



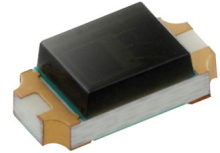
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## Surface - Mount Ambient Light Sensor

## ALS-PDIC15-21B/TR8

### Features

- Monolithic IC containing photodiode and current amplifier
- Human-eye spectral response and excellent IR-cut (from 700 to 1050 nm)
- Wide dynamic range: 1 lux to 30,000 lux
- Excellent output to illuminance linearity
- Size: 3.2mm (L)\*1.5mm (W)\*1.1mm (H)
- Very low (< 3%) photocurrent fluctuation versus temperature change (0 to 60 °C)
- Wide supply voltage range: 1.5V to 5.5V
- Standby current: < 1 uA
- Light to Current, analog output
- Operating temperature performance, -30°C to 85°C
- RoHS compliant and Pb Free package



### Description

The ALS-PDIC15-21B/TR8 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. Due to very low photo current fluctuation versus temperature change, ALS-PDIC15-21B/TR8 is very suitable for hand-held or outdoor application device.

### Applications

- Detection of ambient light to control display backlighting
  - Mobile devices – Mobile phones, PDAs, GPS
  - Computing device – TFT LCD monitor for Notebook computer
  - Consumer device – TFT LCD TV, Plasma TV
- Automatic residential and commercial management
- Automatic contrast enhancement for electronic signboard
- Ambient light monitoring device for daylight and artificial light
  - Street light

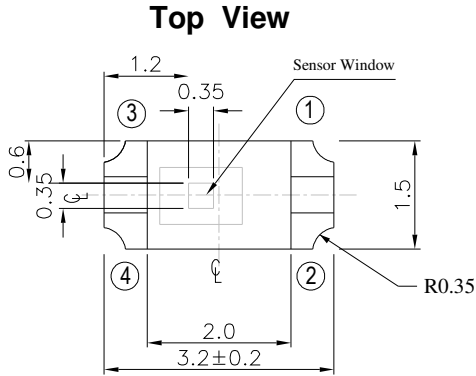


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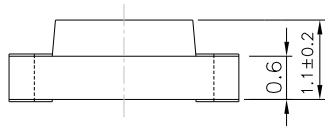
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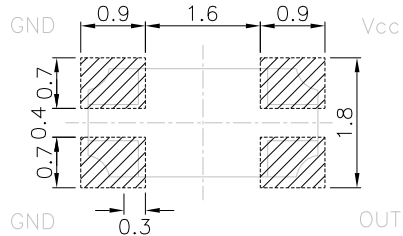
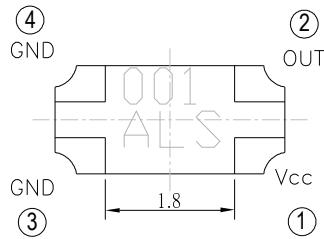
### Package Dimensions



- ① Vcc
- ② Out
- ③ GND
- ④ GND



For reflow soldering (propose)



Unit: mm

Tolerances: ± 0.1mm



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### Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V <sub>cc</sub>	-0.5~7.0	V
Output Voltage	V <sub>o</sub>	0 ~ V <sub>cc</sub> -0.9	V
Output Photo Current	I <sub>PH</sub>	0 ~ 5	mA
Operating Temperature Range	T <sub>opr</sub>	-40 ~ +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 ~ +100	°C
Soldering Temperature Range [Note1]	T <sub>sol</sub>	260	°C
Human Body Model ESD	HBM	3000	V
Machine Model ESD	MM	300	V

**Note1:** For detail reflow time and the recommended temperature profile, please refer to page 8.

### Recommended Operating Conditions (Ta=25°C)

Parameter	Symbol	Min.	Max.	Unit
Operating Temperature	T <sub>opr</sub>	-40	+85	°C
Supply Voltage	V <sub>cc</sub>	1.5	5.5	V

Electrical and Optical Characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Supply Current	I <sub>CC</sub>	—	160	—	μA	E <sub>v</sub> = 1000 lux
Dark Current	I <sub>D</sub>	—	—	10	nA	E <sub>v</sub> = 0Lux
Light Current	I <sub>PH1</sub>	1.2	1.7	1.9	μA	V <sub>CC</sub> =3V; E <sub>v</sub> =10Lux [Note1] [Fig.2]
	I <sub>PH2</sub>	12	17	19	μA	V <sub>CC</sub> =3V; E <sub>v</sub> = 100Lux [Note1] [Fig.2]
	I <sub>PH3</sub>	—	20	—	μA	V <sub>CC</sub> =3V; E <sub>v</sub> = 100Lux [Note2] [Fig.2]
	I <sub>PH4</sub>	—	200	—	μA	V <sub>CC</sub> =3V; E <sub>v</sub> =1000Lux [Note1] [Fig.2]
Photocurrent Ratio	I <sub>PH3</sub> / I <sub>PH2</sub>	—	1.2	—	—	
Saturation Output Voltage	V <sub>O</sub>	2.05	2.15	—	V	V <sub>CC</sub> =3V; E <sub>v</sub> = 100Lux, R <sub>L</sub> =135KΩ [Fig.3]
Peak Sensitivity Wavelength	λ <sub>p</sub>	—	580	—	nm	
Switching Time	Rise Time	tr	0.1	1	ms	V <sub>CC</sub> =3V, R <sub>L</sub> =5KΩ [Fig.4]
	Fall Time	tf	0.5	2	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.

Fig.1 Block Diagram

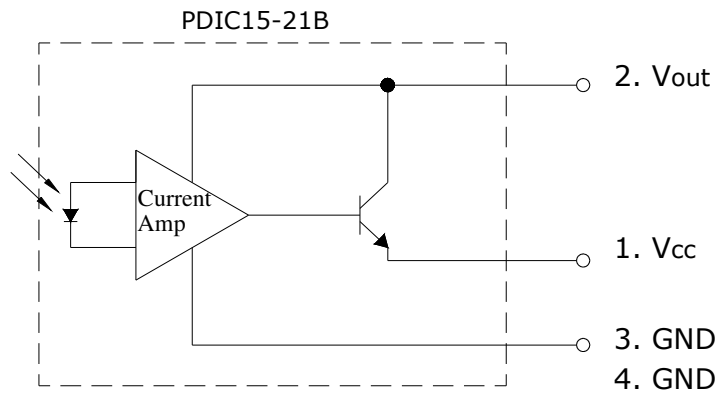


Fig.2 Measurement Method of Light Current

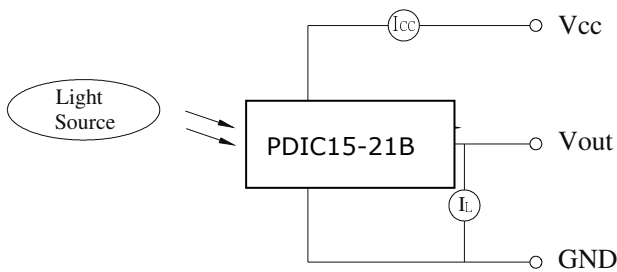


Fig.3 Measurement Method of Saturation Output Voltage

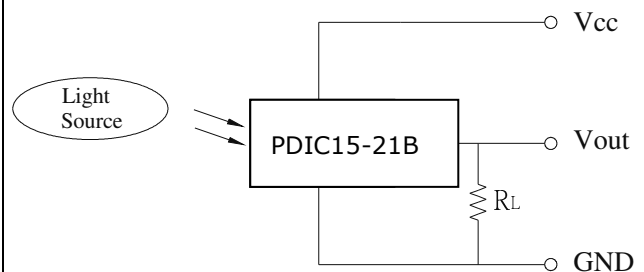
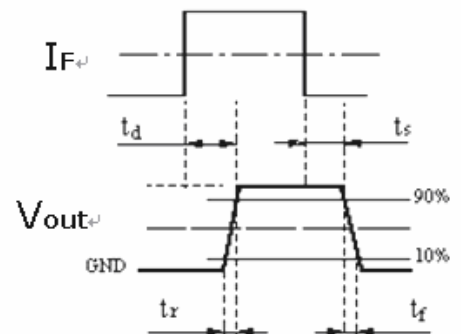
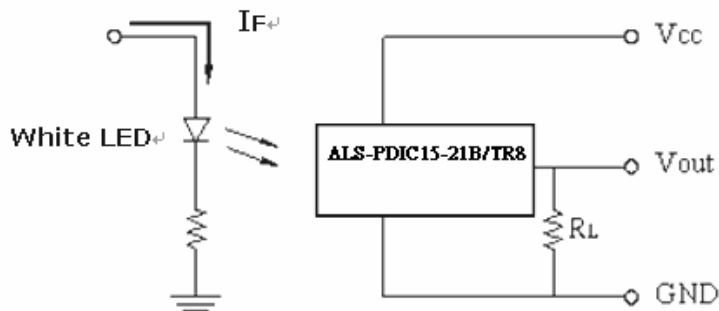


Fig.4 Switching Time Measurement Method

Pulse Current  $I_F$





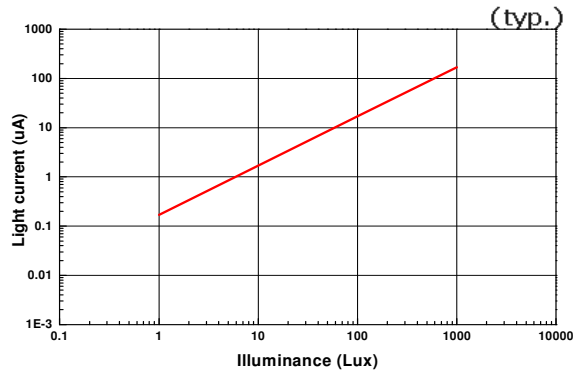
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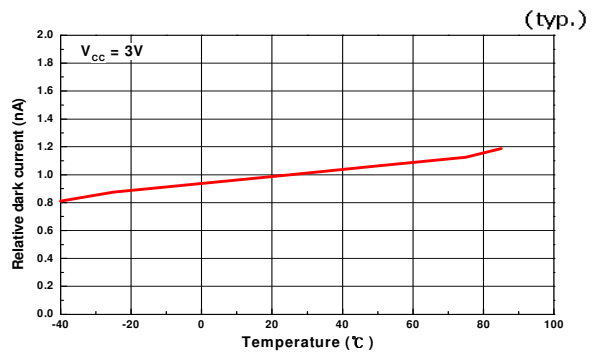
## ALS-PDIC15-21B/TR8

### Typical Electrical and Optical Characteristics Curves

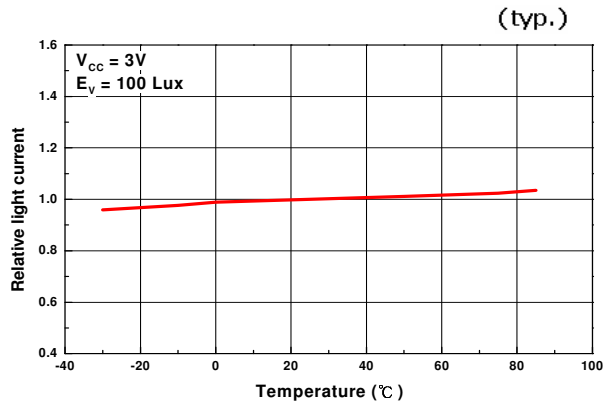
**Fig.5 Light Current vs. Illuminance**



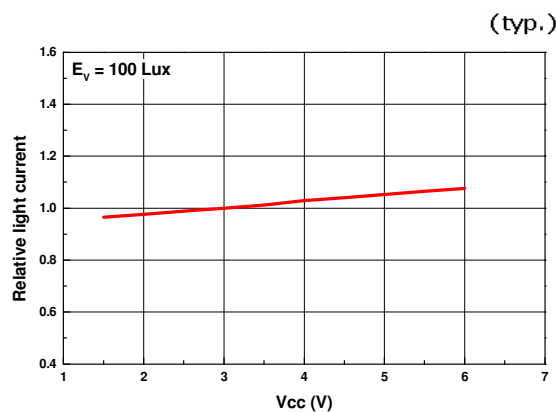
**Fig.6 Dark Current vs. Temperature**



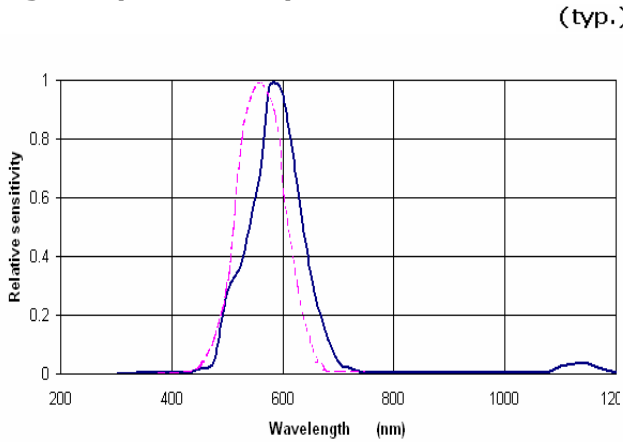
**Fig.7 Relative light current vs. Temperature**



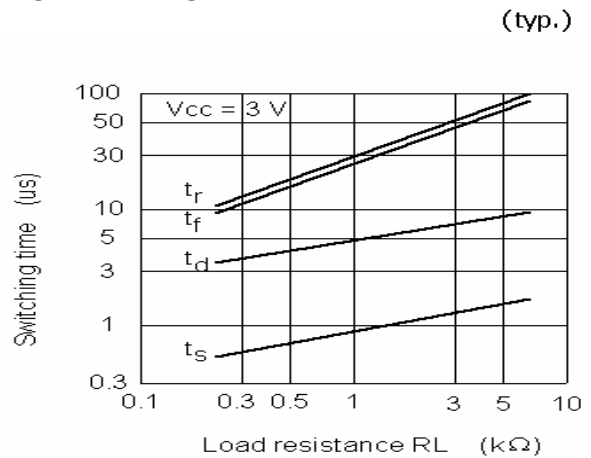
**Fig.8 Light current vs. Supply Voltage**



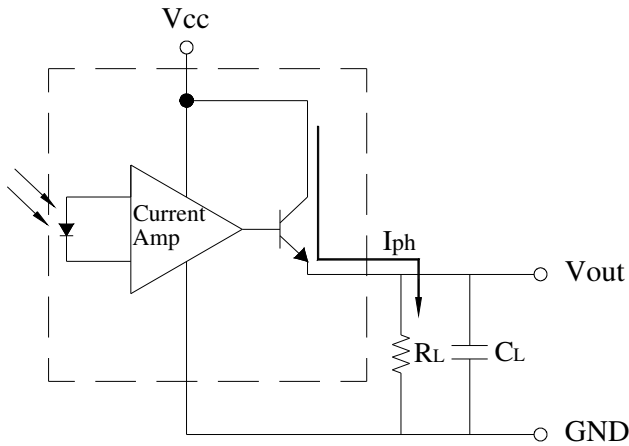
**Fig.9 Spectral Response**



**Fig.10 Switching time vs. Load resistance**



### 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 4 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:

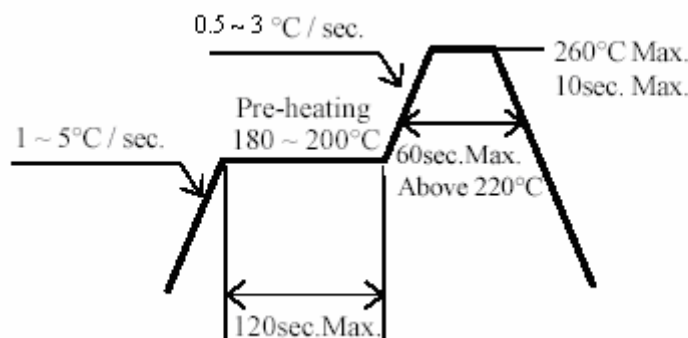
- Storage temperature 10°C to 30°C
- Storage humidity  $\leq 60\%RH$  max

After more than 72 hours 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.





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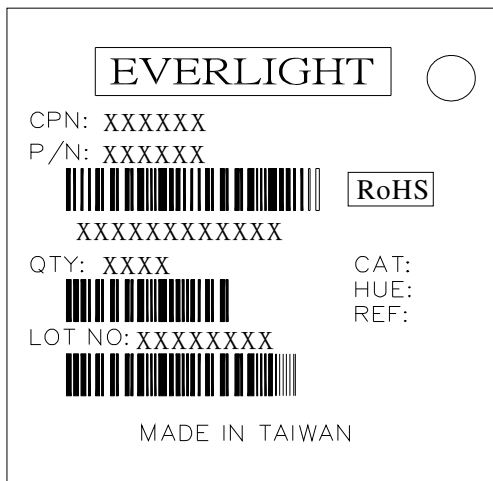
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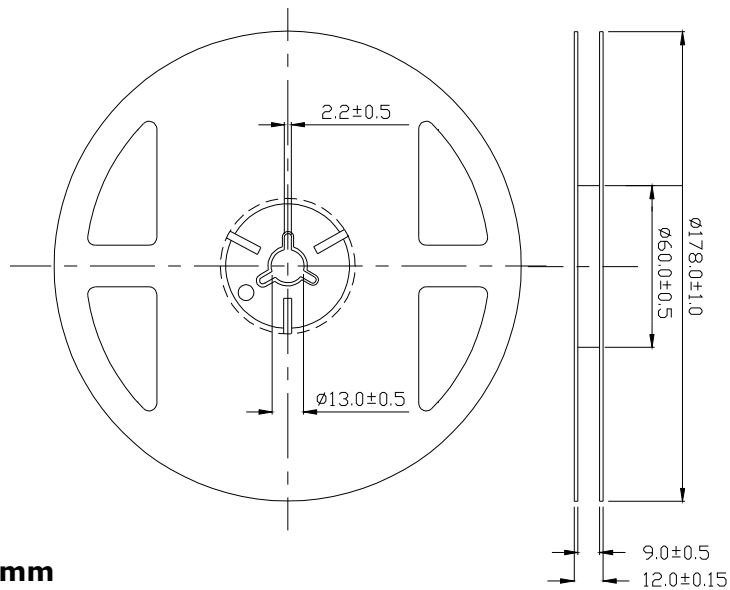
### Packing Quantity Specification

2000 PCS/ 1 Reel

### Label Format



### Reel Dimensions



Unit: mm

Tolerance: ±0.1mm

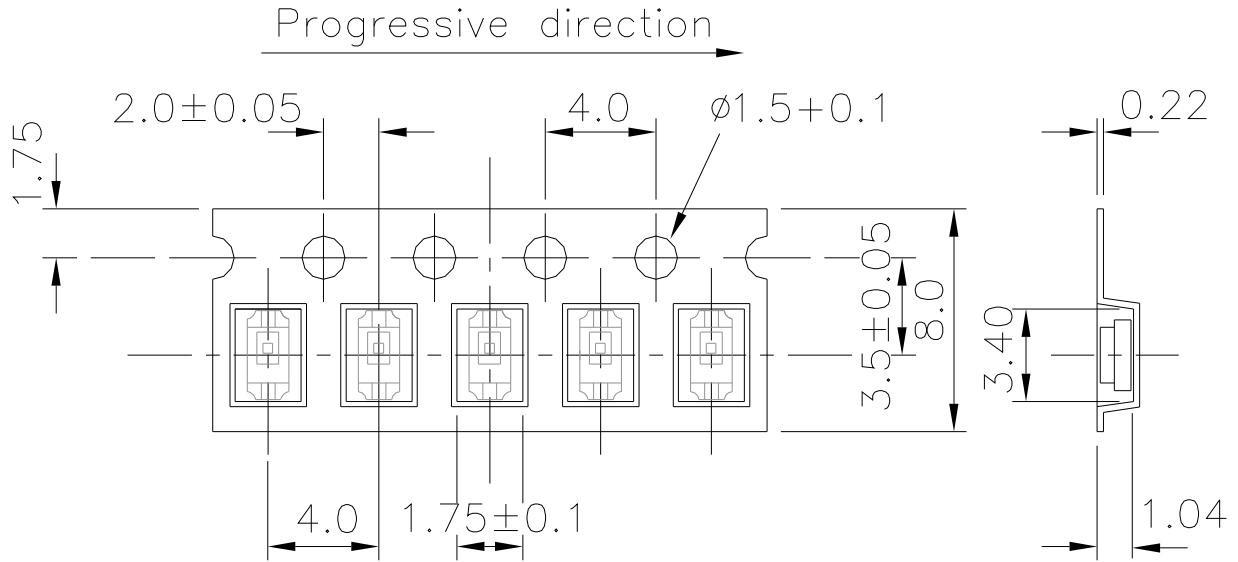


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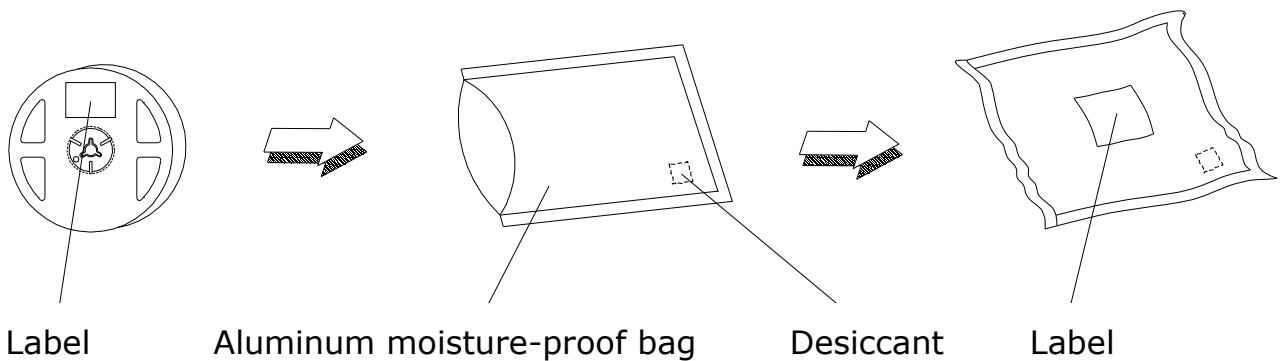
### Tape Dimensions



Unit: mm

Tolerance: ±0.1mm

### Moisture Resistant Packaging





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### Note:

1. Above specification may be changed without notice. EVERLIGHT 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 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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