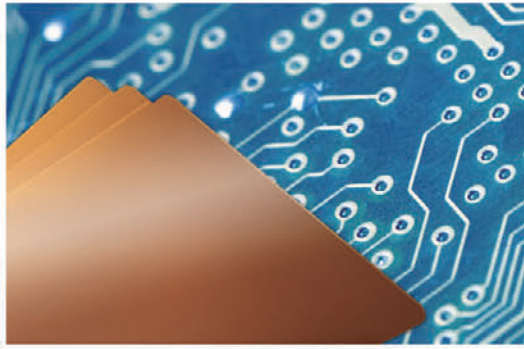


T THERMALLY
C CONDUCTIVE
B BOARD



Overview

Thermally Conductive Board

Thermally Conductive Board (TCB), or insulated metal substrate, provides the advantages of high thermal conductivity, reliability and solder heat endurance. The TCB substrate is a sandwich structure, which includes layers of conductor, insulator and metal base. Traditionally, this insulator is made of epoxy, epoxy filled glass fiber, polyimide, or other dielectric materials. However, these kinds of insulators could not meet the requirement in high-power electronic devices. The heat generated by these devices will accumulate, and the life time and reliability of the end product will decrease.

Polytronics' TCB product is not only a printed circuit board but also a heat transfer interface. The insulator is made by a unique polymer composite that combines epoxy resin and high thermal conductivity filler, and the thermal conductivity is up to 20 times higher than the traditional epoxy filled glass fiber system.

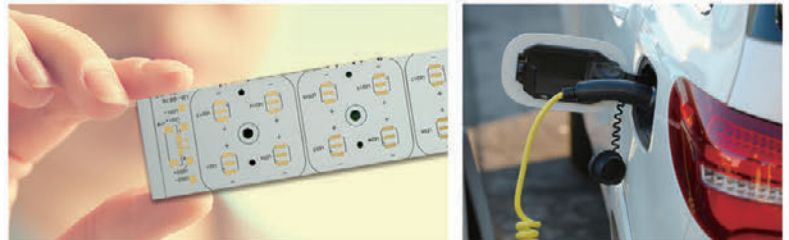
Applications

- High brightness LED lighting
- Backlight module
- Automotive regulator
- EV BMS
- Power module
- Audio (equalizer, amplifier)
- Solar application



Features

- Excellent thermal conductivity
- Excellent solder heat endurance
- Excellent reliability
- Customized substrate structure available
- RoHS compliance
- Halogen free
- Non solvent



UL Certification

- File No: E312082
- UL 746E recognized
- UL 94V-0 Certified



Patents

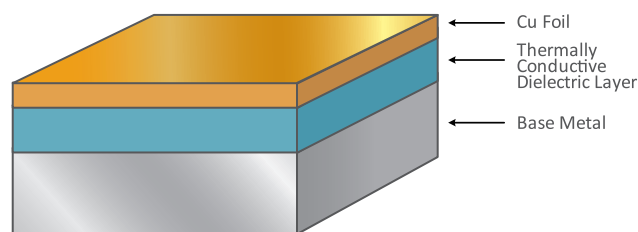
Over 15 patents (US, TW, CN) issued and published covering material, process and product applications.



Thermally Conductive Board - TCB

Product Description

Polytronics offers various combinations of base metal, copper foil, and dielectric layers to meet the general requirement of single layer thermally conductive printed circuit boards.



Substrate structure of Insulated Metal Substrate

Table 1. Standard specification

Item	Material	Specification
Panel Size		610x510mm
Base Metal	Aluminum Copper	1.0, 1.5, 2.0mm
Dielectric Layer	Epoxy resin Ceramic filler	80, 100, 150μm
Cu Foil	Copper	1 oz, General Circuit
		2 oz, High Current Circuit
		3~6 oz, Ultra High Current Circuit

If there is any specific inquiry other than the standard specification, please contact us.

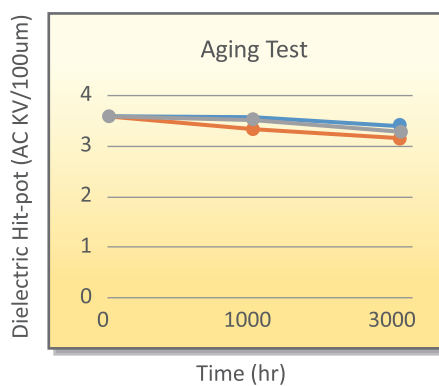
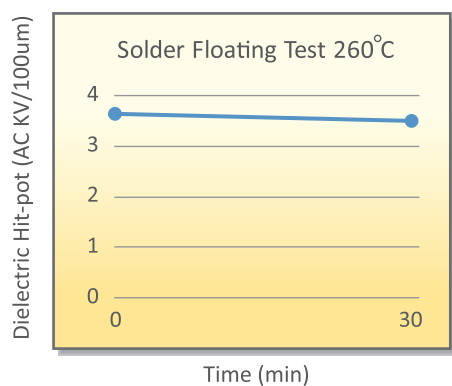
Reliability Testing Data

Polytronics TCB has excellent Hi-Pot withstand strength and peeling strength even after solder dipping, high temperature, high humidity, long term storage or thermal shock conditions.

Tested substrate:

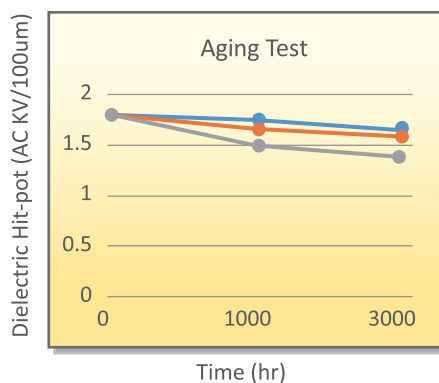
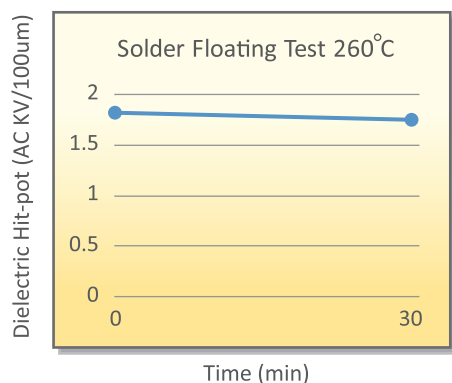
TCB-C (aluminum thickness: 1.5mm, thermally conductive dielectric layer thickness: 100μm, copper foil thickness: 35μm)

Dielectric Hi-Pot Withstand



● Aging test at 150°C
● Thermal shock test during -50 C°/ 30min ~ 150 C°/ 30min
● High temperature and humidity resistance test at 85°C/ 85%RH

Peeling Strength



● Aging test at 150°C
● Thermal shock test during -50 C°/ 30min ~ 150 C°/ 30min
● High temperature and humidity resistance test at 85°C/ 85%RH

*Kg/cm = 5.588 lbs/in

Product General Properties

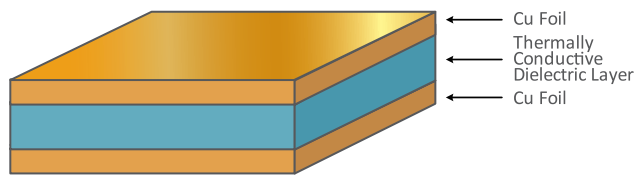
Item	Test Method	Test Condition		TCB-2L	TCB-2AL	TCB-3	TCB-4	TCB-8	TCB-C
THERMAL PROPERTIES									
Thermal Conductivity [W/m-K]	TO-220	C-96/25/65		2	2.7	3	4	8	12
Thermal resistance [°C/W], dielectric 100µm	D5470	C-96/25/65		<0.15	<0.13	<0.12	<0.11	<0.08	<0.06
Water Absorption [%]	IPC-TM-650 2.6.2.1	23°C/24hrs		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Glass Transition Temp. (Tg) [°C]	IPC-TM-650 2.4.25	DSC		110	130	140	150	150	180
Thermal Resistance [minutes]	JIS C 6481	Solder Floating, 260°C		>30 mins	>30 mins	>30 mins	>30 mins	>30 mins	>30 mins
	IPC-TM-650 2.4.24.1	TMA	T260 (mins)	>60	>60	>60	>60	>60	>60
			T288 (mins)	>30	>30	>30	>30	>30	>30
			T300 (mins)	>2	>2	>2	>2	>2	>2
Decomposition Temp. (Td) [°C]	IPC-TM-650 2.4.24.6	TGA	2%	350	350	350	350	350	370
			5%	400	380	400	400	400	400
ELECTRICAL PROPERTIES									
Hi-Pot Withstand [AC KV/mm]	IPC-TM-650 2.5.7	C-96/25/65		50	50	30	30	30	30
		E-1000/150							
		Solder Floating, 260°C/30 min							
		150°C ~ -50°C/1000 cycles							
		C-1000/85/85							
Hi-Pot Withstand [DC KV/mm]	IPC-TM-650 2.5.7	C-96/25/65		60	60	40	40	40	40
		E-1000/150							
		Solder Floating, 260°C/30 min							
		150°C ~ -50°C/1000 cycles							
		C-1000/85/85							
Dielectric Constant	IPC-TM-650 2.5.5.1	C-96/25/65, 1MHz		4.6	4.8	5.1	4.9	5.2	8.27
Dielectric Loss Tangent	IPC-TM-650 2.5.5.1	C-96/25/65, 1MHz		0.021	0.021	0.023	0.022	0.024	0.022
Surface Resistance [Ω]	IPC-TM-650 2.5.17.1	C-96/25/65, 1MHz		>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹³
Volume Resistance [Ω · cm]	IPC-TM-650 2.5.17.1	C-96/25/65, 1MHz		>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³	>10 ¹³
Comparative Tracking Index CTI [V]	UL 746E	C-40/25/50		600	600	600	600	600	600
MECHANICAL PROPERTIES									
Typical Peeling Strength [Kg/cm - lbs/in]	JIS C 6481	C-96/25/65		1.4/7.8	1.4/7.8	1.4/7.8	1.4/7.8	1.4/7.8	1.3/7.3
		E-1000/150							
		Solder Floating, 260°C/30 min							
		150°C ~ -50°C/1000 cycles							
		C-1000/85/85		1.4/7.8	1.4/7.8	1.4/7.8	1.4/7.8	1.4/7.8	1.1/6.2
Thermal Expansion CTE [PPM/°C]	IPC-TM-650 2.4.24.5	TMA	>Tg	37	30	32	25	35	18
			<Tg	24	20	25	16	28	15
Thermal Expansion CTE [%]	IPC-TM-650 2.4.24.5	TMA 50~260°C		0.68	0.54	0.57	0.52	0.58	0.32
AGENCY RATINGS AND DURABILITY									
Flammability	UL 94	C-40/25/50		V-0	V-0	V-0	V-0	V-0	V-0
Solder Limit	UL 746	C-40/25/50		300°C/60sec	300°C/60sec	300°C/60sec	300°C/60sec	300°C/60sec	300°C/60sec
Relative Temperature Index	UL746	-		90	110	130	110	130	150*

* This value is under long-term testing

Thermally Conductive Core - TCC

Product Description

Thermally Conductive Core (TCC) is a copper clad laminate, offering high thermal conductivity and reliability. TCC can be used when a multilayer or thin printed circuit board design is required. TCC is a sandwich structure made from an upper copper foil layer, a thermally conductive dielectric layer, and lower copper foil layer.



Substrate structure of Thermally Conductive Core

Table 2. Standard specification of TCC

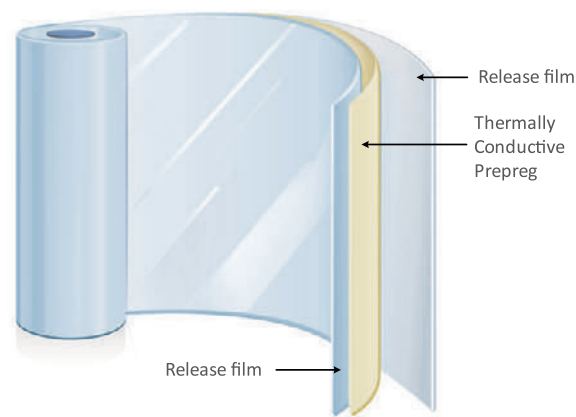
Item	Material	Specification
Panel Size		610x510mm
Dielectric Layer	Epoxy Resin Ceramic Filler	80, 100, 150μm
Cu Foil	Copper	1 oz, General Circuit
		2 oz, High Current Circuit
		3~6 oz, Ultra High Current Circuit

If there is any specific inquiry other than the standard specification, please contact us.

Thermally Conductive Prepreg - TCP

Product Description

TCP provides the advantages of high thermal conductivity and reliability prepreg. It can be used for single and multilayer thermally conductive printed circuit board applications. The TCP package is available in rolls or sheets as layers of upper release film, prepreg dielectric, and a lower release film.

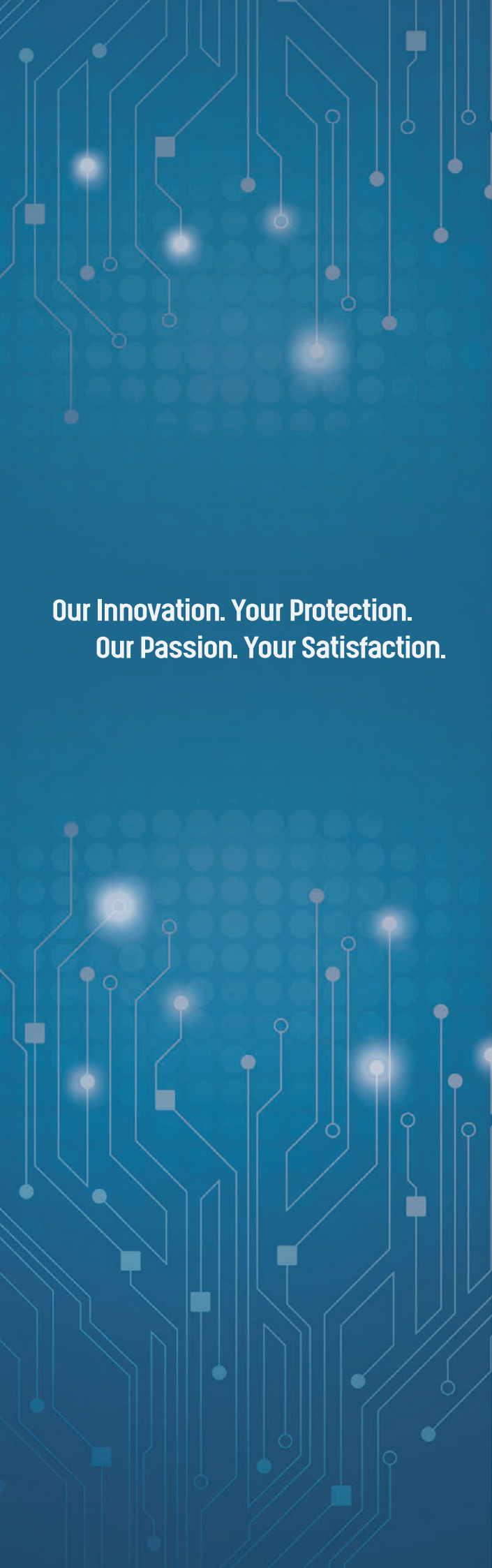


Substrate structure of TCP

Table 3. Standard specification of TCP

Item	Material	Specification
Release Film Thickness	PET	35μm, 50μm
Prepreg Size	Epoxy Resin Ceramic Filler	520mm x 630mm (Panel) 520mm x 50M (Roll)
Prepreg Thickness	Epoxy Resin Ceramic Filler	80, 100, 150μm

If there is any specific inquiry other than the standard specification, please contact us.



**Our Innovation. Your Protection.
Our Passion. Your Satisfaction.**

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