



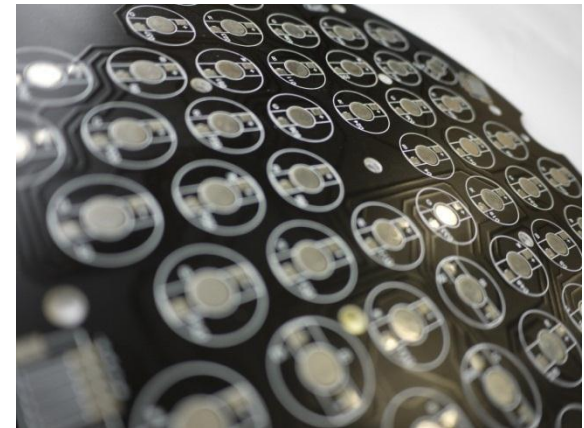
Your Super Pillar MCPCB Thermal Management Solution Supplier.

CofanUSA
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1-877-228-3250 | www.cofan-usa.com
CofanCanada
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Super Pillar MCPCB

Concepts

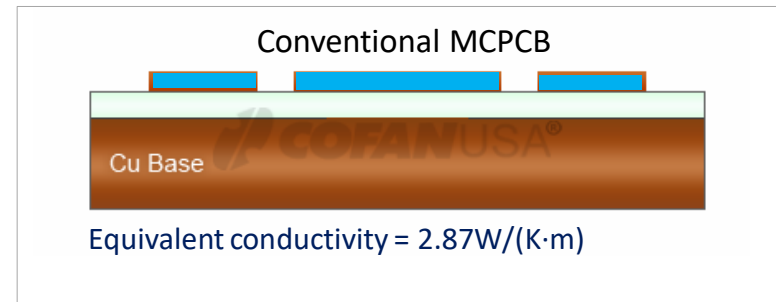
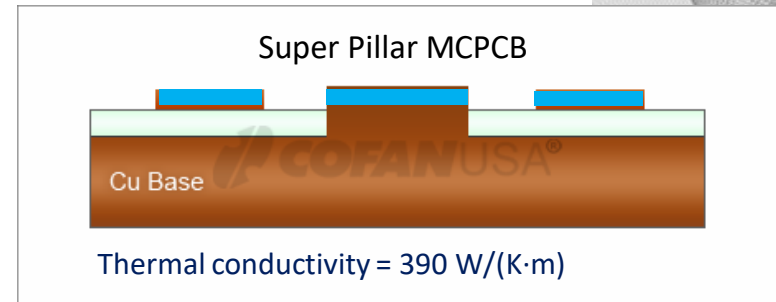
- Build a Cu Pillar through the MCPCB
- Bypass the pre-preg to eliminate one layer of thermal resistance




Advantages

- Increase efficiency of thermal dissipation
- Withstand high power components
- Drive higher current
- Allow usage of lower cost pre-preg

Innovative Processes

- Mechanical shaping
- Flexible lamination scale
- Stable production process



-  Cu Pillar Layer –Base
-  Foil/Circuit Layer
-  Pre-Preg Layer

Super Pillar MCPCB

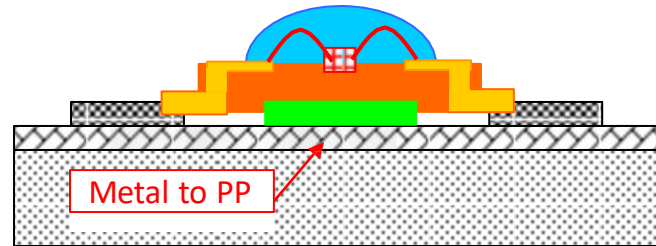
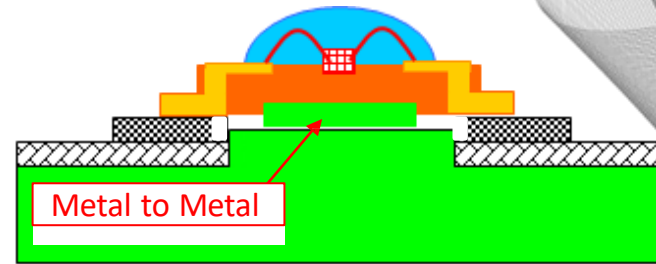
Applications

- High Power Flux LED Products
- General Lighting
- Outdoor Lighting

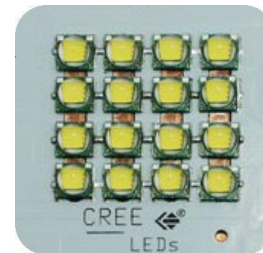
Intellectual Property

- US Patent No.: 8,698,186 B2
- Cost Competitive

Conventional Solution



Reference Application

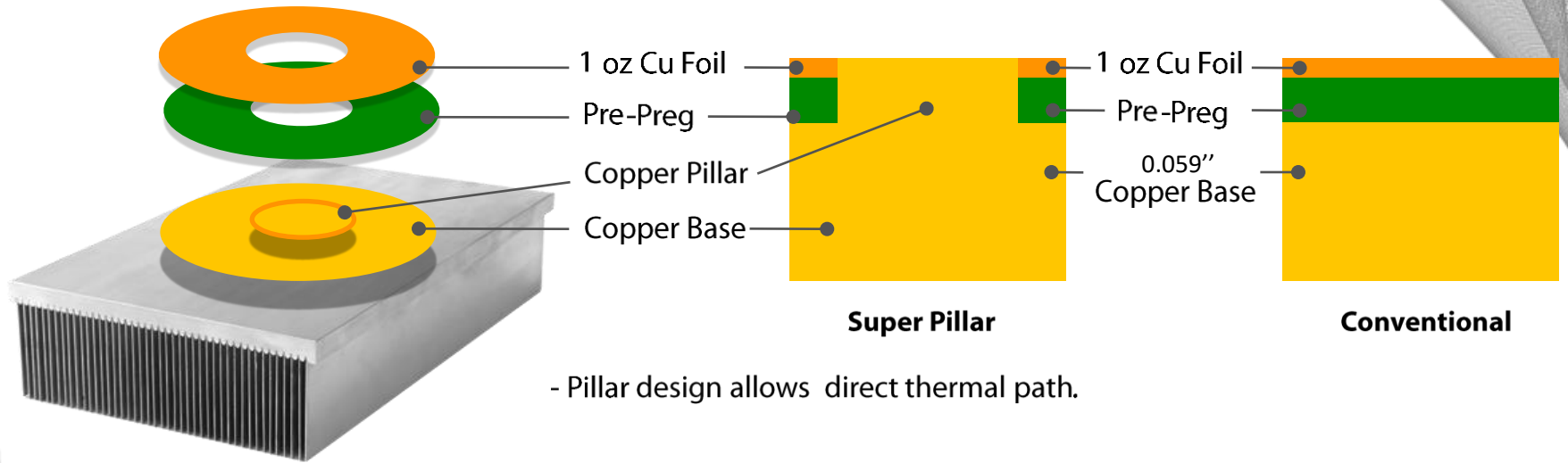


XML 160W



LZP up to 960W

Super Pillar vs. Conventional

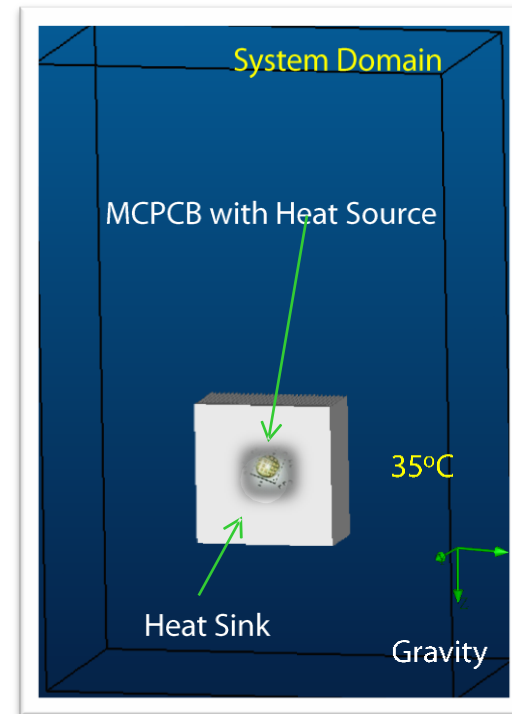
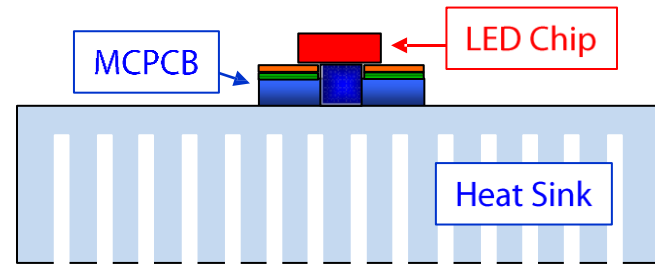


MCPCB	Dimension	Layer 1	Layer 1	Layer 1	Layer 1	Layer 1
Copper Pillar	Diameter 1.97" x 0.069"	0.059"	0.059"	0.5 oz	0.059"	1 oz
Conventional		Copper Base k = 390	Sekisui PP k = 2.8	Cu Foil k = 390	Sekisui PP k = 2.8	Cu Foil k = 390

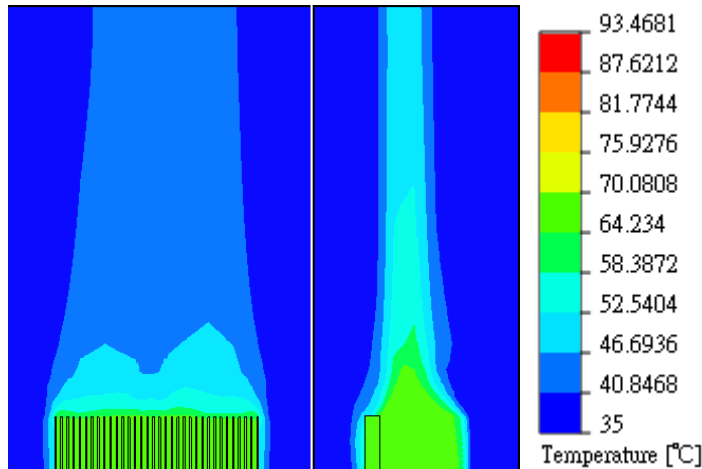
Thermal Simulation

Condition and Parameter

- Single 84W LED chip
- MCPCB diameter = 50mm
- Heat source diameter = 9mm
- Cu Base & Cu Pillar
- Aluminum heat sink
 - 1) 200mm x 200mm x 100mm
 - 2) Number of fin = 34
 - 3) Pitch = 6mm
- Ambient Temperature = 35°C
- System Domain 1)
 - 1) X = 600mm
 - 2) Y = 300mm
 - 3) Z = 800mm
- Natural convection



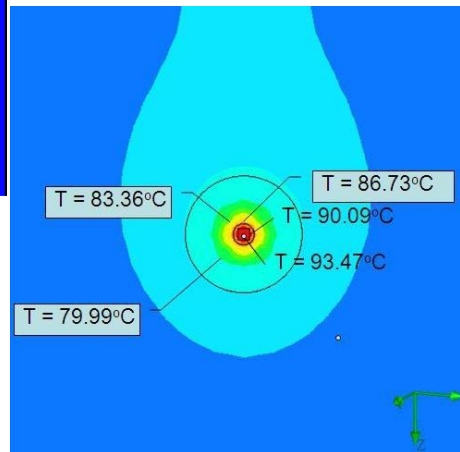
Thermal Simulation Result



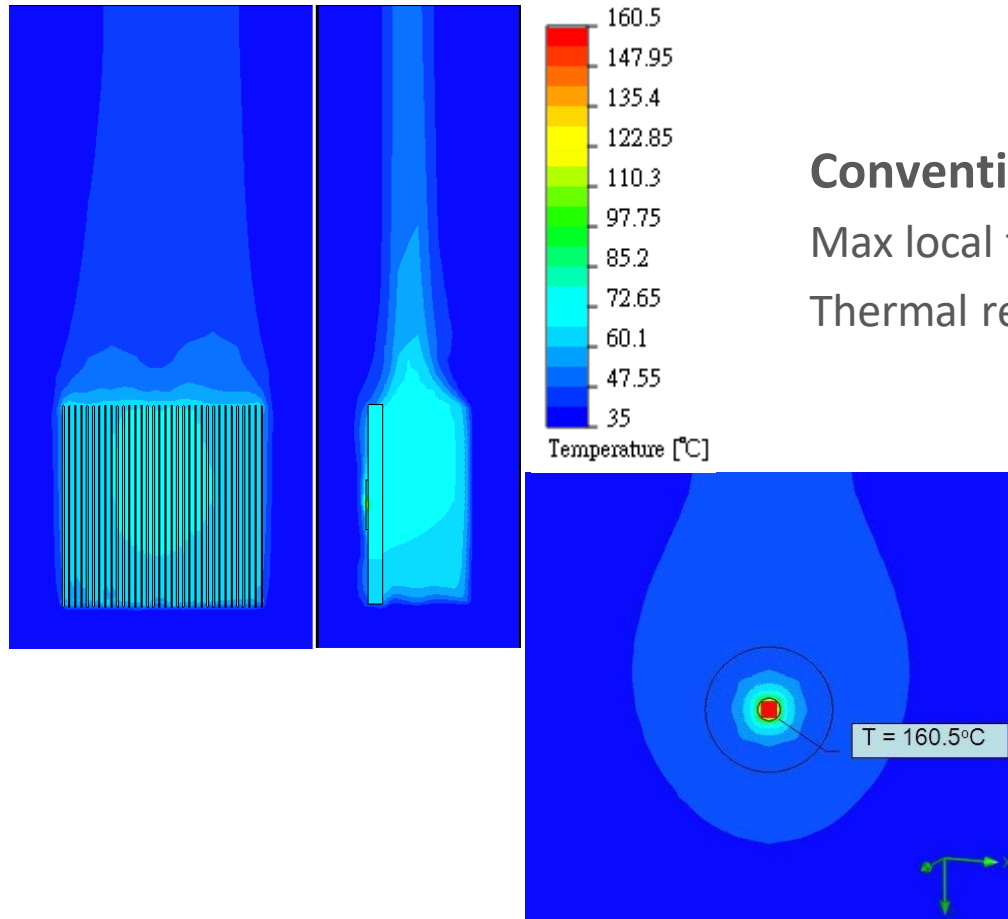
Super Pillar MCPCB

Max local temperature = **93.5°C**

Thermal resistance = **0.70°C/W**



Thermal Simulation Result



Conventional MCPCB

Max local temperature = **160.5°C**

Thermal resistance = **1.49°C/W**

Thermal Performance Test

Test Location

COFAN Electronics R&D Thermal Laboratory

Test Environment

Inside chamber Temperature:
25°C +/- 1°C

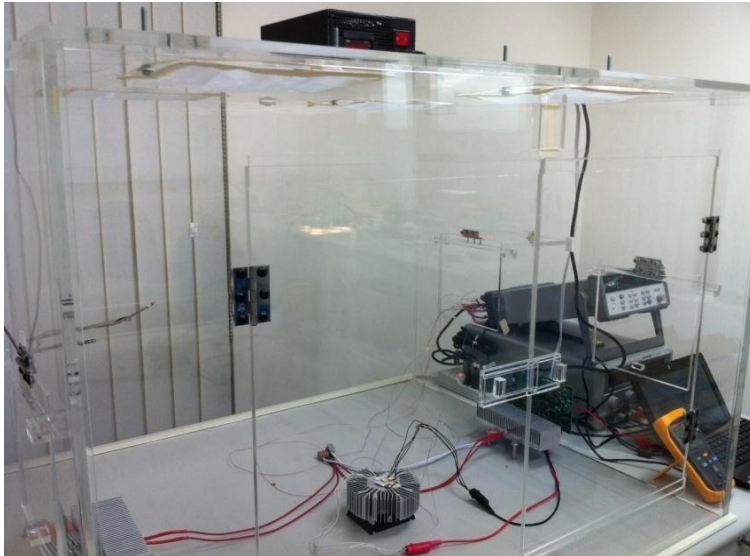
Test Equipment

1. Constant Temperature Natural Convection Chamber
2. Data Acquisition/Switch Unit Agilent 34970A
3. 20 Channel Multiplexer Module Agilent 34901A
4. Power up the DUT with DC power source
5. Thermocouple OMEGA T-type 36AWG

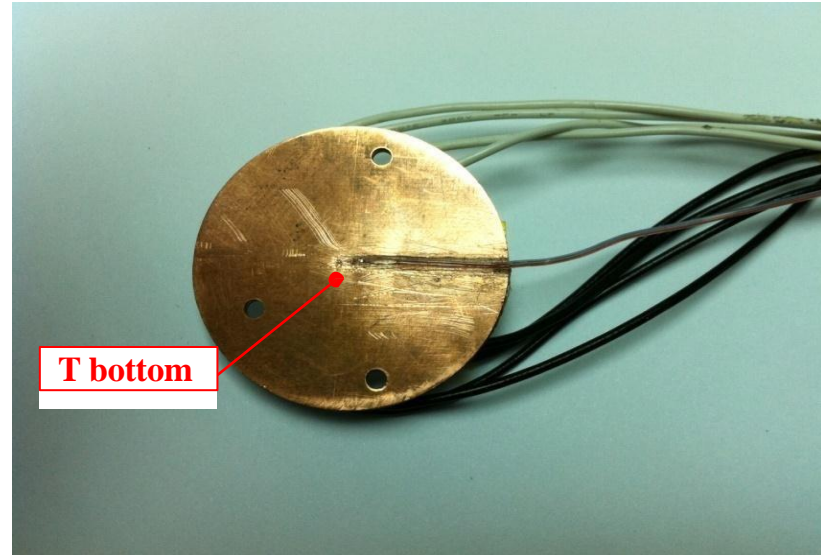
Test Procedure

1. Attach thermocouples to the designated test points
2. Test in natural convection chamber
3. Power up the light module with DC power gradually
4. Let chamber stabilize for 1hr and take temperature data
5. Turn off the power of all equipment

Thermal Performance Test



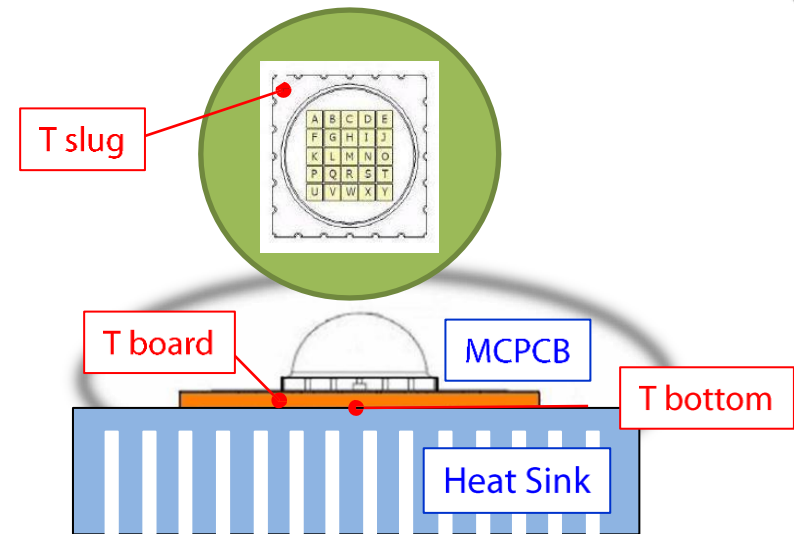
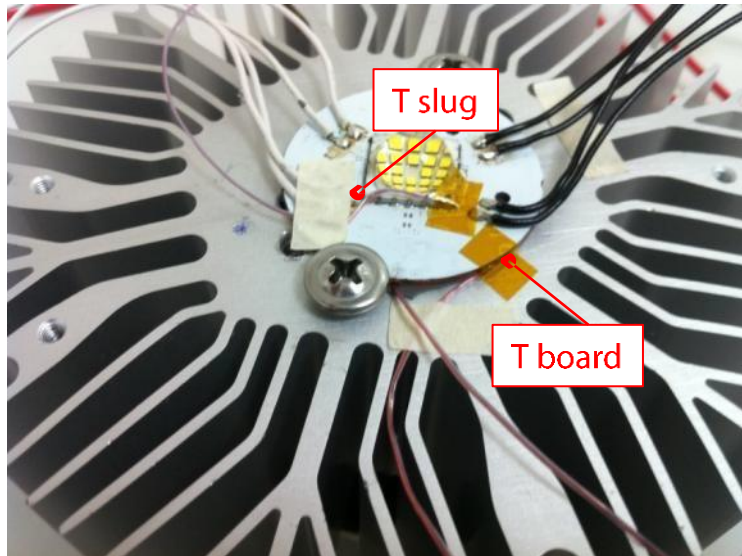
Constant Temperature Chamber



Make a groove on the bottom of MCPCB, put thermocouple wire to measure T bottom

Thermal Performance Test

Designated Points



[Detail view]

Thermal Performance Test

Sample Configuration

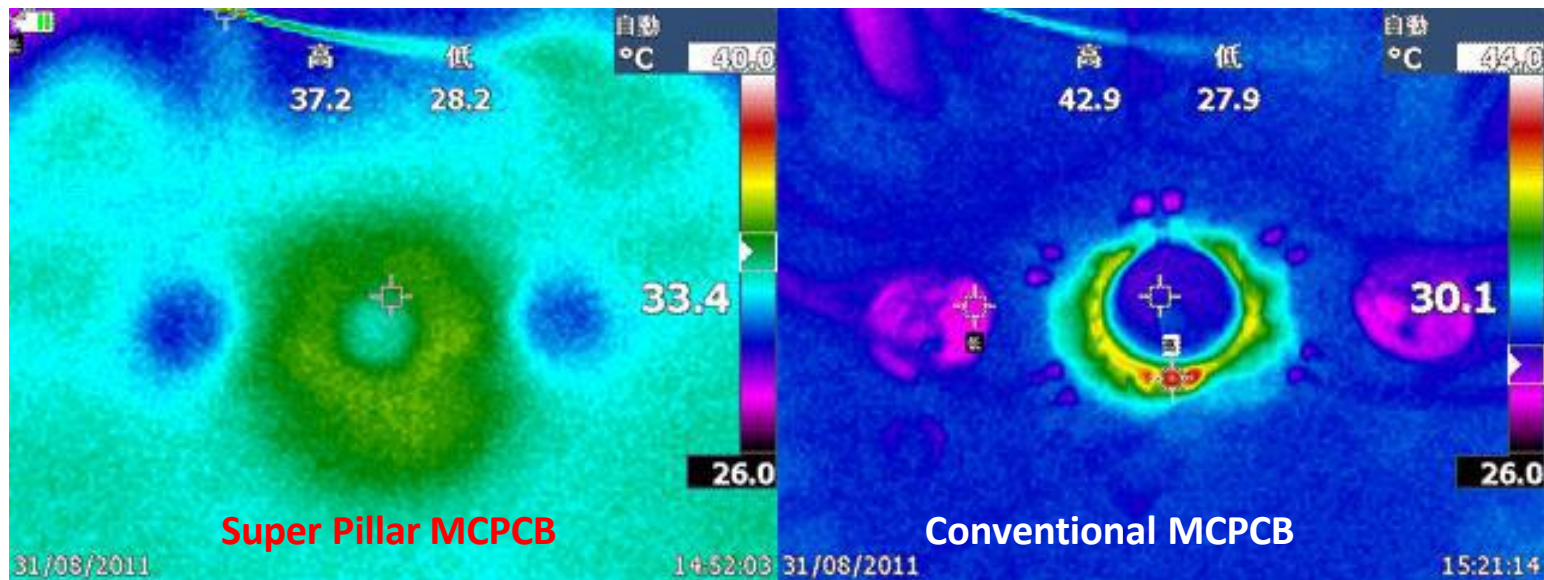
MPCB	Dimension	Layer 1	Layer 1	Layer 1	Layer 1	Layer 1
Conventional	Diameter 1.40" x 0.049"	1 oz 35 micron Cu Foil k = 390	6 mil Sekisui KNDJ002 k = 2.8	1 oz 35 micron Cu Foil k = 390	3 mil Sekisui KNDJ002 k = 2.8	1 mm Copper Base k = 390
Super Pillar	Diameter 1.40" x 0.049"	1 oz 35 micron Cu Foil k = 390	6 mil Sekisui KNDJ002 k = 2.8	1 oz 35 micron Cu Foil k = 390	3 mil Sekisui KNDJ002 k = 2.8	1 mm Copper Base k = 390



Thermal Performance Test

With the same power input, the Super Pillar MCPCB has an extremely low thermal resistance and effective thermal path when compared to Conventional MCPCB.

There is a significant temperature difference of $\sim 56^{\circ}\text{C}$ within 80 seconds. The Super Pillar decreases the junction temperature drastically.



See the changes of transient locally relative temperature comparison

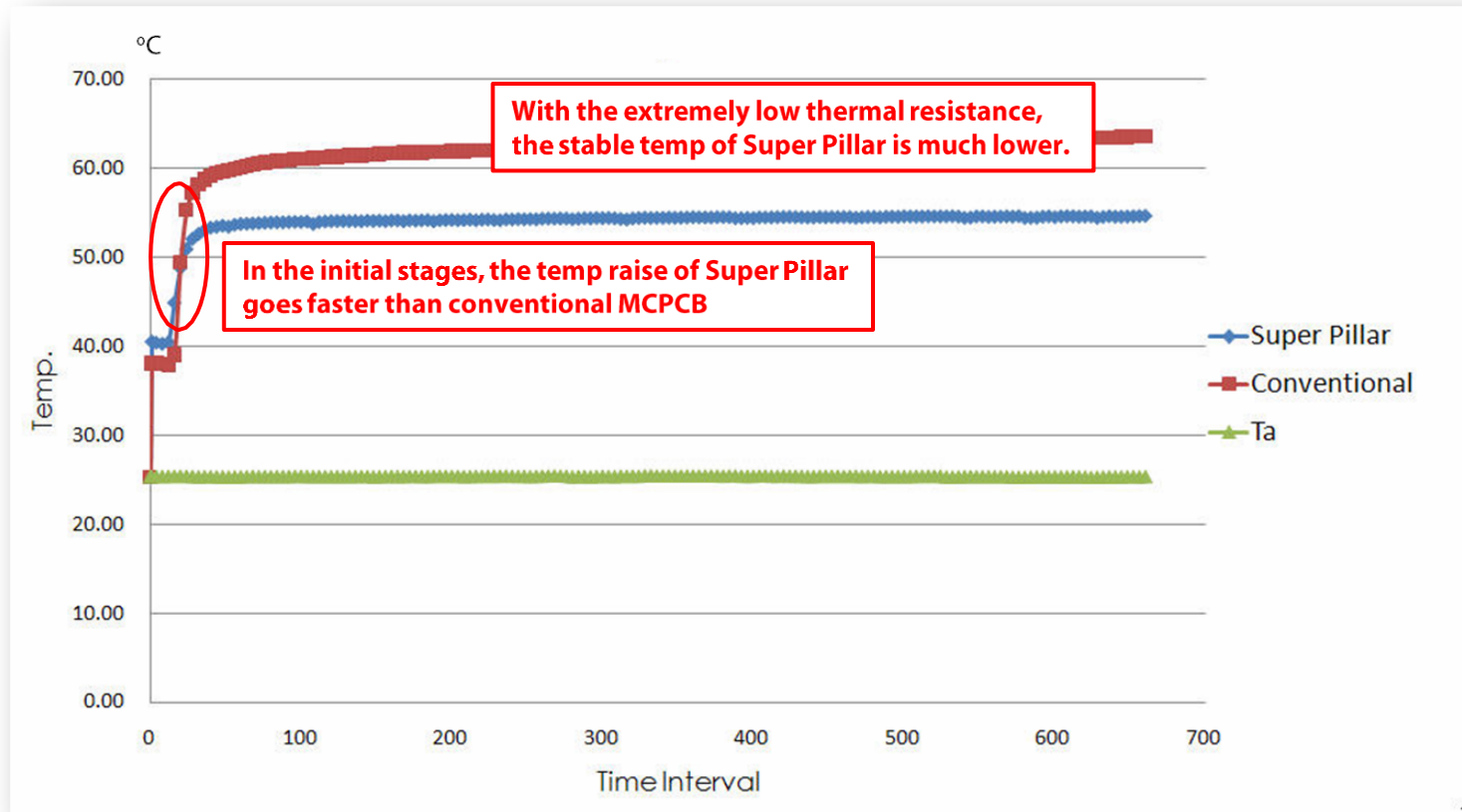
Capturing interval: 3-4 seconds

Time elapsed: ~ 80 Seconds

Thermal Performance Test

Super Pillar can dissipate heat faster than Conventional MCPCB and reduce the LED temperature significantly.

Temperature Profile



[Temperature Monitor: T bottom]

Thermal Performance Test

Test Results

Items	Unit	Conventional MCPCB	Super Pillar	Super Pillar
Model Name	P/N	MCPCB with LZP (4x6) Emitter	MCPCB with LZP (4x6) Emitter	MCPCB with LZP (4x6) Emitter
LED Current	mA	800	780	2800
Input Voltage	V	16.4	17.6	19.0
Input Power	W	13.12	13.73	53.2
Ta	°C	25.37	25.38	25.74
Tslug	°C	64.70	55.10	107.28
T bottom	°C	46.98	53.57	102.23
T board	°C	45.26	49.81	93.96
R slug - bottom	°C/W	1.35	0.11	0.095
R slug - board	°C/W	1.48	0.39	0.25

R slug – bottom

- Conventional MCPCB = 1.35°C/W
- Super Pillar (drive at 780mA) = 0.11°C/W
- The test result indicates that the thermal resistance for the Super Pillar is less than 10% of the Conventional MCPCB

Conclusion

Super Pillar MCPCB provides a direct thermal conductive path for high power LEDs by bypassing the pre-preg layer. As a result, the optical efficiency increases while thermal decay decreases. This allows users to drive components at higher currents while still conserving energy.

Super Pillar technology dramatically improves thermal conduction and decrease the junction temperature drastically.

Intellectual Property - Intellectual Property 3/3

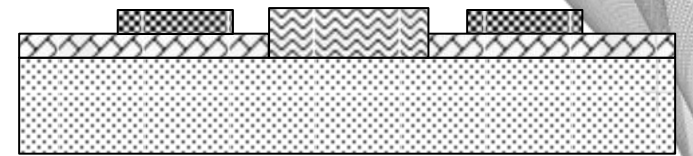
COFAN Patents in U.S.A, Taiwan, China





Invention

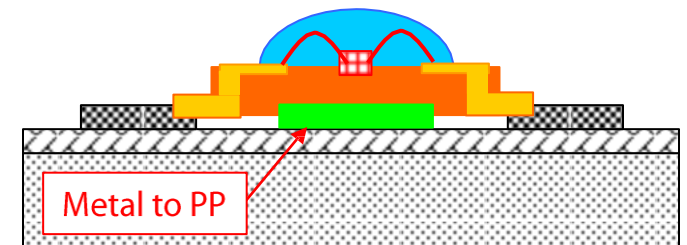
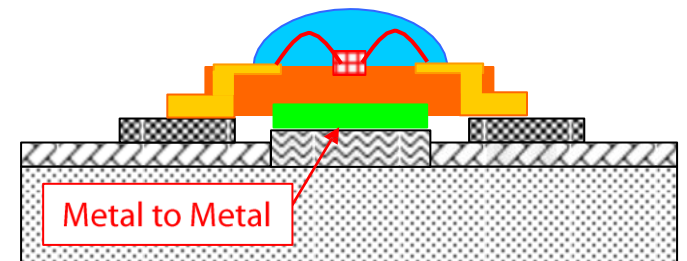
- MCPCB with Thermal Conductive Pillar (Non-COB)
- Pending

Advantages

- Improve LED thermal dissipation
- Allow LED to work in extreme environmental conditions
 - 1) Climate - Arizona summer
 - 2) Installation - Limited space for thermal diffusion



-  Layer 4 – Thermal Conductive Pillar
-  Layer 3 – Electrode Pads and Circuit Trace
-  Layer 2 – Dielectric material.
-  Layer 1 – Copper Base



Quality Assurance & Quality Control

ONLINE CERTIFICATIONS DIRECTORY

ZPWV2.E202216
Wiring, Printed - Component

Enhanced searching capability for this category can be found in U.S. & Canada of Database (US&CAN).

Database

Wiring, Printed - Component

See General Information for Wiring, Printed - Component

COFAN ELECTRONIC CO., LTD.
47 Lane 49 Dong Feng Street, Shulin Dist., New Taipei City 23856, Taiwan (R.O.C.)

Year	Cond. Width		Min. Hole Dia.	Max. Hole Dia.	Min. Drill Dia.	Max. Drill Dia.	Min. Pad Dia.	Max. Pad Dia.	Min. Annular Ring	Max. Annular Ring	Min. Spacing	Max. Spacing	Min. Trace Width	Max. Trace Width	Min. Drill Dia.	Max. Drill Dia.	Min. Pad Dia.	Max. Pad Dia.	Min. Annular Ring	Max. Annular Ring	Min. Spacing	Max. Spacing	Min. Trace Width	Max. Trace Width		
	Min. Hole Dia.	Max. Hole Dia.																								
2011	0.15 (0.006)	0.25 (0.010)	0.3 (0.012)	0.4 (0.016)	0.5 (0.020)	0.6 (0.024)	0.7 (0.028)	0.8 (0.032)	0.9 (0.036)	1.0 (0.040)	1.2 (0.048)	1.5 (0.060)	1.8 (0.072)	2.0 (0.080)	0.3 (0.012)	0.4 (0.016)	0.5 (0.020)	0.6 (0.024)	0.7 (0.028)	0.8 (0.032)	0.9 (0.036)	1.0 (0.040)	1.2 (0.048)	1.5 (0.060)	1.8 (0.072)	2.0 (0.080)

CTE and type designation. May be followed by a suffix to denote device identification.

Quality Management System Certificate of Approval

This is to certify that the Quality Management System of

Shenzhen Cofan Technology Co., Ltd.

Behind the DeJing Repair Factory, Songqian Road, Qianhai, Shenzhen City, Guangdong Province, P.R. China

Has been assessed and found to meet the requirements of

ISO 9001:2008

Manufacture and Service of Hardware Products and Plastic Products (Cooling Fan, Cooling Fan, LED Lamp, PCB, Connector)

Certificate Number: Q141007129
Date of Issue: 18 July 2012
Valid until: 15 July 2015

Authorized by: [Signature] Senior Executive

DAK Conform Ltd., Company Number: 13862614, Redragon, China, Shenzhen, Shenzhen PRC 0518 U.S.A.
Address: 10, York Avenue, 10th Floor, New York, NY 10018-6802, U.S.A.
Tel: 001-212-4277760 Fax: 001-212-4277760 Email: info@dakconform.com

Quality Standards

- ISO 9001:2000
- ISO 9001:2008
- IPC-6011
- IPC-6012B
- ANSI/IPC-A-600
- IPC-4101B
- UL/CSA

TCQCS

Environmentally Certified

Certificate of Registration

Cofan Electronic Co., Ltd.

No. 47, Lane 49, Dong Feng Street, Shulin Dist., New Taipei City, 23856, Taiwan (R.O.C.)

The above business has been assessed and registered by TCQCS International Pty Ltd as having the capability to control the environmental systems associated with its operations in accordance with the conditions of the Licence Agreement at or from the addresses shown above, under an environmental management system complying with the requirements of

ISO 14001:2004

The registration covers the manufacturing of MCPCB and PCB

Issue Date: 24 November 2011
Expiry Date: 21 November 2012

Original Certification: 05 May 2010

Crigit J Bates
President
TCQCS International (Group) Pty Ltd

Lorraine Walsh
Accreditation Manager
TCQCS International (Group) Pty Ltd

This certificate verifies the original certificate issued and is valid as long as it is displayed as an electronic copy at www.iso14001.com and www.iso9001.com

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Quality Certified

Certificate of Registration

Cofan Electronic Co., Ltd.

No. 47, Lane 49, Dong Feng Street, Shulin Dist., New Taipei City, 23856, Taiwan (R.O.C.)

The above business has been assessed and registered by TCQCS International Pty Ltd as having the capability to control the quality of goods or services provided in accordance with the conditions of the Licence Agreement at or from the addresses shown above, under a quality management system complying with the requirements of

ISO 9001:2008

The registration covers the manufacturing of MCPCB and PCB

Exclusions: 7.3 Design and Development

Issue Date: 24 November 2011
Expiry Date: 21 November 2012

Original Certification: 05 May 2010

Crigit J Bates
President
TCQCS International (Group) Pty Ltd

Lorraine Walsh
Accreditation Manager
TCQCS International Pty Ltd

This certificate verifies the original certificate issued and is valid as long as it is displayed as an electronic copy at www.iso9001.com and www.iso14001.com

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www.jas-anz.com

Why partner with Cofan-USA?

1. TECHNOLOGY
2. QUALITY
3. RESPONSIVENESS
4. DELIVERY
5. COST

Cofan invites you, our prospective customer, to join us as we grow to the next level of success.