

IPC-4101 /98 /99 /101 /126    UL - File E41625 Grade PCL-FR-370HR

370HR is the industry's “best in class” lead-free compatible product for high-reliability applications across a wide range of markets.

#### PRODUCT FEATURES

##### Industry Recognition

- UL File Number: E41625
- Polyclad® Grade PCL-FR-370HR
- Qualified to UL's MCIL Program
- RoHS Compliant

##### Performance Attributes

- CAF resistant

##### Processing Advantages

- FR-4 process compatible
- UV blocking and AOI fluorescence
- Multiple reflow capable
- HDI technology compatible

#### PRODUCT AVAILABILITY

##### Standard Material Offering: Laminate

- 2 to 125 mil (0.05 to 3.2 mm)

##### Copper Foil Type

- HTE Grade 3
- RTF (Reverse Treat Foil)
- Embedded resistor foil

##### Copper Weight

- ½, 1 and 2 oz (18, 35 and 70 µm) available
- Heavier copper foil available
- Thinner copper foil available

##### Standard Material Offering: Prepreg

- Tooling of prepreg panels

##### Glass Fabric Availability

- E-glass
- Square weave glass
- Mechanically spread glass

370HR laminates and prepregs, designed by Polyclad, are made using a patented high performance 180°C Tg FR-4 multifunctional epoxy resin system that is designed for multilayer Printed Wiring Board (PWB) applications where maximum thermal performance and reliability are required. We manufacture 370HR laminates and prepregs with high quality E-glass glass fabric for superior Conductive Anodic Filament (CAF) resistance. 370HR provides superior thermal performance with low Coefficient of Thermal Expansion (CTE) and the mechanical, chemical and moisture resistance properties that equal or exceed the performance of traditional FR-4 materials.

370HR is used in thousands of PWB designs and has proven to be best in class for thermal reliability, CAF performance, ease of processing and proven performance on sequential lamination designs.

#### PRODUCT ATTRIBUTES



#### TYPICAL MARKET APPLICATIONS



#### ORDERING INFORMATION:

Contact your local sales representative or contact [info@isola-group.com](mailto:info@isola-group.com) for further information.

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# Typical Values Table

| Property                                               |                                                                                                | Typical Value                                  | Units            | Test Method              |
|--------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------|------------------|--------------------------|
|                                                        |                                                                                                |                                                | Metric (English) | IPC-TM-650 (or as noted) |
| Glass Transition Temperature (Tg) by DSC               |                                                                                                | 180                                            | °C               | 2.4.25C                  |
| Decomposition Temperature (Td) by TGA @ 5% weight loss |                                                                                                | 340                                            | °C               | 2.4.24.6                 |
| Time to Delaminate by TMA<br>(Copper removed)          | A. T260                                                                                        | 60                                             | Minutes          | 2.4.24.1                 |
|                                                        | B. T288                                                                                        | 30                                             |                  |                          |
| Z-Axis CTE                                             | A. Pre-Tg                                                                                      | 45                                             | ppm/°C           | 2.4.24C                  |
|                                                        | B. Post-Tg                                                                                     | 230                                            | ppm/°C           |                          |
|                                                        | C. 50 to 260°C, (Total Expansion)                                                              | 2.8                                            | %                |                          |
| X/Y-Axis CTE                                           | Pre-Tg                                                                                         | 13/14                                          | ppm/°C           | 2.4.24C                  |
| Thermal Conductivity                                   |                                                                                                | 0.4                                            | W/m·K            | ASTM E1952               |
| Thermal Stress 10 sec @<br>288°C (550.4°F)             | A. Unetched<br>B. Etched                                                                       | Pass                                           | Pass Visual      | 2.4.13.1                 |
| Dk, Permittivity                                       | A. @ 100 MHz                                                                                   | 4.24                                           | —                | 2.5.5.3                  |
|                                                        | B. @ 1 GHz                                                                                     | 4.17                                           |                  | 2.5.5.9                  |
|                                                        | C. @ 2 GHz                                                                                     | 4.04                                           |                  | Bereskin Stripline       |
|                                                        | D. @ 5 GHz                                                                                     | 3.92                                           |                  | Bereskin Stripline       |
|                                                        | E. @ 10 GHz                                                                                    | 3.92                                           |                  | Bereskin Stripline       |
| Df, Loss Tangent                                       | A. @ 100 MHz                                                                                   | 0.0150                                         | —                | 2.5.5.3                  |
|                                                        | B. @ 1 GHz                                                                                     | 0.0161                                         |                  | 2.5.5.9                  |
|                                                        | C. @ 2 GHz                                                                                     | 0.0210                                         |                  | Bereskin Stripline       |
|                                                        | D. @ 5 GHz                                                                                     | 0.0250                                         |                  | 2.5.5.5                  |
|                                                        | E. @ 10 GHz                                                                                    | 0.0250                                         |                  | 2.5.5.5                  |
| Volume Resistivity                                     | A. After moisture resistance<br>B. At elevated temperature                                     | 3.0 x 10 <sup>8</sup><br>7.0 x 10 <sup>8</sup> | MΩ-cm            | 2.5.17.1                 |
| Surface Resistivity                                    | A. After moisture resistance<br>B. At elevated temperature                                     | 3.0 x 10 <sup>6</sup><br>2.0 x 10 <sup>8</sup> | MΩ               | 2.5.17.1                 |
| Dielectric Breakdown                                   |                                                                                                | >50                                            | kV               | 2.5.6B                   |
| Arc Resistance                                         |                                                                                                | 115                                            | Seconds          | 2.5.1B                   |
| Electric Strength (Laminate & laminated prepreg)       |                                                                                                | 54 (1350)                                      | kV/mm (V/mil)    | 2.5.6.2A                 |
| Comparative Tracking Index (CTI)                       |                                                                                                | 3 (175-249)                                    | Class (Volts)    | UL 746A<br>ASTM D3638    |
| Peel Strength                                          | A. Low profile copper foil and very low profile copper foil all copper foil >17 µm [0.669 mil] | 1.14 (6.5)                                     | N/mm (lb/inch)   | 2.4.8C                   |
|                                                        | B. Standard profile copper                                                                     | 1.25 (7.0)                                     |                  | 2.4.8.2A                 |
|                                                        | 1. After thermal stress                                                                        | 1.25 (7.0)                                     |                  | 2.4.8.3                  |
|                                                        | 2. At 125°C (257°F)                                                                            | 1.14 (6.5)                                     |                  | 2.4.8.3                  |
| Flexural Strength                                      | A. Length direction                                                                            | 620 (90.0)                                     | MPa (kpsi)       | 2.4.4B                   |
|                                                        | B. Cross direction                                                                             | 531 (77.0)                                     |                  |                          |
| Tensile Strength                                       | A. Length direction                                                                            | 385 (55.9)                                     | MPa (kpsi)       | ASTM D3039               |
|                                                        | B. Cross direction                                                                             | 245 (35.6)                                     |                  |                          |
| Young's Modulus                                        | A. Length direction                                                                            | 3744                                           | ksi              | ASTM D790-15e2           |
|                                                        | B. Cross direction                                                                             | 3178                                           |                  |                          |
| Poisson's Ratio                                        | A. Length direction<br>B. Cross direction                                                      | 0.177<br>0.171                                 | —                | ASTM D3039               |
| Moisture Absorption                                    |                                                                                                | 0.15                                           | %                | 2.6.2.1A                 |
| Flammability (Laminate & laminated prepreg)            |                                                                                                | V-0                                            | Rating           | UL 94                    |
| Relative Thermal Index (RTI)                           |                                                                                                | 130                                            | °C               | UL 796                   |

## NOTES

Visit our site <http://www.isola-group.com> for more details.

Revisions:

A: Initial release - 4/17

B: Corrected units for Flexural and Tensile Strength - 8/18

C: Change MOT to RTI 5/19

D: Changed VLP2 to HVLP to align with common industry terms 4/21

E: Corrected Lengthwise Flexural strength value typo from 6201 to 620 - 6/24

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