IS487/IS488

Built-in Amp.Type
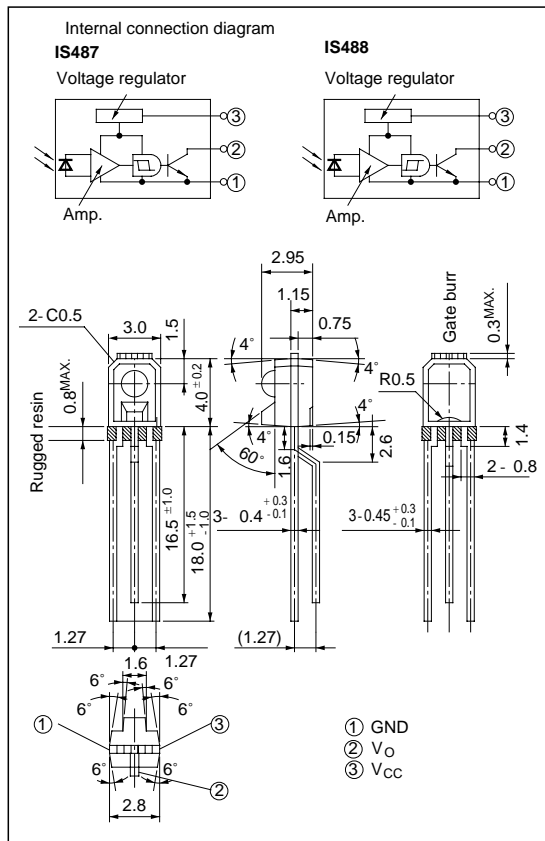## OPIC Light Detector

■ Features

1. Compact type
2. Built-in schmidt trigger circuit
3. LSTTL and TTL compatible output
4. Open collector output
5. Low level output under incident light
   （IS487 ）
   High level output under incident light
   （IS488 ）
6. A wide range of operating supply voltage
   （ V_{CC} : 4.5 to 17v ）

■ Applications

1. Floppy disk drive Units
2. Copiers, printers, facsimiles
3. VCRs
4. Automatic vending machines

■ Outline Dimensions   （Unit : mm ）

Internal connection diagram

IS487 — Voltage regulator — Amp.

IS488 — Voltage regulator — Amp.

① GND
② V_O
③ V_{CC}

*" 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.

■ Absolute Maximum Ratings   （Ta= 25˚C ）

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	- 0.5 to + 35	V
Output voltage	V_O	- 0.5 to + 40	V
Output current	I_O	50	mA
Power dissipation	P	175	mW
Operating temperature	T_{opr}	- 25 to +85	˚C
Storage temperature	T_{stg}	- 40 to +100	˚C
[*1] Soldering temperature	T_{sol}	260	˚C

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

■ Electro-optical Characteristics

（Unless otherwise specified, Ta= 0 to 70°C, V_{CC}= 5V ）

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Low level output voltage		V_{OL}	[2]I_{OL} = 16mA	-	0.15	0.4	V
High level output current		I_{OH}	[3]V_{CC} = 20V, V_O= 30V	-	-	100	μA
Low level supply current		I_{CCL}	*2	-	1.3	3.4	mA
High level supply current		I_{CCH}	*3	-	0.7	2.2	mA
[4] "High→Low" Threshold illuminance	**IS487**	E_{VHL}	T_a = 25°C, R_L = 280Ω	-	15	35	lx
			R_L = 280Ω	-	-	50	
	IS488		T_a = 25°C, R_L = 280Ω	1.5	10	-	
			R_L = 280Ω	1	-	-	
[5] "Low→High" Threshold illuminance	**IS487**	E_{VLH}	T_a = 25°C, R_L = 280Ω	1.5	10.	-	lx
			R_L = 280Ω	1	-	-	
	IS488		T_a = 25°C, R_L = 280Ω	-	15	35	
			R_L = 280Ω	-	-	50	
[6] Hysteresis	**IS487**	E_{VLH}/E_{VHL}	T_a = 25°C, R_L = 280Ω	0.50	0.65	0.90	-
	IS488	E_{VHL}/E_{VLH}					
Response time	"Low→High" Propagation time	**IS487**	t_{PLH}	T_a = 25°C E_V = 50lx R_L = 280 Ω	-	5	15	μs
		IS488			-	3	9	
	"High→Low" Propagation time	**IS487**	t_{PHL}		-	3	9	
		IS488			-	5	15	
	Rise time		t_r		-	0.1	0.5	
	Fall time		t_f		-	0.05	0.5	

*2 Defines E_V = 50lx（**IS487**）and E_V = 0 （**IS488**）.

*3 Defines E_V= 0 （**IS487**）and E_V = 50lx （**IS488**）.

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

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

*6 Hysteresis stands for E_{VLH}/E_{VHL}（**IS487**）and E_{VHL}/E_{VLH}（**IS488**）.

■ Recommended Operating Conditions

Parameter	Symbol	MIN.	MAX.	Unit
Supply voltage	V_{CC}	4.5	17	V
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.
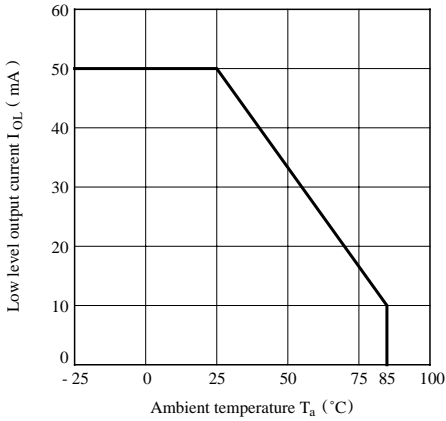Ambient Temperature**

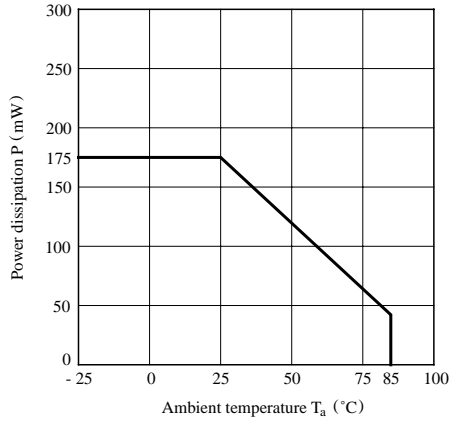**Fig. 2 Power Dissipation vs.
Ambient Temperature**

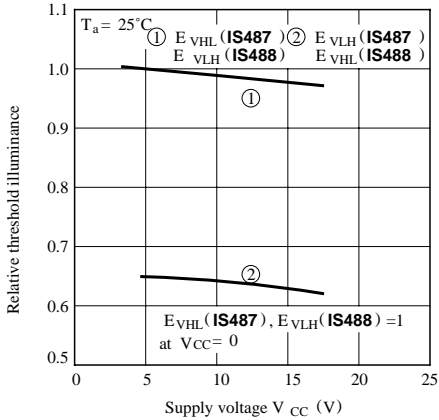**Fig. 3 Relative Threshold Illuminance vs.
Supply Voltage**

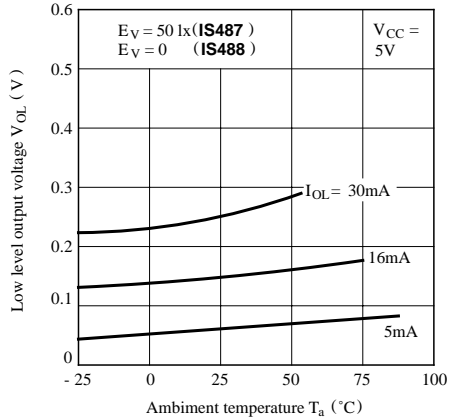**Fig. 4 Low Level Output Voltage vs.
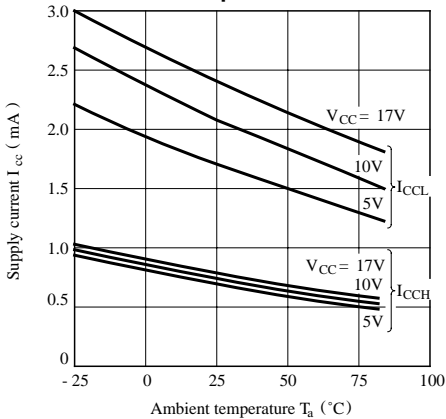Ambient Temperature**

**Fig. 5 Supply Current vs.
Ambient Temperature**
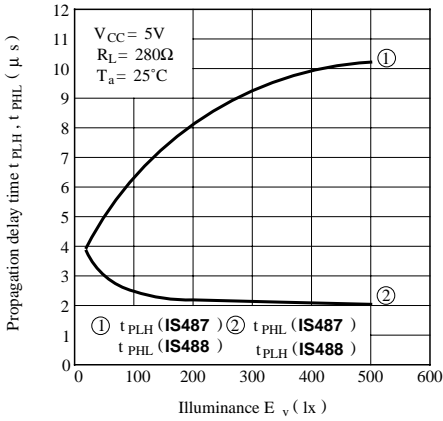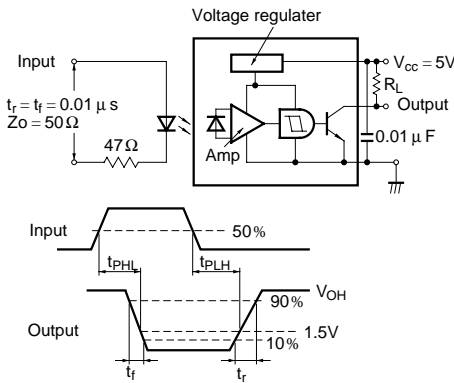
Fig. 6 Propagation Delay Time vs. Illuminance

$V_{CC} = 5V$
$R_L = 280\Omega$
$T_a = 25°C$

① t_{PLH} (**IS487**) ② t_{PHL} (**IS487**)
  t_{PHL} (**IS488**) t_{PLH} (**IS488**)

Propagation delay time t_{PLH}, t_{PHL} (μs)

Illuminance E $_v$ (lx)

Fig. 7 Rise Time, Fall Time vs. Load Resistance
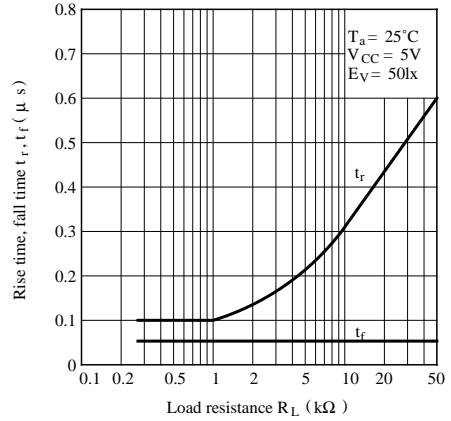
$T_a = 25°C$
$V_{CC} = 5V$
$E_V = 50lx$

t_r

t_f

Rise time, fall time t_r, t_f (μs)

Load resistance R_L (kΩ)

Test Circuit for Response Time（IS487）

Voltage regulater

Input

$t_r = t_f = 0.01\ \mu s$
$Zo = 50\Omega$

$V_{cc} = 5V$
R_L
Output
$0.01\ \mu F$

47Ω Amp

Input   50%
t_{PHL} t_{PLH}
                90% V_{OH}
Output   10%   1.5V
t_f t_r

Test Circuit for Response Time（IS488）

Voltage regulater

Input

$t_r = t_f = 0.01\ \mu s$
$Zo = 50\Omega$

$V_{cc} = 5V$
R_L
Output
$0.01\ \mu F$

47Ω Amp

Input   50%
t_{PLH} t_{PHL}
                90% V_{OH}
                      1.5V
Output   10%
t_r t_f V_{OL}
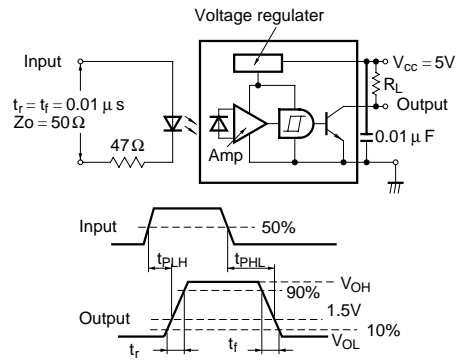
Fig. 8 Sensitivity Diagram
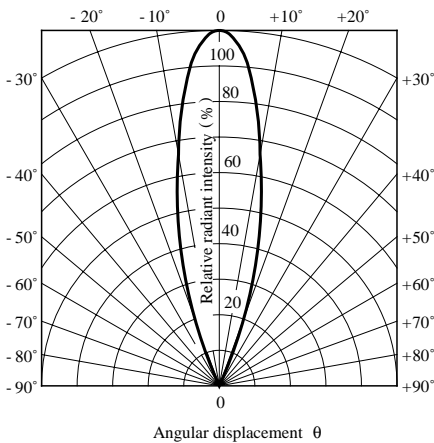
（$T_a = 25°C$ ）

Relative radiant intensity （%）

Angular displacement θ

Fig. 9 Spectral Sensitivity

$T_a = 25°C$

Relative sensitivity （%）

Wavelength λ （nm）

● Please refer to the chapter "Precautions for Use."