ADH Technology Co. Ltd.

GSM/GPRS Module

Software Development Guide
\(<V1.31>\)

ADH Technology Co. Ltd.
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# Revision History

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>V1.0</td>
<td>2008/8/28</td>
<td>- Introduce AT commands step by step for phone call, SMS, TCP/UDP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Introduce sample code for phone call, SMS, TCP/UDP</td>
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<tr>
<td>V1.1</td>
<td>2008/9/1</td>
<td>- Add important steps and notes for using TCP/UDP</td>
</tr>
<tr>
<td>V1.2</td>
<td>2008/9/8</td>
<td>Add Notice</td>
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<tr>
<td>V1.3</td>
<td>2008/10/1</td>
<td>Insert AT+CSCA? before send SMS with PDU mode</td>
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<tr>
<td>V1.4</td>
<td>2008/12/03</td>
<td>Change +CMGR to +CMGL for list SMS function</td>
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**Make a voice call**

**Initial Setting**

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<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Open Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AT+CPIN?</td>
<td>Confirm SIM Card Status</td>
<td>+CPIN: READY</td>
</tr>
<tr>
<td>3</td>
<td>AT+CSQ</td>
<td>Request signal status. “5” is current signal quality. “31” is maximum value. “99” means no service. Please wait for 10 seconds to query after module is turned on.</td>
<td>+CSQ: 5,99</td>
</tr>
</tbody>
</table>

Ps: Initial Setting is essential!

**Case1 Normal**

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ATD9xxxxxxx;</td>
<td>Make a voice call. It's required to end with “;”</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ATH</td>
<td>Hang up the call</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Case2 Extension**

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ATDxxxxxxx;</td>
<td>xxxx as the main number</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AT+VTS=&quot;4&quot;;+VTS=&quot;8&quot;;+VTS=&quot;7&quot;;+VTS=&quot;3&quot;</td>
<td>In this example, the extension number is &quot;4873&quot;.</td>
<td>OK</td>
</tr>
<tr>
<td>3</td>
<td>ATH</td>
<td>Hang up</td>
<td>OK</td>
</tr>
</tbody>
</table>
Sample code

```java
private System.IO.Ports.SerialPort m_ComPort; //use comport
String m_ATCmd = String.Empty;
String ATCmd = String.Concat(m_ATCmd, "AT+CPIN?\r\n");
try {
    if (m_ComPort.IsOpen) {
        m_ComPort.WriteTimeout = 300;
        m_ComPort.Write(ATCmd);
        MessageBox.Show("Send Check SIM Card Status CMD OK");
    }
} catch (Exception texp) {
    MessageBox.Show("Send SIM Card Status CMD Error", texp.Message);
}
```

* "AT+CPIN?\r\n" AT+CPIN? In the quotation can be replaced with other AT Command,

* When making a phone call to "0912345678", please use "ATD0912345678;"
Send SMS

**Case1 text mode**

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CMGF=1</td>
<td>Set to “text mode”</td>
<td>OK</td>
</tr>
<tr>
<td>2</td>
<td>AT+CMGS=&quot;09xxxxxxxx&quot;</td>
<td>Set receiving number</td>
<td>&gt;</td>
</tr>
<tr>
<td>3</td>
<td>GOOD LUCK</td>
<td>Enter message content</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Press Control-Z</td>
<td>Termination character</td>
<td>+CMGS: 78 OK</td>
</tr>
</tbody>
</table>

**Case2 PDU mode**

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CMGF=0</td>
<td>Set to PDU mode</td>
<td>OK</td>
</tr>
<tr>
<td>2</td>
<td>AT+CSQA?</td>
<td>Query service center address</td>
<td>+CSQA: &quot;+886935874 443&quot;,145</td>
</tr>
<tr>
<td>3</td>
<td>AT+CMGS=23</td>
<td>23 bytes</td>
<td>&gt;</td>
</tr>
<tr>
<td>4</td>
<td>0011000C91889611151 0270000AA0AE8329BF D497D9EF37</td>
<td>Message content in PDU code: hellohello Red characters are recipient phone number: Swap 886911510172 by every two digits to become “889611151027” then to be entered in the red part of the sentence. PDU coding reference: <a href="http://www.dreamfabric.com/sms/">http://www.dreamfabric.com/sms/</a></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Press Control-Z</td>
<td>Termination character</td>
<td>+CMGS: 78 OK</td>
</tr>
</tbody>
</table>
## Retrieve SMS

### Case 1 Retrieve single SMS

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CMGR=5</td>
<td>Retrieve a specific number of SMS (e.g. number 5 SMS). It needs to be executed at text mode</td>
<td>+CMGR: &quot;REC READ&quot;,&quot;+886911510172&quot;,&quot;&quot;,&quot;08/08/13,16:33:17+32&quot; hold on 002?0911-921253? OK</td>
</tr>
</tbody>
</table>

### Case 2 Retrieve all SMS

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CMGL=&quot;ALL&quot;</td>
<td>Needs to be implemented at text mode</td>
<td>All SMS message in SIM card will be listed ...</td>
<td></td>
</tr>
</tbody>
</table>

### Case 3 Retrieve SMS upon reception

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CNMI=2,1,0,0,0</td>
<td>At this mode, SMS will be stored into SIM card at reception. User can set not to store SMS message by: AT+CNMI=2,2,0,0,0</td>
<td>+CNMI: 2,1,0,0,0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Automatic retrieving SMS message upon reception</td>
<td>+CMTI:&quot;SM&quot;,11 AT+CMGR=11 +CMGR=&quot;REC READ&quot;,&quot;+886911510172&quot;,&quot;&quot;,&quot;08/08/13,16:39:17+32&quot;nice?0911-921253?</td>
</tr>
</tbody>
</table>
Sample code (for text mode)

```java
private: System::IO::Ports::SerialPort ^ComPort; //use comport

"AT+CMGF=1"
String ^StrCMGF = String::Empty;
StrCMGF = String::Concat(StrCMGF, "AT+CMGF=1");
StrCMGF = String::Concat(StrCMGF, ";");
StrCMGF = String::Concat(StrCMGF, ";");
try {
    if (ComPort->IsOpen) {
        ComPort->WriteTimeout = 300;
        ComPort->Write(StrCMGF);
        MessageBox::Show("CMGF=1 OK");
    }
} catch (Exception^ ex) {
    MessageBox::Show(ex->Message, "CMGF=1 Error");
}

"AT+CMGS="number"
String ^SMSSender = String::Empty;
SMSSender = String::Concat(SMSSender, "AT+CMGS=");
SMSSender = String::Concat(SMSSender, "0912345678");
//change 0912345678 to the phone number you will send to
SMSSender = String::Concat(SMSSender, "\r\n\r\n");
try {
    if (ComPort->IsOpen) {
        ComPort->WriteTimeout = 300;
        ComPort->Write(SMSSender);
        MessageBox::Show("Send Short Message OK");
    }
} catch (Exception^ ex) {
    MessageBox::Show(ex->Message, "Send Short Message Error");
}

"Send Content"
String ^SMSCContent = String::Empty;
SMSCContent = String::Concat(SMSCContent, "xxx");
//change xxx to the content you will send
SMSCContent = String::Concat(SMSCContent, "\x1a"); //Control-Z
try {
    if (ComPort->IsOpen) {
        ComPort->WriteTimeout = 300;
        ComPort->Write(SMSSender);
        MessageBox::Show("Send Content Message OK");
    }
} catch (Exception^ ex) {
    MessageBox::Show(ex->Message, "Send Content Error");
}
```
## TCP

<table>
<thead>
<tr>
<th>STEP</th>
<th>COMMAND</th>
<th>COMMENT</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CPIN?</td>
<td>Confirm SIM Card Status</td>
<td>+CPIN: READY</td>
</tr>
<tr>
<td>2</td>
<td>AT+CSQ</td>
<td>Check signal status</td>
<td>+CSQ: 5,99</td>
</tr>
<tr>
<td>3</td>
<td>AT+CREG=1</td>
<td>Show status of network registration</td>
<td>OK</td>
</tr>
<tr>
<td>4</td>
<td>AT+CREG?</td>
<td>Check status of network registration</td>
<td>+CREG: 1,1</td>
</tr>
<tr>
<td>5</td>
<td>ATE0</td>
<td>Switch off echo</td>
<td>OK</td>
</tr>
<tr>
<td>6</td>
<td>AT+APOCON=“INTERNET”</td>
<td>Attach to internet</td>
<td>+APOCON: &quot;INTERNET&quot;, &quot;,&quot;, &quot;</td>
</tr>
<tr>
<td>7</td>
<td>AT+AIPA=1</td>
<td>Connect to designated IP address</td>
<td>AIPA:1,221,120,6,14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7,5</td>
</tr>
<tr>
<td>8</td>
<td>AT+AIPA=1,&quot;,xxx.xxx.xxx.xxx.xx&quot;, 10000,0</td>
<td>Open socket ID 1, connect to server at given IP 10000 is port number, 0 is tcp mode</td>
<td>(tcpP)bsd_connect timeout=30000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+AIPA: 1,63934,&quot;xxx.xx x.xxx.xxx&quot;,10000,0,0</td>
</tr>
<tr>
<td>9</td>
<td>AT+AIPW=1,&quot;414243&quot;</td>
<td>Write &quot;ABC&quot; in ASCII code</td>
<td>+AIPW: 1,0,7300,5840,3,0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+AIPRTCP: 1,0,7300,5840,3,&quot;414243&quot;</td>
</tr>
<tr>
<td>10</td>
<td>AT+AIPC=1</td>
<td>Close socket ID 1</td>
<td>+AIPC: 1</td>
</tr>
<tr>
<td>11</td>
<td>AT+AIPA=0</td>
<td>Disconnect</td>
<td>AIPA: 0,307</td>
</tr>
</tbody>
</table>

- You can use "AT+CPIN?" and "AT+CSQ" to check if the module is ready or not. Alternatively, you can also use "+CREG" to check module readiness. Once you use "AT+CREG=1" command to display module status, you will get "+CREG: 1" every time when module is initiated.
- Please use "ATE0" to switch off echo message before using the TCP/UDP commands.

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AT+CPIN?</td>
<td>Confirm SIM Card Status</td>
<td>+CPIN: READY</td>
</tr>
<tr>
<td>2</td>
<td>AT+CSQ</td>
<td>Acquire signal status</td>
<td>+CSQ: 5,99</td>
</tr>
<tr>
<td>3</td>
<td>AT+CREG=1</td>
<td>Show status of network registration</td>
<td>OK</td>
</tr>
<tr>
<td>4</td>
<td>AT+CREG?</td>
<td>Check status of network registration</td>
<td>+CREG: 1,1</td>
</tr>
<tr>
<td>5</td>
<td>ATE0</td>
<td>Switch off echo</td>
<td>OK</td>
</tr>
<tr>
<td>6</td>
<td>AT+AIPOCNT=&quot;INTERNET&quot;</td>
<td>Connect to internet</td>
<td>+AIPOCNT: &quot;INTERNET&quot;, &quot;&quot;, &quot;&quot;</td>
</tr>
<tr>
<td>7</td>
<td>AT+AIPA=1</td>
<td>Connect to a given IP address</td>
<td>+AIPA: 1,221.120.6.14</td>
</tr>
<tr>
<td>8</td>
<td>AT+AIPO=1,&quot;xxx.xx.xxx.xxx&quot;,12000,1</td>
<td>Open socket ID 1, connect to server at given IP, 12000 is port number, 1 is UDP mode</td>
<td>+AIPO: 1,0,&quot;xxx.xxx.xxx.xxx&quot;,12000,1</td>
</tr>
<tr>
<td>9</td>
<td>AT+AIPW=1,&quot;414243&quot;</td>
<td>Write &quot;ABC&quot; ASCII code</td>
<td>+AIPW: 1,1,0,0,3 OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+AIPRUDP: 1,1,0,0,3,&quot;414243&quot;</td>
</tr>
<tr>
<td>10</td>
<td>AT+AIPC=1</td>
<td>Close socket ID 1</td>
<td>+AIPC: 1</td>
</tr>
<tr>
<td>11</td>
<td>AT+AIPA=0</td>
<td>Disconnect</td>
<td>+AIPA: 0,307</td>
</tr>
</tbody>
</table>
Sample code
* The code of checking comport readiness is omitted here. User needs to add these codes before connection.
* Comport.write(szCommands) and Comport.read(szResponse) are pre-defined functions, aiming to write and read comport.

* Initialization

```c
// Check if connect to GSM/GPRS module with UART
char szCommands [] = "AT\r\n";
// before send command, you had better to check if the ComPort is ready on not first
Comport.write(szCommands);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // Connected to GSM/GPRS MODULE successfully, and the system start
}

// Check if GSM/GPRS module is ready to work (have attached system network service).
char szCommands [] = "AT+CQIN";
Comport.write(szCommands);
Comport.read(&szResponse);
if ( GetATCQINValue(szResponse) != 99 ) {
    // Range value of response "+CQIN" message is 0 to 31.
    char szCommands [] = "AT+ATEO\r\n";
    Comport.write(szCommands);
    char szCommands [] = "AT+CQIN=1\r\n";
    Comport.write(szCommands);
}
char szCommands [] = "AT+CREG=1\r\n";
Comport.write(szCommands);
Comport.read(&szResponse);
if ( GetATCREGValue(szResponse) == "CREG 1,1" ) {
    // GSM/GPRS module have attached to network.
}
```

* set GPRS service parameter

```c
char szCommands [] = "AT+APCON=\Internet\r\n";
Comport.write(szCommands);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // APN parameter has been set.
}
```

* Attach GPRS network

```c
char szCommands [] = "AT+AIP=1\r\n";
Comport.write(szCommands);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module has attached to GPRS network.
}
```
* Make a Connection
In this example, socket ID 1 is open and the module is connected to server IP
UDP connection (UDP mode=1), port number is 12000,
TCP mode=0, port number is 10000

Note TCP & UDP connections cannot be connected to socket ID 1 at the same time.

UDP:
char szCommandUDPs [] = "AT+AIPO=1,1,203.160.252.541:12000,1\n\n";
Comport.write(szCommandUDPs);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module has create UDP socket, and ready to send data with UDP socket.
}

TCP:
char szCommandTCPs [] = "AT+AIPO=1,1,203.160.252.541:10000,0\n\n";
Comport.write(szCommandTCPs);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module has established TCP connect to remote server and the connection is ready.
}

* Send data
char szCommandData [] = "AT+AIPO=1,565565660\n\n";
Comport.write(szCommandData);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module has send data to remote server with this socket ID
}

* Close socket ID 1
char szCommand [] = "AT+AIPO=1\n\n";
Comport.write(szCommand);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module close this connection for TCP or socket fot UDP
}

* Detach GPRS network
char szCommand [] = "AT+AIPO=0\n\n";
Comport.write(szCommand);
Comport.read(&szResponse);
if ( szResponse == "OK" ) {
    // GSM/GPRS module has detached GPRS network.
}
Notice

- When using this module to connect to network through GPRS with 3rd party software, the 3rd party software might send commands to change value setting without user’s notice. For example, while using Windows to connect to the Internet through GSM module, the software resets ATE/ATS0/ATV/CMGF setting to factory default value.
- Before using MCU or other method to send the AT command to module, it’s set ATE0 first to turn off the echo message.
- In order to prevent conflict between AT commands and response messages, it’s highly recommended to send succeeding AT command after receiving the response (i.e., “OK”) of previous AT command.
- When the system reboots due to unexpected interruption, a response error message will be sent from the system. It’s recommended to ignore that message.
Appendix A

Setup up GPRS dialup connection in Windows

Step 1) From Menu Start, Setting, Control Panel, select Phone and Modem Options.

Note:
If “Standard 56000bps V60 Modem COM1” not available then:
  a) Add...
  b) Select “Don’t detect my modem; I will select it from a list”

  c) Select “Standard modem type: Standard 56000 bps V60 Modem”
d) Select “COM 1”

NOTE: If “COM 1” not available the check no other program is using COM1 port.
Step 1.1) With the following properties:

Note: Check carefully the speed!

Step 1.2) Menu Diagnostics:

Step 1.3) Menu Advanced has to be set depending on the network:
For SFR: at+csgdcont=1,"IP","wbshfr" For Orange:
   at+csgdcont=1,"IP","orange.fr" For China Mobil:
   at+csgdcont=1,"IP","cmnet" For KGT:
   at+csgdcont=1,"IP","internet" For CHT:
   at+csgdcont=1,"IP","wappie"

**Note:** Do NOT copy the above text. Retype it directly into the window as the font can cause a problem.

![Modem Properties Window](image)

Step 1.3.1) Check the “Change Default Preferences”: 
Note: Check the port speed:

Step 1.3.2) And check menu Advance
Step 2) From Menu Start, Settings, Network and Dial Up Connections, Make a New Connection

New Connection Wizard

Welcome to the New Connection Wizard
This wizard helps you:
- Connect to the Internet.
- Connect to a private network, such as your workplace network.

To continue, click Next.

New Connection Wizard

Network Connection Type
What do you want to do?

- Connect to the Internet
  Connect to the Internet so you can browse the Web and read email.

- Connect to the network at my workplace
  Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.

- Set up an advanced connection
  Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.
Getting Ready
The wizard is preparing to set up your Internet connection.

How do you want to connect to the Internet?

- Choose from a list of Internet service providers (ISPs)
- Set up my connection manually
  For a dial-up connection, you will need your account name, password, and a phone number for your ISP. For a broadband account, you won't need a phone number.
- Use the CD I got from an ISP

Internet Connection
How do you want to connect to the Internet?

- Connect using a dial-up modem
  This type of connection uses a modem and a regular or ISDN phone line.
- Connect using a broadband connection that requires a user name and password
  This is a high-speed connection using either a DSL or cable modem. Your ISP may refer to this type of connection as PPPoE.
- Connect using a broadband connection that is always on
  This is a high-speed connection using either a cable modem, DSL, or LAN connection. It is always active and doesn’t require you to sign in.
New Connection Wizard

Select a Device
This is the device that will be used to make the connection.

You have more than one dial-up device on your computer.
Select the devices to use in this connection:

- □ Modem - Conexant D480 MDC V.92 Modem (COM3)
- □ Modem - Standard 56000 bps Modem (COM1)

Next > Cancel

New Connection Wizard

Connection Name
What is the name of the service that provides your Internet connection?

Type the name of your ISP in the following box.
ISP Name

The name you type here will be the name of the connection you are creating.

Next > Cancel
New Connection Wizard

Phone Number to Dial

What is your ISP's phone number?

Type the phone number below.

Phone number:

You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.

< Back  Next >  Cancel

New Connection Wizard

Connection Availability

You can make the new connection available to any user or only to yourself.

A connection that is created for your use only is saved in your user account and is not available unless you are logged on.

Create this connection for:

- [ ] Anyone's use
- [x] My use only

< Back  Next >  Cancel
Step 3) From Menu Start, Setting, Network connections, GPRS: Note: Local Area should be disable and also any other network/connection

Step 4) Double click Connect GPRS:
Step 4.1) Check the properties:

Note:
For GPRS, set phone number as '*98*1#'
For GSM, set the phone number as 17201

Note: Check the Maximum speed (bps):

Note: For SSME, ‘Enable hardware flow control’ should be cancelled!
Step 4.2) Back to menu GPRS, check Options:

Step 4.2.1) Check menu X.25, which will be not active:
Step 4.3) Back to menu GPRS, check Security:

Step 4.4) Back to menu GPRS, check Networking:

Step 4.4.1) Check the Setting of PPP:
Step 4.4.2) And check the Properties of Internet Protocol TCP/IP
Step 4.4.2.1) Menu Advanced:
The check of the Setting is finished. After the mobile is switched on and it attached GPRS, you can try the connection described above.

Step 4.6) Back in Connect GPRS window.
Notes 1:
If GPRS: User name: empty Password: empty
If GSM: User name: 172 Password: 172
Click Dial to make a connection.