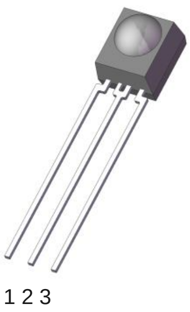
DATASHEET

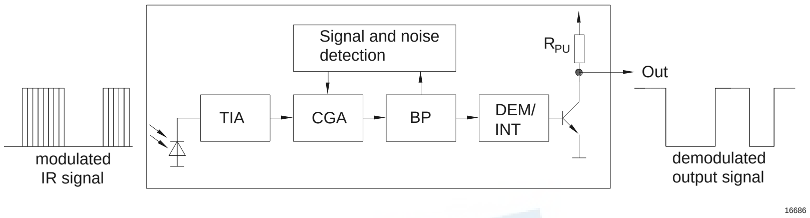
# Infrared Receiver Module
# IRM-36xxJT Series



Pin Configuration

1. Out
2. Gnd
3. $V_{CC}$

Fig.1 Block Diagram




## Features

- Circular lens for improved reception characteristics
- Available for various carrier frequencies
- Low operating voltage and low power consumption
- Optimized immunity against TFT backlight interferences
- High immunity against ambient light
- Long reception range
- High sensitivity
- Pb free and RoHS compliant
- Compliance with EU REACH
- Compliance Halogen Free (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)

## Description

The IRM-36xxJT devices are DIP type infrared receivers which have been developed and designed by using the latest IC technology, providing compatibility to most common IR protocols.
The PIN diode and preamplifier are assembled onto a lead frame and molded into a black epoxy package which operates as an IR filter. The demodulated output signal can directly be decoded by a microprocessor.

## Applications

- AV equipment such as TV, VCR, DVD, CD, MD, etc.
- CATV set top boxes
- Multi-media Equipment
- Other devices using IR remote control

## Part number table

| Model No. | Carrier Frequency $f_c$ |
|---|---|
| IRM-3636JT | 36 kHz |
| IRM-3638JT | 38 kHz |
| IRM-3640JT | 40 kHz |

## Absolute Maximum Ratings ($T_a$=25°C) (note1)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Supply Voltage | $V_{cc}$ | 0 ~ 6 | V |
| Output current | $I_{OUT}$ | 0 ~ 2.5 | mA |
| Operating Temperature | $T_{opr}$ | -20 ~ +80 | ℃ |
| Storage Temperature | $T_{stg}$ | -40 ~ +85 | ℃ |
| Soldering Temperature (note2) | $T_{sol}$ | 260 | ℃ |

## Electro-Optical Characteristics ($T_a$=25°C, $V_{cc}$=5V)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| Current consumption | $I_{cc}$ | 0.1 | 0.23 | 0.6 | mA | No input signal |
| Supply voltage | $V_{CC}$ | 2.7 | --- | 5.5 | V | |
| Peak wavelength | $\lambda_p$ | --- | 940 | --- | nm | |
| High level output voltage | $V_{OH}$ | Vcc-0.4 | Vcc | --- | V | Output open |
| Low level output voltage | $V_{OL}$ | --- | --- | 0.5 | V | $I_{OUT}$< 2.5mA |
| Internal pull up resistor | $R_{PU}$ | --- | 45 | --- | kΩ | |
| Max Reception range | $L_{0max}$ | 14 | 20 | --- | m | Test signal according to figure 2 Output pulse width: 400us<$T_L$<800us 400us<$T_H$<800us |
| | $L_{45max}$ | 7 | 10 | --- | | |
| Min reception distance | $L_{0min}$ | --- | --- | 0.1 | | |
| Half angle(horizontal) | $\varphi_h$ | --- | ±45 | --- | deg | |
| Half angle(vertical) | $\varphi_v$ | --- | ±45 | --- | deg | |
| Output low pulse | $T_L$ | 400 | --- | 800 | us | See chapter test method, |
| Output high pulse | $T_H$ | 400 | --- | 800 | us | |

Note1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.
Note2: 4mm from mold body for less than 5 seconds

## Test method

The specified electro-optical characteristics are valid under the following conditions.

1. Measurement environment must be a place without extreme reflections
2. Transmitter radiant intensity $I_e$ = 80mW/sr
3. External lighting contains LED lighting with a color temperature of 6000K and illumination at the IR receiver is less than 100lux (Ev≦ 100Lux))
4. Test signal as shown below in figure 3

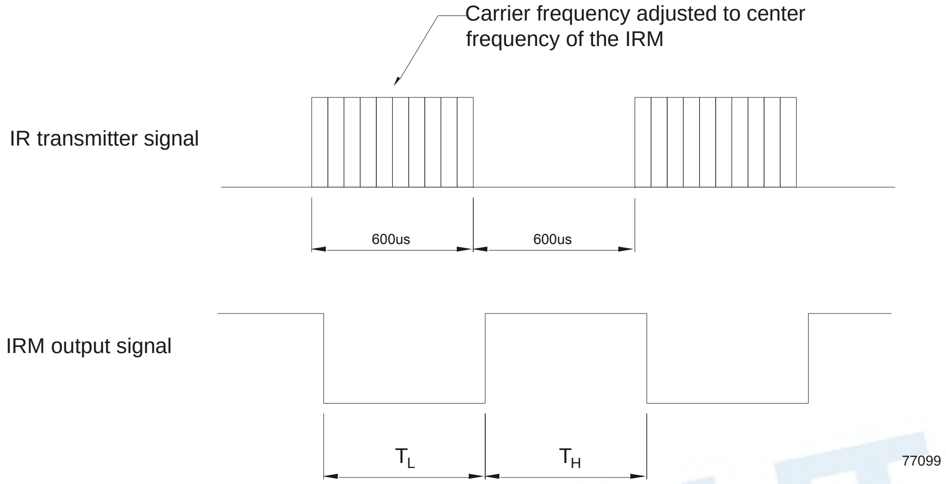



Fig.2 test signal and IRM output signal for reception distance and viewing angle test

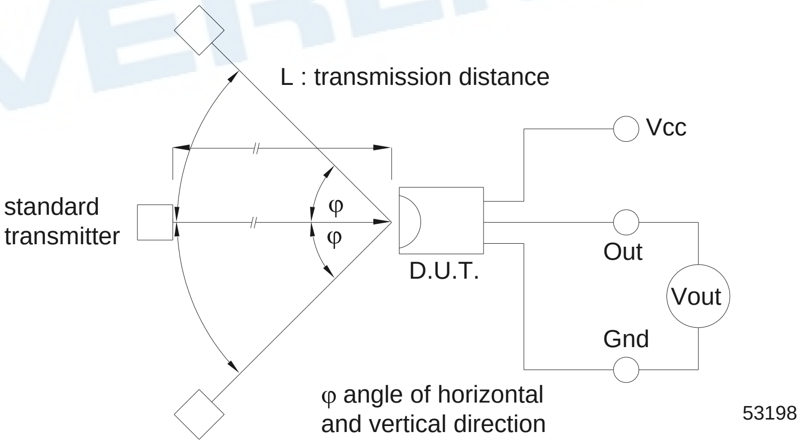



Fig.3 Measuring System

## Typical Electro-Optical Characteristics Curves

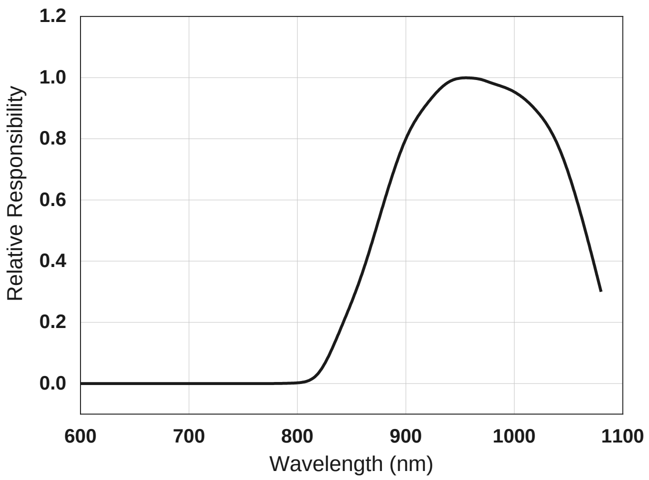



Fig. 4 Relative Responsibility vs. Wavelength

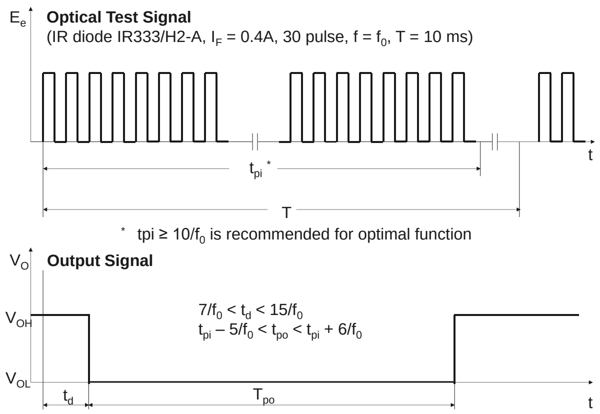



Fig. 5 IR Signal vs. Output Signal

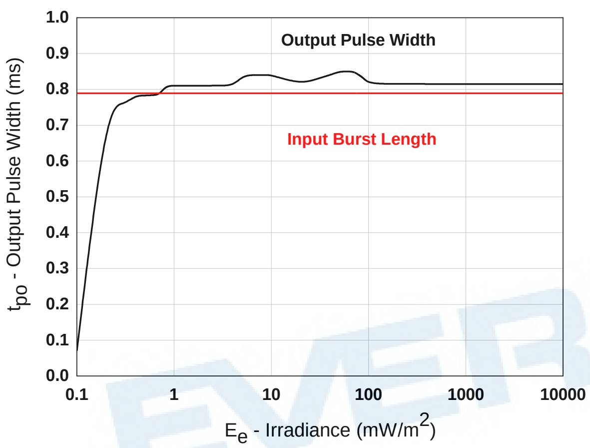



Fig. 6 Output Pulse Width and Sensitivity in Dark Ambient

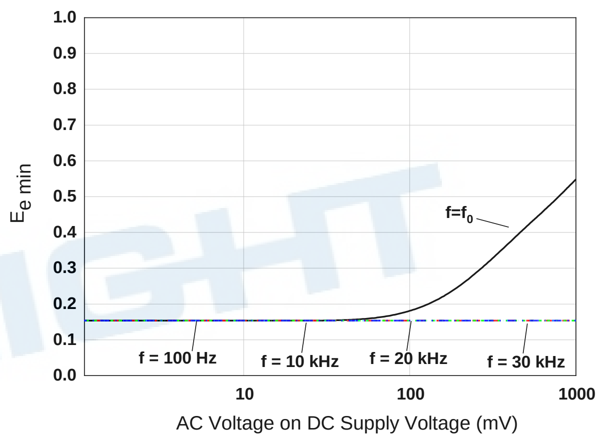



Fig. 7 $E_{e\ min.}$ vs. Supply Voltage Disturbances

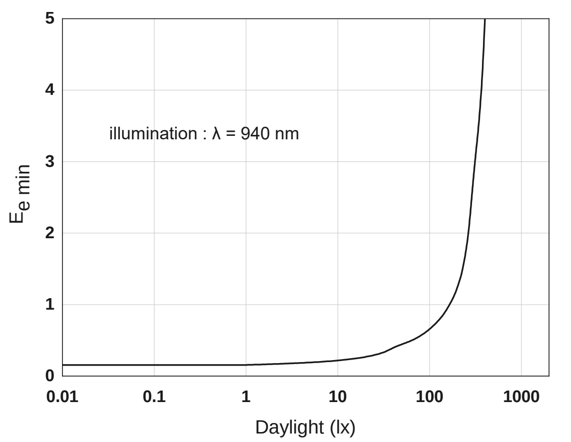



Fig. 8 Daylight vs. $E_{e\ min.}$

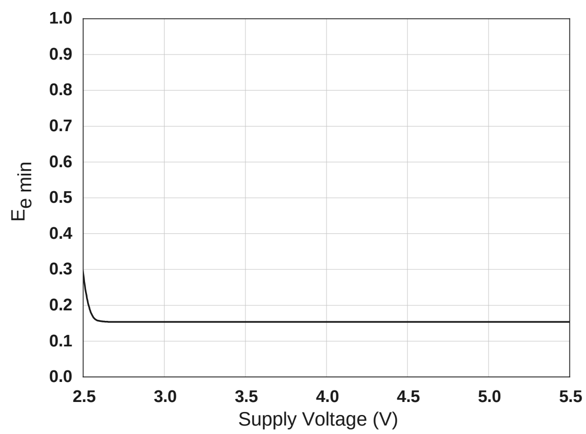



Fig. 9 Ee min. vs. Supply Voltage

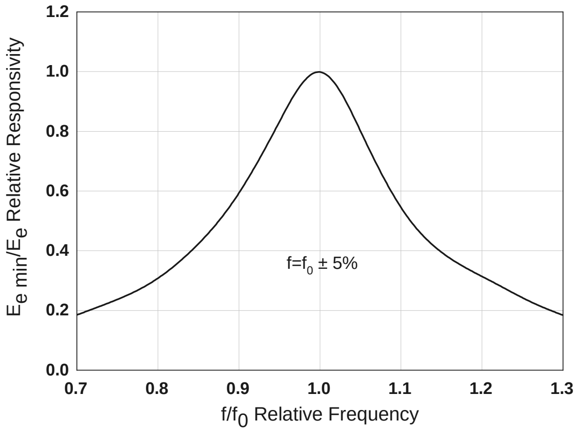



Fig. 10 Frequency Dependence of Responsivity

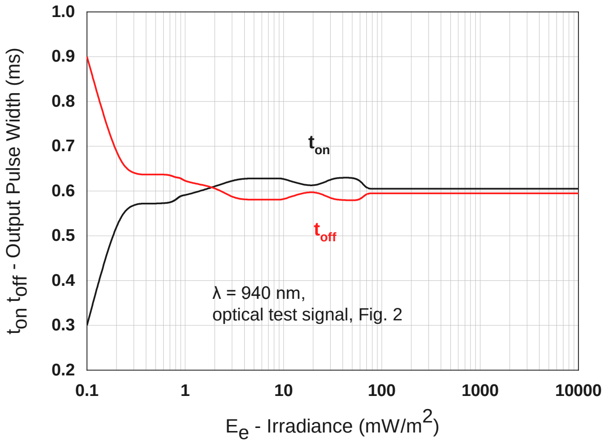



Fig. 11 Output Pulse Diagram

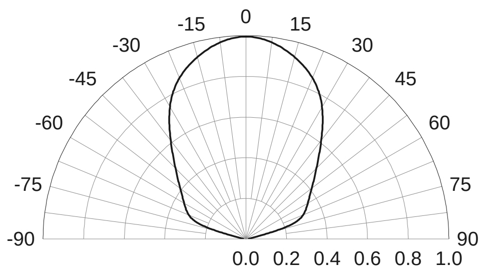



Fig. 12 Horizontal Directivity

## Application considerations

IRM IR receiver modules are high gain analog components to reach a long reception range. However, due to the high gain, they are also sensitive to noise from the power supply like $V_{cc}$ ripple. Noise on the power supply can reduce the reception range of the IRM or cause output glitches and corrupted data. To protect the IRM receiver from power supply noise, a RC filter must be connected as close as possible to the $V_{cc}$ and GND pins of the IRM. The circuit below in figure 9 shows the configuration of the RC filter and the required values. Ceramic or tantalum capacitor should be used, as standard electrolytic capacitors are only suitable for low frequencies and might not be able to filter noise in the frequency range of the IRM. The IRM receiver is most sensitive to noise which is at the carrier frequency or close to the carrier frequency. When using a switching mode power supply, the switching frequency must not be the same as the carrier frequency of the IRM. A gap of at least 20kHz between the switching frequency of the power supply and the IRM carrier frequency is recommended.
If the trace from the IRM output pin to the decoder IC on the PCB is long, the parasitic capacitance might be high causing slow rise times of the IRM output signal. In such case, an additional pull up resistor of 10kOhm or higher can be added at the IRM output to reduce the influence of parasitic trace capacitance.

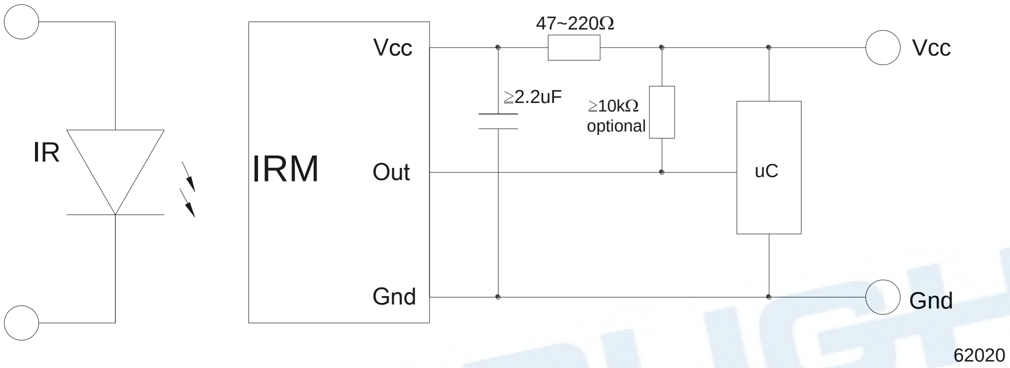



Fig.13: application circuit

## Code compatibility

The IRM-36xxJT receiver modules are mainly designed for remote control applications which require very high noise immunity. Hence the IR code compatibility is matched for the most common IR protocols. To guarantee a proper data signal reception, a few points need to be taken into consideration.
The signal transmission must be carried out in data packages with limited length followed by a data pause time of a certain length. Continuous data transmission is not applicable as such kind of signal will be judged as noise and suppressed after a short time. Table1 below shows the compatibility to most commonly used IR protocols. If an IR protocol is not listed in this table, the compatibility needs to be checked according to the burst times, gap times, data package length and data pause time. The required limits for these items are shown in table 2 “acceptable IR signal timings”.

| Protocol | Suitable | Protocol | Suitable | Protocol | Suitable |
|---|---|---|---|---|---|
| NEC | Yes | Toshiba | Yes | Sony 12 Bit | Yes |
| RC5 | Yes | RCMM | No | Sony 15 Bit | No |
| RC6 | Yes | Continuous | No | Sony 20 Bit | No |

Table 1: IR protocol compatibility

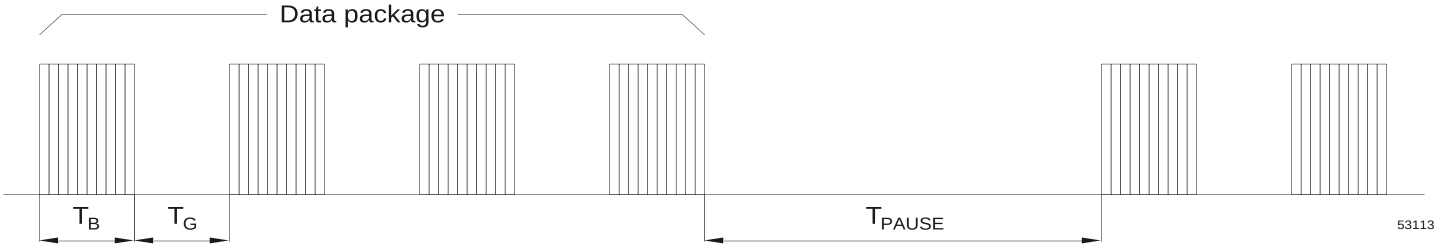



Fig.14: general IR data structure

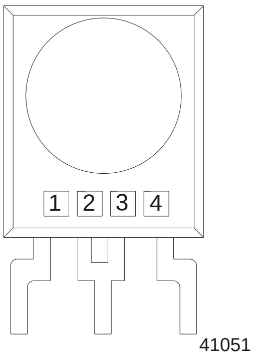
| | IRM-3636JT<br>IRM-3638JT<br>IRM-3640JT |
|---|---|
| Min. burst length $T_B$ | 300us |
| Min. gap length $T_G$ | 350us |
| Min. data pause time $T_{Pause}$ | Min. 25ms |
| Required data pause time | >(Total word length / 3 )+18.5ms |

Table 2: acceptable IR timings

## Operation under noisy environment

The IRM-36xxJT receiver modules are designed for high light noise immunity, especially for noise from fluorescent and energy saving lamps and noise from TFT TVs with CCFL backlight. The receiver is able to suppress most optical noise, but the presence of any kind of optical noise will cause shorter reception range because the AGC will reduce the gain to suppress the noise.
The presence of noise can also affect the output pulse jitter. In such case, the output pulse jitter shown in the electro-optical specification above, might not be valid anymore and bigger pulse jitter can occur. This behavior needs to be considered when tuning the timing limits of the decoder. It is recommended to use the output pulse variation shown in the electro-optical specifications above as a base to set the timing limits of the decoder. However, due to different protocols and environmental conditions, other timing limits might result in better performance and decoding security. This needs to be verified for the specific application by testing under different noise conditions.

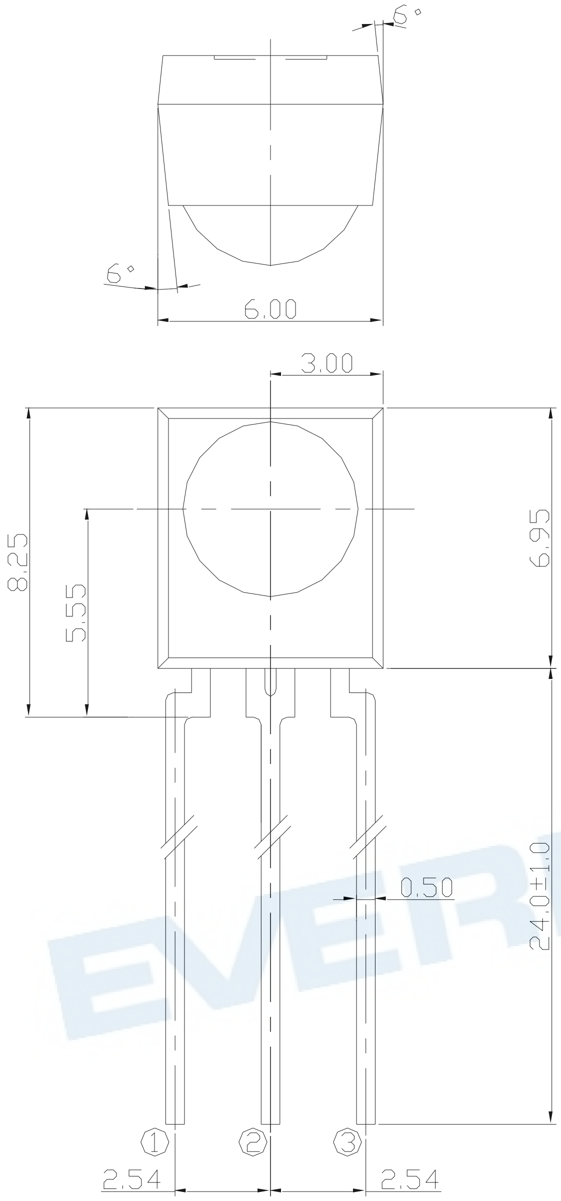
## Device Marking



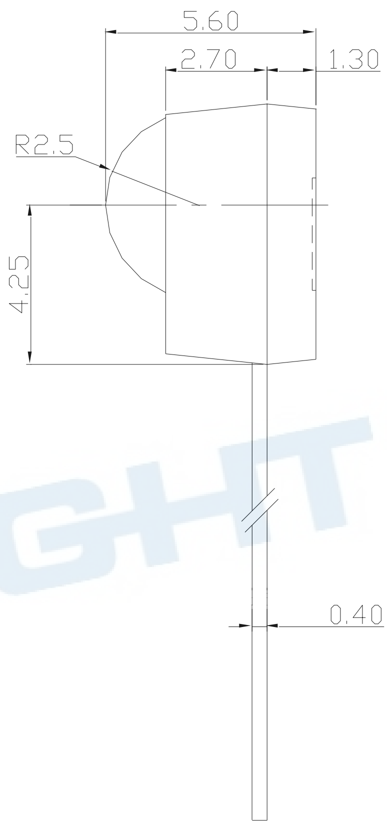

**Notes**

1 denotes Year code
2 denotes Month code
3 denotes Device number
4 denotes Carrier frequency

## Package Dimenstions




Pin Function
①: Vout
②: GND
③: Vcc




Notes:

1. All dimensions are in millimeters.
2. Tolerance unless otherwise mentioned is ±0.5mm

## Packing Quantity

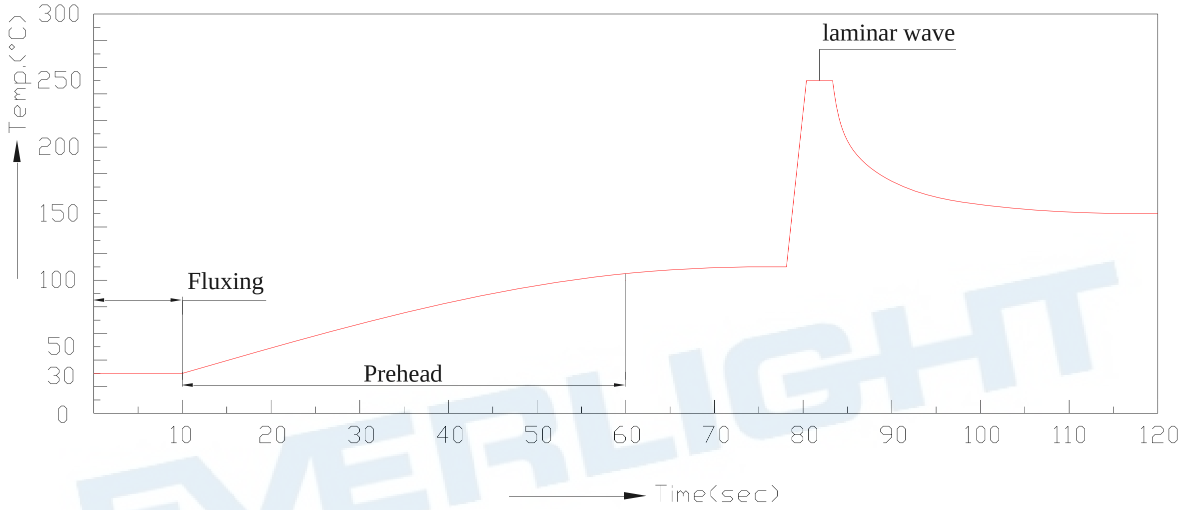
500 pcs / Bag
4 Bags / Box
10 Boxes / Carton

## Soldering

- Careful attention should be paid during soldering. When soldering, leave more then 4mm from solder joint to IRM device, and soldering beyond the base of the tie bar is recommended.
- Recommended soldering conditions:

| Hand Soldering | | DIP Soldering | |
|---|---|---|---|
| Temp. at tip of iron | 350℃ Max. (30W Max.) | Preheat temp. | 100℃ Max. (60 sec Max.) |
| Soldering time | 3 sec Max. | Bath temp. & time | 260 Max., 5 sec Max |
| Distance | 4mm Min.(From solder joint to IRM device) | Distance | 4mm Min.(From solder joint to IRM device) |

- Recommended soldering profile




- Avoiding applying any stress to the lead frame while the IRM device are at high temperature particularly when soldering.
- Dip and hand soldering should not be done more than one time
- After soldering the IRM device, the epoxy should be protected from mechanical shock or vibration until the IRM device return to room temperature.
- A rapid-rate process is not recommended for cooling the IRM device down from the peak temperature. Although the recommended soldering conditions are specified in the above table, dip or hand soldering at the lowest possible temperature is desirable for the IRM device.
- Wave soldering parameter must be set and maintained according to recommended temperature and dwell time in the wave soldering.

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2. The product meets EVERLIGHT published specification for a period of twelve (12) months from date of shipment.
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