

# GP1A35RV

## High Sensing Accuracy OPIC Photointerrupter with Encoder Functions

### ■ Features

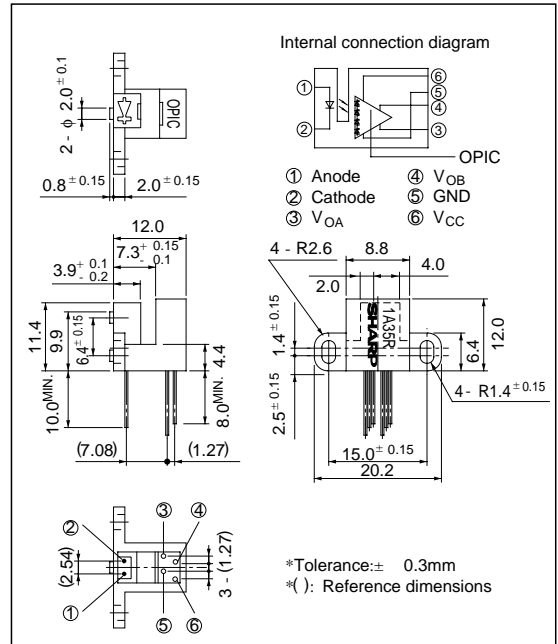
1. 2-phase (A, B) digital output
2. High sensing accuracy  
(Disk slit pitch: 0.22mm, Moire stripe application)
3. TTL compatible output
4. Compact and light

### ■ Applications

1. Copiers
2. Electronic typewriters, printers
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>	65	mA
	*1 Peak forward current	I <sub>FM</sub>	1	A
	Reverse voltage	V <sub>R</sub>	6	V
	Power dissipation	P	100	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
*2 Soldering temperature		T <sub>sol</sub>	260	°C

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

\*2 For 5 seconds

**Electro-optical Characteristics**

(Ta= 25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit		
Input	Forward voltage	V <sub>F</sub>	I <sub>F</sub> = 30mA	-	1.2	1.5	V		
	Reverse current	I <sub>R</sub>	V <sub>R</sub> = 3V	-	-	10	μ A		
Output	Output voltage	Phase A	High level	V <sub>AH</sub>	V <sub>CC</sub> = 5V, I <sub>F</sub> = 30mA	2.4	4.9	-	V
			Low level	V <sub>AL</sub>	I <sub>OL</sub> = 8mA, I <sub>F</sub> = 30mA, V <sub>CC</sub> = 5V	-	0.1	0.4	
		Phase B	High level	V <sub>BH</sub>	V <sub>CC</sub> = 5V, I <sub>F</sub> = 30mA	2.4	4.9	-	
			Low level	V <sub>BL</sub>	I <sub>OL</sub> = 8mA, I <sub>F</sub> = 30mA, V <sub>CC</sub> = 5V	-	0.1	0.4	
	Dissipation current		I <sub>CC</sub>	<sup>*3</sup> V <sub>CC</sub> = 5V, I <sub>F</sub> = 30mA	-	5	20	mA	
Transfer characteristics	Duty ratio	<sup>*4</sup> Δ <sub>A</sub>	I <sub>F</sub> = 30mA <sup>*6</sup> f= 12kHz	30	50	70	%		
		<sup>*4</sup> Δ <sub>B</sub>							
	Phase difference	<sup>*5</sup> θ <sub>AB1</sub>	V <sub>CC</sub> = 5V	50	90	130	deg.		
	Response speed	t <sub>r</sub>	I <sub>F</sub> = 30mA, V <sub>CC</sub> = 5V	-	1.0	2.0	μ s		
t <sub>f</sub>		<sup>*6</sup> f= 12kHz		-	1.0	2.0			

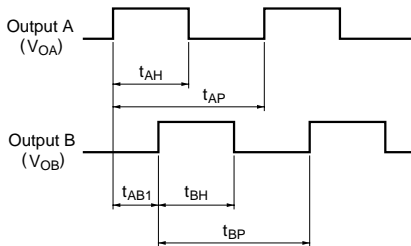
\*3 In the condition that output A and B are low level.

$$*4 \Delta_A = \frac{t_{AH}}{t_{AP}} \times 100, \Delta_B = \frac{t_{BH}}{t_{BP}} \times 100$$

$$*5 \theta_{AB1} = \frac{t_{AB1}}{t_{AP}} \times 360^\circ$$

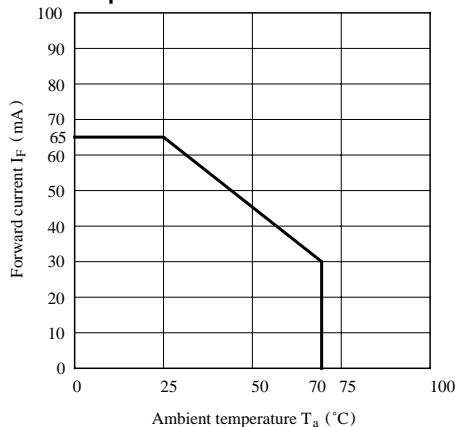
\*6 Measured under the condition shown in Measurement Conditions.

**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**

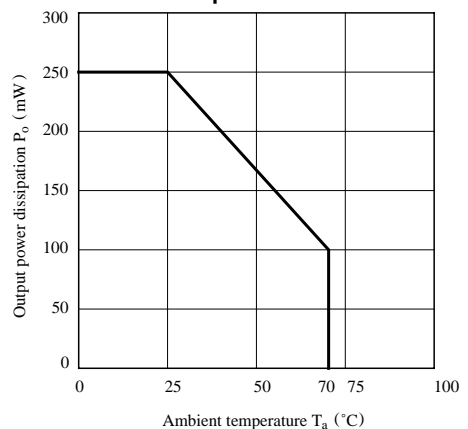


Fig. 3 Duty Ratio vs. Frequency

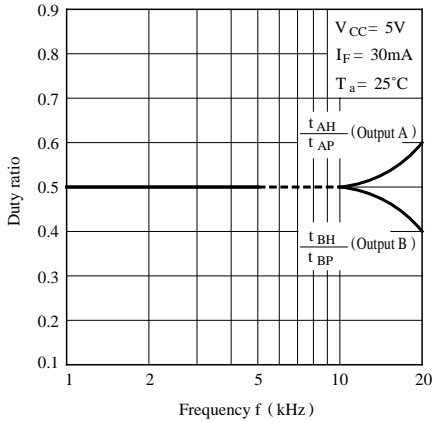


Fig. 4 Phase Difference vs. Frequency

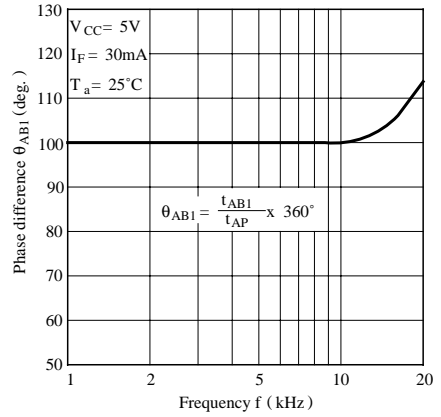


Fig. 5 Duty Ratio vs. Ambient Temperature

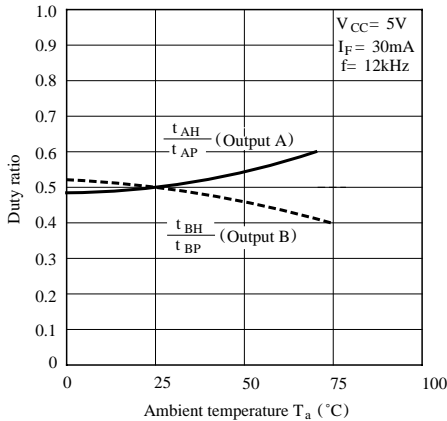


Fig. 6 Phase Difference vs. Ambient Temperature

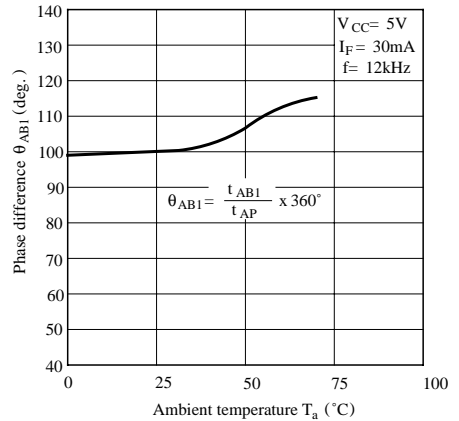


Fig. 7 Duty Ratio vs. Distance (Xdirection)

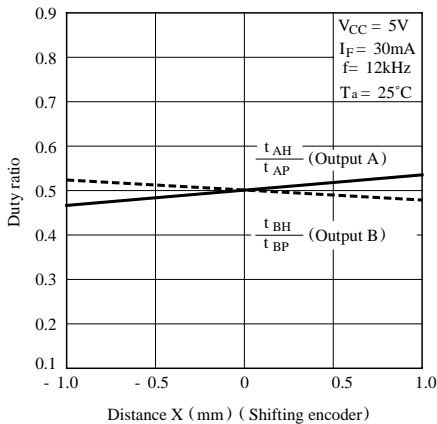
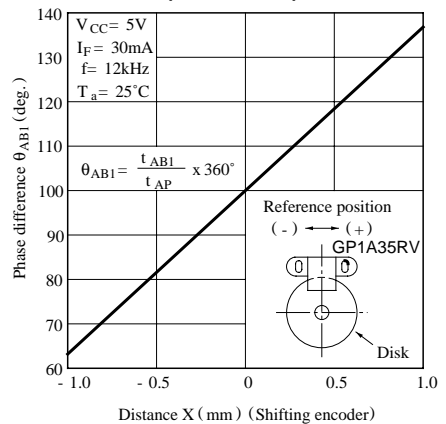
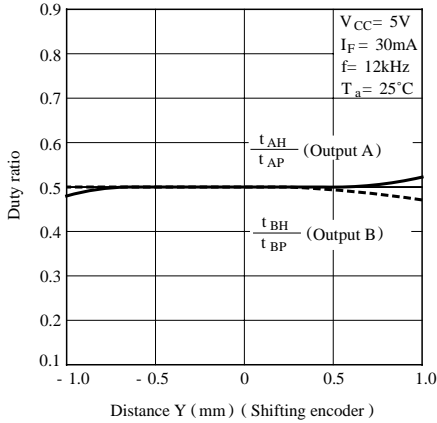


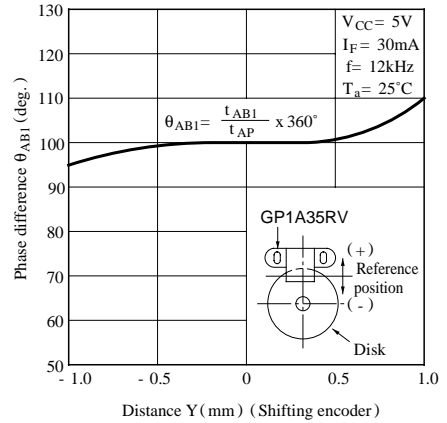
Fig. 8 Phase Difference vs. Distance (Xdirection)



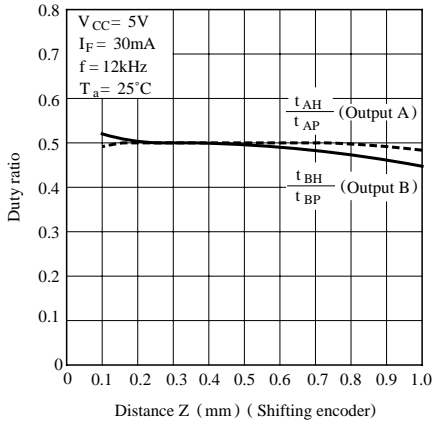
**Fig. 9 Duty Ratio vs. Distance (Ydirection)**



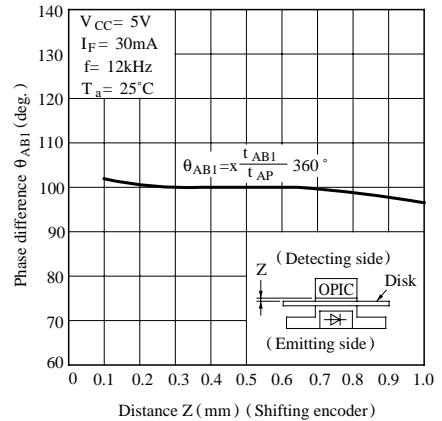
**Fig.10 Phase Difference vs. Distance (Ydirection)**



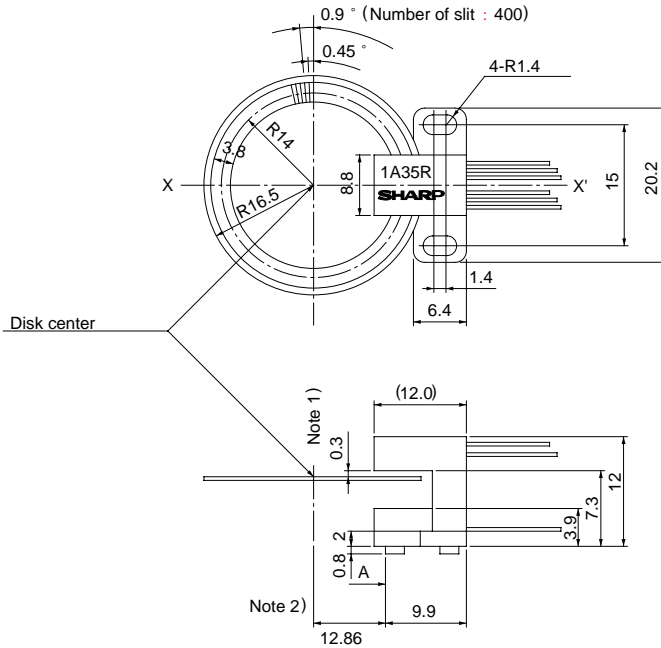
**Fig.11 Duty Ratio vs. Distance (Zdirection)**



**Fig.12 Phase Difference vs. Distance (Zdirection)**



Measurement Conditions

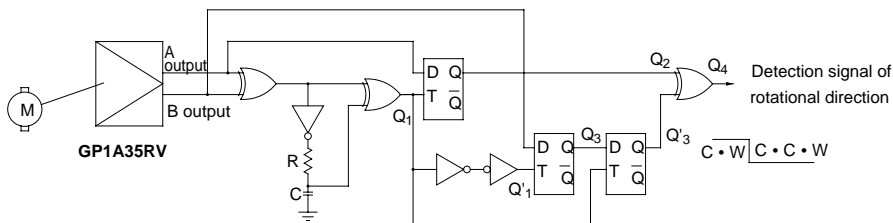


- Note 1) Distance between disk surface and case surface in the detector side is 0.3mm.
- 2) Encoder positioning pin is positioned on X-X' axis.  
Distance between center of disk and portion A of positioning pin is 12.86mm.
- 3) Center of disk slit is R14.0.

■ 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 0.01  $\mu$ F between Vcc and GND near the device.
- (4) As for other general cautions, refer to the chapter “Precautions for Use”.

■ Application Circuit (Detection of Rotational Direction )



When gate delay causes pulse noise in Q4 output, apply the CR filter to remove pulse noise.

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    - Alarm equipment
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