

## NaF2000 Series

### Features of NaF2000 Series

- NaF2000 series are ceramic-filled PTFE high-frequency copper clad laminates (CCLs) independently developed and produced by NaF-T.
- The dielectric constant is very stable and the dielectric loss is ultra low ( $D_k$ : 2.2~2.95;  $D_f$ : 0.0008~0.0023).
  - ▶ Consistent and stable
  - ▶ Low dielectric loss
  - ▶ High peel strength
  - ▶ Excellent cost performance

### Application Fields of NaF2000 Series

- The products are used in radar antenna, microwave transmission, GPS navigation, communication, etc.
- NaF-T not only produces high-frequency copper clad laminates (CCLs) with ultra low loss, but also can customize the thickness and thermal conductivity of CCLs according to customer's needs.
  - ▶ Radar antenna
  - ▶ GPS navigation
  - ▶ Microwave transmission
  - ▶ Communication apparatus



## NaF2029Gth: A highly-thermal conductive, glass-reinforced and ceramic-filled PTFE high-frequency circuit material

### GENERAL PROPERTIES

Property	Typical Value	Direction	Unit	Condition	Test Method
Dielectric Constant, $D_k$	2.95±0.02	Z	-	10 GHz 23°C	IPC-TM-650 2.5.5.5 SPDR
Dissipation Factor, $D_f$	0.0017	Z	-	10 GHz 23°C	IPC-TM-650 2.5.5.5
Thermal Coefficient of $\epsilon_r$	-70	Z	ppm/°C	10 GHz 0-100°C	IPC-TM-650 2.5.5.5
Dimensional Stability	0.03,0.07	X, Y	mm/m	COND A	IPC-TM-650 2.2.4
Volume Resistivity	$10^8$		$M\Omega \cdot cm$	COND A	IPC 2.5.17.1
Surface Resistivity	$10^7$		$M\Omega$	COND A	IPC 2.5.17.1
Tensile Modulus	8500 9500	MD CMD	MPa	23°C	ASTM D638
Water Absorption	0.04	-	%	D 48/50	IPC-TM-650 2.6.2.1
Thermal Conductivity	0.9	-	W/(m·K)	50°C	ASTM D5470
Coefficient of Thermal Expansion	50,33,200	X, Y, Z	ppm/°C	23°C/50% RH (23 ~ 288 °C)	IPC-TM-650 2.4.24
$T_d$	500		°C	TGA	ASTM D3850
Density	2.3		mg /cm <sup>3</sup>		
Copper Peel Strength	18		pli	1 oz. EDC After floating tin	IPC-TM-2.4.8
Flammability	V-0				UL 94
Lead Free Process Compatible	YES				

### PRODUCT SPECIFICATION

Standard Thickness	Standard Panel Size	Standard Copper Cladding
0.020" (0.508mm) +/- 0.0020" 0.030" (0.762mm) +/- 0.0030" 0.060" (1.016mm) +/- 0.0030" * Other thicknesses are available	12" X 18" (305 X 457mm) 24" X 18" (610 X 457mm)	electrolytic copper foil:LP/VLP/RTF/HVLP ½ oz.(18µm) H/H 1 oz.(35µm) 1/1 * Additional cladding weights are available

Note: All typical values listed above are for reference only and not for specification.