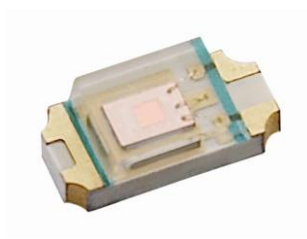


Ambient Light Sensor – Surface Mount EAALSDIC3215A1



Features

- Close responsively to the human eye spectrum
- Light to Current, analog output
- Good output linearity across wide illumination range
- Low sensitivity variation across various light sources
- Operating temperature performance, -40oC to 85oC
- Wide supply voltage range, 2.5V to 5.5V
- Size : 3.2mm(L)*1.5mm(W)*1.05mm(H)
- RoHS compliant and Pb Free package
- Compliance with EU REACH.

Description

EAALSDIC3215A1 Ambient Light Sensor Device, which incorporates a photodiode and a current amplifier IC in a single chip, is a good effective solution to the power saving of display backlighting of mobile appliances, such as the mobile phones and PDAs. Due to the high rejection ratio of infrared radiation, the spectral response of the ambient light sensor is close to human eyes.

Applications

- Detection of ambient light to control display backlighting
 - Mobile devices – mobile phones, PDAs
 - Computing device – TFT LCD monitor for Notebook computer
 - Consumer device – TFT LCD TV, plasma TV, video camera, digital camera, toys
- Automatic residential and commercial management
- Automatic contrast enhancement for electronic signboard
- Ambient light monitoring device for daylight and artificial light
 - Street light, CCD/CCTV

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{CC}	-0.5 ~ 6	V
Output Voltage	V _O	0 ~ V _{CC} -0.8	V
Output Photo Current	I _{PH}	0 ~ 5	mA
Operating Temperature	T _{opr}	-40 ~ +85	°C
Storage Temperature	T _{stg}	-40 ~ +100	°C
ESD	ESD _{HBM}	3000	V
	ESD _{MM}	300	V
Soldering Temperature	T _{sol}	260	°C

Note: For detail reflow time and the recommended temperature profile, please refer to page 8.

Recommended Operating Conditions (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V _{CC}	2.5 ~ 5.5	V
Operating Temperature	T _{opr}	-40 ~ +85	°C

Electro-Optical Characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Supply Current	I_{CC}	-----	$1.2 \times I_{PH}$	-----	μA	
Dark Current	I_D	-----	-----	100	nA	$V_{CC}=3V$; $E_V=0Lux$
Light Current	I_{PH1}	3.6	-----	9.5	μA	$V_{CC}=3V$; $E_V=10Lux$ (Note1, Fig. 2)
	I_{PH2}	36	-----	95	μA	$V_{CC}=3V$; $E_V=100Lux$ (Note1, Fig. 2)
	I_{PH3}	-----	78	-----	μA	$V_{CC}=3V$; $E_V=100Lux$ (Note2, Fig. 2)
	I_{PH4}	360	-----	950	μA	$V_{CC}=3V$; $E_V=1000Lux$ (Note1, Fig. 2)
Photocurrent Ratio	I_{PH2}/I_{PH1}	-----	1.2	-----	-----	
Saturation Output Voltage	V_O	2.20	2.35	-----	V	$V_{CC}=3V$; $E_V=100Lux$ $R_L=75K\Omega$ (Fig. 3)
Peak Sensitivity Wavelength	λ_P	-----	590	-----	nm	
Switching Time	Rise Time	t_r	-----	0.356	1000	mS
	Fall Time	t_f	-----	1.11	2000	mS
	Delay Time	t_d	-----	2.2	-----	mS
	Storage Time	t_s	-----	0.692	-----	mS

Note:

1. White Fluorescent light (Color Temperature = 6500K) is used as light source. However, White LED is substituted in mass production.

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

Rankings

Rank	Test condition	Min	Max	Unit
1	$V_{CC}=3V$; $E_V=100Lux$	36	60	μA
2		50	80	
3		65	95	

Fig.1 Block Diagram

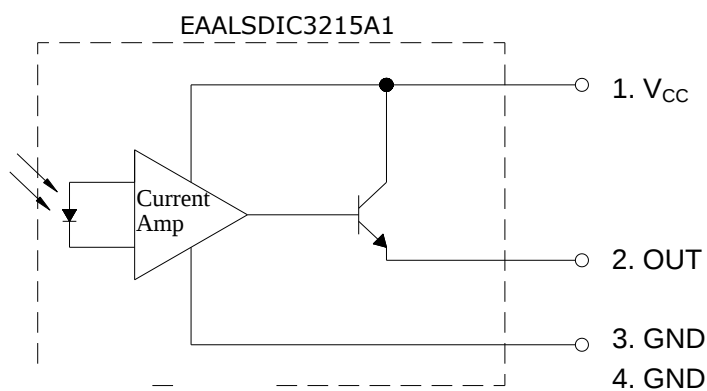


Fig. 2 Measurement Method of Light Current

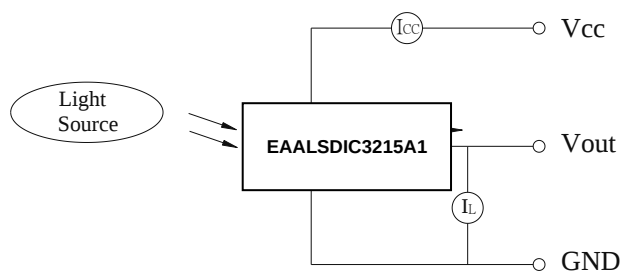


Fig.3 Measurement Method of Saturation Output Voltage

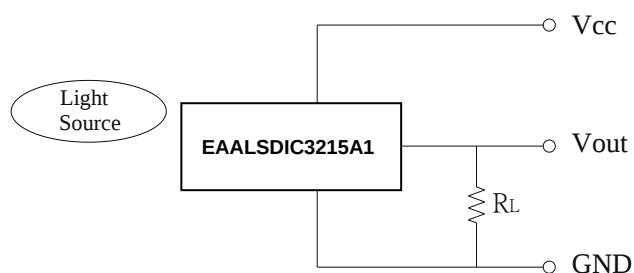
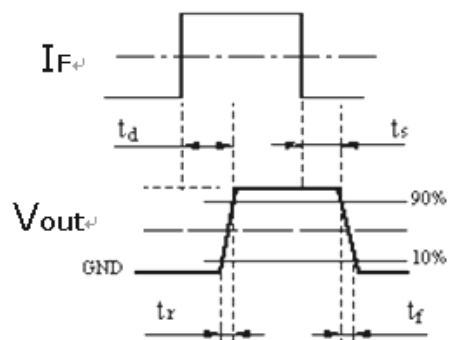
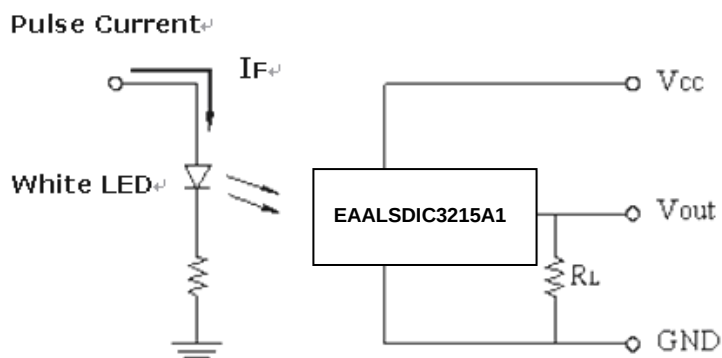


Fig.4 Switching Time Measurement Method



Typical Electro-Optical Characteristics Curves

Fig.5 Light Current vs. Illuminance

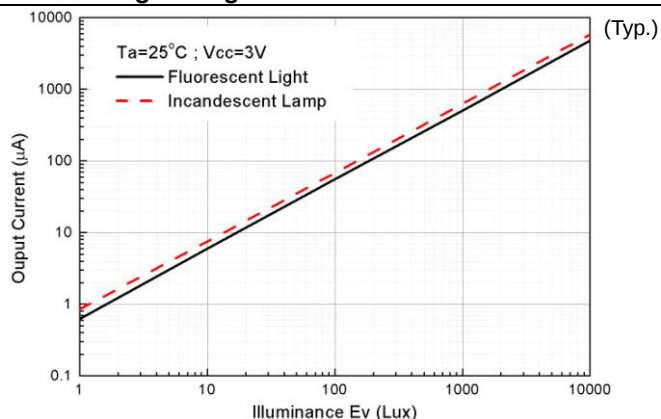


Fig.6 Dark Current vs. Temperature

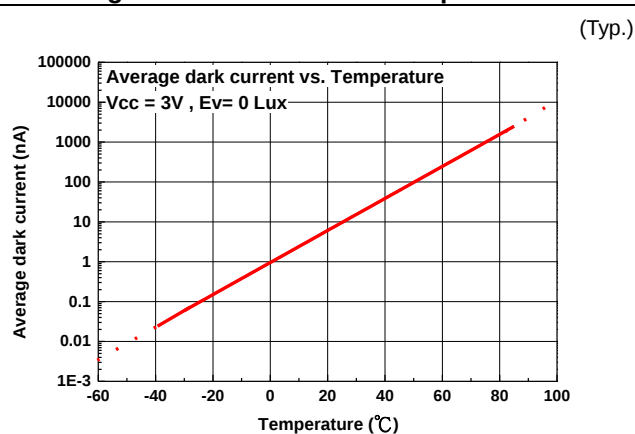


Fig.7 Relative light current vs. Temperature

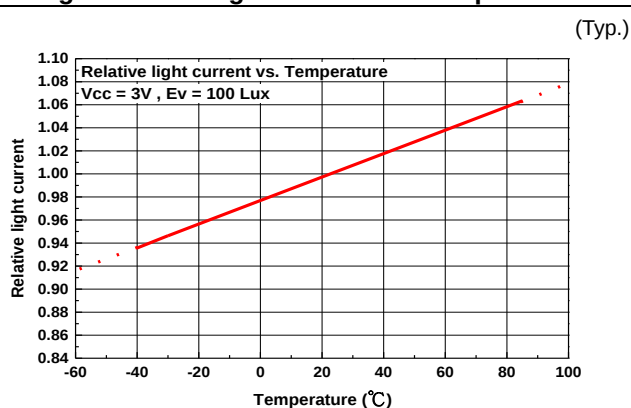


Fig.8 Light current vs. Supply Voltage

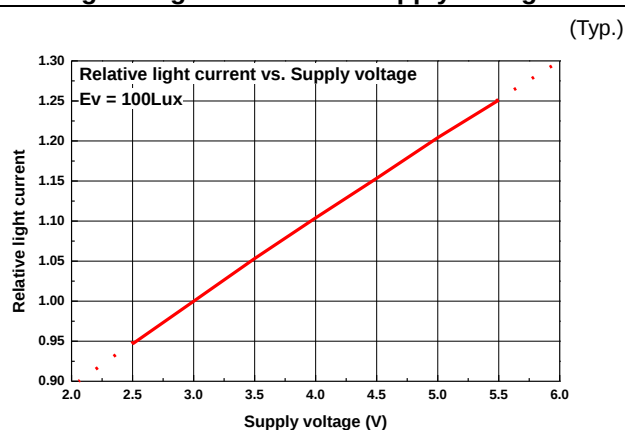


Fig.9 Spectral Response

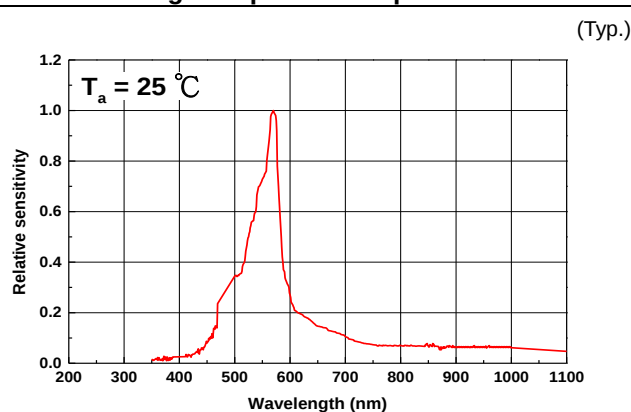


Fig.10 Output voltage vs. Temperature

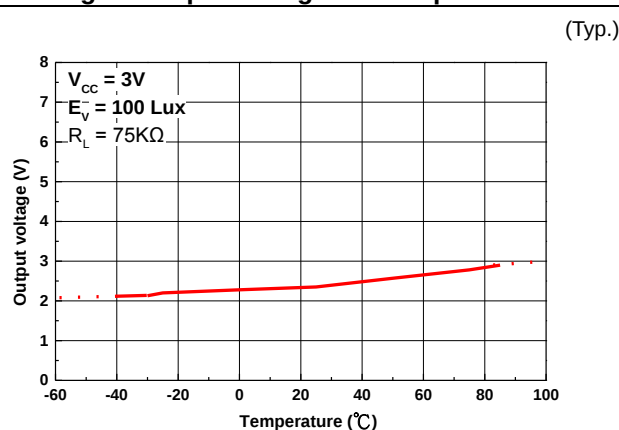


Fig.11 Output Voltage vs. Illuminance

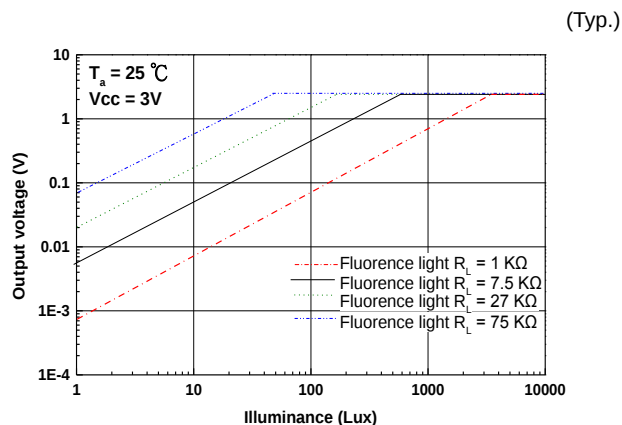


Fig.12 Relative Intensity vs. Radiation Diagram

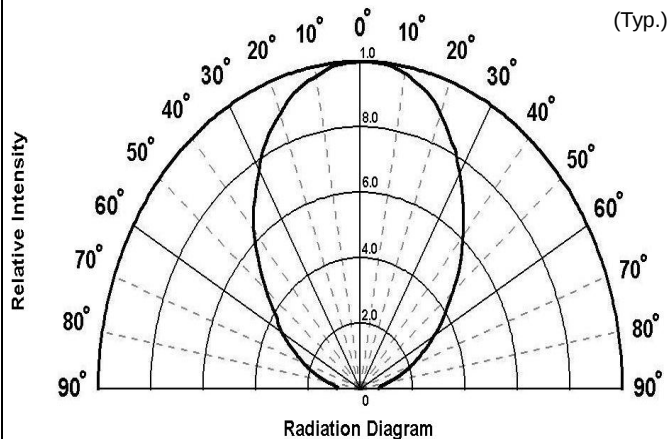
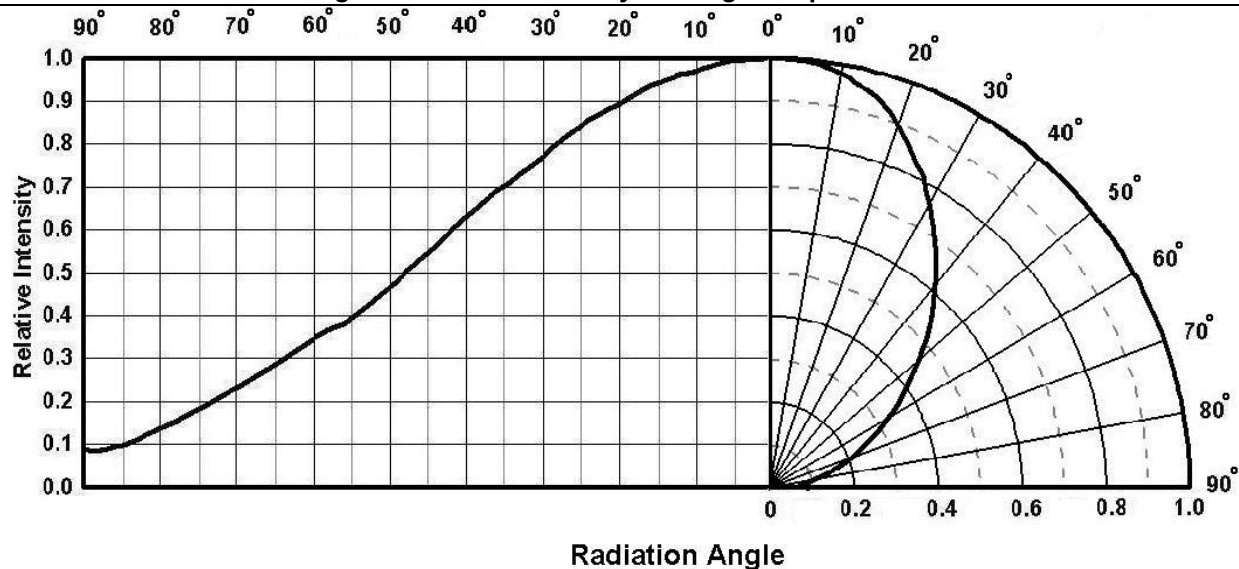
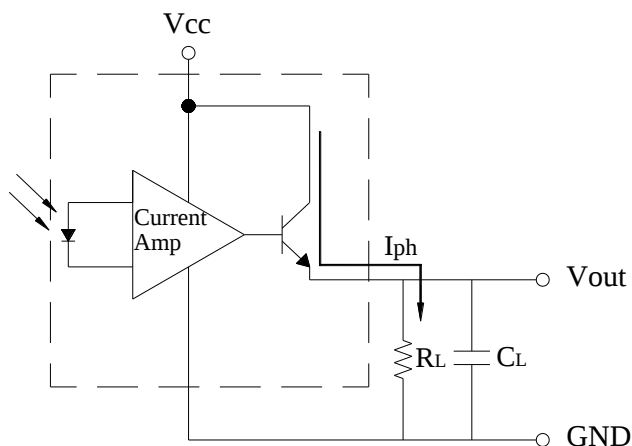


Fig.13 Relative Intensity vs. Angle Displacement



Converting Photocurrent to Voltage



Note:

1. The output voltage (V_{out}) is the product of photocurrent (I_{PH}) and loading resistor (R_L)
2. A right loading resistor shall be chosen to meet the requirement of maximum ambient light, and output saturation voltage:

$$V_{out(max.)} = I_{out(max.)} \times R_L \leq V_{out(saturation)} = V_{cc} - 0.8V$$

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

$$R_L \times C_L \geq 0.5 \quad (\text{empirical data})$$

Recommended method of storage

Reflow Terms: JEDEC Level 2 Specification

Dry box storage is recommended as soon as the aluminum bag has been opened prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10°C to 30°C
- Storage humidity $\leq 60\%RH$ max

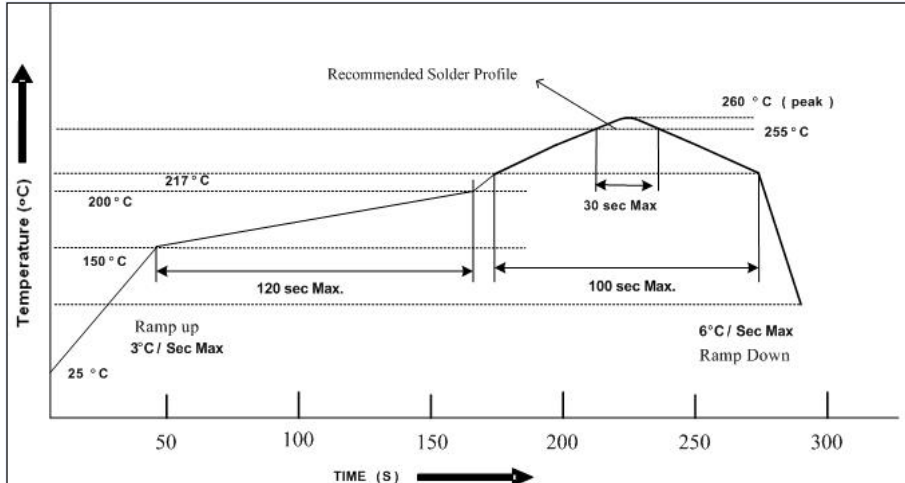
After more than one year under these conditions moisture content will be too high for Reflow soldering. In case of moisture absorption, the devices will recover to former condition by drying under the following condition:

192 hours at 40°C+5°C/-0°C and 5%RH (dry air / nitrogen), or
96 hours at 60°C+5°C and < 5%RH for all device containers, or
24 hours at 125°C+5°C not suitable for reel or tubes

ESD Precaution:

Proper storage and handing procedures should be followed to prevent ESD damage to the devices especially when they are removed from the Anti-static bag. Electro-Static Sensitive Devices warning labels are on the packing.

Recommended Solder Profile



Notice:

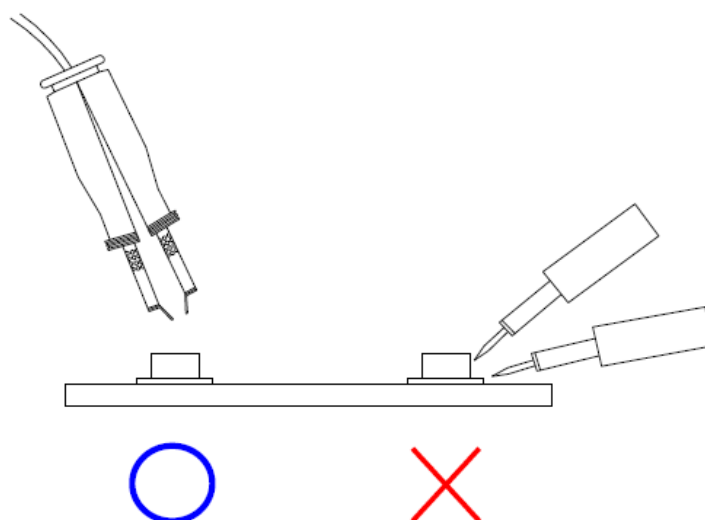
- (1) Reflow soldering should not be done more than two times.
- (2) When soldering, do not put stress on the devices during heating.
- (3) After soldering, do not warp the circuit board.

Soldering Iron

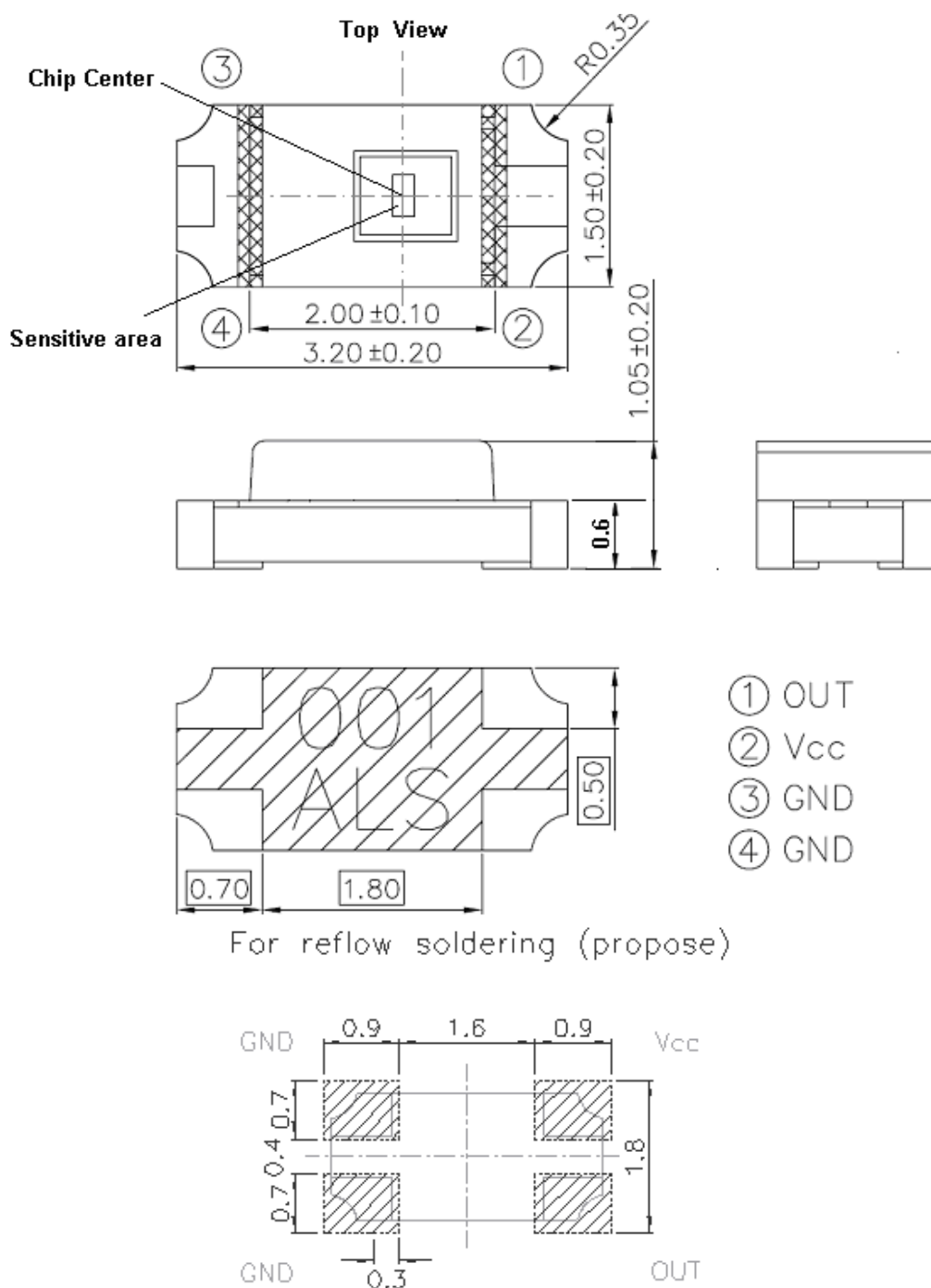
Each terminal is to go to the tip of soldering iron temperature less than 350°C for 3 seconds within once in less than the soldering iron capacity 25W. Leave two seconds and more intervals, and do soldering of each terminal. Be careful because the damage of the product is often started at the time of the hand solder.

Repairing

Repair should not be done after the device have been soldered. When repairing is unavoidable, a double-head soldering iron should be used (as below figure). It should be confirmed beforehand whether the characteristics of the device will or will not be damaged by repairing.



Package Dimension



Note: Tolerances unless mentioned $\pm 0.1\text{mm}$. Unit = mm

Packing Quantity Specification

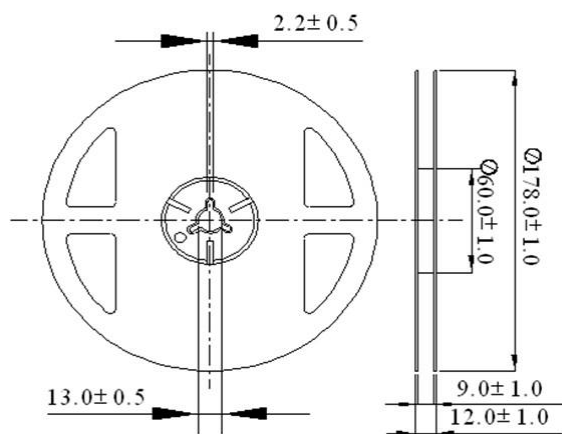
2000 PCS/ 1 Reel

Label Format

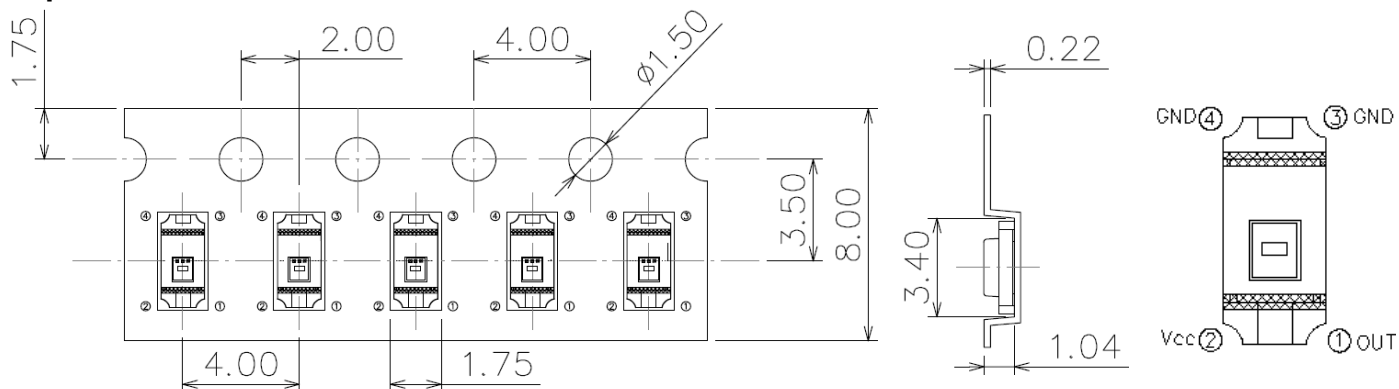


- CPN: Customer's Product Number
- P/N: Product Number
- QTY: Packing Quantity
- CAT: Luminous Intensity Rank
- HUE: Dom. Wavelength Rank
- REF: Forward Voltage Rank
- LOT No: Lot Number

Reel Dimensions

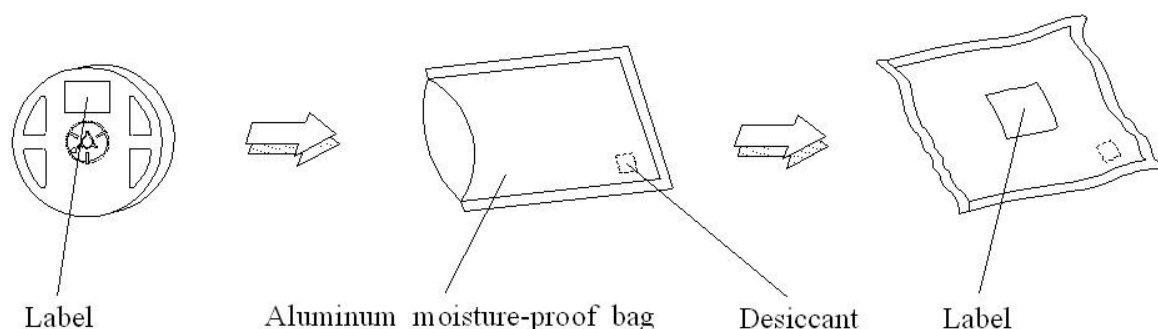


Tape Dimensions



Note: Tolerances unless mentioned ± 0.1 mm. Unit = mm

Moisture Resistant Packing Process



Note: Tolerances unless mentioned $\pm 0.1\text{mm}$. Unit = mm

Note:

1. Above specification may be changed without notice. Everlight Americas will reserve authority on material change for above specification.
2. When using this product, please observe the absolute maximum ratings and the instructions for using outlined in these specification sheets. Everlight Americas assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets.
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