IS474

Linear Output Type OPIC Light Detector

■ Features

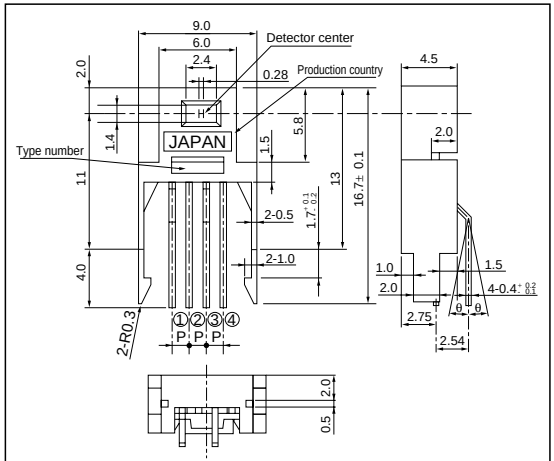
1. Linear output conforming to illuminance
   (50 lx to 50000 lx)
2. Conforming to required visual sensitivity characteristics by means of built-in filter
   Peak sensitivity wavelength : TYP. 550 nm
3. Not dependent on kind of light source such as incandescent lamp and fluorescent lamp
4. Easy-to-mount holder-integral side view type

■ Applications

1. TV sets
2. CRTs of personal computers and others

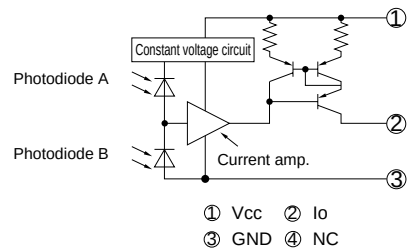
■ Outline Dimensions

(Unit : mm)



* Unspecified tolerance : ± 0.2
* ( ) : Reference dimensions
* Lead pitch (P) : 1.27 (at lead root)
* Lead deflection angle θ : ± 10° MAX.

Internal connection diagram



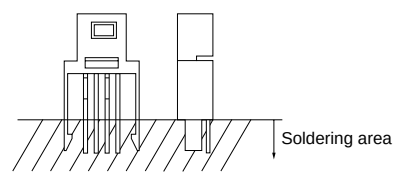
* OPIC (Optical IC) is a trademark of SHARP corporation. An OPIC consists of a light-detecting element and signal-processing circuit integrated onto a single chip.

■ Absolute Maximum Ratings

(Ta=25˚C)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	-0.5 to 8	V
Output current	I_O	-10	mA
Output voltage	V_O	-0.5 to V_{CC}	V
Power dissipation	P	150	mW
Operating temperature	T_{opr}	-25 to +85	˚C
Storage temperature	T_{stg}	-40 to +85	˚C
*1 Soldering temperature	T_{sol}	260	˚C

*1 For MAX. 3 seconds at the position shown in the right drawing



■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Supply voltage	V_{CC}	4.5	5.5	V
Illuminance	E_V *1	100	50 000	lx
Output voltage	V_O	0	V_{CC} - 1.5	V
Operating temperature	T_{opr}	- 10	70	˚C

*1 CIE standard light source A (tungsten lamp)

■ Electro-optical Characteristics

(Vcc=5V, Ta=25˚C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Test circuit
Supply current	Icc	*1 Ev= 0 lx	0.2	0.55	1.0	mA	1
Output current 1	I_{O1}	*1 Ev= 100 lx	- 6.0	-10	- 14	μA	2
Output current 2	I_{O2}	*1 Ev= 1000 lx	- 60	-100	- 140	μA	2
Output current ratio 1	RI_{O1}	Io_2/Io_1	9.0	10	11	-	-
Output current 3	I_{O3}	*2 Ev= 100 lx	-	-11	-	μA	2
Output current 4	I_{O4}	*3 Ev= 100 lx	-	-10	-	μA	2
Output current ratio 2	RI_{O2}	Io_3/Io_4	(0.9)	(1.1)	(1.3)	-	-
Dark output current	Iod	*1 Ev= 0 lx	-	-10	- 500	nA	2
Peak sensitivity wavelength	λp	-	-	(550)	-	nm	-
Response time (rise)	t_r	R_L= 3.3kΩ	-	12	-	μs	3
Response time (fall)	t_f	R_L= 3.3kΩ	-	30	-	μs	3
*4 Power source fluctuation removability	PSRR1	Ev= 0 lx, R_L= 3.3kΩ at 10kHz	-	48	-	dB	-
	PSRR2	Ev= 0 lx, R_L= 3.3kΩ at 100kHz	-	39	-	dB	-
	PSRR3	Ev=1000 lx, R_L= 3.3kΩ at 10kHz	-	11	-	dB	-

*1 Illuminance by CIE standard light source A (tungsten lamp)

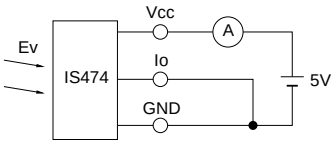
*2 Illuminance by incandescent lamp

*3 Illuminance by fluorescent lamp

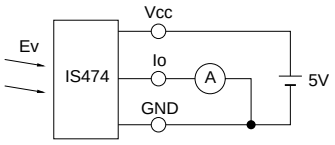
*4 Power source fluctuation removability PSRR is defined according to the following formula.

$$PSRR = 20\log \frac{\text{Vcc ripple voltage}}{\text{Vo ripple voltage}}$$

Test circuit 1



Test circuit 2



Test circuit 3

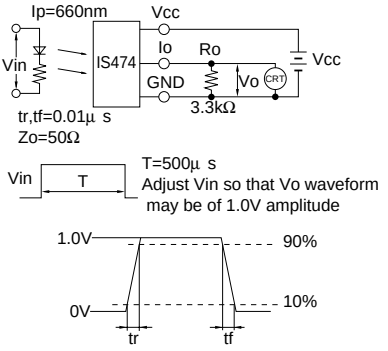


Fig. 1 Total Power Dissipation vs. Ambient Temperature

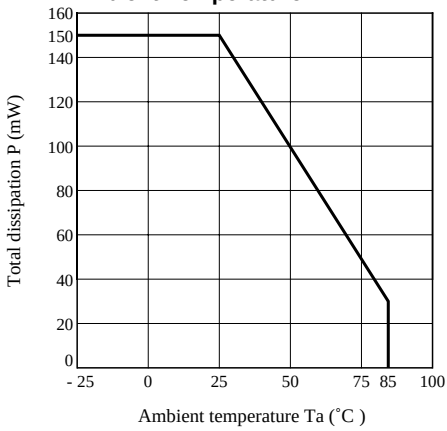


Fig. 2 Output Current vs. Illuminance

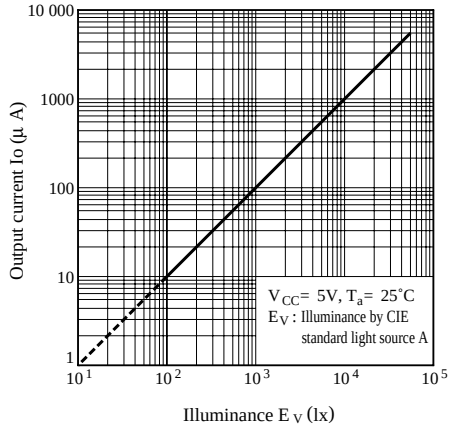


Fig. 3 Spectral Sensitivity

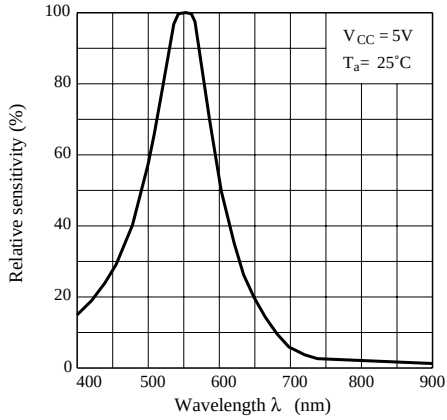


Fig. 4 Relative Output Current vs. Ambient Temperature

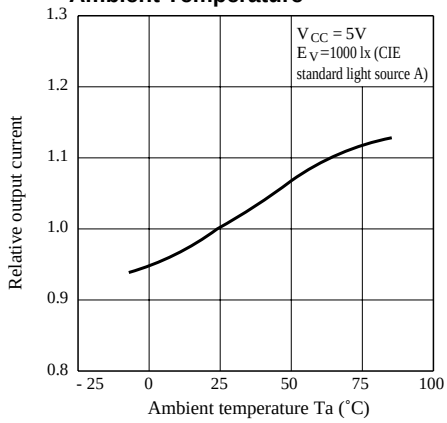


Fig. 5 Dark Output Current vs. Ambient Temperature

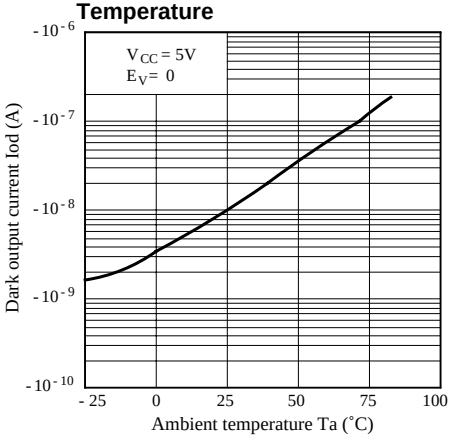


Fig. 6 Output Current vs. Supply Voltage

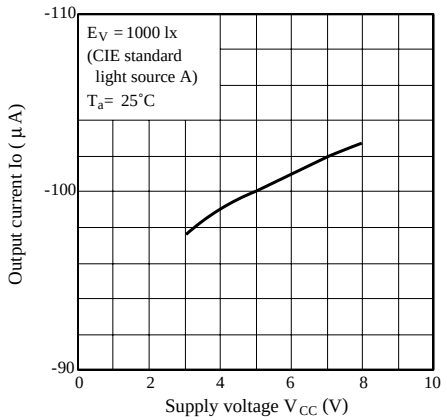
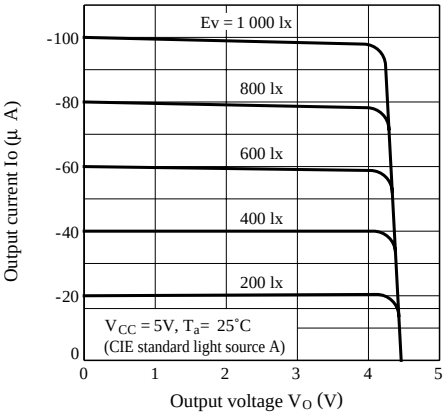


Fig. 7 Output Current vs. Output Voltage



Output Current vs. Output Voltage Test Circuit

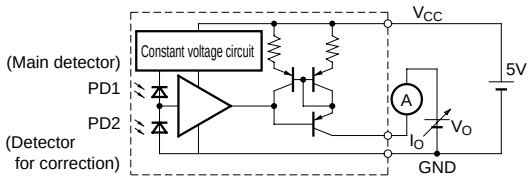


Fig. 8 Supply Current vs. Supply Voltage

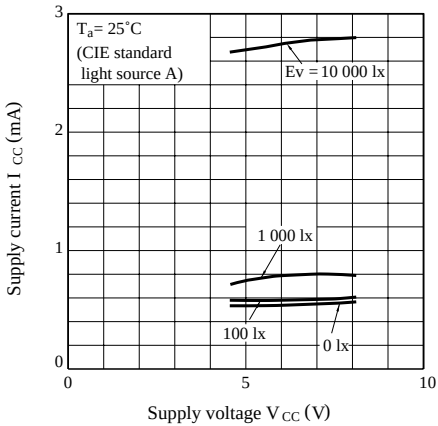


Fig. 9 Supply Current vs. Illuminance

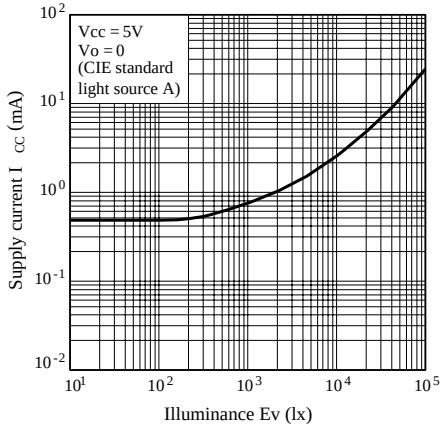
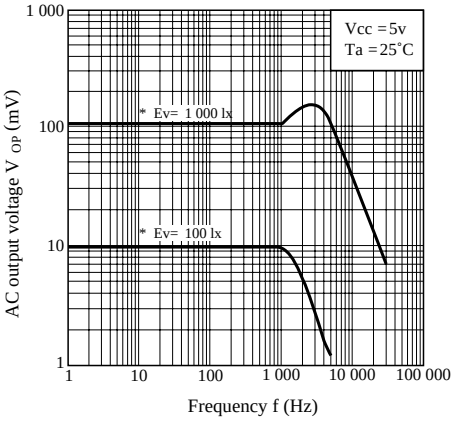


Fig. 10 Frequency Characteristics



Frequency Characteristics Test Circuit

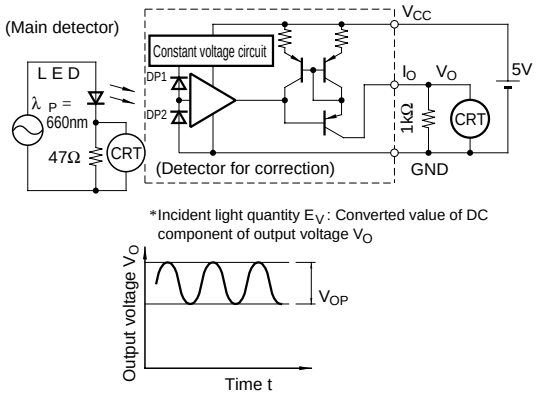


Fig. 11 Radiation Diagram (Right/Left Direction)

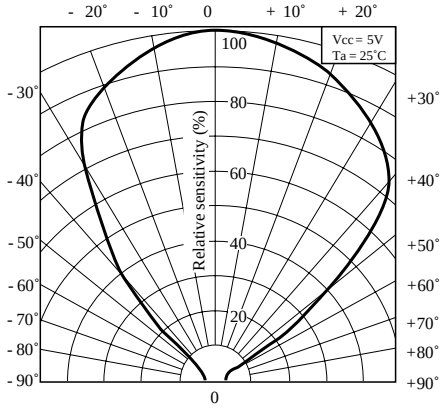
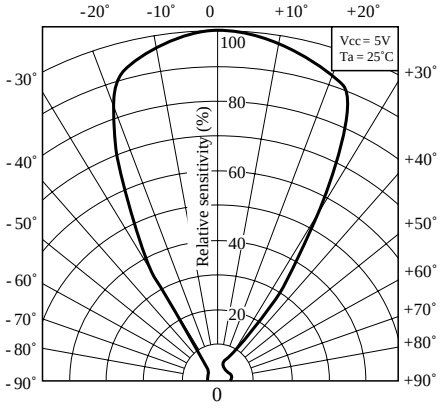
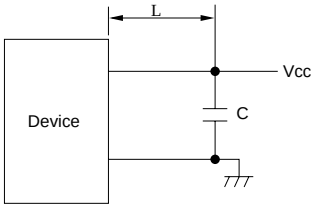


Fig. 12 Radiation Diagram (Top/Bottom Direction)



■ Precautions for Operation

(1) It is recommended to connect a capacitor between V_{CC} and GND near the device in order to stabilize power supply line



L <= 20 mm
C >= 0.01μF

2 pieces of photodiodes are built in this device to amplify difference in collector current between them.
Radiation of even light to 2 pieces of photodiodes is recommended.
Radiation of uneven light may cause change of spectral sensitivity or starting failure of the circuit after power is supplied.

(2) Cleaning

- Conduct cleaning as follows.

Solvent dip cleaning : Solvent temperature of 45˚C max., dipping time : Within 3 minutes

Ultrasonic cleaning : Elements are affected differently depending on the size of cleaning bath, ultrasonic output, time, size of PWB and mounting method of elements. Conduct trial cleaning on actual operating conditions in advance to make sure that no problem results.

- Use following solvents only.

Solvents : Ethyl alcohol, methyl alcohol and isopropyl alcohol

(3) Soldering

Be sure to perform soldering at values within the maximum ratings. Take care so that not external force is applied to the lead during and immediately after soldering. Do not perform reflow soldering.

● Please refer to the chapter "Precautions for Use". (Page 78 to 93)