

# GP1A70R/GP1A71R

## OPIC Photointerrupter with Encoder Functions

### ■ Features

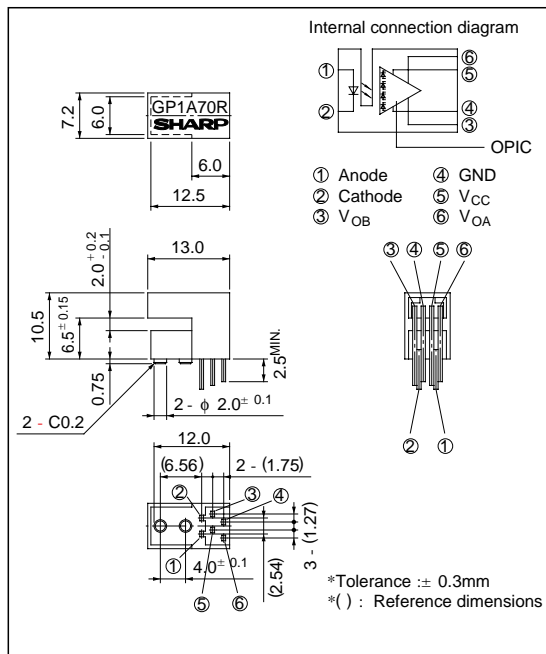
1. 2-phase (A, B) digital output
2. Sensing accuracy  
(**GP1A70R** Disk slit pitch : 1.14mm)  
(**GP1A71R** Disk slit pitch : 0.7mm)
3. PWB mounting type  
(Lead bending type)
4. TTL compatible output
5. Compact, lightweight

### ■ Applications

1. Printers
2. Copiers
3. 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

(T<sub>a</sub> = 25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I <sub>F</sub>	50	mA
	<sup>*1</sup> Peak forward current	I <sub>FM</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation	P	75	mW
Output	Supply voltage	V <sub>CC</sub>	7	V
	Low level output current	I <sub>OL</sub>	20	mA
	Power dissipation	P <sub>O</sub>	250	mW
	Operating temperature	T <sub>opr</sub>	0 to + 70	°C
	Storage temperature	T <sub>stg</sub>	- 40 to + 80	°C
	<sup>*2</sup> Soldering temperature	T <sub>sol</sub>	260	°C

\*1 Pulse width ≤ 100μs, Duty ratio 0.01

\*2 For 5 seconds

■ Electro-optical Characteristics

(Ta = 25°C unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	$V_F$	$I_F = 20\text{mA}$ , $T_a = 25^\circ\text{C}$	-	1.2	1.4	V
	Reverse current	$I_R$	$V_R = 3\text{V}$ , $T_a = 25^\circ\text{C}$	-	-	10	$\mu\text{A}$
Output	Operating supply voltage	$V_{CC}$		4.5	5.0	5.5	V
	High level output voltage	$V_{OH}$	<sup>*3</sup> $V_{CC} = 5\text{V}$ , $I_F = 20\text{mA}$	2.4	4.9	-	V
	Low level output voltage	$V_{OL}$	<sup>*3</sup> $I_{OL} = 8\text{mA}$ , $V_{CC} = 5\text{V}$ , $I_F = 20\text{mA}$	-	0.1	0.4	V
	Supply current	$I_{CC}$	<sup>*4</sup> $V_{CC} = 5\text{V}$ , $I_F = 20\text{mA}$	-	5	20	mA
Transfer characteristics	Duty ratio	GP1A70R	<sup>*5</sup> $D_A, D_B$ <sup>*3</sup> $V_{CC} = 5\text{V}$ , $I_F = 20\text{mA}$ , $f = 2.5\text{kHz}$	25	50	75	%
		GP1A71R		25	50	75	%
	Response frequency	$f_{MAX}$	<sup>*3</sup> $V_{CC} = 5\text{V}$ , $I_F = 20\text{mA}$	-	-	10	kHz

\*3 Measured under the condition shown in Measurement Conditions.

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

\*5  $D_A: \frac{t_{AH}}{t_{AP}} \times 100$ ,  $D_B: \frac{t_{BH}}{t_{BP}} \times 100$ , Duty ratio: Average disk rotation time per turn

■ Output Waveforms

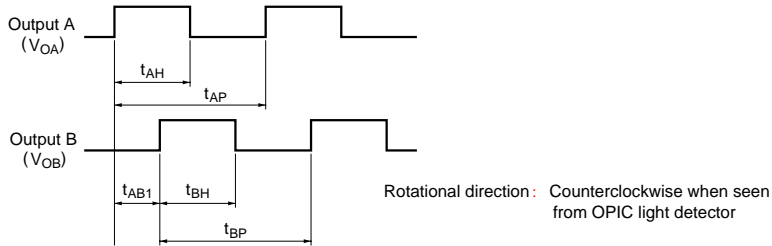


Fig. 1 Forward Current vs. Ambient Temperature

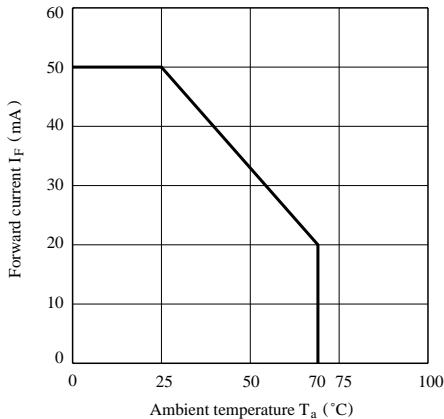


Fig. 2 Output Power Dissipation vs. Ambient Temperature

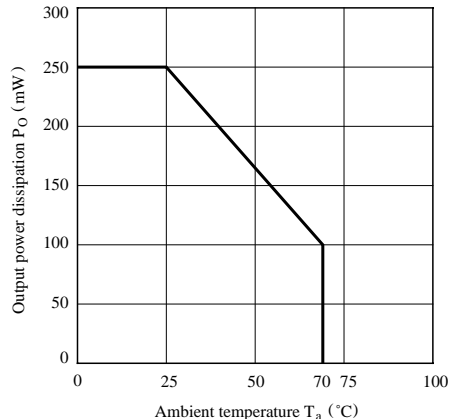


Fig. 3-a Duty Ratio vs. Frequency  
(GP1A70R)

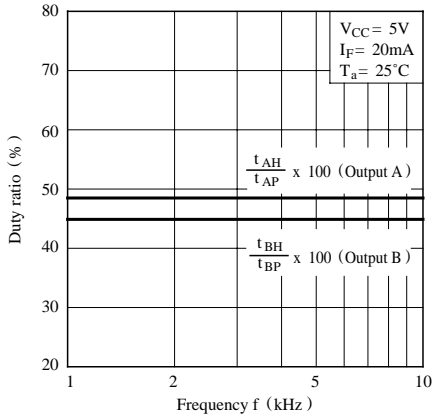


Fig. 3-b Duty Ratio vs. Frequency  
(GP1A71R)

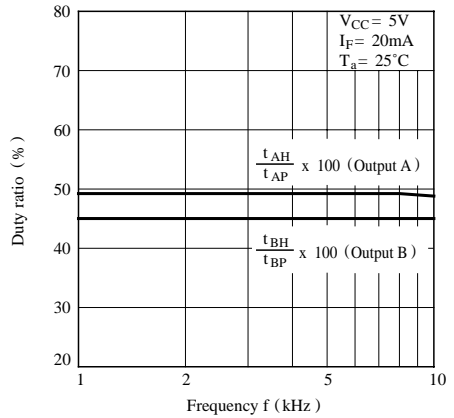


Fig. 4-a Phase Difference vs. Frequency  
(GP1A70R)

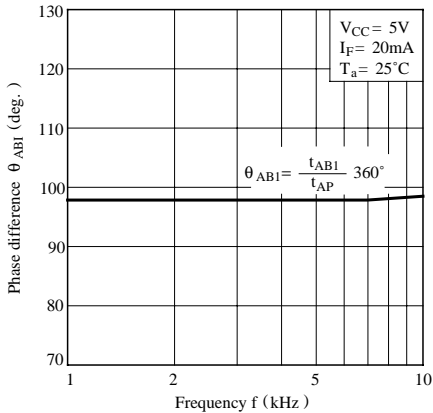


Fig. 4-b Phase Difference vs. Frequency  
(GP1A71R)

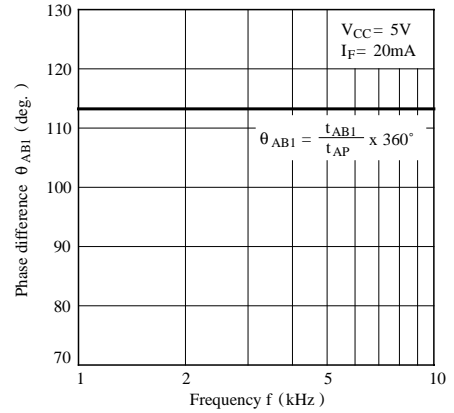


Fig. 5-a Duty Ratio vs. Ambient Temperature  
(GP1A70R)

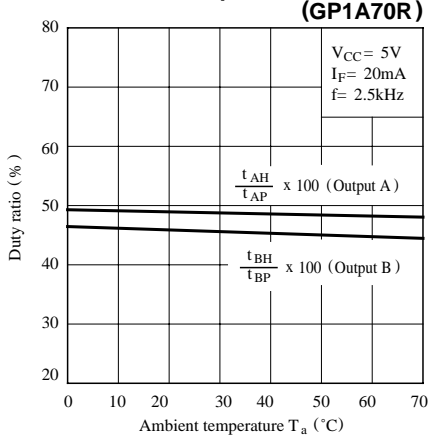


Fig. 5-b Duty Ratio vs. Ambient Temperature  
(GP1A71R)

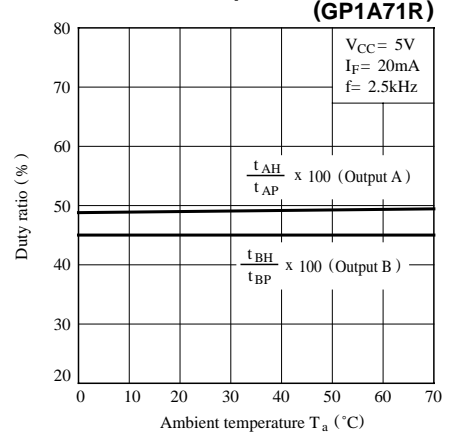


Fig. 6-a Phase Difference vs. Ambient Temperature

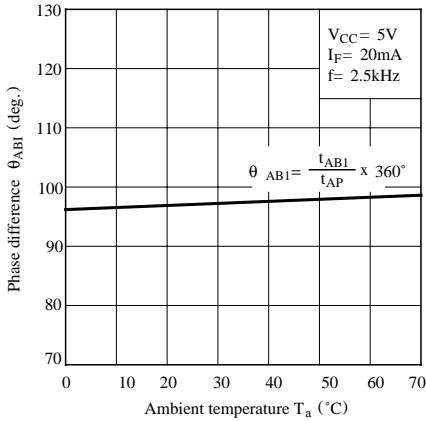


Fig. 6-b Phase Difference vs. Ambient Temperature

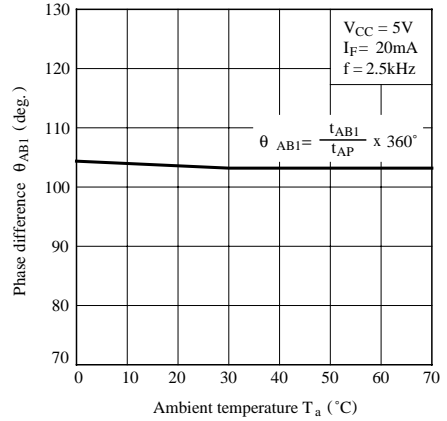


Fig. 7-a Duty Ratio vs. Distance (Xdirection)

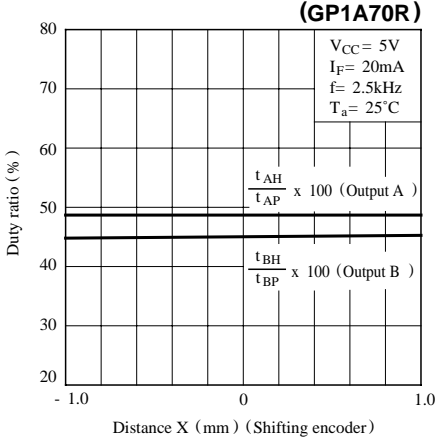


Fig. 7-b Duty Ratio vs. Distance (X direction)

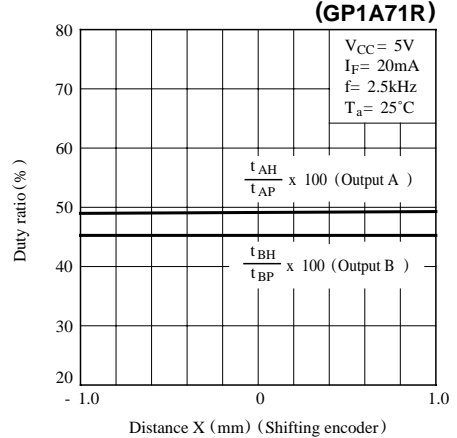


Fig. 8-a Phase Difference vs. Distance (X direction)

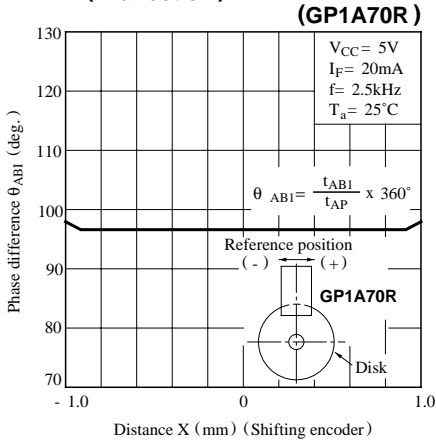


Fig. 8-b Phase Difference vs. Distance (X direction)

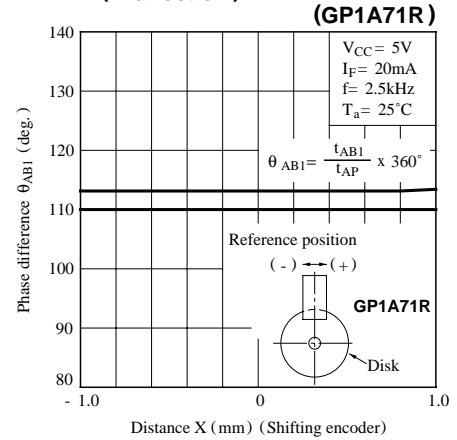


Fig. 9-a Duty Ratio vs. Distance (Ydirection)

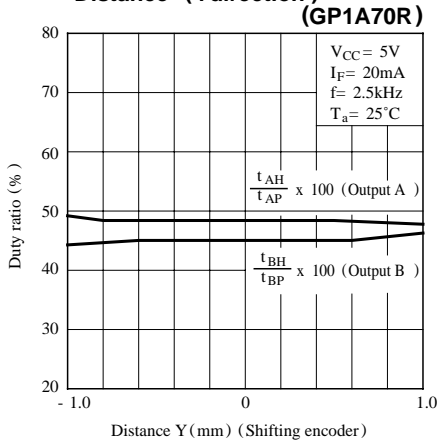


Fig. 9-b Duty Ratio vs. Distance (Y direction)

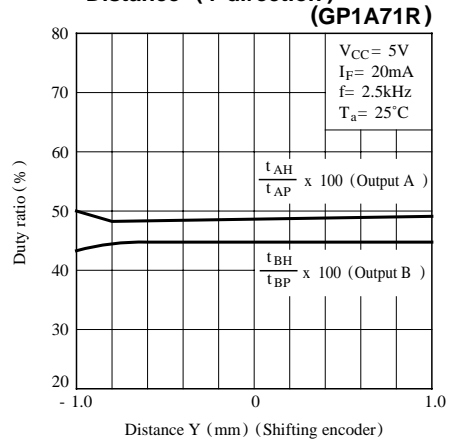


Fig.10-a Phase Difference vs. Distance (Y direction)

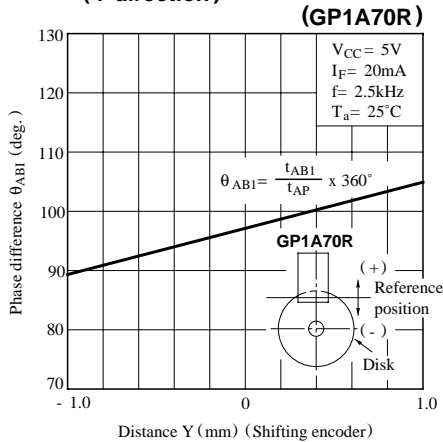


Fig.10-b Phase Difference vs. Distance (Y direction)

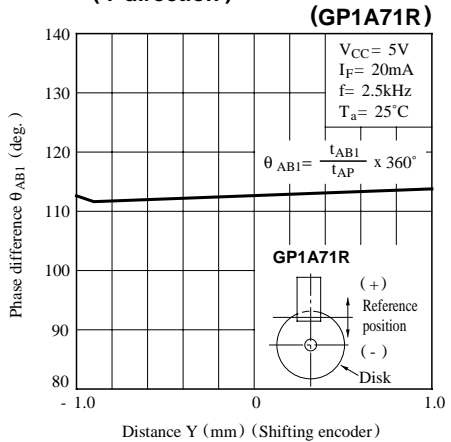


Fig.11-a Duty Ratio vs. Distance (Z direction)

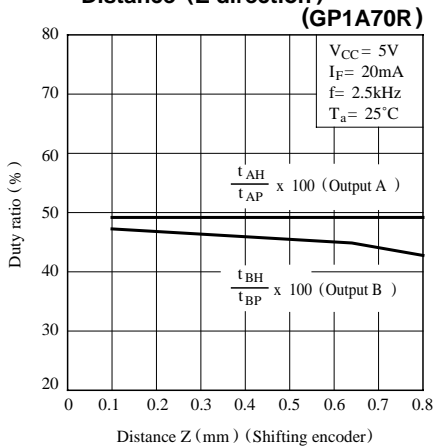


Fig.11-b Duty Ratio vs. Distance (Z direction)

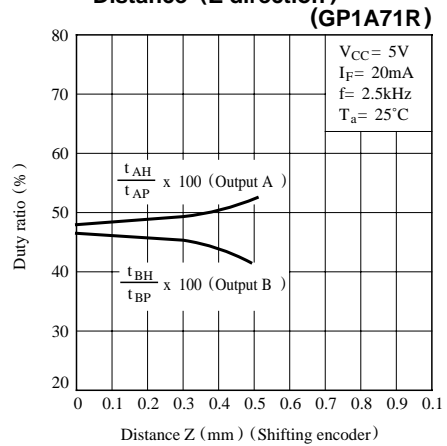


Fig.12-a Phase Difference vs. Distance (Z direction)

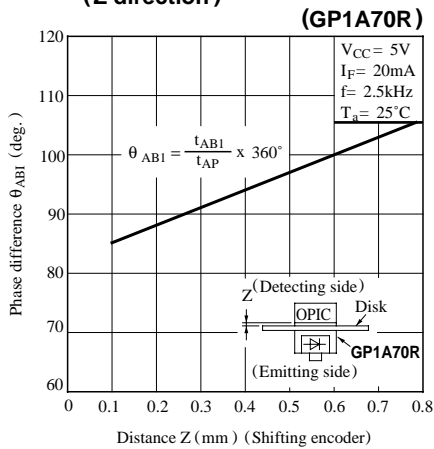
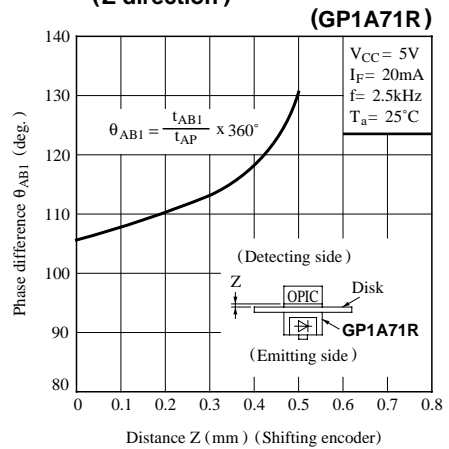
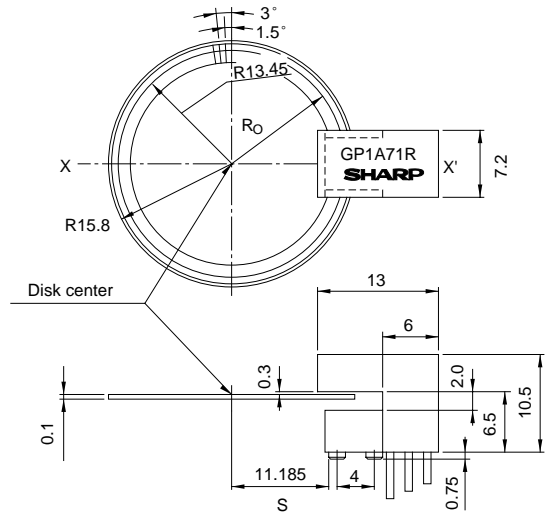
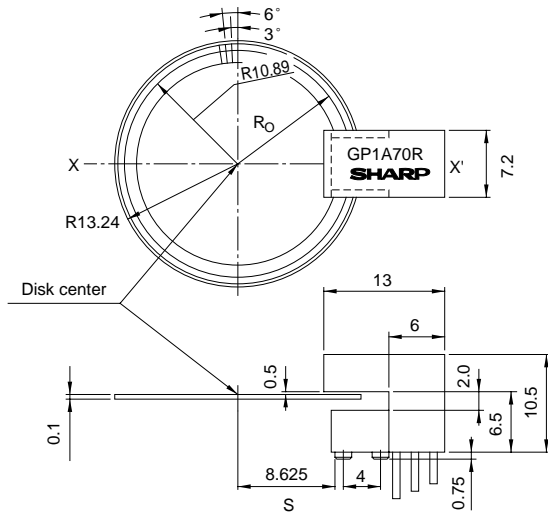


Fig.12-b Phase Difference vs. Distance (Z direction)



<Measurement Conditions> (Unit : mm)



<GP1A70R Basic Design>

$R_0$  (distance between the disk center and half point of a slit) and  $S$  (installing position of GP1A70R) will be provided by the following equations.

$R_0 = N/60 \times 10.89$  (mm)  $N$  : number of slits  
 $S = R_0 - 2.265$  (mm)

<GP1A71R Basic Design>

$R_0$  (distance between the disk center and half point of a slit) and  $S$  (installing position of GP1A71R) will be provided by the following equations.

$R_0 = N/120 \times 13.45$  (mm)  $N$  : number of slits  
 $S = R_0 - 2.265$  (mm)

■ Precautions for Use

- (1) This device is designed to be used under the condition of  $I_F = 20mA$
- (2) It is recommended that a by-pass capacitor of more than  $0.01\mu F$  be added between  $V_{CC}$  and GND near the device in order to stabilize power supply line.
- (3) As for other general cautions, refer to the chapter "Precautions for Use".