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Version History

日期	版本	修改点描述	作者
2014-01-26	1.00	New version	Haibing.chen

Scope

This document describes how to use the AT command about GPS and some application.
Note: The document can apply to SIM808.

1. GPS Introduction

This paper provides information that can be used to implement your GPS application solutions by the SIM808 module. The methods provided will cover the module's circuit connection and how to manage the various accesses to the location data by AT command.

2. AT Commands

SIM808 GPS AT command overview.

Command	Description
AT+CGPSPWR	GPS POWER CONTROL
AT+CGPSRST	GPS RESET MODE (COLD/HOT/WARM)
AT+CGPSINF	GET CURRENT GPS LOCATION INFO
AT+CGPSOUT	GPS NMEA DATA OUTPUT CONTROL
AT+CGPSSTATUS	GPS FIX STATUS

2.1. AT+CGPSPWR GPS Power Control

AT+CGPSPWR GPS Power Control	
Test Command **AT+CGPSPWR=?**	Response **+CGPSPWR: (**list of supported **<mode>**s **)** **OK**
	Parameters See Write Command
Read Command **AT+CGPSPWR?**	Response TA returns the current value of GPS Power Control PIN **+CGPSPWR: <mode>** **OK**
	Parameters See Write Command
Write Command **AT+CGPSPWR=<mode>**	Response GPS POWER CONTROL ON/OFF **OK** or **ERROR** Parameters **<mode>** 0 turn off GPS power supply

	1 turn on GPS power supply

2.2. AT+CGPSRST GPS Reset Mode (COLD /HOT/WARM)

AT+CGPSRST GPS Reset Mode (COLD /HOT/WARM)	
Test Command **AT+CGPSRST=?**	Response **+CGPSRST: (**list of supported **<mode>**s **)** **OK**
	Parameter See Write Command
Read Command **AT+CGPSRST?**	Response TA returns the current value of GPS Reset mode **+CGPSRST: <mode>** **OK**
	Parameter See Write Command
Write Command **AT+CGPSRST=<mode>**	Response GPS MODE RESET Parameters **OK** or **ERROR** **<mode>** 0 reset GPS in COLD start mode; 1 reset GPS in HOT mode 2 reset GPS in WARM mode
Reference	Note: COLD start mode is recommended For first time reset.

2.3. AT+CGPSINF Get Current GPS Location Info

AT+CGPSINF Get Current GPS Location Info	
Test Command **AT+CGPSINF=?**	Response **+CGPSINF : (0,2,4,8,16,32,64,128)** **OK**
	Parameters See Write Command

Write Command **AT+CGPSINF=<mode>**	TA returns the current successful GPS location info. This command should be executed after the GPS locating successfully.
	If **<mode>**equal to 0 : Response **<mode>,<longitude>,<latitude>,<altitude>,<UTC time>,<TTFF>,<num>,<speed>,<course >** **OK** Parameters: **<longitude>** longitude **<latitude>** latitude **<altitude>** altitude **<UTC time>** UTC time The Format is yyyymmddHHMMSS **<TTFF>** time to first fix (in seconds) **<num>** satellites in view for fix **<speed >** speed over ground **<course>** course over ground.
	else if **mode** =2^1, Parameters see Appendix A.1 “$GPGGA”[1]
	else if **mode** =2^2, Parameters see Appendix A.2 “$GPGLL”[1]
	else if **mode** =2^3, Parameters see Appendix A.3 “$GPGSA” [1]
	else if **mode** =2^4, Parameters see Appendix A. 4“$GPGSV” [1][2]
	else if **mode** =2^5, Parameters see Appendix A.5 “$GPRMC” [1]
	else if **mode** =2^6, Parameters see Appendix A.6 “$GPVTG” [1]
	else if **mode** =2^7, Parameters see Appendix A.7 “$GPZDA” [1]
Reference	[1]not including Parameters: “Message ID”, “Checksum” and “ <CR><LF>”; [2] including Parameters: Satellites in View Satellite ID Elevation Azimuth SNR (C/N0) .... Satellite ID Elevation Azimuth SNR (C/N0)

2.4. AT+CGPSOUT GPS NMEA Data Output Control

AT+CGPSOUT GPS NMEA Data Output Control	
Test Command **AT+CGPSOUT=?**	Response **+CGPSOUT : (0-255)** **OK**
	Parameter See Write Command
Read Command **AT+CGPSOUT?**	Response **+CGPSOUT: <mode>** **OK**
	Parameter See Write Command
Write Command **AT+CGPSOUT** **=<mode>**	Control the GPS NMEA information output from AT command UART. Response **OK**
	Parameters **<mode>** If equal to 0: disable GPS NMEA information output from Debug UART; else if bit 1=1, enable NMEA $GPGGA data output, see Appendix A.1[1] bit 2=1, enable NMEA $GPGLL data output, see Appendix A.2[1] bit 3=1, enable NMEA $GPGSA data output, see Appendix A.3[1] bit 4=1, enable NMEA $GPGSV data output, see Appendix A.4 [2] bit 5=1, enable NMEA $GPRMC data output, see Appendix A.5[1] bit 6=1, enable NMEA $GPVTG data output, see Appendix A.6[1] bit 7=1, enable NMEA $GPZDA data output, see Appendix A.7[1] After setting successful, the NMEA information will output from Debug UART, NMEA Format see A Appendix.
Reference	Note Factory setting is "AT+CGPSOUT=0". 255 will allow all NMEA data output from Debug UART.

2.5. AT+CGPSSTATUS GPS Status

AT+CGPSSTATUS GPS Status	
Test Command **AT+CGPSSTATUS=?**	Response **+CGPSSTATUS:** (list of supported < **status** >s) **OK**
	Parameter See Read Command
Read Command **AT+CGPSSTATUS?**	Response **+CGPSSTATUS: <status>** **OK**
	GPS Fix Status Parameters **<status>** is a string value "Location Unknown": if GPS is not run "Location Not Fix": after GPS is run ,and haven't fixed "Location 2D Fix" : after GPS status is 2D fixed "Location 3D Fix" : after GPS status is 3D fixed
Reference	Note

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
890	GPS not running
891	GPS is running
892	GPS is fixing

4. Examples

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

Grammar	Description
AT+CGPSPWR=1 OK	Open GPS
AT+CGPSSTATUS? +CGPSSTATUS: Location 3D Fix OK	Read the GPS fix status GPS has fixed with 3D status
AT+CGPSINF=0 0,3113.317683,12121.244232,51.563730,01140027022006.085,16,13,0.072580,0.000000 OK	Read GPS information
AT+ CGPSOUT =8 OK $GPGSA,A,3,02,09,05,193,29,08,26,15,04,07,10,,1.62,0.95,1.31*3C $GPGSA,A,3,02,09,05,193,29,08,26,15,04,07,10,,1.62,0.95,1.31*3C	GPS NMEA data output from AT uart
AT+CGPSRST=0 OK $GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30 …… $GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,99.99*30 $GPGSA,A,3,02,15,10,05,26,09,29,04,07,,,,1.27,0.95,0.84*01	RESET GPS(COLD Start)
AT+CGPSRST=1 OK $GPGSA,A,1,,,,,,,,,,,,,99.99,99.99,1.00*01 $GPGSA,A,3,193,02,05,26,29,15,10,09,04,08,07,,1.23,0.93,0.80*34	RESET GPS(HOT Start)
AT+CGPSPWR=0 OK	Close GPS

Appendix

A NMEA Format Tables

Message ID GGA: Global Positioning System Fixed Data

Table 5-1 Global Positioning System Fixed Data

Name	Example	Unit	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	2153.000		hhmmss.sss
Latitude	3342.6618		ddmm.mmmmmm
N/S Indicator	N		N=north or S=south
Longitude	11751.3858		dddmm.mmmmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		
Satellites Used	10		Range 0 to 12
HDOP	1.2		Horizontal Dilution of Precision
MSL Altitude	27.0	meters	
Units	M	meters	
Geoid Separation	-34.2	meters	Geoid-to-ellipsoid separation. Ellipsoid altitude = MSL Altitude + Geoid Separation.
Units	M	meters	
Age of Diff. Corr.		sec	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*5E		
<CR><LF>			End of message termination

Table 5-2 Position Fix Indicator Value

Position Fix Indicator Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid

Message ID GLL: Geographic Position - Latitude/Longitude

Table 5-3 Geographic Position - Latitude/Longitude

Name	Example	Unit	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmmmm
E/W Indicator	W		E=east or W=west
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Mode	A		A=Autonomous, D=DGPS, E=DR, N = Output Data Not Valid R = Coarse Positionx
Checksum	*41		
<CR><LF>			End of message termination

Note:

1. Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

Message ID GSA: GNSS DOP and Active Satellites

Table 5-4 GNSS DOP and Active Satellites

Message ID	$GPGSA	GSA protocol header
Mode 1	A	See Table A-5
Mode 2	3	See Table A-6
Satellite used in solution.[1]	07	SV on Channel 1
Satellite Used[1]	02	SV on Channel 2
....		....
Satellite Used[1]	12	SV on Channel 12
PDOP[2]	1.8	Position Dilution of Precision
HDOP[2]	1.0	Horizontal Dilution of Precision
VDOP[2]	1.5	Vertical Dilution of Precision
Checksum	*33	
<CR><LF>		End of message termination

Note:

1. Satellite used in solution.
2. Maximum DOP value reported is 50. When 50 is reported, the actual DOP may be much larger.

Table 5-5 Mode 1 Value

Mode 1 Value	Description
M	Manual – Forced to operate in 2D or 3D mode
A	2D Automatic – Allowed to automatically switch 2D/3D

Table 5-6 Mode 2 Value

Mode 2 Value	Description
1	Fix not available
2	2D Fix (<4 SVs used)
3	3D Fix (>3 SVs used)

Message ID GSV: GNSS Satellites in View

Table 5-7 GNSS Satellites in View

Name	Example	Unit	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages	2		Total number of GSV messages to be sent in this group
Message Number1	1		Message number in this group of GSV messages
Satellites in View1	07		
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
....			....
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR><LF>			End of message termination

Note:

1. Depending on the number of satellites tracked, multiple messages of GSV data may be required. In some software versions, the maximum number of satellites reported as visible is limited to 12, even though more may be visible.1

Message ID RMC: Recommended Minimum Specific GNSS Data

Table 5-8 Recommended Minimum Specific GNSS Data

Name	Example	Unit	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	161229.5		hhmmss.sss
Status[1.]	A		A=data valid or V=data not valid
Latitude	3723.248		ddmm.mmmmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.34		dddmm.mmmmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	TRUE
Date	120598		ddmmyy
Magnetic Variation[2]		degrees	E=east or W=west
East/West Indicator[2]	E		E=east
Mode	A		A=Autonomous, D=DGPS, E=DR, N = Output Data Not Valid R = Coarse Position
Checksum	*10		
<CR><LF>			End of message termination

Note:

1. A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met the solution will be marked as invalid.
2. SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions relative to true North.
3. Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

Message ID VTG: Course Over Ground and Ground Speed

Table 5-9 Course Over Ground and Ground Speed

Name	Example	Unit	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		TRUE
Course		degrees	Measured heading
Reference	M		Magnetic
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A=Autonomous, D=DGPS, E=DR, N = Output Data Not Valid R = Coarse Position
Checksum	*23		
<CR><LF>			End of message termination

Note:

1. All “course over ground” data are geodetic WGS-84 directions.

Message ID ZDA: Time & Date

Table 5-10 Time & Date

Name	Example	Unit	Description
Message ID	$GPZDA		ZDA protocol header
UTC time	181813	hhmmss	The UTC time units are: hh = UTC hours from 00 to 23 mm = UTC minutes from 00 to 59 ss = UTC seconds from 00 to 59 Either using valid IONO/UTC or estimated from default leap seconds
Day	14		Day of the month, range 1 to 31
Month	10		Month of the year, range 1 to 12
Year	2003		1980 to 2079
Local zone hour		hour	Offset from UTC (set to 00)
Local zone minutes[1]		minute	Offset from UTC (set to 00)
Checksum	*4F		
<CR><LF>			End of message termination

Note:

1. Not supported. Reported as 00.

B Related Documents

SN	Document name	Remark
[1]	SIM800 Series_AT Command Manual	

C Terms and Abbreviations

Abbreviation	Description

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