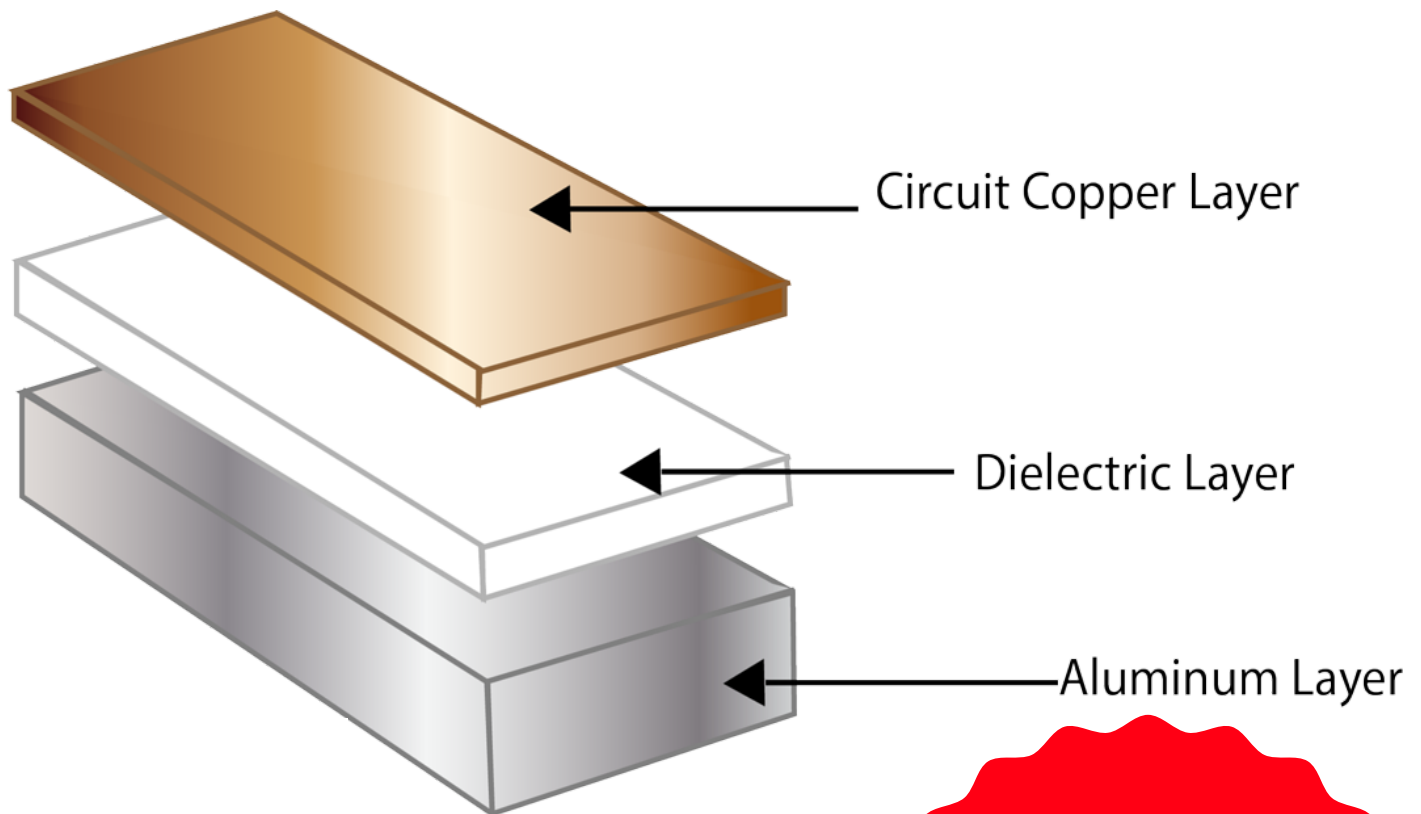


Top **5** Questions about Aluminum PCBs



**+2 Bonus
Aluminum
Resources**

#1

What is the thickness of the dielectric used in Aluminum PCBs?

Amitron typically uses dielectric thicknesses of around 0.003" for single layer products.

#2

What is the thickness of the Aluminum Base?

Material is typically stocked for 0.059" aluminum but there is a wide variety of thicknesses available if you have the budget for a custom pressed product. Thicknesses of 0.030", 0.040", 0.050", 0.080", 0.090", 0.100" and 0.125" are available.

#3

Can Aluminum base PCBs have break-aways and score lines?

Yes! Aluminum base PCBs can utilize break-aways and score lines just like conventional rigid FR-4 products. The only difference is that the tabs would use slightly large holes to make it easier for our drilling process. Scored arrays work just fine but will wear out the blades on those 'pizza cutter' type depanelers much faster than FR-4 does. We recommend either breaking by hand or keeping some back up blades in stock!

#4

Do I have to change my SMT process for Aluminum PCBs?

From the feedback we've received from our customers the only modification necessary is on the reflow cycle. Since the aluminum acts as a heat sink, a longer pre-heat to increase the aluminum temperature is needed before hitting peak reflow temp. Other than that, these materials behave in much the same way as conventional FR-4 products.

#5

How much more do Aluminum PCBs cost?

PCB costs are determined by a variety of factors. With all other variables held constant, Single-Sided Aluminum PCBs are roughly 3.3x the costs of Single-Sided FR-4. For Double-Sided, Aluminum PCBs can be roughly 4.8x the costs of FR-4. The best way to know for sure is to simply request a quote.

*

BONUS

For those that are interested in dielectric constants, dissipation, and impedance of Aluminum PCBs, we have included the datasheets for the two most common dielectrics used on our Aluminum based PCBs. See below:

DESCRIPTION

Insulated Metal Substrate (IMS), based aluminium clad with ED copper foil on the opposite side. It is designed for the reliable thermal dissipation of circuitry. A proprietary formulated reinforced-polymer-ceramic bonding layer with high thermal conductivity and dielectric strength allows us to guarantee thermal endurance.

The material is supplied with a film on the aluminium side to protect it against wet PCB processes.

ROHS compliance directive 2002/95/EC and REACH N° 1907/2006

STANDARD CONSTRUCTIONS

Aluminium thickness, µm (in)	1000 (0.039) – 1500 (0.059) – 2000 (0.078) – 3000 (0.12)	Aluminium Alloy / Treat	5052
Insulation thickness, µm	90-130 (3,5-5 mils)	Dielectric thickness tolerance	± 10 µm (0,4mils)
ED copper thickness, µm	35 (1oz) – 70 (2oz) – 105 (3oz)		
Other constructions available upon request			
UL Approved , QMST2 File: E47820		IPC 4101-C	

(1) Electrical proof test . 100% of our laminate production delivered, has been “on line” verified at 1500/3000 V_{dc}: 500 V/sec. ramp // 5sec. held at 1500/3000 V_{dc}. (90µ/130µ respectively)

PROPERTIES 1500 µm Al / 130 µm dielectric /70 µm Cu	TEST METHOD	UNITS	TYPICAL VALUES	Guaranteed values
Time to blister at 288°C, floating on solder (50 x 50 mm)	IEC-61189	Sec	>120	>60
Copper Peel strength, after heat shock 20 sec/288°C	IPC-TM 650-2.4.8	N/mm (Lb/in)	2,8 (16,0)	>1,8 (>10,3)
Dielectric breakdown voltage, AC (2) (130µ)	IPC-TM 650-2.5.6.3	kV	8	7
Dielectric breakdown voltage, AC (2) (90µ)	IPC-TM 650-2.5.6.3	kV	5.5	5
Proof Test, DC (1) (130µ)	--	V	3000	3000
Proof Test, DC (1) (90µ)	--	V	1500	1500
Thermal conductivity (dielectric layer)	ASTM-D 5470	W/mK (W/inK)	2,20 (0,056)	2,00 (0,051)
Thermal impedance (dielectric layer) HTC 90µ	ASTM-D 5470	Kcm ² /W (Kin ² /K)	0,41 (0,063)	0,45 (0,070)
Thermal impedance (dielectric layer) HTC 130µ			0,59 (0,092)	0,65 (0,100)
Surface resistance after damp heat and recovery	IEC-61189	MΩ	10 ⁵	10 ⁵
Volume resistivity after damp heat and recovery	IEC-61189	MΩm	10 ⁴	10 ⁴
Relative permittivity after damp heat and recovery, 10 kHz	IEC-61189	-	4,5	4,5
Dissipation factor after damp heat and recovery 10 kHz	IEC-61189	-	0,02	0,02
Comparative tracking index (CTI)	IEC-61112	V	600	>550
Permittivity	--	pF/m (pF/in)	6,7 (39,4)	6,7 (39,4)
Flammability, according UL-94, class	UL-94	class	V-0	V-0
Glass transition temperature of dielectric layer (by TMA)	IPC-TM 650-2.4.24	°C	120	120
Maximum operating temperature	--	°C	150	150

(2) Dielectric Breakdown test is a material destructive laboratory test. It is performed according the IPC-TM-650 part 2.5.6.3., by using AC voltage until electric failure on a relatively small surface area of the dielectric layer using metal electrodes. Values should be taken as a material reference and not as guaranteed values.

AVAILABILITY	
STANDARD SHEET SIZES mm (inch)	1220x930 (48x37), 610x460 (24x18) 1060x1170 (42x46), 1210x1000(48x40), 1025x1225 (40,3x48,2) (Also available in cut panels)
Tolerance mm (inch)	+5/-0 (+0.2/-0,0000)
Squareness mm (inch)	3 (0,1181) max., as differential between diagonal measurements.
Standard size tolerance in panels mm (inch)	+/- 0,3 (+/- 0.0118)

The data is based on typical values of standard production and should be considered as general information. Our company reserves the right to future changes. It is the responsibility of the user to ensure that the product complies with his requirements.

CS-AL-88/89 AD2 (2 W/m°C)



Specification of Aluminum Based Copper-clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	200 60	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288°C*10 ⁶ /cycle	Min	6 Times	IPC-TM-650 2.4.13.1
Peel strength (Normal status)	lb/in	Min	9	IPC-TM-650 2.4.8
Breakdown Voltage	V/mil		750	IPC-TM-650 2.5.6
Volume resistivity (Normal status >E+14)	Ω·cm		1.8x10 ¹⁵	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	3.5x10 ¹⁴	IPC-TM-650 2.5.17.1
Dielectric constant				IPC-TM-650
1 MHz Normal status	—		5.6	2.5.5.3
1 GHz Normal status			5.3	2.5.5.5 2.5.5.6
Dissipation Factor				IPC-TM-650
1 MHz Normal status			0.013	2.5.5.3
1 GHz Normal status			0.010	2.5.5.5 2.5.5.9
Water absorption	%		0.2	IPC-TM-650 2.6.2.1
Thermal conductivity (measured on insulation layer only)	W/m°C		2.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	°C		100	IPC-TM-650 2.4.24
Td	°C		410	TBD (5wt% loss)
MOT (RTI)	°C		130	UL 746B
CTI (Comparative Tracking Index)	V		>600 (PLC=0)	UL746E DSR



The thickness and dimension of Aluminum Based Copper-clad Laminate

Product category	CS-AL-88/89 AD2 (The thickness of glue is 2~8mil)				
Dimension m/m	300~340×500~520 405/400×500~520 600~620×500~520 1200~1240×500~520 1200~1240×1020~1060				
The thickness of Single-Sided PCB with Aluminum Substrate	2.0 1/0	1.5 1/0	1.5 2/0	1.0 1/0	0.8 1/0
The thickness of Double-Sided PCB with Aluminum Substrate	2.0 1/1	1.5 H/H	1.5 1/1	1.0 1/1	0.8 1/1

» The above thicknesses exclude the thickness of glue, and the thicknesses of copper tinsel and Aluminum can be combined arbitrarily.

The thickness of copper foil : H oz~5.0 oz. The thickness of aluminum plate : 0.2~5.0mm.

» This material is one kind of halogens-free green environmental kindly material.

» Compliance with the specification of RoHS, Compliance with the specification of REACH.



The scope of application

- » Lighting : LED outer-wall lighting, LED stage lighting, road LED lighting, domestic LED lighting, office LED lighting.
- » Electronic devices in automobile : igniting device, voltage regulator, auto safety control system, AC transformer.
- » Power supply : Switch regulator, switch, DC-DC transformer, DC-AC transformer, large power, base board of solar cell.
- » Electronic control : Relay, transistor base, switchboard, radiator, insulating heat conductive board in semiconductor, motor control device.
- » Computer devices : Power supply device, soft disk driver, CPU.
- » Communication electronic products : automobile telephone, high frequency booster of mobile telephone, filter circuit, transmitting circuit.

