

seeed audio 24GHz mmWave Sensor User Manual

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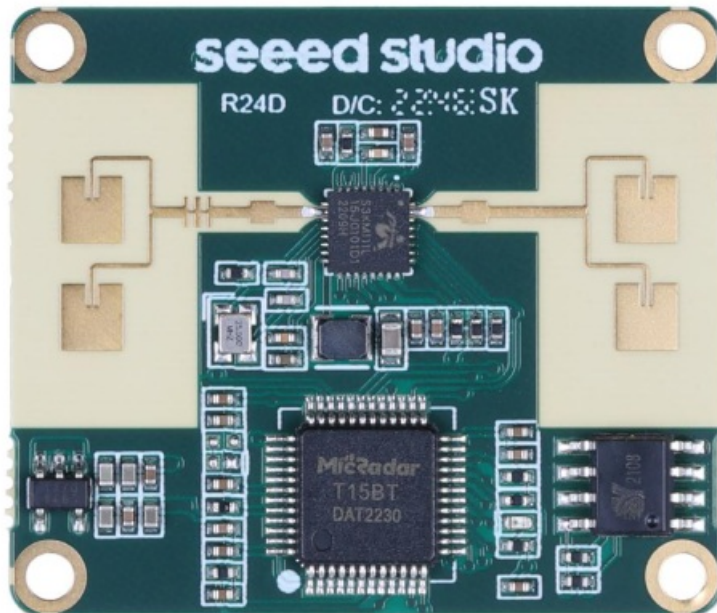


**24GHz mmWave Sensor – Human Static
Presence Module Lite
User Manual and User Protocol**

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Product Overview



Statement

This document is the user manual for the 24GHz mmWave Sensor – Human Static Presence Module Lite and covers its use.

Electrostatic Protection

This radar product have electrostatic sensitive circuits inside, which is easily caused the problem by electrostatic hazards. Therefore, it is necessary perform electrostatic protection in the process of transportation, storage, working and taking. Please do not touch the surface of radar module antenna and connector pins with your hands, but only touch the corners. And please wear antistatic gloves when operating the radar sensor.

Part List

24GHz mmWave Sensor – Human Static Presence Module Lite x1

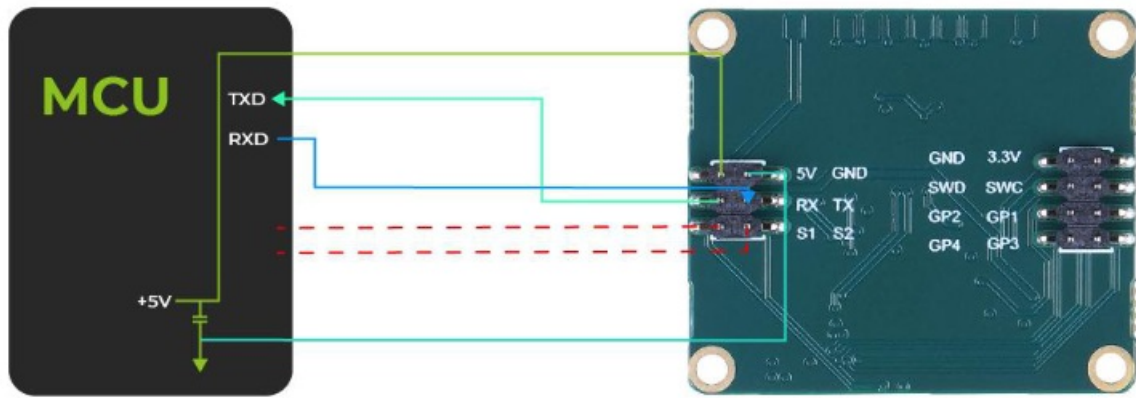
Software

[Upper Computer Software\(Windows\)](#)

Quick Start

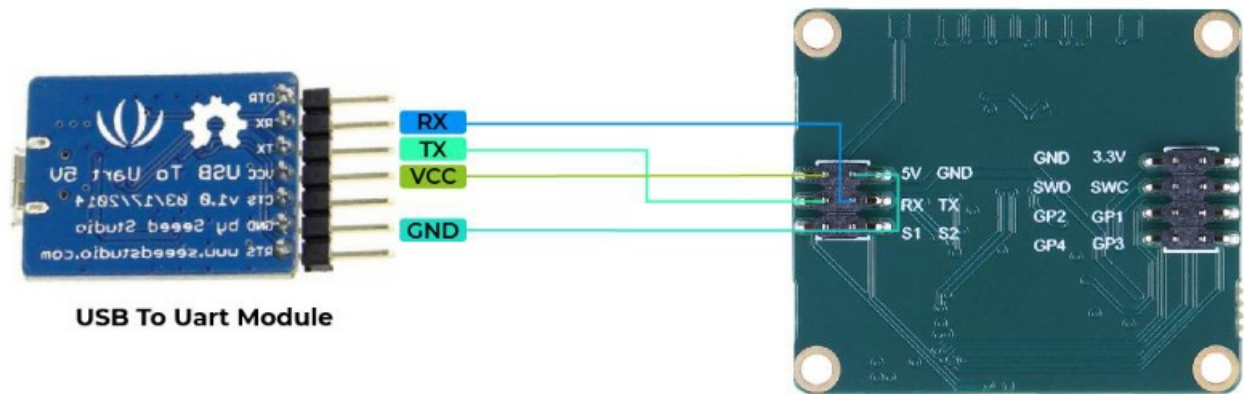
Hardware Connection

The following figure illustrates the connection method.

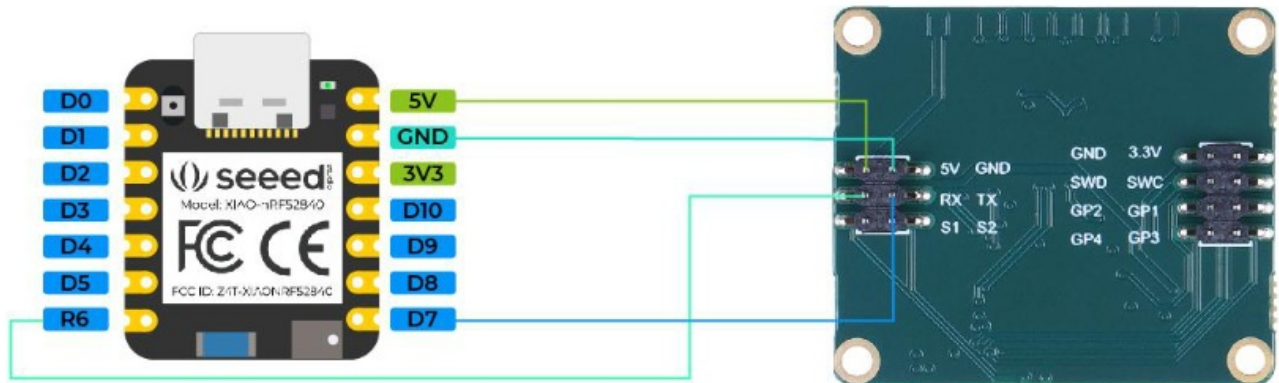


Examples:

1. Hardware connection for using upper computer software.



2. Hardware connection for using Arduino library.



Getting Started

The getting started tutorial is published by Seeed Studio and you can refer to [here](#) for further information.

FAQ

How long is the initialization time?

– When the module is initially powered on and started to work, the internal circuit of the module needs to be completely reset and the ambient noise needs to be fully evaluated to ensure the normal operation of the module. Therefore, during the initial power-on of a module, ensure that the steady start time is at least 30 seconds to ensure the validity of subsequent output parameters.

Why do detections sometimes fail?

– Since human biometric features belong to ultra-low frequency and weak reflection characteristic signals, radar processing requires relatively long-term cumulative processing.

– In the cumulative process, many factors may affect radar parameters, so occasional detection failure is normal.

User Protocol

This protocol is applied to the communication between the radar and the upper computer.
The control commands and data required for radar operation are defined as follows:

- Interface levels: TTL
- Baud Rate: 115200 bps
- Stop Bit: 1
- Data Bit: 8
- Parity Check: no

Communication Command and Parameter Definition

This radar contains two output functions:

- Standard Function
- Open Underlying Function

Frame Structure Definition and Description

Head	Control	Command	Length	Data	Check	Tail
2 bytes	1 byte	1 byte	2 bytes	n bytes	1 byte	2 bytes

- Head: 2 bytes, fixed as 0x53 and 0x59;
- Control: 1 byte
 - 0x01- Heartbeat Packet Identifier
 - 0x02- Product Information
 - 0x03-OTA Upgrade
 - 0x05- Working Status
 - 0x80- Human presence
- Command: 1 byte – identify the current data content
- Length: 2 bytes, equal to the data length in bytes
- Data: n bytes, defined according to the actual function
- Check: 1 byte
 - Check code calculation: Take the sum of (Head + Control + Command + Length + Data) In hexadecimal, and then take the lower eight bits.
- Tail: 2 bytes, fixed as 0x54 and 0x43.

Standard Function Address Assignment and Data Info Description												
Category	Function Deatils	Transmission	Head	Control	Command	Length	Data	Check	Tail	Note		
Human presence information automatic uploading	Presence/Absence Event Report	Upload	53	59	80	01	00 01	00: presence 01: absence	sum	54 43	Upload when state change	
	Motion Amplitude Event Report	Upload	53	59	80	02	00 01	00: none 01: stationary 02: active	sum	54 43	Upload when state change	
	Motion Amplitude Quantified Data Report	Upload	53	59	80	03	00 01	1B (parameter)	sum	54 43	Upload 1 time a second Parameter range: 0-100	
	Position Event Report	Upload	53	59	80	0b	00 01	0x00: none 0x01: forward 0x02: backware	sum	54 43		
System control	Heartbeat packet	Send	53	59	01	01	00 01	0F	sum	54 43		
		Receive	53	59	01	01	00 01	0F	sum	54 43		
	Reset	Send	53	59	01	02	00 01	0F	sum	54 43		
		Receive	53	59	01	02	00 01	0F	sum	54 43		
Product information	Model	Send	53	59	02	A1	00 01	0F	sum	54 43		
		Receive	53	59	02	A1	len	len B: product information	sum	54 43		
	ID	Send	53	59	02	A2	00 01	0F	sum	54 43		
		Receive	53	59	02	A2	len	len B: product ID	sum	54 43		
	Hardware model	Send	53	59	02	A3	00 01	0F	sum	54 43		
		Receive	53	59	02	A3	len	len B: hardware model	sum	54 43		
	Firmware version	Send	53	59	02	A4	00 01	0F	sum	54 43		
		Receive	53	59	02	A4	len	len B: firmware version	sum	54 43		
Protocol version	Send	53	59	02	A5	00 01	0F	sum	54 43			
	Receive	53	59	02	A5	len	01: universal protocol	sum	54 43			
Operating state	Initialization complete	Upload	53	59	05	01	00 01	0F	sum	54 43		
	Set scenario model	Send	53	59	05	07	00 01	01: living room 02: area detection 03: bathroom 04: bedroom	sum	54 43		
		Receive	53	59	05	07	00 01	01: living room 02: area detection 03: bathroom 04: bedroom	sum	54 43		
	Set sensinty	Send	53	59	05	08	00 01	01 02 03(default)	sum	54 43		
		Receive	53	59	05	08	00 01	01 02 03	sum	54 43		
	Get initialization state	Send	53	59	05	81	00 01	0F	sum	54 43		
		Receive	53	59	05	81	00 01	01: complete 02: error	sum	54 43		
	Get scenario model	Send	53	59	05	87	00 01	0F	sum	54 43		
		Receive	53	59	05	87	00 01	0x00: not set 0x01: living room 0x02: area detection 0x03: bathroom 0x04: bedroom	sum	54 43		
	Get sensinty value	Send	53	59	05	88	00 01	0F	sum	54 43		
Receive		53	59	05	88	00 01	0x00: not set 0x01: level 1 0x02: level 2 0x03: level 3	sum	54 43			
Set and get detection range	Set maximum detection range of active object	Send	53	59	07	01	00 02	2 Byte	sum	54 43	The unit is centimeter	
		Receive	53	59	07	01	00 02	2 Byte	sum	54 43		
	Set maximum detection range of stationary object	Send	53	59	07	04	00 02	2 Byte	sum	54 43		
		Receive	53	59	07	04	00 02	2 Byte	sum	54 43		
	Get maximum detection range of active object	Send	53	59	07	81	00 01	0F	sum	54 43		
		Receive	53	59	07	81	00 02	2 Byte	sum	54 43		
Get maximum detection range of stationary object	Send	53	59	07	84	00 01	0F	sum	54 43			
	Receive	53	59	07	84	00 02	2 Byte	sum	54 43			
Human presence information	Set change time of absence trigger	Send	53	59	80	0A	00 01	0x00: none 0x01: 10s 0x02: 30s 0x03: 1min 0x04: 2min 0x05: 5min 0x06: 10min 0x07: 30min 0x08: 1h	sum	54 43	The default value is 30s	
		Receive	53	59	80	0A	00 01	0x00: none 0x01: 10s 0x02: 30s 0x03: 1min 0x04: 2min 0x05: 5min 0x06: 10min 0x07: 30min 0x08: 1h	sum	54 43		
		Send	53	59	80	8A	00 01	0F	sum	54 43		


	Get change time of absence trigger	Send	53	59	80	8A	00	01	0F	sum	54	43	
		Receive	53	59	80	8A	00	01	0x00: none 0x01: 10s 0x02: 30s 0x03: 1min 0x04: 2min 0x05: 5min 0x06: 10min 0x07: 30min 0x08: 1h	sum	54	43	
	Get presence/absence event	Send	53	59	80	81	00	01	0F	sum	54	43	
		Receive	53	59	80	81	00	01	00: presence 01: absence	sum	54	43	
	Get motion amplitude event	Send	53	59	80	82	00	01	0F	sum	54	43	
		Receive	53	59	80	82	00	01	00: none 01: stationary 02: active	sum	54	43	
	Get motion amplitude quantified data	Send	53	59	80	83	00	01	0F	sum	54	43	
		Receive	53	59	80	83	00	01	1B (parameter)	sum	54	43	value range: 0-100
	Get position event	Send	53	59	80	8B	00	01	0F	sum	54	43	
		Receive	53	59	80	8B	00	01	0x00: none 0x01: forward 0x02: backware	sum	54	43	

Underlying Open Function Address Assignment and Data Info Description													
Category	Function Deatils	Transmission	Head	Control	Command	Length	Data	Check	Tail	Note			
Radar underlying information automatic report	5 types of underlying information	Upload	53	59	08	01	00	05	(5 byte total) byte 1 (0-250): statics noise of environment byte 2 (0x01-0x06): detection range of presence byte 3 (0-250): motion noise of environment byte 4 (0x01-0x08): detection range of object moving byte 5 (0x01-0x14): detection speed of object moving	sum	54	43	1. Statics noise of environment: electromagnetic waves in the environment detected when absence 2. Detection range of presence: the distance from radar to detected people 3. motion noise of environment electromagnetic wave frequency change casued by different motion amplitude 4. detection range of object moving the distance from radar to active deteced people 5. detection speed of object moving: the speed of moving object
Motion Amplitude Event Report	Motion amplitude event report	Upload	53	59	08	06	00	01	00: none 01: forward 02: backward	sum	54	43	1. none: when object in disordered motion or absence 2. forward: when object stay approach for 3s 3. backward: when object stay recede for 3s
Motion Amplitude Quantified Data Report	Motion amplitude quantified data report	Upload	53	59	08	07	00	01	0f	sum	54	43	Motion amplitude quantified data: represent amplitude of human motion 0: absence/no one detected 1-5: detertmine human presence and maintain stationary 2-100: value increased with grater motion amplitude
System control	Set switch of open function	Send	53	59	08	00	00	01	00: close 01: open	sum	54	43	The default set is close
		Receive	53	59	08	00	00	01	00: close 01: open	sum	54	43	
	Get switch state of open function	Send	53	59	08	80	00	01	0F	sum	54	43	
		Receive	53	59	08	80	00	01	00: close 01: open	sum	54	43	
Open & Set custom mode	Open custom mode	Send	53	59	05	09	00	01	01: custom mode 1 02: custom mode 2 03: custom mode 3 04: custom mode 4	sum	54	43	The custom mode is used to revert to the preset parameters defined by the users, including all configurable value in underlying open function model.
		Receive	53	59	05	09	00	01	01-04	sum	54	43	
	Save & Exit custom mode	Send	53	59	05	0A	00	01	0F	sum	54	43	
		Recevie	53	59	05	0A	00	01	0F	sum	54	43	
Get basic underlying information	Get statics noise of environment	Send	53	59	08	81	00	01	0F	sum	54	43	
		Receive	53	59	08	81	00	01	range:0-250	sum	54	43	
	Get motion noise of environment	Send	53	59	08	82	00	01	0F	sum	54	43	
		Receive	53	59	08	82	00	01	range:0-250	sum	54	43	
		Send	53	59	08	83	00	01	0F	sum	54	43	
	Get detection range of presence	Receive	53	59	08	83	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m	sum	54	43	
	Get detection range of object moving	Send	53	59	08	84	00	01	0F	sum	54	43	
		Receive	53	59	08	84	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m 07: 3.5m 08: 4.0m	sum	54	43	
	Send	53	59	08	85	00	01	0F	sum	54	43		
		Send	53	59	08	85	00	01	0F	sum	54	43	Speed gear(m/s): 0x01-0x14, progress by 0.5m/s When no one moving and the output data is: 0x0a

Threshold value of detection	Get detection speed of object moving	Receive	53	59	08	85	00	01	00: none 01-14: speed gear	sum	54	43	When object approach(positive) and the output data range is "0x01-0x09" When object recede (negative) and the output data range is "0x0b-0x14" For example: 0x0a(0m/s); 0x0b(0.5m/s); 0x09(-0m5m/s)
	Get position event	Send	53	59	08	86	00	01	0F	sum	54	43	1. none: when object in disordered motion or absence 2. forward: when object approach 3. backward: when object recede
		Receive	53	59	08	86	00	01	00: none 01: forward 02: backward	sum	54	43	
	Get motion amplitude quantified data	Send	53	59	08	87	00	01	0F	sum	54	43	
		Receive	53	59	08	87	00	01	range: 0-100	sum	54	43	
	Set threshold of presence detection	Send	53	59	08	08	00	01	range: 0-250	sum	54	43	The threshold used to distinguish human presence from environment noise, please refer to statics noise of environment to set
		Receive	53	59	08	08	00	01	0-250	sum	54	43	
	Set threshold of motion trigger	Send	53	59	08	08	00	01	range: 0-250	sum	54	43	The threshold used to determine active state while personnel entering the detected area, please refer to motion noise of environment to set
		Receive	53	59	08	08	00	01	0-250	sum	54	43	
	Set detection range of presence	Send	53	59	08	0A	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m 07: 3.5m 08: 4.0m 09: 4.5m 0A: 5.0m	sum	54	43	
		Receive	53	59	08	0A	00	01	00-0A	sum	54	43	
	Set range of motion trigger	Send	53	59	08	0B	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m 07: 3.5m 08: 4.0m 09: 4.5m 0A: 5.0m	sum	54	43	
		Receive	53	59	08	0B	00	01	00-0A	sum	54	43	
	Get threshold value of presence detection	Send	53	59	08	88	00	01	0F	sum	54	43	
		Receive	53	59	08	88	00	01	0-250	sum	54	43	
	Get threshold value of motion trigger	Send	53	59	08	89	00	01	0F	sum	54	43	
		Receive	53	59	08	89	00	01	0-250	sum	54	43	
	Get detection range of presence	Send	53	59	08	8A	00	01	0F	sum	54	43	
		Receive	53	59	08	8A	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m 07: 3.5m 08: 4.0m 09: 4.5m 0A: 5.0m	sum	54	43	
	Get range of motion trigger	Send	53	59	08	8B	00	01	0F	sum	54	43	
		Receive	53	59	08	8B	00	01	00: none 01: 0.5m 02: 1.0m 03: 1.5m 04: 2.0m 05: 2.5m 06: 3.0m 07: 3.5m 08: 4.0m 09: 4.5m 0A: 5.0m	sum	54	43	

Time logic parameter of sensing	Set motion valid time	Send	53	59	08	0C	00	04	time info(ms)	sum	54	43	Time period used to determine whether the state should be changed from absence to active. default: 3000ms
		Receive	53	59	08	0C	00	04	time info(ms)	sum	54	43	
	Set stationary valid time	Send	53	59	08	0D	00	04	time info(ms)	sum	54	43	Time period used to determine whether the state should be changed from active to stationary. default: 3000ms
		Receive	53	59	08	0D	00	04	time info(ms)	sum	54	43	
	Set absence valid time	Send	53	59	08	0E	00	04	time info(ms)	sum	54	43	Time period used to determine whether the state should be changed from presence to absence. default: 30000ms
		Receive	53	59	08	0E	00	04	time info(ms)	sum	54	43	
	Get motion valid time value	Send	53	59	08	8C	00	01	0F	sum	54	43	
		Receive	53	59	08	8C	00	04	time info(ms)	sum	54	43	
	Get presence valid time value	Send	53	59	08	8D	00	01	0F	sum	54	43	
		Receive	53	59	08	8D	00	04	time info(ms)	sum	54	43	
	Get absence valid time vlaue	Send	53	59	08	8E	00	01	0F	sum	54	43	
		Receive	53	59	08	8E	00	04	time info(ms)	sum	54	43	

Documents / Resources

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