

Features & Benefits

- Thermal resistance 4mil, 0.03°C-in²/W (0.18°C-cm²/W)
- Product Thermal conductivity of 3.7 W/m-K
- High Voltage Strength
- High temperature applications
- Lead-free solder compatible
- Eutectic AuSn compatible
- RoHS compliant
- Available on aluminum and copper base substrates
 - Other substrates materials may be available

Thermal Clad Metal Core PCB's (MCPCB's) minimize thermal impedance and conducts heat more efficiently than standard printed wiring boards (PWB's). These substrates are more mechanically robust than Direct Bond Copper (DBC) construction.

The differentiating technology of Thermal Clad resides in the dielectric. This datasheet highlights the performance characteristics of Thermal Clad HT dielectric

Applications

- Automotive LED headlights
- High power density applications where achieving low thermal resistance is required
- Power conversion
- Motor drives

Configurations

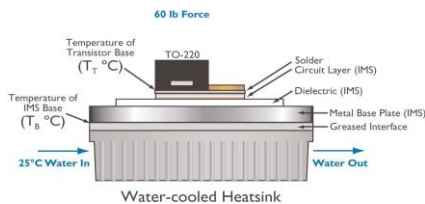
Base Metal **Thickness mm (mil)**

- 5052 Aluminum 0.8 (32), 1.0 (40)*, 1.5 (59)*, 2.0 (80), 3.2 (125)
- 6061 Aluminum 0.8 (32), 1.0 (40)*, 1.5 (59)*, 2.0 (80), 3.2 (125), 4.8 (190)
- 4045 Aluminum 1.5 (59), 2.0 (80)
- Copper C1100 0.5 (20), 0.8 (32), 1.0 (40)*, 1.5 (60)*, 3.2 (125)

* most common thicknesses

** other thicknesses and alloys may be available. Please contact TCLAD sales department

Test Thermal Performance of Insulated Metal Substrate (IMS®) TO-220 Set-up



$$\theta \left(\frac{^{\circ}\text{C}}{\text{W}} \right) = \frac{(T_T - T_B)}{40\text{W typ}}$$

| Item | Thickness | Unit | Value | Method |
|--|--------------|--|------------------|--------------------------|
| Thermal Properties | | | | |
| Product Thermal Conductivity | | W/m-K | 3.7 | MET 5.4-01-40000 |
| Dielectric Thermal Conductivity | | W/m-K | 2.7 | ASTM D5470 |
| Thermal Resistance | 100µm (4mil) | °C-cm ² /W (°C-in ² /W) | 0.18 (0.03) | ASTM D5470 |
| Thermal Impedance | 100µm (4mil) | °C/W | 0.53 | MET 5.4-01-40000 |
| Electrical Properties | | | | |
| Dielectric Constant | | - | 6.3 | ASTM D150 |
| Dissipation Factor | 100µm (4mil) | 1KHz/1MHz | 0.006 | ASTM D150 |
| Capacitance | 100µm (4mil) | pF/cm ² (pF/in ²) | 55 (350) | ASTM D150 |
| Volume Resistivity | | Ω-m | 10 ¹³ | ASTM D257 |
| Surface Resistivity | | Ω/sq | 10 ¹⁶ | ASTM D257 |
| Breakdown Voltage | 100µm (4mil) | KVAC | 9.2 | ASTM D149 |
| Mechanical Properties | | | | |
| Color | | - | Off-White | Visual |
| Peel Strength @ 25°C | | N/mm ((lb/in) | 1.0 (5.7) | ASTM D2861 |
| Glass Transition (T _g) | | °C | 66 | ASTM E1356 |
| CTE in X,Y,Z Axis <T _g | | µm/m°C | 55 | ASTM D3386 |
| CTE in X,Y,Z Axis >T _g | | µm/m°C | 54 | ASTM D3386 |
| Storage Modulus (@25°C/150°C) | | GPa | 17.6/0.6 | ASTM D4065 |
| Chemical Properties | | | | |
| Water Vapor Retention | | % Wt. | 0.02 | ASTM E595 |
| Out-Gassing Total Mass Loss | | % Wt. | 0.01 | ASTM E595 |
| Collect Volatile Condensable Material | | % Wt. | <0.01 | ASTM E595 |
| Agency Ratings & Durability | | | | |
| UL Maximum Operating Temperature (MOT) | | °C | 140 | UL 746 |
| UL Flammability | | - | V-0 | UL 94 |
| UL Comparative Tracking Index | | (CTI) | 0 | ASTM D3638/ IEC 60112 |
| Solder Limit Rating | | °C/Sec | 325/60 | UL 746 |

