

IS437/IS438 Built-in Amp. Type Opic Light Detector

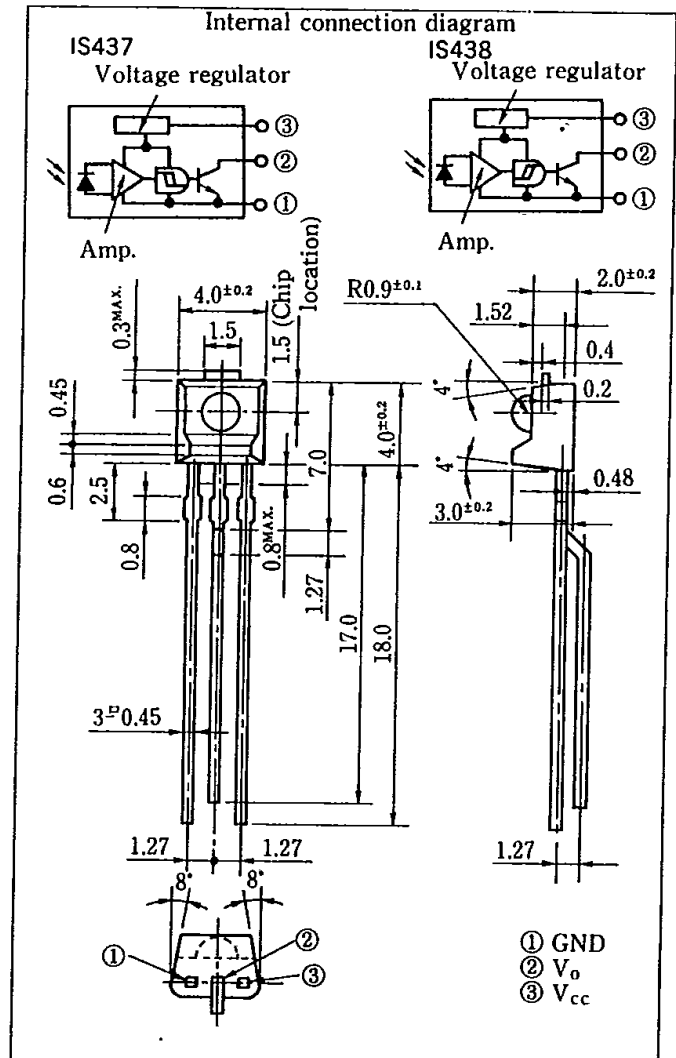
■ Features

1. Built-in Schmidt trigger circuit
2. High sensitivity (E_v : MAX. 35 lx at $T_a=25^\circ\text{C}$)
3. LSTTL and TTL compatible output.
4. Open collector output
5. Low level output at light incident light (IS437)
High level output at incident light (IS438)

■ Applications

1. Floppy disk drives
2. Copiers, printers, facsimiles
3. VCRs, cassette tape recorder
4. Automatic vending machines

■ 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 |
|--------------------------|-----------|------------|------|
| Supply voltage | V_{cc} | -0.5 ~ +35 | V |
| Output voltage | V_o | -0.5 ~ +40 | V |
| Output current | I_o | 50 | mA |
| Power dissipation | P | 250 | mW |
| Operating temperature | T_{opr} | -25 ~ +85 | °C |
| Storage temperature | T_{stg} | -40 ~ +100 | °C |
| *1 Soldering temperature | T_{sol} | 260 | °C |

*1 For 5 seconds at the position of 2.5mm from the bottom face of resin package.

Electro-optical Characteristics

(Unless otherwise specified, $T_a=0\sim 70^\circ\text{C}$, $V_{cc}=5\text{V}$)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit | | |
|--|----------------------------------|-----------|---|--|-----------|------|---------------|---------------|-----|
| Operating supply voltage | | V_{cc} | $T_a=25^\circ\text{C}$ | 4.5 | — | 35 | V | | |
| Low level output voltage | | V_{OL} | $I_{OL}=16\text{mA}^{*2}$ | — | 0.15 | 0.4 | V | | |
| Low level output current | | I_{OH} | $V_{cc}=20\text{V}$, $V_o=30\text{V}^{*3}$ | — | — | 100 | μA | | |
| Low level supply current | | I_{CCL} | *2 | — | 2.0 | 4.5 | mA | | |
| High level supply current | | I_{CCH} | *3 | — | 1.0 | 3.0 | mA | | |
| **“High”→“Low” threshold illuminance | IS437 | E_{VHL} | $T_a=25^\circ\text{C}$, $R_L=280\Omega$ | — | 15 | 35 | ℓ_x | | |
| | | | $R_L=280\Omega$ | — | — | 50 | | | |
| | IS438 | | $T_a=25^\circ\text{C}$, $R_L=280\Omega$ | 1.5 | 10 | — | | | |
| | | | $R_L=280\Omega$ | 1 | — | — | | | |
| **“Low”→“High” threshold illuminance | IS437 | E_{VLH} | $T_a=25^\circ\text{C}$, $R_L=280\Omega$ | 1.5 | 10 | — | ℓ_x | | |
| | | | $R_L=280\Omega$ | 1 | — | — | | | |
| | IS438 | | $T_a=25^\circ\text{C}$, $R_L=280\Omega$ | — | 15 | 35 | | | |
| | | | $R_L=280\Omega$ | — | — | 50 | | | |
| **Hysteresis | | IS437 | E_{VLH}/E_{VHL} | $T_a=25^\circ\text{C}$, $R_L=280\Omega$ | 0.50 | 0.65 | 0.90 | — | |
| | | IS438 | E_{VHL}/E_{VLH} | | | | | | |
| Response time | “Low”→“High” propagation time | IS437 | t_{PLH} | $T_a=25^\circ\text{C}$ $E_v=50 \ell_x$ $R_L=280\Omega$ | — | 5 | 15 | μs | |
| | | IS438 | | | — | 3 | 9 | | |
| | “High”→“Low” propagation time | IS437 | | | t_{PHL} | — | 3 | | 9 |
| | | IS438 | | | t_{PHL} | — | 5 | | 15 |
| | Rise time | | | | t_r | — | 0.1 | | 0.5 |
| Fall time | | t_f | — | 0.05 | 0.5 | | | | |

*2 Defines $E_v=50 \ell_x$ (IS437) and $E_v=0$ (IS438).

*3 Defines $E_v=0$ (IS437) and $E_v=50 \ell_x$ (IS438).

*4 E_{VHL} represents illuminance by CIE standard light source A (tungsten lamp) when output changes from high to low.

*5 E_{VLH} represents illuminance by CIE standard light source A (tungsten lamp) when output changes from low to high.

*6 Hysteresis stands for E_{VLH}/E_{VHL} (IS437) and E_{VHL}/E_{VLH} (IS438).

Recommended Operating Conditions

| Parameter | Symbol | MIN. | MAX. | Unit |
|----------------|----------|------|------|------|
| Supply voltage | V_{cc} | 4.5 | 20 | V |
| Output voltage | V_o | 0 | 30 | V |
| Output current | I_o | — | 16 | mA |

Fig. 1 Power Dissipation vs. Ambient Temperature

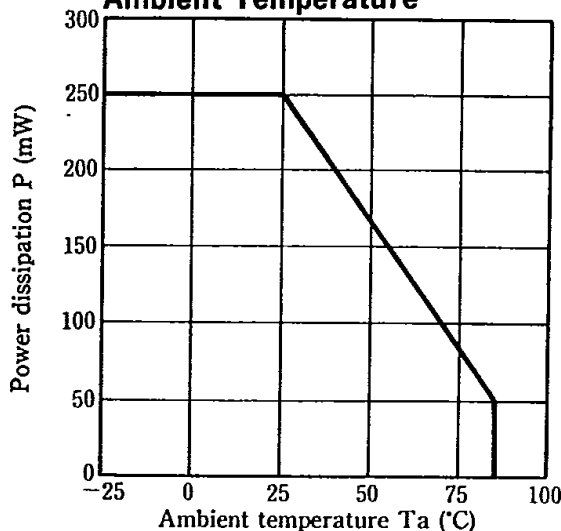


Fig. 2 Relative Threshold Illuminance vs. Supply Voltage

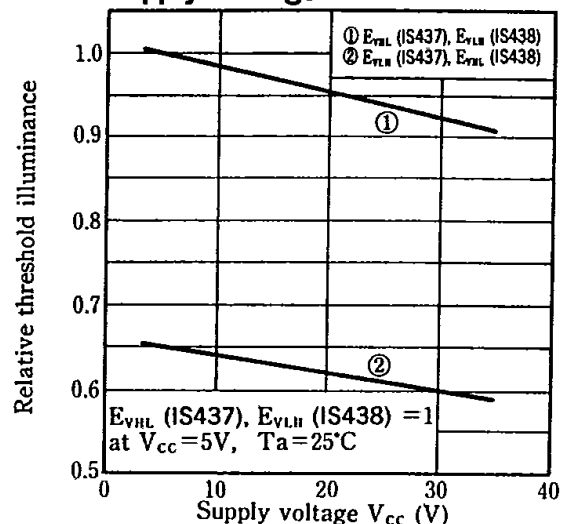


Fig. 3 Low Level Output Voltage vs. Low Level Output Current

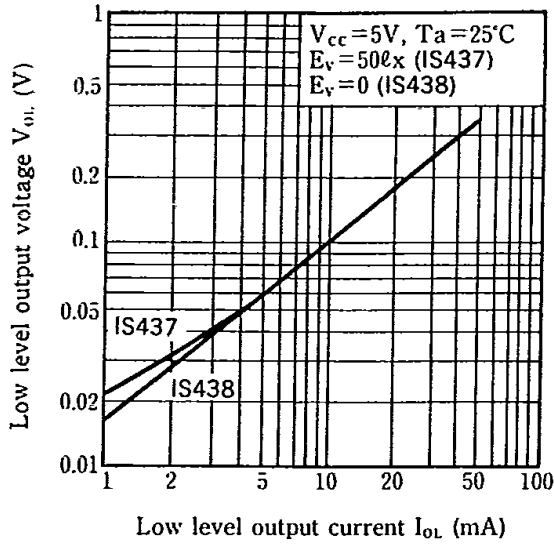


Fig. 4 Low Level Output Voltage vs. Ambient Temperature

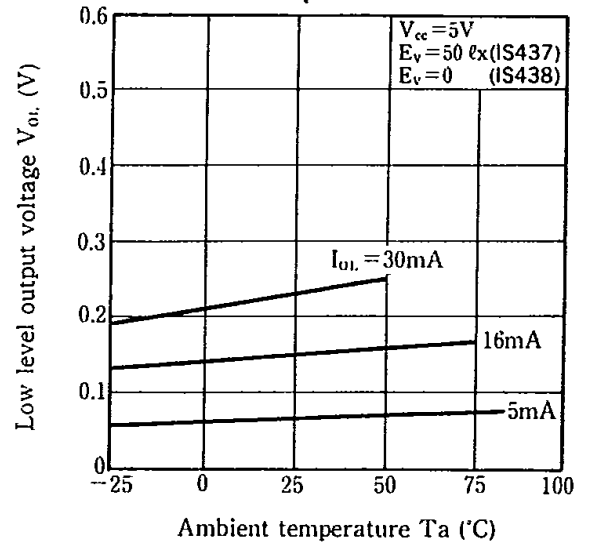


Fig. 5 Supply Current vs. Ambient Temperature

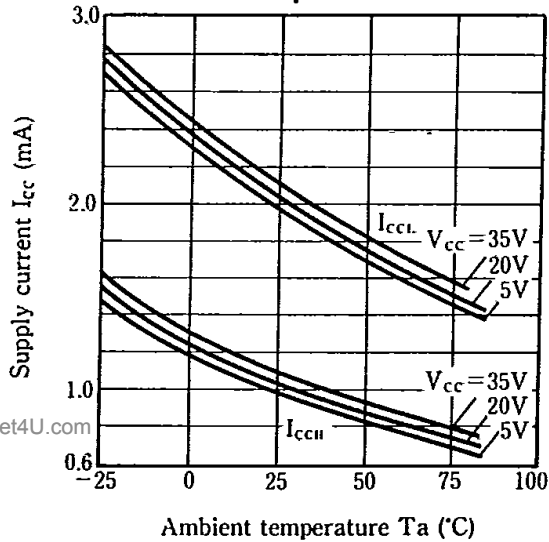


Fig. 6 Propagation Time vs. Illuminance

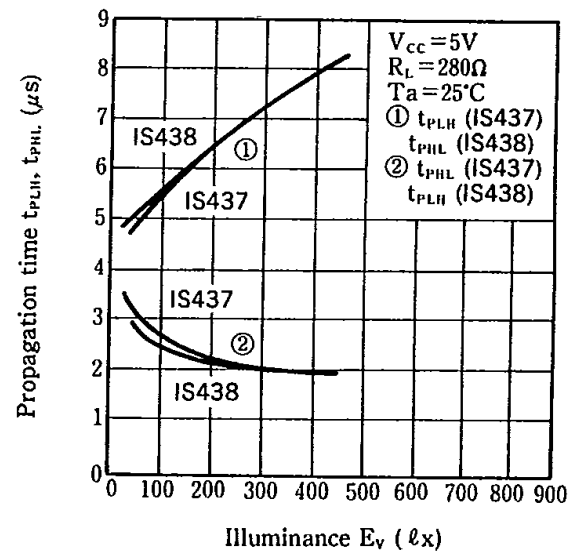
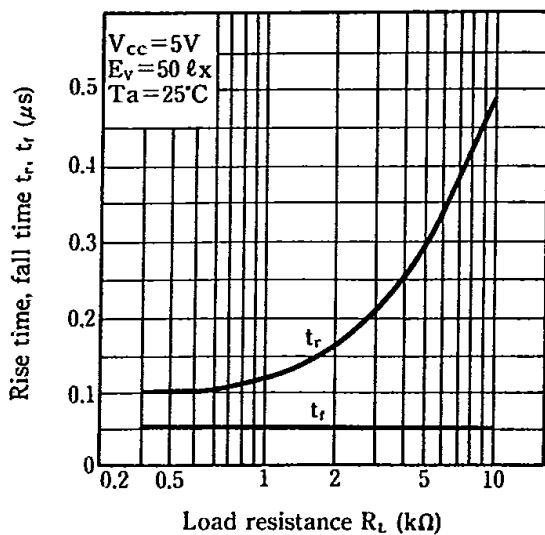
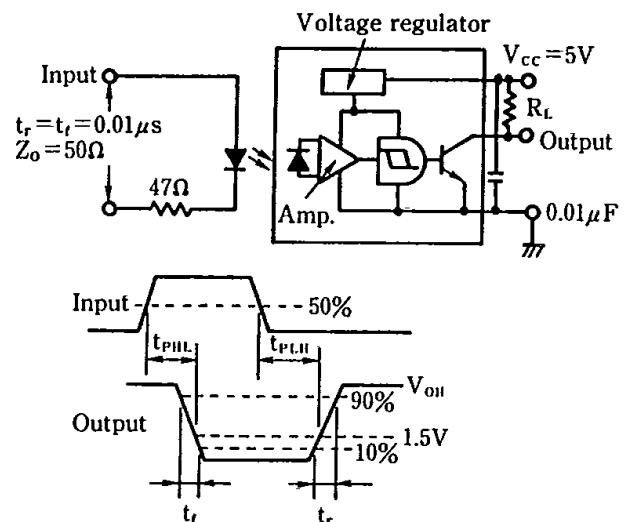


Fig. 7 Rise Time, Fall Time vs. Load Resistance



Test Circuit for Response Time (IS437)



Test Circuit for Resesponse Time (IS438)

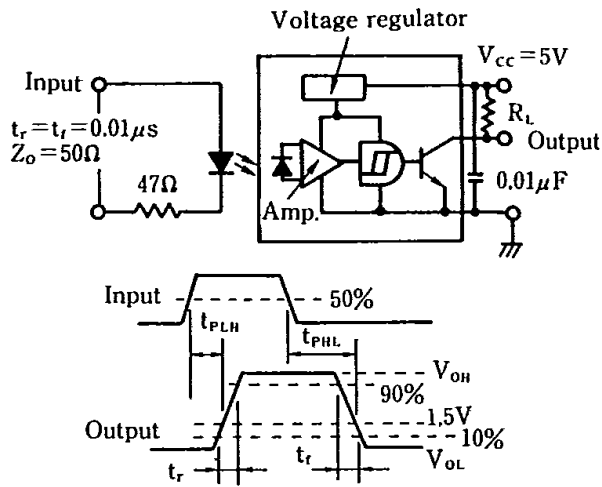


Fig. 8 Sensitivity Diagram ($T_a = 25^\circ\text{C}$)

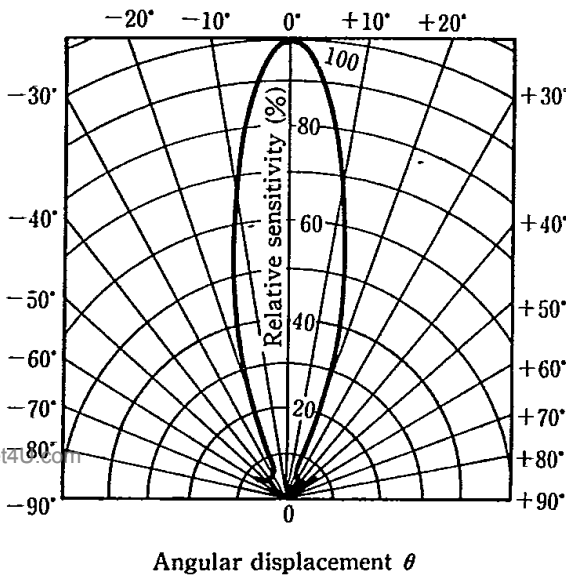


Fig. 9 Spectral Sensitivity

