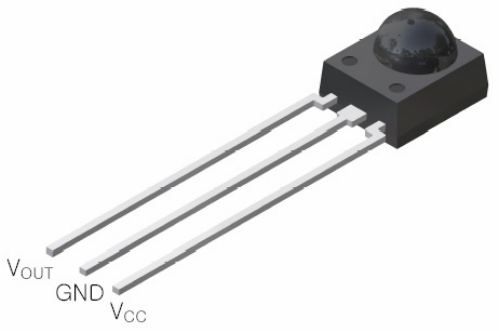
IR Receiver Modules for Remote Control Systems

Description

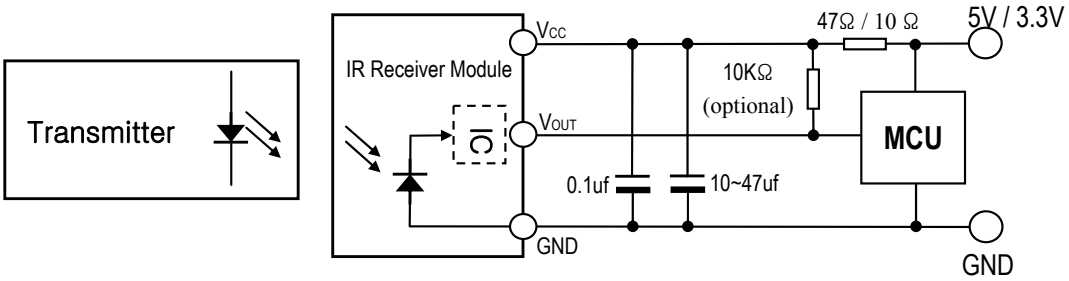
The **FM-9038LM-5CN** is a Bi-CMOS IC for use in infrared remote control system.
Small-sized, light-weight, and low current consumption. modules have been achieved by using resin mold.
The demodulated output signal can directly be decoded by a microprocessor. The main benefit is the reliable function even in disturbed ambient and the protection against uncontrolled output pulses.



Features

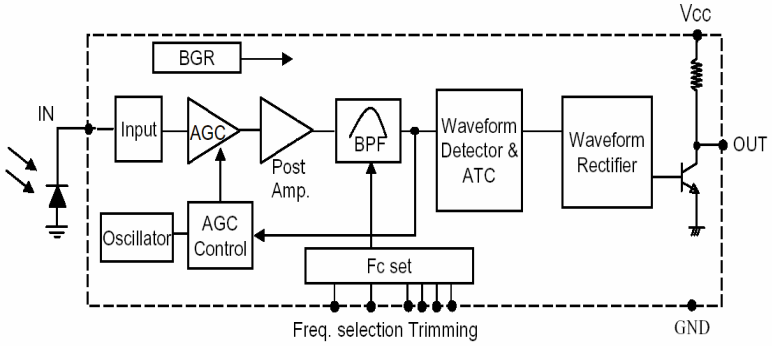
- Supply Voltage Range: 2.7V to 6.0V
- TTL and CMOS compatibility
- Photo detector and preamplifier in one package.
- Internal filter for PCM frequency
- Open collector output [built-in Pull-up resistor(40K)]
- Output active low
- Enhanced Immunity against all kinds of disturbance light
- No occurrence of disturbance pulses at output pin within nominal conditions.
- Short settling time after power On.(below 1msec)
- Meet RoHS

Application Circuit



R-C filter recommended to suppress power supply disturbances.
R-C filter should be connected closely between VCC pin and GND pin.

Block Diagram



Ordering Info.(carrier frequencies)

Type	Carrier Frequency (fo)
FM-9032LM-5CN	32.7 K
FM-9036LM-5CNP	36.0 K
FM-9036LM-5CN	36.7 K
FM-9038LM-5CN	37.9 K
FM-9040LM-5CN	40.0 K
FM-9056LM-5CN	56.7 K

Suitable Data Format

NEC code	◆	Sony 15bit	◆	RCS-80 code	◇
RC5 code	◆	Sony 20bit	◇	Sharp code	◇
RC6 code	◆	RCMM code	◇	High data rate code	◇
Sony 12 bit	◆	RCA code	◇	Disturbance suppression	◆

Note： ◆：Suitable for this IR code ；◇：Not recommended

Absolute Maximum Ratings

(Ta = 25℃)

Parameter	Symbol	Ratings	Unit
Supply Voltage	Vcc	6.5	V
Supply Current	Icc	3.0	mA
Operating Temperature	Topr	-20 ~ +80	℃
Storage Temperature	Tstg	-30 ~ +85	℃
Soldering Temperature	Tsd	260℃, Max 5 sec	℃

Electro-optical Characteristics

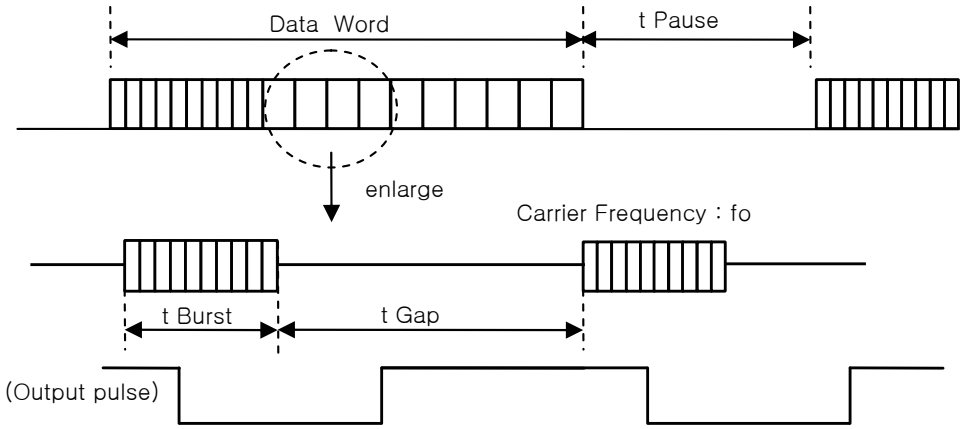
(Ta = 25℃)

Parameter	Symbol		Min.	Typ.	Max.	Unit	Conditions
Supply Current	ICC		0.7	1	1.3	mA	No signal
Output Voltage	Voh		Vcc-0.5	-	-	V	No external pull-up resistor (I_{sink} < 1mA)
	Vol		-	0.2	0.4	V	
Peak Wave Length	λp		-	940	-	nm	
Internal Pull-up Resistor	Rpul		-	42	-	kΩ	
BPF frequency	fc		-3.5	fo	+3.5	%	
Arrival Distance	L	±0°	15	-	-	m	Fig 1,2,3
		±30°	10	-	-	m	
		±45°	7	-	-	m	
Output Pulse width	Tpw		400	600	800	us	Burst Wave =600us Period = 1.2ms

Note :

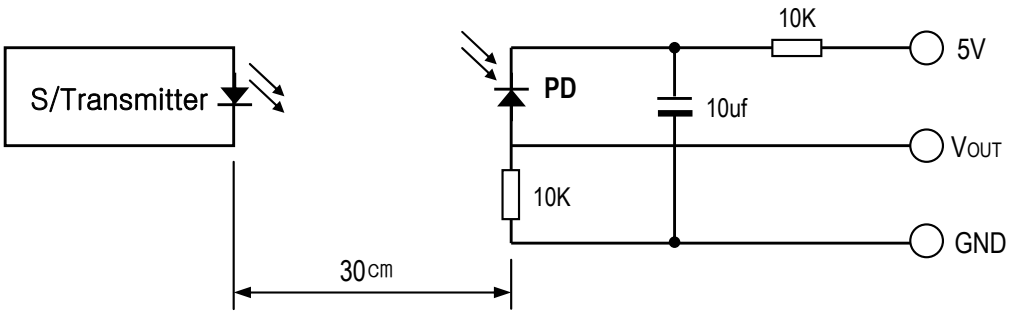
1) Arrival Distance Effected by Environment
2) While the device is operational across the temperature range, functionality will vary with temperature. Specifications are stated only at 25°C unless otherwise noted.
3) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

[Fig.1] Data Signal diagram



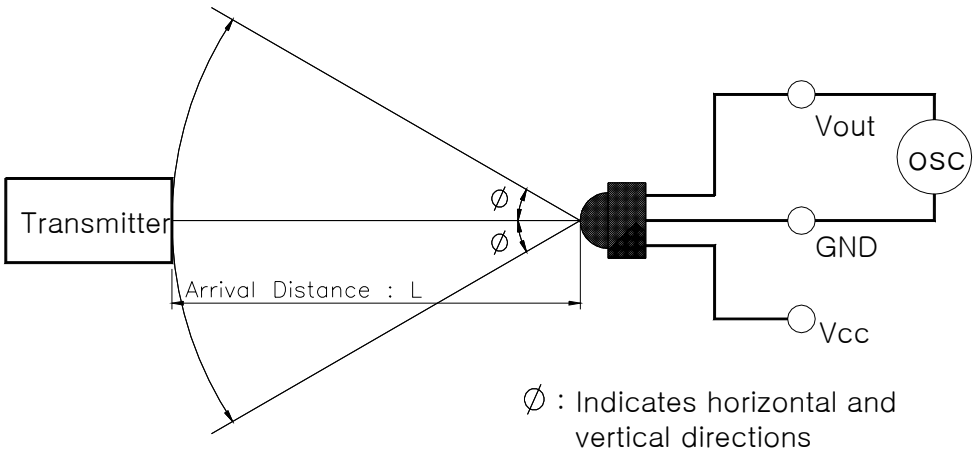
- t Gap : Signal gap time between two burst in pulses of carrier. Minimum Gap Time ≧ 300us
- t Burst : Length of a burst in pulses of the carrier frequency. Minimum Burst ≧ 300us
- t pause : Data pause between two data words. Minimum Data PauseTime ≧ 20ms

[Fig.2] Transmitter



※ The specifications shall be satisfied under the following conditions. The standard transmitter shall be specified of the burst wave form adjusted to VOUT 200mVp-p upon Po measuring circuit Standard Transmitter

[Fig.3] Test condition of arrival distance



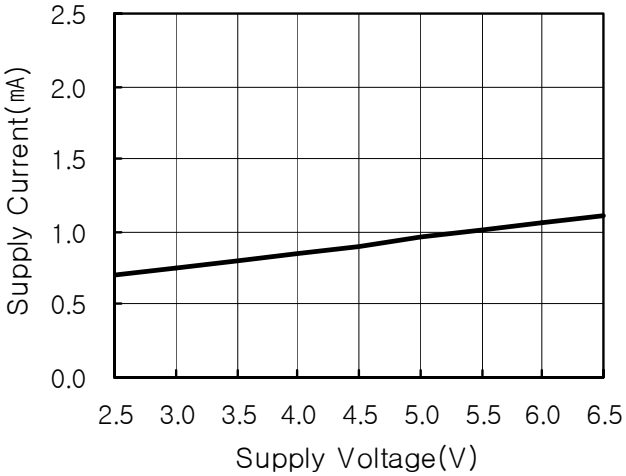
Ø : Indicates horizontal and vertical directions

[Measurement condition for arrival distance]

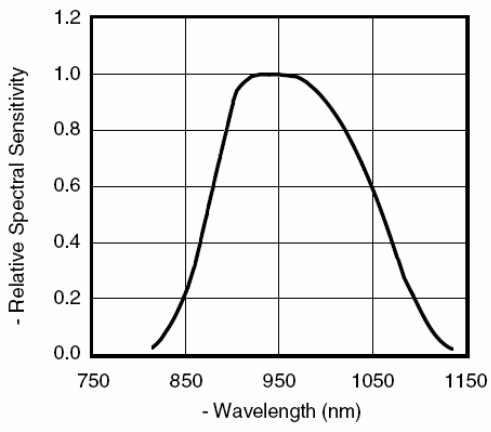
☞ Ambient light source : Detecting surface illumination shall be irradiate 200±50Lux under ordinary white fluorescence lamp without high frequency lighting

Electrical/Optical Characteristics

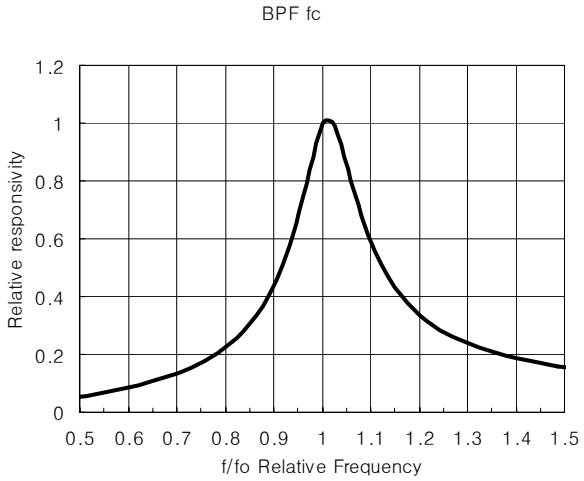
[Fig.4] Supply Current vs. Voltage



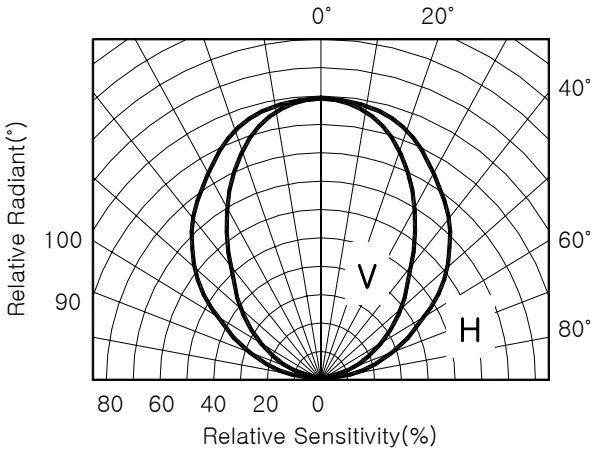
[Fig.5] Relative Spectral Sensitivity vs. Wavelength



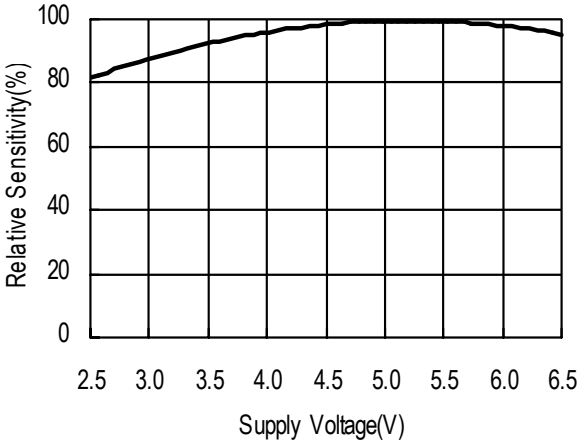
[Fig.6] BPF Fc Curve



[Fig.7] Directivity (Horizontal/Vertical)



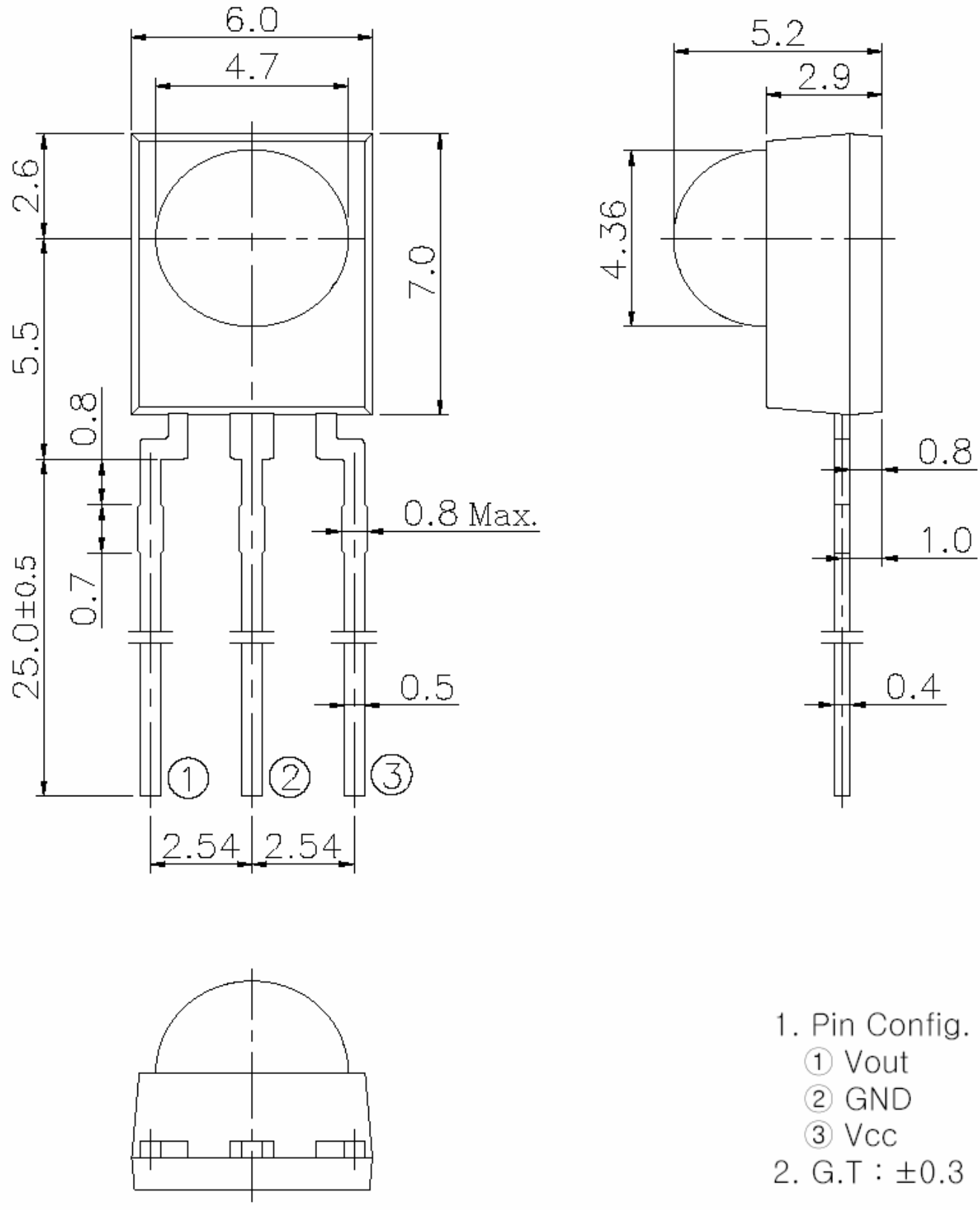
[Fig.8] Sensitivity vs. Supply Voltage



ESD Test Results

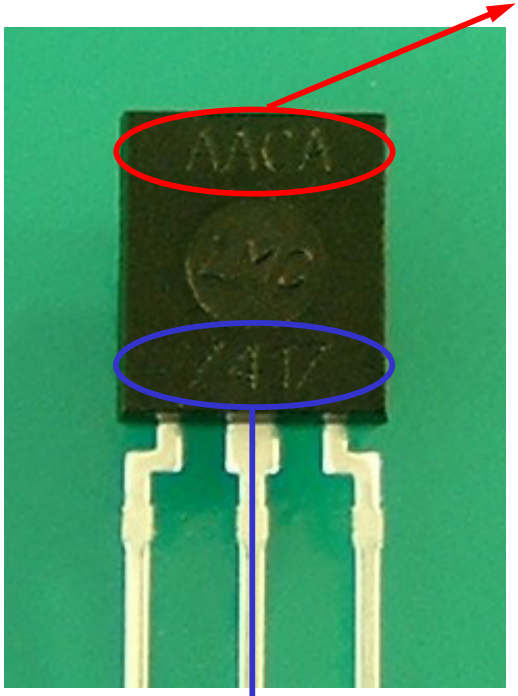
Parameter	Conditions	Specification	Results
Machine Model	C=200pF R=0Ω	Min ±200V	>±200V
Human Body Model	C=100pf R=1.5KΩ	Min ±2000V	>±2000V

Package Dimension (Unit : mm)



1. Pin Config.
   ① Vout
   ② GND
   ③ Vcc
2. G.T : ±0.3

Laser Marking Code



X X X X

(Device Code Marking)		
Mode	LM	A
	TM2	
	LN	C
	TN2	
	SM	F
	SN	

Freq.	32.7	A
	36.7	B
	37.9	C
	40.0	D
	56.7	E
	36.0	P

Series	90	A
	91	B
	30	C
	32	D

Chip	5AN	A
	5NR	B
	5ANP	C
	5NRP	D
	5CN	E
	5CNP	
	5CR	F
	5CRP	

X X X X

(Production Code Marking)	
Date	01 ~ 31
Month	1~9,A=10,B=11,C=12
Year	0 ~ 9

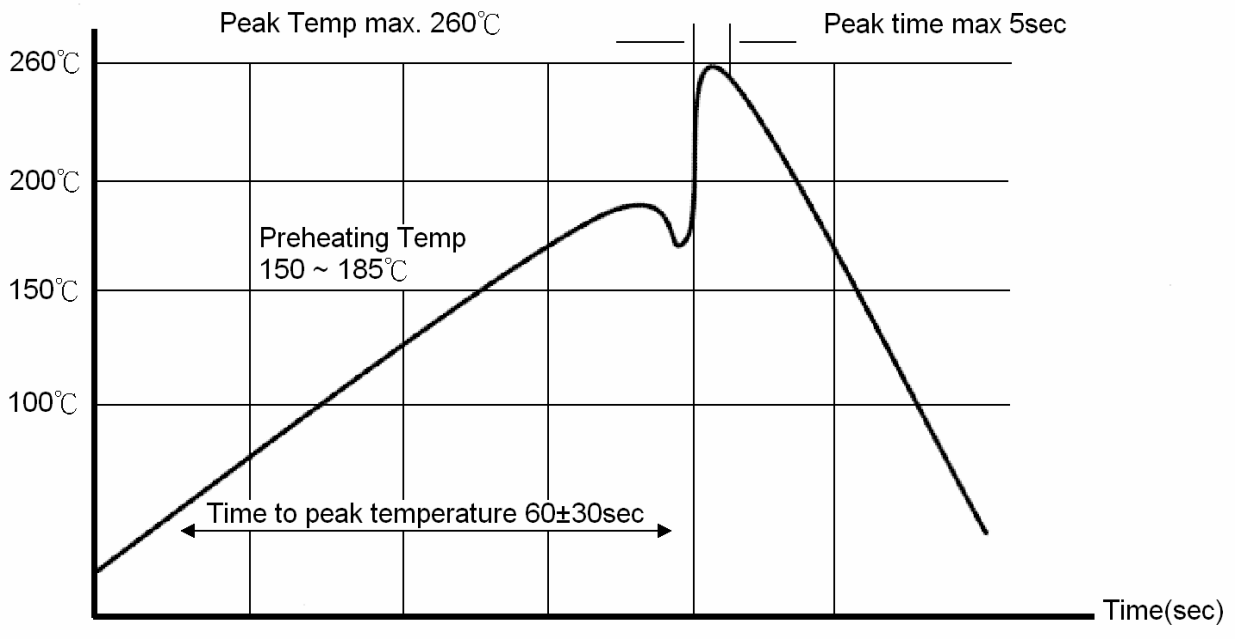
Example

	Chip	Series	Freq.	Mode		Year	Month	Data	
FM-3238SN-5NR	B	D	C	F	2007/01/01	7	1	0	1
FM-9056TM2-5AN	A	A	E	A	2007/05/13	7	5	1	3
FM-9138LM-5CR	F	B	C	A	2007/10/25	7	A	2	5
FM-9036LM-5CNP	E	A	P	C	2008/02/14	8	2	1	4

◆ Recommended Soldering Condition

Flow Soldering Condition

Recommendation Flow Soldering condition Temp & Time



1. Packing unit for Remote control module

Package	Device	Packing Method	Units / Bag	Poly Bag / Inner Box	Max Devices / Inner Box	Max Inner Box / Outer Box	Partial Shipment of Outer Box
Transfer mold Type		Poly Bag	200	5 (Inner Box #1)	1000 (Inner Box #1)	10 (Outer Box #2)	(Outer Box #3)

(Unit：mm)
Inner Box #1 with Opto-Sensor Logo (170*240*65)
Outer Box #2 with Opto-Sensor Logo (365*360*270)
Outer Box #3 with Opto-Sensor Logo (385*750*300)

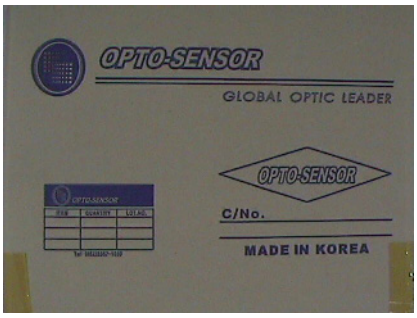
2. Packing method

1) Input max 200 units to one Poly bag and label should be attached middle of it.

2) Input 5 poly bags to one inner box and label should be attached as below.

<Inner Box # 1>

3) Input 10 inner boxes to outer box.



<Outer Box # 2>

4) Input 2 outer boxes into Box #3.

<Outer Box # 3>