

# Product Specification & User's Manual: Detection Sensor RM68-51



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## 1. Overview

### 1.1. Introduction

The radar module "RM68-51" from Smart Radar System (SRS) is a compact millimeter wave detection sensor optimized for detecting minute movements of objects at close area. It has an embedded program on the board that can be configured to meet the various application requirements. With the help of unique antenna design technology and algorithms, it can reliably detect even the breathing and heartbeats of people in the room.

The sensor uses TI's integrated single-chip mmWave sensor IWR6843, to support a friendly and easy-to-use FMCW (Frequency Modulated Continuous Wave) radar platform. The TI device includes two ARM R4F-based processor subsystems: one processor subsystem is for master control, and additional algorithms; a second processor subsystem is responsible for front-end configuration, control, and calibration. It can be configured to respond to a variety of application needs by simple programming.

### 1.2. Features

- 60-64 GHz radar sensor for detection of minute movements like heartbeat and breathing, etc.
- Synthesized FMCW frequency source
- 20-pin connectors interface connector
- FTDI with a serial port for onboard QSPI flash programming
- Back-channel UART through USB-to-PC for logging purposes
- Onboard antenna.
- LEDs for displaying operation status.
- 5V DC to power the product

### 1.3. Application

The sensor performs the following functions while fixed to a wall or ceiling.

- Human presence detection
- People counting in indoor environments
- Vital sign detection of a person indoors
- Posture detection of a person in a room or bathroom

 **For FCC, the sensor module is for fixed operation only. It must be mounted on an enclosure and a bracket so that it can be installed on a fixed structure such as a wall or ceiling. (Please refer to chapter 5)**

## 2. Hardware Description

### 2.1. Product Appearance

The top and bottom views of the RM68-51 module are shown as follows.

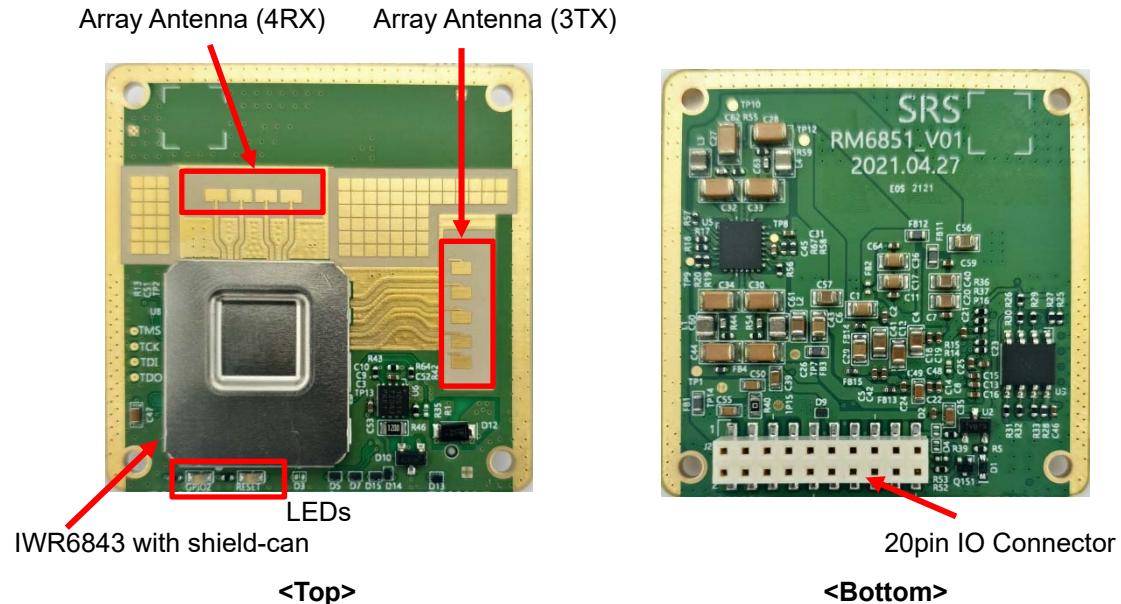


Figure 1. Radar Module Photos

### 2.2. Connector Interface



Part Number: A3A-20DA-2SV(71) (Hirose)

Table 1. 20-Pin IO Connector Pin

IN/OUT	Name	No.		Name	IN/OUT
Input Power	VDD_5V0	1	2	VDD_5V0	Input Power
	GND	3	4	GND	
Differential signal	CAN_L	5	6	UART_RX	Input Signal
Differential signal	CAN_H	7	8	UART_TX	Output Signal
	GND	9	10	GND	
Output power	VIO_3V3	11	12	AR_RESET_N	Input Signal
Output Signal	UART2_TX	13	14	PWR_EN	Input Signal
Input Signal	UART2_RX	15	16	PG	Output Signal
Input Signal	SOP2	17	18	SOP1	Input Signal
Input Signal	SOP0	19	20	NC	

\* CAN Terminal Resistor(120Ω) : not Assembled

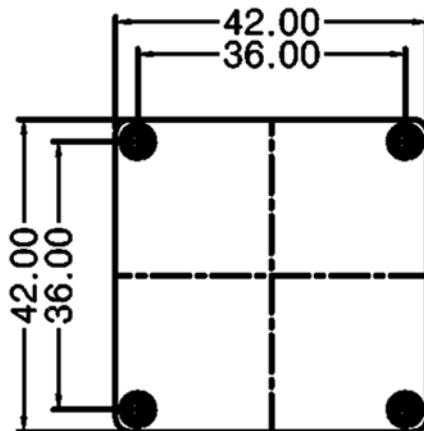
### 2.3. LEDs

**Table 2. LEDs Information**

Ref Num.	Usage	Comments
LED1	USER LED	Glows when the radar operation is activated. (can be changed according to software settings.)
LED2	RESET	This LED is used to indicate the state of RESET pin. If this LED is glowing, the device is out of reset. This LED will glow only after the 5-V supply is provided.

## 3. Mechanical Specification

Items	Spec.	Notes
Dimension	42 x 42 x 8 (PCB t: 1.6)	Module only (W x L x H) (mm)
Weight	14	Module only (g)



RM68-51

## 4. Specifications

### 4.1. Absolute Maximum Ratings

Parameters	Conditions	Spec.			Notes
		Min	Max	Unit	
Operating Temperature	Complete Sensor	-20	+45	°C	
Storage Temperature	Complete Sensor	-40	+85	°C	
Supply Voltage		4.75	5.25	V	

### 4.2. Performance Specifications

(@ 25°C unless otherwise noted)

Parameters		Spec.	Notes
Detection Range	Distance	5m	People
	Detectable Floor Area	3m x 3m (@2.7m height)	When installing on a ceiling
Azimuth Angle (H. FOV)		120° @3m, 20° @5m	
Azimuth Resolution		22°	
Elevation Angle (V. FOV)		120° ( $\pm 60^\circ$ )	
Elevation Resolution		31°	
Update rate		100ms	Configurable

※ Specifications in this datasheet are subject to change without notice.

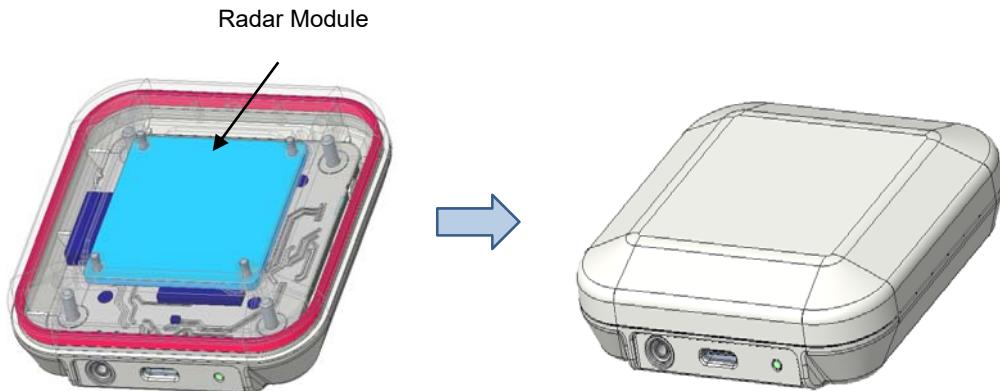
### 4.3. Radar Operating Conditions

Parameters		Spec.	Notes
Power Consumption		Ave.:1.5W, Peak.: 3W	
Frequency	Range	60 ~ 64 GHz	
	Bandwidth	4GHz	
Antenna Power		-10dBm	FCC requirement
Max. Transmitted Power (EIRP)		10 dBm	FCC requirement

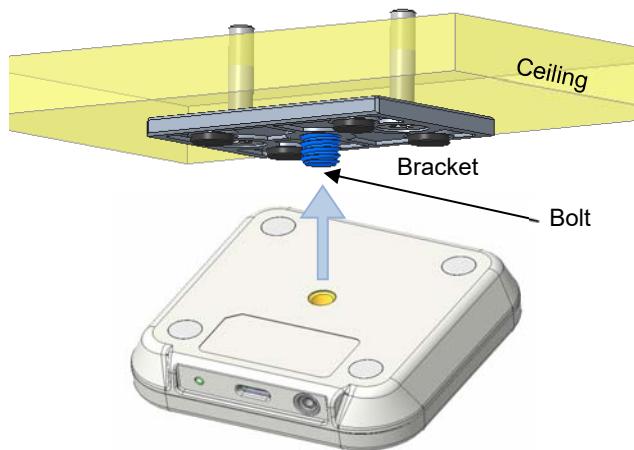
## 5. Installation Guide

To comply with FCC regulations for fixed operation, final device must consider the following:

- For long-term stable operation, the module must be mounted in a plastic enclosure made of PC (polycarbonate).
- Install the bracket at the desired location and then mount the enclosure to the bracket.
- Use a tiltable bracket if you need to adjust the angle the radar faces.



< Example of the module mounted in an enclosure >



< Example of fixed installation >

## 6. Product Storage and Using Recommendations

The plated finish of the PCB provides better high frequency performance, but is prone to oxidation in environments with high humidity or corrosive gases. Please do not use in high humidity or in environments with sulfur or chlorine.

## 7. Notice for FCC

### FCC Approval

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device should be installed and operated with minimum 20Cm between the radiator and your body.

## INTEGRATION INSTRUCTIONS

### List of applicable FCC rules

This module complies with part 15.255 of the FCC rules.

### Summarize the specific operational use conditions

15.255(a) Operation under the provisions of this section is not permitted for the following products:

(1) Equipment used on satellites.

(2) Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation, or used as short-range devices for interactive motion sensing. For the purposes of this section, the reference to fixed operation includes field disturbance sensors installed in fixed equipment, even if the sensor itself moves within the equipment.

The module is limited to installation in fixed applications only.

### Limited module procedures

Not applicable

### Trace antenna designs

Not applicable

### RF exposure considerations

This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device should be installed and operated with minimum 20Cm between the radiator and your body. The host manual shall include the RF exposure statements.

If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

### Antennas

The module itself has antenna.

### **Label and compliance information**

The module is labeled with its own FCC. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AVKZRM68-51"

The host manual shall include the following regulatory statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device should be installed and operated with minimum 20Cm between the radiator and your body.

### **Information on test modes and additional testing requirements**

Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The host manufacturer can use the software to control the RF signal during test.

For more information, please contact us.

### **Additional testing, Part 15 Subpart B disclaimer**

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The host product may need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.