



## PRODUCT DESCRIPTION

Tlam™ is a thermally conductive IMPCB substrate used for heat dissipation in electronics circuit boards used in Power Supplies, DC-DC Converters, LEDs & Ballast Lighting, Automotive, Appliances, Commercial & Industrial Motor Drives, and Military & Aerospace Applications.

The heart of this system is the thermally conductive pre-preg, Tlam™ PP 1KA. This ceramically filled 3 W/mK, dielectric prepreg offers 8-10 times better thermal performance over FR4, while maintaining good adhesion and voltage breakdown properties. Tlam™ PP 1KA is a “B” State epoxy film providing room temperature stability for 6 months. Tlam™ PP 1KA is provided in multiple thicknesses. Thinner films offer better thermal performance while thicker films offer better dielectric strength.

Tlam™ PP 1KA can be used to build many different combinations of PCB laminates. The simplest is copper foil, Tlam™ PP 1KA dielectric and an aluminum base plate which acts as a heatsink and adds rigidity. Board complexity goes up from here offering multi-layer boards constructions and PCB structures can further include varying layers of Tlam™ PP 1KA and FR4 layers to give the thermal properties where need while maintaining cost effectiveness.

Tlam™ PP 1KA can laminated with copper foils from ½ oz to 4 oz can be used aluminum or copper base plates ranging from 2.5mm to 6mm thick. Further Tlam™ PP 1KA can be laminated on both sides with copper films to make traditional type PCB Cores.

For detailed information on Design and Fabrication:

[A18422: Tlam System Design Guide: Part 1: Performance and Reliability](#)

[A18423: Tlam System Design Guide: Part 1: Manufacturability](#)

[A18424: Tlam System Fabrication Guide](#)



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## FEATURES & BENEFITS

- Low Thermal Resistance for SMD & Chip & Wire Components
- Compatible with Heavy Copper Foil & most Pre-pregs
- Low Modulus for Stress Relief & High Reliability
- Mechanically Rugged under Vibration and Mechanical Shock
- Integral aluminum Base Plate for Mechanical & Thermal Interface
- Compatible with Power Substrate & Multilayer Construction
- Uses Standard low-cost PCB Fabrication Techniques
- Can run through standard pick and place SMT and manual wire bond processes.

## MARKETS

- Power supplies
- DC/DC Converters
- Audio Amplifiers
- LED & Ballast Lighting
- Battery Charging
- Inverters
- Automotive
- Appliances
- Commercial & Industrial Motor Drives
- Military & Aerospace

**AVAILABILITY**

- Tlam™ PP 1KA is typically supplied in 0.1mm (0.004"), 0.15mm (0.006") and 0.2mm (0.008").
- Also available 0.25mm and 0.3mm thicknesses
- Standard sheet size is 18" x 24"

**STORAGE CONDITIONS**

- 5C to 25C & <60% RH
- Shelf life 6 months from the date of shipment

**TYPICAL PROPERTIES**

PROPERTY	UNITS	1KA04	1KA06	1KA08
Dielectric Thickness	Inches (mm)	0.004 (0.102)	0.006 (0.152)	0.008 (0.203)
Peel Strength	lbs/in (Kg/cm)	4.5 (0.8)	4.5 (0.8)	5.0 (1.0)
Thermal Conductivity	(Watt/m°K)	3	3	3
Thermal Resistance	°C-in <sup>2</sup> /watt (°C-cm <sup>2</sup> /watt)	0.05 (0.34)	0.08 (0.52)	0.11 (0.70)
Glass Transition Temperature	°C	105	105	105
Max Operating Temperature	°C	110	120	130
Max Soldering Temperature	°C	288	288	288
Heat Capacity	J/g °K	1.53	1.53	1.53
UL Continuous Operating Temperature	°C	110	120	130
Dielectric Constant	KHz/MHz	4.3/4.1	4.3/4.1	4.3/4.1
Dissipation Factor	KHz/MHz	0.008/0.035	0.008/0.035	0.008/0.035
Capacitance	pF/in <sup>2</sup> @KHz/MHz	244/230	161/153	121/115
Volume Resistivity	ohm-cm	1.2x10 <sup>14</sup>	1.2x10 <sup>14</sup>	1.2x10 <sup>14</sup>
Surface Resistivity	ohm	1.0x10 <sup>10</sup>	1.0x10 <sup>10</sup>	1.0x10 <sup>10</sup>
Continuous AC	VAC	50	120	240
Continuous DC	VDC	95	225	450
Peak Recurring	VDC	140	300	600
Dielectric Strength	VAC/mil (KVAC/mm)	650 (25.6)	800 (31.5)	800 (31.5)
Withstand voltage	VDC	1800	2500	3500
CTE in XY/Z axis < Tg	ppm	32/43	32/43	32/43
CTE in XY/Z axis > Tg	ppm	81/171	81/171	81/171
Tensile Strength	MPa	52.2	52.2	52.2
Elongation 25/150°C	%	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
Poisson's Ratio @ 25/150°C		0.26/0.16	0.26/0.16	0.26/0.16
Flexural Strength	MPa	49.7	49.7	49.7
Water Absorption 168 hours	%	0.5	0.5	0.5
Out gassing-TML	% wt.	0.57	0.57	0.57
Out gassing - CVCM	% wt.	0.06	0.06	0.06
UL Flammability E165095		94V0	94V0	94V0
Comparative Tracking Index		600	600	600
Solder Float (3 min. @ 288°C)		Pass	Pass	Pass

All properties are typical @ 25°C, unless otherwise specified. For design engineer guidance only, observed performance varies in application. Engineers are reminded to test the material in application. Peel strength is measured with 1oz Cu weight. All properties are based on nominal thickness. The layout and process may require thicker starting Tlam™ PP 1KA to meet nominal laminated thickness.

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