GP1A16R OPIC Photointerrupter with Encoder Function

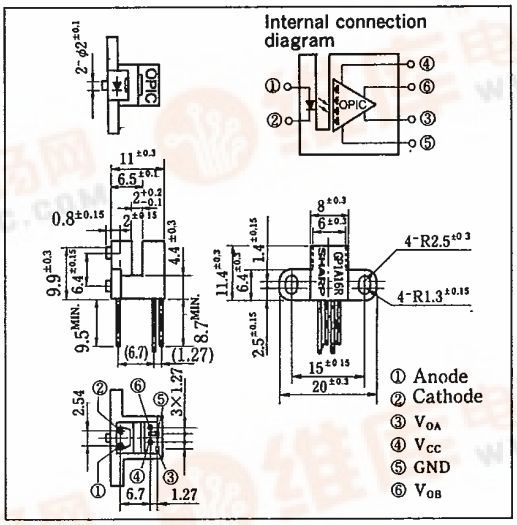
■ Features

1. 2-phase (A, B) digital output
2. High sensing accuracy
   (Disk slit pitch: 0.7mm)
3. TTL compatible output
4. Compact

■ Applications

1. Electronic typewriters, 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
	*1Peak 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
*2Soldering temperature		T_{sol}	260	°C

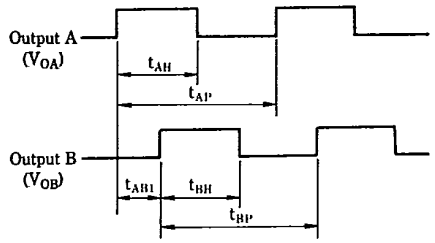
*1 Pulse width≦100μs, Duty ratio=0.01
*2 For 5 seconds

■ Electro-optical Characteristics (Unless otherwise specified, Ta=0～+70°C)

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_{OH}	V_{CC}=5V, I_F=20mA*3	2.4	4.9	—	V
	Low level output voltage	V_{OL}	I_{OL}=8mA, V_{CC}=5V, I_F=20mA*3	—	0.1	0.4	V
	Supply current	I_{CC}	I_F=20mA, V_{CC}=5V*4	—	5	20	mA
Transfer characteristics	Duty ratio	D_A*5	V_{CC}=5V, I_F=20mA*3 f=2.5kHz	0.20	0.50	0.80	—
		D_B*5		0.20	0.50	0.80	
	Response frequency	$f_{MAX.}$	V_{CC}=5V, I_F=20mA*3	—	—	10	kHz

*3 Measured under the condition shown in Measurement Conditions
*4 In the condition that outputs A and B are low level.
*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

Fig. 1 Forward Current vs. Ambient Temperature

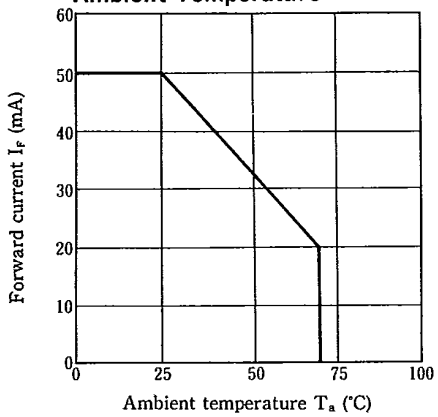


Fig. 2 Output Power Dissipation vs. Ambient Temperature

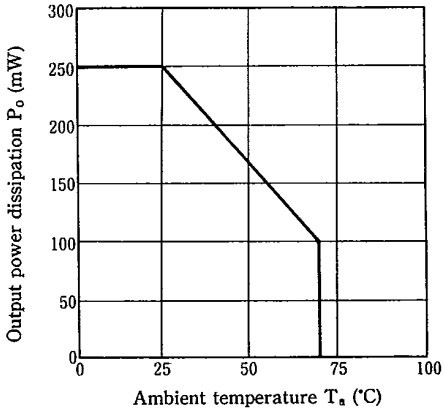


Fig. 3 Duty Ratio vs. Frequency

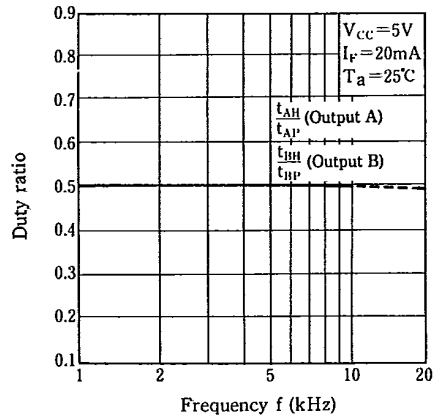


Fig. 4 Phase Difference vs. Frequency

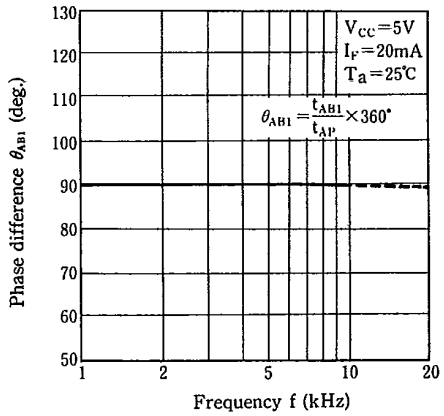


Fig. 5 Duty Ratio vs. Ambient Temperature

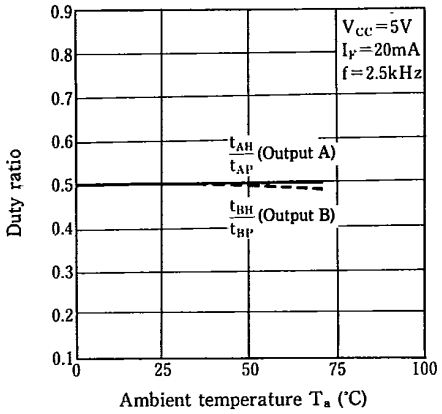


Fig. 6 Phase Difference vs. Ambient Temperature

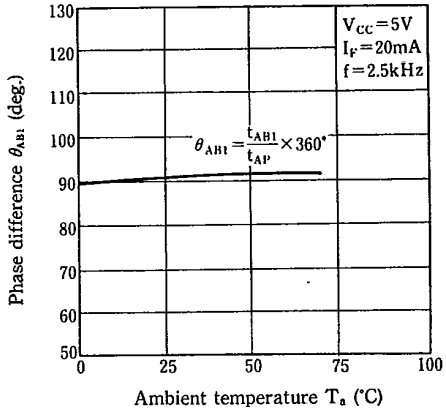


Fig. 7 Duty Ratio vs. Distance (X direction)

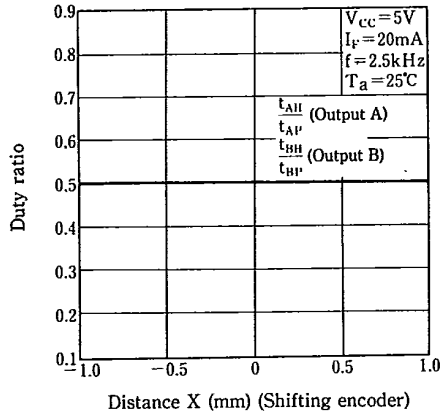


Fig. 8 Phase Difference vs. Distance (X direction)

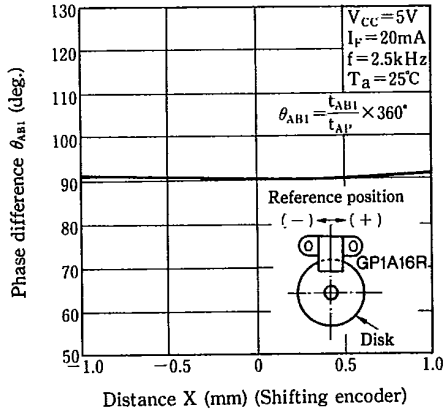


Fig. 9 Duty Ratio vs. Distance (Y direction)

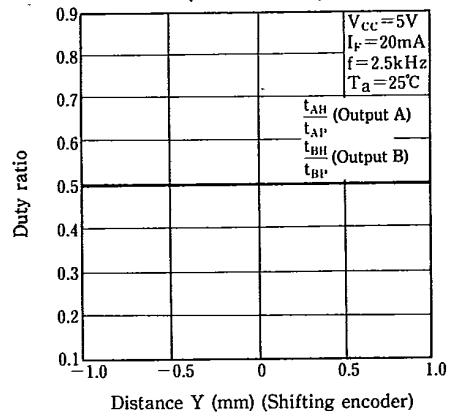


Fig. 10 Phase Difference vs. Distance (Y direction)

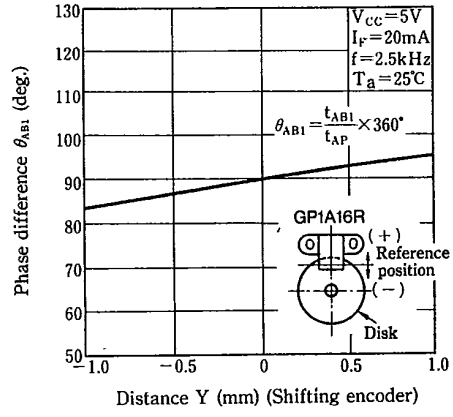


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Fig. 11 Duty Ratio vs. Distance (Z direction)

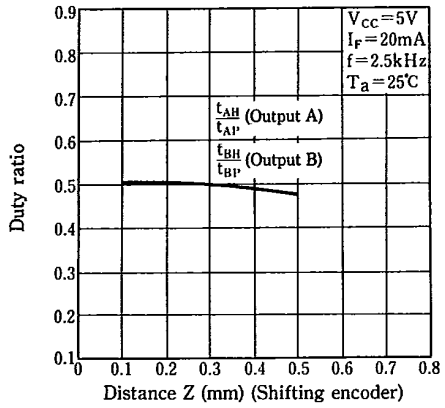
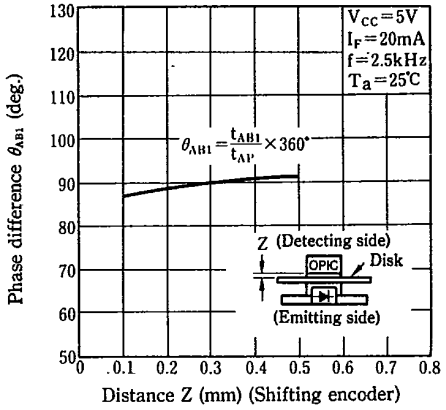
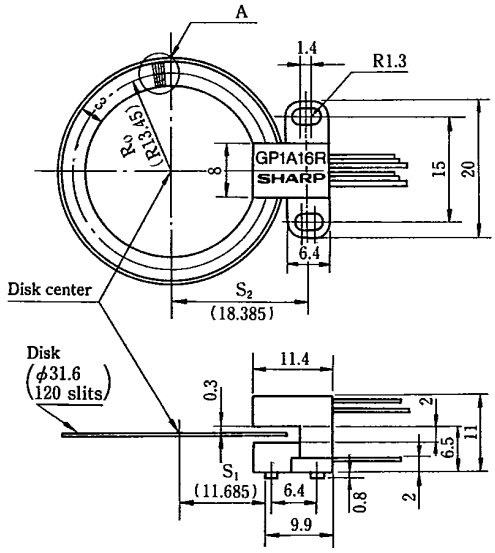


Fig. 12 Phase Difference vs. Distance (Z direction)



■ 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.

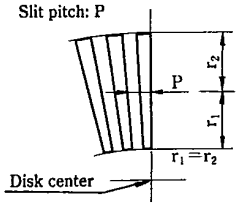
Slit pitch: P (slit center)

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

$P = \frac{2\pi R_0}{N}$

$S_1 = R_0 - 1.765$ (mm) $S_2 = S_1 + 6.7$ (mm)

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



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

$R_0 = \frac{200}{120} \times 13.45$

$= 22.42$mm

$P = \frac{2 \times \pi \times 22.42}{200}$

$= 0.704$mm

$S_1 = 22.42 - 1.765$

$= 20.655$mm

$S_2 = 20.655 + 6.7$

$= 27.355$mm

■ Disk is optional.

Following types are available.

Model No.	Resolution (P/R)
GP1P16RA	120
GP1P16RB	200

(Precautions for Use)

Note 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.

Note 2) This module is designed to be operated at I_F = 20mA TYP.