

**VT-447**

UL Approval: E214381    Version: C1 /127 /128 /130

**Laminate/Prepreg****General Information**

- > Halogen Free & High Tg (175°C) FR4.1
- > CAF Resistance
- > Low Z-CTE
- > Excellent Thermal Reliability

**Application**

Mobile Phone, Smart Phone, Computer, Communication Equipment, Instrumentation, Electronic Game Machine, VCR, etc.

**Availability**

- > Core Thickness: 0.002" (0.05mm) to 0.200" (5mm), available in sheet or panel form
- > Copper Foil: 1/4oz to 12oz
- > Prepregs are available in roll or panel form
- > E-Glass styles: 7628, 1506, 1500, 2113, 2313, 3313, 2116, 1080, 1086, 1078, 106 & 1067, etc

**Note:** For cores  $\leq 0.005"$ , it is recommended to use the reverse treated copper due to the low profile. The peel strength for RT foil is  $\approx 1\text{-}2\text{lbs/in}$  (0.35Kg/m) less than standard foil.

| Properties        |                   | Prepreg           |                  | Laminate             |
|-------------------|-------------------|-------------------|------------------|----------------------|
| Storage Condition | Temperature       | Below 23°C (73°F) | Below 5°C (41°F) | Room                 |
|                   | Relative humidity | Below 55% RH      | /                | /                    |
| Shelf Life        |                   | 3 months          | 6 months         | 24 months (airproof) |

The prepreg exceeding shelf life should be retested.

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## Laminate/Prepreg

### IPC-4101E /127 /128 /130

| Properties                       |                            | Test Method         | Units            | Specification    | Typical Value     |
|----------------------------------|----------------------------|---------------------|------------------|------------------|-------------------|
| <b>Thermal Properties</b>        |                            |                     |                  |                  |                   |
| Tg                               | DSC                        | IPC-TM-650 2.4.25   | °C               | –                | –                 |
|                                  | TMA                        | IPC-TM-650 2.4.24   | °C               | 170 minimum      | 175               |
| Td                               |                            | ASTM D3850          | °C               | 340 minimum      | 385               |
| T260                             |                            | IPC-TM-650 2.4.24.1 | Minute           | 30 minimum       | >60               |
| T288                             |                            | IPC-TM-650 2.4.24.1 | Minute           | 15 minimum       | >30               |
| Thermal Stress @ 288°C           |                            | IPC-TM-650 2.4.13.1 | Second           | Pass 10s         | >600              |
| Z-axis CTE                       | Before Tg                  | IPC-TM-650 2.4.24   | ppm/°C           | 60 maximum       | 40                |
|                                  | After Tg                   | IPC-TM-650 2.4.24   | ppm/°C           | 300 maximum      | 210               |
|                                  | Total Expansion (50~260°C) | IPC-TM-650 2.4.24   | %                | 3.0 maximum      | 2.2               |
| X-Y CTE                          |                            | IPC-TM-650 2.4.24   | ppm/°C           | –                | 11~13             |
| MOT                              |                            | UL 94               | °C               | –                | 130               |
| <b>Electrical Properties</b>     |                            |                     |                  |                  |                   |
| DK @ 1GHz RC 50%                 |                            | IPC-TM-650 2.5.5.9  | –                | 5.4 maximum      | 4.35              |
| DF @ 1GHz RC 50%                 |                            | IPC-TM-650 2.5.5.9  | –                | 0.035 maximum    | 0.013             |
| Volume Resistivity               | After Moisture Resistance  | IPC-TM-650 2.5.17.1 | MΩ-cm            | 1.0E+4 minimum   | 5.0E+8            |
|                                  | E-24/125                   | IPC-TM-650 2.5.17.1 | MΩ-cm            | 1.0E+3 minimum   | 5.0E+6            |
| Surface Resistivity              | After Moisture Resistance  | IPC-TM-650 2.5.17.1 | MΩ               | 1.0E+4 minimum   | 5.0E+7            |
|                                  | E-24/125                   | IPC-TM-650 2.5.17.1 | MΩ               | 1.0E+3 minimum   | 5.0E+6            |
| Electrical Strength              |                            | IPC-TM-650 2.5.6.2  | Volt/mil (KV/mm) | 762 (30) minimum | 1200~1400 (54)    |
| Dielectric Breakdown             |                            | IPC-TM-650 2.5.6    | KV               | 40 minimum       | 60                |
| Comparative Tracking Index (CTI) |                            | ASTM D3638          | Rating (Volt)    | –                | Grade 3 (175-250) |
| Arc Resistance                   |                            | ASTM D495           | Second           | –                | 195               |
| <b>Mechanical Properties</b>     |                            |                     |                  |                  |                   |
| Peel Strength (1oz)              | As received                | IPC-TM-650 2.4.8    | lb/in (N/mm)     | –                | 7~9 (1.2~1.6)     |
|                                  | After thermal stress       | IPC-TM-650 2.4.8    | lb/in (N/mm)     | 6 (1.05) minimum | 7~9 (1.2~1.6)     |
| Flexural Strength                | Warp                       | IPC-TM-650 2.4.4    | KPsi (MPa)       | 60 (415) minimum | 72 (500)          |
|                                  | Fill                       | IPC-TM-650 2.4.4    | KPsi (MPa)       | 50 (345) minimum | 58 (400)          |
| <b>Physical Properties</b>       |                            |                     |                  |                  |                   |
| Moisture Absorption              |                            | IPC-TM-650 2.6.2.1  | %                | 0.80 maximum     | 0.18              |
| Flammability                     |                            | UL-94               | Rating           | V-0 minimum      | V-0               |

Note: All test data provided are typical values and are not intended to be specification values.

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