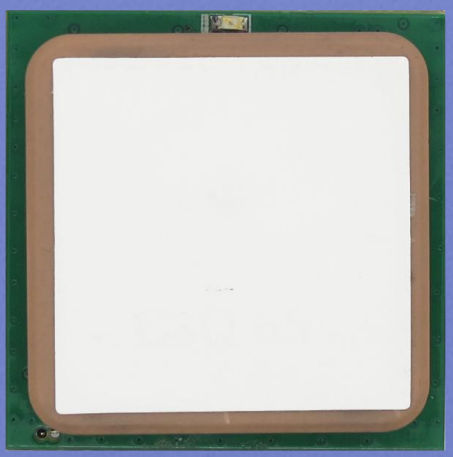
Data Sheet

VK2828U7G5LF

V1.0

G-Mouse



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G-MOUSE

Contents

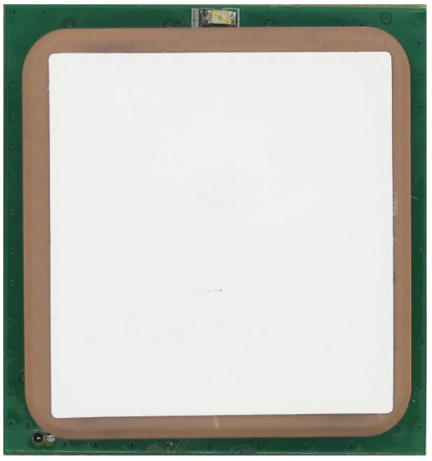
G-MOUSE

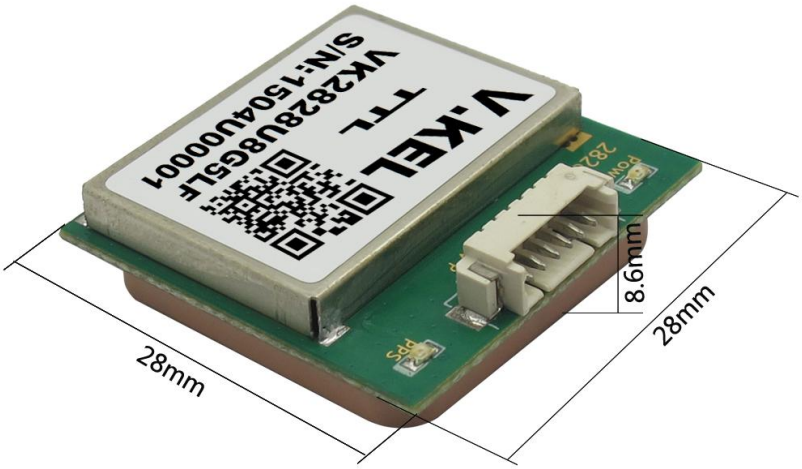
1. Introduction of VK2828U7G5LF

1.1 Features

- Industry standard GPS antenna of 25 * 25 * 4mm, with high sensitivity
- Optional interface: UART/TTL, RS232
- High-precision TCXO of KDS 0.5PPM
- Built-in SQI flash to set the parameters as required
- Built-in RTC crystal and capacitors to start quickly
- Built-in LNA
- Optional frequency of data refreshing: 1Hz-10Hz
- Supports A-GPS service: Assist Now Online and Assist Now Offline
- Hybrid engine: GPS, GALILEO, SBAS (WAAS, EGNOS, MSAS, GAGAN)

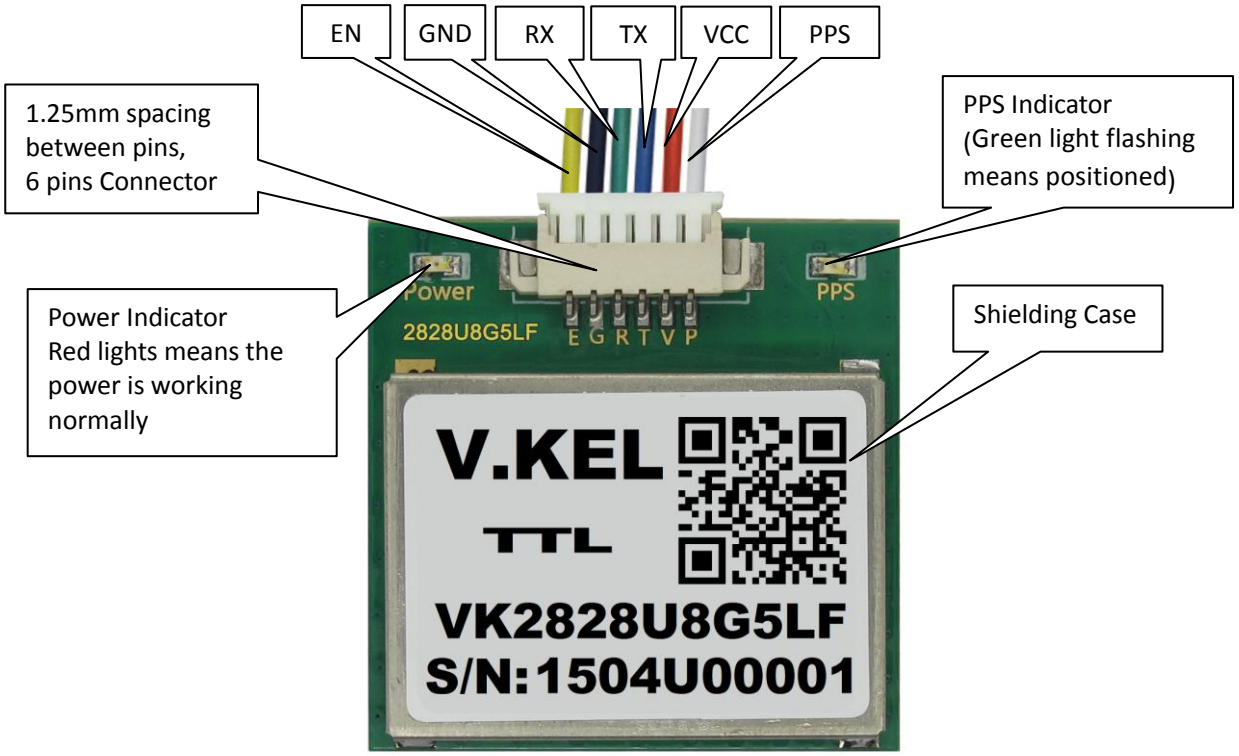
1.2 Appearance and Size





G-MOUSE

1.3 Pins



Pins' Definition

Name	Function Description
PPS	Output time pulses (pulses per second)
VCC	The main power supply is +3.3V~+5V, and the power consumption is 50mA in one hour
TX	UART/TTL interface, and RS232_TXD is optional
RX	UART/TTL interface, and RS232_RXD is optional
GND	Connect to the ground
EN	Power Enable: high level means the module works, low level means the modules is closed.

2. Working Conditions

2.1 Normal Working Requirements

Parameters	Min	Norm	Max	Unit
Voltage	3.3	5	5.5	V
Working Temperature	-40	--	+85	℃
Current	25	30	35	mA
Storage Temperature	-40	--	+85	℃

2.2 RTC Power Requirements

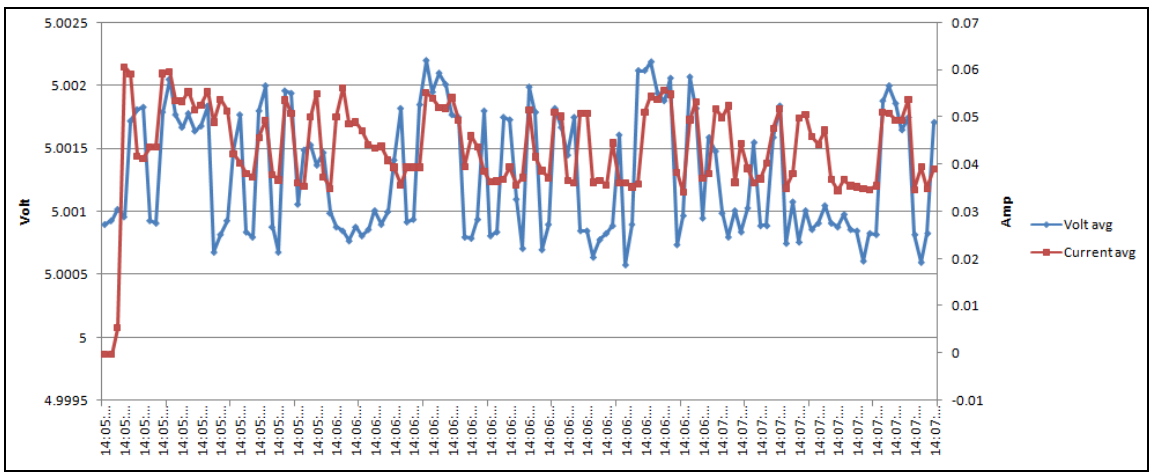
The RTC power is built in the module, and its endurance is 2 hours.

Parameters	Min	Norm	Max	Unit
RTC Voltage	1.8	3.0	3.6	V
Current Consumption	--	15	--	uA

2.3 Digital Interface Level Requirements

Parameters	Min	Norm	Max	Unit
High Level (Input)	2.0	2.8	3.3	V
Low Level (Input)	--	--	0.8	V
High Level (Output)	2.4	2.8	3.3	V
Low Level (Output)	--	--	0.4	V

2.4 Transient Current Chart

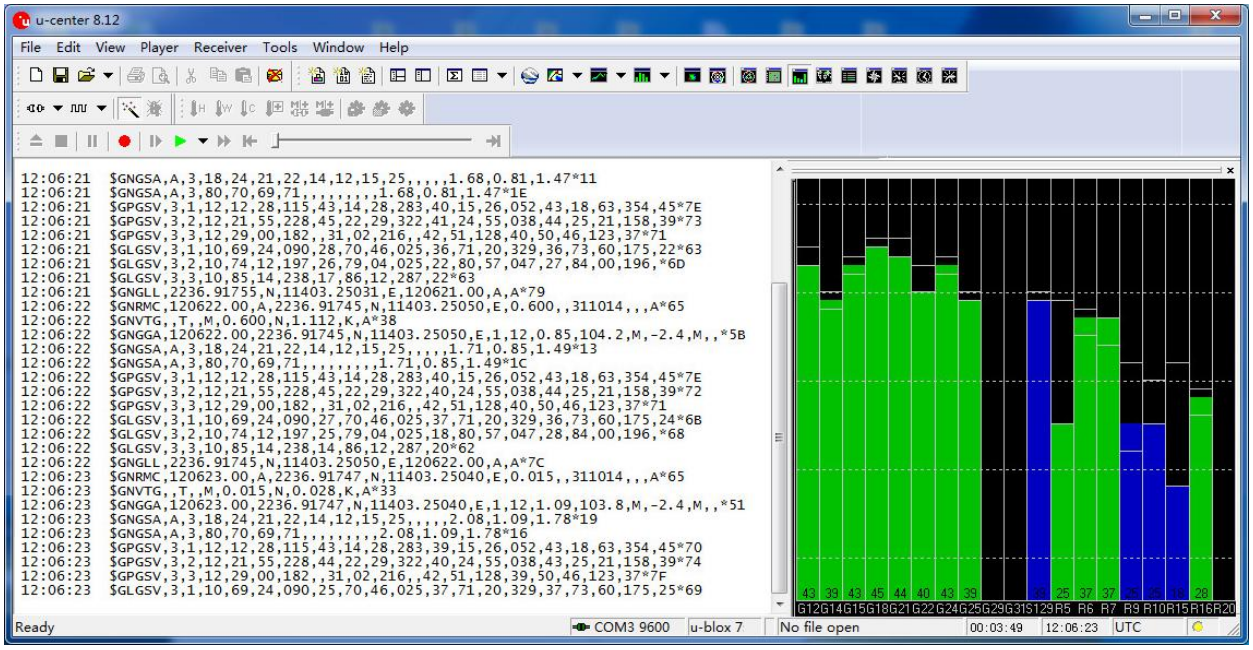


3. Technical Parameters

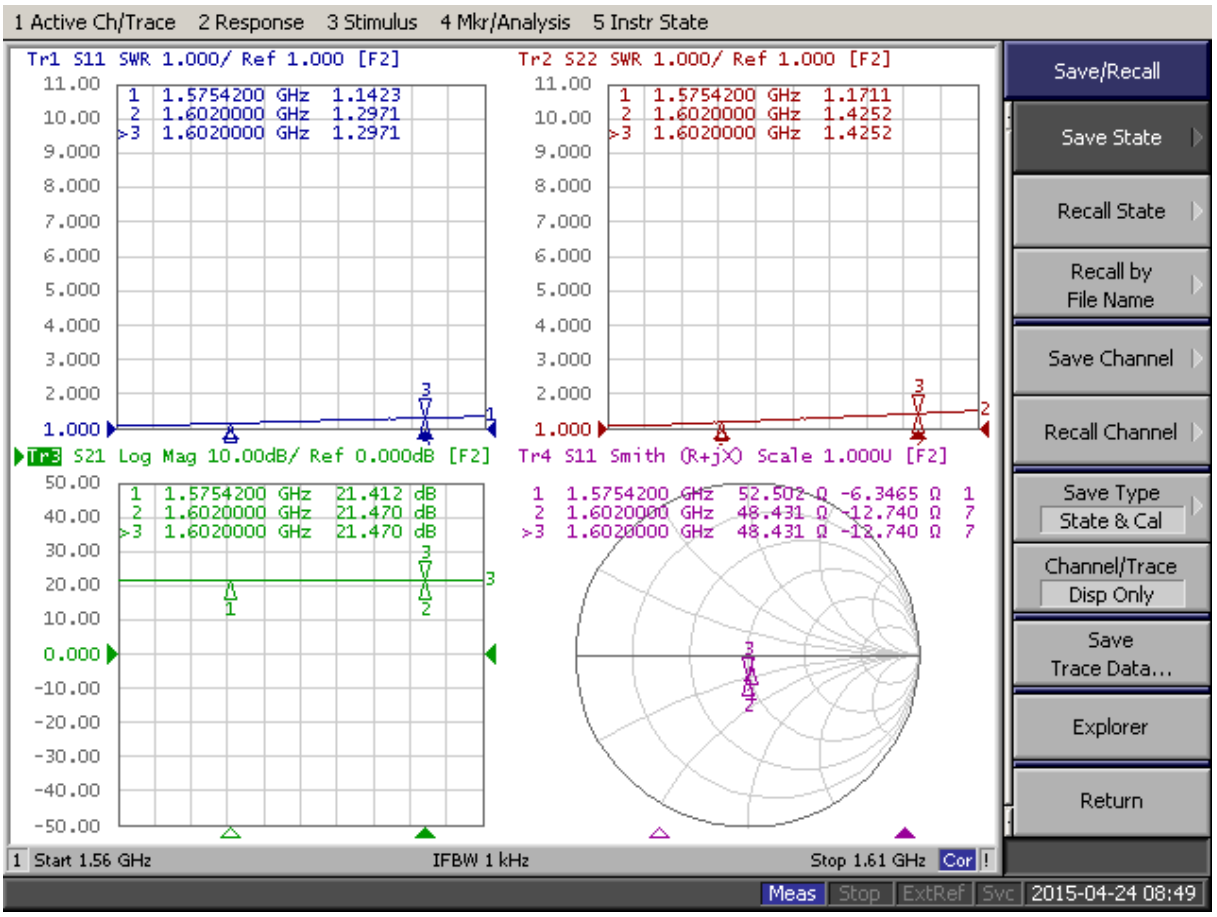
Module Property	
Chip	UBX-M8030-KT
C/A (Data Rate)	1.023MHz
Receiving Frequency	L 1 [1575.42MHz]
Receiving Channel	56
S11 SWR	≦1.3
S11 SWR	≦1.3
S21 Log Mag	≥20db
S11 Smith	50Ω±5%
Positioning Property	
Horizontal Position	Autonomous<2.5m on average, SBAS < 2.0m on average
Speed	<0.1m/s
Direction	<0.5 degrees
Timing Accuracy	30ns
Coordinate System	WGS-84
Max Height	50km
Max Speed	500m/s
Accelerate	≦4G
Electrical Property	
Sensitivity	Tracking:-162dBm Capturing:-160dBm Cold Start:-148dBm
Cold Start	26 seconds on average
Warm Start	24 seconds on average
Hot Start	1 second on average
A-GPS	3 seconds
Optional data baud	9600bps(by default) [optional: 1200,2400,4800, 19200, 38400, 57600, 115200, 230400,460800,921600]
Optional output code	NMEA 0183 V3.0(GGA, GSA, GSV, RMC, VTG, GLL)
Working Environment	-40℃ to 85℃
Other Parameters	
Clock Pulse	0.25-1KHz
Updating Frequency	1-10 Hz
UART/TTL	YES
RS232	Optional

4. Signal Testing and RF Property

4.1 GPS Signal Testing



4.2 RF Property



5. NMEA0183 Protocols

- NMEA 0183 output

GGA: time, position, position type

GLL: latitude, longitude, UTC

GSA: GPS receiver operating mod, satellites for positioning, DOP value

GSV: Available GPS satellites information, azimuth, elevation, SNR

RMC: time, date, position, speed

VTG: the speed information on ground

MSS: signal strength

Note: the output information and frequency are determined by your setting.

- Examples

$GPGGA,060556.00,2236.91418,N,11403.24669,E,2,08,1.02,115.1,M,-2.4,M,,0000*43

$GPGLL, 2236.91418, N, 11403.24669, E, 060556.00, A, D*64

$GPGSA,A,3,24,22,14,12,15,25,18,42,,,,,2.20,1.02,1.95*00

$GPGSV,3,1,11,12,31,118,39,14,30,289,44,15,20,059,41,18,68,007,43*75

$GPGSV,3,2,11,21,48,208,,22,39,325,46,24,46,036,44,25,23,160,31*73

$GPGSV,3,3,11,31,03,218,,42,51,128,35,50,46,122,36*4F

$GPRMC,060556.00,A,2236.91418,N,11403.24669,E,0.13, 309.62,130214,,,D*7F

$GPVTG, 309.62, T, M, 0.13, N, 0.2, K*6E

5.1 GGA

Example: $GPGGA,060556.00,2236.91418,N,11403.24669,E,2,08,1.02,115.1,M,-2.4,M,,0000*43

Name	Example	Unit	Description
Message ID	$GPGGA		GGA protocol head
UTC	060556.00		hhmmss.ss
latitude	2236.91418		ddmm.mmmmm
N/S direction	N		N=North, S=South
longitude	11403.24669		dddmm.mmmmm
E/W direction	E		W=West, E=East
Position direction	2		0: not position 1:SPS mode, valid position 2: Differentia, SPS mode, valid position 3: PPS mode, valid position
Number of satellites	08		Range: 0-12
HDOP	1.02		Horizontal accuracy
MSL amplitude	115.2	meter	-
Unit	M	meter	
Ground	-2.4	meter	-
Unit	M		-
Differentiated time		second	Invalid as there is no DGPS
Differentiated ID	0000		
Checksum	*43		
<CR><LF>			Message ends

5.2 GLL

Example: $GPGLL,2236.91418,N,11403.24669,E,060556.00,A,D*64

Name	Example	Unit	Description
Message ID	$GPGLL		GLL protocol head
latitude	2236.91418		ddmm.mmmmm
N/S direction	N		N=North, S=South
longitude	11403.24669		dddmm.mmmmm
E/W direction	E		W=West, E=East
UTC	060556.00		hhmmss.ss
Status	A		A=Valid data, V=Invalid data
Checksum	D*64		
<CR><LF>			Message ends

5.3 GSA

Example: $GPGSA,A,3,24,22,14,12,15,25,18,42,,,,,2.20,1.02,1.95*00

Name	Example	Unit	Description
Message ID	$GPGSA		GSA protocol head
Mode 1	A		M=Manually (in 2D/3D positioning mode) A=Automatically
Mode 2	3		1: invalid position 2: 2D positioning 3: 3D positioning
Satellite using	24		Channel 1
Satellite using	22		Channel 2
…	…	…	…
Satellite using			Channel 12
PDOP	2.20		Positioning accuracy
HDOP	1.2		Horizontal accuracy
VDOP	1.95		Vertical accuracy
Checksum	*00		
<CR><LF>			Message ends

5.4 GSV

Examples: $GPGSV,3,1,11,12,31,118,39,14,30,289,44,15,20,059,41,18,68,007,43*75

$GPGSV,3,2,11,21,48,208,,22,39,325,46,24,46,036,44,25,23,160,31*73

$GPGSV,3,3,11,31,03,218,,42,51,128,35,50,46,122,36*4F

Name	Example	Unit	Description
Message ID	$GPGSV		GSV protocol head
Message amount	3		Range: 1-3
Message NO.	1		Range: 1-3
Satellites NO.	11		
Satellites ID	12		Range: 1-32
Elevation	31	degree	The maximum is 90
Azimuth	118	degree	Range:0-359
CNR (C/No)	39	dBHz	Range: 0-99; Null means there is no positioning
Satellites ID	14		Range: 1-32
Elevation	30	degree	The maximum is 90
Azimuth	289	degree	Range: 0-359
CNR (C/No)	44	dBHz	Range: 0-99; Null means there is no positioning
Satellites ID	15		Range: 1-32
Elevation	20	degree	The maximum is 90
Azimuth	059	degree	Range:0-359
CNR (C/No)	41	dBHz	Range: 0-99; Null means there is no positioning
Satellites ID	18		Range: 1-32
Elevation	68	degree	The maximum is 90
Azimuth	007	degree	Range:0-359
CNR (C/No)	43	dBHz	Range: 0-99; Null means there is no positioning
Checksum	*75		
<CR><LF>			Message ends

5.5 RMC

Example: $GPRMC,060556.00,A,2236.91418,N,11403.24669,E,0.13, 309.62,130214,,,D*7F

Name	Example	Unit	Description
Message ID	$GPRMC		RMC protocol head
UTC	060556.00		hhmmss.ss
Status	A		A=Valid data, V=Invalid data
latitude	2236.91418		ddmm.mmmmm
N/S direction	N		N=North, S=South
longitude	11403.24669		dddmm.mmmmm
E/W direction	E		W=West, E=East
Speed on the ground	0.13	Knot	
Direction	309.62	Degree	
Date	130214		ddmmyy
Magnetic variable			-
Checksum	*7F		
<CR><LF>			Message ends

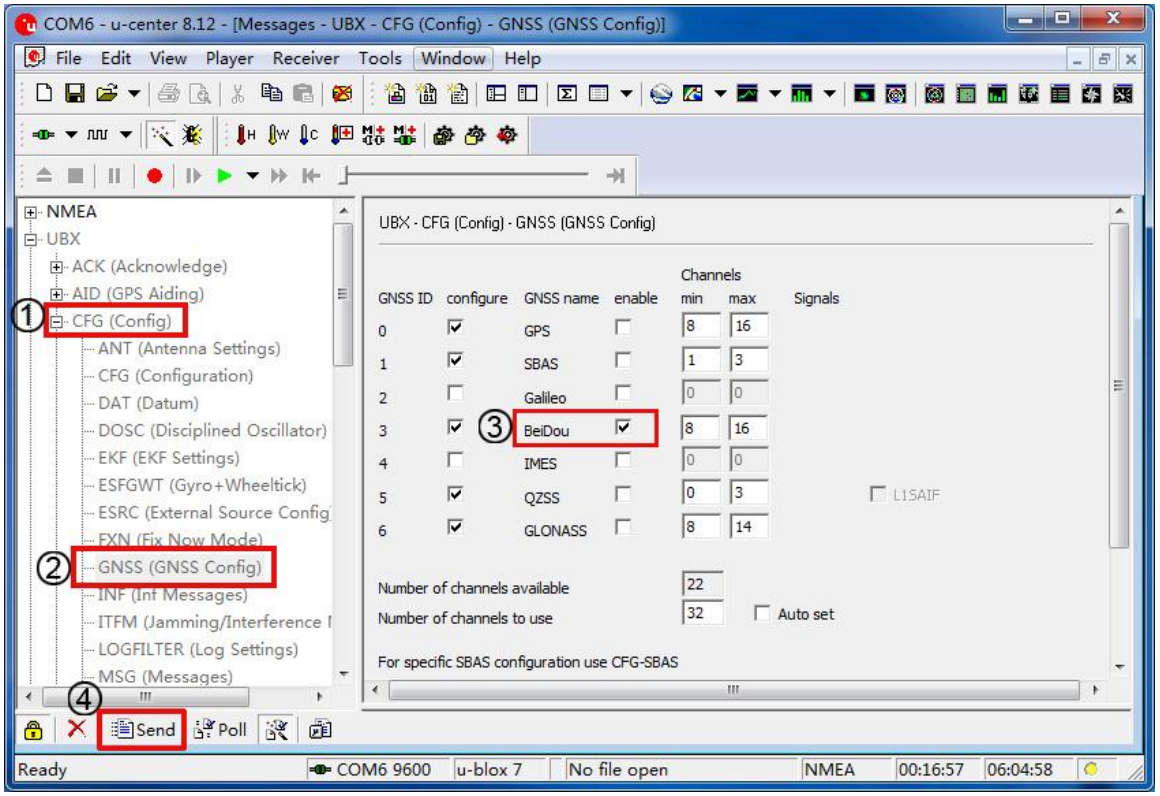
5.6 VTG

Example: $GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

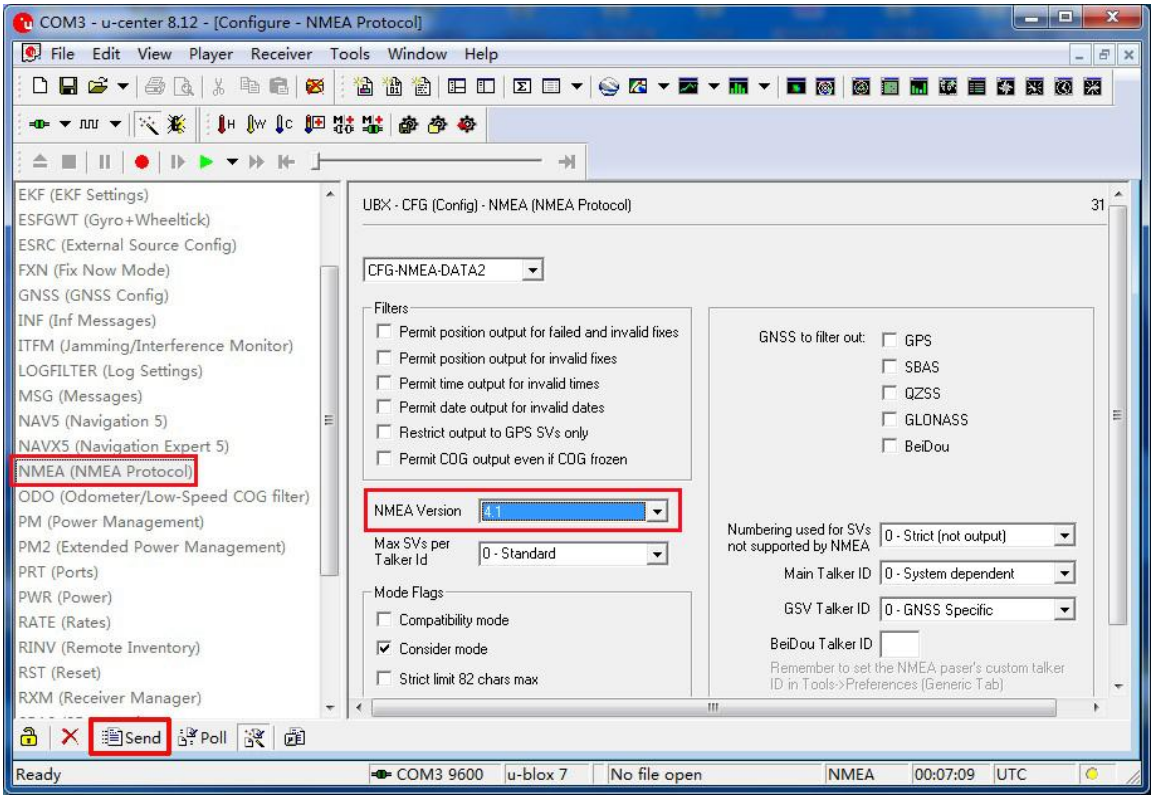
Name	Example	Unit	Description
Message ID	$GPVTG		VTG protocol head
Direction	309.62	Degree	
Reference	T		True North
Direction	309.62	Degree	
Reference	M		Magnetic
Speed	0.13	Knot	
Unit	N		Knot
Speed	0.2	Km/h	
Unit	K		Km/h
Checksum	*10		
<CR><LF>			Message ends

6. GPS/GLONASS and BeiDou Switching

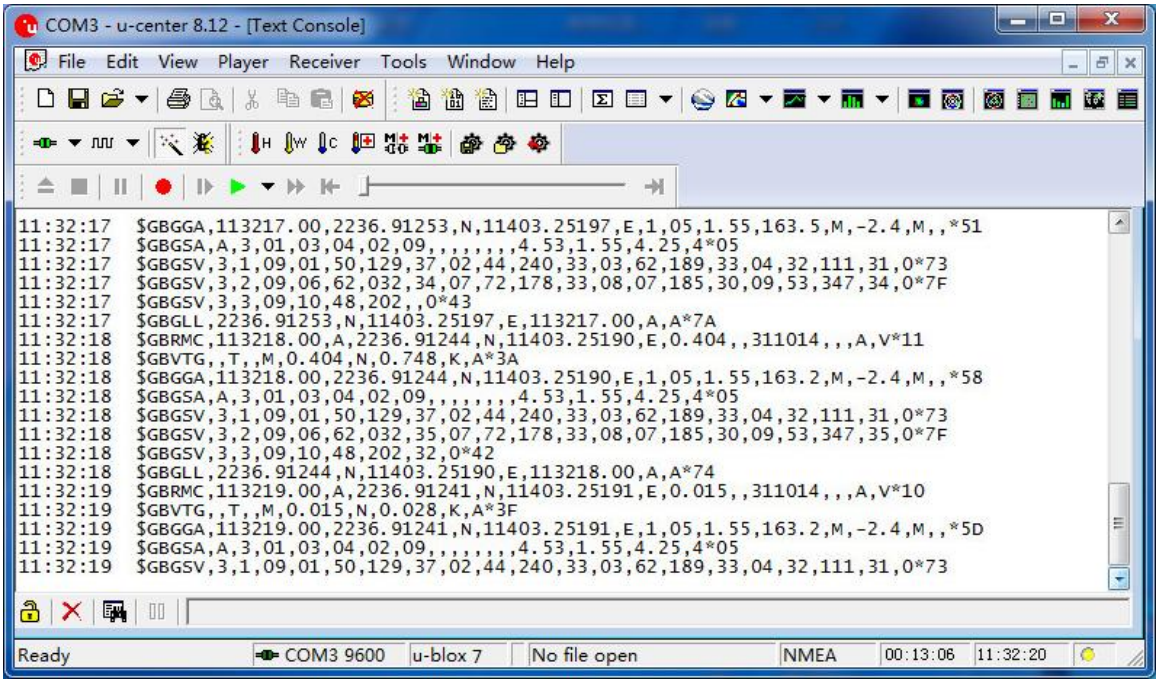
It is the data of GPS/GLONASS protocol outputting from the module by default. You can modify to the BeiDou protocol though the testing software. The steps are shown in the following figures.



Select “NMEA(NMEA Protocol) “ and set the NEMA Version to “4.1”, and then click [Send] to save this modification.



The $GB indicates that the data meets BeiDou protocol.



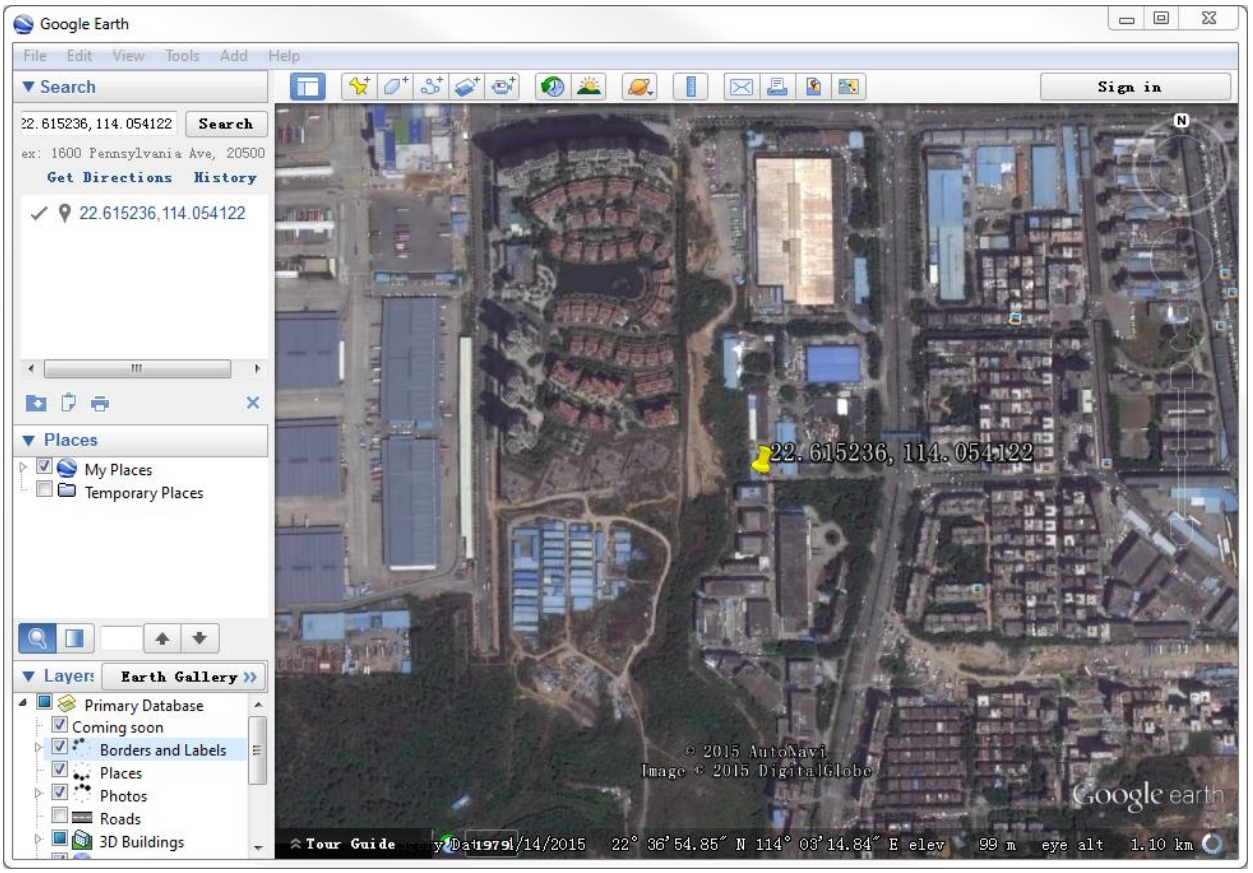
7. Longitude and Latitude Switching

$GPRMC,060556.00,A,2236.91418,N,11403.24669,E,0.034,,130214,,,D*7F

	please input		Results
Longitude (GPS)	11403.2467	The reults	114.054112
Latitude (GPS)	2236.9142	The reults	22.615236

Basis for calculation: abcde.fghi
abd+(de/60)+(fghi/600000)

Input the results in “Google Earth” and search, you can get the detailed position information.



8. Protocols for Setting U-blox Parameters

You can send commands through serial port to modify the settings. The HEX must be selected when you send commands through the serial port of PC software.
It will cost 300ms to start the U-blox for the first time. Please send the following commands to set the parameters after it starts.

8.1 Disable Outputting Commands

24 45 49 47 50 51 2c 44 54 4d 2a 33 42 0d 0a b5 62 06 01 03 00 f0 0a 00 04 23 -> Disable GPDTM

24 45 49 47 50 51 2c 47 42 53 2a 33 30 0d 0a b5 62 06 01 03 00 f0 09 00 03 21 -> Disable GPGBS

24 45 49 47 50 51 2c 47 47 41 2a 32 37 0d 0a b5 62 06 01 03 00 f0 00 00 fa 0f -> Disable GPGGA

24 45 49 47 50 51 2c 47 4c 4c 2a 32 31 0d 0a b5 62 06 01 03 00 f0 01 00 fb 11 -> Disable GPGLL

24 45 49 47 50 51 2c 47 52 53 2a 32 30 0d 0a b5 62 06 01 03 00 f0 06 00 00 1b -> Disable GPGRS

24 45 49 47 50 51 2c 47 53 41 2a 33 33 0d 0a b5 62 06 01 03 00 f0 02 00 fc 13 -> Disable GPGSA

24 45 49 47 50 51 2c 47 53 54 2a 32 36 0d 0a b5 62 06 01 03 00 f0 07 00 01 1d -> Disable GPGST

24 45 49 47 50 51 2c 47 53 56 2a 32 34 0d 0a b5 62 06 01 03 00 f0 03 00 fd 15 -> Disable GPGSV

24 45 49 47 50 51 2c 52 4d 43 2a 33 41 0d 0a b5 62 06 01 03 00 f0 04 00 fe 17 -> Disable GPRMC

24 45 49 47 50 51 2c 56 54 47 2a 32 33 0d 0a b5 62 06 01 03 00 f0 05 00 ff 19 -> Disable GPVTG

24 45 49 47 50 51 2c 5a 44 41 2a 33 39 0d 0a b5 62 06 01 03 00 f0 08 00 02 1f -> Disable GPZDA

8.2 Enable Outputting Commands

24 45 49 47 50 51 2c 44 54 4d 2a 33 42 0d 0a b5 62 06 01 03 00 f0 0a 01 05 24 -> Enable GPDTM

24 45 49 47 50 51 2c 47 42 53 2a 33 30 0d 0a b5 62 06 01 03 00 f0 09 01 04 22 -> Enable GPGBS

24 45 49 47 50 51 2c 47 47 41 2a 32 37 0d 0a b5 62 06 01 03 00 f0 00 01 fb 10 -> Enable GPGGA

24 45 49 47 50 51 2c 47 4c 4c 2a 32 31 0d 0a b5 62 06 01 03 00 f0 01 01 fc 12 -> Enable GPGLL

24 45 49 47 50 51 2c 47 52 53 2a 32 30 0d 0a b5 62 06 01 03 00 f0 06 01 01 1c -> Enable GPGRS

24 45 49 47 50 51 2c 47 53 41 2a 33 33 0d 0a b5 62 06 01 03 00 f0 02 01 fd 14 -> Enable GPGSA

24 45 49 47 50 51 2c 47 53 54 2a 32 36 0d 0a b5 62 06 01 03 00 f0 07 01 02 1e -> Enable GPGST

24 45 49 47 50 51 2c 47 53 56 2a 32 34 0d 0a b5 62 06 01 03 00 f0 03 01 fe 16 -> Enable GPGSV

24 45 49 47 50 51 2c 52 4d 43 2a 33 41 0d 0a b5 62 06 01 03 00 f0 04 01 ff 18 -> Enable GPRMC

24 45 49 47 50 51 2c 56 54 47 2a 32 33 0d 0a b5 62 06 01 03 00 f0 05 01 00 1a -> Enable GPVTG

24 45 49 47 50 51 2c 5a 44 41 2a 33 39 0d 0a b5 62 06 01 03 00 f0 08 01 03 20 -> Enable GPZDA

8.3 Set Baud Rate

- Set baud rate to 4800

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 c0 12 00 00 07 00 07 00 00 00 00 00 d3 fc b5 62 06 00 01 00 01 08 22

- Set baud rate to 9600

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 80 25 00 00 07 00 07 00 00 00 00 00 a6 cd b5 62 06 00 01 00 01 08 22

- Set baud rate to 38400

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 00 96 00 00 07 00 07 00 00 00 00 00 97 a8

- Set baud rate to 115200

b5 62 06 00 14 00 01 00 00 00 d0 08 00 00 00 c2 01 00 07 00 07 00 00 00 00 00 c4 96 b5 62 06 00 01 00 01 08 22

8.4 Set Outputting Rate

1HZ (1 output per second)
B5 62 06 08 06 00 E8 03 01 00 01 00 01 39

5Hz (5 outputs per second)
B5 62 06 08 06 00 C8 00 01 00 01 00 DE 6A B5 62 06 08 00 00 0E 30

10Hz (10 outputs per second)
B5 62 06 08 06 00 64 00 01 00 01 00 7A 12 B5 62 06 08 00 00 0E 30

0.33Hz (1 output per 3 seconds)
B5 62 06 08 06 00 B8 0B 01 00 01 00 D9 41 B5 62 06 08 00 00 0E 30

0.2Hz (1 output per 5 seconds)
B5 62 06 08 06 00 88 13 01 00 01 00 B1 49 B5 62 06 08 00 00 0E 30

0.1Hz (1 output per 10 seconds)
B5 62 06 08 06 00 10 27 01 00 01 00 4D DD B5 62 06 08 00 00 0E 30

0.05Hz (1 output per 20 seconds)
B5 62 06 08 06 00 20 4E 01 00 01 00 84 00 B5 62 06 08 00 00 0E 30

8.5 Other Settings

- Reset

B5 62 06 04 04 00 FF 87 01 00 95 F7

- Cold Start

B5 62 06 04 04 00 FF FF 02 00 0E 61

- Hot Start

B5 62 06 04 04 00 00 00 02 00 10 68

- Reset to Manufacturer Defaults

B5 62 06 09 0D 00 FF FF 00 00 00 00 00 00 FF FF 00 00 07 1F 9E

- Enable the Sleeping Mode(Low Consumption Mode)

B5 62 06 04 04 00 00 00 08 00 16 74

Note: There is no data outputting in sleeping mode, but the module still keeps positioning. You can send the "Hot Start" commands to enable the real-time tracking mode.

- Save the changes

B5 62 06 09 0D 00 00 00 00 00 FF FF 00 00 00 00 00 00 17 31 BF

9. Packages

There are 50pcs in every pallet. The dimension of the pallet is shown in the following figure.