

DuPont™ Coolam™ LX

THERMAL SUBSTRATES FOR METAL CORE PRINTED CIRCUIT BOARDS

Technical Data Sheet

Description

DuPont™ Coolam™ LX thermal substrates for metal core printed circuit boards (MCPCBs) are ideal for applications requiring very low thermal impedance and good electrical performance. It is a composite of metal foil, proprietary thermally conductive polyimide dielectric bonded to a metal base.

This material system is designed for today's demanding thermal applications requiring very low thermal impedance, very high operating temperature, excellent long term reliability, and electrical isolation. Typical applications include LED light bulbs, LED high bay lighting and outdoor LED lighting.

Specifications

- Very low thermal impedance
- Excellent reliability performance
- Excellent durability and stability at high temperature
- Uniform thermal, mechanical and electrical properties under environmental stress
- UL 94 recognition: V-0
- Halogen free
- Lead free solder compatibility
- RoHS compliant

Typical physical and electrical properties along with application test methods are shown in **Table 2**.

Constructions

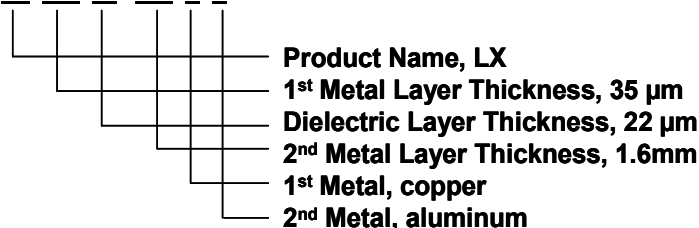
Standard Coolam™ LX constructions are listed in **Table 1**. The polyimide dielectric thickness is 0.71 mil and 0.87 mil (17 µm and 22 µm), the copper foil weights are 1 and 2 oz./ft² (35 µm and 70 µm) and the aluminum thicknesses are 0.040 in. and 0.063 in. (1.0 mm and 1.6 mm). Other constructions may be available upon request depending on specific requirements for dielectric and thermal performance.

Table 1
DuPont™ Coolam™ LX Product Offerings

Product Codes	Copper µm (oz./ft ²)	Dielectric µm (mil)	Aluminum mm (in.)
LX03517010	35 (1)	17 (0.71)	1.0 (0.040)
LX07017010	70 (2)	17 (0.71)	1.0 (0.040)
LX03517016	35 (1)	17 (0.71)	1.6 (0.063)
LX07017016	70 (2)	17 (0.71)	1.6 (0.063)
LX03522010	35 (1)	22 (0.87)	1.0 (0.040)
LX07022010	70 (2)	22 (0.87)	1.0 (0.040)
LX03522016	35 (1)	22 (0.87)	1.6 (0.063)
LX07022016	70 (2)	22 (0.87)	1.6 (0.063)

Product Code Description

LX 035 22 016 X Y



MCPCBs Design

DuPont will work with OEM MCPCB designs to qualify and specify Coolam™ LX. For board designers, please consult our "Design Guide".

Fabrication

DuPont has established fabricators to produce cost effective, high quality MCPCBs. Coolam™ LX thermal substrates are fully compatible with most printed circuit board fabrication processes. Please contact us for the latest list of Coolam™ fabricators.

Storage Conditions

Coolam™ LX laminate is shipped with a protective polypropylene plastic film applied to both the copper and aluminum sides to protect them during shipping and handling. Coolam™ LX should be stored in the original package at temperatures of 5–25°C (41–77°F) and below 60% relative humidity in order to prevent the protective film from over adhering to the metal surfaces during storage, making removal of the protective films difficult or impossible. The products do not require refrigeration and should not be frozen. The material should be kept dry, clean and well protected from physical damage. If stored as recommended, Coolam™ LX laminate itself has a shelf life of two years with the protective films removed from the date of shipment. With protective film still applied the shelf life is six months from the date of shipment. The protective polypropylene film can be recycled subject to local rules and laws.

Safe Handling

Although DuPont is not aware of anyone developing contact dermatitis when using Coolam™ LX products, some individuals may be more sensitive than others. Anyone handling Coolam™ LX should wash their hands with soap before eating, smoking or using restroom facilities. Gloves, finger cots, and finger pads should be changed daily. As with all parts, sharp metal edges present a potential hazard during handling. All personnel involved in handling Coolam™ LX products should use suitable hand protection to minimize cuts.

CoolLam™ LX is fully cured when delivered. However, fabrication areas should be well ventilated with fresh air supply to avoid build-up from trace quantities of residual solvent (typical of polyimides) that may volatilize during assembly.

When drilling or routing parts with CoolLam™ LX, provide adequate vacuum around the drill head to minimize worker exposure to dust.

Coolam™ LX does not contain polybrominated biphenyls (PBBs) or polybrominated biphenyloxides (PBBOs).

Table 2
Typical Properties of DuPont™ CoolLam™ LX Products

Properties	Typical Values at 23°C (73°F)		Test Method
	LX03517016RA	LX07022016RA	
Electrical			
Breakdown voltage kVolts (DC)	2.5	4.0	100V/sec ramp rate
Sustain Voltage kVolts (DC)	>1	>3	100V/sec ramp rate, 60 sec hold
Dielectric Strength, kVolts/mm (kVolts/mil)	170 (4.3)	197 (5.0)	ASTM D-149
Dielectric Constant, 1 MHz	5.5		ASTM D-150
Dissipation Factor, 1 MHz	0.003		ASTM D-257
Volume Resistivity, megohm-cm	10 ⁹		ASTM D-257
Surface Resistivity, megohm	10 ⁶		ASTM D-257
Mechanical, 1 oz (35µm) copper			
Adhesion to Cu (peel strength) as fabricated N/mm (lb/in) after solder N/mm (lb/in)	2.5 (14) 2.5 (14)		IPC TM 650, 2.4.9
Thermal			
Thermal Impedance ⁽¹⁾ , °C-in ² /Watt/°C-cm ² /Watt	0.037 / 0.24	0.045 / 0.31	Calculated
Thermal Conductivity, W/m-K, dielectric	0.80 / 0.70		ASTM E-1461 / ASTM D-5470
UL			
Maximum Operating Temperature (MOT)	130°C		

(1) thermal impedance = thickness/thermal conductivity

Typical Metal Properties

Type	CTE, ppm/°C	Thermal Conductivity, W/mK
Copper	18	390
Aluminum 5052	24	140

For more information on DuPont™ CoolLam™, please visit:

led.dupont.com

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Caution: Do not use in medical applications involving permanent implantation in the human body, or contact with internal body fluids or tissues. For other medical applications, see "DuPont Medical Caution Statement," H-50102-2.

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