

GP1A30R

OPIC Photointerrupter with Encoder Function

■ Features

1. 2-phase (A, B) digital output
2. Possible to use plastic disk
3. High sensing accuracy
(Disk slit pitch : 0.7mm)
4. TTL compatible output
5. Compact and light

■ Applications

1. Electronic typewriters, printers
2. Numerical control machines

■ 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 ≤ 100μs, 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	μA
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	*5 D_A	V_{CC} = 5V, I_F = 30mA, *3 f = 2.5kHz	20	50	80	%
		*5 D_B		20	50	80	%
	Response frequency	f_{MAX}	*3 V_{CC} = 5V, I_F = 30mA	-	-	5	kHz

*3 Measured under the condition shown in Measurement Conditions.

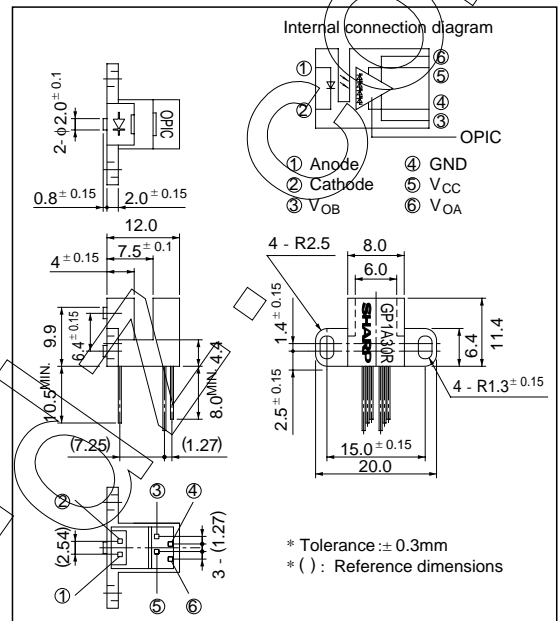
*4 In the condition that output A and B are low level.

*5

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

■ Outline Dimensions

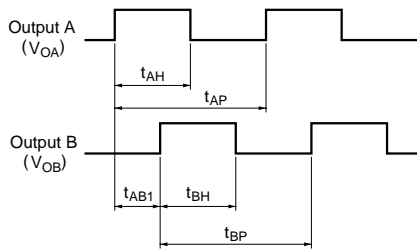
(Unit : mm)



** 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.

■ Output Waveforms



Rotational direction: Counterclockwise when seen from OPIC light detector

Fig. 1 Forward Current vs. Ambient Temperature

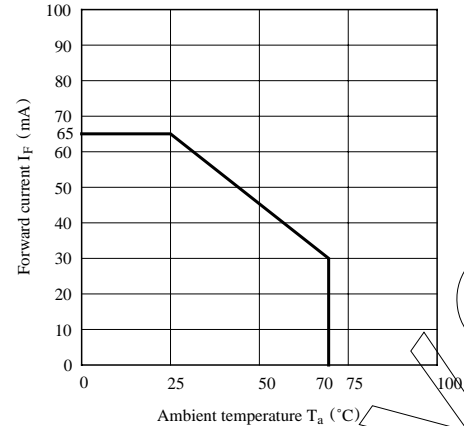


Fig. 2 Output Power Dissipation vs. Ambient Temperature

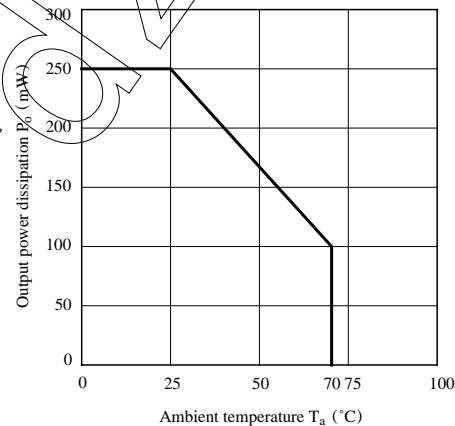


Fig. 3 Duty Ratio vs. Frequency

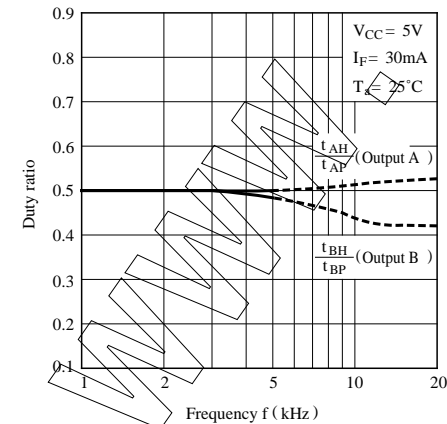


Fig. 4 Phase Difference vs. Frequency

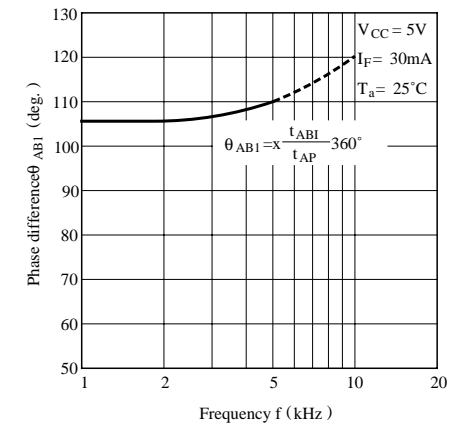


Fig. 5 Duty Ratio vs. Ambient Temperature

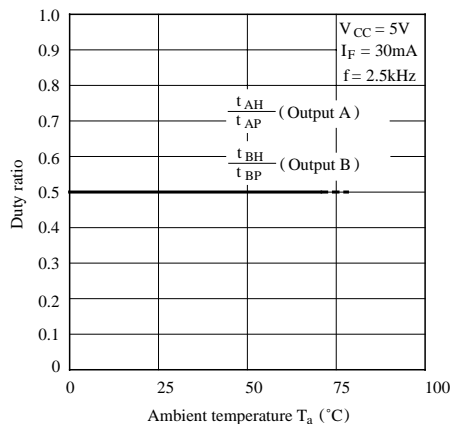


Fig. 6 Phase Difference vs. Ambient Temperature

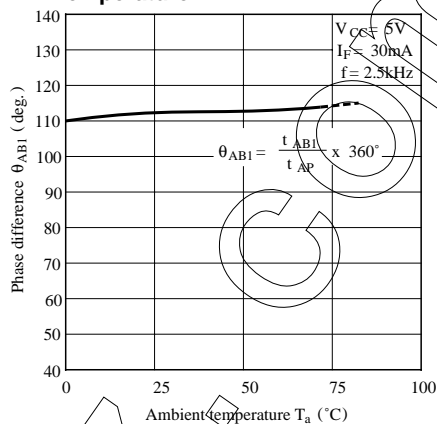


Fig. 7 Duty Ratio vs. Distance (X direction)

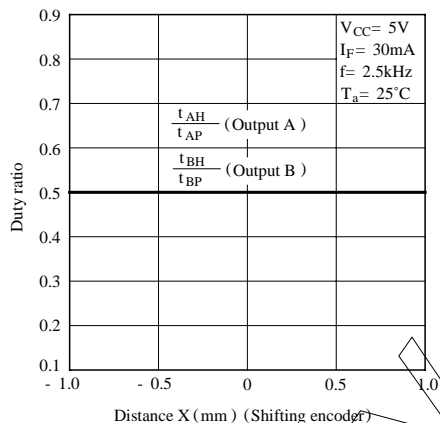


Fig. 8 Phase Difference vs. Distance (X direction)

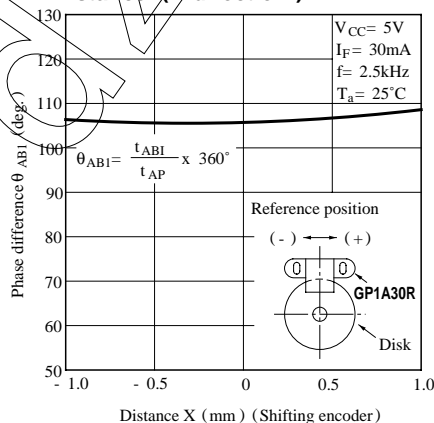


Fig. 9 Duty Ratio vs. Distance (Y direction)

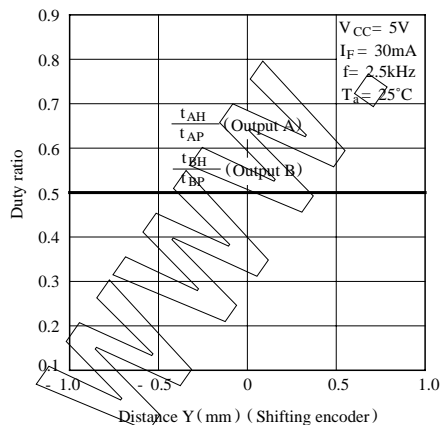


Fig.10 Phase Difference vs. Distance (Y direction)

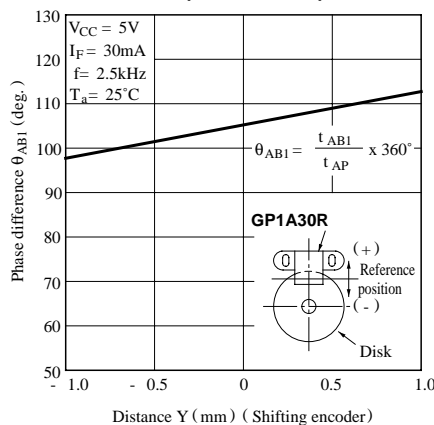
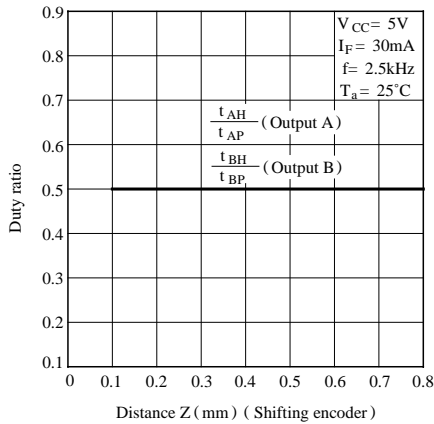
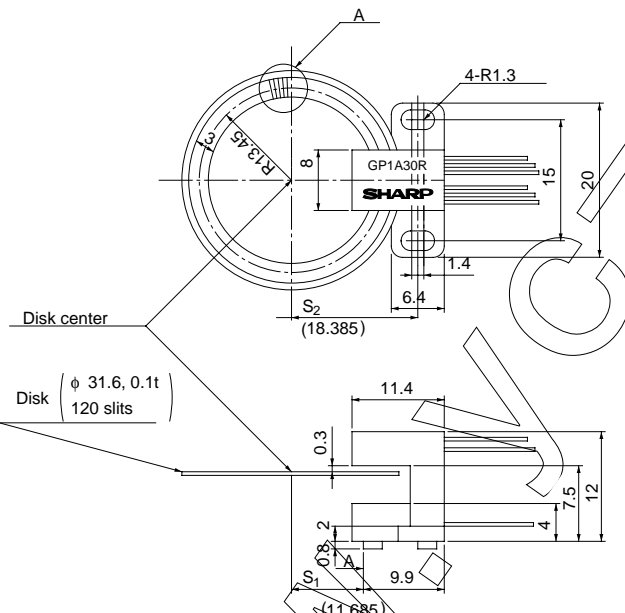


Fig.11 Duty Ratio vs. Distance (Z direction)



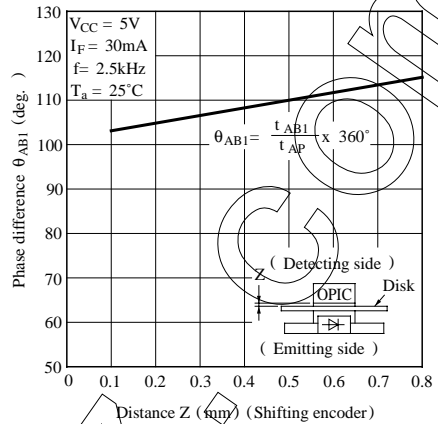
Measurement Conditions



Precautions for Use

- (1) This module is designed to be operated at $I_F = 30mA$ TYP.
- (2) Fixing torque: MAX. 0.6Nm (6kgf • cm)
- (3) In order to stabilize power supply line, connect a by-pass capacitor of more than $0.01\mu F$ between Vcc and GND near the device.
- (4) As for other general cautions, refer to the chapter "Precautions for Use".

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



<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)

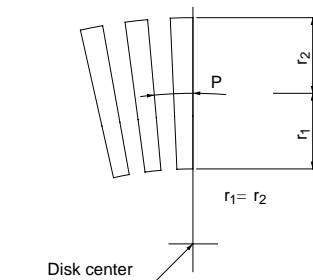
$$R_0 = \frac{N}{120} \times 13.45 \text{ (mm)} \quad N: \text{number of slits}$$

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

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

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

Enlarged drawing
 of A portion
 Slit pitch : P



(Ex.) In the case of
 $N = 200P/R$

$$R_0 = \frac{200}{120} \times 13.45 \text{ (mm)}$$

$$= 22.42 \text{ mm}$$

$$P = \frac{2 \times p \times 22.42}{200} \text{ (mm)}$$

$$= 0.704 \text{ mm}$$

$$S_1 = 22.42 - 1.765$$

$$= 20.655 \text{ mm}$$

$$S_2 = 20.655 + 6.7$$

$$= 27.355 \text{ mm}$$

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 - Alarm equipment
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