TCLAD

Technical Data

HPL Dielectric

Features & Benefits

- Thermal resistance 38µm, 0.13°C-cm²/W (0.02°C-in²/W)
  - (38µm thickness)
- Product Thermal conductivity of 7.5 W/m-K
  - (2oz Cu x 38µm HPL x 1.6 Al)
- High Voltage Strength
- High temperature applications
- Lead-free solder compatible
- Eutectic AuSn compatible
- RoHS compliant and environmentally green
- Available on aluminum and copper base substrates
  - Other substrate 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 HPL dielectric.

Applications

- High power density applications where achieving low thermal resistance is required.
- Automotive high voltage power modules
- Power conversion
- LED headlight & foglamps
- High power LED architectural lighting and UV LED
- Motor drives
- Solid state relays

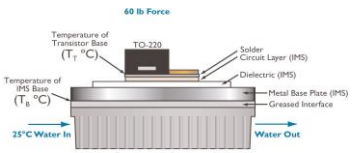
Configurations

Base Metal	Thickness mm (mil)
5052 Aluminum	0.8 (32), 1.0 (40)*, 1.5 (59)*, 2.0 (80), 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)*, 1.58 (62)*, 3.2 (125)

Copper Foil	Weight oz (thickness µm)
ED Copper:	1oz (35), 2oz (70), 3oz (105), 4oz (140), 6oz (210)
RA Copper:	8oz (280), 10oz (350)

* Most common thicknesses.

** Other thicknesses and alloys may be available. Please contact TCLAD sales department for more information.



Water-cooled Heatsink

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

Item	Thickness	Unit	Value	Method
Thermal Properties				
Product Thermal Conductivity		W/m-K	7.5	MET 5.4-01-40000
Dielectric Thermal Conductivity		W/m-K	3.0	ASTM D5470
Thermal Resistance	38µm (1.5mil)	°C-cm²/W	0.13 (0.02)	ASTM D5470
	50µm (2mil)		0.17 (0.026)	
	100µm (4mil)	(°C-in²/W)	0.20 (0.031)	
	150µm (6mil)		0.25 (0.039)	
Thermal Impedance	38µm (1.5mil)	°C/W	0.30	MET 5.4-01-40000
	50µm (2mil)		0.40	
	100µm (4mil)		0.47	
	150µm (6mil)		0.58	
Electrical Properties				
Dielectric Constant		-	6.6	ASTM D150
Dissipation Factor	38µm (1.5mil)	1KHz/1MHz	0.003/0.005	ASTM D150
	50µm (2mil)		TBD	
	100µm (4mil)		TBD	
	150µm (6mil)		TBD	
Capacitance	38µm (1.5mil)	pF/cm²	140 (925)	ASTM D150
	50µm (2mil)		90 (452)	
	100µm (4mil)	(pF/in²)	71 (560)	
	150µm (6mil)		33 (204)	
Volume Resistivity		Ω-m	10^{14}	ASTM D257
Surface Resistivity		Ω/sq	10^{13}	ASTM D257
Breakdown Voltage	38µm (1.5mil)	KVAC	5.0	ASTM D149
	50µm (2mil)		7.7	
	100µm (4mil)		12.2	
	150µm (6mil)		17.4	
Mechanical Properties				
Color		-	Off-white	Visual
Peel Strength @ 25°C		N/mm ((lb/in)	0.9 (5)	ASTM D2861
Glass Transition (Tg)		°C	185	ASTM E1356
CTE in X,Y/Z Axis <Tg		µm/m°C	35	ASTM D3386
CTE in X,Y/Z Axis >Tg		µm/m°C	85	ASTM D3386
Storage Modulus		GPa	17/12	ASTM D4065
Chemical Properties				
Water Vapor Retention		% Wt.	0.11	ASTM E595
Out-Gassing Total Mass Loss		% Wt.	0.15	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 / 600	ASTM D3638/ IEC 60112
Solder Limit Rating		°C	325	UL 746

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Rev 2024 D01-017