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SKU:TEL0182

Introduction

The SIM7070G is a globally compatible NBIoT communication module. It not only supports CAT-M, NBIoT, GSM, GPRS, EDGE communication and GNSS satellite positioning, but also features low power consumption with a total device power consumption of only 14mA in sleep mode and 40mA in idle mode.

This ultra-low power consumption characteristic, along with the support for CAT-M and GNSS satellite positioning, makes this product ideal for communication in scenarios such as smart logistics, asset tracking, smart cities, agriculture, forestry, etc.

Furthermore, the Gravity communication module based on SIM7070G supports the UART Gravity PH2.0-4P communication interface and USB2.0 interface. This facilitates the use of the module for communication between MCUs, PCs, industrial computers, development boards, etc.

The SIM7070G is equipped with a rich set of built-in AT commands and provides detailed user manuals and application documents, including usage methods for network communication protocols such as HTTP, MQTT, FTP, CoAP, NIDD, PING, etc. There is no need to learn and develop complex underlying network protocols, it is ready to use out of the box.

Every country or region has strict control over wireless communication devices, and products must have relevant certifications. The SIM7070G has obtained relevant certifications in most countries or regions worldwide, specifically:

- Anatel: Brazil Telecommunication Equipment Certification
- AT&T: AT&T Certification
- CCC: China Compulsory Certification
- CE: European CE Certification
- UKCA: UK Conformity Assessed Certification
- FCC: Federal Communications Commission Certification
- GCF: Global Certification Forum
- IC: Canadian Telecommunication Equipment Certification
- JATE: Japanese Industrial Standards Certification
- TA: China Radio Transmission Certification
- NCC: Taiwan Telecommunications Terminal Certification
- KC: Korea Certification
- PTCRB: PTCRB Certification Organization
- RCM: Australia New Zealand Compliance Certification
- REACH: European Chemicals Certification
- RoHS: European Environmental Certification
- TELEC: Japanese Telecommunication Equipment Certification
- T-mobile: T-mobile Mobile Communication Service Provider Certification

- US Cellular: US Cellular Mobile Communication Service Provider Certification
- Verizon: Verizon Mobile Communication Service Provider Certification
- Deutsche Telekom: German Telecommunication Certification

With the testing and certification from the above-mentioned agencies, the SIM7070G can be confidently used in products or projects without worrying about compliance issues.

Features

- Supports global frequency bands for NBIoT
- Supports CAT-M communication
- Supports GNSS satellite positioning
- Built-in AT commands, eliminating the need for lower-level development
- Communication via both UART and USB interfaces
- Supports adaptive common baud rates: 9600/19200/38400/57600/115200 bps
- Baud rate support range: 300bps-3686400bps
- Compatible with both 3.3V and 5V levels
- Comprehensive certifications

Application

- Logistics and Supply Chain Management
- Smart street lighting, sewage detection, environmental monitoring, and other urban monitoring activities

Specification

Power Supply

- Supply Voltage: 3.3V-5V
- Device Current Consumption: Approximately 40mA (Idle Mode)
- Current Consumption in Low Power Mode: Approximately 14mA
- GSM/GPRS Power Levels:
  - GSM850: 4 (2W)
  - EGSM900: 4 (2W)
  - DCS1800: 1 (1W)
  - PCS1900: 4 (1W)
- EDGE Power Levels:
  - GSM850: E2 (0.5W)
  - EGSM900: E2 (0.5W)
  - DCS1800: E1 (0.4W)
  - PCS1900: E1 (0.4W)
  - LTE Power Level 5 (0.125W), where the power level for Band31 and Band72 is class2 (0.4W)

Data Transfer

- GPRS: 85.6Kbps(UL), 107Kbps(DL)
- EDGE: 296Kbps(UL), 236.8Kbps(DL)
- LTE Category M1: 589Kbps (DL)
- LTE Category M1: 1119Kbps (UL)
- LTE Category NB1/NB2: 127Kbps (DL)
- LTE Category NB1/NB2: 158.5Kbps (UL)

- EGPRS: Compatible with MCS 12

Communication Interface

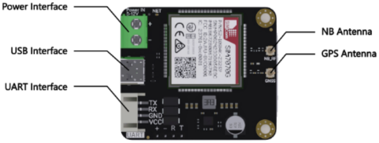
- UART Interface Type: Gravity PH2.0-4P
- UART Interface Level: 3.3V-5V
- USB Interface: USB2.0 TYPE-C
- NBIoT Antenna Interface: IPEX1
- GNSS Antenna Interface: IPEX1
- SIM Card: NBIoT/CAT-M/2G Card (Only supports 1.8V SIM card, not 3V card)

Supported Bands

- NBIoT
    - B1 B2 B3 B4 B5 B8 B12 B13 B18 B19 B20 B25 B26 B28 B66 B71 B85
- CAT-M (LTE-HD-FDD)
    - B1 B2 B3 B4 B5 B8 B12 B13 B14 B18 B19 B20 B25 B26 B27 B28 B66 B85
- GSM/GPRS
    - GSM850MHz
- EDGE
    - EGSM900MHz
    - DCS1800MHz
    - PCS1900MHz
- GNSS
    - GPS
    - GLONASS
    - BeiDou
    - Galileo
    - Protocol: NMEA

Product Size: 49mm×42mm

Functional Diagram



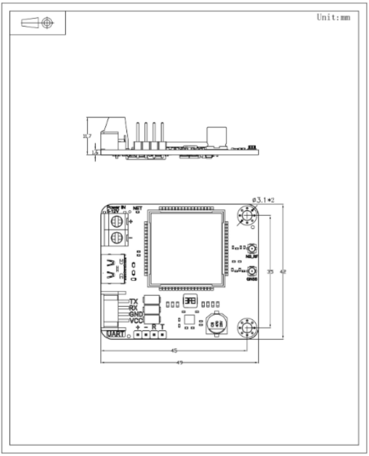
Interface	Description
NB_RF	Connects to NB antenna
GNSS	Connects to GPS positioning antenna
UART	UART interface (interface level 3.3V-5V)
USB-Type C	USB device interface, used for communication tests or parameter settings with a computer

Power IN	External 5-12V power supply is needed in case of insufficient power
SIM Card	Insert SIM card

Precautions:

1. It is suggested to connect an external power supply of 5V-12V when the module communicates using PH2.0 seat.
2. The module powers on upon electrification. After inserting the NB card for the first time, it is necessary to power it and wait 1-2 minutes for network registration.
3. Net—Network signal indicator light
    - Blue light on for 0.06 seconds, off for 0.8 seconds: Not registered on the network
    - Blue light on for 0.06 seconds, off for 3 seconds: Registered on the network
    - Blue light on for 0.06 seconds, off for 0.3 seconds: Data transmission state (PPP dial-up state and when using internal TCP/FTP/HTTP data services)
    - Extinguished: Shutdown or PSM sleep mode
4. To prevent damage to the internal flash of the SIM7070G module, use the "AT+CPOWD=1" command for safe shutdown instead of directly cutting off the power.

Dimensional Diagram



Common AT Commands

Command	Meaning	Return Value

AT	AT test command	OK
ATE	ATE1 sets echo, ATE0 turns off echo	OK
AT+CGMI	Query module manufacturer	OK
AT+CGMM	Query module model identifier	OK
AT+CGSN	Query product serial number	OK
AT+CGMR	Query software version serial number	OK
AT+IPR=9600	Set module temporary hardware serial port baud rate to 9600	OK
AT+IPR?	Query current hardware serial port baud rate	OK
AT+CPIN?	Query SIM card status, return READY, indicating that the SIM card can be recognized normally	OK
AT+CSQ	Network signal quality query, return signal value	OK
AT+CGREG?	Check network registration	OK
AT+CMEE=1	Report mobile device error	OK
AT+CGNAPN	Get network APN in CAT-M or NB-IOT	OK
AT+CPSI?	Query UE system information	OK
AT+CNACT=0,1	Activate application network	OK
AT+CNACT?	Query network IP	OK
AT+CNACT=0,0	Close application network	OK
AT+CNMP=38	Select LTE mode	OK
AT+CMNB=2	Select NB network	OK
AT+CPOWD=1	Shutdown	NORMAL POWER DOWN

Note: Please refer to the AT instruction set for more test commands

Sample Application

Hardware Preparation

- Global Version SIM7070G NB-IoT Module x1
- Windows11 PC x1
- NB SIM card x1
- NB_RF antenna x1
- GPS antenna x1
- USB data cable x1

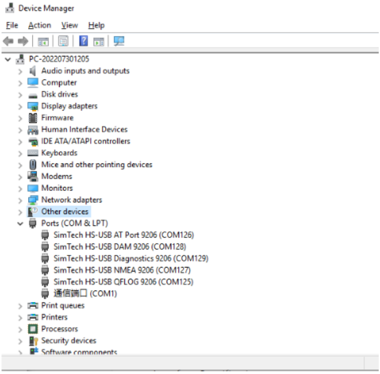
Software Preparation

Install drivers:

Download driver file and decompress on the desktop. In the "Other devices" of Device Manager, a SIM port will appear. Right-click to update the driver software.

After the update, you can see several ports in "Other devices". Similarly, right-click to update the driver software for these SIM ports.

After installation, it should look as follows:



- PC-202207301205
  - Audio inputs and outputs
  - Computer
  - Disk drives
  - Display adapters
  - Firmware
  - Human Interface Devices
  - IDE ATA/ATAPI controllers
  - Keyboards
  - Mice and other pointing devices
  - Modems
  - Monitors
  - Network adapters
  - Other devices
  - Ports (COM & LPT)
    - SimTech HS-USB AT Port 9206 (COM126)
    - SimTech HS-USB DAM 9206 (COM128)
    - SimTech HS-USB Diagnostics 9206 (COM129)
    - SimTech HS-USB NMEA 9206 (COM127)
    - SimTech HS-USB QFLOG 9206 (COM125)
    - 通信端口 (COM1)
  - Print queues
  - Printers
  - Processors
  - Security devices
  - Software components

**Note:* *This is an NB module, which only supports NB SIM cards in China.

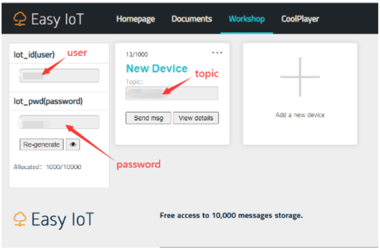
MQTT Connection

Command	Meaning	Return Value
AT+CNACT=0,1	Activate application network	OK
AT+CNACT?	Query network IP	OK
AT+SMCONF	Set MQTT parameters	OK
AT+SMCONN	Start MQTT connection	OK
AT+SMPUB	Push topic message	OK
AT+SMSUB	Subscribe to topic	OK
AT+SMUNSUB	Unsubscribe from topic	OK
AT+SMSTATE	Query MQTT connection status	OK
AT+SMPUBHEX	Push HEX type topic message	OK
AT+SMDISC	Disconnect MQTT connection	OK
AT+CNACT=0,0	Disconnect application connection	OK

This example sends a set message to the Easy IoT platform by operating SIM7070G through AT instructions.

Enter Easy IoT. If you don't have an account, you can register one first.

After successful login, open the workspace, get your account (user) and password, add a new device (Topic), and record the **three important parameters**. The specific steps are as follows:



Iot_id(user) [redacted]

Iot_pwd(password) [redacted]

Topic: [redacted]

Allocated: 1000/10000

```
AT+CNACT=0,1
```

//Activate wireless connection, the first parameter '0' represents PDP Index, the second parameter '1' represents activation

```
AT+CNACT?
```

//Get local IP address

```
AT+SMCONF="URL","iot.dfrobot.com",1883
```

//Set MQTT server address and port, iot.dfrobot.com is the server address, 1883 is the default port of MQTT

```
AT+SMCONF="USERNAME","user"
```

//Set MQTT username, enter the **account obtained** on the Easy IoT platform in "**user**"

```
AT+SMCONF="PASSWORD","password"
```

//Set MQTT password, enter the **password obtained** on the Easy IoT platform in "**password**"

```
AT+SMCONF="CLIENTID","Topic"
```

//Set MQTT client ID, enter the **device obtained** on the Easy IoT platform in "**Topic**"

```
AT+SMCONF="CLEANSS",1
```

//Set to clear session, 1 means clear session

```
AT+SMCONF="KEEPTIME",60
```

//Set keep connection time, 60 means 60 seconds

```
AT+SMCONF="QOS",1
```

//Set message quality level, 1 means at least once

```
AT+SMCONF="RETAIN",1
```

//Set retain flag, 1 means message and its qos will be saved

```
AT+SMCONF="TOPIC","Topic"
```

//Set publish topic name, enter the **device obtained** on the Easy IoT platform in "**Topic**"

```
AT+SMCONF="MESSAGE","DFROBOT"
```

//Set publish message details, "DFROBOT" is the message content

```
AT+SMCONN
```

//Connect to MQTT server

```
AT+SMPUB="Topic",7,1,1
```

//Publish message, enter the **device obtained** on the Easy IoT platform in "**Topic**", 7 is the message length, 1 means retain message, 1 means message quality is 1, **note: when publishing message, you need to check "return carriage"**

//Then uncheck "return carriage" and send message content "DFROBOT"

```
AT+SMDISC
```

//Disconnect from MQTT server

```
AT+CNACT=0,0
```

//Disconnect wireless connection, the first parameter '0' represents PDP Index, the second parameter '0' represents disconnect.

Note: Carriage return is also needed when publishing a message. When sending message content, cancel the carriage return.

Read GNSS Positioning Information

When using GNSS positioning, first plug in the GPS antenna, **and place the module outdoors.** After turning on the GNSS power, you can choose the way suitable for your project to start GNSS positioning.

Command	Meaning	Return Value
AT+CGNSPWR	GNSS power control	OK
AT+CGNSINF	GNSS navigation information parsed from NMEA sentence	OK
AT+CGNSCOLD	GNSS cold start	OK
AT+CGNSWARM	GNSS warm start	OK

AT+CGNSHOT	GNSS hot start	OK
AT+CGNSMOD	GNSS working mode setting	OK
AT+CGNSXTRA	Open GNSS XTRA	OK
AT+CGNSCPY	Copy GNSS XTRA file	OK
AT+SGNSCFG	GNSS NMEA output configuration	OK
AT+SGNSCMD	AT serial port output GNSS NMEA data	OK

Note: There are three ways to start GNSS: cold start, warm start, and hot start.

1. **Cold start:** When GNSS starts in a brand new environment and needs to re-acquire all satellite information. It is usually used for first use, battery exhaustion, or large device movement. In this case, the startup time is longer.
2. **Warm start:** This is when GNSS starts again more than 2 hours after the last positioning. At this time, some satellite information has changed and needs to be updated. The startup time is between cold start and hot start, suitable for restarting after temporary shutdown of the device.
3. **Hot start:** This is when GNSS starts again within a short time (within 2 hours). The device's position has not changed much, most of the satellite information is still valid, the startup time is the shortest, suitable for frequent startups within a short time.

This example is GNSS positioning through AT instructions.

```
AT+CGNSPWR=1
```

//Turn on GNSS power (UART or USB AT port)

```
AT+CGNSINF
```

//Read GNSS navigation information

Assume that the positioning data printed by the serial port is: **1,1,20191024051848.000,12.345678,123.456789,123.123,0.00,-1.8,0,,1.4,1.7,0.9,,6,,12.4,12.0**

The following is the specific meaning of the GNSS navigation information read by the SIM7070G module:

1. GNSS running status: the value 1 indicates that GNSS is running
2. Positioning status: the value 1 indicates successful positioning
3. UTC date and time: 20191024051848.000, the format is year, month, day, hour, minute, second. Milliseconds
4. Latitude: 12.345678 degrees
5. Longitude: 123.456789 degrees
6. MSL altitude: 123.123 meters
7. Ground speed: -1.8 kilometers per hour
8. Ground direction: speed is 0
9. Positioning mode: value 0 indicates automatic selection to use GPS and GLONASS
10. Reserved1: Reserved field, data missing
11. HDOP: Horizontal accuracy factor, value 1.4
12. PDOP: Position accuracy factor, value 1.7

13. VDOP: Vertical accuracy factor, value 0.9
14. Reserved2: Reserved field, data missing
15. GNSS Satellites in View: Number of visible satellites, value 6
16. Reserved3: Reserved field, data missing
17. HPA: Horizontal protection limit, value 12.4 meters
18. VPA: Vertical protection limit, value 12.0 meters

Note: You cannot connect to the cellular network and GPS positioning at the same time.

HTTP(S) Routine

Command	Meaning	Return Value
AT+CSSLCFG	Configure SSL parameters for context identifier	OK
AT+SHCONF	Set HTTP(S) parameters	OK
AT+SHSSL	Select SSL configuration	OK
AT+SHCONN	HTTP(S) connection	OK
AT+SHBOD	Set Body	OK
AT+SHAHEAD	Add Head	OK
AT+SHPARA	Set HTTP(S) Para	OK
AT+SHCPARA	Clear HTTP(S) Para	OK
AT+SHCHEAD	Clear Head	OK
AT+SHSTATE	Query HTTP(S) connection status	OK
AT+SHREQ	Set request type	OK
AT+SHREAD	Read response value	OK
AT+SHDISC	Disconnect HTTP(S)	OK
AT+HTTPTOFS	Download file to ap file system	OK
AT+HTTPTOFSRL	Status of downloading file to ap file system	OK

This example establishes an HTTP connection and sends a GET request.

```
AT+CNACT=0,1
```

//Activate wireless connection, the first parameter '0' represents PDP Index, the second parameter '1' represents activation.

```
AT+CNACT?
```

//Get local IP address

```
AT+SHCONF="URL","http://www.baidu.com"
```

//Set server URL

```
AT+SHCONF="BODYLEN",1024
```

//Set HTTP body length, for the range of maximum body length

```
AT+SHCONF="HEADERLEN",350
```

//Set HTTP header length, for the range of maximum header length

```
AT+SHCONN
```

//Establish HTTP connection

```
AT+SHSTATE?
```

//Get HTTP status

//"+SHSTATE: 1": Connected //"+SHSTATE: 0": Disconnected

```
AT+SHCHEAD
```

//Clear HTTP header, because the HTTP header is appended

```
AT+SHAHEAD="User-Agent","Mozilla/5.0"
```

//Add header content

```
AT+SHAHEAD="Cache-control","no-cache"
```

//Add header content

```
AT+SHAHEAD="Connection","keep-alive"
```

//Add header content

```
AT+SHAHEAD="Accept","*/*"
```

//Add header content

```
AT+SHREQ="/search?q=SIM7070G", 1
```

//Set request type to GET //The response will depend on the actual size of the data returned by the server //For example, the size of the data returned here is 247

```
AT+SHREAD=0,247
```

//Read data length is 247 //Data content follows "+SHREAD: 247"

```
AT+SHDISC
```

//Disconnect HTTP connection

```
AT+CNACT=0,0
```

//Close wireless connection, the first parameter '0' represents PDP Index, the second parameter '0' represents disconnect.

Note: The default time to keep a request is 60 seconds, you can also choose the setting range of 30-1800

Function Mode

Command	Meaning	Return Value
AT+CFUN=0	Minimum function mode	OK
AT+CFUN=1	Full function mode (default)	OK
AT+CFUN=4	Flight mode	OK

Note:

1. After setting "AT+CFUN=0", the module enters the minimum function mode, turns off the radio frequency function and SIM card function. In this case, the serial port and USB can still be used, but the functions related to radio frequency and SIM card and some AT commands cannot be used.
2. After setting "AT+CFUN=4", the module enters flight mode and turns off the radio frequency function. In this case, the module's serial port and USB can still be used, but the functions related to radio frequency and some AT commands cannot be used.
3. When the module enters the minimum function mode or enters the flight mode, it can return to the full function mode by the command "AT+CFUN=1".

More Resources Download

- SIM7070G NB-IoT Module - Schematic
- SIM7070G NB-IoT Module - Instruction Set
- SIM7070G NB-IoT Module - 2D_DXF.rar
- SIM7070G NB-IoT Module - 3D_STP.rar

Frequently Asked Questions

Q: Why does SIM7070G have no signal?

A: Setting NB-IOT or CAT-M is easier to get signal

```
AT+CMNB=2      //Set NB-IOT mode
AT+CMNB=1      //Set CAT-M mode
AT+CMNB=3      //Set CAT-M and NB-IOT combination mode
```

A: Fixed LTE mode can register to the network faster

```
AT+CNMP=38
```

Q: Can SIM7070G use communication and GNSS positioning at the same time?

A: SIM7070G cannot use communication and GNSS positioning functions at the same time.

Downloaded from Arrow.com.