GP2W1004YP0F

IrDA Compliant Transceiver Module
9.6 kb/s to 4 Mb/s (FIR)
Low Profile
Low Consumption Current

■Description

The **GP2W1004YP0F** is an infrared transceiver module for IrDA ver. 1.4 (FIR).
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 (FIR)
   Transmission speed : 9.6 kb/s to 4 Mb/s
   Transmission distance : 1 m
2. Small package
   L 7.9 × W 2.85 × H 2.5 mm
3. Peak emission wavelength : 870 nm
4. Side 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 2.7 to 3.6 V
9. With LP/HP mode switching function
10. With V_{IO} terminal

■Agency approvals/Compliance

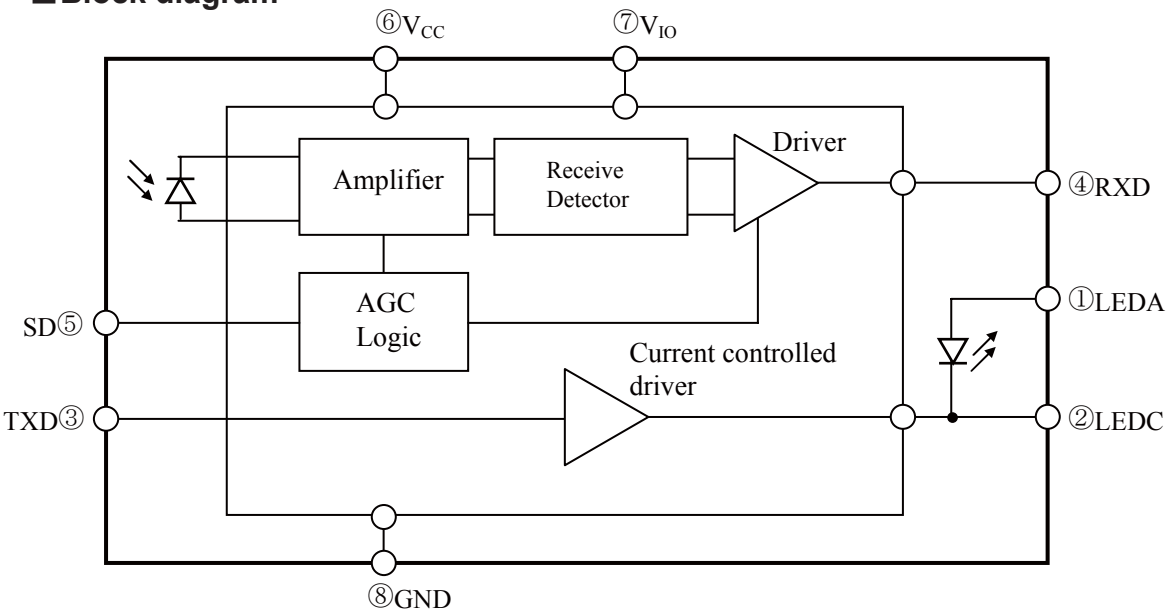
1. Compliant with IEC60825-1 class 1 eye safety standard
2. Compliant with RoHS directive (2002/95/EC)
3. Content status of six substances specified in
   " Management Methods for Control of Pollution Caused by Electronic Information Products Regulation "
   (popular name : *China RoHS*)
   (Chinese : 电子信息产品污染控制管理办法)
   ; refer to page 14
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
4. Personal computers
5. Personal information tools

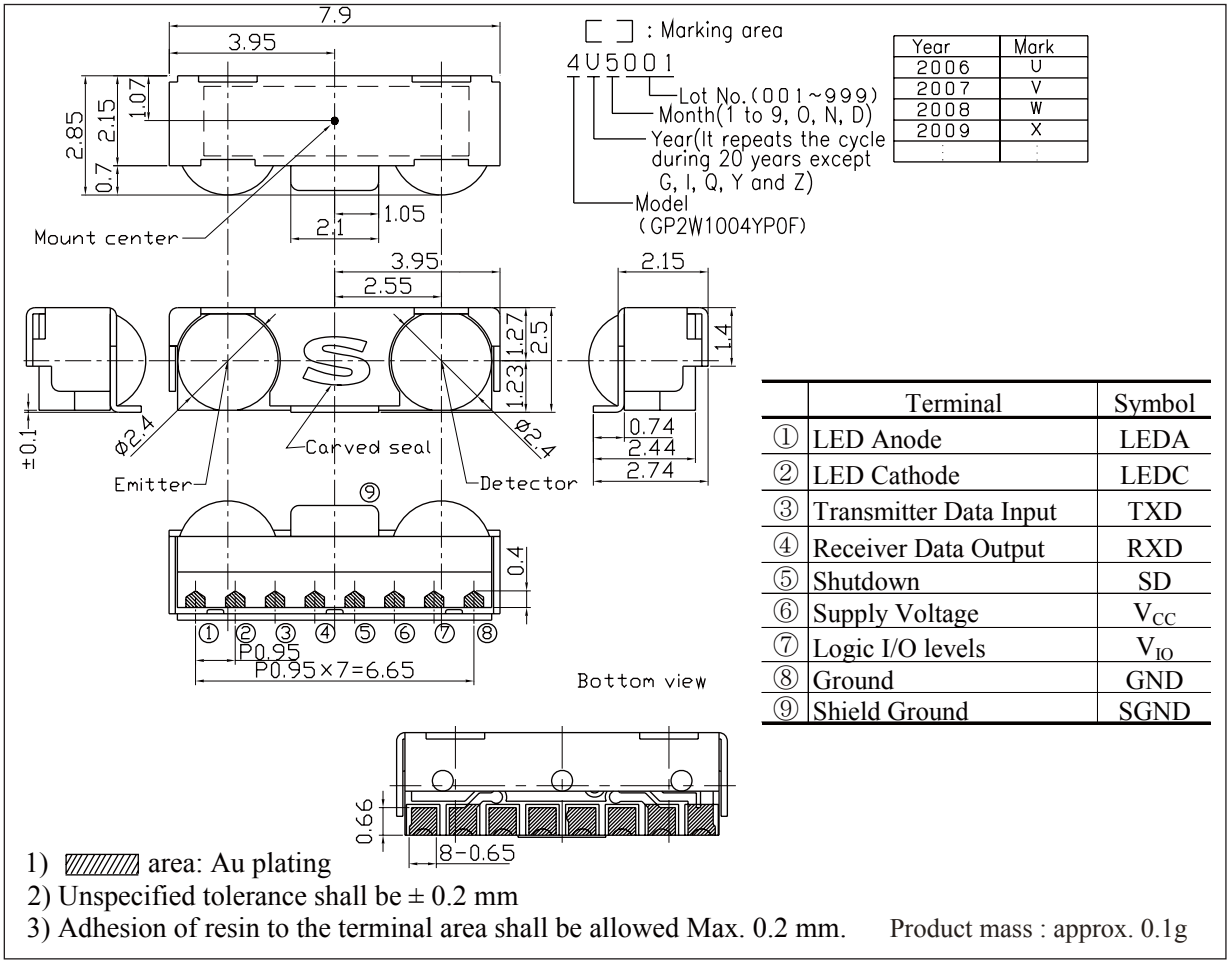
Sheet No.: E3-A00601EN
Date Mar.01.2007

■Block diagram



■Outline Dimensions

(Unit : mm)



Year	Mark
2006	U
2007	V
2008	W
2009	X
⋮	⋮

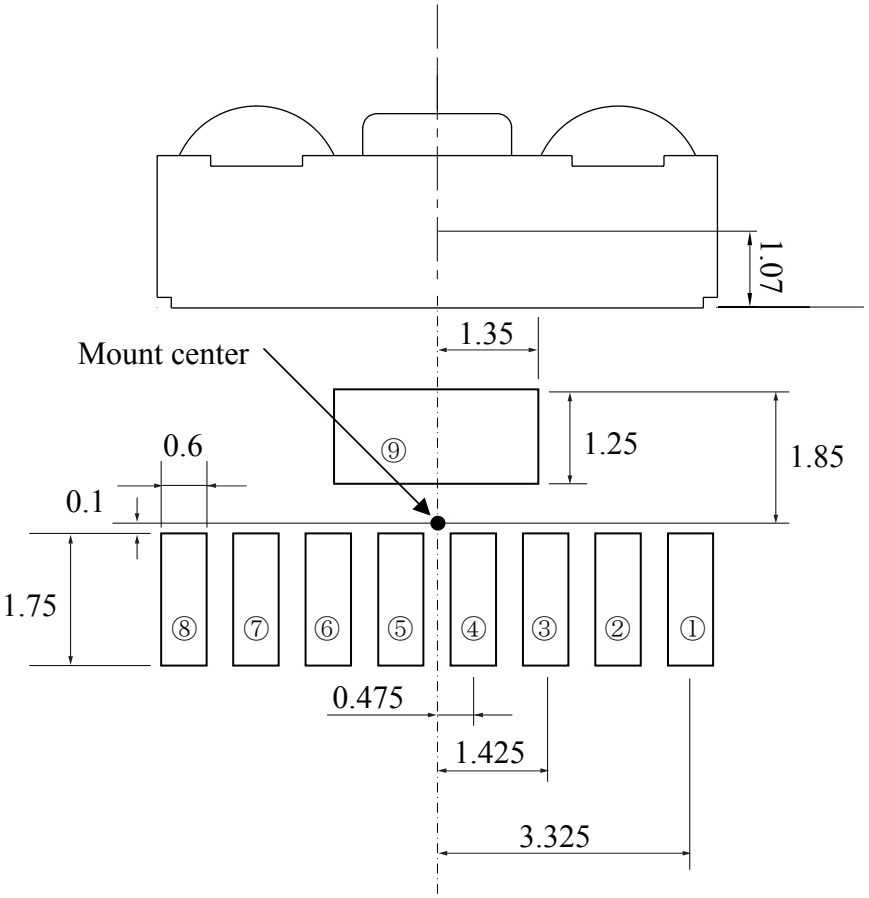
	Terminal	Symbol
①	LED Anode	LEDA
②	LED Cathode	LEDC
③	Transmitter Data Input	TXD
④	Receiver Data Output	RXD
⑤	Shutdown	SD
⑥	Supply Voltage	V_{CC}
⑦	Logic I/O levels	V_{IO}
⑧	Ground	GND
⑨	Shield Ground	SGND

1) ▨ area: Au plating
2) Unspecified tolerance shall be ± 0.2 mm
3) Adhesion of resin to the terminal area shall be allowed Max. 0.2 mm. Product mass : approx. 0.1g

■Recommended PCB Foot Pattern

Dimensions are shown for reference

(Unit:mm)



	Terminal	Symbol
①	LED Anode	LEDA
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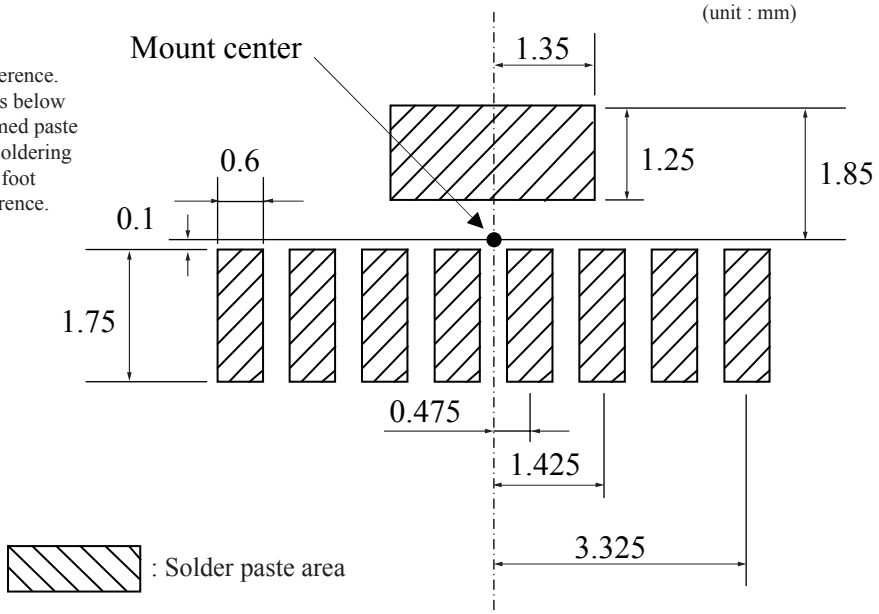
⑨	Shield Ground	SGND

■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.

(unit : mm)



■Absolute Maximum Ratings

(T_a=25℃)

	Parameter	Symbol	Rating	Unit
	Supply voltage	V_{CC}	-0.3 to 6.0	V
*1	LED Supply voltage	V_{LED}	-0.3 to 7.0	V
	Transmission Data Input	TXD	-0.3 to V_{CC}+0.3	V
	Shut down	SD	-0.3 to V_{CC}+0.3	V
	Logic I/O levels	V_{IO}	-0.3 to V_{CC}+0.3	V
*2	Peak forward current	I_{FM}	600	mA
*3	Operating temperature	T_{opr}	-25 to +85	℃
	Storage temperature	T_{stg}	-25 to +85	℃
*4	Soldering temperature	T_{sol}	260	℃

*1 R_{LED} = 4.7 Ω

*2 Pulse operation(FIR 4 Mb/s)

*3 When you make Duty 25 % of signal emit light continuously, please use continuation luminescence time in less than 10 seconds.

*4 Soldering reflow time : 10 seconds

■Electro-optical Characteristics

(T_{opr}=25±5℃, V_{CC}=3.0V Unless otherwise specified)

Parameter		Symbol	Rating	MIN.	TYP.	MAX.	Unit
Current consumption at no input signal	SIR mode	I_{CC-SIR}	No input signal, V_{ILSD}=0V Output terminal OPEN	—	0.45	0.6	mA
	MIR/FIR mode	I_{CC-FIR}		—	1.2	1.55	mA
Current consumption at receiving	SIR mode	$I_{CC-RSIR}$	V_{ILSD}=0V Output terminal OPEN	—	0.65	—	mA
	MIR/FIR mode	$I_{CC-RFIR}$		—	1.3	—	mA
Current consumption at Transmitting	All mode	I_{CC-T}	V_{IHTXD}=High, V_{ILSD}=0V	—	27	55	mA
Current consumption at Shutdown mode		I_{CC-S}	No input signal, V_{IHSD}=V_{CC}-1.2V Output terminal OPEN	—	0.01	1.0	μA
Receiver	High level output voltage	V_{OH}	I_{OH}=0.3mA*5	V_{IO}-0.5	V_{IO}-0.3	V_{IO}+0.3	V
	Low level output voltage	V_{OL}	I_{OL}=1mA*5	—	—	0.6	V
	Rise time	t_r	BR=4Mb/s,C_L=15pF,T_a=25℃*5	—	—	50	ns
	Fall time	t_f		—	—	50	ns
	Low level pulse width	t_{w0}	t_{w0},E_{e1};BR=9.6kb/s, ϕ ≦15°	1	—	24	μs
		t_{w1}	t_{w1},E_{e1};BR=115.2kb/s, ϕ ≦15°	1	—	4	μs
		t_{w2}	t_{w2},E_{e2};BR=1.152Mb/s, ϕ ≦15°	110	—	500	ns
		t_{w3}	t_{w3},E_{e2};BR=4Mb/s(single) ϕ ≦15°	67	—	195	ns
		t_{w4}	t_{w4},E_{e2};BR=4Mb/s(double) ϕ ≦15°	190	—	320	ns
	Maximum reception distance	L		100	—	—	cm
	Input irradiance	E_{e1}	T_a=25℃	—	—	4	μW/cm^2
		E_{e2}	Except for pulse during a half of preamble	—	—	10	μW/cm^2
	Overload irradiance	E_{e3}		500	—	—	mW/cm^2
	Receiver Latency	t_l		—	—	500	μs
	Receiver wakeup time	t_{sdw}	No input signal	—	—	1	ms
	SD input current	I_{isd}	V_{IHSD}=V_{CC}, V_{ILSD}=GND	-0.1	0	+0.1	μA
	SD terminal Input voltage Logic High	V_{IHSD}	Shutdown mode	V_{CC}-1.2	—	V_{CC}	V
	SD terminal Input voltage Logic Low	V_{ILSD}	Normal mode	—	—	0.5	V
	Jitter	t_j	BR=4Mb/s, T_a=25℃	—	30	60	ns
Transmitter	Radiant intensity	I_E	V_{LED}=3.3V,R_{LED}=0.9Ω ϕ ≦15° ,T_a=25℃*6	100	—	300	mW/sr
	LED peak current	I_{LED}	V_{LED}=3.3V,R_{LED}=0.9Ω,T_a=25℃*6	—	450	550	mA
	Rise time	t_r	BR=4Mb/s,V_{LED}=3.3V,T_a=25℃*6	—	—	40	ns
	Fall time	t_f		—	—	40	ns
	Peak emission wave length	λ_p	T_a=25℃	850	870	890	nm
	TXD-LP,TXD-HP high level input voltage	V_{IHTXD}	LED(ON),1.5≦V_{IO}≦1.8V	1.4	—	V_{CC}	V
			LED(ON),1.8＜V_{IO}≦V_{CC}	1.6	—	V_{CC}	V
	TXD-LP,TXD-HP low level input voltage	V_{ILTXD}	LED(OFF)	—	—	0.6	V
	TXD-LP,TXD-HP high level input current	I_{IHTXD}	T_a=25℃	—	—	20	μA
	TXD-LP,TXD-HP low level input current	I_{ILTXD}	T_a=25℃	—	—	8	μA
	Maximum optical pulse width	t_{OPWM}	TXD pin stuck high	30	—	300	μs

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

■Recommended Operating Conditions

(T_a=25℃)

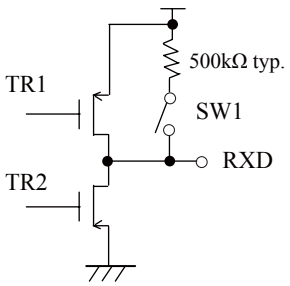
Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{CC}		2.7 to 3.6	V
LED Supply voltage	V_{LED}	R_{LED}=4.7Ω(V_{LED}=5V)	2.7 to 5.5	V
Operating temperature	T_{opr}	*3	-25 to +85	℃
Data rate	BR		9.6k to 4M	b/s
Logic I/O levels	V_{IO}		15 to V_{CC}	V

■Truth Table

MODE	SD	SW1	SW2	TXD	LED	Receiver	TR1	TR2	RXD
Shutdown	H	On	Off	L	Off	Don't Care	Off	Off	Pull-up
Transmitter	L	Off	On	H	On	Don't Care	Off	On	L(echo)
Receiver	L	Off	On	L	Off	IrDA Signal	Off	On	L
	L	Off	On	L	Off	No Signal	On	Off	H

H:high, L:Low

*RXD equivalent circuit



*TXD equivalent circuit

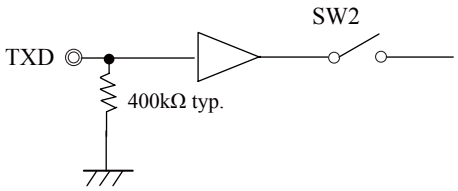
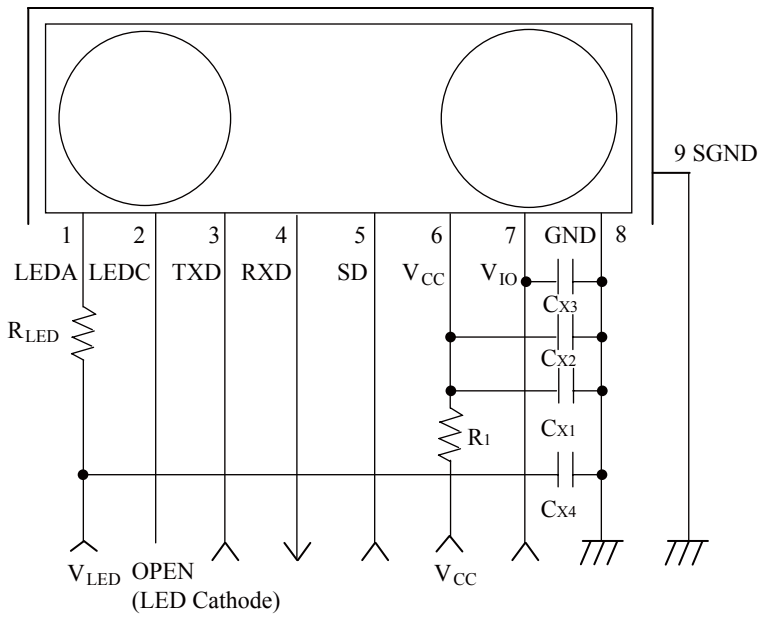


Fig.1 Recommended External Circuit



Components		Recommended values
C_{X1}		4.7µF(Ceramic)(Note1)
C_{X2}		0.47µF(Ceramic)(Note1)
C_{X3}		0.47µF(Ceramic)(Note1)
C_{X4}		10µF(Ceramic)
R_1(1/16W)		4.7Ω
R_{LED}	1/2W	4.7Ω(V_{LED}=5V)
(Note2)	1/10W	0.9Ω(V_{LED}=3.3V)

(Note1) Components choose the most suitable C_{X1}, C_{X2}, C_{X3}, C_{X4} according to the noise level and noise frequency of power supply.

(Nore2) In order to guarantee(100mW/sr), V_{LED} is required 5V(R_{LED}=4.7Ω), V_{LED} is required 3.3V(R_{LED}=0.9Ω).

Fig.2 Output Waveform Specification(Receiver side)

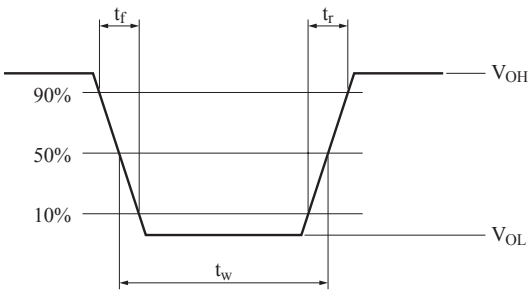
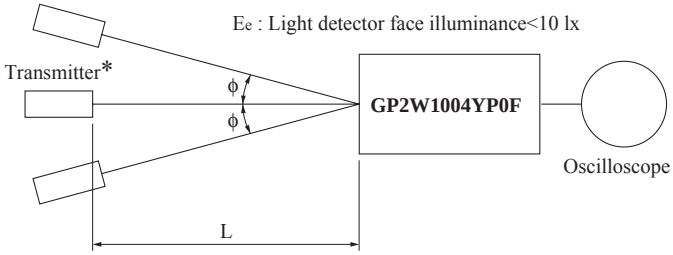


Fig.3 Standard Optical System(Receiver side)



ϕ : Indicates horizontal and vertical directions.

Data rate	T_1	T_2	T_2/T_1	Radiant intensity
9.6kb/s	104µs	19.5µs	3/16	40mW/sr
115.2kb/s	8.68µs	1.63µs	3/16	40mW/sr
1.152Mb/s	868ns	217ns	1/4	100mW/sr
4Mb/s	500ns	125ns	1/4	100mW/sr

* Transmitter shall use **GP2W1004YP0F** (λ_p=870 nm TYP.) which is adjusted the radiation intensity at 40 mW/sr (at 9.6 to 115.2 kb/s), 100 mW/sr (at 1.152, 4 Mb/s).

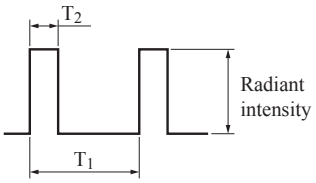


Fig.4 Output Waveform Specification(Transmitter side)

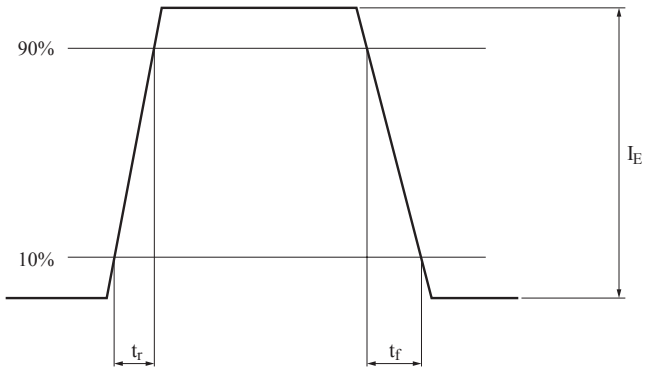


Fig.5 Standard Optical System(Transmitter side)

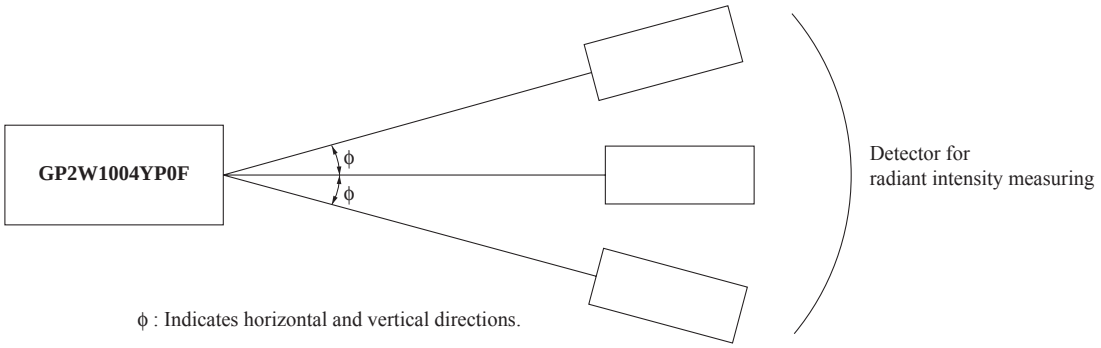
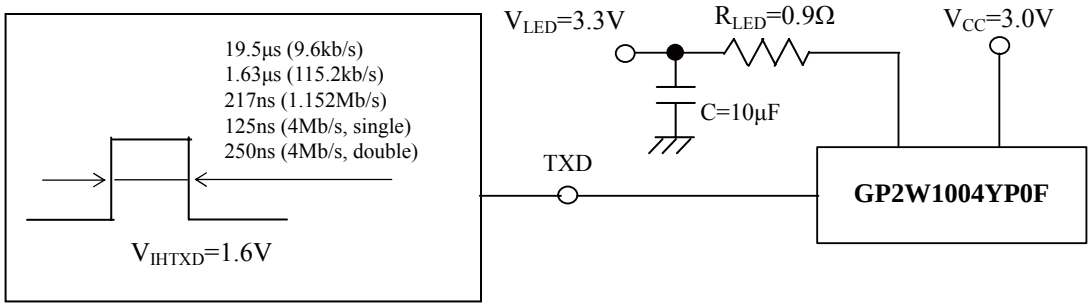
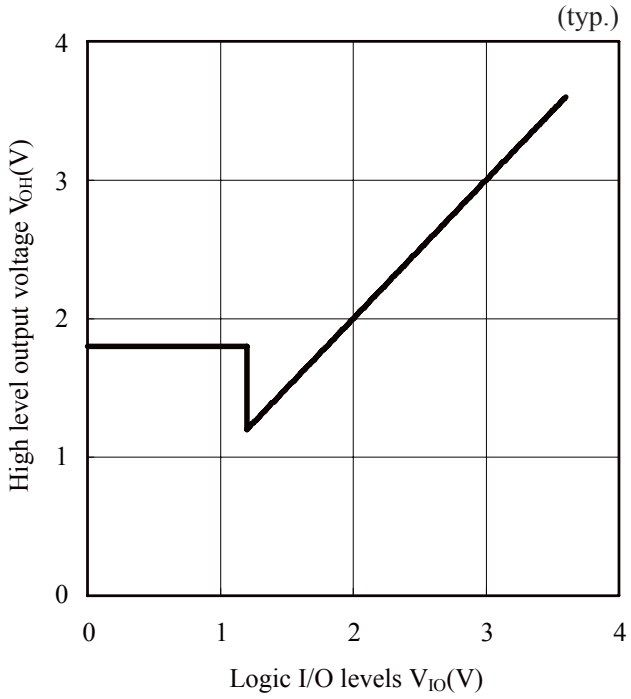


Fig.6 Recommended Circuit of Transmitter side



BR=9.6kb/s
BR=115.2kb/s
BR=1.152Mb/s
BR=4Mb/s

Fig.7 High level output voltage(V_{OH}) vs Logic I/O levels(V_{IO})



■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 1 ms 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.

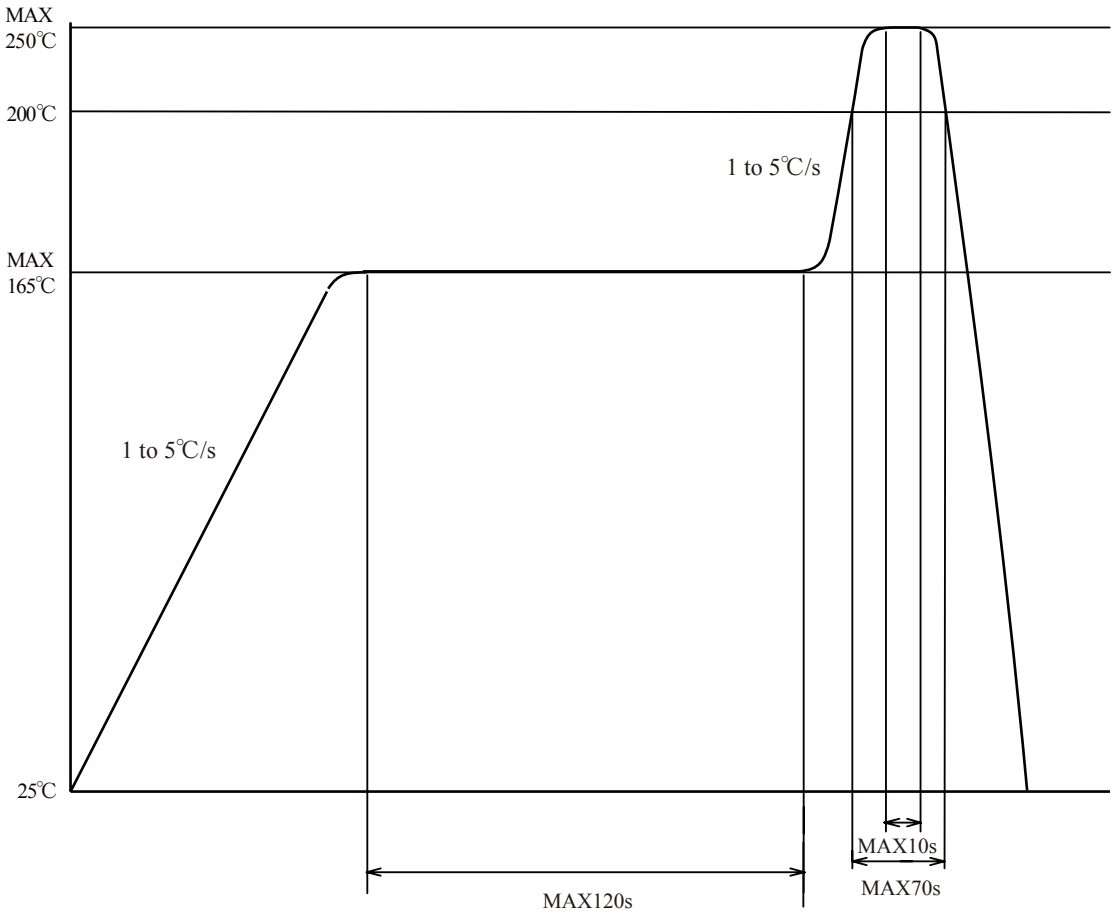
(4) In case that this sensor is adopted in IR communication system, please use it according to the signal method which is specified by [Serial Infrared Physical Layer Link Specification Version 1.4] published by Infrared Data Association. False operation may happen if the different signal method is used.

(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 2 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.

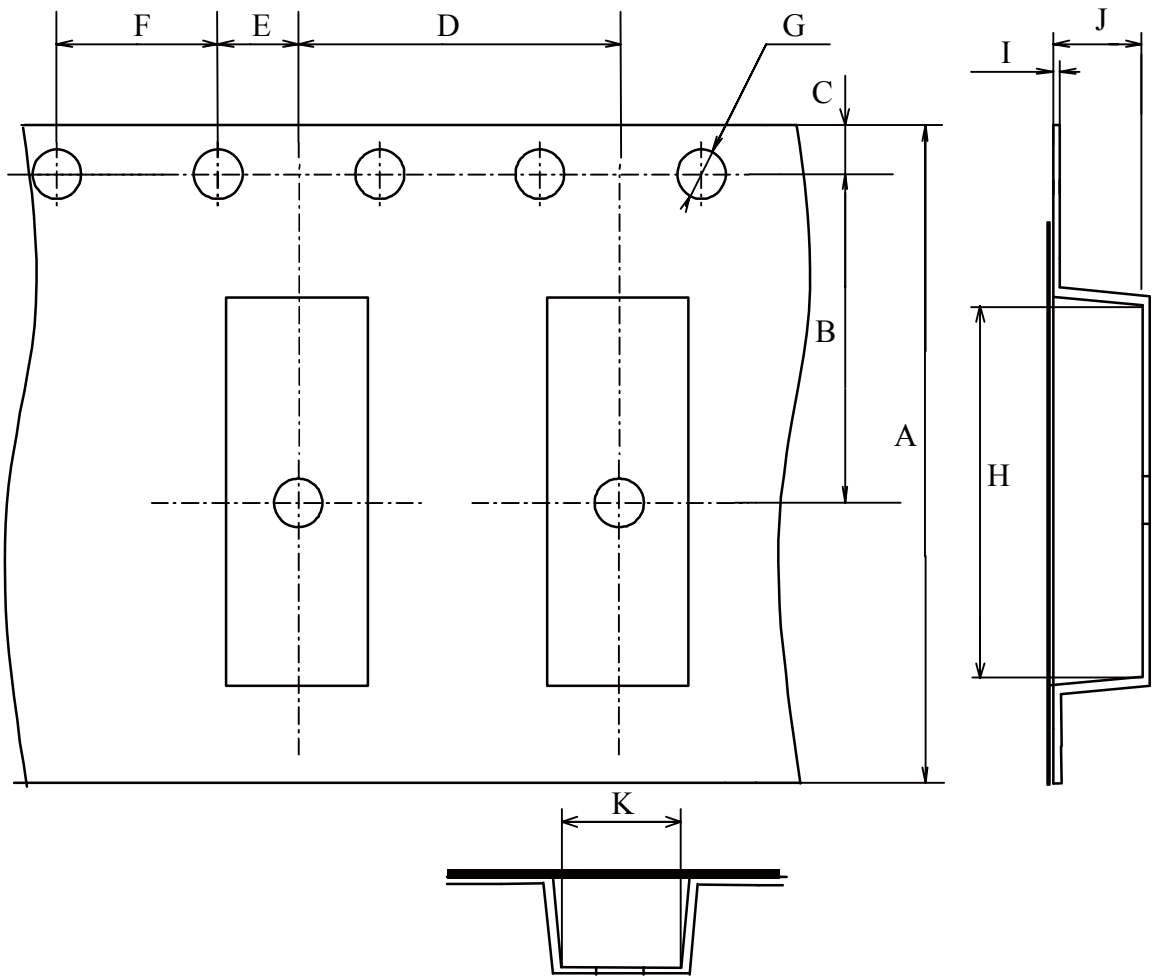
3. Soldering

- 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

Carrier tape structure and Dimensions

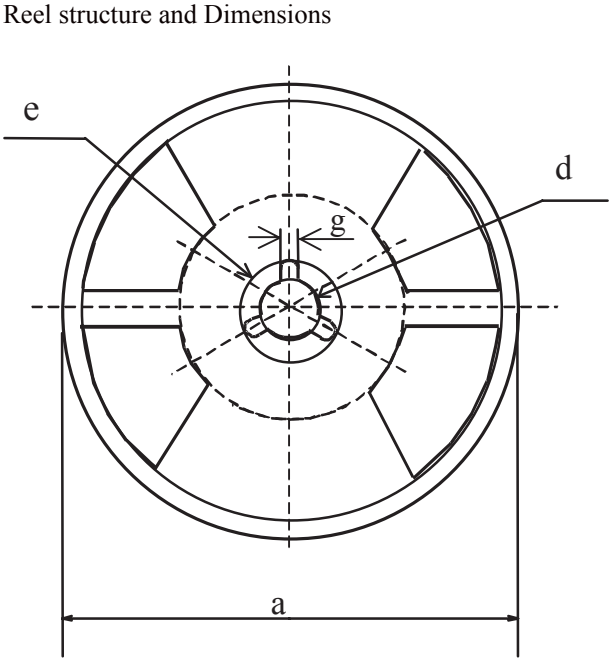


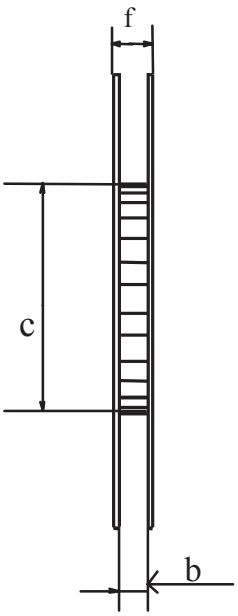
Dimension List

(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	
$\phi 1.5^{+0.1}_{-0.0}$	8.36±0.1	0.33±0.05	2.8±0.1	2.97±0.1	

Reel structure and Dimensions



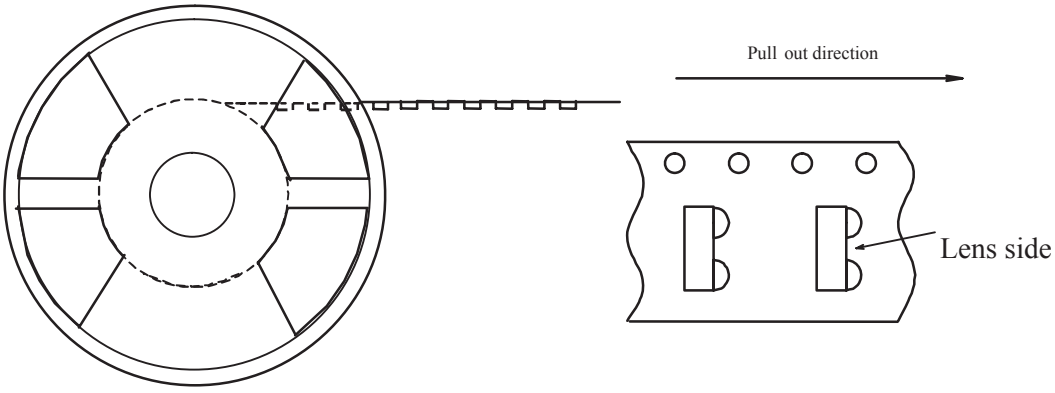


Dimension List

(Unit : mm)

a	b	c	d
ϕ 330±2	17.5±2	100±1	13±0.3
e	f	g	
21±0.8	22.5±2	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, 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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- --- Personal computers
- --- Office automation equipment
- --- Telecommunication equipment [terminal]
- --- 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 with equipment that requires higher reliability such as:
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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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- --- Medical and other life support equipment (e.g., scuba).

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