OT852

Ambient Light Sensor

Specification

Version 1.0

February 16, 2010

oTHE Technology Inc.

Update History		
Version	**Date**	**Description**
1.0	February 16, 2010	Preliminary version

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1. Overview

The oT852 is a compact surface mount photo-sensor IC for detecting ambient light illuminating intensity. The sensitivity is superior to that of a phototransistor, and exhibits little chip-to-chip variation. It has excellent spectral sensitivity to the illuminating light source and excellent output linearity. It is suitable in the power-saving control for backlighting displays in Smart phone, Notebook PC, Tablet PC, GPS, PDAs, Digital cameras, Video cameras, LCD monitor, TV, Energy saving lamp.

2. Features

- Monolithic IC containing photodiode and current amplifier
- Human-eye spectral response and excellent IR-cut (from 700 to1050 nm)
- Wide dynamic range: 1 lux to 30,000 lux
- Excellent output to illuminance linearity
- Very low (< 3%) photocurrent fluctuation versus temperature change (0 to 60 ^{o}C)
- Operating supply voltage range: 1.5V to 5.5V
- Standby current: < 1 uA
- Light to Current, analog output
- Size: 3.2mm (L)*1.5mm (W)*1.1mm (H)
- Operating temperature performance, -40^{o}C to 85^{o}C
- RoHS compliant and Pb free package

3. Applications

- Illuminance meter (Lux meter)
- Light frequency detector
- Accurate display back-lighting control in Smart phone, Notebook PC, Tablet PC, GPS, PDA, Digital cameras, Video cameras, LCD monitor, TV, Energy saving lamp
- Auto exposure and flasher control in cameras
- Ambient light monitoring for street lights and automotive headlight control

4. Block Diagram

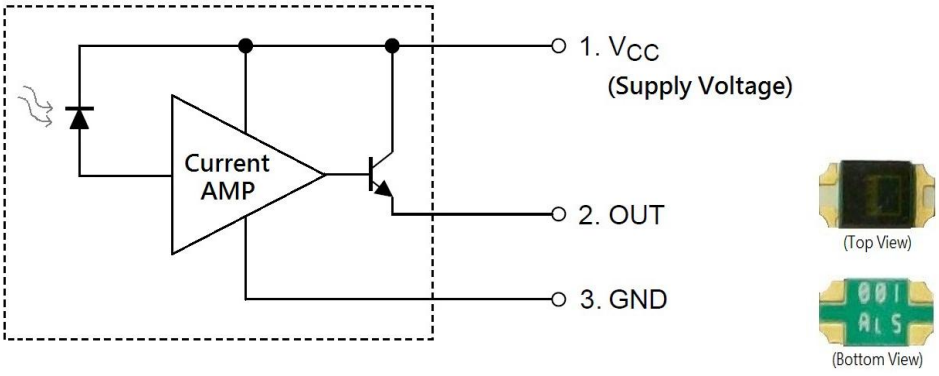
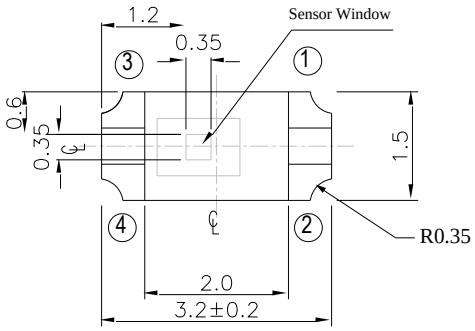


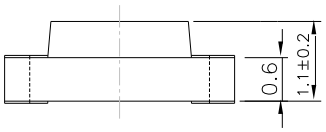
Figure 4-1 : OT852 Block Diagram

5. Package Dimensions

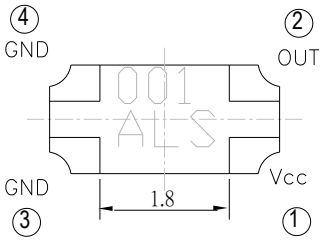
Top View

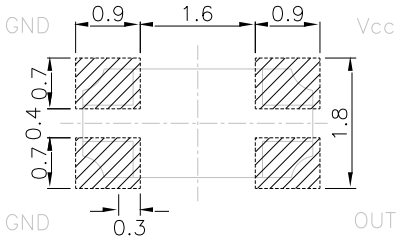


① Vcc
② Out
③ GND
④ GND



For reflow soldering (propose)





Bottom View

Unit: mm
Tolerances: ± 0.1mm

6. Electrical Characteristics

6-1 Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V_{cc}	-0.5 ~ 7.0	V
Output Voltage	V_o	0 ~ Vcc-0.9	V
Output Photo Current	I_{ph}	0 ~ 5	mA
Operating Temperature Range	T_{opr}	-40 ~ +85	°C
Storage Temperature Range	T_{stg}	-40 ~ +100	°C
Soldering Temperature Range	T_{sol}	260	°C
Human Body Model EDS	HBM	3000	V
Machine Model ESD	MM	300	V

6-1 Recommended Operating Conditions

(Ta=25°C)

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T_{opr}	-40	+85	°C
Supply Voltage	V_{cc}	1.5	5.5	V

6-2 Electrical And Optical Characteristics

(Ta=25°C)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Test Condition
Supply Current		I_{cc}	-	160	-	uA	E_v=1000 lux
Dark Current		I_D	-	-	10	nA	E_v=0 lux
Light Current		I_{ph1}	1.2	1.7	1.9	uA	V_{cc}=3V; E_v=10lux
		I_{ph2}	12	17	19	uA	V_{cc}=3V; E_v=100lux
		I_{ph3}	-	20	-	uA	V_{cc}=3V; E_v=100lux
		I_{ph4}	-	200	-	uA	V_{cc}=3V; E_v=1000lux
Photo Current Ratio		I_{ph3} / I_{ph2}	-	1.2	-	-	
Saturation Output Voltage		V_o	2.05	2.15	-	V	V_{cc}=3V; E_v=100lux R_L=135KΩ
Peak Sensitivity Wavelength		λ_p	-	580	-	nm	
Switching Time	Rise Time	t_r	-	0.1	1	ms	V_{cc}=3V; R_L=5KΩ
	Fall Time	t_f	-	0.5	2	ms	

Note: Illuminance by CIE standard illuminant-A / 2856K, incandescent lamp.

6-3 Typical Electrical and Optical Characteristics Curves

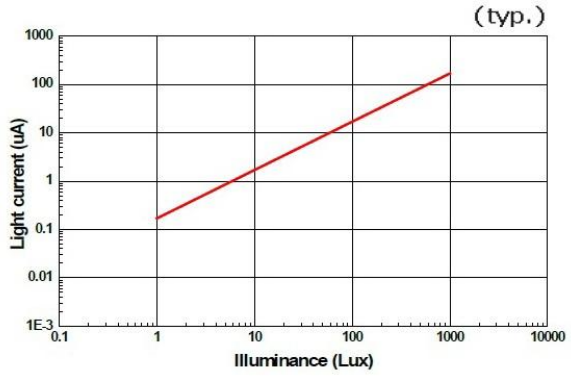


Figure 6-1: Light Current vs. Illuminance

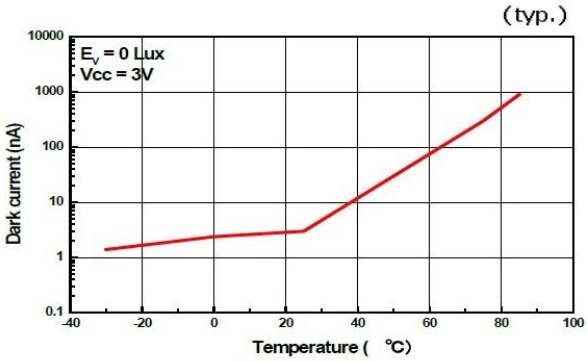


Figure 6-2 : Dark Current vs. Temperature

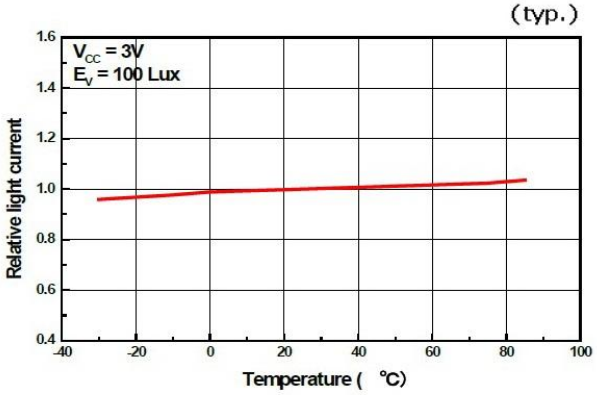


Figure 6-3: Relative light current vs. Temperature

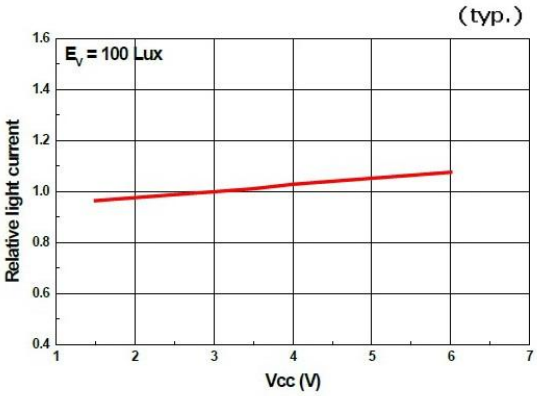


Figure 6-4 : Light current vs. Supply Voltage

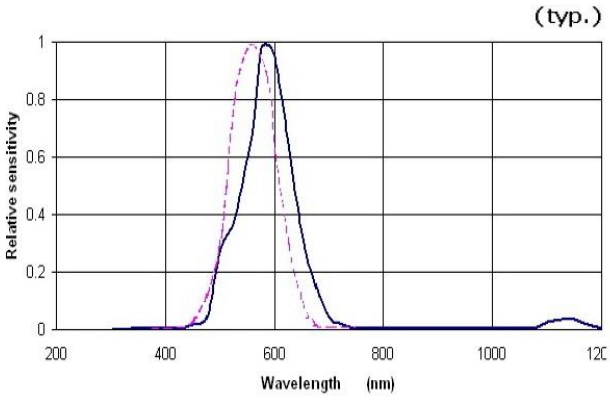


Figure 6-5 : Spectral Response

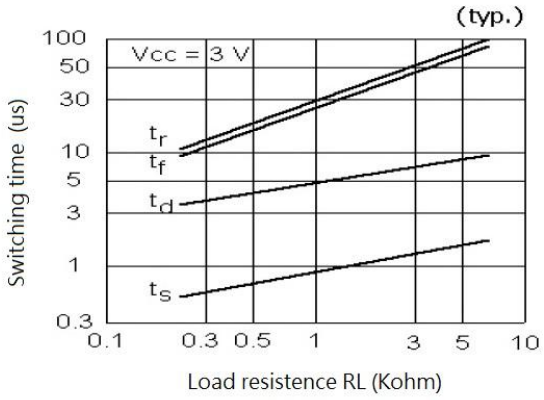


Figure 6-6 : Switching time vs. Load resistence

Note: Saturation Output Voltage ~= Vcc – 0.85 V

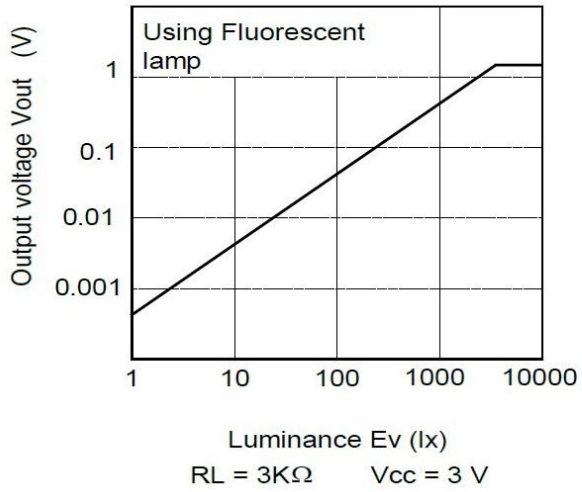


Figure 6-7 : Output voltage vs. Luminance

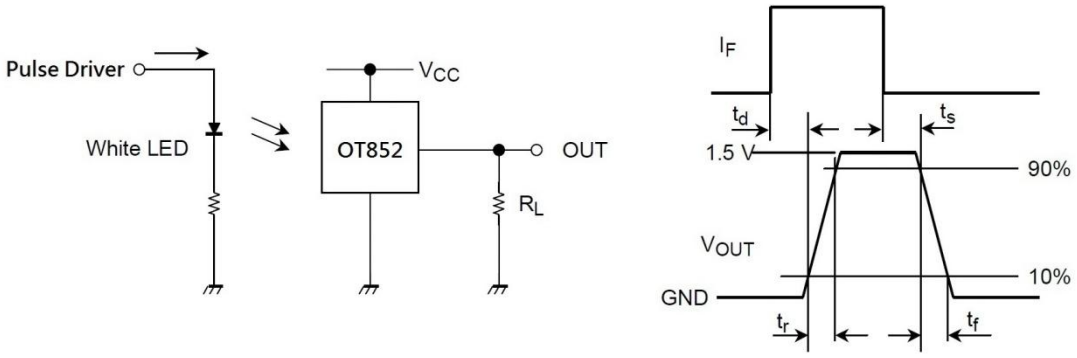


Figure 6-8 : Switching Time Measurement Method

6-4 Converting Photo current to Voltage

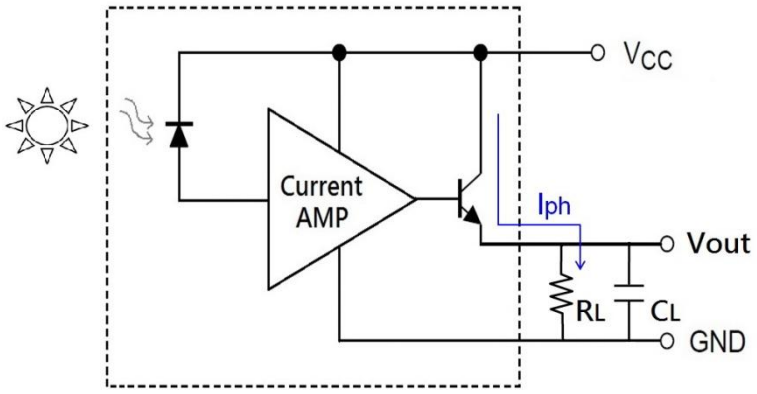


Figure 6-9 : Application Circuit

Note:

1. The output voltage (Vout) is the product of photo current (IPH) and loading resistor (RL).
2. A right loading resistor shall be chosen to meet the requirement of maximum ambient light, and output saturation voltage:

$$\mathbf{Vout(max.) = Iout(max.) \times RL \leqq Vout(saturation) = Vcc - 0.85V}$$

3. To avoid 60Hz ripple from fluorescent lamps, we suggest that the time constant must be greater than 0.5 second:

$$\mathbf{RL \times CL \geqq 0.5 \quad (empirical\ data)}$$

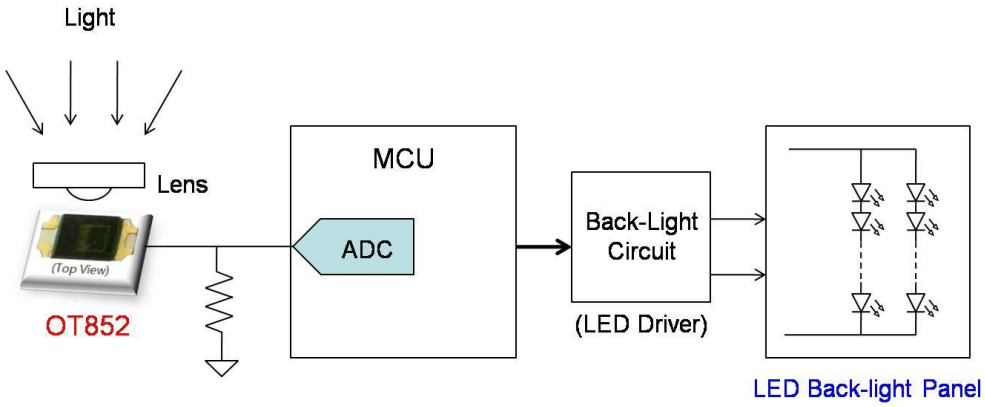


Figure 6-10 : Application Diagram for System

7. Appendix – Smart ALS Module(IK101)

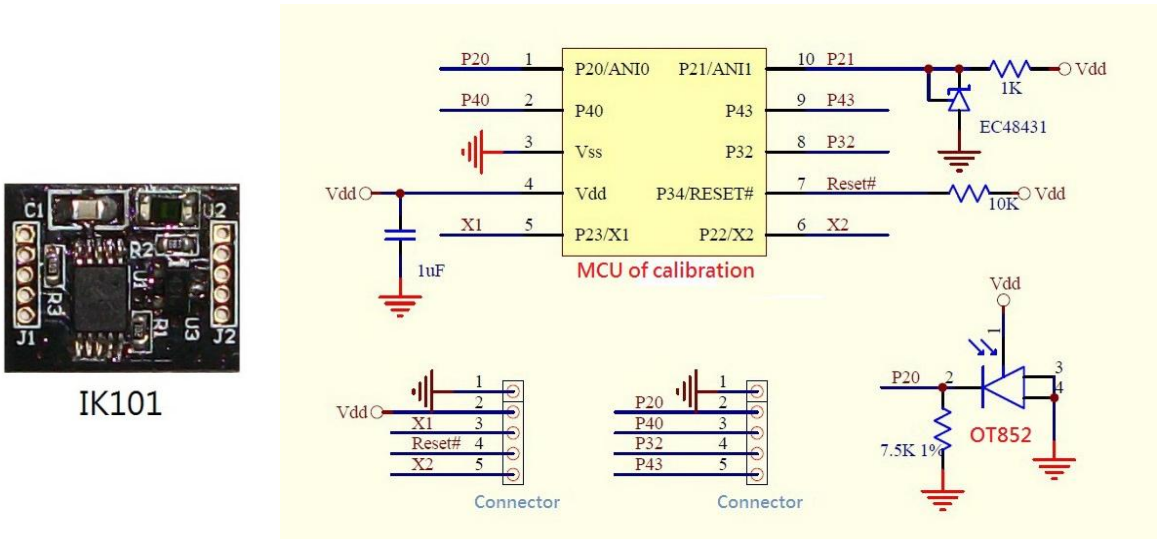


Figure 7-1 : Smart ALS Module – IK101 and Internal Circuit

IK101 Features:

- Smart Calibrate MCU with OT852(ALS)
- Support 10-bit resolution and digital(UART) output
- Wide dynamic range: 1 lux to 30,000 lux
- Very low (< 3%) photocurrent fluctuation versus temperature change (0 to 60 °C)
- Excellent output to illuminance linearity
- Operating voltage range: 2V to 5.5V
- Operating temperature : -40°C to 85°C
- Size: 15mm (L)*12mm (W)*2.2.0mm (H)
- Easy to integrate with Smart phone, DSC for illuminance meter function

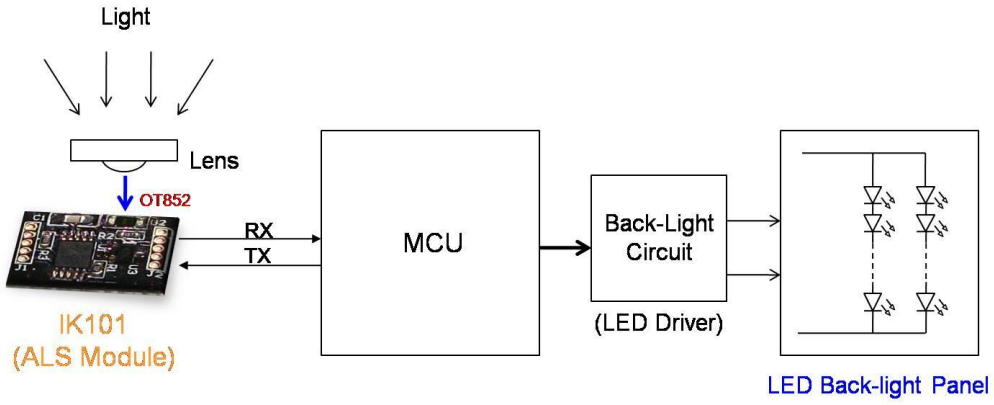


Figure 7-2 : IK101 Application Diagram for System