SIM868 Series_GNSS _Application Note

GPRS Module

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About Document

Version History

Version	Date	Owner	What is new
V1.00	2017-01-03	Xiping.li	New version
V1.01	2019-07-25	Zhao.wang	Add AT+CGNSINFIX
V1.02	2020-06-15	Fumei.zeng	Change the style

Scope

This document presents the AT command of GNSS function and application examples. The document can apply to SIM868 module witch hardware release version is V2.01 and above and the software release version is 1418B03SIM868M32 and later.

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Tables and Figures

1 Introduction

1.1 Purpose of the document

SIM868 module combines GNSS technology for satellite navigation. Featuring an industry-standard interface and GNSS function, it allows variable assets to be tracked seamlessly at any location and anytime with signal coverage.
GNSS application provides a method to interact with a GNSS module.

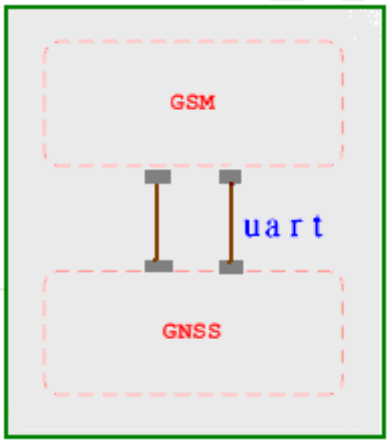

Figure 1-1 SIM868 System connection

1) For hardware design, please refer to SIM868_Hardware_Design_V1.02 "All-in-one mode".

1.2 Related documents

1.3 Conventions and abbreviations

Abbreviation	Description
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

2 AT Command

SIM868 module provides GNSS AT command sets as below.

Command	Description
AT+CGNSPWR	GNSS power control
AT+CGNSSEQ	Define the last NMEA sentence that parsed
AT+CGNSINF	GNSS navigation information parsed from NMEA sentences
AT+CGNSINFIX	Fix parameters of GNSS navigation information statement
AT+CGNSURC	GNSS navigation, GEO-fence and speed alarm URC report control
AT+CGNSCMD	Send command to GNSS
AT+CGNSTST	Send NMEA data to AT UART
AT+CGNSCHK	Check EPO file property
AT+CGNSDEL	Delete EPO file
AT+CGNSIPR	Configure UART2 baud rate
AT+CGNSAID	Send EPO file to GNSS engine
AT+CRFLOC	Give reference location to GNSS engine
AT+CGNSVER	Query GNSS version

2.1 AT+CGNSPWR GNSS power control

AT+CGNSPWR GNSS power control	
Test Command AT+CGNSPWR=?	Response **+CGNSPWR: (**list of supported **<mode>**s **)** **OK**
Read Command AT+CGNSPWR?	Response TA returns the current status of GNSS Power supply. **+CGNSPWR: <mode>** **OK**
Write Command AT+CGNSPWR=<mode>	Response GNSS POWER CONTROL ON/OFF **OK** or

	ERROR
Parameter Saving Mode	NO_SAVE
Reference	Note

Defined Values

<mode>	0 Turn off GNSS power supply 1 Turn on GNSS power supply

2.2 AT+CGNSSEQ Define the last NMEA sentence that parsed

AT+CGNSSEQ	**Define the last NMEA sentence that parsed**
Test Command **AT+CGNSSEQ=?**	Response **+CGNSSEQ: (GGA,GSA,RMC,GSV)** **OK**
Read Command **AT+CGNSSEQ?**	Response TA returns the current setting of last sentence parsed: **+CGNSSEQ: <last sentence>** **OK**
Write Command **AT+CGNSSEQ=<last sentence>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note Factory setting is: AT+CGNSSEQ="RMC".

Defined Values

<last sentence>	is a string type parameter. "**GGA**" refer to "GPGGA" or "GLGGA" or "GNGGA" "**GSA**" refer to "GPGSA" or "GLGSA" or "GNGSA" "**GSV**" refer to "GPGSV" or "GLGSV" or "GNGSV" "**RMC**" refer to "GPRMC" or "GLRMC" or "GNRMC"

Table 2-1 Parsed NMEA message

Message	Description	Possible Talker Identifiers
GGA	Time, position and fix type data	GP
GSA	GNSS receiver operating mode, satellites used in the position solution, and DOP values	GP, GN
GSV	Number of GNSS satellites in view satellite ID numbers, elevation, azimuth, & SNR values	GP,GL,GN
RMC	Time, date, position, course and speed data	GP,GN

Table 2-2 Parsed GNSS navigation parameters

Parameters	Description
UTC Time	Parsed from "$--RMC" NMEA sentence
fix status	Parsed from "$--RMC" NMEA sentence
Latitude	Parsed from "$--RMC" NMEA sentence
N/S Indicator	Parsed from "$--RMC" NMEA sentence
Longitude	Parsed from "$--RMC" NMEA sentence
E/W Indicator	Parsed from "$--RMC" NMEA sentence
Speed Over Ground	Parsed from "$--RMC" NMEA sentence
Course Over Ground	Parsed from "$--RMC" NMEA sentence
Date	Parsed from "$--RMC" NMEA sentence
Magnetic Variation	Reserved
East/West Indicator	Reserved
RMC mode	Parsed from "$--GGA" NMEA sentence
HDOP	Parsed from "$--GGA" NMEA sentence
MSL Altitude	Parsed from "$--GGA" NMEA sentence
Units	Parsed from "$--GGA" NMEA sentence
Geoid Separation	Reserved
Units	Reserved
Age of Diff. Corr.	Reserved
Diff. Ref. Station ID	Reserved
Satellites Used	Parsed from "$--GGA" NMEA sentence
PDOP	Parsed from "$--GGA" NMEA sentence
VDOP	Parsed from "$--GGA" NMEA sentence
Satellites in View	Parsed from "$--GSV" NMEA sentence
HPA	Reserved
VPA	Reserved

2.3 AT+CGNSINF GNSS navigation information parsed from NMEA sentences

AT+CGNSINF GNSS navigation information parsed from NMEA sentences	
Execution Command AT+CGNSINF	Response **+CGNSINF: <GNSS run status>,<Fix status>,<UTC date & Time>,<Latitude>,<Longitude>,<MSL Altitude>,<Speed Over Ground>,<Course Over Ground>,<Fix Mode>,<Reserved1>,<HDOP>,<PDOP>,<VDOP>,<Reserved2>,<GNSS Satellites in View>,<GNSS Satellites Used>,<GLONASS Satellites Used>,<Reserved3>,<C/N0 max>,<HPA>,<VPA>** **OK**
Parameter Saving Mode	NO_SAVE
Reference	Note

Defined Values

<GNSS run status>	0 GNSS off 1 GNSS on
<Fix status>	0 Not fixed position 1 Fixed position See below table 2-3.

Table 2-3 AT+CGNSINF return Parameters

Index	Parameter	Unit	Range	Length
1	GNSS run status	--	0-1	1
2	Fix status	--	0-1	1
3	UTC date & Time	yyyyMMddhhmmss.sss	yyyy: [1980,2039] MM : [1,12] dd: [1,31] hh: [0,23] mm: [0,59] ss.sss:[0.000,60.999]	18
4	Latitude	±dd.dddddd	[-90.000000,90.000000]	10
5	Longitude	±ddd.dddddd	[-180.000000,180.000000]	11

6	MSL Altitude	meters		8
7	Speed Over Ground	Km/hour	[0,999.99]	6
8	Course Over Ground	degrees	[0,360.00]	6
9	Fix Mode	--	0,1,2[1]	1
10	Reserved1			0
11	HDOP	--	[0,99.9]	4
12	PDOP	--	[0,99.9]	4
13	VDOP	--	[0,99.9]	4
14	Reserved2			0
15	GPS Satellites in View	--	[0,99]	2
16	GNSS Satellites Used	--	[0,99]	2
17	GLONASS Satellites in View	--	[0,99]	2
18	Reserved3			0
19	C/N0 max	dBHz	[0,55]	2
20	HPA[2]	meters	[0,9999.9]	6
21	VPA[2]	meters	[0,9999.9]	6
				Total：(94) chars

Note:

1. The range of <Fix Mode> depends on the GNSS chip used.
2. Reserved.

2.4 AT+CGNSINFIX Fix parameters of GNSS navigation information statement

AT+CGNSINFIX Fix parameters of GNSS navigation information statement	
Test Command **AT+CGNSINFIX=?**	Response **+CGNSINFIX: (0-1)** **OK**
Read Command **AT+CGNSINFIX?**	Response **+ CGNSINFIX: <mode>** **OK**
Write Command **AT+CGNSINFIX=<mode>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE

Reference	Note The CGNSINF parameters in the Table 2-3 are GPS Satellites in View、GNSS Satellites Used and GLONASS Satellites in View, which are modified to GNSS Satellites in View、GPS Satellites Used and GLONASS Satellites Used, Please see the Table 2-4.

Defined Values

<mode>	0 Fix off 1 Fix on

Table 2-4 List of CGNSINF parameters after modification by CGNSINFIX

Index	Parameter	Unit	Range	Length
...	...	...	...	...
15	GNSS Satellites in View	--	[0,99]	2
16	GPS Satellites Used	--	[0,99]	2
17	GLONASS Satellites Used	--	[0,99]	2
...	...	...	...	...

2.5 AT+CGNSURC GNSS navigation, GEO-fences and speed alarm URC report

AT+CGNSURC	GNSS navigation, GEO-fences and speed alarm URC report
Test Command **AT+CGNSURC=?**	Response **+CGNSURC: (0-255)** **OK**
Read Command **AT+CGNSURC?**	Response TA returns the current URC setting **+CGNSURC: <Navigation mode>** **OK**
Write Command **AT+CGNSURC=<Navigation mode>**	Response **OK** or **ERROR**
Unsolicited Result Code	**+UGNSINF: <GNSS run status>,<Fix status>,<UTC date &**

	Time>,<Latitude>,<Longitude>,<MSL Altitude>,<Speed Over Ground>,<Course Over Ground>,<Fix Mode>,<Reserved1>,<HDOP>,<PDOP>,<VDOP>,<Reserved2>,<Satellites in View>,<Satellites Used>,<Reserved3>,<C/N0 max>,<HPA>,<VPA>
Parameter Saving Mode	NO_SAVE
Reference	Note Factory setting is **"**AT+CGNSURC=0**"**. URC **"+UGNSINF: "**parameters are the same as **"+CGNSINF:"** return.

Defined Values

<Navigation mode>	0 Turn off navigation data URC report 1 Turn on navigation data URC report, and report every GNSS FIX 2 Turn on navigation data URC report, and report every 2 GNSS FIX … 255 Turn on navigation data URC report, and report every 255 GNSS FIX

2.6 AT+CGNSCMD Send command to GNSS

AT+CGNSCMD Send command to GNSS	
Test Command **AT+CGNSCMD=?**	Response **+CGNSCMD: (0-1),"CmdString"** **OK**
Write Command **AT+CGNSCMD=<Cmdtype>,<CmdString>**	Response If send ok: **OK** If send false: **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note Max length of <CmdString> is 258.

Defined Values

<CmdType>	0 NMEA style command 1 HEX style command
<CmdString>	command string For example, if you want to send **"**$PMTK000*32<CR><LF>**"** command to GNSS: You can use: AT+CGNSCMD=0,**"**$PMTK000*32**"** Or: AT+CGNSCMD=1,**"**24504D544B3030302A33320D0A**"**

2.7 AT+CGNSTST Send NMEA data to AT UART

AT+CGNSTST Send NMEA data to AT UART	
Test Command **AT+CGNSTST=?**	Response **+CGNSTST: (0-1)** **OK**
Read Command **AT+CGNSTST?**	Response GNSS test mode on/off **+CGNSTST: <mode>** **OK**
Write Command **AT+CGNSTST=<mode>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note This command is used for test.

Defined Values

<CmdType>	0 Switch off 1 Switch on

2.8 AT+CGNSDEL Check EPO file property

AT+CGNSDEL Check EPO file property	
Test Command **AT+CGNSCHK=?**	Response **+CGNSCHK: (1-3),(0-1)** **OK**
Write Command **AT+CGNSCHK=<mode>,[<time>]**	Response **+CGNSCHK: <epofile>,<exist>,<size>,<available hours>** **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note

Defined Values

<mode>	1 and 2 Reserved 3 EPO file
<time>	0 or empty will not display expiration date 1 will display EPO file available hours

2.9 AT+CGNSDEL Delete EPO file

AT+CGNSDEL Delete EPO file	
Test Command **AT+CGNSDEL=?**	Response **+CGNSDEL: (1-3)** **OK**
Write Command **AT+CGNSDEL=<mode>**	Response If send ok: **OK** If send false: **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note EPO file path is "C:\user\". Max length of <CmdString> is 258.

Defined Values

<mode>	1 and 2 Reserved 3 EPO file

2.10 AT+CGNSIPR Configure UART2 baud rate

AT+CGNSIPR Configure UART2 baud rate	
Test Command **AT+CGNSIPR=?**	Response **+CGNSIPR:** **(4800,9600,19200,38400,57600,115200,230400,460800)** **OK**
Read Command **AT+CGNSIPR?**	Response **+CGNSIPR: 115200** **OK**
Write Command **AT+CGNSIPR=<IPR>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note This command is used for test.

Defined Values

<IPR>	4800 9600 19200 38400 57600 115200 230400 460800

2.11 AT+CGNSAID Send EPO file to GNSS engine

AT+CGNSAID Send EPO file to GNSS engine	
Test Command **AT+CGNSAID=?**	Response **+CGNSAID: (0-31)(0-1)(0-1)(0-720)** **OK**
Write Command **AT+CGNSAID=<mode>,<time>,<epo>,<Reserved>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note This command is used for test.

Defined Values

<mode>	0-30 Reserved 31 send
<time>	0 Do not synchronize GNSS UTC time 1 Synchronize GNSS UTC time
<epo>	0 Do not synchronize epo file 1 Synchronize epo file
<Reserved>	Reserved

2.12 AT+CRFLOC Give reference location to GNSS engine

AT+CRFLOC Give reference location to GNSS engine	
Test Command **AT+CRFLOC=?**	Response **+CRFLOC: "location"** **OK**
Write Command **AT+CRFLOC="<LAT>,<LON>"**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note This command is used for test.

Defined Values

<LAT>	Latitude
<LON>	Longitude

2.13 AT+CGNSVER Query GNSS version

AT+CGNSVER Query GNSS version	
Execution Command **AT+CGNSVER**	Response **OK** Version1,0000,version2 **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note This command is used for test.

2.14 AT+CGNSSAV Save http data to EPO file

AT+CGNSSAV Save http data to EPO file	
Test Command **AT+CGNSSAV=?**	Response **+CRFLOC:** (list of supported <**mode**>s),(range of supported <**day**>s) **OK**
Write Command **AT+CGNSSAV=<mode>,<day>**	Response **OK** or **ERROR**
Parameter Saving Mode	NO_SAVE
Reference	Note Only support AT+CGNSSAV=3,3

Defined Values

<mode>	0-2 Reserved 3 EPO mode
<day>	EPO file available days 0-31

3 CME Error Code

The following errors are related to GPS. The format is like this: **+CME ERROR: <err>**. The detail error code and description is list in the following table.

Code	Description
895	GNSS baud rate selected by HW
891	GNSS data check sum err

4 AT Commands Examples

Demonstration	Syntax	Expect Result
Turn on GNSS power	AT+CGNSPWR=1	OK
Turn off GNSS power	AT+CGNSPWR=0	OK
Define the last NMEA sentence that parsed	AT+CGNSSEQ="RMC"	OK
Read GNSS navigation information	AT+CGNSINF	+CGNSINF: 1,1,20150327014838.000,31.221783,121.354528,114.600,0.28,0.0,1,,1.9,2.2,1.0,,8,4,,,42,, OK
Set URC reporting every 2(1-255) GNSS fix	AT+CGNSURC=2	OK
Turn off URC reporting	AT+CGNSURC=0	OK
Send Command to GNSS	AT+CGNSCMD=0,"$PMTK000*32"	OK
Send NMEA data to AT UART	AT+CGNSTST=1	OK
Check EPO file property	AT+CGNSCHK=3,1	+CGNSCHK: 3,1,9216,0 OK
Delete EPO file	AT+CGNSDEL=3	+CGNSDEL: 3,1,9216 OK
Configure UART2 baud rate	AT+CGNSIPR=9600	OK
Send EPO file to GNSS engine	AT+CGNSAID=31,1,1	OK
Give reference location to GNSS engine	AT+CRFLOC="31.133300,121.212659"	OK
Query GNSS version	AT+CGNSVER	AXN_3.82_3333_16103100,0000,,1.0*04 OK