ROHM SEMICONDUCTOR

Electronics for the Future

Low current LED series

0603 size CSL1901 series (2mA)
0402 size SML-P11 series (1mA)
0603 size SMLD12 series (5mA)
0402 size SMLP14 series (5mA)
0603 size SML-D22 Series (5mA)

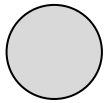
2022
Module Business Unit
LED Division
Rev.3

No. 65AN102E Rev.003
2022.12

Features of ROHM LEDs

ROHM is one of the few LED suppliers that manufactures their own dies

Integrated production

Epi	Die	Assembly	Finished Product
			

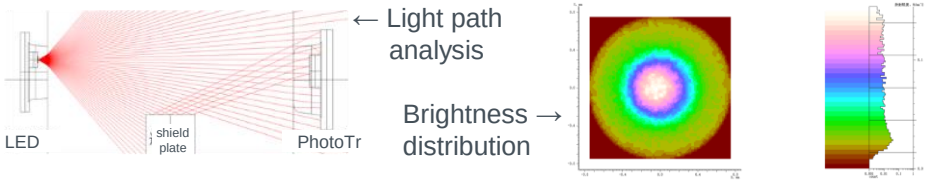
- Quality Management
- Production Control
- Development System

Some products are manufactured by separate processes.

Capable of responding to detailed requests for color and brightness

Color	IR	IR	V	U	U2	D	Y	W	M	P	E	E2	B	WB
Dominant wavelength (nm)	940	850	630	620	615	605	590	580	572	560	525	505	470	White
Chip Type	AlGaAs System		AlGaInP System								InGaN System			

Optical simulation and other support tools are provided for customer development



← Light path analysis

Brightness → distribution

A wide range of services available from a comprehensive semiconductor manufacturer

“Kyo-no-Hikari-Koyomi”

ROHM has been lighting up the Kyoto Station building since 2010. Created using original LED technology in collaboration with Mikiko Ishii’s design, ‘Kyo no Hikari Koyomi’ expresses Kyoto’s delicate seasonal atmosphere and traditional events through light.

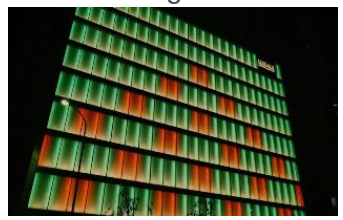
Combining ROHM's full-color LEDs and LED modules with optimizable color temperature in both vertical and horizontal directions ensures gentle, soft lighting similar to that through shoji (paper sliding door), in harmony with the streetscapes of Kyoto.

〈Schedule〉

Delicate Japanese sensibility is expressed by subtly adjusting the color temperature according to the season.

Day

Night



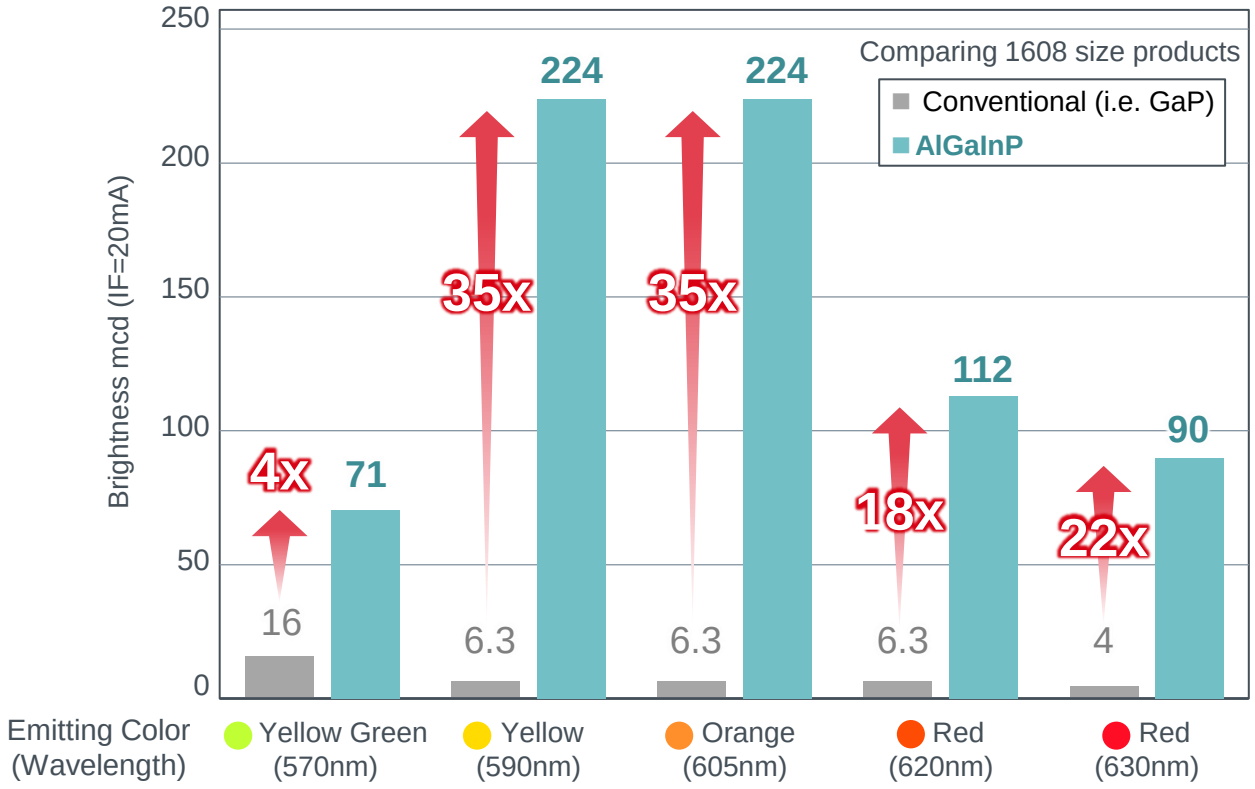
On the 16th of every month, we participate in the "DO YOU KYOTO?" light-down campaign promoted by Kyoto City to turn lights. (Unified Action Light-Down calls for turning off outdoor lights, etc.)

Why low-current LEDs are needed?

Increased luminous intensity of LED devices

In the past 20 years, compared to 2000, LED elements have achieved a significant increase in luminous intensity

Energy Saving High Efficiency Light Emitting AlGaInP-Based Elements



Device brightness has significantly increased over 20 years (compared to 2000)

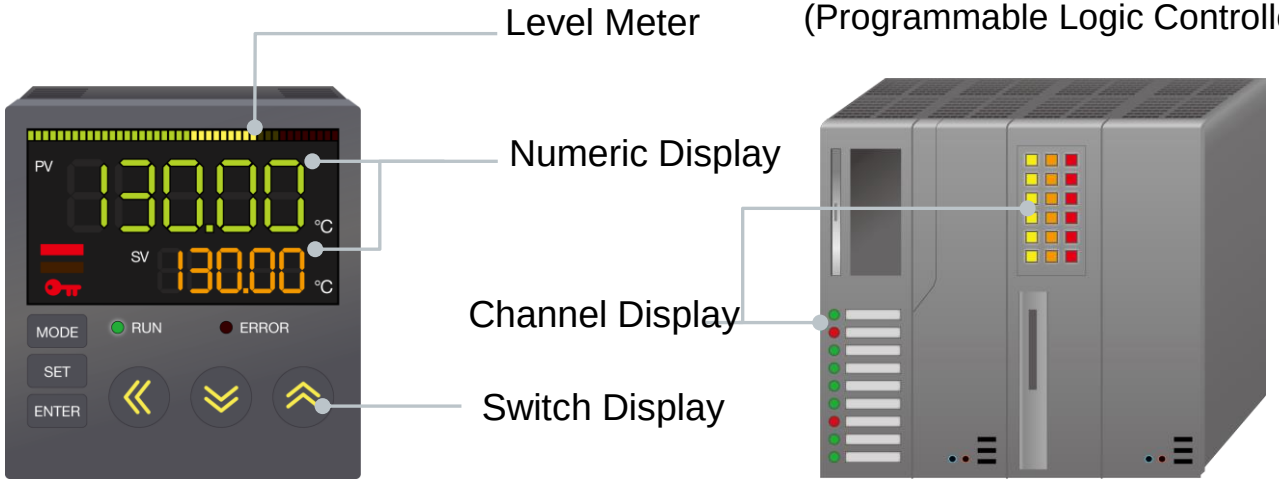
Achieves high brightness for outdoor use

Why low-current LEDs are needed?

Indoor product display area required brightness

Places where a single LED displays one dot should not be too bright.
Conventional brightness is good.

Temperature Regulator



One LED used per dot display

PLC

(Programmable Logic Controller)

Wearables

Need to reduce current for battery-driven applications

Conventional brightness is sufficient for indoor display equipment.

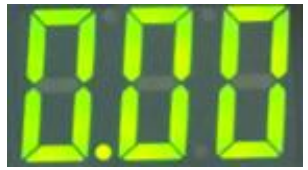
Why low-current LEDs are needed?

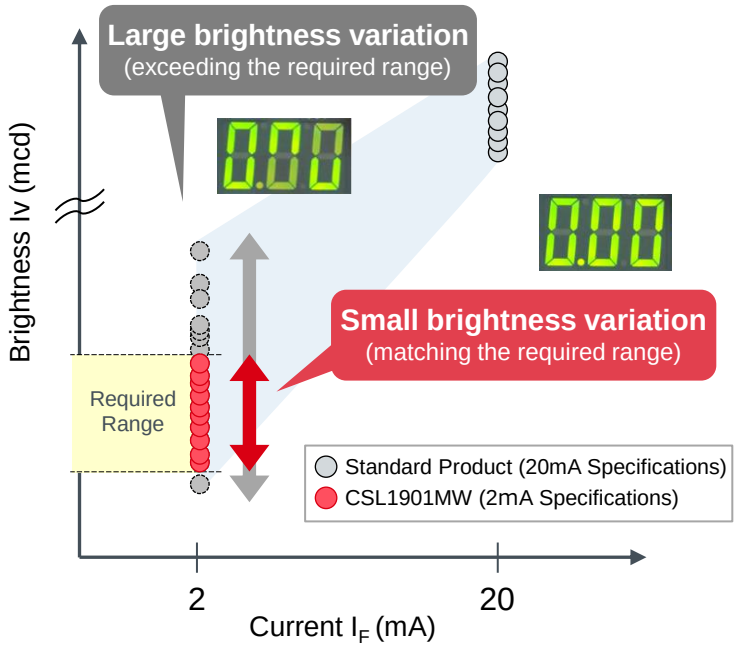
To reduce display brightness

- Developing elements with less variation in the low current region
- Brightness sorting at low currents ensures brightness in the low current range

20mA sorted product used

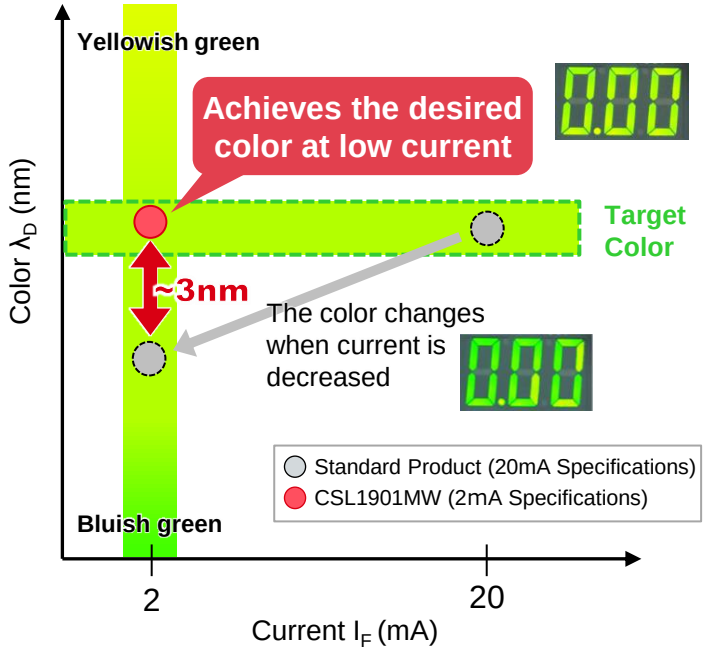
Uses low-current-selected products





2mA (low current) luminous intensity guarantee halves brightness variation

Wavelength change due to current (570nm product)



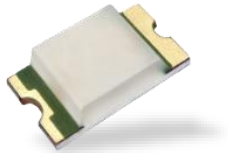
Dominant wavelength 2mA measurement (low current) halves color variation

ROHM Low Current Selective LED Lineup

1608 size

Size : mm

2mA sorting type



CSL1901 series
1.6×0.8×0.55t

V U D Y M

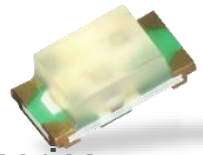
5mA sorting type

SMLD12 series
1.6×0.8×0.55t

E E2 E3 B WB

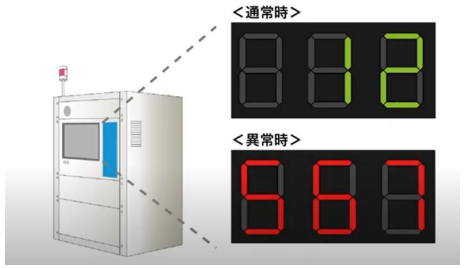
Universal color support

Dual colors 5mA sorting type



SML-D22 series
1.6×0.8×0.55t

V Y U M



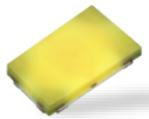
1006 size

0402 inch size 1mA sorting type

SML-P11 series
1.0×0.6×0.2t

V U D Y M

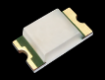
0402 inch size 5mA sorting type



SMLP14 series
1.0×0.6×0.2t

E B WB

CSL1901 series



1.6×0.8×0.55t

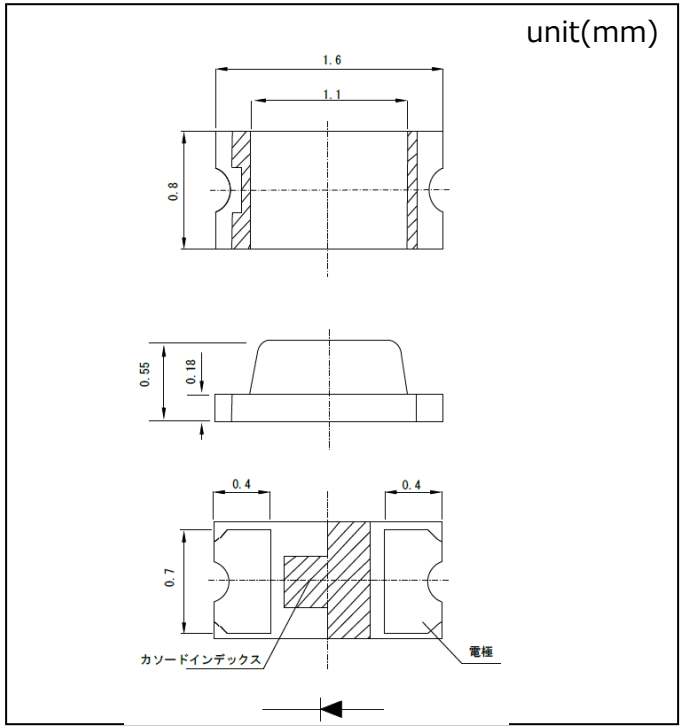
0603 size 2mA sorting LED: CSL1901 series

Product Lineup

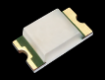
0603 size surface mount type Low current guarantee reduces uneven luminous intensity and chromaticity!

Part No.	Absolute Max. Ratings		Electrical and optical Characteristics(**IF=2mA**)			
	IF [mA] (Ta= 25℃)	Topr [˚C]	VF (typ.) [V]	λD(Typ.) [nm]	Brightness IV (mcd)	
					Min.	Max.
CSL1901VW	20	-40～+85	2.0	630	1.6	6.3
CSL1901UW				620	2.5	10
CSL1901DW				605	6.3	25
CSL1901YW				590		
CSL1901MW				570	1	4

luminous intensity and wavelength guaranteed at low current



CSL1901 series



1.6×0.8×0.55t

0603 size 2mA measurement LED: CSL1901 series

Case Study

PLC equipment

Requests

As an indoor device, 7 segments and indicators are densely placed in a small space area.

7Seg and indicator are placed densely in a small space.

If it is too bright, it is difficult to see the display.

If the current is turned down, unevenness in the brightness of the 7-segment display will occur.

No uneven brightness in 7 segments.

No unevenness in brightness in 7 segments.

Good visibility indoors.

Image for reference only.

Optimal Applications

Various light sources for 7Seg

Various Level Meter Indicators

Vivid display without uneven brightness and chromaticity

SML-P11 series

1.0×0.6×0.2t

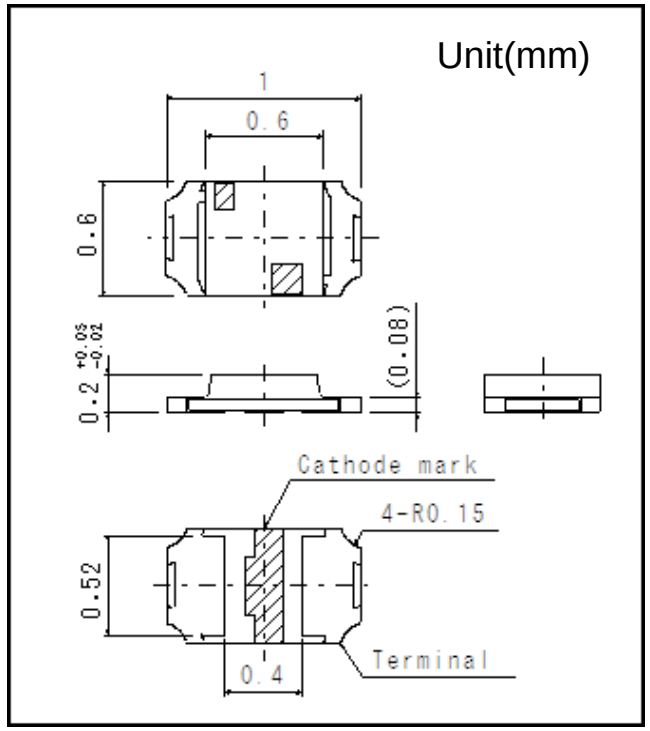
0402 size 1mA sorting LED: SML-P11 series

Product Lineup

Ultra-small and thin package (1.0 x 0.6 mm t=0.2 mm) 1 mA for light intensity sorting

Part No.	Absolute Max. Ratings		Electrical and optical Characteristics (**IF=1mA**)			
	IF [mA] (Ta= 25℃)	Topr [˚C]	VF (typ.) [V]	λD(Typ.) [nm]	Brightness IV (mcd)	
					Min.	Max.
SML-P11VT(R)	20	-40～+85	1.8	626	1.6	6.3
SML-P11UT(R)				621	1	6.3
SML-P11DT(R)				605	6.3	25
SML-P11YT(R)			1.9	586	4	16
SML-P11MT(R)				570	1	4

Guaranteed luminous intensity and wavelength at low current



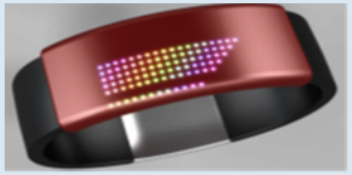
SML-P11 series

1.0×0.6×0.2t

0402 size 1mA measurement LED: SML-P11 series

Adoption Example

Wearable Equipment



Requests

We want to reduce the current consumption of LEDs in battery-powered products.

We want to reduce the variation of brightness because we use multiple LEDs.

Power consumption is saved by using LEDs at 1mA.

No unevenness in brightness even with multiple lights on at the same time

No uneven brightness even with multiple lights on at the same time.

No need to adjust light intensity.

➡ Adopt SML-P11 series

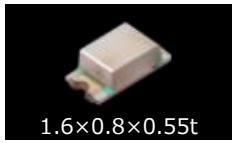
Image for reference only.

Optimal Applications

Wearable equipment Light source

PLC Light Source

Temperature regulator Light source



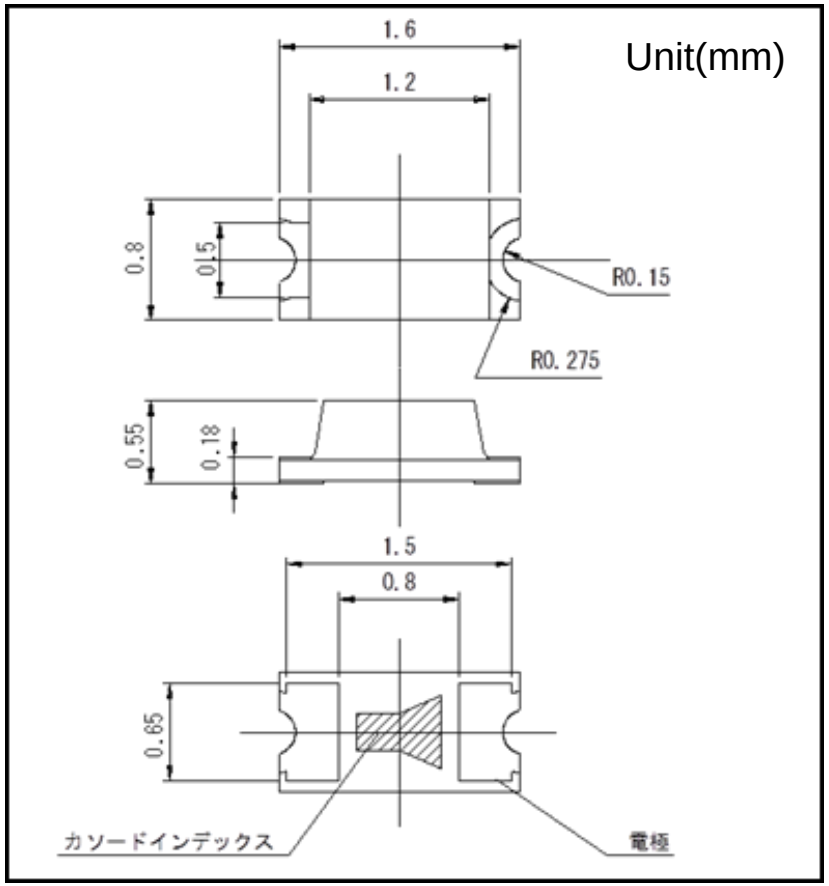
0603 size 5mA sorting LED: SMLD1 series (blue, white)

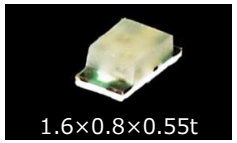
Product Lineup

0603 size surface mount type Low current guarantee reduces uneven luminous intensity and chromaticity!

Part No.	Absolute Max. Ratings		Electrical and optical Characteristics (IF＝5mA)				
	IF [mA] (Ta=25℃)	Topr [℃]	VF(Typ.) [V]	λD (Typ.)[nm]	[X,Y] (Typ.)	IV(mcd) Min.	IV(mcd) Max.
SMLD12EN1W	20	-40～+100	3	527	-	56	220
SMLD12E2N1W			2.9	505	-	56	140
SMLD12E3N1W				496	-		
SMLD12BN1W				470	-	14	56
SMLD12WBN1W				-	(0.295, 0.280)	56	220

Guaranteed luminous intensity and wavelength at low current





0603 size 5mA sorting LED: SMLD22 series (2 colors)

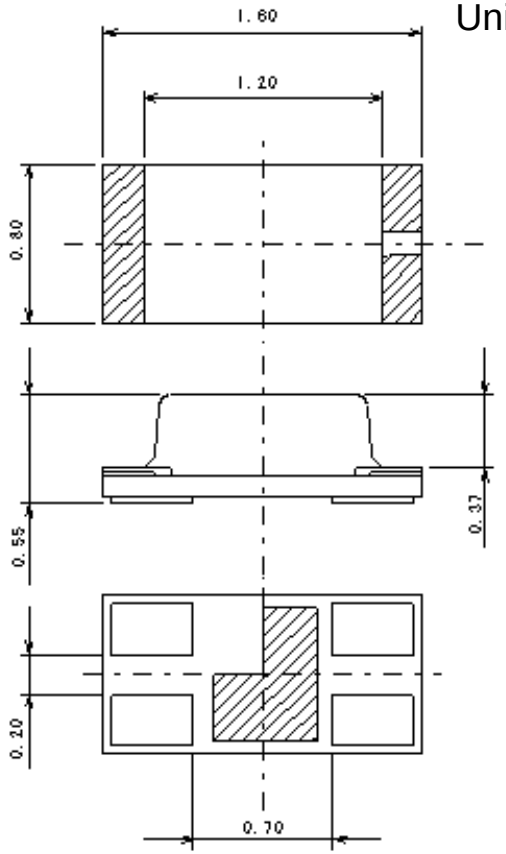
Product Lineup

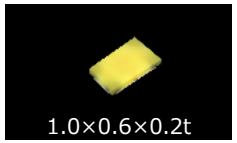
0603 size surface mount type Low current guarantee reduces uneven luminous intensity and chromaticity!

Part No.	Absolute Max. Ratings		Electrical and optical Characteristics (IF＝5mA)			
	IF [mA] (Ta=25℃)	Topr [℃]	VF(Typ.) [V]	λD(Typ.) [nm]	IV(mcd)	
					Min.	Max.
SML-D22MUW	25	-40～+105	2.0	570	6	16
			1.9	620	10	25
SML-D22YVW			2.0	488	16	40
			1.9	429	16	25

Guaranteed luminous intensity and wavelength at low current

Unit(mm)





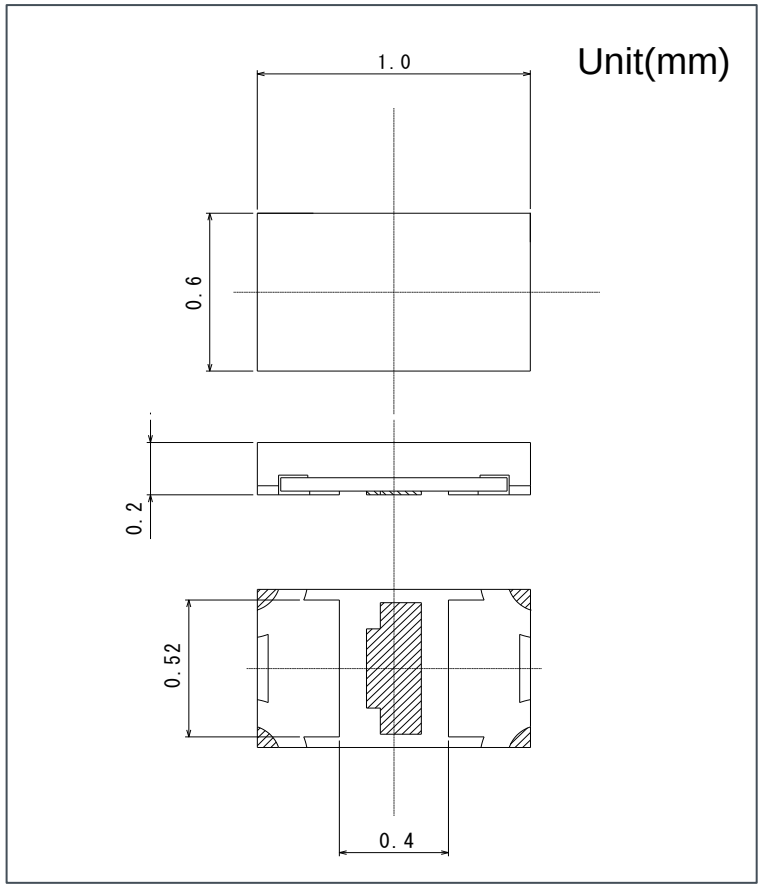
0402 size 5mA sorting LED: SMLP14 series (blue, white)

Product Lineup

Ultra-small and thin package (1.0 x 0.6 mm t=0.2 mm) 5 mA for light intensity sorting

Part No.	Absolute Max. Ratings		Electrical and optical Characteristics (**IF＝5mA**)				
	IF [mA] (Ta=25℃)	Topr [℃]	VF(Typ.) [V]	λD(Typ.) [nm]	[X,Y] (Typ.)	IV(mcd) Min.	IV(mcd) Max.
SMLP14ECNW	10	-40～+85	3	527	-	56	360
SMLP14BCNW			2.9	470	-	14	90
SMLP14WBCN1W				-	(0.30,0.30)	56	220

Guaranteed luminous intensity and wavelength at low current



5mA sorting LED SMLD12, SMLP14, SML-D22 series

Adoption examples

Electronic Cigarettes

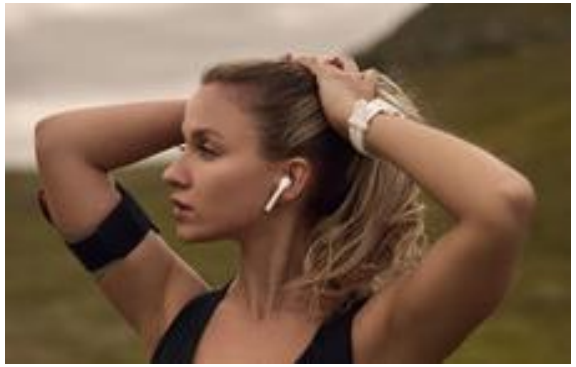
Image is for reference only.

[Request]
To be small in size and low in consumption
Low current products are needed, but
but also need luminous intensity

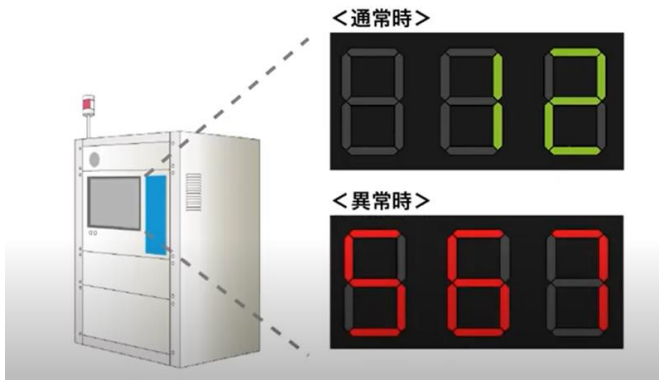
Compact white color
SMLP12WBNCW adopted

Optimal Applications

Wearable device light source



Light source for display devices for industrial equipment



Package Lineup

PICOLED™ is a trademark or a registered trademark of ROHM Co.,Ltd.

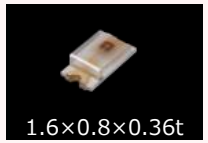
★:Reverse mount available

Unit(mm)

Top view

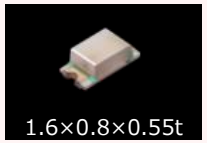
1608size

SML-E1/EN series



V U D Y M P
E B WB

SML-D1 series



V U D Y3 Y W M
F P E E2 E3 B WB

CSL19 series New

V U D Y M

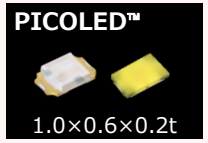
CSL09 series

V U D Y W M P
E B

CSL11 series New

WB

SML-P1/P14 series



V U U2 D Y3 Y W
Y2 M2 M F P E B
WB IR

SML-H1 series

V U D Y M P
TB

SML-M1/MN series

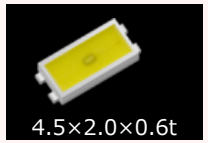
V U D Y M P
E B WB IR

SML-Z1/ZN series

V U D Y M F P
E B WB

High Power(White)

SMLK1＊series

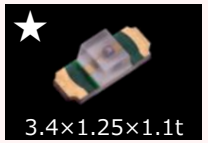


WB

SML-S1 series

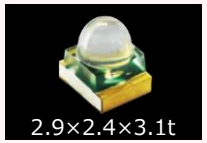
V U D Y M P
E B IR

SML-81 series



V U D W M
B WB TB

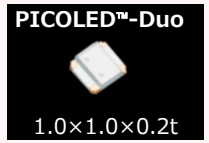
CSL07 series



U D

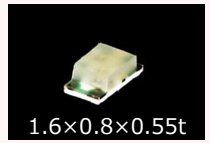
Multi color

SML-P24 series



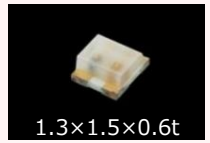
M U

SML-D22 series



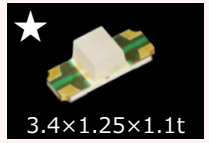
M U V Y

SML-52 series



B U M U M D M Y

SML-82 series

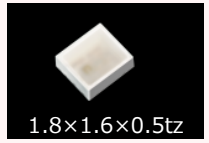


M V

SMLP34RGB

SMLP36RGB

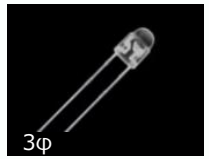
MSL0402RGB



SMLVN6RGB

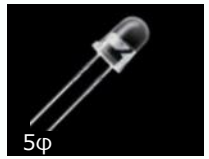
Lamp

SLI-343 series



V U D Y M P
E B WB

SLI-560 series



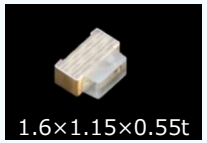
U D Y M E B
WB

Side view

CSL04 series

WB

SML-A1 series



V U D Y W M P
E B WB

CSL15 series New

IR

MSL07 series

M U B Y

MSL0601RGB

MSL0104RGB

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representativeand verify the latest specifica-tions :

3) Although ROHM is continuously working to improve product reliability and quality, semicon-ductors can break down and malfunction due to various factors.Therefore,
in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures.
ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products
The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products.
ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties.
ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products specified in this document are not designed to be radiation tolerant.

7) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative :
transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

8) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

9) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

10) ROHM has used reasonable care to ensurH the accuracy of the information contained in this document.
However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

11) Please use the Products in accordance with any applicable environmental laws and regulations, such as the RoHS Directive.
For more details, including RoHS compatibility, please contact a ROHM sales office.
ROHM shall have no responsibility for any damages or losses resulting non-compliance with any applicable laws or regulations.

12) When providing our Products and technologies contained in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, including without limitation the US Export Administration Regulations and the Foreign Exchange and Foreign Trade Act.

13) This document, in part or in whole, may not be reprinted or reproduced without prior consent of ROHM.

Electronics for the Future

ROHM Co.,Ltd.