# GP1A06 2-phase Digital Output Type OPIC Photointerrupter

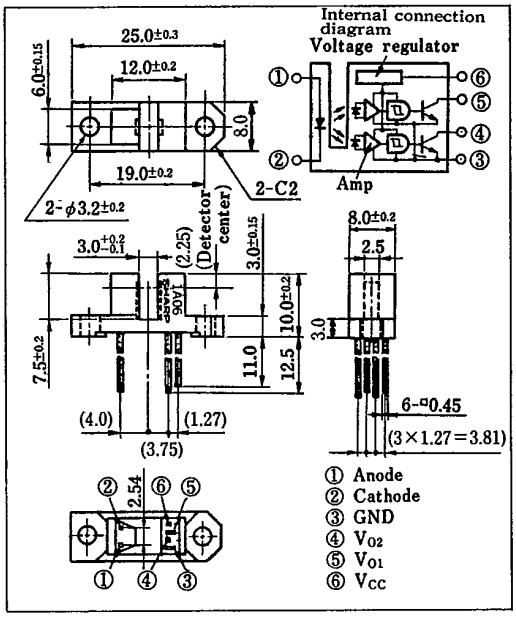
## ■ Features

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.

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## ■ Absolute Maximum Ratings (Ta=25°C)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input | Forward current | $I_F$ | 50 | mA |
| | *1Peak 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 | | $T_{stg}$ | −40~+100 | °C |
| *2Soldering temperature | | $T_{sol}$ | 260 | °C |

*1 Pulse width≦100μs, 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, $I_F$=20mA | — | 1.2 | 1.4 | V |
| | Reverse current | | $I_R$ | Ta=25°C, $V_R$=3V | — | — | 10 | μA |
| Output | Operating supply voltage | | $V_{CC}$ | Ta=25°C | 4.5 | — | 16 | V |
| | Low level output voltage | | $V_{OL}$ | $I_{OL}$=16mA, $V_{CC}$=5V, $I_F$=20mA | — | 0.2 | 0.4 | V |
| | High level output current | | $I_{OH}$ | $V_O$=20V, $V_{CC}$=16V, $I_F$=0 | — | — | 100 | μA |
| | Supply current | | $I_{CC}$ | $V_{CC}$=5V | — | 7.0 | 15 | mA |
| Transfer characteristics | *3"High→Low" threshold input current | | $I_{FHL}$ | Ta=25°C, $V_{CC}$=5V, $R_L$=280Ω | — | 3.0 | 15 | mA |
| | | | | $V_{CC}$=5V, $R_L$=280Ω | — | — | 20 | |
| | *4"Low→High" threshold input current | | $I_{FLH}$ | Ta=25°C, $V_{CC}$=5V, $R_L$=280Ω | 0.4 | 1.8 | — | mA |
| | | | | $V_{CC}$=5V, $R_L$=280Ω | 0.3 | — | — | |
| | Response time | "High→Low" propagation time | $t_{PHL}$ | Ta=25°C, $V_{CC}$=5V, $I_F$=20mA, $R_L$=280Ω | — | 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 | |
| | | *5Output 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**

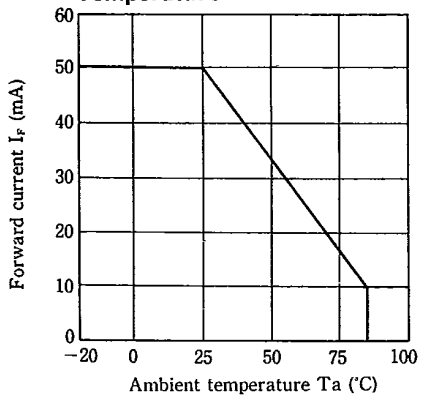


**Fig. 2 Output Power Dissipation vs. Ambient Temperature**

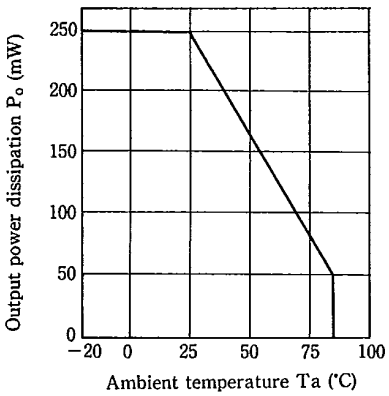

**Fig. 3 Forward Current vs. Forward Voltage**

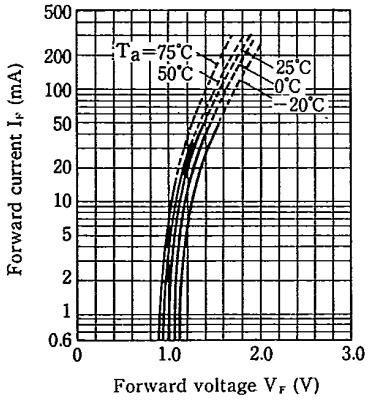


**Fig. 4 Relative Threshold Input Current vs. Supply Voltage**

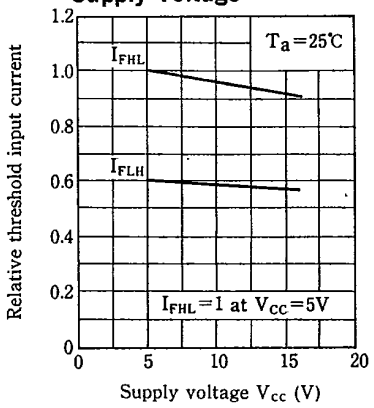


**Fig. 5 Relative Threshold Input Current vs. Ambient Temperature**

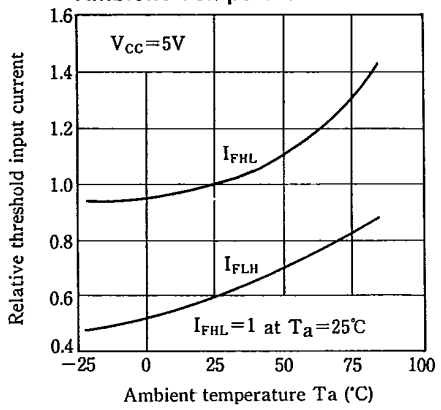


**Fig. 6 Low Level Output Voltage vs. Low Level Output Current**

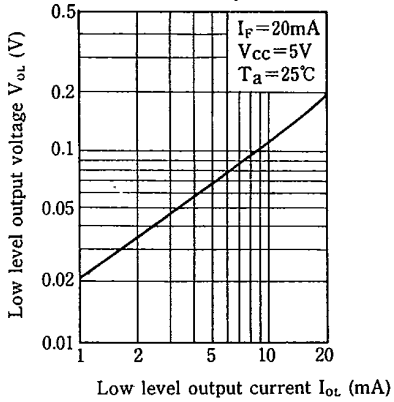


**Fig. 7 Low Level Output Voltage vs. Ambient Temperature**

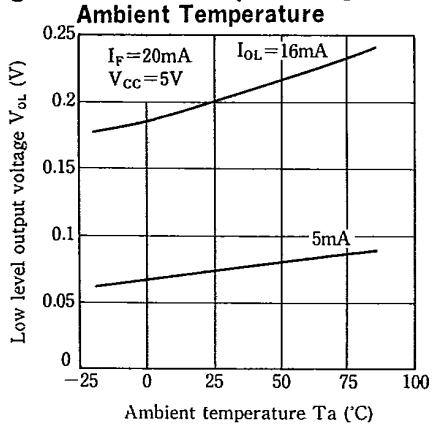


**Fig. 8 Supply Current vs. Supply Voltage**

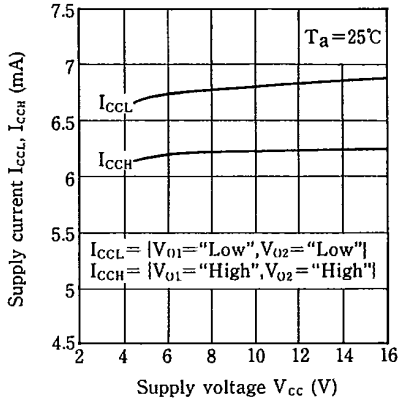


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**Fig. 9 Propagation Time vs. Forward Current**

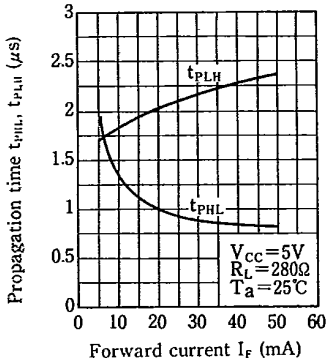
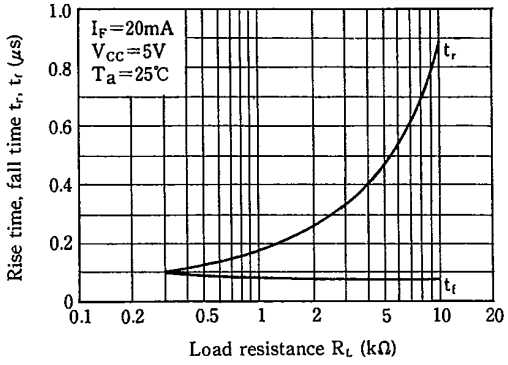
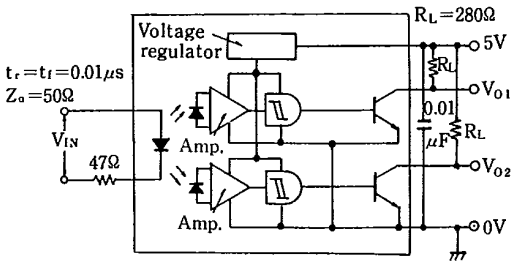
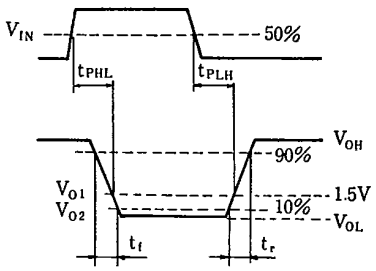



**Fig. 10 Rise, Time, Fall Time vs. Load Resistance**




Test Circuit for Response Time



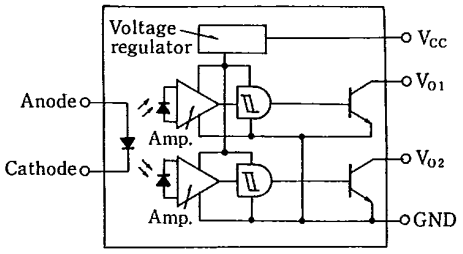




Explanation of Operation

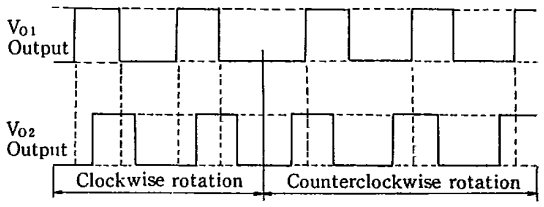
When the forward current which is over the threshold input current ($I_{FHL}$) is supplied;

(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

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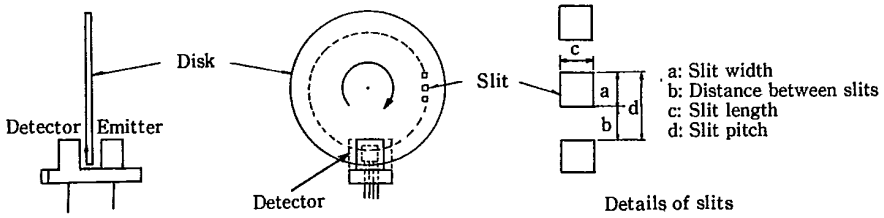


Drawing seen from emitter
(Clockwise rotation)

Details of slits

(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$\mu$F between $V_{CC}$ and GND near the device.

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