GP2W0004XP0F

IrDA Compliant Transceiver Module
9.6 to 115.2 kb/s (SIR)
Low Profile
Low Consumption Current

■Description

The **GP2W0004XP0F** is an infrared transceiver module for IrDA ver. 1.4 (SIR).
The transceiver consisits of a pin-photo diode, infrared emitter and control IC in a single package.

■Features

1. Compliant with the IrDA 1.4 (SIR)
   Transmission speed : 9.6 to 115.2 kb/s
   Transmission distance : 1 m
2. Small package
   L 9.21 × W 3.35 × H 3.8 mm
3. Peak emission wavelength : 870 nm
4. Top view type
5. Soldering reflow type
6. Shield type
7. Low consumption current due to shutdown function
   (Consumption current at shutdown mode : Max. 1.0 μA)
8. Operates from 2.4 to 5.5 V

■Agency approvals/Compliance

1. Compliant with IEC60825-1 class 1 eye safety standard
2. Compliant with RoHS directive (2002/95/EC)
3. Content status of six substances specified in
   " Management Methods for Control of Pollution Caused by Electronic Information Products Regulation "
   (popular name : *China RoHS*)
   (Chinese : 电子信息产品污染控制管理办法)
   ; refer to page 13
4. Lead (Pb) free device

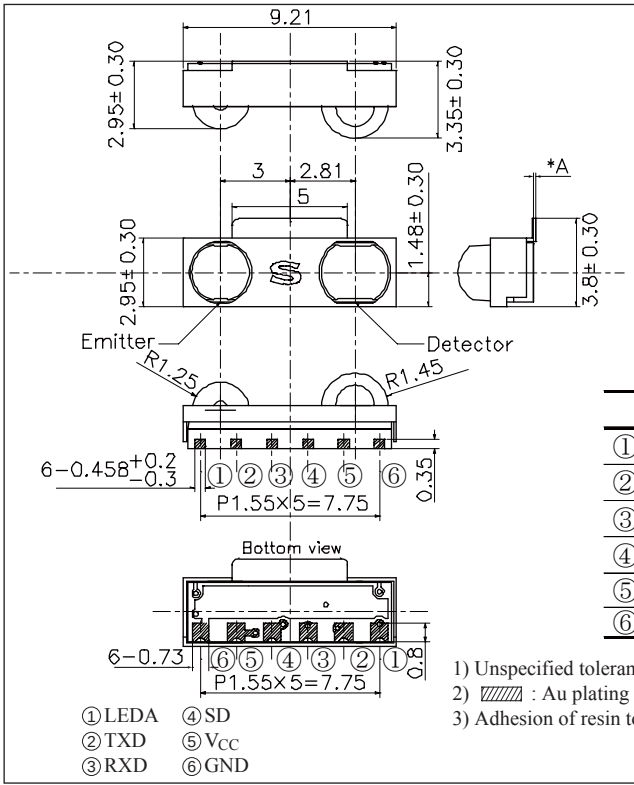
■Applications

1. Mobile equipment
   (Cellular phone, Pager, Smart phone, PDAs, Portable printer, etc.)
2. Digital imaging equipment
   (Digital camera, Photo imaging printer)
3. POS equipment

Sheet No.: E3-A00502EN
Date Apr.02.2007

■Outline Dimensions

(Unit : mm)



*A: Distance between PCB of the transceiver and bottom side of the shield case shall be less than 0.1 mm for both up and downward direction.

	Terminal	Symbol
①	LED anode	LEDA
②	Transmitter Data Input	TXD
③	Receiver Data Output	RXD
④	Shutdown	SD
⑤	Supply voltage	V_{CC}
⑥	Ground	GND

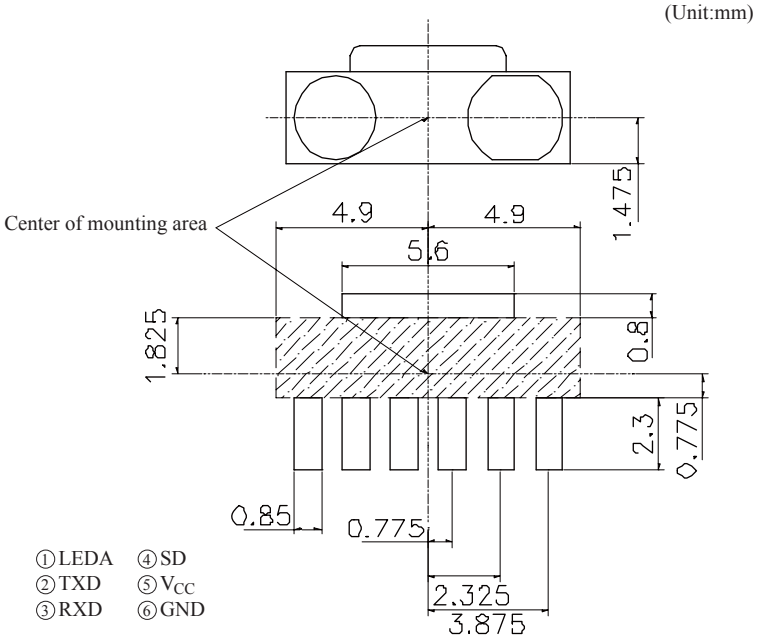
1) Unspecified tolerance : ±0.2mm
2) ▨ : Au plating
3) Adhesion of resin to the terminal area shall be allowed Max. 0.2 mm

Product mass : aprox. 0.13g

■Recommended PCB Foot Pattern

Dimensions are shown for reference

(Unit:mm)



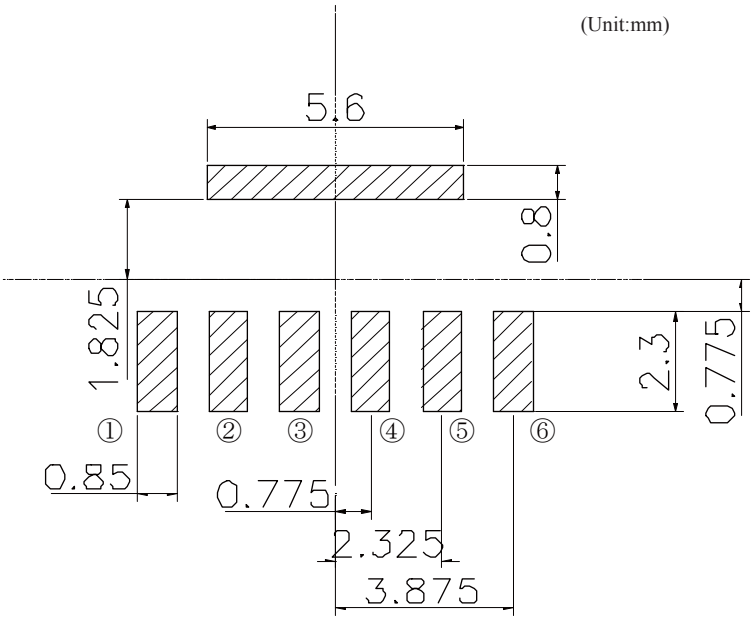
▨ : Wiring prohibition area.

*Don't wiring in the territory where a mounting side touches the back of the product except for the product terminal part.

■Recommended Size of Solder Creamed Paste (Reference)

(Unit:mm)

Dimensions are shown for reference.
Please open the solder mask as below so that the size of solder creamed paste for this device before reflow soldering must be as large as one of the foot pattern land indicated for reference.



: Solder paste area

■Absolute Maximum Ratings

(T_a=25°C)

	Parameter	Symbol	Rating	Unit
	Supply voltage	V_{CC}	0 to 6.0	V
	LED Supply voltage	V_{LEDA}	0 to 7.0	V
*1	Peak forward current	I_{FM}	600	mA
	Operating temperature	T_{opr}	-25 to +85	℃
	Storage temperature	T_{stg}	-25 to +85	℃
*2	Soldering temperature	T_{sol}	255	℃

*1 Pulse width: 78.1µs, Duty ratio: 3/16
*2 Soldering reflow time for MAX. 10s

■Electrical Characteristics

(T_a=25°C, V_{CC}=3.3V)

	Parameter	Symbol	Rating	MIN.	TYP.	MAX.	Unit
Receiver side	Current consumption at no input signal	I_{CC}	No input signal, output terminal open, V_{ILSD}=0V	—	110	130	µA
	Current consumption at shutdown mode	I_{CC-S}	No input signal, output terminal open, V_{ISD}=V_{CC}	—	0.01	1.0	µA
	High level output voltage	V_{OH1}	V_{CC}=5.0V, I_{OH}=500µA *3	4.3	4.6	—	V
		V_{OH2}	V_{CC}=2.4V, I_{OH}=500µA *3	1.5	1.7	—	V
	Low level output voltage	V_{OL1}	V_{CC}=5.0V, I_{OH}=500µA *3	—	0.22	0.4	V
		V_{OL2}	V_{CC}=2.4V, I_{OH}=500µA *3	—	0.17	0.3	V
	Rise time/Fall time	t_{r1},t_{f1}	V_{CC}=5.0V, C_L=15pF	—	18	27	ns
		t_{r2},t_{f2}	V_{CC}=5.0V, C_L=50pF	—	60	80	ns
		t_{r3},t_{f3}	V_{CC}=2.4V, C_L=15pF	—	36	55	ns
		t_{r4},t_{f4}	V_{CC}=2.4V, C_L=50pF	—	63	94	ns
	Pulse width	t_w	BR=9.6kb/s, 115.2kb/s,ϕ≦15° *3	1.0	2.4	3.6	µs
	Maximum reception distance	L	BR=9.6kb/s, 115.2kb/s,ϕ≦15° *3	1.0	—	—	m
	Receiver viewing angle	$2\theta_{1/2}$		15.0	—	—	°
	Transmit Receiver Latency	t_l	No disturbing light	—	100	200	µs
	Receiver wake up time	t_{sdw}	No disturbing light	—	100	200	µs
	SD terminal Input voltage Logic High	V_{IHSD}	Shutdown mode	V_{CC}-0.5	—	V_{CC}	V
	SD terminal Input voltage Logic Low	V_{ILSD}	Normal mode	0	—	0.5	V
Transmitter side	Radiant intensity	I_E	ϕ≦15°, V_{CC}=V_{LED}=3.3V, *4	40	—	—	mW/sr
	LED peak current	V_{LED}		—	370	—	mA
	Peak emission wavelength	λ_p		850	870	900	nm
	TX high input voltage	V_{IHTX}	LED ON *5	2/3×V_{CC}	—	V_{CC}	V
	TX low input voltage	V_{ILTX}	LED OFF *5	0	—	1/3×V_{CC}	V

*3 Refer to Fig. 2, 3, 4
*4 Refer to Fig. 5, 6, 7
*5 Refer to Fig. 7

■Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	2.4 to 5.5	V
LED Supply voltage	V_{LEDA}	2.4 to 7.0	V
Operating temperature	T_{opr}	-25 to +85	℃
Data rate	BR	9.6 to 115.2	kb/s

■Truth table

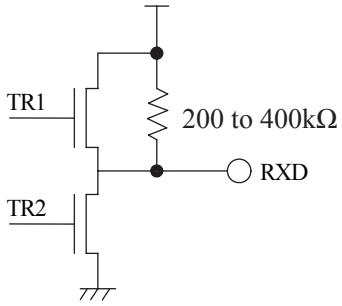
SD	SW	TXD	LED	Receiver	TR1	TR2	RXD
H	Off	Don't Care	Off	Don't Care	Off	Off	200 to 400kΩ pull-up
L	On	H	On	Don't Care	—	—	H
L	On	L	Off	IrDA Signal	Off	On	L
L	On	L	Off	No Signal	On	Off	H

H : High
L : Low

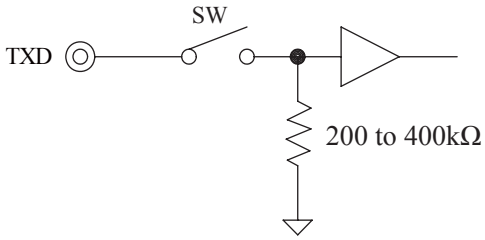
· Echo cancel function : When TX input is applied high(normal data input),
The RXD output is held high, which is the normal No Data state.
When the TX input has been low for 200μs, the RXD output will again become active.

· Shut down : When the SD pin is held high, the RXD output is held in the 200 to 400kΩ pull-up condition.
Also, the TX output is disabled and will not operate with the application of a TX input signal.

* RXD Equipment circuit



* TXD Equipment circuit

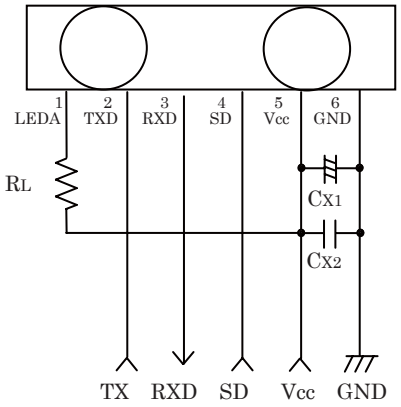


SD input	Performance
Low	Normal mode
High	Shutdown mode

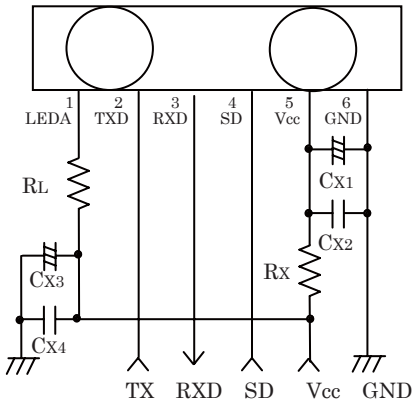
Fig. 1 Recommended External Circuit

1, V_{LED} power supply is shared.

[Standard circuit]



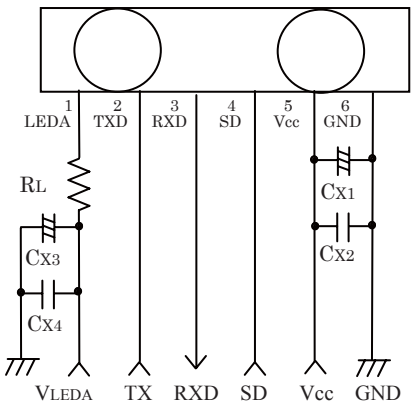
[Countermeasure circuit for noise]



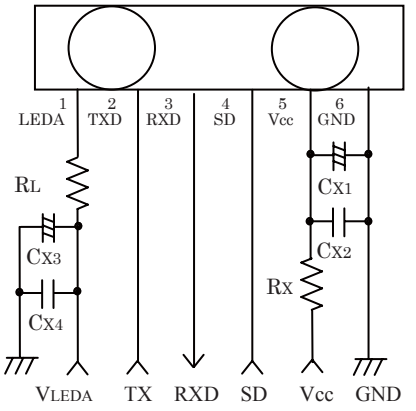
When there is a noise ingredient, which cannot be removed only by C_{X1} and C_{X2}, please insert R_X (1 to 10Ω), and C_{X3} and C_{X4} by the set, and use them after a check. In this case, please avoid insertion of only R_X.

2, With independent V_{LED} power supply

[Standard circuit]



[Countermeasure circuit for noise]



When there is a noise ingredient, which cannot be removed only by C_{X1} and C_{X2}, please insert R_X (1 to 10Ω) and use it after a check.

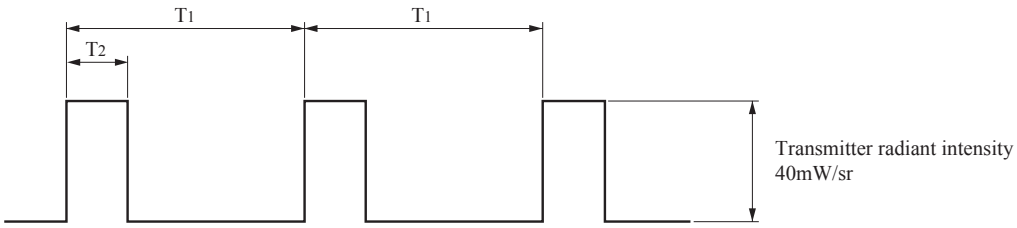
Components	Recommended values
C_{X1}	22μF(Note)
C_{X2},C_{X4}	0.1μF(Note)
C_{X3}	6.8μF(Note)
R_L	(Table 1)

(Table 1)

V_{LEDA}	R_L
$2.4V \leqq V_{LEDA} \leqq 3.6V$	0Ω±5%,0.5W
$3.5V \leqq V_{LEDA} \leqq 4.8V$	1.3Ω±5%,0.5W
$4.5V \leqq V_{LEDA} \leqq 5.5V$	2.7Ω±5%,0.5W

(Note) Component chooses the most suitable constant of C_{X1}, C_{X2}, C_{X3}, and C_{X4} according to the noise level and noise frequency of a power supply. Depending on the noise level of a power supply, and noise frequency, a noise may be unable to be removed only by C_X of a standard circuit. At this time, pulses other than a signal may be outputted from a RXD terminal in a specific communication distance. Please confirm with the system that it is satisfactory with each transmission speed in all communication distance at the time of examination. When there is a problem, please use it after a check as a noise measure circuit. Responding to the Vcc voltage, please choose the resistance value of R_X. And please set the resistance value of R_X in ranges where the Vcc voltage of this product does not absolutely drop below 2.4V by a voltage descent with R_X.

Fig. 2 Input Signal Waveform(Receiver side)



At BR=9.6kb/s : T_1=104.2µs, T2=19.5µs
At BR=115.2kb/s : T_1=8.68µs, T2=1.63µs

Fig. 3 Output Waveform Specification(Receiver side)

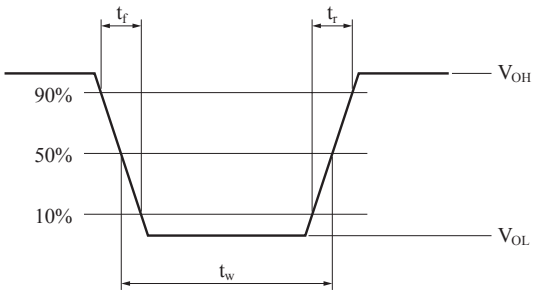
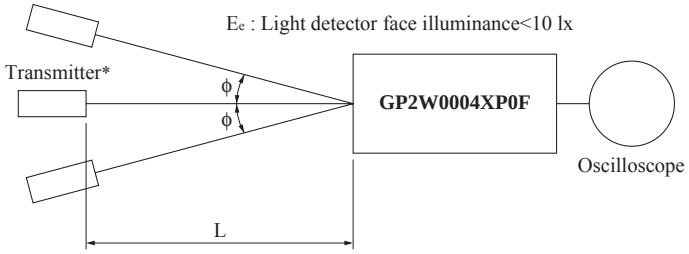


Fig. 4 Standard Optical System(Receiver side)



ϕ : Indicates horizontal and vertical directions.

*Transmitter shall use GP2W0004XP0F (λ_p=870nm TYP.) which is adjusted the radiation intensity at 40mW/sr

Fig. 5 Output Waveform Specification(Transmitter side)

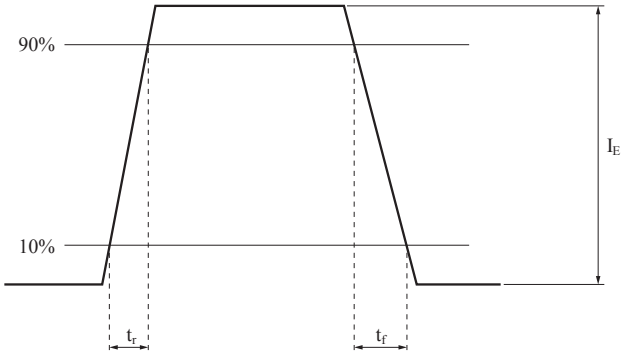


Fig. 6 Standard Optical System(Transmitter side)

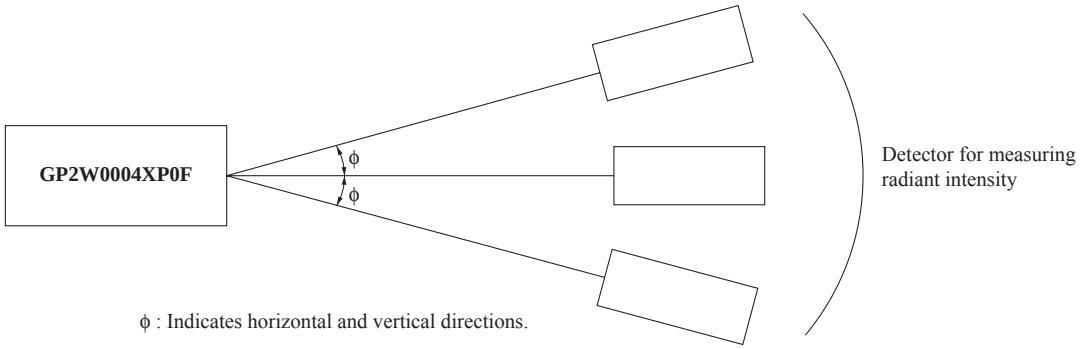


Fig. 7 Recommended Circuit of Transmitter side

■Notes

(1) When the system (program) is designed, the Turn Around Time shall be secured by considering 500 µs or more that is specified to IrDA.
Then, this Turn Around Time means the time when this device does not temporarily detect the signal light, since the transmitted light form the transceiver reaches the detector side of the transceiver.

(2) As it is necessary 200 µs or more (at Ta =25 °C, no input signal) to return from shut-down mode to ready-operation mode, please consider this point at the system (program) designing.
Also, please confirm thoroughly the operation in actual application.

(3) When there is much external disturbing light source is located near this transceiver and the detector face resceiver much external disturbing light, there is case that the pulse other than signal output is generated as noise on output terminal of this transceiver. Please consider the lay-out and structure to reduce disturbing light on the detector face.

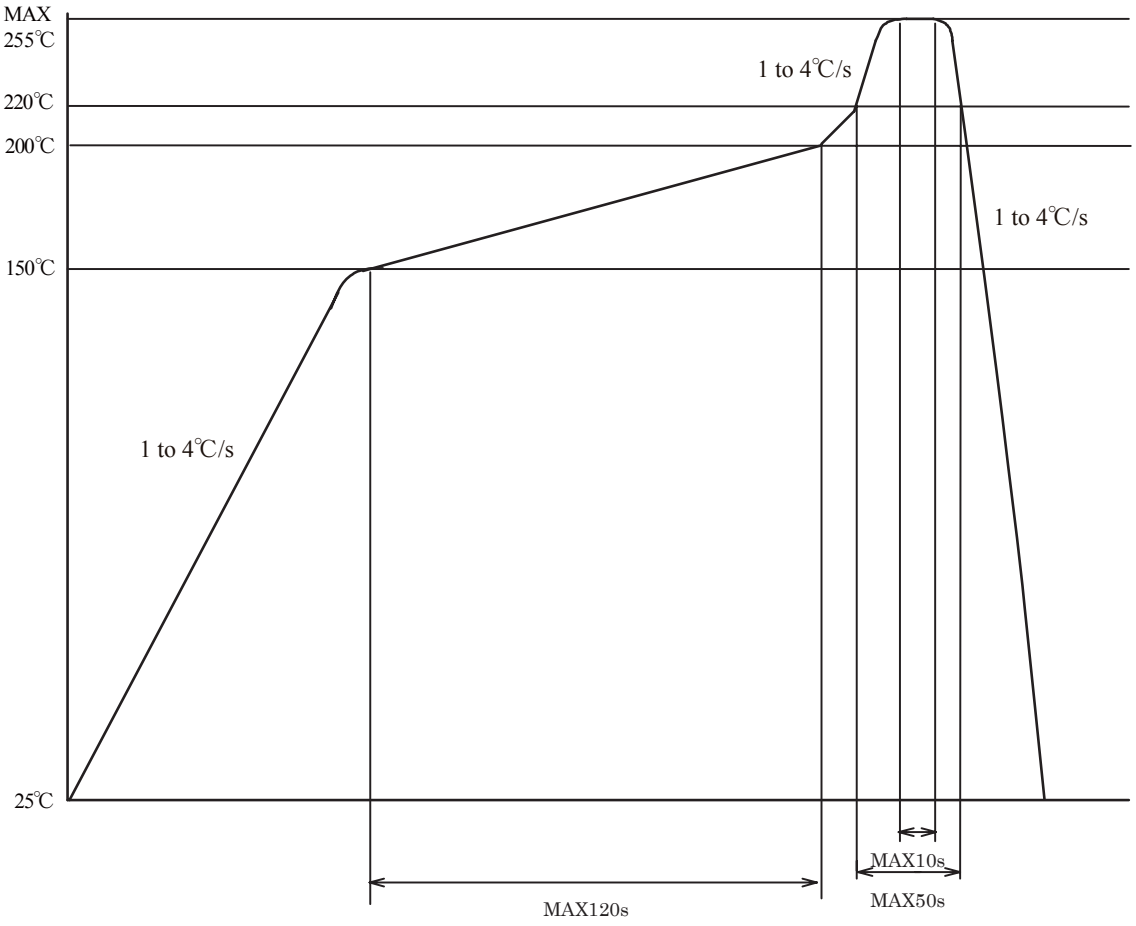
(4) In case that this sensor is adopted in IR communication system, please use it according to the signal method which is specified by [Serial Infrared Physical Layer Link Specification Version 1.4] published by Infrared Data Association. False operation may happen if the different signal method is used.

(5) In circuit designing, make allowance for the degradation of light emitting diode output that results from long continuous operation. (50 % degradation/5 years)

■Soldering Method

1. In case of solder reflow

Please carry out only two times soldering at the temperature and the time within the temperature profile as shown in the figure below. Reflow interval shall be within 3 days under conditions, 10 to 30℃, 70%RH or less.



2. Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin.
So keep the package temperature within that specified in Item 1. Also avoid immersing the resin part in the solder.
Even if within the temperature profile above, there is the possibility that the gold wire in package is broken in case that the deformation of PCB gives the affection to lead pins. Please use after confirming the conditions fully by actual solder reflow machine.

3. Soldering

- Soldering iron shall be less than 25W, and temperature of point of soldering iron shall use at 300℃or less.
- Soldering time shall be within 5s.
- Soldered product shall treat at normal temperature.

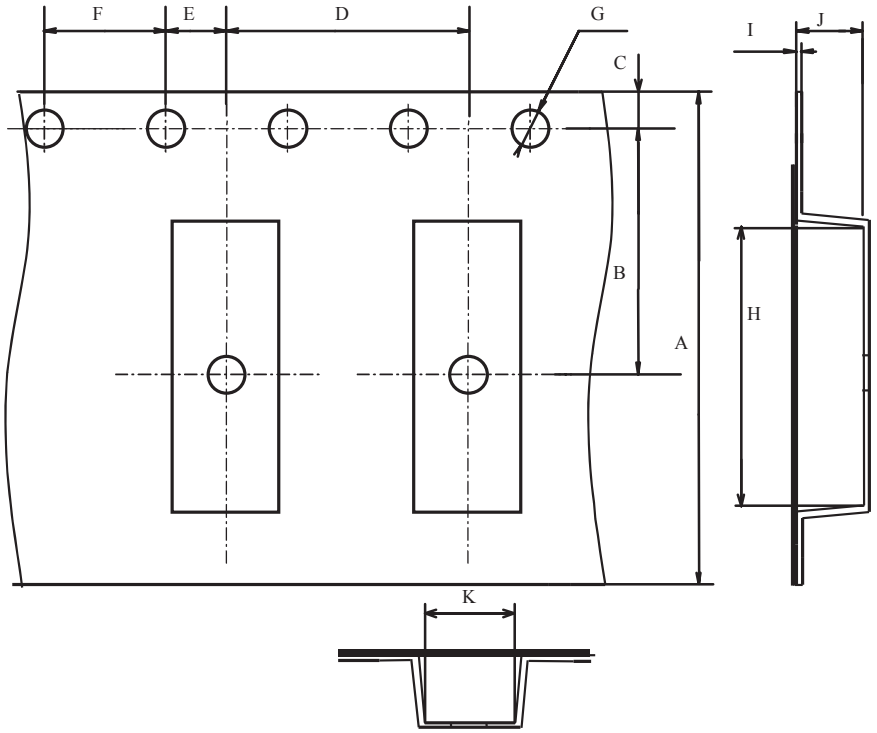
■Package specification

●Tape and Reel package
2000 pcs/reel

Package materials

Name	Material	Counter measure for ESD
Reel	PPE	Coped(Conductivity)
Carrier tape	PC	Coped(Conductivity)
Cover tape	PET	Coped(Conductivity)

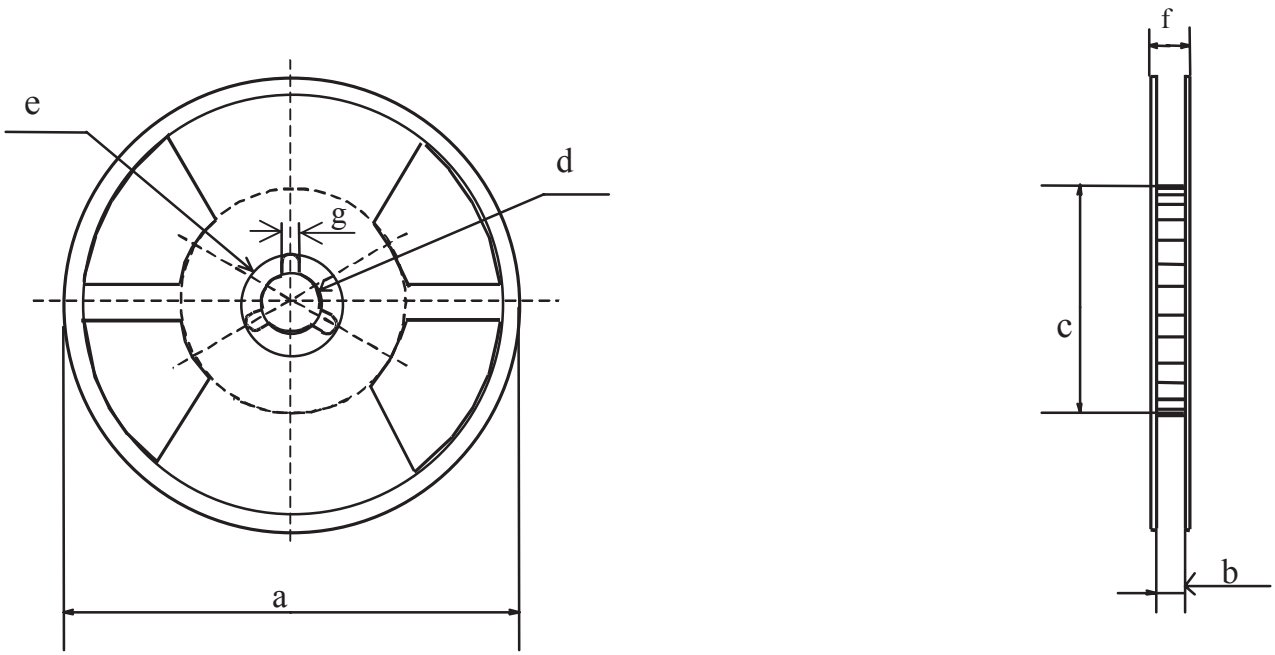
Carrier tape structure and Dimensions



Dimension List (Unit : mm)

A	B	C	D	E	F
16.0±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1
G	H	I	J	K	
ϕ $1.5^{+0.1}_{-0.0}$	9.56±0.1	0.33±0.05	3.06±0.1	4.04±0.1	

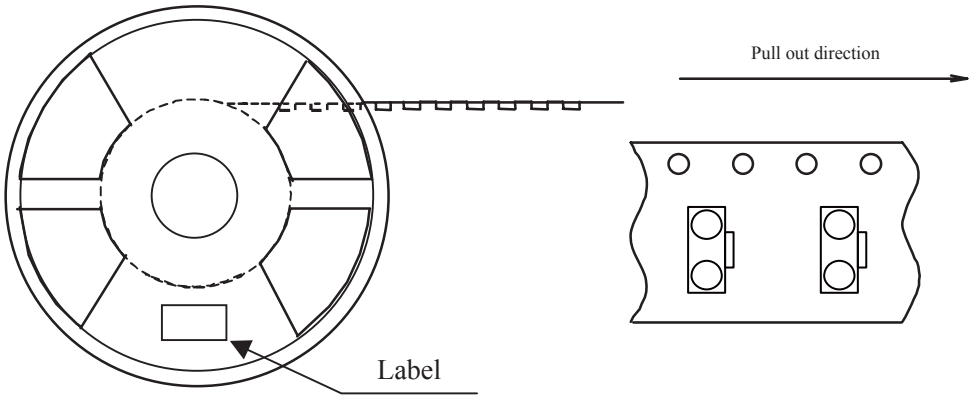
Reel structure and Dimensions



Dimension List (Unit : mm)

a	b	c	d
ϕ 330±2	17.5±1	ϕ 100±1	ϕ 13±0.2
e	f	g	
ϕ 21±0.8	22.5±0.1	2±0.5	

Direction of product insertion



●Cleaning Instructions

Solvent cleaning :

Solvent temperature 45℃ or less, Immersion for 3 min or less

Ultrasonic cleaning :

The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc.
Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning. The cleaning shall be carried out with solvent below.

Recommended Solvent materials :

Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

●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.

• The RoHS directive (2002/95/EC)
This product complies with the RoHS directive (2002/95/EC).
Object substances: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE)

• Content of six substances specified in " Management Methods for Control of Pollution Caused by Electronic Information Products Regulation " (Chinese : 电子信息产品污染控制管理办法)

Category	Toxic and hazardous substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr^{6+})	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Infrared data communication device	✓	✓	✓	✓	✓	✓

✓: indicates that the content of the toxic and hazardous substance in all the homogeneous materials of the part is below the concentration limit requirement as described in SJ/T 11363-2006 standard.

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--- Office automation equipment
--- Telecommunication equipment [terminal]
--- Test and measurement equipment
--- Industrial control
--- Audio visual equipment
--- Consumer electronics
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--- Traffic signals
--- Gas leakage sensor breakers
--- Alarm equipment
--- Various safety devices, etc.
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--- Telecommunication equipment [trunk lines]
--- Nuclear power control equipment
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