SIM7000 Series_GNSS_Application Note_V1.01

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Version History

Date	Version	Description of change	Author
2017-12-18	1.00	New version	Xiping.li
2018-04-12	1.02	Add XTRA mode	Xiping.li

Scope

This document presents the AT command of GNSS function and application examples. The document can apply to SIM7000 series module.

1 Introduction

This document gives the usage of SIM7000 series GNSS function. User can get useful information about the SIM7000 series GNSS functions quickly through this document.
The GNSS functions are provided in AT command format, and they are designed for customers to design their GNSS applications easily. User can access these GNSS AT commands through USB or UART interface which communicates with SIM7000 series module.

2 AT Command

SIM7000 series modules provide GNSS AT command is as follows:

Command	Description
AT+CGNSPWR	GNSS Power Control
AT+CGNSINF	GNSS Navigation Information Parsed From NMEA Sentences
AT+CGNSURC	GNSS Navigation URC Report
AT+CGNSPORT	GNSS NMEA Out Port Set
AT+CGNSCOLD	GNSS Cold Start
AT+CGNSWARM	GNSS Warm Start
AT+CGNSHOT	GNSS Hot Start
AT+CGNSMOD	GNSS Work Mode Set
AT+CGNSCFG	GNSS NMEA Out Configure
AT+CGNSTST	GNSS NMEA Data Out Put To AT Port
AT+CGNSCPY	Copy XTRA file
AT+CGNSXTRA	Open XTRA function

For more detail introduction, please refer to SIM7000 Series_AT Command Manual.

3 AT Commands Examples

In the "Grammar" columns of following tables, input of AT commands are in black, module return values are in blue.

In default mode only power on(AT+CGNSPWR) GNSS through USB's AT Port, USB's NMEA port will output NMEA data.

3.1 Get GNSS information through UART

Grammar	Description
AT+CGNSPWR=1 OK	Turn on GNSS power(UART port)
AT+CGNSINF +CGNSINF: 1,1,20171103022632.000,31.222067,121.354368,34.700,0.00,0.0,1,,1.1,1.4,0.9,,21,6,,45 ,, OK	Read GNSS navigation information

3.2 Get NMEA data through AT port

Grammar	Description
AT+CGNSPWR=1 OK	Turn on GNSS power(UART or USB AT port)
AT+CGNSTST=1,1 OK	Output 1 package GNSS NMEA data to AT port
$GNGGA,,,,,,0,,,,,,,,*78 $GNRMC,,V,,,,,,,,,,N*4D $GLGSV,2,1,07,66,30,216,,86,07,130,,65,82,336,,88,54,350,*64 $GLGSV,2,2,07,87,58,098,,81,08,323,,72,33,028,*5D $GPGSV,2,1,08,06,54,050,42,09,32,056,42,13,05,189,40,17,25,147,45*7A $GPGSV,2,2,08,19,46,147,44,02,53,333,,12,24,267,,25,10,302,*7F $BDGSV,2,1,06,06,58,192,,08,69,052,,09,32,202,,10,03,212,*67 $BDGSV,2,2,06,12,48,320,,13,61,337,*62	NMEA data

$GNVTG,,T,,M,,N,,K,N*32 $GPGSA,A,1,,,,,,,,,,,,,*1E $GLGSA,A,1,,,,,,,,,,,,,*02 $BDGSA,A,1,,,,,,,,,,,,,*0F	

3.3 Configure GNSS through UART and 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.

Grammar	Description
AT+CGNSCFG=1 OK	Configure GNSS out to USB NMEA port before GNSS power on
AT+CGNSPWR=1 OK	Turn on GNSS power(UART port)
$GLGSV,2,1,07,66,33,217,20,86,05,132,34,65,79,347,23,87,56,105,27*6A $GLGSV,2,2,07,72,30,028,18,88,56,351,,81,11,324,*5F $GPGSV,7,1,25,02,55,336,32,05,45,257,34,06,53,054,42,07,00,099,40*7A $GPGSV,7,2,25,09,30,053,40,12,23,264,25,13,07,189,36,17,22,147,46*70 $GPGSV,7,3,25,19,45,149,44,20,00,244,,23,05,037,,25,10,299,*7B $GPGSV,7,4,25,33,,,35,34,,,34,35,,,46,36,,,35*7C $GPGSV,7,5,25,38,,,34,39,,,35,40,,,35,41,,,34*7C $GPGSV,7,6,25,42,,,42,46,,,35,48,,,35,49,,,35*7A $GPGSV,7,7,25,50,,,35*7D $BDGSV,3,1,11,01,46,146,45,08,69,056,38,17,,,29,02,36,237,*58 $BDGSV,3,2,11,03,51,199,,04,33,122,,06,59,194,,09,33,203,*64 $BDGSV,3,3,11,10,02,212,,12,50,319,,13,62,337,*56 $GNGGA,023851.00,3113.330830,N,12121.264888,E,1,08,0.9,33.8,M,9.0,M,,*7D $GNVTG,0.0,T,4.6,M,0.0,N,0.0,K,A*3F $GNRMC,023851.00,A,3113.330830,N,12121.264888,E,0.0,0.0,031117,4.6,W,A*31	NMEA data output from USB's NMEA port

$GPGSA,A,2,02,05,06,09,12,13,17,19,,,,,1.2,0.9,0.8*36 $GLGSA,A,2,86,87,,,,,,,,,1.2,0.9,0.8*2C $BDGSA,A,2,01,,,,,,,,,,1.2,0.9,0.8*21	

3.4 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.

Grammar	Description
AT+CGNSCFG=2 OK	Configure GNSS out to UART3 port before GNSS power on
AT+CGNSPWR=1 OK	Turn on GNSS power(UART port)
$GLGSV,2,1,07,66,33,217,20,86,05,132,34,65,79,347,23,87,56,105,27*6A $GLGSV,2,2,07,72,30,028,18,88,56,351,,81,11,324,*5F $GPGSV,7,1,25,02,55,336,32,05,45,257,34,06,53,054,42,07,00,099,40*7A $GPGSV,7,2,25,09,30,053,40,12,23,264,25,13,07,189,36,17,22,147,46*70 $GPGSV,7,3,25,19,45,149,44,20,00,244,,23,05,037,,25,10,299,*7B $GPGSV,7,4,25,33,,,35,34,,,34,35,,,46,36,,,35*7C $GPGSV,7,5,25,38,,,34,39,,,35,40,,,35,41,,,34*7C $GPGSV,7,6,25,42,,,42,46,,,35,48,,,35,49,,,35*7A $GPGSV,7,7,25,50,,,35*7D $BDGSV,3,1,11,01,46,146,45,08,69,056,38,17,,,29,02,36,237,*58 $BDGSV,3,2,11,03,51,199,,04,33,122,,06,59,194,,09,33,203,*64 $BDGSV,3,3,11,10,02,212,,12,50,319,,13,62,337,*56 $GNGGA,023851.00,3113.330830,N,12121.264888,E,1,08,0.9,33.8,M,9.0,M,,*7D $GNVTG,0.0,T,4.6,M,0.0,N,0.0,K,A*3F $GNRMC,023851.00,A,3113.330830,N,12121.264888,E,0.0,0.0,031117,4.6,W,A*31 $GPGSA,A,2,02,05,06,09,12,13,17,19,,,,,1.2,0.9,0.8*36	NMEA data output from UART3 port

$GLGSA,A,2,86,87,,,,,,,,,,1.2,0.9,0.8*2C $BDGSA,A,2,01,,,,,,,,,,,1.2,0.9,0.8*21	

3.5 Auto report GNSS information every 1s

Grammar	Description
AT+CGNSPWR=1 OK	Turn on GNSS power
AT+CGNSURC=1 OK	Auto output GNSS information every 1s
+UGNSINF: 1,1,20171103024050.000,31.222176,121.354393,31.000,0.00,99.5,1,,0.9,1.3,0.9,,20,8,,,48,,, +UGNSINF: 1,1,20171103024051.000,31.222176,121.354395,31.100,0.00,99.5,1,,0.9,1.3,0.9,,20,8,,,48,,, +UGNSINF: 1,1,20171103024052.000,31.222176,121.354396,31.100,0.00,99.5,1,,0.9,1.3,0.9,,20,8,,,48,,,	

3.6 Close USB's NMEA port when start GNSS through USB's AT port

Grammar	Description
AT+CGNSPORT=4 OK	Turn off GNSS NMEA output to USB's NMEA port
…	Reboot
AT+CGNSPWR=1 OK	Turn on GNSS (USB's AT port)

In this way USB's NMEA port will not output NMEA data, but CGNSINF and CGNSTST can be used.

3.7 Configure the GNSS fix mode

Grammar	Description
AT+CGNSMOD=1,0,1,0 OK	configure GNSS mod GPS+bd

…	Reboot
AT+CGNSPWR=1 OK	Turn on GNSS (USB's AT port)
$GNGGA,032201.00,3113.331505,N,12121.263672,E,1,11,0.8,42.5,M,9.0,M,,*76 $GNVTG,0.0,T,4.6,M,0.0,N,0.0,K,A*3F $GNRMC,032201.00,A,3113.331505,N,12121.263672,E,0.0,0.0,031117,4.6,W,A*38 $GPGSA,A,2,02,05,06,07,09,12,13,17,19,20,30,,1.1,0.8,0.8*32 $BDGSA,A,2,,,,,,,,,,,,1.1,0.8,0.8*22 $GPGSV,6,1,22,02,66,009,36,05,56,288,33,06,45,085,44,07,07,082,48*78 $GPGSV,6,2,22,09,17,042,39,12,13,246,32,13,26,187,39,15,01,208,34*74 $GPGSV,6,3,22,17,04,153,46,19,24,156,42,20,12,258,26,25,08,281,27*7A $GPGSV,6,4,22,29,,,33,30,07,112,47,33,,,35,38,,,35*4E $GPGSV,6,5,22,39,,,35,40,,,35,41,,,35,42,,,34*76 $GPGSV,6,6,22,46,,,35,51,,,35*7F $BDGSV,3,1,12,01,46,147,,02,36,237,,03,50,199,,04,33,122,*6B $BDGSV,3,2,12,05,14,255,,06,67,213,,08,73,087,,09,39,215,*69 $BDGSV,3,3,12,11,12,320,,12,66,302,,13,68,336,,15,55,331,*64 $GNGGA,032202.00,3113.331494,N,12121.263622,E,1,11,0.8,42.0,M,9.0,M,,*7C $GNVTG,0.0,T,4.6,M,0.0,N,0.0,K,A*3F $GNRMC,032202.00,A,3113.331494,N,12121.263622,E,0.0,0.0,031117,4.6,W,A*37 $GPGSA,A,2,02,05,06,07,09,12,13,17,19,20,30,,1.1,0.8,0.8*32 $BDGSA,A,2,,,,,,,,,,,,1.1,0.8,0.8*22	On NMEA port

3.8 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.
TTF can be reduced by 18 to 30 sec (or more in harsh signal environments)

Grammar	Description
AT+SAPBR=3,1, "APN","CMNET" OK AT+SAPBR=1,1 OK AT+CNTPCID=1 OK AT+CNTP="ntp1.aliyun.com",32,1 OK AT+CNTP OK +CNTP: 1,"2018/01/09,10:28:59"	NTP sync time to local
AT+CNACT=1,"CMNET" OK +APP PDP: ACTIVE AT+HTTPTOFS="http://xtrapath1.izatcloud.net/xtra3grc.bin","/customer/xtra3grc.bin" OK +HTTPTOFS: 200,28919	Download XTRA file XTRA file server: 1. xtrapath1.izatcloud.net 2. xtrapath2.izatcloud.net 3. xtrapath3.izatcloud.net XTRA file xtra3grc.bin period of validity is 3 days. The path of XTRA file save must be /customer/
AT+CGNSCPY +CGNSCPY: 0 OK	Copy XTRA file
AT+CGNSXTRA=1 OK	Open XTRA function
AT+CGNSCOLD OK +CGNSXTRA: 0	Cold start GNSS Aid XTRA file success

Appendix

A Related documents

SN	Document name	Remark
[1]	SIM7000 Series_AT Command Manual	

B Terms and Abbreviations

Abbreviation	Definition
APN	Access Point Name
URC	Unsolicited Result Code
FTP	File Transfer Protocol
GGA	Global Positioning System Fixed Data
GLL	Geographic Position - Latitude/Longitude
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
AGPS	Assisted GPS
DGPS	Differential Global Positioning System
GPRS	General Packet Radio Service
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
HPA	Horizontal Position Accuracy
VPA	Vertical Position Accuracy
GEO-Fence	A geographic area
HDOP	Horizontal Dilution of Precision
HTTP	Hypertext Transfer Protocol
NMEA	National Marine Electronics Association
PDOP	Position Dilution of Precision
PDP	Packet Data Protocol
RMC	Recommended Minimum Specific GNSS Data
VDOP	Vertical Dilution of Precision
VTG	Course Over Ground and Ground Speed
ZDA	Time & Date
EPO	Extended Prediction Orbit

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