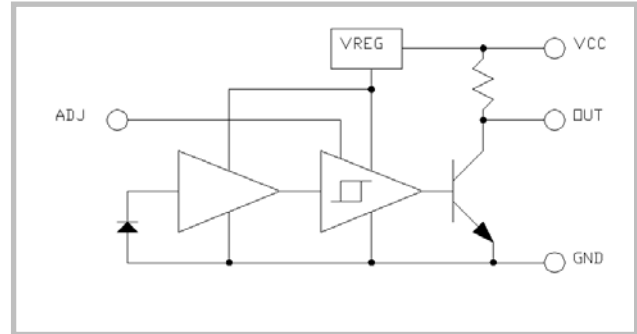


LIGHT-ACTIVATED INVERTER IC WITH INTERNAL PULL-UP AND ADJUSTABLE OPTICAL THRESHOLD

ET6501B

FEATURES

- Single supply range 4.5V to 18V
- 10k internal pull-up resistor on output
- Optical Sensitivity Adjustable over 7:1 range
- Operate point only 0.23mW/cm² (480nW) typical
- Sensitivity tracks the temperature coefficient of power output of the GaAIAs LEDs
- Spectral response optimized for 880nm LED



BLOCK DIAGRAM

APPLICATIONS

- Industrial Controls
- Light to voltage conversion

ADJ Resistor	Normalized Threshold
Open	1.00
10K	1.95
4.7K	2.73
2.2K	3.80
1K	4.98
Short	7.23

Table showing threshold adjustments.

DESCRIPTION

This device incorporates an integral photodiode, amplifier, Schmitt trigger, and internally pulled-up output stage. An on-chip voltage regulator allows operation over a wide range of available supply voltage. The phase of the digital output is considered to be inverted from the optical input, so that the output is HI when the light source is OFF, and the output is LOW when the light source is ON.

An adjust pin (ADJ) is provided to allow the user to alter the optical threshold at which the output changes state. Decreasing the resistance between this pin and ground causes the output to switch at higher and higher input levels, to a maximum of about 1.66mW/cm², or about 3.5μW on the photodiode.

ABSOLUTE MAXIMUM SPECIFICATIONS

Parameter	Symbol	Min.	Max.	Units	Comments
Operating Temperature Range	T_A	-40	85	°C	
Supply Voltage Range	V_{CC}	-0.5	18	V	
Voltage at ADJ pin	V_{ADJ}	-0.5	3	V	
Voltage at OUT (output off)	V_{OUT_MAX}	-0.5	$V_{CC}+0.5$	V	
Sink current (output on)	I_{SINK}	-	30	mA	

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $T_A = 25^\circ\text{C}$ and $V_{CC} = 5\text{V}$, ADJ pin open. LED on denotes an optical input of 720nW @ 880nm. LED off denotes a dark condition.

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Vcc Voltage Range	V_{CC}	4.5	5	18	V	
Supply Current @ 5V, Output Low	I_{CC1}	1.5	2.1	2.9	mA	LED source on
Supply Current @ 5V, Output High	I_{CC2}	1.8	2.5	3.5	mA	LED source off
Supply Current @ 18V, Output Low	I_{CC3}	2.9	4.0	5.6	mA	LED source on
Supply Current @ 18V, Output High	I_{CC4}	2.2	3.1	4.4	mA	LED source off
Dark-Light Optical Threshold, 5V	P_{T5}	320	480	720	nW	
Dark-Light Optical Threshold, 18V	P_{T18}	320	520	790	nW	
Optical Hysteresis Ratio	HYS	1.20	1.33	1.50	-	
Low Level Output, 5V	V_{OL1}	-	290	400	mV	LED on, $I_{OL} = 16\text{mA}$
Low Level Output, 18V	V_{OL2}	-	285	400	mV	LED on, $I_{OL} = 16\text{mA}$
Pull-Up Resistor Value	R	6	10	14	kohm	

AC SWITCHING CHARACTERISTICS

Values given at $V_{CC}=5\text{V}$, $T_A = 25^\circ\text{C}$, $C_L = 15\text{pF}$, and $R_L = 10\text{K}$, and with optical input @ 940 nW (this is equal to 1.3 times the threshold).

Parameters	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Propagation delay, dark to light	T_{PHL}	-	1.8	3.6	μs	Note 1.
Propagation delay, light to dark	T_{PLH}	-	2.0	4.0	μs	Note 1.
Output Rise Time	T_R	-	440	600	ns	Note 1.
Output Fall Time	T_F	-	16	30	ns	Note 1.

PAD FUNCTION TABLE

PAD NAME	FUNCTION
GND	Supply return
ADJ	Adjustment for sensitivity if necessary (may be left open)
VCC	Supply voltage
OUT	NPN output with 10K internal pull-up

Ordering Information:

Contact the factory.

Chip dimensions 44x44x12 mils. The photodiode is located 21.3 mils from the left edge, and 12.7mils from the top edge.

