

## Mid infrared LED

L15893/L15894/L15895 series

**Peak emission wavelength: 3.3  $\mu\text{m}$ , 3.9  $\mu\text{m}$ , 4.3  $\mu\text{m}$**

The L15893 series, L15894 series, L15895 series are mid infrared LEDs with the peak wavelength of 3.3  $\mu\text{m}$ , 3.9  $\mu\text{m}$ , and 4.3  $\mu\text{m}$  respectively, manufactured using Hamamatsu unique crystal growth and process technologies. Output is significantly increased compared to the previous products. These are suitable as light sources mounted in gas detectors.

### Features

- High output
- High-speed response
- High reliability
- Low power consumption
- Small surface mount type ceramic package  
(L15893-0330C/CN, L15894-0390C/CN, L15895-0430C/CN)
- TO-46 with reflector (for light condensing)  
(L15893-0330ML, L15894-0390ML, L15895-0430ML)

### Applications

- Gas detection (CH<sub>4</sub>, CO<sub>2</sub>)

### Structure

Type no.	Package*1	Window material
L15893-0330C	Surface mount type ceramic	Si with AR coating
L15893-0330CN <b>NEW</b>		None
L15893-0330MA <b>NEW</b>	TO-46	Si with AR coating
L15893-0330ML	TO-46 with reflector	None*2
L15894-0390C	Surface mount type ceramic	Si with AR coating
L15894-0390CN <b>NEW</b>		None
L15894-0390MA <b>NEW</b>	TO-46	Si with AR coating
L15894-0390ML	TO-46 with reflector	None*2
L15895-0430C	Surface mount type ceramic	Si with AR coating
L15895-0430CN <b>NEW</b>		None
L15895-0430MA <b>NEW</b>	TO-46	Si with AR coating
L15895-0430ML	TO-46 with reflector	None*2

\*1: These products are not hermetically sealed.

\*2: To protect the emission section, a protective tape is applied to the surface of the product. Remove the tape after assembly.

### ■ Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

Type no.	Reverse voltage VR (V)	Forward current IF (mA)	Pulse forward current IFP*3 (A)	Power dissipation P (mW)	Operating temperature Topr*4 (°C)	Storage temperature Tstg*4 (°C)	Soldering temperature Tsol (°C)
L15893-0330C	1	100	0.5	340	-40 to +85	-40 to +100	240 (twice)*5
L15893-0330CN <b>NEW</b>							-
L15893-0330MA <b>NEW</b>					-20 to +60	-20 to +60	-
L15893-0330ML				280	-40 to +85	-40 to +100	240 (twice)*5
L15894-0390C							-
L15894-0390CN <b>NEW</b>					-20 to +60	-20 to +60	-
L15894-0390MA <b>NEW</b>							-
L15894-0390ML							-
L15895-0430C				260	-40 to +85	-40 to +100	240 (twice)*5
L15895-0430CN <b>NEW</b>							-
L15895-0430MA <b>NEW</b>					-20 to +60	-20 to +60	-
L15895-0430ML							-

\*3: Pulse width=10 μs, duty ratio=1%

\*4: No dew condensation.

When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

\*5: Reflow soldering, JEDEC J-STD-020 MSL 3, see P.12

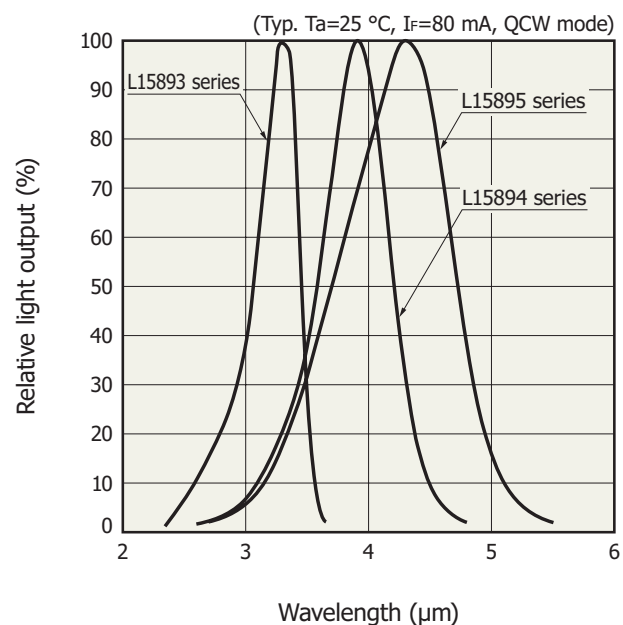
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

### ■ Electrical and optical characteristics (Ta=25 °C)

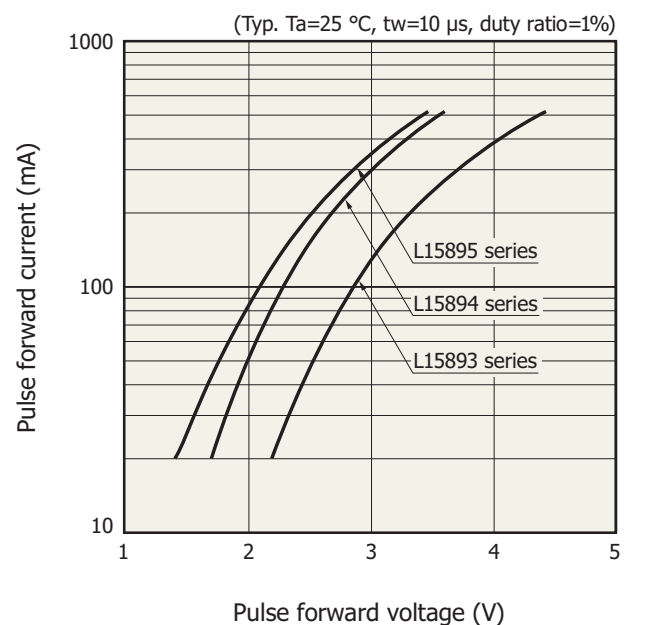
Type no.	Peak emission wavelength $\lambda_p^{*6}$			Spectral half width $\Delta\lambda^{*6}$		Radiant flux $\phi_c^{*6}$		Forward voltage $V_F^{*6}$		Rise time $t_r$ 10 to 90%
	Min. (nm)	Typ. (nm)	Max. (nm)	Typ. (nm)	Max. (nm)	Min. (mW)	Typ. (mW)	Typ. (V)	Max. (V)	Max. ( $\mu$ s)
L15893-0330C	3.1	3.3	3.4	0.4	0.6	0.8	1.3	2.7	3.2	1
L15893-0330CN <b>NEW</b>										
L15893-0330MA <b>NEW</b>						0.9	1.5			
L15893-0330ML						1.6	2.6			
L15894-0390C	3.8	3.9	4.1	0.6	0.9	0.8	1.4	2.2	2.7	
L15894-0390CN <b>NEW</b>										
L15894-0390MA <b>NEW</b>						0.8	1.4			
L15894-0390ML						1.4	2.4			
L15895-0430C	4.1	4.3	4.4	1.0	1.3	0.45	0.75	2.0	2.5	
L15895-0430CN <b>NEW</b>										
L15895-0430MA <b>NEW</b>						0.5	0.8			
L15895-0430ML						0.8	1.4			

\*6: IF=80 mA, QCW (quasi continuous wave) mode (pulse width=100 μs, duty ratio=50%)

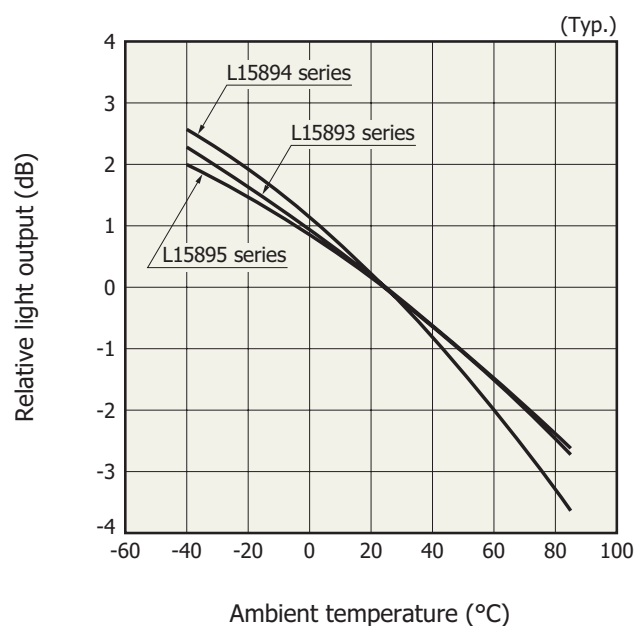
### Emission spectrum



### Pulse forward current vs. pulse forward voltage



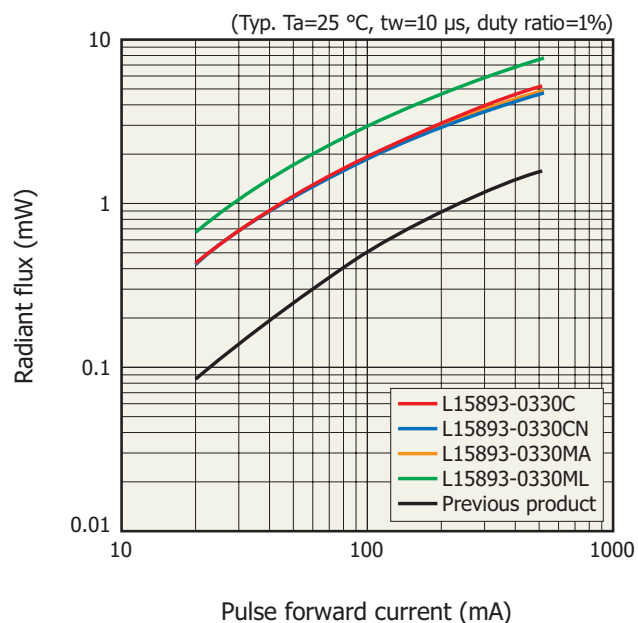
### Light output vs. ambient temperature



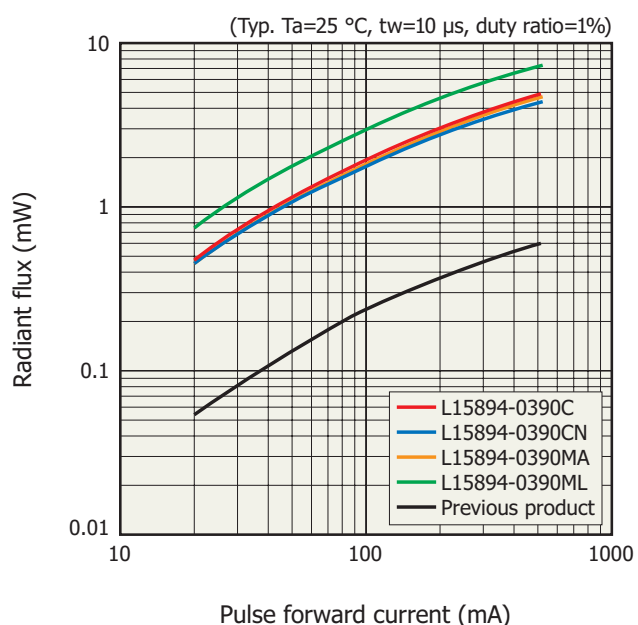
L15893-0330ML, L15894-0390ML, L15895-0430ML:  
operating temperature =  $-20$  to  $+60\text{ }^{\circ}\text{C}$

### ❖ Radiant flux vs. pulse forward current

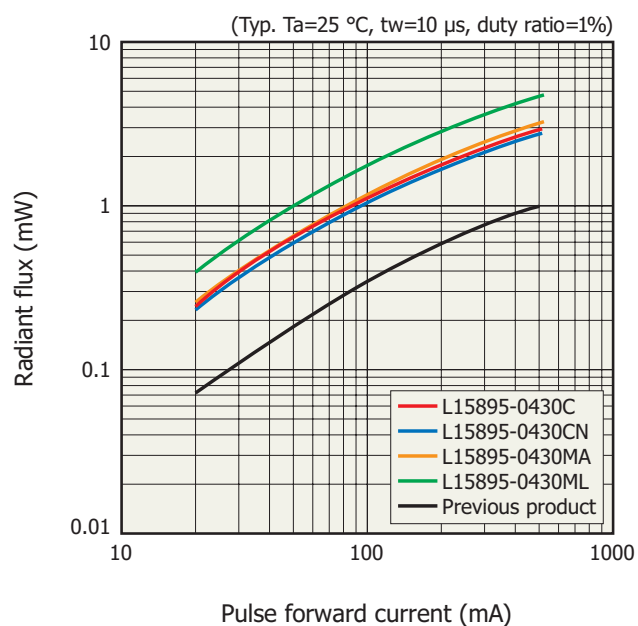
L15893 series



L15894 series

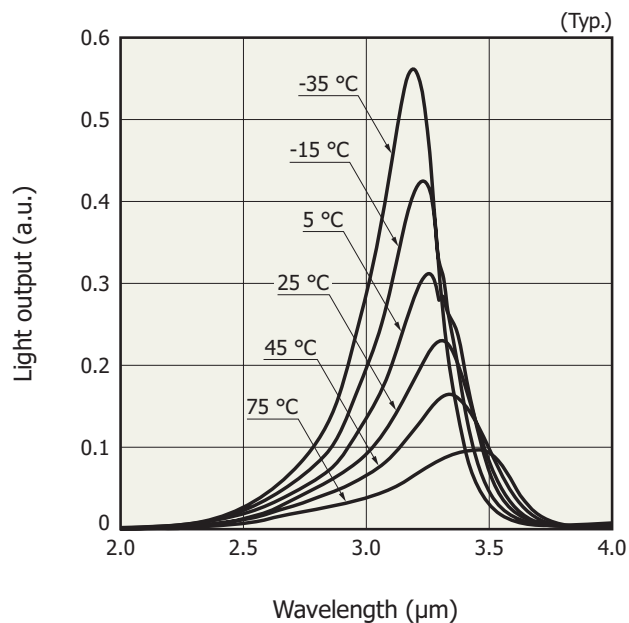


L15895 series

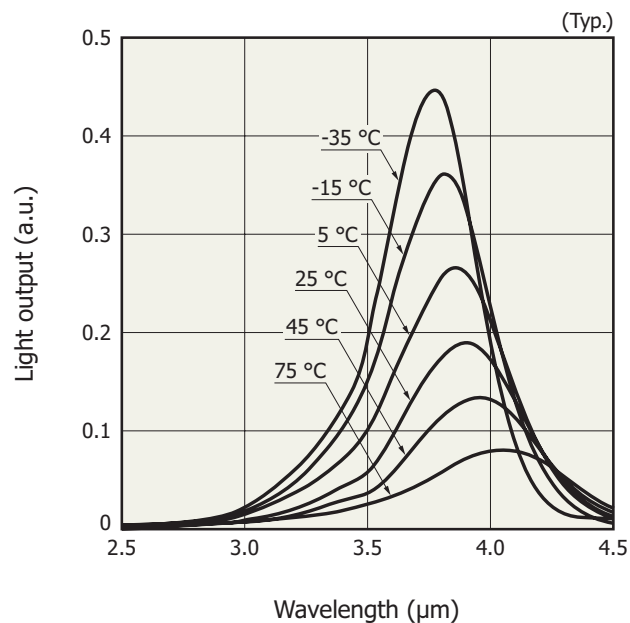


### Temperature characteristics of emission spectrum

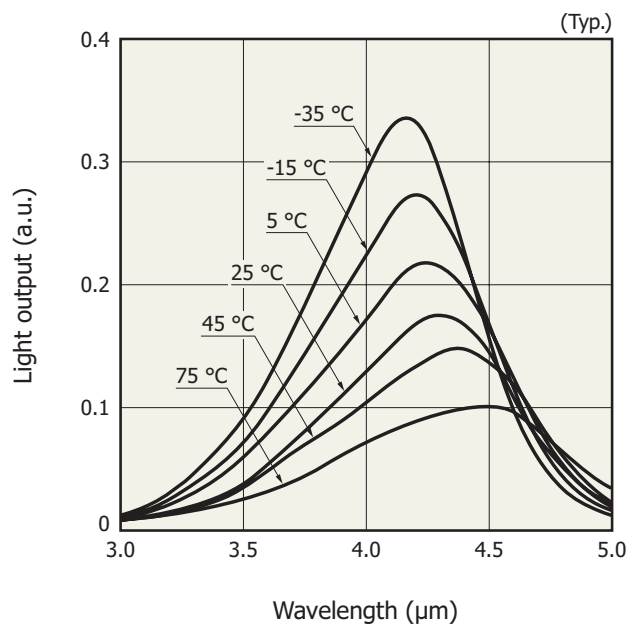
L15893 series



L15894 series



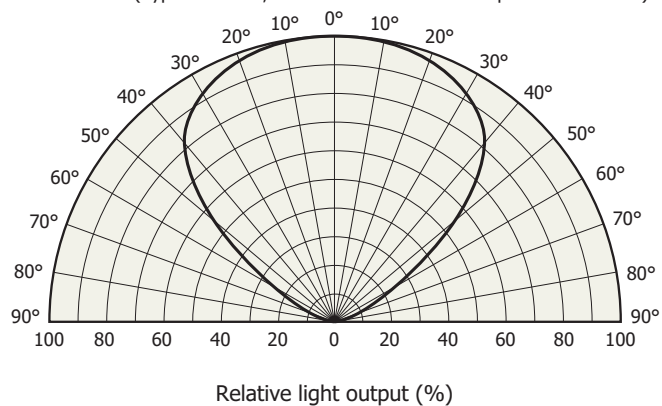
L15895 series



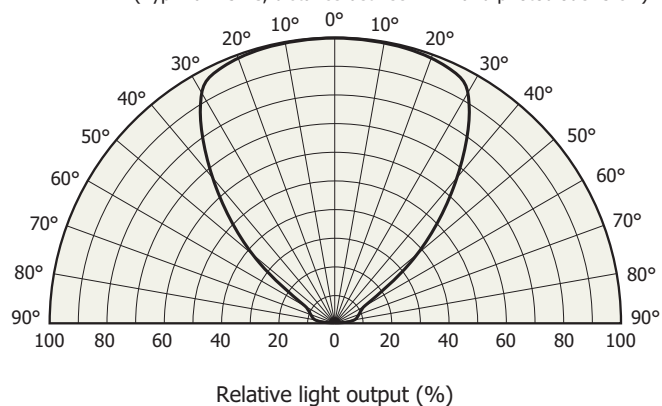
L15893-0330ML, L15894-0390ML, L15895-0430ML:  
operating temperature = -20 to +60 °C

**Directivity**

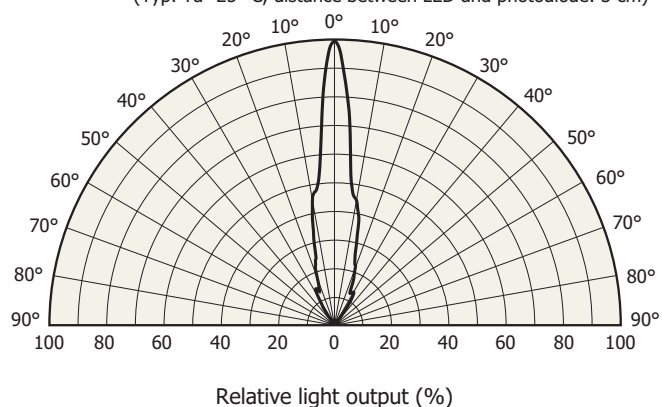
L15893-0330C, L15894-0390C, L15895-0430C

(Typ.  $T_a=25\text{ }^{\circ}\text{C}$ , distance between LED and photodiode: 3 cm)

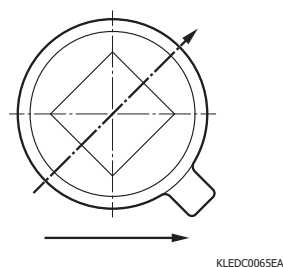
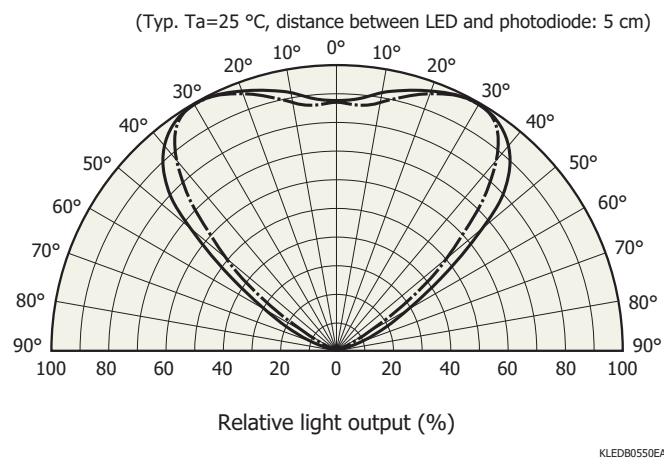
L15893-0330CN, L15894-0390CN, L15895-0430CN

(Typ.  $T_a=25\text{ }^{\circ}\text{C}$ , distance between LED and photodiode: 5 cm)

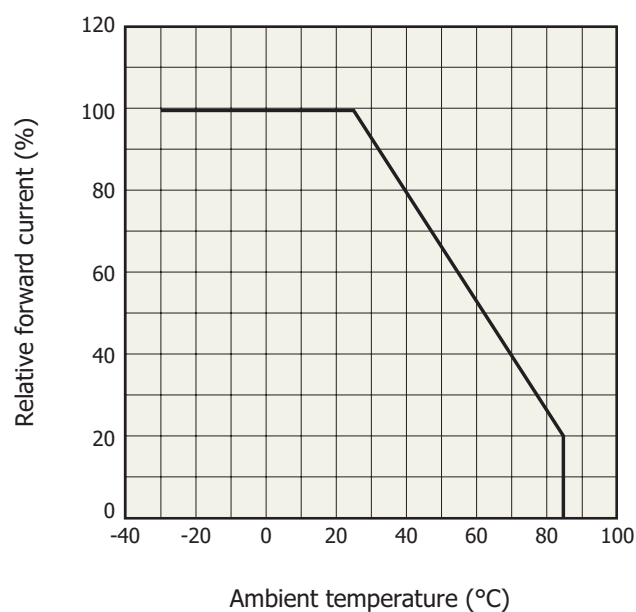
L15893-0330ML, L15894-0390ML, L15895-0430ML

(Typ.  $T_a=25\text{ }^{\circ}\text{C}$ , distance between LED and photodiode: 3 cm)

L15893-0330MA, L15894-0390MA, L15895-0430MA



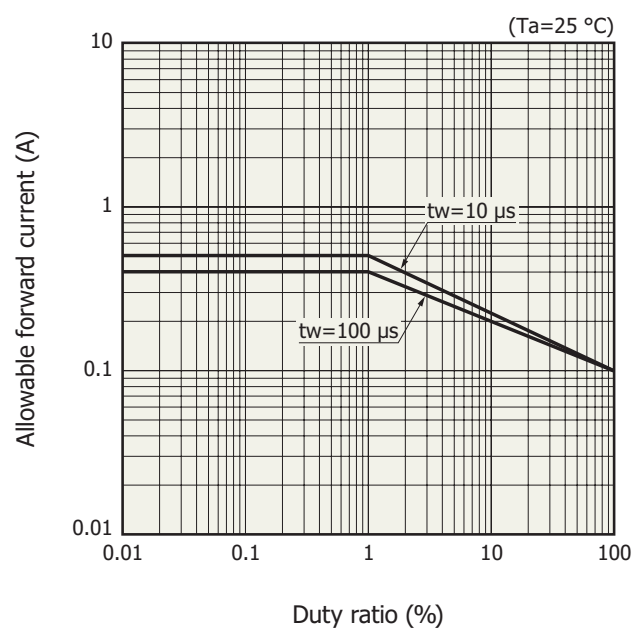
Allowable forward current vs. ambient temperature



L15893-0330ML, L15894-0390ML, L15895-0430ML:  
operating temperature =  $-20$  to  $+60^\circ\text{C}$

KLED80417EB

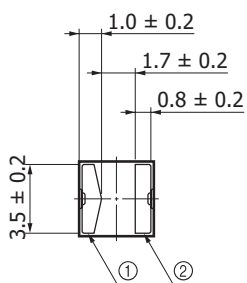
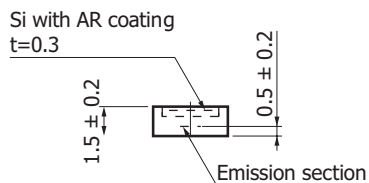
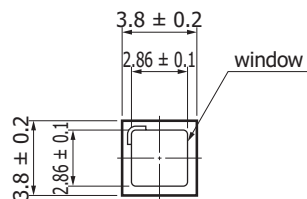
Allowable forward current vs. duty ratio



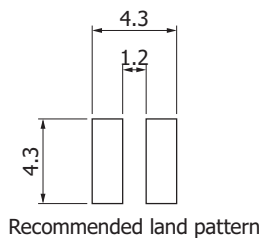
KLED80418EA

### Dimensional outlines (unit: mm)

L15893-0330C, L15894-0390C, L15895-0430C



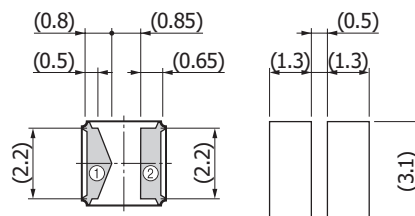
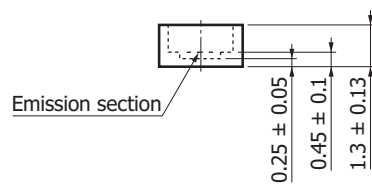
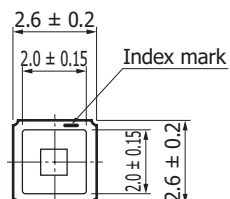
① ○ ➔ ○ ②



Recommended land pattern

KLEDA0105EC

L15893-0330CN, L15894-0390CN, L15895-0430CN



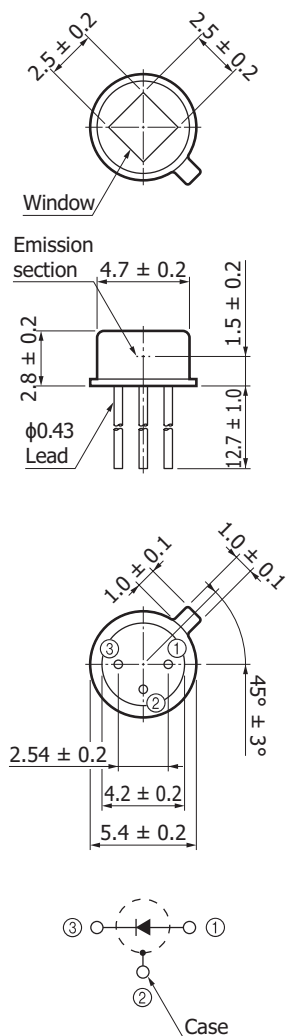
① ○ ➔ ○ ②

Recommended land pattern  
Values in parentheses  
indicate reference values.

KLEDA0114EA

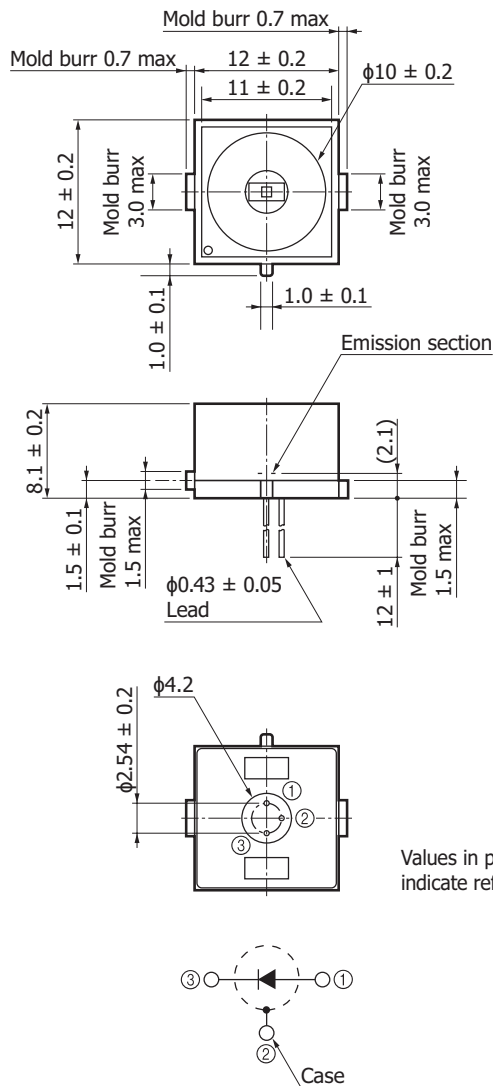


L15893-0330MA, L15894-0390MA, L15895-0430MA



KLEDA0113EA

L15893-0330ML, L15894-0390ML, L15895-0430ML



KLEDA0112EB

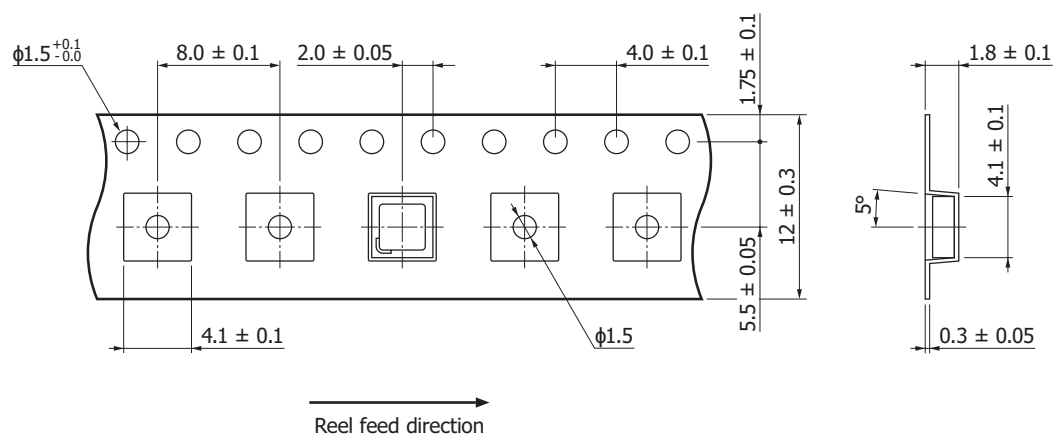
## Standard packing specifications

L15893-0330C, L15894-0390C, L15895-0430C

■ Reel (conforms to JEITA ET-7200)

Outer diameter	Hub diameter	Tape width	Material	Electrostatic characteristics
φ180 mm	φ60 mm	12 mm	PS	Conductive

■ Embossed tape (unit: mm, material: PS, conductive)



KLEDC0060EA

■ Packing quantity

500 pcs/reel

■ Packing state

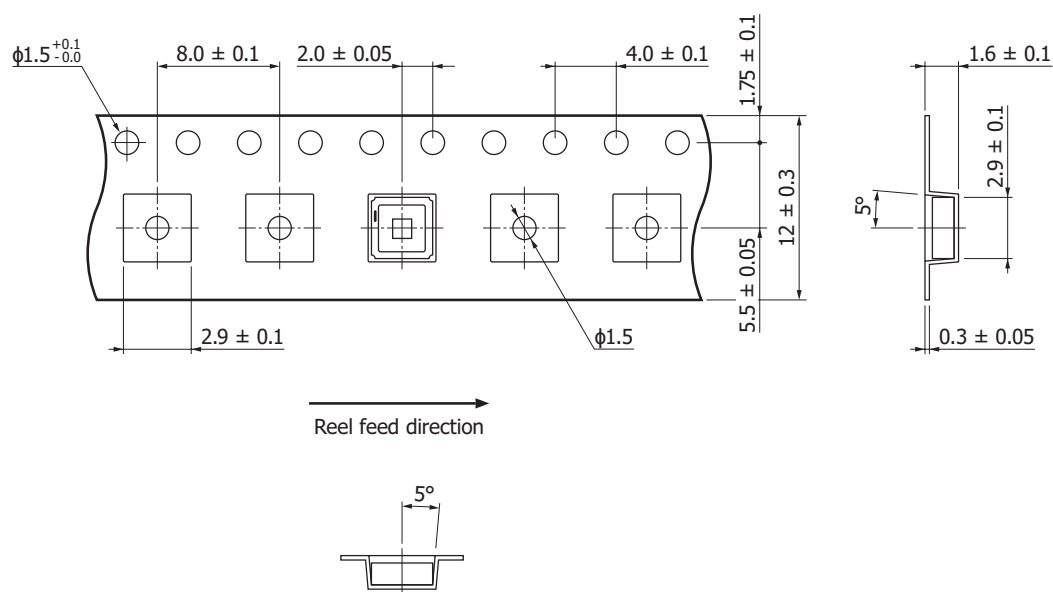
Reel and desiccant in moisture-proof packaging (vacuum-sealed)

L15893-0330CN, L15894-0390CN, L15895-0430CN

## ■ Reel (conforms to JEITA ET-7200)

Outer diameter	Hub diameter	Tape width	Material	Electrostatic characteristics
φ180 mm	φ60 mm	12 mm	PS	Conductive

## ■ Embossed tape (unit: mm, material: PS, conductive)



KLEDC0143EA

## ■ Packing quantity

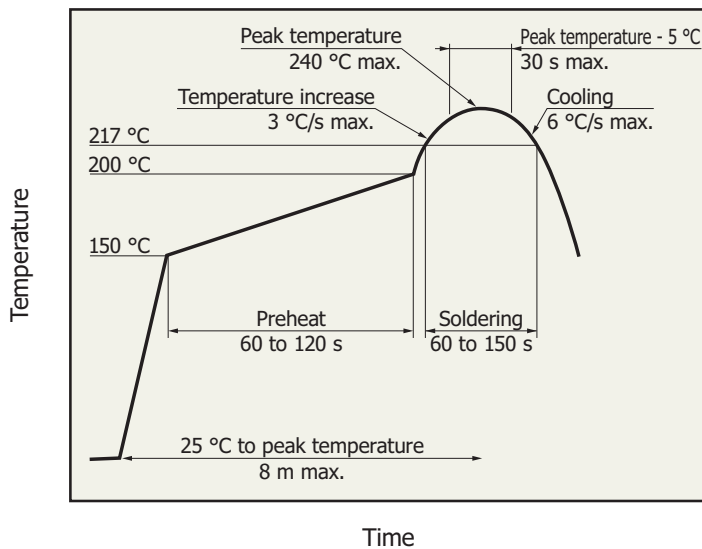
500 pcs/reel

## ■ Packing state

Reel and desiccant in moisture-proof packaging (vacuum-sealed)

## Recommended soldering conditions

L15893-0330C/CN, L15894-0390C/CN, L15895-0430C/CN



KSPD80418EA

- After unpacking, keep it in an environment at a temperature of 5 to 30 °C and a humidity of 60% or less, and perform soldering within 168 hours.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.
- If three months have passed in an unpacked state or the above storage period has passed after opening, perform baking to dehumidify before reflow soldering. For the baking, refer to the precautions "Surface mount type products." When you set baking conditions, check that problems do not occur in the product by testing out the conditions in advance.

L15893-0330MA, L15894-0390MA, L15895-0430MA

Solder temperature: 260 °C (5 s or less, once)

Solder the leads at a point at least 2 mm away from the package body.

L15893-0330ML, L15894-0390ML, L15895-0430ML

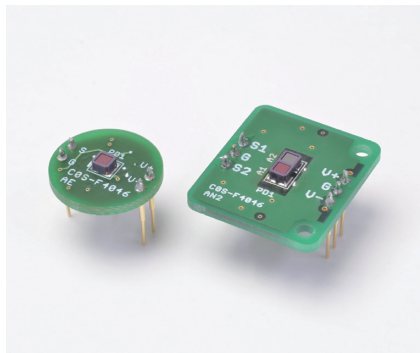
Solder temperature: 230 °C (5 s or less, once)

Solder the leads at a point at least 2 mm away from the package body.

Note: When you set soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

## Related products

### Evaluation kits M16607 series for InAsSb photovoltaic detector



The M16607 series are evaluation kits with an amplifier incorporating Hamamatsu InAsSb photovoltaic detector (ceramic package with band-pass filter). These can detect infrared light transmitted through a band-pass filter simply by connecting a power supply ( $\pm 15$  V). Two-element type that can detect two wavelengths is also available.

## Specifications

- ➔ **Gain: 30 V/V**
- ➔ **Frequency characteristics: DC to 80 kHz**
- ➔ **Recommended drive voltage:  $\pm 15$  V**
- ➔ **Built-in element: InAsSb photovoltaic detector (ceramic package with band-pass filter)**

Type no.	Built-in sensor	Center wavelength ( $\mu\text{m}$ )
M16607-033CF	P16612-033CF	3.3
M16607-039CF	P16612-039CF	3.9
M16607-043CF	P16612-043CF	4.26
M16607-015CF	P16849-011CF	3.3/3.9
M16607-016CF	P16849-012CF	4.26/3.9

### Evaluation kit M16615 for mid infrared LED



Note: LED sold separately

The M16615 is a driver for mid infrared LED (TO-46 package). The LED can be pulse-driven simply by connecting a power supply (+15 V). This is used in combination with the evaluation kit M16607 series for InAsSb photovoltaic detector.

## Specifications

- ➔ **Applicable LED: Mid infrared LED (TO-46 package)**
- ➔ **Output current: 400 mA**
- ➔ **Output pulse: 10  $\mu\text{s}$**
- ➔ **Output cycle: 1000  $\mu\text{s}$**
- ➔ **Recommended drive voltage: +15 V**

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### ■ Precautions

- Disclaimer
- Safety consideration
- Metal, ceramic, plastic package products
- Surface mount type products
- Compound opto-semiconductors (photosensors, light emitters)

### ■ Technical note

- LED

Information described in this material is current as of July 2023.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

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