



MicroBrain Intelligent

UAV-H31-1 (UART)

UAV Altitude mmWave radar
sensor user manual

2023. 12. 27

Microbrain Intelligent Technology Co., Ltd.

Disclaimer

Welcome to buy this product

Website: <http://microbrain.com.cn>

Before using this product, please read this statement carefully. Once used, it is regarded as recognition and acceptance of the content of this statement. Please strictly follow the manual installation and use the product. If there is an improper use, and the damage or damage caused, the comparison of technology does not bear the corresponding losses and compensation liability. This product is Microbrain Intelligent Technology Co.,Ltd All rights reserved. Without permission, it is not allowed to copy and reprint them in any form. The use of products and manuals will not be held accountable.

Historic Version

Date	Version	Version description
2023.12.27	1.1	UAV-H31-1 Open source flight controller

Catalog

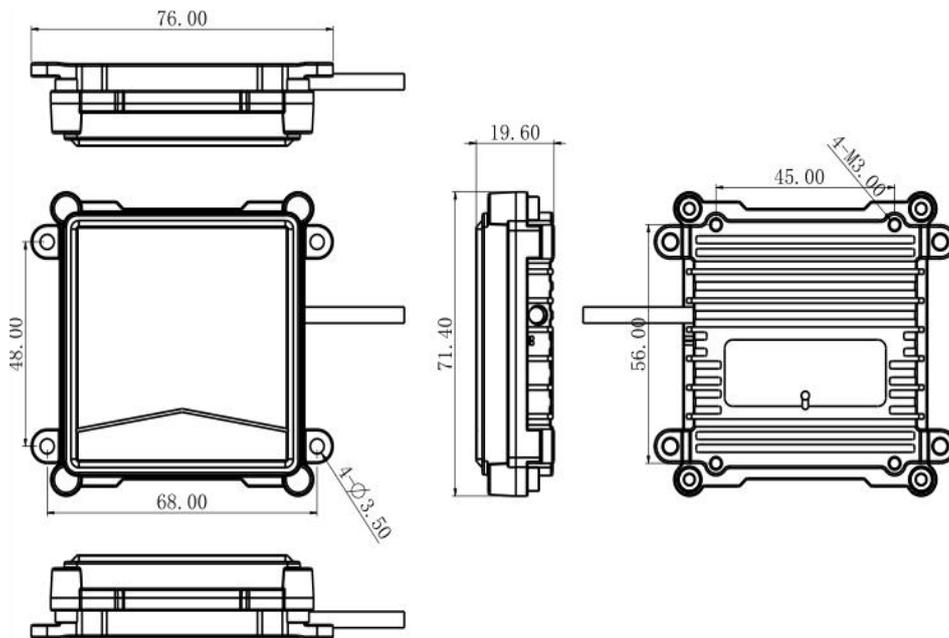
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1. Product Introduction of UAV-H31-1

UAV-H31-1 Altitude millimeter-wave radar is a fixed-height millimeter-wave radar independently developed by Microbrain Intelligent Technology Co., Ltd., using the 77GHz-81GHz frequency band, 2cm measurement accuracy, compact size, high sensitivity, light weight, and easy to use Integrated and stable performance, it can detect the distance between vegetation and the ground at the same time, adapt to various complex terrain environments, and meet the flight height guidance of unmanned flying platforms such as agricultural plant protection aircraft and small express transport aircraft.

2、Product Feature

- Type:Altitude radar sensor
- Model:UAV-H31-1
- Dimension: 76*71.5*19.6mm
- Weight: approx.87g (including cable)
- Protection rating: IP67



Picture1 UAV-H31-1

Remark:

Unmarked dimensional tolerance:

When ≤ 10 mm, the tolerance is ± 0.3 mm;

When between (10~50) mm, the tolerance is ± 0.5 mm;

When ≥ 50 mm, the tolerance is ± 0.8 mm.

3. Performance parameters

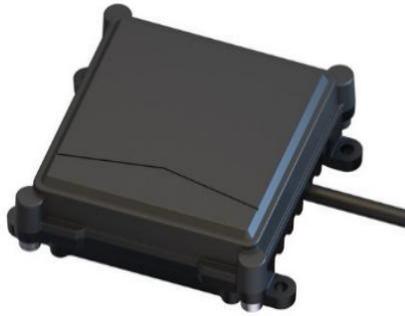
UAV-H31-1 adopts linear frequency modulation continuous wave (FMCW) modulation mode, which can accurately measure the distance between the radar and the ground or water surface within the measurement range.

Features	Parameters	Technical indicators
Receiving antenna performance	Azimuth beam width (3dB)	$\pm 15^\circ$
	Pitch beam width (3dB)	$\pm 4^\circ$
	EIRP (dBm)	30
Radar performance	Distance detection range (m)	0.1~27
	Distance detection accuracy (m)	0.02
	Distance detection resolution (m)	0.12
Radar properties	Frequency (GHz)	77
	Refresh rate (Hz)	20
	Bandwidth (GHz)	1.5
System property	Working voltage (V)	5~24
	Working Temperature	$-40^\circ\text{C} \sim 85^\circ\text{C}$
	Power consumption (W)	3W
	Communication interface	UART
	PCB size (mm)	55*52*1.6

Table 1 UAV-H31-1 Performance parameters

4、 Packing list

Packing list including:UAV-H31-1 radar sensor×1(as picture)



Picture 2 UAV-H31-1 radar sensor

5、 Installation Method

The radar is installed directly below the drone, with the wiring harness facing the nose.



Picture 3 UAV-H30-1 Installation

6、Quickly use steps

● Pin Definition

UAV-H31-1 The interface pin definition of the sensor, as shown in the table 1:

PIN	Definition	Range
1	POWER_IN (Red)	5~24V DC
2	GND (Black)	-
3	TX (Green)	0~3.3V
4	RX (White)	0~3.3V

Table 1: UAV-H31-1 Pin interface definition

● Testing using

Superior machine testing software provided by Microbrain Intelligent can obtain and analyze UAV-H31-1 sensor data, and intuitively display the observation results. Use this tool to help the use of UAV-H31-1 obstacle avoidance radar distance detection

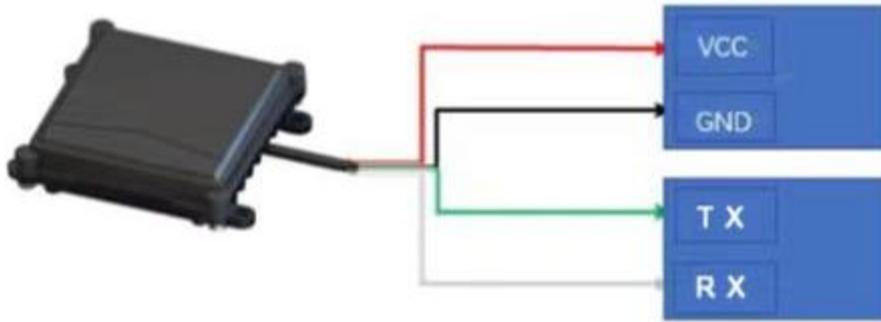
Use the UART protocol test method as follows:

First obtain UAV-H31-1 upper computer test software from Microbrain Intelligent customer service or website. Please install and configure the upper computer testing software according to the manual.

Table 3 Testing tools

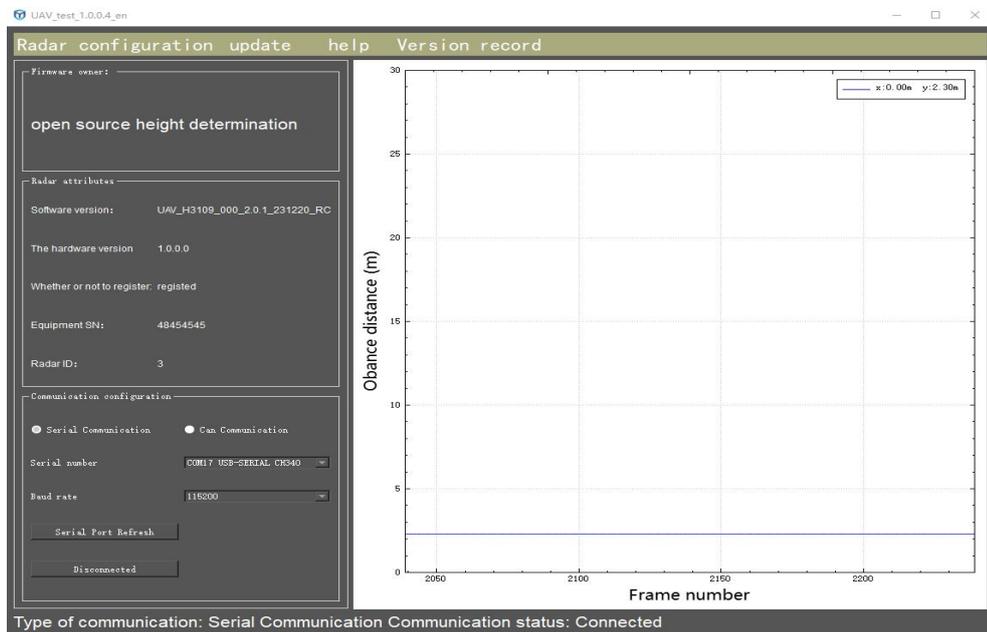
No.	Device	Number
1	UAV-H31-1 radar sensor	1
2	PC	1
3	TTL-USB	1
4	5~24V power adapter	1
5	Upper computer test software	1

1) Through TTL-USB Module, connect with UVA-H31-1radar sensor, picture as follow



Picture 4 Serial port line connection

a) Connect with PC and radar sensor, open upper computer test software, Click to start ,the test result as shown in the picture follow



Picture 5 Radar sensor upper computer test software

7、Serial port data analysis

UAV-H31-1radar sensor adopts UART-TTL interface, Use preset default transfer rate 115200bit/s, UAV-H31-1 radar sensor datagram format is defined in the following table:

Table 4 UAV-H31-1datagram format definitions

The radar altimeter outputs data through the serial port, 115200bps, 8N1. It will only send if there is data. If there is no data, it will not send. The specific protocol format is as follows:

Data type	Byte	Instructions
HEAD	1Byte	Stable, 0x48
Altimeter data	2Bytes	The low 8 bits come first, the high 8 bits come last; unit cm; signed integer, the highest bit of each byte should be discarded when acquiring data;

Radar Altimeter 3 Byte Protocol: 0x48, DataL, DataH; In order to adapt to open source flight control, the following method is used to calculate the actual distance:

$$\text{Actual distance (cm)} = [(\text{DataH}\&0x7F)*128 + (\text{DataL}\&0x7F)]*2.5。$$

8. Precautions of product use

- The power pin needs to be connected to a separate external 5~24V DC regulated power supply.
- Use 4pcs M4 screws to secure UAV-H31-1
- Please keep the radar cover clean during installation. To clean the cover, wipe it with a soft damp cloth and then let it dry naturally
- When installing, please pay attention to the shape of the radar and ensure that the installed radar is not deformed. Do not squeeze, bump, or beat it.
- When installing, make sure the radar is the factory original. Do not disassemble or assemble by yourself.

9、FAQ

- 1) What is the altitude accuracy of UAV-H31-1?

UAV-H31-1 altitude accuracy is 2cm.

If you encounter problems that cannot be solved during the installation process, please contact the customer service staff of Microbrain Intelligent Technology Co., Ltd.

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