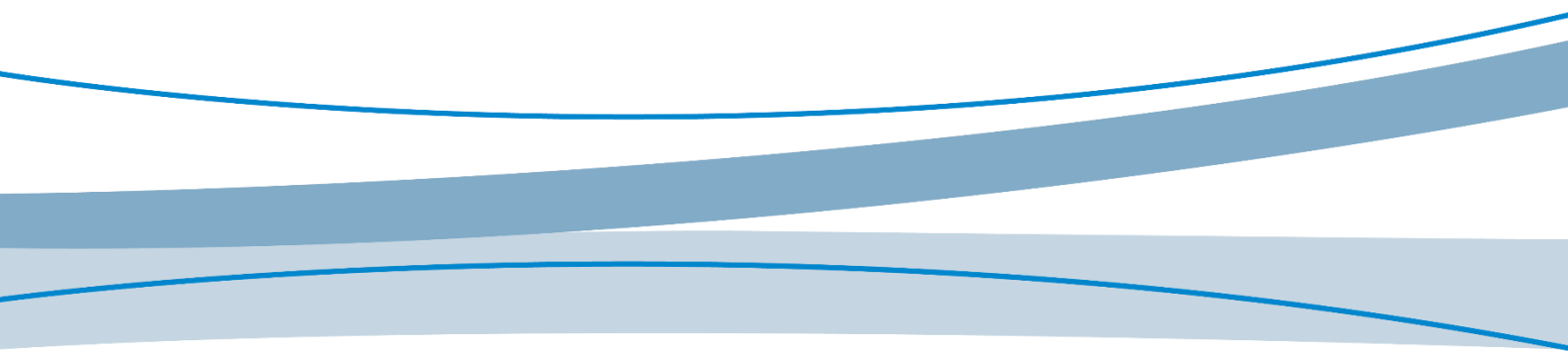




F1 series GNSS Application Guide

V1.2



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Applicable Models

No.	Applicable Model	Description
1	FM101 series & FG101 series	SDX12 platform
2	FM160 series & FG160 series	SDX62 platform
3	FM170 series & FG170 series	SDX65 platform
4	FM180 series & FG180 series	SDX72 platform
5	FM190 series & FG190 series	SDX75 platform
6	FG131 series & FG132 series	SDX35 platform

Change History

V1.2 (2024-12-04)	Grouping FM190W into FM190 series Grouping FG190, FG190B, FG190W into FG190 series Fixed some typos
V1.1 (2024-10-25)	Added project model FG132
V1.0 (2024-7-12)	Initial version.

1 Overview

This document outlines the operations and requirements of Fibocom F1 series product test GNSS related tools. Before using this guide, you need to install the F1 series USB driver corresponding to the Windows system and the serial port tool that sends AT commands.

2 Tool Configuration and Connection

2.1 Module Boot

After the module is powered on, wait for the port enumeration in the device manager. The following port screenshot shows the ports in AT+GTUSBMODE=17 mode:

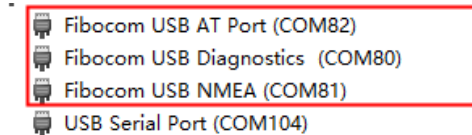


Figure 1. Ports in Device Manager

2.2 Serial Port Tool Configuration

Open the serial port debugging tool, select Fibocom USB AT Port for the AT command port, and select Fibcom USB NMEA port for the NMEA data output port.

2.3 Testing GNSS Function

2.3.1 Testing GPS Function

Enter the AT command in the serial port debugging tool interface:

1. Set the positioning mode to standalone mode.

```
AT+GTGPSEPO=0
```

2. Initiate positioning.

```
AT+GTGPSPOWER=1
```

3. Query the currently cached NMEA data.

```
AT+GTGPS?
```

The AT command allows you to query the currently cached NMEA data and parse it according to the NMEA statement criteria.

The NMEA port of the serial port tool outputs as follows:

```
$GNGGA,165026.00,3412.489668,N,10849.778478,E,1,12,1.0,472.8,M,-34.0,M,,*5B
$GNRMC,165026.00,A,3412.489668,N,10849.778478,E,0.0,,241223,4.2,W,A,V*67
$GNGSA,A,3,05,17,19,20,,,,,,,,,1.2,1.0,0.7,1*3D
$GNGSA,A,3,66,,,,,,,,,1.2,1.0,0.7,2*37
$GNGSA,A,3,07,21,,,,,,,,,1.2,1.0,0.7,3*32
$GNGSA,A,3,01,03,07,10,28,32,40,41,46,,,1.2,1.0,0.7,4*3D
$GNGSA,A,3,02,04,,,,,,,,,1.2,1.0,0.7,5*36
$GPGSV,3,1,09,05,31,227,30,11,62,341,28,17,17,130,46,19,40,124,47,1*6C
```

```

$GPGSV,3,2,09,20,69,248,26,04,05,037,,06,50,044,,09,26,065,,1*63
$GPGSV,3,3,09,12,41,270,,1*5E
$GPGSV,1,1,03,06,50,044,22,11,62,341,24,09,26,065,,8*57
$GLGSV,3,1,09,14,14,235,21,02,37,170,50,16,04,335,14,15,20,287,19,1*71
$GLGSV,3,2,09,01,61,085,26,24,53,031,20,23,20,088,23,17,29,320,22,1*71
$GLGSV,3,3,09,08,19,031,15,1*47
$GAGSV,2,1,08,07,34,086,22,21,07,177,41,24,04,327,16,12,05,276,,7*70
$GAGSV,2,2,08,13,11,078,,19,02,184,,31,34,287,,33,49,310,,7*76
$GAGSV,1,1,02,07,34,086,20,21,07,177,34,1*79
$GQGSV,1,1,02,02,17,162,41,04,57,116,31,8*68
$GBGSV,5,1,20,46,08,230,37,40,57,156,50,32,51,178,48,28,28,103,45,1*7A
$GBGSV,5,2,20,27,68,054,25,20,03,204,40,10,70,208,38,07,62,180,46,1*72
$GBGSV,5,3,20,04,24,113,37,03,51,177,43,01,36,127,44,02,42,219,,1*78
$GBGSV,5,4,20,05,24,244,,08,68,278,,13,61,263,,30,42,316,,1*7C
$GBGSV,5,5,20,33,11,038,,36,10,276,,38,76,319,,41,56,068,,1*71
$GBGSV,2,1,07,28,28,103,46,32,51,178,51,33,11,038,20,40,57,156,53,3*74
$GBGSV,2,2,07,41,56,068,26,46,08,230,43,27,68,054,,3*49
$GBGSV,2,1,06,27,68,054,24,28,28,103,32,32,51,178,40,40,57,156,34,5*74
$GBGSV,2,2,06,41,56,068,24,46,08,230,27,5*74

```

When GPS is turned on, the NMEA port will output the NMEA data actively reported by the module, and the frequency is 1Hz.

2.3.2 Testing AGPS Functions Without Certificates

Enter the following AT command in the serial port debugging tool interface:

1. Query the network registration status.

```
AT+COPS?
```

```
AT+CGDCONT?
```

2. Set the SUPL APN.

```
AT+CGDCONT=1,"IPV4V6","CTNET"
```

3. Set the SUPL server address and port.

```
AT+GTAGPSSERV="supl.qxwz.com",7276
```

4. Set the GPS positioning mode to MSB mode.

```
AT+GTGPSEPO=1
```

5. Set that the SUPL certificate is not used.

```
AT+GTGPSCFG=3,0
```

6. Set the SUPL version to SUPL 2.0.4.

```
AT+GTGPSCFG=0,2
```

7. Initiate positioning.


```
AT+GTGPSPower=1
```

8. Query the currently cached NMEA data.

```
AT+GTGPS?
```

When testing SUPL, you need to pay attention to the following points:

- You need to insert a SIM card, register the SIM card to the network, and enable data service for the SIM card.
- The APN must be set to the APN of the corresponding SIM card operator, for example, CTNET, CMNET, and 3GNET, etc.
- The MSB location mode (+GTGPSEPO=1) is tested in the screenshot, MSA mode (+GTGPSEPO=2) requires server support, and MSA location mode is not supported by supl.qxwz.com.
- There are differences in supl versions on different platforms:
 - 0: SUPL1.0
 - 1: SUPL2.0 (FG101 series and FM101 series by default)
 - 2: SUPL2.0.4 (FG160, FM160, FG170, FM170, FG190x, FM190x, FG132, and FG131 series by default)

2.3.3 Testing AGPS Function Requiring Certificates

Enter the following AT commands in the serial port debugging tool interface:

1. Query the network registration status.

```
AT+COPS?
```

```
AT+CGDCONT?
```

2. Set the SUPL APN.

```
AT+CGDCONT=1,"IPV4V6","CTNET"
```

3. Set the SUPL server address and port.

```
AT+GTAGPSSERV="supl.qxwz.com",7275
```

4. Set the GPS positioning mode to MSB mode.

```
AT+GTGPSEPO=1
```

5. Set to use the SUPL certificate.

```
AT+GTGPSCFG=3,1
```

6. Set the SUPL version to SUPL 2.0.

```
AT+GTGPSCFG=0,1
```

7. Set the certificate.

```
AT+GTGPSCERT=1,4,893
```



Import the certificate. After the command is issued, the serial port will enter the data mode and files can be sent directly. Skip this step if the setting does not require authentication.

8. Initiate positioning.

```
AT+GTGPSPower=1
```

9. Query the currently cached NMEA data.

AT+GTGPS?

As shown in the figure, the module received satellite data from the SUPL server during the period from when AT+GTGPSPOWER=1 was sent at time 15:46:51:888 until the NMEA statement received at time 15:46:54:942 contained GSV information.

```
+CGDCONT: 4,"IPV4v6","sos","0.0.0.0,0.0.0.0,0.0.0.0,0.0.0.0,0.0.0.0,0.0.0.0",0,0,0,1
OK
[15:46:47.283]发->AT+GTGPSCFG=3,1
[15:46:47.292]收<-
OK
[15:46:47.978]发->AT+GTGPSCFG=0,1
[15:46:47.986]收<-
OK
[15:46:48.588]发->AT+GTGPSCFG=4,1
[15:46:48.601]收<-
OK
[15:46:51.888]发->AT+GTGPSPOWER=1
[15:46:51.897]收<-
OK
[15:47:15.710]发->AT+GTGPS?
[15:47:15.714]收<-
+GTGPS:
$GPGGA,074716.00,2229.977843,N,11354.862419,E,1,06,1.3,58.6,M,-1.0,M,*43
$BDGGA,,,,,0,,,,,*77
$GAGGA,,,,,0,,,,,*77
$GPRMC,074716.00,A,2229.977843,N,11354.862419,E,0.0,0.0,130520,2.3,W,A,V*55
$BDRMC,,V,,,,,,N,V*38
$GARMC,,V,,,,,,N,V*38
$GPGSA,A,2,01,06,17,19,28,30,,,,,1.5,1.3,0.9,1*21
$BDGSA,A,1,,,,,,,*23
$GAGSA,A,1,,,,,,,*23
$FQGS,A,1,,,,,,,*24
$GPGSV,3,1,12,01,11,040,27,03,37,061,23,06,40,254,44,17,43,343,48,1*6C
$GPGSV,3,2,12,19,31,316,44,28,82,001,28,30,24,202,37,02,11,243,,1*65
$GPGSV,3,3,12,04,00,116,,07,06,175,,09,03,147,,22,16,045,,1*69
$BDGSV,2,1,06,36,,42,30,,44,13,,39,10,,34,1*7E
$BDGSV,2,2,06,08,,38,02,,38,1*79
$GLGSV,1,1,04,,31,,41,73,43,305,44,,32,1*4F
$GAGSV,1,1,02,12,,40,24,,42,7*76
$FQGSV,2,1,06,36,,42,30,,44,13,,39,10,,34,1*79
$FQGSV,2,2,06,08,,38,02,,38,1*7E
OK
```

Figure 2. Satellite data from SUPL server

```
[15:46:52.943]收<-◆$GPGGA,,,,,0,,,,,*66
$GAGGA,,,,,0,,,,,*77
$BDGGA,,,,,0,,,,,*77
$GPVTG,T,M,N,K,N*2C
$GAVTG,T,M,N,K,N*3D
$BDVTG,T,M,N,K,N*3D
$GPRMC,,V,,,,,,N,V*29
$GARMC,,V,,,,,,N,V*38
$BDRMC,,V,,,,,,N,V*38
$GPGSA,A,1,,,,,,,*32
$GAGSA,A,1,,,,,,,*23
$FQGS,A,1,,,,,,,*24
$BDGSA,A,1,,,,,,,*23
[15:46:53.944]收<-◆$GPGGA,,,,,0,,,,,*66
[15:46:54.942]收<-◆
$GAGGA,,,,,0,,,,,*77
$BDGGA,,,,,0,,,,,*77
$GPVTG,T,M,N,K,N*2C
$GAVTG,T,M,N,K,N*3D
$BDVTG,T,M,N,K,N*3D
$GPRMC,,V,,,,,,N,V*29
$GARMC,,V,,,,,,N,V*38
$BDRMC,,V,,,,,,N,V*38
$GPGSA,A,1,,,,,,,*32
$GAGSA,A,1,,,,,,,*23
$FQGS,A,1,,,,,,,*24
$BDGSA,A,1,,,,,,,*23
$GPGSV,3,1,12,06,40,254,44,17,43,343,47,19,31,316,43,01,11,040,,1*6E
$GPGSV,3,2,12,02,11,243,,03,37,061,,04,00,116,,07,06,175,,1*61
$GPGSV,3,3,12,09,03,147,,22,16,045,,28,82,001,,30,24,202,,1*6D
$GPGSV,1,1,01,,44,1*65
$GLGSV,1,1,02,,40,,42,1*78
$GAGGA,,,,,0,,,,,*66
$GAGGA,,,,,0,,,,,*77
$BDGGA,,,,,0,,,,,*77
$GPVTG,T,M,N,K,N*2C
$GAVTG,T,M,N,K,N*3D
$BDVTG,T,M,N,K,N*3D
$GPRMC,,V,,,,,,N,V*29
$GARMC,,V,,,,,,N,V*38
$BDRMC,,V,,,,,,N,V*38
$GPGSA,A,1,,,,,,,*32
$GAGSA,A,1,,,,,,,*23
$FQGS,A,1,,,,,,,*24
$BDGSA,A,1,,,,,,,*23
$GPGSV,3,1,11,01,11,040,24,06,40,254,45,17,43,343,48,19,31,316,44,1*62
$GPGSV,3,2,11,28,82,001,24,30,24,202,36,02,11,243,,03,37,061,,1*65
$GPGSV,3,3,11,07,06,175,,09,03,147,,22,16,045,,1*58
```

Figure 3. Satellite data

```

$GPGSV,3,1,12,01,11,040,27,06,40,254,45,17,43,343,48,19,31,316,44,1*62
$GPGSV,3,2,12,28,82,001,24,30,24,202,37,02,11,243,,03,37,061,,1*67
$GPGSV,3,3,12,04,00,116,,07,06,175,,09,03,147,,22,16,045,,1*69
$GPGSV,1,1,02,,,37,,,45,1*63
$GLGSV,1,1,02,,,40,,,44,1*7E
$PQGSV,2,1,05,36,,,42,30,,,44,10,,,35,08,,,38,1*70
$PQGSV,2,2,05,02,,,39,1*7F
$BDGSV,2,1,05,36,,,42,30,,,44,10,,,35,08,,,38,1*77
$BDGSV,2,2,05,02,,,39,1*78
$GAGSV,1,1,02,12,,,39,24,,,41,7*7B
$GPGGA,074701.90,,,,,0,,,,,,*44
$GAGGA,,,,,0,,,,,,*77
$BDGGA,,,,,0,,,,,,*77
$GPVTG,,T,,M,,N,,K,N*2C
$GAVTG,,T,,M,,N,,K,N*3D
$BDVTG,,T,,M,,N,,K,N*3D
$GPRMC,,V,,,,,,,,,N,V*29
$GARMC,,V,,,,,,,,,N,V*38
$BDRMC,,V,,,,,,,,,N,V*38
$GPGSA,A,1,,,,,,,,,,,,*32
$GAGSA,A,1,,,,,,,,,,,,*23
$PQGSA,A,1,,,,,,,,,,,,*24
$BDGSA,A,1,,,,,,,,,,,,*23

[15:47:01.943]收←◆$GPGSV,3,1,12,01,11,040,26,06,40,254,44,17,43,343,48,19,31,316,45,1*63
$GPGSV,3,2,12,28,82,001,23,30,24,202,37,02,11,243,,03,37,061,,1*60
$GPGSV,3,3,12,04,00,116,,07,06,175,,09,03,147,,22,16,045,,1*69
$GPGSV,1,1,02,,,37,,,45,1*63
$GLGSV,1,1,02,,,40,,,44,1*7E
$PQGSV,2,1,05,36,,,42,30,,,44,10,,,35,08,,,37,1*7F
$PQGSV,2,2,05,02,,,38,1*7E
$BDGSV,2,1,05,36,,,42,30,,,44,10,,,35,08,,,37,1*78
$BDGSV,2,2,05,02,,,38,1*79
$GAGSV,1,1,02,12,,,40,24,,,42,7*76
$GPGGA,074702.00,2229.977741,N,11354.863657,E,1,06,1.3,63.8,M,-1.0,M,*44
$GAGGA,,,,,0,,,,,,*77
$BDGGA,,,,,0,,,,,,*77
$GPVTG,,T,2.3,M,0.0,N,0.0,K,A*0C
$GAVTG,,T,,M,,N,,K,N*3D
$BDVTG,,T,,M,,N,,K,N*3D
$GPRMC,074702.00,A,2229.977741,N,11354.863657,E,0.0,,130520,2.3,W,A,V*7A
$GARMC,,V,,,,,,,,,N,V*38
$BDRMC,,V,,,,,,,,,N,V*38
$GPGSA,A,3,01,06,17,19,28,30,,,,,2.2,1.3,1.8,1*24
$GAGSA,A,1,,,,,,,,,,,,*23
$PQGSA,A,1,,,,,,,,,,,,*24
$BDGSA,A,1,,,,,,,,,,,,*23

[15:47:02.050]收←◆$GPGSV,3,1,12,01,11,040,25,03,37,061,19,06,40,254,45,17,43,343,48,1*66
$GPGSV,3,2,12,19,31,316,45,28,82,001,23,30,24,202,37,02,11,243,,1*6F

```

Figure 4. Latitude and longitude information

The longitude and latitude information appears in the GGA statement at time 15:47:01:943, indicating that the module obtains the positioning position information for the first time.

When testing SUPL, you need to pay attention to the following points:

- You need to insert a SIM card, register the SIM card to the network, and enable data service for the SIM card.
- The APN must be set to the APN of the corresponding SIM card operator, for example, CTNET, CMNET, and 3GNET, etc.
- The MSB location mode (+GTGPSEPO=1) is tested in the screenshot, MSA mode (+GTGPSEPO=2) requires server support, and MSA location mode is not supported by supl.qxwz.com.

2.3.4 Clearing Ephemeris Data Function

You can use the following commands to delete ephemeris data:

AT+GTGPSDELAID=0: clears all cached satellite data.

AT+GTGPSDELAID=1: clears only all ephemeris data.



After stopping GPS positioning, use the above commands to delete data.

3 Reference Document

For the GNSS-related AT commands involved in this document, refer to the manual *Fibocom_F1 Series_AT Command User Manual_GNSS*.