

# IS485/IS486

## Built-in Amp. Type OPIC Light Detector

### ■ Features

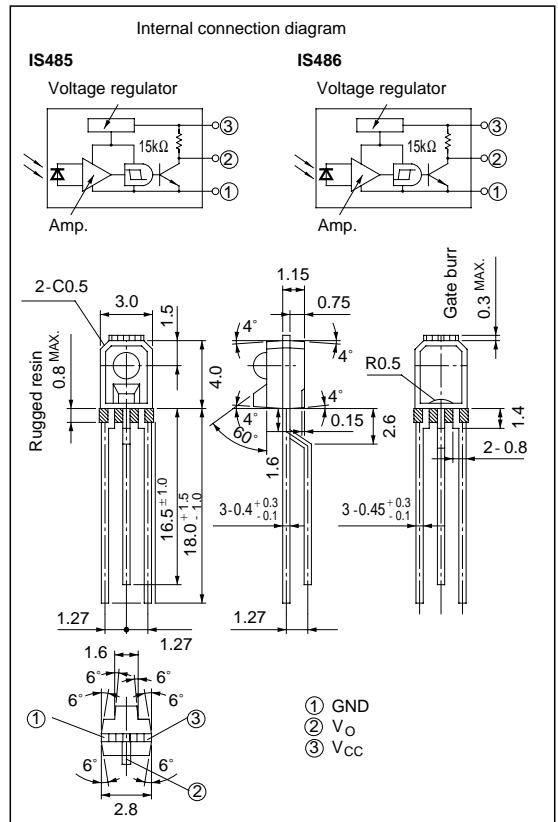
1. Built-in schmidt trigger circuit
2. High sensitivity( $E_v$  : MAX. 35  $\ell$  x at  $T_a=25^\circ\text{C}$ )
3. A wide range of operating supply voltage ( $V_{CC}$ : 4.5 to 17V)
4. LSTTL and TTL compatible output
5. Low level output under incident light (IS485)  
High level output under incident light (IS486)
6. Compact package

### ■ Applications

1. Floppy disk drive units
2. Copiers, printers, facsimiles
3. VCRs, cassette decks
4. Automatic vending 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.

\* Unspecified tolerance shall be  $\pm 0.2\text{mm}$ .

### ■ Absolute Maximum Ratings

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

| Parameter                | Symbol    | Rating       | Unit             |
|--------------------------|-----------|--------------|------------------|
| Supply voltage           | $V_{CC}$  | -0.5 to + 17 | V                |
| Output current           | $I_o$     | 50           | mA               |
| Power dissipation        | P         | 175          | mW               |
| Operating temperature    | $T_{opr}$ | -25 to + 85  | $^\circ\text{C}$ |
| Storage temperature      | $T_{stg}$ | -40 to + 100 | $^\circ\text{C}$ |
| *1 Soldering temperature | $T_{sol}$ | 260          | $^\circ\text{C}$ |

\*1 For 5 seconds at the position of 1.4mm from the bottom face of package.

## ■ Electro-optical Characteristics

(Unless otherwise specified Ta= 0 to 70°C, Vcc= 5V)

| Parameter                                 |   | Symbol              | Conditions                          | MIN.         | TYP. | MAX. | Unit |     |
|---|---|---------------------|-------------------------------------|--------------|------|------|------|-----|
| Low level output voltage                  |   | $V_{OL}$            | $I_{OL} = 16\text{mA}$ , *2         | -            | 0.15 | 0.4  | V    |     |
| High level output voltage                 |   | $V_{OH}$            | *3                                  | 3.5          | -    | -    | V    |     |
| Low level supply current                  |   | $I_{CCL}$           | *2                                  | -            | 1.7  | 3.8  | mA   |     |
| High level supply current                 |   | $I_{CCH}$           | *3                                  | -            | 0.7  | 2.2  | mA   |     |
| *4 “High”→ “Low”<br>threshold illuminance | <b>IS485</b>                            | $E_{VHL}$           | Ta = 25°C                           | -            | 15   | 35   | lx   |     |
|   |   |                     | -                                   | -            | -    | 50   |      |     |
|   | <b>IS486</b>                            |                     | Ta = 25°C                           | 1.5          | 10   | -    |      |     |
|   |   |                     | -                                   | 1            | -    | -    |      |     |
| *5 “Low”→ “High”<br>threshold illuminance | <b>IS485</b>                            | $E_{VLH}$           | Ta = 25°C                           | 1.5          | 10   | -    | lx   |     |
|   |   |                     | -                                   | 1            | -    | -    |      |     |
|   | <b>IS486</b>                            |                     | Ta = 25°C                           | -            | 15   | 35   |      |     |
|   |   |                     | -                                   | -            | -    | 50   |      |     |
| *6 Hysteresis                             | <b>IS485</b>                            | $E_{VLH} / E_{VHL}$ | Ta = 25°C                           | 0.50         | 0.65 | 0.90 | -    |     |
|   | <b>IS486</b>                            | $E_{VHL} / E_{VLH}$ |                                     |              |      |      |      |     |
| Response<br>time                          | “High”→ “Low”<br>propagation delay time | $t_{PHL}$           | Ta = 25°C<br>Ev = 50lx<br>RL = 280Ω | -            | 3    | 9    | μs   |     |
|   |   |                     |                                     | <b>IS485</b> | -    | 5    |      | 15  |
|   | “Low”→ “High”<br>propagation delay time | $t_{PLH}$           |                                     | <b>IS485</b> | -    | 5    |      | 15  |
|   |   |                     |                                     | <b>IS486</b> | -    | 3    |      | 9   |
|   | Rise time                               |                     |                                     | $t_r$        | -    | 0.1  |      | 0.5 |
|   | Fall time                               |                     |                                     | $t_f$        | -    | 0.05 |      | 0.5 |

\*2 Defines  $E_V = 50\text{lx}$  (**IS485**) and  $E_V = 0$  (**IS486**).

\*3 Defines  $E_V = 0$  (**IS485**) and  $E_V = 50\text{lx}$  (**IS486**).

\*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.

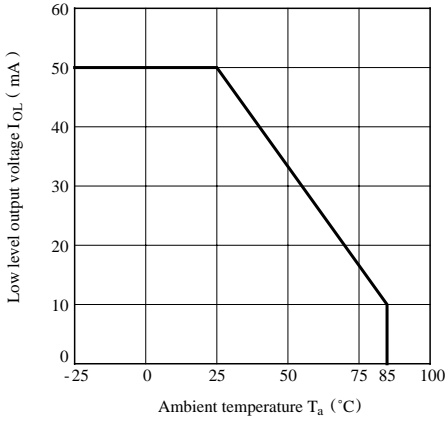
\*6 Hysteresis stands for  $E_{VLH} / E_{VHL}$  (**IS485**) and  $E_{VHL} / E_{VLH}$  (**IS486**).

## ■ Recommended Operating Conditions (Ta= 0 to 70°C)

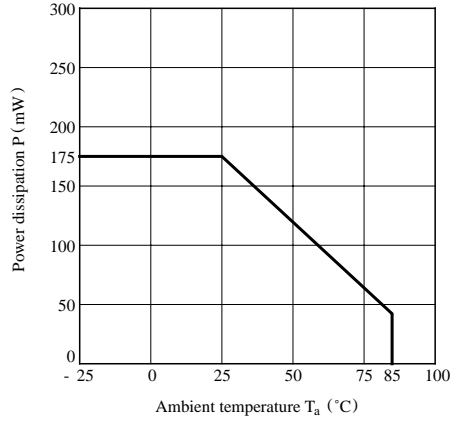
| Parameter                | Symbol   | MIN. | MAX. | Unit |
|--------------------------|----------|------|------|------|
| Supply voltage           | $V_{CC}$ | 4.5  | 17   | V    |
| Low level output current | $I_{OL}$ | -    | 16   | mA   |

In order to stabilize power supply line, connect a by-pass capacitor of 0.01μF or more between  $V_{CC}$  and GND near the device.

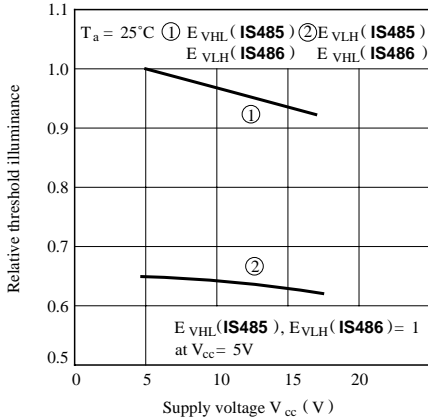
**Fig. 1 Low Level Output Current vs. Ambient Temperature**



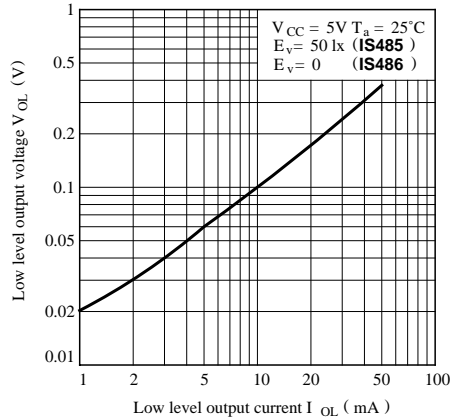
**Fig. 2 Power Dissipation vs. Ambient Temperature**



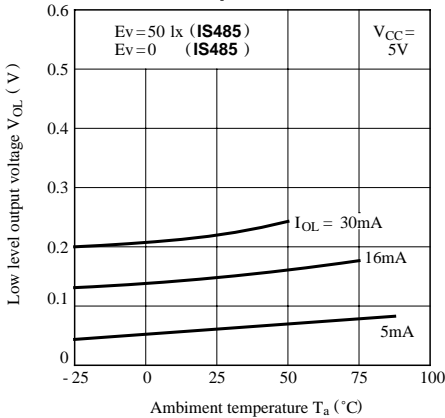
**Fig. 3 Relative Threshold Illuminance vs. Supply Voltage**



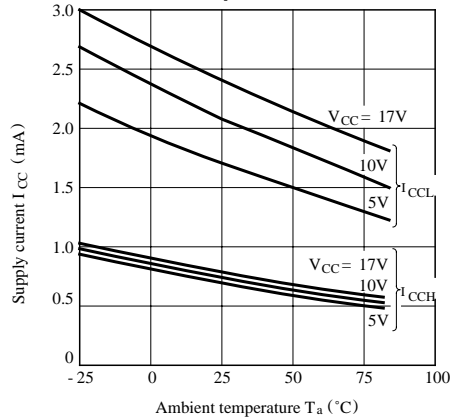
**Fig. 4 Low Level Output Voltage vs. Low Level Output Current**



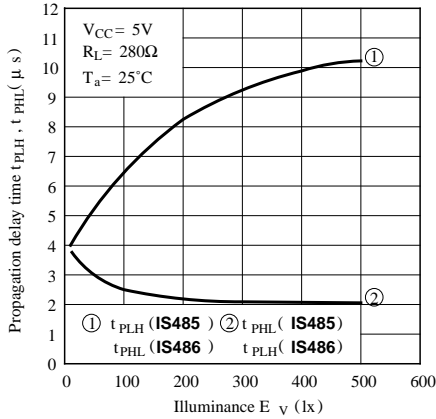
**Fig. 5 Low Level Output Voltage vs. Ambient Temperature**



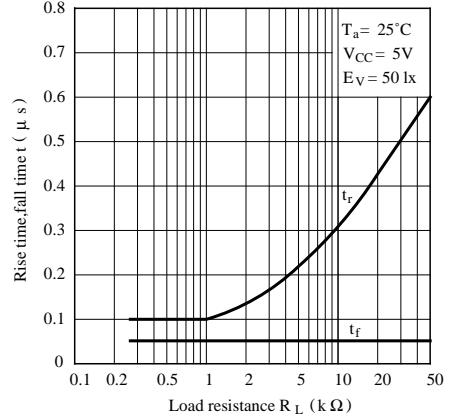
**Fig. 6 Supply Current vs. Ambient Temperature**



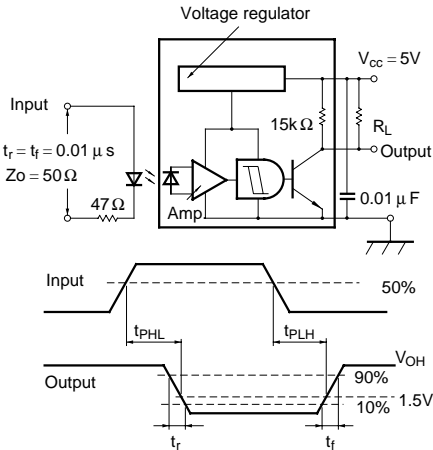
**Fig. 7 Propagation Delay Time vs. Illuminance**



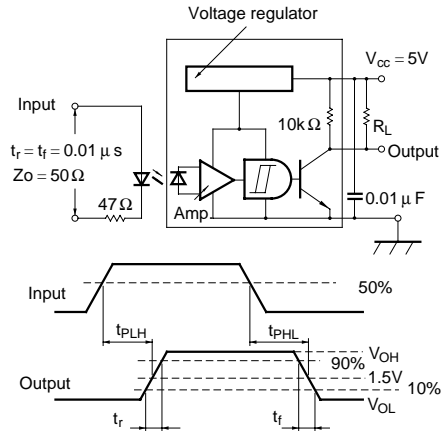
**Fig. 8 Rise Time, Fall Time vs. Load Resistance**



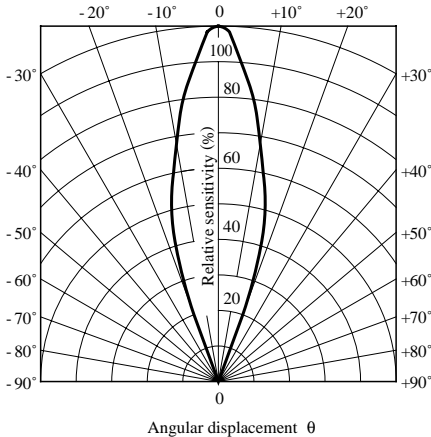
**Test Circuit for Response Time (IS485)**



**Test Circuit for Response Time (IS486)**



**Fig. 9 Sensitivity Diagram** ( $T_a = 25^\circ C$ )



**Fig.10 Spectral Sensitivity**

