

GP1A06

2-phase Digital Output Type OPIC Photointerrupter

■ Features

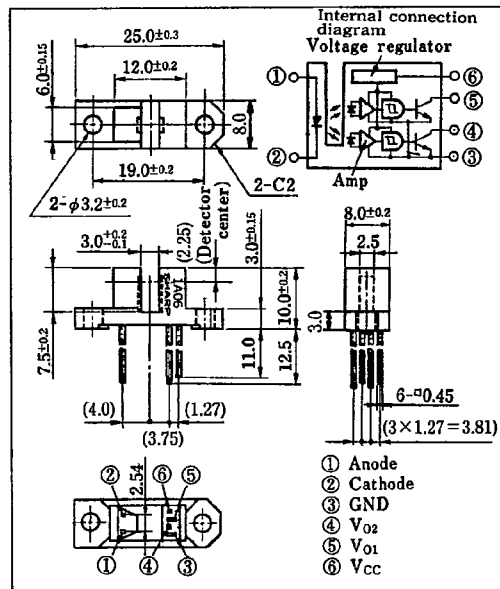
1. Built-in Schmidt trigger circuit
2. 2-phase digital output with phase difference
3. LSTTL and TTL compatible output
4. Operating supply voltage V_{CC} : 4.5~16V

■ 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

(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}	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	°C
	Storage temperature	T_{sig}	-40 ~ +100	°C
	*2 Soldering temperature	T_{sol}	260	°C

*1 Pulse width $\leq 100\mu s$, 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

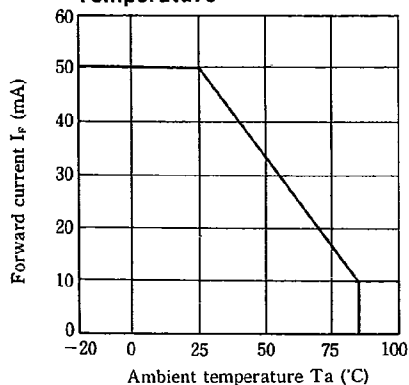


Fig. 2 Output Power Dissipation vs. Ambient Temperature

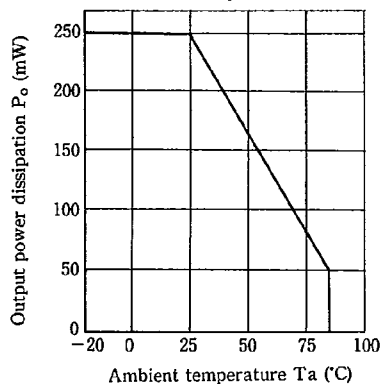


Fig. 3 Forward Current vs. Forward Voltage

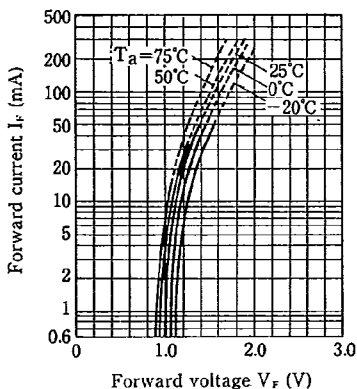


Fig. 4 Relative Threshold Input Current vs. Supply Voltage

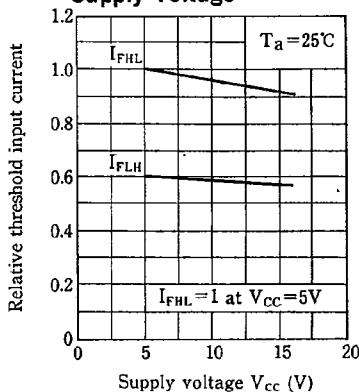


Fig. 5 Relative Threshold Input Current vs. Ambient Temperature

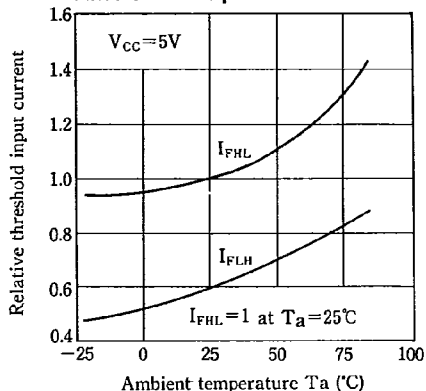


Fig. 6 Low Level Output Voltage vs. Low Level Output Current

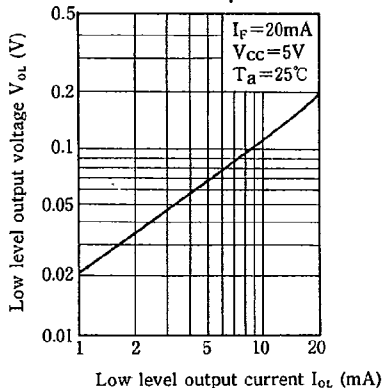


Fig. 7 Low Level Output Voltage vs. Ambient Temperature

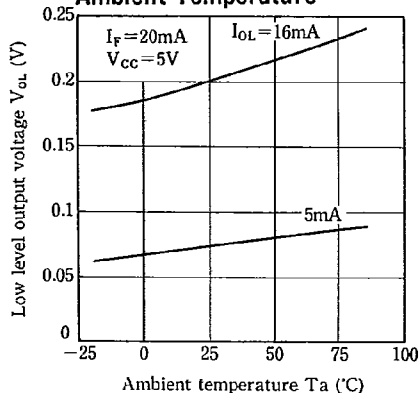


Fig. 8 Supply Current vs. Supply Voltage

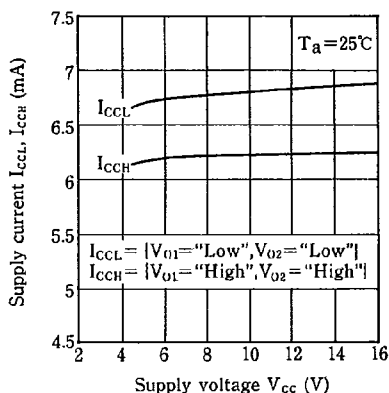


Fig. 9 Propagation Time vs. Forward Current

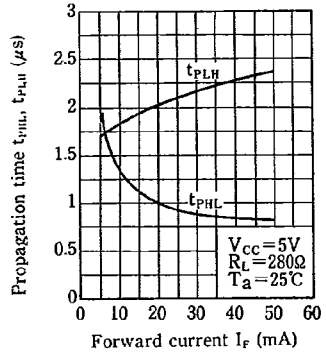
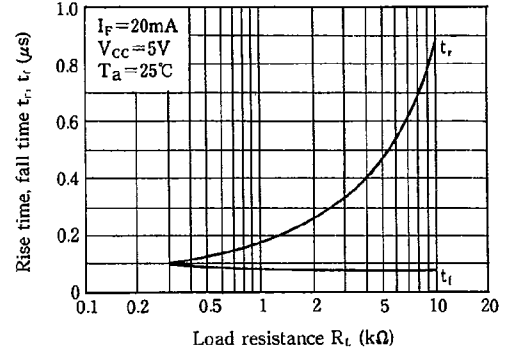
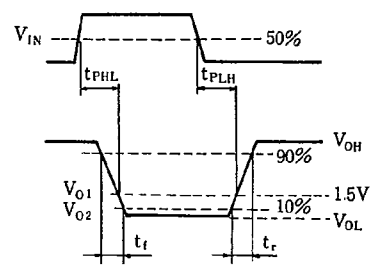
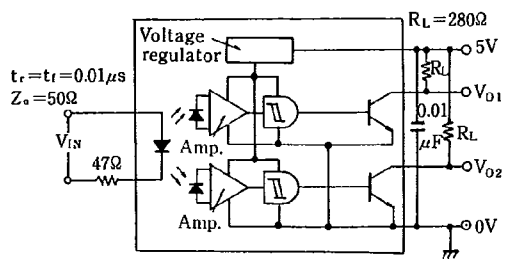


Fig. 10 Rise, Time, Fall Time vs. Load Resistance

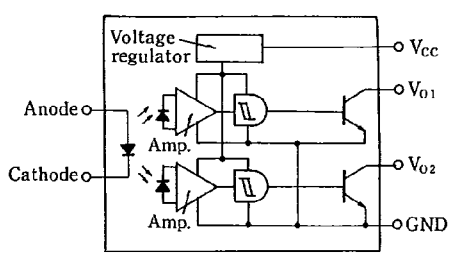


Test Circuit for Response Time

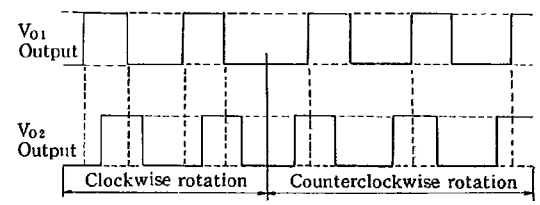


Explanation of Operation

- 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.



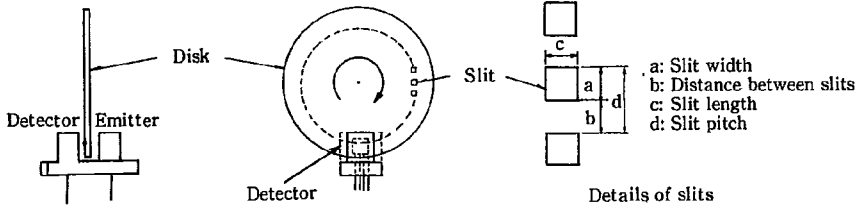
Internal Equivalent Circuit



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: $a, b, c=2\text{mm}, d=4\text{mm}$
- 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.