

Thin Film Circuit

◆Product Features

- 1.Sputtering technology, high reliability and ultra-stable performance, good consistency.

2.Designed and processed with 99.6% pure Al<sub>2</sub>O<sub>3</sub> substrate, which has excellent insulation performance and low loss at high frequency.

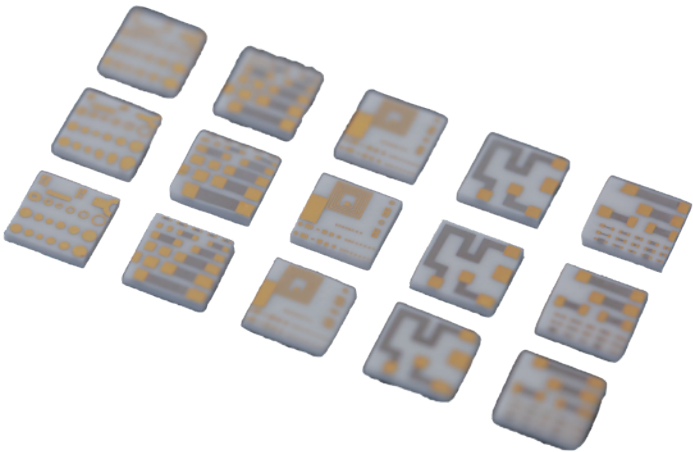
3. Designed and processed with high-purity AlN substrate, which has excellent thermal conductivity.

◆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	Chemical Composition	Purity	Color	Nominal Density (g/cm <sup>3</sup> )	Loss (1 MHz)	Dielectric Constant (1 MHz)	Thermal Conductivity (W/m <sup>2</sup> K)	CTE (10 <sup>-6</sup> mm/°C)
Aluminum Oxide	Al <sub>2</sub> O <sub>3</sub>	96%	White	3.7	0.0003	9.5±0.2	24.7	6.5~8.0 (25°C~800°C)
Aluminum Oxide (Polished)	Al <sub>2</sub> O <sub>3</sub>	99.6%	White	3.87	0.0001	9.9±0.1	26.9	7.0~8.3 (25°C~1000°C)
Aluminum Oxide (As-fired)	Al <sub>2</sub> O <sub>3</sub>	99.6%	White	3.87	0.0001	9.9±0.1	26.9	7.0~8.3 (25°C~1000°C)
Aluminum Nitride (Polished)	AlN	98%	Gray	3.28	0.001	8.8±0.2	170	4.6 (25°C~300°C)
Aluminum Nitride (As-fired)	AlN	98%	Gray	3.28	0.001	8.8±0.2	170	4.6 (25°C~300°C)

## ◆ 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: 0.254, 0.381)
4. Roughness: polished(<0.08μm), as-fired(<0.2μm), lapped (customer specified)

### ● Metal

1. Sputtering: Ti、TiW、TaN、Cu、Ni、Pt、Au
2. Electroplating: Au
3. Au thickness: 0.5 ~ 5μm

### ● TaN Sheet Resistance

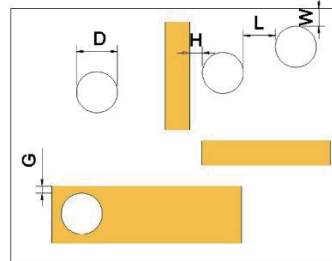
1. Sheet resistance: 25 ~ 200Ω/□ (Typical: 50Ω/□)
2. Resistance tolerance: ±10% (Typical: ±20%)
3. Minimum resistor size: 50μm\*50μm
4. Resistance TCR: -100±50ppm/°C @ -55°C ~ +125°C
5. Maximum service temperature: 350°C (<0.5 hours)

### ● Graphic

1. Minimum line width: 10μm
2. Minimum line gap: 20μm
3. Line tolerance: ±3μm (for non-critical areas ±5μm)

### ● 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: 38.1μm minimum
5. Via hole to conductor edge G: 50.8μm minimum



## ● Dimensions

1. Minimum size: 0.3mm\*0.3mm
2. Tolerance: ±0.05mm

## ● Drawing

1. Format: DXF、DWG
2. Length unit: mm

## ● Detailed Design Guidelines

