

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
	*1Peak 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
*2Soldering 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}	*3V _{CC} = 5V, I _F = 30mA	2.4	4.9	-	V
	Low level output voltage	V _{OL}	*3I _{OL} = 8mA, V _{CC} = 5V, I _F = 30mA	-	0.1	0.4	V
	Supply current	I _{CC}	*3*4I _F = 30mA, V _{CC} = 5V	-	5	20	mA
Transfer characteristics	Duty ratio	*5D _A	V _{CC} = 5V, I _F = 30mA,	20	50	80	%
		*5D _B	*3f = 2.5kHz	20	50	80	%
	Response frequency	f _{MAX.}	*3V _{CC} = 5V, I _F = 30mA	-	-	5	kHz

*3 Measured under the condition shown in Measurement Conditions.

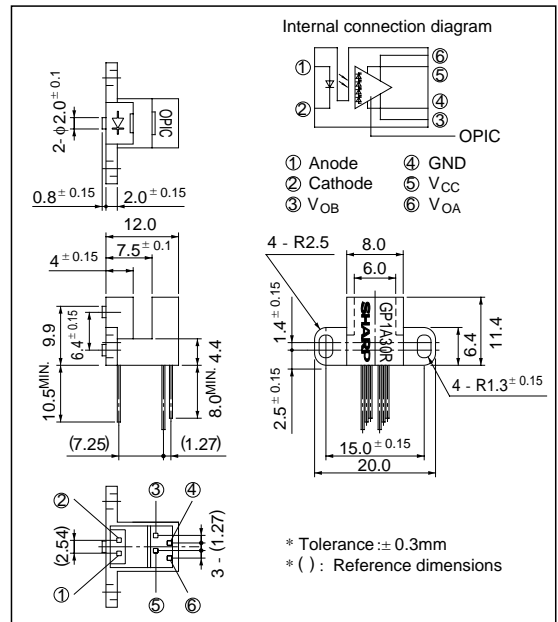
*4 In the condition that output A and B are low level.

*5

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

■ Outline Dimensions

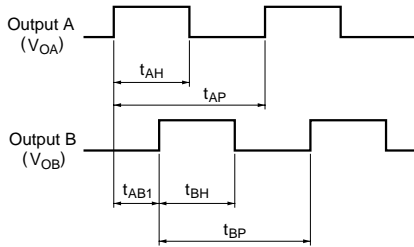
(Unit : mm)



** 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

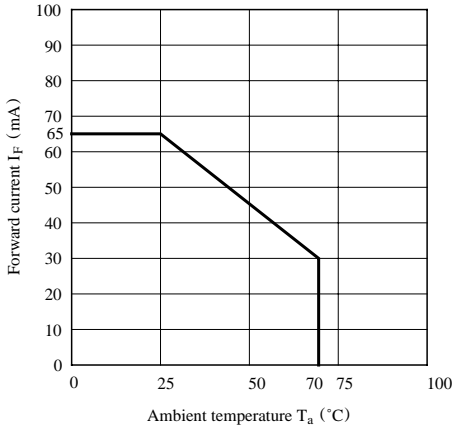


Fig. 2 Output Power Dissipation vs. Ambient Temperature

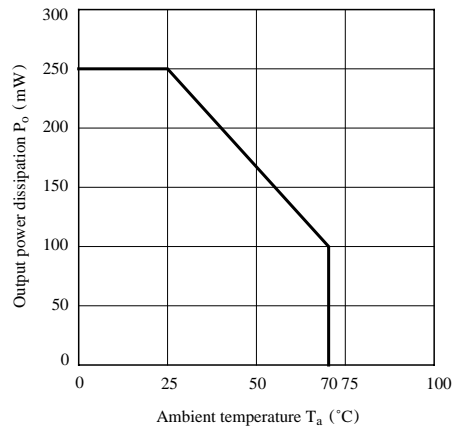


Fig. 3 Duty Ratio vs. Frequency

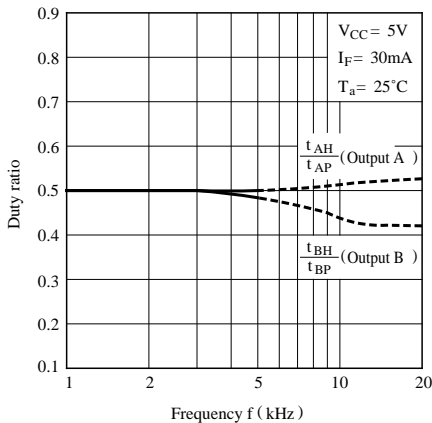


Fig. 4 Phase Difference vs. Frequency

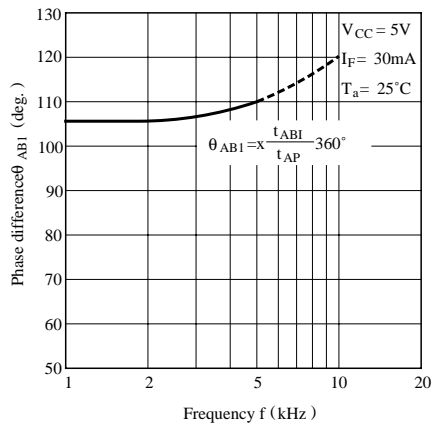


Fig. 5 Duty Ratio vs. Ambient Temperature

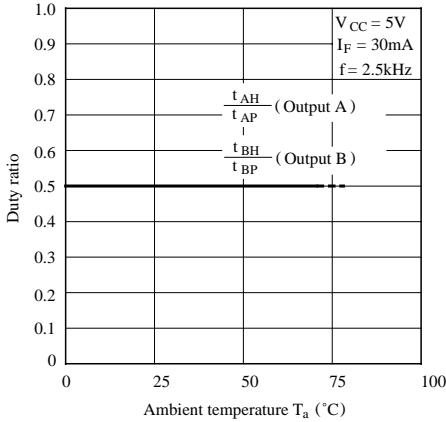


Fig. 6 Phase Difference vs. Ambient Temperature

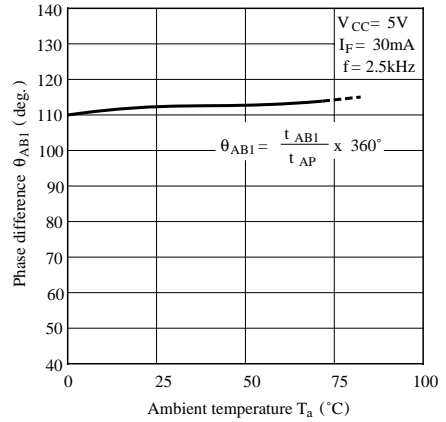


Fig. 7 Duty Ratio vs. Distance (X direction)

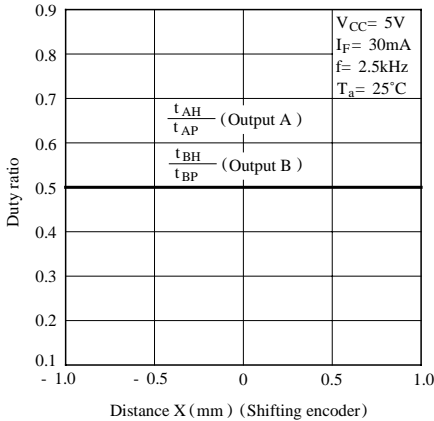


Fig. 8 Phase Difference vs. Distance (X direction)

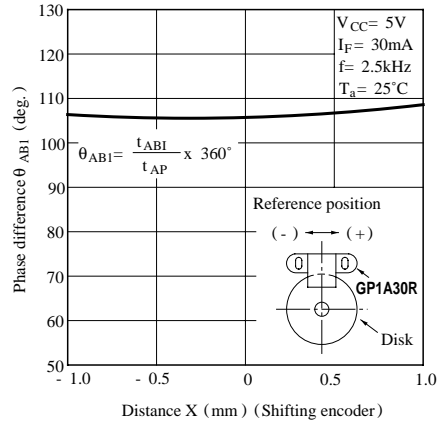


Fig. 9 Duty Ratio vs. Distance (Y direction)

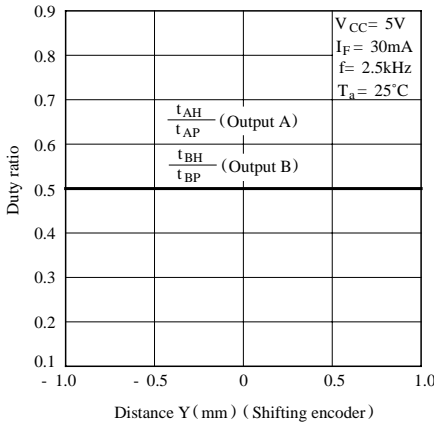


Fig.10 Phase Difference vs. Distance (Y direction)

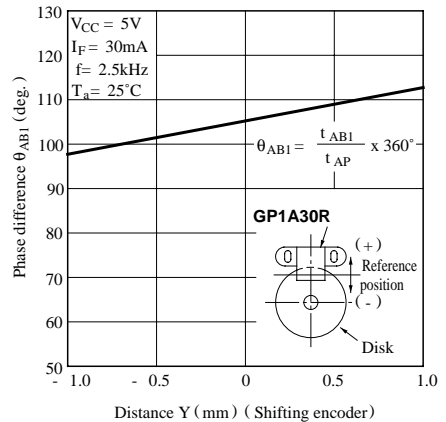


Fig.11 Duty Ratio vs. Distance (Z direction)

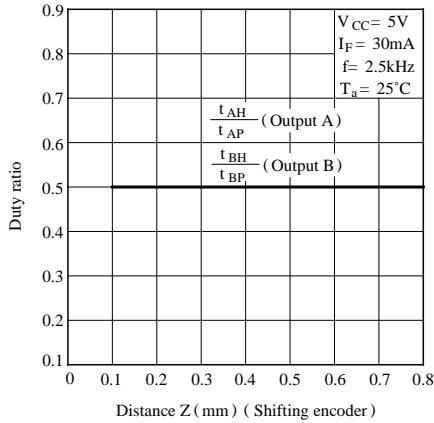
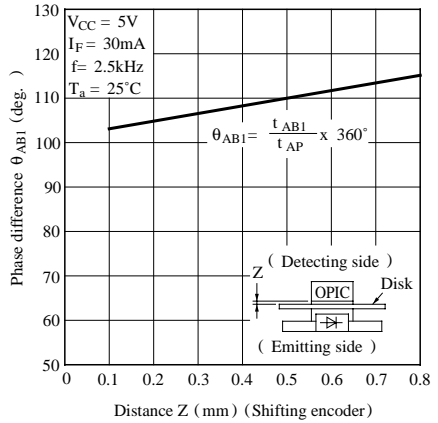
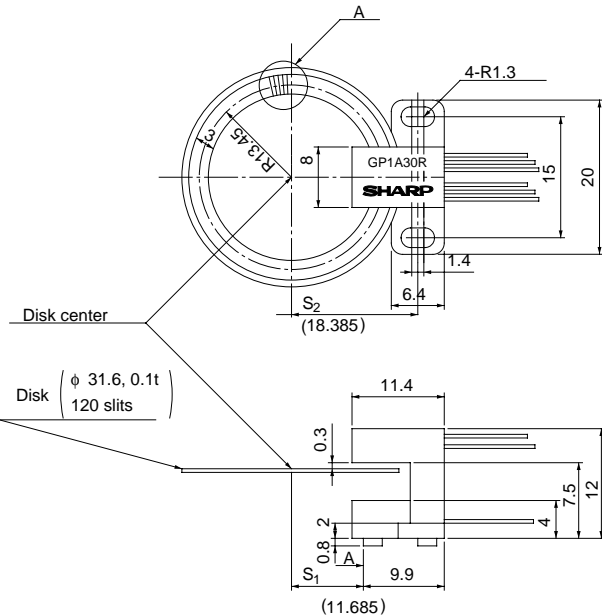


Fig.12 Phase Difference vs. Distance (Z direction)



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 V_{CC} and GND near the device.
- (4) As for other general cautions, refer to the chapter “Precautions for Use” .

<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)

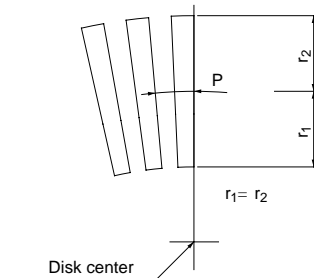
$$R_0 = \frac{N}{120} \times 13.45 \text{ (mm)} \quad N: \text{ number of slits}$$

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

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

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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