UART GPS NEO-7M-C User Manual

Features

- NEO-7M-C onboard, with high-gain active antenna
- IPX interface, for connecting different active antennas
- Chargeable backup battery, keeps the ephemeris data when power down, supports hot starts

Parameters

Receiver type:	56 channels, GPS L1(1575.42Mhz) C/A code, SBAS:WAAS/EGNOS/MSAS
Horizontal position accuracy:	2.5mCEP (SBAS:2.0mCEP)
Navigation update rate:	10Hz maximum (1HZ default)
Capture time:	Cool start: 27s (fastest)； Hot start: 1s
Tracking & Navigation sensitivity:	-162dBm
Communication protocol:	NMEA(default)/UBX Binary
Serial baud rate:	4800, 9600(default), 19200, 38400, 57600, 115200, 230400
Operating temperature:	-40℃ ~ 85℃
Operating voltage:	2.7V~5.0V(power supply input via VCC)
Operating current:	35mA
TXD/RXD impedance:	510Ohms

Applications

This module can be applied to navigator, aircraft positioning, etc.

Hardware

1. A computer with Windows XP/Win7/Win8 OS;
2. An USB to TTL serial module, such as FT232, PL2303, CP2102, etc. If there is a native serial port in the computer, a DB9 to TTL serial module may be used;
3. A UART GPS NEO-7M-C module.

How to use

1. Connect the UART GPS NEO-7M-C module to a serial module. FT232 is applied as the serial module in this document.
   The connection between the GPS module and the serial module is listed as the table below.

UART GPS NEO-7M-C module pins	Serial module pins
VCC	3.3V/5V
GND	GND
TXD	RX
RXD	TX
PSS*	
* PPS should be connected to the clock pulse output (CPOUT) of a MCU. However, this pin is unconnected, in the case that the GPS module is connected to a computer.	

2. Connect the serial module to the computer.
3. Start the serial debugging assistant, and set the serial port as below:
   - Select the corresponding serial port in the PortNo option. In this example, COM8 is selected.
   - Baud rate: 9600(default).
   - 8 data bits, 1 stop bit, no parity and no flow control.
4. After finishing the settings, you can see the serial debugging assistant will show many data in its window, as the figure shows below.

```
$GPVTG,,,,,,,,,N*30
$GPGGA,014122.00,,,,,0,00,99.99,,,,,*62
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,02,21,29,321,,24,35,166,10*73
$GPGLL,,,,,014122.00,V,N*4E
$GPRMC,014123.00,V,,,,,,,060314,,,N*78
$GPVTG,,,,,,,,,N*30
$GPGGA,014123.00,,,,,0,00,99.99,,,,,*63
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,02,21,29,321,,24,35,166,26*76
$GPGLL,,,,,014123.00,V,N*4F
$GPRMC,014124.00,V,,,,,,,060314,,,N*7F
$GPVTG,,,,,,,,,N*30
$GPGGA,014124.00,,,,,0,00,99.99,,,,,*64
$GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30
$GPGSV,1,1,02,21,29,321,,24,35,166,*72
$GPGLL,,,,,014124.00,V,N*48
```

The data shown in the figure above means that the connection is established successfully, but it is unable to perform positioning.

In this case, please place the GPS module to the balcony or near the window, or outdoors for testing, because GPS is less stable in searching signal indoors.

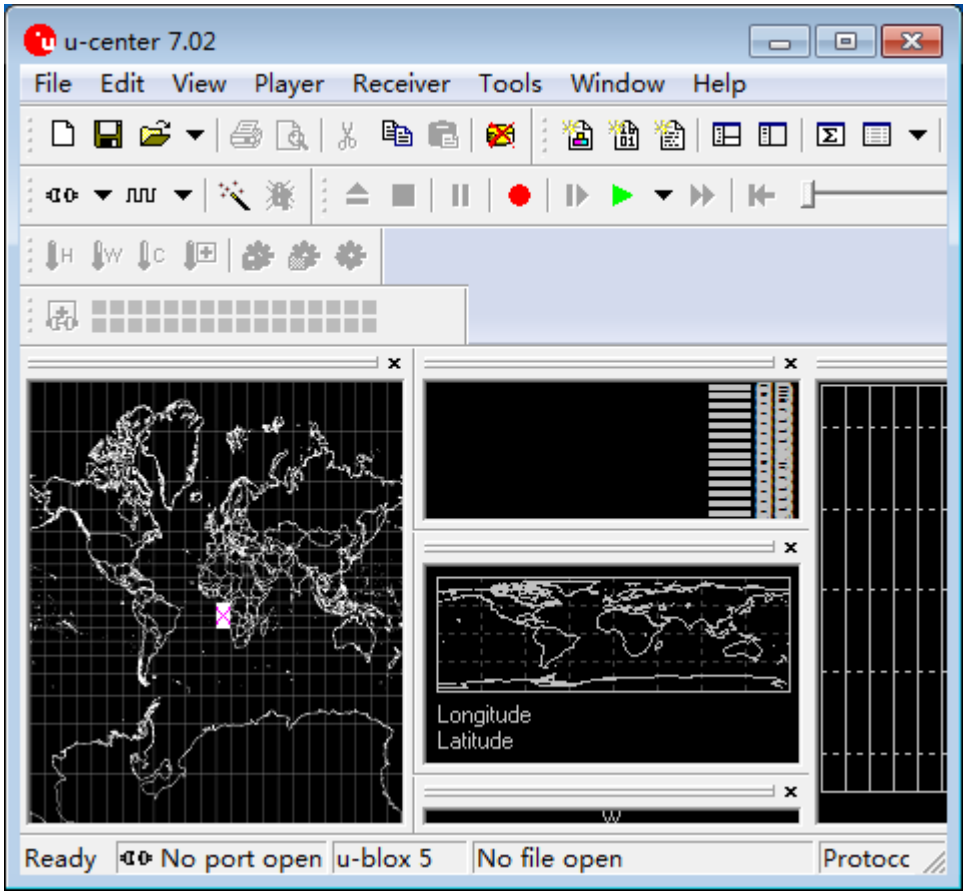
1. After waiting for a while, if the serial debugging assistant lists similar data in its window as the figure shows below, it means GPS has performed positioning. And you can see that the LED on the module, which remains on when GPS is unable to perform the positioning, is flickering now.

```
$GPGLL,2232.73995,N,11404.60273,E,030427.00,A,A*6B
$GPRMC,030428.00,A,2232.73995,N,11404.60275,E,0.037,,070314,,,A*7E
$GPVTG,,T,,M,0.037,N,0.069,K,A*28
$GPGGA,030428.00,2232.73995,N,11404.60275,E,1,07,1.17,122.5,M,-2.3,M,,*4F
$GPGSA,A,3,29,21,18,05,14,22,26,,,,,,2.12,1.17,1.77*00
$GPGSV,3,1,10,05,18,096,31,12,07,154,15,14,12,248,29,15,44,025,*7B
$GPGSV,3,2,10,18,38,325,43,21,61,296,41,22,09,304,31,24,70,114,*7D
$GPGSV,3,3,10,26,10,045,16,29,16,208,35*7B
$GPGLL,2232.73995,N,11404.60275,E,030428.00,A,A*62
$GPRMC,030429.00,A,2232.73994,N,11404.60277,E,0.017,,070314,,,A*7E
$GPVTG,,T,,M,0.017,N,0.031,K,A*27
$GPGGA,030429.00,2232.73994,N,11404.60277,E,1,07,1.17,122.7,M,-2.3,M,,*4F
$GPGSA,A,3,29,21,18,05,14,22,26,,,,,,2.12,1.17,1.77*00
$GPGSV,3,1,10,05,18,096,31,12,07,154,14,14,12,248,29,15,44,025,*7A
$GPGSV,3,2,10,18,38,325,43,21,61,296,41,22,09,304,31,24,70,114,21*7E
$GPGSV,3,3,10,26,10,045,14,29,16,208,35*79
$GPGLL,2232.73994,N,11404.60277,E,030429.00,A,A*60
```

Notice: For its first positioning after cold starts, GPS module normally takes 1-3 minutes to finishing this positioning successfully in the open air with a good weather. So, please be patient. Moreover, if there is a bad weather, it may take more time for positioning, or even unable to perform positioning sometimes.

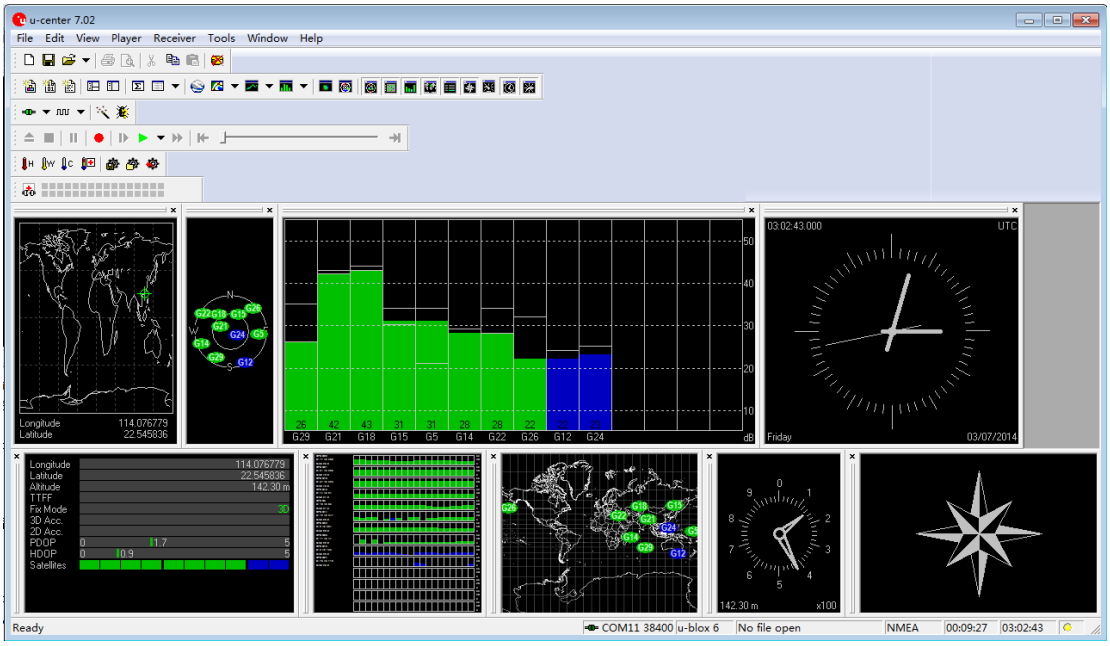
2. Install software\u-centersetup-7.0.2.1\u-centerSetup-7.0.2.1.exe (please ensure you computer is connected to Internet).

   Start the software, u-center, and you can see the interface as the figure shows below.



3. Click Receiver menu, and select Port option to configure the actual serial port number and Baud rate: 9600.

   Click the button  to connect to the UART GPS NEO-7M-C module. u-center will show the information as below:

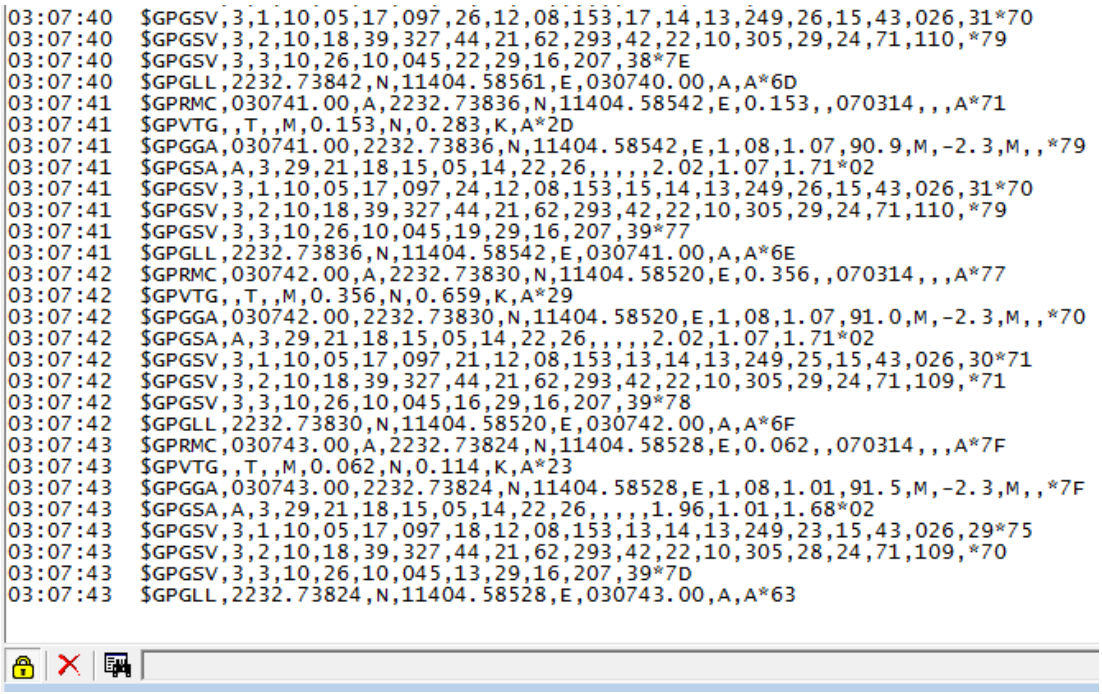


4. Install a plug-in, GoogleEarthPluginSetup.exe, for a better view. After finishing the

installation, select Google Earth under the View menu in the u-center.
Notes: There may be some differences between the reality and the result shown by Google Earth, because of GPS static drift.

Appendix

- After a successful positioning, you will receive a lot of information, as the figure shows below.



What are the meanings of the information?
We will illustrate these information with an example of $GPRMC,030742.00,A,2232.73830,N,11404.58520,E,0.356,,070314,,,A*77

1. Firstly, open the document chip PDF\NMEA0183.pdf
   Secondly, find the relative explanations of GPRMC, as the figure shows.

RMC Recommended Minimum Navigation Information

```
                                                           12
       1          2 3       4 5        6 7   8   9    10  11|
       |          | |       | |        | |   |   |    |   | |
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxx,x.x,a*hh

 1) Time (UTC)
 2) Status, V = Navigation receiver warning
 3) Latitude
 4) N or S
 5) Longitude
 6) E or W
 7) Speed over ground, knots
 8) Track made good, degrees true
 9) Date, ddmmyy
10) Magnetic Variation, degrees
11) E or W
12) Checksum
```

2. The meaning of each field in $GPRMC,030742.00,A,2232.73830,N,11404.58520,E,0.356,,070314,,,A*77 is listed as below.

030742.00	UTC time; since the test location is Eastern eight zones, the actual time should be 03+8=11(hour):07(minute):42(second)
A	Position state; it indicates valid
2232.73830	Latitude value
N	The Northern Hemisphere
11404.58520	Longitude value
E	The Eastern Hemisphere
0.356	Ground speed; 0.356knot (1knot =1 nautical mile per hour，which is equivalent to 0.5m per second)
070314	UTC date; it indicates 7th March, 2014
A	Mode indication; it is in AssistNow Autonomous mode
77	Checksum; it is the result of XOR operation on the ASCII code of all the characters between $ and *

- For more detail instructions about u-center, please refer to software\u-centersetup-7.0.2.1\User_Guide.pdf