



# 60G Radar Module for Human Perception and Track Tracking IR60TR1A

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## 1. Overview

IR60TR1A radar module is a radar module that uses 60g millimeter wave radar technology to realize the functions of moving human body perception, position detection and track tracking. This module is based on FMCW radar system to realize wireless perception of personnel status in specific places.

The radar module has the following working characteristics:

1. Realize the function of position detection and track tracking of moving personnel;
2. Limit the detection object to people with biological characteristics (moving or stationary), and eliminate the interference of other inanimate objects in the environment;
3. This module can effectively eliminate the interference of non living objects, and can also realize the detection of non living moving objects;
4. The product supports secondary development and adapts to a variety of scenarios ;
5. General UART communication interface, providing general protocol;
6. Four groups of I \ o are reserved, which can be input and output according to user-defined or simple interface simulation;
7. The output power is small and does no harm to human body;
8. The module is not affected by temperature, light, dust and other factors, with high sensitivity and wide application fields.

## 2. Main Parameters

### 2.1 Detection Angle and Distance

Parameter Contents	Minimum	Typical	Maximum	Unit
IR60TR1A				
Detection Range of Moving Personnel	-	12	-	m
Perception Distance of Static / Slight-moving Personnel	-	6		m
Radar Detection Angle (Horizontal)	-	100	-	°
Radar Detection Angle (Pitch)	-	100	-	°

## 2.2 Electrical Characteristics

<b>Operating Parameters</b>	<b>Minimum</b>	<b>Typical</b>	<b>Maximum</b>	<b>Unit</b>
Operating Voltage (VCC)	4.5	5.0	6	V
Operating Current (ICC)	90	93	100	mA
Operating Temperature (TOP)	-20	-	+60	°C
Storage Temperature (TST)	-40	-	+80	°C

## 2.3 RF Performance

<b>Transmit Parameters</b>				
Operating Frequency (fTX)	58	-	63.5	GHz
Transmitting Power (Pout)	-	-	6	dBm

### 3. Module Dimension and Pin Definition

#### 3.1 Outline Dimension

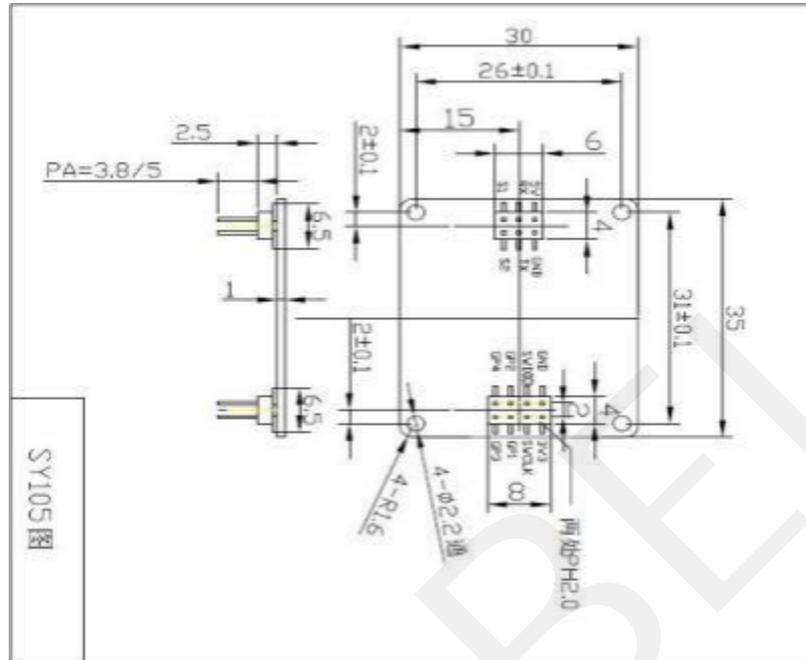


Figure 1 Diagram of Radar Module Outline Dimension

#### 3.2 Pin Definition

Interface	Pin	Description	Typical	Remark
Interface1	1	5V	5.0V	Positive end of power input
	2	GND		Ground
	3	RX		Serial port receive
	4	TX		Serial port send
	5	S1	3.3V/0V	
	6	S2	3.3V/0V	
Interface 2	1	3V3	3.3V	Output power supply
	2	GND		Ground
	3	SL		Reserve
	4	SD		Reserve
	5	GP1		Spare extension pin
	6	GP2		Spare extension pin
	7	GP3		Spare extension pin
	8	GP4		Spare extension pin

### 3.3 Wiring Diagram

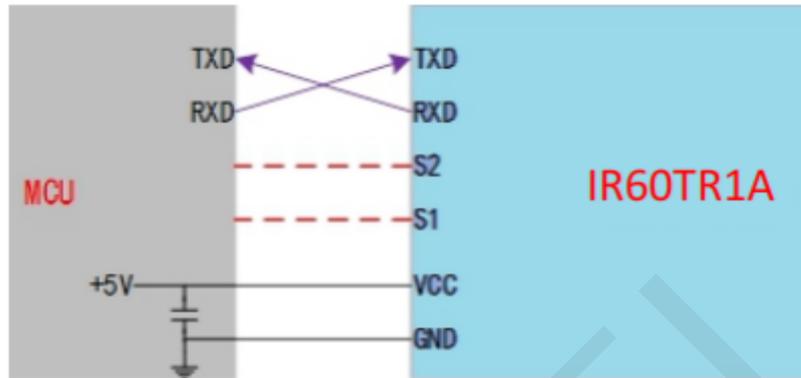
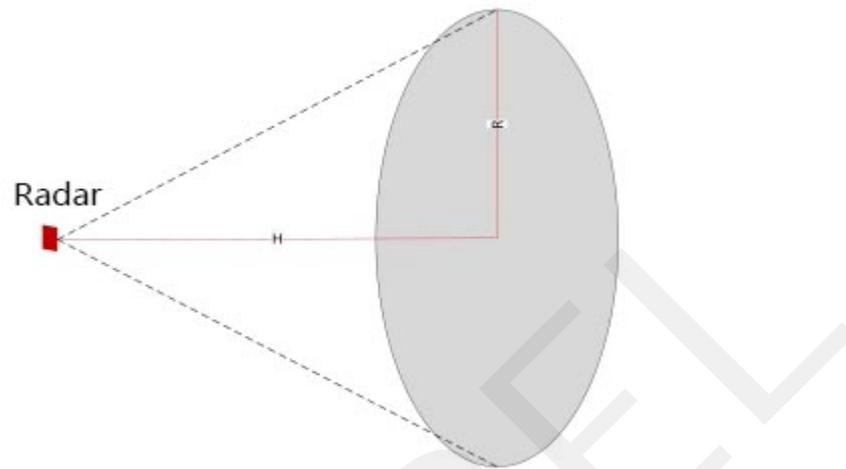


Figure 2 Wiring Diagram of Radar Module and Peripheral Equipment

## 4. Main Operating Performance

### 4.1 Radar Module Operating Coverage

The beam coverage of radar module is shown in. The radar coverage is a three-dimensional sector area with 100 ° horizontal and 100 ° pitch.



Due to the influence of radar beam characteristics, the radar operates far in the normal direction of the antenna surface, but the operating distance deviates from the normal direction of the antenna will become shorter.

## 4.2 Main Functions and Performance

### 4.2.1. MainFunctions

- 1) Moving target detection;
- 2) Slight motion target detection;
- 3) Statistics function for counting people number;

### 4.2.2. Main Parameters for Performance

- 1)Max Detection Range:  $\leq 12\text{m}$ ; (moving objects, limited to adults)
- 2)Stationary Detection Range:  $\leq 8\text{m}$ ; (sitting, radial direction)
- 3)Ranging Accuracy:  $\leq 0.5\text{m}$ ;
- 4)Angle Measurement Accuracy:  $\leq 5^\circ$ ; (object  $\geq 2\text{m}$ )
- 5)Refresh Rate for Motion Detection:  $\geq 10\text{Hz}$ ;
- 6)Response Time for Stationary Detection:  $\leq 30\text{s}$ ;
- 7)Maximum of Counting Personnel Number: 10;
- 8)Maximum of Tracking of Personnel: 3;

## 5. Radar Operation and Installation Mode

### 5.1 Installation

The commended installation method of this radar module is horizontal installation.

#### Horizontal-mounted

The radar is installed horizontally (as shown in the Figure), and the radar is fixed on the wall or placed on the desktop, and the radar beam irradiates the human body in a positive direction.

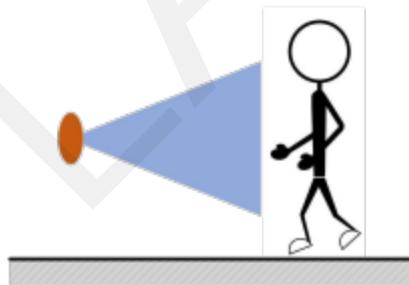


Figure Horizontal-mounted

## 6. Precautions

### 6.1. Start Time

When the module starts to work when it is initially powered on, it is necessary to completely reset the internal circuit of the module and fully evaluate the environmental noise to ensure the normal operation of the module. Therefore, when the module is initially powered on, it needs a startup stability time of 20s to ensure the validity of subsequent output parameters.

### 6.3. Radar biological detection performance

Because human biological characteristics belong to ultra-low frequency and weak reflection characteristic signals, radar processing requires a relatively long cumulative processing. During the cumulative process, many factors may affect the radar parameters, so occasional detection failure is normal.

### 6.4. Power

The radar module requires higher power quality than conventional low frequency circuits. When powering the module, it is required that the power supply has no threshold glitches or ripples and that it effectively shields the power supply noise caused by accessory equipment. The radar module needs to be well grounded. Due to the ground noise brought by other circuits, the performance of the radar module may even be reduced or even work abnormally; the most common cause is a shorter detection distance or an increased false alarm rate.

In order to ensure the normal operation of the VCO circuit inside the module, the power supply requirement for this module is +5V- +9V power supply, voltage of power supply no less than 5V. The external power supply must provide sufficient current output capability and transient response capability.

## 7. Disclaimer

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