

**Development of LEDs for lighting ‘COB Series, Version 3’**  
–These high-wattage LEDs have achieved the world’s highest level of luminous flux and obtained a UL Standard (North American safety standard) certification of compliance.–

Citizen Electronics Co., Ltd. (Head Office: Fujiyoshida City, Yamanashi Prefecture. President: Yoshihiro Gohta) has developed four packages (shapes) and eleven types of high-wattage LEDs for lighting, ‘COB \*1 Series, Version 3,’ that provide the world’s highest level of luminous efficacy through an increase of about 14 % over that of the current model. The products will be exhibited during the ‘LIGHTFAIR INTERNATIONAL 2014’ in Las Vegas, USA from June 3, 2014.

<b>LEDs for lighting, ‘COB Series, Version 3’</b>			
Series: 4 packages and 11 types (88 models in total including color variations)			
Luminous flux: 30 lm to 22,473 lm (0.2 W to 165 W)			
Applications: LED bulbs, downlights, streetlights, floodlights, etc.			
Mass production is scheduled to start in June 2014			
CLU024 Series	CLU034 Series	CLU044 Series	CLU054 Series
			

◆**Background and advantages of development**

Further efforts have been made to protect the global environment with lighting applications such as promotion of energy conservation by elimination of incandescent lamps and the Minamata Convention aimed at eliminating the use of mercury. It is believed that market for LEDs for lighting will expand further.

In response to these social demands and market needs, Citizen Electronics developed ‘COB Series, Version 1’ in 2011 and has introduced upgrade products into the market thereafter.

The new products have achieved the world’s highest level of luminous efficacy through reselection and improvement of materials such as dies. The high efficacy type has improved color rendering \*2 while retaining luminous efficacy and luminous flux. In addition, while maintaining eleven types of products, Citizen Electronics has increased the lineup from 66 models to 88 models by expanding color variations, and has improved its ability to respond to ever-changing customer needs.

◆**Main features**

**1. Luminous efficacy has been improved by about 14 % over that of the current model and the world’s highest level of luminous efficacy has been achieved**

Luminous flux and luminous efficacy have been improved by about 8 % and 14 % respectively over those of the current model through enhancement of light extraction efficiency and heat dissipation with improvement and optimization of materials. The developed product has achieved the world’s highest level of luminous efficacy in COB-type high-wattage LEDs.

\* Comparison of the two models below made when they light up under the same conditions (5,000K, Ra 80 min., Tc=25°C)

	Luminous flux	Luminous efficacy	Product code
New product:	2,400 lm	145 lm/W	CLU034-1208B8
Current model:	2,215 lm	127 lm/W	CLL032-1208A5
	[about 8 % increase]	[about 14 % increase]	

## 2. Color rendering is improved while high efficacy is retained

Needs for improved color rendering have increased in recent years in applications where efficacy was conventionally prioritized such as for outdoor lighting. If color rendering increases, luminous flux and luminous efficacy decrease. However, the newly developed product's color rendering has improved from Ra 65 typ. to Ra 70 min. while retaining luminous flux and luminous efficacy. In addition, the products can ensure quality of light and meet ever-changing needs for outdoor lighting by expanding color variations—3,000K and 4,000K.

## 3. Efficiency of luminaire design has been promoted

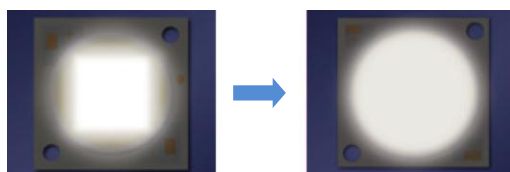
For conventional light sources, in order to provide a range of luminous flux from one produced by a 10W-class incandescent bulb to one produced by a 400W-class mercury lamp, several hundred different types of light sources are required. However, the new lineup consisting of only four packages and eleven types can cover luminous flux of 30 lm to 22,473 lm (0.2 W to 165 W classes). Therefore, it is possible to promote efficiency of luminaire design, including standardizing the optical design of the peripheral part of LEDs.

## 4. UL standard (UL 8750) certification has been obtained

Certification of compliance with a UL standard (UL 8750), a North American safety standard, has been obtained. Citizen Electronics contributes to the simplification of obtaining UL certification for luminaires by providing UL-listed LED packages.

## 5. High-heat dissipation structure and uniform light

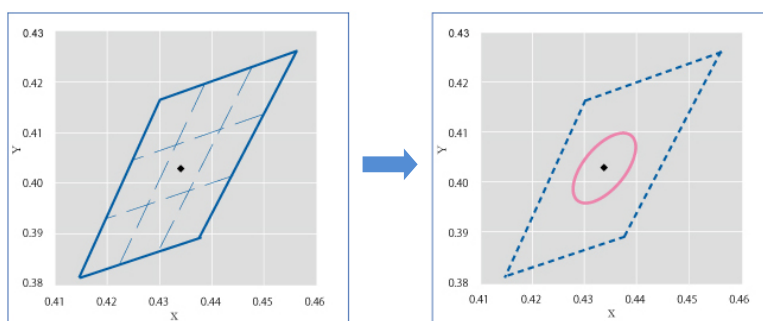
- Citizen Electronics has adopted the Chip on Aluminum technique (patented by Citizen Electronics), which is a high-heat dissipation technique where LED dies are directly mounted on an aluminum board.
- LED dies are placed to generate uniform light in the light emitting area considering optimization of the light distribution design of luminaires.



Non-uniform-light-emitting area

Uniform-light-emitting area

- 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 in LEDs are rarely noticed (excluding the Ra 70 min. type).



Chromaticity range of ANSI C78.377


Chromaticity range of 3-Step MacAdam ellipse

**6. Selection of LEDs is simplified through use of a selector tool**

In order to support luminaire makers to select the desired LED, Citizen Electronics provides a product selector tool (software tool) on its website. By entering desired conditions such as the amount of luminous flux, it is possible to narrow down the selection of appropriate types of LEDs.

**◆Main specifications**

(5,000K, Ra 70 min., Tc=25°C)

Series	CLU024 Series	CLU034 Series	CLU044 Series	CLU054 Series
Product name	CLU024-1201 CLU024-1202 CLU024-1203 CLU024-1204	CLU034-1205 CLU034-1206 CLU034-1208	CLU044-1212 CLU044-1812 CLU044-1818	CLU054-1825
Size (mm)	13.5 × 13.5 × 1.4	19.0 × 19.0 × 1.4	28.0 × 28.0 × 1.4	38.0 × 38.0 × 1.4
Power (W)	0.2–27.6	0.8–55.2	1.9–118.1	6.0–165.1
Total luminous flux (lm)	30–3,332	148–6,709	354–15,664	1,078–22,473
Color temperature (K)	Ra 70 min. (ANSI C78.377): 3,000K, 4,000K and 5,000K Ra 80 min. (3-Step MacAdam ellipse): 2,700K, 3,000K, 3,500K, 4,000K and 5,000K			
Applications				

- \*1 COB: stands for Chip on Board and is a structure where LED dies are directly mounted on a board.
- \*2 Color rendering: If quality of a light source changes, an object may appear to be a different color. Thus, ‘color rendering’ is the effect of quality of a light source on the color appearance of objects. Color rendering is generally indicated in a general color rendering index (Ra) and it is said that the nearer to 100 Ra is, the closer to natural light the color of light looks and the better it is.
- \*3 ANSI C78.377: a chromaticity control standard provided by the American National Standards Institute (ANSI)



”CITILED The Light Engine” is a brand name of LEDs for lighting manufactured by CITIZEN ELECTRONICS CO., Japan.  
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