






The world's first *1 LED for lighting providing luminous flux of 17,675 lm has been developed.

Eleven types, including five packages, cover the brightness range from a 10W incandescent bulb to a 300W mercury lamp.

High luminous efficacy of 155 lm/W is also achieved

Citizen Electronics Co., Ltd. (Head Office: Fujiyoshida City, Yamanashi Prefecture. President: Yoshihiro Gohta) has developed five packages (shapes) and eleven types of LEDs, such as the world's first LEDs for lighting that produce high luminous flux of 17,675 lm. Features include one LED providing a wide range of luminous flux and it being possible to select an LED based on luminous efficacy. The LEDs can replace a variety of light sources. Product demonstrations will be held during the "Hong Kong International Lighting Fair 2011" from October 27, 2011.

- Developed products: 5 packages, 11 types, and 6 colors for each type (66 models in total)
- Mass production is scheduled to start in November 2011

CLL010 Series	CLL020 Series	CLL030 Series	CLL040 Series	CLL050 Series
				
CLL010-0305A1	CLL020-1202A1 CLL020-1203A1 CLL020-1204A1	CLL030-1205A1 CLL030-1206A1 CLL030-1208A1 CLL030-1212A1	CLL040-1218A1 CLL040-1818A1	CLL050-1825A1

Main features

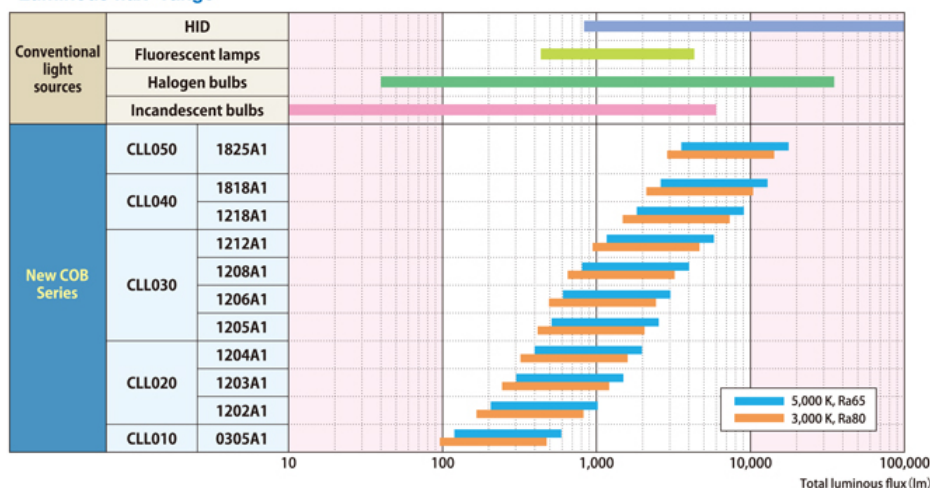
1. The world's first LED producing high luminous flux of 17,675 lm

- High luminous flux of 17,675 lm (5,000K, Ra65 type) is achieved and luminous flux per LED is dramatically increased from 4,390 lm, which was the highest luminous flux of our conventional models.

2. Now possible to select from LED range based on luminous flux and luminous efficacy per LED

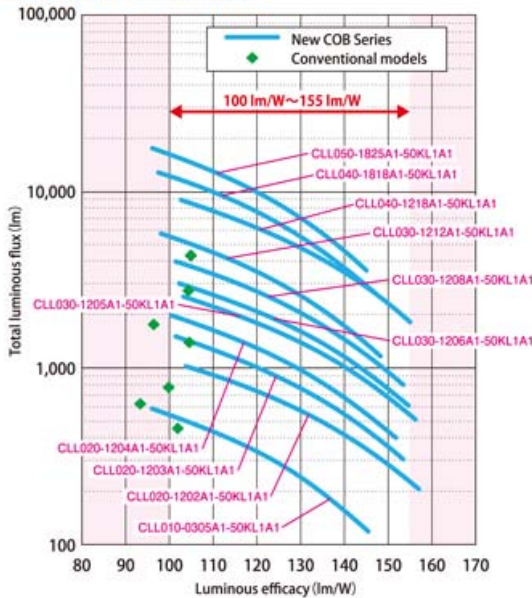
- One LED can provide a wide range of luminous flux due to high heat dissipation by utilizing our original Chip on Aluminum technique *2 and high efficiency of light extraction by re-selecting and optimizing materials. The five packages and eleven types incorporate LEDs which can produce a wide range of luminous flux, and provide luminous flux over the entire range of approximately 100 lm to 17,675 lm (0.8 W to 184 W classes).

"Luminous flux" range

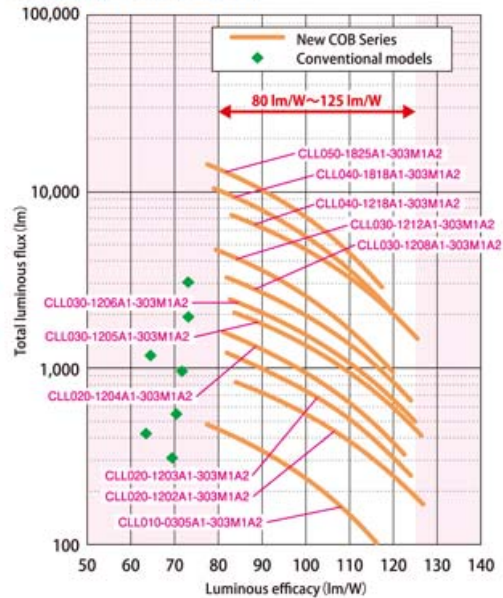


- It is possible to select an LED focusing on luminous efficacy or luminous flux. In addition, you can use an LED with high luminous efficacy of more than 155 lm/W depending on the drive conditions.

Luminous efficacy vs. total luminous flux at 5,000K and Ra65



Luminous efficacy vs. total luminous flux at 3,000K and Ra80

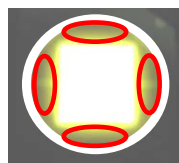


3. Possible to standardize design of luminaire

- Five LED packages cover luminous flux of conventional light sources, from a 10W bulb to a 300W mercury lamp, a range which consists of several hundred different types of luminous flux. Therefore, it is possible to standardize the optical design of the peripheral part of LEDs and promote the efficiency of luminaire design.

4. Improved quality of light

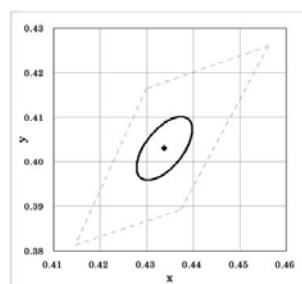
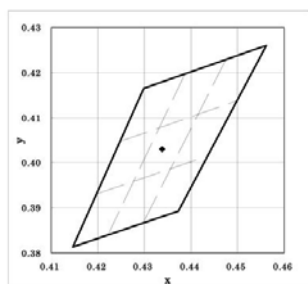
- LED dice in packages are placed to form a square for conventional models. However, we have changed the shape to a circle in order to promote optical optimization and patchy areas of light in the luminaire have been reduced.



Dice placed to form a square

Dice placed to form a circle

- As the new products are compliant with the chromaticity control standard “3-Step MacAdam ellipses” which is about a ninth of the chromaticity range of ANSI C78.377 *3, chromaticity variations of LEDs are rarely noticed (excluding the 5,000K, Ra65 type).



Chromaticity range of ANSI C78.377

Chromaticity range of 3-Step MacAdam ellipses

5. Performance has been improved by 40% over that of the conventional model

- Luminous flux and luminous efficacy have been improved by 40% over that of the conventional model through reselection and optimization of materials.

* Comparison of the two models below made when they light up with the same quantity of dice and the same drive conditions

Conventional model (CL-L233, 3,000K):	960 lm	72 lm/W
New product (CLL030-1206A1, 3,000K):	1,363 lm (42% up)	103 lm/W (43% up)

6. Chip on Aluminum technique (Citizen Electronics has acquired a patent for this technique)

- This technique provides high heat dissipation and heat resistance effects.
- As an aluminum board is used, the heat sink can be screwed directly to the LED.

7. Selection of models is simplified through use of a simulation tool

- We have made a simulation tool for the new products. By entering the amount of luminous flux, types of models are narrowed down and it is possible for luminaire makers to select a desired LED easily.

Applications

The developed products cover a brightness range from a 10W incandescent bulb to a 300W mercury lamp and can replace a variety of light sources.

[Background and advantages of development]

We have been involved in the development of LEDs for lighting since 2003. Our LEDs have been adopted in various luminaires, and we have accumulated a lot of results as a pioneer in the industry of high-wattage LEDs. LED lighting has been rapidly spreading through replacement of conventional light sources.

Brightness or shape of light sources varies depending on applications, such as incandescent bulbs often used in homes, halogen lamps used for downlights or spot lights at commercial facilities and HID lamps ^{*4} used for street lights or floodlights. When we replace conventional light sources with LED light sources, it is usually difficult to provide enough luminous flux with only one LED. Therefore, it is necessary to place two or more LEDs in lights depending on applications. In such cases, the area in which LEDs are to be placed becomes larger and accordingly the size of the light also tends to increase. In addition, there are other negative effects. When there are two or more light sources, design to control light such as that of the reflection plate becomes complex and multiple shadows ^{*5} may occur.

The newly developed products are capable of covering luminous flux from a 10W incandescent bulb to a 300W mercury lamp. Our product lineup, five packages and eleven types, provides luminous flux over the entire range from about 100 lm to 17,675 lm by producing a wide range of luminous flux with only one LED. In addition, it is possible to select from several LEDs according to luminous efficacy.

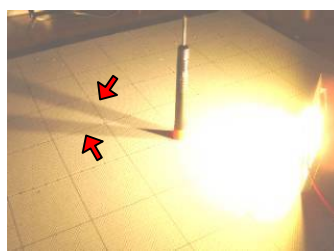
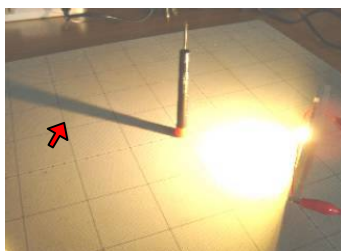
This enables the previously mentioned problems to be resolved and can contribute to the miniaturization of lights and simplified optical design. In addition, as the number of LED packages (shapes) is only five, it is possible to standardize optical design of peripheral part of LEDs and promote the efficiency of luminaire design. Luminaire makers can select LEDs with luminous flux or luminous efficacy suitable for their specifications and we can increase the possibility of replacing a variety of conventional light sources.

Main specifications

Product Lineup

Series	CLL010	CLL020	CLL030	CLL040	CLL050	
Type	CLL010-0305A1	CLL020-1202A1 CLL020-1203A1 CLL020-1204A1	CLL030-1205A1 CLL030-1206A1 CLL030-1208A1 CLL030-1212A1	CLL040-1218A1 CLL040-1818A1	CLL050-1825A1	
Shape						
Size (mm)	9.5×9.5×1.4	13.5×13.5×1.4	19.0×19.0×1.4	28.0×28.0×1.4	38.0×38.0×1.4	
Color lineup	●High color rendering type: 2,700K, 3,000K, 3,500K, 4,000K, 5,000K (MacAdam 3-Step) ●High efficacy type: 5,000K					
Drive (W)	0.8~6.1	1.3~19.6	3.3~58.9	11.8~132.4	24.6~183.9	
Total luminous flux (lm)	95~590	165~1,970	415~5,780	1,480~12,915	2,885~17,675	
Applications	MR-16 Bulb 	A19 Bulb 	Bulb PAR30 	Downlight 	Floodlight 	Outdoor Lighting 

- *1 world's first: according to the results of a survey conducted by Citizen Electronics as at October 2011
- *2 Chip on Aluminum technique: This is a technique where LED dice are directly mounted on an aluminum board. Citizen Electronics has acquired a patent for this technique.
- *3 ANSI C78.377: a chromaticity control standard provided by the American National Standards Institute (ANSI)
- *4 HID (high-intensity discharge) lamp: a general term for high-pressure mercury vapor lamps, metal halide lamps, etc. and used for illumination requiring large amounts of light
- *5 multiple shadows: several overlapping shadows caused from two or more LEDs mounted in one luminaire



One LED lights in the left image while two LEDs light and two shadows appear in the right image.

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