

GP2W2003YK/ GP2W2004YK

IrDA Transceiver Module Compliant with IrDA Control

■ Features

- Compliant with IrDA control
GP2W2003YK : for peripheral Type 1
GP2W2004YK : for peripheral Type 2
- Low dissipation current
 (Dissipation current at shut-down:MAX.1 μ A)
- 4 Range of LED power control
- Long distance (approx. 8m (Min. 5m)) wireless communication at 75kbps data rate (Radiant intensity=100mW/sr) (**GP2W2003YK**)
- Wide viewing angle (Min. 1.5m, $\pm 40^\circ$) wireless communication at 75kbps data rate (**GP2W2004YK**)
- Low power operation : 3.3V
- Built-in envelope detector
- By using assistance LED (SHARP **GL710**), able to use for Host Type. (**GP2W2003YK**)
- RESET function to recover the receiver sensitivity
- Optimized interface to sharp peripheral engine, an embedded communication controller for IrDA Control

■ Applications

- Personal Computers
- Input devices for PC (mouse, keyboard, joy stick)
- Amusement equipment
- AV equipment
- Universal controllers

■ Absolute Maximum Ratings (Ta=25°C)

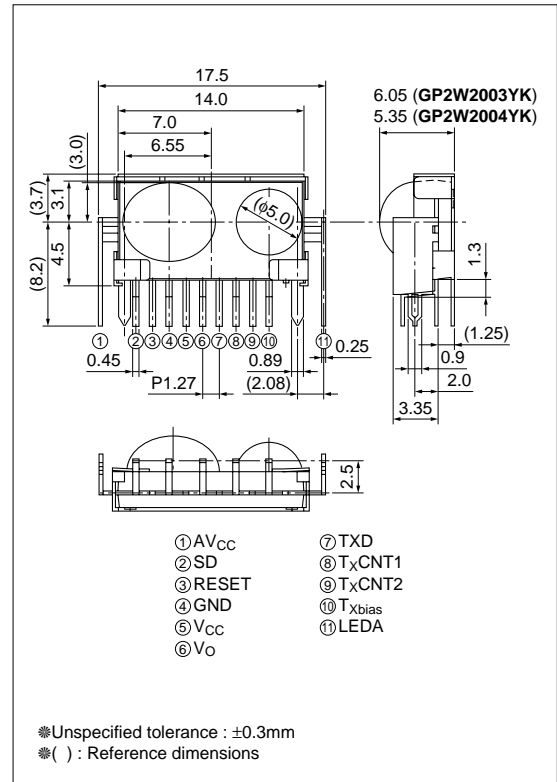
Parameter	Symbol	Rating	Unit
Supply voltage	V _{CC}	0 to 6.0	V
Operating temperature	T _{op}	-10 to 70	°C
Storage temperature	T _{stg}	-20 to 85	°C
*1 Peak forward LED current	I _{FM}	600	mA
Receiver data output current	V _O	V _{CC}	V
*2 Soldering temperature	T _{SOL}	260	°C

*1 Refer to Fig.11

*2 For MAX. 5s at the position of 1.3mm from the resin edge.

■ Outline Dimensions

(Unit : mm)



■ Recommended Operating Conditions

(Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Operating temperature	T _{OP}		-10	-	+70	°C	
Supply voltage	V _{CC1}	Supply voltage of detector side	2.4	-	3.6	V	
Supply voltage	V _{CC2}	Supply voltage of emitter side	2.8	-	3.6	V	
Transmitter input subcarrier frequency	f _{SC}	*3 Frequency accuracy within the range of ±1.1%	1.484	-	1.517	MHz	
Logic high transmitter input voltage (TXD)	V _{IH (TXD)}		1.3	-	-	V	
Logic low transmitter input voltage (TXD)	V _{IL (TXD)}		0.0	-	0.4	V	
Logic low receiver input irradiance	GP2W2003YK	E _{IIL}	*5 $\theta_r \leq \pm 40^\circ$, $\phi_r \leq \pm 25^\circ$ *4 For in-band signals ≤ 75.83 kbps	0.4	-	1 250	$\mu\text{W}/\text{cm}^2$
		E _{IIL}	*5 $\theta_r \leq \pm 50^\circ$, $\phi_r \leq \pm 15^\circ$ *4 For in-band signals ≤ 75.83 kbps	1.111	-	1 250	$\mu\text{W}/\text{cm}^2$
	GP2W2004YK	E _{IIL}	*5 $\theta_r \leq \pm 40^\circ$, $\phi_r \leq \pm 25^\circ$ *4 For in-band signals ≤ 75.83 kbps	3.0	-	1 250	$\mu\text{W}/\text{cm}^2$
		E _{IIL}	*5 $\theta_r \leq \pm 50^\circ$, $\phi_r \leq \pm 15^\circ$ *4 For in-band signals ≤ 75.83 kbps	1.111	-	1 250	$\mu\text{W}/\text{cm}^2$
LED (logic high) current	I _{LEDA}	I _E =100mW/sr, *5 $\theta_t \leq \pm 15^\circ$, $\phi_t \leq \pm 15^\circ$	300	-	-	mA	
Receiver signal rate	D _{RATE}		74.175	-	75.825	kbps	
High level input voltage (RESET terminal)	V _{IHRE}	*6 Refer to "RESET Function"	2.1	-	V _{CC}	V	
Low level input voltage (RESET terminal)	V _{ILRE}	*6 Refer to "RESET Function"	0	-	0.6	V	
Recovery time	t _{ret}	*6 Refer to "RESET Function"	-	-	40	μs	
SD recovery time	t _{SD}		-	-	1	ms	
High level input voltage (SD terminal)	V _{IHSD}	*7	1.3	-	V _{CC}	V	
Low level input voltage (SD terminal)	V _{ILSD}	*7	0	-	0.4	V	
Txbias High level input voltage	V _{IH (TXbias)}		1.3	-	V _{CC}	V	
Txbias Low level input voltage	V _{IL (TXbias)}		0	-	0.4	V	
Txcnt1, 2 High level input voltage	V _{IH (TXCN)}		1.3	-	V _{CC}	V	
Txcnt1, 2 Low level input voltage	V _{IL (TXCN)}		0	-	0.4	V	

*3 IrDA Control system uses 16PSM coding scheme over 1.5MHz sub-carrier. See [Infrared IrDA control Specification] Version 1.0 for the details of coding scheme and pulse characteristics.

*4 An in-band optical signal is a pulse/sequence where the peak wavelength λ_p is defined as $850\text{nm} \leq \lambda_p \leq 900\text{nm}$, and the pulse characteristics (Refer to fig.5) are compliant with [Infrared IrDA control Specification] Version 1.0.

*5 Refer to Fig.9

*6 Refer to Fig.10

■ Electro-optical Characteristics

(V_{CC}=3.3V, T_a=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Receiver side	Dissipation current	I _{cc}	No input light, V _{CC} =3.3V	—	0.4	0.5	mA	
	S/D dissipation current	I _{ccsd}	At S/D mode *7	—	—	1	μA	
	High level output voltage	V _{OH}	No input light, High level	V _{CC} -0.5	—	—	V	
	Low level output voltage	V _{OL}	I _{OL} =400μA	—	—	0.5	V	
	Pules width	Single	t _{ws}	Input pules width 6.33μs *9, *10	3.66	6.67	9.67	μs
		Double	t _{wd}	Input pules width 13.0μs *9, *10	10.33	13.33	16.34	μs
		Multi	t _{wm}	Input pules width 53.0μs *9, *10	50.36	53.36	56.36	μs
	Jitter	t _j		*8, *9	-1.8	—	+1.8	μs
	Rise time	t _r		*9	—	—	4.0	μs
	Fall time	t _f		*9	—	—	4.0	μs
Maximum communication distance	GP2W2003YK	L1	100mW/sr, θ _r ≤30°, φ _r ≤15°	5.0	—	—	m	
		L2	100mW/sr, θ _r ≤50°, φ _r ≤15°	3.0	—	—	m	
	GP2W2004YK	L1	68mW/sr, θ _r ≤40°, φ _r ≤25°	1.5	—	—	m	
Radiant intensity	GP2W2003YK	I _E	θ _t ≤15°, φ _t ≤15°, I _{LEDA} =300mA, *10, *11	100	—	—	mW/sr	
	GP2W2004YK		θ _t ≤40°, φ _t ≤25°, I _{LEDA} =300mA, *10, *11	9	—	—	mW/sr	
Peak emission wavelength		λ _p	I _{LEDA} =300mA	850	—	900	nm	
Rise time		t _r (LED)	*10, *11	—	—	80	ns	
Fall time		t _f (LED)	*10, *11	—	—	80	ns	

* t_{wm}=53.00μs (6.67μsx8-0.36)

*7 "S/D mode": low level (V_{ILSD}≤0.5V), "H" or OPEN : normal operating mode.

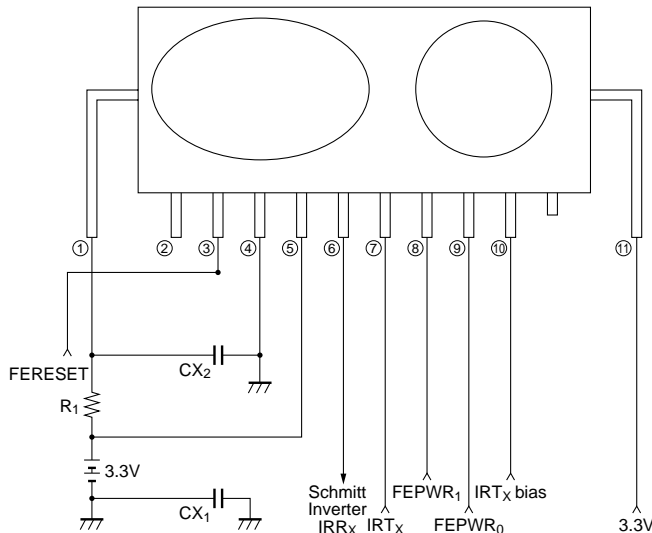
*8 The time difference or time gap from the pulse judgement criteria point of the output waveform at the 50% point between V_{OH} and V_{OL}.

*9 Refer to Fig.6

*10 Refer to Fig.7

*11 Refer to Fig.8

Fig.1 Recommended External Parts



- ① AV_{CC}
- ② SD
- ③ RESET
- ④ GND
- ⑤ V_{CC}
- ⑥ V_O
- ⑦ TXD
- ⑧ TxCNT1
- ⑨ TxCNT2
- ⑩ Tx_{bias}
- ⑪ LEDA

CX1 : 0.1μF, ±10%, Ceramic
 CX2 : 0.1μF, ±10%, Ceramic
 R1 : 100Ω±5%, 0.125W

Note)

Please choose the most suitable CX1 and R1 according to the noise level and noise frequency of power supply.

Fig.2 System Configuration

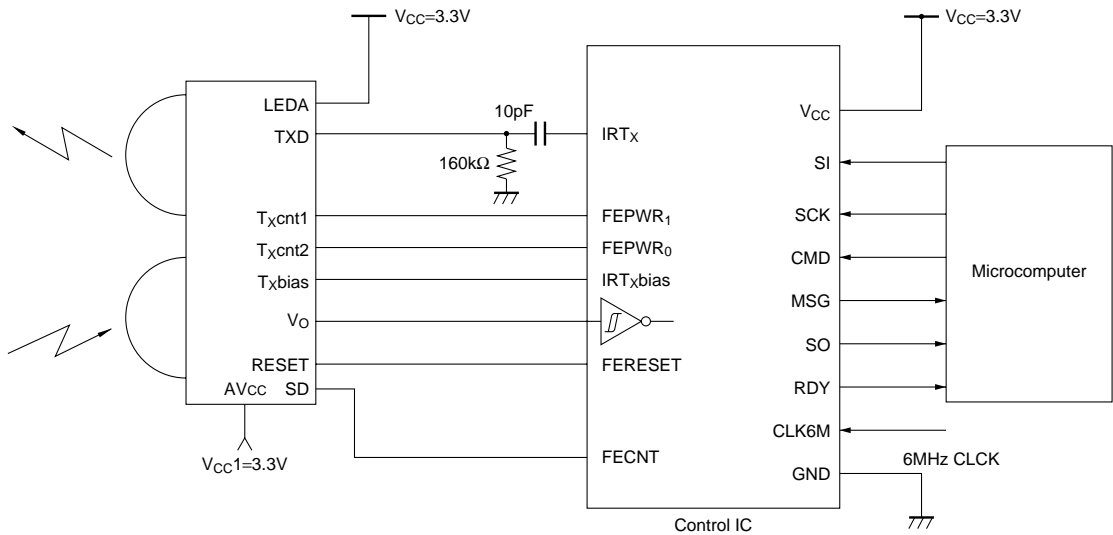


Fig.3 Example of Signal Waveform

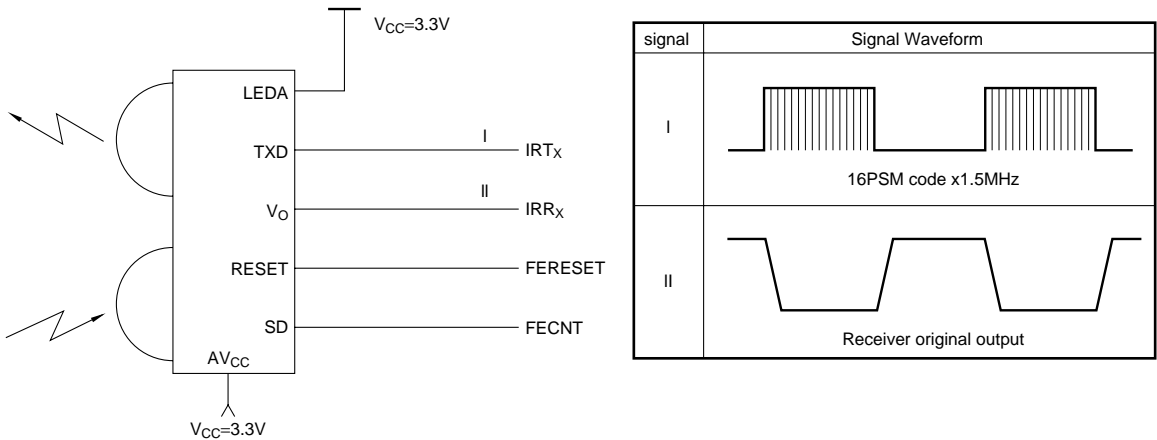
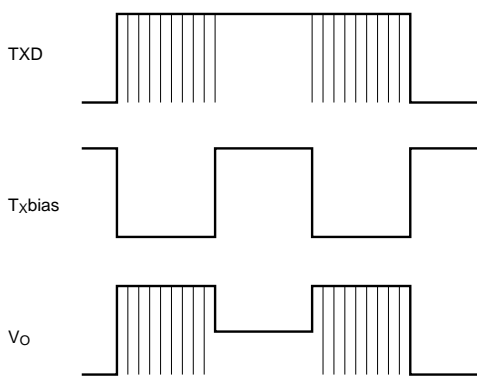


Fig.4 LED Power Mode Truth Table

Mode	Txcnt1	Txcnt2	Txin	LED output power
Mode1	0	0	1	1
Mode2	0	1	1	1/2
Mode3	1	0	1	1/4
Mode4	1	1	1	1/8

※ 4 range of LED power control. Refer to Fig.3

Fig.5 Txbias Output Waveform



Tx bias truth table

TXD	Tx bias	DC bias
0	0	OFF
0	1	OFF
1	0	OFF
1	1	ON

※ DC bias voltage can be superimposed on Vo output, applying signal waveform shown on the left to Txbias terminal. Refer to Fig.3

Fig.6 Output Waveform (Receiver side)

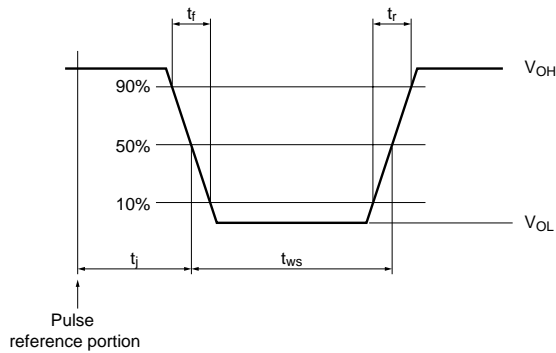
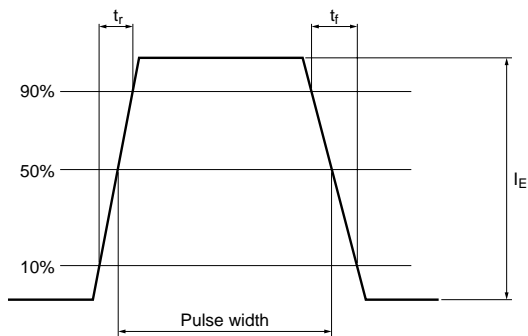


Fig.7 Output Waveform (Transmitter side)



The light emitting diode (SHARP GL710, λ_p=850 to 900nm) is used as the transmitter, where the following continuous signals are transmitted.

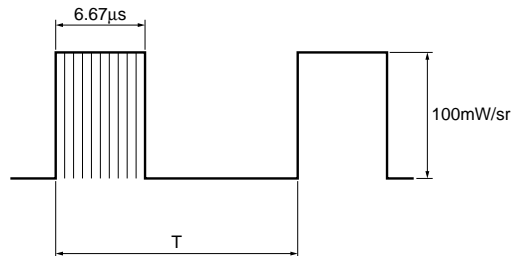
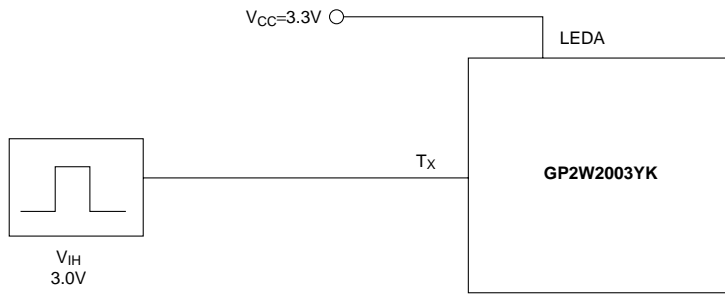


Fig.8 Recommended Circuit of Transmitter side



Output signal (Fig.7) shall be complete electro-optical characteristics of transmitter side.

Fig.9 Viewing Angular Criteria

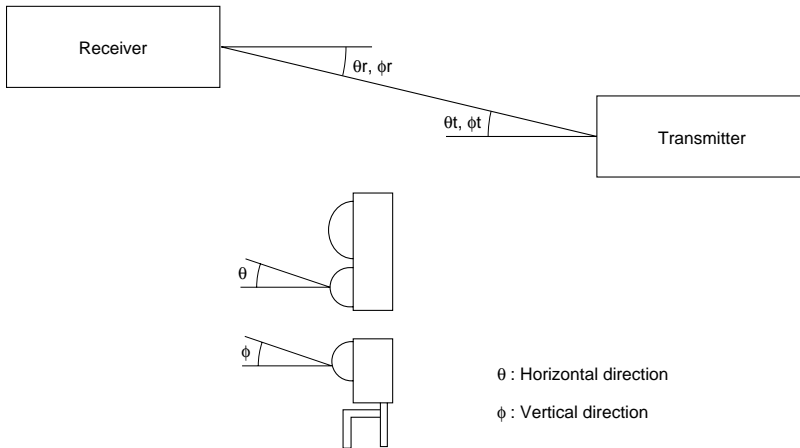
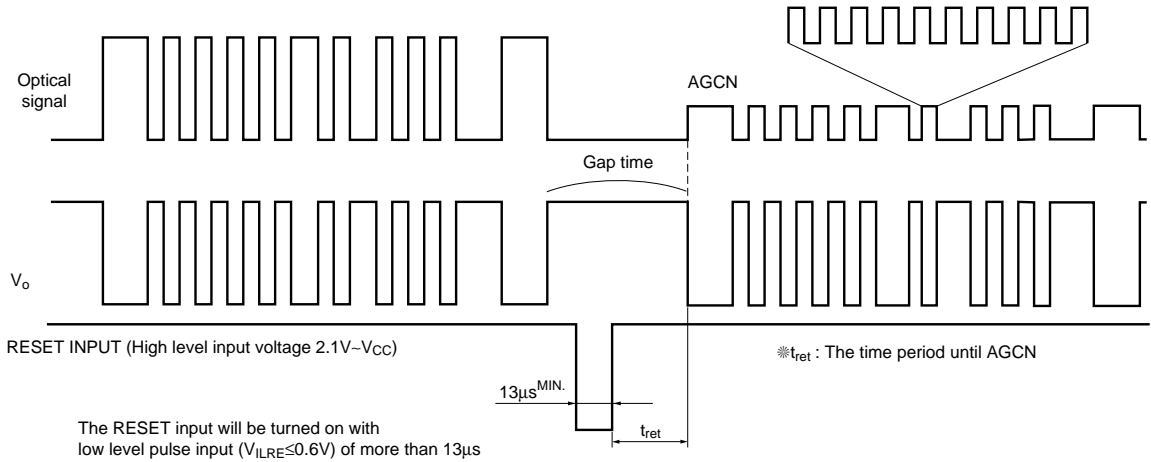


Fig.10 Reset Function

The "RESET" terminal is used to recover the receiver sensitivity to its maximum level.

Sharp IrDA control Transceiver has a built-in capability to adjust the receiver sensitivity (Threshold level adjustment). With this function, in order to receive very weak infrared signals right after very strong infrared signals, following input to "RESET" terminal provides the receiver sensitivity recovery to its maximum level.



The RESET input must be pulsed to the transceiver within the gap time for correct operation.

The timing for "RESET" must be adjusted at the controlled IC.

Fig.11 Peak Forward Current vs. Ambient Temperature

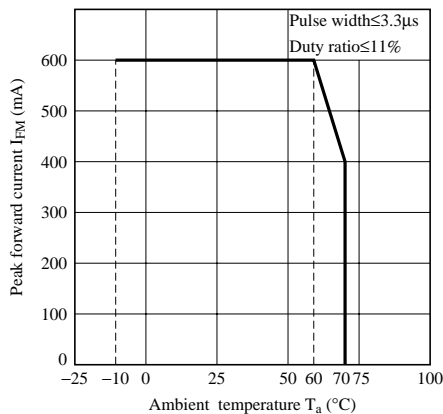


Fig.12 Relative Communication Distance vs. Ambient Temperature

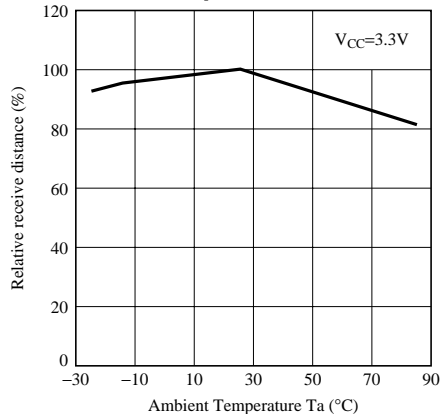


Fig.13 Radiation Diagram(GP2W2003YK)

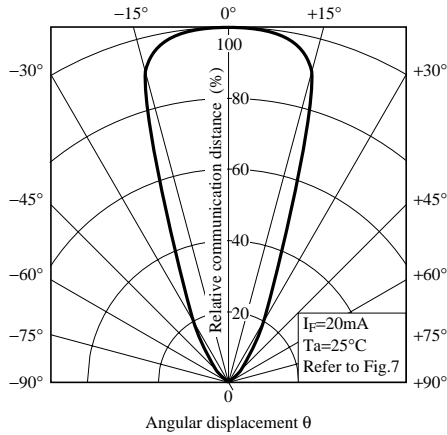


Fig.14 Radiation Diagram (GP2W2004YK)

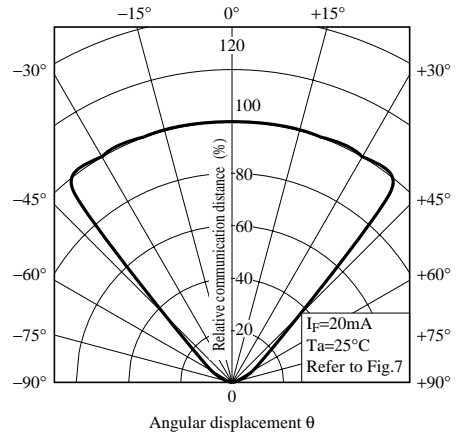


Fig.15 Sensitivity Diagram (GP2W2003YK)

Transmitter radiant intensity :100mW/sr $V_{CC}=3.3\text{V}$, $T_a=25^\circ\text{C}$
 Transmitter code :16PSM code Refer to Fig.7

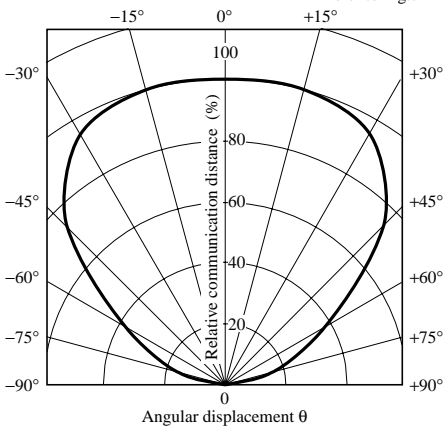


Fig.16 Sensitivity Diagram (GP2W2004YK)

Transmitter radiant intensity :100mW/sr $V_{CC}=3.3\text{V}$, $T_a=25^\circ\text{C}$
 Transmitter code :16PSM code Refer to Fig.7

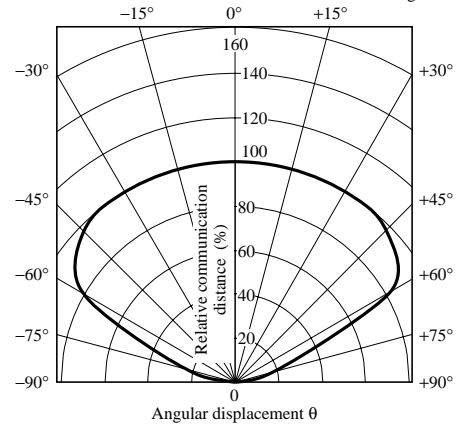


Fig.17 Spectral Distribution

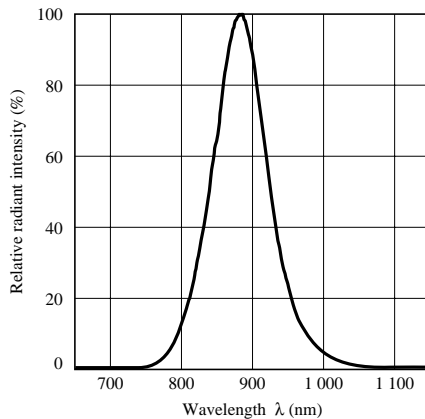
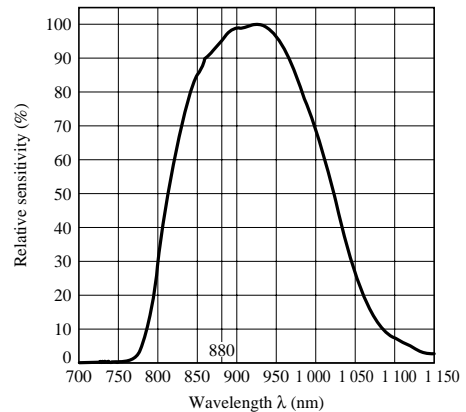


Fig.18 Spectral Sensitivity



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