

GSM/GPS Bring-up Communication

Communication with the GSM/GPS module SIM808 is available through basic 2 wire serial communication, mostly known as Universal asynchronous receiver-transmitter (UART), using AT commands. The module will always respond with either OK and the necessary information or ERROR if there is a problem with the command.

The syntax of an AT command is “AT+<command>”, and there are three types of AT commands:

1. Test Command (AT+<command>=?) in which the SIM808 module responds with the list of available options that can be set within that command.

Example for the CEER command:

3.2.7 AT+CEER Extended Error Report

AT+CEER Extended Error Report	
Test Command AT+CEER=?	Response +CEER: (list of supported <n>s) OK

```
AT+CEER=?  
+CEER: (0-1)  
  
OK
```

The response lists the available settings for that command (in this case 0 or 1)

2. Read command (AT+<command>?), which has the role to respond with the current state of the command.

Read Command AT+CEER?	Response +CEER: <n> OK
	Parameters See Write Command

```
AT+CEER?  
+CEER: 0
```

OK

In this case, the current state is 0.

3. Execution command(AT+<command>=x) where x is the setting that the user wants to set.
For the CEER command we can execute AT+CEER=1 which will set it to 1 instead of 0.

The communication will be automated through the AVR128DA48 microcontroller in which we will perform the following procedures:

- GPS Coordinates interrogation
- SMS GPS Data Transfer
- Module Sleep Mode
- Module wake up

Module Sleep Mode

4.3.2 Sleep Mode (AT+CSCLK=1)

When the GPS function is shut off, user can control SIM808 module to enter or exit the sleep mode (AT+CSCLK=1) by DTR signal. When DTR is in high level and without interrupt (on air and hardware such as GPIO interrupt or data in serial port), SIM808 will enter sleep mode automatically. In this mode, SIM808 can still receive paging or SMS from network but the serial port is not accessible.

In order for the module to enter sleep mode, we have to turn off the GPS function first.

This is performed with the AT+CGPSPWR command.

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

After we turned off GPS functionality, we can then set AT+CSCLK=1 command and then the module will wait for the DTR pin to be pulled low in order to enter sleep mode.

In addition to these commands, we will also use the AT+CFUN=0 command in order to ensure minimum functionality and turn off the GSM antenna during sleep.

4.3.1 Function Mode

There are three functionality modes, which could be set by the AT command "AT+CFUN=<fun>". The command provides the choice of the functionality levels <fun>=0, 1, 4.

- AT+CFUN=0: minimum functionality.
- AT+CFUN=1: full functionality (default).
- AT+CFUN=4: flight mode (disable RF function).

Table 8: The current consumption of function modes (BS-PA-MFRMS=5)

<Fun>	Current consumption(uA) (CSCLK=1)
0	869.5
1	1400
4	922.5

Minimum functionality mode minimizes the current consumption to the lowest level. If SIM808 is set to minimum functionality by "AT+CFUN=0", the RF function and SIM card function will be disabled. In this case, the serial port is still accessible, but all AT commands correlative with RF function and SIM card function will not be accessible.

```
COM4
AT+CGPSPWR=0
OK
AT+CFUN=0
+CPIN: NOT READY

OK
AT+CSCLK=1
OK
```

Alternatively we can power off the module entirely during sleep mode using the PWKEY pin or the AT+CPOWD=1 Command.

6.2.2 AT+CPOWD Power off

AT+CPOWD Power Off	
Write Command AT+CPOWD=<n> >	Response [NORMAL POWER DOWN] Parameter <n> 0 Power off urgently (Will not send out NORMAL POWER DOWN) 1 Normal power off (Will send out NORMAL POWER DOWN)
Parameter Saving Mode	NO_SAVE
Max Response Time	-
Reference	Note

Module Wake up

4.3.3 Wake Up SIM808 from Sleep Mode (AT+CSCLK=1)

When SIM808 is in sleep mode (AT+CSCLK=1), the following methods can wake up the module:

- Pull down DTR pin.
The serial port will be active after DTR pin is pulled to low level for about 50ms.
- Receive a voice or data call from network.
- Receive a SMS from network.
- Receive external interrupt
- Charge VBUS pin

To wake up the module we have to pull low the DTR level for at least 50ms. After that we can return to full functionality with AT+CFUN command and turn on the GPS module with the AT+CGPSPWR command.

```
AT+CFUN=1
+CPIN: READY
```

OK

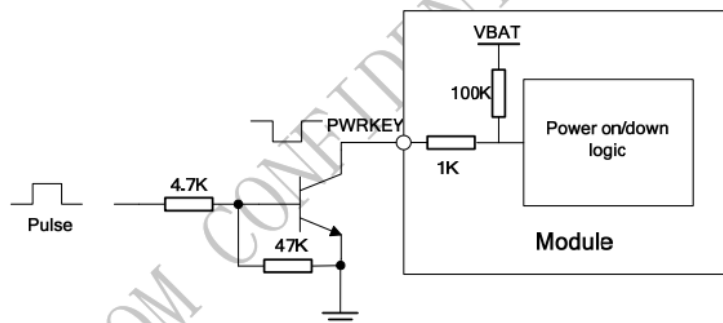
SMS Ready

```
Call Ready
AT+CGPSPWR=1
OK
```

Alternatively, if the module was turned off, we turn it on using the PWKEY pin.

4.2.1.1 Turn on SIM808 Using the PWRKEY Pin (Power on)

User can power on SIM808 by pulling down the PWRKEY pin for at least 1 second and release. This pin is already pulled up to VBAT in the module internal, so external pull up is not necessary. Reference circuit is shown as below.



GPS Coordinates Interrogation

To receive the GPS coordinates we have to make sure the GPS is turned on. After that, we use the AT+CGPSOUT command to receive the GPS data in GPGLL format.

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.

If this setting is non-zero, the module will send data once every second through the UART channel. To stop the data transmission, we set this setting to 0. Using this command we can fill a buffer with the GPGLL data and parse it afterwards.

17:17:11.938 -> AT+CGPSPWR=1
17:17:11.938 -> OK
17:17:14.930 -> AT+CGPSOUT=2
17:17:14.964 -> OK
17:17:15.066 -> \$GPGGA,000506.262,,,,,0,0,,,M,,M,,*4D
17:17:16.053 -> \$GPGGA,000507.262,,,,,0,0,,,M,,M,,*4C
17:17:17.069 -> \$GPGGA,000508.262,,,,,0,0,,,M,,M,,*43
17:17:18.053 -> \$GPGGA,000509.262,,,,,0,0,,,M,,M,,*42
17:17:19.039 -> \$GPGGA,000510.262,,,,,0,0,,,M,,M,,*4A
17:17:20.059 -> \$GPGGA,000511.262,,,,,0,0,,,M,,M,,*4B
17:17:20.229 -> AT+CGPSOUT=0
17:17:20.263 -> OK

SMS GPS Data Transfer

In order to send data we first have to make sure the SIM card is being read by the module. For that we can use the AT+CPIN? command

```
at+cpin?  
+CPIN: READY  
  
OK
```

After that we have to set the SMS mode to text mode.

20.7 SMS Commands

Demonstration	Syntax	Expect Result
Set SMS system into text mode, as opposed to PDU mode.	AT+CMGF=1	OK

Afterward we use the AT+CMGS command to send the actual text message. First, we send AT+CMGS="<phone number>" in order to store the phone number that will receive the message.

After that we send the actual text message. To end the text message we have to finish our text with the CTRL+Z character (26 in ASCII).

```
AT+CMGF=1  
OK  
AT+CMGS="+40769297780"  
> Message from SIM808 Module  
>  
>  
+CMGS: 67  
OK
```


4.2.5 **AT+CMGS** Send SMS Message

AT+CMGS Send SMS Message	
Test Command AT+CMGS=?	Response OK
Write Command 1) If text mode (+CMGF=1): +CMGS=<da>[,<toda>] <CR>text is entered <ctrl-Z/ESC> ESC quits without sending 2) If PDU mode (+CMGF=0): +CMGS=<length> > <CR>PDU is given <ctrl-Z/ESC>	Parameters <da> GSM 03.40 TP-Destination-Address Address-Value field in string format(string should be included in quotation marks); BCD numbers (or GSM default alphabet characters) are converted to characters of the currently selected TE character set (specified by +CSCS in 3GPP TS 27.007); type of address given by <toda> <toda> GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129) <length> Integer type value (not exceed 160 bytes) indicating in the text mode (+CMGF=1) the length of the message body <data> (or <cdata>) in characters; or in PDU mode (+CMGF=0), the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length) Response TA sends message from a TE to the network (SMS-SUBMIT). Message reference value <mr> is returned to the TE on successful message delivery. Optionally (when +CSMS <service> value is 1 and network supports) <scts> is returned. Values can be used to identify message upon unsolicited delivery status report result code. 1) If text mode(+CMGF=1) and sending successful: +CMGS: <mr> OK 2) If PDU mode(+CMGF=0) and sending successful: