

GP1A06 2-phase Digital Output Type OPIC Photointerrupter

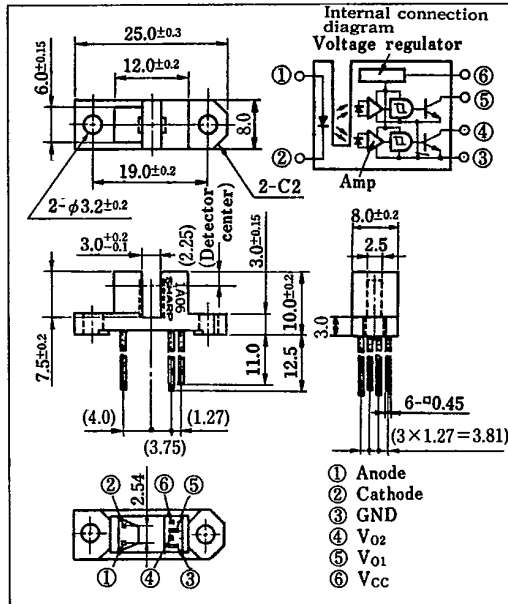
■ Features

1. Built-in Schmidt trigger circuit
2. 2-phase digital output with phase difference
3. LSTTL and TTL compatible output
4. Operating supply voltage V_{CC} : 4.5~16V

■ Applications

1. Tape counters in VCRs and cassette tape recorders
2. Copiers, facsimiles
3. Industrial robots, NC machines
4. Electronic scales

■ 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

($T_a = 25^\circ\text{C}$)

	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}	16	V
	Low level output current	I_{OL}	20	mA
	High level output voltage	V_{OH}	20	V
	Power dissipation	P_o	250	mW
	Operating temperature	T_{opr}	-20 ~ +85	$^\circ\text{C}$
	Storage temperature	T_{stg}	-40 ~ +100	$^\circ\text{C}$
	*2 Soldering temperature	T_{sol}	260	$^\circ\text{C}$

*1 Pulse width $\leq 100\mu\text{s}$, Duty ratio = 0.01

*2 For 5 seconds

Electro-optical Characteristics

(Ta=0~+70°C unless specified)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V_F	Ta=25°C, $I_F=20\text{mA}$	—	1.2	1.4	V	
	Reverse current	I_R	Ta=25°C, $V_R=3\text{V}$	—	—	10	μA	
Output	Operating supply voltage	V_{CC}	Ta=25°C	4.5	—	16	V	
	Low level output voltage	V_{OL}	$I_{OL}=16\text{mA}$, $V_{CC}=5\text{V}$, $I_F=20\text{mA}$	—	0.2	0.4	V	
	High level output current	I_{OH}	$V_O=20\text{V}$, $V_{CC}=16\text{V}$, $I_F=0$	—	—	100	μA	
	Supply current	I_{CC}	$V_{CC}=5\text{V}$	—	7.0	15	mA	
Transfer characteristics	*3 "High→Low" threshold input current	I_{FHL}	Ta=25°C, $V_{CC}=5\text{V}$, $R_L=280\Omega$	—	3.0	15	mA	
			$V_{CC}=5\text{V}$, $R_L=280\Omega$	—	—	20		
	*4 "Low→High" threshold input current	I_{FLH}	Ta=25°C, $V_{CC}=5\text{V}$, $R_L=280\Omega$	0.4	1.8	—	mA	
			$V_{CC}=5\text{V}$, $R_L=280\Omega$	0.3	—	—		
	Response time	"High→Low" propagation time	t_{PHL}	Ta=25°C $V_{CC}=5\text{V}$ $I_F=20\text{mA}$ $R_L=280\Omega$	—	1.0	5.0	μs
		"Low→High" propagation time	t_{PLH}		—	2.0	10	
		Rise time	t_r		—	0.1	0.5	
Fall time		t_f	—		0.1	0.5		
*5 Output delay time		t_{d12}	1.0		—	—		

*3 I_{FHL} represents forward current when output goes from high to low.

*4 I_{FLH} represents forward current when output goes from low to high.

*5 t_{d12} represents the delay time between V_{O1} and V_{O2} output. The disk shall be rotated at the speed of 1,000 pulse/sec, and the slit width, slit length and distance between slits are all 2.0 mm.

Fig. 1 Forward Current vs. Ambient Temperature

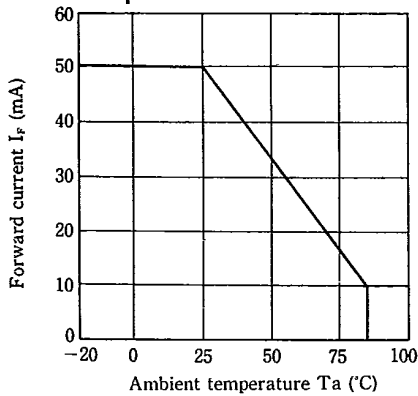


Fig. 2 Output Power Dissipation vs. Ambient Temperature

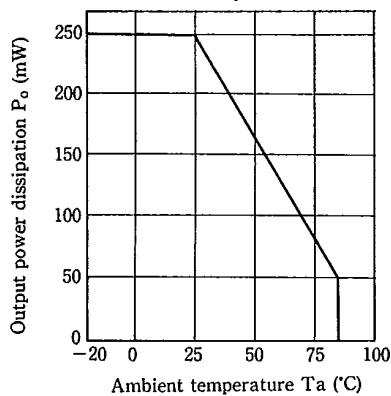


Fig. 3 Forward Current vs. Forward Voltage

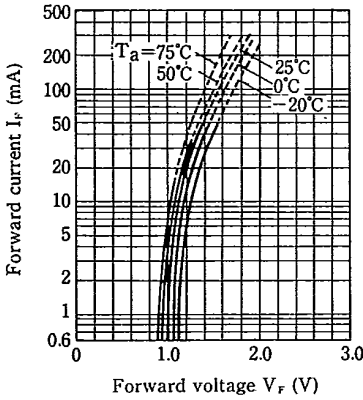


Fig. 4 Relative Threshold Input Current vs. Supply Voltage

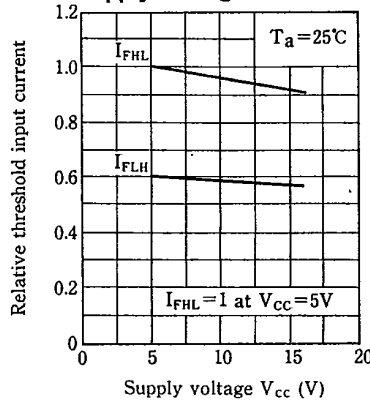


Fig. 5 Relative Threshold Input Current vs. Ambient Temperature

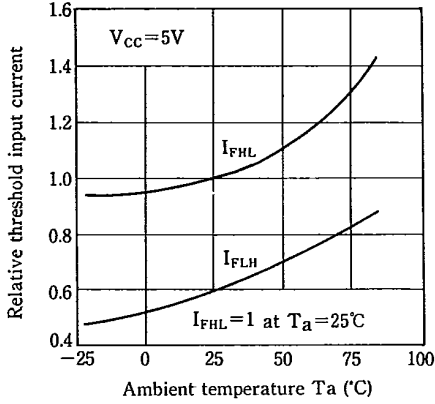
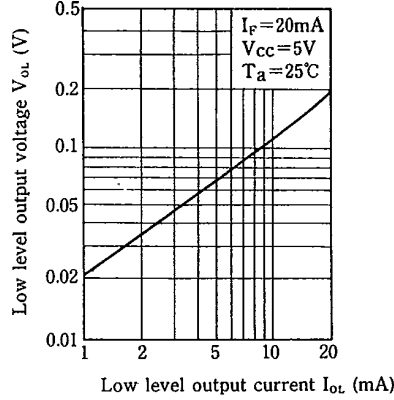


Fig. 6 Low Level Output Voltage vs. Low Level Output Current



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Fig. 7 Low Level Output Voltage vs. Ambient Temperature

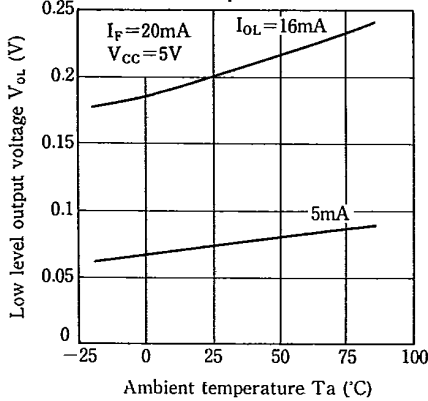


Fig. 8 Supply Current vs. Supply Voltage

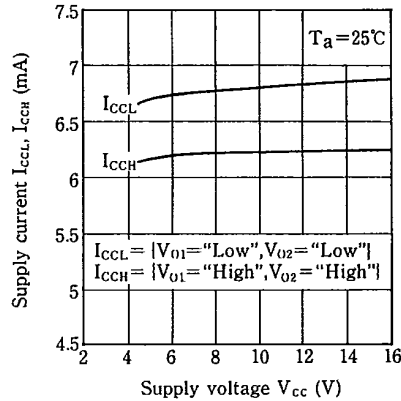


Fig. 9 Propagation Time vs. Forward Current

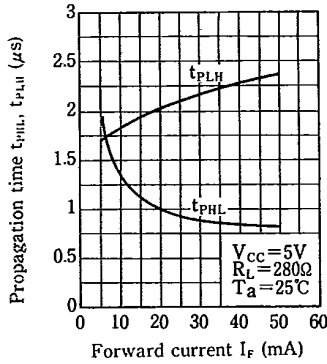
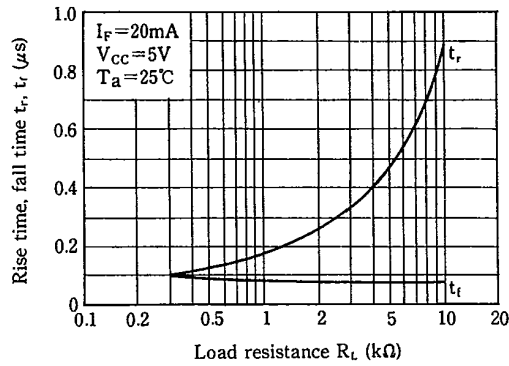
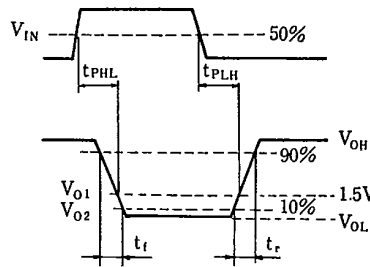
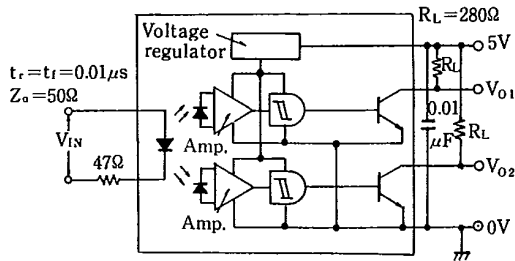


Fig. 10 Rise, Time, Fall Time vs. Load Resistance



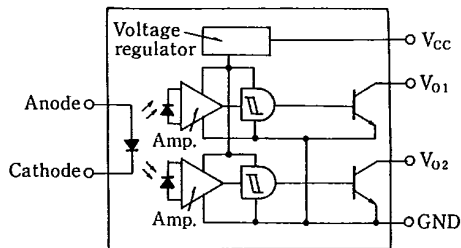
Test Circuit for Response Time



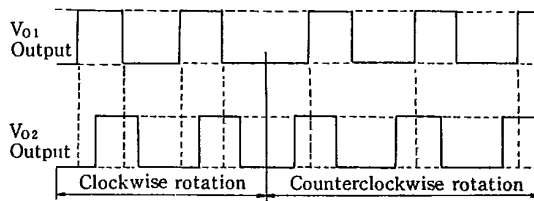
Explanation of Operation

When the forward current which is over the threshold input current (I_{FHL}) is supplied;

- (1) V_{O1} and V_{O2} output will turn to high level when some objects cut off the luminous flux between LED and detector. It will turn to low level without object.
- (2) When a rotating disk is used, the operation diagram of V_{O1} and V_{O2} output is shown below.



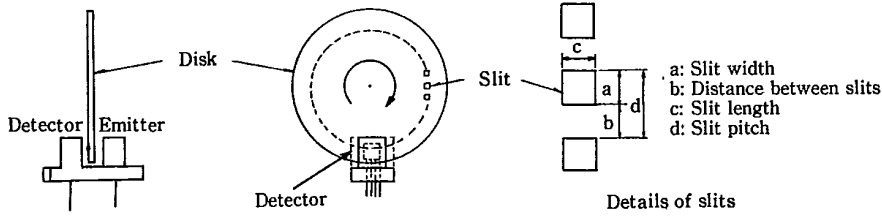
Internal Equivalent Circuit



Operation Diagram

Definition of Rotational Direction

T-41-73



Drawing seen from emitter
(Clockwise rotation)

(Precautions for Use)

- The slit shall be designed as follows: a, b, c=2mm, d=4mm
- In order to stabilize power supply line, connect a by-pass capacitor of more than $0.01\mu\text{F}$ between V_{cc} and GND near the device.

