GP1A13R OPIC Photointerrupter with Encoder Function

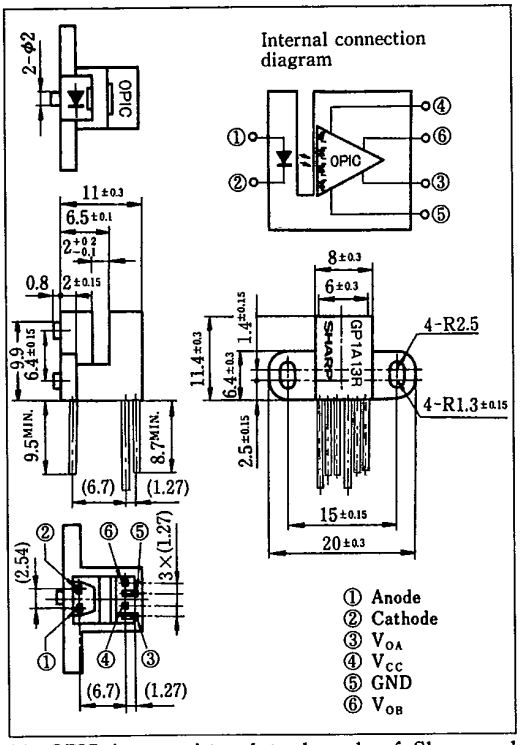
■ Features

1. A, B 2-phase digital output
2. Resolution : Slit pitch 1.6mm
3. TTL compatible output
4. Compact and light

■ Applications

1. Electronic printers
2. Robots
3. Numerical control machines

■ Outline Dimensions (Unit : mm)



※ OPIC is a registered trademark of Sharp and stands for Optical IC. It has a light detecting element and signal processing circuitry integrated onto a single chip.

■ Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	*1 Peak forward current	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P	75	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~+70	°C
Storage temperature		T_{stg}	−40~+80	°C
*2 Soldering temperature		T_{sol}	260	°C

*1 Pulse width≦100μs, Duty ratio=0.01
*2 For 5 seconds

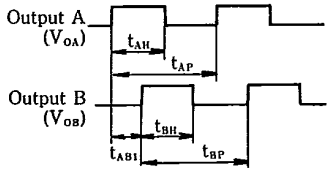
■ Electro-optical Characteristics

(Ta=0~+70°C unless specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	Ta=25°C, I_F=20mA	—	1.2	1.4	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_{OL}	V_{CC}=5V, I_F=20mA, I_{OL}=8mA*4	—	0.1	0.4	V
	Low level output voltage	V_{OH}	V_{CC}=5V, I_F=20mA*4	2.4	4.9	—	V
	Supply current	I_{CC}	I_F=20mA, V_{CC}=5V*3,*4	—	5	20	mA
Transfer characteristics	Duty ratio	*5D_A	V_{CC}=5V, I_F=20mA	0.25	0.50	0.75	—
		*5D_B	f=2.5kHz*4	0.25	0.50	0.75	—
	Response frequency	$f_{max.}$	V_{CC}=5V, I_F=20mA*4	—	—	10	kHz

*3 In the condition that output A and B are low level.
*4 Measured under the condition shown in Measurement Condition.
*5 $D_A : \frac{t_{AH}}{t_{AP}}$, $D_B : \frac{t_{BH}}{t_{BP}}$

■ Output Waveforms



Rotational direction : Counterclockwise when seen from OPIC light detector

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Fig. 1 Forward Current vs. Ambient Temperature

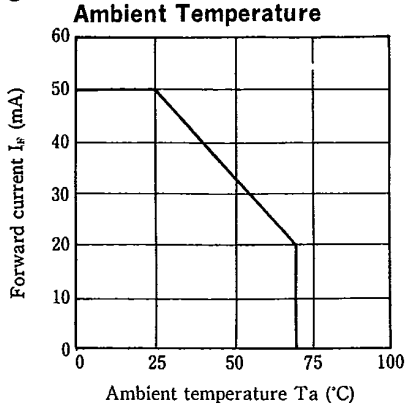

Fig. 2 Output Power Dissipation vs. Ambient Temperature

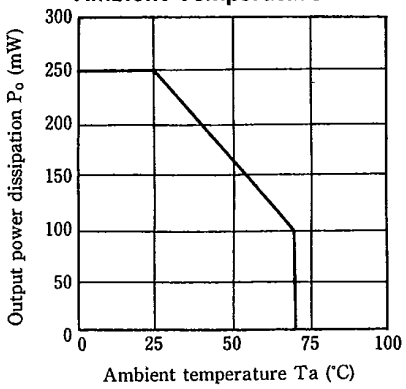

Fig. 3 Duty Ratio vs. Frequency

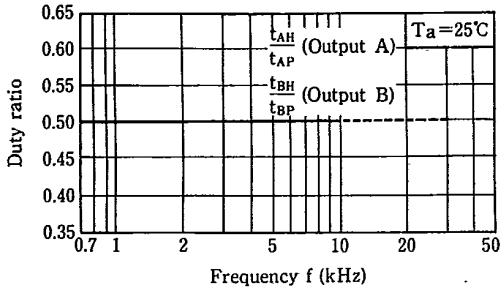

Fig. 4 Phase Difference vs. Frequency

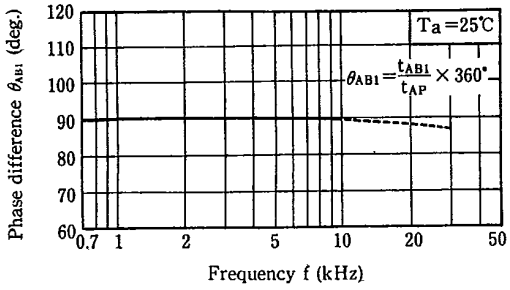

Fig. 5 Duty Ratio vs. Ambient Temperature

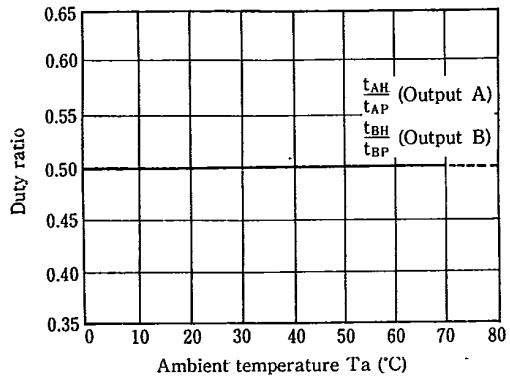

Fig. 6 Phase Difference vs. Ambient Temperature

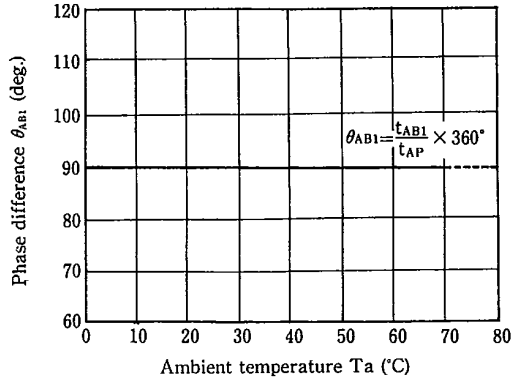

Fig. 7 Duty Ratio vs. Distance (X direction)

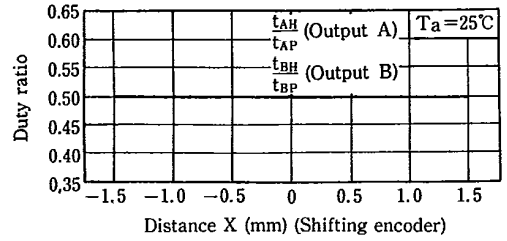

Fig. 8 Phase Difference vs. Distance (X direction)

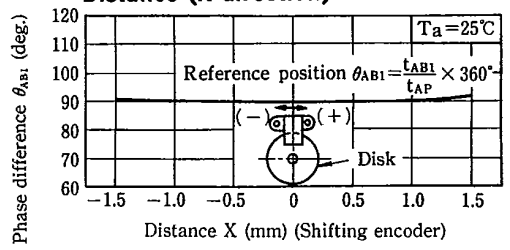

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Fig. 9 Duty Ratio vs. Distance (Y direction)

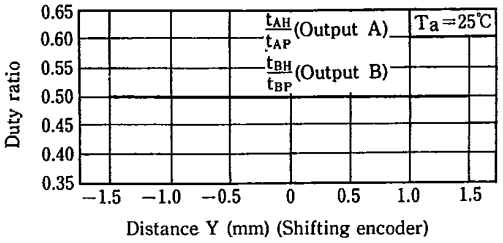


Fig.10 Phase Difference vs. Distance (Y direction)

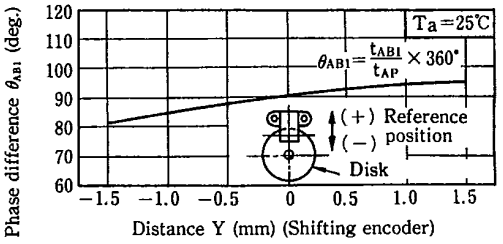


Fig. 11 Duty Ratio vs. Distance (Z direction)

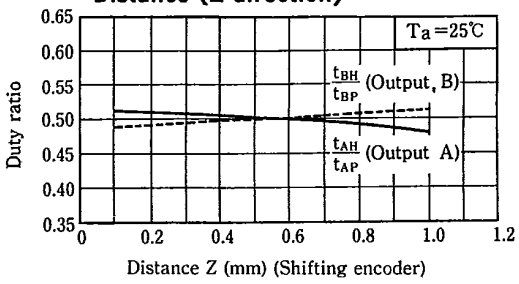
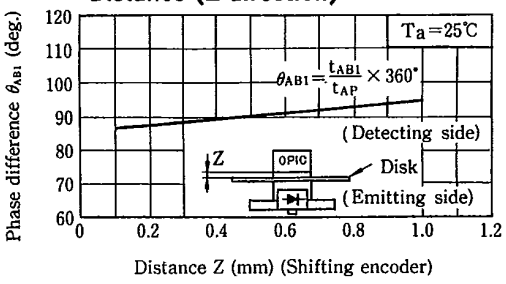


Fig. 12 Phase Difference vs. Distance (Z direction)



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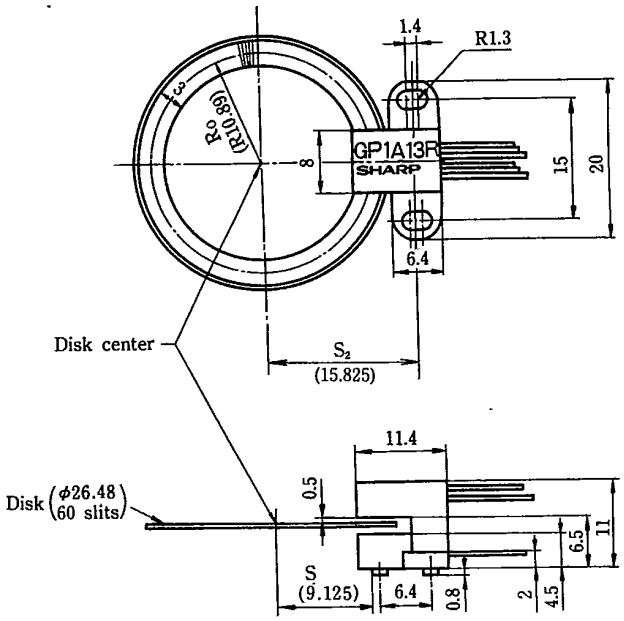
〈Measuring Condition〉



Basic Design

R_O (distance between the disk center and half point of a slit) and S (fixing position of photointerrupter) will be provided by the following equations.

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

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

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

(Precautions for Use)

1) In order to stabilize power supply line, connect a by-pass capacitor of more than 0.01μF between V_{CC} and GND near the device.
2) This module is designed to be operated at I_F=20mA TYP.