

## Features & Benefits

- Thermal resistance 100μm, 0.06 °C-in<sup>2</sup>/W
- Product Thermal conductivity of 12 W/m-K
  - (2oz Cu x 100μm SFL-12 x 1.5 Al)
- High Electrical Strength
- Lead-free solder compatible
- RoHS compliant and environmentally green
- **Available as a laminated panel, RCC or prepreg**
- **Available on aluminum and copper base substrates**
  - Other substrates materials may be available.

TCLAD Metal Core PCB's (MCPCB's) minimize thermal impedance and conduct heat more efficiently than standard printed wiring boards (PWB's).

The distinguishing difference of Thermal Clad resides in the dielectric. This datasheet highlights the performance characteristics of TCLAD SFL-12 dielectric.

## Applications

- High power density applications where achieving low thermal resistance is required, such as:
- LED Lighting
- Power conversion
- Motor drives
- Solid state relays

## Configurations

### Base Metal Thickness mm (mil)

- 5052 Aluminum 0.8 (32), 1.0 (40)\*, 1.5 (59)\*, 2.0 (80)
- 6061 Aluminum 0.8 (32), 1.0 (40)\*, 1.5 (59)\*, 2.0 (80)
- 1050 Aluminum 0.8 (32), 1.0 (40)\*, 1.5 (59)\*, 2.0 (80)
- 4045 Aluminum 1.5 (59), 2.0 (80)
- Copper C1100 1.0 (40)\*, 1.5 (59)\*, 2.0 (80)

### Copper Foil Weight oz (thickness μm)

- ED Copper 1oz (35), 2oz (70), 3oz (105), 4oz (140), 6oz (210)
- RA 8oz (280), 10oz (350)

\* Most common thicknesses

\*\* Other thicknesses and alloys may be available.

Please contact TCLAD sales department for more information.

We provide custom solutions for your applications. For Further inquiries, please contact your local sales agent or directly to TCLAD sales in your region.

| Item                                                 | Thickness                                     | Unit                  | Value (Typ.)                | Method              |
|------------------------------------------------------|-----------------------------------------------|-----------------------|-----------------------------|---------------------|
| <b>Thermal Properties</b>                            |                                               |                       |                             |                     |
| Product Thermal Conductivity                         |                                               | W/m-K                 | 12                          | TO220               |
| Dielectric Thermal Conductivity                      |                                               | W/m-K                 | 3.2                         | ASTM D5470          |
| Thermal Resistance                                   | 100μm (4mil)                                  | °C-in <sup>2</sup> /W | 0.06                        | ASTM D5470          |
| Thermal Impedance                                    | 100μm (4mil)                                  | °C/W                  | 0.08                        | TO-220              |
| <b>Electrical Properties</b>                         |                                               |                       |                             |                     |
| Dielectric Constant                                  |                                               | -                     | 4.2                         | IPC-TM-650 2.5.5.3  |
| Dissipation Factor                                   | 100μm (4mil)                                  | 1MHz                  | 0.011                       | IPC-TM-650 2.5.5.3  |
| Capacitance                                          | 100μm (4mil)                                  | pF                    | 38                          | IPC-TM-650 2.5.5.3  |
| Volume Resistivity                                   |                                               | Ω-cm                  | 10 <sup>13</sup>            | IPC-TM-650 2.5.17.1 |
| Surface Resistivity                                  |                                               | Ω/sq                  | 10 <sup>13</sup>            | IPC-TM-650 2.5.17.1 |
| Breakdown Voltage                                    | 80μm (3.2mil)<br>100μm (4mil)<br>150μm (6mil) | KVAC                  | 4<br>5<br>7                 | ASTM D149           |
| <b>Mechanical Properties</b>                         |                                               |                       |                             |                     |
| Color                                                |                                               | -                     | Off-white                   | Visual              |
| Peel Strength @ 25°C                                 |                                               | Kg/cm                 | >1.3                        | IPC TM-650 2.4.8    |
| Glass Transition (Tg)                                |                                               | °C                    | 180                         | IPC TM-650 2.4.25   |
| CTE in X,Y/Z Axis <Tg                                |                                               | μm/m°C                | 15                          | IPC TM-650 2.4.24.5 |
| CTE in X,Y/Z Axis >Tg                                |                                               | μm/m°C                | 18                          | IPC TM-650 2.4.24.5 |
| Storage Modulus @ 25°C                               |                                               | GPa                   | 18                          | ASTM D638           |
| Storage Modulus                                      |                                               | GPa                   | 18 (25 °C)<br>10.8 (150 °C) | ASTM D4065          |
| Decomposition Temperature (2% loss)                  |                                               | °C                    | 370                         | IPC TM-650 2.4.24.6 |
| Decomposition Temperature (5% loss)                  |                                               | °C                    | 400                         | IPC TM-650 2.4.24.6 |
| <b>Chemical Properties</b>                           |                                               |                       |                             |                     |
| Water Vapor Retention                                |                                               | %                     | < 0.5                       | ASTM E595           |
| Out-Gassing Total Mass Loss                          |                                               | %                     | < 0.1                       | ASTM E595           |
| Collect Volatile Condensable Material                |                                               | %                     | < 0.1                       | ASTM E595           |
| <b>Agency Ratings &amp; Durability (UL: E121882)</b> |                                               |                       |                             |                     |
| UL Maximum Operating Temperature (MOT)               |                                               | °C                    | 130                         | UL 746              |
| UL Flammability                                      |                                               | -                     | V-0                         | UL 94               |
| UL Comparative Tracking Index                        |                                               | (CTI)                 | 600                         | UL 746E             |

