

GP1A33R

OPIC Photointerrupter with Encoder Function

■ Features

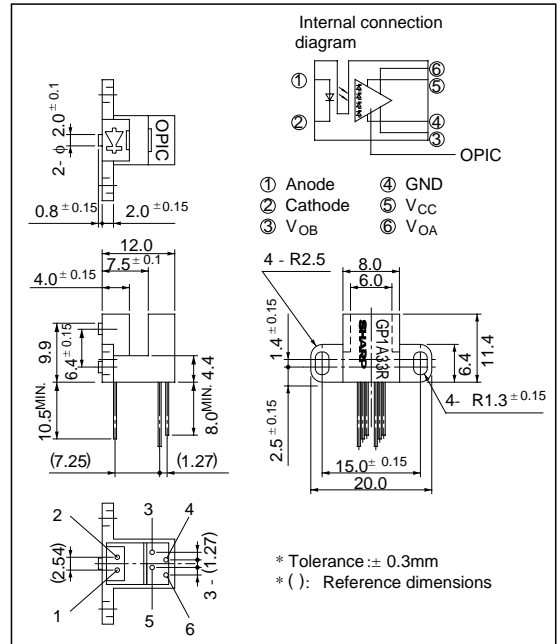
1. 2-phase (A, B) digital output
2. Capable of using plastic disk
3. Sensing accuracy
(Disk slit pitch: 1.14mm)
4. TTL compatible
5. Compact and light

■ Applications

1. Electronic typewriters, printers
2. Numerical control machines

■ Outline Dimensions

(Unit: mm)



*** OPIC™ (Optical IC) is a trademark of the 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
Input	Forward current	I _F	65	mA
	*1 Peak forward current	I _{FM}	1	A
	Reverse Voltage	V _R	6	V
	Power dissipation	P	100	mW
Output	Supply voltage	V _{CC}	7	V
	Low level output current	I _{OL}	20	mA
	Power dissipation	P _O	250	mW
Operating temperature		T _{opr}	0 to + 70	°C
Storage temperature		T _{stg}	- 40 to + 80	°C
*2 Soldering temperature		T _{sol}	260	°C

*1 Pulse width ≤ 100 μs, Duty ratio = 0.01

*2 For 5 seconds

Electro-optical Characteristics

(Unless otherwise specified, Ta = 0 to + 70°C)

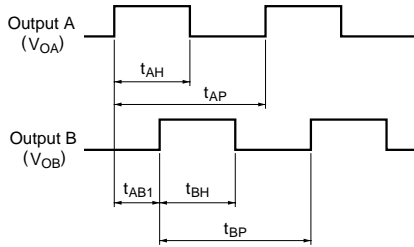
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V _F	Ta = 25°C, I _F = 30mA	-	1.2	1.5	V
	Reverse current	I _R	Ta = 25°C, V _R = 3V	-	-	10	μ A
Output	Operating supply voltage	V _{CC}		4.5	5.0	5.5	V
	High level output voltage	V _{OH}	^{*3} V _{CC} = 5V, I _F = 30mA	2.4	4.9	-	V
	Low level output voltage	V _{OL}	^{*3} I _{OL} = 8mA, V _{CC} = 5V, I _F = 30mA	-	0.1	0.4	V
	Supply current	I _{CC}	^{*3*4} I _F = 30mA, V _{CC} = 5V	-	5	20	mA
Transfer characteristics	Duty ratio	D _A ^{*5}	V _{CC} = 5V, I _F = 30mA, ^{*3} f = 2.5kHz	20	50	80	%
		D _B ^{*5}		20	50	80	%
	Response frequency	f _{MAX.}	^{*3} V _{CC} = 5V, I _F = 30mA	-	-	5	kHz

*3 Measured under the condition shown in Measurement Condition.

*4 In the condition that output A and B are low level.

*5 $D_A = \frac{t_{AH}}{t_{AP}} \times 100$, $D_B = \frac{t_{BH}}{t_{BP}} \times 100$

Output Waveforms



Rotational direction : Counterclockwise when seen from OPIC light detector

Fig. 1 Forward Current vs. Ambient Temperature

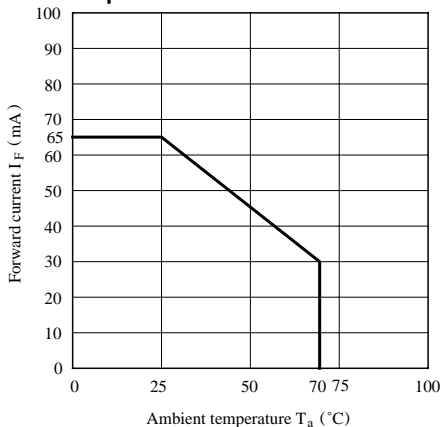


Fig. 2 Output Power Dissipation vs. Ambient Temperature

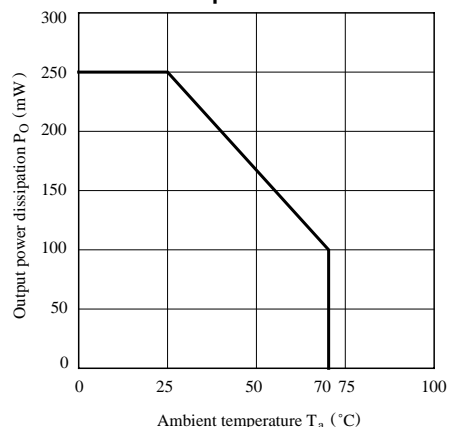


Fig. 3 Duty Ratio vs. Frequency

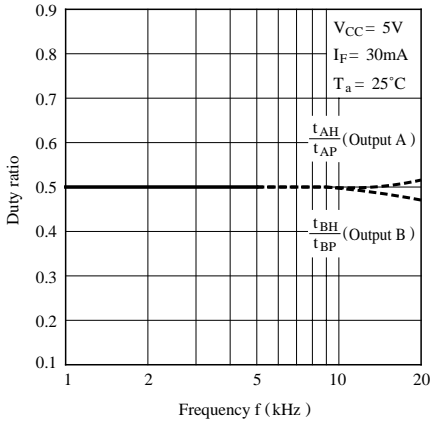


Fig. 4 Phase Difference vs. Frequency Temperature

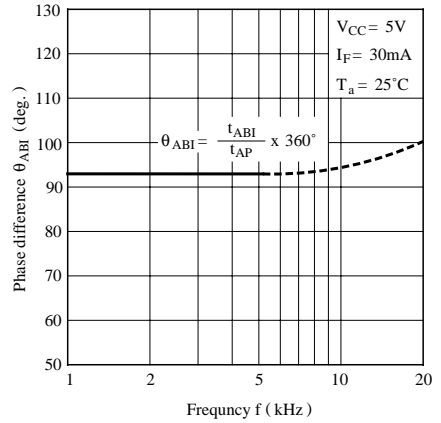


Fig. 5 Duty Ratio vs. Ambient Temperature

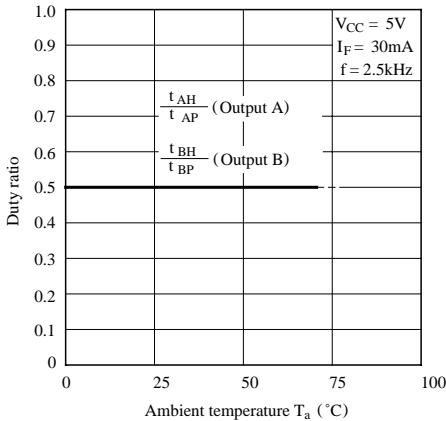


Fig. 6 Phase Difference vs. Ambient Temperature

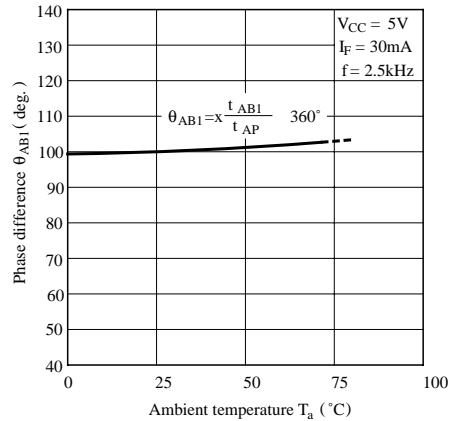


Fig. 7 Duty Ratio vs. Distance (X direction)

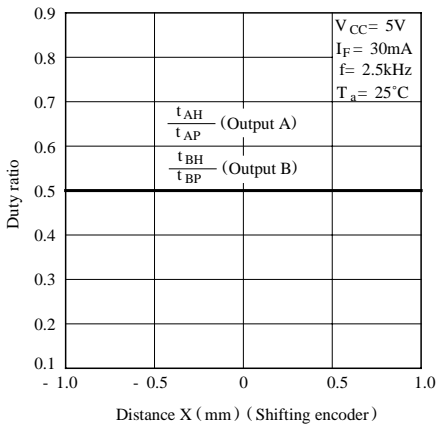


Fig. 8 Phase Difference vs. Distance (X direction)

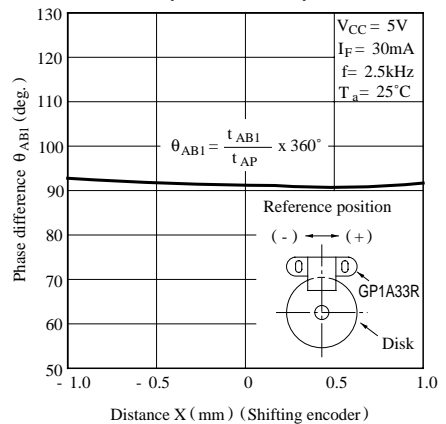


Fig. 9 Duty Ratio vs. Distance (Y direction)

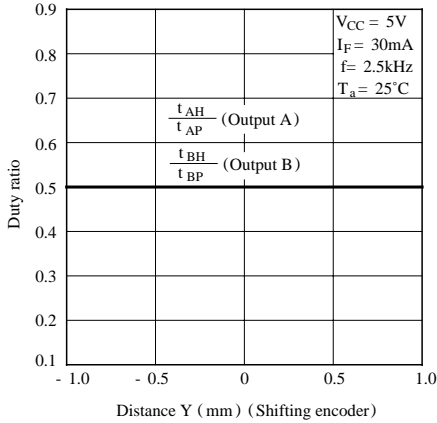


Fig.10 Phase Difference vs. Distance (Y direction)

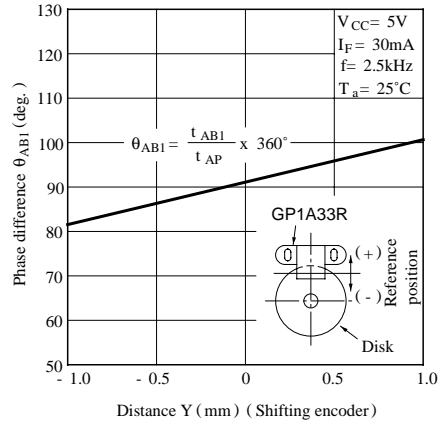


Fig.11 Duty Ratio vs. Distance (Z direction)

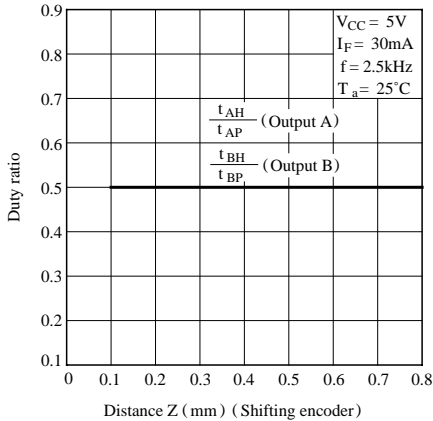
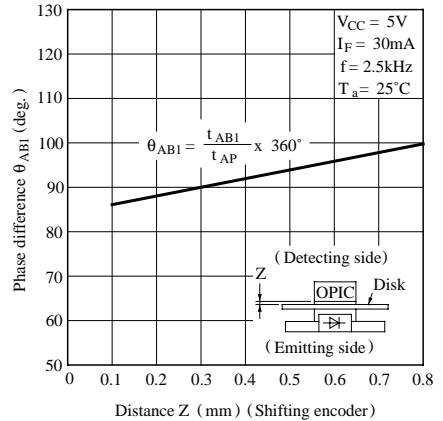
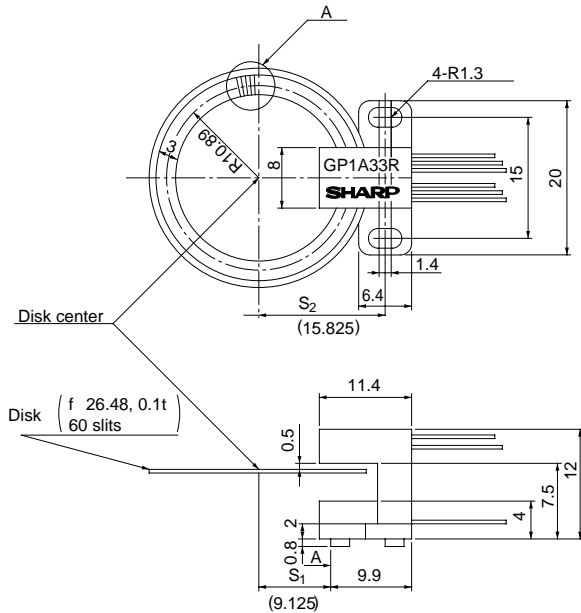


Fig.12 Phase Difference vs. Distance (Z direction)



Measurement Conditions



<Basic Design>

R_0 (distance between the disk center and half point of a slit),
 P (slit pitch), S_1 and S_2 (installing position of photointerrupter) will be provided by the following equations.

Slit pitch : P (slit center)

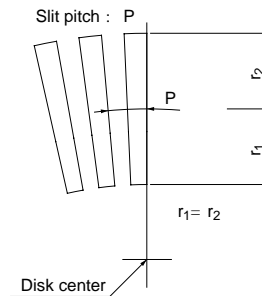
$$R_0 = \frac{N}{60} \times 10.89 \text{ (mm)} \quad N: \text{ number of slits}$$

$$P = \frac{2 \times p \times R_0}{N} \text{ (mm)}$$

$$S_1 = R_0 - 1.765 \text{ (mm)}, S_2 = S_1 + 6.7 \text{ (mm)}$$

Note) When the number of slits is changed, values in parenthesis are also changed according to the number.

Enlarged drawing of A portion



(Ex.) In the case of
 $N = 100P/R$

$$R_0 = \frac{100}{60} \times 10.89 \text{ (mm)}$$

$$= 18.15 \text{ mm}$$

$$P = \frac{2 \times p \times 18.15}{100}$$

$$= 1.14 \text{ mm}$$

$$S_1 = 18.15 - 1.765$$

$$= 16.385 \text{ mm}$$

$$S_2 = 16.385 + 6.7$$

$$= 23.085 \text{ mm}$$

■ Precautions for Use

- (1) This module is designed to be operated at $I_F = 30 \text{ mA}$ TYP.
- (2) Fixing torque : MAX. $0.6 \text{ N} \cdot \text{m}$
- (3) In order to stabilize power supply line, connect a by-pass capacitor of more than $0.01 \mu\text{F}$ between V_{CC} and GND near the device.
- (4) As for other general cautions, refer to the chapter "Precautions for Use".



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