

# IR Receiver Modules for Remote Control Systems

## Description

The **FM-22□□SMV-5DR** series are miniaturized receiver for infrared remote control system. The PIN Photodiode and preamplifier are assembled on lead frame. The epoxy package is designed as IR filter. The module has excellent performance even in disturbed ambient light application and provides protection against uncontrolled output pulses.



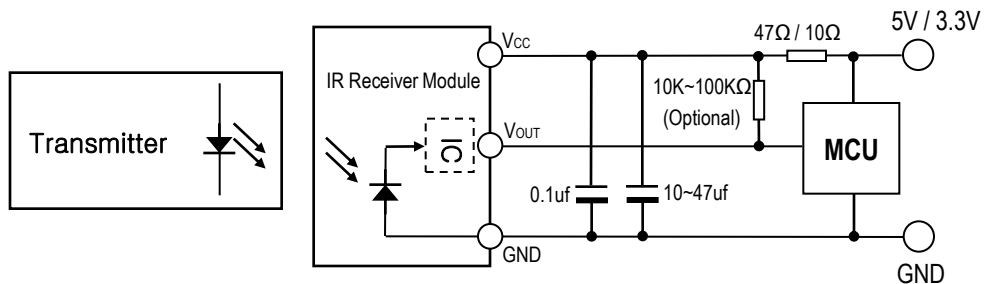
① ② ③ ④

①GND ②V<sub>cc</sub>  
③V<sub>out</sub> ④GND

## Features

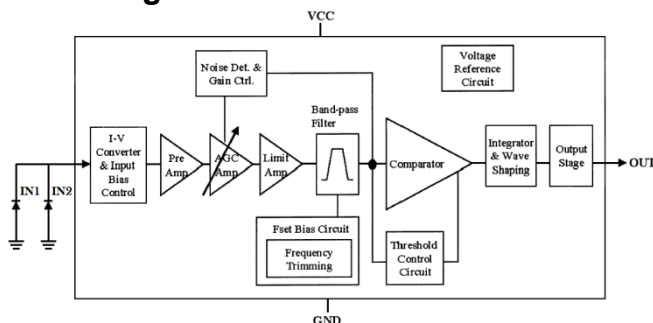
- Surface Mount Package.
- Supply Voltage Range: 2.7V to 5.5V
- Supply Current : 0.55mA
- Epoxy IR filter characteristic : 940nm
- Internal filter for PCM frequency
- Open collector output [built-in Pull-up resistor(38K)]
- Data rate of 2000 bit/s
- Short bursts possible(≥ 6pulses / t Burst)
- Enhance immunity against all kinds of disturbance light
- Continuous data transmission possible
- Meet RoHS

## Application Circuit



R-C filter recommended to suppress power supply disturbances.  
R-C filter should be connected closely between V<sub>cc</sub> pin and GND pin.

## Block Diagram



## B.P.F Center Frequency

Model No.	Carrier Frequency (fo)
FM-2236SMV-5DR	36.7 KHz
FM-2238SMV-5DR	37.9 KHz
FM-2240SMV-5DR	40.0 KHz

**Suitable Data Format**

NEC code	◆	RECS-80 code	◆	4PPM code	◆
RC5 code	◆	r-step code	◆	Sony 12-bit code	◆
RC6 code(mode 0,1A)	◆	Sharp code	◆	Sony 15-bit code	◆
R-2000(33KHz)	◆	Panasonic/Matsushita	◆	Sony 20-bit code	◆
JVC code	◆	Zenith code	◆	Mitsubishi code	◆
RCMM code	◆	XMP-1 code	◆	High Data Rate code	◆
RCA code	◆	XMP-2 code	◆	Continuous code	◆

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

The data signal should full-fill the following condition :

- Carrier frequency should be close to center frequency of the band-pass.
- Burst length should be 160us/burst or longer.
- After each burst a gap time of at least 300us is necessary.

**Absolute Maximum Ratings**

(Ta = 25°C)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V <sub>cc</sub>	6.5	V
Supply Current	I <sub>cc</sub>	3.0	mA
Output Current	I <sub>sink</sub>	2.5	mA
Operating Temperature	T <sub>opr</sub>	-20 ~ +80	°C
Storage Temperature	T <sub>stg</sub>	-30 ~ +85	°C
Soldering Temperature	T <sub>sd</sub>	260°C, Max 5 sec	°C

**Electro-optical Characteristics, V<sub>cc</sub> = 5V**

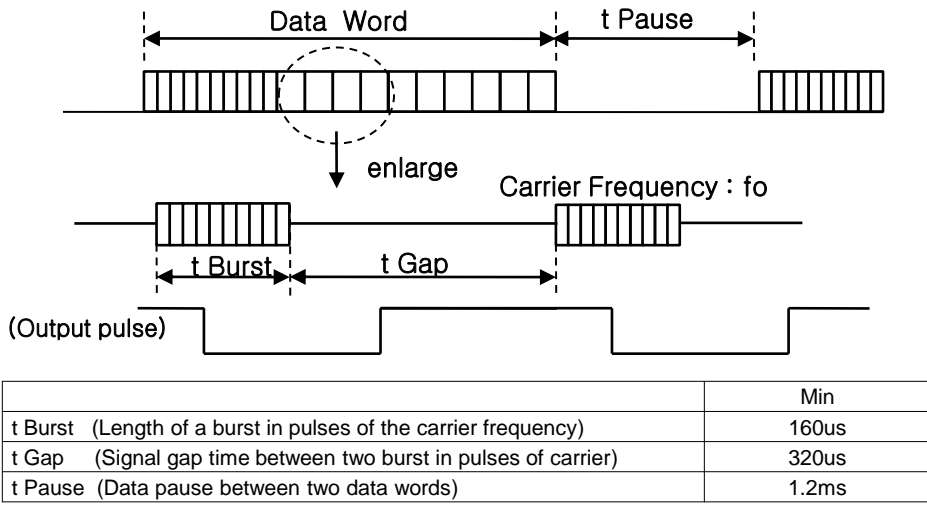
(Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Supply Current	ICC	0.4	0.53	1.0	mA	No signal	
Output Voltage	V <sub>oh</sub>	V <sub>cc</sub> -0.5	-	-	V		
	V <sub>ol</sub>	-	0.2	0.4	V		
Peak Wave Length	λ <sub>p</sub>	-	940	-	nm		
Internal Pull-up Resistor	R <sub>pul</sub>	-	38	-	kΩ		
Center frequency	f <sub>o</sub>	-	37.9	-	KHz		
BPF Bandwidth	f <sub>BW</sub>	3.0	5.0	7.0	KHz	-3dB Bandwidth	
Arrival Distance	L	±0°	20	-	-	m	Fig 1,2,3
		±30°	15	-	-	m	
		±45°	10	-	-	m	
Output Pulse width	T <sub>pw</sub>	60	160	260	us	Burst Wave =160us Period = 320us	

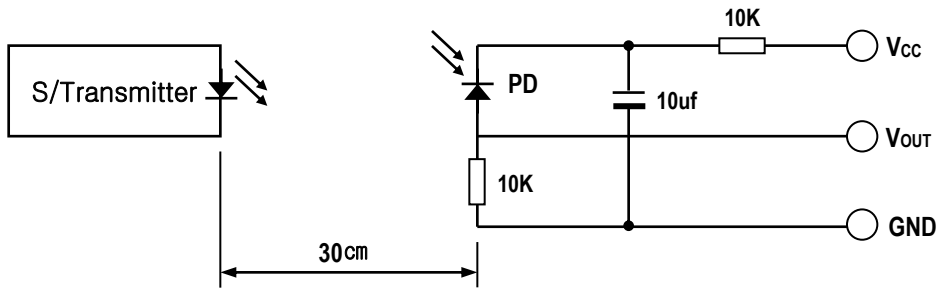
Note :

- 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

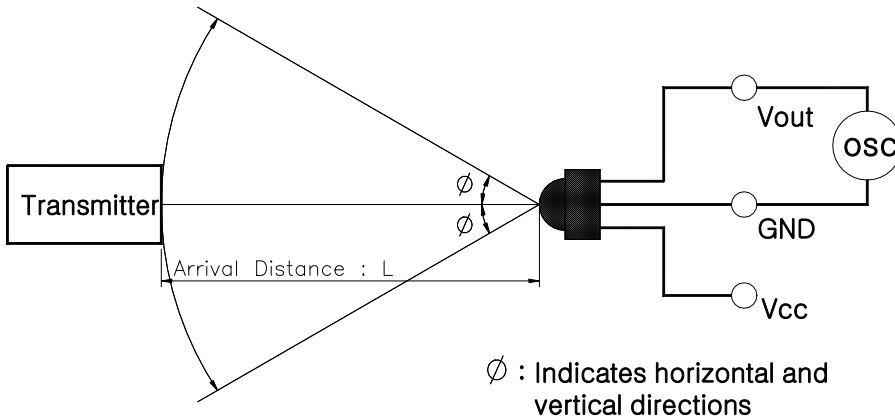


[ Fig.2 ] Transmitter



※ The specifications shall be satisfied under the following conditions. The standard transmitter shall be specified of the burst wave form adjusted to  $V_{out}$  200mVp-p upon  $P_o$  measuring circuit Standard Transmitter

[ Fig.3 ] Test condition of arrival distance

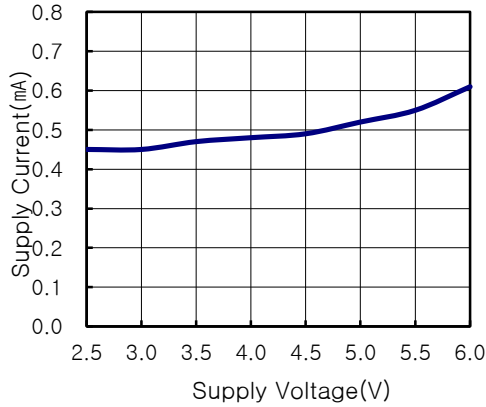


[ Measurement condition for arrival distance ]

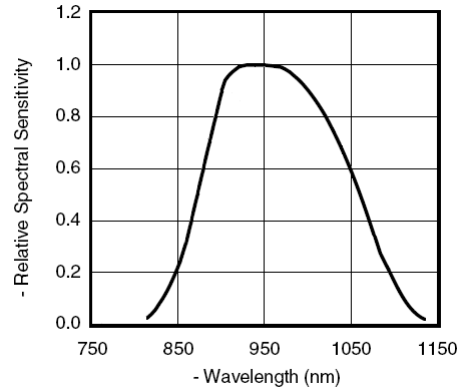
☞ Ambient light source : Detecting surface illumination shall be irradiate  $200 \pm 50$  Lux under ordinary white fluorescence lamp without high frequency lighting

### Electrical/Optical Characteristics

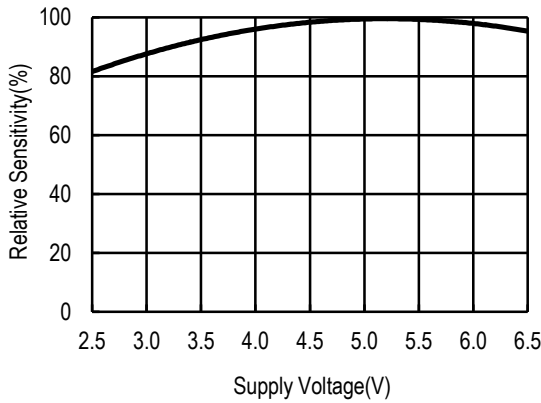
[ Fig.4 ] Supply Current vs. Voltage



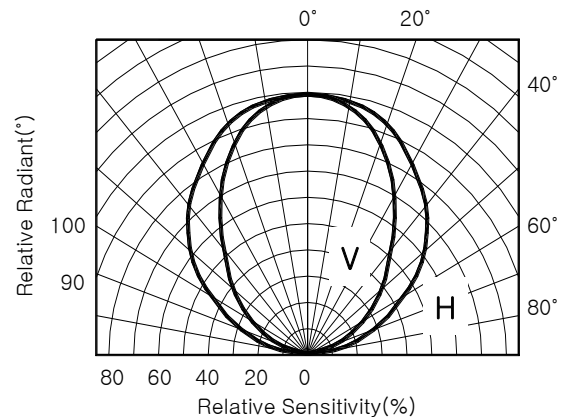
[ Fig.5 ] Relative Spectral Sensitivity vs. Wavelength



[ Fig.6 ] Sensitivity vs. Supply Voltage



[ Fig.7 ] Directivity (Horizontal/Vertical)



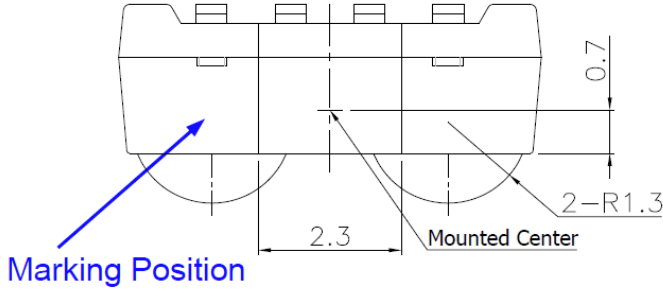
### ESD Test Results

Parameter	Conditions	Specification	Results
Machine Model	C=200pF R=0Ω	Min ±200V	>±800V
Human Body Model	C=100pf R=1.5KΩ	Min ±2000V	>±8000V

ESD Testing was performed on Zapmaster System using the Human-Body-Model and Machine-Model according to JESD22-A114D and JESD22-A115-A respectively.

## Appearance & Dimensions

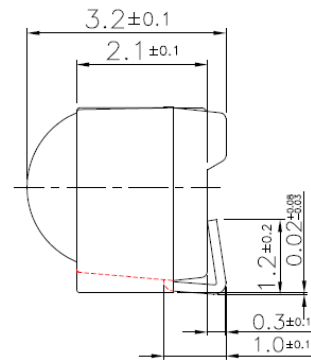
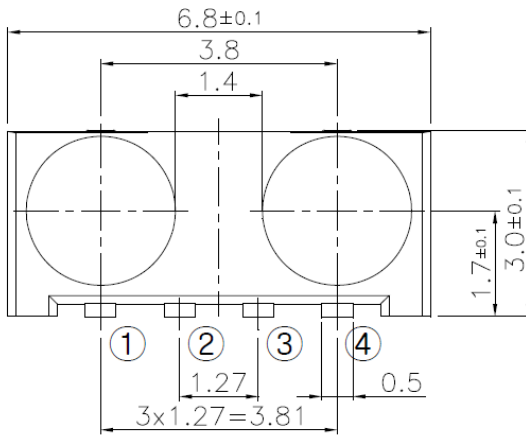
### 1) Package Dimension (Unit : mm)



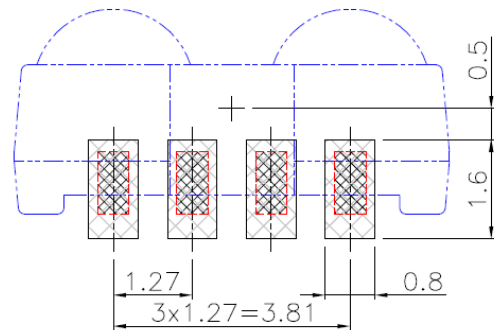
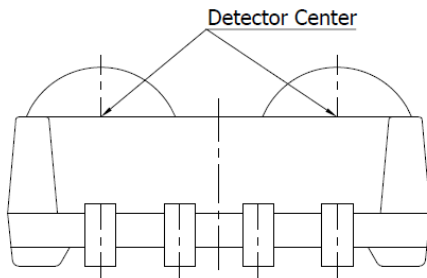
### 1. PIN CONFIG

- ① GND
- ② Vcc
- ③ Vout
- ④ GND

2.G.T ± 0.15



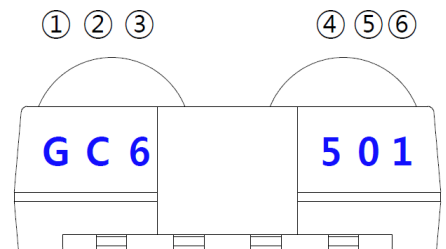
### Example of Mounting drawing from Solder Side (Reference)



### 2) Marking Position : Package Back Side

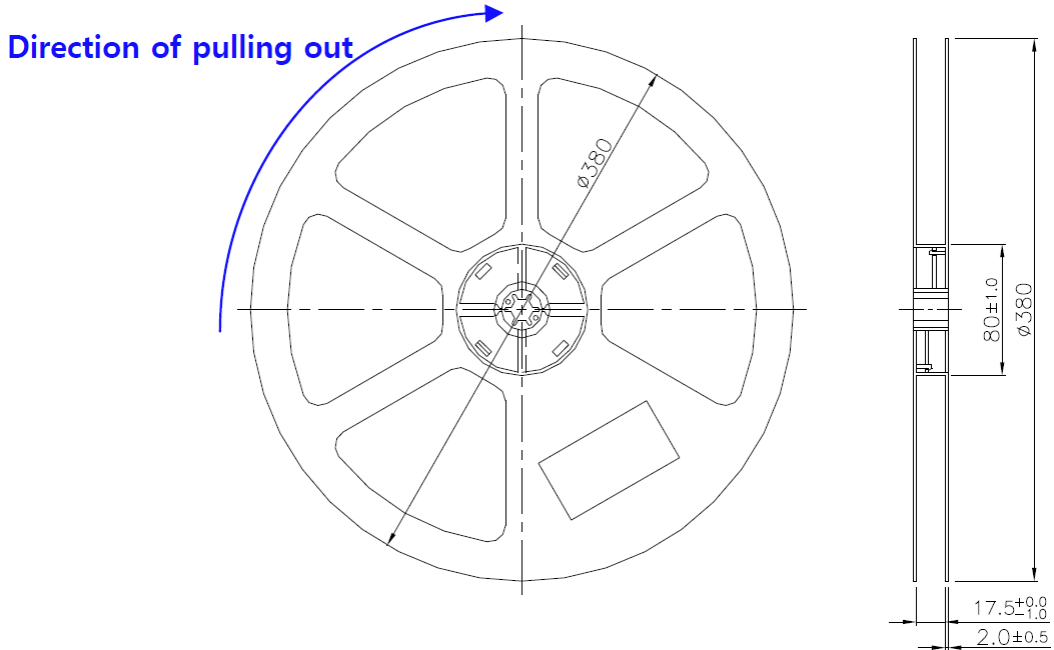
### 3) Laser Marking of Method

No.	Classification	Remark
①	Management No.	-
②	Center Freq.	B(36) , C(38) , D(40)
③	Year	0~9
④	Month	1~9 , X(10) , Y(11) , Z(12)
⑤,⑥	Product Lot No.	01~99

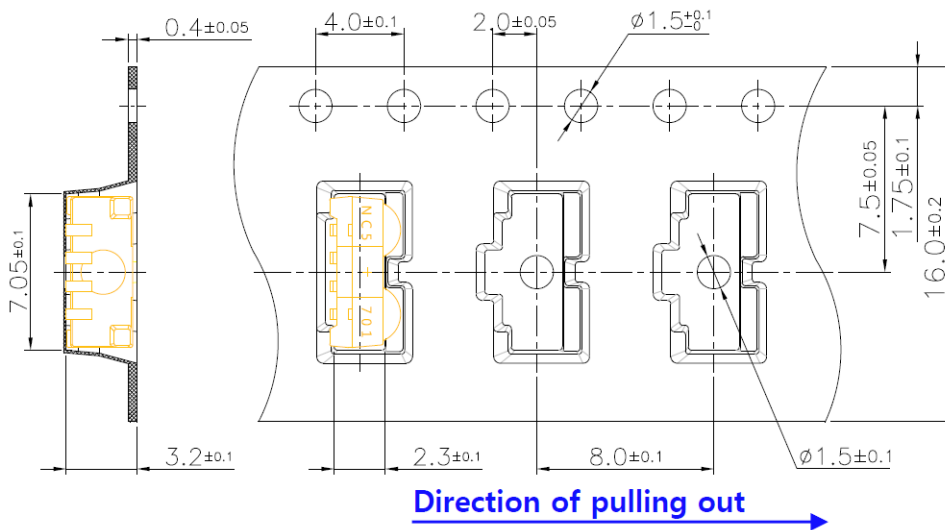


Tape and Reel Packing Specifications (Unit : mm)

1. Shape and Dimensions of Reels



2. Dimension of Tapes



3. Configuration of Tapes

