



Electronics for the Future

ROHM IR LEDs / Phototransistors

2022
Module Business Unit
LED Division
Rev.3

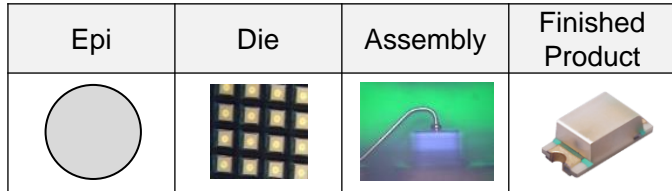
No. 65AN104E Rev.003
2022.12

Features of ROHM LEDs



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

Integrated production



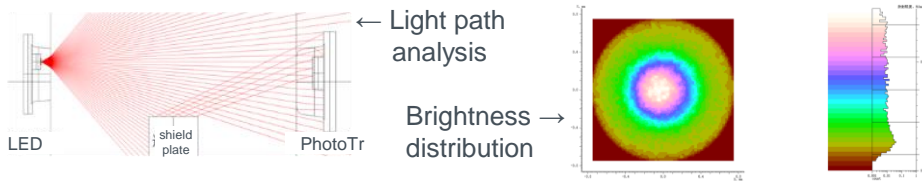
- Quality Management
- Production Control
- Development System

Some products are manufactured by separate processes.

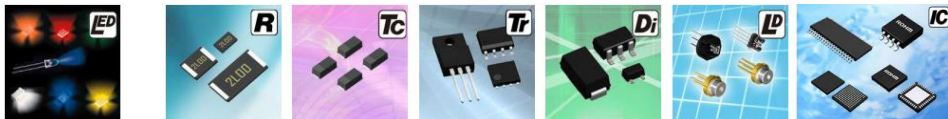
Capable of responding to detailed requests for color and brightness

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



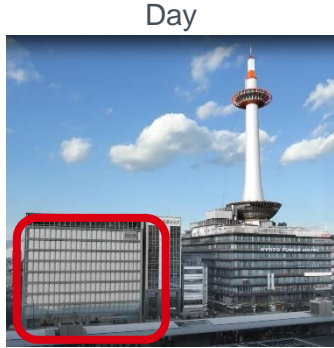
A wide range of services available from a comprehensive semiconductor manufacturer



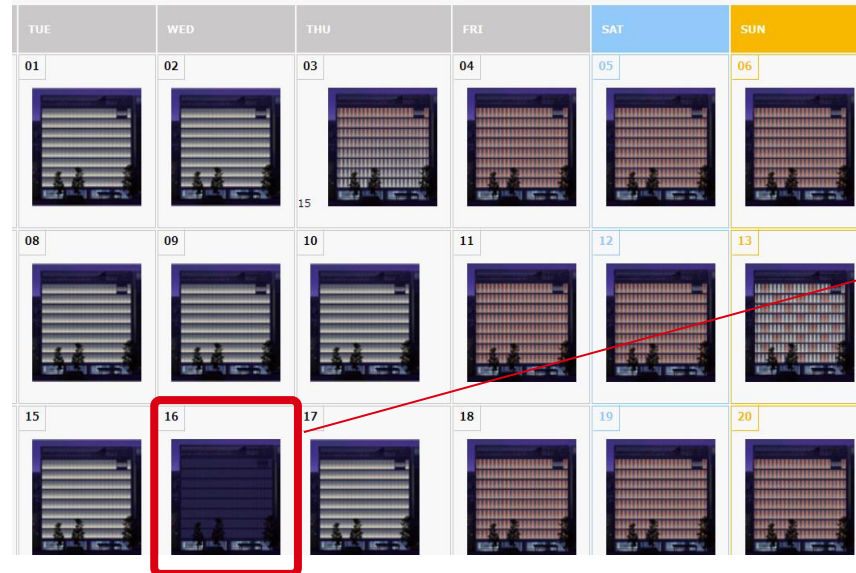
“Kyo-no-Hikari-Koyomi”

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.



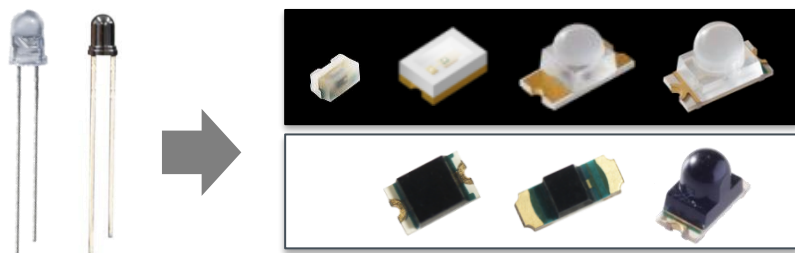
《Schedule》



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.

Contributes to miniaturization and low profile



Changed from $\Phi 5\text{mm}$ and $\Phi 3\text{mm}$ shell type to surface mount type.
 → Contributes to man-hour reduction through reflow implementation

One of the few manufacturers with in-house elements

	in-house element	Supply volume
ROHM	○	○
Company A	○	○
Company B	×	○
Company C	×	○
Company D	○	×

Rohm Research

※Some of the products are available for purchase.

- In addition to package design, we can also design and manufacture elements in-house. Unlike manufacturers who only purchase and assemble elements, we maximize performance by creating elements that match the package.
- Mass production at the same factory as visible LEDs is possible.

Can be used for optical simulation

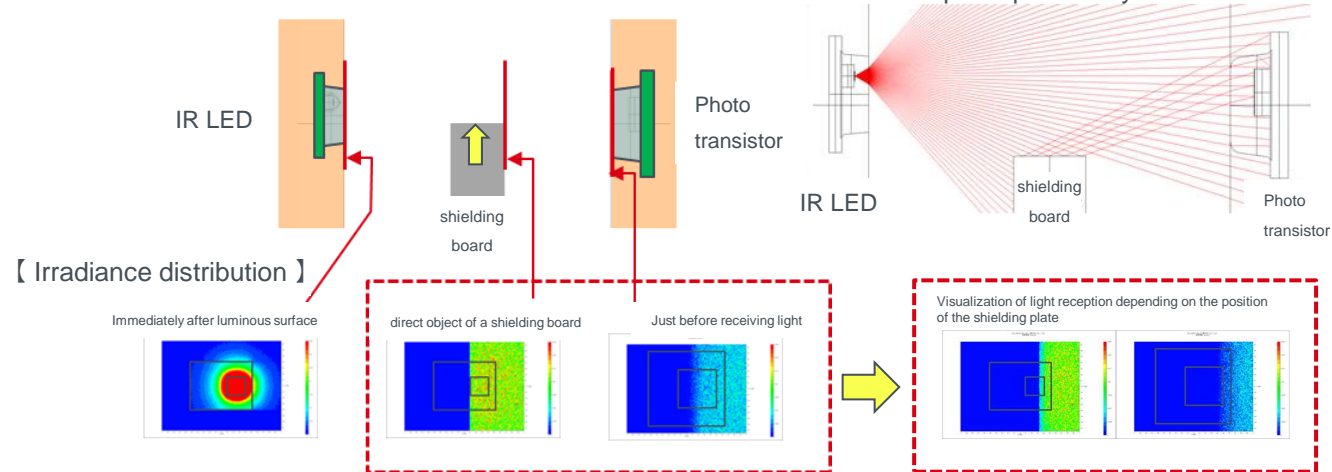
ROHM supports customers' development with optical simulation.
 →Contributing to the reduction of development man-hours for our customers

【 Analysis example: Interruption (switch) operation of phototransistor photocurrent I_c 】

A shielding plate is inserted between the infrared LED and the phototransistor. The light received by the phototransistor depending on the position of the shielding plate is analyzed in terms of light path and irradiance distribution.

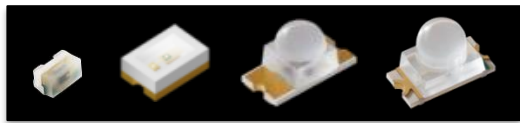
【Top of surface-mounted product】

【 optical path analysis 】



Lineup of both light emitting and light receiving

- IR LED detail P.4
- Phototransistors detail P.5



IR LEDs

Selectable light emission direction and directivity according to the purpose

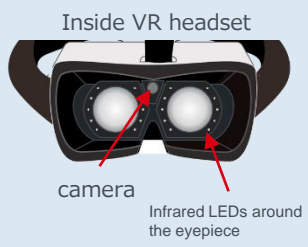
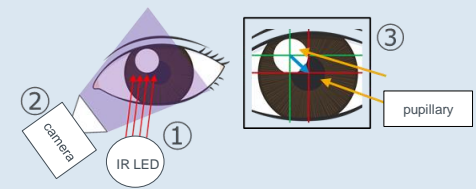
appearance	Part No.	Absolute Maximum Rating	Standard characteristics					
		I _F (mA)	I _E (mW/sr)	I _F (mA)	V _F (V)	I _F (mA)	λ _P (nm)	2θ1/2 (deg.)
Side View 1.0×0.55 (t=0.5)	CSL1501RW	50	2.5	30	1.5	30	860	150
Top 2.0×1.25 (t=0.8)	SML-M13RT	30	1.7	20	1.4	20	870	120
Reverse Mount available Top 3.2×1.6 (t=1.85)	SML-S13RT	30	2.5	20	1.4	20	850	32
Reverse Mount available Top 3.2×1.6 (t=1.85)	SML-S15R2T	50	12	20	1.4	20	870	32
Top 3.0×1.5 (t=2.2)	SCM-013RT	30	2	20	1.4	20	850	16

Case Study

CSL1501RW : Eye tracking for VR headsets



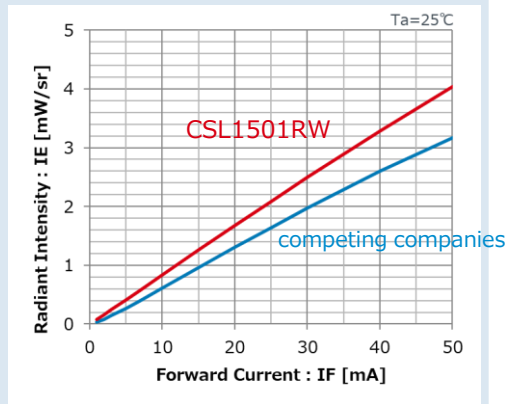
【 Eye tracking using IR LEDs 】



Inside VR headset

【 Corneal Reflex Method 】

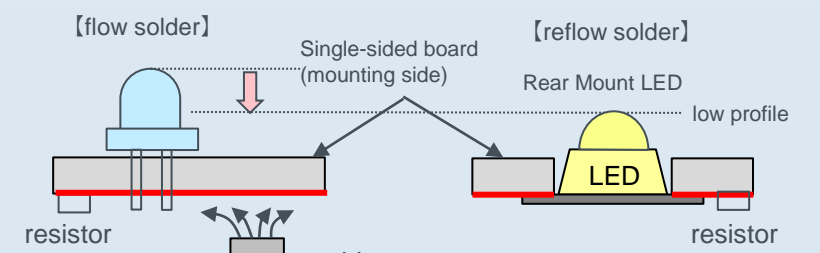
- ① Infrared light is irradiated to the eye
- ② Corneal reflection is captured by camera
- ③ Measure pupil position in relation to corneal reflex, gaze input, screen scrolling, etc.



SML-S15R2T : Smart meter weighing pulse confirmation

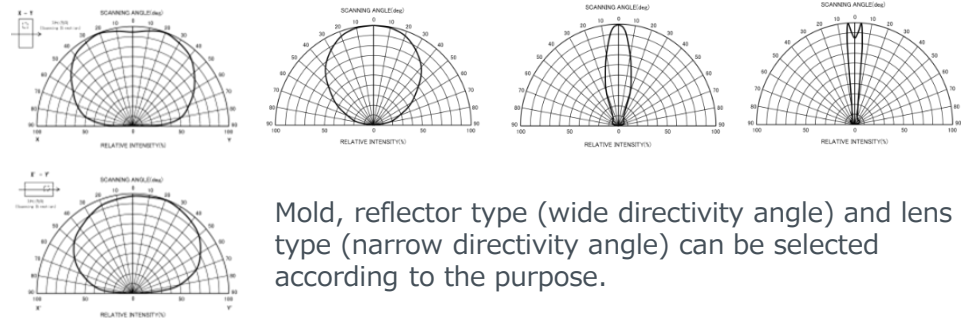


Contributing to miniaturization of smart meters by changing from bullet-type to miniature surface mounting.

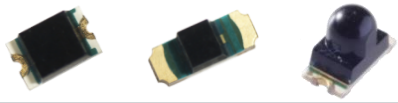


- Reflow soldering is the mainstream mounting method
- Reflow soldering is possible on single-sided boards

【directivity】 CSL1501RW SML-M13RT SML-S1 Series SCM-013RT



Mold, reflector type (wide directivity angle) and lens type (narrow directivity angle) can be selected according to the purpose.



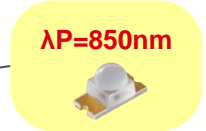
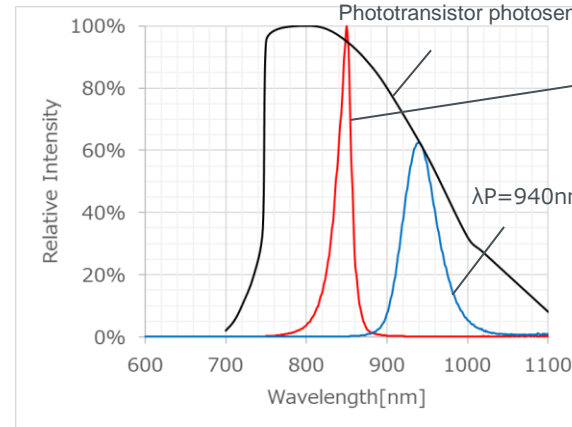
Phototransistors

Various light-receiving directivities can be selected according to the purpose

appearance	Part No.	Standard characteristics			
		Photo Electric Current I _C (mA)	V _{CE} (V)/E(Lx)	Peak Wave Length λ _P (nm)	2θ1/2 (deg.)
Top View 2.0×1.25 (t=0.8)	SML-H10TB	2.0~4.0	5/500	800	150
Top 3.4×1.25 (t=1.1)	SML-810TB	2.3~3.8	5/500	800	120
Top 3.0×1.5 (t=2.2)	SCM-014TB	0.3~3.8	5/500	800	32

Reverse Mount available

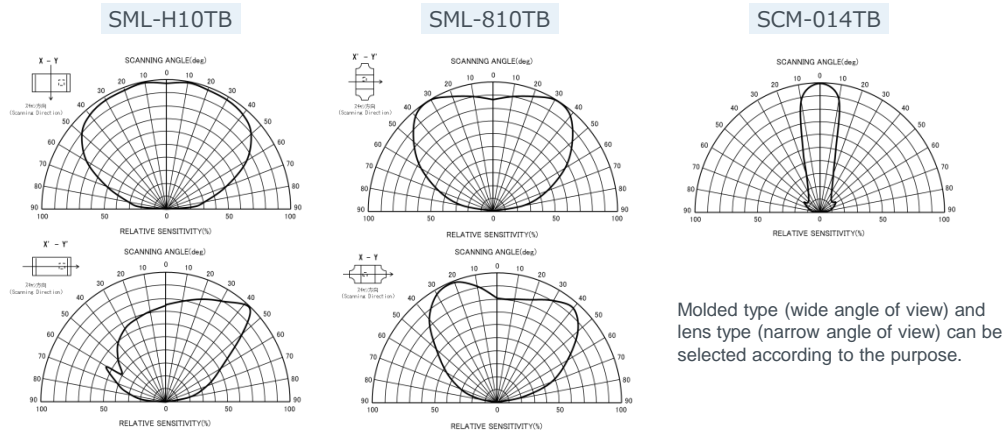
Infrared LEDs are also compatible with each other if ROHM is used for in-house devices.



The peak wavelength of SML-S13RT best matches the photosensitivity characteristics of phototransistors.

Phototransistor relative photosensitivity
 850nm : 約95%
 940nm : 約63%

【 Photodirectionality 】



Molded type (wide angle of view) and lens type (narrow angle of view) can be selected according to the purpose.

For wide range of photosensitivity → Molded type **SML-H10TB,810TB**
 For high light-receiving sensitivity → Lens type **SCM-014TB**

Case Study

Car audio/navigation








Disk presence/absence detection

automatic water tap

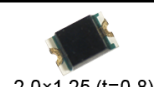




Proximity sensor

【IR LEDs】

Package (mm)	Part No.	LED Chip	Emitting Color	Absolute Maximum Rating (T _a =25°C)						Electrical and Optical Characteristics (T _a =25°C)									
				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		Reverse Current I _R		Light Wavelength λ _P		Radiant Intensity			
										Typ (V)	I _F (mA)	Typ (μA)	V _R (V)	Typ (nm)	I _F (mA)	Min (mW/sr)	Typ (mW/sr)	Max (mW/sr)	I _F (mA)
 1.0×0.58 (t=0.53)	CSL1501RW	AlGaAs	Infrared	100	50	200*1	5	-40 to +85	-40 to +100	(1.4) (1.5)	20 30	10	5	(860)	30	(1.2) 1.9	(1.6) (2.5)	(2.2) 3.4	20 30
 2.0×1.25 (t=0.8)	SML-M13RT	AlGaAs	Infrared	60	30	100*1	5	-40 to +85	-40 to +100	1.4	20	10	5	870	20	0.5	1.7	3.5	20
 Reverse Mount Available 3.2×1.6 (t=1.85)	SML-S13RT	AlGaAs	Infrared	60	30	300*1	5	-40 to +85	-40 to +100	1.4	20	10	5	850	20	1.5	2.5	3.6	20
 Reverse Mount Available 3.2×1.6 (t=1.85)	SML-S15R2T	AlGaAs	Infrared	100	50	300*1	5	-40 to +85	-40 to +100	1.4	20	10	5	870	20	5.6	12	22	20
 3.0×1.5 (t=2.2)	SCM-013RT	AlGaAs	Infrared	57	30	300*1	5	-40 to +85	-40 to +100	1.4	20	10	5	850	20	0.5	2.0	5.0	20

【Phototransistors】

Package (mm)	Part No.	LED Chip	Absolute Maximum Ratings (T _a =25°C)						Electrical and Optical Characteristics (T _a =25°C)									
			Collector-Emitter Voltage (V)	Emitter-Collector Voltage (V)	Collector Current (mA)	Collector Power Dissipation (mW)	Operating Temperature Topr (°C)	Storage Temperature Tstg (°C)	Light Current			Dark Current		Sensitivity Wavelength λ _P Typ (nm)	Collector-Emitter Saturation Voltage			
									Min (mA)	Max (mA)	V _{CE} (V) / I _E (Lx)	Max (μA)	V _{CE} (V)		Min (V)	Typ (V)	Max (V)	I _C (mA) / I _E (Lx)
 2.0×1.25 (t=0.8)	SML-H10TB	Si	32	5	30	80	-30 to +85	-30 to +100	2.0	4.0	5/500	0.5	10	800	—	—	0.4	0.1/500
 Reverse Mount Available 3.4×1.25 (t=1.1)	SML-810TB	Si	32	5	30	80	-30 to +85	-30 to +100	2.3	3.8	5/500	0.5	10	800	—	—	0.4	0.1/500
 3.0×1.5 (t=2.2)	SCM-014TB	Si	32	5	30	100	-30 to +85	-30 to +100	0.3	3.8	5/500	0.5	10	800	—	—	0.4	0.1/500

*1 Duty1/10, 1kHz

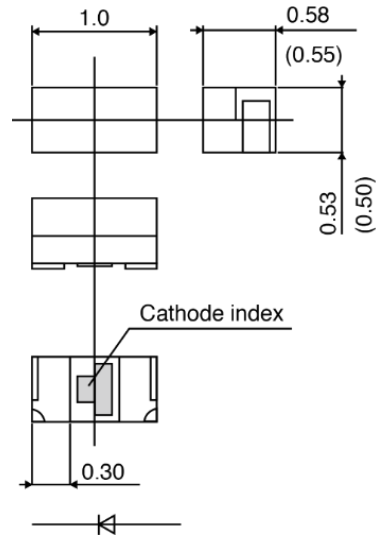
() : Reference

Outline Drawing and Recommended Pattern : IR LEDs

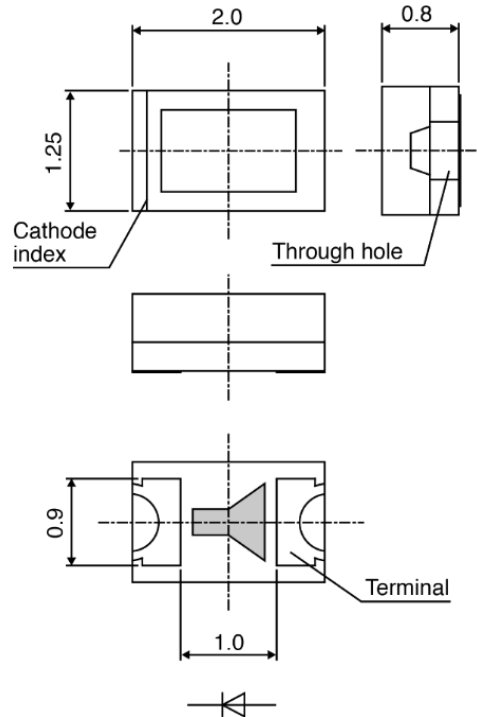
【 Outline Drawing 】

Unit:mm

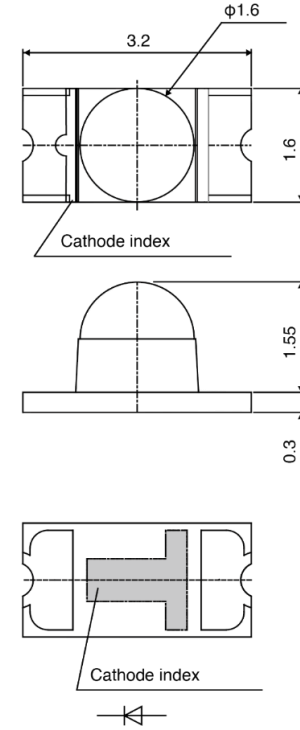
■ CSL15 series



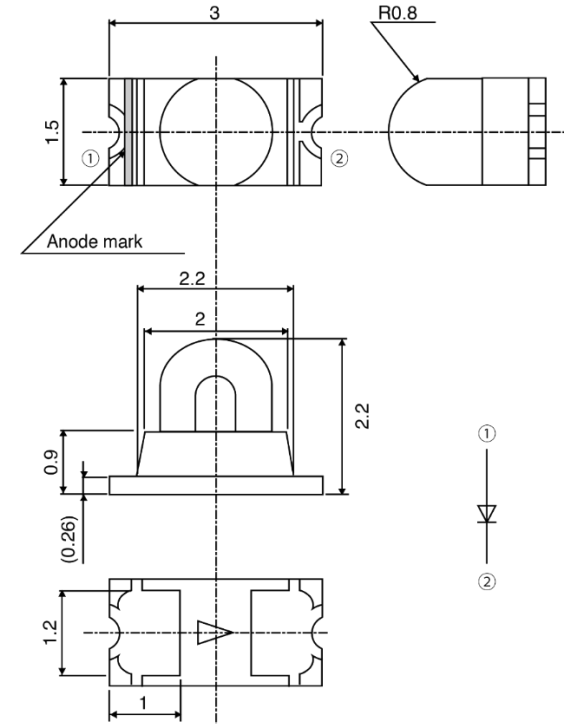
■ SML-M1 series



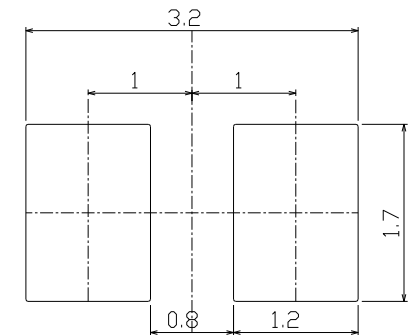
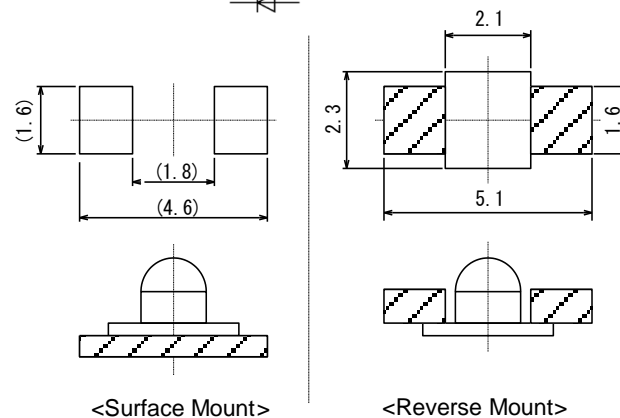
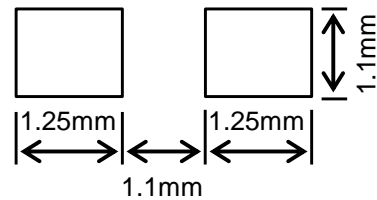
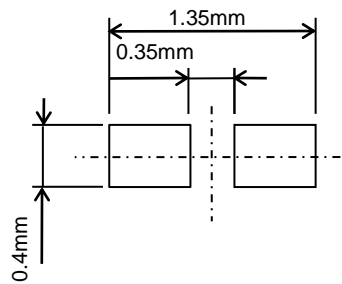
■ SML-S1 series



■ SCM-013 series



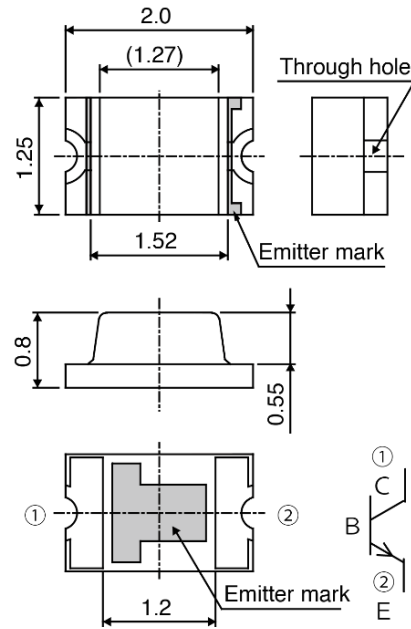
【 Recommended Pattern 】



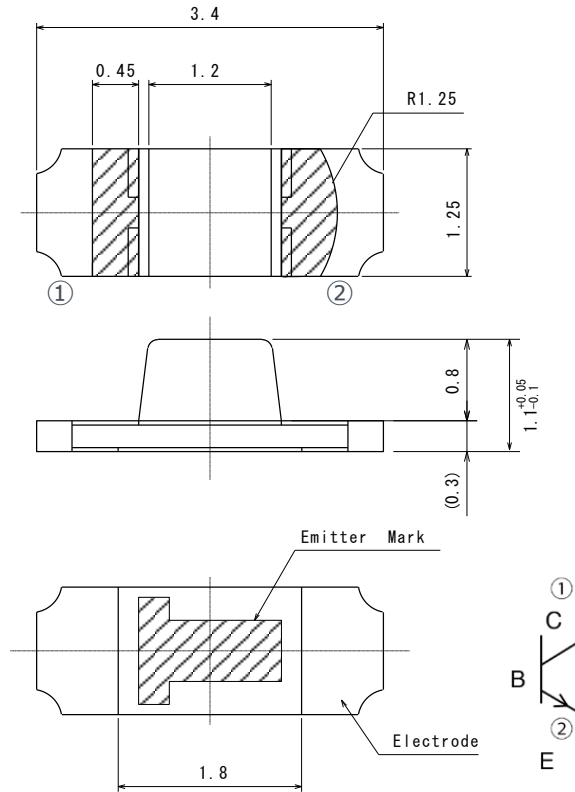
Outline Drawing and Recommended Pattern : Phototransistors

【 Outline Drawing 】

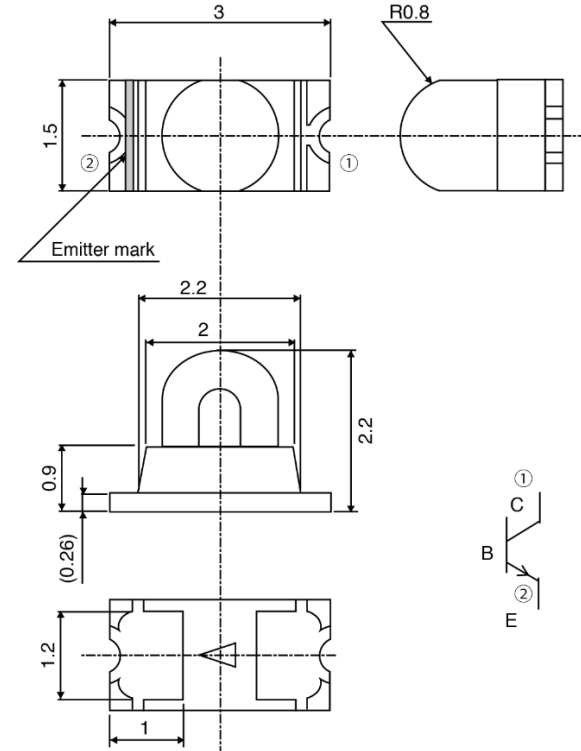
■ SML-H10TB



■ SML-810TB

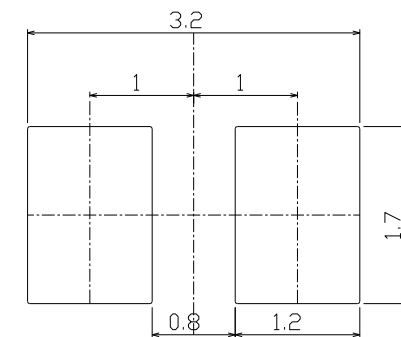
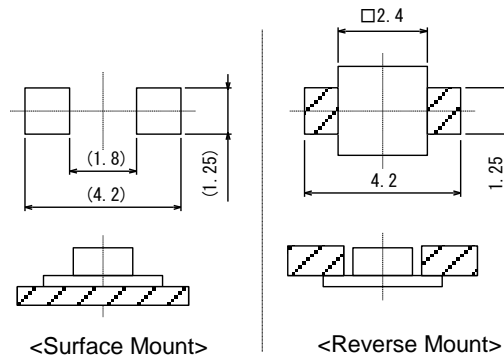
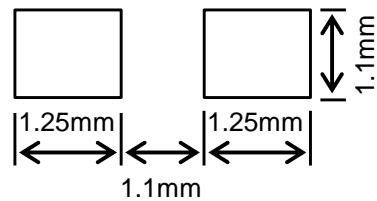


■ SCM-014TB



Unit:mm

【 Recommended Pattern 】



Package Lineup

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

★ : Reverse mount available

Unit (mm)

Top view

1608size

Multi color

SML-E1/EN series



1.6×0.8×0.36t

V U D Y M P
E B WB

SML-D1 series



1.6×0.8×0.55t

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

CSL19 series



1.6×0.8×0.55t

V U D Y M
★ New

CSL09 series



1.6×0.8×1.24t

V U D Y W M P
E B

CSL11 series



1.6×0.8×0.55t

WB
★ New

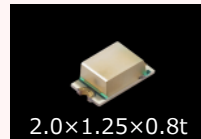
SML-P1/P14 series



1.0×0.6×0.2t

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

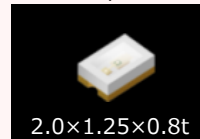
SML-H1 series



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



3.5×2.8×1.9t

V U D Y M F P
E B WB

PLCC

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

Side view

CSL04 series



2.8×1.2×0.8t

WB

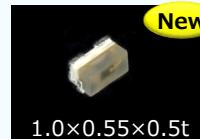
SML-A1 series



1.6×1.15×0.55t

V U D Y W M P
E B WB

CSL15 series



1.0×0.55×0.5t

IR
★ New

SML-P24 series



1.0×1.0×0.2t

M U
PICOLED™-Duo

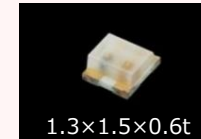
SML-D22 series



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
★

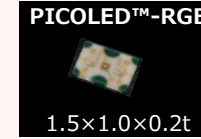
SMLP34RGB



1.0×1.0×0.2t

PICOLED™-RGB

SMLP36RGB



1.5×1.0×0.2t

PICOLED™-RGB

MSL0402RGB



1.8×1.6×0.5tz

RGB

SMLVN6RGB



3.5×2.8×0.6t

RGB

MSL07 series



1.6×1.06×0.8t

M U B Y

MSL0601RGB



2.9×1.0×1.35t

RGB

MSL0104RGB



6.9×2.2×2.15t

RGB

Lamp

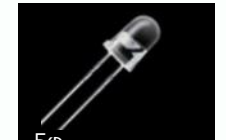
SLI-343 series



3φ

V U D Y M P
E B WB

SLI-560 series



5φ

U D Y M E B
WB

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- 2) Before you use our Products, please contact our sales representative and verify the latest specifications :
- 3) Although ROHM is continuously working to improve product reliability and quality, semiconductors 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 Products 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.
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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 :
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- 8) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.
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Electronics for the Future