



SIM7080 Series_GNSS_Application Note

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Related Documents

[1] SIM7080 Series_AT Command Manual_V1.02

This document applies to the following products:

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1 Purpose of this document

Based on module AT command manual, this document will introduce GNSS application process.

Developers could understand and develop application quickly and efficiently based on this document.

2 Introduction

The full name of GNSS is the Global Navigation Satellite System, which refers to all satellite navigation systems, including global, regional and enhanced, such as GPS in the United States, Glonass in Russia, Galileo in Europe, and China. Beidou satellite navigation system, and related augmentation systems, such as WAAS (Wide Area Augmentation System) in the United States, EGNOS (European Geostationary Navigation Overlay System) in Europe, and MSAS (Multifunctional Transportation Satellite Augmentation System) in Japan, etc. Other satellite navigation systems to be built and later. The international GNSS system is a complex system with multiple systems, multiple layers and multiple modes.

3 AT Commands for GNSS

Command	Description
AT+CGNSPWR	GNSS Power Control
AT+CGNSINF	GNSS Navigation Information Parsed From NMEA Sentences
AT+CGNSCOLD	GNSS Cold Start
AT+CGNSWARM	GNSS Warm Start
AT+CGNSHOT	GNSS Hot Start
AT+CGNSMOD	GNSS Work Mode Set
AT+CGNSXTRA	GNSS XTRA Function Open
AT+CGNSCPY	GNSS XTRA File Copy
AT+SGNSCFG	GNSS NMEA Out Configure
AT+SGNSCMD	GNSS Power Control

For detail information, please refer to “SIM7080 Series_AT Command Manual”.

4 GNSS samples

There are two ways to use GNSS, one is get GNSS information from the AP side and the other is from the modem side. Customer can choose according to own demand.

4.1 From AP side

4.1.1 Open GNSS function

AT Command	Response	Description
AT+SGNSCMD=1,0	OK	Turn on GNSS power(UART or USB AT port)
	+SGNSCMD: 2,05:29:31,31.22213,121.35575,16.62,40.15, 30.69,0,0,0,0,0x16dfc3dca78,311	

4.1.2 Configure GNSS output NMEA data to USB's NMEA port

In this way, NMEA data will out to USB's NMEA port, please open NMEA port to receive NMEA data.

AT Command	Response	Description
AT+SGNSCFG="N NMEAOUTPORT ",1	OK	Configure GNSS out to USB NMEA port before GNSS power on
AT+SGNSCMD=2,1 000,0,1	OK	Turn on GNSS power
	\$GPGSV,3,1,12,03,04,243,32,04,00,000,41,08 ,17,207,38,09,15,316,40,1*6A \$GPGSV,3,2,12,14,16,162,34,16,63,346,40,21 ,17,075,34,23,42,294,43,1*6E \$GPGSV,3,3,12,26,49,034,45,27,60,187,43,31 ,37,103,45,22,00,000,,1*67 \$GLGSV,3,1,10,10,13,300,22,18,11,027,24,09 ,48,011,34,16,16,079,26,1*79 \$GLGSV,3,2,10,20,35,150,29,19,44,068,23,07 ,27,233,31,08,28,291,24,1*78 \$GLGSV,3,3,10,06,02,191,,01,06,329,,1*7B \$GAGSV,1,1,0,7*43 \$PQGSV,1,1,0,1*42	NMEA data output from USB's NMEA port

```
$GPGSA,A,3,14,16,23,26,27,31,,,,,,,,,1.6,1.3,0.
9,1*23
$GPVTG,,T,,M,0.0,N,0.0,K,A*23
$GPRMC,000203.00,A,3113.32456,N,12121.3
3663,E,0.0,,060180,4.5,W,A,V*78
$GPGGA,000203.00,3113.3245,N,12121.336
6,E,1,06,1.3,5.1,M,9.4,M,,*51
```

4.1.3 Configure GNSS output NMEA data to UART3 port

In this way, NMEA data will out to UART3 port, please open UART3 port to receive NMEA data.

AT Command	Response	Description
AT+SGNSCFG="N MEAOUTPORT ",2	OK	Configure GNSS out to UART3 NMEA port before GNSS power on
AT+SGNSCMD=2,1 000,0,1	OK	Turn on GNSS power
	\$GPGSV,3,1,12,03,04,243,32,04,00,000,41,08 ,17,207,38,09,15,316,40,1*6A \$GPGSV,3,2,12,14,16,162,34,16,63,346,40,21 ,17,075,34,23,42,294,43,1*6E \$GPGSV,3,3,12,26,49,034,45,27,60,187,43,31 ,37,103,45,22,00,000,,1*67 \$GLGSV,3,1,10,10,13,300,22,18,11,027,24,09 ,48,011,34,16,16,079,26,1*79 \$GLGSV,3,2,10,20,35,150,29,19,44,068,23,07 ,27,233,31,08,28,291,24,1*78 \$GLGSV,3,3,10,06,02,191,,01,06,329,,1*7B \$GAGSV,1,1,0,7*43 \$PQGSV,1,1,0,1*42 \$GPGSA,A,3,14,16,23,26,27,31,,,,,,,,,1.6,1.3,0. 9,1*23 \$GPVTG,,T,,M,0.0,N,0.0,K,A*23 \$GPRMC,000203.00,A,3113.32456,N,12121.3 3663,E,0.0,,060180,4.5,W,A,V*78 \$GPGGA,000203.00,3113.3245,N,12121.336 6,E,1,06,1.3,5.1,M,9.4,M,,*51	NMEA data output from UART3 port

4.1.4 Auto report GNSS information every 1s

AT Command	Response	Description
AT+SGNSCFG="O UTURC",1	OK	Turn on navigation data URC report.
AT+SGNSCMD=2,1	OK	Turn on GNSS power , Auto output GNSS

000,0,1 information every 1s

+SGNSCMD:
2,05:29:31,31.22213,121.35575,16.62,40.15,
30.69,0,0,0,0,0x16dfc3dca78,311

+SGNSCMD:
2,05:29:32,31.22213,121.35575,12.46,35.79,
26.33,0,0,0,0,0x16dfc3dce60,311

+SGNSCMD:
2,05:29:33,31.22215,121.35575,11.40,39.24,
29.78,0,0,0,0,0x16dfc3dd248,311

4.1.5 Configure the GNSS fix mode

AT Command	Response	Description
AT+CGNSMOD=1, 1,0,0,0 or AT+SGNSCFG="M ODE",0	OK	configure GNSS mod GPS+GLO
	...	Reboot
AT+SGNSCFG="N MEAOUTPORT",1	OK	Configure GNSS out to USB NMEA port before GNSS power on
AT+SGNSCMD=2,1 000,0,1	OK	Turn on GNSS
	\$GPGSV,3,1,12,03,04,243,32,04,00,000,41,08 ,17,207,38,09,15,316,40,1*6A \$GPGSV,3,2,12,14,16,162,34,16,63,346,40,21 ,17,075,34,23,42,294,43,1*6E \$GPGSV,3,3,12,26,49,034,45,27,60,187,43,31 ,37,103,45,22,00,000,,1*67 \$GLGSV,3,1,10,10,13,300,22,18,11,027,24,09 ,48,011,34,16,16,079,26,1*79 \$GLGSV,3,2,10,20,35,150,29,19,44,068,23,07 ,27,233,31,08,28,291,24,1*78 \$GLGSV,3,3,10,06,02,191,,01,06,329,,1*7B \$GAGSV,1,1,0,7*43 \$PQGSV,1,1,0,1*42 \$GPGSA,A,3,14,16,23,26,27,31,,,,,,1.6,1.3,0. 9,1*23 \$GPVTG,T,,M,0.0,N,0.0,K,A*23 \$GPRMC,000203.00,A,3113.32456,N,12121.3 3663,E,0.0,,060180,4.5,W,A,V*78	On NMEA port

```
$GPGGA,000203.00,3113.3245,N,12121.336
6,E,1,06,1.3,5.1,M,9.4,M,,*51
```

4.1.6 Configure GNSS NMEA type

AT Command	Response	Description
AT+SGNSCFG="N MEATYPE",255	OK	Configure GNSS NMEA type, Output all types.
AT+SGNSCFG="N MEAOUTPORT",1	OK	Configure GNSS out to USB NMEA port before GNSS power on
AT+SGNSCMD=2,1 000,0,1	OK	Turn on GNSS
	\$GPGSV,3,1,12,03,04,243,32,04,00,000,41,08 ,17,207,38,09,15,316,40,1*6A \$GPGSV,3,2,12,14,16,162,34,16,63,346,40,21 ,17,075,34,23,42,294,43,1*6E \$GPGSV,3,3,12,26,49,034,45,27,60,187,43,31 ,37,103,45,22,00,000,,1*67 \$GLGSV,3,1,10,10,13,300,22,18,11,027,24,09 ,48,011,34,16,16,079,26,1*79 \$GLGSV,3,2,10,20,35,150,29,19,44,068,23,07 ,27,233,31,08,28,291,24,1*78 \$GLGSV,3,3,10,06,02,191,,01,06,329,,1*7B \$GAGSV,1,1,0,7*43 \$PQGSV,1,1,0,1*42 \$GPGSA,A,3,14,16,23,26,27,31,,,,,1.6,1.3,0. 9,1*23 \$GPVTG,,T,,M,0.0,N,0.0,K,A*23 \$GPRMC,000203.00,A,3113.32456,N,12121.3 3663,E,0.0,,060180,4.5,W,A,V*78 \$GPGGA,000203.00,3113.3245,N,12121.336 6,E,1,06,1.3,5.1,M,9.4,M,,*51	On NMEA port

4.1.7 XTRA function mode

It provides enhanced standalone performance, and eliminates the need to demodulate the GPS signal for ephemeris, almanac, iono, UTC, or health.

Normally requires -144 dBm or stronger for all SVs in view.

TTFB can be reduced by 18 to 30 sec (or more in harsh signal environments)

AT Command	Response	Description
AT+CNACT=0	OK	Registration network
	+APP PDP: ACTIVE	

AT+CLTS=1	OK	Time synchronization
AT+HTTPTOFS="http://iot2.xtracloud.net/xtra3gr_72h.bin", "/customer/Xtra3.bin"	OK	XTRA file server: 1. iot1.xtracloud.net 2. iot2.xtracloud.net 3. iot3.xtracloud.net XTRA file: 1. GPS + GLO : xtra3gr_72h.bin 2. GPS + BDS : xtra3gc_72h.bin 3. GPS + GAL : xtra3ge_72h.bin 4. GPS + QZSS : xtra3gj_72h.bin 5. GPS : xtra3g_72h.bin
AT+CGNSCPY	+CGNSCPY: 0 OK	Copy XTRA file
AT+CGNSXTRA	OK	Query xtra file validity and import Data
AT+CGNSXTRA=1	OK	Open XTRA function
AT+SGNSCFG="NMEA0UTPORT ",1	OK	Configure GNSS out to USB NMEA port before GNSS power on
AT+SGNSCMD=2,1000,0,1	OK	start GNSS

4.2 From modem side

4.2.1 Open GNSS function

AT Command	Response	Description
AT+CGNSPWR=1	OK	Turn on GNSS power(UART or USB AT port)
AT+CGNSINF	+CGNSINF: 1,1,20191024051848.000,31.221946,121.355 565,3.417,0.00,,0,,1.4,1.7,0.9,,6,,12.4,12.0 OK	Read GNSS navigation information

4.2.2 XTRA function mode

It provides enhanced standalone performance, and eliminates the need to demodulate the GPS signal for ephemeris, almanac, iono, UTC, or health.

Normally requires -144 dBm or stronger for all SVs in view.

TTFB can be reduced by 18 to 30 sec (or more in harsh signal environments)

AT Command	Response	Description
AT+CNACT=0,1	OK	Activate network, Activate 0 th PDP.

	+APP PDP: 0,ACTIVE	
AT+CLTS=1	OK	Time synchronization
AT+HTTPTOFS="http://iot2.xtracloud.net/xtra3gr_72h.bin", "/customer/Xtra3.bin"	OK	XTRA file server: 1. iot1.xtracloud.net 2. iot2.xtracloud.net 3. iot3.xtracloud.net XTRA file: 1. GPS+GLO: xtra3gr_72h.bin 2. GPS+BDS: xtra3gc_72h.bin 3. GPS+GAL: xtra3ge_72h.bin 4. GPS+QZSS: xtra3gj_72h.bin 5. GPS: xtra3g_72h.bin
AT+CGNSCPY	+CGNSCPY: 0	Copy XTRA file
	OK	
AT+CGNSXTRA	OK	Query xtra file validity and import Data
AT+CGNSXTRA=1	OK	Open XTRA function
AT+CGNSCOLD	OK	Cold start GNSS
	+CGNSXTRA: 0	Aid XTRA file success

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