

Improves visibility for people with color vision deficiency

ROHM recently announced the 1608-size high accuracy blue-green chip LEDs, [SMLD12E2N1W](#) and [SMLD12E3N1W](#). These products support the adoption of Color Universal Design (CUD) in a variety of applications, such as fire alarm system indicator lights, industrial equipment warning lamps and public transportation information displays.

Color is considered to be one of the most important means of communication and as such is used in a variety of ways – daily. However, approximately over 200 million people with P-type and D-type color deficiencies around the world find it difficult to distinguish between red and green, possibly resulting in information being inaccurately conveyed – depending on the combination of colors used. Furthermore, since color vision can vary from person to person, it is difficult to perceive how different people see certain colors, which can be very inconvenient and also problematic as other people may not notice this deficiency.

As a result, there is a growing need in the society to implement Color Universal Design that takes into account the various types of color vision in order to deliver information accurately to as many people as possible. ROHM succeeded in developing blue-green chip LEDs with special wavelengths. These products are ideal for implementing Color Universal Design in a wide range of devices, utilizing a vertically integrated production system from the element fabrication stage and leveraging ROHM's strength thorough quality control.

The SMLD12E2N1W and SMLD12E3N1W are the first\* 1608 size LEDs to be certified by the Japanese NPO (Non-Profit Organization), Color Universal Design Organization (hereafter referred to as CUDO) – making it possible to achieve color schemes and designs that can be easily discernible by everyone, including those who cannot distinguish differences in color.



\*Based on ROHM's investigation as of June, 2020.

In addition, adopting a new resin allows ROHM to significantly extend the LED lifetime while reducing the degradation of light intensity compared to conventional epoxy resins and improving the mold strength compared to the silicone resins while providing superior reliability. ROHM also offers AEC-Q102 qualified products that ensure worry-free use in automotive systems and industrial equipment demanding extreme reliability.

ROHM will continue to strengthen its lineup by developing high reliability LEDs that deliver greater convenience and safety.

## CUD Application Examples

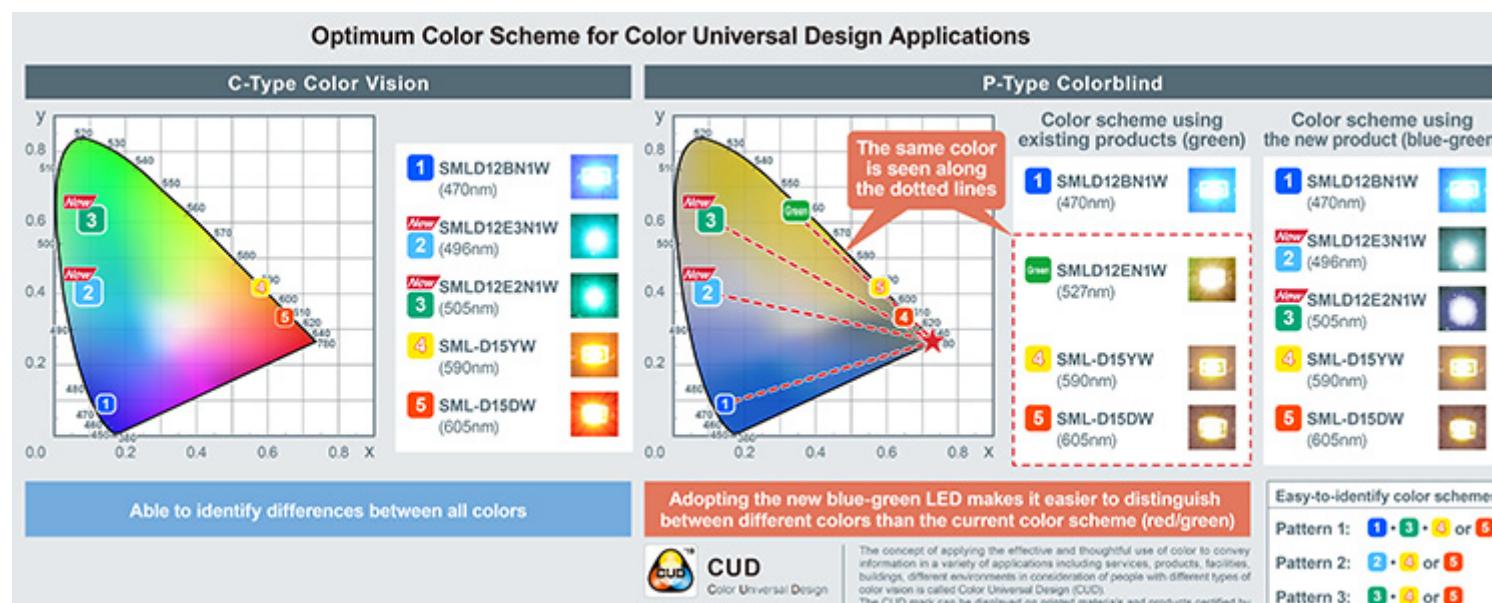
Example 1: Panel indicator lights for fire alarm systems		Example 2: Occupancy (empty/full) indicator lamps in a parking garage	
<i>Easier to understand than the current color scheme (red)</i>		<i>Easier to understand than the current color scheme (red/green)</i>	

## Key Features

### ROHM's special wavelength blue-green LEDs – ideal for color universal design applications

While there are a variety of devices that transmit information using red and green colors, adopting blue-green and orange or yellow will make it easier for people with P-type or D-type color deficiency and difficulty to distinguish red and green colors. As such, the color scheme is important for conveying information using LEDs.

Now, by acquiring Color Universal Design certification for ROHM's SMLD12E2N1W and SMLD12E3N1W blue-green LEDs, it is possible for people with various types of color vision and sensitivities to accurately identify color patterns that include the use of ROHM's blue LED (SMLD12BN1WT86,  $\lambda D$ : 470nm) and warm color LEDs (SML-D15YW,  $\lambda D$ : 590nm; SML-D15DW,  $\lambda D$ : 605nm) – making them ideal for Color Universal Design applications.



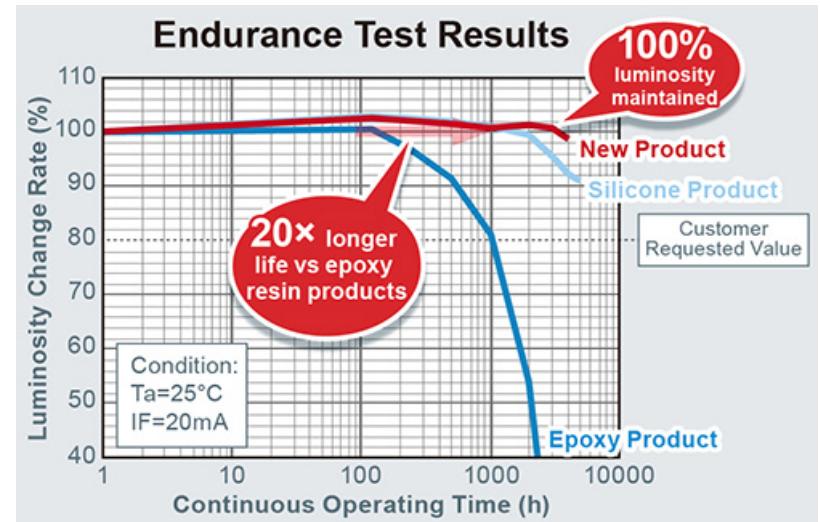
## Advantages of the SMLD12 Series

### Adopts a new resin while ensuring high reliability

The SMLD12 series (SMLD12E2N1W and SMLD12E3N1W) utilizes a new resin that improves on the following issues when using conventional epoxy and silicone resins, allowing worry-free use in devices requiring high reliability.

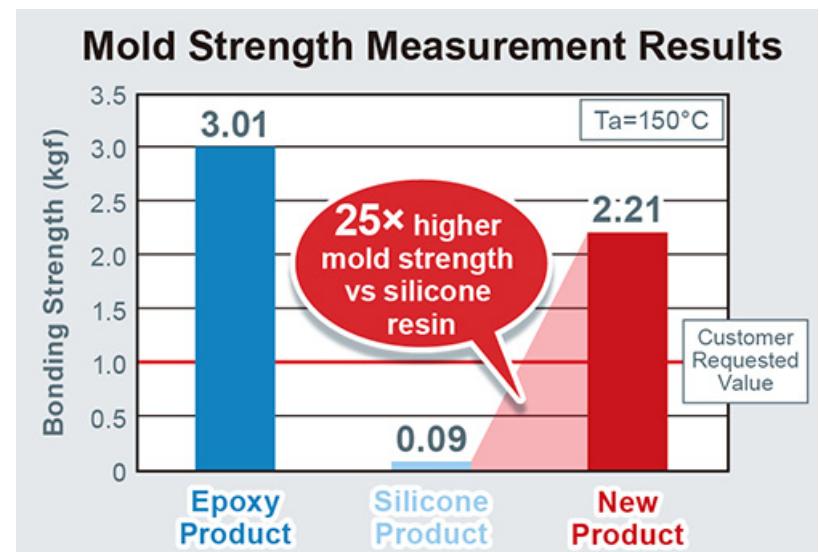
#### 1) 20x longer life vs. epoxy resin

Luminous intensity is maintained even during endurance testing (25°C, IF=20mA, 1,000hrs), resulting in approx. 20x longer life at the same residual light intensity level vs epoxy resin products.



## 2) 25x higher mold strength compared to silicone resin

Adopting a new resin material which affects mountability improves mold strength by 25x compared to silicone resin products even at high temperatures (Ta=150°C). This minimizes defects during mounting, achieving superior mountability.



## Lineup

Part No.	Emitting Color	Dominant (Emission) Wavelength $\lambda_D$ [nm]	Brightness IV [mcd]	Forward Voltage VF [V]	Forward Current IF [mA]	AEC-Q102	Package [mm]
SMLD12BN1W	Blue	470	40				
SMLD12E3N1W NEW	Cyan	496	85	2.9	5		
SMLD12E2N1W NEW	Blue Green	505	120			✓*(C) added to P/N	1.6x0.8 (t=0.55)
SML-D15YW	Yellow	590		2.1			
SML-D15DW	Orange	605		224	20		
					2.0		

## Color Universal Design Application Examples

- Operating panel indicator lights for fire alarm systems, etc.
- Safety warning lamps in industrial equipment
- Information boards for public transportation facilities
- Parking lot occupancy (empty/full) indicator lamps
- Battery charge status indicators
- Display panels for hospital equipment (i.e. nurse calls) and more...

**Availability:** Now

**Pricing:** Starting from \$0.26/unit (1,000pcs)

## Terminology

### Color Universal Design

A design system developed in consideration of people with various types of color vision – allowing information to be accurately conveyed to as many individuals as possible

### Color Universal Design Organization

Can be abbreviated to CUDO – an NPO established with the aim of creating a ‘color barrier-free society’ by improving the color environment to ensure easy identification even by people with various types of color vision.

### P-Type / D-Type Colorblind

CUDO classifies the differences in color vision into the following 5 types.

Designation	Description
C-Type (Common)	A person with normal color vision who has all three types of photoreceptor cone cells: red, green, and blue
P-Type (Protanopia)	Strong: No or non-functioning cone cells for detecting red light Weak: Red cone cells with spectral sensitivity shifted towards green cone cells
D-Type (Deutanopia)	Strong: No or non-functioning cone cells for detecting green light Weak: Green cone cells with spectral sensitivity shifted towards red cone cells
T-Type (Tritanopia)	No cone cells for primarily detecting blue light; functionally weak

Designation	Description
A-Type (Achromatopia)	Only has one type of cone cell, no cone cells at all, or all cells are weak

## Latest News

**2021-04-15**

32bit D/A Converter IC for Hi-Fi Audio Equipment

**2021-04-07**

ROHM Semiconductor Europe appoints Wolfram Harnack as new President

**2021-03-18**

ROHM and Sanden Huayu Hold an Opening Ceremony Announcing the Establishment of a Joint Technology Laboratory

**2021-03-15**

"ROHM was Selected as a White 500 Company 2021 Four Years in a Row" Certifying Outstanding Health and Productivity Management ...

**2021-03-11**

ROHM acquired the "Association for Business Innovation in harmony with Nature and Community Certification" sponsored by the G ...

**2021-03-10**

RHOM was recognized as "Sports Yell Company 2021" by Japan Sports Agency for the first time.

**2021-03-03**

Enactment of the ROHM Group Tax Policy

**2021-03-01**

Social Conducted an online class to Ritsumeikan High School

**2021-02-24**

ROHM's Wi-SUN FAN Module Solution: Empowering the infrastructure of smart cities

**2021-02-17**

Ultra-Low IQ PMIC from ROHM Selected to Power NXP iMX8M Nano for High Performance Embedded Artists Industrial Control Board

**2021-02-10**

New 5th Gen P-channel MOSFETs Deliver Class-Leading Low ON Resistance

**2021-02-05**

ROHM has been selected as an "Excellent Business Operator" for emission reduction of greenhouse gas by Kyoto City.

**2021-02-05**

We carried out a food drive at Kyoto headquarter and Yokohama office!

**2021-02-03**

ROHM SiC MOSFETs Solve Design Challenges for Leading Solar Energy Company Midnite Solar

**2021-02-01**

Posted 3rd quarter financial results and related documents for fiscal year ending March 31, 2021

**2021-01-28**

ROHM expands its miniature PICOLED™ lineup: Power-Saving Infrared LED for VR/MR/AR Applications

**2021-01-19**

ROHM Awarded Gold Class in "Sustainability Site Award 2021"

**2021-01-18**

ROHM Completes Construction of a New Environmentally Friendly Building at its Apollo Chikugo to Expand Production Capacity o ...

**2021-01-14**

New faster 125°C operation compatible EEPROMs extend service life

**2020-12-21**

ROHM Awarded Gold Rating of Sustainability 2020 by EcoVadis