

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 consists 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 μ A)
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

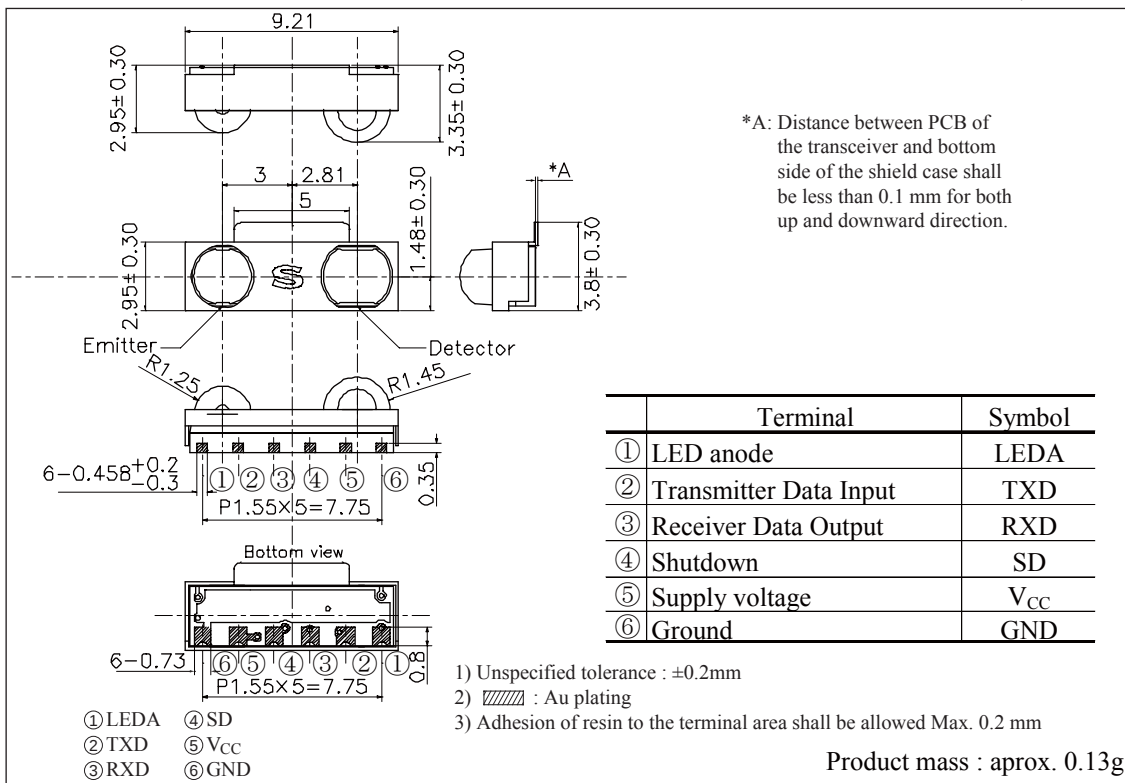
1. Mobile equipment
(Cellular phone, Pager, Smart phone, PDAs,
Portable printer, etc.)
2. Digital imaging equipment
(Digital camera, Photo imaging printer)
3. POS equipment

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Outline Dimensions

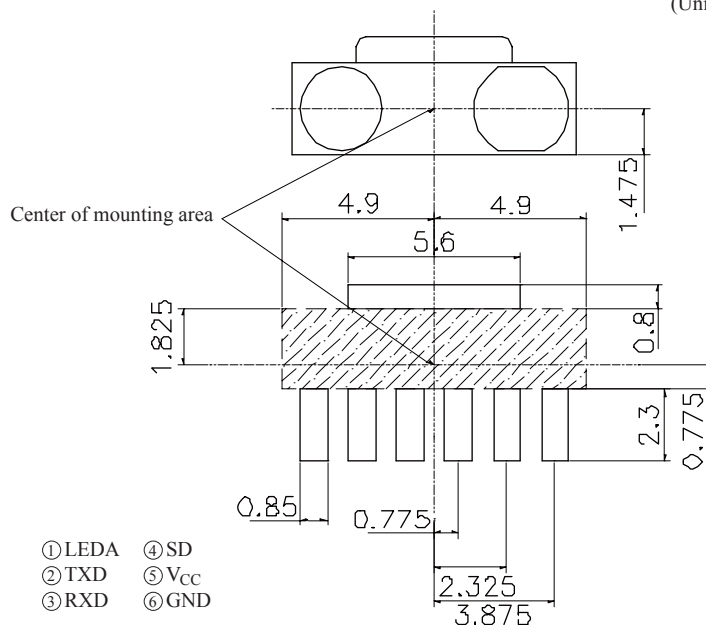
(Unit : mm)



Recommended PCB Foot Pattern

Dimensions are shown for reference

(Unit:mm)

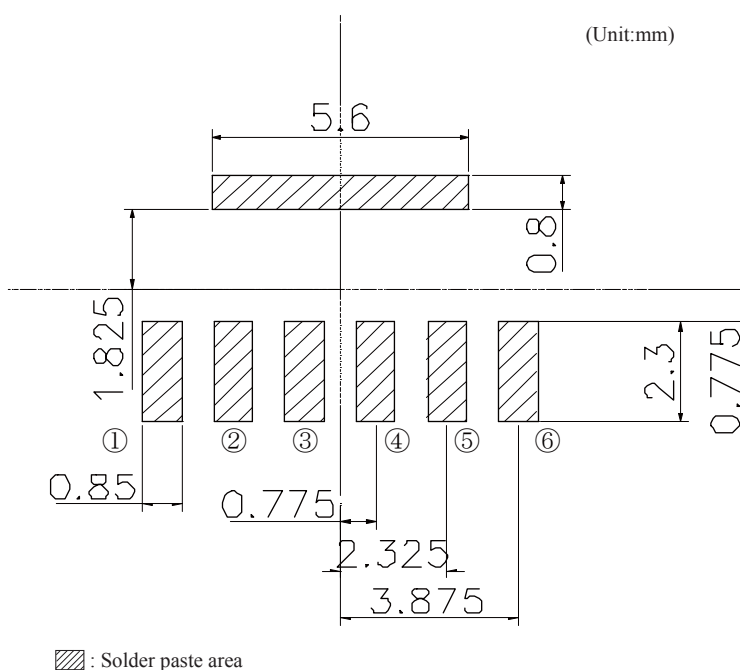


: Wiring prohibition area.

*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)

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.



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	°C
Storage temperature	T _{stg}	-25 to +85	°C
*2 Soldering temperature	T _{sol}	255	°C

*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
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
Receiver side	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	2θ _{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		—	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	°C
Data rate	BR	9.6 to 115.2	kb/s

■ Truth table

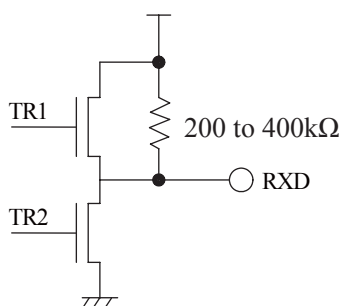
SD	SW	TXD	LED	Receiver	TR1	TR2	RXD
H	Off	Don't Care	Off	Don't Care	Off	Off	200 to 400k Ω pull-up
L	On	H	On	Don't Care	—	—	H
L	On	L	Off	IrDA Signal	Off	On	L
L	On	L	Off	No Signal	On	Off	H

H : High

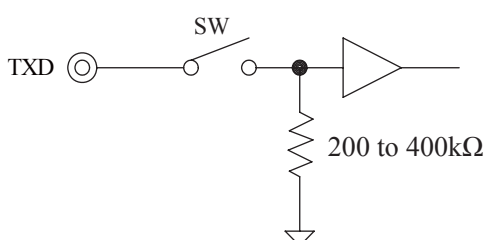
L : Low

- 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 200 μ s, 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 400k Ω pull-up condition.
Also, the TX output is disabled and will not operate with the application of a TX input signal.

* RXD Equipment circuit



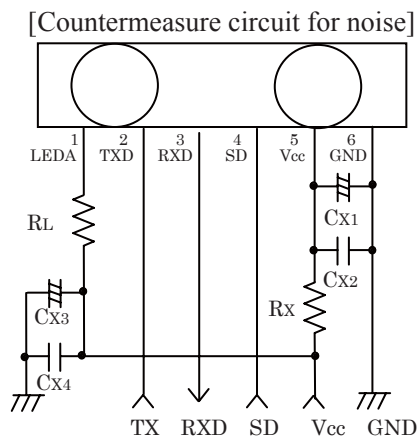
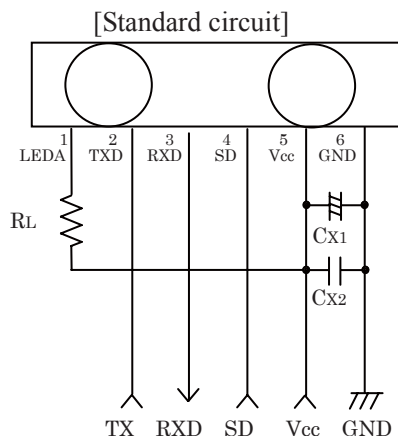
* TXD Equipment circuit



SD input	Performance
Low	Normal mode
High	Shutdown mode

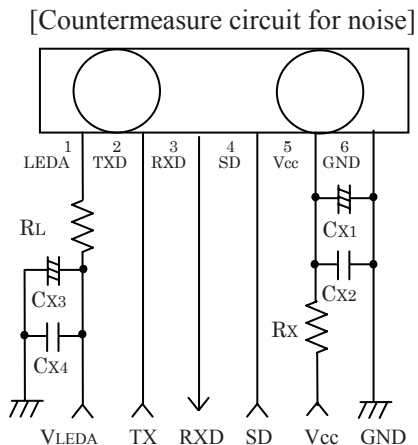
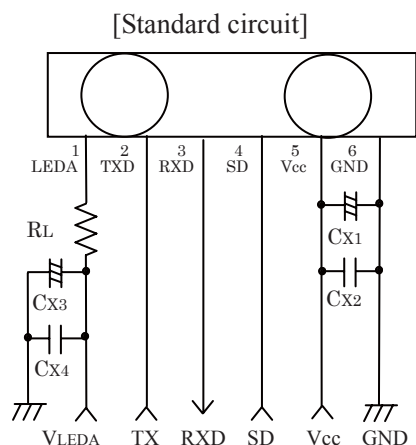
Fig. 1 Recommended External Circuit

1, V_{LED} power supply is shared.



When there is a noise ingredient, which cannot be removed only by C_{X1} and C_{X2} , please insert R_x (1 to 10 Ω), 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



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

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

(Table 1)

V_{LED}	R_L
$2.4V \leq V_{LED} \leq 3.6V$	$0\Omega \pm 5\%, 0.5W$
$3.5V \leq V_{LED} \leq 4.8V$	$1.3\Omega \pm 5\%, 0.5W$
$4.5V \leq V_{LED} \leq 5.5V$	$2.7\Omega \pm 5\%, 0.5W$

(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 V_{cc} voltage, please choose the resistance value of R_x . And please set the resistance value of R_x in ranges where the V_{cc} 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)

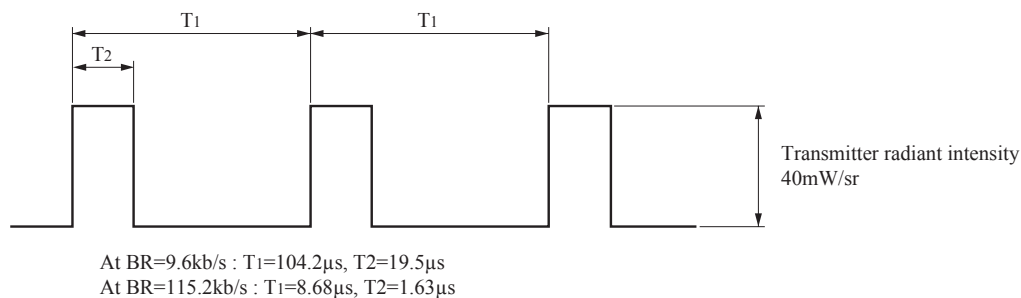


Fig. 3 Output Waveform Specification(Receiver side)

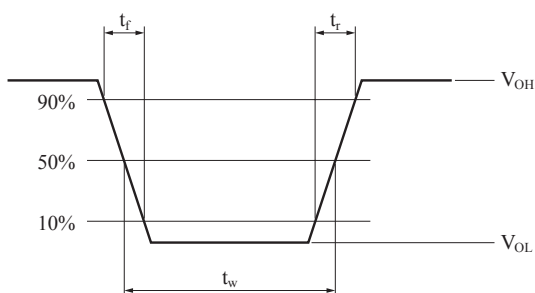
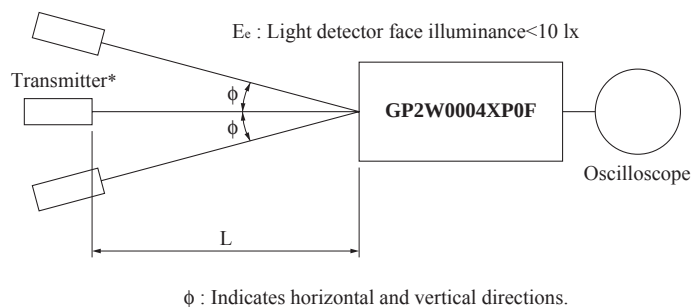


Fig. 4 Standard Optical System(Receiver side)



*Transmitter shall use GP2W0004XP0F ($\lambda_p=870\text{nm}$ TYP.) which is adjusted the radiation intensity at 40mW/sr

Fig. 5 Output Waveform Specification(Transmitter side)

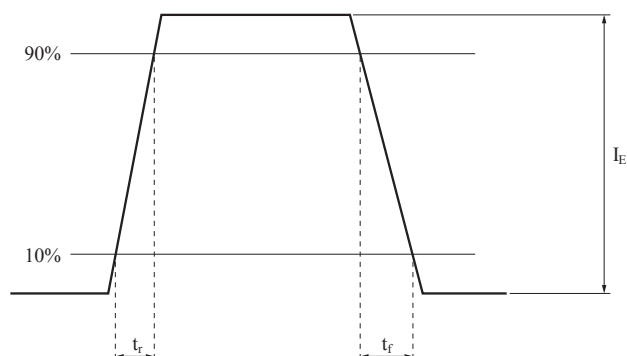


Fig. 6 Standard Optical System(Transmitter side)

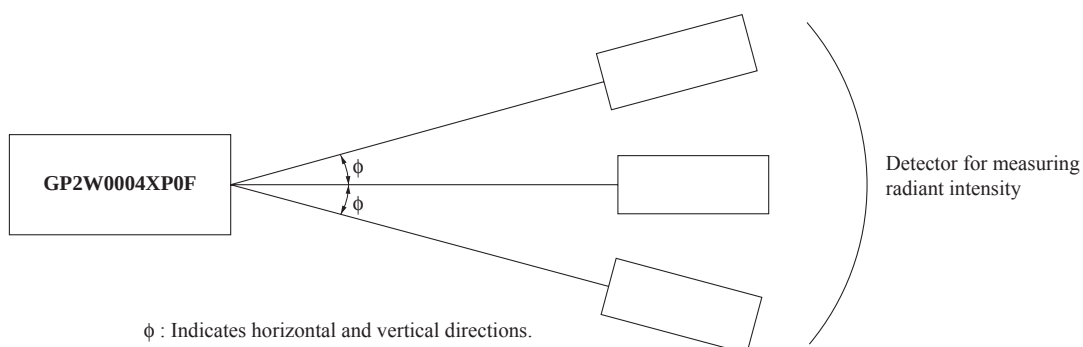
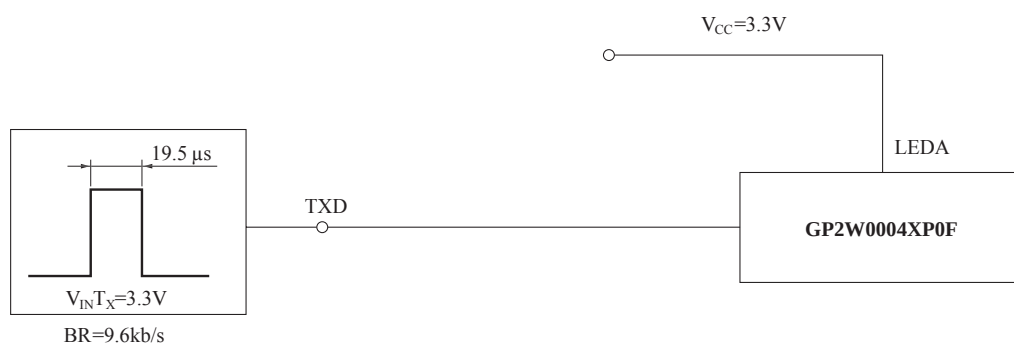


Fig. 7 Recommended Circuit of Transmitter side



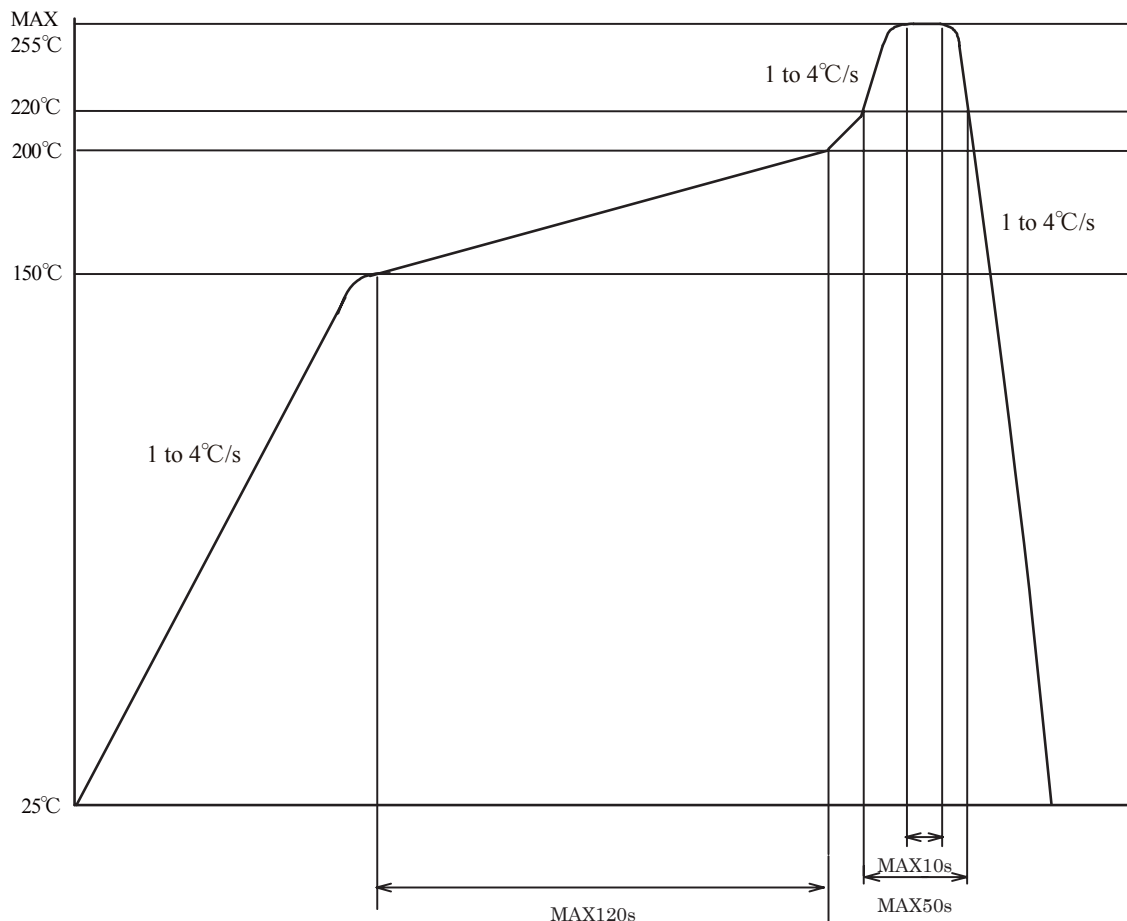
■Notes

- (1) When the system (program) is designed, the Turn Around Time shall be secured by considering 500 μ s 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 from the transceiver reaches the detector side of the transceiver.
- (2) As it is necessary 200 μ s 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 receives much external disturbing light, there is a case that the pulse other than signal output is generated as noise on output terminal of this transceiver. Please consider the layout 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°C, 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°C or less.
- Soldering time shall be within 5s.
- Soldered product shall treat at normal temperature.

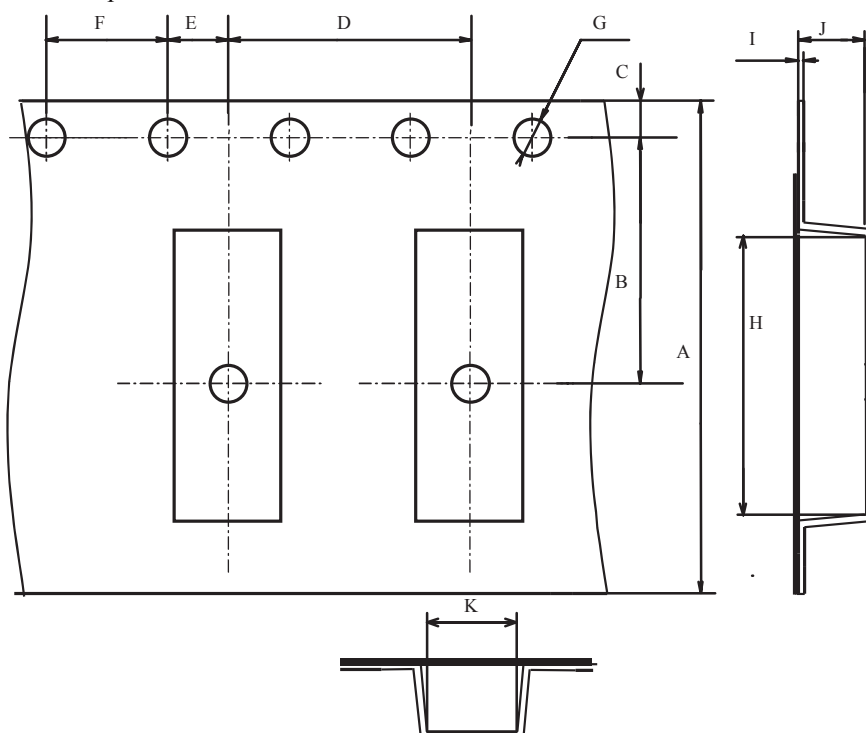
■ Package specification

● 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

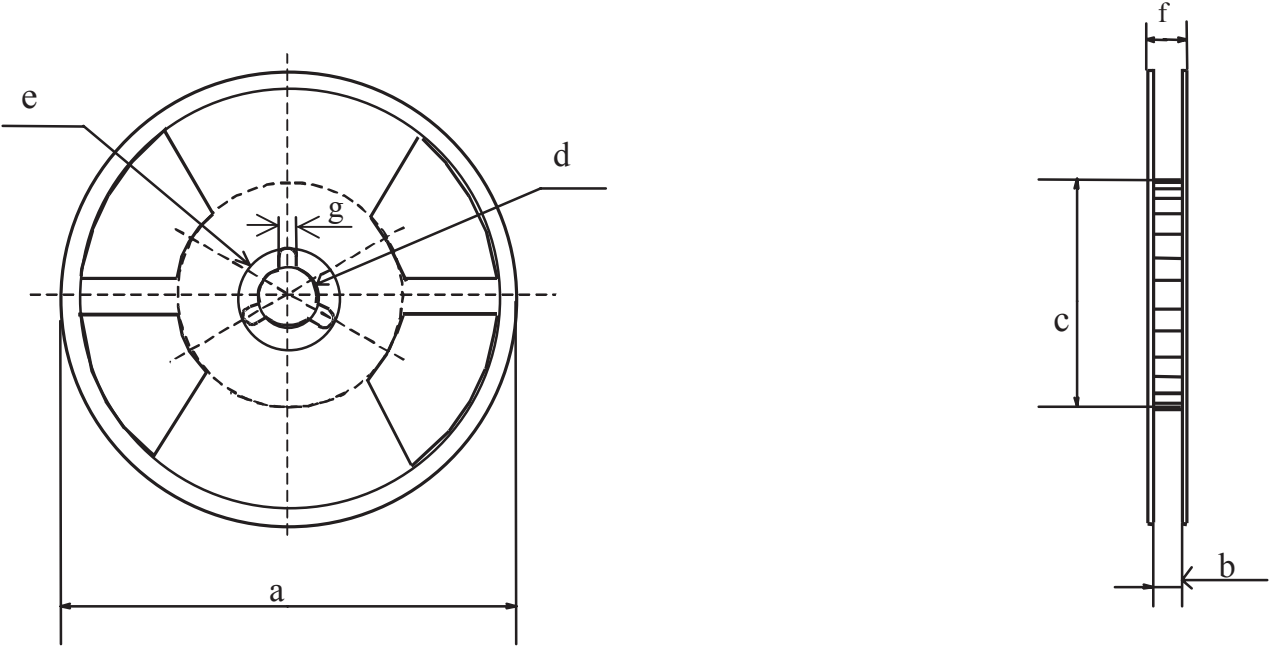


Dimension List

(Unit : mm)

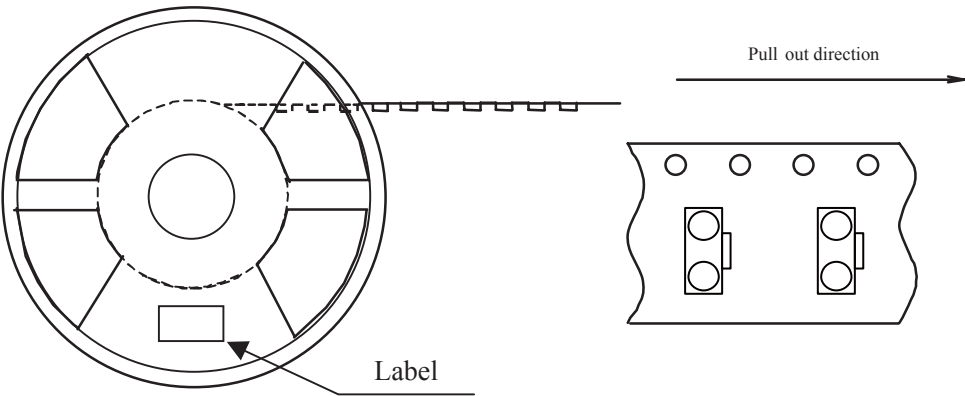
A	B	C	D	E	F
16.0±0.3	7.5±0.1	1.75±0.1	8.0±0.1	2.0±0.1	4.0±0.1
G	H	I	J	K	
$\phi 1.5^{+0.1}_{-0.0}$	9.56±0.1	0.33±0.05	3.06±0.1	4.04±0.1	

Reel structure and Dimensions



Dimension List (Unit : mm)			
a	b	c	d
$\phi\ 330\pm2$	17.5 ± 1	$\phi\ 100\pm1$	$\phi\ 13\pm0.2$
e	f	g	
$\phi\ 21\pm0.8$	22.5 ± 0.1	2 ± 0.5	

Direction of product insertion



●Cleaning Instructions

Solvent cleaning :

Solvent temperature 45°C 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, 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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- Test and measurement equipment
- Industrial control
- Audio visual equipment
- Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection

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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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