Product Application

Aluminum-base PCB

Lighting of fluorescent lamps

Embedded lamps

A Professional Mass-Lam & PCB Solution Provider !

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CHIN-SHI ELECTRONIC MATERIALS LTD.
清 晰 科 技 股 份 有 限 公 司

MOT 130° C
CS-AL-88/89Aluminum Based Copper-clad Laminate

A Professional Mass-Lam & PCB Solution Provider !

E206580

SGS RoHS Halogens-free report

Features

「CS-AL-88/89」is a kind of copper-clad metal plate, and has the following features:

- Excellent heat sink, and good electrical insulation.
- High mechanical strength, dimensional stability etc.
- Apply to the Surface Mount Technology (SMT).
- Reduce the temperature of product and extend the life of product.

Structure

「CS-AL-88/89」is composed of copper foil, heat conductive insulation glue and aluminum plate:

1.Copper foil : the thickness of copper foil is Hoz~5.0 oz.

2.Insulation glue : a kind of low heat-resisted, heat conductive insulating material. To Combine Copper foil with the Core. Its thickness is 2~8 mil.

3.Core : it can be aluminum, copper, iron or others.

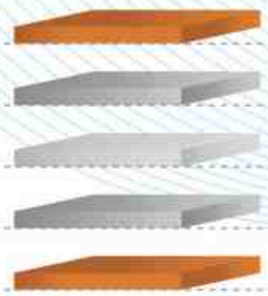
Single-Sided PCB with Aluminum Substrate

Circuit Layer

Dielectric Layer

Metal base Layer

Double-Sided PCB with Aluminum Substrate



Circuit Layer

Dielectric Layer

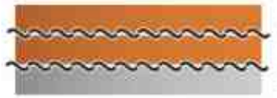
Metal base Layer

Dielectric Layer

Circuit Layer

Copper Laminated with Aluminum Substrate

(For example : Single-sided, two-layer plate)



Electrical Conductive Layer

Heat Conductive Glue

Electrical Conductive Layer

Heat Conductive Glue

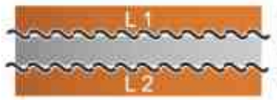
AL

The manufacturing procedure of PCB

1. Base board (heat conductive glue, two-layer plate)
2. Drilling
3. Electroplating with copper, once
4. Inner layer imaging,etching (L2)
5. Black oxide treatment
6. Adding AL, heat conductive film to be pressed and combined
7. Outer layer imaging (L1)
8. Etching, second drilling, solder mask, silkscreen
9. Final surface finishing, Formation
10. Appearance inspection, reliability test

Metal-Core Al Base Board

(AL base plate with copper two-side covered)



Electrical Conductive Layer

Heat Conductive Glue

AL

Heat Conductive Glue

Electrical Conductive Layer

The manufacturing procedure of PCB (Build Up Process)

1. Cut WPNL AL plate, drill for DRILL 1
2. Press two-side coppers with heat-conducted glue (stuff glue)
3. Drilling DRILL 2, Electroplating with copper, once
4. Outer layer imaging, Etching
5. Solder mask, Silkscreen, Final surface finishing
6. Drilling DRILL 3, Formation
7. Appearance inspection, reliability test

PP, RCC, THIN-CORE

PP

MODEL　AD2(2W)、AD3(3W)、AD5(5W)、AD8(8W)、M9(9W)

SIZE　1295^{W}mm×200M/Roll，Cutting size

THICKNESS　4、5、6、7mil

PURPOSE　Metal base board for pressing,
Multi-Layer Metal Base Substrate Laminate

RCC

MODEL　AD2(2W)、AD3(3W)、AD5(5W)、AD8(8W)、M9(9W)

SIZE　1295^{W}mm×200M/Roll，Cutting size

THICKNESS　Cu：Hoz~5oz　PP：2、3、4、5、6、7、8mil

PURPOSE　Metal base board for pressing,
Multi-Layer Metal Base Substrate Laminate

THIN-CORE

MODEL　AD2(2W)、AD3(3W)、AD5(5W)、AD8(8W)、M9(9W)

SIZE　36″×48″、40″×48″、42″×48″，Cutting size

THICKNESS　Cu：H/H、1/1、1/2、1/3、1/4　PP：4~6mil

PURPOSE　Slim-Type High-Thermal-Conductivity Copper-Based
MCCL, Multi-Layer Metal Base Substrate Laminate

Characteristics Thin-core

Item	Unit		Specification	Test condition
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288˚C*10"/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

CS-AL-88/89 L1 (1 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 2.4.13.1
Thermal shock	288°C*10"/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 1 MHz Normal status 1 GHz Normal status	—		 5.6 5.3	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.013 0.010	IPC-TM-650 2.5.5.3 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		1.0	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 L1 (The thickness of resin 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				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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 resin,and the thickness of copper 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.
Aluminum:1050,1060,1100 Anodizing
» Halogenfree material.
» Compliance with the RoHS and REACH.

The scope of application

» Lighting：LED outer-wall lighting, LED stage lighting, LED street lighting,LED indoor lighting,office LED lighting.
» Electronic devices in automobile : Ignition device, voltage regulator,auto safety control system,AC converter.
» Power supply : Switch regulator,switch,DC-DC converter,DC-AC converter,MEGA power supply,solar power board.
» Electronic control : Relay,transistor base,switchboard,radiator,insulating conductive board in semiconductor,motor control device.
» Computer devices : Power supply device,soft disk driver,CPU.
» Communication : Automobile telephone,high frquency booster moblie telephone,circult filter,transmitting circult.

CS-AL-88/89 L15 (1.5 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 2.4.13.1
Thermal shock	288°C*10"/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 1 MHz Normal status 1 GHz Normal status	—		 5.6 5.3	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.013 0.010	IPC-TM-650 2.5.5.3 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		1.5	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 L15 (The thickness of resin 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 resin,and the thickness of copper 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.
Aluminum:1050,1060,1100 Anodizing
» Halogenfree material.
» Compliance with the RoHS and REACH.

The scope of application

» Lighting : General LED lighting.
» Electronic devices in automobile : Ignition device, voltage regulator,auto safety control system,AC converter.
» Power supply : Switch regulator,switch,DC-DC converter,DC-AC converter,MEGA power supply,solar power board.
» Electronic control : Relay,transistor base,switchboard,radiator,insulating conductive board in semiconductor,motor control device.
» Computer devices : Power supply device,soft disk driver,CPU.
» Communication : Automobile telephone,high frquency booster moblie telephone,circult filter,transmitting circult.

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"/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 1 MHz Normal status 1 GHz Normal status	—		 5.6 5.3	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.013 0.010	IPC-TM-650 2.5.5.3 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	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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.

CS-AL-88/89 AD3 (3 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"/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		$1.8x10^{16}$	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	$3.5x10^{15}$	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 6.1 6.0	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.017 0.009	IPC-TM-650 2.5.5.3 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		3.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	˚C		100	IPC-TM-650 2.4.24
Td	˚C		420	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 AD3 (The thickness of glue is 2~8mil)				
Dimension m/m	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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.

CS-AL-88/89 AD5 (5 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"/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		$3.5x10^{15}$	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	$4.7x10^{14}$	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 5.8 5.7	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.015 0.008	IPC-TM-650 2.5.5.3 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		5.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	°C		100	IPC-TM-650 2.4.24
Td	°C		430	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 AD5 (The thickness of glue is 2~8mil)				
Dimension m/m	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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.

CS-AL-88/89 AD8 (8 W/m°C)

Specification of Aluminum Based Copper-clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	200 75	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288°C*10"/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		$3.5x10^{15}$	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	$4.7x10^{14}$	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 5.8 5.7	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.015 0.008	IPC-TM-650 2.5.5.3 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		8.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	°C		100	IPC-TM-650 2.4.24
Td	°C		450	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 AD8 (The thickness of glue is 3~8mil)				
Dimension m/m	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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.

CS-5100M9 (Super-High Thermal Conductivity)9W/m°C)
Technology cooperate with HITACHI CHEMICAL CO., LTD

Specification of Aluminum Based Copper-clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	150 95	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288°C*10*/cycle	Min	6 Times	IPC-TM-650 2.4.13.1
Peel strength (Normal status)	lb/in	Min	7.5	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		10^{13}	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	10^{11}	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 8.0 7.6	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.005 0.003	IPC-TM-650 2.5.5.3 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		9.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	°C		160	IPC-TM-650 2.4.24
Td	°C		350	TBD (5wt% loss)

The thickness and dimension of Aluminum Based Copper-clad Laminate

Product category	CS-5100M9 (The thickness of glue is 3~6mil)				
Dimension m/m	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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 foil and Aluminum plate 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, LED street lighting,LED indoor 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.

CS-AL-88/89 AD12 (12 W/m°C)

Specification of Aluminum Based Copper-clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	200 75	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288°C*10"/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		$3.5x10^{15}$	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	$4.7x10^{14}$	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 5.8 5.7	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.015 0.008	IPC-TM-650 2.5.5.3 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		12.0	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	°C		100	IPC-TM-650 2.4.24
Td	°C		450	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 AD12 (The thickness of glue is 3~8mil)				
Dimension m/m	300~340x500~520 400~410x500~520 600~620x500~520 940x1245/1040x1245 1090x1245/1000x1200				
Normal thickness spec of Single-Sided MCCL with Aluminum Substrate	2.0 1/0	1.5 1/0	1.0 1/0	0.8 1/0	0.6 1/0
Normal thickness spec of Double-Sided MCCL 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.

Bendable low-thermal-resistance Material
CS-8000IMC(FCCL-Copper-Based)
CS-8000IMA(MCCL-Aluminum Based)

Specification of Metal Based Copper-Clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	45 27	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288˚C*10"/cycle	Min	6 Times	IPC-TM-650 2.4.13.1
Peel strength (Normal status)	lb/in	Min	7	IPC-TM-650 2.4.8
Breakdown Voltage	V/mil		1500	IPC-TM-650 2.5.6
Volume resistivity (Normal status >E+14)	Ω · cm		10^{13}	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	10^{12}	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status	—		 4.1 4.0	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.005 0.004	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.9
Water absorption	%		0.8	IPC-TM-650 2.6.2.1
Thermal conductivity (measured on insulation layer only)	W/m˚C		0.5	ASTM-D5470
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	˚C		280	IPC-TM-650 2.4.24
Td	˚C		470	TBD (5wt% loss)
MOT (RTI)	˚C		140	UL 746B
CTI (Comparative Tracking Index)	V		>250 (PLC=2)	UL746E DSR

The thickness and dimension of Metal Based Copper-clad Laminate

Product category	CS-8000IMC/IMA (The thickness of glue is 27-45mm)				
Dimension m/m	300~340×500 400~410×500 600~620×500 1200~1240×500				
Normal thickness spec. of Single-Sided MCCL with Copper Substrate(IMC)	1/3x32μm	1/3x45μm	1/2x32μm	1/2x45μm	1/3x27μm
Normal thickness spec. of Single-Sided MCCL with Aluminum Substrate(IMA)	0.6x32μmX1/0	0.8x32μmX1/0	0.2x32μmX1/0	0.6x45μmX1/0	0.8x45μmX1/0

» The above thicknesses include the thickness of glue, and the thicknesses of copper tinsel and Aluminum can be combined arbitrarily.
The thickness of copper foil：1oz~2.0 oz. The thickness of aluminum plate：0.15~1.5mm. The thickness of copper base:1.0oz~3.0oz
» 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

» LED Backlight : Slim,Narranredge LED TV (LED Lighting for automotives,(EX DRL),LED street lighting),LED indoor lighting,office LED lighting.
» 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.

CS-9000IMC (FCCL)
Technology cooperate with HITACHI CHEMICAL CO., LTD

Specification of Aluminum Based Copper-clad Laminate

Item	Unit		Specification	Test condition
Insulation thickness	μm	Max Min	35 15	—
Solder resistance (288°C)	Sec.	Min	600	IPC-TM-650 3.10.1.12
Thermal shock	288˚C*10"/cycle	Min	6 Times	IPC-TM-650 2.4.13.1
Peel strength (Normal status)	lb/in	Min	5.6	IPC-TM-650 2.4.8
Breakdown Voltage	V/mil		1000	IPC-TM-650 2.5.6
Volume resistivity (Normal status >E+14)	Ω•cm		10^{13}	IPC-TM-650 2.5.17.1
Surface resistivity (Normal status >E+12)	Ω	—	10^{12}	IPC-TM-650 2.5.17.1
Dielectric constant 1 MHz Normal status 1 GHz Normal status			 3.3 3.2	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.6
Dissipation Factor 1 MHz Normal status 1 GHz Normal status			 0.004 0.003	IPC-TM-650 2.5.5.3 2.5.5.5 2.5.5.9
Water absorption	%		0.8	IPC-TM-650 2.6.2.1
Thermal conductivity (measured on insulation layer only)	W/m˚C		0.25	ASTM-E1461
Flammability	94V-0		Pass	IPC-TM-650 2.3.9
Tg	˚C		260	IPC-TM-650 2.4.24
Td	˚C		350	TBD (5wt% loss)

The thickness and dimension of Aluminum Based Copper-clad Laminate

Product category	CS-9000IMC (The thickness of glue is 0.6~1.4mil)
Dimension m/m	300~340×500~520 405/400×500~520 600~620×500~520 1200~1240×500~520
The thickness of Single-Sided PCB with Copper Substrate	H oz~2.0 oz / H oz~3.0 oz

» The above thicknesses exclude the thickness of resin, and the thicknesses of copper tinsel and copper base can be combined arbitrarily.
The thickness of copper foil : H oz~2.0 oz ; The thickness of Copper base : H oz~3.0 oz.
» 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.