

Data Sheet

FR-4-86 PY

- High CTI Laminates, Tg 140 °C (DSC)
- Exceptional consistent laminate quality due to exclusive use of Nan Ya's raw materials
- Common PTH process parameters result in very good through hole reliability and copper foil peel strength
- High luminance of Epoxy contrast with Copper for Laser Type AOI
- IPC-4101C / --- (Slash Sheet 21 is applicable)

FR-4-86 PY

Revision Date: May 2010

NAN YA SPECIFICATION SHEET FOR FR-4-86 PY - High CTI medium Tg Epoxy Laminates

SPECIFICATION SHEET #: IPC-4101 / 21
CURING AGENT: Dicy
FLAME RETARDANT MECHANISM: RoHS compliant Bromine, UL94 V-0
FILLERS: N/A
ID REFERENCE: UL/ANSI: FR-4 / ---

LAMINATE DATA SHEET

| Laminate Properties | Specification $\geq 0,50$ mm [0,0197 in] 40% RC | Units metric [English] | Test Method (IPC-TM-650) | Ref. Para. | |
|---|--|---------------------------------|---|--|---|
| | | | | | Typical Value |
| Glass Transition Temperature (Tg) by DSC / TMA | 140 \pm 5 / 130 | ≥ 110 | °C | 2.4.25 3.10.1.6 | |
| Decomposition Temperature (Td) TGA 5% wt. loss onset wt. loss | 310 305 | - - | °C | ASTM D3850 3.10.1.10 | |
| CTE, z-axis prior Tg above Tg | 50 - 70 250-350 | AABUS - | ppm/°C | 2.4.24 3.10.1.11 | |
| CTE, x/y-axis prior Tg above Tg | 15 - 18 15 - 18 | AABUS - | ppm/°C | 2.4.24 3.10.1.11 | |
| Thermal Expansion (50 °C - 260 °C) z-axis | TE | 4,2 | AABUS | % 2.4.24 3.10.1.11 | |
| Thermal Conductivity | λ | 0,49 | - | W/mK Laser Flash - | |
| Thermal Resistance: Time to Delamination | T260 T288 | 20-30 2 - 5 | - - | minutes 2.4.24.1 3.10.1.12 | |
| Pressure Cooker Test - 2 hours (10 s solder dip @ 288 °C) | | pass | pass visual | pass visual - - | |
| Thermal Stress 10 s at 288 °C [550,4 °F], minimum A. unetched B. etched | | pass pass | pass visual pass visual | rating 2.4.13.1 3.10.1.2 | |
| CAF Resistance | | pass | AABUS | pass / fail 2.6.25 3.12.1.4 | |
| Peel Strength, minimum A. Low profile copper foil and very low profile copper foil - all copper foil $>17\mu\text{m}$ [0,669 mil] B. Standard profile copper foil 1. after thermal stress (35 μm) 2. at 125 °C [257 °F] 3. after process solutions C. all other foil - composite | | - 1,58 [9,00] - - - | 0,70 [4,00] 1,05 [6,00] 0,70 [4,00] 0,80 [4,57] AABUS | N/mm [lb/in] 2.4.8 N/mm [lb/in] 2.4.8.2 N/mm [lb/in] 2.4.8.3 N/mm [lb/in] 2.4.8 3.9.1.1 3.9.1.1.1 3.9.1.1.2 3.9.1.1.3 | |
| Volume Resistivity, minimum A. C-96/35/90 B. after moisture resistance C. at elevated temperature E-24/125 | | 5,0*10 ⁸ - - | - 10 ⁶ 10 ³ | M Ω cm 2.5.17.1 3.11.1.3 | |
| Surface Resistivity, minimum A. C-96/35/90 B. after moisture resistance C. at elevated temperature E-24/125 | | 5,0*10 ⁶ - - | - 10 ⁴ 10 ³ | M Ω 2.5.17.1 3.11.1.4 | |
| Dielectric Breakdown, minimum | | 60 | 40 | kV 2.5.6 3.11.1.6 | |
| Electric Strength, minimum (laminate & prepreg as laminated) | | - | - | kV/mm [V/mil] 2.5.6.2 3.11.1.7 3.11.2.3 | |
| Arc Resistance, minimum | | 120 | 60 | s 2.5.1 3.11.1.5 | |
| Comparative Tracking Index (CTI) | | 0 / ≥ 600 | AABUS | PLC / V ASTM D3638 - | |
| Permittivity, spec. maximum (laminate & prepreg as laminated) | A. @ 1MHz B. @ 100MHz C. @ 1 GHz D. @ 2 GHz E. @ 5 GHz | 4,60 - 4,10 - - | 5,40 - - - - | - - - - - | 2.5.5.2 3.11.1.1 2.5.5.3 3.11.2.11 2.5.5.9 2.5.5.5 |
| Loss Tangent, spec. maximum (laminate & prepreg as laminated) | A. @ 1MHz B. @ 100MHz C. @ 1 GHz D. @ 2 GHz E. @ 5 GHz | 0,013 - 0,013 - - | 0,035 - - - - | - - - - - | 2.5.5.2 3.11.1.2 2.5.5.3 3.11.2.2 2.5.5.9 2.5.5.5 |
| Flexural Strength, minimum A. Length direction B. Cross direction | | 480-550 415-480 | 415 [60190] 345 [50040] | N/mm ² [lb/in ²] 2.4.4 3.9.1.3 | |
| Flexural Strength at elevated temperature, length direction, minimum | | - | - | N/mm ² [lb/in ²] 2.4.4.1 3.9.1.4 | |
| Dimensional stability x/y-axis E-0,5/170(R)/E-4/105(TL) | | 0,005 - 0,03 | < 0,05 | % 2.4.39 3.9.1.2 | |
| Moisture Absorption, maximum | | 0,10 | 0,80 | % 2.6.2.1 3.12.1.1 | |
| Flammability (laminate & prepreg as laminated) | | V-0 | V-0 minimum | rating UL94 3.10.1.1 | |
| Density (50 % resin content) | | 1,92 | - | g/cm ³ - - | |

PREPREG DATA SHEET

| Prepreg Requirements | Typical Value | Specification | Unit | Test Method | Ref. Para. |
|---|---------------|---------------|--------|-------------|------------|
| 1. Shelf Life, minimum (Condition 1/ Condition 2) | | | Days | AABUS | 3.17 |
| 2. Reinforcement | | | - | - | - |
| 3. Volatile content maximum | | | % | 2.3.19 | 3.9.2.8 |
| 4. Prepreg Parameters | | | AABUS | AABUS | 1.1.7 |
| 5. Flammability (as laminated) | | | rating | UL94 | 3.10.2.1 |
| 6. Other | | | | | |

Data shown are nominal values for reference only

*AABUS = As Agreed upon Between User and Supplier.

all Nan Ya laminates are in conformance with RoHS regulations