

Technical Data Sheet

Infrared Remote-control Receiver Module

IRM-V538/TR1

Features

- High shielding against electric field disturbance.
- Circular lens to improve the receive characteristic.
- Line-up for various center carrier frequencies.
- Low voltage and low power consumption.
- High immunity against ambient light.
- Photodiode with integrated circuit.
- TTL and CMOS compatibility.
- Side-received SMD.
- Suitable burst length ≥ 10 pulses/burst.
- This product itself will remain within RoHS compliant version.
- Pb free.
- External dimensions 5.3(L)*3.8(W)*2.65(H)mm.



Descriptions

The device is a miniature SMD type infrared remote control system receiver that has been developed and designed by utilizing the most updated IC technology. The PIN diode and preamplifier are assembled on PCB, the epoxy package is designed as an IR filter. The demodulated output signal can directly be decoded by a microprocessor.

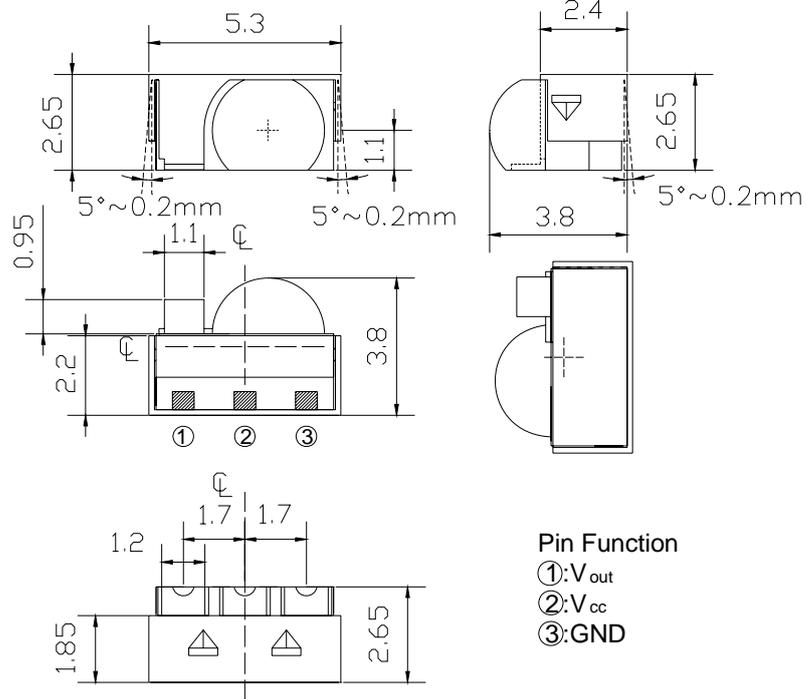
Applications

1. Light detecting portion of remote control
 - AV instruments such as Audio, TV, VCR, CD, MD, etc.
 - Home appliances such as Air-conditioner, Fan , etc.
 - The other equipments with wireless remote control.
 - CATV set top boxes
 - Multi-media Equipment

Device Selection Guide

| PART | MATERIAL | COLOR |
|------------|----------|--------------|
| Chip | Silicon | --- |
| Package | Epoxy | Black |
| Metal case | SPCC | Silver white |

Package Dimensions

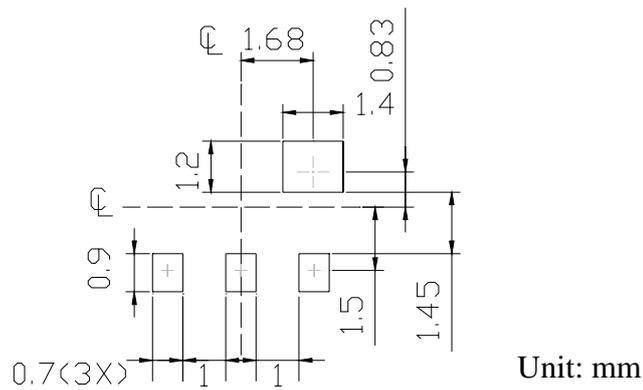


Pin Function
 ①: V_{out}
 ②: V_{cc}
 ③: GND

- Notes :** 1.All dimensions are in millimeters.
 2.Tolerances unless dimensions ±0.2mm.

Soldering patterns

The following soldering patterns are recommended for reflow-soldering :



Unit: mm

Available Types For Different Carrier Frequencies

| Type | Carrier Frequencies (Typ) |
|--------------|---------------------------|
| IRM-V538/TR1 | 38 kHz |

Absolute Maximum Ratings (Ta=25°C)

| Parameter | Symbol | Rating | Unit | Notice |
|-----------------------|------------------|-----------|------|--------|
| Supply Voltage | V _{cc} | 0~6 | V | |
| Operating Temperature | T _{opr} | -25 ~ +85 | °C | |
| Storage Temperature | T _{stg} | -40 ~ +85 | °C | |

Recommended Operating Condition**Supply Voltage Rating: V_{cc} 2.7V to 5.5V****Electro-Optical Characteristics (Ta=25°C, and V_{cc}=3.0V)**

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit | Condition |
|---------------------------|-----------------|------|------|------|---------|-----------------------|
| Supply Current | I _{cc} | --- | --- | 1.2 | mA | No signal input |
| Peak Wavelength | λ_p | --- | 940 | --- | nm | |
| Reception Distance | L ₀ | 8 | --- | --- | m | At the ray axis *1 |
| | L ₄₅ | 5 | --- | --- | | |
| Half Angle(Horizontal) | Θ_h | --- | 45 | --- | deg | |
| Half Angle(Vertical) | Θ_v | --- | 45 | --- | deg | |
| High Level Pulse Width | T _H | 400 | --- | 800 | μs | |
| Low Level Pulse Width | T _L | 400 | --- | 800 | μs | |
| High Level Output Voltage | V _H | 2.7 | --- | --- | V | |
| Low Level Output Voltage | V _L | --- | 0.2 | 0.5 | V | |

Notes:

*1 : The ray receiving surface at a vertex and relation to the ray axis in the range of $\theta=0^\circ$ and $\theta=45^\circ$.

*2 : A range from 30cm to the arrival distance. Average value of 50 pulses.

The Notice of Application:

Transmission remote control signal consist of four parts: Encode Part, IR Transmitter Source, IRM device, Decode Part

1. When IRM-V538 code select frequency, it need to well understand the center system of encode part.
2. Strong or weak light of IR Transmitter can affect distance of transmission.
3. Minimum Burst Length T_{burst} (number of pulses per burst) : 10 cycles
4. It needs to ensure the translation range of decode part if it is applied to the pulse-width range.

If the above items hardly assure of its application, it'll cause NG(no good) message from the edge of signal.

Test Method :

The specified electro-optical characteristics is satisfied under the following Conditions at the controllable distance.

① Measurement place

A place that is nothing of extreme light reflected in the room.

② External light

Project the light of ordinary white fluorescent lamps which are not high Frequency lamps and must be less then 10 Lux at the module surface.
($E_e \leq 10\text{Lux}$)

③ Standard transmitter

A transmitter whose output is so adjusted as to **$V_o=400\text{mVp-p}$** and the output Wave form shown in Fig.-1. According to the measurement method shown in Fig.-2 the standard transmitter is specified.

However , the infrared photodiode to be used for the transmitter should be $\lambda_p=940\text{nm}, \Delta\lambda=50\text{nm}$. Also, photodiode is used of PD438B($V_r=5\text{V}$).
(Standard light / Light source temperature 2856°K).

④ Measuring system

According to the measuring system shown in Fig.-3

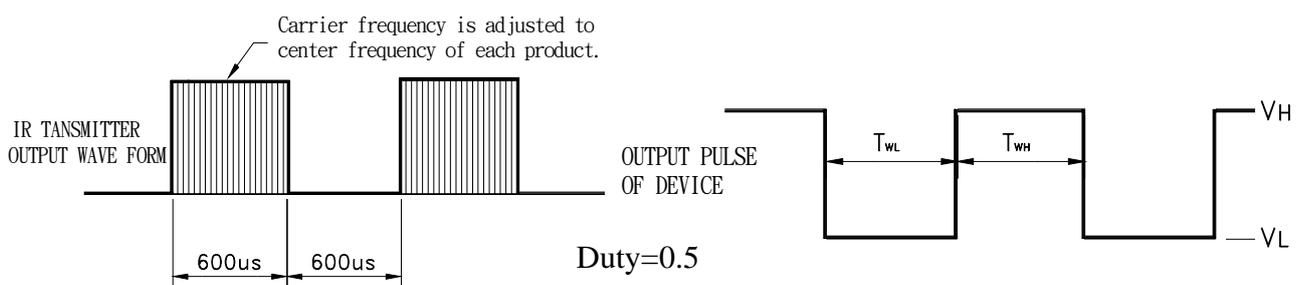
Fig.-1 Transmitter Wave Form**D.U.T output Pulse**

Fig.-2 Measuring Method

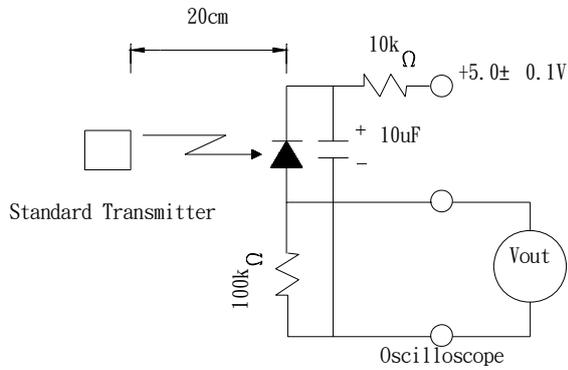
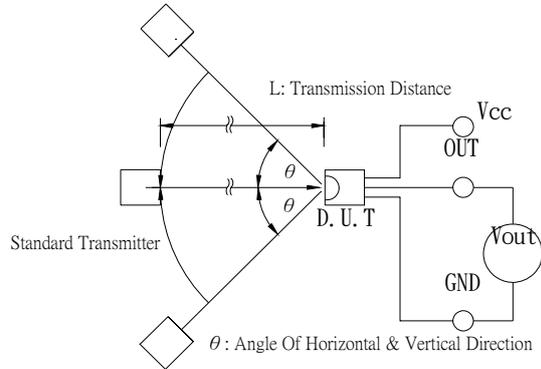
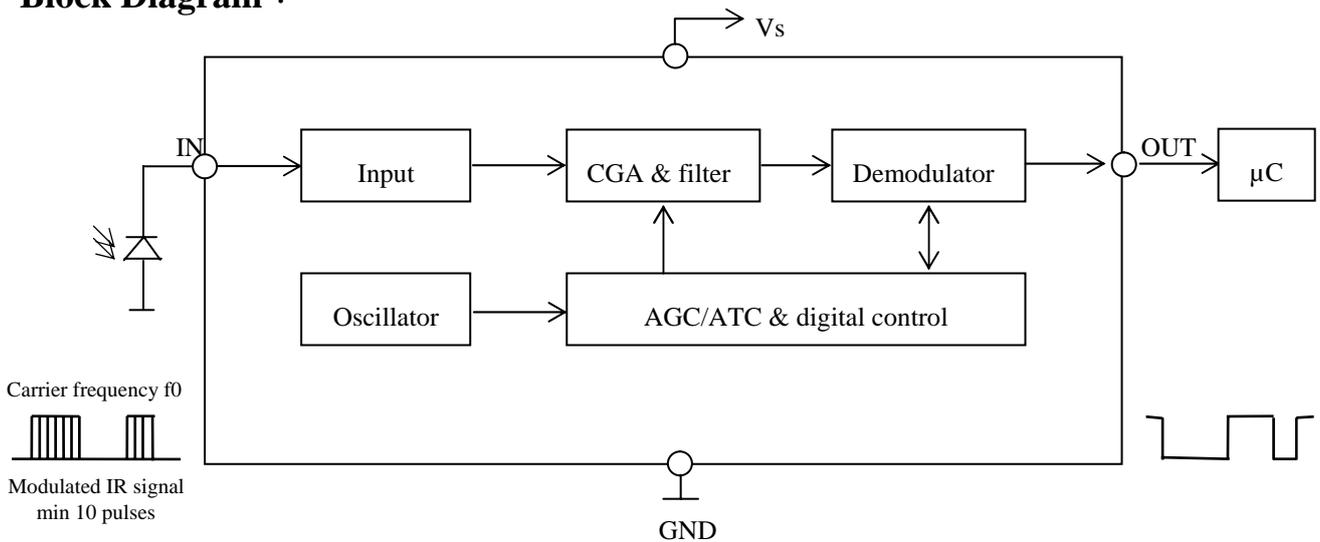


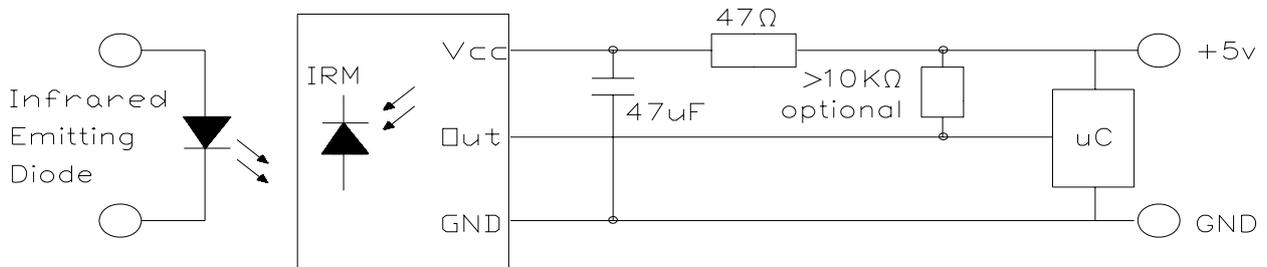
Fig.-3 Measuring System



Block Diagram :



Application Circuit :



RC Filter should be connected closely between Vcc pin and GND pin.

Typical Electro-Optical Characteristics Curves

Fig.-4 Relative Spectral Sensitivity vs. Wavelength

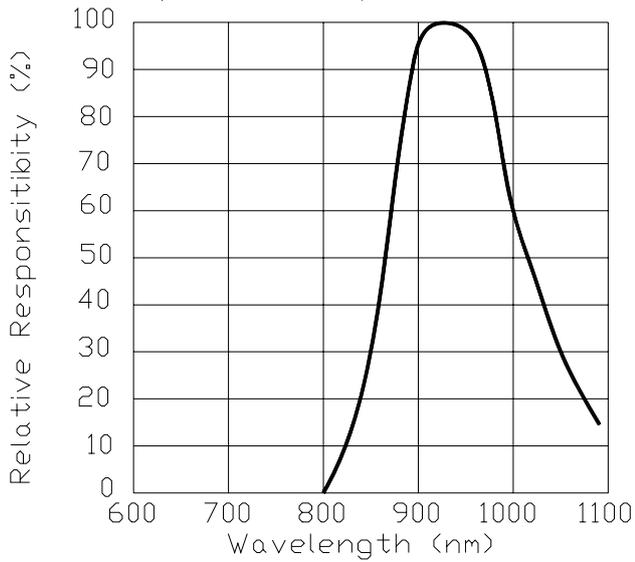


Fig.-5 Relative Transmission Distance vs. Direction

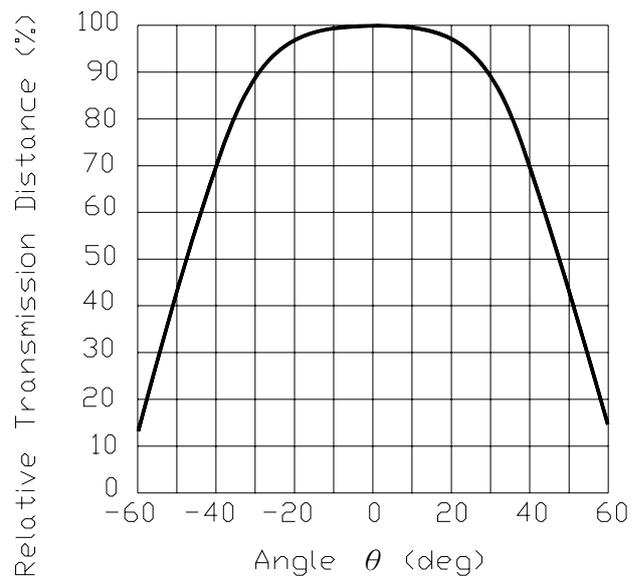


Fig.-6 Output Pulse Length vs. Arrival Distance

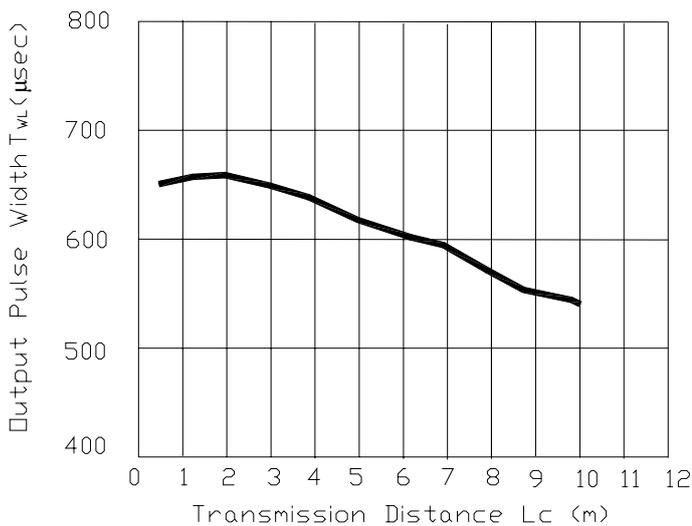
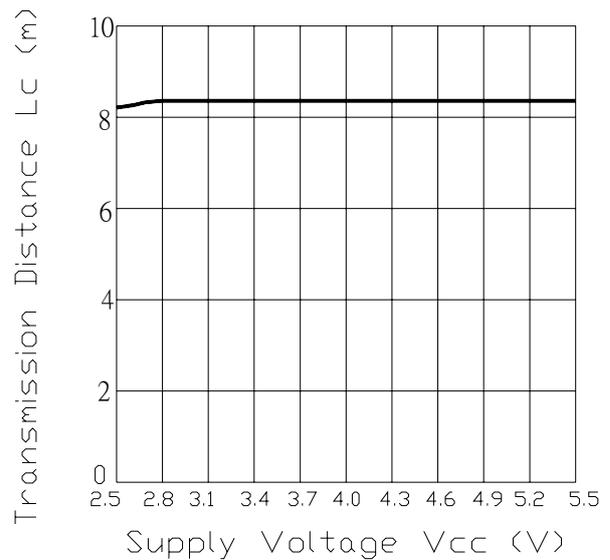


Fig.-7 Arrival Distance vs. Supply Voltage



Typical Electro-Optical Characteristics Curves

Fig.-8 Relative Transmission Distance vs. Center Carrier Frequency

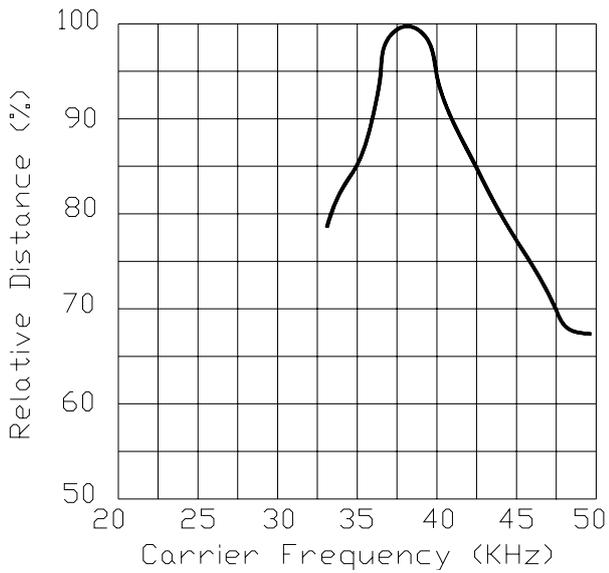
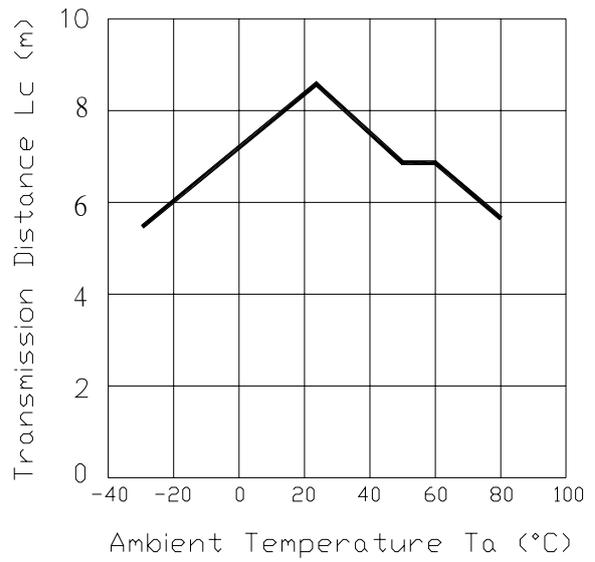


Fig.-9 Arrival Distance vs. Ambient Temperature



Reliability Test Item And Condition

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%

LTPD : 10%

Reflow Terms: JEDEC Level 4 Specification

Drying; Temp.:125°C 24hrs → Moisture 30°C / 60% RH 96hrs → Reflow Temp.: 260°C±5°C

10sec, 3 times

Note:

1. Not sooner than 15 minutes and not longer than 4 hours after removal from the temperature/humidity chamber.
2. The time between reflow shall be 5 minutes minimum and 60 minutes maximum.

| Test Items | Test Conditions | Failure Judgement Criteria | <u>Samples(n)</u> Defective(c) |
|-----------------------------------|---|---|-----------------------------------|
| Temperature cycle | 1 cycle : -25°C ↔ +85°C (30min)(5min)(30min) 300 cycle test | $L_0 \leq L \times 0.8$ $L_{45} \leq L \times 0.8$ | n=76,c=0 |
| High temperature test | Temp : +85°C Vcc : 5V 1000hrs | L: Lower specification limit | n=76,c=0 |
| Low temperature storage | Temp : -40°C 1000hrs | *Icc : Operate Current (mA) | n=76,c=0 |
| High temperature High humidity | Ta : 85°C , RH : 85% 1000hrs | Variation $\leq \pm 20\%$: | n=76,c=0 |

Recommended method of storage

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:

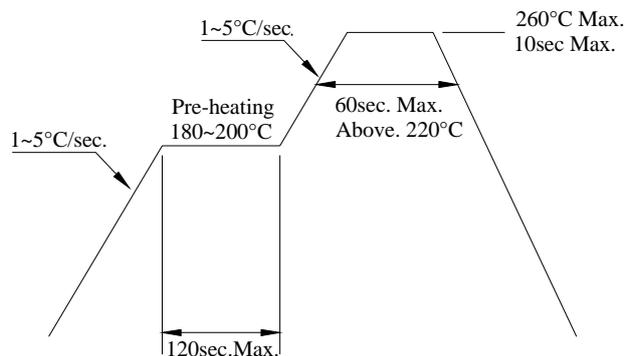
In case of moisture absorption, the devices will recover to former condition by drying under the following condition:

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



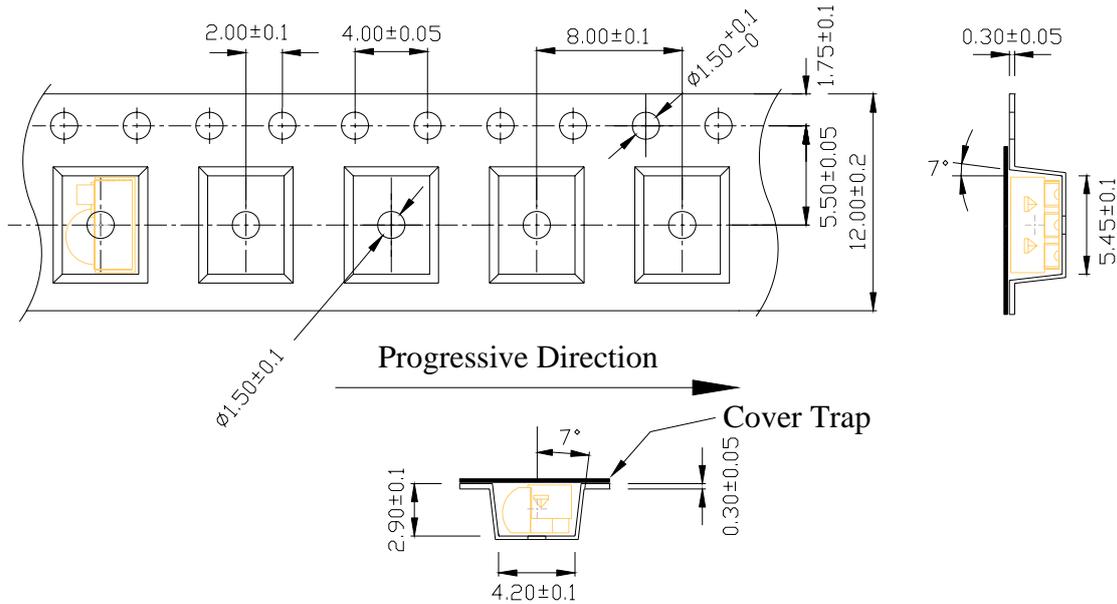
Notice:

- (1) Reflow soldering should not be done more than two times.
 - (2) When soldering, do not put stress on the IRM-V538/TR1 Series devices during heating.
 - (3) After soldering, do not warp the circuit board.
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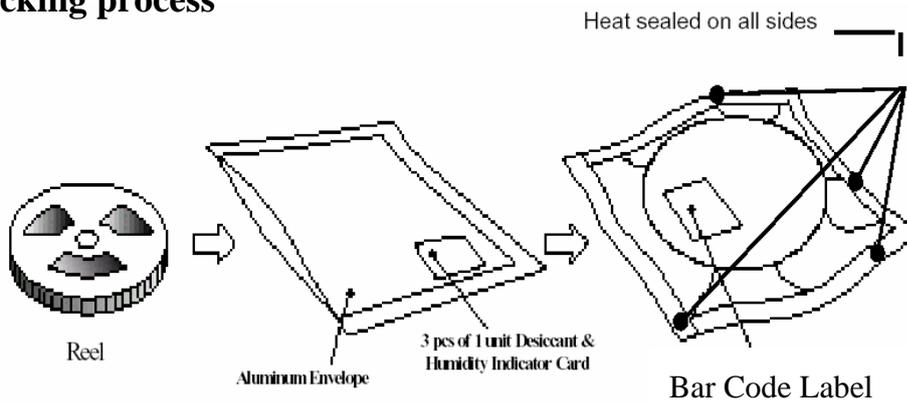
Packing Quantity Specification

- 1. 2000 PCS/1 Reel
- 2. 5 Reel /1Carton

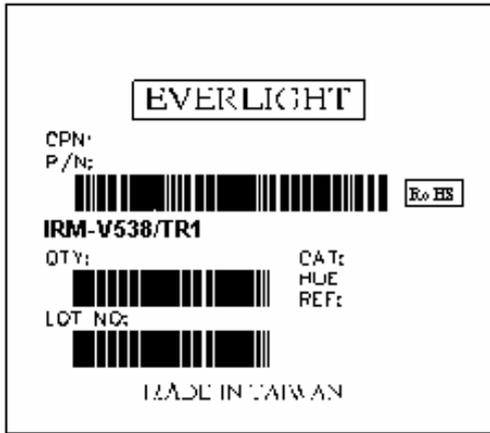
Carrier Tape Dimensions: Loaded quantity 2000 PCS per reel



Packing process



Label Form Specification



CPN: Customer's Production Number

P/N : Production Number

QTY: Packing Quantity

CAT: None

HUE: None

REF: Reference

LOT No: Lot Number

MADE IN TAIWAN: Production Place