ROHM SEMICONDUCTOR

Electronics for the Future

Introduction of Industry Standard 0603 Size LED
～ Single COLOR ～

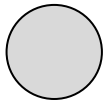
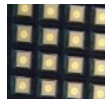
2023
Module Business Unit
LED Division
Rev.5

No. 65AN024E Rev.005
2023.2

Features of ROHM LEDs

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

Integrated production

Epi	Die	Assembly	Finished Product
			

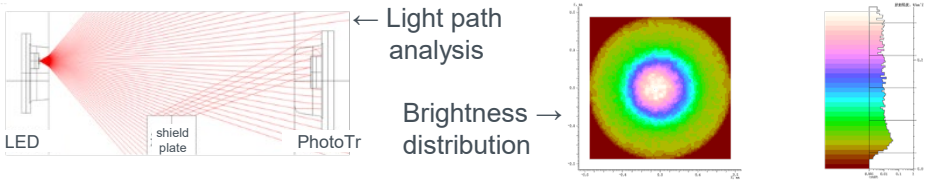
- Quality Management
- Production Control
- Development System

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.

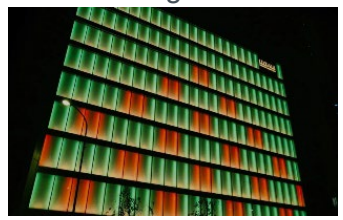
Combining ROHM's full-color LEDs and LED modules with optimizable color temperature in both vertical and horizontal directions ensures gentle, soft lighting similar to that through shoji (paper sliding door), in harmony with the streetscapes of Kyoto.

〈Schedule〉

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

Day

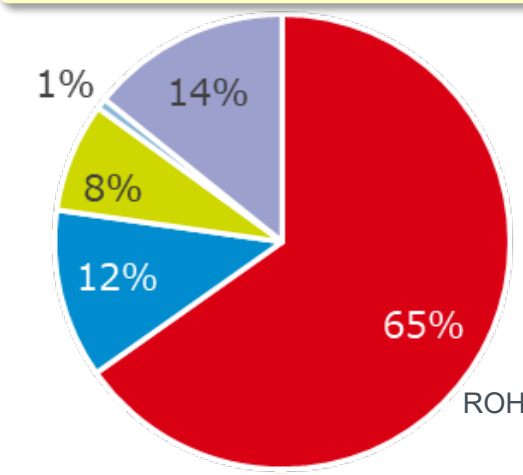
Night



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.)

ROHM 0603 Size LED

Overwhelming production volume



- Industry standard size
- Stable supply
- Wide range of products
- Automotive grade available

0603 size is an all-rounder

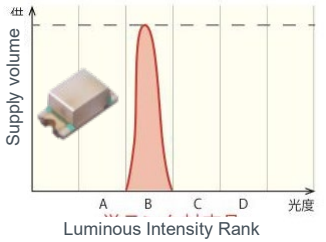
Items/Size	PLCC	0805	0603	0402
Mounting area	Fair	Fair	Good	Excellent
Brightness	Excellent	Good	Excellent	Fair
Heat radiation	Excellent	Good	Good	Fair
Handling *	Good	Good	Good	Fair

*Easy handling of LEDs, such as hand soldering during prototyping

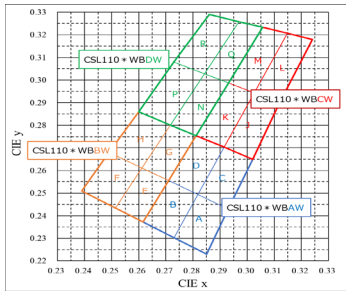
ROHM can help you find the 0603 size LED you need

I'm going to be lined a lot of them, so I want to minimize the variation...

[Standard type]
Single rank
SML-D15 Series

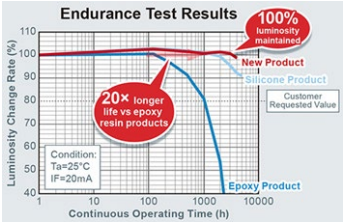


[Reflector type]
White narrow rank
CSL11 series



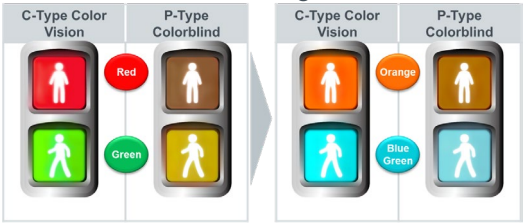
I want to reduce the light intensity drop...

[Standard type]
Long Life
SMLD1 Series



The color is easy for everyone to see...

[Standard type]
SML-D1 Series ■ Orange / SMLD1 Series ■ Blue-Green
● Color Universal Design



Easier to recognize than the color scheme in the current product (red and green)

I want to reduce the size of the product while keeping the LEDs bright...

● **87% reduction** in mounting area

● Equivalent luminous intensity in a small space

3.5mm×2.8mm
Conventional

1.6mm×0.8mm

[Lens type]
CSL09 Series

[Reflector type]
CSL11 Series

- Please see the next page for details -

Lineup of ROHM 0603 Sizes

Size：mm

Standard type
Basic form of the 0603 inch series, Start here

SML-D12＊8 series
1.6×0.8×0.55t
V U D Y W M P

Details on page 4

Brightness rank reduction type

SML-D12＊1 series
1.6×0.8×0.55t
V U D Y W M

Details on page 4

High brightness standard type

SML-D13(A) series
1.6×0.8×0.55t
V U D Y W M

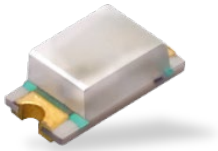
Details on page 4

High brightness Single rank type
Variation reduction

SML-D15 series
1.6×0.8×0.55t
V U U2 D Y M

Details on page 4

Long life type



SMLD12 series
1.6×0.8×0.55t
E E2 E3 B WB

Details on page 5

Lens type
Replacement of PLCC and LED lamps

CSL09 series
1.6×0.8×1.24t
V U D Y W M P E B

Details on page 6

Reflector type
White LED with high luminous intensity/ reduced color variation

CSL11 series
1.6×0.8×0.55t
WB

Details on page 7

Red to Green 2mA sorting type

CSL1901 series
1.6×0.8×0.55t
V U D Y W M

Details on page 8






Standard Type ①: SML-D1 Series

Wide lineup

Series		Brightness (mcd) [typ.]			
		SML-D12*8W	SML-D12*1W	SML-D13(A)	SML-D15
AEC Q101		YES	-	YES	YES
Color	Wavelength (nm)	Standard type	**Rank reduction type**	High brightness type	High brightness and Single rank type
V	630	40	40	55	90
U	620	63	63	85	112
U2	615	-	-	-	140
D	605	100	100	120	224
Y	590	63	100	-	224
W	587	-	-	110	-
M	572	25	30	45	71
P	560	6	-	-	-

High brightness and Single rank type: D15 Series

・Merit of High brightness type

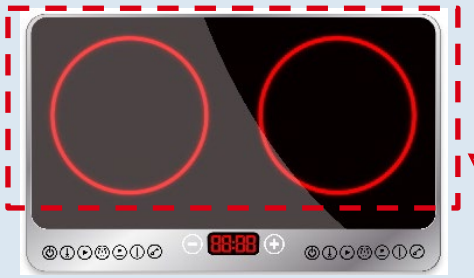
① Eliminates light intensity variations within and between products → **Improved performance of application**

② No need to evaluate current control for each rank → **Reduction of design man-hours**

③ No need to consider rank designation → **No need for brightness adjustment and stable supply**

Case study

IH cooking heater



When heating the glass top plate Red color is displayed in a ring shape

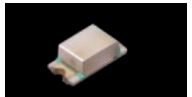
[Request]

They want to display a high-brightness ring-shaped display on the glass top panel during cooking without uneven brightness.

- High brightness display is possible even through a glass top plate.
- No unevenness in color even if dozens of units are used per unit.
- No need to adjust light intensity.

⇨Adopted by SML-D15U2W.

*The image is for reference



Standard Type ②: SMLD1 Series

Color lineup

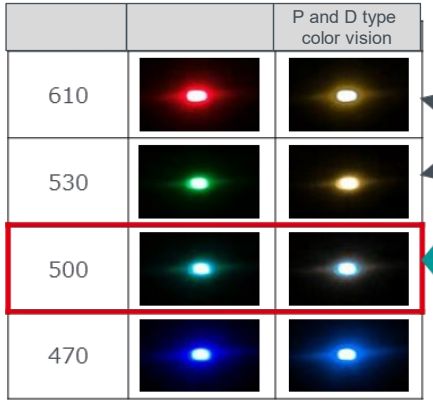
Series		Brightness (mcd) [typ.]
		SMLD12＊
AEC Q101		YES
Color	Wavelength (nm)/ Chromaticity (x,y)	**Long life**
E	527	140
E2 ※1	505	120
E3 ※1	496	85
B	470	40
WB	(0.295,0.280)	120

NEW COLOR

Unusual color for a single color

*1) Emission wavelength (around 500nm) is compatible with color universal design.

Color Universal

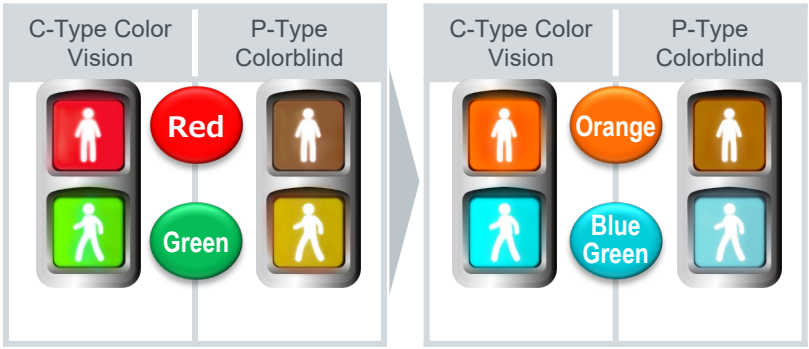


Both red and green appear to be yellowish.

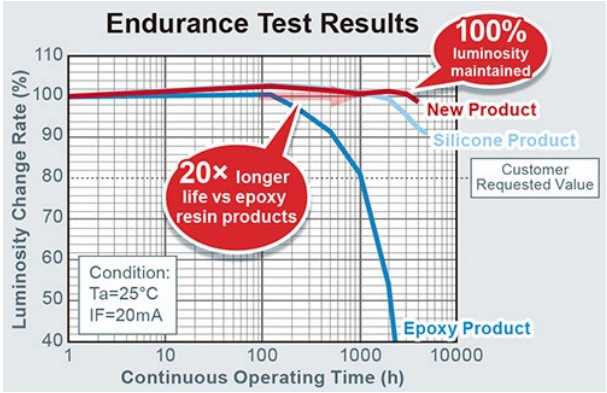
This is a green color that is easily recognized by people with P and D type color vision.

Appearance Examples

Allows for more recognizable color schemes



Long life



- Long life design that prevents darkening even when the power is on for a long time

Overcoming the weakness of molded LEDs that reduce luminous intensity with blue light

High mountability

Material	Long life (Improvement of degradation)	Mounting (Enhanced mold strength)
New material	12 Good	mold shock substrate Good
Epoxy	12 Bad	Good
Silicone	12 Good	Bad

- Successfully enhanced mold strength for better mountability

Case Study

Power supply

[Request]

10 years for industrial equipment

They want long-life products that are white.

- White with Long life

  Adopted by **SMLD12WBN**

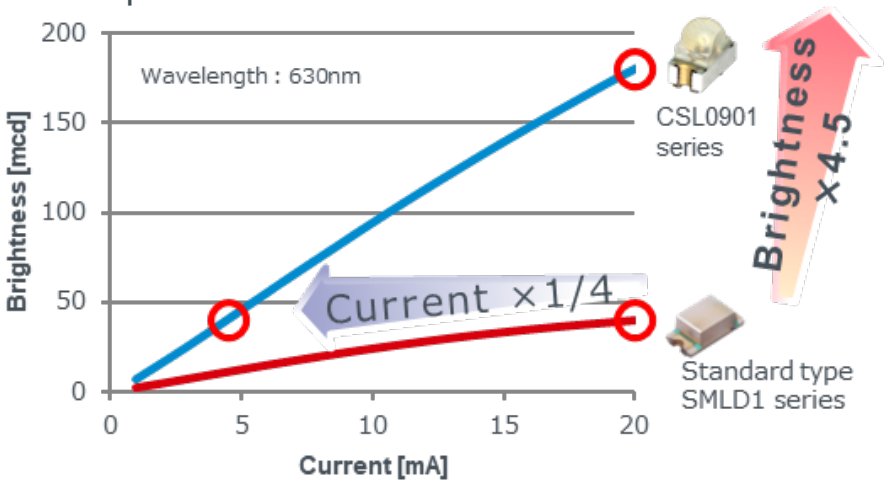
*The image is for reference

Lens Type: CSL09 Series

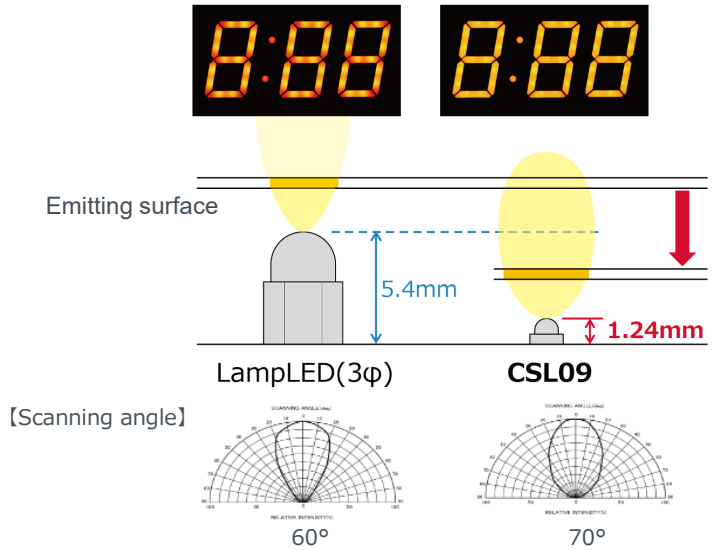
Selectable from low to high brightness

Series		Brightness (mcd) [typ.]		
		CSL0901*	CSL0902*	CSL0903*
AEC Q101		YES		
Color	Wavelength (nm)	Low brightness	Middle brightness	High brightness
V	630	180	250	800
U	620	280	400	1200
D	605	380	500	1500
Y	590	320	520	800
M	571	100	150	–
E	527	360	1,100	–
B	470	56	360	–

● Power saving by increasing brightness compared to standard products



Lens type, but not prone to unevenness of light, can be proposed as a replacement for LED lamps.



Shorter distance to irradiation surface

Space saving
Reduces uneven brightness with lens

Case study

Power tool

Adopted for operation display unit

「Request]

1) Downsizing of the set

2) For outdoor use, a small LED with high luminous intensity is desired so that the blue display can be easily seen.

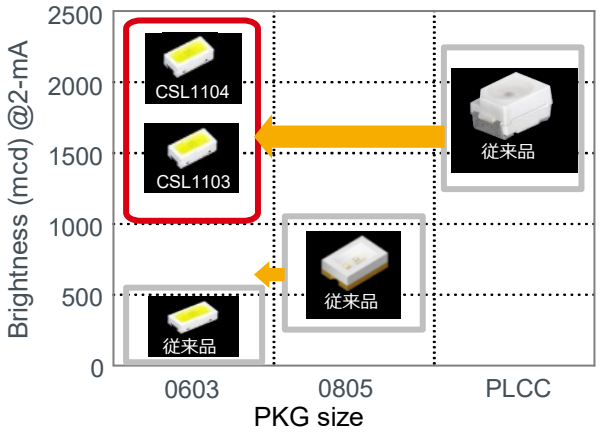
● 0603 size, high luminous intensity lens type

Adopted by CSL0902BT

*The image is for reference

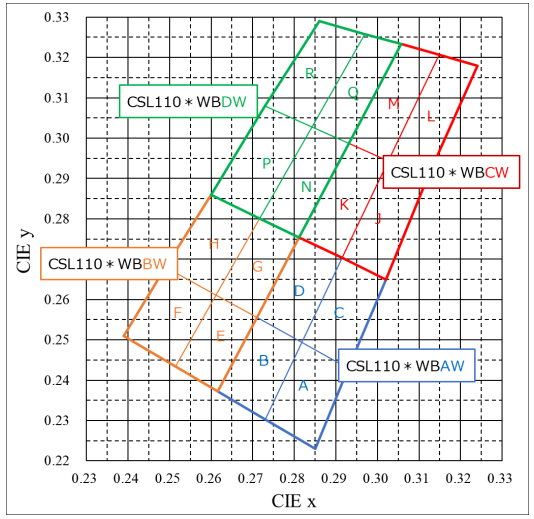
Reflector Type: CSL11 Series

Small but bright



Available from low to high brightness in the same package

Improved color variation



●4 color variation (AW, BW, CW, DW)

The rank range is defined for each shape name, making it easy to manage!

Improved design and visibility

●Blackout specification

Easier to adjust the transmittance of the cover material, which has been a problem for designers!

Low brightness type

The text will show through.

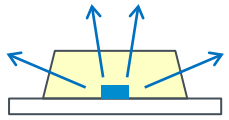
High brightness type

Complete blackout

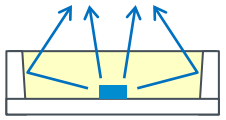
●Safe even in high-density mounting

The reflector suppresses light leakage to adjacent symbols, and the chip is placed in the center for easy optical design.

No reflector



With reflector



The neighbor symbol show through.

Symbols are clearly visible.

Case study

Electric medical device

Adopted for operation display unit

[Request]

① Miniaturization of the set

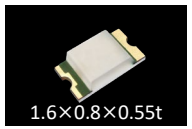
② White color for long-life products is desired.

③ High luminous intensity is desired to improve visibility.

●Small size, High brightness, White

➡ Adopted by CSL11*WB

*The image is for reference



0603 size 2mA measurement LED: CSL1901 series①

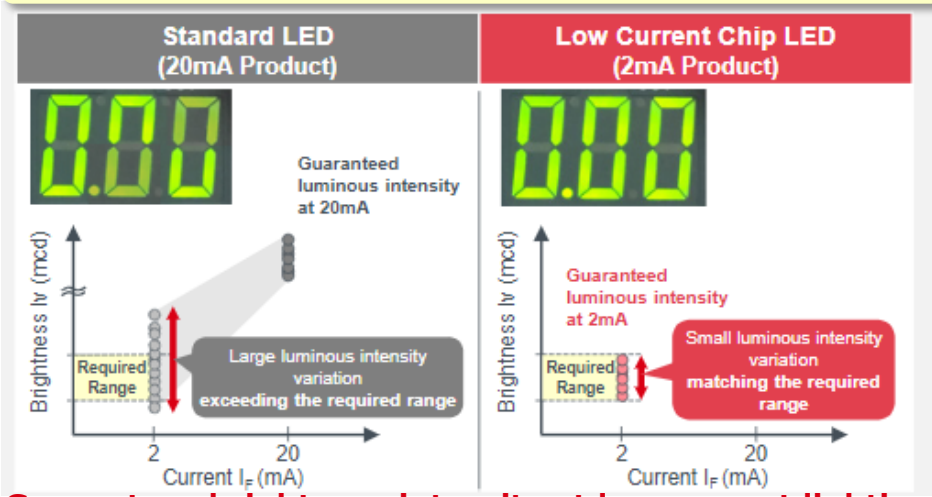
lineup

Series		Brightness (mcd)	
Color	Wavelength (nm)	Min.[mcd]	Max.[mcd]
V	630	1.6	6.3
U	620	2.5	10
D	605	6.3	25
Y	590	6.3	25
M	570	1.0	4.0

Point

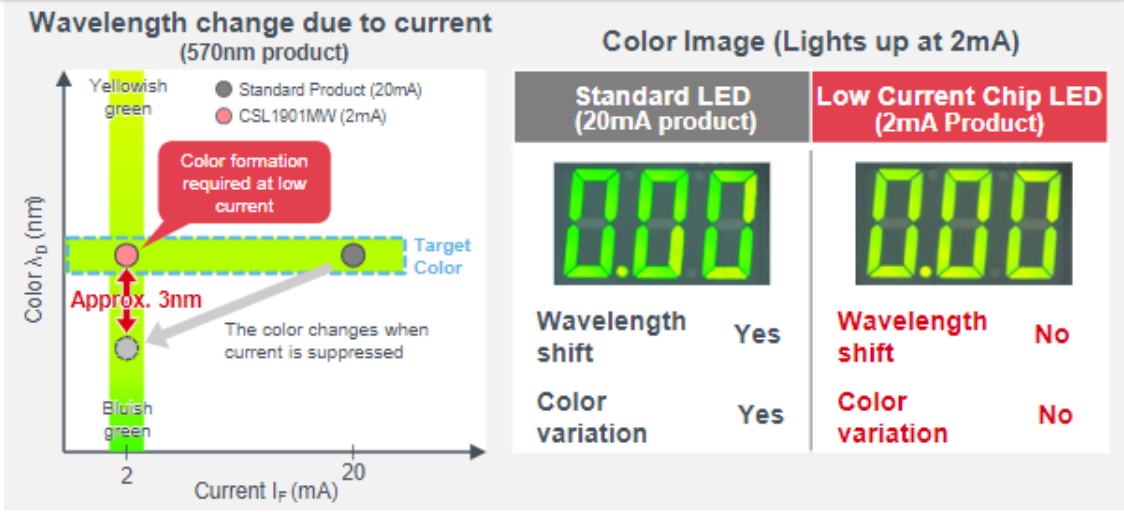
- **Reduces brightness and color variations in low-emission applications**
  Guaranteed luminous intensity at 2mA halves the intensity fluctuation
  Dominant wavelength measurement at 2mA reduces wavelength shift and color variation
- **Lineup includes energy saving high efficiency light-emitting AlGaInP-based devices**
  Emits light at 2mA with sufficient brightness even through a diffuser plate
- **Five-color lineup optimized for display**

Guaranteed 2mA luminous intensity halves the brightness variation

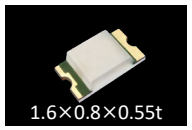


Guarantees brightness integrity at low current lighting

2mA dominant wavelength measurement reduces wavelength shift and color variation



Eliminates color issues with low current lighting



0603 size 2mA measurement LED: CSL1901 series②

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.

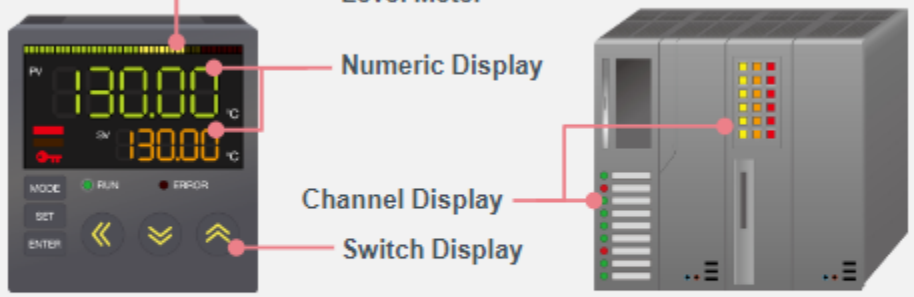
No unevenness in brightness in 7 segments.

Good visibility indoors.

Image for reference only.

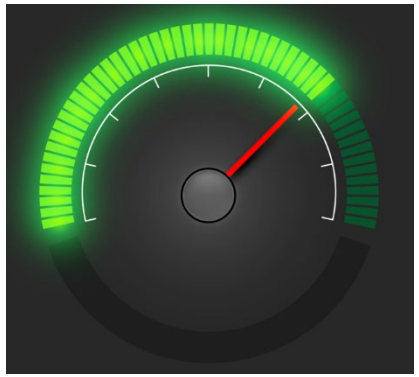
Various light sources for 7Seg

- Temperature Regulator
- PLC (Programmable Logic Controller)

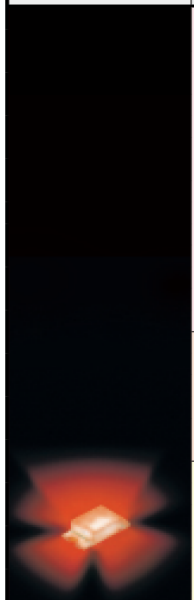


- The light emitting parts are not too bright
- Light does not leak to the neighboring light emitting parts

Ideal for energy-saving LED lighting in the low current range

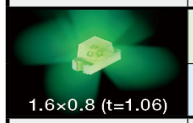


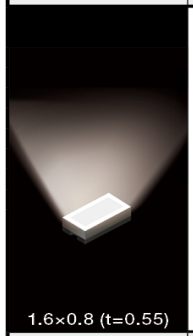
0603 Size Products①

Package (mm)	Emitting Color	Part No.	Electrical and Optical Characteristics (T_a=25°C)										Absolute Maximum Ratings (T_a=25°C)					
			Dominant Wavelength λ_D/ Chromaticity Coordinates (x, y)		Luminous Intensity I_V				Forward Voltage V_F		Reverse Current I_R		Power Dissipation P_D	Forward Current I_F	Peak Forward Current I_{FP}	Reverse Voltage V_R	Operating Temperature Topr	Storage Temperature Tstg
			Typ* (nm)	I_F (mA)	Min (mcd)	Typ (mcd)	Max (mcd)	I_F (mA)	Typ (V)	I_F (mA)	Max (μA)	V_R (V)	(mW)	(mA)	(mA)	(V)	(°C)	(°C)
	Red	SML-D12L8W	635	20	10	16	40	20	2.0	20	10	5	50	20	100*5	5	−40 to +85	−40 to +100
		SML-D14VW (A)	630	20	71	100	180	20	2.0	20	10	5	72	30	100*2	5	−40 to +100	−40 to +100
		Single rank SML-D15VW				90	112						84	35				
		SML-D13VW (A)			36	55	90						72	30				
		SML-D12V8W			16	40	100		2.2				54	20			−40 to +85	
		SML-D12V1W			25		63											
		New CSL1901VW		2	1.6	4.8	6.3	2	1.8	2			44					
		Single rank SML-D15UW	620	20	90	112	140	20	2.0	20	10	5	84	35	100*2	5	−40 to +100	−40 to +100
		SML-D13UW (A)			56	85							72	30				
		SML-D13U8W			40	70	160		2.1				52	20			−40 to +85	
		SML-D12U8W			25	63			2.2				54					
		SML-D12U1W			40		100											
		New CSL1901UW		2	2.5	6	10	2	1.8	2			44					
		SML-D14U2W (A)	615	20	90	160	224	20	2.0	20	10	5	72	30	100*2	5	−40 to +100	−40 to +100
		Single rank SML-D15U2W			112	140	180						84	35				
	Orange	Single rank SML-D15DW	605	20	180	224	280	20	2.0	20	10	5	84	35	100*2	5	−40 to +100	−40 to +100
		SML-D14DW (A)			112	200							72	30				
		SML-D13DW (A)			71	120	180											
		SML-D12D8W			40	100	250		2.2				54	20			−40 to +85	
		SML-D12D1W			63		160											
		New CSL1901DW		2	6.3	9.4	25	2	1.8	2			44					
		Single rank SML-D15YW	590	20	180	224	280	20	2.1	20	10	5	87	35	100*2	5	−40 to +100	−40 to +100
		SML-D14YW (A)			112	200							75	30				
		SML-D12Y1W			63	100	160		2.2				54	20			−40 to +85	
		SML-D13Y8W																
		SML-D12Y8W			25	63												
		New CSL1901YW		2	6.3	9.4	25	2	1.8	2			44					
		SML-D12W8W (A)	588	2	5	7	9	2	2.0	2	10	12	52	20	100*2	12	−40 to +100	−40 to +100
		SML-D11YW			2	4	6		1.9			5	67	25		5	−40 to +85	
		SML-D14WW (A)	587	20	112	180	280	20	2.1	20	10	5	75	30	100*2	5	−40 to +100	−40 to +100
		SML-D13WW (A)			71	110	180											
		SML-D13Y2W	581	20	40	80	160	20	2.1	20	10	5	78	30	100*2	5	−40 to +85	−40 to +100
		SML-D12Y3W			16	40	100		2.2				54	20				
	Yellow Green	SML-D12M1W	572	20	16	30	63	20	2.2	20	10	5	54	20	100*2	5	−40 to +85	−40 to +100
		SML-D13M8W																
		SML-D12M8W			10	25												
		Single rank SML-D15MW	571	20	56	71	90	20	2.1	20	10	5	87	35	100*2	5	−40 to +100	−40 to +100
		SML-D14MW (A)			36	60							75	30				
		SML-D13MW (A)			28	45	71											
		New CSL1901MW	570	2	1	3	4	2	1.8	2	10	5	44	20	100*2	5	−40 to +85	−40 to +100
	Green	SML-D13FW	565	20	18	22	36	20	2.1	20	10	5	81	30	100*2	5	−40 to +85	−40 to +100
		SML-D12FW			14	18	28		2.2				67	25				
		SML-D12P8W	560	20	3	6	16	20	2.2	20	10	5	54	20	100*2	5	−40 to +85	−40 to +100
		SMLD12EN1W	527	5	56	140	220	5	3.0	5	10	5	70	20	100*2	5	−40 to +100	−40 to +100
	Blue Green	SMLD12E2N1W	505	5	56	120	140	5	2.9	5	10	5	66	20	100*2	5	−40 to +100	−40 to +100
		SMLD12E3N1W	496	5	56	85	140	5	2.9	5	10	5	66	20	100*2	5	−40 to +100	−40 to +100
	Blue	SMLD12BN1W	470	5	14	40	56	5	2.9	5	10	5	66	20	100*2	5	−40 to +100	−40 to +100
1.6×0.8 (t=0.55)	White	SMLD12WBN1W	(x, y) (0.295, 0.280)	5	56	120	220	5	2.9	5	10	5	66	20	100*2	5	−40 to +100	−40 to +100

*1 Duty≤1/5, 200Hz *2 Duty≤1/10, 1kHz *3 Duty≤1/20, 1ms *4 Duty≤1/5, 1kHz *5 Duty≤1/10, pulse width 10ms Max
*Luminous intensity for white color is noted with chromaticity coordinate (x, y).
Note1: PICOLED™ is a trademark or a registered trademark of ROHM Co., Ltd.
Note2: You can order this product by single rank designation.

0603 Size Products②

Package (mm)	Emitting Color	Part No.	Electrical and Optical Characteristics (T_a=25°C)										Absolute Maximum Ratings (T_a=25°C)					
			Dominant Wavelength λ_D		Luminous Intensity I_V				Forward Voltage V_F		Reverse Current I_R		Power Dissipation P_D	Forward Current I_F	Peak Forward Current I_{FP}	Reverse Voltage V_R	Operating Temperature Topr	Storage Temperature Tstg
			Typ (nm)	I_F (mA)	Min (mcd)	Typ (mcd)	Max (mcd)	I_F (mA)	Typ (V)	I_F (mA)	Max (μA)	V_R (V)	(mW)	(mA)	(mA)	(V)	(°C)	(°C)
 1.6×0.8 (t=1.06)	Green	CSL1001ET (C)	527	5	90	140	224	5	3.0	5	10	5	35	10	50*2	5	−40 to +100	−40 to +100
	Blue	CSL1001BT (C)	470	1	4	6	9	1	2.8	1	10	5	33	10	50*2	5	−40 to +100	−40 to +100

Package (mm)	Emitting Color	Part No.	Electrical and Optical Characteristics (T_a=25°C)										Absolute Maximum Ratings (T_a=25°C)					
			Dominant Wavelength λ_D/ Chromaticity Coordinates (x, y)		Luminous Intensity I_V				Forward Voltage V_F		Reverse Current I_R		Power Dissipation P_D	Forward Current I_F	Peak Forward Current I_{FP}	Reverse Voltage V_R	Operating Temperature Topr	Storage Temperature Tstg
			Typ* (nm)	I_F (mA)	Min (mcd)	Typ (mcd)	Max (mcd)	I_F (mA)	Typ (V)	I_F (mA)	Max (μA)	V_R (V)	(mW)	(mA)	(mA)	(V)	(°C)	(°C)
 1.6×0.8 (t=0.55)	White	New CSL1101WBAW	(x, y) (0.282, 0.249)	5	90	140	220	5	2.9	5	10	5	68	20	100*2	12	−40 to +110	−40 to +110
		New CSL1101WBBW	(x, y) (0.261, 0.261)	5	90	140	220	5	2.9	5	10	5	68	20	100*2	12	−40 to +110	−40 to +110
		New CSL1101WBCW	(x, y) (0.303, 0.294)	5	90	140	220	5	2.9	5	10	5	68	20	100*2	12	−40 to +110	−40 to +110
		New CSL1101WBDW	(x, y) (0.284, 0.303)	5	90	140	220	5	2.9	5	10	5	68	20	100*2	12	−40 to +110	−40 to +110
		New CSL1102WBAW	(x, y) (0.282, 0.249)	20	710	1,000	1,400	20	3.2	20	10	5	152	40	100*2	12	−40 to +110	−40 to +110
		New CSL1102WBBW	(x, y) (0.261, 0.261)	20	710	1,000	1,400	20	3.2	20	10	5	152	40	100*2	12	−40 to +110	−40 to +110
		New CSL1102WBCW	(x, y) (0.303, 0.294)	20	710	1,000	1,400	20	3.2	20	10	5	152	40	100*2	12	−40 to +110	−40 to +110
		New CSL1102WBDW	(x, y) (0.284, 0.303)	20	710	1,000	1,400	20	3.2	20	10	5	152	40	100*2	12	−40 to +110	−40 to +110
		New CSL1103WBAW	(x, y) (0.282, 0.249)	20	900	1,500	2,200	20	3.2	20	10	5	152	40	100*2	5	−40 to +110	−40 to +110
		New CSL1103WBBW	(x, y) (0.261, 0.261)	20	900	1,500	2,200	20	3.2	20	10	5	152	40	100*2	5	−40 to +110	−40 to +110
		New CSL1103WBCW	(x, y) (0.303, 0.294)	20	900	1,500	2,200	20	3.2	20	10	5	152	40	100*2	5	−40 to +110	−40 to +110
		New CSL1103WBDW	(x, y) (0.284, 0.303)	20	900	1,500	2,200	20	3.2	20	10	5	152	40	100*2	5	−40 to +110	−40 to +110
		New CSL1104WBAW	(x, y) (0.282, 0.249)	20	1,400	2,000	2,800	20	2.9	20	10	5	144	40	100*2	5	−40 to +110	−40 to +110
		New CSL1104WBBW	(x, y) (0.261, 0.261)	20	1,400	2,000	2,800	20	2.9	20	10	5	144	40	100*2	5	−40 to +110	−40 to +110
		New CSL1104WBCW	(x, y) (0.303, 0.294)	20	1,400	2,000	2,800	20	2.9	20	10	5	144	40	100*2	5	−40 to +110	−40 to +110
		New CSL1104WBDW	(x, y) (0.284, 0.303)	20	1,400	2,000	2,800	20	2.9	20	10	5	144	40	100*2	5	−40 to +110	−40 to +110

Package (mm)	Emitting Color	Part No.	Electrical and Optical Characteristics (T_a=25°C)										Absolute Maximum Ratings (T_a=25°C)					
			Dominant Wavelength λ_D		Luminous Intensity I_V				Forward Voltage V_F		Reverse Current I_R		Power Dissipation P_D	Forward Current I_F	Peak Forward Current I_{FP}	Reverse Voltage V_R	Operating Temperature Topr	Storage Temperature Tstg
			Typ (nm)	I_F (mA)	Min (mcd)	Typ (mcd)	Max (mcd)	I_F (mA)	Typ (V)	I_F (mA)	Max (μA)	V_R (V)	(mW)	(mA)	(mA)	(V)	(°C)	(°C)
 1.6×0.8 (t=1.24)	Red	CSL0903VT	630	20	560	800	1,400	20	2.1	20	10	12	87	35	100*2	12	−40 to +100	−40 to +100
		CSL0902VT			180	280	450											
		CSL0901VT			112	180	355						62.5	25				
		CSL0903UT	620	20	710	1,200	1,800	20	2.1	20	10	12	87	35	100*2	12	−40 to +100	−40 to +100
		CSL0902UT			224	355	560											
		CSL0901UT			140	280	450						62.5	25				
	Orange	CSL0903DT	605	20	900	1,400	2,240	20	2.1	20	10	12	87	35	100*2	12	−40 to +100	−40 to +100
		New CSL0902DT			355	560	900											
		CSL0901DT			224	400	710						62.5	25				
	Yellow	CSL0903YT	590	20	560	800	1,400	20	2.1	20	10	12	87	35	100*2	12	−40 to +100	−40 to +100
		CSL0902YT			355	560	900											
		CSL0901YT			180	320	560						62.5	25				
		CSL0901WT	587	20	180	280	560	20	2.1	20	10	12	62.5	25	100*2	12	−40 to +100	−40 to +100
	Yellow Green	New CSL0902MT	571	20	112	180	280	20	2.1	20	10	12	87	35	100*2	12	−40 to +100	−40 to +100
		CSL0901MT			56	100	180						62.5	25				
	Green	CSL0901PT	560	20	14	30	45	20	2.1	20	10	12	62.5	25	100*2	12	−40 to +100	−40 to +100
		CSL0902ET	527	20	710	1,100	1,800	20	3.4	20	10	5	95	25	100*2	5	−40 to +100	−40 to +100
		CSL0901ET		5	220	360	560	5	3.0	5			70	20				
	Blue	CSL0902BT	470	20	220	360	560	20	3.3	20	10	5	95	25	100*2	5	−40 to +100	−40 to +100
		CSL0901BT		5	36	56	90	5	2.9	5			68	20				

*1 Duty≤1/5, 200Hz *2 Duty≤1/10, 1kHz *3 Duty≤1/20, 1ms *4 Duty≤1/5, 1kHz *5 Duty≤1/10, pulse width 10ms Max *6 Peak wavelength
*Luminous intensity for white color is noted with chromaticity coordinate (x, y).
Note: AutomotiveGrade products are indicated by a 'C' at the end of the part number. For details, please contact a sales representative.

Quick Reference of Luminous Intensity

Red (V, U) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	1.0 to 1.6	1.6 to 2.5	2.5 to 4.0	4.0 to 6.3	6.3 to 10	10 to 16	16 to 25	25 to 40	40 to 63	63 to 100	100 to 160	160 to 250	250 to 400	400 to 630	630 to 1000	1000 to 1600	1600 to 2500	2500 to 3120
Mini-mold	1608	0.55	2		CSL1901VW																
						CSL1901UW															
			20						SML-D12L8W												
													SML-D15VW								
													SML-D14VW (A)*								
												SML-D13VW (A)*									
											SML-D12V1W										
											SML-D12V8W										
														SML-D15UW							
															SML-D15U2W						
													SML-D14U2W (A)*								
												SML-D13UW (A)*									
												SML-D13U8W									
												SML-D12U1W									
											SML-D12U8W										
Lens		1.24												CSL0901VT							
														CSL0901UT							
															CSL0902VT						
															CSL0902UT						
																	CSL0903VT				
																		CSL0903UT			

Orange (D) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	1.0 to 1.6	1.6 to 2.5	2.5 to 4.0	4.0 to 6.3	6.3 to 10	10 to 16	16 to 25	25 to 40	40 to 63	63 to 100	100 to 160	160 to 250	250 to 400	400 to 630	630 to 1000	1000 to 1600	1600 to 2800
Mini-mold	1608	0.55	2					CSL1901DW												
			20													SML-D15DW				
														SML-D14DW (A)*						
													SML-D13DW (A)*							
												SML-D12D8W								
													SML-D12D1W							
Lens		1.24														CSL0901DT				
																	CSL0902DT			
																		CSL0903DT		

Quick Reference of Luminous Intensity

Yellow (Y, W) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	1.0 to 1.6	1.6 to 2.5	2.5 to 4.0	4.0 to 6.3	6.3 to 10	10 to 16	16 to 25	25 to 40	40 to 63	63 to 100	100 to 160	160 to 250	250 to 400	400 to 630	630 to 1000	1000 to 1600	1600 to 2800
Mini-mold	1608	0.55	2		SML-D11YW															
							SML-D12W8W (A)*													
								CSL1901YW												
			20												SML-D15YW					
														SML-D14YW (A)*						
														SML-D14WW (A)*						
													SML-D13WW (A)*							
													SML-D13Y8W							
												SML-D13Y2W								
										SML-D12Y3W										
													SML-D12Y1W							
											SML-D12Y8W									
Lens		1.24													CSL0901YT					
															CSL0901WT					
																CSL0902YT				
																	CSL0903YT			

Yellow Green (M), Green (P, F) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	0.63 to 1.0	1.0 to 1.6	1.6 to 2.5	2.5 to 4.0	4.0 to 6.3	6.3 to 10	10 to 16	16 to 25	25 to 40	40 to 63	63 to 100	100 to 160	160 to 250	250 to 400	400 to 630	630 to 1000	1000 to 1800	1800 to 2500
Mini-mold	1608	0.55	2		CSL1901MW																
			20												SML-D15MW						
													SML-D14MW (A)*								
													SML-D13MW (A)*								
											SML-D13FW										
											SML-D13M8W										
							SML-D12P8W														
											SML-D12M1W										
										SML-D12M8W											
										SML-D12FW											
Lens		1.24												CSL0901MT							
										CSL0901PT											
															CSL0902MT						

Quick Reference of Luminous Intensity

Green (E)/Blue Green (E2, E3) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	9.0 to 14	14 to 22	22 to 36	36 to 56	56 to 90	90 to 140	140 to 220	220 to 360	360 to 560	560 to 900	900 to 1400	1400 to 2200	2200 to 3600	3600 to 5600
Mini-mold	1608	0.55	5					SMLD12EN1W									
								SMLD12E2N1W									
								SMLD12E3N1W									
		1.06							CSL1001ET								
Lens		1.24	20								CSL0901ET						
														CSL0902ET			

Blue (B) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	0.9 to 1.4	1.4 to 2.2	2.2 to 3.6	3.6 to 5.6	5.6 to 9.0	9 to 14	14 to 22	22 to 36	36 to 56	56 to 90	90 to 140	140 to 220	220 to 360	360 to 560	560 to 900	900 to 1400
Mini-mold	1608	0.55	5							SMLD12BN1W									
		1.06	1				CSL1001BT												
Lens	1608	1.24	5									CSL0901BT							
			20													CSL0902BT			

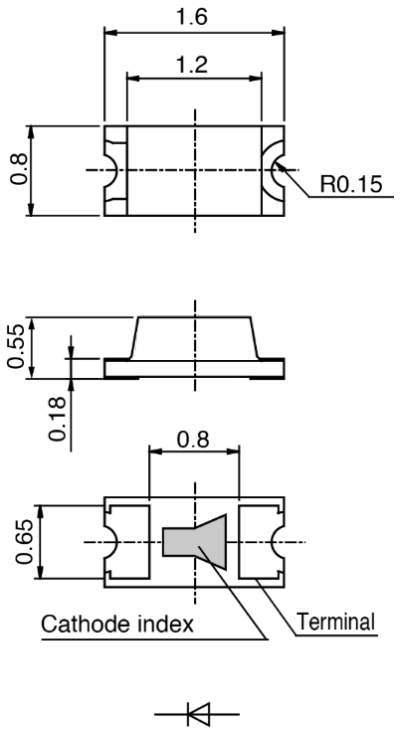
White (WB) Quick Reference of Luminous intensity

Package Structure	Package Size (mm)	Height (mm)	Luminous Intensity (mcd) / I_F (mA)	9 to 14	14 to 22	22 to 36	36 to 56	56 to 90	90 to 140	140 to 220	220 to 360	360 to 560	560 to 900	900 to 1100	1100 to 1400	1400 to 1800	1800 to 2200	2200 to 2800	2800 to 3600	3600 to 7000	7000 to 8500
Mini-mold	1608	0.55	5					SMLD12WBN1W													
Reflector									CSL1101WBxW												
			20										CSL1102WBxW								
														CSL1103WBxW							
															CSL1104WBxW						

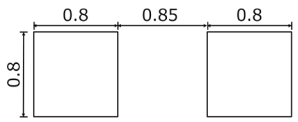
Outline Drawing and Recommended Pattern

■SMLD10 Series

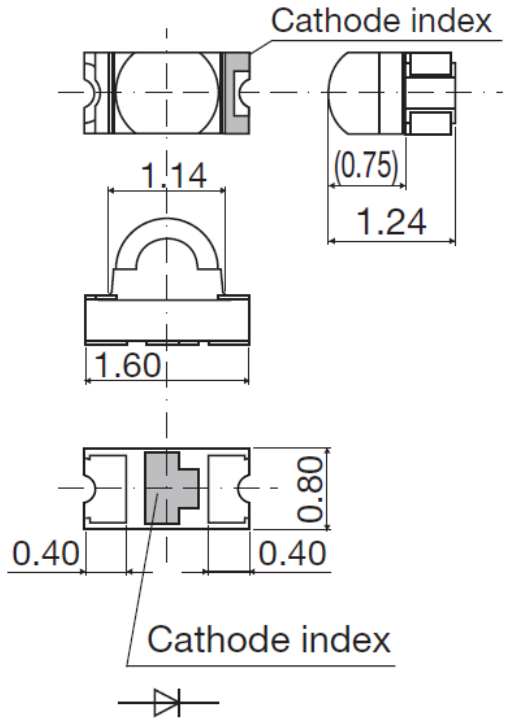
Outline Drawing

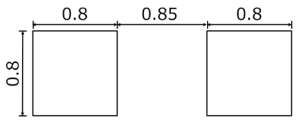


Recommended Pattern

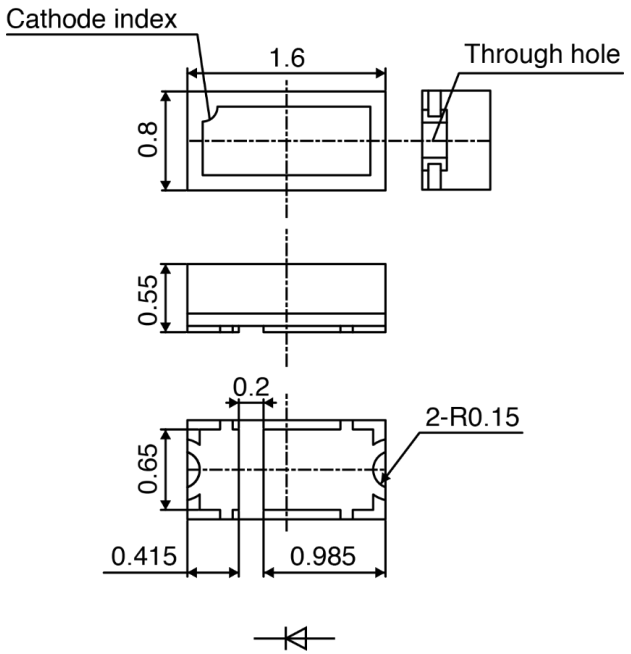


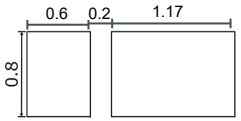
■CSL09 Series



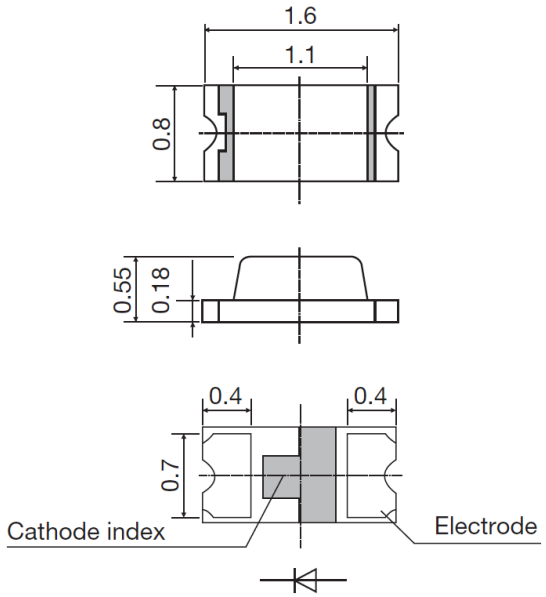


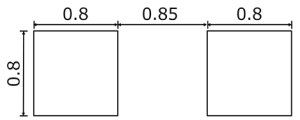
■CSL11 Series





■CSL19 Series





Package Lineup

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

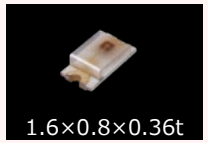
★ : Reverse mount available

Unit (mm)

Top view

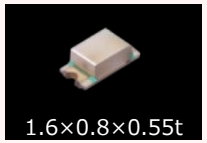
1608size

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

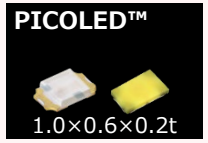
CSL09 series

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

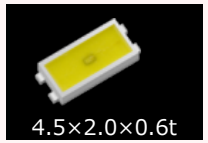
V U D Y M P
E B WB IR

SML-Z1/ZN series

V U D Y M F P
E B WB

High Power(White)

SMLK1＊series

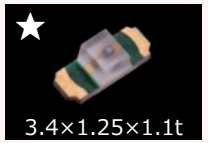


WB

SML-S1 series

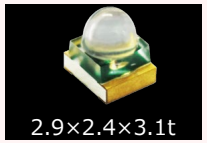
V U D Y M P
E B IR

SML-81 series



V U D W M
B WB TB

CSL07 series



U D

Multi color

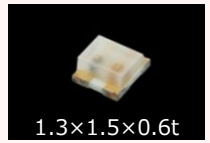
SML-P24 series

M U

SML-D22 series

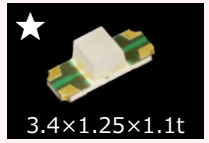
M U V Y

SML-52 series



B U M U M D M Y

SML-82 series

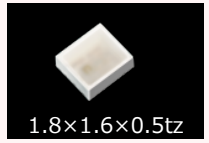


M V

SMLP34RGB

SMLP36RGB

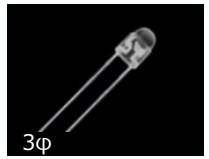
MSL0402RGB



SMLVN6RGB

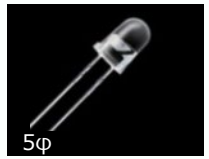
Lamp

SLI-343 series



V U D Y M P
E B WB

SLI-560 series



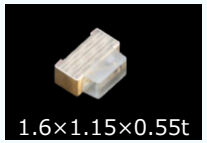
U D Y M E B
WB

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.
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Electronics for the Future

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