Data sheet

Part number : KUA0118A

2011/65/EU, (EU)2015/863
10 Substances regulation compliant

Package	Reflector sensor for long distance (Digital output)
Product features	・Outer dimension：32.8 x 12.5 x 10 (L x W x H) ・Integrated IRED and Photo IC ・Compact small package ・Detection distance: to 1,000mm (adjustable by external resistance) ・RoHS :2011/65/EU, (EU)2015/863 compliant

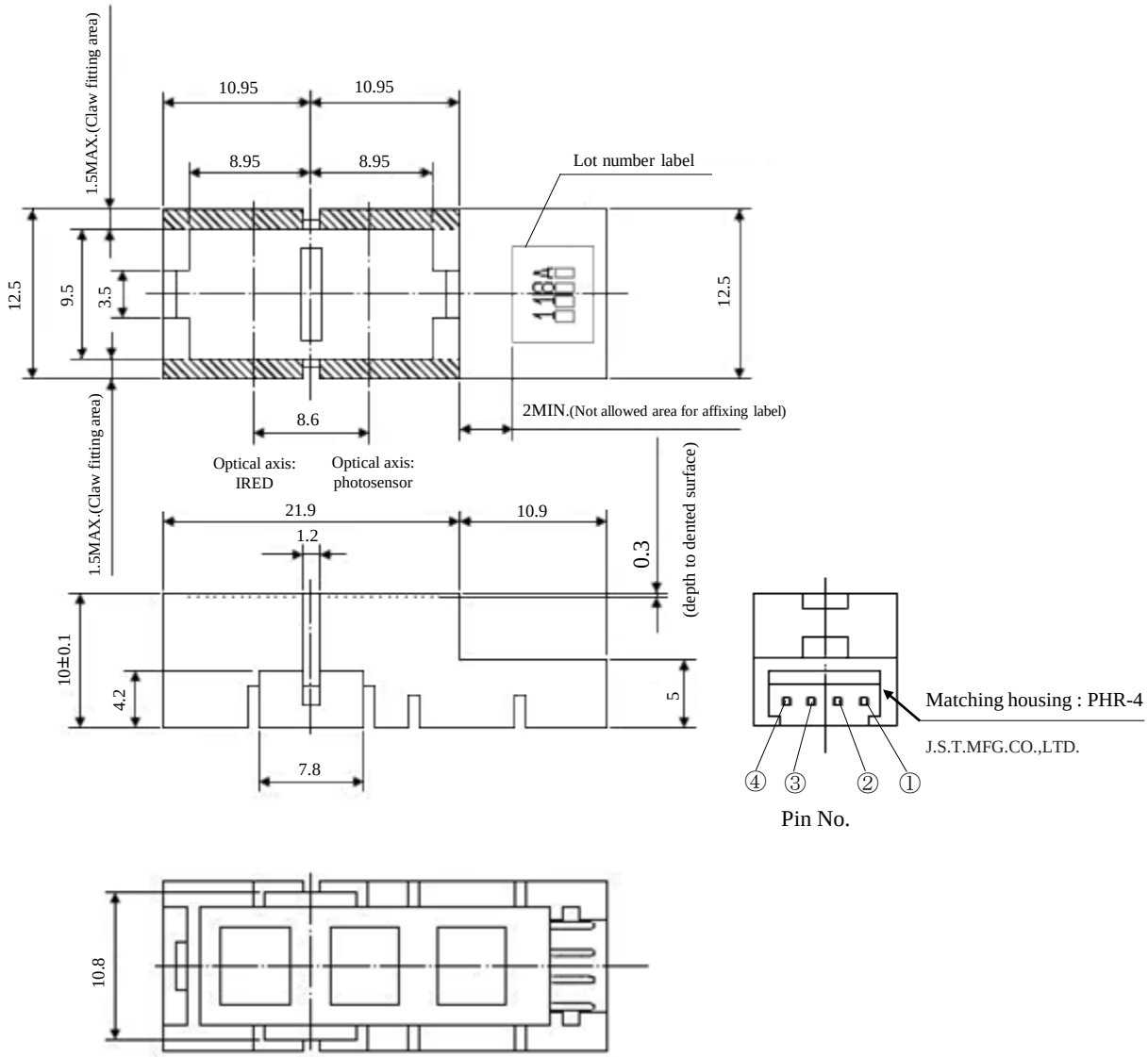
Recommended applications

Motion sensor , OA , AV , PC , Amusement equipment , ATM , Bidet toilet seat, etc.

Outline dimensions

KUA0118A

Unit : mm
Weight : 2.9g
Tolerance : ±0.2



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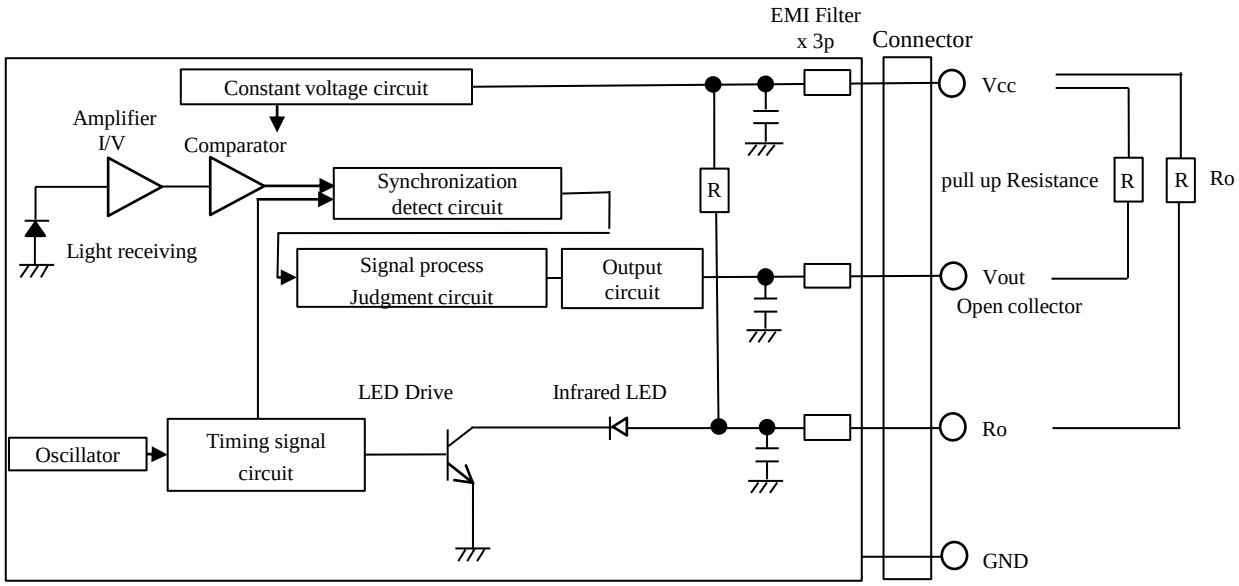
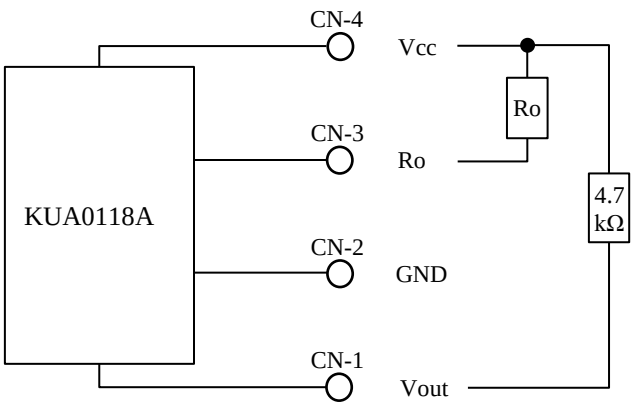
Specifications

【Sensor circuit block diagram】



【Connection diagram】



Specifications

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【Characteristic of the product】

（Ta=25℃ Vcc=5V Ambient Brightness=0Lux.）

Detective method	Infrared reflection method	
Supply voltage	DC 5V ±5%	
Current consumption	100 mA max.（Average） 500 mA max.（Peak）	
Detection distance	1,000 mm max.	Note1
Output	Open collector	
Output signal	Object detection (ON=L) V_{OL} = 0.5 V max. Object non-detection (OFF=H) V_{OH} = 4.5 V min.	Note2
Response time	5 msec	Note3
Acceptable ambient brightness	3,000 Lx	Note4
Operating temperature	0 to +60℃	
Operating humidity	+10 to +90% RH	
Storage temperature	-30 to +70℃	
Storage humidity	+5 to +95% RH	

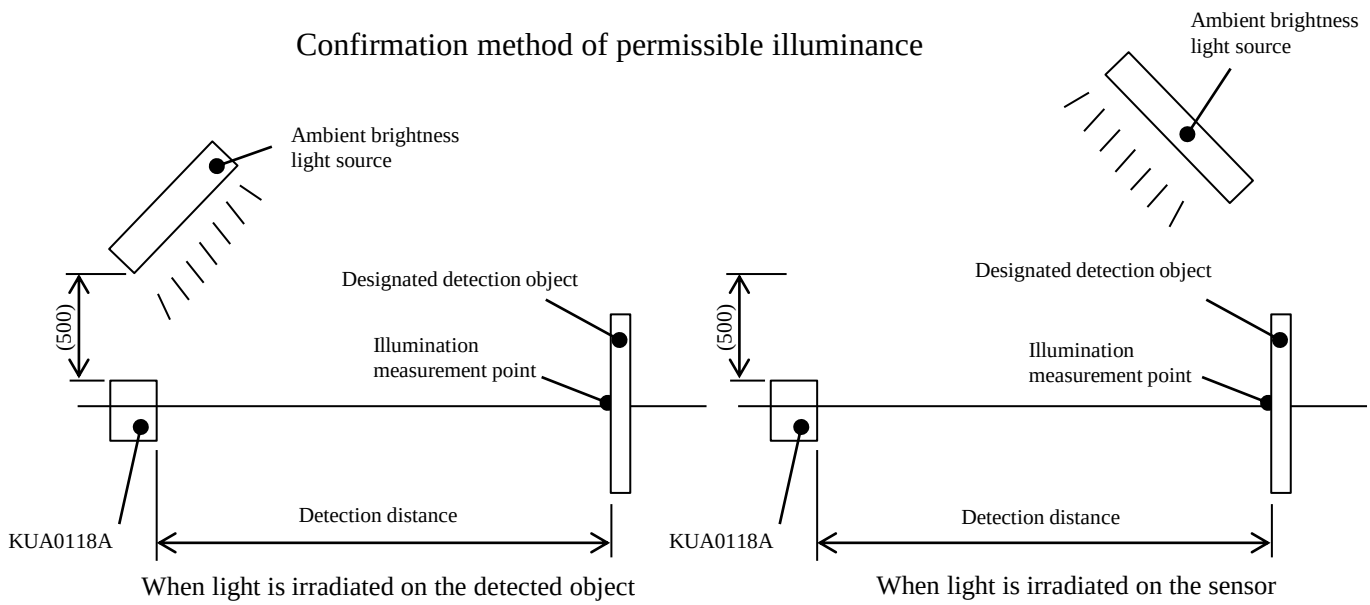
Note1 Detective thing: 90% Reflective paper (White Paper) 300 mm × 300 mm
detective center

Note2 Pullup to 5 V by 4.7 kΩ resistance

Note3 Than object detection output ON time ,than object non-detection output OFF time.

Note4 Under fluorescent lamps and incandescent lamps.

Confirmation method of permissible illuminance

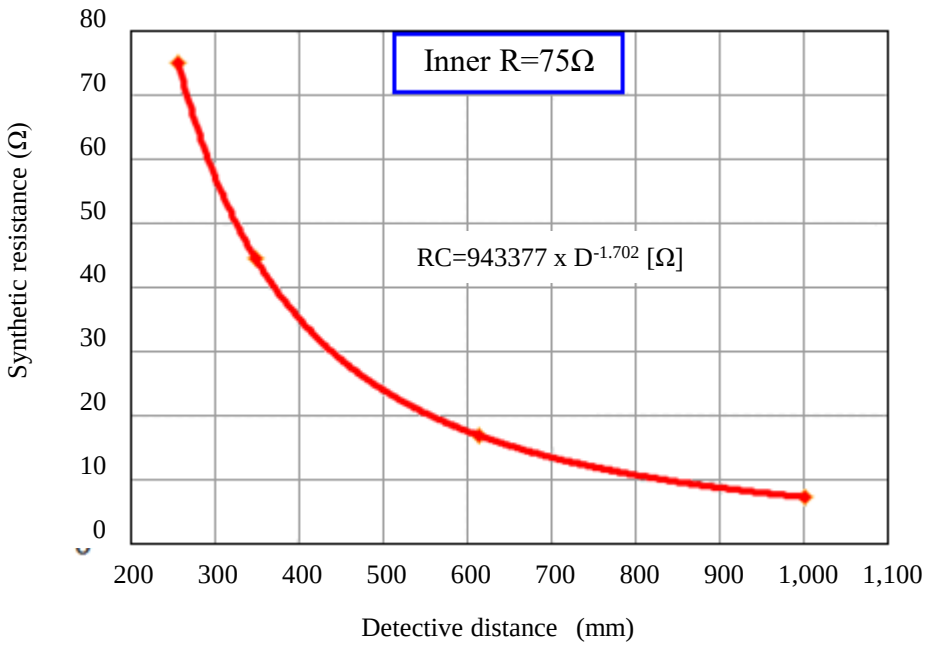


Specifications

【Calculation method of the external resistance level】

Detective distance setting
The detective distance sets it by external resistance.

D : Detective distance [mm]
Rc : Synthetic resistance =943377 x $D^{-1.702}$ [Ω]



calculate a resistance level external than synthetic resistance

$$\text{External resistance Ro}[\Omega] = \frac{Rc \times 75}{75 - Rc}$$

Technical data

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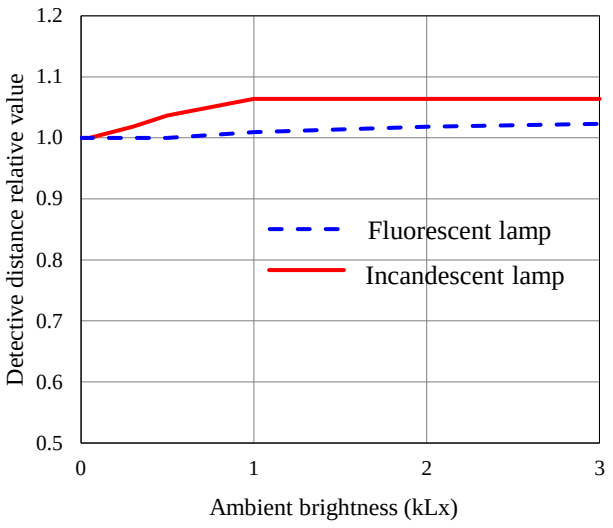
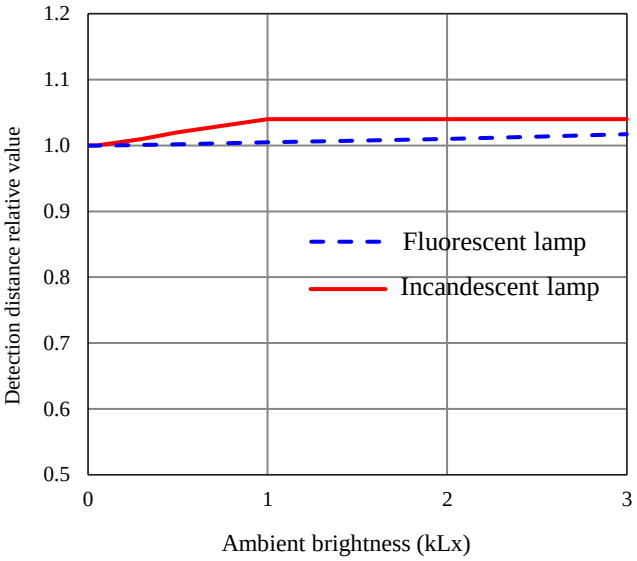
Ambient brightness vs. Detective distance

Ta=25℃、Vcc=5V



Ambient light vs. detection Distance characteristics

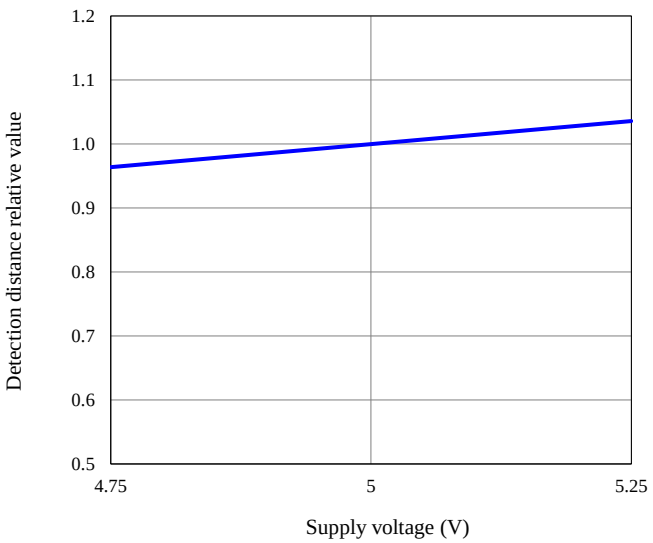
Ta=25℃、Vcc=5V



Detective thing：90% Reflective paper (white paper)　300mm x 300mm

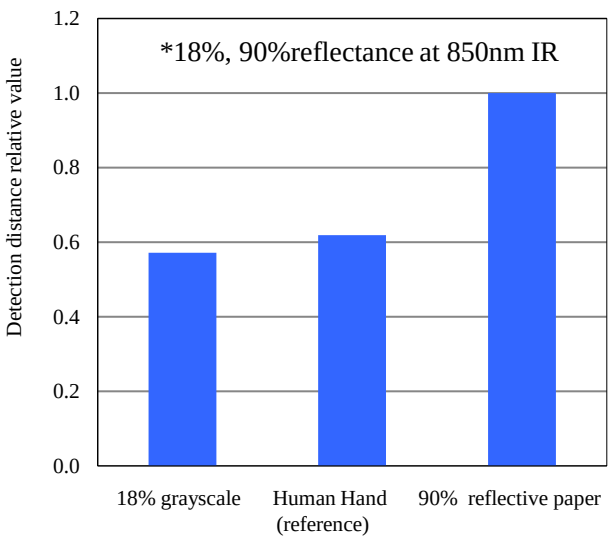
Supply voltage fluctuation characteristics vs. Detection distance

Ta=25℃



Detected object reflectance

Ta=25℃, Vcc=5V



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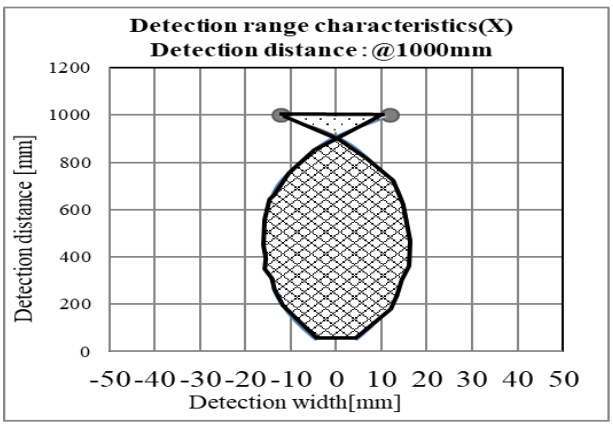
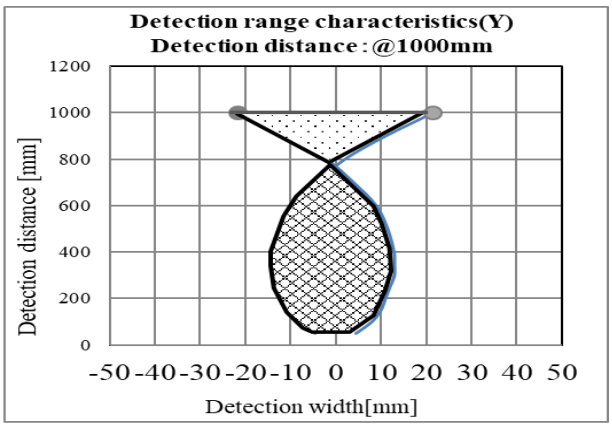
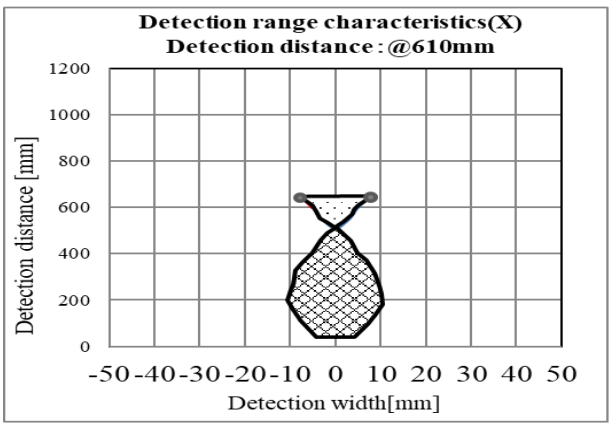
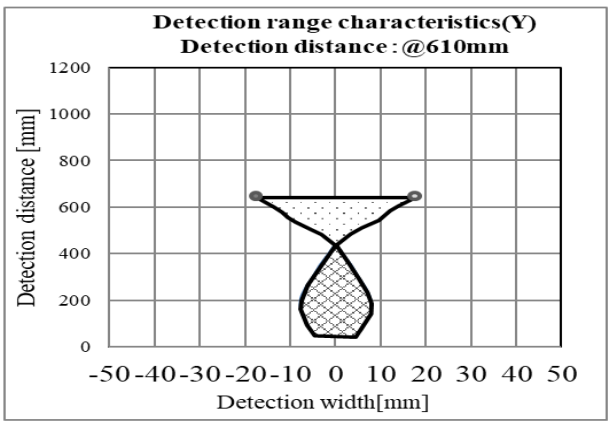
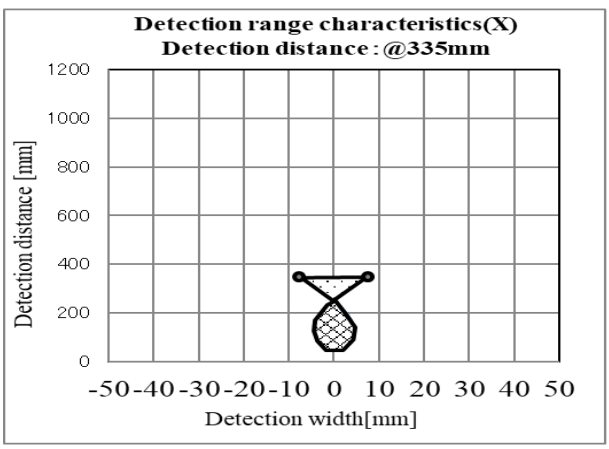
Technical data

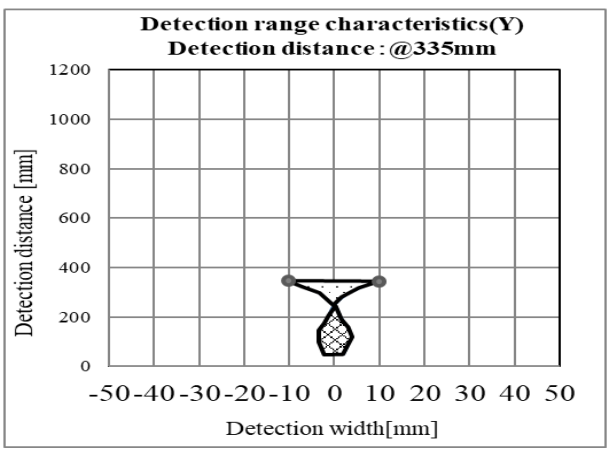








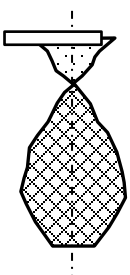




Dot area

Detects when a detected object enters the entire area.

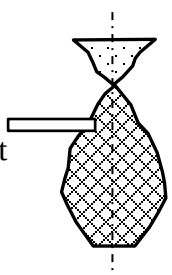
object



Hatching area

Detects when a detected object enters a part of the area.

object



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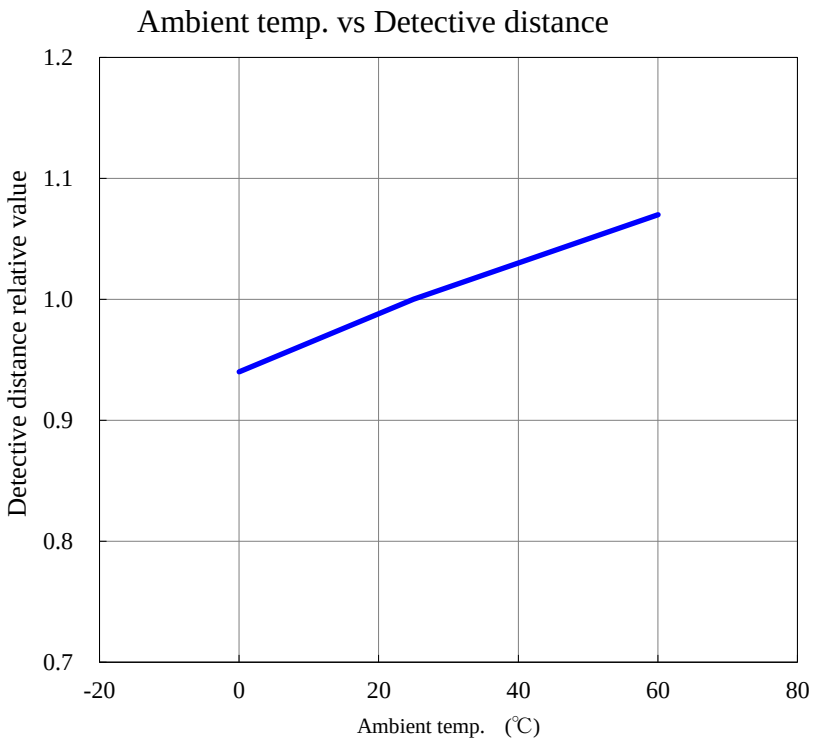
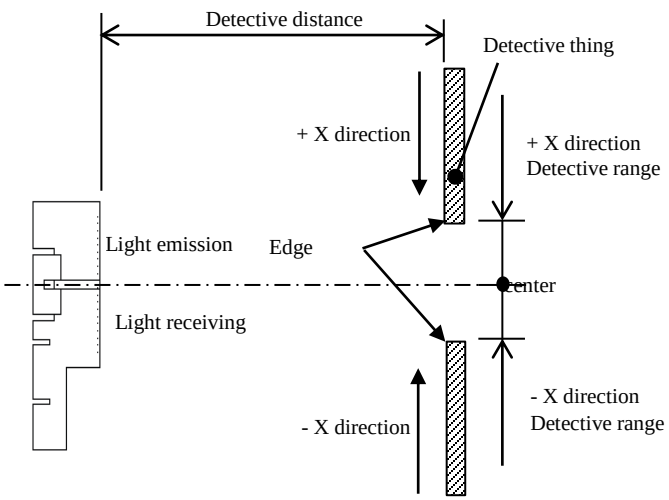
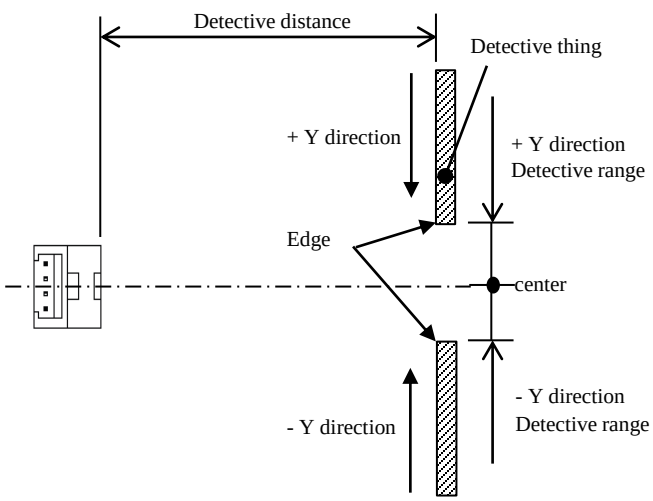
Technical data





X direction



Y direction

Handling precaution

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1.Handling and installing
If excessive force or heat is applied to the lamp house or lens when handling or installing the sensor, the lamp house or lens may be damaged, the optical axis may be changed, and the sensor may be damaged or the characteristics may be degraded.

2.About sensor installation
In general, a sensor has a range to detect an object.
If there is an object that is different from the specified object within the detection range, the sensor will detect that object. This range varies depending on the detected object, optical axis variation, and distance.
When installing the sensor in a narrow place, please ensure that there is no influence from other object.
In addition, the sensor characteristics may change if the sensor is mounted in a different positional relationship from the detection object described in the specifications.

3.Attaching the filter to the front of the sensor
The detection distance varies greatly depending on the filter setting conditions.

4.Detected objects
Detecting distance changes as the reflectance of the object changes.
Also, the background may also be detected depending on the reflectance and detection distance.

5.Dust and dirt
Detecting distance will change if dust or dirt adheres to the lens in front of the sensor.
Please wipe off with a lens paper to avoid scratching.

6.Condensation
Occurs when the temperature changes suddenly under high temperature and humidity, and may cause sensor output drop, malfunction, insulation deterioration, etc.

7.Freezing
Moisture such as condensation may freeze in temperature less than 0 ℃, causing sensor output to drop, malfunction, and insulation deterioration.

8.Noise and power supply ripple
This sensor is equipped with a 10μF capacitor between Vcc and GND to eliminate noise and ripple, but please be careful when designing a large ripple.

9.Static electricity
This sensor satisfies for each one time of HBM ±2kV (JEITA ED-4701/302).

10.Outside surge
Since this sensor does not take measures against external surges, use a surge absorber in the external circuit.
We will conduct a noise resistance test with the sensor installed to the equipment, confirm the noise resistance on Stanley and customer discuss if significant noise resistance performance degradation occurs.

11.Chemical resistance
Polycarbonate (PC) and polyphenylene sulfite (PPS) are used in this sensor.
Please set the environment referring to the chemical resistance of each resin.

12.Waterproof
This sensor is not waterproof. Take appropriate measures as necessary.

13.Purpose of use
This sensor is aimed for use to general electronic equipment.

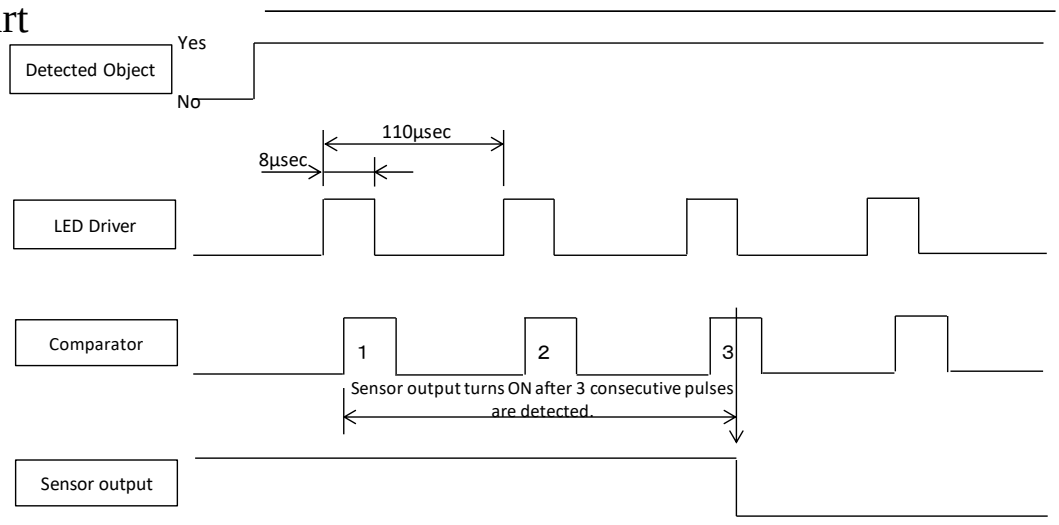
14.Safety of IR LED
The IR LED (850nm) used in this sensor is generally harmless, but be careful that direct viewing at close range may be dangerous depending on conditions.

15.Please contact us if you use our product other conditions or purpose that listed.

Circuit configuration

It consists of an infrared LED, a light-receiving IC, and a filter circuit.
The light receiving IC consists of a timing signal generation circuit, LED driver (pulse), light receiving section, amplifier, comparator, synchronous detection circuit, signal processing/judgment circuit, and output circuit.
The electrical operation of the sensor is described below.
First, LED pulses are generated by the timing signal generator circuit, and the LED is pulsed by the LED driver.
The pulse has a period of 110 µsec and a pulse width of 8 µsec.
This pulse signal is emitted from the LED, reflected by a person (object), and enters the photosensor.
The signal incident on the photosensor is amplified by a preamplifier, and the photocurrent is converted into a voltage.
The signal converted to voltage passes through a comparator circuit.
This comparator circuit has a hysteresis function to prevent chattering due to minute fluctuations in the incident light.
The signal that has passed through the comparator is output after synchronous detection with LED pulses by the synchronous detection circuit.
Furthermore, even if synchronous detection is performed, signals due to ambient light input synchronized with the synchronous detection timing are indistinguishable from signals due to LED light.
Therefore, as shown in the timing chart in Figure 2, the comparator judges when the comparator outputs three consecutive synchronization-detected outputs [signal present], and conversely [no signal] when the comparator output is not output three consecutive times.
The signal processing/judgment circuit is responsible for this judgment.
The signal thus output is output as a sensor output from the output circuit with an open collector (see Figure 2. Timing Chart).

Timing Chart



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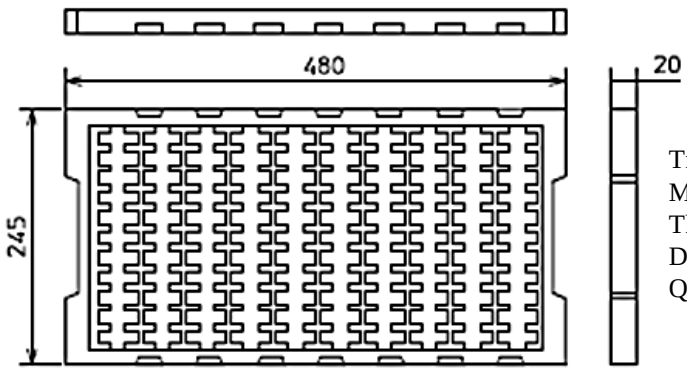
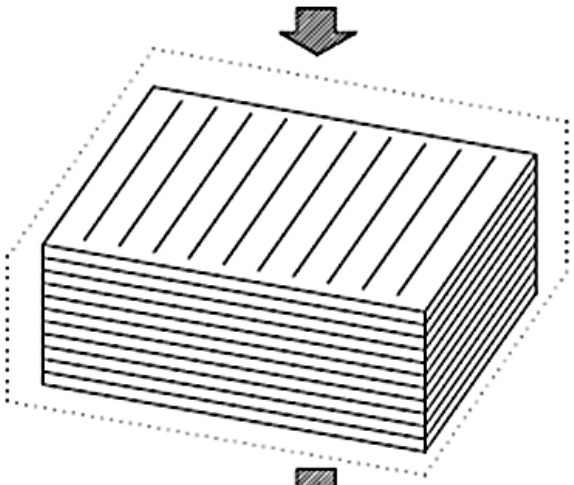
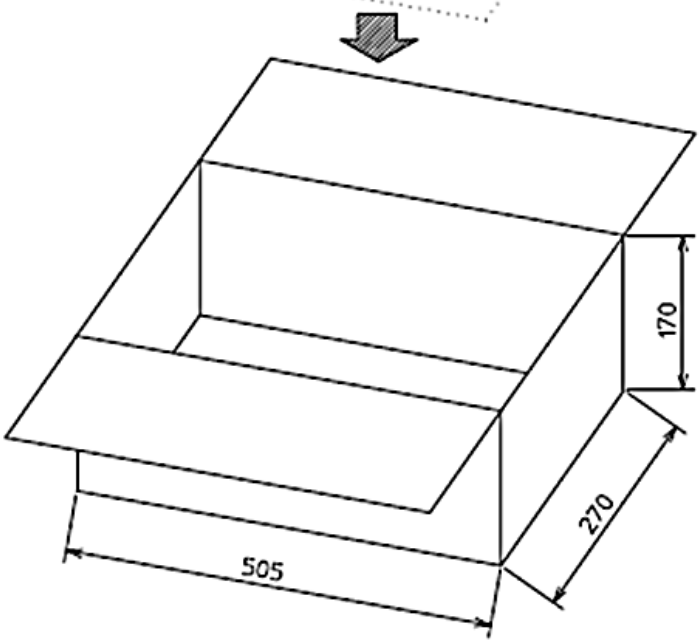
Packaging specifications



Tray
Materials : White PS
Thickness : t = 0.7 mm
Dimensions : 480 × 245 × 20 mm
Quantity : 100 pcs / 1 tray



Electrostatic prevention bag
Materials : LLDPE Indigo blue
Thickness : t = 0.05 mm
Dimensions : 500 × 700 × 330 mm



100 pcs × 10 trays = 1,000 pcs / box
*Basic unit of shipment : 1,000 pcs / box .
*The tray of the top is empty. : as a lid

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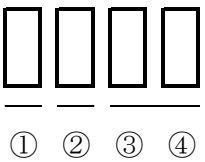
Lot number notational system



① - 1digit : Production year

year	Sign	year	Sign
2011	A	2021	N
2012	B	2022	P
2013	C	2023	Q
2014	D	2024	R
2015	E	2025	S
2016	F	2026	T
2017	G	2027	W
2018	H	2028	X
2019	K	2029	Y
2020	M	2030	Z

② - 1digit : Production month

month	1	2	3	4	5	6	7	8	9	10	11	12
Sign	A	B	C	D	E	F	G	H	K	M	N	P

③ - 1digit : Production date

date	Sign	date	Sign	date	Sign	date	Sign
1	1	11	A	21	N	31	Z
2	2	12	B	22	P		
3	3	13	C	23	Q		
4	4	14	D	24	R		
5	5	15	E	25	S		
6	6	16	F	26	T		
7	7	17	G	27	V		
8	8	18	H	28	W		
9	9	19	K	29	X		
10	0	20	M	30	Y		

④ - 1digit : Inspection machine number

KUA0118A

Correspondence to RoHS / ELV instruction

This product is in compliance with RoHS / ELV.
Prohibition substance and it's criteria value of RoHS / ELV are as follows.

- RoHS instruction … Refer to following 1 to 10.
- ELV instruction … Refer to following 1 to 4.

2011/65/EU, (EU)2015/863

No.	Substance group name	Maximum permissible concentration value
1	Lead and its compounds	1,000ppm (0.1%)
2	Cadmium and its compounds	100ppm (0.01%)
3	Mercury and its compounds	1,000ppm (0.1%)
4	Hexavalent chromium compounds	1,000ppm (0.1%)
5	PBB : Polybrominated Biphenyls	1,000ppm (0.1%)
6	PBDE : Polybrominated Biphenyl Ethers	1,000ppm (0.1%)
7	DEHP : Bis (2-ethylhexyl) phthalate	1,000ppm (0.1%)
8	BBP : Butyl benzyl phthalate	1,000ppm (0.1%)
9	DBP : Dibutyl phthalate	1,000ppm (0.1%)
10	DIBP : Diisobutyl phthalate	1,000ppm (0.1%)

Reliability testing result

KUA0118A

Test item	Test condition	Duration	Failuer
Operating life	Ta=25℃	1,000h	0 / 10
High temp. humidity operating life	Ta=60℃, Rh=90%	1,000h	0 / 10
Low temp. operating life	Ta=0℃	1,000h	0 / 10
Low temp. storage life	Ta=-30℃	1,000h	0 / 10
High temp. humidity storage life	Ta=70℃, Rh=95%	1,000h	0 / 10
Thermal shock cycle	Ta=−30℃(30min.) to +70℃(30min.)	100 cycles	0 / 10
Vibration test	Total amplitude 1.52mm, 10 to 55 to 10Hz, 1 min./cycle, XYZ direction	30min of each direction	0 / 10
Mechanical shock test	294m/s^2(30G)(State of packing), XYZ each direction	1time	0 / 10

Failure criteria

Initial detection distance × 0.9 > Detection distance

Initial detection distance × 1.1 < Detection distance

Special notice to customers using the products and technical information shown in this data sheet

1) The technical information shown in the data sheets are limited to the typical characteristics and circuit examples of the referenced products. It does not constitute the warranting of industrial property nor the granting of any license.

2) For the purpose of product improvement, the specifications, characteristics and technical data described in the data sheets are subject to change without prior notice. Therefore it is recommended that the most updated specifications be used in your design.

3) When using the products described in the data sheets, please adhere to the maximum ratings for operating voltage, heat dissipation characteristics, and other precautions for use. We are not responsible for any damage which may occur if these specifications are exceeded.

4) The products that have been described to this catalog are manufactured so that they will be used for the electrical instrument of the benchmark (OA equipment, telecommunications equipment, AV machine, home appliance and measuring instrument).
The application of aircrafts, space borne application, medical equipment and nuclear power control equipment, etc. needs a high reliability and safety, and the breakdown and the wrong operation might influence the life or the human body. Please consult us beforehand if you plan to use our product for the usages of aircrafts, space borne application, transportation equipment, medical equipment and nuclear power control equipment, etc. except OA equipment, telecommunications equipment, AV machine, home appliance and measuring instrument.

5) In order to export the products or technologies described in this data sheet which are under the "Foreign Exchange and Foreign Trade Control Law," it is necessary to first obtain an export permit from the Japanese government.

6) No part of this data sheet may be reprinted or reproduced without prior written permission from Stanley Electric Co., Ltd.

7) The most updated edition of this data sheet can be obtained from the address below:
http://www.stanley-components.com/en/