Specification

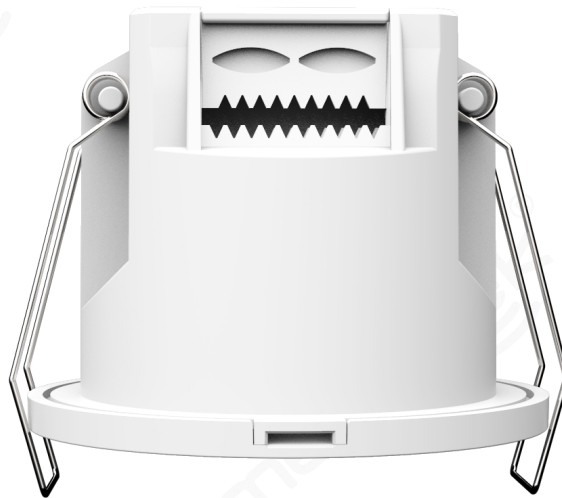**Product Name:**   24GHz Microwave Presence Sensor(ON/OFF output)

Product Model: MSA202S RC

Product Version: V1.2

【Product Description】

MSA202S RC is a 24GHz radar sensor based on Merrtek patented orthogonal half-wave bending antenna. Its antenna has high gain and wide detection range and is combined with Merrytek's unique software algorithm. It can accurately detect minor movements brought by human in almost all indoor spaces and provide fast and accurate front-end sensing input for automatically lighting control in toilet, meeting room, office etc., avoid suddenly shutting off without motion of human.

【Product Feature】

- The first Lifebeing detection created by Merrytek.
- Accurately input human-existing/ no-human signals.
- Accurately input ambient illuminance.
- International standard: 24Ghz ISM Band Millimeter Wave Radar.
- Presence detection diameter: 5-7m Max.
- Minor Moving detection diameter: 6-8m Max.
- Moving detection diameter: 6-8m Max.
- Presence, minor moving and moving detection range are highly coincide
- Round radiation. Effectively managing a whole space by a single product
- Switching time of no-human state to human-existing state: less than 0.5s
- Switching time of human-existing state to no-human state: more than 30s
- Support surfaced and flush installation
- The parameters can be set by remote control and DIPs.
- Sensing function based on millimeter wave radar technology
- Low RF power output. No harm to human health
- Not affected by temperature, humidity, noise, airflow, dust, light and other environments

【Product Application】

- Health Care
- Smart Home
- Intelligent Lighting
- Smart Hotel
- Smart Energy Consumption Control
- Home Security

【Specification】

- Dimension: φ65x46mm
- Wiring: 4-position terminal

## 【Parameter】

<table>
<tr><th rowspan="5">Input/Output</th><td>Voltage Range</td><td>220-240V AC 50Hz</td></tr>
<tr><td>Rated Voltage</td><td>220V AC</td></tr>
<tr><td>Rated load power</td><td>Resistive (Incandescent lamp, ventilation fan, etc): 800W Max
Inductive (Ballast, energy saving lamp, etc): 400W Max
LED load: 400W Max</td></tr>
<tr><td>Working Power</td><td>≤1W</td></tr>
<tr><td>Surge current</td><td>50A (50% Ipeak, twidth =500uS, 220Vac full load, cold start);</td></tr>
<tr><th rowspan="7">Sensor Parameters</th><td>Working Frequency</td><td>24GHz -24.25GHz，ISM band</td></tr>
<tr><td>Transmitting Power</td><td>5mW Max. 3dBm Max.</td></tr>
<tr><td>Detection Area</td><td>100% 75% 50% 25% (set by remote control MH10 or DIPs)</td></tr>
<tr><td>Hold Time</td><td>5s/30s /1min / 3min /5min /10min /20min/30min (set by remote control MH10)
5s/30s/1min/3min/5min (set by DIPs)</td></tr>
<tr><td>Detecting Range (QS1 mode,100% detection area, radius)</td><td>Movement: 3-4m (at 3m height)
Minor Movement: 2.5-3.5m (at 3m height)
Presence: 2.5-3.5m (at 3m height)</td></tr>
<tr><td>Mounting Height</td><td>2.5-4.0m, typical value:3m</td></tr>
<tr><td rowspan="2">3db Beam Angle</td><td>100°（XZ field）</td></tr>
<tr><td>100°（YZ field）</td></tr>
<tr><th rowspan="2">Environment</th><td>Working Temperature</td><td>0℃...+50℃</td></tr>
<tr><td>Storage Temperature</td><td>-40℃...80℃ Humidity:≤85% (non condensing)</td></tr>
<tr><th rowspan="3">Certificate Standard</th><td>Certificate</td><td>FCC/RED</td></tr>
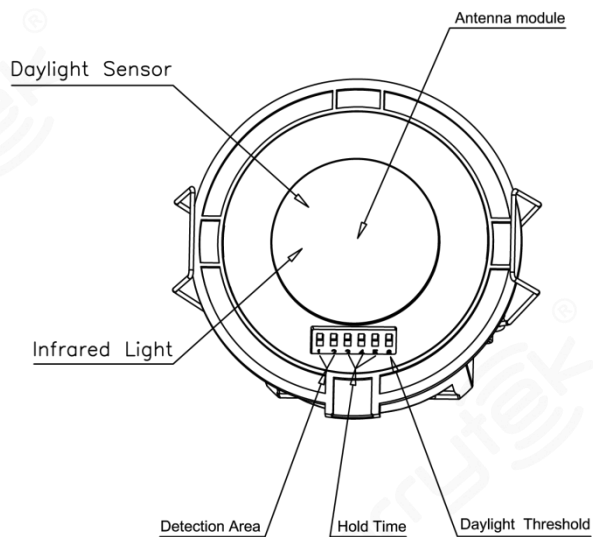<tr><td>Environmental Requirement</td><td>RoHS</td></tr>
<tr><td>IP Rating</td><td>IP20</td></tr>
<tr><td colspan="3">Note: "N/A" means not available.</td></tr>
</table>

【Dimension】

【Wiring Diagram】

单控　　　　　　　　　　　　　　　　　　　　双控
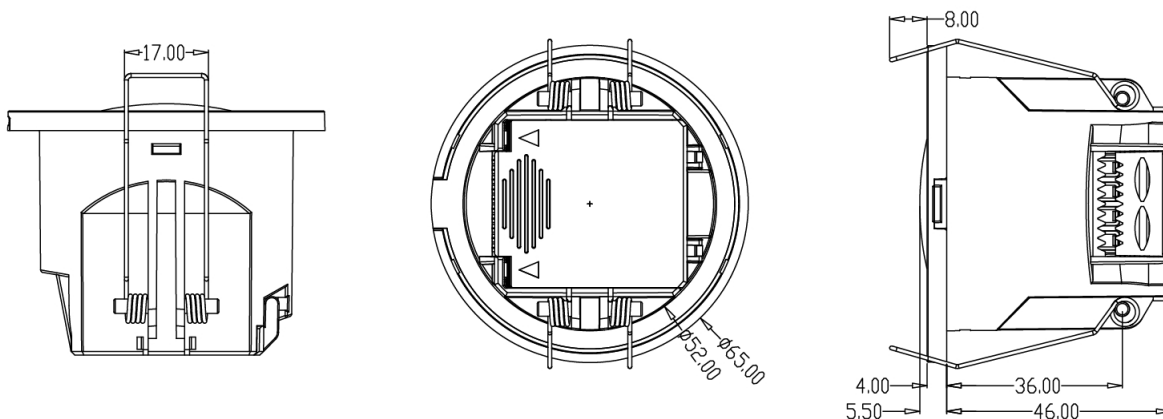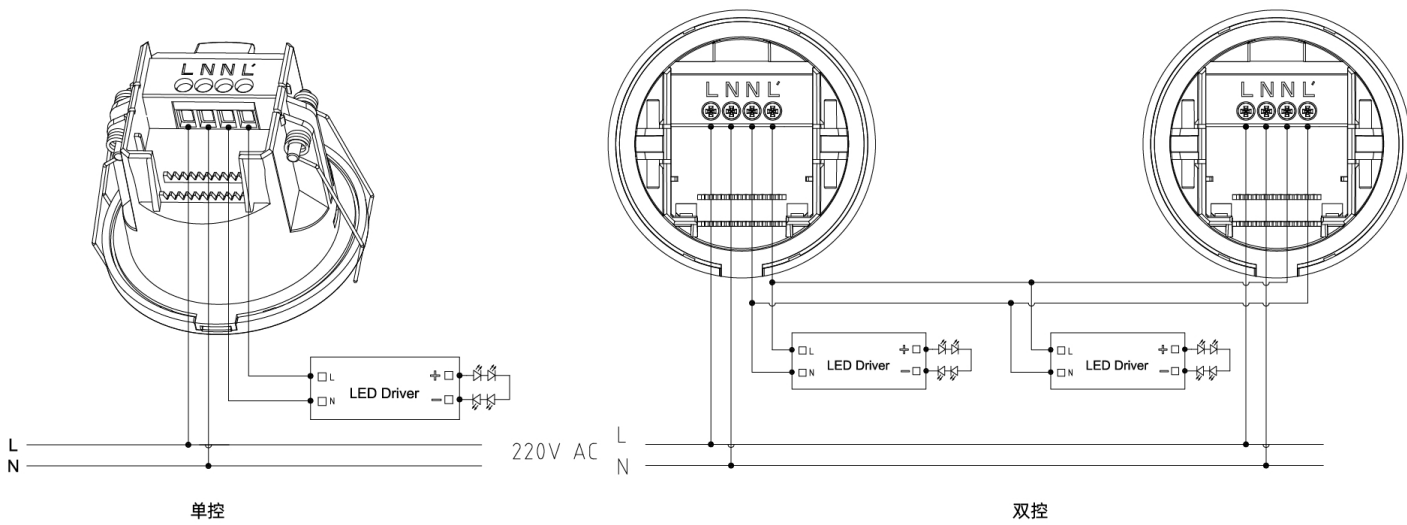
【Structure】

【Start Process & Initialization】

When the first power-on, indicator turns off after flashing for 20 seconds. Sensor does not detect moving signal and remote control settings are invalid during initialization.

【Factory settings】

Detection Area: QS1 mode 100%　　　　　Hold Time: 1min

Daylight Sensor: Disable　　　　Indicator light: open

【Installation Instruction】

● **Flush Mounting**

（1）Cut size 55mm

（2）Use a flat-blade screwdriver to remove wiring cap

（3）Connect wire to terminal

（4）Press the power wires with the wire clip and fasten

　　it with screws, and then cover the wiring cap

（5）Use a flat-blade screwdriver to remove surface cover

（6）Adjust DIPs to set parameters

（7）Cover the surface cover to make the button fasten to

　　the body.

（8）Bend the spring clip backwards to push product into

　　the opening in ceiling

（9）Ensure installation stable and reliable
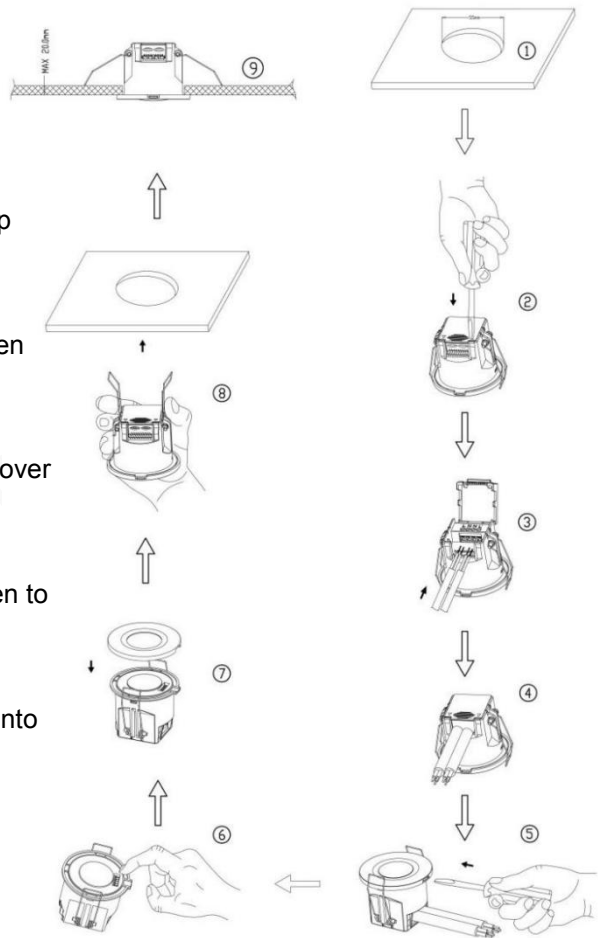
● **Ceiling Box Installation Dimension：**
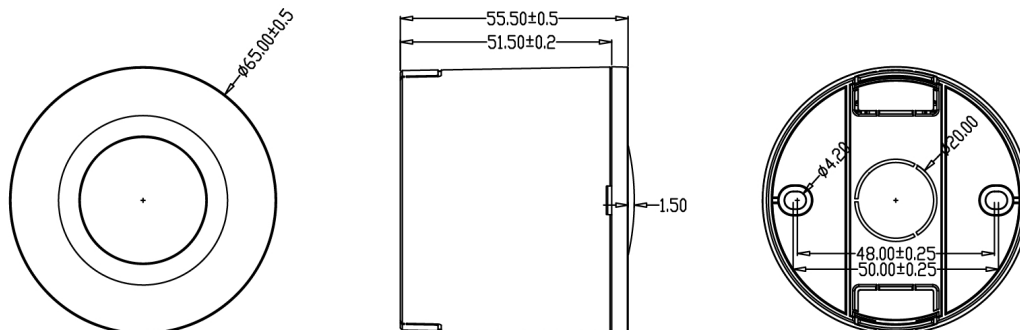
● **Ceiling Mounting**

  (1) Cut the reserved thin wall with tool

  (2) Use matching screws to fasten the product to the

mounting surface.

  (3) Connect the input wire with the terminal, and close

the cover to press the wire.

  (4) Use a flat-blade screwdriver to remove surface cover

  (5) Adjust DIPs to set parameters, and then cover the

surface cover.

  (6) Push the sensor into the ceiling mount, the buckle will

fasten the sensor and prevent it from falling off.

  (7) To separate the product from the ceiling mount, insert a

flat-blade screwdriver into the removal notch, lift the

flat-blade screwdriver, pry down with the tip of the

blade, and the product will pop out of the ceiling mount.
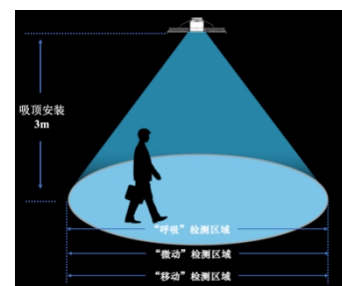
  (8) Ensure installation stable and reliable.
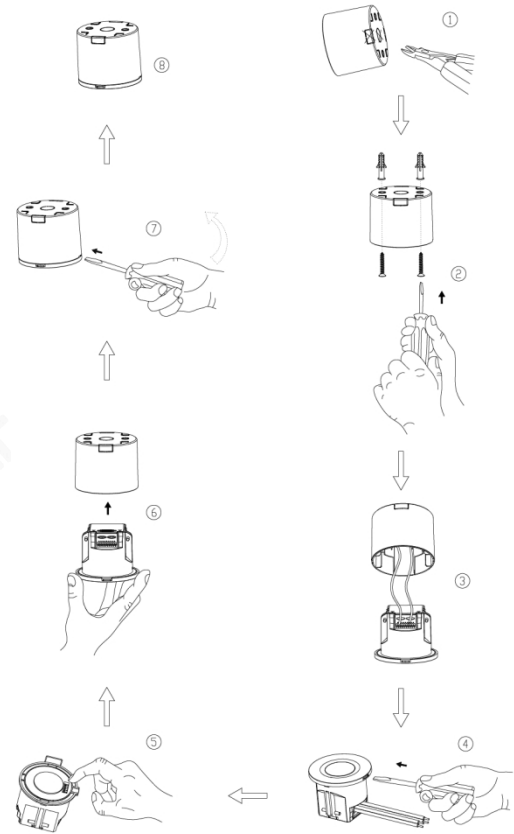
【Work Performance】

● **Radiation：**
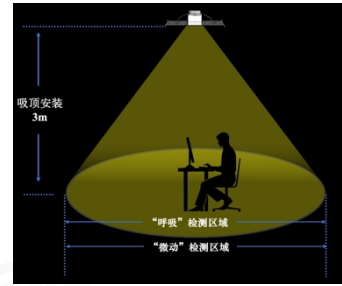The typical installation of MSA202S RC is ceiling mounting, and its radiation range is as follows:

Movement Detecting Function

1. Detection diameter: 6-8m, controlled by remote control or DIPs

2. Detecting Speed: <0.2m/s
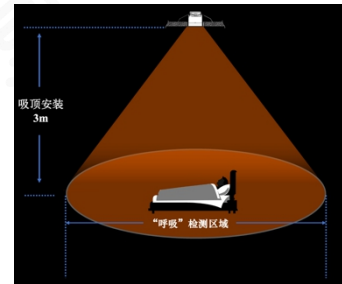
3. Response time: <100ms

Minor Movement Detecting Function

1. Detection diameter: 5-7m; controlled by remote control or DIPs

2. Response time: <1s

Presence Detecting Function

1. Detection diameter: 5-7m; controlled by remote control or DIPs

2. Hold time is required more than 30S.

【Typical Application】

The product is mainly used in home, office, public places and other scenes. The following is an explanation of the application mode for typical scenes.

● **Smart Home**

In today's era, smart home is in the ascendant. It is a major topics of smart home that carrying out system management based on the human-existing in the home place makes all home units, such as lighting, home appliances, electric control, temperature control, fresh air and other systems runs intelligently with human center. Merrytek MSA202S RC detects human moving signals by 24GHz millimeter wave, it can cooperate with various systems of the home to achieve the ultimate home experience where people go, the light moves with it, and the temperature is comfortable.

**Scenes: kitchen, cloakroom, living room and bathroom**

● **Smart Office**

In view of the increasing demand for energy consumption in office spaces, more and more users are looking for humanized automatic dimming and switching of lamps in offices, conference rooms, bathrooms and other scenes. Humanized automatic air conditioning and air volume adjustment are used to take into account the needs of healthy office and energy saving and emission reduction. This sensor can accurately output human-existing/no-human signals to match with sensors such as temperature, humidity, and illumination, which perfectly meets the user's human-oriented intelligent application in the office.

Scenes: office lighting, office curtain, office air conditioning and other intelligent devices

● **Smart Hotel**

For the intelligent upgrading and transformation of hotels, humanized energy saving and personalized scene linkage have gradually become a hot spot. The product accurately output human-existing/no-human signal. It can be used with the hotel's ZigBee communication system for card-free power extraction, scene interaction and other applications. It can effectively meet the needs of the hotel based on human-existing for intelligent electricity, intelligent fresh air and intelligent bathroom.
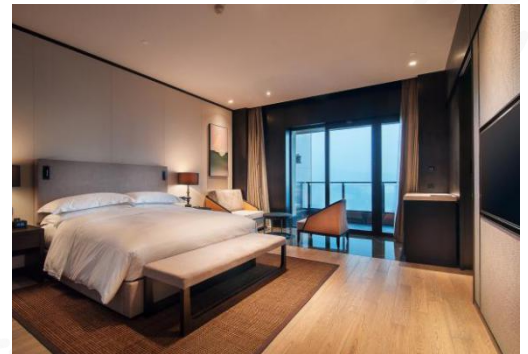
Scenes: card-free power extraction, scene interaction, Smart bathroom, hotel electrical energy saving, human-existing/no-human monitoring

【Detection Signal】

The product detects human moving, minor moving, and presence signals, and realizes the detection of human-existing/no-human in non-sleep state. The following is a description of the moving, minor moving and presence signals:

● **Moving signal:** detect the human significant moving (walking) in the detection area.

● **Minor moving signal:** detect the human slight moving in the detection area, such as leaning forward, leaning forwarder and back, swinging limbs, shaking head, typing, playing with mobile phones and so on.

● **Presence signal:** detect human abdominal and thoracic expansion behaviors caused by breathing, but not detect moving signal and minor moving signal.

【Application Notice】

1. Product should be installed by a professional electrician.

2. Product should be kept as far away as possible from large-area metal plates, glass and other substances with high medium density to avoid false triggering.

3. The antenna surface of the product and its nearby circuits should avoid the flow of large currents, so as not to affect the normal operation of the product.

4. When installing multiple products in one place, please try to ensure that the antenna surfaces of the products are parallel to each other and do not face each other. The installation distance between products should be greater than 1m. Dense installation may cause false reports.

5. The antenna surface of the product should avoid facing the AC drive power supply, and stay away from the rectifier bridge, transformer, switch tube and other high-power devices of the drive power supply, so as to avoid power frequency signals from interfering with the microwave module.

6. Avoid using objects that vibrate for a long time around the product, such as shaking head fans and so on. The vibration signal will be regarded as a moving signal to trigger the product.

7. Avoid unnecessary lights illuminating the product's illuminance sensor detection window and interfere with the measurement of ambient light.

8. The microwave sensor has an ability to penetrate the building wall, and the microwave that penetrates outside the wall may cause false triggering when it detects moving objects. In order to avoid false triggering, when installing, please choose appropriate detection area, for example:

A. When product is used in the room whose length and width is about 3m or less, QS3 mode is recommended and detection area shall be set to best cover your ideal range;

B. When product is used in the room whose length and width is about 3-4.5m, QS2 mode is recommended and detection area shall be set to best cover your ideal range;

C. When product is used in the room whose length and width is more than 4.5m, QS1 mode is recommended and detection area shall be set to best cover your ideal range;

Note: The setting detection area depends on the actual environment(detection area parameters above application scenes are for reference only).

9. The detection distance is related to the moving speed of the moving object, the size of the moving object, the installation height, the installation angle, whether the installation environment is empty, the material of the reflector and other factors. The detection distances given in the specification are typical values, which are obtained by testers at height of 165cm and weight of 65kg and tested in an indoor open environment.

10. Product specifications and parameters may be optimized without prior notice.

【DIPs settings】

● Detection Area

	1	2
100%	ON	ON
75%	-	ON
50%	ON	-
25%	-	-

● Hold Time

	3	4	5	
I	ON	ON	ON	5S
II	-	ON	ON	30S
III	ON	-	ON	1min
IV	ON	ON	-	3min
V	-	-	-	5min

● Daylight Sensor

	6	
I	ON	50Lux
II	-	Disable

*When set to "disable", the lamp will switch on when it detect the motion no matter the ambient light level.

【Remote control】

The remote control only can set the parameters of sensitivity, hold time, ON/OFF, Reset, Sensor Motion and indicator on-off setting.

Remote Control Setting	Button	Remarks
	ON/OFF	Press "ON/OFF", the load lamp will enter normal ON mode, sensor function will be override. "ON/OFF" key has the memory function after power off. The load lamp enter the normally ON mode after power on again. Press "Reset" / "Sensor motion" to exit the normally ON mode, and the sensing function is turned on.
	Reset	Press "RESET", sensor parameters return to factory setting. Detection Area: 100% Hold time: 1min Indicator light: open
	Sensor motion	Press "Sensor motion", return to sensor mode (previous parameters setting is valid)
	DIM Test	N/A
	Override DH	N/A
	DIM + DIM -	N/A
	DH Mode	N/A
	Q1 Q2 Q3	QS1: For more than 20㎡ space
QS2: For 10-20㎡ space
QS3: For 1-10㎡ space
	TEST 2S	N/A
	HS LS	HS: Turn ON indicator light
LS: Turn OFF indicator light
	☾☀	Daylight Sensor
Set up daylight threshold:
5LUX/15LUX/30LUX/50LUX/100LUX/150LUX/Disable
	🕐	N/A
	🕐	Hold time
Set up hold time:
5S/30S/1min/3min/5min/10min/20min/30min
	50% 10%	N/A
	Detection	Detection Area
Set up detection area: 25%/50%/75%/100%
	5m 10m 15m	Remote Distance
Toggle bottom can set the remote distance of remote control and sensoer.

【Disclaimer】

Due to the complexity of product technology and differences in application environment, it is difficult to guarantee a completely accurate or complete description, so this specification is only for user reference.

We will reserve the right to make changes to the product specifications without notifying the user, and do not make any commitments and guarantees in the legal sense.

At the same time, our company encourages users to supplement or modify the contents of our specifications after using our products.

Versions	Release/ change Date	Publishing
V1.0	2022.09.05	Jacky
V1.1	2022.11.11	Jacky
V1.2	2023.05.20	Jacky