上海晶丰明源半导体股份有限公司
Bright Power Semiconductor

BPS1818-A1 5.8G
Microwave Motion Sensor Instructions

Version: 1.0

Catalog

BPS1818-A1 5.8GHz Radar User Giude

Description

BPS1818-A1 is a high performance radar sensor operating in 5.8G band, as compare with the traditional 5.8G radar module, the sensor seems quite simple because of BPS1818-A1 which is a single-chip radar designed by Air Touch, the chip integrates 5.8G TRX and IF amplifier to simplify radar design and improve the system performance. Antenna is another key factor for the size of radar system, by using a double-feed antenna the size is minimized to 18mm*18mm which is smaller than a coin. The sensor can be applied in many cases that need motion detect such as smart home, IOT and intelligent lighting, it's the best choice for motion sensor light bulb and T8.

Radar Sensor Illustration

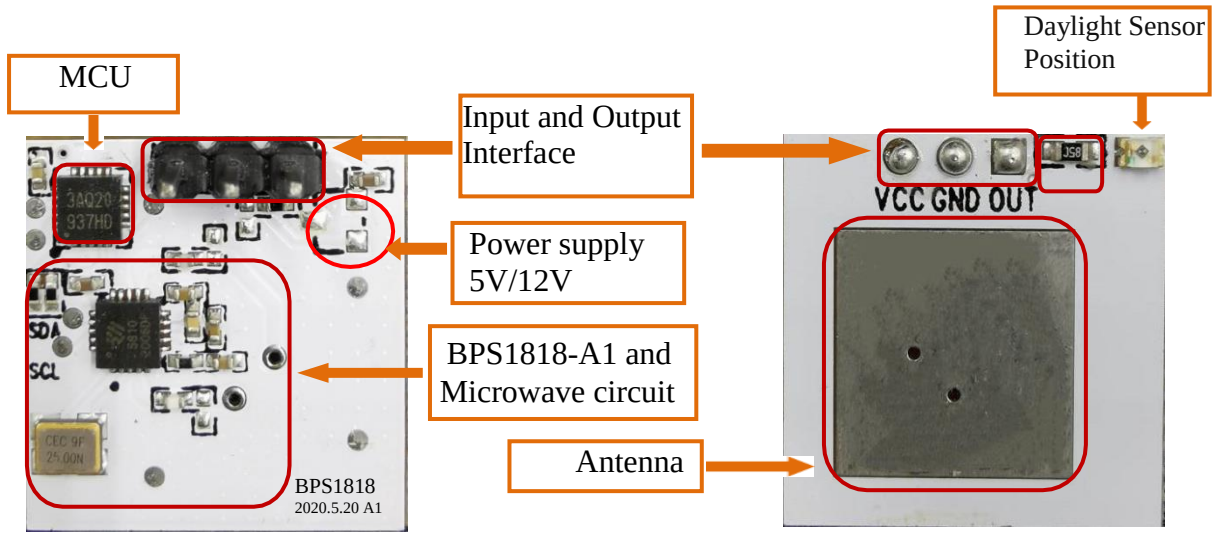


Figure 1 BPS1818-A1 Radar Sensor

Input and Output Interface

BPS1818-A1 can be embedded in end product with three contact PINs, the PIN space is 2.54mm, below is the detail description about the interface:

Pin Name	Function	Note
VCC	Power supply	VCC is 5V by default, external LDO is needed if VCC higher than 7V. Driver current should be better than 50mA.
GND	Ground	
OUT	Output control	Output is 5V TTL by default, could be PWM if needed

Product features

- Compared with 3.9G radar, the scheme is stable and has better sensing effect
- Compared with 3.9G radar, the scheme is weak through the wall and is not easy to trigger by mistake
- Compared with the non-fixed frequency 5.8G radar, the frequency of this scheme is stable and not easy to drift
- Compared with the non- fixed frequency 5.8G radar, the scheme can be mass production certified, with the farthest sensing distance of 10m.
- Mass production frequency can be controlled within 3MHz according to high standard requirements
- The software can set the frequency range without affecting 5g communication and 5g router
- Compared with PIR, the induction angle of this scheme is larger
- Compared with PIR, this scheme has no lens and lens aging problems and is easy to install
- Not affected by temperature, humidity, air flow, dust, noise and other external environment
- It can penetrate acrylic, glass and thin non-metallic materials, with beautiful mold design

Specifications

Parameters	Min.	Typ.	Max.	Unit	Note
Frequency	5725		5875	MHz	
TX Power		0.5	2	mW	
Input VCC	4.5	5	5.5	V	Default state: Without external LDO
Output High Level		5		V	
Output Low Level		0		V	
Current		35	50	mA	
Mounting Height		3		m	Adjustable according to customer requirements d
Detection Radius		7		m	Related to mounting height
Hold time		30		s	Adjustable according to customer requirements d
Daylight sensor		10		Lux	Adjustable according to customer requirements d
Operating temperature	-30		85	°C	

Radar Signal Processing

The radar sensor chip is integrated with microwave circuit and if amplifier circuit. After the chip is powered on, the MCU initializes it through I2C interface. The configuration parameters include frequency and gain. After initialization, MCU directly reads the digital intermediate frequency signal after ADC quantization through I2C, and then outputs the corresponding induction control signal according to the characteristics of intermediate frequency signal.

How to change the hold time

The radar sensing hold time can be set by R1 and R2 resistors. When the value of resistor is 0 Ω, it is recorded as 0； When the resistor is no connect， it is recorded as NC. The corresponding relationship between the state of R1R2 and the delay time is as follows.

The truth table is as follow.

R1	R2	Sensor Working Duration
0	0	2S
0	NC	30S
NC	0	60S
NC	NC	120S

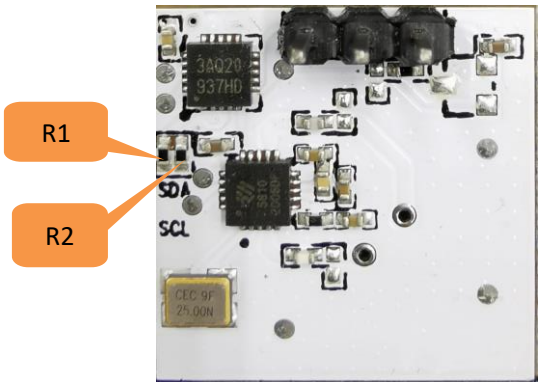


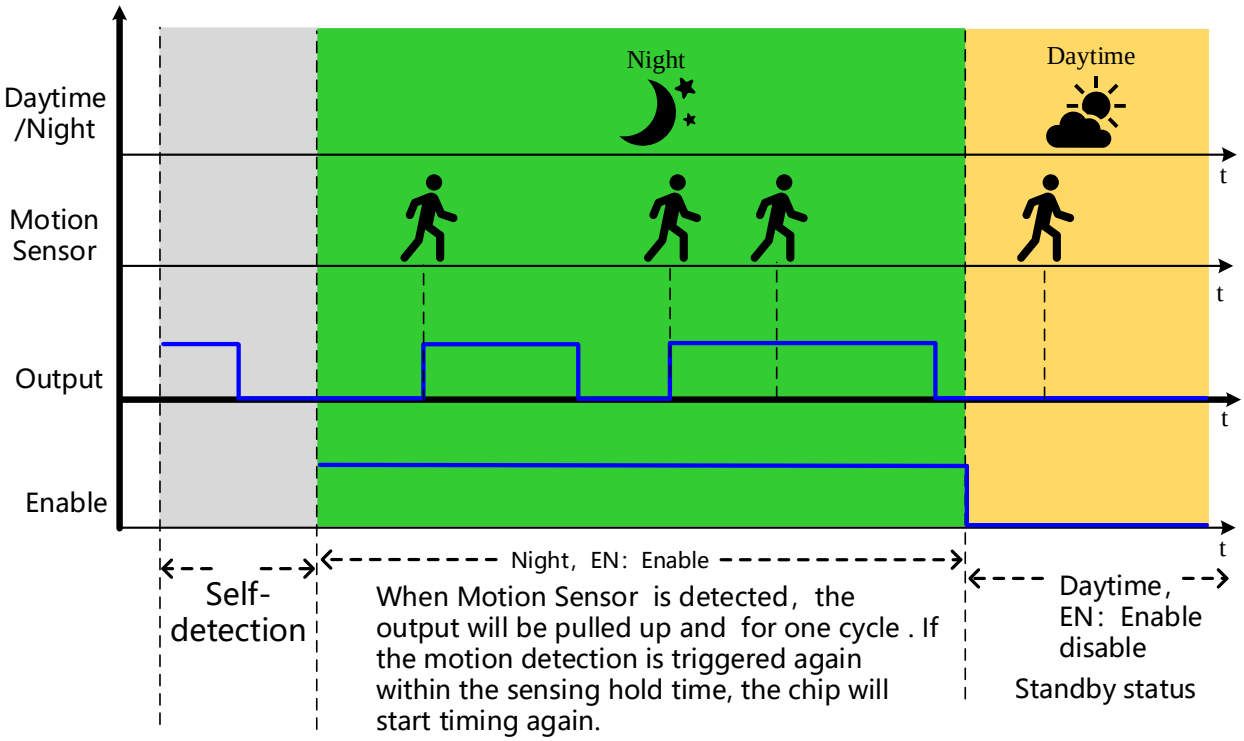
Figure 2 Hold Time Adjustment Resistance

In addition, the detection default is continuous detection mode .If the motion detection is triggered again within the sensing hold time, the chip will start timing again.

About the Daylight Sensor

By default, there is a photosensitive sensor on the sample, which is in standby state during the day. Even if someone moves during the day, it is not sensitive. During the daytime test, the photosensitive sensor can be removed or blocked with black tape to facilitate the test of radar sensing characteristics.

Radar Sequence Diagram



Note:
1. The time mentioned above can be changed by software;
2. The sensing mode can be adjusted by software to select continuous mode or discontinuous mode;
3. It can support output PWM mode through software.

Figure 3 BPS1818-A1 Radar Sequence diagram

Detection Zone

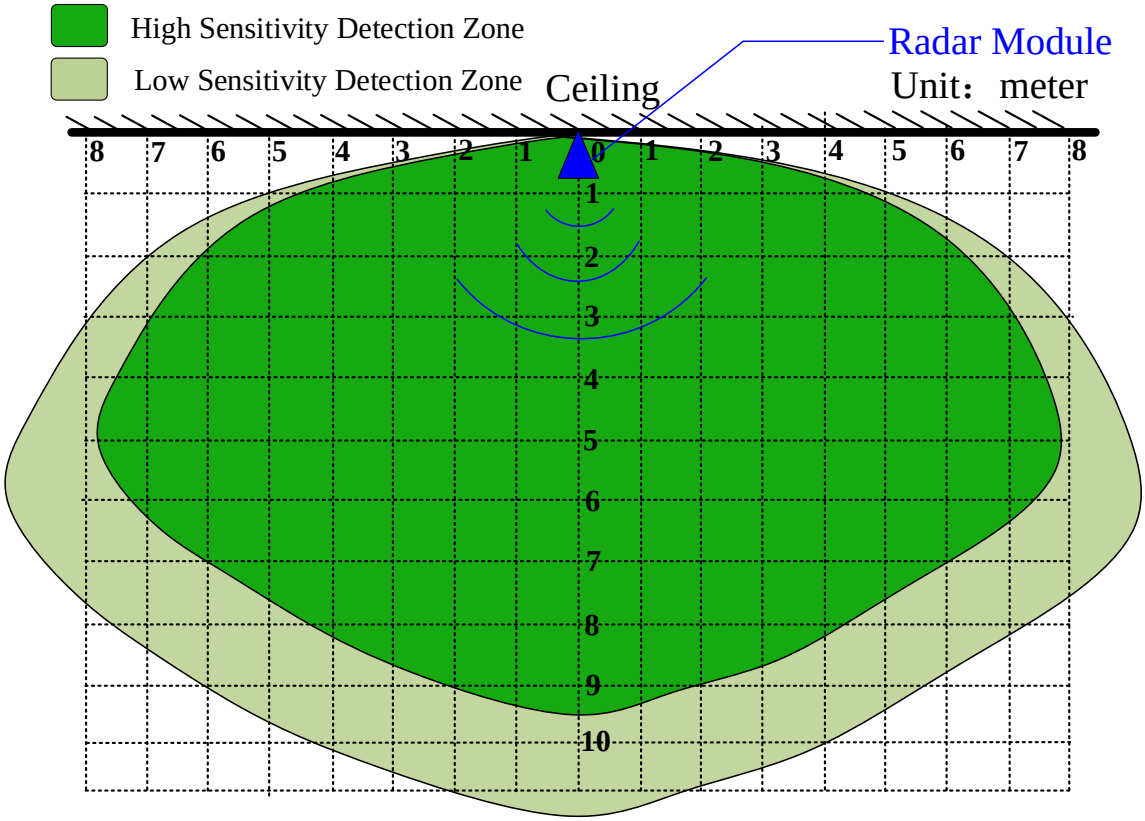


Figure 4 BPS1818-A1 Detection Pattern

Above is a detection range of radar sensor BPS1818-A1, the detection area can be tuned by changing the sensitivity setting. Its limit linear induction distance can be up to 10 meters.

Installation Notes

- Antenna is sensitive to metal, don't put anything with metal in front of the antenna, thin plastic and glass is acceptable, however, don't let the antenna cling to the cover, the gap between the antenna and the cover should be more than 2mm;
- Try to set the antennas in parallel to each other when there are multi radar sensors in the same space, make sure the gap between two sensors is more than 1m;
- Power frequency may cause serious interference for radar signal, try to put LED driver far away from the antenna, don't fix the LED driver in front of the antenna;
- Power consumption for the sensor is about 35mA, make sure the current-driving capability for LED driver is better than 50mA.

Revision History

Revision	Release Date	Description
1.0	2020/05/25	Initial version