conductivity

◆ Product Applications

Substrates for microwave/millimeter wave application, microwave/millimeter wave device, and high-speed optical communication device.

◆ Process Introduction

On the ceramic substrate, through magnetron sputtering, photoetching, dry wet etching, electroplating gold and other processes, the thin film components and metal lines are integrated to form high-precision circuit patterns with specific functions.



◆ Material Properties

Material	Aluminum Oxide	Aluminum Oxide (Polished)	Aluminum Oxide (As-fired)	Aluminum Nitride (Polished)	Aluminum Nitride (As-fired)
Chemical Composition	Al_2O_3	Al_2O_3	Al_2O_3	AlN	AlN
Purity	96%	99.6%	99.6%	98%	98%
Color	White	White	White	Gray	Gray
Nominal Density (g/cm^3)	3.7	3.87	3.87	3.28	3.28
Loss (1 MHz)	0.0003	0.0001	0.0001	0.001	0.001
Dielectric Constant (1 MHz)	9.5 ± 0.2	9.9 ± 0.1	9.9 ± 0.1	8.8 ± 0.2	8.8 ± 0.2
Thermal Conductivity $\text{W}/(\text{m} \cdot \text{K})$	>21	>21	>21	>170	>170
CTE ($10^{-6}/^\circ\text{C}$)	6.5~8.0 (25~800 $^\circ\text{C}$)	7.0~8.3 (25~1000 $^\circ\text{C}$)	7.0~8.3 (25~1000 $^\circ\text{C}$)	4.6 (25~300 $^\circ\text{C}$)	4.6 (25~300 $^\circ\text{C}$)

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◆ Design Guidelines

● Substrate Materials

1. Material: alumina oxide, aluminum nitride, silicon, glass, etc.
2. Layout: 2~6 inches square or round (Typical: 2 inches square)
3. Thickness: 0.101~1.524 mm(Typical: 0.254mm, 0.381mm)
4. Roughness: polished(<0.08 μ m), as-fired(<0.8 μ m), grinding (customer specified)

● Metal

1. Sputtering: Ti, TiW, TaN, Cu, Ni, Pt, Au
2. Electroplating: Au
3. Au thickness: 0.5~5 μ m

● TaN Sheet Resistance

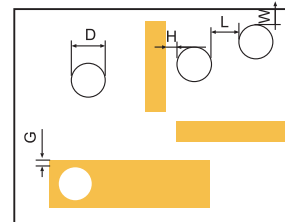
1. Sheet resistance: 25~200 $\Omega/\square$ (Typical: 50 $\Omega/\square$)
2. Resistance tolerance: $\pm 10\%$ (Typical: $\pm 20\%$)
3. Minimum resistor size: 50 μ m * 50 μ m
4. Resistance TCR: -100 ± 50 ppm/ $^{\circ}$ C@-55~+125 $^{\circ}$ C
5. Maximum service temperature: 350 $^{\circ}$ C(<0.5 hours)

● Graphic

1. Minimum line width: 10 μ m
2. Minimum line gap: 20 μ m
3. Line tolerance: $\pm 3\mu$ m(For non-critical areas $\pm 5\mu$ m)

● Metallized holes/slots

1. Hole diameter D: 0.5 * T minimum
 2. Spacing between via holes L: 1 * T minimum
 3. Hole to edge W: 1 * T minimum
 4. Hole to metal line H: 38.1 μ m minimum
 5. Via hole to conductor edge G: 50.8 μ m minimum
- Note: T is the thickness of the ceramic substrate.



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● Dimensions

1. Minimum size: 0.3mm*0.3mm
2. Tolerance: $\pm 0.05\text{mm}$

● Drawing

1. Format: DXF, DWG
2. Length unit: mm

● Detailed Design Guidelines

