

### Infrared Receiver Module IRM-V5xxM3/TR1 Series

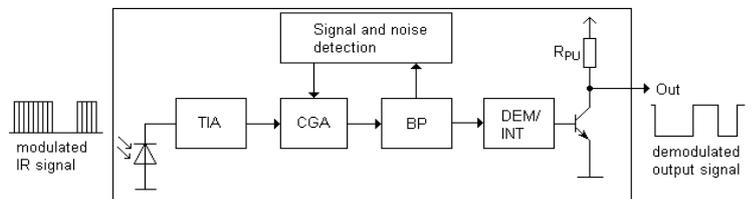


Pin Configuration

1. OUT
2. VCC
3. GND

1 2 3

#### Block Diagram



#### Features

- High protection ability against EMI
- Available for various carrier frequencies
- min burst length (36/38 kHz): 8 cycles
- min burst length (56 kHz): 10 cycles
- min gap length (36/38 kHz): 12 cycles
- min gap length (56 kHz): 14 cycles
- Low operating voltage and low power consumption
- High immunity against ambient light
- High immunity against TFT and PDP backlight
- 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)

#### Descriptions

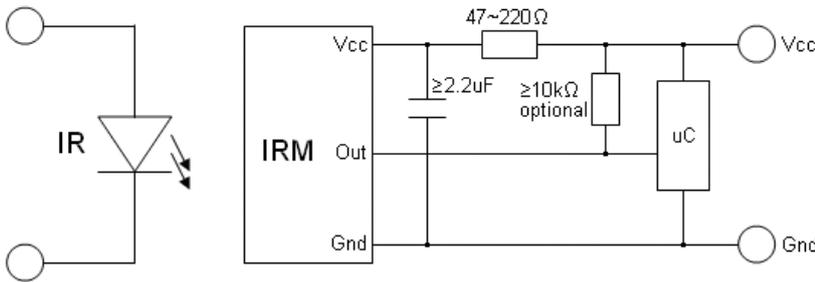
The device is miniature SMD type infrared receiver that has been developed and designed by utilizing the latest IC technology.

The PIN diode and preamplifier are assembled onto a lead frame and molded into an epoxy package which operated an IR filter. The demodulated output signal can directly be decoded by a microprocessor.

## Applications

- Light detecting portion of remote control
- AV instruments such as Audio, TV, VCR, CD, MD, etc
- Home appliances such as Air-conditioner, Fan, etc
- Other devices using IR remote control
- CATV set top boxes
- Multi-media Equipment

## Application Circuit



The RC filter must be placed as close as possible to the Vcc and Gnd pins of the IRM.

## Parts Table

Model No.	Carrier Frequency
IRM-V536M3/TR1	36 kHz
IRM-V538M3/TR1	38 kHz

### Absolute Maximum Ratings (T<sub>a</sub>=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	V <sub>cc</sub>	6	V
Operating Temperature	T <sub>opr</sub>	-20 ~ +80	°C
Storage Temperature	T <sub>stg</sub>	-40 ~ +85	°C
Soldering Temperature *1	T <sub>sol</sub>	260	°C

\*1 Soldering time ≤ 5 seconds

### Electro-Optical Characteristics (T<sub>a</sub>=25°C and V<sub>cc</sub>=3.0V)

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Current Consumption	I <sub>cc</sub>	---	0.4	0.6	mA	No signal input
Supply Voltage	V <sub>cc</sub>	2.7	---	5.5	V	
Peak Wavelength	λ <sub>p</sub>	---	940	---	nm	
Reception Distance	L <sub>0</sub>	8	---	---	m	See chapter ,Test method' *2
	L <sub>45</sub>	5	---	---		
Half Angle(Horizontal)	θ <sub>h</sub>	---	±45	---	deg	
Half Angle(Vertical)	θ <sub>v</sub>	---	±45	---	deg	
High Level Pulse Width	T <sub>WH</sub>	450	---	750	μs	Test signal according to figure 1 *3
Low Level Pulse Width	T <sub>WL</sub>	450	---	750	μs	
High Level Output Voltage	V <sub>H</sub>	V <sub>cc</sub> -0.4	---	---	V	
Low Level Output Voltage	V <sub>L</sub>	---	0.2	0.5	V	I <sub>SINK</sub> ≤ 2mA
Internal pull up resistor	R <sub>PU</sub>	---	40	---	kΩ	

Notes:

\*2 : The ray receiving surface at a vertex and relation to the ray axis in the range of θ= 0° and θ=45°.

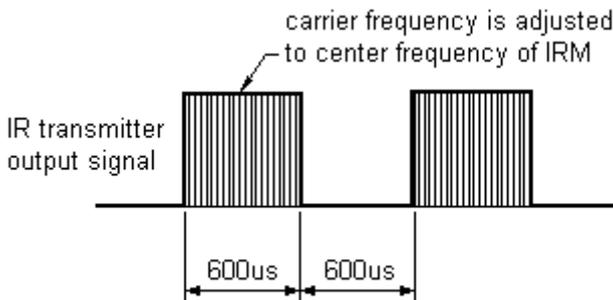
\*3 : A range from 30cm to the arrival distance. Average value of 50 pulses.

## Test Method

The specified electro-optical characteristic is satisfied under the following Conditions:

1. Measurement environment  
A place without extreme light reflected
2. External light  
Ordinary white fluorescent lamps (Light source temperature 2856°K,  $E_e \leq 10\text{Lux}$ ) without high frequency modulation
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 ( $V_r=5\text{V}$ )..
4. Measuring system According to the measuring system shown in Fig.-3

Fig.-1 Transmitter Wave Form



D.U.T output Pulse

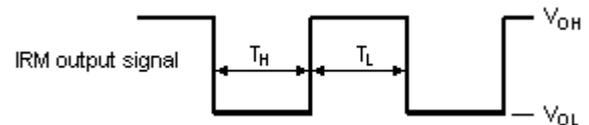


Fig.-2 Measuring Method

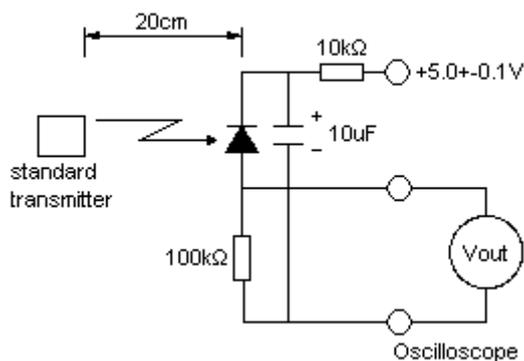
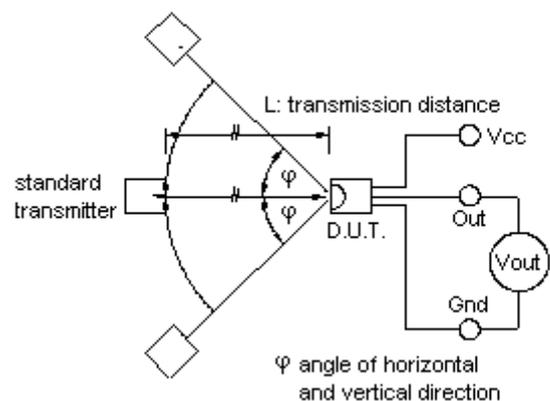


Fig.-3 Measuring System



Typical Electro-Optical Characteristics Curves

Fig.4 Relative Responsibility vs. Wavelength

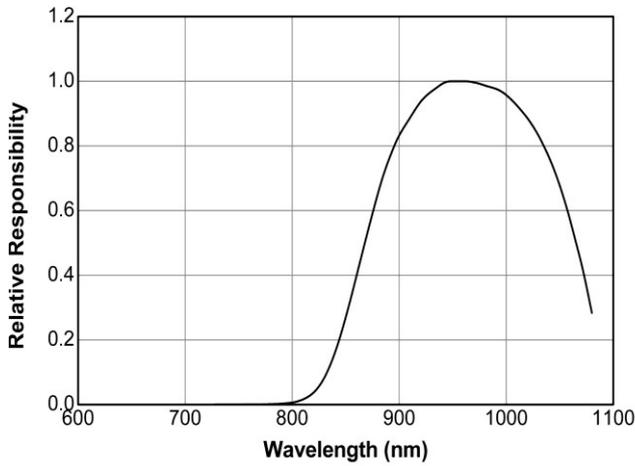


Fig.-5 Relative Sensitivity vs. Angle

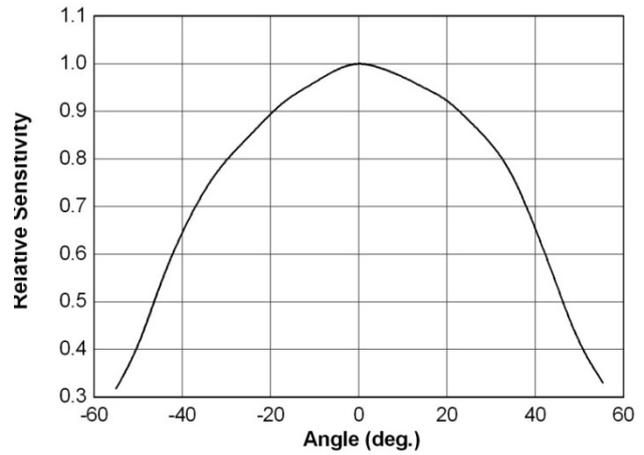


Fig.6 Variation Output Pulse Width vs. Distance

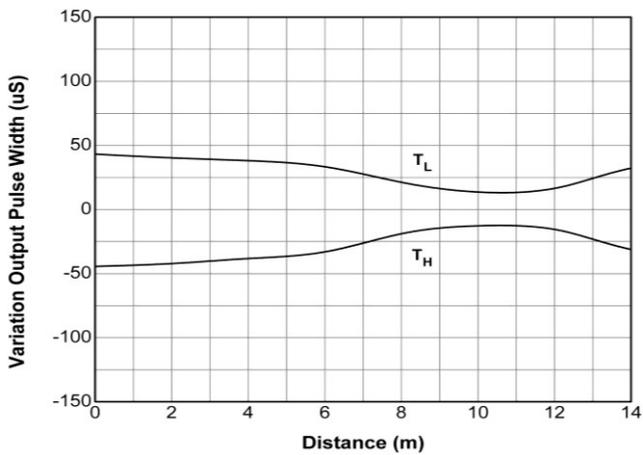


Fig.7 Relative Sensitivity vs. Supply Voltage

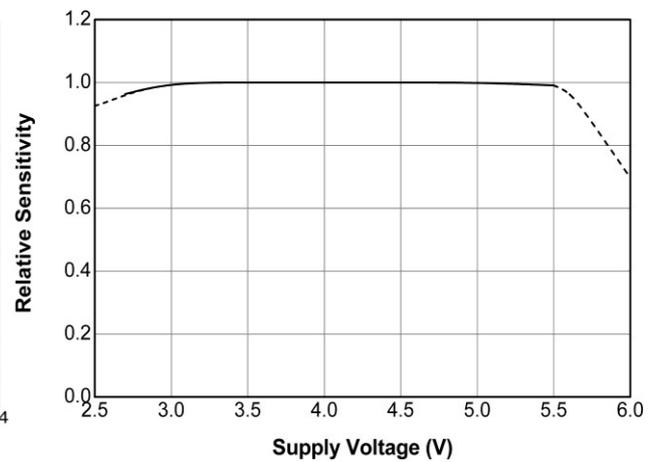
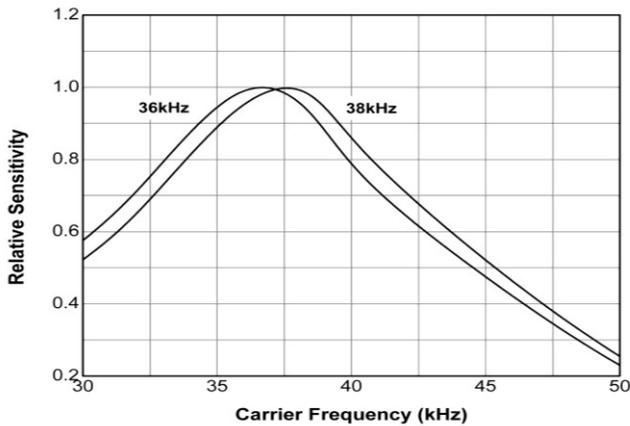
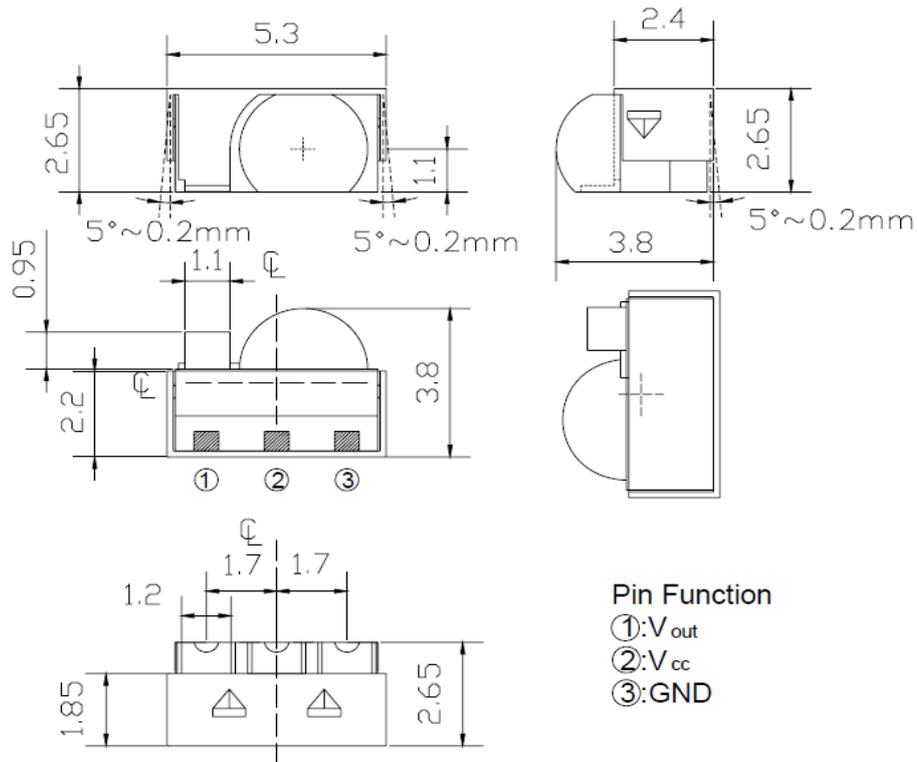


Fig.8 Relative Sensitivity vs. Carrier Frequency



### Package Dimenstions

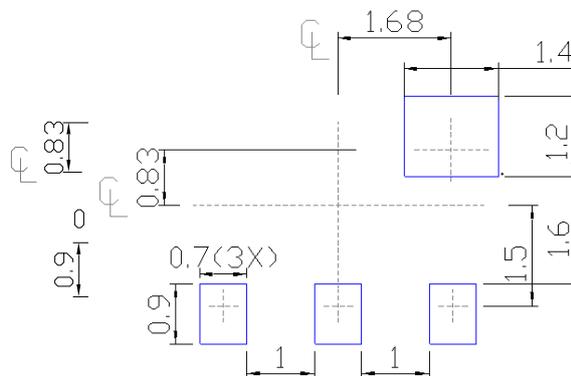
(Dimensions in mm)



- Notes: 1. All dimensions are in millimeters.  
2. Tolerances unless dimensions  $\pm 0.3$ mm.

### Soldering patterns

The following soldering patterns are recommended for reflow-soldering



Notice: Suggested pad dimension is just for reference only.  
Please modify the pad dimension based on individual need.

### Code information

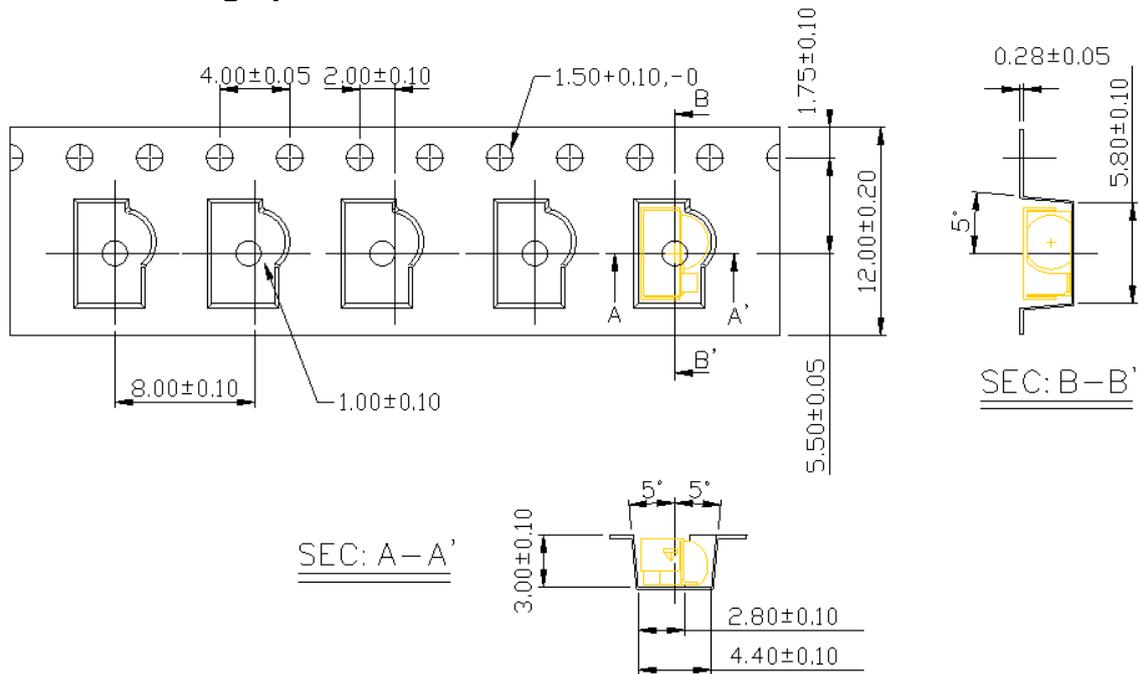
Protocol	Suitable	Protocol	Suitable
JVC	Yes	RCA	No
Matsushita	Yes	r-step <sup>2)</sup>	Yes
Mitsubishi	No	Sharp	Yes
NEC	Yes	Sony 12 bit <sup>3)</sup>	Yes
Panasonic	Yes	Sony 15 bit	No
RC5	Yes	Sony 20 bit	No
RC6 <sup>1)</sup>	Yes	Toshiba	Yes
RCMM	No	XMP-1	Yes
RCS-80	No	Continuous Code	No

1) Best choice depends on RC6 mode. If data low time is below 22ms, M2 is the best choice, otherwise M3.

2) For r-step 38kHz version M3 is the best choice, for 56kHz version only M is recommended.

3) If only Sony 12 bit version is used, M3 is recommended otherwise M2 is the best choice.

### Tape & Reel Packing Specifications

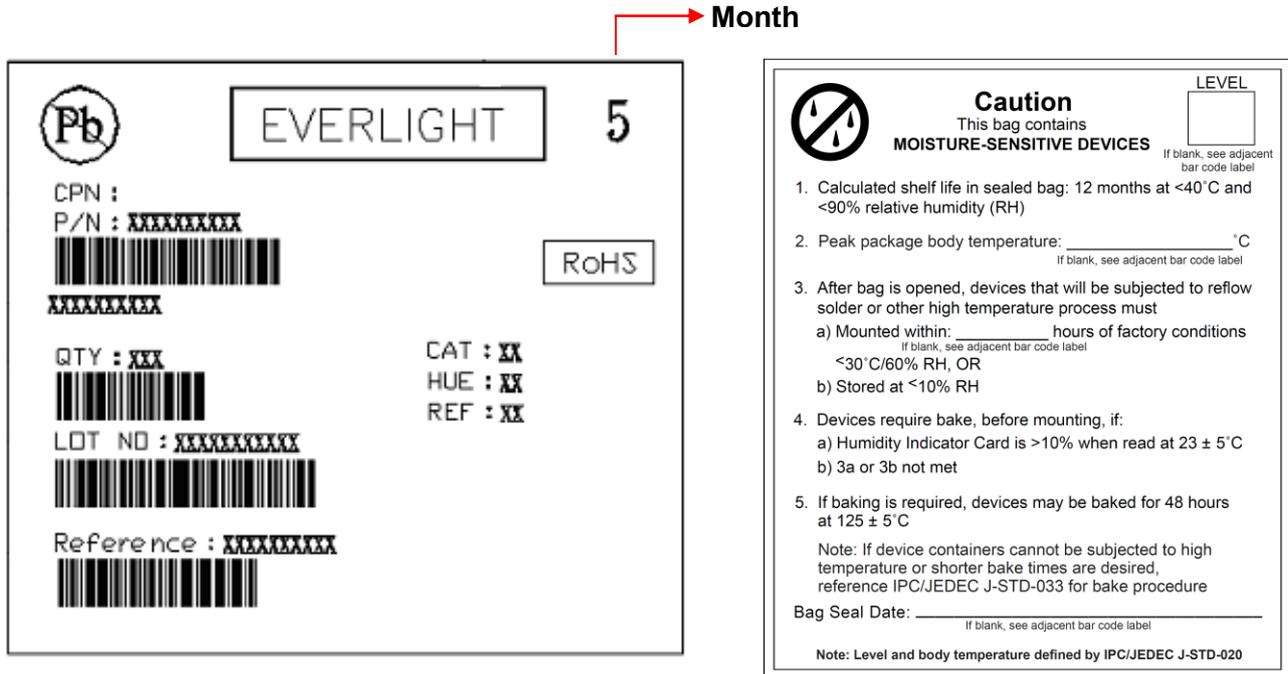


### Packing Quantity

2000 pcs / Reel

5 Reels / Carton

## Label format



Moisture Classification-storage and used condition label

## Recommended method of storage

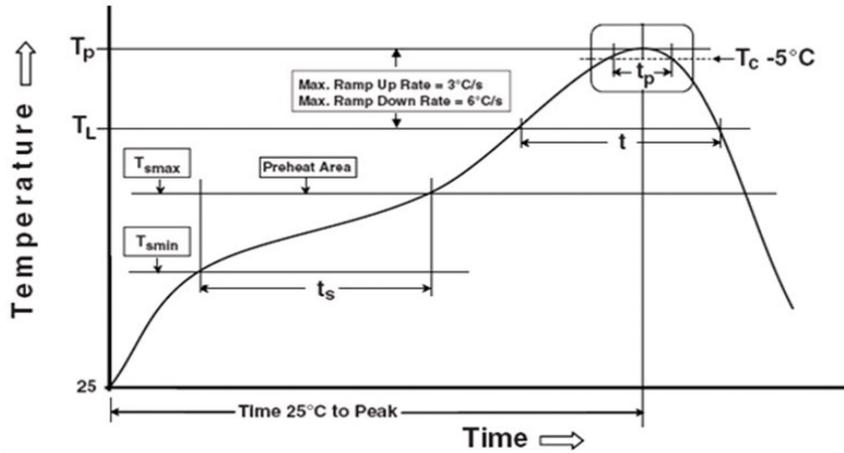
The following are general recommendations for moisture sensitive level (MSL) 4 storage and use:

1. Shelf life in sealed bag from the bag seal date: 12 months at 10°C~30°C and < 90% relative humidity (RH)
2. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must be mounted within 72 hours of factory conditions at 10°C~30°C and 60%RH.
3. If the moisture absorbent material (silica gel) has faded away or the IRM has exceeded the storage time. Baking treatment is required, refer to IPC/JEDEC J-STD-033 for bake procedure or recommend the conditions: 96 hours at 60°C ± 5°C and < 5 % RH.

## ESD Precaution

Proper storage and handling 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.

### Solder Reflow Temperature Profile



Note:

Reference: IPC/JEDEC J-STD-020D

#### Preheat

Temperature min ( $T_{smin}$ )	150 °C
Temperature max ( $T_{smax}$ )	200°C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3 °C/second max

#### Other

Liquidus Temperature ( $T_L$ )	217 °C
Time above Liquidus Temperature ( $t_L$ )	60-150 sec
Peak Temperature ( $T_p$ )	260°C
Time within 5 °C of Actual Peak Temperature: $T_p - 5^\circ\text{C}$	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time $25^\circ\text{C}$ to peak temperature	8 minutes max.
Reflow times	3 times

Note:

1. Suggest that reflow soldering should not be done more than two times.
2. When soldering, do not put stress on the IRM device during heating.
3. After soldering, do not warp the circuit board.

## **DISCLAIMER**

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
3. When using this product, please observe the absolute maximum ratings and the instructions for use 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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