

Benefits

- Very low thermal resistance of $0.05^{\circ}\text{Cin}^2/\text{W}$ ($0.32^{\circ}\text{Ccm}^2/\text{W}$)
- High thermal conductivity of 4.1 W/m-K
- High temperature applications
- Lead-free solder compatible
- Eutectic AuSn compatible
- RoHS compliant and environmentally green
- Available on all aluminum and copper metal substrates

Thermal Clad Metal Core PCB's (MCPCB's) minimize thermal impedance and conduct heat more effectively than standard printed wiring boards (PWB's). These substrates are more mechanically robust than thick-film ceramic and direct bond copper construction.

Thermal Clad is a cost-effective solution which can eliminate components, allow for simplified designs, smaller devices and an overall less complicated production process. Additional benefits of Thermal Clad include lower operating temperatures, resulting in longer component life and increased durability.

The technology of Thermal Clad resides in the dielectric. This datasheet highlights the performance characteristics of Thermal Clad HT 3 mils (High Temperature) a dielectric resistant to degradation from high temperature exposure and features high dielectric breakdown characteristics. This dielectric is proven in applications such as LED, Power Conversion, Heat-Rails, Solid State Relays and Motor Drives.

| HT Typical Values | | |
|-------------------|-------|-------------|
| HT-04503 | VALUE | TEST METHOD |

THERMAL PROPERTIES

| | | |
|---------------------------------|---|------------------|
| Product Thermal Conductivity | 4.1 W/m-K | MET 5.4-01-40000 |
| Dielectric Thermal Conductivity | 2.2 W/m-K | ASTM D5470 |
| Thermal Resistance | 0.05°C-in ² /W (0.32°C-cm ² /W) | ASTM D5470 |
| Thermal Impedance | 0.45°C/W | MET-5.4-01-40000 |
| Glass Transition | 150°C | ASTM E1356 |
| Max Operating Temp. | 140°C | U.L. 796 |
| Max Soldering Temp. | 325°C | U.L. 796 |

ELECTRICAL PROPERTIES

| | | |
|---------------------|--|-----------|
| Dielectric Constant | 7 | ASTM D150 |
| Dissipation Factor | 0.0033/0.0148 (@1KHz/1MHz) | ASTM D150 |
| Capacitance | 540 pF/in ² (85pF/cm ²) | ASTM D150 |
| Volume Resistivity | 1 ¹⁴ Ω-m | ASTM D257 |
| Surface Resistivity | 1 ¹³ Ω/sq | ASTM D257 |
| Dielectric Strength | 2000 V/mil (80 kV/mm) | ASTM D149 |
| Breakdown Voltage | 8.5 kVAC | ASTM D149 |

MECHANICAL PROPERTIES

| | | |
|----------------------------------|------------------------|------------|
| Color | White | Visual |
| Dielectric Thickness | 0.003" (76 μm) | Visual |
| Peel Strength@25C | 6 lb/in (1.1 N/mm) | ASTM D2861 |
| CTE in XY/Z Axis <T _g | 25 μm/m°C | ASTM D3386 |
| CTE in XY/Z Axis >T _g | 95 μm/m°C | ASTM D3386 |
| Storage Modulus | 16/7 GPa (@25°C/150°C) | ASTM 4065 |

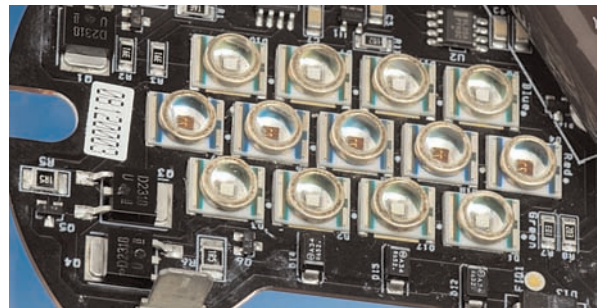
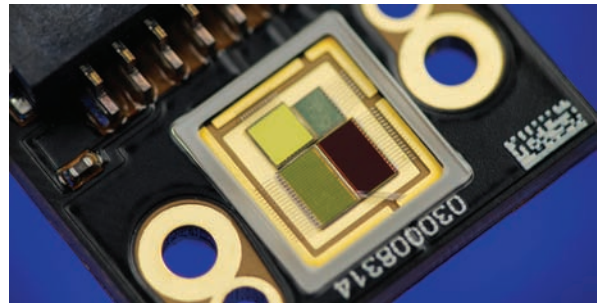
CHEMICAL PROPERTIES

| | | |
|---------------------------------------|-----------|-----------|
| Water Vapor Retention | 0.24% wt. | ASTM E595 |
| Out-Gassing Total Mass Loss | 0.28% wt. | ASTM E595 |
| Collect Volatile Condensable Material | 0.01% wt. | ASTM E595 |

AGENCY RATINGS & DURABILITY

| | | |
|------------------------------------|------------------|---------------------|
| U.L. Maximum Operating Temperature | 140°C | U.L. 746B |
| U.L. Flammability | V-0 | U.L. 94 |
| Comparative Tracking Index (CTI) | 0/600 | ASTM D3638/IEC60112 |
| Solder Limit Rating | 325°C/60 seconds | U.L. 796 |

Please test this material in your application. Bergquist provides this engineering data for design guidance only. Depending upon your application, the observed material performance may vary.



High Power LED applications using Thermal Clad.

Applications

- High watt-density applications where achieving low thermal resistance is required
- Power conversion
- Heat-rails
- Solid state relays
- Motor drives
- LED applications
- Solar receivers

MET-4.5-01-40000 Test Thermal Performance of Insulated Metal Substrates (IMS) TO-220 Set-up

