GP1A33R

OPIC Photointerruper with Encoder Function

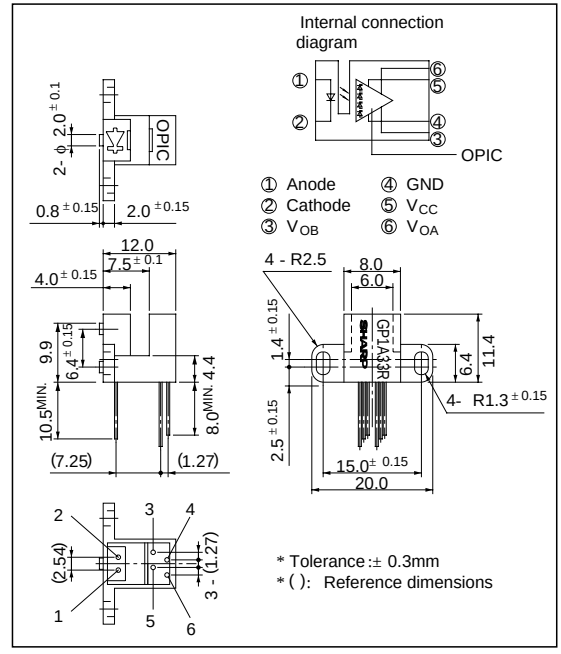
■ Features

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
	*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

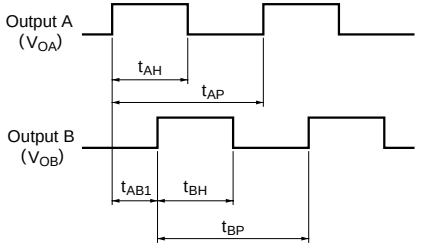
■ Electro-optical Characteristics

(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}	*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

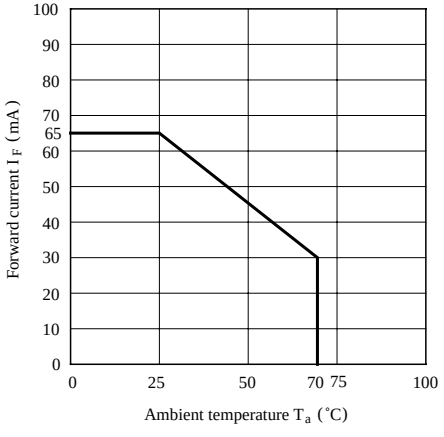


Fig. 2 Output Power Dissipation vs. Ambient Temperature

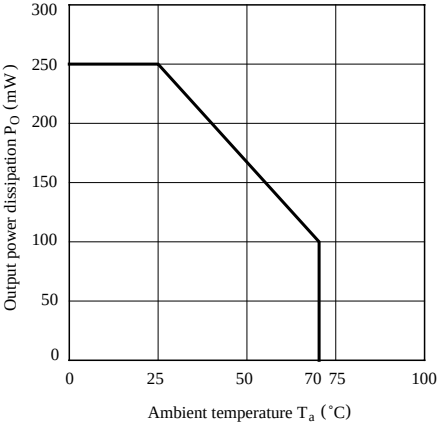


Fig. 3 Duty Ratio vs. Frequency

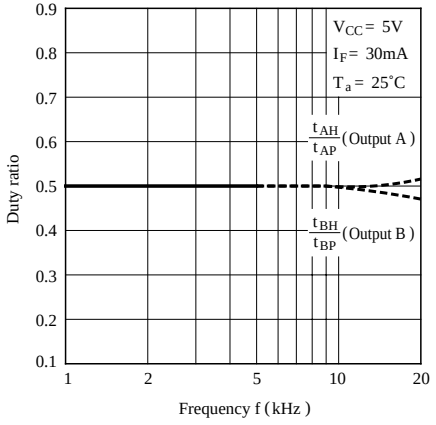


Fig. 4 Phase Difference vs. Frequency Temperature

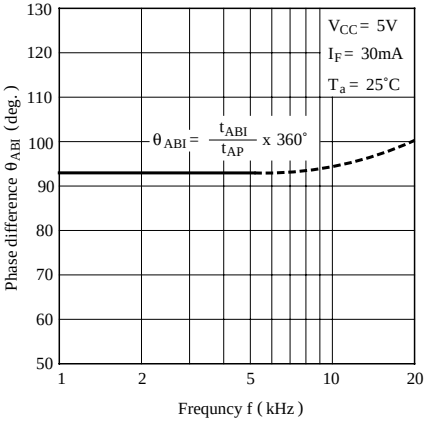


Fig. 5 Duty Ratio vs. Ambient Temperature

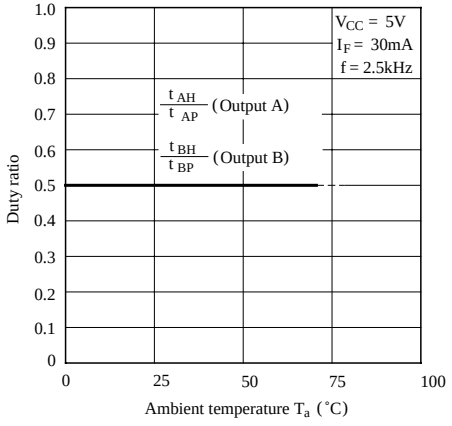


Fig. 6 Phase Difference vs. Ambient Temperature

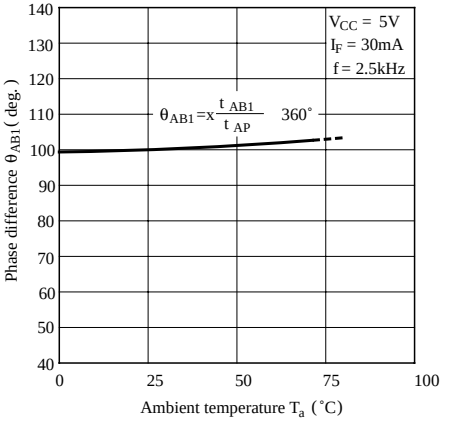


Fig. 7 Duty Ratio vs. Distance（X direction）

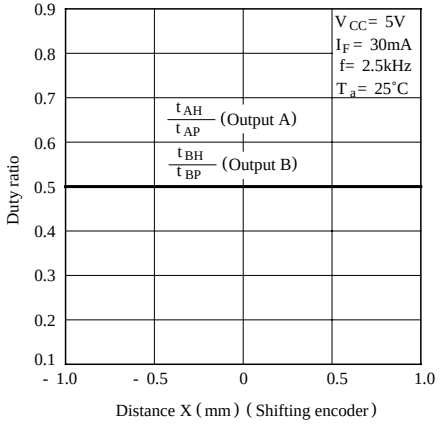


Fig. 8 Phase Difference vs. Distance（X direction）

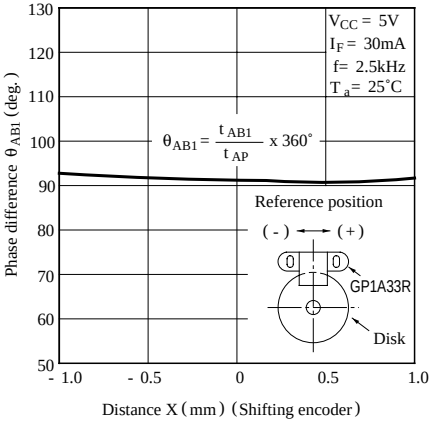


Fig. 9 Duty Ratio vs. Distance (Y direction)

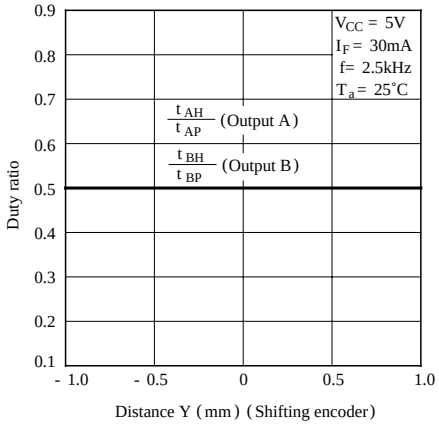


Fig.10 Phase Difference vs. Distance (Y direction)

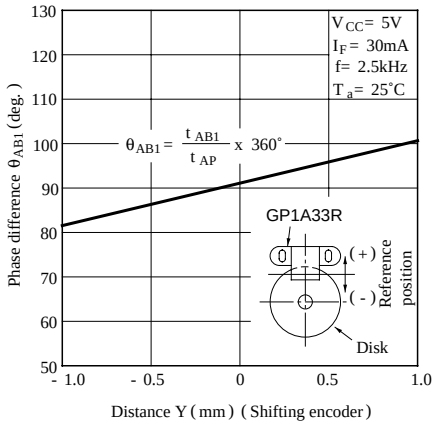


Fig.11 Duty Ratio vs. Distance (Z direction)

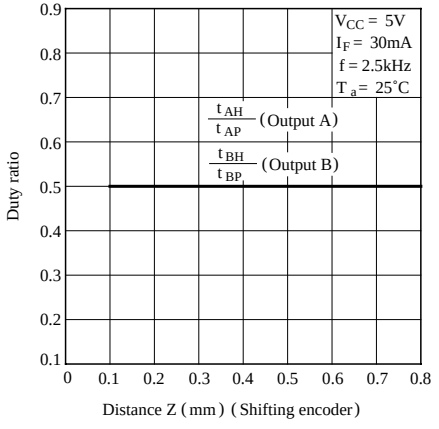
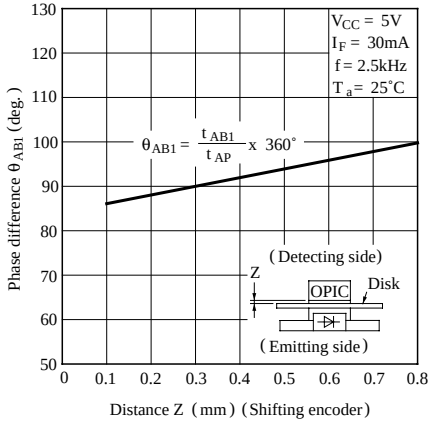
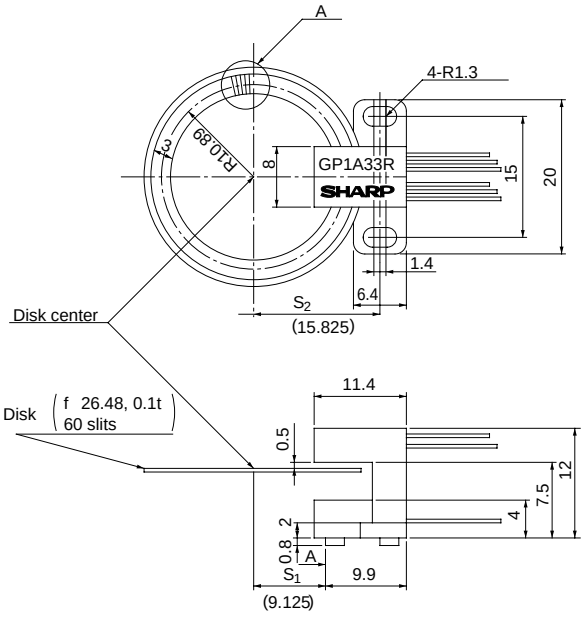


Fig.12 Phase Difference vs. Distance (Z direction)



Measurement Conditions



<Basic Design>

R_O (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)

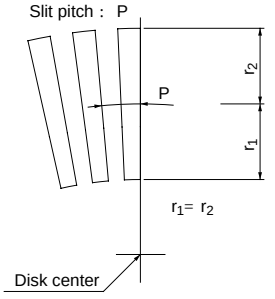
$$R_O = \frac{N}{60} \times 10.89 \text{ (mm)} \quad N: \text{ number of slits}$$

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

$S_1 = R_O - 1.765$ (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.

Enlarged drawing of A portion



(Ex.) In the case of

N= 100P/R

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

= 18.15mm

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

= 1.14mm

$S_1 = 18.15 - 1.765$

= 16.385mm

$S_2 = 16.385 + 6.7$

= 23.085mm

■ Precautions for Use

(1) This module is designed to be operated at I_F = 30mA TYP.

(2) Fixing torque : MAX. 0.6N • m

(3) In order to stabilize power supply line, connect a by-pass capacitor of more than 0.01μF between Vcc and GND near the device.

(4) As for other general cautions, refer to the chapter "Precautions for Use".