



**Glass cloth base epoxy resin  
flame retardant copper clad laminate**

**FR-4-86PY**

**FEATURES**

- Excellent dimensional stability, through-hole reliability and warp/twist.
- Excellent electrical, chemical and heat resistance properties
- IPC-4101 C specification is applicable.
- High CTI value
- Other properties are similar to FR-4-86.

**PERFORMANCE LIST**

| Characteristics                       | Unit   | Conditioning              | Typical Values                         | SPEC                     | Test Method |       |
|---------------------------------------|--------|---------------------------|--|--------------------------|-------------|-------|
| Volume resistivity                    | MΩ-cm  | C-96/35/90                | $5.0 \times 10^8 \sim 5.0 \times 10^9$ | $5 \times 10^6 \uparrow$ | 2.5.17      |       |
| Surface resistivity                   | MΩ     | C-96/35/90                | $5.0 \times 10^6 \sim 5.0 \times 10^7$ | $10^5 \uparrow$          | 2.5.17      |       |
| Permittivity 1MHZ                     | -      | C-24/23/50                | 4.5~4.7                                | 5.4 ↓                    | 2.5.5.9     |       |
| Permittivity 1GHZ                     | -      | C-24/23/50                | 4.0-4.2                                | -                        | 2.5.5.9     |       |
| Loss Tangent 1MHZ                     | -      | C-24/23/50                | 0.010~0.016                            | 0.035 ↓                  | 2.5.5.9     |       |
| Loss Tangent 1GHZ                     | -      | C-24/23/50                | 0.010-0.016                            | -                        | 2.5.5.9     |       |
| Arc resistance                        | SEC    | D-48/50+D-0.5/23          | 120 ↑                                  | 60 ↑                     | 2.5.1       |       |
| Dielectric breakdown                  | KV     | D-48/50                   | 60 ↑                                   | 40 ↑                     | 2.5.6       |       |
| Water absorption                      | %      | D-24/23                   | 0.05~0.10                              | 0.35 ↓                   | 2.6.2.1     |       |
| Flammability                          | -      | C-48/23/50                | 94V0                                   | 94V0                     | UL94        |       |
| Peel strength 1 oz                    | lb/in  | 288°Cx10" solder floating | 8-12                                   | 6 ↑                      | 2.4.8       |       |
| Thermal stress                        | SEC    | 288°C dipping             | 200 ↑                                  | 10 ↑                     | 2.4.13.1    |       |
| Flexural strength                     | LW     | N/mm <sup>2</sup>         | A                                      | 480~550                  | 415 ↑       | 2.4.4 |
|                                       | CW     | N/mm <sup>2</sup>         | A                                      | 415~480                  | 345 ↑       | 2.4.4 |
| Dimensional stability X-Y axis        | %      | E-0.5/170                 | 0.005~0.030                            | 0.05 ↓                   | 2.4.39      |       |
| Coefficient of thermal expansion      |        |                           |  |                          |             |       |
| Z-axis before Tg                      | ppm/°C | TMA                       | 50-70                                  | N/A                      | 2.4.24      |       |
| Z-axis after Tg                       | ppm/°C | TMA                       | 250-350                                |                          |             |       |
| Glass transition temp                 | °C     | DSC                       | 140 ± 5                                | N/A                      | 2.4.25      |       |
| Comparative Tracking Index            | V      | C-96/20/65                | 600                                    | PLC 0                    | ASTM D-3638 |       |
| Decomposition Temperature (Td 5% W/L) | °C     | TGA                       | 310-                                   | N/A                      | 2.4.24.6    |       |

Data shown are nominal values for reference only

**NOTE:**

The average value in the table refers to samples of .062" 1/1.  
Test method per IPC-1M650

**CERTIFICATION UL**

- UL File No. : E98983
- ANSI TYPE:No ANSI

