



# unicorecomm UM4B0 High Precision GNSS Module User Manual

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## Product Information

### **UNICORECOMM UM4B0 GPS/BDS/GLONASS/Galileo or All-constellation All-frequency Uni c RTK Positioning Module**

The UNICORECOMM UM4B0 is a GPS/BDS/GLONASS/Galileo or All-constellation All-frequency Uni c RTK Positioning Module. It has 432 channels and is based on NebulasII SoC. It supports GPS L1/L2/L5, BDS B1I/B2I/B3I/B1C/B2a, GLONASS L1/L2, Galileo E1/E5a/E5b, and QZSS L1/L2/L5 frequencies. The module has a horizontal accuracy of 1.5m for single point positioning and 0.4m for RTK positioning. It has a vertical accuracy of 2.5m for single point positioning and 0.8m for RTK positioning. The module also has a heading accuracy (RMS) of 1cm+1ppm and a velocity accuracy (RMS) of 1.5cm+1ppm. The module's initialization reliability is 99.9% with an RTK initialization time of 5ms.

## Installation and Operation

The installation and operation instructions for the UNICORECOMM UM4B0 module are provided in the user manual. The manual provides detailed information on the hardware, hardware design, installation and configuration, configuration commands, antenna detection, firmware upgrade, production requirement, and packaging.

## Hardware

The hardware section of the manual provides information on the physical specifications of the module such as weight and dimensions. It also provides information on the antenna input pin ANT\_IN and the external antenna feed design. The module provides a +3.3V antenna feed, and when an active antenna of +3.3~5V is adopted, make sure the 50 antenna impedance is matched.

## Hardware Design

The hardware design section of the manual provides information on the UM4B0 module's features, installation, specification, and use. The manual is a generic version, and readers should refer to the appropriate part of the manual according to their purchased product configuration concerning CORS, RTK, and Heading. The manual is intended for technicians who know GNSS Receiver to some extent but not for general readers.

## Installation and Configuration

The installation and configuration section of the manual provides detailed information on the operation procedures

for the module.

## **Configuration Commands**

The configuration commands section of the manual provides information on the commands that can be used to configure the module.

## **Antenna Detection**

The antenna detection section of the manual provides information on how to detect an antenna connected to the module.

## **Firmware Upgrade**

The firmware upgrade section of the manual provides information on how to upgrade the module's firmware.

## **Production Requirement**

The production requirement section of the manual provides information on the requirements for producing the module.

## **Packaging**

The packaging section of the manual provides information on how the module is packaged.

## **Revision History**

Version	Revision History	Date
Ver. 1.0	First Edition	Feb. 2017
R3.1	Add the related description to clarify the VCC restrictions	2019-08-22
R3.2	Chapter 2.2: add the working current info of No.17 pin	2019-09-18
R3.3	2.5 Physical Specifications: update the weight value from 8.8 to 9.2 1.1 Overview: update the product diagram	2020-02-26
R3.4	Add QZSS	2020-07-01
R3.5	Fix typo/update BDS frequencies	2020-10-21
R3.6	Update dimensions	2020-10-28
R3.7	Add external antenna feed reference circuit	2020-12-17
R3.8	Update COFIG command	2021-01-22
R4	Remove information on the MEMS device and add RF input power consumption of antennas	2021-04-13
R4.1	Add average current in chapter 2.4	2021-06-23
R4.2	Modify pin19 in Figure 2-2	2021-07-01

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## Foreword

- This <User Manual> offers you information in the features of the hardware, the installation, specification and use of UNICORECOMM UM4B0 product.
- This manual is a generic version. Please refer to the appropriate part of the manual according to your purchased product configuration, concerning CORS, RTK and Heading.

### Readers it applies to

- This <User Manual> is applied to the technicians who know GNSS Receiver to some extent but not to the general readers.

## Introduction

### Overview

- UM4B0 is a high precision positioning and heading RTK module developed by Unicore Communications, targeting light robots, UAVs, intelligent vehicles, GIS information collection, etc.
- By employing a single UC4C0 (432 channel tracking) baseband chip and a single RF chip, using single-sided SMD packaging, UM4B0 has achieved the smallest size (30x40mm) in this industry with high accuracy heading and positioning output. It can simultaneously track BDS B1I/B2I/B3I/B1C/B2a + GPS L1/L2/L5 + GLONASS L1/L2+Galileo E1/E5a/E5b.



**Figure 1-1** UM4B0 Module

### Key Features

- 30\*40mm, the smallest multi-system multi-frequency high precision module
- Support GPS L1/L2/L5+GLONASS L1/L2+BDS B1I/B2I/B3I/B1C/B2a+Galileo E1/E5a/E5b
- Based on 432 channel NebulasII GNSS SoC
- 20Hz update rate
- Instant RTK initialization and long-distance RTK
- Enhanced multi-system multi-frequency RTK technology, JamShield Adaptive narrow-band anti-interference and U-AutoAlign multi-path mitigation

- Support odometer input and external high-performance IMU interface\*
- SMD packaging

### Technical Specifications

**Table 1-1 Performance Specifications**

Channels	432 channels, based on NebulasII SoC	RTK Initialization Time	<5s (typical)
Frequency	GPS L1/L2/L5 BDS B1I/B2I/B3I/B1C/B2a GLONA SS L1/L2 Galileo E1/E5a/E5b QZSS L1/L2/L5	Initialization Reliability	>99.9%
Single Point Positioning	Horizontal: 1.5m	Cold Start	<25s
	Vertical: 2.5m	Reacquisition	<1s
DGPS(RMS)	Horizontal: 0.4m	Correction	RTCM 3.0/3.2/3.3
	Vertical: 0.8m		
RTK(RMS)	Horizontal: 1cm+1ppm	Data Output	NMEA-0183, Unicore Binary
	Vertical: 1.5cm+1ppm	Update Rate	20Hz
Heading Accuracy (RMS)	0.2 degree@1 m baseline	Time Accuracy (RMS)	20ns
Velocity Accuracy (RMS)	0.03m/s	Power Consumption	1.8W
Dimension	30×40×4 mm		

**Table 1-2 Functional Ports**

3x UART, 1xI2C, 1x SPI (LV-TTL)	1x1PPS LV-TTL
1x Event input	

### Interfaces

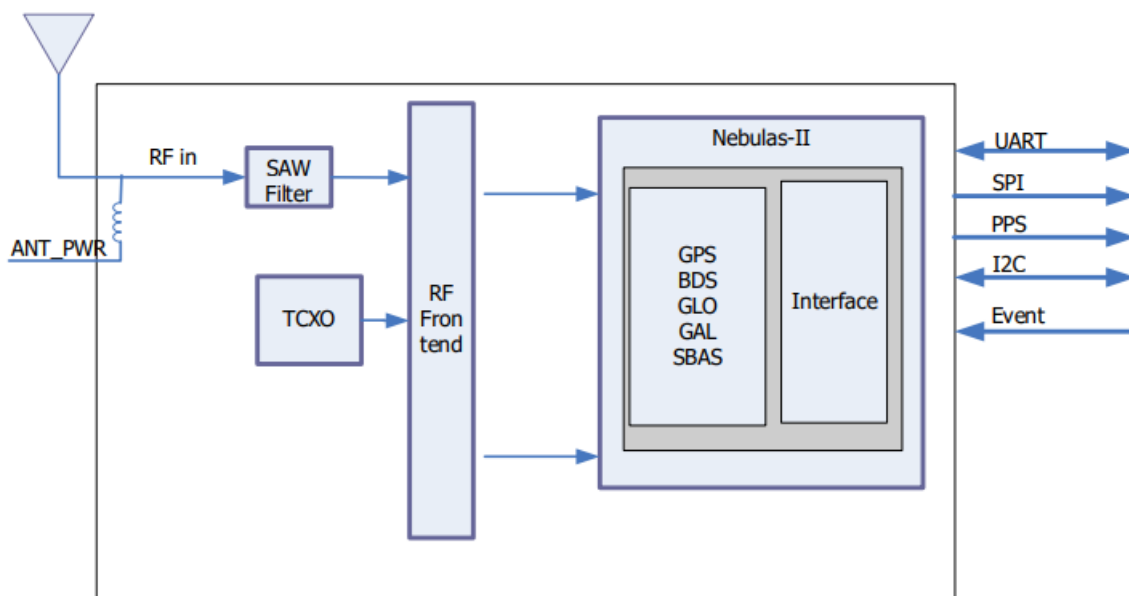


Figure 1-2 Block Diagram

### 1. RF Part

- The receiver gets filtered and enhanced GNSS signal from the antenna via a coaxial cable. The RF part converts the RF input signals into the IF signal, and converts IF analog signal into digital signals required for NebulasII (UC4C0) digital processing.

### 2. NebulasII SoC (UC4C0)

- The UM4B0 incorporates the processing from the NebulasII (UC4C0), UNICORECOMM's new generation high precision GNSS SoC with 55nm low power design, which supports up to 12 digital intermediate frequency or 8 analog intermediate frequency signals and can track 12 navigation signals with 432 channels.

### 3. 1PPS

- UM4B0 outputs 1 PPS with adjustable pulse width and polarity.

### 4. Event

- UM4B0 provides 1 Event Mark Input with adjustable pulse width and polarity.

## Hardware

### Dimensions

Table 2-1 Dimension

Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	38.00	40.00	40.50
B	29.80	30.00	30.2
C	3.80	—	4.00
D	1.57	1.58	1.59
E	1.26	1.27	1.28
Pin		1.07	

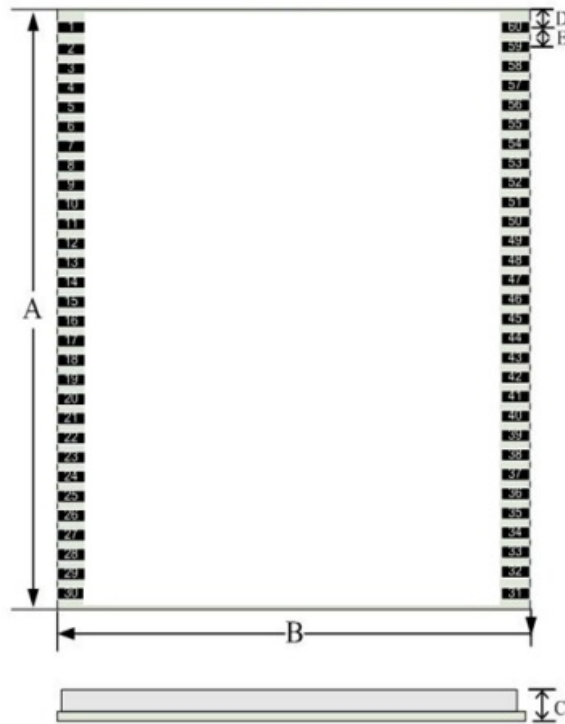


Figure 2-1 Mechanical Dimensions

#### Pin Definition (Top View)

1	GND	GND	60
2	ANT1_IN	RSV	59
3	GND	GND	58
4	GND	GND	57
5	ANT1_PWR	RSV	56
6	GND	GND	55
7	ANT1_NLOD	RSV	54
8	ANT1_FFLG	RSV	53
9	GND	GND	52
10	RSV	RSV	51
11	RSV	RSV	50
12	RSV	RSV	49
13	RSV	RSV	48
14	GND	GND	47
15	SPEED	RST_N	46
16	FWR	EVENT	45
17	V_BACKUP	PPS	44
18	GND	GND	43
19	PVT_STAT	I2C_SCL	42
20	GPIO2	I2C_SDA	41
21	RSV	RXD3	40
22	FRESET_N	TXD3	39
23	ERR_STAT	RXD2	38
24	RTK_STAT	TXD2	37
25	GND	RXD1	36
26	SPI_MISO	TXD1	35
27	SPI_MOSI	GND	34
28	SPI_CLK	GND	33
29	SPI_SS0	3.3V_VCC	32
30	SPI_SS1	3.3V_VCC	31

Figure 2-2 UM4B0 Pin Diagram

Table 2-2 Pin Definition

No	Pin	I/O	Description
----	-----	-----	-------------



1	GND	—	Ground
2	ANT_IN	I	GNSS antenna signal input
3	GND	—	Ground
4	GND	—	Ground
5	ANT_PWR	I	GNSS antenna power supply
6	GND	—	Ground
7	ANT_NLOD	O	GNSS antenna open circuit indicator 1: normal 0: antenna is open circuit
8	ANT_FFLG	O	GNSS antenna short circuit indicator 1: normal 0: antenna is short circuit
9	GND	Power	DGND/GND
10	RSV	—	RSV
11	RSV	—	RSV
12	RSV	—	RSV
13	RSV	—	RSV
14	GND	—	Ground
15	SPEED	I	Odometer- pulse
16	FWR	I	Odometer- direction
17	V_BACKUP	I	When the main power supply of the module VCC is cut off, V_BCKP supplies power to RTC and SRAM. Level requirements: 2.0~ 3.6 V, and the working current is about 10uA. Can be suspended without using the hot start function.
18	GND	—	Ground

19	PVT_STAT	O	PVT positioning indicator, active-high. The module outputs high level when positioning is available and outputs low level when no positioning is proceeded.
20	GPIO2	I/O	Common IO
21	RSV	—	RSV
22	FRESET_N	I	Reset to factory default (clear all user settings), LVTTTL active-low, activate for longer than 5 seconds.
23	ERR_STAT	O	Abnormal indicator, active-high. When the RTK solution is fixed, it outputs high level, otherwise outputs low level when the module completes its self-diagnosis.
24	RTK_STAT	O	RTK positioning indicator, active-high. When the module's self-diagnosis system fails, it outputs high level; otherwise outputs low level when it's in other positioning states or no positioning is proceeded.
25	GND	—	Ground
26	SPI_MISO	I	SPI data input

No	Pin	I/O	Description
27	SPI_MOSI	O	SPI data output
28	SPI_CLK	O	SPI clock
29	SPI_SS0	O	SPI chip select 0
30	SPI_SS1	O	SPI chip select 1
31	3.3V_VCC	Power	Power Supply (+3.3V)
32	3.3V_VCC	Power	Power Supply (+3.3V)
33	GND	—	Ground
34	GND	—	Ground
35	TXD1	O	COM 1 transmit
36	RXD1	I	COM 1 receive

37	TXD2	O	COM 2 transmit
38	RXD2	I	COM 2 receive
39	TXD3	O	COM 3 transmit
40	RXD3	I	COM 3 receive
41	I2C_SDA	I/O	I2C data
42	I2C_SCL	I/O	I2C clock
43	GND	–	Ground
44	PPS	O	Pulse per second
45	EVENT	I	Event Mark
46	RST_N	I	Fast reset, will not clear user configurations. Active Low, > 5 ms
47	GND	–	Ground
48	RSV	–	RSV
49	RSV	–	RSV
50	RSV	–	RSV
51	RSV	–	RSV
52	GND	–	Ground
53	RSV	–	RSV
54	RSV	–	RSV
55	GND	–	Ground
56	RSV	–	RSV
57	GND	–	Ground
58	GND	–	Ground
59	RSV	–	RSV
60	GND	–	Ground

## Electrical Specifications

**Table 2-3 Absolute Maximum Ratings**

Item	Pin	Min	Max	Unit
Power Supply (VCC)	Vcc	-0.3	3.6	V
Voltage Input	Vin	-0.3	VCC+0.2	V
LNA Input	ANT_PWR	-0.3	6	V
GNSS Antenna Signal Input	ANT_IN	-0.3	ANT_PWR	V
RF Input Power Consumption of Antenna	ANT_IN input power		+15	dBm
VCC Ripple (Rated Max.)	Vrpp	0	50	mV

Item	Pin	Min	Max	Unit
Voltage Input (pins other than RXD1, RXD2, RXD3)	Vin	-0.3	3.6	V
Maximum ESD stress	VESD(HBM)		±2000	V

## Operational Conditions

**Table 2-4 Operational Conditions**

Item	Pin	Min	Typical	Max	Unit	Condition
Power Supply (VCC)	Vcc	3.2	3.3	3.6	V	
Pulse current*	Iccp			8.8	A	Vcc = 3.3 V
LOW-Level Input Voltage	Vin_low_1	-0.3		VCC*0.3	V	

High-Level Input Voltage	Vin_high_1	VCC*0.7		VCC+0.3	V	
LOW Level Output Voltage	Vout_low	0		0.45	V	Iout= 4 mA
High Level Output Voltage	Vout_high	VCC-0.45		VCC	V	Iout =4 mA
Antenna Gain	Gant	20	30	36	dB	
Noise Figure	Nftot	2.5	3	3.5	dB	
LNA Input	ANT_PWR	3.3	5	5.5	V	< 100mA
Operating Temperature	Topr	-40		85	°C	
Power Consumption	P	1.5	1.8	2.0	W	
Average Current	Iavg		0.545		A	

**NOTE:** Since the product contains capacitors at the input, inrush current will occur during power-on. Evaluate in the actual environment in order to check the effect of the supply voltage drop due to the inrush current.

#### Physical Specifications

**Table 2-5 Physical Specifications**

Size	30×40×4 mm
Weight	9.2g
Temperature	Operating: -40°C~+85°C
	Storage: -55°C~+95°C
Humidity	95% No condensation
Vibration	GJB150.16-2009, MIL-STD-810
Shock	GJB150.18-2009, MIL-STD-810

## Hardware Design

### Design in Considerations

- To make UM4B0 work properly, you need to properly connect the following
- The module's VCC should be monotonic when powered on, the initial level should be lower than 0.4V, and the undershoot and ringing should be guaranteed to be within 5% VCC
- Provide stable power to the VCC pin
- Connect all the GND pins to ground
- Connect ANT\_IN signal to the antenna, and ensure the 50-ohm impedance matching
- Connect ANT\_PWR to +3.3~5.5 V voltage, then supply +3.3~5.5 V feed to the antenna through ANT\_IN
- Ensure COM1 is connected to a PC or an external processor, and users can use this serial port to receive position data. COM1 is also necessary for firmware upgrades
- Properly connect the module's reset pin FRESET\_N to ensure complete reset of the module. It will restore the module to the manufacturing configuration.
- When ANT\_NLOD, ANT\_FFLG and antenna detection indication signal are connected, the IO without any pull-up/down of the client MCU terminal is required at the input.
- In order to obtain proper performance, special concerns should be paid during the design:
- **Power supply:** A stable and low ripple power supply is necessary for good performance. Make sure the peak-to-peak voltage ripple does not exceed 50mVpp. It is recommended to use a power chip with current output capacity greater than 2A to power the board.
- Use LDO to ensure the purity of power supply
- Try to place LDO close to the module in layout
- Widen the tracks of power circuit or use copper pour surface to transmit current
- Avoid walking through any high-power or high inductance devices such as a magnetic coil
- **Interfaces:** Ensure that the signals and baud rate of the main equipment match those of the UM4B0 module
- Antenna interface: Make sure the antenna impedance matches, and the cable is short without any kinks, try to avoid all acute angles
- Try to avoid designing in any circuits underneath UM4B0
- This module is a temperature sensitive device, so dramatic changes in temperature will result in reduced performance. Keep it away as far as possible from any high-power high-temperature air and heating devices

### UM4B0 Reference Design



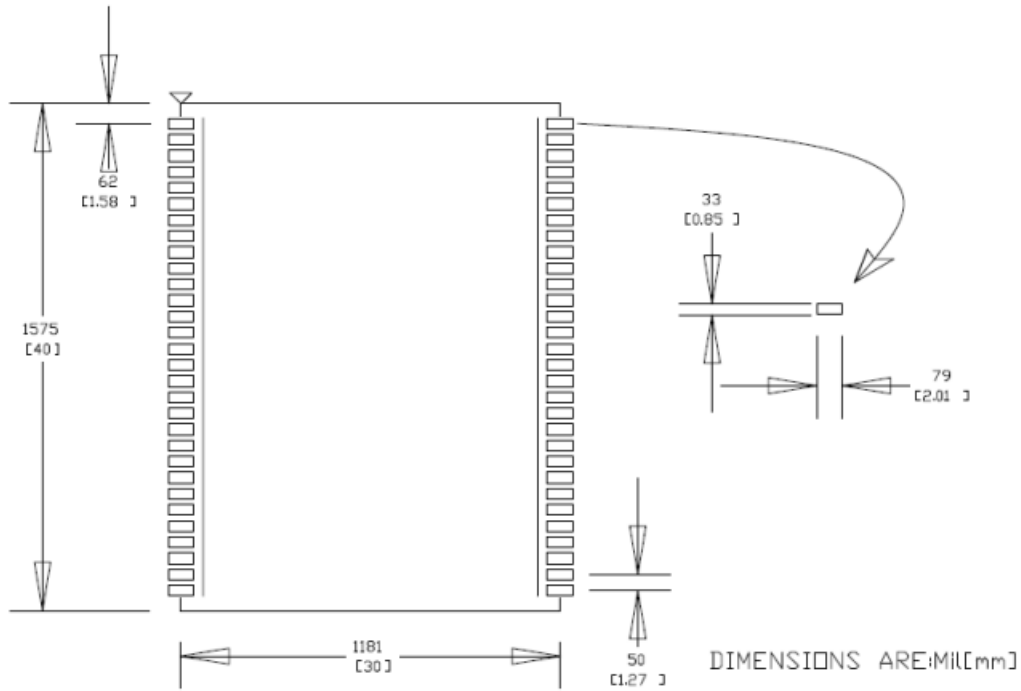
	Pin Name	Pin	I/O	Description	Notes
Power Supply	VCC	31, 32	Power	Voltage Supply	Stable, clean low ripple power supply, peak ripple power lower than 50mVpp is preferred
	ANT_PWR	5	Power	Antenna Power Supply	Voltage supply for active antenna
	GND	1, 3, 4, 6, 9, 14, 18, 25, 33, 34, 43, 47, 52, 55, 57, 58, 60	Power	Ground	Connect all the GND signals to ground. Better to use copper pour surface.
Antenna	ANT_IN	2	I	Satellite Signal Input	50 $\Omega$ impedance matching
UART	TXD1	35	O	COM1 Transmit Data	COM1 output, leave unconnected if not used

	Pin Name	Pin	I/O	Description	Notes
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	RXD1	36	I	COM1 Receive Data	COM1 input, leave unconnected if not used
	TXD2	37	O	COM2 Transmit Data	COM2 output, leave unconnected if not used
	RXD2	38	I	COM2 Receive Data	COM2 input, leave unconnected if not used
	TXD3	39	O	COM3 Transmit Data	COM3 output, leave unconnected if not used
	RXD3	40	I	COM3 Receive Data	COM3 input, leave unconnected if not used
System	FRESET_N	22	I	Hardware Reset (low effective)	Restore factory settings by lowering FRESET_N for no less than 5 seconds
	PPS	44	O	PPS signal	PPS
	EVENT	45	I	EVENT signal	Event

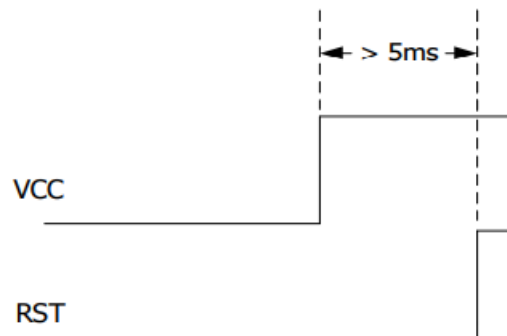
## PCB Packaging



**Figure 3-3 UM4B0 recommended PCB Packaging (unit: mil, in brackets: mm)**

## Reset Signal

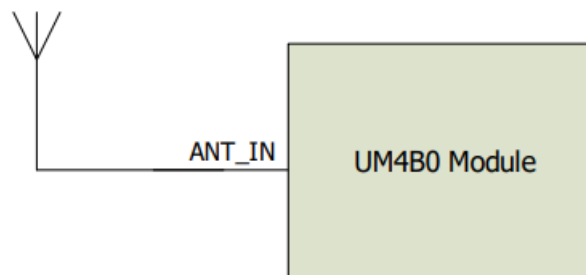
The UM4B0 module can't work properly unless it is correctly reset after powering on. To ensure an effective reset, the reset pin (RST) and power supply pin (VCC) must meet the following time sequence requirement. To reset UM4B0 during normal operation, please pull the RST pin to a low level for more than 5ms.



**Figure 3-4 UM4B0 RST**

## Antenna

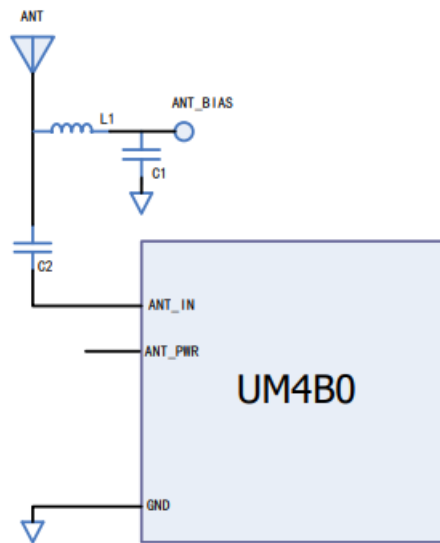
The module has the antenna input pin ANT\_IN. It provides a +3.3V antenna feed, when an active antenna of +3.3~5V is adopted, please make sure the 50  $\Omega$  antenna impedance is matched.



**Figure 3-5 UM4B0 Active Antenna Connection**

## External Antenna Feed Design

- UM4B0 feeds the antenna signals to the required circuits internally, but in order to effectively prevent damage from lightning and surges, circuit protection should be installed externally to protect the module.
- High voltage and high-power protection chips should be used to feed the antenna from the outside of the module. Gas discharge tube, varistor, TVS tube and other high-power protective devices may be used in the antenna circuit to effectively improve the prevention against lightning stroke and surge.



**Figure 3-6 UM4B0 External Antenna Feed Reference Circuit**

#### Remarks:

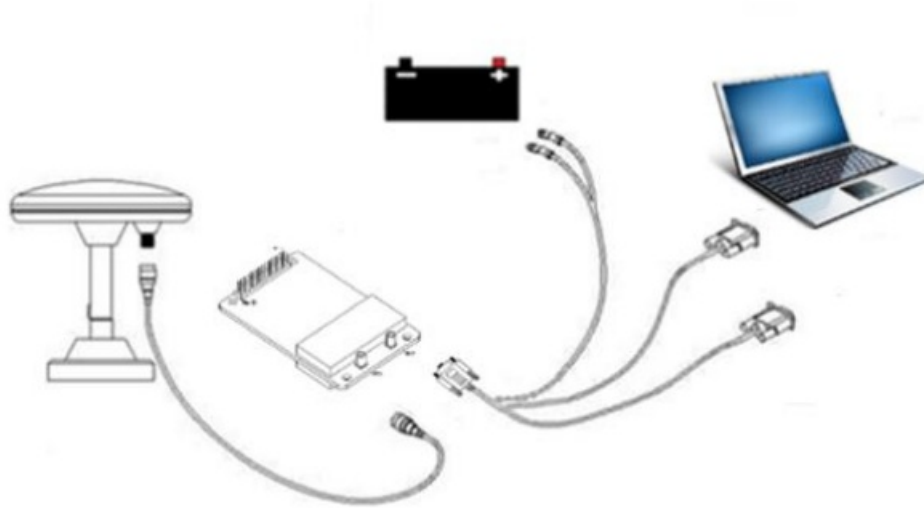
- **a)** L1, feed inductor, 68nH RF inductor in 0603 package is recommended;
- **b)** C1, decoupling capacitor, it is recommended to connect two capacitors of 100nF/100pF in parallel;
- **C2**, DC blocking capacitor, recommended 100pF capacitor.

## Installation and Configuration

### ESD Handling Precautions

UM4B0 Module is an Electrostatic Sensitive Device (ESD) and special precautions when handling are required.

- Electrostatic discharge may cause damages to the device. All operations mentioned in this chapter should be carried out on an antistatic workbench, wearing an antistatic wrist strap and using a conductive foam pad. If an antistatic workbench is not available, wear an antistatic wrist strap and connect the other end to a metal frame to avoid the effects of static electricity.
- Hold the edge of the module, not in direct contact with the components
- Please check carefully whether the module has obviously loose or damaged components.



**Figure 4-1 Typical Installation of UM4B0**

- Please check the contents of the package carefully after receiving the package of UM4B0.
- UM4B0 EVK suite (or evaluation board)
- User manual
- UPrecise software
- Qualified antenna
- MMCX antenna cable
- PC or Laptop with serial ports (Win7 or above), with UPrecise installed

## Hardware Installation

- After the above preparation, please follow the steps below to install:
- **Step 1:** Make sure to take all the anti-static measures, such as wearing an anti-static wrist strap, grounding the workbench;
- **Step 2:** Align UM4B0 transfer board positioning holes and pins with EVK, and fix it in the EVK. EVK provides power supply and standard communication interface for the module to communicate with peripheral devices;
- **NOTE:** The RF connector on the board is MMCX, and the suitable connecting wire should be selected according to the package. The input signal gain at the antenna interface is optimal between 20 and 36 dB. Please select the appropriate antenna, antenna cable and online LNA accordingly.



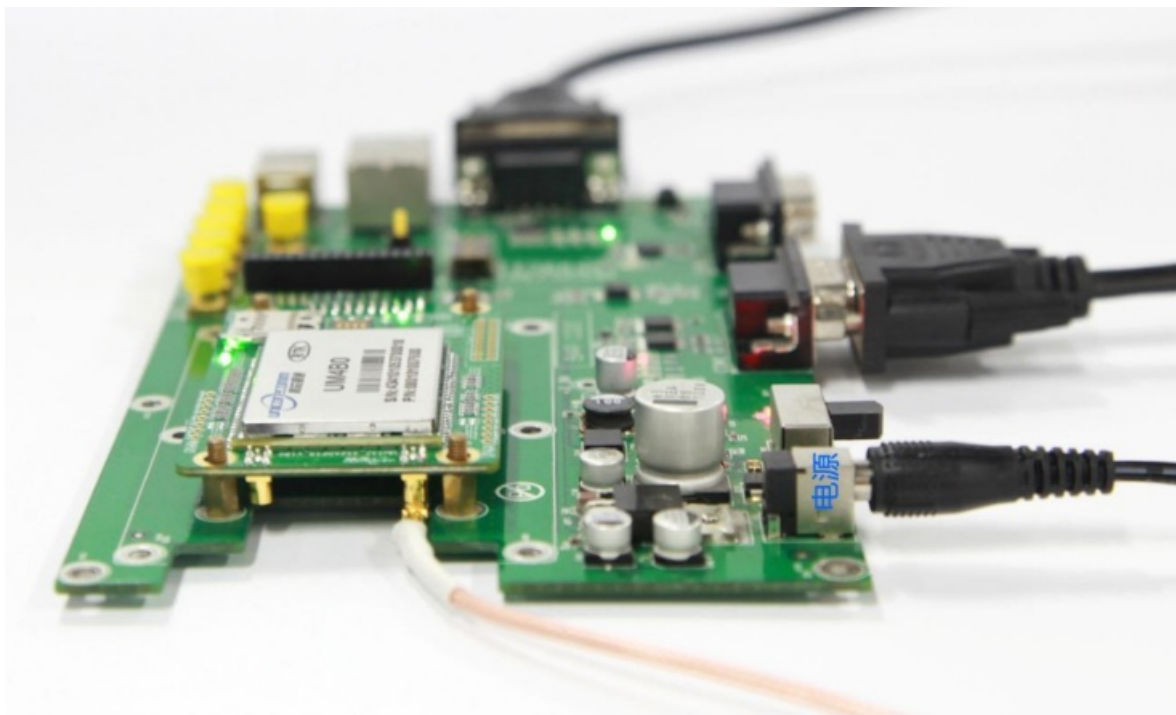
**Figure 4-2 Installation Instruction**

- **Step 3:** Select the GNSS antenna with appropriate gain, and fix it in a stable, non-block area, using the coaxial radio frequency cable to connect the antenna to UM4B0 EVK;
- **Step 4:** Connect the PC to the EVK serial port through direct serial cable;



**Figure 4-3 Connect the Serial Port**

- **Step 5:** Connect a 12V adapter to the EVK power input, and switch on to power the device;



**Figure 4-4 Connect the Antenna**

- **Step 6:** Open the UPrecise software on the PC;
- **Step 7:** Control the receiver through UPrecise to send commands or to log data.

## Start-Up

The power supply for UM4B0 is 3.3VDC. Before powering on the device, please connect UM4B0 serial port to the GNSS antenna. The receiver is started and the communication is connected after powering up. Testing tools are provided for module testing.

### Configuration and Output

UNICORECOMM UPrecise software provides a user-friendly graphical interface to control and display the operation of your receiver. The features of UPrecise include:

- Logging Control View: Graphic interface for data logging
- Console window for sending command to the receiver (Console View)
- Displaying the receiver's output in ASCII-format (ASCII View)
- Graphic window for displaying Position of satellite, PRN, and Signal/Noise Ratio (Constellation View)
- Historical and present Trajectory of the receiver (Trajectory View)
- Position/Velocity/Time of the receiver (PVT View)
- Apart from the basic functions above, UPrecise offers advanced functions as follows:
- Selecting and recording the log
- Sending commands to the receiver
- Operating and configuration of the ASCII view
- The trajectory view for displaying the present point and the past point of the receiver
- Switching Views over the tracking window
- Switching between Constellation Views
- Resetting the receiver
- Replaying the GGA log



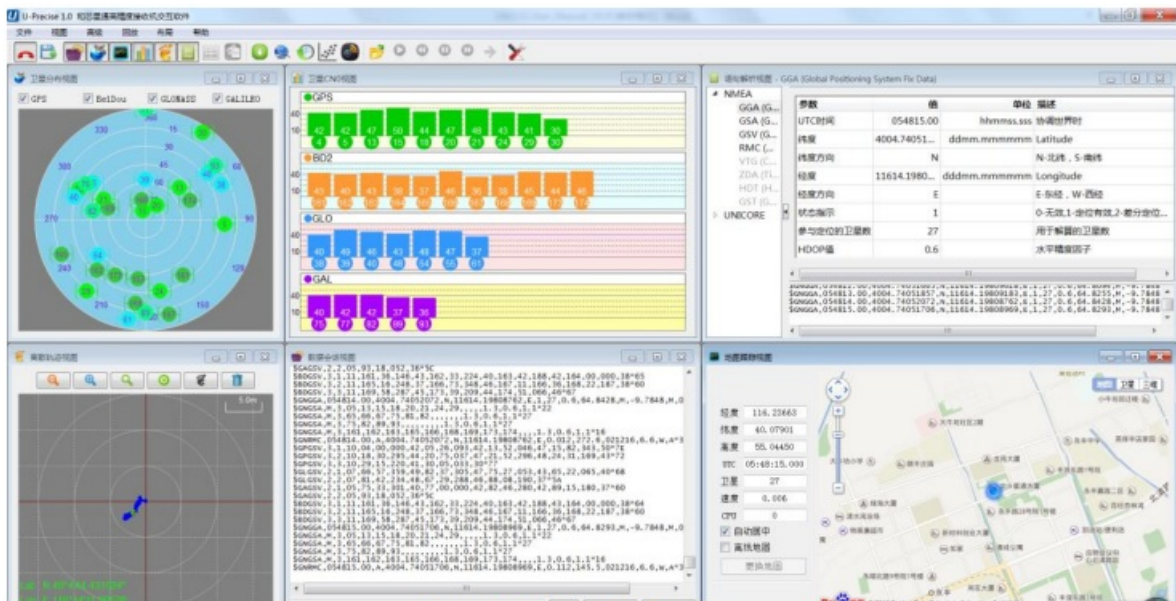


Figure 4-5 UPrecise Software

## Operation Procedures

- **Step 1.** Follow 4.2 Installation Guide to connect the power source, antenna to the board, and turn on the EVK switch
- **Step 2.** Click file –> connect the serial port, and set the baud rate; the default baud rate of UB4B0M is 115200bps

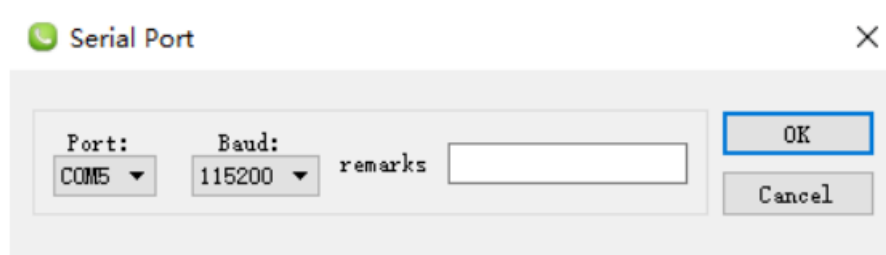
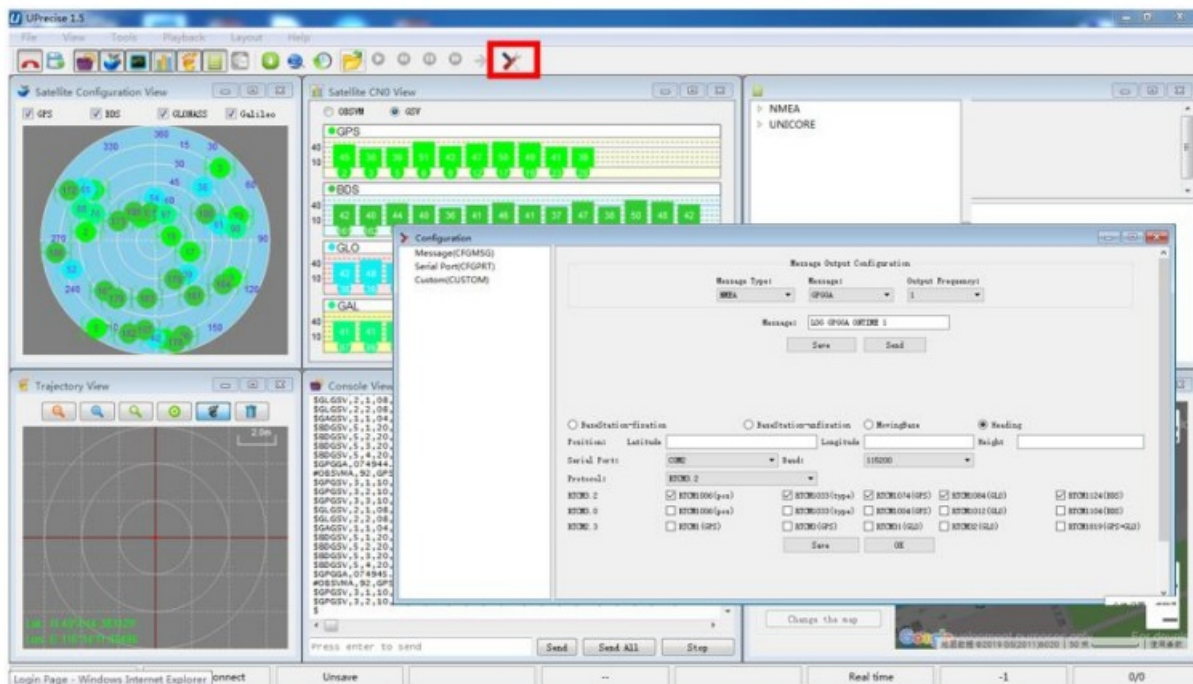


Figure 4-6 Connect the Serial Port

- **Step 3.** Click the receiver settings button to configure the NMEA message output. It is recommended to configure GPGGA, GPGSV, and other messages.



**Figure 4-7 NMEA Data Output**

- **Step 4.** Click the receiver settings button to configure the NMEA message output, then click send. It is recommended to configure GPGGA, GPGSV, and other messages.
- **Step 5.** In the data session window, click “Send all Message” to complete all the NMEA message output (update rate 1Hz). Right click in the data session window to adjust: output log font size, stop / resume log output, or clear log content, etc.
- **Step 6.** Use various views of UPrecise to configure or input commands as required.

## Configuration Commands

- UM4B0 supports abbreviated ASCII format. Simplified ASCII format without check bit is more accessible to user commands. All commands are composed of a log heading and configuration parameters (If parameters are null, there will be only one heading in the command). Header field contains the command name or message headers. UM4B0 is simple to use, and common instructions are shown in the following table:

Command Name	Description
freset	Restore the factory default settings. <b>Note:</b> the factory set baud rate is 115200 bps.
version	Query version information for all components.



<b>config</b>	Query status of the serial port
<b>mask GPS</b>	Mask (disable) tracking of GPS system satellites, BDS/GPS/GLO/GAL systems are all supported to disable
<b>unmask BDS</b>	Unmask (enable) BDS system satellites, BDS/GPS/GLO/GAL systems are all supported to enable
<b>config com1 115200</b>	Configure com1 port operating at 115200 baud rate. The usable COM ports are COM1, COM2, COM3.  The baud rate could be 9600, 19200, 38400, 57600, 115200, 230400, 460800 bps
<b>unlog</b>	Disable all outputs of the port in use
<b>saveconfig</b>	Save the settings
<b>Base/Rover Station Settings</b>	
<b>mode base time 60 1.5 2.5</b>	<p>Within 60 seconds of the automatic positioning of the receiver, or when the standard deviation of horizontal positioning is no more than 1.5 m and that of vertical positioning is no more than 2.5 m, set the average value of horizontal and vertical positioning results as the fixed base station coordinates.</p> <p>The base station coordinates are automatically set in this mode.</p> <p>Restarting the receiver triggers a new calculation and repositioning.</p>

<b>mode base lat lon height</b>	<p>Set datum coordinates manually: latitude, longitude, height.</p> <p>Datum coordinates are fixed, when restarting the receiver. For example,</p> <p>lat=40.07898324818, lon=116.23660197714,</p> <p>height=60.4265</p> <p>Note: Longitude and latitude can be obtained by GGA command.</p> <p>The Southern Hemisphere corresponds to a negative latitude value;</p> <p>The Western Hemisphere corresponds to a negative longitude value</p>
<b>mode base</b>	<p>Set the default base station mode</p>

Command Name	Description
<b>mode movingbase</b>	Set the moving base station mode
<b>mode rover</b>	Set the default rover station mode (This command transfers the receiver from base station mode to rover mode.)
<b>rtcm1033 comx 10</b> <b>rtcm1006 comx 10</b> <b>rtcm1074 comx 1</b> <b>rtcm1124 comx 1</b> <b>rtcm1084 comx 1</b> <b>rtcm1094 comx 1</b>	Set base station to transmit RTCM messages to rover receivers via CMOX, ICMOX, and NCMOX.  The serial port CMOX can be assigned as COM1, COM2, COM3.
<b>NMEA0183 Messages Associated</b>	
<b>gpgga comx 1</b>	Set GGA message output rate at 1Hz.  Users can choose the message type and update rate. 1, 0.5, 0.2, 0.1 corresponds to the frequency 1Hz, 2Hz, 5Hz, 10Hz respectively.  The optional message types are: GGA, RMC, VTG, ZDA, NTR
<b>gphdt comx 1</b>	Output the heading message HDT of the present instant. Vessel Heading message types include HDT and TRA

### RTK Reference Station Configuration

- If the precise coordinates are known, the precise coordinates could be set as in this example
- Mode base 40.07898324818 116.23660197714 60.4265 // set lat lon height rtcm1033 com2 10 // RTCM1033 input from com2 rtcm1006 com2 10
- rtcm1006 com2 10
- rtcm1074 com2 1
- rtcm1084 com2 1

- rtm1094 com2 1
- rtm1124 com2 1
- save config

#### **If precise coordinates are unknown:**

- Mode base time 60 1.5 2.0 // 60 seconds position average
- rtm1033 com2 10
- rtm1006 com2 10
- rtm1074 com2 1
- rtm1084 com2 1
- rtm1094 com2 1
- rtm1124 com2 1
- saveconfig

#### **RTK Rover Configuration**

- RTK Rover stations (rover station) receive differential correction data sent from reference stations and receive satellite signals to provide an RTK positioning solution and realize RTK high-precision positioning with cm or mm-level accuracy. Common instructions for configuring RTK rover are as follows:
- gngga 1
- saveconfig

#### **Moving Base Configuration**

- RTK reference station provides precisely known coordinates of a fixed station. Unlike the RTK reference station, moving base station is in motion, at the same time receives the satellite information, and sends it to the rover station receiver (to be determined) directly or after processing. The rover station receiver receives satellite observations as well as information from the moving base station, to make relative positioning and determine the position of the rover station. Commonly used instructions to set the moving base station are as follows:
- Mode movingbase
- rtm1006 com2 1
- rtm1074 com2 1
- rtm1084 com2 1
- rtm1094 com2 1
- rtm1124 com2 1
- saveconfig

#### **Heading Configuration**

- GNSS heading refers to the clockwise angle between true North and the baseline vector constituted by the two GNSS antennas. Commonly used instructions are as follows:
- Mode heading

- gphdt com1 1
- saveconfig

### Antenna Detection1

- The UM4B0 module offers antenna open/short detection. The corresponding pins are ANT\_NLOAD and ANT\_FFLG

Ant_Nlod	Ant_Fflg	Status	Status Description
1	1	On	Normal
0	1	Off	Open
1	0	Short	Short
0	0	RSV	RSV

- The current monitoring chip outputs 2 bit high and low voltage; the software portion sets 2 bit IO of corresponding NII as input pull-up, and then queries the status of 2 bit IO to check the antenna state.
- If ANT\_PWR malfunctions, the query result is invalid.
- If the antenna is not fed by ANT\_PWR but by other means, the query result is invalid.

### Firmware Upgrade

- Uprecise software is used for the remote update of UM4B0. Please follow the steps below to upgrade the device:

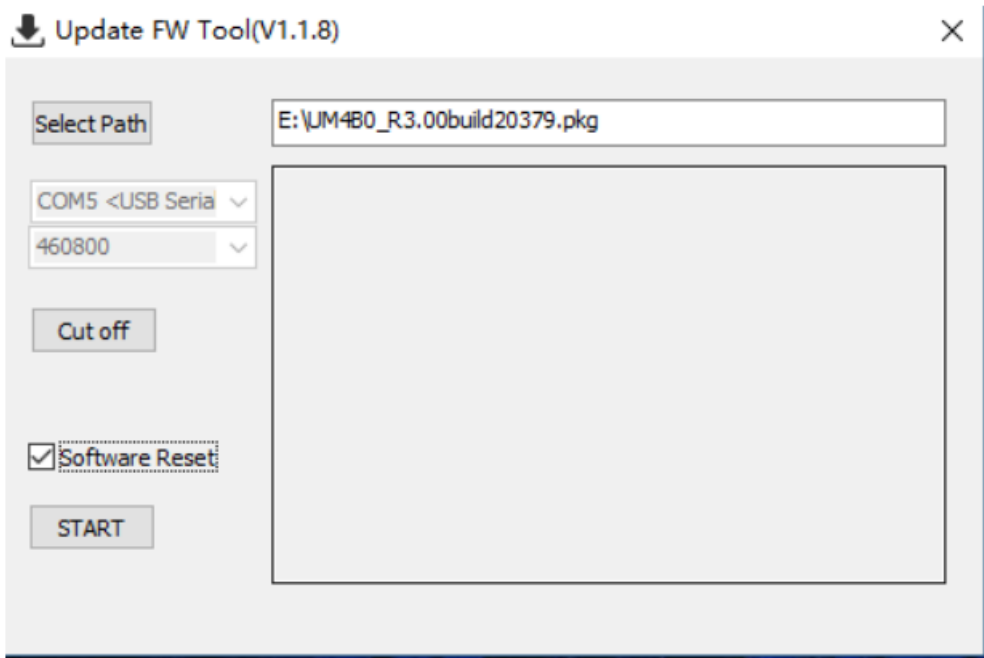
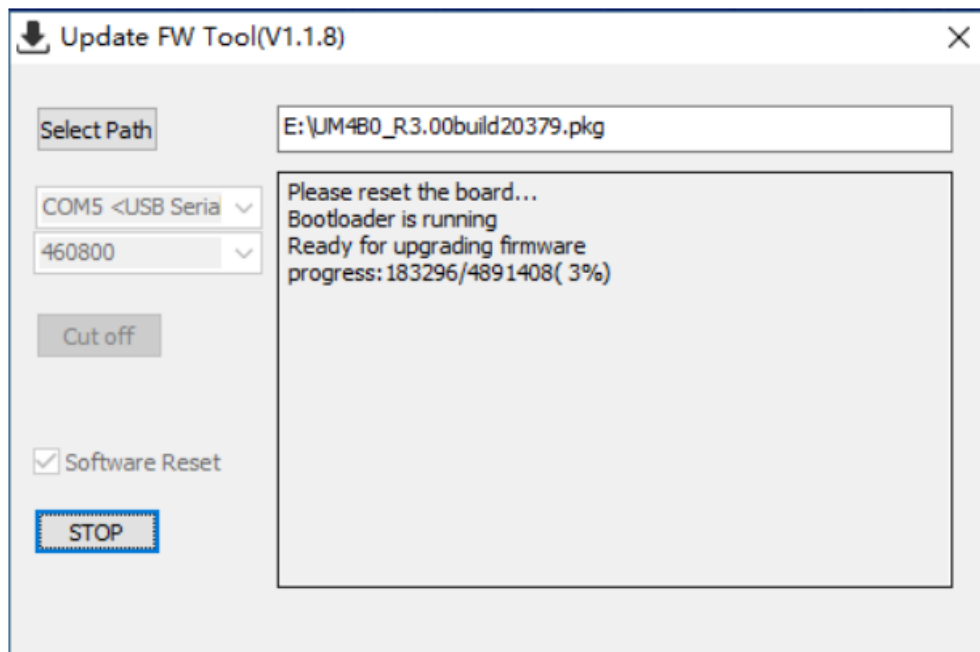


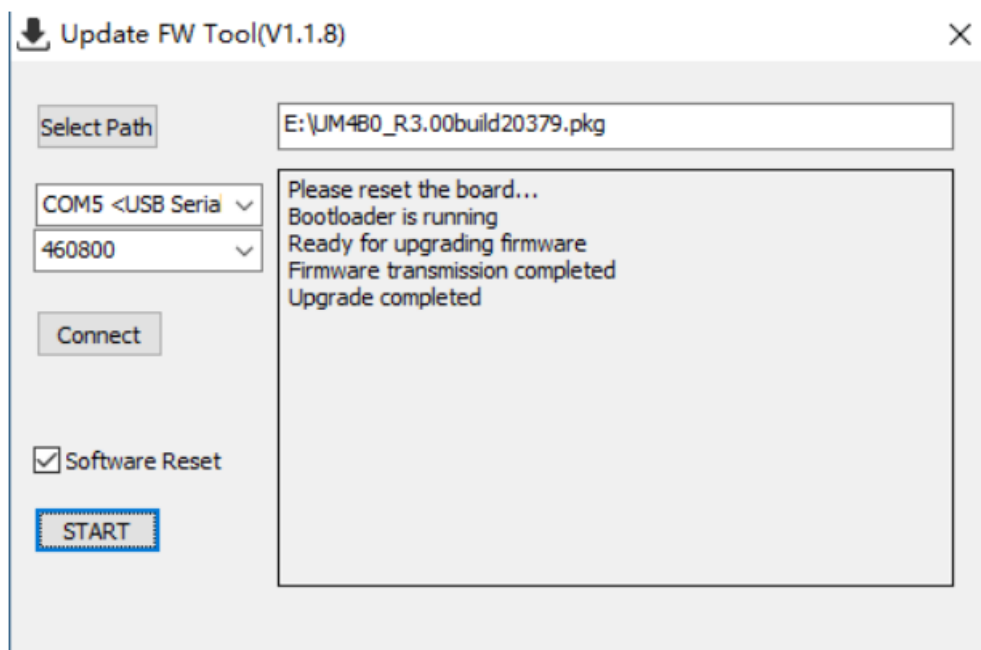
Figure 7-1 Update Interface

- Click “...” to browse the firmware update package, and click “Start” to start the firmware upgrading process (uncheck software reset):



**Figure 7-2 Update Steps**

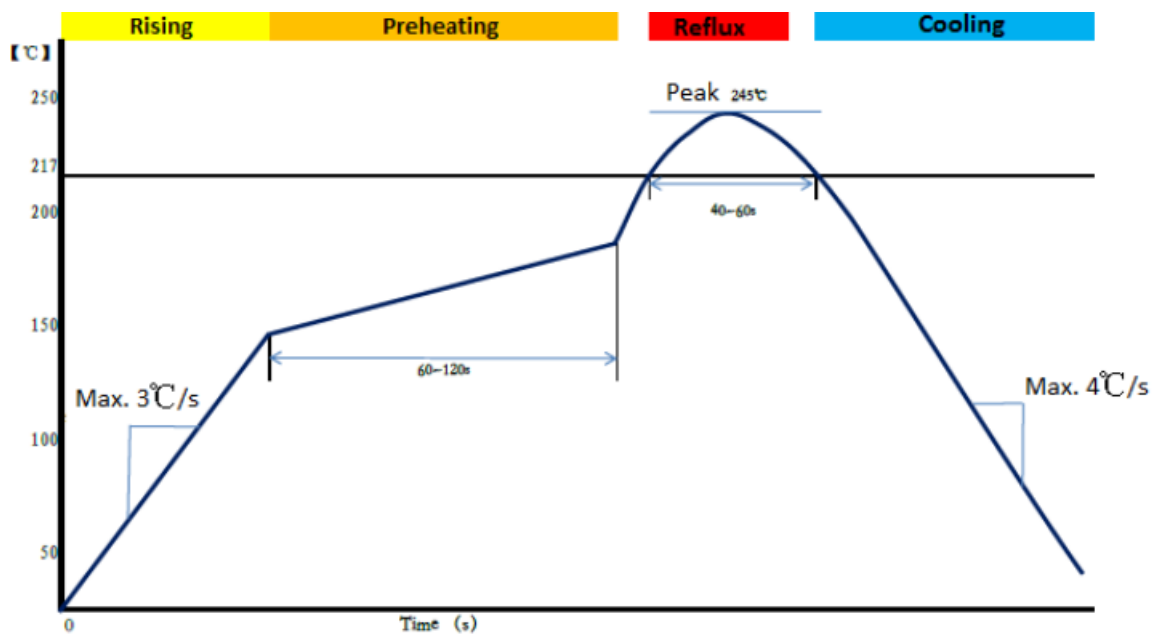
- Waiting for the process to complete 100% (the upgrade time is normally within 5min):



**Figure 7-3 Update Steps**

## Production Requirement

- Recommended thermal cycle curve is as follows:



**Figure 8-1 Soldering Temperature**

- Temperature rising stage
- **Rising slope:** Max. 3°C/s
- Rising temperature range: 50°C-150°C

#### **Preheating stage**

- Preheating time: 60 – 120 s
- Preheating temperature range: 150 – 180°C

#### **Reflux Stage**

- Over melting temperature (217°C) time: 40 – 60 s
- Peak temperature: no higher than 245°C

#### **Cooling Stage**

- Cooling slope: Max. 4°C / s

#### **Notes:**

- In order to prevent fall off during soldering of modules, please avoid soldering the module in the back of the Board during design, that is, better not go through soldering cycle twice.
- The setting of temperature depends on many factors, such as type of Board, solder paste type, solder paste thickness, etc. Please also refer to the relevant IPC standards and indicators for solder paste.
- Since the lead-free soldering temperatures are relatively low, if using this soldering method, please give priority to other components on the Board.

#### **Packaging**

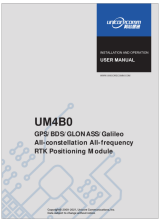
- UM4B0 modules are delivered in trays, which is suitable for mainstream SMT equipment. Each box contains 5 trays, so there are 150 UM4B0 modules in the box.

**Table 9-1 Package Information**

No	Description
1	10 trays/box
2	10 antistatic packaging boxes/tray
3	1 UM4B0/antistatic packaging box

- Hexinxing Technology (Beijing) Co., Ltd.
- Unicore Communications, Inc.
- 3rd Floor, Beidouxingtong Building, No. 7 Fengxian East Road, Haidian District, Beijing
- F3, No.7, Fengxian East Road, Haidian, Beijing, P.R.China, 100094
- [www.unicorecomm.com](http://www.unicorecomm.com)
- Phone: 86-10-69939800
- Fax: 86-10-69939888
- [info@unicorecomm.com](mailto:info@unicorecomm.com)
- [www.unicorecomm.com](http://www.unicorecomm.com)

## Documents / Resources

	<p><a href="#">unicorecomm UM4B0 High Precision GNSS Module</a> [pdf] User Manual</p> <p>UM4B0 High Precision GNSS Module, UM4B0, High Precision GNSS Module, Precision GNSS Module, GNSS Module</p>
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## References

-  [-200](#)
-  [- OEM](#)