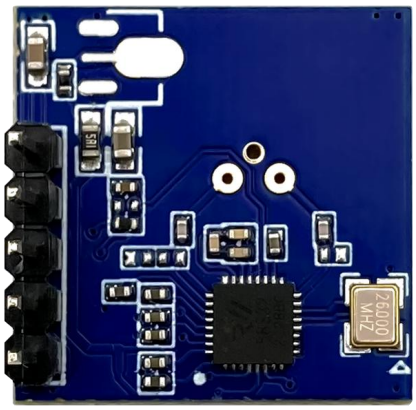
# High-performance 5.8GHz radar sensor

## HLK-LD016-5G




**Version:1.3**

# Overview of Radar Sensor HLK-LD016-5G Instructions

HLK-LD016-5G is a low-power 5.8G radar sensor launched by Hi-Link. The overall power consumption is about 20mA, and the module size is 20mm*20mm. The sensor adopts the domestic radar sensor chip solution. The chip is fully integrated with 5.8GHz Microwave circuits, intermediate frequency amplifier circuits, signal processing circuits and powerful MCUs, which is in high integration and good production consistency. The peripherals are equipped with miniaturized planar antennas to ensure the performance of the sensor while greatly reducing the overall size. Due to its low power consumption, high cost performance, and compliance certification, the sensor has been widely used in smart lighting, smart home and other fields. This solution is the first choice for upgrading the traditional non-fixed frequency solution, and it is also the preferred solution for improving the performance of traditional 5.8G microwave induction products.

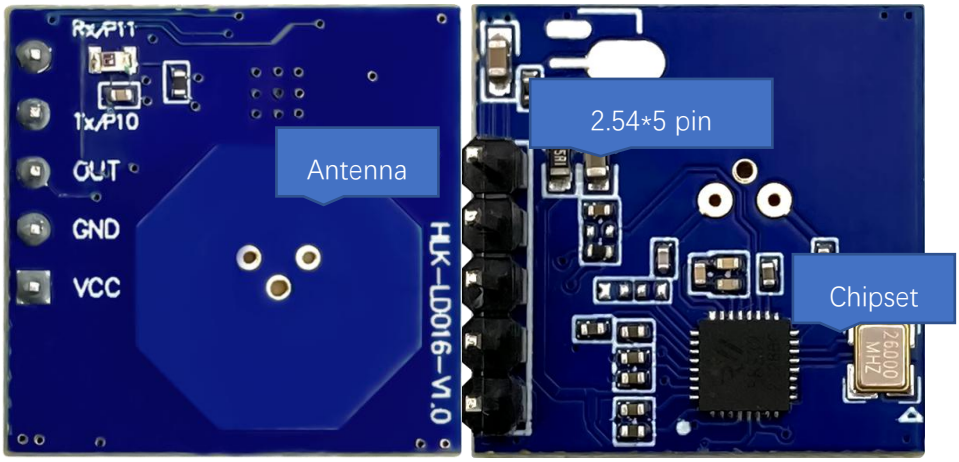



Figure 1 Module diagram

## Input and output interface

The module reserves 5 pin holes. There are five signal PINs: VCC, GND, OUT, TX and RX. The PIN distance is 2.54mm. If you need to adjust the distance and delay time online, you can use the UART TX, RX and AT58MP1T1RS32A communication to rewrite the internal parameters, the following table is the description of each PIN definition:

| Pin Item | Function | Remarks |
|---|---|---|
| VIN | Module power supply | LDO is not attached by default. If the power supply voltage exceeds 5.5V, an LDO needs to be added. At this time, the power supply VCC is 5~12V. |
| GND | Ground PIN | |
| OUT | Output signal | The output signal is high and low level, and the high level voltage is 5V |
| TX | UART communication pin | Can be used for software upgrade or performance parameter adjustment, high-level voltage is 3.3V |
| RX | UART communication pin | Can be used for software upgrade or performance parameter adjustment, high-level voltage is 3.3V |

## Module size and pin position

Figure 2 below is a schematic diagram of the module's size and pin position. The module length and width are 20mm*20mm. Pin is configured by factory default, and the default pin height is 12mm. If there is no need to bring pins, the overall thickness is 2.5mm.

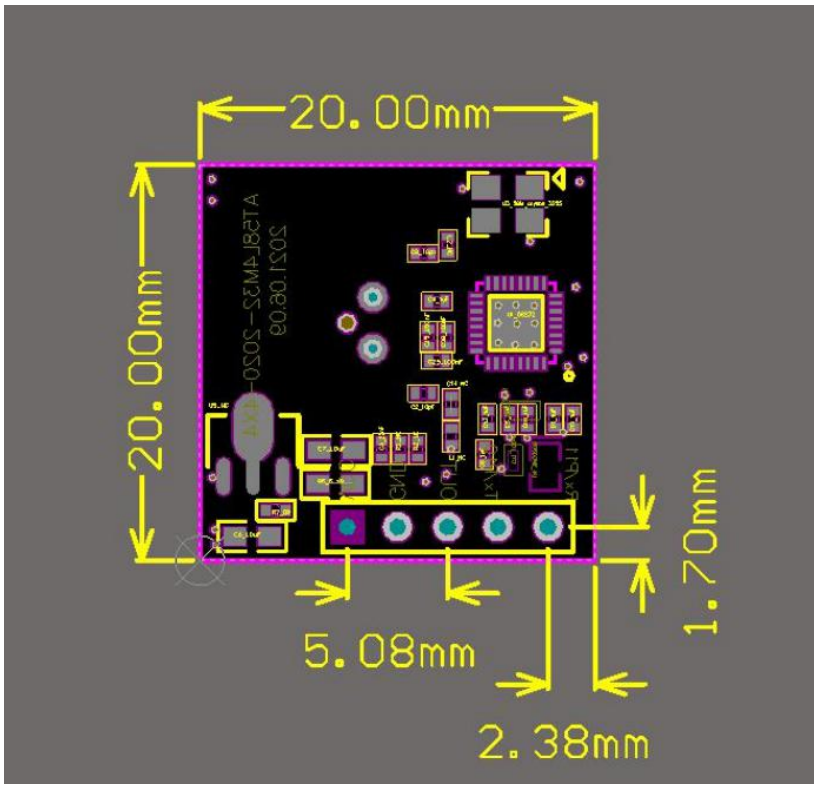



Figure 2 LD016-5G Size and Pin position diagram

## Electrical parameters

| Parameter | Mini value | Typical value | Max value | Unit | Remarks |
|---|---|---|---|---|---|
| Transmit frequency | 5725 | | 5875 | MHz | Adjustable according to specific needs |
| Transmit power | | -5 | | dBm | Adjustable according to specific needs |
| Input voltage (5V) | 4.5 | 5 | 5.5 | V | The default LDO is not attached, and the default input is 5V |
| Output high level (OUT) | | 5 | | V | 5V by default |
| Output high level (TX, RX and other IO) | | 3.3 | | V | |
| Output low level | | 0 | | V | |
| Working current | | 20 | 28 | mA | Average working current |
| Sensing distance | | 6 | 10 | M | Hanging height 3 meters |
| Delay time | | 15 | | S | Adjustable according to specific needs |
| Photosensitive threshold | | 10 | | Lux | Adjustable according to specific needs |
| Operating temperature | -30 | | +85 | °C | |

## Sensing time and sensing distance adjustment

The module needs 3 pins by default, namely VCC, GND and OUT. At this time, the induction delay and induction distance are fixed values. If you need to adjust the induction delay and induction distance and other related parameters, the hardware needs to add RX and TX two PIN lead out as shown in Figure 3.

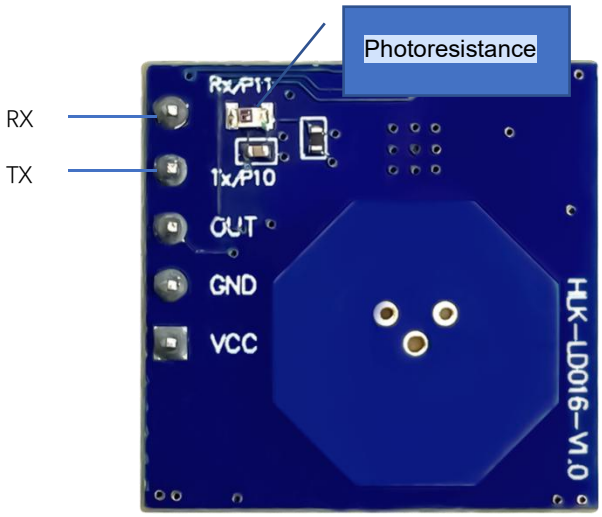



Figure 3 Photosensitive tuning position and serial port position

The RX and TX interfaces in the figure can be used as UART ports to tune the module parameters. When used as a serial port, please refer to the document "AirtouchRadarSettingTool Instructions" for detailed instructions. If the sensor is triggered again within the delay time, the timing will restart.

## Photosensitive detection

The module supports photosensitive detection. The sample module does not enable the photosensitive detection function by default. The position shown in Figure 3 is a photosensitive diode. The photosensitive threshold can be adjusted by changing the photosensitive judgment threshold or tuning the photosensitive resistance. In the version with photosensitive function, the radar sensor will be activated only when the ambient light is lower than the set illuminance. If the light is too bright, the module will not activate the sensor function.

## Module power-on sequence diagram

The module has a power-on self-check function, that is, after the module is powered on, the OUT pin first outputs a high level, and then outputs a low level after a delay of 2S, and enters the normal induction mode after a delay of 0.5S. The following is the timing diagram of the control

signal after the module is powered on:

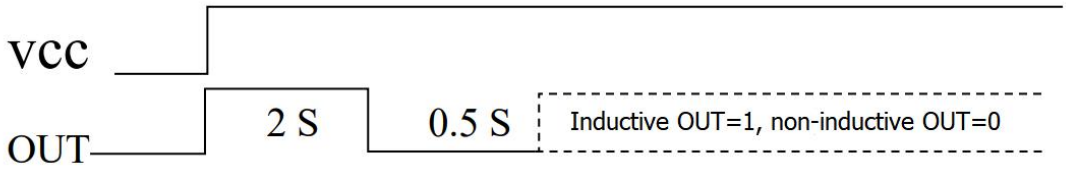



Figure 4 Module power-on sequence diagram

## Schematic diagram of detection range

The sensing sensitivity of the radar sensor can be configured by modifying the software sensing threshold. The positive limit sensing distance is about 20 meters, and the actual sensing distance can be adjusted appropriately as needed. The following schematic diagram of the radar detection range of the typical scene. If the sensitivity is set higher, the detection range will be correspondingly larger. The dark area in the figure is the high sensitivity area, which can be fully detected in this area, and the light color area is the low sensitivity detection area, objects can be basically detected in this area.

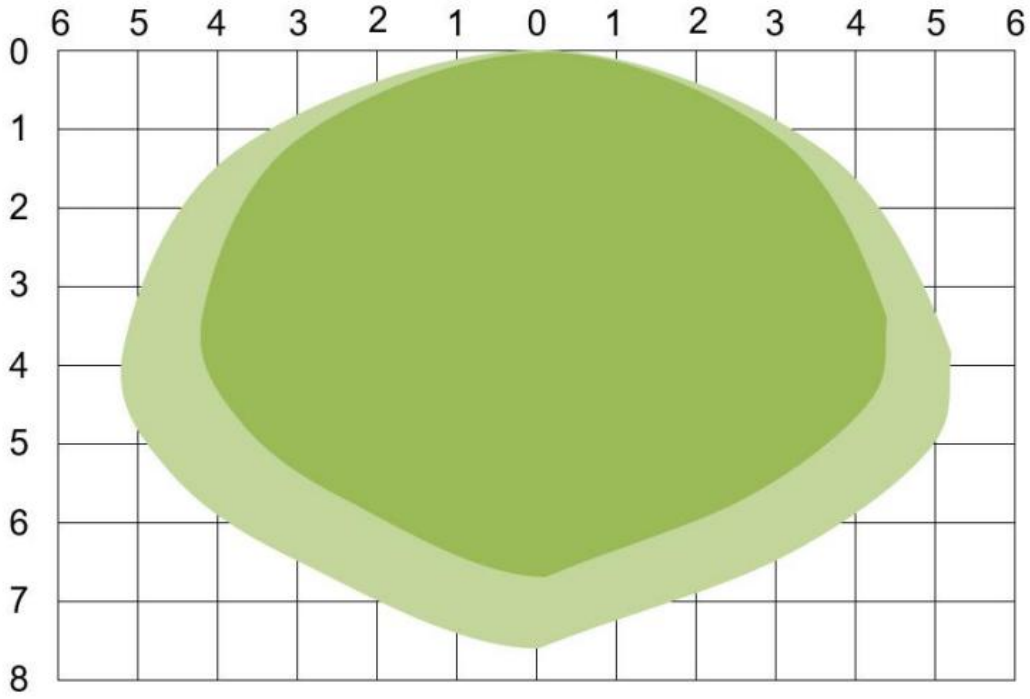



Figure 5 Schematic diagram of detection range (unit: meter)

## Precautions

- When installing the module, avoid metal shells or components on the front of the antenna to avoid shielding the signal. Plastic or glass obstructions are allowed, but the obstructions should not be close to the front of the antenna;
- Try to avoid directing the radar antenna direction to large metal equipment or pipelines, etc.;
- When installing multiple radar modules, try to ensure that the antennas of each radar module are parallel to each other, avoid direct radiation between the antennas, and keep a distance of more than 1m between the modules;
- The radar sensor should avoid facing the AC drive power supply, and try to stay away from the rectifier bridge of the drive power supply to avoid power frequency interference with the radar signal