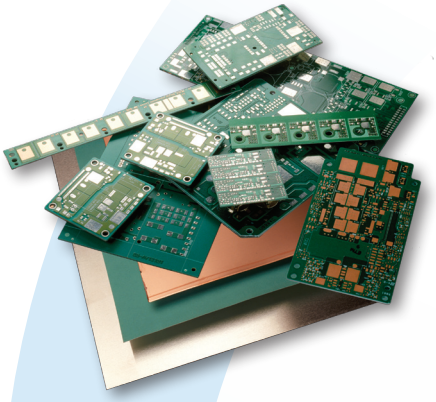
Laird TECHNOLOGIES

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 cooper 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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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-in2/watt (°C-cm2/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 XY/Z axis < Tg	ppm	32/43	32/43	32/43	32/43	32/43
CTE in XY/Z 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.