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

T-41-67

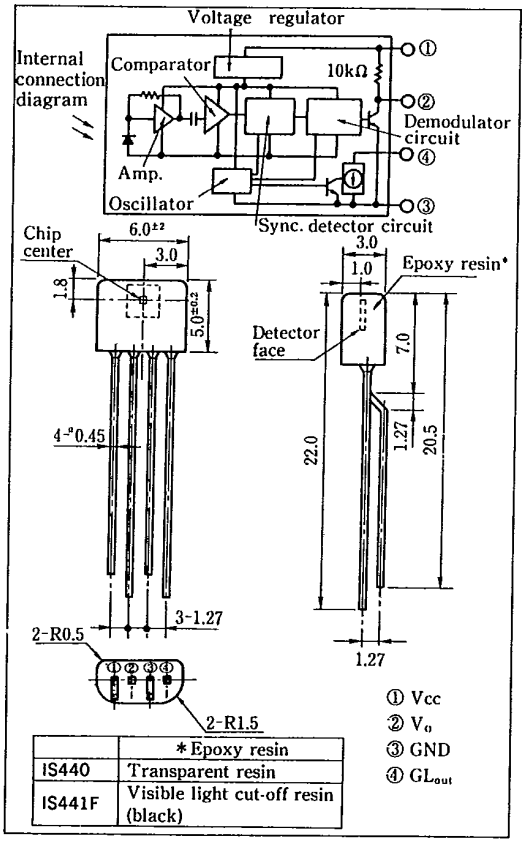
■ Features

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)



	*Epoxy resin
IS440	Transparent resin
IS441F	Visible light cut-off resin (black)

※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		Vcc	−0.5~16	V
Output	Output voltage	V_O	16	V
	Output current	I_O	50	mA
GL output *1	Output voltage	V_{GL}	16	V
Power dissipation		P	250	mW
Operating temperature		T_{opr}	−25~+60	°C
Storage temperature		T_{stg}	−40~+100	°C
*2Soldering 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

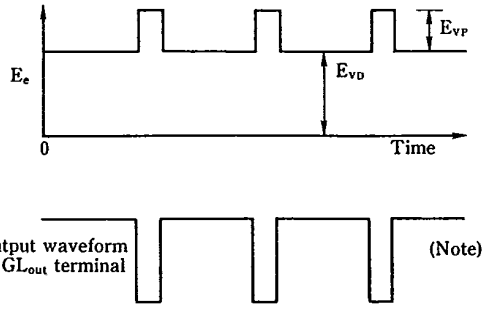
■ Electro-optical Characteristics

(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	IS440	V_{OH}	$E_{VP}=E_{VD}=0$ *3	4.95	—	—	V
		IS441F			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
	*4Pulse cycle		t_p		70	130	220	μs
	*4Pulse width		t_w		4.4	8	13.7	μs
*5"Low → High" threshold irradiance		IS440	E_{epLH}	E_{eD}=0 *3 *6 Light emitting diode (λp=940nm)	—	1.0	5.70	μW/mm²
		IS441F			—	0.4	2.66	μW/mm²
*5"High → Low" threshold irradiance		IS440	E_{epHL}		—	1.5	6.0	μW/mm²
		IS441F			—	0.7	2.8	μW/mm²
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/mm², λp=940nm	2000	7200	—	ℓx
		IS441F		E_{ep}=7.5μW/mm², λp=940nm	2000	4500	—	ℓx

*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



(Note) Output waveform at GL_{out} terminal with the IS440/IS441F connected as shown in Fig. 3.

*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

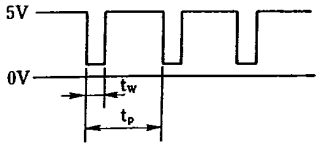
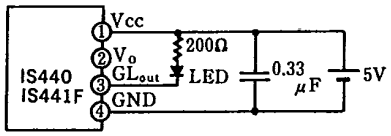


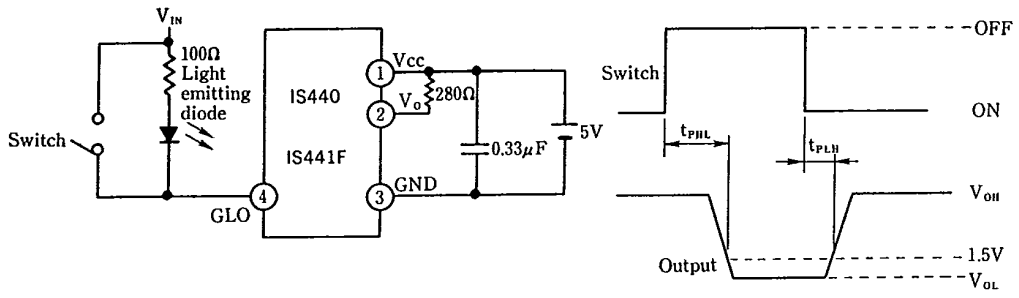
Fig. 3



*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 T-41-67

Fig. 4



Light emitting diode: Peak emissinon wavelength λp=940nm

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

Fig. 5 Total Power Dissipation vs. Ambient Temperature

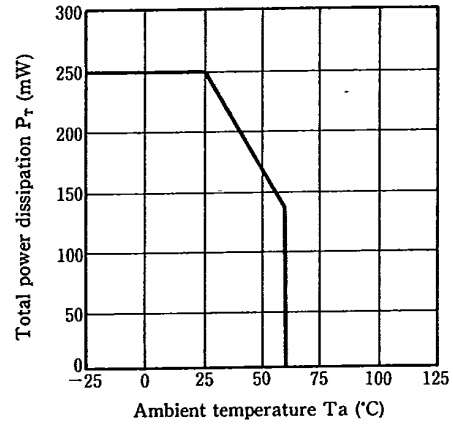


Fig. 6 Low Level Output Voltage vs. Low Level Output Current

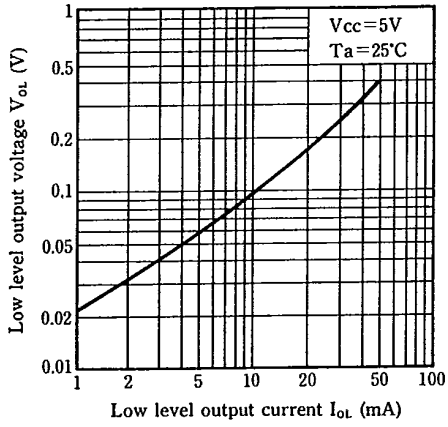


Fig. 7 Low Level Output Voltage vs. Ambient Temperature

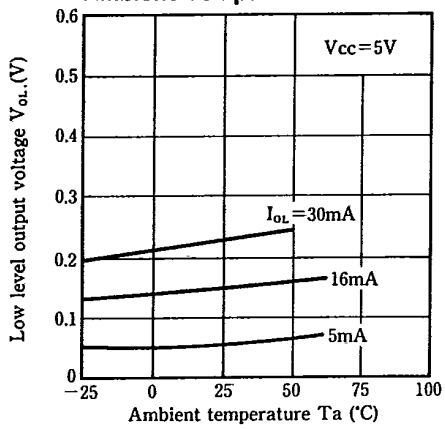


Fig. 8 Supply Current vs. Supply Voltage

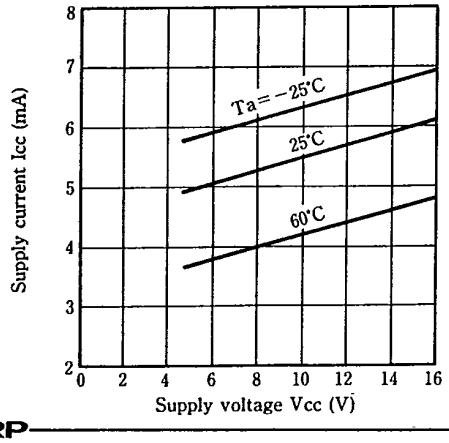


Fig. 9 Low Level Output Current vs. Supply Voltage

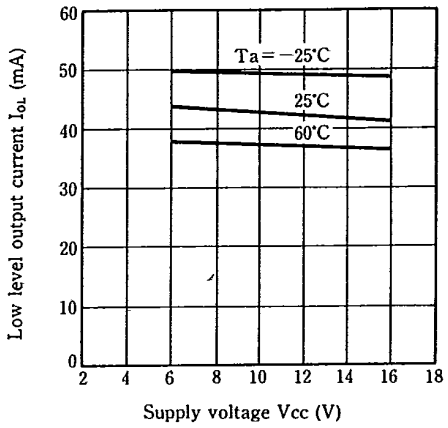


Fig. 10 Sensitivity Diagram

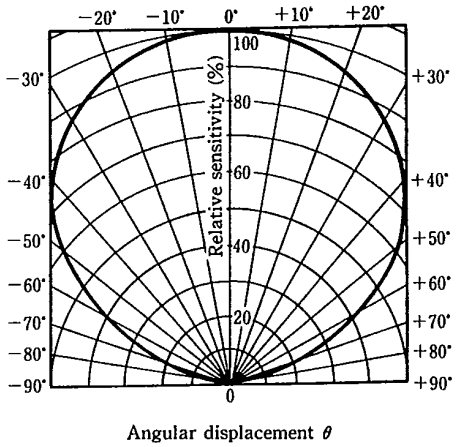
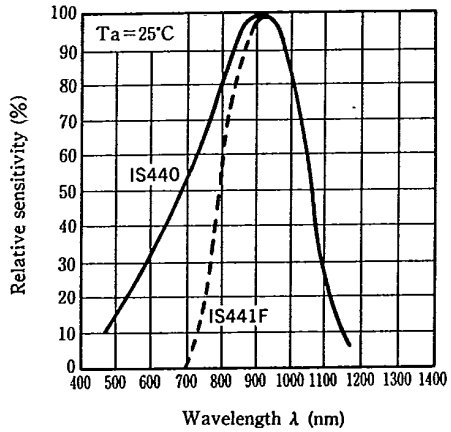


Fig. 11 Spectral Sensitivity



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■ Basic Circuit