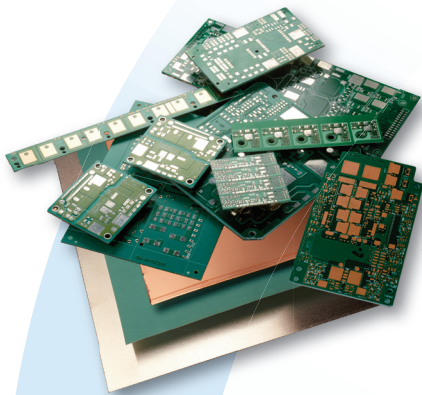




Innovative **Technology**  
for a **Connected** World



# T-lam™ ML 1KA

## Thermally Conductive PCB Substrate

### MULTI LAYER CONSTRUCTIONS BASED ON T-LAM DS 1KA AND T-LAM PP 1KA

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

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

The T-lam ML based on T-lam DS 1KA and T-lam PP 1KA materials have 8-10 times better thermal conductivity compared to FR4 and this is the key to keeping components cool. The T-lam 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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# T-lam™ 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 <sup>2</sup> /watt (°C-cm <sup>2</sup> /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 <sup>2</sup>	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-T-LAM-ML-1KA 0509

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