

IS440/ IS441F OPIC Light Detector with Built-in Signal Processing Circuit for Light Modulation System

T-41-67

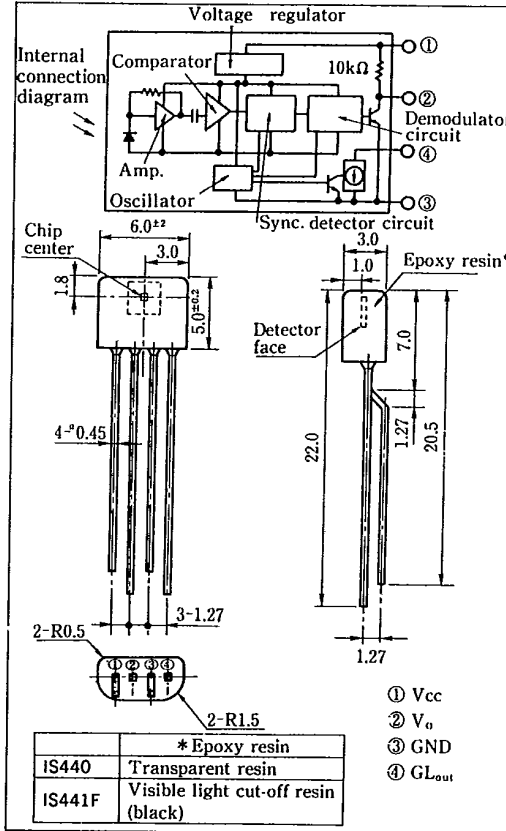
■ Features

1. Impervious to external disturbing lights due to light modulation system
2. Built-in pulse driver circuit and sync. detector circuit on the emitter side
3. A wide range of operating supply voltages (Vcc: 4.5~16V)
4. Visible light cut-off resin (IS441F)

■ Applications

1. Optoelectronic switches
2. Copiers, printers, facsimiles

■ Outline Dimensions (Unit : mm)



■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V _{cc}	-0.5~16	V
Output	Output voltage	V _o	16
	Output current	I _o	50
GL output *1	Output voltage	V _{GL}	16
Power dissipation	P	250	mW
Operating temperature	T _{opr}	-25~+60	°C
Storage temperature	T _{stg}	-40~+100	°C
**Soldering temperature	T _{sol}	260	°C

*1 Applies to GL_{out} terminal.

*2 For 5 seconds at the position of 3.3mm from the bottom face of resin package

※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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■ Electro-optical Characteristics

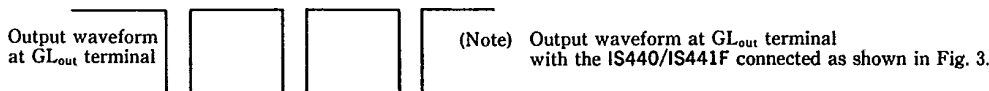
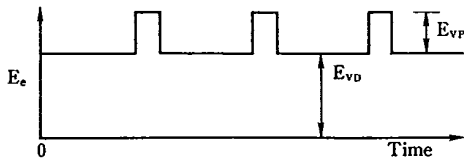
(Vcc=5V, Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Operating supply voltage	Vcc		4.5	—	16	V	
Supply current	Icc	V _o , GL _{out} terminals shall be opened.	—	3.5	7.0	mA	
Output	Low level output voltage	V _{OL}	I _{OL} =16mA, E _{VP} =500lx, E _{VD} =0 *3	—	0.15	0.35	V
	High level output voltage	V _{OH}	E _{VP} =E _{VD} =0 *3	4.95	—	—	V
				4.97	—	—	V
Output short-circuit current	I _{OS}	E _{VP} =E _{VD} =0 *3	0.25	0.5	1.0	mA	
GL output	Low level output current	I _{GL}	V _{GL} =1.2V	40	55	70	mA
	**Pulse cycle	t _p		70	130	220	μs
	**Pulse width	t _w		4.4	8	13.7	μs
*5"Low → High" threshold irradiance	IS440	E _{epLH}	E _{cd} =0 *3 *6 Light emitting diode (λp=940nm)	—	1.0	5.70	μW/mm ²
	IS441F			—	0.4	2.66	μW/mm ²
*5"High → Low" threshold irradiance	IS440	E _{epHL}	Light emitting diode (λp=940nm)	—	1.5	6.0	μW/mm ²
	IS441F			—	0.7	2.8	μW/mm ²
Hysteresis	E _{epLH} /E _{epHL}		0.45	0.65	0.95	—	
Response time	"High→Low" propagation time	t _{pHL}	*6	—	400	670	μs
	"Low→High" propagation time	t _{pLH}	*6	—	400	670	μs
*7External disturbing light illuminance	IS440	E _{VDX}	E _{ep} =18μW/mm ² , λp=940nm	2000	7200	—	lx
	IS441F		E _{ep} =7.5μW/mm ² , λp=940nm	2000	4500	—	lx

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*3 E_{VP} represents illuminance of signal light in sync with the low level timing of output at GL_{out} terminal.
Light source: Infrared light emitting diode (λp=940nm)
E_{VD} represents illuminance of DC light. For detail, see Fig. 1. Note that the light source is CIE standard light source A.

Fig. 1



*4 Pulse cycle (t_p), pulse width (t_w) are defined as shown in Fig. 2.
The waveform shown in Fig. 2 is the output voltage waveform at GL_{out} terminal with IS440/IS441F connected as shown in Fig. 3.

Fig. 2

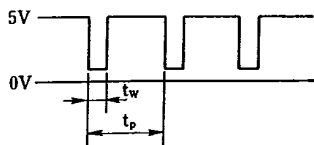
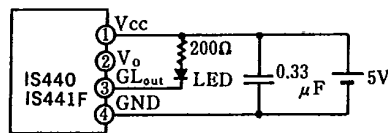


Fig. 3

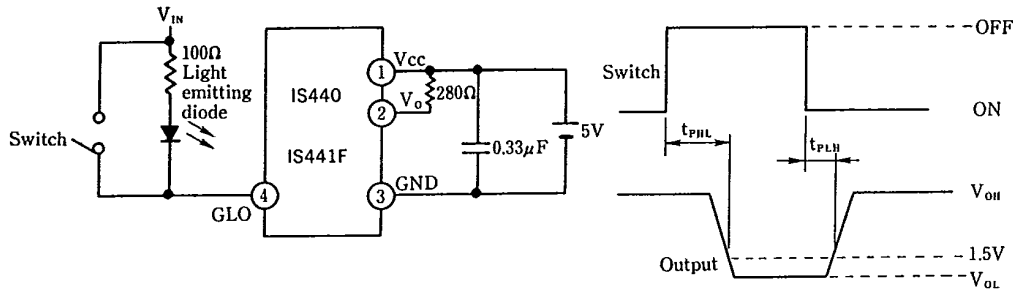


*5 Defined as E_{ep} that causes the output to go "Low to High" (or "High to Low").

*6 Test circuit for response time, and threshold irradiance is shown in Fig. 4

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Fig. 4



Light emitting diode: Peak emission wavelength $\lambda_p=940\text{nm}$

*7 E_{VDX} : Defined as the E_{VD} at the limit of normal operation range.

Fig. 5 Total Power Dissipation vs. Ambient Temperature

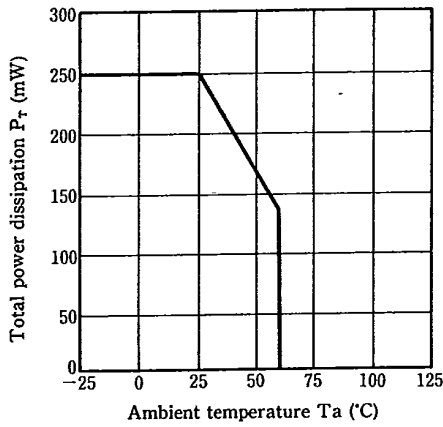


Fig. 6 Low Level Output Voltage vs. Low Level Output Current

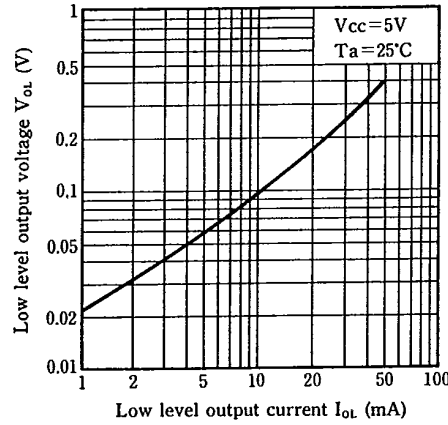


Fig. 7 Low Level Output Voltage vs. Ambient Temperature

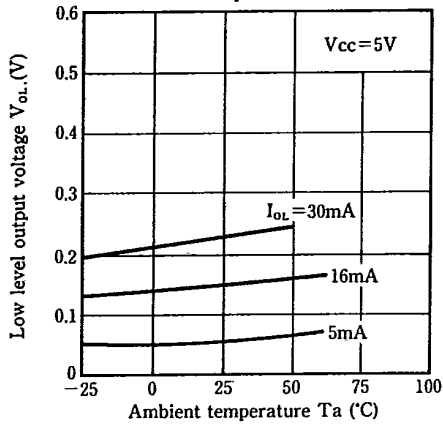
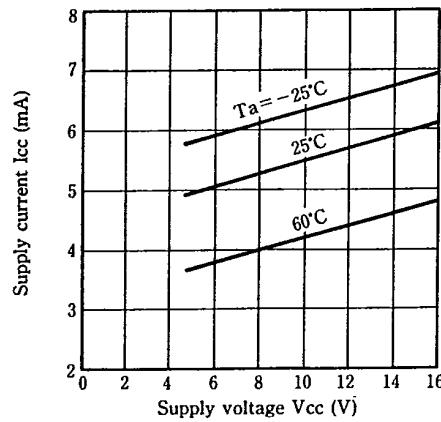


Fig. 8 Supply Current vs. Supply Voltage



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Fig. 9 Low Level Output Current vs. Supply Voltage

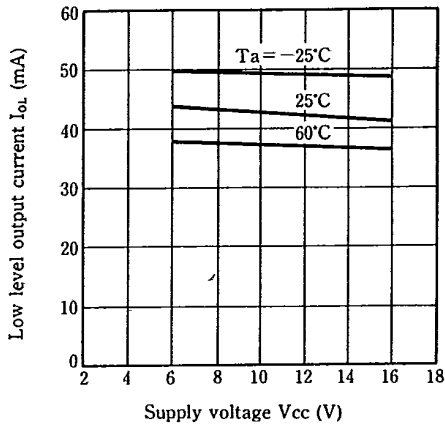


Fig. 10 Sensitivity Diagram

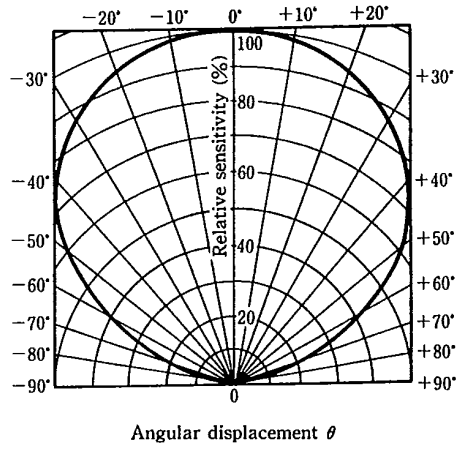
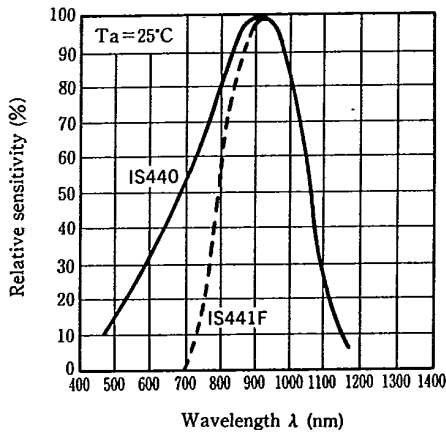


Fig. 11 Spectral Sensitivity



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Basic Circuit

