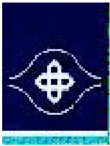


**NAN YA PLASTICS CORPORATION**
ELECTRONIC MATERIALS DIVISION.
**COPPER CLAD LAMINATE DEPARTMENT**
NO. 201. TUNG HWA N. ROAD, TAIPEI, TAIWAN.

Issued: 2008/03/01
New: 2008/03/01

**Resin Coated Copper Foil**

# NPRCC

## ■ FEATURES

- Higher glass transition temperature
- Excellent filling ability
- Lower dielectric constant
- Thin dielectric and light weight
- Easy to drill by $CO_2$ laser
- Even surface for fine line and space usage
- Traditional FR-4 processability
- UL File number E98983

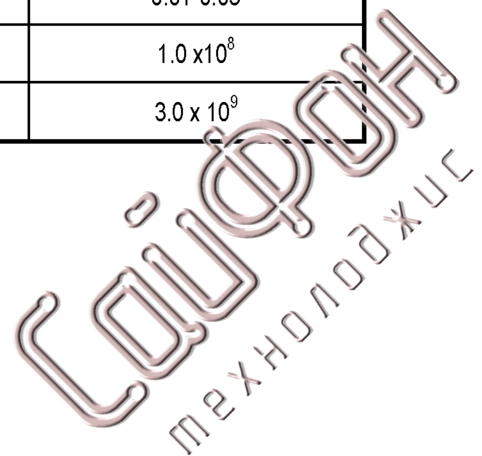
## ■ PRODUCT

| Resin Thickness (μm) | Copper (μm) | RF% | VC% |
|---|---|---|---|
| 60 ± 5 | 12(3/8 oz)<br>18(1/2 oz)<br>36(1 oz) | 17 ± 8 | 0.75↓ |
| 80 ± 5 | | 20 ± 8 | |

## ■ PERFORMANCE LIST

| CHARACTERISTICS | UNIT | CONDITIONING | Typical Values |
|---|---|---|---|
| Glass Transition Temperature | ℃ | TMA | 160 ± 5 |
| | ℃ | DSC | 180 ± 5 |
| Coefficient of Thermal Expansion (Before Tg) | in/in/℃ | TMA | $6 \times 10^{-5} \sim 9 \times 10^{-5}$ |
| Surface Flatness | μm | - | 2-3 |
| Flammability | - | C-48/23/50 | V-0 |
| Peel Strength H oz | lb/in | 288℃ x 10" solder floating | 5-7 |
| Thermal Stress | SEC | 288℃ solder dipping | 120↑ |
| Permittivity 1MHZ | - | C-24/23/50 | 3.6-3.8 |
| Permittivity 1GHZ | - | C-24/23/50 | 3.0-3.2 |
| Loss Tangent 1MHZ | - | C-24/23/50 | 0.02-0.04 |
| Loss Tangent 1GHZ | - | C-24/23/50 | 0.01-0.03 |
| Surface Resistivity | MΩ | C-96/35/90 | $1.0 \times 10^{8}$ |
| Volume Resistivity | MΩ-cm | C-96/35/90 | $3.0 \times 10^{9}$ |

Data shown are nominal values for reference only.

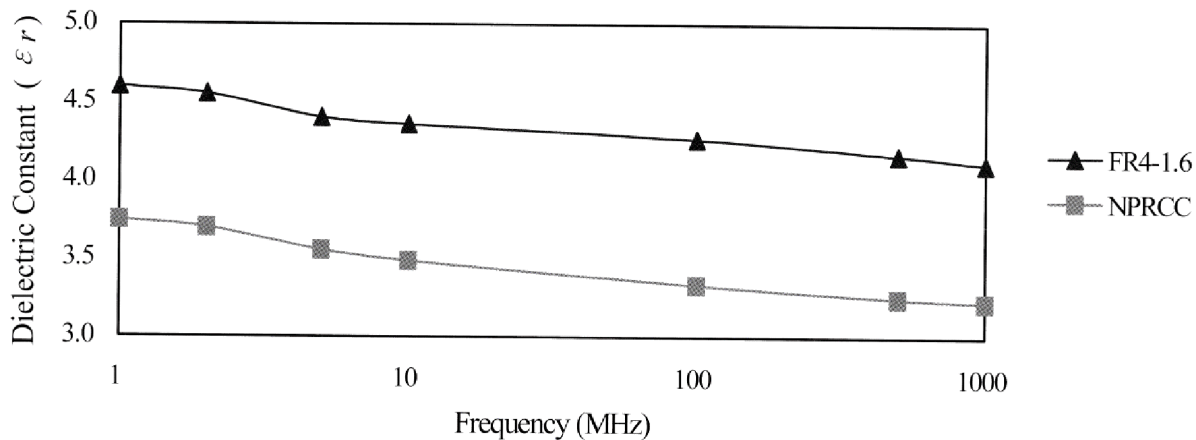


## ■ DIELECTRIC CONSTANT AND DISSIPATION FACTOR

A. Dielectric Constant (εr)

| | 1MHz | 2MHz | 5MHz | 10MHz | 100MHz | 500MHz | 1GHz |
|---|---|---|---|---|---|---|---|
| FR4-1.6 | 4.6007 | 4.5509 | 4.4014 | 4.3561 | 4.2628 | 4.1641 | 4.1101 |
| NPRCC | 3.7453 | 3.6973 | 3.5533 | 3.4827 | 3.332 | 3.2497 | 3.2231 |

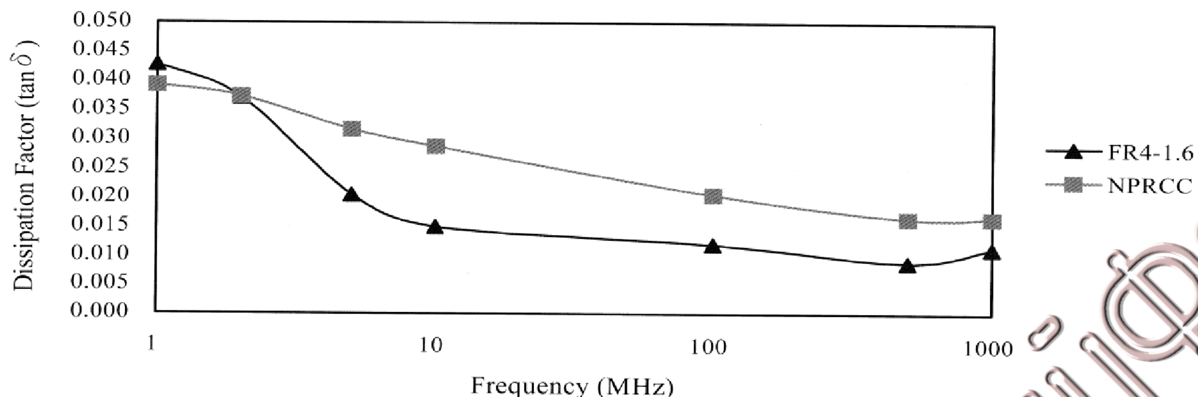
Test Condition: C-24/23/50

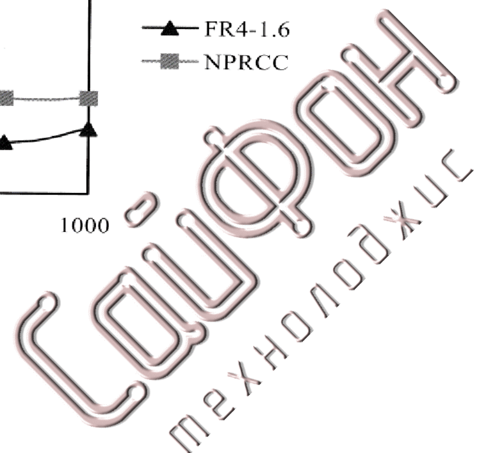



B. Dissipation Factor (tan δ)

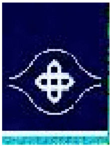
| | 1MHz | 2MHz | 5MHz | 10MHz | 100MHz | 500MHz | 1GHz |
|---|---|---|---|---|---|---|---|
| FR4-1.6 | 0.042751 | 0.037166 | 0.020411 | 0.01491 | 0.011922 | 0.00887 | 0.011303 |
| NPRCC | 0.0392 | 0.0373 | 0.031599 | 0.028771 | 0.020463 | 0.016398 | 0.016504 |

Test Condition: C-24/23/50



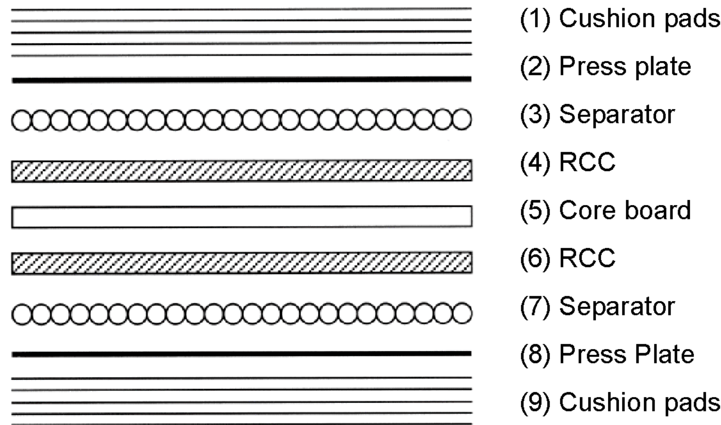



Measurement Equipment : RF Impedance/Material Analyzer 4291A (Hewlett Packard)





## ■ THE MANNER OF LAY-UP

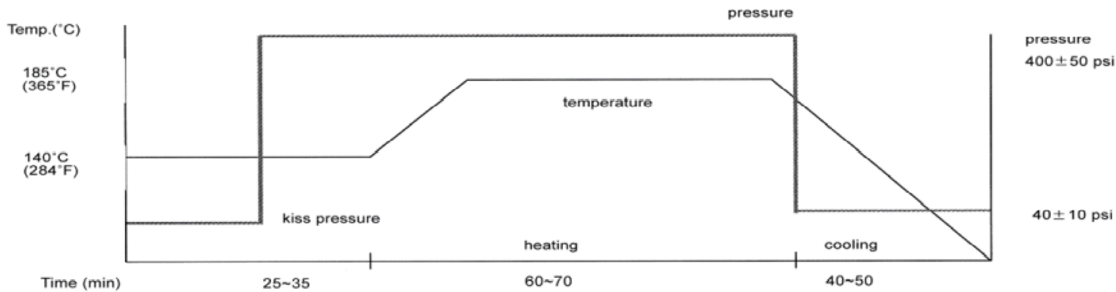


(1) Cushion pads
(2) Press plate
(3) Separator
(4) RCC
(5) Core board
(6) RCC
(7) Separator
(8) Press Plate
(9) Cushion pads

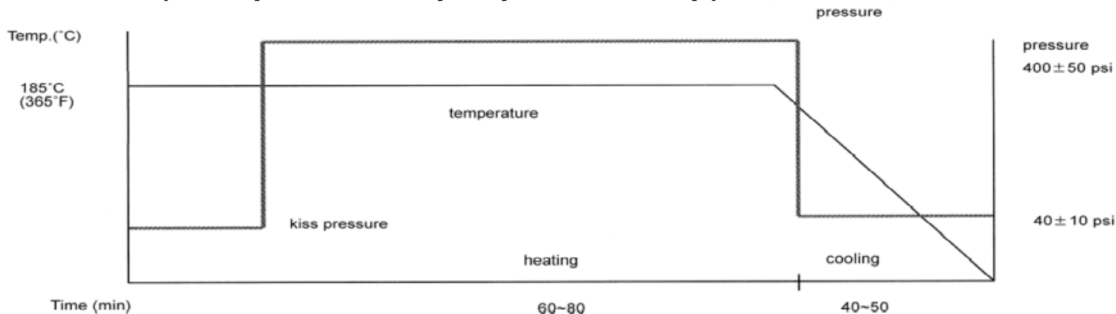
## ■ LAMINATION

### Recommended press cycles:

### A. 2T2P (2 temperature step /2 pressure step)




### B. 1T2P (1 temperature step /2 pressure step)




### C.Vacuum

| | Vacuum (mmHg) | Time (min) |
|---|---|---|
| Step 1 | 760 | 0 |
| Step 2 | ≦ 50 | 1-5 |
| Step 2 | **≦ 50** | 40-60 |

Suggestions:

1. Heating rate of material between 70℃ and140℃, 1-3℃/min,is acceptable.
2. Temperature of material over 170℃ must be held for at least 40 min to allow epoxy resin to fully cure.
3. Cooling rate of material should be kept under 2.5℃/min when the temperature of material is over 1[illegible]℃, in order to avoid introducing twist.
4. A vacuum of less than 50 mmHg will be needed to eliminate voids

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