

## NaF3000 Series of products

### Features of NaF3000 Series

- NaF3000 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 ( $D_k$ : 3.0~10.2;  $D_f$ : 0.00098~0.0023).
  - ▶ Consistent and stable
  - ▶ Low dielectric loss
  - ▶ High peel strength
  - ▶ Excellent cost performance

### Application Fields of NaF3000 Series

- The Products are used in antenna, millimeter wave, military radar, military electronics, missile antenna, 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.
  - ▶ Space wideband antenna
  - ▶ Microstrip and strip-line circuits
  - ▶ Millimeter wave equipment
  - ▶ Military radar
  - ▶ Phased array radar
  - ▶ Missile antenna
  - ▶ Base station antenna
  - ▶ Phase shifter
  - ▶ High-frequency power divider
  - ▶ IoT devices



## NaF3062: A PTFE RF Circuit Material with Ceramic filling

### GENERAL PROPERTIES

| Property                            | Typical Value   | Direction | Unit               | Condition                       | Test Method                   |
|-------------------------------------|-----------------|-----------|--------------------|---------------------------------|-------------------------------|
| Dielectric Constant, $D_k$          | 6.2±0.15        | Z         | -                  | 10 GHz 23°C                     | IPC-TM-650<br>2.5.5.5<br>SPDR |
| Dissipation Factor, $D_f$           | 0.0012          | Z         | -                  | 10 GHz 23°C                     | IPC-TM-650<br>2.5.5.5         |
| Thermal Coefficient of $\epsilon_r$ | -100            | Z         | ppm/°C             | 10 GHz 0-100°C                  | IPC-TM-650<br>2.5.5.5         |
| Dimensional Stability               | -0.23,-0.20     | X, Y      | mm/m               | COND A                          | IPC-TM-650<br>2.2.4           |
| Volume Resistivity                  | 10 <sup>5</sup> |           | MΩ•cm              | COND A                          | IPC 2.5.17.1                  |
| Surface Resistivity                 | 10 <sup>5</sup> |           | MΩ                 | COND A                          | IPC 2.5.17.1                  |
| Tensile Modulus                     | 1500<br>1500    | MD<br>CMD | MPa                | 23°C                            | ASTM D638                     |
| Water Absorption                    | 0.02            | -         | %                  | D48/50                          | IPC-TM-650<br>2.6.2.1         |
| Thermal Conductivity                | 0.79            | -         | W/(m•K)            | 50°C                            | ASTM D5470                    |
| Coefficient of Thermal Expansion    | 15,13,20        | X, Y, Z   | ppm/°C             | 23°C/50% RH<br>(23 ~ 288 °C)    | IPC-TM-650<br>2.4.24          |
| $T_d$                               | 500             |           | °C                 | TGA                             | ASTM D3850                    |
| Density                             | 2.3             |           | mg/cm <sup>3</sup> |                                 |                               |
| Copper Peel Strength                | 7.0             |           | pli                | 1 oz. EDC<br>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"<br>0.030" (0.762mm) +/- 0.0030"<br>0.060" (1.016mm) +/- 0.0030"<br>* Other thicknesses are available | 12" X 18" (305 X 457mm)<br>24" X 18" (610 X 457mm) | Electrolytic copper foil:LP/VLP/RTF/HVLP<br>½ oz.(18µm) H/H<br>1 oz.(35µm) 1/1<br>* Additional cladding weights are available |

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