GP2W2003YK/ GP2W2004YK

IrDA Transceiver Module Compliant with IrDA Control

■ Features

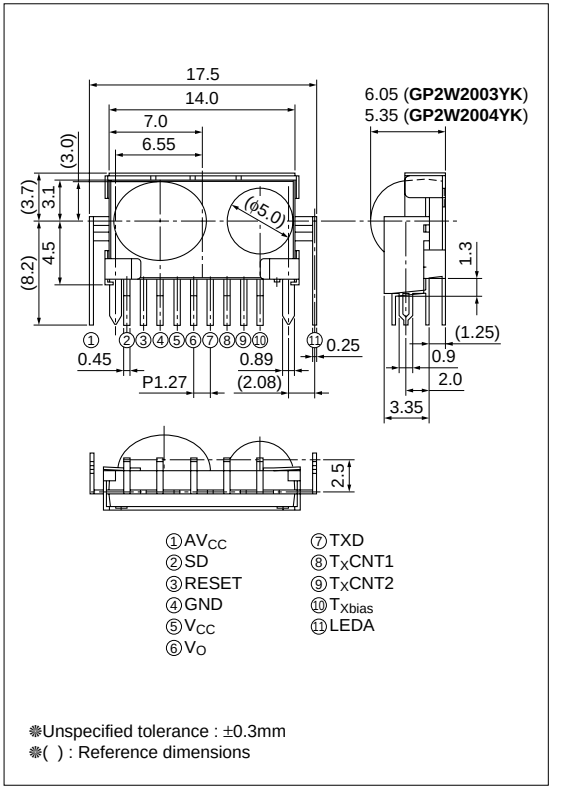
1. Compliant with IrDA control
   GP2W2003YK : for peripheral Type 1
   GP2W2004YK : for peripheral Type 2
2. Low dissipation current
   (Dissipation current at shut-down:MAX.1μA)
3. 4 Range of LED power control
4. Long distance (approx. 8m (Min. 5m)) wireless communication at 75kbps data rate (Radiant intensity=100mW/sr) (**GP2W2003YK**)
5. Wide viewing angle (Min. 1.5m, ±40˚) wireless communication at 75kbps data rate (**GP2W2004YK**)
6. Low power operation : 3.3V
7. Built-in envelope detector
8. By using assistance LED (SHARP **GL710**), able to use for Host Type. (**GP2W2003YK**)
9. RESET function to recover the receiver sensitivity
10. Optimized interface to sharp peripheral engine, an embedded communication controller for IrDA Control

■ Applications

1. Personal Computers
2. Input devices for PC (mouse, keyboard, joy stick)
3. Amusement equipment
4. AV equipment
5. Universal controllers

■ Outline Dimensions

(Unit : mm)



❋Unspecified tolerance : ±0.3mm
❋( ) : Reference dimensions

■ 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.

■ 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	EI_{IL}	*5 θr≤±40°, φr≤±25° *4 For in-band signals≤75.83kbps	0.4	–	1 250	μW/cm²
			*5 θr≤±50°, φr≤±15° *4 For in-band signals≤75.83kbps	1.111	–	1 250	μW/cm²
	GP2W2004YK	EI_{IL}	*5 θr≤±40°, φr≤±25° *4 For in-band signals≤75.83kbps	3.0	–	1 250	μW/cm²
LED (logic high) current		I_{LEDA}	I_E=100mW/sr, *5 θt≤±15°, φt≤±15°	300	–	–	mA
Receiver signal rate		D_{RATE}		74.175	–	75.825	kbps
High lebel input valtage (RESET terminal)		V_{IHRE}	*6 Refer to "RESET Function"	2.1	–	Vcc	V
Low lebel input valtage (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 λp, is defined as 850nm≤λp≤900nm, 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, Ta=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	Vcc–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**	L_1	100mW/sr, θr≤30°, ϕr≤15°	5.0	–	–	m
			L_2	100mW/sr, θr≤50°, ϕr≤15°	3.0	–	–	m
		GP2W2004YK	L_1	68mW/sr, θr≤40°, ϕr≤25°	1.5	–	–	m
Transmitter side	Radiant intensity	**GP2W2003YK**	I_E	θt≤15°, ϕt≤15°, I_{LEDA}=300mA, *10, *11	100	–	–	mW/sr
		GP2W2004YK		θt≤40°, ϕt≤25°, I_{LEDA}=300mA, *10, *11	9	–	–	mW/sr
	Peak emission wavelength		λp	I_{LEDA}=300mA	850	–	900	nm
	Rise time		$t_{r\,(LED)}$	*10, *11	–	–	80	ns
	Fall time		$t_{f\,(LED)}$	*10, *11	–	–	80	ns

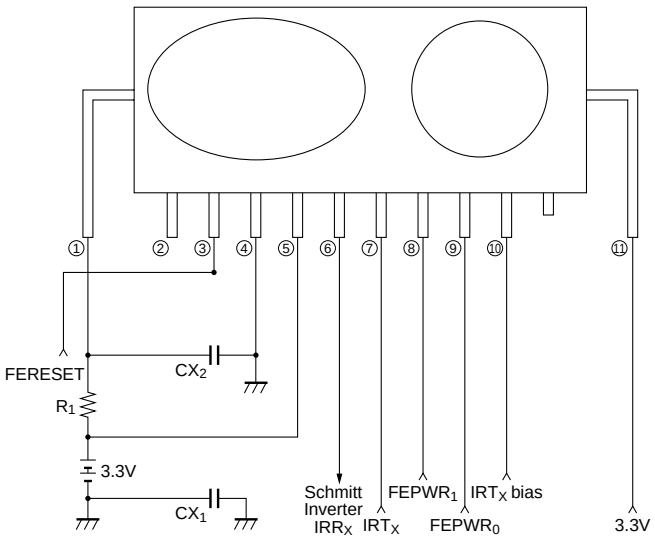
❋ t_{wm}=53.00µs (6.67µsx8–0.36)

*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



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

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 frequncy of power supply.

Fig.2 System Configuration

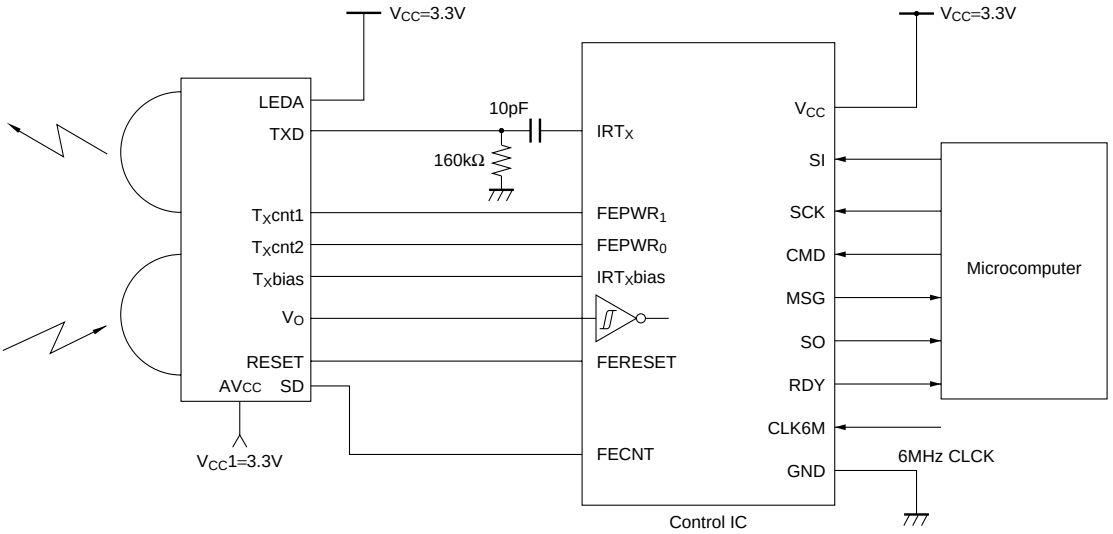
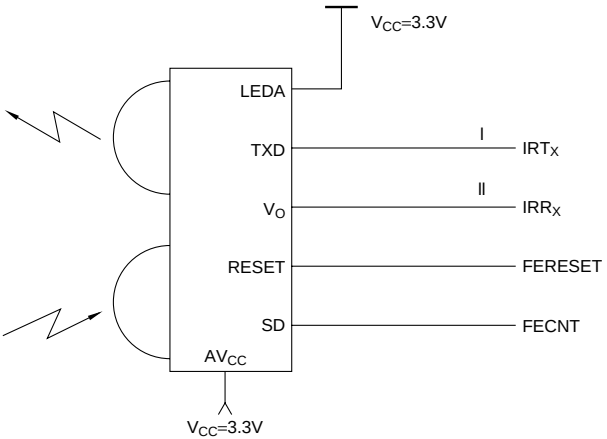


Fig.3 Example of Signal Waveform



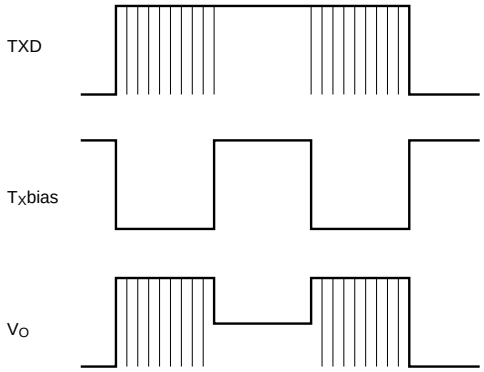
signal	Signal Waveform
I	16PSM code x1.5MHz
II	Receiver original output

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



T_X 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 V_O output, applying signal waveform shown on the left to T_{Xbias} teminal. Refer to Fig.3

Fig.6 Output Waveform (Receiver side)

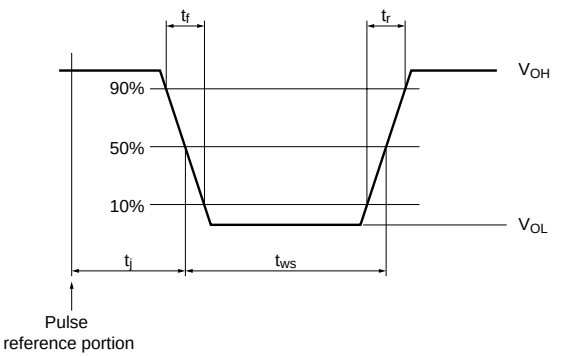
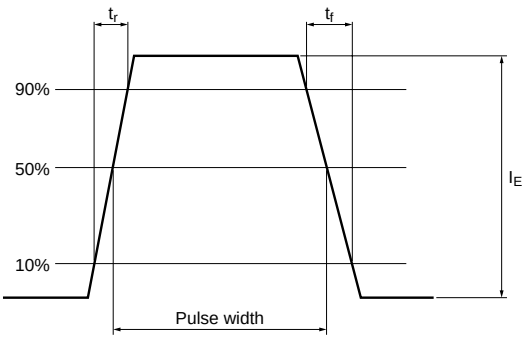


Fig.7 Output Waveform (Transmitter side)



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

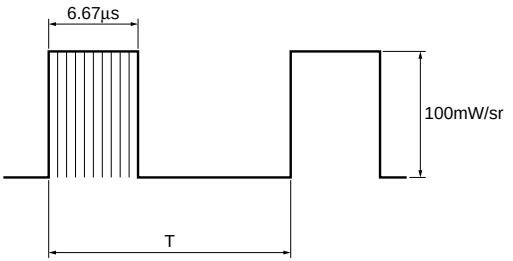
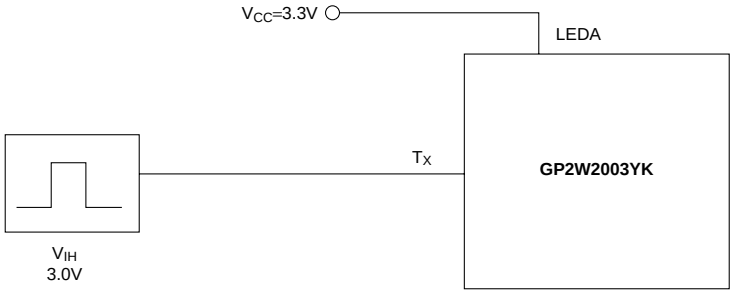


Fig.8 Recommended Circuit of Transmitter side



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

Fig.9 Viewing Angular Criteria

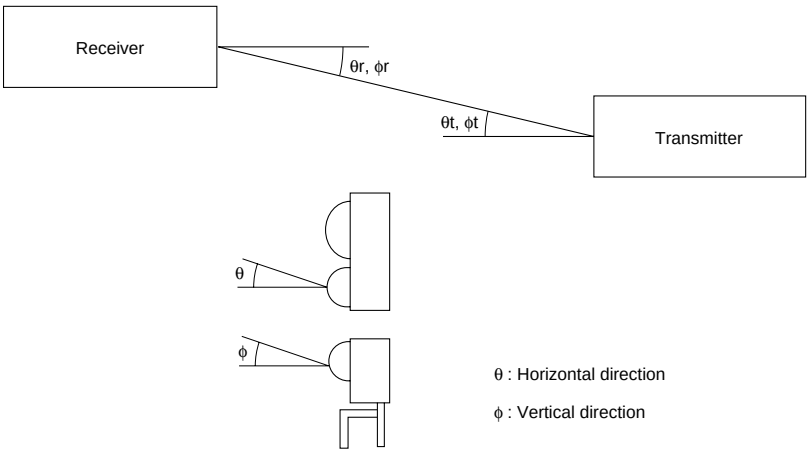
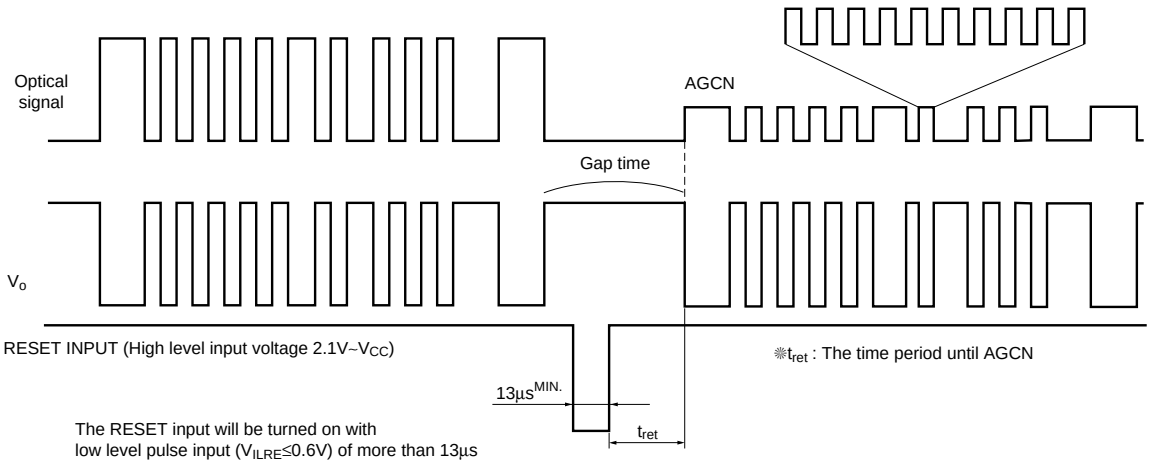


Fig.10 Reset Function

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 transcever 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

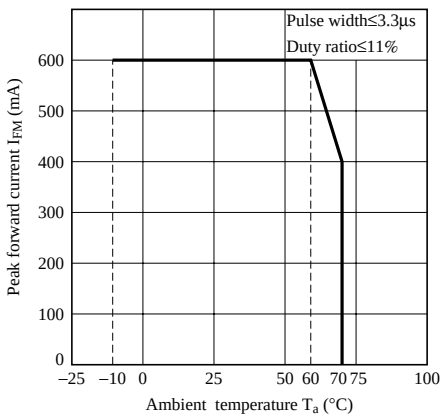


Fig.12 Relative Communication Distance vs. Ambient Temperature

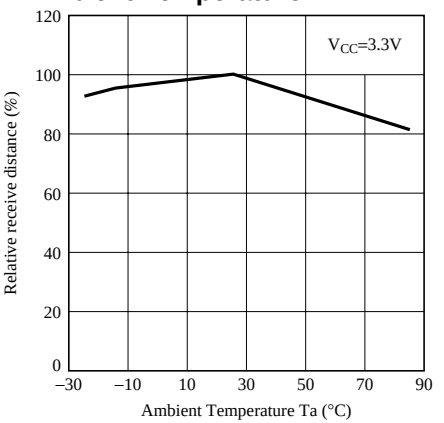


Fig.13 Radiation Diagram(GP2W2003YK)

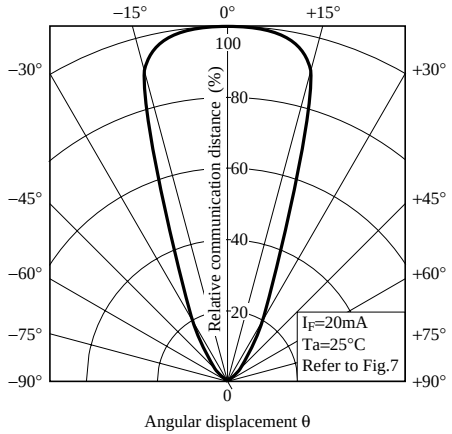


Fig.14 Radiation Diagram (GP2W2004YK)

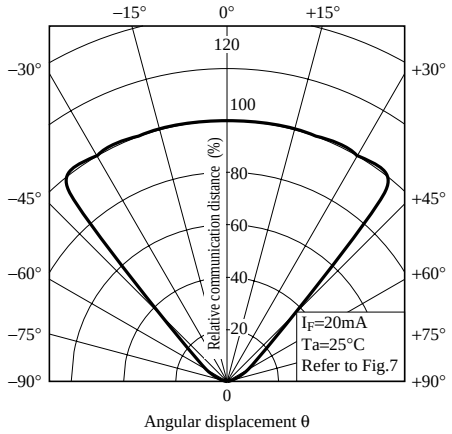


Fig.15 Sensitivity Diagram (GP2W2003YK)

Transmitter radiant intensity :100mW/sr
Transmitter code :16PSM code
V_{CC}=3.3V, Ta=25°C
Refer to Fig.7

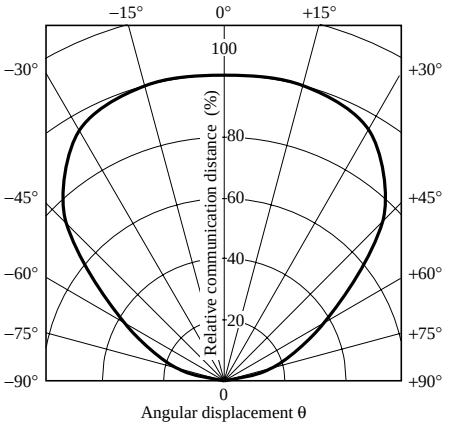


Fig.16 Sensitivity Diagram (GP2W2004YK)

Transmitter radiant intensity :100mW/sr
Transmitter code :16PSM code
V_{CC}=3.3V, Ta=25°C
Refer to Fig.7

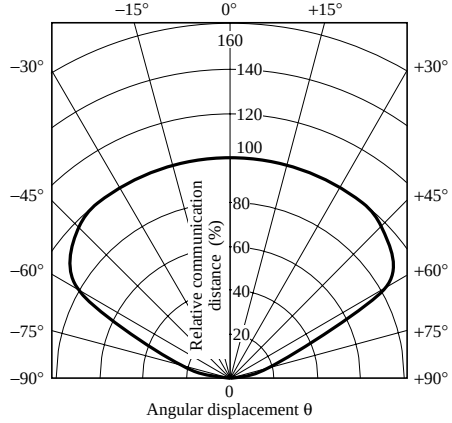


Fig.17 Spectral Distribution

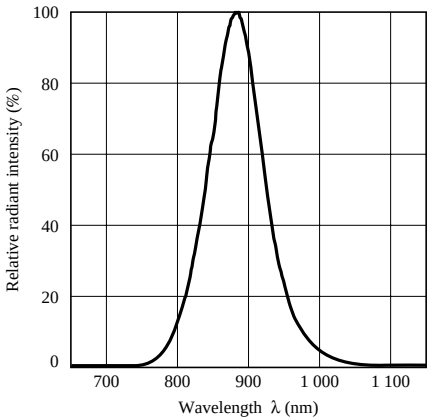
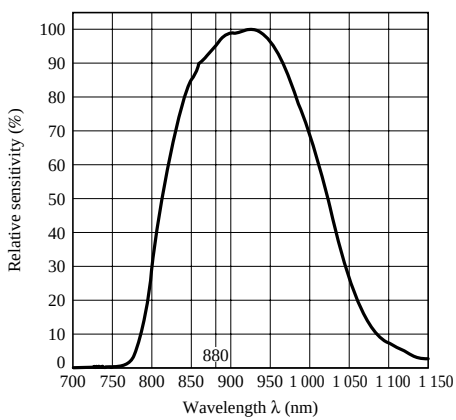


Fig.18 Spectral Sensitivity



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