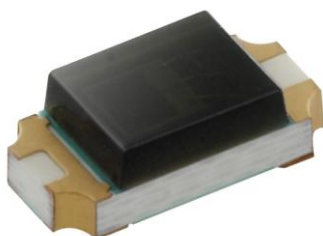


SMD ■ Ambient Light Sensor ALS-PDIC15-21B/TR8



Features

- Monolithic IC containing photodiode and current amplifier
- Human-eye spectral response and excellent IR-cut (from 700 to 1050 nm)
- Wide dynamic range: 1lx to 30,000lx
- 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)
- Supply voltage range: 1.8V to 5.5V
- Standby current: <1 uA
- Light to Current, analog output
- Operating temperature performance, -40°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. It is suitable in the power-saving control for backlighting displays in mobile phones.

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} -0.6	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}	5500	V
	ESD _{MM}	700	V
Soldering Temperature	T _{sol}	Reflow Soldering : 260 °C for 30 sec.	

Note:

1. 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}	1.8 ~ 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}	-----	90	-----	μA	$E_V=1000\text{Lux}$
Dark Current	I_D	-----	-----	100	nA	$E_V=0\text{Lux}$
Light Current	I_{PH1}	5	7.5	10	μA	$V_{CC}=3V$; $E_V=100\text{Lux}$ (Note1, Fig. 2)
	I_{PH2}	6	9	12	μA	$V_{CC}=3V$; $E_V=1000\text{Lux}$ (Note2, Fig. 2)
	I_{PH3}	50	75	100	μA	$V_{CC}=3V$; $E_V=1000\text{Lux}$ (Note1, Fig. 2)
Photocurrent Ratio	I_{PH2}/I_{PH1}	-----	1.2	-----	-----	
Saturation Output Voltage	V_O	2.2	2.4	-----	V	$V_{CC}=3V$; $E_V=1000\text{Lux}$ $R_L=150K\Omega$ (Fig. 3)
Peak Sensitivity Wavelength	λ_P	-----	550	-----	nm	
Switching Time	Rise Time	t_r	-----	11	μS	$V_{CC}=3V$; $E_V=1000\text{Lux}$ $R_L=150K\Omega$ (Fig. 4)
	Fall Time	t_f	-----	400	μS	
	Delay Time	t_d	-----	250	μS	
	Storage Time	t_s	-----	35	μS	

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

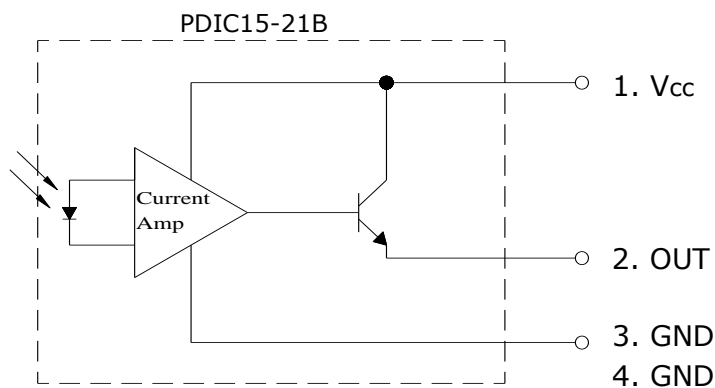


Fig. 2 Measurement Method of Light Current

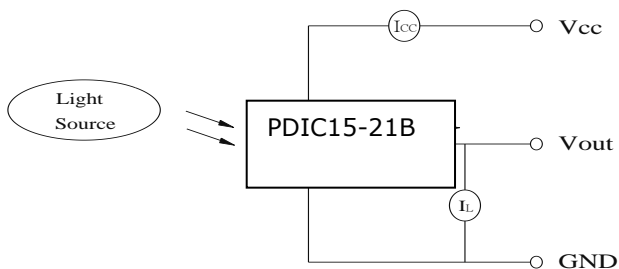


Fig.3 Measurement Method of Saturation Output Voltage

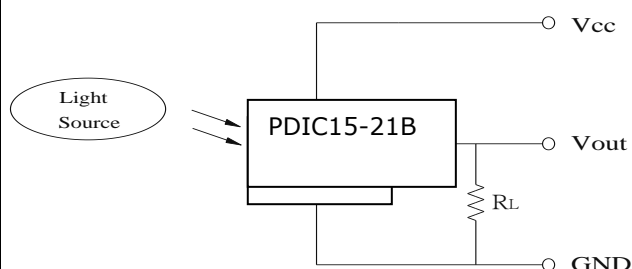
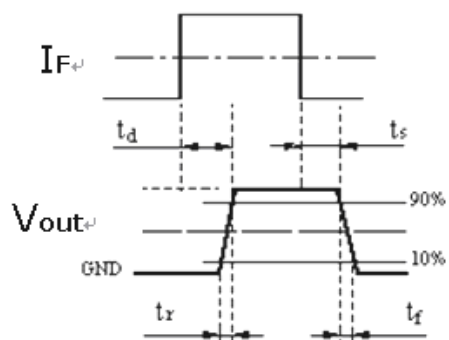
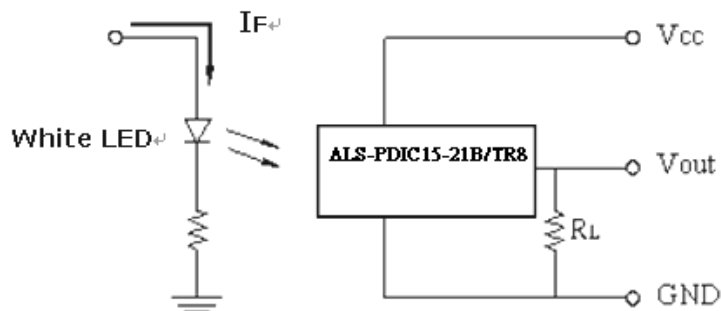


Fig.4 Switching Time Measurement Method

Pulse Current I_F



Typical Electro-Optical Characteristics Curves

Fig.5 Light Current vs. Illuminance

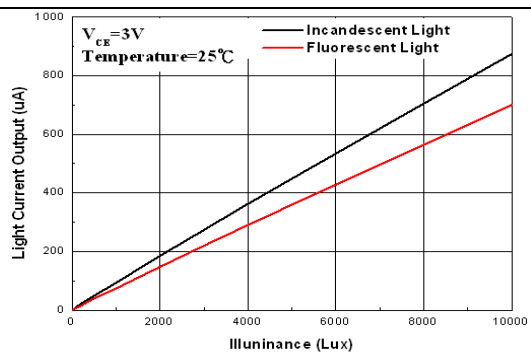


Fig.6 Dark Current vs. Temperature

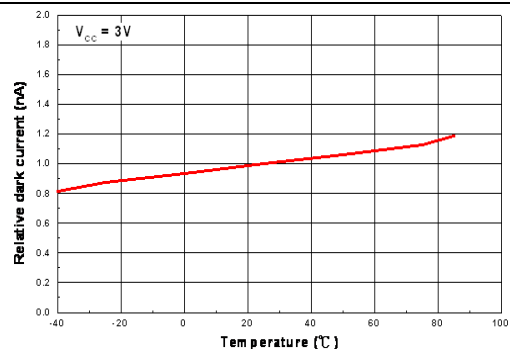


Fig.7 Relative light current vs. Temperature

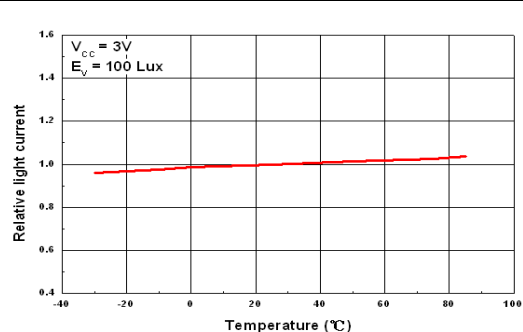


Fig.8 Light current vs. Supply Voltage

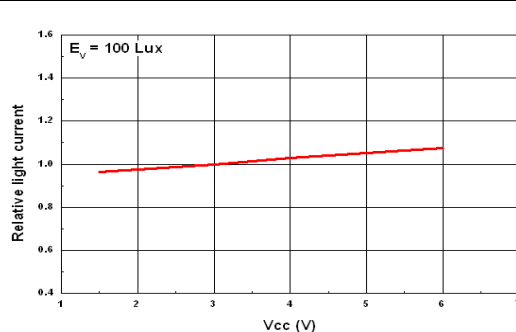


Fig.9 Spectral Response

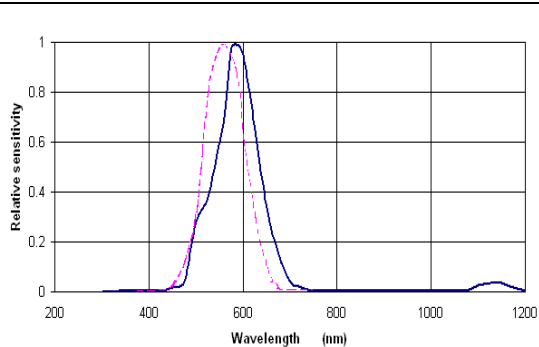


Fig.10 Switching time vs. Load resistance

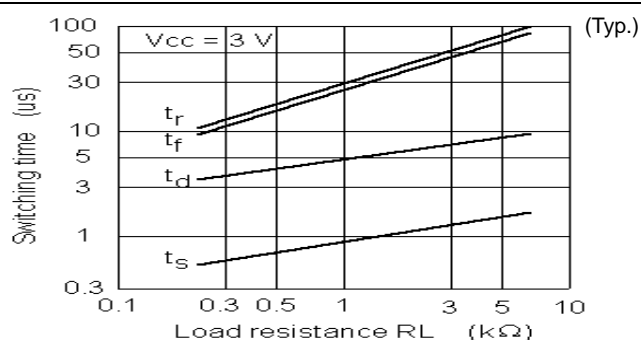


Fig.11 Output Voltage vs. Illuminance

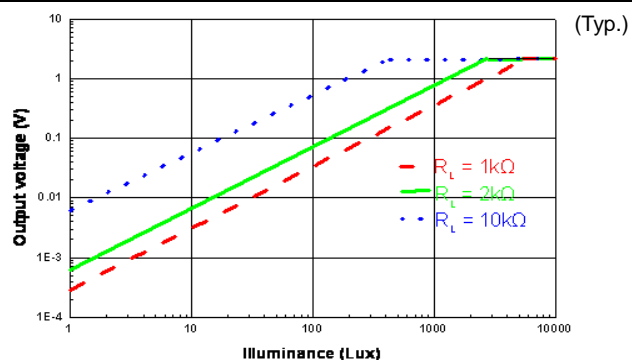
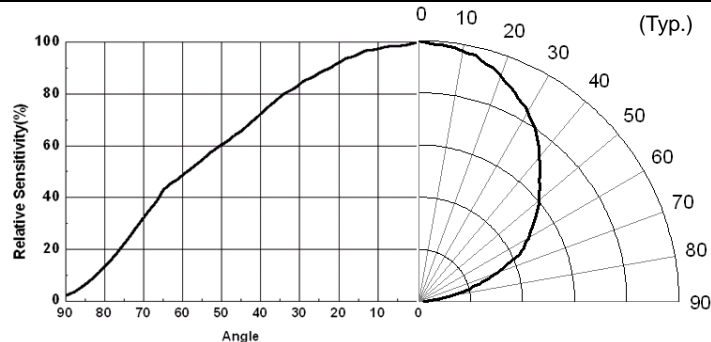
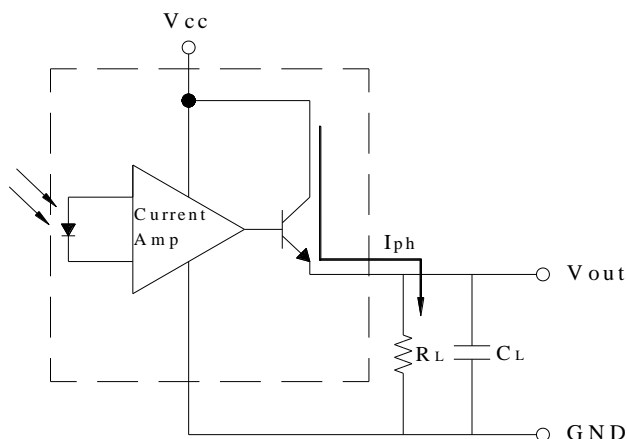


Fig.11 Relative Sensitivity vs. Angle



Converting Photocurrent to Voltage

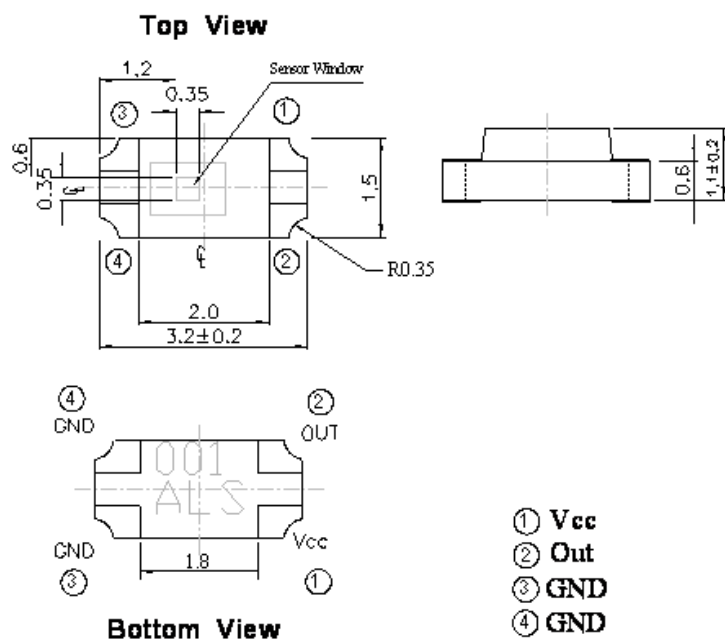


Note:

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:

$$V_{out(max.)} = I_{out(max.)} \times R_L \leq V_{out(saturation)} = V_{cc} - 0.6V$$

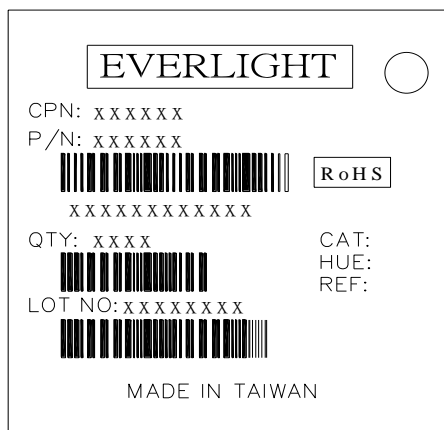
Package Dimension



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

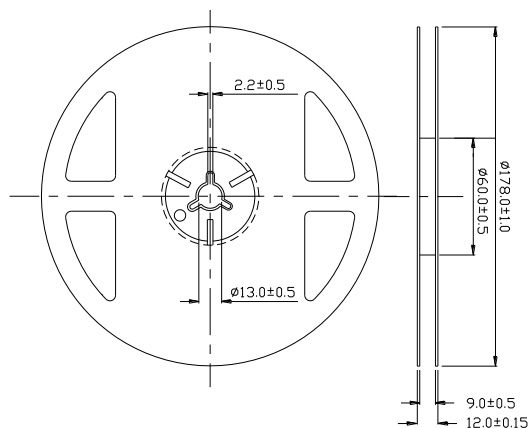
Moisture Resistant Packing Materials

Label Explanation

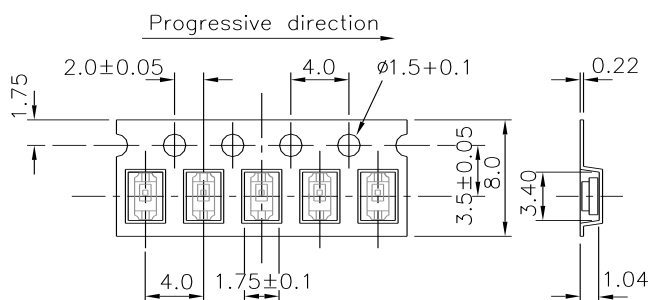


- CPN: Customer's Product Number
- P/N: Product Number
- QTY: Packing Quantity
- CAT: Luminous Intensity Rank
- HUE: Dom. Wavelength Rank
- REF: Forward Voltage Rank
- LOT No: Lot Number

Reel Dimensions

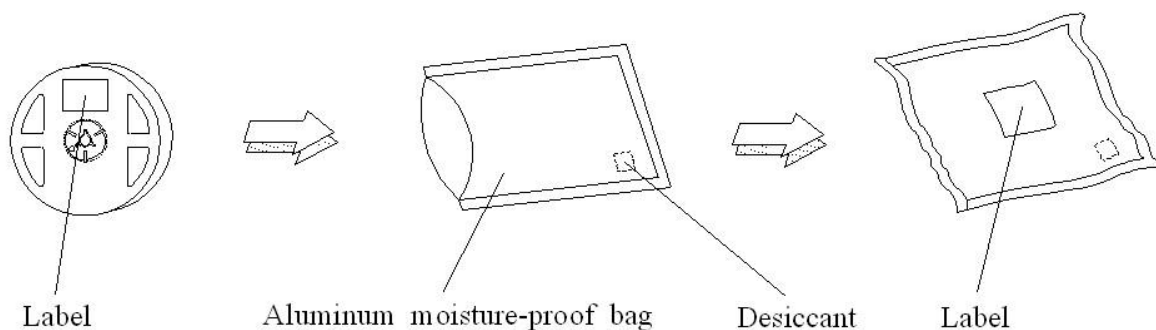


Carrier Tape Dimensions: Loaded Quantity 2000 pcs Per Reel



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

Moisture Resistant Packing Process

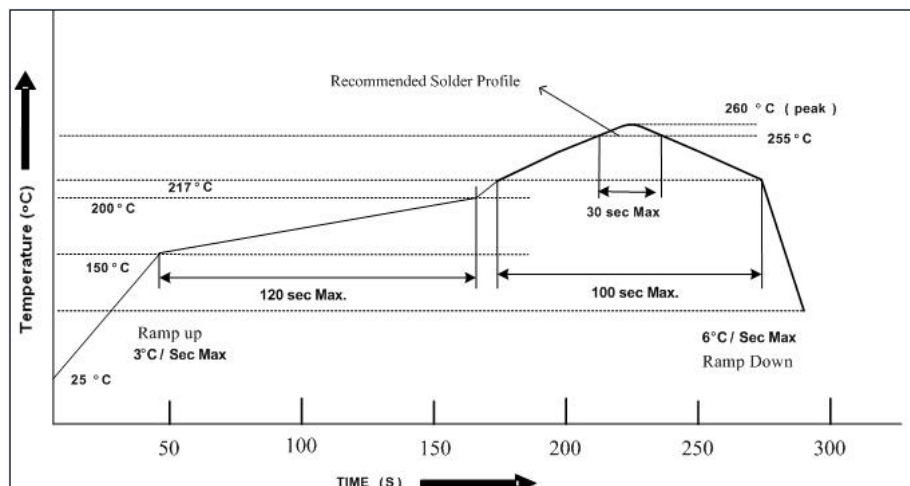


Note: Tolerances unless mentioned $\pm 0.1\text{mm}$. Unit = mm

Recommended method of storage

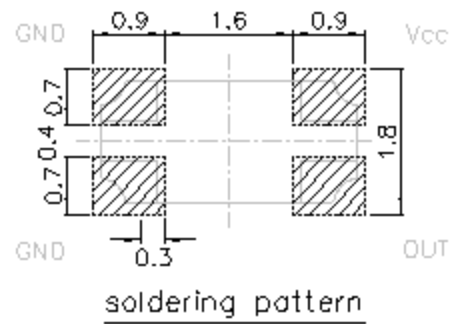
1. Do not open moisture proof bag before devices are ready to use.
2. Shelf life in sealed bag from the bag seal date: 18 months at $10^{\circ}\text{C}\sim 30^{\circ}\text{C}$ and $< 90\% \text{ RH}$.
3. After opening the package, the devices must be stored at $10^{\circ}\text{C}\sim 30^{\circ}\text{C}$ and $\leq 60\% \text{ RH}$, and used within 168 hours (floor life).
4. If the moisture absorbent material (desiccant material) has faded or unopened bag has exceeded the shelf life or devices (out of bag) have exceeded the floor life, baking treatment is required.
5. If baking is required, refer to IPC/JEDEC J-STD-033 for bake procedure or recommend the following conditions:
192 hours at $40^{\circ}\text{C} +5/-0^{\circ}\text{C}$ and $< 5\% \text{ RH}$ (reeled/tubed/loose units) or
96 hours at $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and $< 5\% \text{ RH}$ (reeled/tubed/loose units) or
24 hours at $125^{\circ}\text{C} \pm 5^{\circ}\text{C}$, not suitable for reel or tubes.

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.
4. Reference: IPC/JEDEC J-STD-020D
5. Recommend soldering pad as drawing.

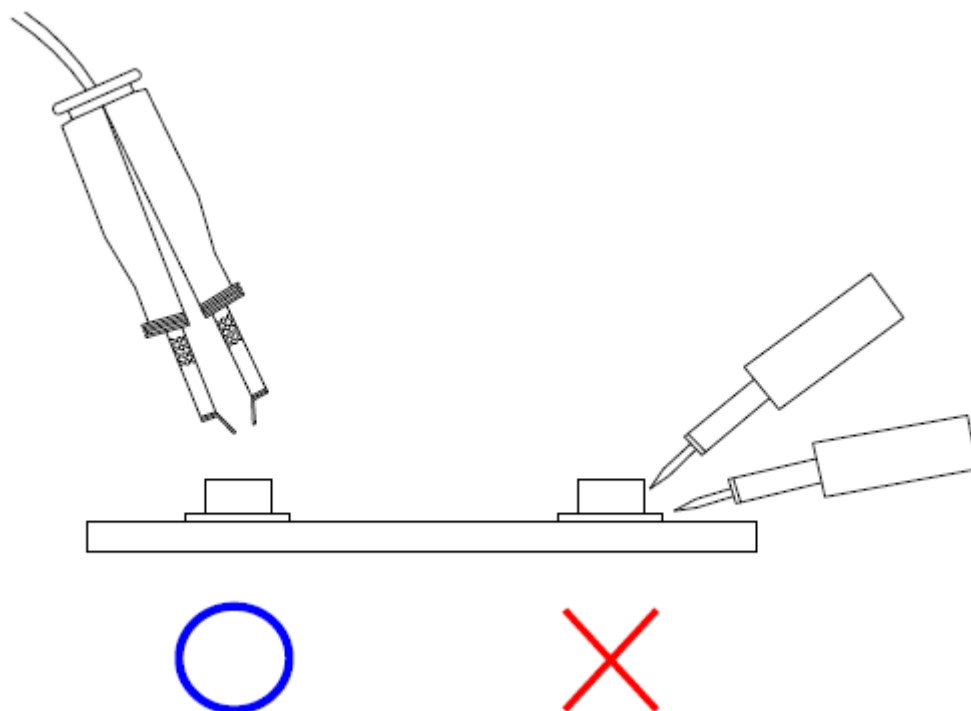


Soldering Iron

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.



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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