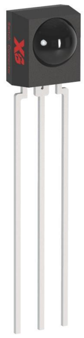
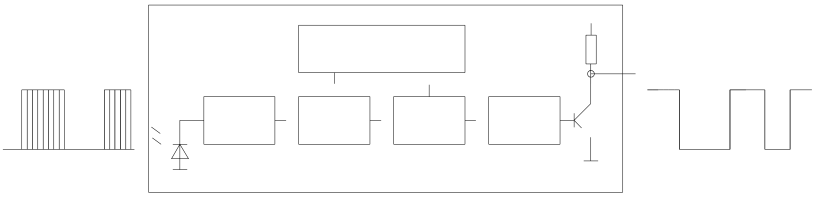


Infrared Receiver Module
IRM-8601J10-X Series

Pin Configuration

1: Vout
2: GND
3: Vcc

Fig.1 Block Diagram



Features

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

Description

The IRM-8601J10-X 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-8601J10-2	36 kHz
IRM-8601J10	38 kHz
IRM-8601J10-4	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	°C
Storage Temperature	T_{stg}	-40 ~ +85	°C
Soldering Temperature (note2)	T_{sol}	260	°C

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Current consumption	I_{cc}	0.15	0.45	0.75	mA	No input signal
Supply voltage	V_{CC}	3.3	-	5.5	V	
Peak wavelength	λ_p	---	940	---	nm	
High level output voltage	V_{OH}	Vcc-0.2	Vcc	---	V	Output open
Low level output voltage	V_{OL}	---	0.2	0.4	V	$I_{OUT} \leqq 2mA$
Internal pull up resistor	R_{PU}	---	50	---	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}	6	10	---		
Min reception distance	L_{0min}	---	---	0.1		
Half angle(horizontal)	φ_h	---	±45	---	deg	
Half angle(vertical)	φ_v	---	±25	---	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

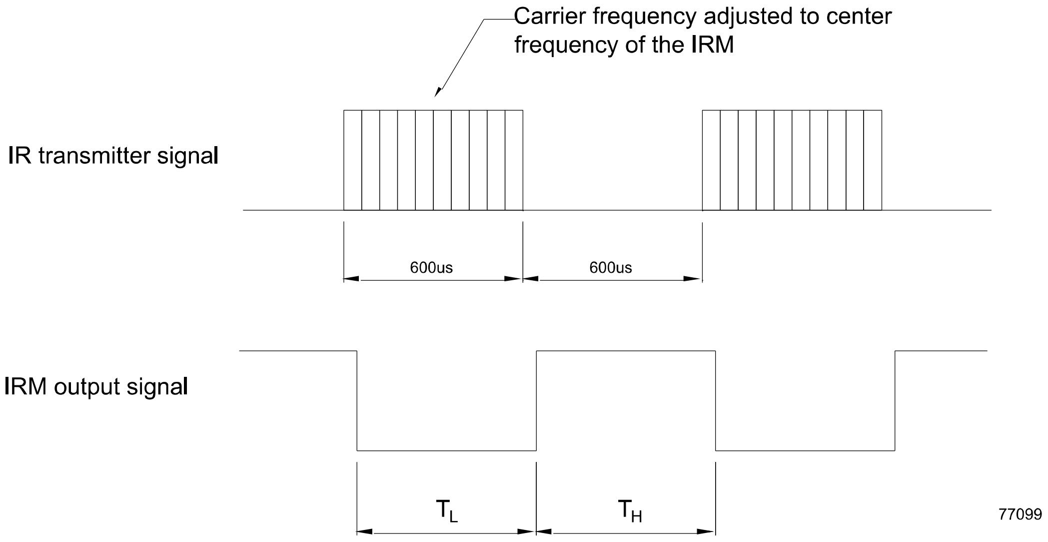


Fig.2 test signal and IRM output signal for reception distance and viewing angle test

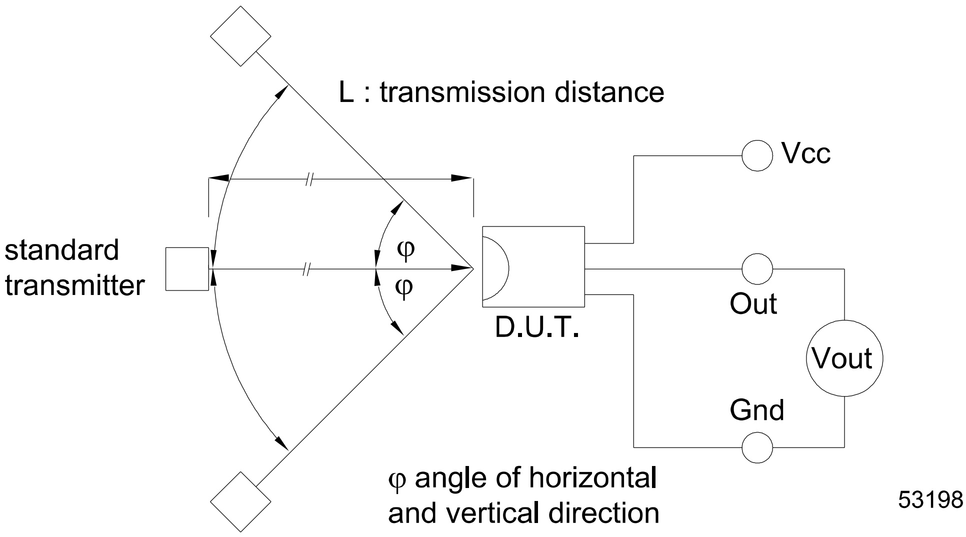


Fig.3 Measuring System

Typical Electro-Optical Characteristic Curves

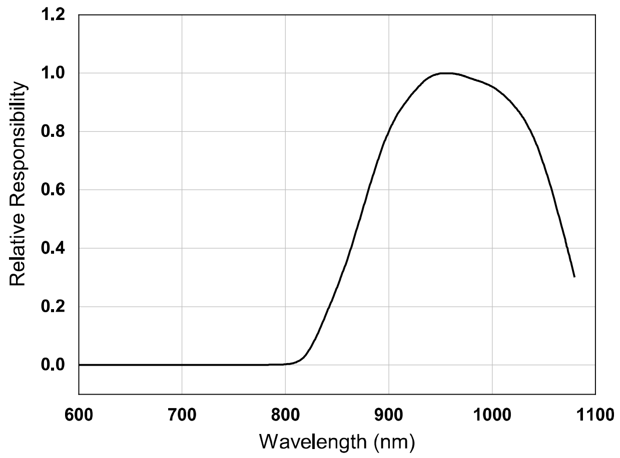


Fig. 4 Relative Responsibility vs. Wavelength

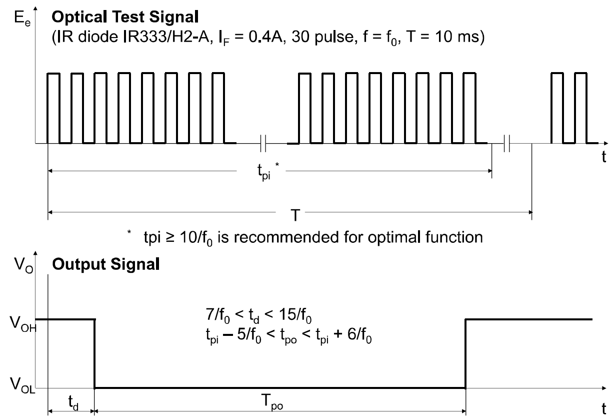


Fig. 5 IR Signal vs. Output Signal

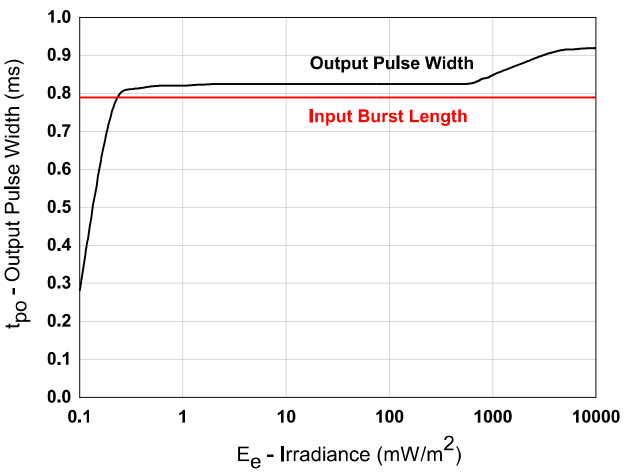


Fig. 6 Output Pulse Width and Sensitivity in Dark Ambient

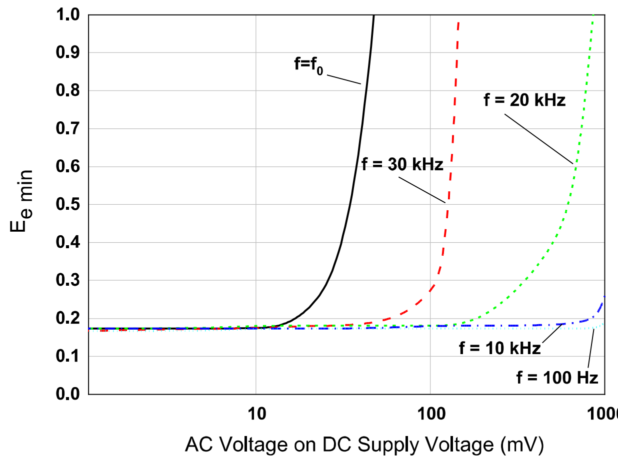


Fig. 7 $E_{e\ min.}$ vs. Supply Voltage Disturbances

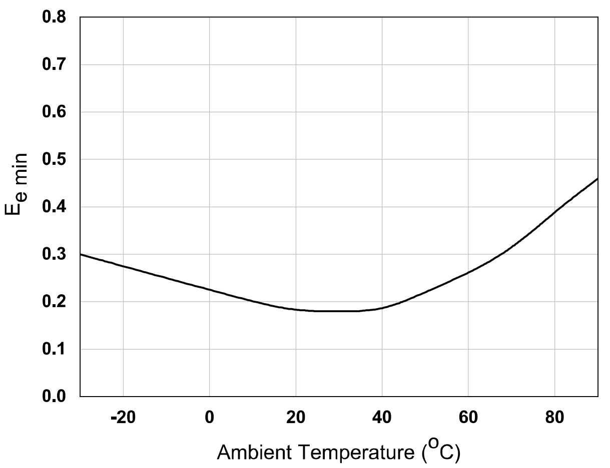


Fig. 8 $E_{e\ min.}$ vs. Ambient Temperature

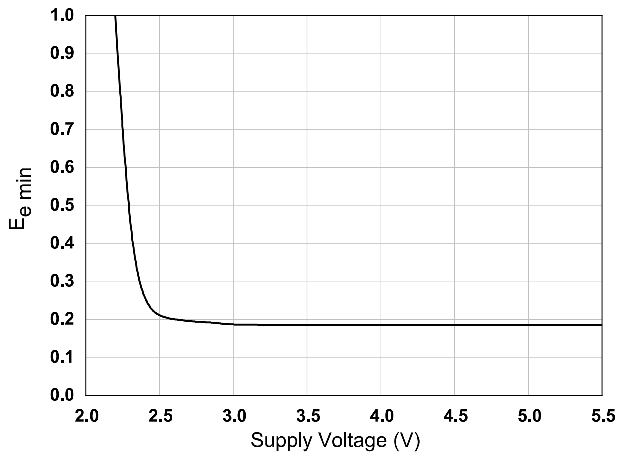


Fig. 9 Ee min. vs. Supply Voltage

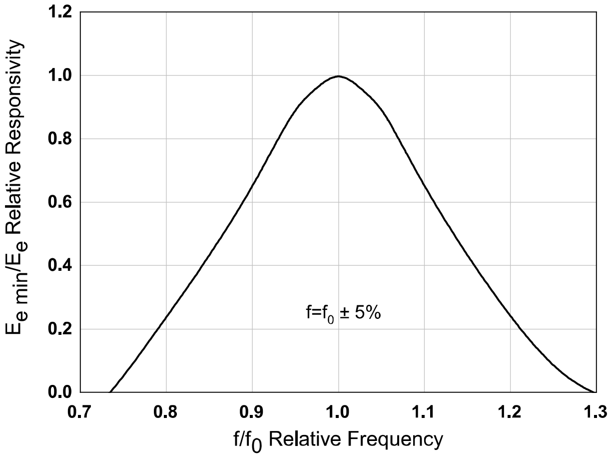


Fig. 10 Frequency Dependence of Responsivity

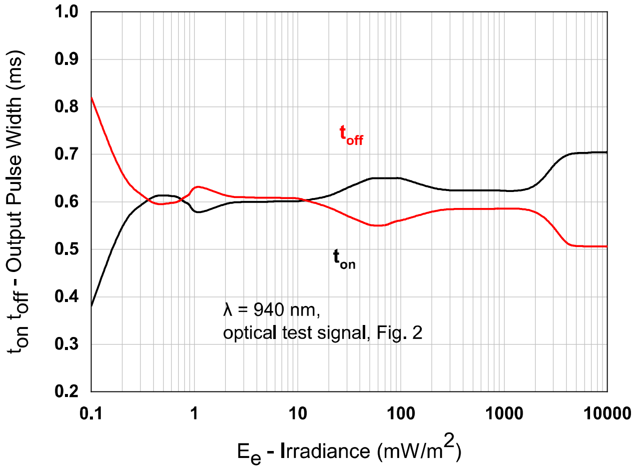


Fig. 11 Output Pulse Diagram

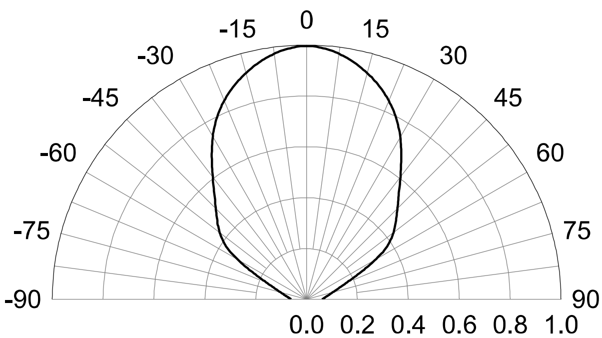


Fig. 12 Horizontal Directivity

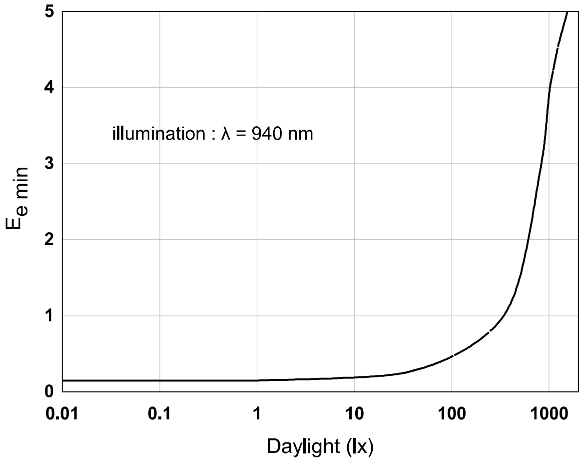


Fig. 13 Daylight vs. $E_{e\ min.}$

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 Vcc 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 Vcc 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.

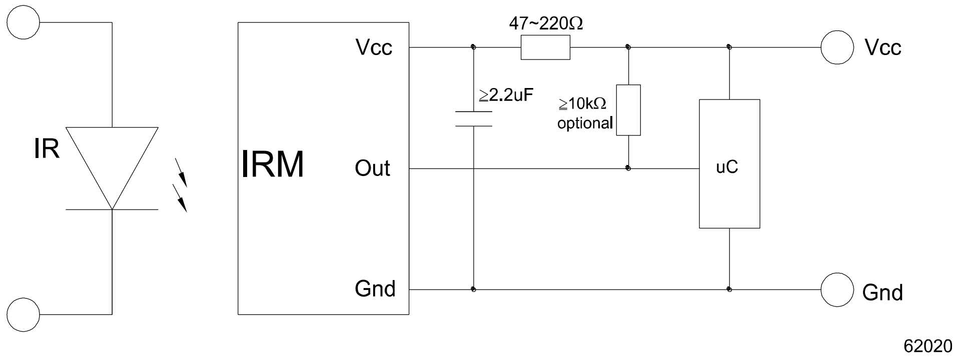


Fig.14: application circuit

Code compatibility

The IRM-8601J10-X 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	Sony 12 Bit	Yes	Continuous	Yes
Toshiba	Yes	Sony 15 Bit	Yes	XMP	No
RC5	Yes	Sony 20 Bit	Yes	RCMM	No
RC6	Yes	RCA	Yes		

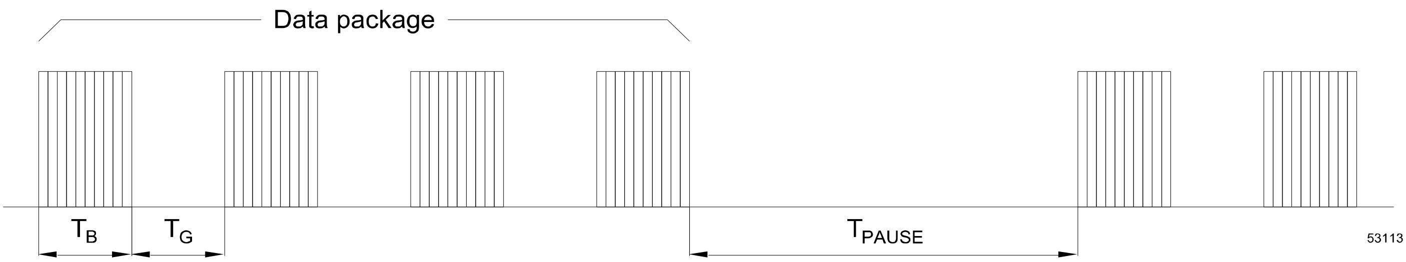


Fig.15: general IR data structure

	IRM-8601J10-X
Min burst length T_B	350us
Min gap length T_G	400us
Required data pause time	$T_{actual\_Gap} \geq 0.8 \times T_{actual\_Burst}$

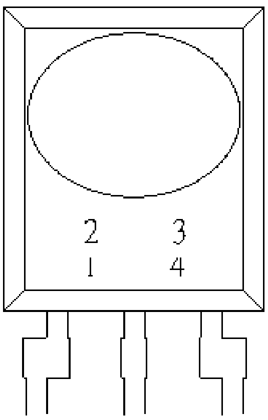
Table 2: acceptable IR timings

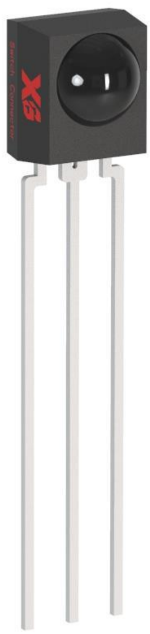
Operation under noisy environment

The IRM-8601J10-X 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

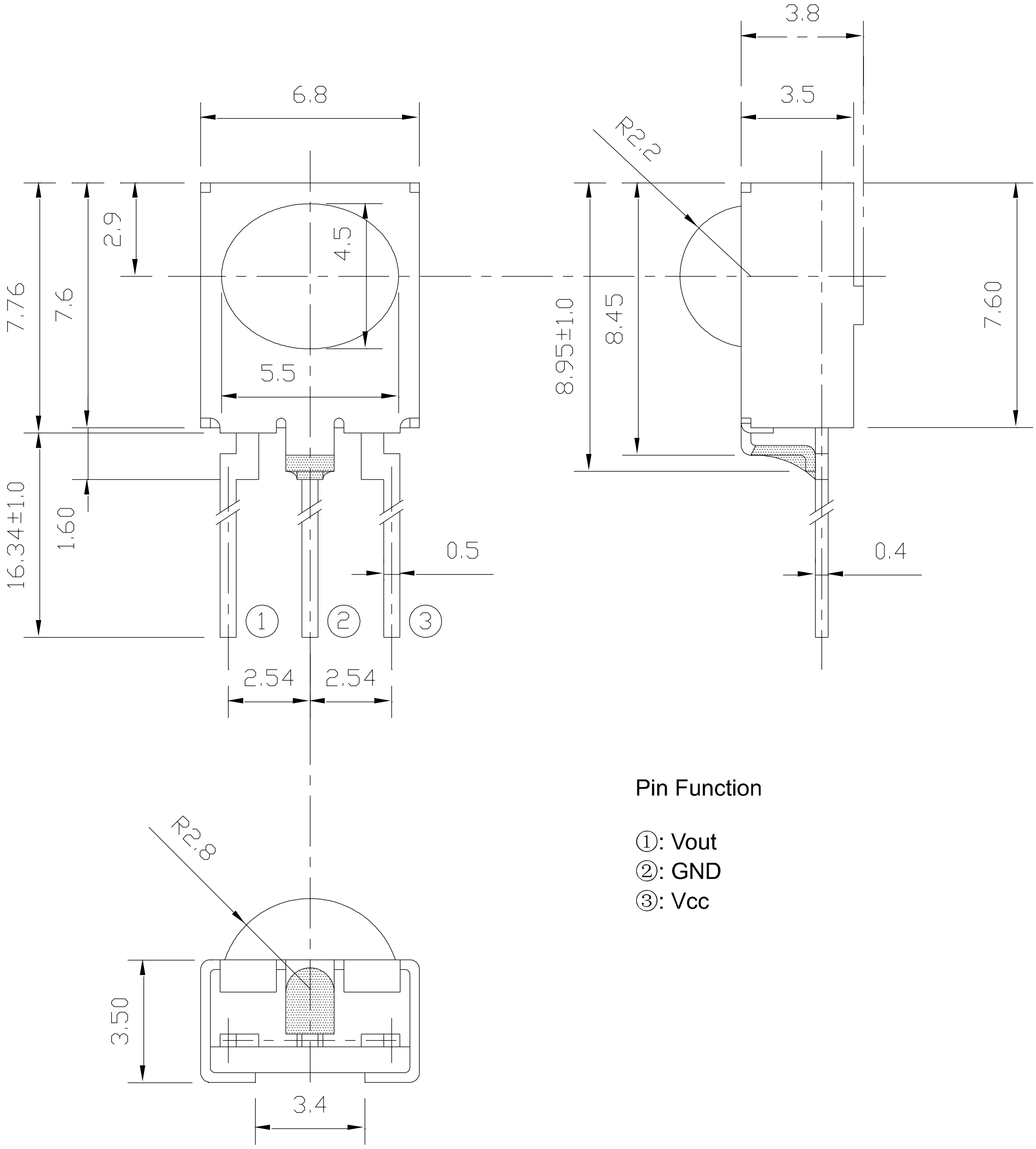




Notes

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

Package Dimensions



Pin Function

①: Vout
②: GND
③: Vcc

Notes:

1. Tolerances unless mentioned ±0.5mm. Unit: mm
2. Dimensions in mm

Packing Quantity

250 pcs / Bag
6 Bags / 1Box
10 Boxes / Carton

Recommended method of storage

The following are general recommendations for IRM with metal shell storage and use:

1. Do not open package bag before devices are ready to use.
2. Sealed package bag suggested to be stored at 10°C~30°C and ≤ 60%RH.
3. After opening the package, the devices must be stored at 10°C~30°C and ≤ 60%RH, and suggested to be used within 24 hours or as soon as possible. Besides, suggest that the remaining devices seal in the package bag as soon as possible please.

DISCLAIMER

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2. The product meets XI BNANG published specification for a period of twelve (12) months from date of shipment.
3. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
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