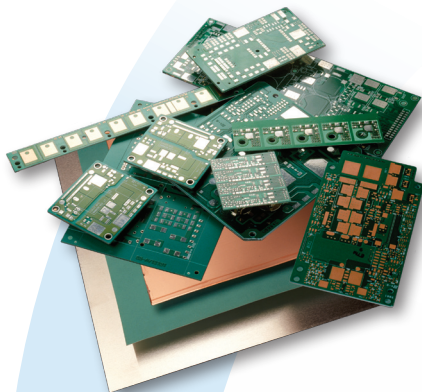




Innovative **Technology**
for a **Connected** World



Tlam™ ML 1KA

Thermally Conductive PCB Substrate

MULTI LAYER CONSTRUCTIONS BASED ON TLAM DS 1KA AND TLAM PP 1KA

Tlam DS 1KA is a double sided circuit copper laminate bonded together with Tlam 1KA dielectric. Tlam DS 1KA laminates are processed through standard FR4 plate and etch operations. Tlam DS 1KA laminates are available in 6-8 mil dielectric and 0.5 – 4 ounce circuit copper combinations.

Tlam PP is a thick, high flow, thermally conductive pre-preg that bonds the Tlam DS board to either an aluminum or a copper base plate to complete the multi-layer insulated metal PCB (Tlam ML). Tlam PP 1KA is available in 8-12 mil thicknesses to maintain dielectric isolation on buried 4 ounce circuit copper traces.

The Tlam ML based on Tlam DS 1KA and Tlam PP 1KA materials have 8-10 times better thermal conductivity compared to FR4 and this is the key to keeping components cool. The Tlam ML 1KA boards are processed through standard pick and place SMT and manual wire bond operations.

FEATURES AND BENEFITS

- UL® recognized up to 4 ounce copper internally
- Create copper core IMPCB without whole fill step
- UL® RTI of 130°C
- RoHS Compliant
- Environmentally green

APPLICATIONS

- Multi-layer DC/DC power converters
- Multi-layer LED substrates

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Tlam™ ML 1KA

Thermally Conductive PCB Substrate

| OPERATING VOLTAGE | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
|---------------------------------------|--|----------------|------------------|------------------|------------------|------------------|
| Continuous AC | VAC | 50 | 120 | TBD** | TBD** | TBD** |
| Continuous DC | VDC | 95 | 225 | TBD** | TBD** | TBD** |
| Peak Recurring | Vp | 140 | 300 | TBD** | TBD** | TBD** |
| THERMAL PROPERTIES | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
| Thermal Conductivity* | watt/m °K | 3 | 3 | 3 | 3 | 3 |
| Thermal Resistance | °C-in ² /watt (°C-cm ² /watt) | 0.05 (0.35) | 0.081 (0.552) | TBD** | TBD** | TBD** |
| Glass Transition Temperature | °C | 105 | 105 | 105 | 105 | 105 |
| Soldering Temperature, Maximum | °C | 288 | 288 | 288 | 288 | 288 |
| Heat Capacity | J/g° | 1.53 | 1.53 | 1.53 | 1.53 | 1.53 |
| ELECTRICAL PROPERTIES | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
| Dielectric Constant @ 1KHz/1MHz | | 4.3/4.1 | 4.3/4.1 | 4.3/4.1 | 4.3/4.1 | 4.3/4.1 |
| Dissipation Factor @ 1KHz/1MHz | | 0.008/0.035 | 0.008/0.035 | 0.008/0.035 | 0.008/0.035 | 0.008/0.035 |
| Capacitance @ 1KHz | pF/in ² | 161 | 121 | 121-244** | 121-244** | 121-244** |
| Volume Resistivity | ohm-cm | 1.20E+15 | 1.20E+14 | 1.20E+14 | 1.20E+14 | 1.20E+14 |
| Surface Resistivity | ohm | 1.00E+10 | 1.00E+10 | 1.00E+10 | 1.00E+10 | 1.00E+10 |
| Dielectric Strength | V/mil (kV/mm) | 800 (20.3) | 800 (20.3) | 800 (20.3) | 800 (20.3) | 800 (20.3) |
| Withstand Voltage | VDC | 1200 | 2500 | TBD** | TBD** | TBD** |
| MECHANICAL PROPERTIES | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
| Dielectric Thickness | inches (mm) | 0.006 (0.152) | 0.008 (0.203) | 0.008 (0.203) | 0.010 (0.245) | 0.012 (0.305) |
| Peel Strength | lbs/in (Kg/cm) | 4.5 (0.8) | 4.5 (0.8) | 4.5-6 (0.8-1.20) | 4.5-6 (0.8-1.20) | 4.5-6 (0.8-1.20) |
| CTE in XYZ axis < Tg | ppm | 32/43 | 32/43 | 32/43 | 32/43 | 32/43 |
| CTE in XYZ axis > Tg | ppm | 81/171 | 81/171 | 81/171 | 81/171 | 81/171 |
| Tensile Strength | MPa | NA | NA | 52.2 | 52.2 | 52.2 |
| Elongation 25/150°C | % | NA | NA | 0.8/1.1 | 0.8/1.1 | 0.8/1.1 |
| Young's Modulus @ 25/150°C | MPa | 9700/2700 | 9700/2700 | 9700/2700 | 9700/2700 | 9700/2700 |
| Poisson's Ratio @ 25/150°C | | 0.26/0.16 | 0.26/0.16 | 0.26/0.16 | 0.26/0.16 | 0.26/0.16 |
| Flexural Strength | MPa | 49.7 | 49.7 | 49.7 | 49.7 | 49.7 |
| CHEMICAL PROPERTIES | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
| Water Absorption after 168 hours | % wt. | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Out-gassing-Total Mass Loss | % wt. | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| Collect Volatile Condensable Material | % wt. | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| AGENCY RATINGS & DURABILITY | UNITS | DS 1KA06 | DS 1KA08 | PP 1KA08 | PP 1KA10 | PP 1KA12 |
| UL Continuous Operating Temperature | °C | 120 | 130 | 110-120** | 110-130** | 110-130** |
| UL Flammability | E165095 | 94V0 | 94V0 | 94V0 | 94V0 | 94V0 |
| Comparative Tracking Index | | 600 | 600 | 600 | 600 | 600 |
| Solder Float (3 min. @ 288°C) | | Pass | Pass | Pass | Pass | Pass |

*As measured on dielectric compound only.
** Depends on final dielectric thickness.

Data for design engineer guidance only. Observed performance varies in application. Engineers are reminded to test the material in application.

THR-DS-Tlam-ML-1KA 0410

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