

Development of “Upward-lighting Multicolor LEDs”: small, high brightness LED packages that have an improved color mixing property

Enabling the use of a wide variety of expressions related to products

Citizen Electronics Co., Ltd (Head Office: Fujiyoshida City, Yamanashi Prefecture. President: Sekiguchi Kanetaka) has developed upward-lighting multicolor LEDs in the “CL-V501 Series,” that have realized a better color mixing property as well as being small and high in brightness. Shipment of samples is expected to start from October 2021, and shipment of mass production is expected to start from January 2022.

Upward-lighting multicolor LED

Product name: CL-V501 Series

Type: Upward

Size: W 1.6mm x L 1.4mm x H 0.55mm

Applications: Illumination and indicators for game devices, keyboards for personal computers, home appliances, hobby goods, displays, ambient lighting for automobiles, colored lighting

Date of sale: Shipment of samples is expected to start from October 2021, and shipment of mass production from January 2022.



Background for development

Multicolor LEDs have three dies of RGB (Red, Green and Blue), which are light's primary colors, in one package. That is why they can generate various colors including white by mixing the colors, and are used for illumination or as indicators in many kinds of devices such as digital devices.

In recent years, applications for illumination in game devices, keyboards for personal computers and amusement devices have

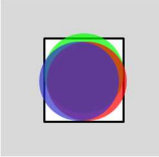
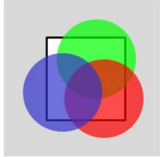


been expanding. The number of devices that contain a lens and light guide to create a complicated lighting expression has increased. With this background, smaller, high-brightness LEDs are required, and good color mixing properties when more than two dies are lighted simultaneously, is an important factor so as not to damage the design and functionality of the device. Through our unique packaging technology based on high-density packaging, we have realized a high color mixing property which conventional packages were unable to achieve. Downsizing and high-brightness are also achieved enabling customers to use a wide variety of expressions they require.



Main characteristics

1. Natural white color realized by high color mixing property

White color generated by lighting RGB dies in conventional multicolor LEDs had poor color mixing property, and it was difficult to use as white color. Thus, in some cases, RGBW LED was used, in which white (W) LED is added to RGB. This solution makes the LED package larger and circuit design of the device complicated and was expensive. However, by developing the composition of raw materials and adopting a new manufacturing method, we have succeeded in controlling directivity in the device itself. The natural white color is realized with this high color mixing property. As the light source does not generate color breakup, design is improved as well to meet various applications. Even in cases where a lens and light guide plate are used, it is easier for customers to create designs because the light source itself has color mixing.

New product (CL-V501)	Conventional product (CL-341)
Image of color mixing	
	
Real picture taken through a lens	
	
<p>No color breakup is generated when RGB dies are lighted simultaneously. Natural white color can be emitted.</p>	<p>Color breakup is generated when RGB dies are lighted simultaneously. Color mixing property is too low to use as white color.</p>

2. Both high-brightness and small size are realized, and luminous efficacy per unit area is doubled

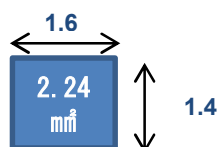
We have further developed our high-density packaging technology to achieve a small package with good color mixing properties. Compared with our conventional product, area of the product is reduced by 30%, and luminous area is reduced by 50%. This downsizing contributes to space-saving of the mounting area of the device, and the doubling in luminous efficacy per unit area can reduce energy consumption.

1 New product CL-V501 W 1.6mm x L 1.4mm = Mounting area is 2.24mm²

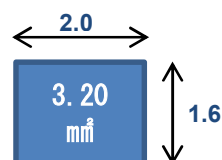
(Luminous area is 1.34mm²)

2 Conventional model CL-341 W 2.0mm x L 1.6mm = Mounting area 3.20mm²

(Luminous area is 2.62mm²)



1 New product (CL-V501)



2 Conventional model (CL-341)

Citizen Electronics Co., Ltd. developed and manufactured SMD-type (surface mounting type) LEDs for the first time in the world in 1983. Since then, we have been contributing to the development of LEDs through technology that was created during our long history of manufacturing products of high quality. We will keep developing fresh, surprising products to meet market needs.



“C I T I L E D” is a registered trademark of CITIZEN WATCH CO., LTD.

*Information provided on this news release was accurate at the time of announcement. Design of the product, date sale, specifications, etc. may change.

Contact Information:

North America -----	Marty Sugikawa	+1-847-619-6700
Europe -----	Andre Schmitz	+49-69-2992-4812
South China & Hong Kong -----	Clinton Lo	+852-2793-0613
East China -----	Lian Chang Jun	+86-21-6295-5510
South East Asia / India -----	Clinton Lo	+852-2793-0613
Other areas -----	kawaika@citizen.co.jp	