□ 产品概述 ：

GH719/GH719C 是一款专为物联网设备设计的微型多普勒雷达传感器模块，采用 10.525GHz 微波探测技术，可实现非接触式移动物体检测。模块支持 16 级灵敏度调节、4 种触发逻辑及光控功能，可隐蔽安装于非金属外壳内，为智能设备提供可靠、低功耗、易集成的存在感知能力。微波感应模块以军工级穿透力与消费级易用性，赋能智能家居、安防监控与工业物联设备精准"识人辨物"。

□ 核心特性（IoT 优化）:

特性	说明	IoT 应用价值
宽电压输入	DC 3.3V-20V	兼容 3.3V/5V/12V 各类 IoT 主控与电池系统
较低功耗	静态电流仅 1.6mA	支持电池供电设备长期待机
穿透安装	可穿透塑料/玻璃/木材外壳	保持设备外观完整性，防尘防水
环境免疫	抗射频干扰，不受温湿度/气流/光线影响	适应复杂室内外环境，减少误触
灵活配置	16 级灵敏度+4 种触发模式	适配不同场景与节能策略
数字接口	高低电平输出（3V/0V）	直连 MCU GPIO，无需 ADC 转换

技术规格：

项目	参数
探测技术	多普勒雷达（Doppler Radar）
中心频率	10.525 GHz ±3MHz
感应距离	1-12 米（16 级可调）
探测角度	水平 80° / 垂直 40°
输出信号	数字高/低电平（3V/0V）
响应时间	<0.3 秒
工作电压	DC 3.3V - 20V
静态电流	1.6mA
工作温度	-30°C ~ +70°C
尺寸重量	GH719: 45×37×13mm / GH719C: 35×30×14mm

功能详解：

触发模式（4 种）：通过板上 2 位端口（H 4- H 5）设置逻辑：

模式	编码	行为特征	适用场景
不可重复	00	探测到目标→输出 3 秒高电平→强制 2 秒休眠	节能型监控
可重复-2 秒	01	持续探测则持续刷新 2 秒延时，每秒检测 30 次	人体存在感应
可重复-10 秒	10	持续探测则持续刷新 10 秒延时	走廊照明
可重复-30 秒	11	持续探测则持续刷新 30 秒延时	安防报警

灵敏度调节（16 级）：通过板上 4 位二进制端口（H0-H3）设置探测距离：

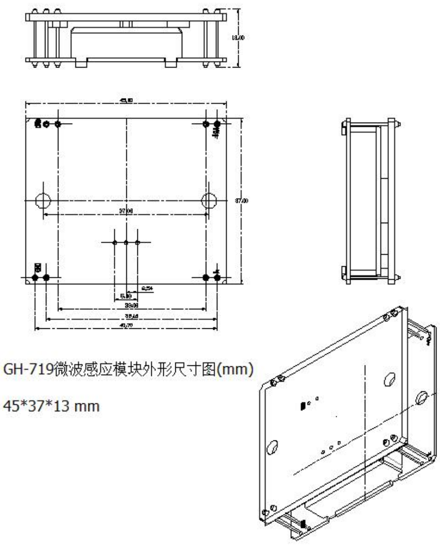
0：0000	1：0001	2：0010	3：0011	4：0100	5：0101	6：0110	7：0111。
8：1000	9：1001	A：1010	B：1011	C：1100	D：1101	E：1110	F：1111。
0000：1 米（最低）；1111：12 米（最高）；步进：约 0.7 米/级 ；配置后需断电重启生效							

光敏控制（CDS 接口）

- 外接光敏电阻实现昼夜模式切换
- 锁定型：触发期间不受光线变化影响，确保执行完整性
- 推荐：10kΩ-100kΩ 光敏电阻+10kΩ 分压电阻

□ 外形及尺寸:

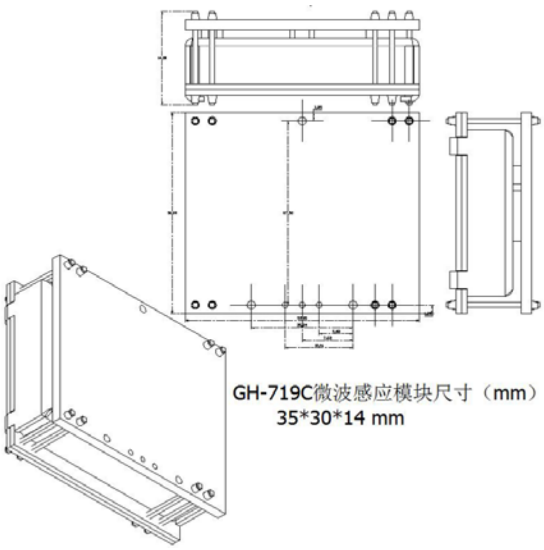
□ GH719 产品图片与外形尺寸图:



GH-719微波感应模块外形尺寸图(mm)

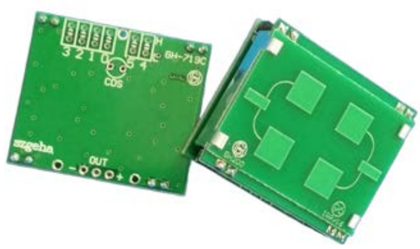
45*37*13 mm

□ GH719C 产品图片与外形尺寸图:



GH-719C微波感应模块尺寸（mm）

35*30*14 mm



□ 微波传感器技术参数:

发射	
1 发射频率 :	10.525 GHz
2 频率设置精度 :	3MHz
3 输出功率(最小):	< 13dBm EIRP
4 工作电压 :	3.3V±0.25V
5 工作电流(CW):	60mA max., 38mA typical
6 谐波发射:	< -10dBm
7 脉冲工作模式（平均电流）:	(5%DC) : 2mA typ.
8 脉冲宽度(Min.):	5uS
9 负载循环(Min.):	1%
接收	
1 灵敏度（3Hz 至 80Hz 带宽）:	-86dBm
2 3Hz 至 80Hz 带宽杂波:	10uV
3 天线增益:	8dBi
4 垂直面 3dB 波束宽度:	36 度
5 水平面 3dB 波束宽度:	72 度
6 重量:	8 克
7 规格:	37×45×10mm/35×30×10mm

□注释:
□GH719/GH719C 微波感应模块辐射功率，测试符合 FCC_Part15.245 标准.
□GH719/GH719C 微波感应模块工作频率 10.525Ghz，测试符合 EN300 440 标准.
□注意:
□探测范围取决于目标的反射度和大小以及信噪比.
□10.525GHz 下多普勒速度为 31Hz/m.p.h.
□模块在摄氏-30 度到 70 度 范围工作但谐波可能超出规范水平.

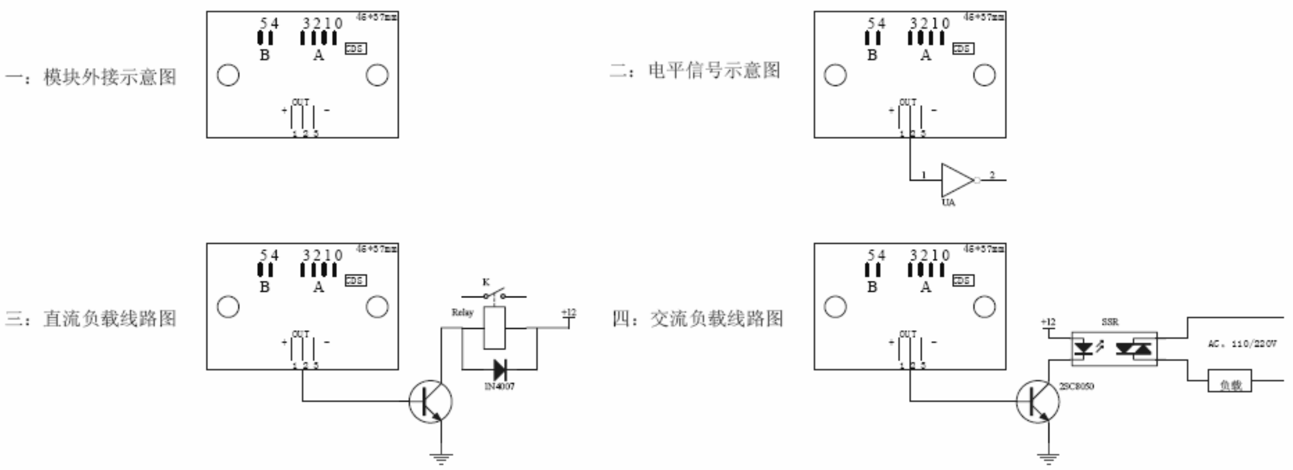
□ 模块输出接口定义:

- VCC：电源正极（3.3V-20V）
- GND：电源负极/系统地
- OUT：TTL 电平输出（3V/0V），最大驱动能力 5mA
- CDS：光敏电阻接口，外接 10kΩ-100kΩ光敏电阻+10kΩ分压电阻至 GND

□ 典型应用电路:

- MCU 直连：OUT→MCU GPIO（内部下拉），CDS→MCU ADC（如使用光控）
- 驱动直流负载：OUT→NPN 三极管基极（如 2N2222）→继电器/LED
- 驱动交流负载：OUT→光耦隔离→可控硅/继电器（参考原厂交流负载线路图）
- 指示电路：OUT→1kΩ电阻→LED，直观显示触发状态

□ GH719/ GH719C 微波感应模块使用电路图：



□ 物联网集成指南：

硬件接口：

- GH719 模块 → IoT 主控（如 ESP32/8266）：
- VCC → 3.3V/5V/12V 电源
- GND → 系统地
- OUT → GPIO 输入（建议内部下拉）

设计建议：

- OUT 引脚电流驱动能力弱（<5mA），禁止直接驱动负载
- 电源加 100nF+10μF 去耦电容，防止射频干扰
- 若穿透金属外壳，需在前方面板预留 45×37mm 或 35×30mm 非金属窗口

□ 软件逻辑示例（Arduino）:

GH-719_1.0

```
#define GH719_PIN 5 //定义GH719数字引脚

#define LED1 15 //定义LED1数字引脚

void setup() {
  Serial.begin(9600); //初始化串口通讯
  pinMode(GH719_PIN, INPUT); //设置GH719为输入模式

  pinMode(LED1, OUTPUT); //设置LED1为输出模式

  digitalWrite(LED1, LOW); //控制LED1输出低电平 0
}
void loop() {
  if (digitalRead(GH719_PIN) == HIGH) {
    Serial.println("GH719 Sensor OUTPUT: ON"); //检测到物体或人体，输出提示信息

     digitalWrite(LED1, HIGH);//控制LED1输出高电平 1
  }
  else {
    Serial.println("GH719 Sensor OUTPUT: OFF");//未检测到物体或人体，输出提示信息

     digitalWrite(LED1, LOW);//控制LED1输出低电平 0

     // 夜间触发
    // 执行联动: 开灯/上报云端/录像

  }
  delay(1000);//延时1000ms，循环检测
}
```

□ 典型 IoT 应用场景:

智能照明系统:

- 配置：灵敏度 8 级（6 米），可重复-10 秒模式
- 优势：替代 PIR，穿壳安装，不受温度影响，车库/地下室稳定工作

安防监控唤醒:

- 配置：灵敏度 12 级（10 米），不可重复模式+光控
- 优势：低功耗待机，检测到人形后唤醒摄像头，避免无效录像

空间占用监测:

- 配置：灵敏度 6 级（4 米），可重复-2 秒模式
- 优势：实时监测会议室/工位占用状态，数据上云生成热力图

智能家居联动:

- 配置：灵敏度 4 级（3 米），可重复-30 秒模式
- 优势：穿透面板安装，实现隐藏式存在感知，控制灯光/空调/音乐

工业设备安全:

- 配置：灵敏度 10 级（8 米），不可重复模式
- 优势：机械臂工作区域入侵检测，触发急停回路

□ 配置与调试:

快速配置流程

- **上电前**：根据场景选择灵敏度与触发模式，用焊锡短接对应焊盘
- **安装**：模块正面朝向探测区域，远离金属/电机/WiFi 天线（>15cm）
- **测试**：使用串口打印 OUT 电平，步行测试最大探测边界
- **优化**：若误触，降低灵敏度；若漏检，提高灵敏度并移除光控

安装注意事项

- **探测盲区**：模块正下方 30cm 内为盲区
- **干扰源**：远离 2.4GHz/5GHz 天线、开关电源、变频器
- **移动目标**：可探测径向移动，切向移动灵敏度降低 50%

材料穿透损耗:

- **塑料/玻璃**：<10%距离衰减
- 木材（5mm）：约 20%衰减
- **避免金属、水膜覆盖**

□ 注意事项:

□□ **电源要求**：电压低于 3.0V 时灵敏度下降，高于 20V 可能损坏模块

□□ **配置生效**：灵敏度/模式修改后必须断电重启才能生效

□□ **射频安全**：符合 FCC 标准，但持续发射时建议距离人体>2cm

□□ **温度漂移**：-30°C 以下谐波可能超标，70°C 以上距离缩短 10%

□ 订购信息与技术支持：

型号	尺寸	重量	包装	推荐场景
GH719	45×37×13mm	约 15g	静电袋+纸盒	工业、安防
GH719C	35×30×14mm	约 13g	静电袋+纸盒	消费类 IoT 设备

供货周期：现货库存，批量 5000PCS 交期 2 周

开发支持：提供 ESP32/Arduino/STM32 示例代码、3D 外壳模型、MQTT 协议参考

售后服务：一年质保，免费技术支持

制造商信息：

杰华智感（深圳）科技有限公司

地址：深圳市龙华区观澜街道观光路 1301 号

电话：+86-755-28168358

传真：+86-755-28168293

网址：http://www.szgeha.com

邮箱：support@szgeha.com

□ Product Overview:

The GH719/GH719C is a miniature Doppler radar sensor module specifically designed for IoT devices. Utilizing 10.525GHz microwave detection technology, it enables non-contact motion detection. The module features 16-level sensitivity adjustment, 4 trigger logic options, and photo-control functionality, allowing covert installation within non-metallic enclosures. It provides smart devices with reliable, low-power, and easy-to-integrate presence sensing capabilities. With military-grade penetration performance and consumer-level usability, the microwave sensing module empowers smart homes, security monitoring, and industrial IoT devices to accurately "identify people and objects.".

□ Core Features (IoT-Optimized):

feature	Instructions	IoT Application Value
Wide voltage input	DC 3.3V-20V	Compatible with various IoT controllers and battery systems at 3.3V/5V/12V
Lower power consumption	Static current is only 1.6mA	Support long-term standby of battery powered devices
Penetrating installation	Penetrating plastic/glass/wood shell	Maintain the integrity of the device's appearance, dust and water resistance
Environmental immunity	Anti RF interference, unaffected by temperature, humidity, airflow, and light	Adapt to complex indoor and outdoor environments, reduce accidental contact
Flexible configuration	16 level sensitivity+4 triggering modes	Adapt to different scenarios and energy-saving strategies
Digital interface	High and low level output (3V/0V)	Directly connected to MCU GPIO, no need for ADC conversion

□ Technical specifications:

project	parameter
detection technology	Doppler Radar
center frequency	10.525 GHz ±3MHz
sensing distance	1-12 meters (adjustable at level 16)
Detection angle	Horizontal 80 °/Vertical 40 °
output signal	Digital high/low level (3V/0V)
response time	<0.3s
Working Voltage	DC 3.3V - 20V
quiescent current	1.6mA
Operating Temperature	-30°C ~ +70°C
Dimensions & Weight	GH719: 45×37×13mm / GH719C: 35×30×14mm

□ Function Explanation:

Trigger mode (4 types): Set the logic through the two ports (H 4- H 5) on the board:

pattern	encoding	behavioral characteristics	Applicable scenarios
Cannot be repeated	00	Detected target → Output 3-second high level → Force 2-second sleep mode	Energy saving monitoring
Repeatable for -2 seconds	01	Continuous detection will refresh continuously for 2 seconds with a delay of 30 human presence detections per second	Human body presence sensing
Repeatable for -10 seconds	10	Continuous detection will refresh continuously for 10 seconds with a delay	Corridor lighting
Repeatable for -30 seconds	11	Continuous detection will refresh continuously for 30 seconds with a delay	Security alarm

Sensitivity adjustment (16 levels): Set the detection distance through the 4-digit binary port (H0-H3) on the board:

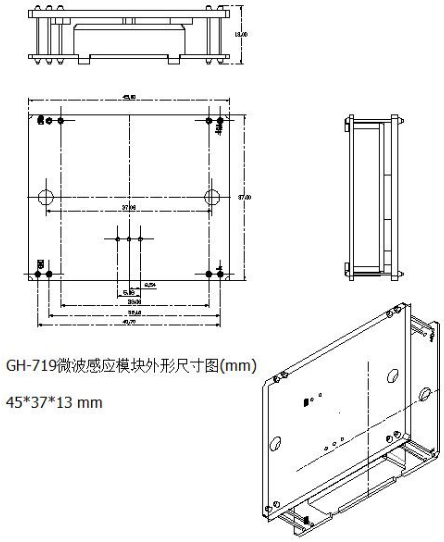
0： 0000	1： 0001	2： 0010	3： 0011	4： 0100	5： 0101	6： 0110	7： 0111。
8： 1000	9： 1001	A： 1010	B： 1011	C： 1100	D： 1101	E： 1110	F： 1111。
0000:1 meter (minimum); 1111:12 meters (highest); Step: about 0.7 meters per level; After configuration, it needs to be powered off and restarted to take effect							

Light sensitive control (CDS interface)

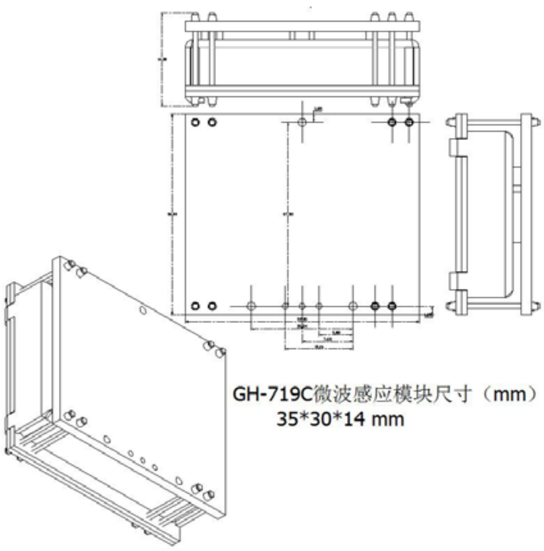
- External photoresistor for day night mode switching
- **Locking type:** not affected by changes in light during triggering, ensuring execution integrity
- **Recommendation:** 10k Ω -100k Ω photoresistor+10k Ω voltage divider resistor

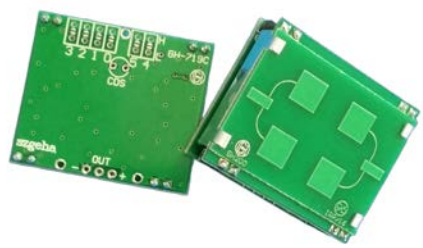
□ Appearance and dimensions:

□ GH719 product images and external dimension drawings:



□ GH719C product images and external dimension drawings:





□ Technical parameters of microwave sensor:

transmitter	
1 Transmission frequency:	10.525 GHz
2 Frequency setting accuracy:	3MHz
3 Power Output (Min.):	< 13dBm EIRP
4 Operating Voltage：	3.3V±0.25V
5 Operating current (CW):	60mA max., 38mA typical
6 Harmonic emission:	＜-10dBm
7 Average current:	(5％DC) : 2mA typ.
8 Pulse width (Min.):	5uS
9 Duty Cycle (Min.):	1％
Receiver	
1 Sensitivity (3Hz to 80Hz):	-86dBm
2 Noise:(3Hz to 80Hz bandwidth):	10uV
3 Antenna gain:	8dBi
4 Antenna Beam-width (3 dB) – Elevation	36º
5 Antenna Beam-width (3 dB) - Azimuth	72º
6 Weight:	8 grams
7 Specifications:	37×45×10mm/35×30×10mm

□Notes:
□GH719/GH719C microwave induction module radiation power, tested in accordance with FCC_Part15.245 standard
□GH719/GH719C microwave induction module operates at a frequency of 10.525GHz and meets the EN300 440 standard during testing
□The detection range depends on the reflectivity and size of the target, as well as the signal-to-noise ratio
□The Doppler velocity at 0.525GHz is 31Hz/m.p.h
□The module operates within the temperature range of -30 degrees Celsius to 70 degrees Celsius, but harmonics may exceed the specified level

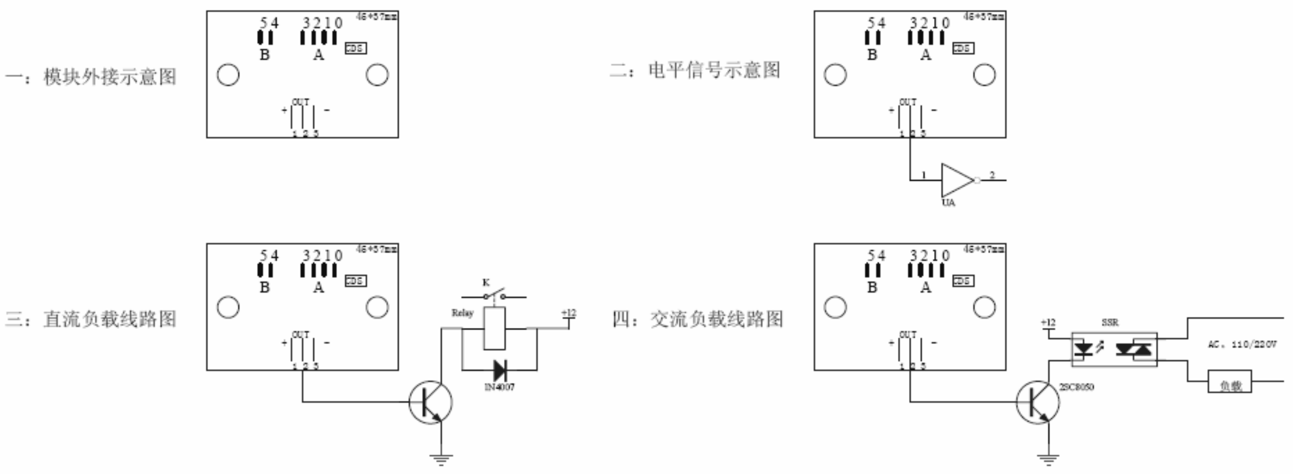
□ Module output interface definition:

- VCC： VCC: power +(3.3V-20V)
- GND: Negative pole of power supply/system ground
- OUT: TTL level output (3V/0V), maximum driving capacity 5mA
- CDS: external 10k Ω -100k Ω CDS +10k Ω voltage divider resistor to GND

□ Typical application circuit:

- MCU Direct Connection: OUT→MCU GPIO (internal pull-down), CDS→MCU ADC
- Drive DC load: OUT → NPN transistor base (e.g., 2N2222) → relay/LED
- Drive AC load: OUT → optocoupler isolation → triac/relay
- Indication circuit: OUT → 1k Ω resistor → LED, visually displaying the triggering status

□ GH719/GH719C Microwave Induction Module Circuit Diagram:



□ IoT Integration Guide:

Hardware interface:

- GH719 module → IoT controller (such as ESP32/8266):
- VCC → 3.3V/5V/12V power supply
- GND → System Ground
- OUT → GPIO input (internal pull-down recommended)

Design suggestion:

- The current driving capability of the OUT pin is weak (<5mA), and direct driving of the load is prohibited

●Add 100nF+10 μ F decoupling capacitor to the power supply to prevent RF interference

●If penetrating the metal casing, a non-metallic window of 45 × 37mm or 35 × 30mm needs to be reserved on the front panel

□ Software Logic Example (Arduino):

```
GH-719_1.0
#define GH719_PIN 5 //定义GH719数字引脚

#define LED1 15 //定义LED1数字引脚

void setup() {
  Serial.begin(9600); //初始化串口通讯
  pinMode(GH719_PIN, INPUT); //设置GH719为输入模式

  pinMode(LED1, OUTPUT); //设置LED1为输出模式

  digitalWrite(LED1, LOW); //控制LED1输出低电平 0
}
void loop() {
  if (digitalRead(GH719_PIN) == HIGH) {
    Serial.println("GH719 Sensor OUTPUT: ON"); //检测到物体或人体，输出提示信息

     digitalWrite(LED1, HIGH);//控制LED1输出高电平 1
  }
  else {
    Serial.println("GH719 Sensor OUTPUT: OFF");//未检测到物体或人体，输出提示信息

     digitalWrite(LED1, LOW);//控制LED1输出低电平 0

     // 夜间触发
    // 执行联动: 开灯/上报云端/录像

  }
  delay(1000);//延时1000ms，循环检测
}
```

□ Typical IoT application scenarios:

Intelligent lighting system:

- Configuration: Sensitivity level 8 (6 meters), repeatable -10 second mode
- Advantages: Alternative to PIR, through shell installation, not affected by temperature, stable operation in garage/basement

Security monitoring wake-up:

- Configuration: Sensitivity level 12 (10 meters), non repeatable mode+light control
- Advantages: Low power standby, wakes up the camera upon detecting a human form, avoiding ineffective recording

Space occupancy monitoring:

- **Configuration:** Sensitivity level 6 (4 meters), repeatable -2 second mode
- **Advantages:** Real time monitoring of conference room/workstation occupancy status, cloud based generation of heat maps from data

Smart home linkage:

- **Configuration:** Sensitivity level 4 (3 meters), repeatable -30 second mode

●**Advantages:** Penetrating panel installation, achieving hidden presence perception, controlling lighting/air conditioning/music

Industrial equipment safety:

- **Configuration:** Sensitivity level 10 (8 meters), non repeatable mode
- **Advantages:** Intrusion detection in the working area of the robotic arm, triggering the emergency stop circuit

□ Configuration and Debugging:

Quick configuration process

- **Before powering on:** Select sensitivity and trigger mode according to the scene, and short-circuit the corresponding solder pad with solder
- **Installation:** The module faces the detection area from the front, away from metal/motor/WiFi antenna (>15cm)
- **Test:** Use serial port to print OUT level and walk to test the maximum detection boundary
- **Optimization:** If accidentally touched, reduce sensitivity; If missed, increase sensitivity and remove light control

Installation precautions

- **Detection blind spot:** The blind spot is within 30cm directly below the module
- **Interference source:** Keep away from 2.4GHz/5GHz antennas, switch power supplies, and frequency converters
- **Mobile target:** Can detect radial movement, reduce sensitivity to tangential movement by 50%

Material penetration loss:

- **Plastic/glass:**<10% distance attenuation
- **Wood (5mm):** approximately 20% attenuation
- Avoid metal and water film coverage

□ Notes:

- **Power requirements:** Sensitivity decreases when voltage is below 3.0V, and module damage may occur when voltage is above 20V
- **Configuration takes effect:** Sensitivity/mode modification must be powered off and restarted to take effect
- **RF safety:** Complies with FCC standards, but it is recommended to maintain a distance of>2cm from the human body during continuous transmission
- **Temperature drift:** Harmonics below -30 ° C may exceed the standard, and distances above 70 ° C will be reduced by 10%

□ Ordering Information and Technical Support:

model	size	weight	packaging	recommended scenarios
GH719	45×37×13mm	约 15g	Static bag+paper box	Industrial and security
GH719C	35×30×14mm	约 13g	Static bag+paper box	Consumer IoT devices

Supply cycle: In stock inventory, batch of 5000PCS with a lead time of 2 weeks

Development support: Provide ESP32/Arduino/STM32 sample code, 3D shell model, MQTT protocol reference

After sales service: one-year warranty, free technical support

Manufacturer information:

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