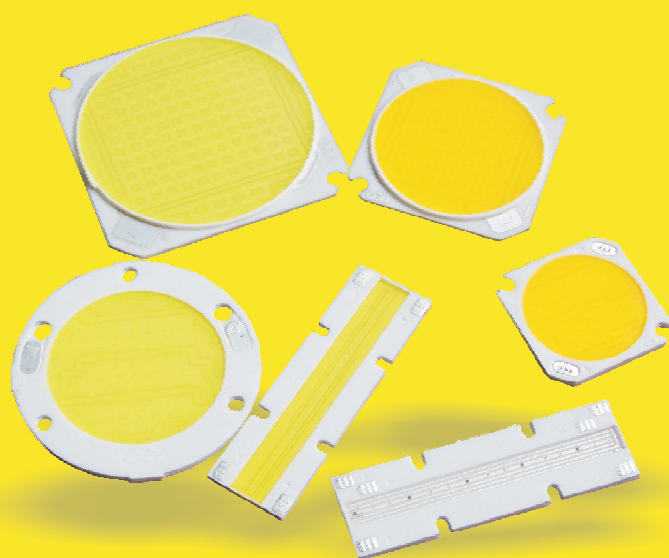




世纪光点电子科技有限公司  
**Lightspot Technology Co. Ltd**



COB LED Module

## Introduction

Lightspot Ceramic COB LED modules, with an LED die array mounted on ceramic substrate, high luminous flux, high efficiency and radiation performance, no uncomfortable glare, low resistance plus they offer high reliability. The existing LED applications, such as home lighting, relatively small power output; a move to higher-power applications means that engineers will deal with more heat and durability problems. Lightspot COB LED ceramic substrate modules both high-brightness and high-durability for high-output LEDs, and have capability of being made into compact shapes.”

Lightspot Ceramic COB LED modules which is suitable for lighting applications anywhere such as

- Down light
- Pendant light
- Spotlight
- Landscape light
- Road lighting

The light from LEDs contains less infrared light (heat) than that from a conventional incandescent lamp, so the LED is adaptable to lighting applications where items may be susceptible to damage caused by temperature rise. It is also an excellent fit for lighting items where there is a concern of deterioration or discoloration from ultraviolet rays, because the LEDs have no emission in the UV spectrum.

With global warming becoming a huge concern for the environment and more people looking for eco-friendly alternatives, the LED lighting is being perceived as a way to achieve a greener earth. Environment friendly LED lighting function high luminous efficiencies, high reliability, save energy, power, have a longer lifespan which, in turn, is what makes them environmentally friendly. LEDs offer all these and more: they save energy and reduce waste. LEDs contain no hazardous substances, convert energy to light in an efficient manner, meaning less heat output for a given amount of light – a major need for space conditioning.

With this technology, the LED chips are in the form of a semiconductor chip, which is neither soldered nor connected. The semiconductor chip is described as a “Die”. This LED chip is processed by a special procedure which is called “Die Bonding”. Here the individual chips are placed on the PCB and using the Wire Bonding method, connected to the contact surface of the PCB, which are described as “Pads”. Gold wires in the micrometer range are used for contacting. The COB technology allows virtually limitless freedom of scope for the PCBs and thus serves as the basis for totally unique solutions. Furthermore Lumiere is using ceramic as substrate of which will improve the inter-

## Sustainability

Lightspot continuously develop the highly efficiency MCOB LED light engine with long life span and environmentally safe products that replaces demand for incandescent light both in the home, commercial and public use. In consequences participate to achieve lowering the consumption of energy and reduce the emission of carbon dioxide.

## Lightspot Ceramic COB Production



1. LED die separation + pick and place positioning on the Ceramic PCB



2. Bake and curing



3. Die bonding



4. Phosphor deposition, encapsulation



5. Bake and curing after encapsulation



6. Binning and inspection

## COB LED PATENT FOR INVENTION



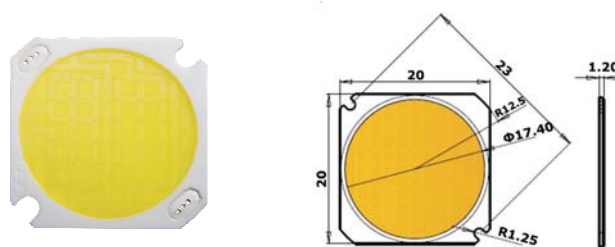
**Patent No.:** 20051003432.2

**Patent Name:**

The package method and the product of multi LED chips on board. (abbreviateion COB ).

**Patentee,**

Mr. Wang RuiXun, the General manager of Lightspot and Lumiere.


**LCOB25**
**LCOB25 BS Standard CRI**

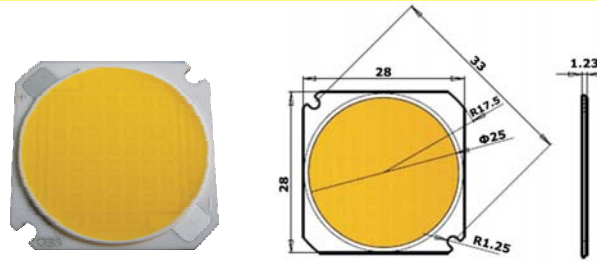
Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB25-03W0-XXX	3W	8.4-10.2V	320mA	2900K-3300K	270-340	105lm/W	63
				6020K-7040K	280-350	105lm/W	72
LCOB25-04W0-XXX	4W	11.2-13.6V	320mA	2900K-3300K	380-500	105lm/W	63
				6020K-7040K	390-510	105lm/W	72
LCOB25-05W0-XXX	5W	14-17V	320mA	2900K-3300K	440-540	105lm/W	63
				6020K-7040K	450-550	105lm/W	72
LCOB25-07W0-XXX	7W	19.6-23.8V	320mA	2900K-3300K	660-850	105lm/W	63
				6020K-7040K	670-860	105lm/W	72

**LCOB25 BS High CRI**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB25-03W0-XXX	3W	8.4-10.2V	320mA	2900K-3300K	220-280	90lm/W	80
				6020K-7040K	240-300	90lm/W	82
LCOB25-04W0-XXX	4W	11.2-13.6V	320mA	2900K-3300K	300-380	90lm/W	80
				6020K-7040K	320-400	90lm/W	82
LCOB25-05W0-XXX	5W	14-17V	320mA	2900K-3300K	380-480	90lm/W	80
				6020K-7040K	400-500	90lm/W	82
LCOB25-07W0-XXX	7W	19.6-23.8V	320mA	2900K-3300K	540-680	90lm/W	80
				6020K-7040K	560-700	90lm/W	82

**LCOB25 BA Series**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB25-03W0-XXX	3W	8.4-10.2V	320mA	2900K-3300K	215-275	85lm/W	63
				6020K-7040K	225-285	85lm/W	72
LCOB25-04W0-XXX	4W	11.2-13.6V	320mA	2900K-3300K	290-370	85lm/W	63
				6020K-7040K	300-380	85lm/W	72
LCOB25-05W0-XXX	5W	14-17V	320mA	2900K-3300K	365-465	85lm/W	63
				6020K-7040K	375-475	85lm/W	72
LCOB25-07W0-XXX	7W	19.6-23.8V	320mA	2900K-3300K	515-655	85lm/W	63
				6020K-7040K	525-665	85lm/W	72


**LCOB35**
**LCOB35 BS Standard CRI**

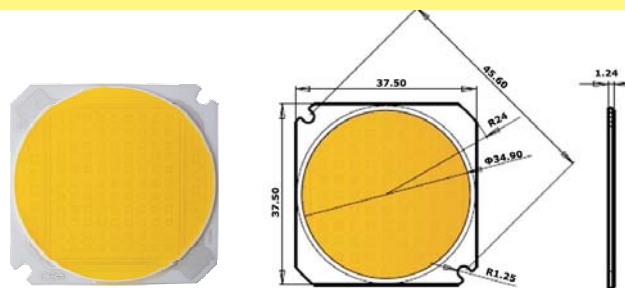
Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB35-05W0-XXX	5W	22.4-27V	200mA	2900K-3300K	440-540	105lm/W	63
				6020K-7040K	450-550	105lm/W	72
LCOB35-07W0-XXX	7W	30.8-37.4V	200mA	2900K-3300K	660-850	105lm/W	63
				6020K-7040K	670-860	105lm/W	72
LCOB35-07W5-XXX	7.5W	33.5-40.5V	200mA	2900K-3300K	700-900	105lm/W	63
				6020K-7040K	750-950	105lm/W	72
LCOB35-10W0-XXX	10W	23-27V	400mA	2900K-3300K	950-1100	105lm/W	63
				6020K-7040K	1000-1150	105lm/W	72
LCOB35-20W0-XXX	20W	29-32V	640mA	2900K-3300K	1900-2300	105lm/W	63
				6020K-7040K	2000-2400	105lm/W	72
LCOB35-25W0-XXX	25W	36-40V	640mA	2900K-3300K	2400-2900	105lm/W	63
				6020K-7040K	2500-3000	105lm/W	72

**LCOB35 BS High CRI**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB35-05W0-XXX	5W	22.4-27V	200mA	2900K-3300K	380-480	90lm/W	80
				6020K-7040K	400-500	90lm/W	82
LCOB35-07W0-XXX	7W	30.8-37.4V	200mA	2900K-3300K	540-680	90lm/W	80
				6020K-7040K	560-700	90lm/W	82
LCOB35-07W5-XXX	7.5W	33.5-40.5V	200mA	2900K-3300K	580-730	90lm/W	80
				6020K-7040K	600-750	90lm/W	82
LCOB35-10W0-XXX	10W	23-27V	400mA	2900K-3300K	730-930	90lm/W	80
				6020K-7040K	750-950	90lm/W	82
LCOB35-20W0-XXX	20W	29-32V	640mA	2900K-3300K	1800-2100	90lm/W	80
				6020K-7040K	1900-2200	90lm/W	82
LCOB35-25W0-XXX	25W	36-40V	640mA	2900K-3300K	2100-2450	80lm/W	80
				6020K-7040K	2250-2600	80lm/W	82

**LCOB35 BA Series**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB35-05W0-XXX	5W	22.4-27V	200mA	2900K-3300K	365-465	85lm/W	63
				6020K-7040K	375-475	85lm/W	72
LCOB35-07W0-XXX	7W	30.8-37.4V	200mA	2900K-3300K	515-655	85lm/W	63
				6020K-7040K	525-665	85lm/W	72
LCOB35-07W5-XXX	7.5W	33.5-40.5V	200mA	2900K-3300K	550-710	85lm/W	63
				6020K-7040K	560-720	85lm/W	72


**LCOB50**
**LCOB50 BS Standard CRI**

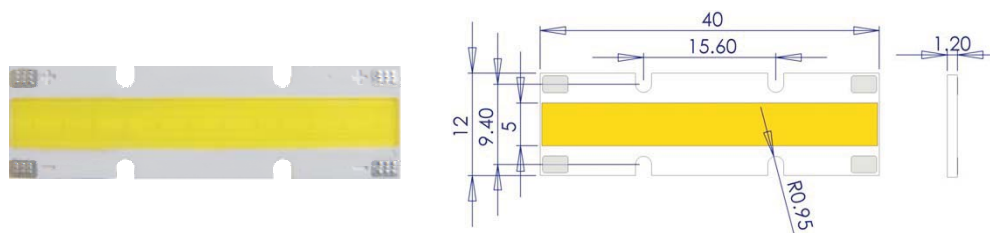
Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB50-10W0-XXX	10W	28-34V	320mA	2900K-3300K	1000-1200	105lm/W	63
				6020K-7040K	1050-1250	105lm/W	72
LCOB50-15W0-XXX	15W	42-50V	320mA	2900K-3300K	1500-1700	105lm/W	63
				6020K-7040K	1600-1800	105lm/W	72
LCOB50-20W0-XXX	20W	30-34V	640mA	2900K-3300K	1900-2300	105lm/W	63
				6020K-7040K	2000-2400	105lm/W	72
LCOB50-30W0-XXX	30W	32-36V	960mA	2900K-3300K	2600-2900	90lm/W	63
				6020K-7040K	2700-3000	90lm/W	72
LCOB50-40W0-XXX	40W	58-62V	640mA	2900K-3300K	3600-4200	90lm/W	63
				6020K-7040K	3800-4400	90lm/W	72
LCOB50-50W0-XXX	50W	60-64V	800mA	2900K-3300K	4300-5100	90lm/W	63
				6020K-7040K	4500-5300	90lm/W	72

**LCOB50 BS High CRI**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB50-10W0-XXX	10W	28-34V	320mA	2900K-3300K	730-930	90lm/W	80
				6020K-7040K	750-950	90lm/W	82
LCOB50-15W0-XXX	15W	42-50V	320mA	2900K-3300K	1100-1400	90lm/W	80
				6020K-7040K	1200-1500	90lm/W	82
LCOB50-20W0-XXX	20W	30-34V	640mA	2900K-3300K	1800-2100	90lm/W	80
				6020K-7040K	1900-2200	90lm/W	82
LCOB50-30W0-XXX	30W	32-36V	960mA	2900K-3300K	2000-2300	80lm/W	80
				6020K-7040K	2100-2400	80lm/W	82
LCOB50-40W0-XXX	40W	58-62V	640mA	2900K-3300K	2800-3300	80lm/W	80
				6020K-7040K	3000-3500	80lm/W	82
LCOB50-50W0-XXX	50W	60-64V	800mA	2900K-3300K	3400-4000	80lm/W	80
				6020K-7040K	3600-4200	80lm/W	82

**LCOB50 BA Series**

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LCOB50-10W0-XXX	10W	28-34V	320mA	2900K-3300K	720-920	85lm/W	63
				6020K-7040K	750-950	85lm/W	72
LCOB50-15W0-XXX	15W	42-50V	320mA	2900K-3300K	1100-1400	85lm/W	63
				6020K-7040K	1125-1425	85lm/W	72


**LC4012**

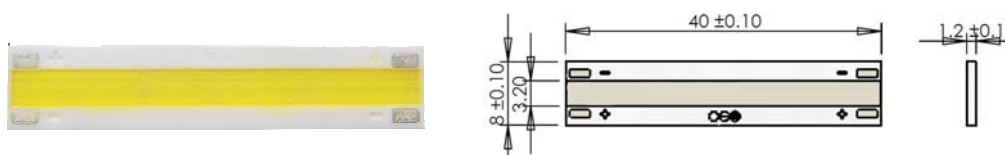
### LC4012 BS Standard CRI

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LC4012-007W-XXX	0.7W	9-10.2V	80mA	2900K-3300K	70-80	105lm/W	63
				6020K-7040K	75-85	105lm/W	72
LC4012-010W-XXX	1W	9-10.2V	100mA	2900K-3300K	90-110	105lm/W	63
				6020K-7040K	100-120	105lm/W	72
LC4012-013W-XXX	1.3W	9-10.2V	140mA	2900K-3300K	120-140	105lm/W	63
				6020K-7040K	130-150	105lm/W	72
LC4012-020W-XXX	2W	9-10.2V	200mA	2900K-3300K	180-210	105lm/W	63
				6020K-7040K	190-220	105lm/W	72
LC4012-022W-XXX	2.2W	9-10.2V	220mA	2900K-3300K	200-230	105lm/W	63
				6020K-7040K	210-240	105lm/W	72
LC4012-030W-XXX	3W	9-10.2V	320mA	2900K-3300K	260-290	105lm/W	63
				6020K-7040K	270-300	105lm/W	72

### LC4012 BS High CRI

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LC4012-007W-XXX	0.7W	9-10.2V	80mA	2900K-3300K	55-70	90lm/W	80
				6020K-7040K	60-75	90lm/W	82
LC4012-010W-XXX	1W	9-10.2V	100mA	2900K-3300K	75-95	90lm/W	80
				6020K-7040K	80-100	90lm/W	82
LC4012-013W-XXX	1.3W	9-10.2V	140mA	2900K-3300K	100-125	90lm/W	80
				6020K-7040K	110-135	90lm/W	82
LC4012-020W-XXX	2W	9-10.2V	200mA	2900K-3300K	150-190	90lm/W	80
				6020K-7040K	160-200	90lm/W	82
LC4012-022W-XXX	2.2W	9-10.2V	220mA	2900K-3300K	160-200	90lm/W	80
				6020K-7040K	170-210	90lm/W	82
LC4012-030W-XXX	3W	9-10.2V	320mA	2900K-3300K	220-280	90lm/W	80
				6020K-7040K	240-300	90lm/W	82




**LC4008**

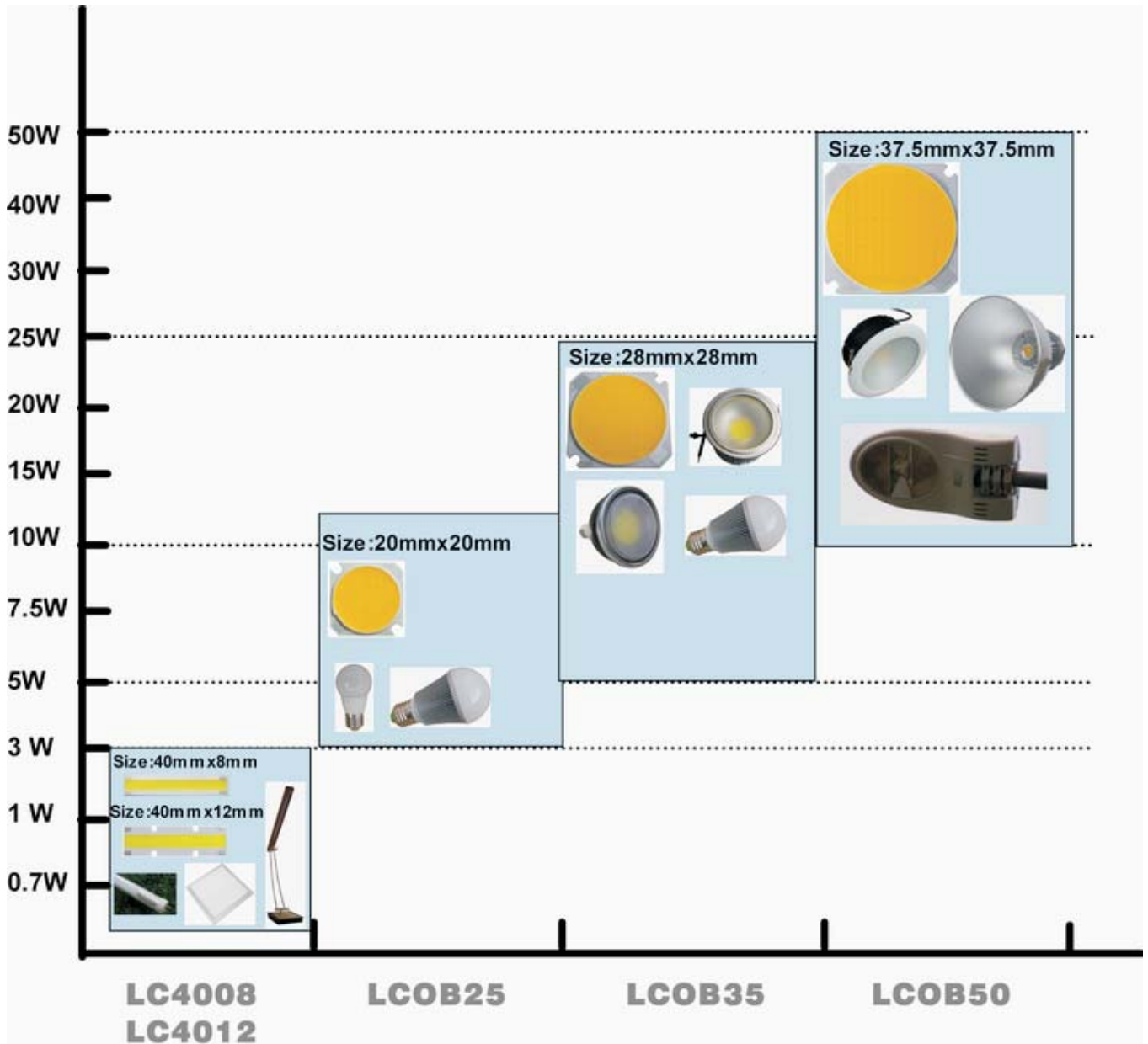
### LC4008 BS Standard CRI

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LC4012-007W-XXX	0.7W	9-10.2V	80mA	2900K-3300K	70-80	105lm/W	63
				6020K-7040K	75-85	105lm/W	72
LC4012-010W-XXX	1W	9-10.2V	100mA	2900K-3300K	90-110	105lm/W	63
				6020K-7040K	100-120	105lm/W	72
LC4012-013W-XXX	1.3W	9-10.2V	140mA	2900K-3300K	120-140	105lm/W	63
				6020K-7040K	130-150	105lm/W	72
LC4012-020W-XXX	2W	9-10.2V	200mA	2900K-3300K	180-210	105lm/W	63
				6020K-7040K	190-220	105lm/W	72
LC4012-022W-XXX	2.2W	9-10.2V	220mA	2900K-3300K	200-230	105lm/W	63
				6020K-7040K	210-240	105lm/W	72
LC4012-030W-XXX	3W	9-10.2V	320mA	2900K-3300K	260-290	105lm/W	63
				6020K-7040K	270-300	105lm/W	72

### LC4008 BS High CRI

Part No.	Power	Forward Voltage	Forward Current	CCT	Lumens(lm) min.-max.	Lumen(lm) Typ.	CRI (Typ.)
LC4012-007W-XXX	0.7W	9-10.2V	80mA	2900K-3300K	55-70	90lm/W	80
				6020K-7040K	60-75	90lm/W	82
LC4012-010W-XXX	1W	9-10.2V	100mA	2900K-3300K	75-95	90lm/W	80
				6020K-7040K	80-100	90lm/W	82
LC4012-013W-XXX	1.3W	9-10.2V	140mA	2900K-3300K	100-125	90lm/W	80
				6020K-7040K	110-135	90lm/W	82
LC4012-020W-XXX	2W	9-10.2V	200mA	2900K-3300K	150-190	90lm/W	80
				6020K-7040K	160-200	90lm/W	82
LC4012-022W-XXX	2.2W	9-10.2V	220mA	2900K-3300K	160-200	90lm/W	80
				6020K-7040K	170-210	90lm/W	82
LC4012-030W-XXX	3W	9-10.2V	320mA	2900K-3300K	220-280	90lm/W	80
				6020K-7040K	240-300	90lm/W	82

**Lightspot Ceramic COB LED**  
**Product Distribution and Typical Application**



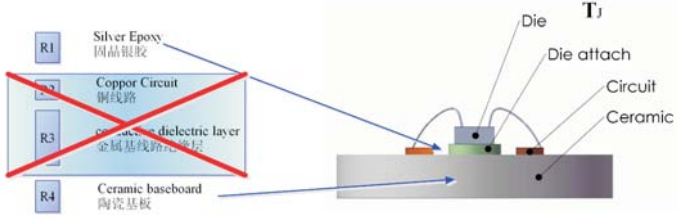
## Comparison: Thermal Resistance

### 1, Ceramic COB LED

$$R_{J-A} = R1 + R4$$

$T_J$

Ceramic COB LED



$T_A$

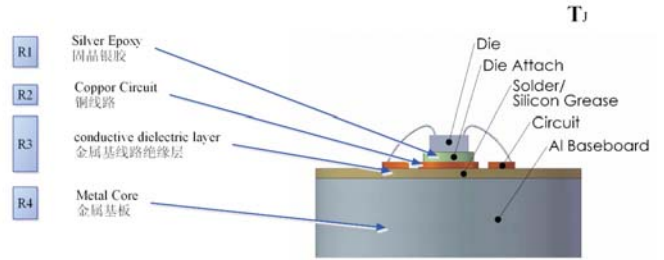
$T_A$

### 2, Aluminium COB LED

$$R_{J-A} = R1 + R2 + R3 + R4$$

$T_J$

Aluminium COB LED



$T_A$

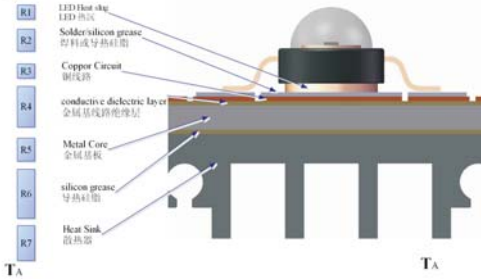
$T_A$

### 3, High Power LED

$$R_{J-A} = R1 + R2 + R3 + R4 + R5 + R6 + R7$$

$T_J$

$T_J$



$T_A$

$T_A$

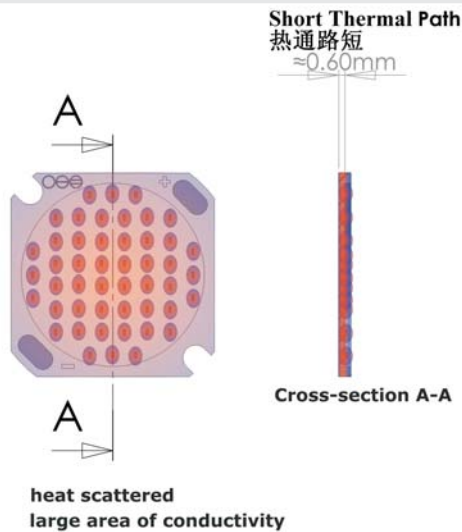
Ceramic COB LED use ceramic board, which has the least thermal resistance.

- the least thermal resistance
- highest heat conductivity: 18W/mlk

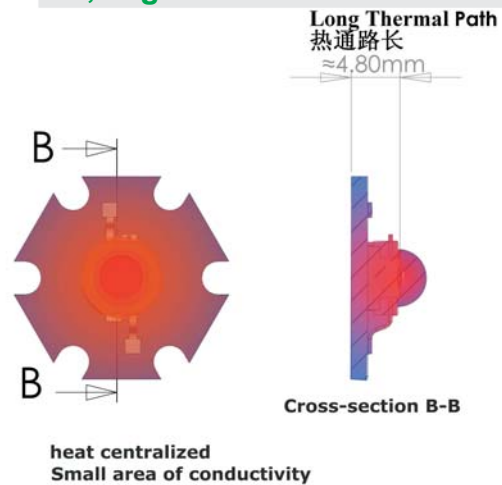
Guarantee heat conductivity, reliability and life span.

## Comparison: Thermal Path and Conductivity area

### 1, Ceramic COB LED


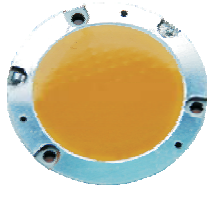
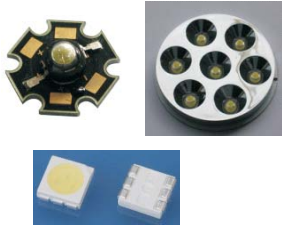


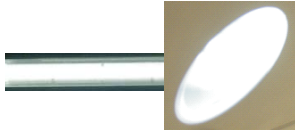
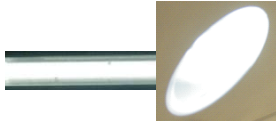




### 2, High Power LED



Ceramic COB LED has large conductivity area and the heat from LED chip is scattered.

## Comparison: LED Light Engines

Description	Ceramic PCB COB Light Engine	Aluminum PCB COB Light Engine	Others Light Engine
Product photo			
Luminescence method	Surface	Surface	Point
Glare	Insignificant	Insignificant	Significant
Thermal Shock Test	Both of the PCB and dies substrate is ceramic, which similar in the thermal expansion Coefficient. No temperature shock will cause the dies failure and luminous decay and dead light	Thermal expansion Coefficient of the Aluminum PCB is 4 times higher than the dies ceramic substrate; the temperature shock will cause the reliability problems	Same as Aluminum PCB COB Light Engine
Thermal Shock Test	Both of the PCB and dies substrate is ceramic, which similar in the thermal expansion Coefficient. No temperature shock will cause the dies failure and luminous decay and dead light	Thermal expansion Coefficient of the Aluminum PCB is 4 times higher than the dies ceramic substrate; the temperature shock will cause the reliability problems	Same as Aluminum PCB COB Light Engine
85°C high temperature and 85% humidity Test	Use of high quality packaging materials and result of high weatherability	The market value of the light engine is lower than US\$0.85/W might have a sever luminous decay in a short time	The market value of the light engine is lower than US\$0.60/W might have a sever luminous decay in a short time
Thermal Resistance	Very low	Low	High
Thermal conductivity	high thermal conductivity with large conductivity area for effective heat dissipation, ease of thermal management and low cost	Thermal conductivity is lower than the ceramic; large conductivity area for heat dissipation, ease of thermal cooling and low cost	Thermal conductivity is low, thermal area is small and the heat is concentrated. More difficult thermal design, cooling costs are high
High voltage resistance	>4000V	<600V	<600V

Description	Ceramic PCB COB Light Engine	Aluminum PCB COB Light Engine	Others Light Engine
Finished lamps product design with non-isolated power for UL / GS certification	Qualify	Difficult	Difficult
Finished lamps product design with isolated power for UL / GS certification	Qualify	Qualify, but Loss of light efficiency	Qualify, but Loss of light efficiency
Power Matching	With high voltage safety, any ceramic COB 5W and above are designed to Vf> 24V, low current high voltage to match the non-isolated power supply to reduce power costs, improve power efficiency, enhance power supply reliability	In order to qualify the UL / GS certification, isolated power must be use; in result loss of power efficiency and reliability. particularly evident in high wattage finished lamps product	Same as Aluminum PCB COB Light Engine
light efficiency	100-120lm/w	50-75 lm/w	80-100lm/w
Luminescence pattern			
Lighting effect			
Lm/RMB	17-20lm/RMB	10-14lm/RMB	15-18lm/RMB
Cooling cost	Resistance is small, thermal path short with large thermal dissipation area; the cost of cooling can effectively reduce.	Thermal path short with large thermal dissipation area, but resistance is larger than ceramic. Higher cooling cost than ceramic.	Large thermal resistance and long thermal path, small thermal dissipation area, high cooling costs
Install integration costs	Direct mounting on the heat sink and low cost.	Direct mounting on the heat sink and low cost.	First solder on FR4 PCB or MCPCB and then fixed on the heat sink, the high cost is high
Cost of power supply matching	For UL / GS certification, non-isolated power supply can be used. Low cost.	Non-isolated power supply must be used to qualify for the UL / GS certification. High cost.	Non-isolated power supply must be used to qualify for the UL / GS certification. High cost.

## Cautions Notes

### Usage

Lumiere MCOB LED modules are not to be used in any of these environments:

- Outdoor exposure with direct sunlight and dusty conditions
- Not to be used in water, oil, medical fluids, and organic solvents
- High humidity environments, such as dew or condensation
- Direct contact with corrosive (salt) air or corrosive gases, such as Cl, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub>

### Installation

1. As the mounting frame material is aluminized ceramic, it is very hard but brittle. If incorrectly installed, may occur cracking of the frame material and damage of the MCOB LED module.

2. When using screws to mounting the ceramic substrate LED module onto its heat sink.

- Screw torque: within 0.2 N•m.
- Use threads locking materials to prevent screws from loosening due to thermal cycling.
- Do not use flathead screws, which can cause substrate cracks due to stress at the screw holes.
- Do not install the LED module onto a convex surface. This can easily damaged by torque it to a convexedly-warped mounting surface.
- To maximize thermal efficiency between the device and its heat sink, a thermally-conductive sheet and/or conductive grease is recommended .
- Circuit board cracks of the ceramic substrate LED module can be caused when screws are tightened; be sure to check the actual conditions carefully.

### Connection

Solder the part with a thermo controlled iron, (tip temperature 380°C), within 10 seconds per pad. Use a backer material whose thermal conductivity will not radiate the heat from soldering.

Avoid touching the yellow phosphor with soldering iron.

### Safety

This MCOB LED module has a very high light output. Looking directly at it during full power output can cause injury.

### Warranty Information

Lumiere Opto-Photonics (Shenzhen) Co. Ltd warrants that its products shall be new and free from defects in workmanship and material for a period of 12 months after purchase. Lumiere Opto-Photonics (Shenzhen) Co. Ltd obligation under this warranty is limited to replacing or repairing the defective unit or component without charge. If any product is returned to Lumiere Opto-Photonics (Shenzhen) Co. Ltd for repair and is found be free of defect, then the customer shall bare all of the associated costs of shipping and handling. A prior written authorization must be obtained from Lumiere Opto-Photonics (Shenzhen) Co. Ltd before any items



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