ADS-B Receiver Module ADSB-MU4

User Manual

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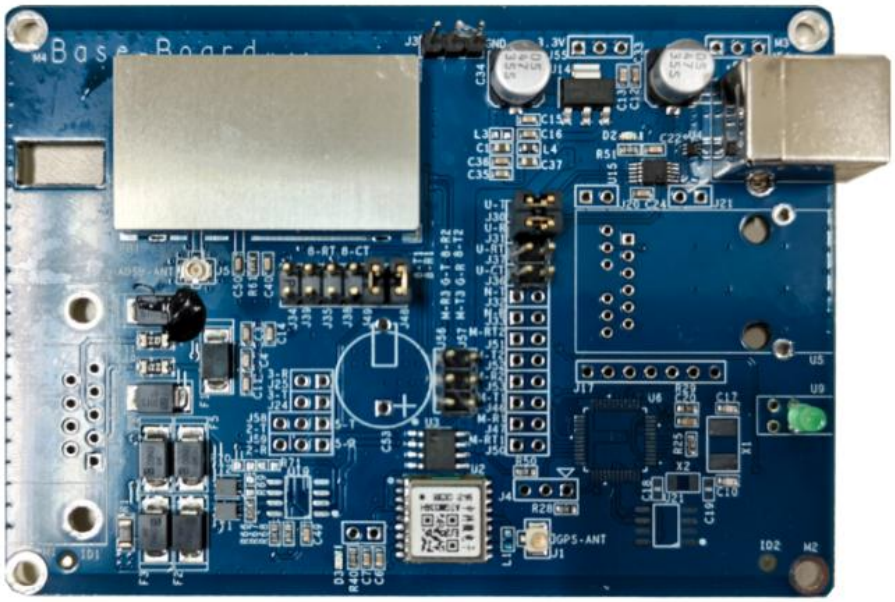
1. Introduction

The ADSB-MU4 is a high-performance ADS-B signal Receiver Module featuring high expandability and ease of integration. It offers high signal reception sensitivity, enabling long-range ADS-B signal reception.

The module integrates a high-sensitivity 1090 MHz RF receiver module and a low-noise amplifier (LNA), enabling it to independently complete the entire process of signal reception, processing, and data parsing. It also incorporates a GNSS module, which provides high-precision timestamping for each ADS-B message.

For data output, the module supports output of raw ADS-B messages via a USB interface. Alternatively, it can be configured with a serial interface output, compatible with both RS232 and RS485 protocols.



Packing List:

No.	Item	Quantity
1	ADSB-MU4 Module	1
2	USB Cable	1

2. Features

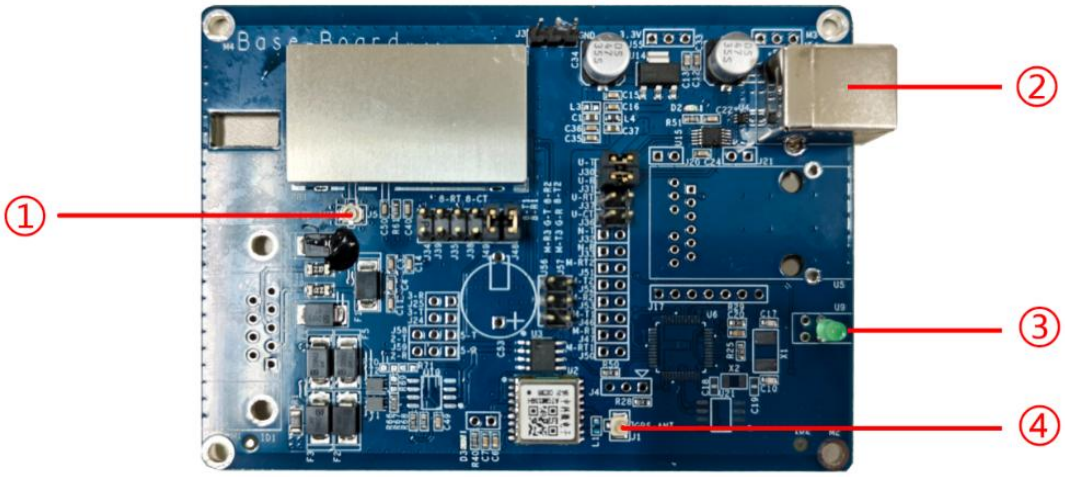
- Easy to expand, suitable for embedded applications
- Built-in low noise amplifier (LNA)
- Outputs raw Mode-S (including ADS-B) data messages
- Messages comply with the Beast Binary protocol
- The message includes GPS/BDS timestamps and supports multilateration (MLAT)
- High-precision nanosecond-level timestamp (when connected to a GNSS antenna)
- Highly configurable, adaptable to various application scenarios
- Supports customized output via multiple serial protocols
- Optional signal strength output

3. Specifications

No.	Parameter	Specification
1	Power Supply	5 V, 2 A
2	Power Consumption	0.88 W
3	Receiving Frequency	1090 MHz
4	Sensitivity	≤ -97 dBm
5	Reception Range	> 400 km (no interference, no obstruction)
6	Dynamic Range	> 80 dB
7	Update Rate	≥ 1Hz
8	Target Capacity	> 700 targets
9	Processing Capability	> 3,500 messages/s
10	LNA Gain	31 dB
11	Data Format	Compliant with Beast Binary protocol; binary format; outputs raw Mode-S (including ADS-B) data
12	Timestamp Resolution	1 ns
13	Timestamp Accuracy	180 ns

14	Data Interfaces	Type-B USB, DB9 female (customized)
15	Serial Protocols	RS232 (customized), RS485 (customized)
16	ADS-B Antenna Connector	IPEX
17	GNSS Antenna Connector	IPEX
18	Dimensions	100 × 76 × 35 mm (main unit)
19	Weight	40 g (main unit)
20	Operating Temperature	-20℃ ~ +60℃
21	Storage Temperature	-20℃ ~ +70℃
22	Storage Humidity	10% ~ 80%

4. Interface Description



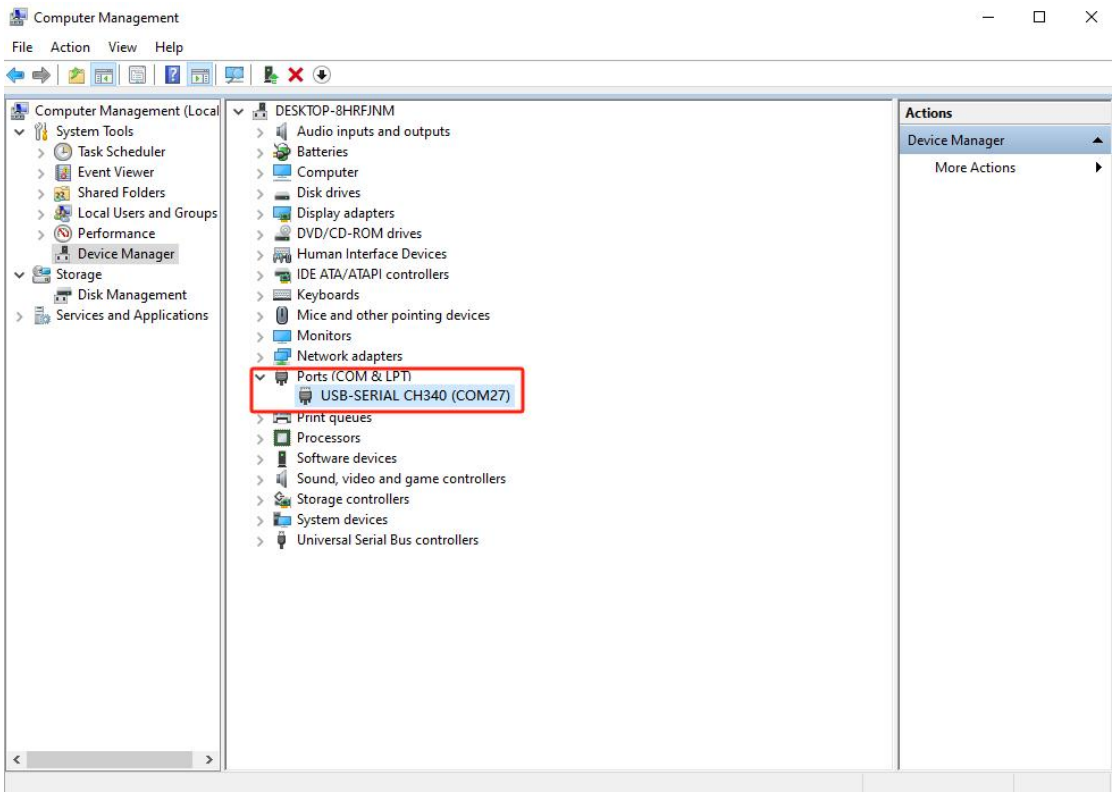
Main Unit Interfaces:

No.	Interface Name	Description
1	ADSB-ANT	ADS-B antenna interface, IPEX
2	USB	Data interface 1, Type-B connector (default output interface)
3	Indicator Light	Data indicator (green)
4	GPS-ANT	GPS/BDS antenna interface, IPEX

5. Connecting the module

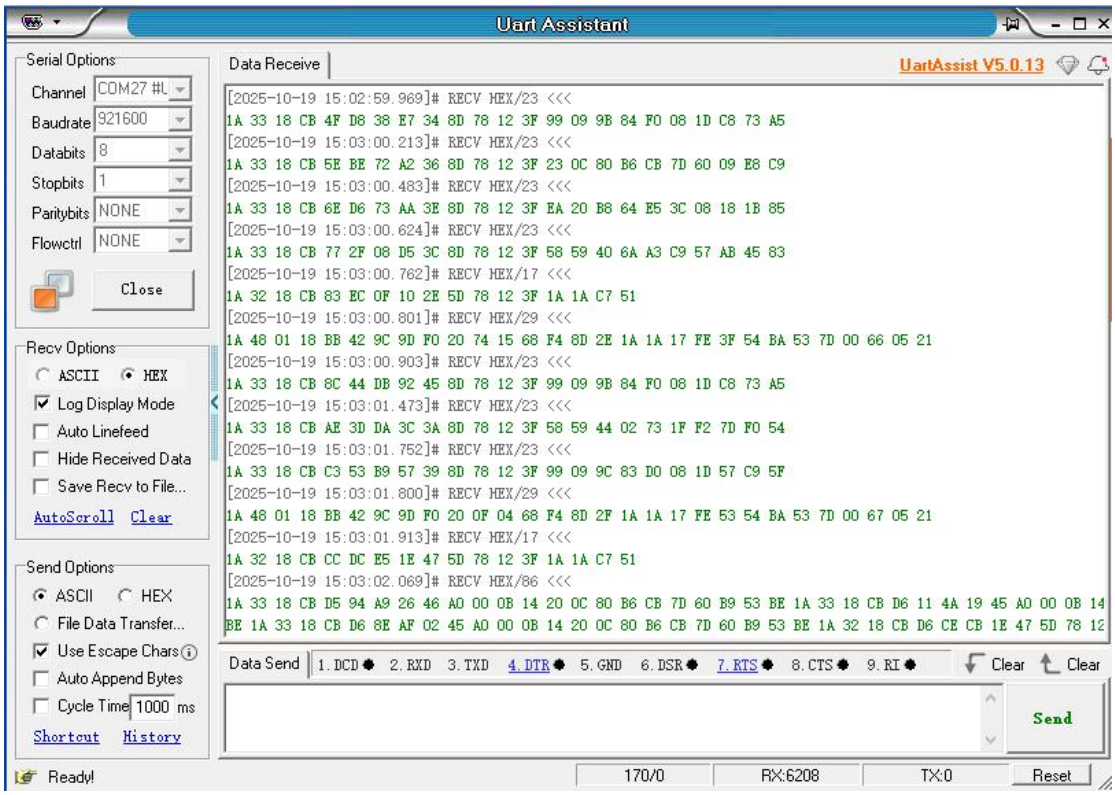
Note: Before touching the device, discharge any static electricity from your body.

Connect the ADSB-MU4 to a computer using a USB cable. The USB-SERIAL CH340 COM port will appear in the computer's Device Manager.



Enter the following serial connection settings in a serial debugging tool or device. Once connected, data reception will begin.

No.	Parameter	Configuration
1	Baud Rate	921600
2	Data Bits	8
3	Parity	None
4	Stop Bits	1



6. Data Description

Data Example:

```
1A 48 01 18 BB 42 9C 9D F0 20 D7 DD 68 F4 8D 43 1A 1A 18 00 E3 54 BA 53 E0 00 6C 07 0F
1A 32 18 D0 C6 D2 AB 22 33 5D 78 0C BD A9 44 9F
1A 33 18 D0 C7 06 8C 62 34 A0 00 12 B3 C1 BA 43 2F 20 0C 01 B4 C5 83
1A 32 18 D0 C7 33 75 21 33 5D 78 0C BD A9 44 9F
1A 33 18 D0 C7 67 56 61 32 A0 00 12 B3 B8 D8 00 30 A4 00 00 04 90 36
1A 32 18 D0 C7 94 39 44 35 5D 78 0C BD A9 44 9F
1A 32 18 D0 C8 57 AE 0C 33 5D 78 0C BD A9 44 9F
1A 32 18 D0 C9 79 2F 54 31 5D 78 0C BD A9 44 9F
1A 33 18 D0 DA 49 B8 98 33 8D 78 0C BD 58 97 40 2E 9F 4D 51 BD 08 2C
1A 32 18 D0 DF DA CB EE 33 5D 78 0C BD A9 44 8A
1A 33 18 D0 E2 B5 DB 9F 34 A0 00 12 B3 B8 D8 00 30 A4 00 00 04 90 36
1A 33 18 D0 E3 1B 06 0F 33 A0 00 12 B3 C1 BA 43 2E FF CC 01 88 97 C6
1A 33 18 D0 E3 80 48 42 33 A0 00 12 B3 80 37 67 3A 60 04 E0 97 15 FC
1A 33 18 D0 E4 4A BC 62 31 A0 00 12 B4 B8 D8 00 30 A4 00 00 83 62 D1
1A 32 18 D0 E5 14 7D 79 32 28 00 10 A5 41 A7 3C
1A 32 18 D0 E5 79 98 49 32 28 00 10 A5 41 A7 3C
```

Data Structure:

Type	Payload Size	Description
0x32	7 bytes	Raw Mode-S short message data
0x33	14 bytes	Raw Mode-S extended message data
0x48	Variable	HULC protocol message

Data Item Description of the Message:

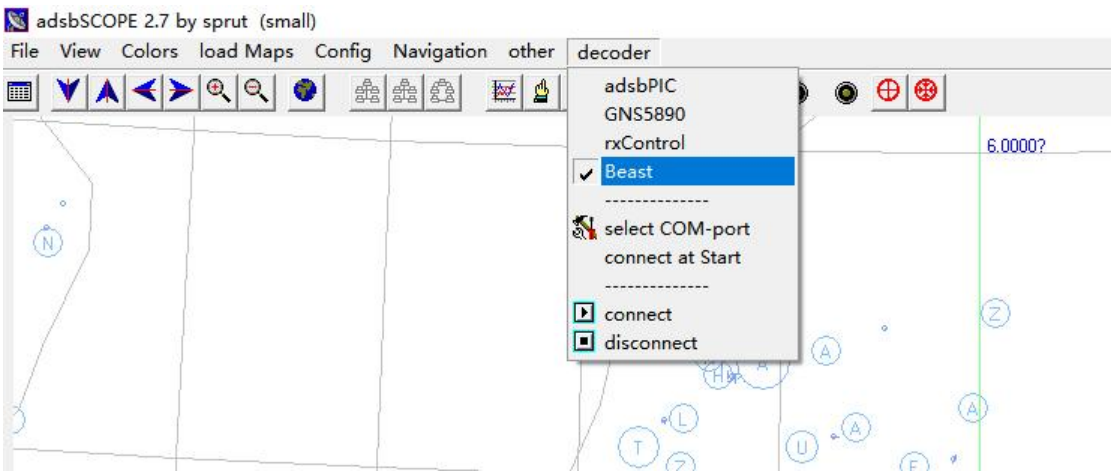
Byte	Data Example	Description
1	1A	Escape character <esc> (hexadecimal representation: 0x1a)
2	33	14 bytes: Identifier for Mode-S long frame
2	32	7 bytes: Identifier for Mode-S short frame
3-8	0F E4 A4 6C 80 97	6 bytes: timestamp
9	37	1 byte: signal level
10-23	8D 78 10 F0 E1 1F 3A 00 00 00 00 CB 7B E9	14 bytes: Mode-S long frame
10-16	5D 78 0D E5 A4 5A DF	7 bytes: Mode-S short frame

7. ADS-B Display Software adsbscope

The ADSB-MU4 can be connected to the free display software adsbScope. The specific operation procedure is as follows:

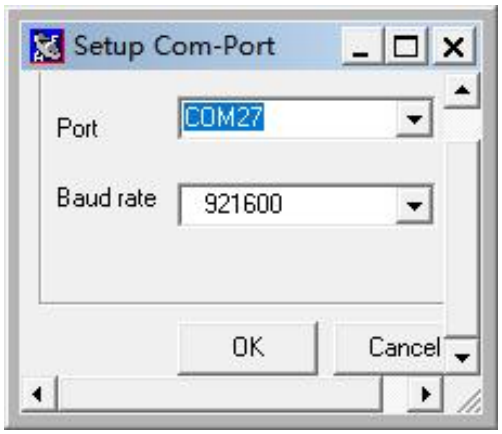
(1) Open the display software adsbScope, e.g., adsbscope27_256.exe.

(2) Locate the Decoder menu at the top, and select Beast from the menu.



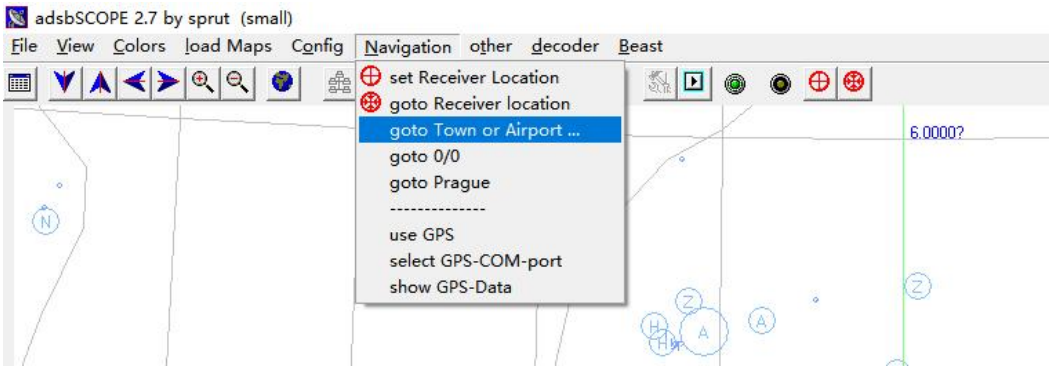
(3) Click Select COM-port in the menu.

(4) In the pop-up window, select the COM port corresponding to the USB connection (i.e., COM27 as mentioned earlier) under Port, select 921600 under Baudrate, and click OK.

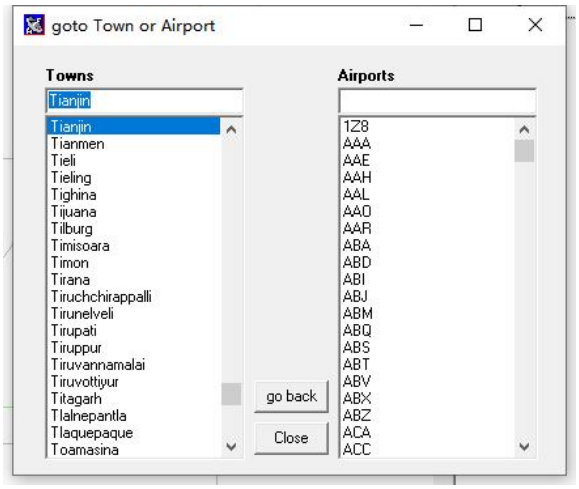


(5) Click the Connect button in the Decoder menu to connect to the serial port.

(6) Select Goto Town or Airport... from the Navigation menu.



(7) In the pop-up window, enter the English name of the nearest airport in the input box under Towns, select the corresponding airport from the search list below, and click the close button in the upper right corner.



(8) The display software will now show the aircraft positions correctly.

8. Customization

All our products can be supplied tailored to your specific needs and customized with your brand and logo. We tailor designs, enclosures, features, and data formats to meet your specifications. Our OEM services empower you to launch unique products swiftly and risk-free.

9. Why Choose Us

- Comprehensive product range to meet users' needs for various levels of ADS-B ground station systems.
- Easy installation and use, with no complex configuration or high technical requirements for engineers. Simple and user-friendly.
- Complete after-sales service, providing technical support and services to help users maximize product benefits.
- Support for remote upgrades, assisting users in accessing the latest product features.
- Independent product development with customization options based on user requirements, including form factors, logo, software, hardware, performance, and functionality.