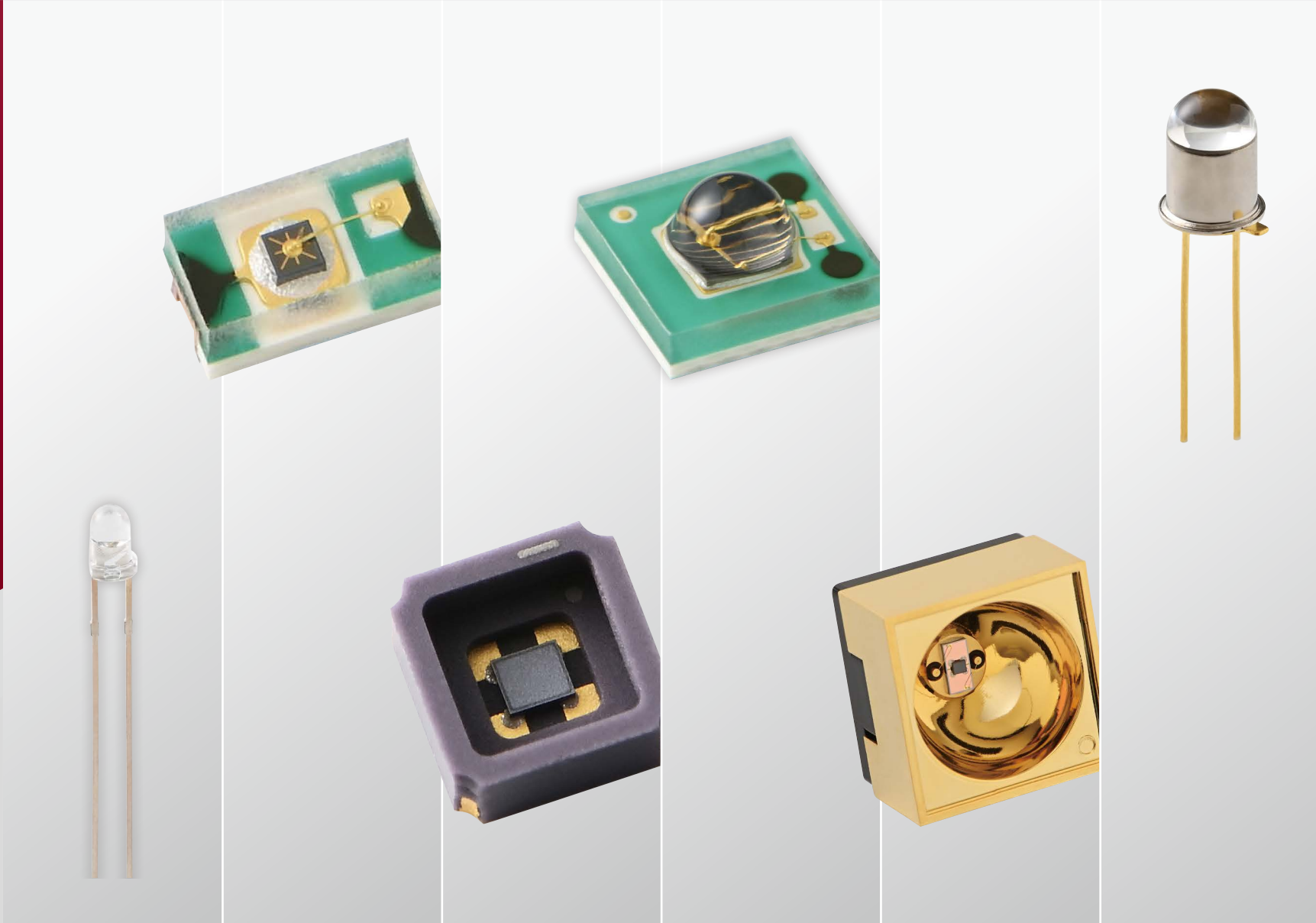


Rich variety of light emitters
for wide range of applications

LED



Rich variety of light emitters for wide range of applications

Hamamatsu provides various LEDs from red to mid infrared range, which are mainly used in combination with a photosensor. By using crystal growth technology and process technology for a variety of compound semiconductor materials, we have a product lineup for a variety of wavelengths. We also achieve high quality and high reliability through strictly controlled assembly and inspection processes.



Hamamatsu LEDs

- Product lineup that covers a wide variety of wavelengths

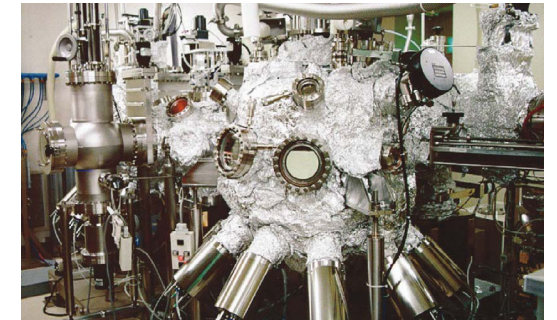
Type	Peak emission wavelength	Main applications
Red LED	650 to 700 nm	Optical switches, POF data communication, barcode readers
Near infrared LED	830 to 945 nm	Optical encoders, optical fiber communication, FSO, optical switches
	1.2 to 1.55 μm	Moisture measurement, analysis, near infrared lighting
Mid infrared LED	3.3 to 4.3 μm	Gas detection
Light emitting/receiving module	870 nm	VICS in-vehicle unit
SIP type LED	650 to 940 nm	Optical links, optical switches, encoders

- Variety of package types

Package	Features
Metal	High reliability
Plastic	Low price
Surface mount type	Compact, thin type
With lens	Narrow directivity
High output	High heat radiation

- Custom devices available

In addition to package and lens design, and multi-element array, we can also support custom specifications, such as wavelength changes that require new epitaxial wafer crystal growth.



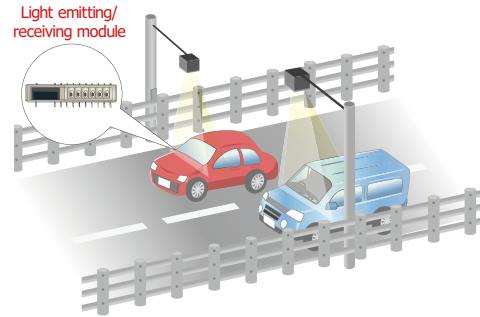
Thin-film crystal growth under ultra-high vacuum in MBE equipment



Thin-film crystal growth with MOCVD equipment

Application examples

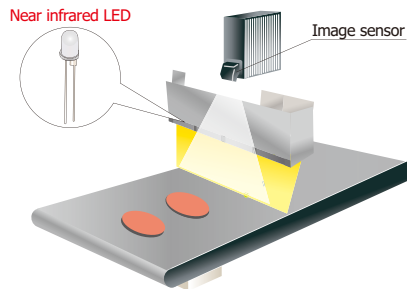
VICS



KLEDC0029EB

Light emitting/receiving modules with built-in LEDs and a photosensor are embedded in VICS in-vehicle devices.

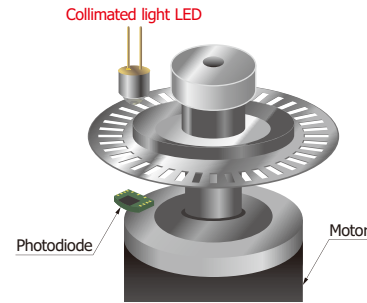
Lighting for infrared cameras



KLEDC0056EA

Infrared LEDs with large output are used as light sources for infrared camera imaging. These LEDs are arranged around the camera.

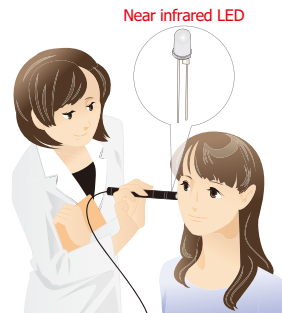
Encoders



KLEDC0054EA

Optical transmission encoders require a collimated LED to achieve high accuracy.

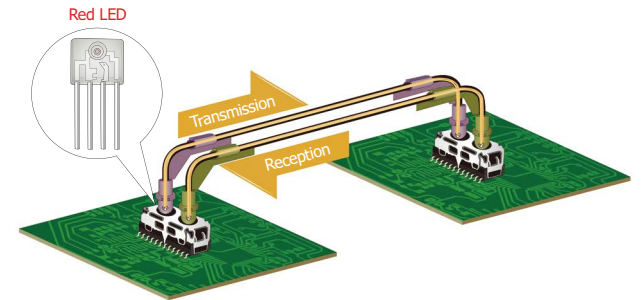
Skin moisture measurement



KLEDC0057EA

Compact near infrared LEDs are used for measuring skin moisture levels.

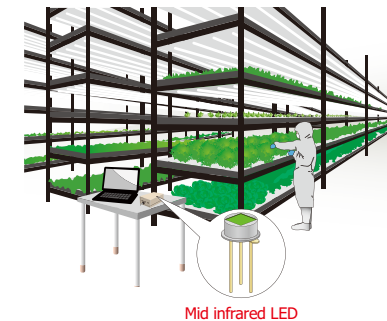
Optical communication



KLEDC0055EA

Red LEDs are used for POF (plastic optical fiber) communications and FSO (free space optics).

Gas detection











KLEDC0058EB

Mid infrared LEDs are used for CO2 density measurements in plant factories.

Red LEDs

Red LEDs have a peak emission wavelength in the 660 to 700 nm range. They are used in a wide range of applications including optical switches, POF data communication, and barcode readers.

(Typ. Ta=25 °C)








Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L10762	660	15	φ0.4	1.0*	1.9	70	20		⑧	High fiber end output	POF data communication
L11767		18	□0.31	13	2.1	6			①	High output, wide directivity	Optical switches
L11767-0066L			φ4.65	7					⑤	High reliability, narrow directivity	
L6108	670	25	□0.25	5.5	1.8	5	20		①	High output, wide directivity	Optical switches
L6112			φ1.15					2.5		②	
L6112-01			φ4.65						⑤	High reliability, narrow directivity	
L6112-02			φ1.15						③	High reliability, wide directivity	
L10363	700	20	φ4.65	1.4	1.7	5	20		⑤	High reliability, narrow directivity	Optical switches

* POF core diameter=φ1 mm, length=1 m, Z (distance between the top surface of the cap and the fiber end)=0.3 mm

830 to 945 nm

These near infrared LEDs have a peak emission wavelength in the 830 to 945 nm range. They are used in a wide range of applications including optical switches and encoders.

(Typ. Ta=25 °C)











Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L14336-0083R	830	40	φ0.75	16	1.5	20	50		②	High output	Optical switches
L11913	850	25	φ4.65	3.4*	1.45	20	20		⑥	High reliability, superior collimation	Encoders
L13141-0085K		30	φ0.11	2.8	1.7	25	50		⑦	Wide directivity, current confinement type	Optical switches
L13142-0085K		35	φ0.4	3					⑧	Narrow directivity, current confinement type	
L13142-0085L		30	φ4.65			⑥					
L14096-0085GL		25	φ1.4	23	1.9	20			⑭	High output, narrow directivity	
L14337-0085R		45	φ0.75	13	1.5	50			②	High output, high-speed response	

* Light output

830 to 945 nm

These near infrared LEDs have a peak emission wavelength in the 830 to 945 nm range. They are used in a wide range of applications including optical switches, optical fiber communication, near infrared lighting, and encoders.

(Typ. Ta=25 °C)



Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L8013	870	45	φ1.15	45 μW*1	1.45	50	30		⑦	Easy fiber alignment	POF data communication
L9337			φ0.75	23	1.42	40	50		②	High output	Optical switches
L9337-01			φ4.65	13					⑤	High reliability, narrow directivity	
L9337-02			φ0.75	10		③	High reliability, wide directivity				
L9437			φ4.65	1.6*2	1.5	30		⑥	High reliability, superior collimation	Encoders	
L10843			□0.39	23	1.45	50	50		①	High output, wide directivity	Optical switches
L11368-01		35	φ1.7	65 μW*3	2	50	50		④	Current confinement type	Optical communication
L12170		45	φ5.0	80	1.45	40	200		⑪	Large current, high output, narrow directivity	Near infrared lighting
				1200	2.4		3000*4				
L12171-0087G			□0.24	18	1.55	50		⑬	Surface mount type, compact	Optical switches	
L12756	φ3.0		23	1.5							⑫

*1: PCF200 fiber end output *2: Light output *3: GI50 fiber end output *4: Pulse value=10 μs, duty ratio=1%

830 to 945 nm

These near infrared LEDs have a peak emission wavelength in the 830 to 945 nm range. They are used in a wide range of applications including optical switches and near infrared lighting.

(Typ. Ta=25 °C)








Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L14097-0094GL	940	40	φ1.4	60	2.5	10	50		⑮	Large current, high output	Near infrared lighting
				1200	3.0		1000*				
L9338	945	60	φ0.75	15	1.34	0.3	50		②	High output	Optical switches

* Pulse value=10 μs, duty ratio=1%

1.2 to 1.55 μm

These high output near infrared LEDs have a peak emission wavelength at 1 μm or higher. 1.2 μm , 1.3 μm , 1.45 μm , and 1.55 μm peak emission wavelength types are available. They are used for analysis, near infrared lighting, etc.









(Typ. Ta=25 °C)

Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L13072-0120K	1200	80	ϕ 1.15	2.2	1.1	15	50		③	High reliability, high output	Analysis, near infrared lighting
L13072-0120L			ϕ 4.65	3.2					⑤		
L13072-0120P			ϕ 3.0	5					⑫	High output, narrow directivity	
L13072-0120G			\square 0.31	4.4					⑬	Surface mount type, compact	
L12771	1300	90	ϕ 1.15	2.8	1	15	50		③	High reliability, high output	Analysis, near infrared lighting
L12771-01			ϕ 4.65	3.1					⑤		
L12771-0130G			\square 0.31	4.4					⑬	Surface mount type, compact	

1.2 to 1.55 μm

These high output near infrared LEDs have a peak emission wavelength at 1 μm or higher. 1.2 μm , 1.3 μm , 1.45 μm , and 1.55 μm peak emission wavelength types are available. They are used for moisture measurements, analysis, near infrared lighting, etc.



(Typ. Ta=25 °C)

Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Emitter area (mm)	Radiant flux (mW)	Forward voltage (V)	Cutoff frequency (MHz)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current (mA)				
L10660	1450	120	ϕ 1.15	2.4	1	15	50		③	High reliability	Moisture measurement, near infrared lighting
L10660-01			ϕ 4.65	2.8					⑤		
L13895-0145P			ϕ 3.0	5		⑫		High output			
L13895-0145G			\square 0.31	4				⑬	Surface mount type, compact		
L12509-0155K	1550	120	ϕ 1.15	1.9	0.8	15	50		③	High reliability, high output	Analysis, near infrared lighting
L12509-0155L			ϕ 4.65	2.7					⑤		
L12509-0155P			ϕ 3.0	3.8		⑫		High output			
L12509-0155G			\square 0.31	3				⑬	Surface mount type, compact		

Mid infrared LEDs

Mid infrared LEDs with peak emission wavelengths in the mid infrared region (3.3 μm, 3.9 μm, 4.3 μm) feature high output and are used for gas detection. They are used in combination with quantum type detectors such as InAsSb photovoltaic detectors.

(Typ. Ta=25 °C)





Type no.	Peak emission wavelength* (nm)	Spectral half width* (nm)	Emitter area (mm)	Radiant flux* (mW)	Forward voltage* (V)	Rise time max. (μs)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current QCW mode (mA)				
L15893-0330C	3300	400	0.67 × 0.77	1.3	2.7	1	80		⑩⑥	Surface mount type	Methane detection
L15893-0330CN NEW									⑩⑦	Surface mount type, windowless	
L15893-0330MA NEW									⑩⑩	High output, high reliability	
L15893-0330ML									⑩⑨	High output, narrow directivity	
L15894-0390C	3900	600	0.67 × 0.77		2.2	1	80		⑩⑥	Surface mount type	Reference light source for gas detection
L15894-0390CN NEW									⑩⑦	Surface mount type, windowless	
L15894-0390MA NEW									⑩⑩	High output, high reliability	
L15894-0390ML									⑩⑨	High output, narrow directivity	

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

Mid infrared LEDs

Mid infrared LEDs with peak emission wavelengths in the mid infrared region (3.3 μm, 3.9 μm, 4.3 μm) feature high output and are used for gas detection. They are used in combination with quantum type detectors such as InAsSb photovoltaic detectors.

(Typ. Ta=25 °C)

Type no.	Peak emission wavelength* (nm)	Spectral half width* (nm)	Emitter area (mm)	Radiant flux* (mW)	Forward voltage* (V)	Rise time max. (μs)	Measurement condition	Photo	Directivity	Features	Application examples
							Forward current QCW mode (mA)				
L15895-0430C	4300	1000	0.67 × 0.77	0.75	2	1	80		⑩⑥	Surface mount type	CO2 detection
L15895-0430CN NEW								⑩⑦	Surface mount type, windowless		
L15895-0430MA NEW								⑩⑩	High output, high reliability		
L15895-0430ML								⑨	High output, narrow directivity		

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

Evaluation kit for mid infrared LED

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.



Note: LEDs are sold separately

Specifications


- Applicable LED: Mid infrared LED (TO-46 package)
- Output current: 400 mA
- Output pulse: 10 μ s
- Output cycle: 1000 μ s
- Recommended drive voltage: +15 V

Special LEDs

Light emitting/receiving module

This VICS in-vehicle module employs six 870 nm LED chips and one Si photodiode in a plastic package.

(Typ. Ta=25 °C)




Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Pulse radiant intensity*1 (mW/sr)	Pulse forward voltage*1 (V)	Cutoff frequency (MHz)	Measurement conditions	Photo
						Pulse forward current (mA)	
P12793	870*2	45*2	1550	6.7	15	900	

*1: 64 kHz, duty ratio=50%, 4 ms ON, average peak value during pulse drive *2: IF=100 mA

SIP type LEDs

These are compact, plastic SIP (single inline package) LEDs with a lens in which the LED chip is molded in transparent resin.

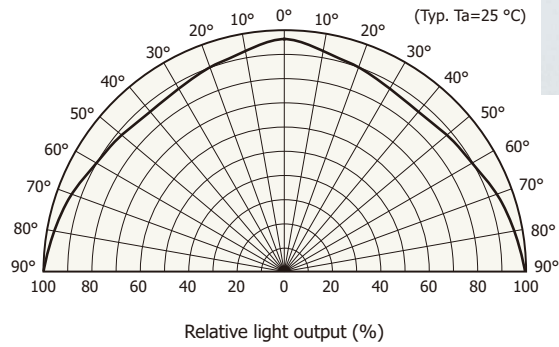
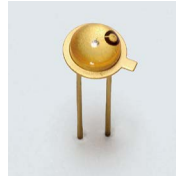
(Typ. Ta=25 °C)

Type no.	Peak emission wavelength (nm)	Spectral half width (nm)	Radiant flux (mW)	Forward voltage (V)	Measurement condition	Application examples	Directivity	Photo
					Forward current (mA)			
L10881	650	25 max.	-4.5 dBm*3	1.9	20	High output for 156 Mbps optical link	18	
L5276	880	50	2.2	1.3	20	For optical switches	19	
L6286	940	45	0.8*4	1.25				
L6895-10	940	60	1.2*4	1.25	20	For encoders	20	

*3: Fiber coupling optical output *4: minimum value

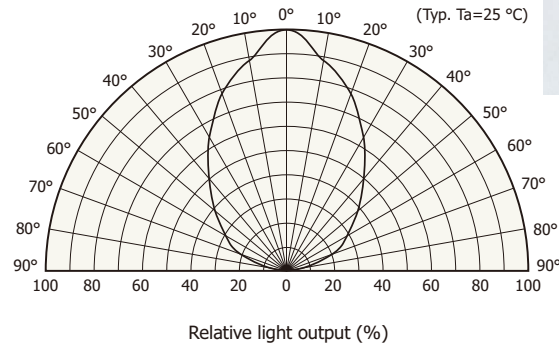
Metal package

① Resin potted type (no reflector)



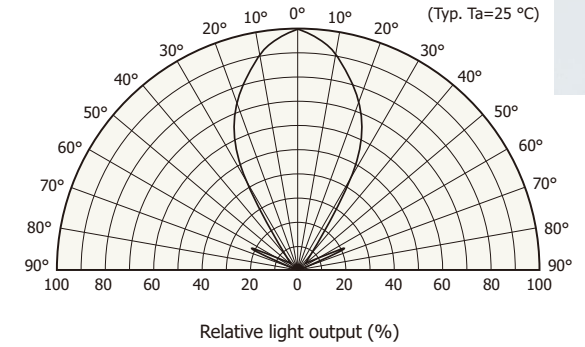
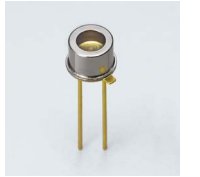
KLEDB0348EA

② Resin potted type (with reflector)



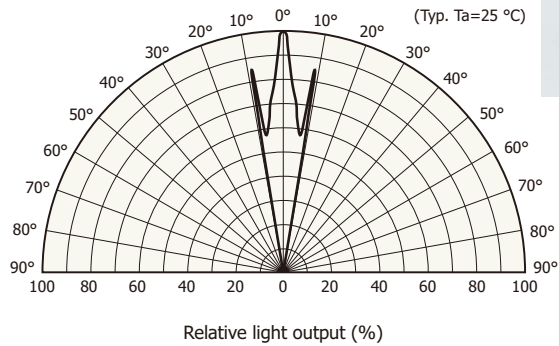
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③ Flat cap



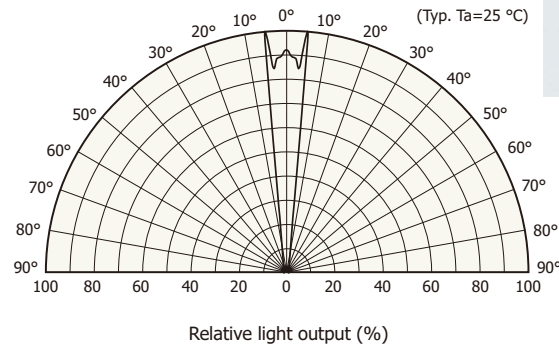
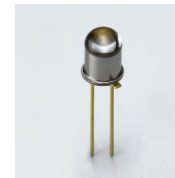
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④ With mini lens



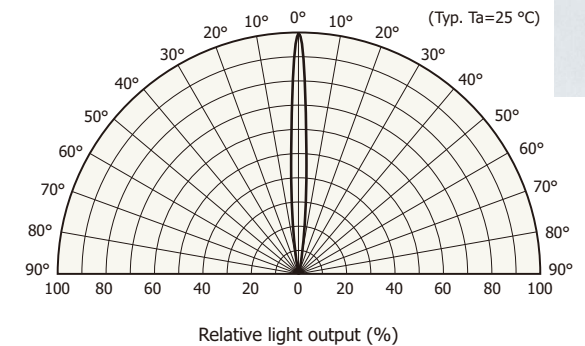
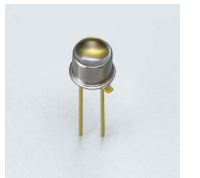
KLEDB0463EA

⑤ With lens



KLEDB0475EA

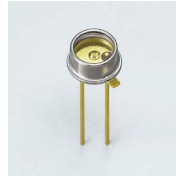
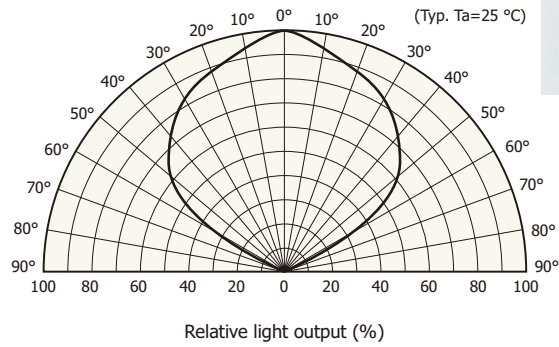
⑥ With lens (superior collimation)



KLEDB0396EA

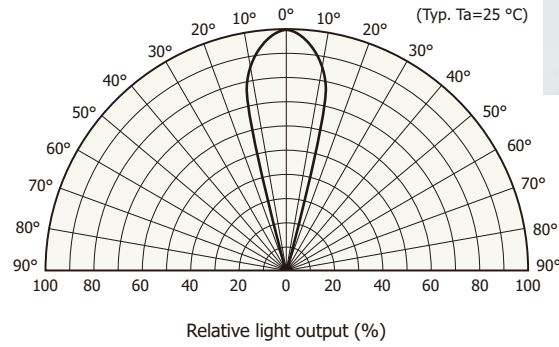
Metal package

⑦ Low-profile flat cap



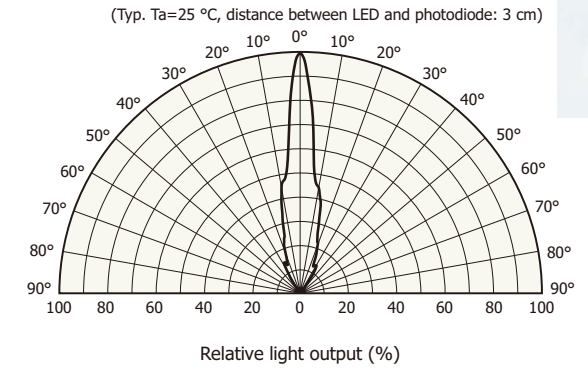
KLEDB0422EA

⑧ With ball lens



KLEDB0477EA

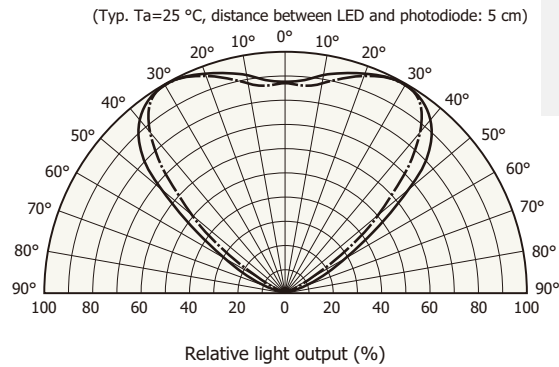
⑨ With reflector



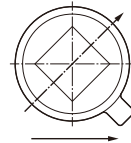
KLEDB0549EA

Plastic package

⑩ With AR coating

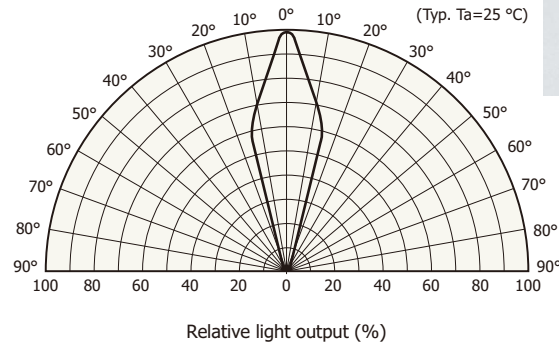


KLEDB0550EA



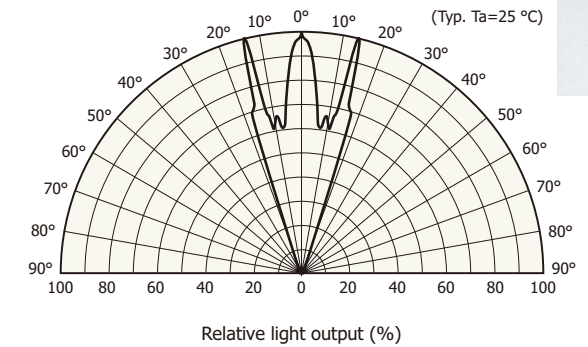
KLEDC0065EA

⑪ Bullet-shaped (φ5 mm)



KLEDB0375EA

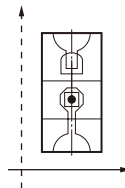
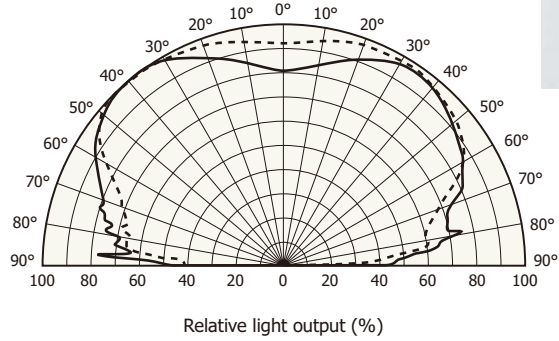
⑫ Bullet-shaped (φ3 mm)



KLEDB0386EA

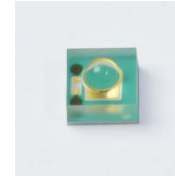
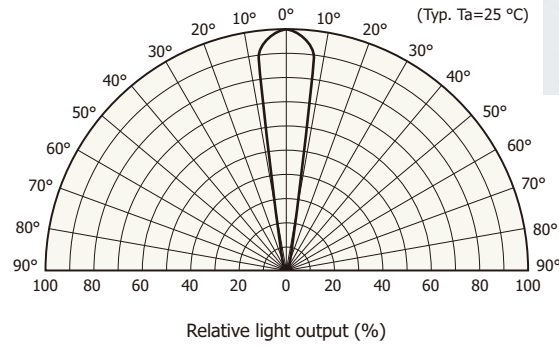
Surface mount type

⑬ COB (chip-on-board)



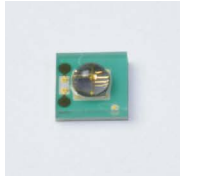
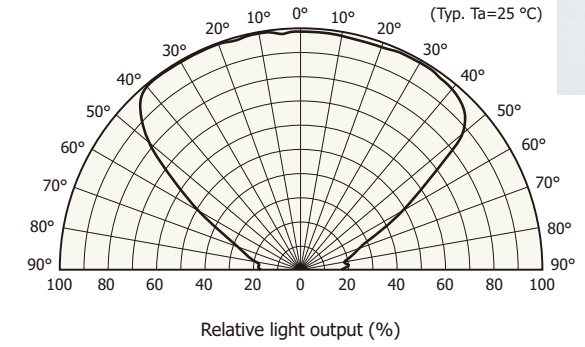
KLEDB0461EA

⑭ COB with lens (narrow directivity)



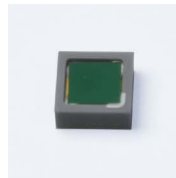
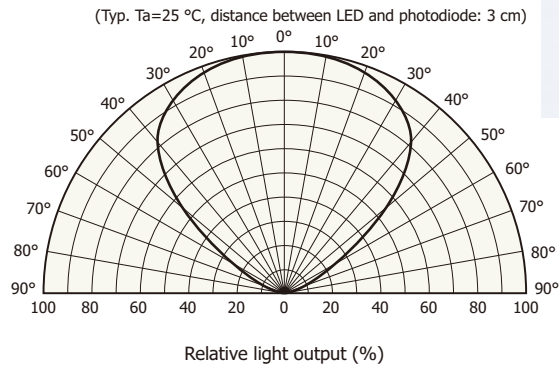
KLEDB0462EA

⑮ COB with lens (large output)



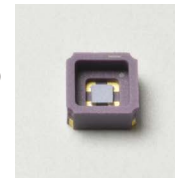
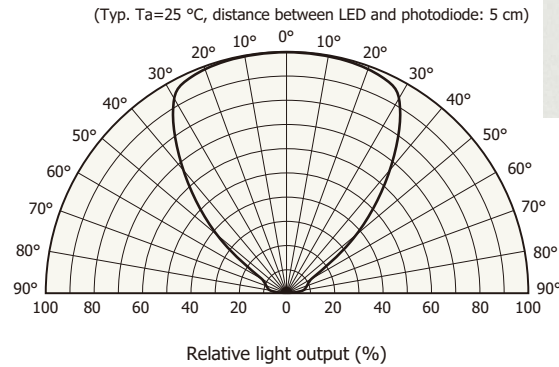
KLEDB0500EA

⑯ Ceramic type



KLEDB0464EA

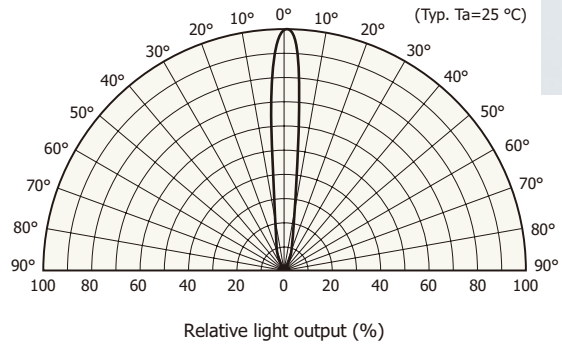
⑰ Ceramic type (windowless)



KLEDB0554EA

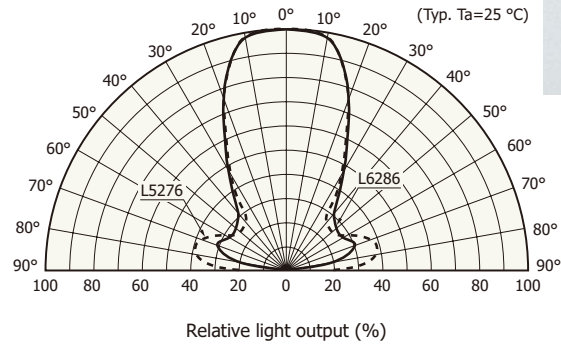
SIP type LEDs

⑱ For optical link



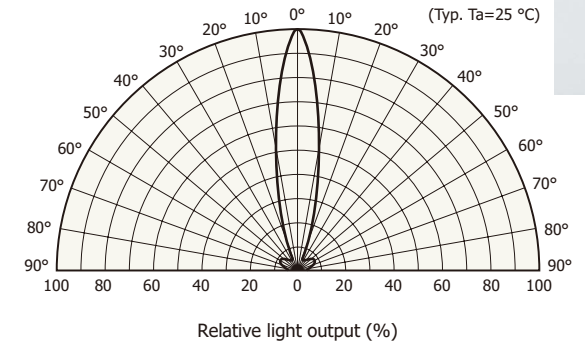
KLEDB0564EA

⑲ For optical switch



KLEDB0565EA

⑳ For encoder



KLEDB0566EA

● Precautions

[Disclaimer](#)

[Safety consideration](#)

[Metal, ceramic, plastic package products](#)

[Unsealed products](#)

[Surface mount type products](#)

[Compound opto-semiconductors \(photosensors, light emitters\)](#)

● [Inquiries from online](#)

www.hamamatsu.com

- Information described in this material is current as of August 2023.
- Product specifications are subject to change without prior notice due to improvements or other reasons. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

HAMAMATSU PHOTONICS K.K.

KLED0002E15 Aug. 2023 DN

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