ROHM SEMICONDUCTOR

Electronics for the Future

3color LED
~RGB TYPE~

2024
Module Business Unit
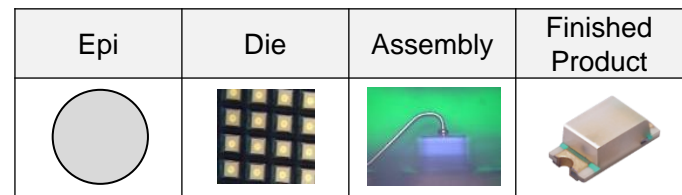LED Division
Rev.005

Features of ROHM LEDs

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

Integrated production

| Epi	Die	Assembly	Finished Product

Some products are manufactured by separate processes.

- Quality Management
- Production Control
- Development System

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

LED   shield plate   PhotoTr
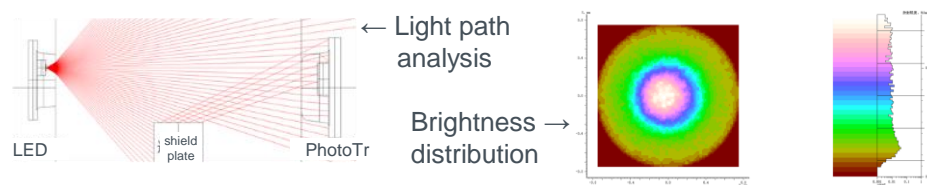
A wide range of services available from a comprehensive semiconductor manufacturer


"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〉

Day

Night
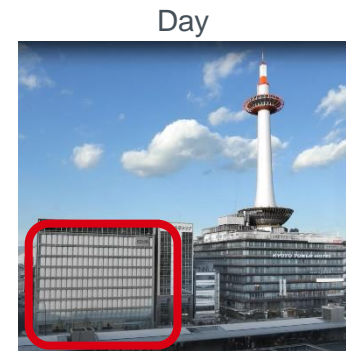
On the 16th of every month, we participate in the "DO YOU KYOTO?" light-down campaign promoted by Kyoto City to turn lights. (Unified Action Light-Down calls for turning off outdoor lights, etc.)
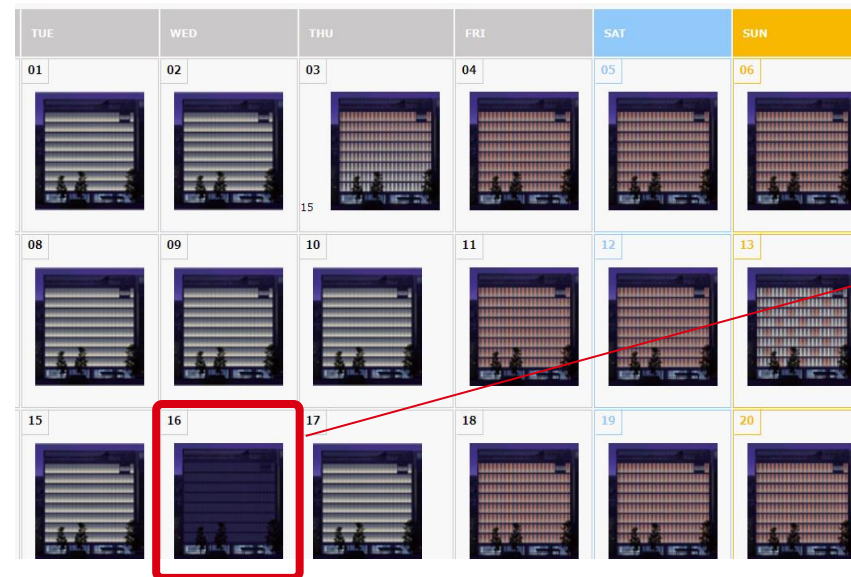
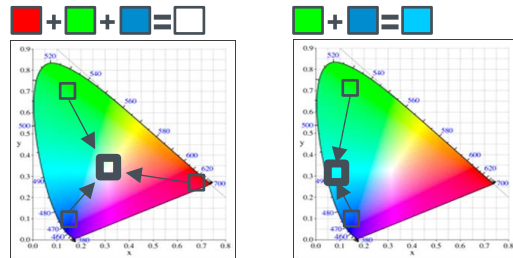Delicate Japanese sensibility is expressed by subtly adjusting the color temperature according to the season.

ROHM 3color LED

A variety of colors can be expressed with a single product

■ RGB LED examples of colors

RED

GREEN

BLUE

RED+GREEN+BLUE

RED+GREEN

GREEN+BLUE

RED+BLUE

Various expressions are possible !
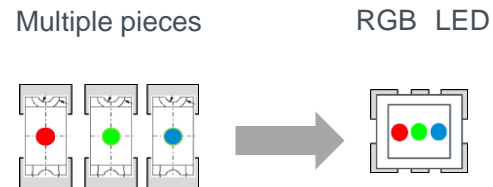
■ Concept of neutral colors

🟥 + 🟩 + 🟦 = ⬜   🟩 + 🟦 = 🟦

Colors between 2 and 3 on the chromaticity coordinate are intermediate colors.

The design range of the set will be expanded
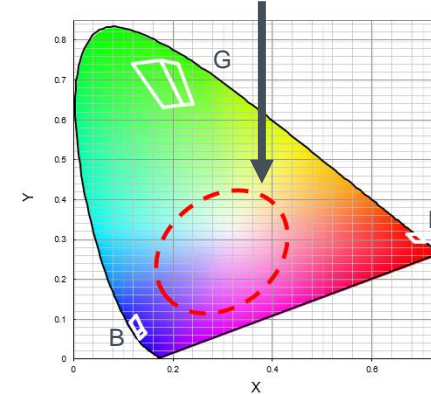
■ RGB LED   Effects of Reduction

Multiple pieces   RGB LED

・ Reduction of mounting frequency
・ Reduction of mounting area
・ Reduction of materials used etc.

Reduction of total cost
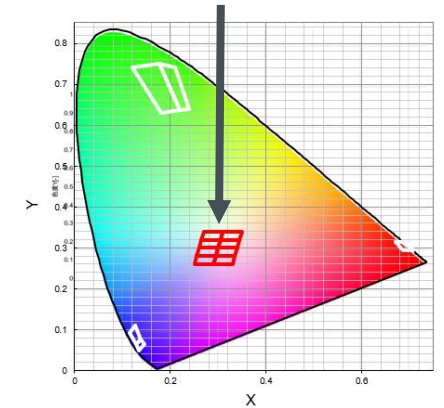
ROHM" is particular about white balance

・R,G,B: single color only

White expression by combining RGB

Due to the variation of each luminous intensity

Greater chromaticity variation when white lights are on

・ Sorting White

To keep within white sorting standards

RGB combination input and white sorting

→Small chromaticity variation when white lights are on

You can choose the LEDs that best suit your application.

Top view reflector type

SMLV series / MSL04 series

3.5×2.8×0.6t

1.8×1.6×0.5tz
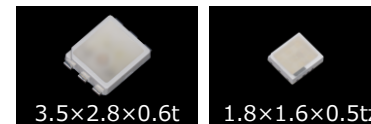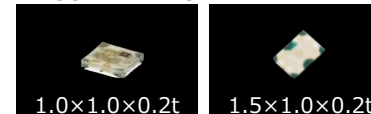
Side view reflector type

MSL01 series / MSL06 series

6.9×2.2×2.15t

2.9×1.0×1.35t

Small type

PICOLEDT™ RGB

1.0×1.0×0.2t

1.5×1.0×0.2t

- Please see the next page for details -
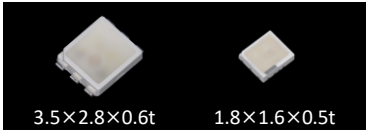
Top view reflector type : SMLV/MSL04 series

3.5×2.8×0.6t　1.8×1.6×0.5t

Color lineup

Part No.	Color	IF(mA)	Dominant Wavelength(nm/x,y)	IV(mcd)	VF(V)
SMLVN6RGBFU1(C)	RED	20	621	750	2.1
	GREEN	20	525	1800	3.3
	BLUE	20	470	430	3.3
	WHITE	R20/G20/B20	x:0.26/y:0.26	2980	-
MSL0402RGBU	RED	20	624	400	2.1
	GREEN	20	527	550	3.5
	BLUE	20	470	180	3.3
	WHITE	R20/G20/B10	x:0.3/y:0.3	1100	-

※"U"→Silicon resin product / "W"→Epoxy resin product SMLVN6RGB1W part number is also available.
Silicon resin :○ Resistant to light and heat / Epoxy resin : ○Tolerant to environmental gases (sulfur, etc.)

Reflector for high brightness and color mixing

Mold type
Reflector type

・color mixing △
・Light leakage to the side ×
・Direct brightness△

・*color mixing* ◎
・**Light leakage to the side** ◎
・**Direct brightness** ◎
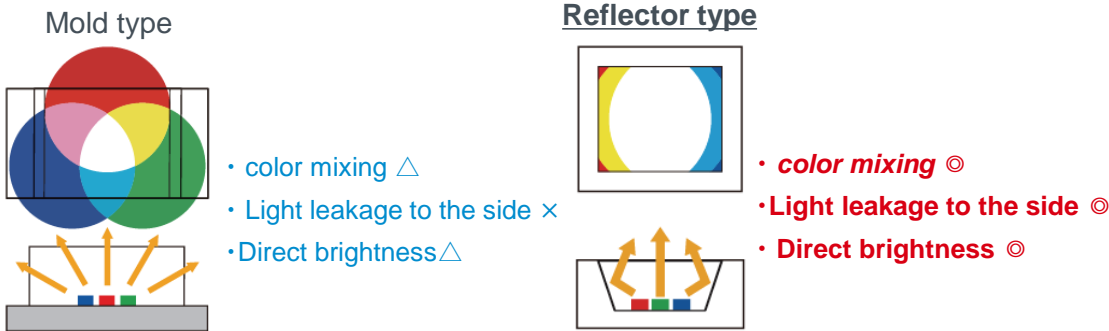
Bright, high-definition design is possible

Two lineups in thin PKG

For display surface and short distance

薄型化

For display surface and long distance

・Color irregularities occur within symbols
・LEDs are transparent and not well designed.

・Uniform emission within the symbol
・LEDs are not transparent and have good design

・SMLVseries

3528 size
・High brightness type
・Large-area luminescence possible

・MSL04series

1816 size
・Small type
・Matrix display by integration is possible

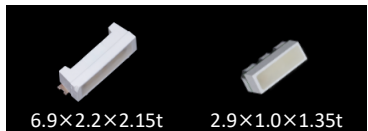Thinner profile enables design without color variation

Case Study

家庭用ロボット

【Request】

① I want to change the eye color depending on the state of the robot.
② I want an even glow around my eyes.

Various colors can be expressed, color mixing capability
**MSL0402RGBU is adopted**

Color lineup

Part No.	Color	IF(mA)	Dominant Wavelength(nm/x,y)	IV(mcd)	VF(V)
■■■ MSL0104RGBU	RED	20	624	700	2.1
	GREEN	20	527	1200	3.5
	BLUE	20	470	400	3.3
	WHITE	R8/G14/B18	x:0.25/y:0.24	1650	-
■■■ MSL0601RGBU	RED	20	624	700	2.1
	GREEN	20	527	1250	3.3
	BLUE	20	470	360	3.2

※"U"→Silicon resin product / "W"→Epoxy resin product SMLVN6RGB1W part number is also available.
Silicon resin :○ Resistant to light and heat / Epoxy resin : ○Tolerant to environmental gases (sulfur, etc.)

Uniformly illuminates a large area in combination with a light guide plate.

·Top view

Diffuser plate

LED

·Side view

LED
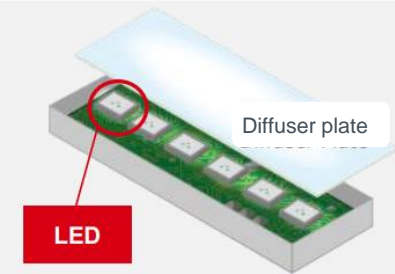
Light guide plate

· Multiple pieces required to light all surfaces
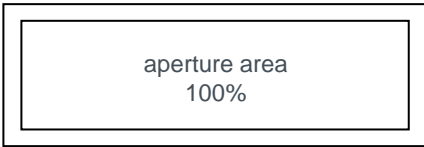· Uneven color due to LED placement
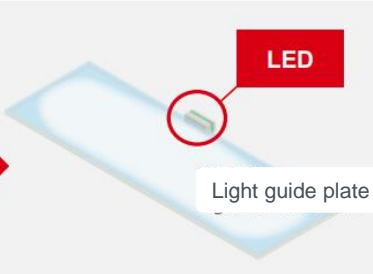
· **Only one LED is needed in combination with a light guide plate**

· **No unevenness in color due to single use**

Lineup of products in two sizes with side view

MSL01 series

aperture area 100%

t

MSL06 series

aperture area 21%

t/2

· Good connection with light guide plate due to large aperture

→**Ideal for illuminating large areas.**

· Aperture 80%, height 50% down from MSL01

→ **Enables miniaturization and thinning of the set while maintaining the same brightness.**
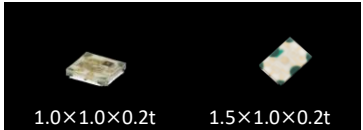
Case Study

Printer

【 Request 】

①I want to indicate the status of the printer by color.
② Large area to be illuminated.

Side view type
MSL0104RGBWが採用

Ultra-small type :PICOLED™-RGB series

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

1.0×1.0×0.2t   1.5×1.0×0.2t

Color lineup

Part No.	Color	IF(mA)	Dominant Wavelength(nm)	IV(mcd)	VF(V)
■■■ SMLP34RGBN1W	RED	5	624	80	2.1
	GREEN		527	220	3.1
	BLUE		470	60	3
■■■ SMLP36RGBNW	RED		624	80	2.1
	GREEN		527	220	3.1
	BLUE		470	60	3

Ultra-small and ultra-thin:PICOLED™-RGB

MSL04 series (Small TYPE)

SMLP34 Series 4pin

SMLP36 Series 6pin

1816 size

1010 size

1610 size

Mounting Area **65% reduction**

Mounting Area **35% reduction**

Significant reduction in mounting area

t=0.5 mm   t=**0.2 mm**   t=**0.2 mm**
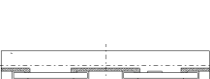
Product height 60% DOWN

Case Study

Full color dot matrix	Wearable Products

【Request】

① I want to make a high-definition matrix representation.
② I want to make a full-color expression.

→**2.0mm pitch high-density mounting is possible**

【Request】

①Smaller mounting area
② I want to communicate information in many colors.

→**Compact and thin PKG**

PICOLED™-RGB is used t m

SMLP34RGBNW(4pin)/SMLP36RGBNW(6pin) are available
You can choose the product according to the LED driver you are using.

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

Package (mm)	Emitting Color	Part No.	Power Dissipation P_D (mW)	Forward Current I_F (mA)	Peak Forward Current I_FP (mA)	Reverse Voltage V_R (V)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Forward Voltage V_F Typ (V)	I_F (mA)	Reverse Current I_R Max (μA)	V_R (V)	Dominant Wavelength λ_D Typ (nm)	I_F (mA)	Luminous Intensity I_V Min (mcd)	Typ (mcd)	Max (mcd)	I_F (mA)	Automotive Grade AEC-Q101/ AEC-Q102
1.8×1.6 (t=0.5)	Red	MSL0402RGBU*9	180*6*7	30	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	220	400	560	20	
	Green		180*6*7	30	100	5	−40 to +85	−40 to +100	3.5	20	100	5	527	20	360	550	900	20	—
	Blue		180*6*7	30	100	5	−40 to +85	−40 to +100	3.3	20	100	5	470	20	90	180	360	20	
3.5×2.8 (t=0.6)	Red	SMLVN6RGB1U*9	400*6*7	50	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	450	700	1,100	20	
	Green		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	527	20	710	1,200	1,800	20	YES
	Blue		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	470	20	220	400	560	20	
	Red	SMLVN6RGB1W*8	400*6*7	50	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	450	700	1,100	20	
	Green		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	527	20	710	1,200	1,800	20	—
	Blue		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	470	20	220	400	560	20	
	Red	SMLVN6RGB7W	180*6*7	30	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	280	500	900	20	
	Green		180*6*7	30	100	—	−40 to +85	−40 to +100	3.5	20	—	—	527	20	560	1,000	1,800	20	—
	Blue		180*6*7	30	100	—	−40 to +85	−40 to +100	3.3	20	—	—	470	20	140	300	560	20	
4-terminal PICOLED™-RGB 1.0×1.0 (t=0.2)	Red	SMLP34RGBN1W	35	10	50*3	5	−40 to+85	−40 to+100	2.1	5	10	5	624	5	36	80	140	5	
	Green		35	10	50*3	5	−40 to+85	−40 to+100	3.1	5	10	5	527	5	140	220	360	5	—
	Blue		35	10	50*3	5	−40 to+85	−40 to+100	3	5	10	5	470	5	36	60	140	5	
6-terminal PICOLED™-RGB 1.5×1.0 (t=0.2)	Red	SMLP36RGBNW	35	10	50*3	5	−40 to +85	−40 to +100	2.1	5	10	5	624	5	36	80	140	5	
	Green		35	10	50*3	5	−40 to +85	−40 to +100	3.1	5	10	5	527	5	140	220	360	5	—
	Blue		35	10	50*3	5	−40 to +85	−40 to +100	3.0	5	10	5	470	5	36	60	140	5	
2.9×1.35 (t=1.0)	Red	MSL0601RGBU	300*6*7	40	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	600	700	830	20	
	Green		300*6*7	30	100	5	−40 to +85	−40 to +100	3.3	20	10	5	527	20	1,100	1,250	1,500	20	—
	Blue		300*6*7	30	100	5	−40 to +85	−40 to +100	3.2	20	10	5	470	20	290	360	500	20	
3 Colors Side View type 6.9×2.2 (t=2.15)	Red	MSL0104RGBU*8	400*6*7	50	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	450	700	1,100	20	
	Green		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	527	20	710	1,200	1,800	20	—
	Blue		400*6*7	40	100	—	−40 to +85	−40 to +100	3.2	20	—	—	470	20	220	400	560	20	
	Red	MSL0104RGBW*8	400*6*7	50	100	5	−40 to +85	−40 to +100	2.1	20	10	5	624	20	450	700	1,100	20	
	Green		400*6*7	40	100	—	−40 to +85	−40 to +100	3.3	20	—	—	527	20	710	1,200	1,800	20	—
	Blue		400*6*7	40	100	—	−40 to +85	−40 to +100	3.2	20	—	—	470	20	220	400	560	20	

*1 Duty1/5, 200Hz *2 Duty1/10, 1kHz *3 Duty≤1/20, 1ms *4 Duty≤1/5, 1kHz *5 Duty1/10, pulse width 10ms Max
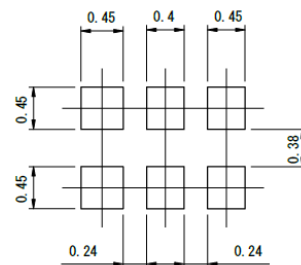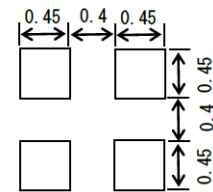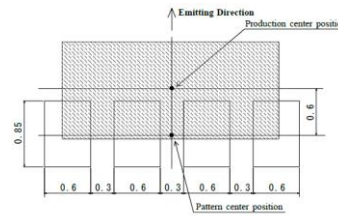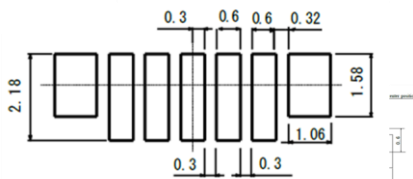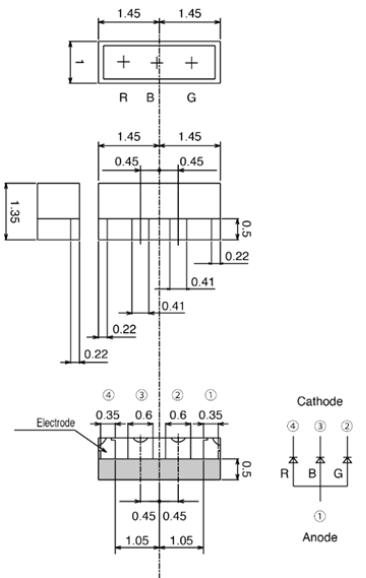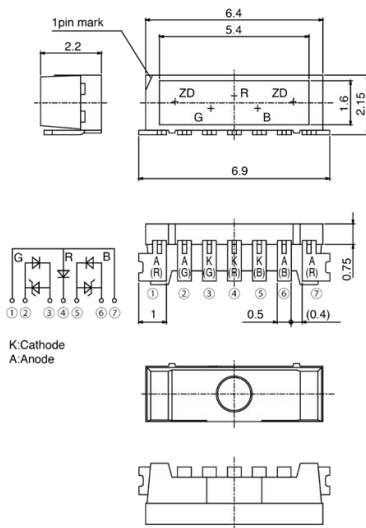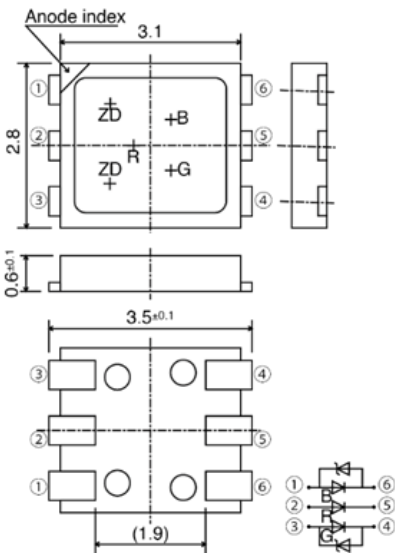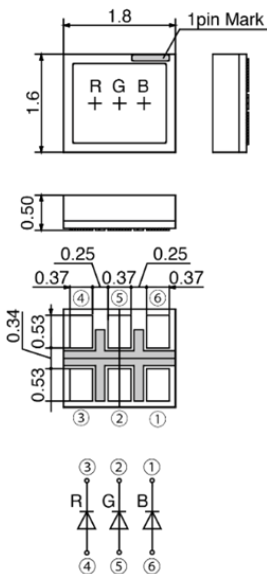*6 Total power dissipation in case of lighting three colors. (when lighting three colors, it will be recuced down to 30% of it.)
*7 50mm×50mm, Substrate: FR4: t=1.6mm   Cu foil: t=0.07mm
*8 Epoxy resin *9 Silicon resin *10 Peak wavelength

Package Structure	Package Size (mm)	Height (mm)	I_F (mA)	Luminous Intensity (mcd) / Emitting Color	5.6 to 9.0	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 1800
Reflector	1816	0.5	20	Red										MSL0402RGBU			
				Green										MSL0402RGBU			
				Blue													
	3528	0.6	20	Red											SMLVN6RGB1U		
				Green											SMLVN6RGB1U		
				Blue													
				Red										SMLVN6RGB1W			
				Green										SMLVN6RGB1W			
				Blue													
				Red									SMLVN6RGB7W				
				Green									SMLVN6RGB7W				
				Blue													
Mold	1010	0.2	5	Red					SMLP34RGBN1W								
				Green					SMLP34RGBN1W								
				Blue													
	1510	0.2	5	Red					SMLP36RGBNW								
				Green					SMLP36RGBNW								
				Blue													
Side View (Reflector)	29135	1.0	20	Red										MSL0601RGBU			
				Green										MSL0601RGBU			
				Blue													
	6922	2.15	20	Red										MSL0104RGBU			
				Green										MSL0104RGBU			
				Blue													
				Red										MSL0104RGBW			
				Green										MSL0104RGBW			
				Blue													

【 Outline Drawing 】

■ **MSL04 series**　　■ **SMLV series**　　■ **MSL01 series**　　■ **MSL06 series**　　■ **SMLP34 series**　　■ **SMLP36 series**

【 Recommended Pattern 】

Package Lineup

unit（mm）
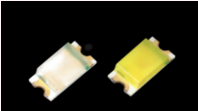
Top view　★ AEC-Q102　★ : Reverse mount available　1608size　Multi color

Lamp
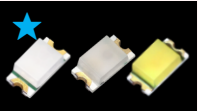
Series	Dimensions
SML-E1/EN series	1.6×0.8×0.36t
SML-D1 series ★	1.6×0.8×0.55t
CSL19 series	1.6×0.8×0.55t
CSL09 series ★	1.6×0.8×1.24t
CSL11 series ★	1.6×0.8×0.55t

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 — V U D Y M
CSL09 series — V U D Y W M P E B
CSL11 series — WB

SML-P1/P14 series **PICOLED** 1.0×0.6×0.2t
V U U2 D Y3 Y W Y2 M2 M F P E B WB IR
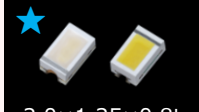
SML-H1 series 2.0×1.25×0.8t
V U D Y M P TB

SML-M1/MN series ★ 2.0×1.25×0.8t
V U D Y M P E B WB IR

SML-Z1/ZN series **PLCC** 3.5×2.8×1.9t
V U D Y M F P E B WB

CSL10 series ★ 1.6×0.8×1.06t
E B

High Power(White)
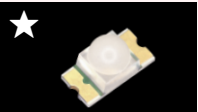
SMLK1＊series 4.5×2.0×0.6t
WB
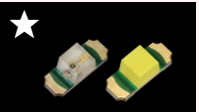
SML-S1 series ★ 3.2×1.6×1.85t
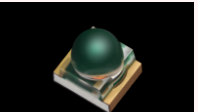V U D Y M P E B IR

SML-81 series ★ 3.4×1.25×1.1t
V U D W M B WB TB

CSL07 series 2.9×2.4×3.1t
U D

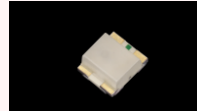SML-P24 series **PICOLED-Duo** 1.0×1.0×0.2t
M U

SML-D22 series 1.6×0.8×0.55t
M U V Y

SML-52 series 1.3×1.5×0.6t
B U M U M D M Y

SML-82 series ★ 3.4×1.25×1.1t
M V

SMLP34RGB **PICO-RGB** 1.0×1.0×0.2t
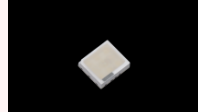
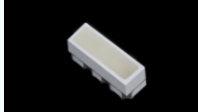SMLP36RGB **PICO-RGB** 1.5×1.0×0.2t

MSL0402RGB 1.8×1.6×0.5tz

SMLVN6RGB 3.5×2.8×0.6t
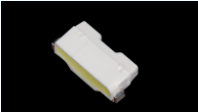
Side view
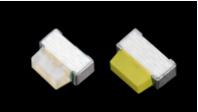
CSL04 series 2.8×1.2×0.8t
WB
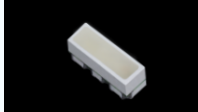
SML-A1 series 1.6×1.15×0.55t
V U D Y W M P E B WB

MSL0601RGB 2.9×1.35×1.0t

MSL0104RGB 6.9×2.2×2.15t

SLI/SLR-343 series 3φ
V U D Y M P E B WB

SLI/SLA-560 series 5φ
U D Y M E B WB

SLI/SLA-580 series 5φ
U D Y M E B

SLR-56 series 5φ
V D Y M E B

SLI-430 series 4φ
U D Y M

SLR/SLI-325 series 3.2φ
V U D Y M

SLR-322 series 3φ
V D Y M

ROHM_WEB

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> **Go to HP for data related !**
> **Can be obtained with individual product data**

Tools

MODELS
- 🔴 SMLD12EN1W SPICE Model
- 🔴 SMLD12EN1W Ray Data

2D/3D/CAD
- 🔴 SMLD12EN1W 3D STEP Data
- 🔴 Parasolid X_T File
- 🔴 3D eDrawings Data

CHARACTERISTICS DATA
- 📕 Electrical Static Discharge (ESD)

Packaging & Quality

MANUFACTURING DATA
- 📕 Reliability Test Result
- 📕 Factory Information

ENVIRONMENTAL DATA
- 📕 About Flammability of Materials
- 📕 Compliance of the ELV directive
- 📕 MSDS
- 📕 Compliance of the RoHS / ELV directive

EXPORT INFORMATION
- 📕 About Export Regulations

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～LED Product Videos～

Extensive lineup **Compact 1608 LED** 👆click	Hight Brightness Lens Type **CSL09series** 👆click
Low current series 👆click	**Single Rank SML-D15series** 👆click
High Brightness White LED **CSL11series** 👆click	**3color LED R/G/B SMLVN6RGBFU** 👆click

We will continue to distribute product videos

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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.

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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.

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

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