

GP2Y0A02YK0F

Distance Measuring Sensor Unit
Measuring distance: 20 to 150 cm
Analog output type



■Description

GP2Y0A02YK0F is a distance measuring sensor unit, composed of an integrated combination of PSD (position sensitive detector), IRED (infrared emitting diode) and signal processing circuit.

The variety of the reflectivity of the object, the environmental temperature and the operating duration are not influenced easily to the distance detection because of adopting the triangulation method. This device outputs the voltage corresponding to the detection distance. So this sensor can also be used as a proximity sensor.

■Features

1. Distance measuring range : 20 to 150 cm
2. Analog output type
3. Package size : 29.5×13×21.6 mm
4. Consumption current : Typ. 33 mA
5. Supply voltage : 4.5 to 5.5 V

■Agency approvals/Compliance

1. Compliant with RoHS directive (2011/65/EU)

■Applications

1. Touch-less switch
(Sanitary equipment, Control of illumination, etc.)
2. Sensor for energy saving
(ATM, Copier, Vending machine, Laptop computer, LCD monitor)
3. Amusement equipment
(Robot, Arcade game machine)

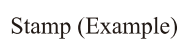
The block diagram illustrates the internal structure of the Distance measuring IC. The IC is represented by a dashed rectangular boundary. Inside this boundary, the following functional blocks are shown:

- Signal processing circuit:** Receives input from the PSD (Position Sensitive Detector) and provides control signals to the Voltage regulator, Oscillation circuit, and LED drive circuit.
- Voltage regulator:** Connected to the V_{CC} supply and the GND, it provides a regulated voltage to the other internal blocks.
- Oscillation circuit:** Receives control signals from the Signal processing circuit and provides a clock signal to the LED drive circuit and the Output circuit.
- LED drive circuit:** Receives control signals from the Signal processing circuit and the Oscillation circuit, and drives the LED.
- Output circuit:** Receives control signals from the Signal processing circuit and the Oscillation circuit, and produces the final output voltage V_O.

External connections include:

- PSD:** A Position Sensitive Detector connected to the Signal processing circuit.
- LED:** A Light Emitting Diode connected to the LED drive circuit.
- GND:** Ground connection for the V_{CC} supply.
- V_{CC}:** The main power supply voltage.
- V_O:** The output voltage of the IC.

(Unit : mm)



SHARP

2Y0A02 F

Model name

Model name

— Production month : Jan. to Sep. ; 1 to 9
Oct. ; X, Nov. ; Y, Dec. ; Z

- Production year : Last digit of prod. year

	Terminal	Symbol
①	Output terminal voltage	V_O
②	Ground	GND
③	Supply voltage	V_{CC}

Note 4. The dimension marked by "*" show a distance from/to the center of an internal optical slit.

Product mass : approx. 4.8g

■ Absolute Maximum Ratings ($T_a=25^{\circ}\text{C}$, $V_{CC}=5\text{V}$)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.3 to +7	V
Output terminal voltage	V_O	-0.3 to $V_{CC}+0.3$	V
Operating temperature	T_{opr}	-10 to +60	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-40 to +70	$^{\circ}\text{C}$

■ Electro-optical Characteristics ($T_a=25^{\circ}\text{C}$, $V_{CC}=5\text{V}$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Average supply current	I_{CC}	$L=150\text{cm}$ (Note 1)	—	33	50	mA
Measuring distance range	ΔL	(Note 1)	20	—	150	cm
Output voltage	V_O	$L=150\text{cm}$ (Note 1)	0.25	0.4	0.55	V
Output voltage differential	ΔV_O	Output voltage difference between $L=20\text{cm}$ and $L=150\text{cm}$ (Note 1)	1.8	2.05	2.3	V

* L : Distance to reflective object

Note 1 : Using reflective object : White paper (Made by Kodak Co., Ltd. gray cards R-27・white face, reflectance; 90%)

■ Recommended operating conditions

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{CC}		4.5 to 5.5	V

Fig. 1 Timing chart

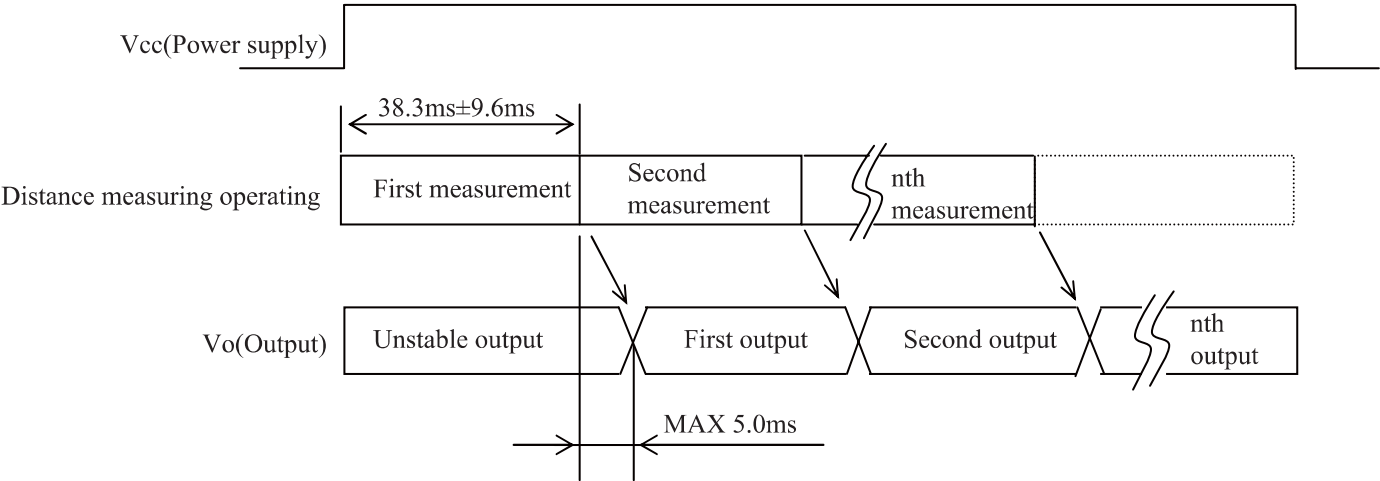
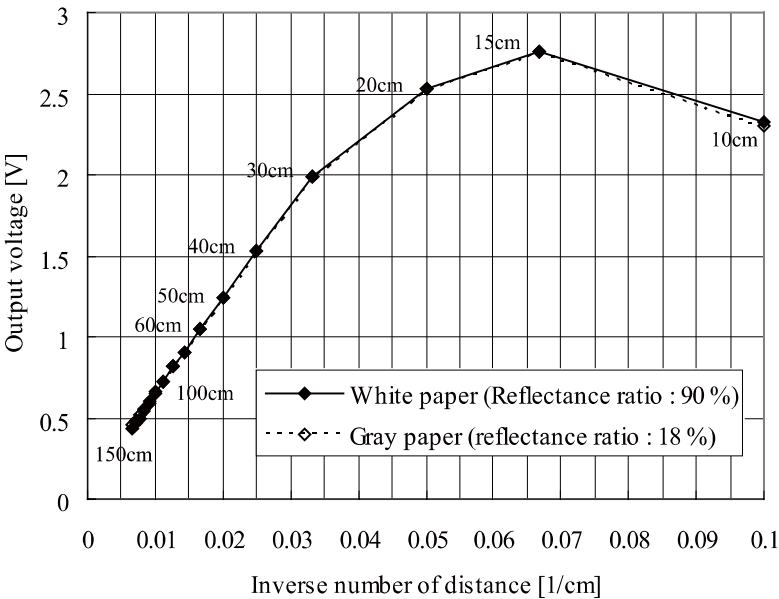
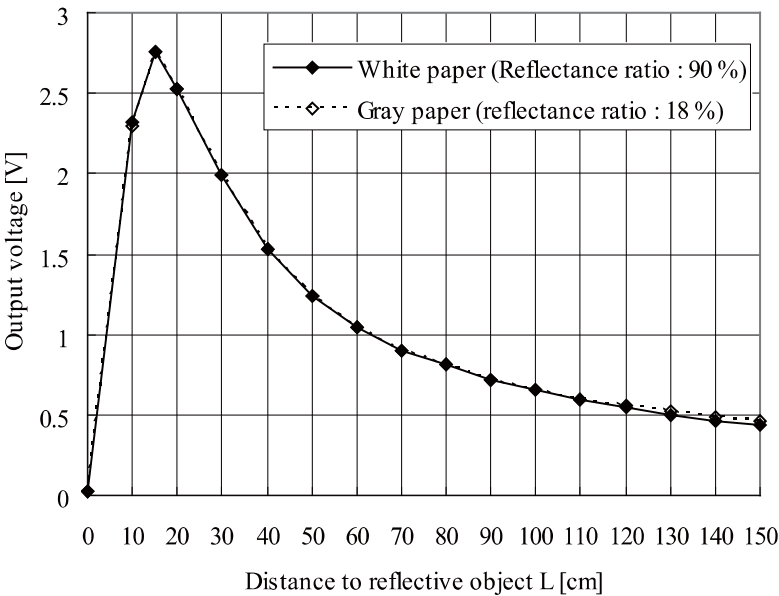


Fig. 2 Example of distance measuring characteristics (output)



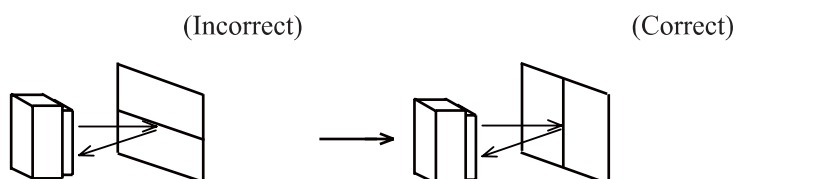
■ Notes

● Advice for the optics

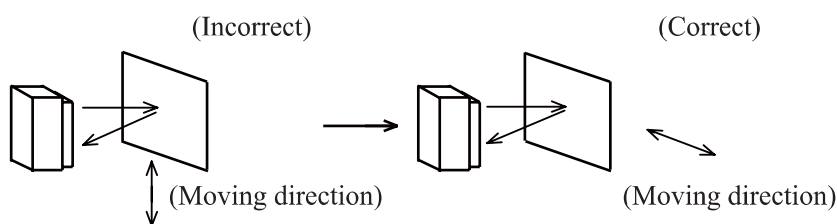
- The lens of this device needs to be kept clean. There are cases that dust, water or oil and so on deteriorate the characteristics of this device. Please consider in actual application.
- Please don't do washing. Washing may deteriorate the characteristics of optical system and so on. Please confirm resistance to chemicals under the actual usage since this product has not been designed against washing.

● Advice for the characteristics

- In case that an optical filter is set in front of the emitter and detector portion, the optical filter which has the most efficient transmittance at the emitting wavelength range of LED for this product ($\lambda = 850 \pm 70\text{nm}$), shall be recommended to use. Both faces of the filter should be mirror polishing. Also, as there are cases that the characteristics may not be satisfied according to the distance between the protection cover and this product or the thickness of the protection cover, please use this product after confirming the operation sufficiently in actual application.
- In case that there is an object near to emitter side of the sensor between sensor and a detecting object, please use this device after confirming sufficiently that the characteristics of this sensor do not change by the object.
- When the detector is exposed to the direct light from the sun, tungsten lamp and so on, there are cases that it can not measure the distance exactly. Please consider the design that the detector is not exposed to the direct light from such light source.
- Distance to a mirror reflector can not be sometimes measured exactly.
In case of changing the mounting angle of this product, it may measure the distance exactly.
- In case that reflective object has boundary line which material or color etc. are excessively different, in order to decrease deviation of measuring distance, it shall be recommended to set the sensor that the direction of boundary line and the line between emitter center and detector center are in parallel.



- In order to decrease deviation of measuring distance by moving direction of the reflective object, it shall be recommended to set the sensor that the moving direction of the object and the line between emitter center and detector center are vertical.



● Advice for the power supply

- In order to stabilize power supply line, we recommend to insert a by-pass capacitor of $10\mu\text{F}$ or more between Vcc and GND near this product.

● Notes on handling

- There are some possibilities that the internal components in the sensor may be exposed to the excessive mechanical stress. Please be careful not to cause any excessive pressure on the sensor package and also on the PCB while assembling this product.

● Presence of ODC etc.

This product shall not contain the following materials.

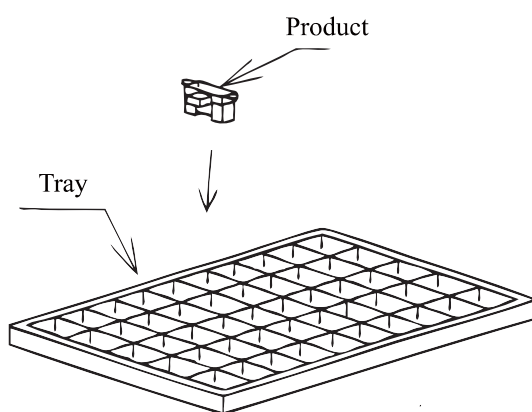
And they are not used in the production process for this product.

Regulation substances : CFCs, Halon, Carbon tetrachloride, 1.1.1-Trichloroethane (Methylchloroform)

Specific brominated flame retardants such as the PBB and PBDE are not used in this product at all.

This product shall not contain the following materials banned in the RoHS Directive (2011/65/EU).

- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).

■ Package specification

MAX. 50 pieces per tray

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- Telecommunication equipment [terminal]
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- Industrial control
- Audio visual equipment
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- Traffic signals
- Gas leakage sensor breakers
- Alarm equipment
- Various safety devices, etc.

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- Telecommunication equipment [trunk lines]
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