

## A special TPH-1/2 microwave composite dielectric copper-clad substrate

TPH-1/2 is made of a new type of inorganic and organic materials, with special process and compounding.

The advantage of design for microwave circuit using TPH-1/2 here:

- (1) The substrate is black. The dielectric constant is 2.65, with consistent performance over broad temperature and frequency ranges. The operating temperature is  $-100^{\circ}\text{C} \sim +150^{\circ}\text{C}$ ;
- (2) The peel strength between the copper and the substrate is more reliable than the vacuum film coating of ceramic substrate. This substrate is created to offer customers easy for circuit processing, higher pass-rate of production, and the manufacturing cost is much lower than the ceramic substrate.
- (3) Dissipation factor  $\text{tg}\delta \leq 1 \times 10^{-3}$ , and the loss has a slight variation with the rise of the frequency.
- (4) It is easy for mechanical manufacturing, including drill、punch、grind、cut、etching, etc.. For these, the ceramic substrate cannot be compared.
- (5) Due to the specific gravity less, the remarkable characteristics of the module are weight lighter manufacturing by this substrate, which but other materials cant compare.
- (6) Copper thickness is:  $0.035 \mu\text{m}$

Technical Specifications:

Appearance	Smooth and neat on both sides: no stain, scratch and dent.			
Dimension and tolerance (mm)	Dimensions and Tolerance			
	$160 \times 160 \pm 2\text{mm}$ $200 \times 200 \pm 2\text{mm}$			
	Thickness and Tolerance			
	$\delta$ (mm): $2.5 \pm 0.075$ , $3.0 \pm 0.1$ , $4.0 \pm 0.1$ , $5.0 \pm 0.2$ , $6.0 \pm 0.12$ , $7.0 \pm 0.15$ , $8.0 \pm 0.15$ , $9.0 \pm 0.2$ , $10.0 \pm 0.2$ , $12.0 \pm 0.2$			
For special dimensions, customized lamination is available.				
Mechanical Strength	Peel strength	In normal state: $\geq 6\text{N/cm}$ ; In the environment of alternating humidity and temperature: $\geq 4\text{N/cm}$ .		
	Chemical Property	According to the properties of laminate, the chemical etching method for PCB can be used. The dielectric properties of materials are not changed.		
Electrical property	Name	Test condition	Unit	Value
	Density	Normal state	$\text{g/cm}^3$	1.05
	Moisture Absorption	Dip in distilled water of $20 \pm 2^{\circ}\text{C}$ for 24 hours	%	$\leq 0.02$

Operating Temperature	High-low temperature chamber	°C	-100 ~ +150 ( Processing temperature should not exceed 200°C )
Thermal Conductivity	-55~288°C	W /m /k	0.3
CTE	0~100°C	ppm/°C	50(x, y, z)
Shrinkage Factor	2 hours in boiling water	%	0.0004
Surface Resistivity		M.Ω	≥1×10 <sup>6</sup>
Volume Resistivity	Normal state	MΩ.cm	≥1×10 <sup>9</sup>
	Constant humidity and temperature		≥1×10 <sup>6</sup>
Pin Resistance	500V DC	Normal state	≥1×10 <sup>6</sup>
		Constant humidity and temperature	≥1×10 <sup>1</sup>
Dielectric Breakdown		kv	≥20
Dielectric Constant	10GHZ	ε r	2.65 ( ±2% )
Dissipation Factor	10GHZ	tgδ	≤1×10 <sup>-3</sup>



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