GP1A70R/GP1A71R

OPIC Photointerrupter with Encoder Functions

■ Features

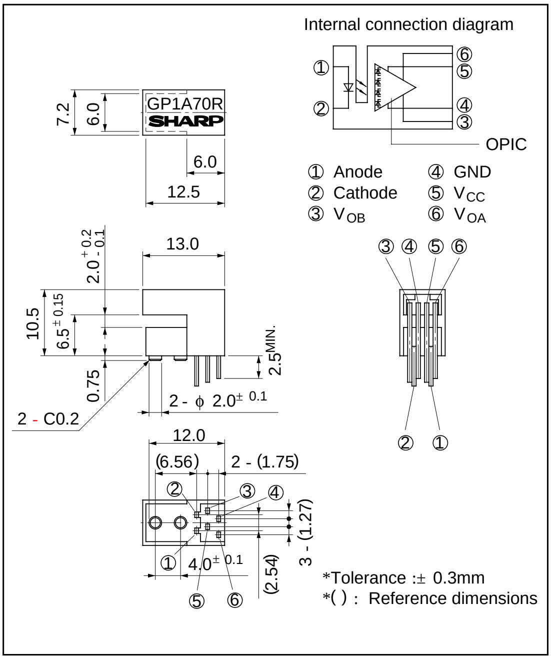
1. 2-phase (A, B) digital output
2. Sensing accuracy
   (**GP1A70R** Disk slit pitch : 1.14mm)
   (**GP1A71R** Disk slit pitch : 0.7mm)
3. PWB mounting type
   (Lead bending type)
4. TTL compatible output
5. Compact, lightweight

■ 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

(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 to + 70	˚C
Storage temperature		T_{stg}	- 40 to + 80	˚C
*2 Soldering temperature		T_{sol}	260	˚C

*1 Pulse width<=100μ s, Duty ratio 0.01
*2 For 5 seconds

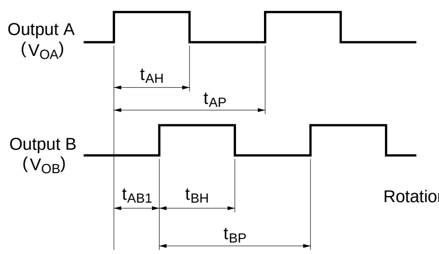
■ Electro-optical Characteristics

(Ta = 25˚C unless otherwise specified)

Parameter			Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	I_F = 20mA, Ta= 25˚C	-	1.2	1.4	V
	Reverse current		I_R	V_R= 3V, Ta= 25˚C	-	-	10	μ A
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= 20mA	2.4	4.9	-	V
	Low level output voltage		V_{OL}	*3 I_{OL}= 8mA, V_{CC}= 5V, I_F= 20mA	-	0.1	0.4	V
	Supply current		I_{CC}	*4 V_{CC}= 5V, I_F= 20mA	-	5	20	mA
Transfer charac-teristics	Duty ratio	**GP1A70R**	*5 D_A , D_B	*3 V_{CC}= 5V, I_F= 20mA, f = 2.5kHz	25	50	75	%
		GP1A71R			25	50	75	%
	Response frequency		$f_{MAX.}$	*3 V_{CC}= 5V, I_F= 20mA	-	-	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: $\frac{t_{AH}}{t_{AP}}$ x 100, D_B : $\frac{t_{BH}}{t_{BP}}$ x 100, Duty ratio : Average disk rotation time per turn

■ Output Waveforms



Rotational direction : Counterclockwise when seen from OPIC light detector

Fig. 1 Forward Current vs. Ambient Temperature

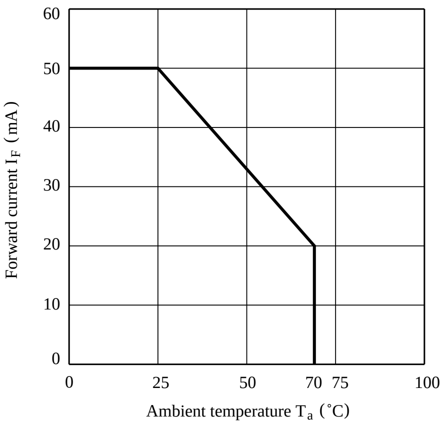


Fig. 2 Output Power Dissipation vs. Ambient Temperature

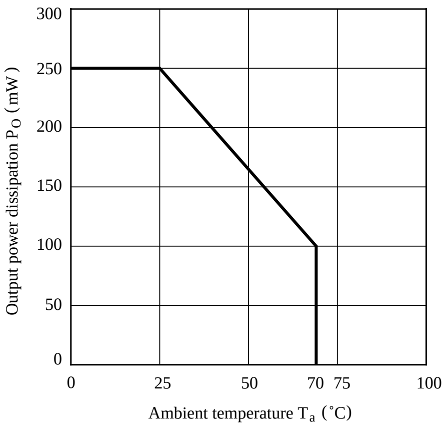


Fig. 3-a Duty Ratio vs. Frequency (GP1A70R)

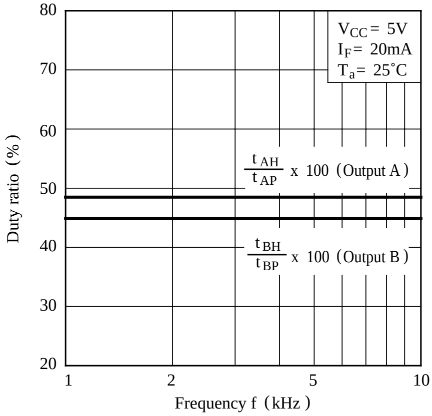


Fig. 3-b Duty Ratio vs. Frequency (GP1A71R)

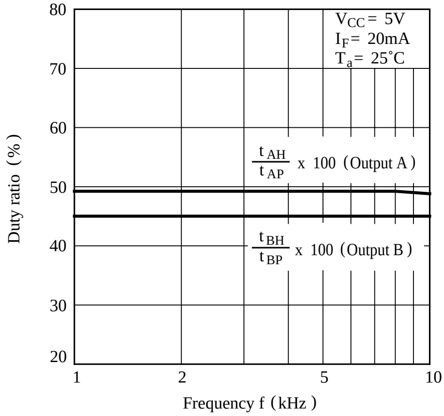


Fig. 4-a Phase Difference vs. Frequency (GP1A70R)

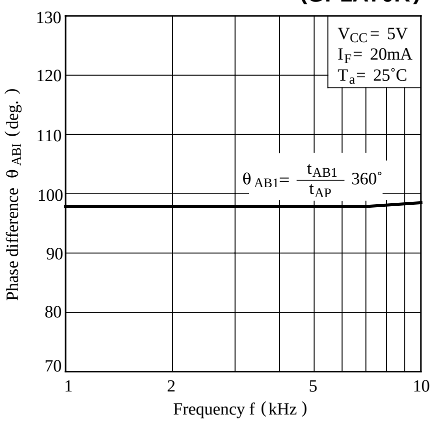


Fig. 4-b Phase Difference vs. Freauency (GP1A71R)

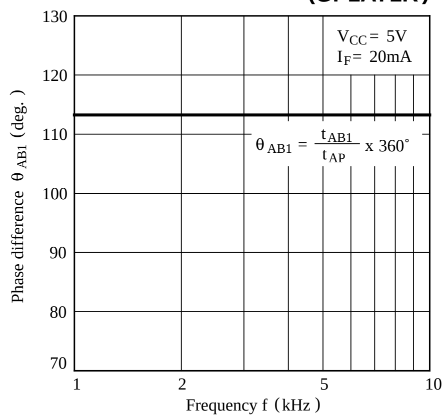


Fig. 5-a Duty Ratio vs. Ambient Temperature (GP1A70R)

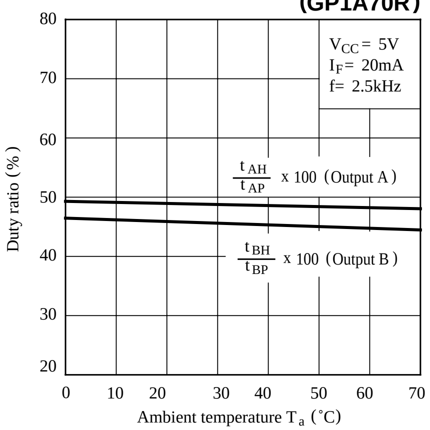


Fig. 5-b Duty Ratio vs. Ambient Temperature (GP1A71R)

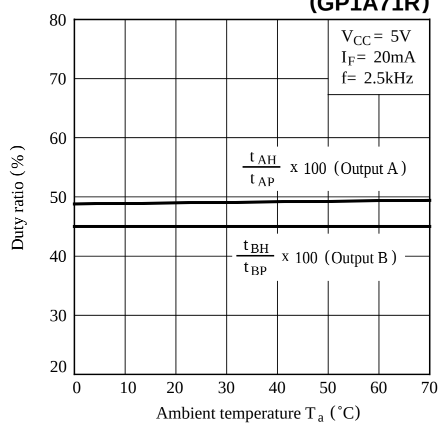


Fig. 6-a Phase Difference vs. Ambient Temperature

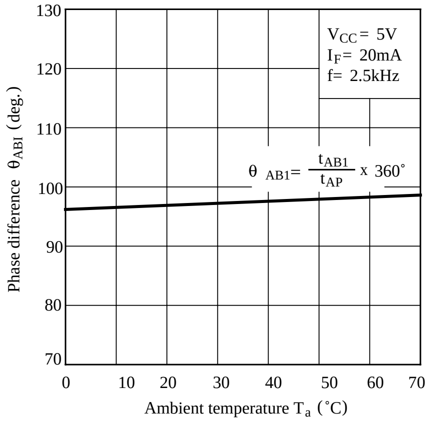


Fig. 6-b Phase Difference vs. Ambient Temperature

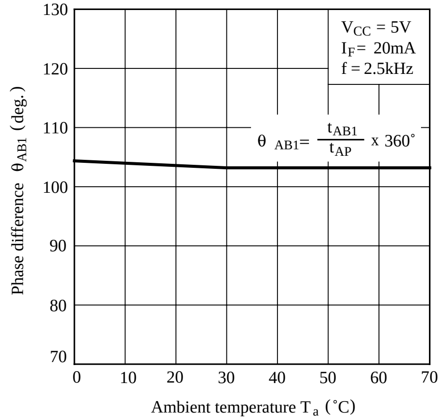


Fig. 7-a Duty Ratio vs. Distance (Xdirection) (GP1A70R)

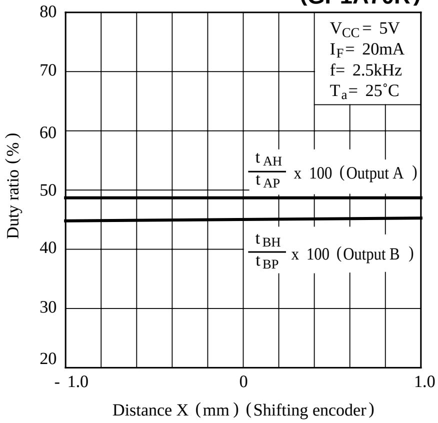


Fig. 7-b Duty Ratio vs. Distance (X direction) (GP1A71R)

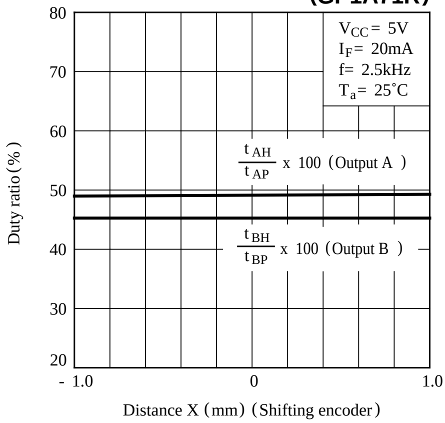


Fig. 8-a Phase Difference vs. Distance (X direction) (GP1A70R)

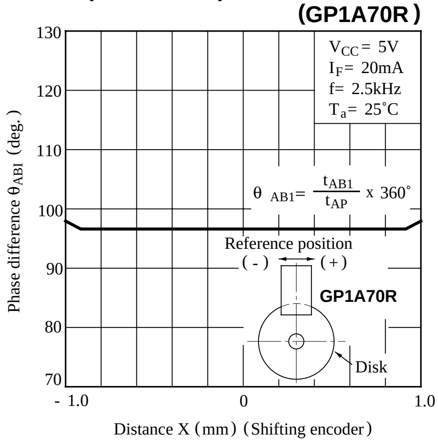


Fig. 8-b Phase Difference vs. Distance (X direction) (GP1A71R)

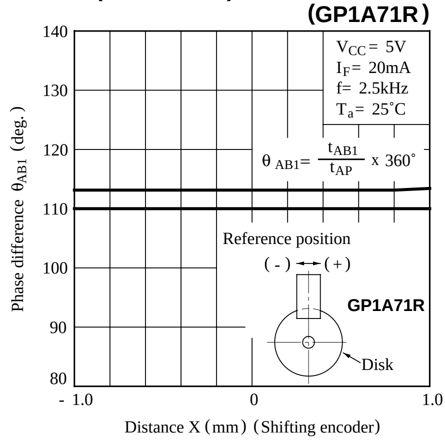


Fig. 9-a Duty Ratio vs. Distance（Ydirection）（GP1A70R）

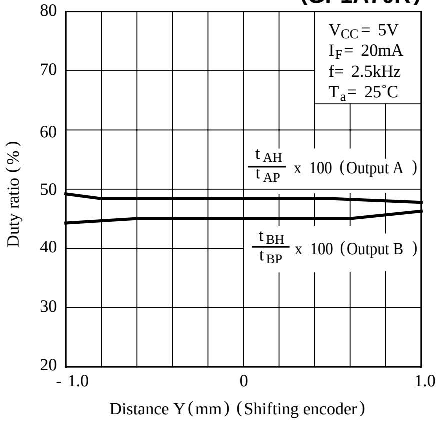


Fig. 9-b Duty Ratio vs. Distance（Y direction）（GP1A71R）

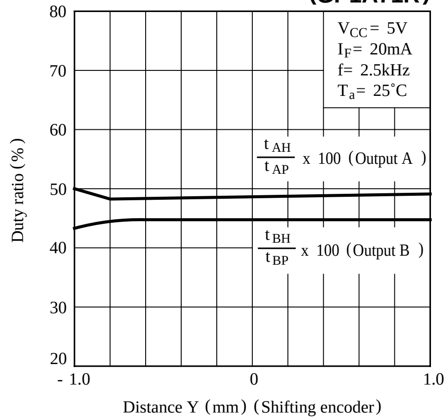


Fig.10-a Phase Difference vs. Distance（Y direction）（GP1A70R）

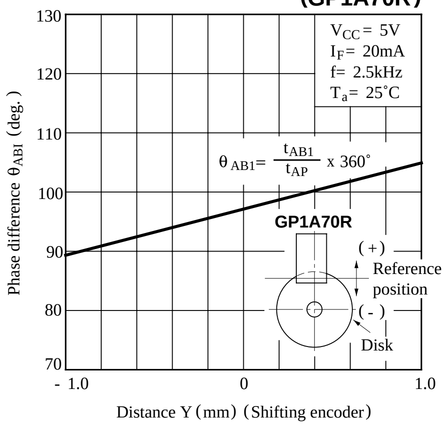


Fig.10-b Phase Difference vs. Distance（Y direction）（GP1A71R）

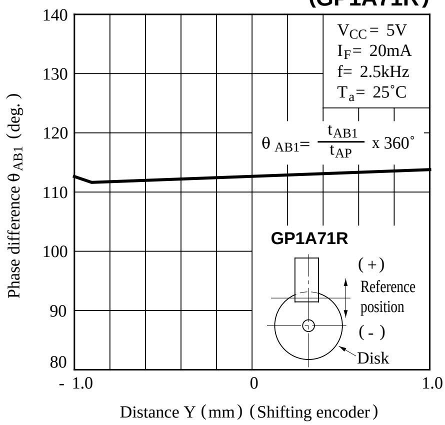


Fig.11-a Duty Ratio vs. Distance（Z direction）（GP1A70R）

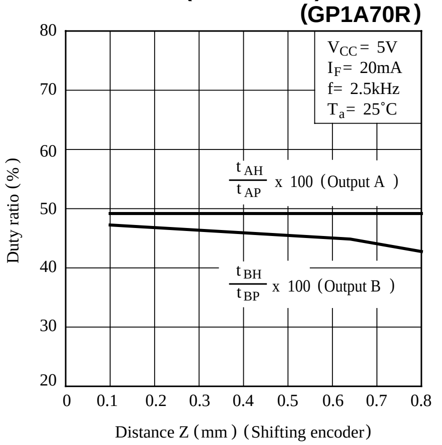


Fig.11-b Duty Ratio vs. Distance（Z direction）（GP1A71R）

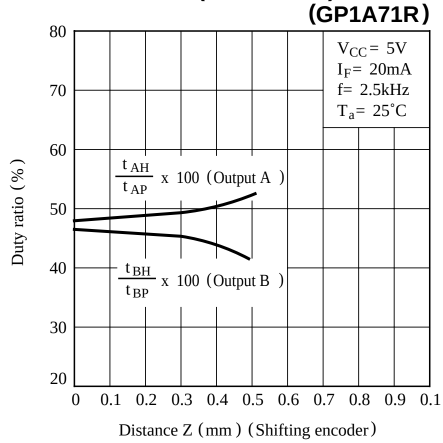


Fig.12-a Phase Difference vs. Distance (Z direction)

(GP1A70R)

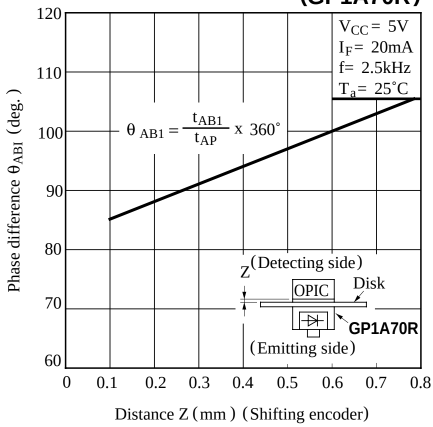
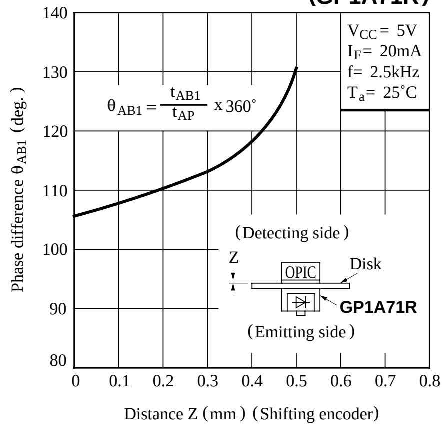
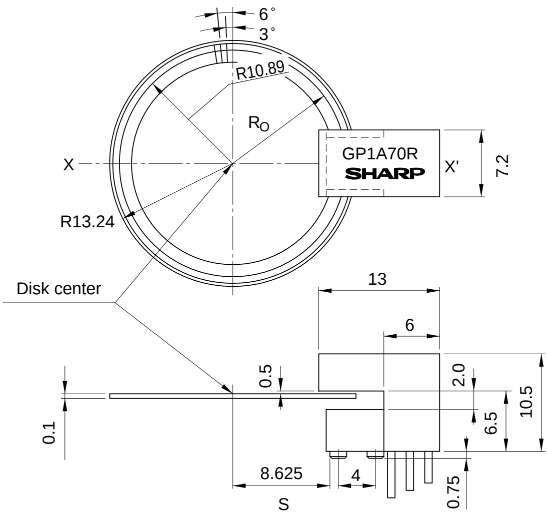


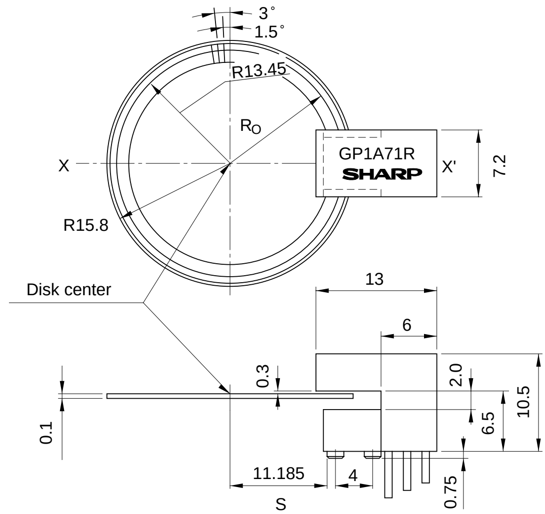
Fig.12-b Phase Difference vs. Distance (Z direction)

(GP1A71R)



<Measurement Conditions> (Unit : mm)





<GP1A70R Basic Design>

R_O (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_O=N/60 x 10.89 (mm) N : number of slits
S= R_O- 2.265 (mm)

<GP1A71R Basic Design>

R_O (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_O= N/120 x 13.45 (mm) N: number of slits
S= R_O- 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 0.01µF 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".

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

(i) The devices in this publication are designed for use in general electronic equipment designs such as:

— Personal computers
— Office automation equipment
— Telecommunication equipment [terminal]
— Test and measurement equipment
— Industrial control
— Audio visual equipment
— Consumer electronics

(ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:

— Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
— Traffic signals
— Gas leakage sensor breakers
— Alarm equipment
— Various safety devices, etc.

(iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:

— Space applications
— Telecommunication equipment [trunk lines]
— Nuclear power control equipment
— Medical and other life support equipment (e.g., scuba).

- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
-
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.