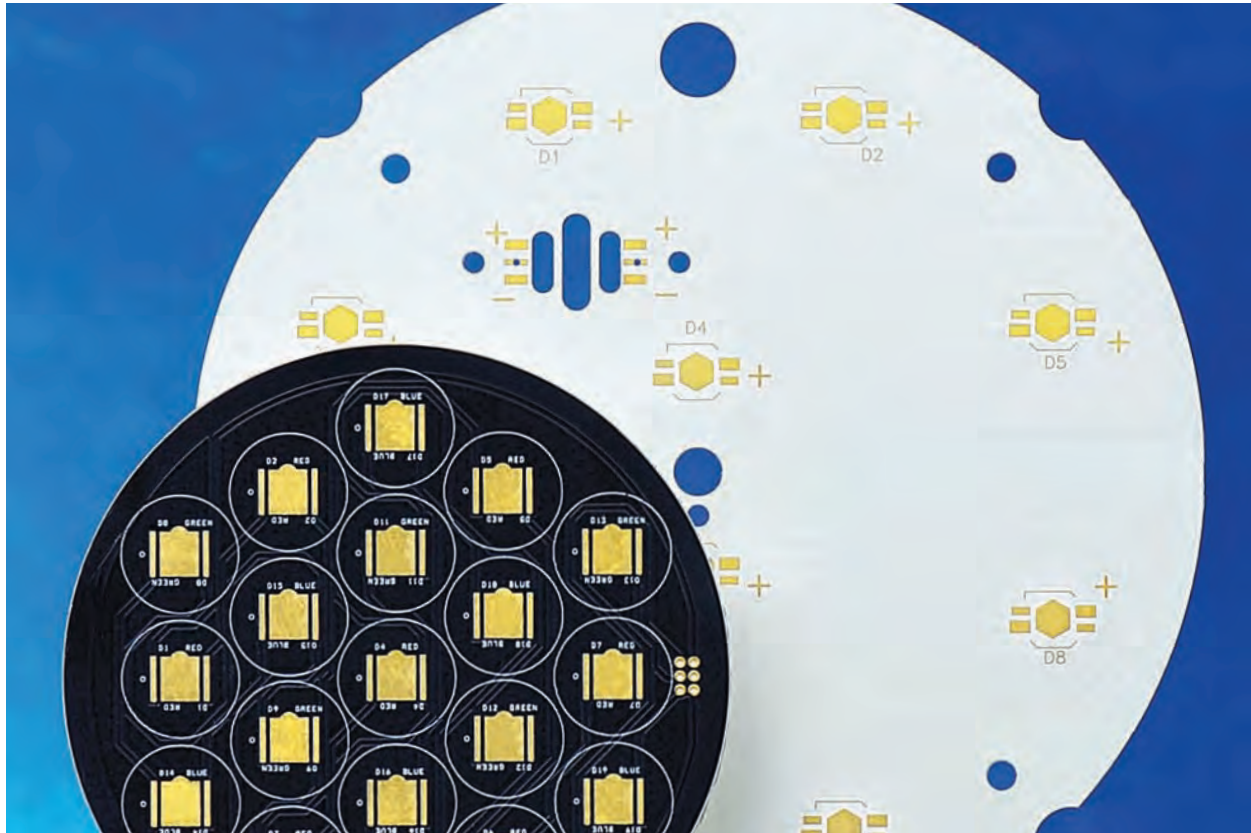


### Superior Dielectric Lowers Operating Temperatures



#### Benefits

- Very low thermal resistance of 0.02°Cin<sup>2</sup>/W (0.13°Ccm<sup>2</sup>/W)
- High thermal conductivity of 3.0 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

Bergquist introduces a new high thermal performance dielectric into its comprehensive Thermal Clad metal core PCB (MCPCB's) line. HPL is a dielectric specifically formulated for high power lighting LED applications with demanding thermal performance requirements. This thin dielectric at 0.0015" (38µm) has an ability to withstand high temperatures with a glass transition of 185°C and phenomenal thermal performance of 0.30°C/W (RD 2018).

Bergquist Thermal Clad Metal Core PCB's minimize thermal impedance and conduct heat more effectively and efficiently than standard printed wiring boards (PWB's). The low thermal impedance of Thermal Clad dielectrics outperforms other PCB materials and offers a cost effective solution eliminating additional LEDs for simplified designs and an overall less complicated production process. Use of Thermal Clad results in lower operating temperatures substantially extending LED lifetimes and offers better durability for high power lighting applications.

For Additional Info (800) 347-4572  
[www.bergquistcompany.com](http://www.bergquistcompany.com)

#### HPL Dielectric Typical Values

HPL-03015	VALUE	TEST METHOD
<b>THERMAL PROPERTIES</b>		
Thermal Conductivity	3.0 W/m-K	ASTM D5470
Thermal Resistance	0.02°C-in <sup>2</sup> /W (0.13°C-cm <sup>2</sup> /W)	ASTM D5470
Thermal Impedance	0.30°C/W	MET-5.4-01-40000
Glass Transition	185°C	ASTM E1356
Max Operating Temp.	140°C	U.L. 796
Max Soldering Temp.	325°C	U.L. 796

#### ELECTRICAL PROPERTIES

Dielectric Constant	6.6	ASTM D150
Dissipation Factor	0.003/0.005 (@1KHz/1MHz)	ASTM D150
Capacitance	925 pF/in <sup>2</sup> (140pF/cm <sup>2</sup> )	ASTM D150
Volume Resistivity	1 <sup>14</sup> Ω-m	ASTM D257
Surface Resistivity	1 <sup>13</sup> Ω/sq	ASTM D257
Dielectric Strength	2000 V/mil (75 kV/mm)	ASTM D149
Breakdown Voltage	2.5 kVAC	ASTM D149

#### MECHANICAL PROPERTIES

Color	Off-white	Visual
Dielectric Thickness	0.0015" (38 μm)	Visual
Peel Strength@25C	5 lb/in (0.9 N/mm)	ASTM D2861
CTE in XY/Z Axis <T <sub>g</sub>	35 μm/m°C	ASTM D3386
CTE in XY/Z Axis >T <sub>g</sub>	85 μm/m°C	ASTM D3386
Storage Modulus	18/12 GPa (@25°C/150°C)	ASTM 4065

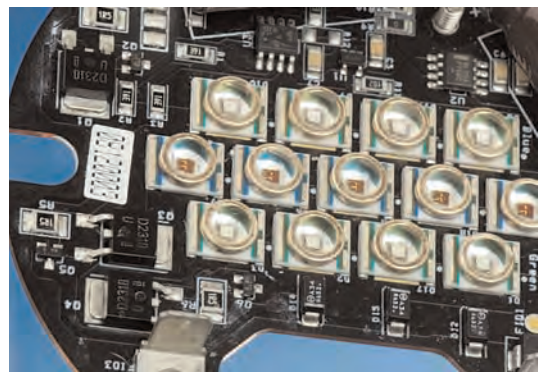
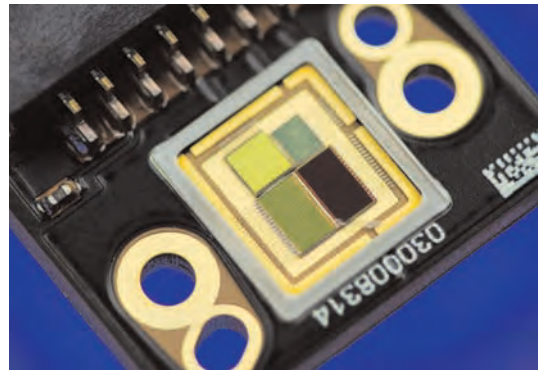
#### CHEMICAL PROPERTIES

Water Vapor Retention	0.11% wt.	ASTM E595
Out-Gassing Total Mass Loss	0.15% wt.	ASTM E595
Collect Volatile Condensable Material	< 0.01% wt.	ASTM E595

#### AGENCY RATINGS & DURABILITY

U.L. Continuous Operating Temperature	140°C	U.L. 746B
U.L. Flammability	V-0	U.L. 94
Comparative Tracking Index (CTI)	0	ASTM D3638
Solder Float	Pass	IPC TM 650 2.4.13

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
- Backlighting
- Projectors
- LED applications

**TO-220 Thermal Characterization**  
Measured according to RD 2018 at 40 Watts

