IS1640

OPIC Light Detector for DVD-ROM/DVD Player (X2 Speed)

■ Features

1. OPIC light detector for RF signal detection
   (Integrates 6-division PIN photodiode and Amp. IC onto a single chip)
2. High speed response
   (Response frequency : MIN. 20MHz)
3. High sensitivity
   (Sensitivity : TYP.40.5mV/μW at 635nm)
4. With sebsitivity switching terminal which enables to read both 1-layer disc
5. Compact and thin package
   (Package dimensions : 5.0x4.0x1.5mm)
6. Possible to supply custom-made detecting patterns
7. Pair use with SHARP's laser diode is recommended.
   Laser diode : 650nm band **GH06510A2A/B**

■ Applications

1. DVD-ROM drives
2. DVD players

■ Absolute Maximum Ratings (Ta=25°C)

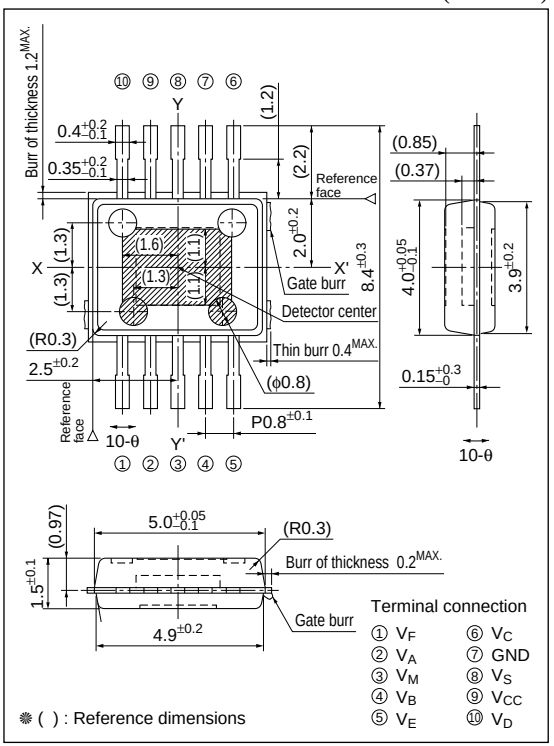
Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	6.0	V
*1 Output voltage	V_O	V_{CC}	V
Operating temperature	T_{opr}	−20 to +80	°C
Storage temperature	T_{stg}	−40 to +100	°C
*2 Soldering temperature	T_{sol}	+260	°C

*1 Applies to V_A to V_F terminal.

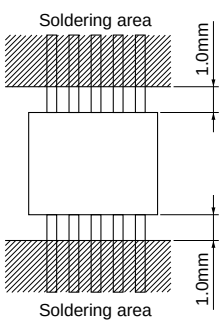
*2 For MAX. 3s at the position of 1.0mm from the bottom face of resin package.

■ 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 signal chip.



■ Recommended Operating Conditions

(Ta=25°C)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply voltage 1	V_{cc}	4.5	5.0	5.5	V
Supply voltage 2	V_S	Vcc/2	Vcc/2	Vcc/2	V

■ Electro-optical Characteristics 1

(Ta=25°C, Vcc=5V, V_S=2.5V)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Application
"H"gain mode	Supply current	I_{CCH}	–	3.6	5.4	9.8	mA	Vcc
	Output off-set voltage	V_{odH}	Specified by voltage difference from Vs	−15	0	+15	mV	V_A to V_F
	Extremes of off-set voltage	ΔV_{odH}	A−B	−15	0	+15	mV	V_A, V_B
			C−D	−15	0	+15		V_C, V_D
			(A+C)−(B+D)	−15	0	+15		V_A to V_D
			E−F	−15	0	+15		V_E, V_F
"L"gain mode	Supply current	I_{CCL}	–	4.4	6.6	12.0	mA	Vcc
	Output off-set voltage	V_{odL}	Specified by voltage difference from Vs	−15	0	+15	mV	V_A to V_F
	Extremes of off-set voltage	ΔV_{odL}	A−B	−15	0	+15	mV	V_A, V_B
			C−D	−15	0	+15		V_C, V_D
			(A+C)−(B+D)	−15	0	+15		V_A to V_D
			E−F	−15	0	+15		V_E, V_F

■ Electro-optical Characteristics 2

(Ta=25°C, Vcc=5V, V_S=2.5V)

	Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Application
"H"gain mode	*3, *4 Sensitivity 1	R_{H1}	–	30.3	40.5	50.7	mV/μW	V_A to V_D
	*3, *4 Sensitivity 2	R_{H2}	–	43.9	58.6	73.3	mV/μW	V_E, V_F
	Temperature coefficient of sensitivity	R_{Ht}	Ta=−20°C to +70°C	−	2500	−	ppm/°C	V_A to V_F
	*4, *5, *6 Response frequency 1	f_{cH1}	−3dB	20	27	−	MHz	V_A to V_D
	*4, *5, *6 Response frequency 2	f_{cH2}	−3dB	1	1.7	−	MHz	V_E, V_F
	*4 Peaking rate 1	ΔR_{pH1}	1MHz reference	−	−	4.0	dB	V_A to V_D
	*4 Peaking rate 2	ΔR_{pH2}	1MHz reference, f=1 to 10MHz	−2.0	0	2.0	dB	V_A to V_D
	*4, *6 Group delay deviation	t_{gd}	f=1 to 10MHz, Average of V_A to V_D	−	5	12	ns	V_A to V_D
	Output noise level	V_{nH}	f=10MHz, BW=30kHz	−	−77	−66	dBm	V_A to V_D
"L"gain mode	*3, *4 Sensitivity 1	R_{L1}	–	10.1	13.5	16.9	mV/μW	V_A to V_D
	*3, *4 Sensitivity 2	R_{L2}	–	14.6	19.5	24.4	mV/μW	V_E, V_F
	Temperature coefficient of sensitivity	R_{Lt}	Ta=−20°C to +70°C	−	2500	−	ppm/°C	V_A to V_F
	*4, *5, *6 Response frequency 1	f_{cL1}	−3dB	20	27	−	MHz	V_A to V_D
	*4, *5, *6 Response frequency 2	f_{cL2}	−3dB	1	1.7	−	MHz	V_E, V_F
	*4 Peaking rate 1	ΔR_{pL1}	1MHz	−	−	4.0	dB	V_A to V_D
	*4 Peaking rate 2	ΔR_{pL2}	1MHz, f=1 to 10MHz	−2.0	0	2.0	dB	V_A to V_D
	*4, *6 Group delay deviation	t_{gd}	f=1 to 10MHz, Average of V_A to V_D	−	5	12	ns	V_A to V_D
	Output noise level	V_{nL}	f=10MHz, BW=30kHz	−	−86	−75	dBm	V_A to V_D

*3 10μW, φ30μm of DC light is applied to the center of each photodiode.
Under that condition, sensitivity R is shown by following formula.
$R=(V_p-V_{od})/10\mu W$
V_p : Output voltage when DC light is applied.
V_{od} : Output voltage when DC light is not applied.
*4 Light source : Laser diode of λ=635nm
*5 Frequency sensitivity is −3dB. (reference sensitivity : value at f=0.1MHz)
*6 In addition to 10μW, φ30μm DC light, 4μWp-p AC light is applied to the center of each photodiode. BW=10kHz

Fig.1 Detecting Pattern of Photodiode

(Unit : μm)

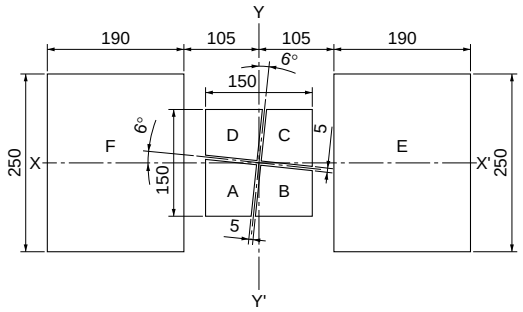


Fig.2 Block Diagram

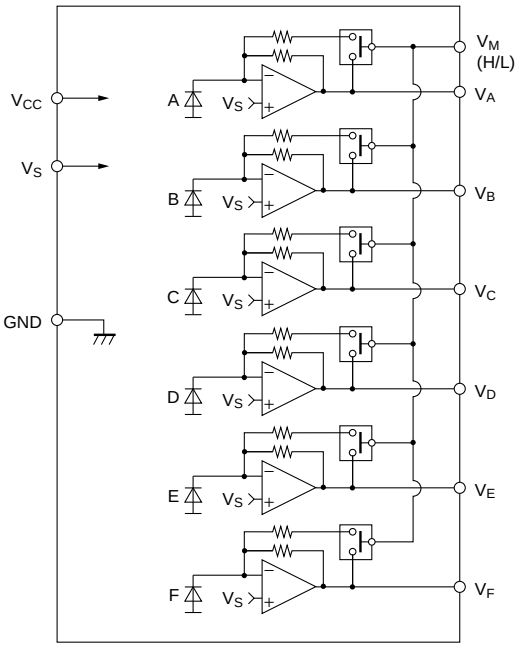


Fig.3 Supply Current vs. Ambient Temperature (H Gain Mode)

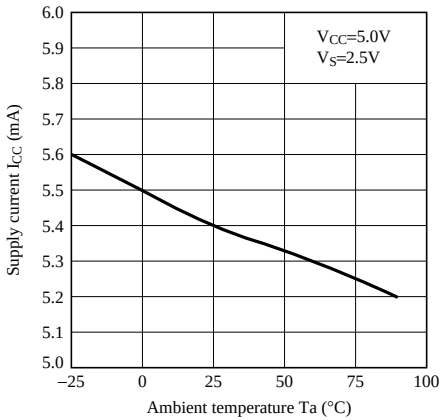


Fig.4 Supply Current vs. Ambient Temperature (L Gain Mode)

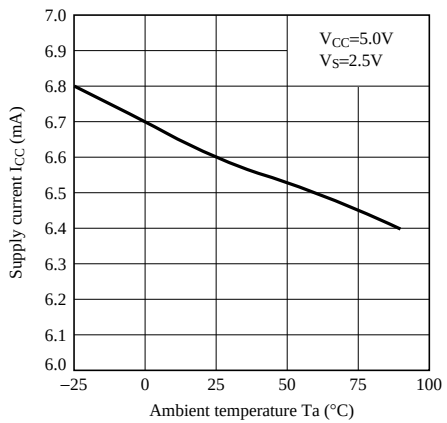


Fig.5 Output Offset Voltage vs. Ambient Temperature (A to F)(H/L Gain Mode)

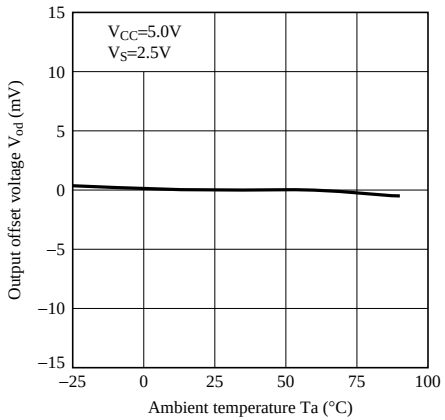


Fig.6 Response Frequency vs. Ambient Temperature (A to D)(H Gain Mode)

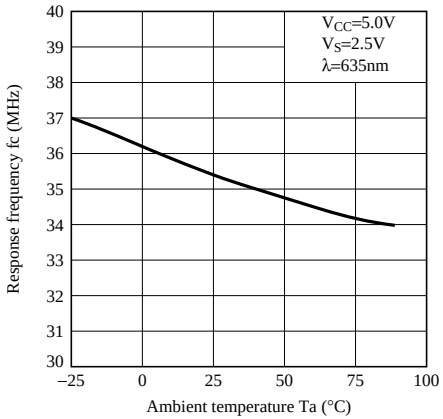


Fig.7 Response Frequency vs. Ambient Temperature (A to D)(L Gain Mode)

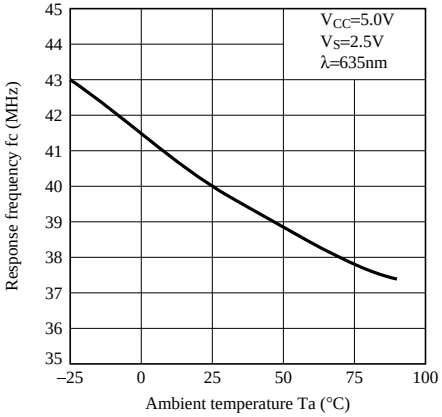


Fig.8 Sensitivity vs. Ambient Temperature (A to D)(H Gain Mode)

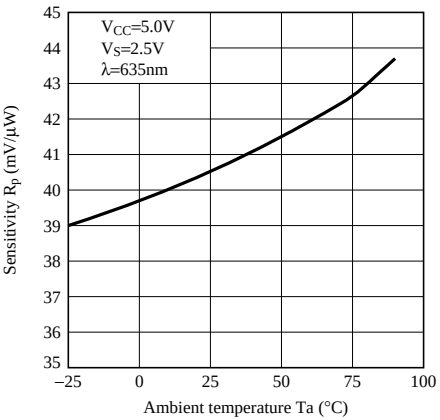


Fig.9 Sensitivity vs. Ambient Temperature (E, F)(H Gain Mode)

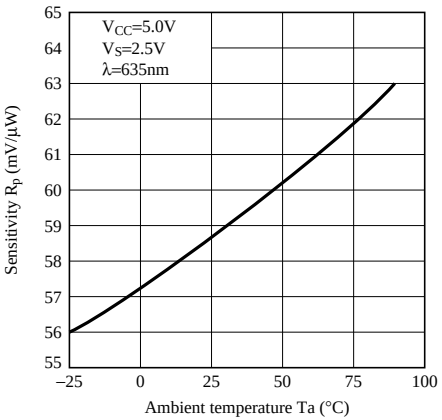


Fig.10 Sensitivity vs. Ambient Temperature (A to D)(L Gain Mode)

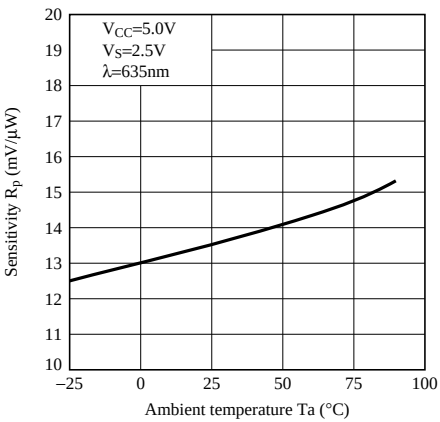
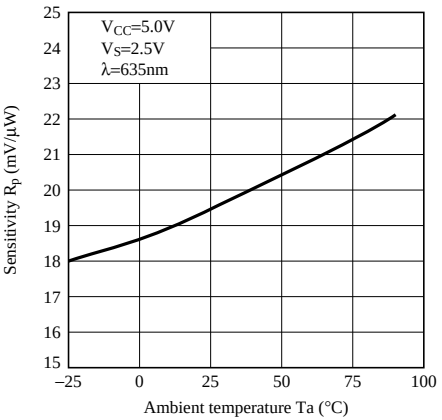


Fig.11 Sensitivity vs. Ambient Temperature (E, F)(L Gain Mode)



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