



SIM7000E NB-IOT HAT

Overview

This Raspberry Pi HAT features multi communication functionalities: NB-IoT, eMTC, EDGE, GPRS, and GNSS.

The NB-IoT (NarrowBand-Internet of Things) and eMTC (enhanced Machine Type Communication) are rising IoT communication technologies evolved from LTE (4G), with advantages include low power, low cost, wide coverage, etc. They are suited for applications such as intelligent instruments, remote controlling, asset tracking, remote monitoring, E-health, mobile POS terminals, sharing bikes, and so on. While the GSM/GPRS, and EDGE are traditional 2G/2.5G technologies capable of sending SMS or making other wireless communications.

Therefore, the SIM7000E NB-IoT HAT would be an ideal choice for either evaluating new rising technologies, or simply communicating/positioning via multiple ways.

Features

- Raspberry Pi connectivity, compatible with Raspberry Pi Zero/Zero W/Zero WH/2B/3B/3B+
- Supports TCP, UDP, PPP, HTTP, FTP, MQTT, SMS, Mail, etc.
- Supports GNSS positioning (GPS,GLONASS,BeiDou and Galileo)
- Onboard USB interface, to test AT Commands, get GPS positioning data, and so on
- Breakout UART control pins, to connect with host boards like Arduino/STM32
- Onboard voltage translator, 3.3V by default, allows to be switched to 5V via 0Ω resistor
- SIM card slot, compatible with both normal SIM card and NB-IoT specific card
- 2x LED indicators, easy to monitor the working status
- Baudrate: 300bps~3686400bps
- Control via AT commands (3GPP TS 27.007, 27.005, and SIMCOM enhanced AT Commands)
- Supports SIM application toolkit: SAT Class 3, GSM 11.14 Release 98, USAT
- Comes with development resources and manual (examples for Raspberry /Arduino/STM32)





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1. Hardware configuration

1.1. Hardware configuration

This module comes with GSM antenna, GPS antenna and micro USB cable. Besides these you should prepare a sim card or a nb-iot card:

- 1) Insert the SIM card to the card slot and connect the GSM antenna.
- 2) Connect the USB interface of SIM7000E NB-IoT HAT to PC with a micro USB cable. Then the PWR indicator will keep bright.

Figure : Hardware connnection

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3) Generally, the NET indicator will fast flash firstly (1 time per second), which means that the module has not logged in the Network. After logging in, the indicator become to flash slowly (1 time every three seconds). Up to the local GSM network, this process that logging in will last several seconds to dozens of seconds.

If you take too much time to log in and failed, please check that whether the GSM antenna is connected correctly, and whether the SIM card is usable and insert correctly.

4) Install SIM7000 driver (windows driver: www.waveshare.com/wiki/File:SIM7X00-Driver.7z) Open Device Manager to get the corresponding COM port number of SIM7000. For example, the AT Port is COM19 as below. Users need to choose the correct port according to the Manager.

Figure: Devices Manager

- SimTech HS-USB AT Port 9001 (COM25)
- 💭 SimTech HS-USB Audio 9001 (COM24)
- SimTech HS-USB Diagnostics 9001 (COM28)
- SimTech HS-USB NMEA 9001 (COM27)

1.2. Solder joints



Pin \ Solder	Soldered to A side	Soldered to B side
νςςιο	5V	3.3V (Default)
DTR	P26	NC (Default)
PWR	P4 (Control power supply via pin)	3.3V (Default:Power on automatically)



Raspberry Intarface

2. GPRS Debugging

2.1. General AT commands

Commands	Description	
AT+CGATT?	Check the state of GPRS attachment	+CGATT:1

		1 Attached
AT+CSTT?	AT+CSTT? : Check available APN	+CSTT:
AT+CSTT	AT+CSTT ="cmnet": Set APN to CMNET	ОК
AT+CIICR	Bring up wireless connection with GPRS	ОК
AT+CIFSR	Get local IP address	ОК
	AT+CIPSTART="Mode", "IP_Addr", "Port"	
	Mode: connection type;	CONNECT
AT+CIPSTART	IP_Add: Remote server IP address;	ОК
	Port: Remote server port	
AT+CIPSEND	Send data	ОК
1A	(HEX format) Tell module to send data	SEND OK
AT+CIPCLOSE	Close TCP or UDP connection	CLOSE OK
AT+CIPSHUT	Deactivate GPRS PDP Context	SHUT OK

2.2. Local virtual severs settings

Virtual servers define the mapping between service ports of WAN and web servers of LAN. All requests from Internet to service ports of WAN will be redirected to the computer (web servers of LAN) specified by the server IP. (see your router's guide manual)

- 1) Log in Management Console of your router with browser (read your router's guide manual for specific address)
- 2) Set Port: 1822 (The Port can't be conflict to other's. Here we set 1822)
- 3) Set LAN IP address of your computer (you can run CMD on your computer, and execute command ipconfig to enquiry the address of IPv4), 192.168.6.168 as examples

SIM7000 Test	wan1_pp poe1	P/UDP 1822-1822	1822-1822	192.168.6.168
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2.3. Searching WAN IP

You can search "IP" on browser to get your WAN IP address.



2.4. GPRS Setting

- AT+CSQ //To enquiry the quality of signal. The first parameter of response is signal quality (Max is 31). The signal stronger, the value bigger.
- AT+CREG? //Check Network registration. If the second parameter of response is 1 or 5, it means that Network has been registered successfully
- 3) AT+CGATT? // Check the state of GPRS attachment
- 4) AT+CSTT="CMNET" //Set the Network according to actual situation. Here we use CMNET
- 5) AT+CIICR //Bring up wireless connection with GPRS
- 6) AT+CIFSR //Get the local IP address
- 7) AT+CIPSTART="TCP","113.81.232.178",1822 //Established TCP/IP connection

🏠 SSCOM V5.13.1 Serial/Net data debugger,Author:Tintin,2618058@qq.com(Newest version)		– 🗆 X
PORT COM Settings Display Send Data Multi Strings Tools Help PCB打样那家强?		
AT +CIMP=13	Send Multi Char stm32/GE32 TSP STC/TAP15 TSP	
0K AT+4R<["=1		
OK	(-Diag spit RoundSend help Import	order delay
AL #00FS' #00FS: 0,0,"460 00 CMCC",0	HEX Data (DDClick to Write notes)	AT test compand 1 1000
nr.	ATE1	Enable echo 3 1000
AT +CGATT?	ATEO	Disable echo 2 1000
+CGATT: 1	AT+IPR?	Check the baud rate 0 1000
		5无注释 0 1000
district const, ""		
OK .	NB-ToT-	
AT+CSTT="onnet"	AT+CMMP=38	LTE mode 0 1000
AT *CLICR	AT +CHINB=2	NB-IoT mode 0 1000
una AT≁CIPSR	AT +NESC=1	Scrambling Feature 0 1000
10.88.255.116	AT +CSQ	Signal quality report 0 1000
OK	AT+CPST2	Tranining 18 info 0 1000
CONNECT OK	AT +CGNAPN	Get network app 0 1000
AT+CIFSEND=33	AT+CSTT="otn"	Set APN 0 1000
	AT+CIICR	Bring up connection 0 1000
ISERU OK SIMTOOO Test SuccefullyAT+CIPCLOSE	AT +CIFSR	Get local address 0 1000
LIGES OK JetAssist (V3.7) ×	AT+CIPSTART= TUP", 113.81.232.178", 1822	Start up connection 0 1000
Settings Cata Receive	Hallo Wavesbare STM7000X TCP Test	
(1) Protocol Reveive from 117, 136, 31, 244 : 58318]:	AT +CIPCLOSE=1	Close connection 0 1000
TCP Server V Hello, Waveshare SIM7000X TCP Test	AT +CIPSHUT	Deactivate context 0 1000
(2) Local boot IP		24无注释 0 1000
192 168 6 158	GPRS	
(2) Ludikular	AT+CMP=13 AT+MESC=1	GSM/GPRS mode 0 1000
1822	AT +COPS?	Stranding rearre 0 1000
	AT +CGATT?	Check attach service 0 1000
- Disconnect	AT+CSTT?	Query available APN 0 1000
	AT+CSTT="cmnet"	set APN 0 1000
-Recv Options	AT +CIICR	Bring up connection 0 1000
Receive to file	AT+CIPSTART="TCP", "113 81 232 178", 1822	Start up connection 0 1000
Add line return	AT+CIPSEND=33	Send data 0 1000
Receive As HEX	Hello, Waveshare SIM7000X TCP Test	data 0 1000
Accive Pause	AT +CIPCLOSE	Close connection 0 1000
Save Clear	AT+CIPSHUT	Deactivate context 0 1000
		39先注释 0 1000
Send Options	AT +CGNSPWR=1	Turn on GNSS power 0 1000
Data from file	AT +CGNSINF	Get GPS info 0 1000
T Auto CheckSum	AT +CGRSPWR=0	trun off GMSS power 0 1000
Auto Clear Inout		44无注释 0 1000
Send As Hex		45九汪祥 U 1000
Send Cyclic Peers: All Connections		46万正和 0 1000
Interval 1000 ms SIM7000 Test Succefully		48无注释 0 1000
Load Clear Send		49元注释 0 1000
		50无注释 0 1000
If Ready! Send : O Reset		51无注释0_1000 ▼
ClearData OpenFile Stop ClearSend OnTop English SaveConfig Hide -		
ConNun COM25 SinTech HS-USB AT Por HEXShow SaveData ReceivedToFile SendHEX SendHEX 500 mm/Tim AddCrLf		
🛞 CloseCom 👌 More Settings Show Tine and Packe OverTime: 20 mc Woll BytesTo 末尾 マVerifyNone 💌		
RTS DTR Baudaat 9600		
のJ gent AE& Ross Auma Alt 請您注册嘉立创作结尾客户 SEND ×		

2.5. Sending data

- 1) AT+CIPSEND=33 //Send fixed length data
- 2) AT+CIPSEND // Send changeable length data

- 3) After getting the response >, edit the contents of message (has been converted) without Enter at the end. Then send 1A in HEX format as below
- 4) If the data sent successfully, the server will receive the data.

2.6. Receiving data

- 1) Choose the IP address of module on peers input box
- 2) Input the data which you want to send: SIM7000 Test Succefully
- 3) Click Send button, you can see that module receive the data with COM assistant software

2.7. Deactivating Connection

1) Send AT+CIPCLOSE or AT+CIPSHUT to deactivate connection.

3. NB-IoT Debugging

3.1. General AT commands

Commands	Description	Return
AT+CGATT?	Check the state of GPRS attachment	1 Attached
		+CPSI:
AT+CPSI?	AT+CPSI?: Inquiring UE information	ОК
		+CGNAPN:
AT+CGNAPN	Check available APN	
AT+CSTT	AT+CSTT ="cmnet": Set APN to CMNET	ОК
AT+CIICR	Bring up wireless connection with GPRS	ОК
AT+CIFSR	Get local IP address	ОК
	AT+CIPSTART="Mode", "IP_Addr", "Port"	
	Mode: connection type;	CONNECT
AT+CIPSTART	IP_Add: Remote server IP address;	ОК
	Port: Remote server port	
AT+CIPSEND	Send data	ОК



1A	(HEX format) Tell module to send data	SEND OK
AT+CIPCLOSE	Close TCP or UDP connection	CLOSE OK
AT+CIPSHUT	Deactivate GPRS PDP Context	SHUT OK

3.2. NB-IoT Setting

- AT+CSQ //To enquiry the quality of signal. The first parameter of response is signal quality (Max is 31). The signal stronger, the value bigger.
- AT+CREG? //Check Network registration. If the second parameter of response is 1 or 5, it means that Network has been registered successfully
- 3) AT+CGATT? // Check the state of GPRS attachment
- 4) AT+CPSI? // Inquiring UE system information
- 5) AT+CGNAPN // Get network APN in CAT-M or NB-IOT
- 6) AT+CSTT="T" //Set the Network according to actual situation. Here we use T
- 7) AT+CIICR //Bring up wireless connection with GPRS
- 8) AT+CIFSR //Get the local IP address
- 9) AT+CIPSTART="TCP","118.190.93.84",2317 //Established TCP/IP connection



AT+CNMP? +CNMP: 13 0K AT+CNMP=13 OK AT +NBSC=1 OK AT+COPS? +COPS: 0,0,"460 00 CMCC",0 DK AT+CGATT? +CGATT: 1 OK AT+CSTT? +CSTT: "CMINET", "", "" OK AT+CSTT="cmnet" OK AT+CIICR OK AT+CIFSR 10. 147. 17. 105 AT+CIPSTART="UDP", "118. 190. 93. 84", 2317 OK CONNECT OK AT+CIPSEND=33 > Hello, Waveshare SIM7000% TCP Test SEND OK Hello, Waveshare SIM7000X TCP TestAT+CIPCLOSE CLOSE OK AT+CIPSHUT SHUT OK

3.3. Sending data

- 5) AT+CIPSEND=33 //Send fixed length data
- 6) AT+CIPSEND // Send changeable length data
- 7) After getting the response >, edit the contents of message (has been converted) without Enter at the end. Then send 1A in HEX format as below
- 8) If the data sent successfully, the server will receive the data.

3.4. Receiving data

- 4) Choose the IP address of module on peers input box
- 5) Input the data which you want to send: SIM7000 Test Succefully
- 6) Click Send button, you can see that module receive the data with COM assistant software

3.5. Deactivating Connection

Send AT+CIPCLOSE or AT+CIPSHUT to deactivate connection.



4. GNSS Debugging

4.1. General AT commands

Commands	Description	Return
	GNSS Power Control:	
AT+CGNSPWR	AT+CGNSPWR =1:Turn on	ОК
	AT+CGNSPWR =0:Turn off	
AT+CGNSTST	AT+CGNSTST=1:Send data received to AT Port AT+CGNSTST=0: Stop sending data received to AT Port	ОК
AT+CGNSINF	GNSS navigation information parsed from NMEA sentences	+CGNSINF: OK

4.2. GPS Debugging

- 1) Connecting the GPS antenna, and place the receiver on open area outdoor
- 2) AT+CGNSPWR=1 //Turn on power of GPS
- 3) AT+CGNSTST=1 // Start to sending data received to AT Port

Open u-center and set the Port and Baudrate(AT Port, COM25).

Of course, you can use another port(NMEA Port,COM27)

- SimTech HS-USB AT Port 9001 (COM25)
- SimTech HS-USB Audio 9001 (COM24)
- SimTech HS-USB Diagnostics 9001 (COM28)
- SimTech HS-USB NMEA 9001 (COM27)
- 4) AT+CGNSTST=0 // Stop sending data received to UART
- 5) AT+CGNSINF // Print the GPS information
- 6) AT+CGNSPWR=0 //Turn off power of GPS

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🆍 SSCOM V5.13.1 Serial/Net data debugger,Author:Tintin,2618058@qq.com(Newest version)		- 1	a ×
PORT COM_Settings Display Send_Data Multi_Strings Tools Help PCB打样那家强?			
AT+CGRSP#R=1	Send Multi Char stm32/GB32 ISP STC/IAP15 ISP		
UK AT+CGRSTST=1	Drag splt BoundSend help Import		
0K Marcev 3 1 12 86 30 033 33 87 26 326 29 71 37 059 36 78 01 330 #68	Way Data (DbClick to Write potes)	Send(note) + -	r deray
SelLSSY, 3, 2, 12, 70, 00, 26, 77, 30, 291, 76, 30, 219, 75, 04, 181, #6B	AT	AT test command	1 1000
\$6L58Y, 3, 3, 12, 65, 16, 177, 88,, 65, 02, 080, 72, 46, 133, #52 MCRORY 3, 1, 12, 02, 22, 988, 20, 05, 02, 210, 26, 65, 0, 377, 46, 09, 16, 125, 27#,70	ATE1	Enable echo	3 1000
\$PPGSV, 3, 2, 12, 17, 53, 016, 45, 19, 45, 345, 45, 28, 51, 164, 32, 03, 19, 040, *74	ATEO	Disable echo	2 1000
\$PCSV, 3, 3, 12, 12,, 23, 11, 065, 24,, 30, 02, 178, #7C \$PCSV, 3, 3, 12, 12,, 23, 11, 065, 24,, 30, 02, 178, #7C	AT+IPR?	Check the baud rate	0 1000
\$BD057, 4, 2, 13, 05, 23, 255, , 06, 27, 156, , 07, 36, 185, , 06, 47, 001, *6F		5无注释 (0 1000
(\$EDGSV, 4, 3, 13, 09, 11, 182, 10, 52, 223, 11, 34, 064, , 13, 47, 320, *6P		6无注释 (0 1000
\$GN954, 102241.00, 2232.551635, W, 11404.693141, E, 1, 06, 1.1, 60.9, M, -		7无注释 (3 1000
1.0, M, *5B SKRYG O T 2.3 M O D V O D X 4*3C	NB-IoT	NB-IoT	3 1000
SORRMC, 102241.00, A, 2232.551635, N, 11404.693141, E, O. 0, O. 0, 210518, 2.3, W, A*3	AT+CNMP=38	LTE mode	3 1000
B Superau a 2 n3 n6 n9 17 19 28 1 4 1 1 0 9#37	AT+CMMB=2	NB-IoT mode	3 1000
\$GL05A, A, 2, 71, 86, 87,1.4, 1, 1, 0, 9+24	AT+HESC=1	Scrambling Feature	J 1000
(\$BDGSA, A, 2,, 1, 4, 1, 1, 0, 9*2E b1+CG8F5T=0	AT+CSQ	Signal quality report	0 1000
OK OK	AI TOGALLY	Lheck attach service	1000
AT *CORSINF +CORSINF	AT+CGNAPN	Got notwork on	0 1000
1, 1, 20180521102245, 000, 22, 542530, 114, 078219, 60, 900, 0, 00, 0, 0, 1, , 1, 1, 1, 4, 0	AT+CSTT="etp"	Sat APN	0 1000
. 9, 12, 6, , , 48, ,	AT+CIICR	Bring up connection	0 1000
0K	AT+CIFSR	Get local address	0 1000
AT +CGESP4R=0	AT+CIPSTART="TCP", "113. 81. 232. 178", 1822	Start up connection	3 1000
	AT+CIPSEND=34	Send data	0 1000
	Hello, Waveshare SIM7000X TCP Test	data	0 1000
	AT+CIPCLOSE=1	Close connection (0 1000
	AT+CIPSHUT	Deactivate context	0 1000
		24无注释 (3 1000
	GPRS	GPRSGPRAG	0 1000
	AT+CNMP=13	GSM/GPRS mode	3 1000
	AT+HESC=1	Scrambling Feature	3 1000
	AT+COPS?	Signal quality report	3 1000
	AT+CGATTY	Check attach service	J 1000
	AITUSII?	Query available APN	0 1000
	ATACTTCP	Set Arm	0 1000
	ATACTECE	Cat last address	0 1000
	AT +CTPSTART="TCP" "113 81 232 178" 1822	Stort up connection	0 1000
	AT+CIPSEND=33	Send data	0 1000
	Hello, Waveshare SIM7000X TCP Test	data	0 1000
	AT+CIPCLOSE	Close connection	3 1000
	AT+CIPSHUT	Deactivate context	0 1000
		39无注释 0	0 1000
	GHSS	GNSS	0 1000
	AT+CGRSPWR=1	Turn on GNSS power	3 1000
	AT+CGNSINF	Get GPS info	3 1000
	AT+CGNSPWR=0	trun off GMSS power	3 1000
		44九汪祥	1000
		45元注释 (0 1000
		40元注释	0 1000
		48开注释	0 1000
		49无注释	0 1000
		50元注释	0 1000
		51无注释	0 1000 -
Sendfile Stop [ClearSend] Unicop English SaveConfig Hide -			
LOBBUN LOD SINIEGN NO-WORK NO-WORK IN TO THE AND SAVEDALE IN RECEIVED OF THE SENDER SOUTHING Addirit			
Unseren C ware settings : Show time and racke overting for mplan, sycestow TB Astronomic			
STEREWE Scouter store State St			
1/21 EXTREMENTATION SEED			





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					20
21	32 42				10
G15	G2 G24 G26 G29 C	G5 G21 G18			dB
08:14:10	\$GPGLL,2232.467426,N,11404.392523,E,0814	410.000,A,A*5D	*		- ×
08:14:10	\$GPGSV.2.1.08.15.72.310.21.26.45.02929	9.40.244.18.24.34.171	.43*79		
08:14:10	\$GPGSV,2,2,08,05,29,063,,21,25,321,,02,	23,136,32,18,15,295,*	7B		-25
08:14:10	\$GPRMC,081410.000,A,2232.46/426,N,11404. \$GPVTG_0_0_TM_0_000_N_0_000_K_A*0D	.392523,E,0.000,0.0,1	/1114,,,	1. march 20001	-
08:14:10	\$GPZDA,081410.000,17,11,2014,,*5B			NG PORT	4
08:14:11	\$GPGGA,081411.000,2232.467675,N,11404.3	92685,E,1,3,3.01,2.02	9,M,-1.9 -	The C	V V
08:14:11	\$GPGLL,2232.467675,N,11404.392685,E,0814	411.000,A,A*57	-	$\langle \cdot \rangle \langle \cdot \rangle$	12 2
08:14:11	SGPGSA, A, 2, 15, 24, 02, , , , , , , , , , 3, 17, 3, 01, . SGPGSV 2 1 08 15 72 310 21 26 45 020 20	0 40 244 17 24 34 171	42*77	1 2 1 1	
08:14:11	\$GPG5V.2.2.08.05.29.06321.25.32102.	22.136.32.18.15.295.*	7A 3		
08:14:11	\$GPRMC,081411.000,A,2232.467675,N,11404.	.392685,E,0.000,0.0,1	71114,,,	4	
08:14:11	\$GPVTG,0.0,T,,M,0.000,N,0.000,K,A*0D				Z
08:14:11	\$GPZDA,081411.000,17,11,2014,,*5A				
_	2		5 Longitude		114.073211 22.541128
1 <mark>9 ×</mark> 🗃	1	m. 001417 11500 A. L		NINEA 00.17.12	001412
一元成		-u= COIVI1/ 11520 Antaris	INO THE OPEN	INIVIEA 00:17:13	08:14:12

5. Using with Raspberry Pi

5.1. Interface overview

The default relationship between SIM7000 control pins and Raspberry Pi IOs is shown in Table 1.

SIM7000	IO of Raspberry Pi B+	Description
5V	5V	Power supply (5V)
GND	GND	Ground
TXD	P15 / RXD	UART pin
RXD	P14 / TXD	UART pin
PWR	P4 (Need to modify the back solder joint)	Power up the module

Table 1: The relationship between SIM7000 control pins and Raspberry Pi IOs

5.2. UART configuration of Raspberry Pi

Because UART of Raspberry Pi is used for Linux console output by default, if we want to use the UART, we need to change the settings. Executing this command to enter the configuration page :

sudo raspi-config

Choose Interfacing Options -> Serial -> no->yes, to disable Linux's use of console

UART Open /boot/config.txt file, find the below statement and uncomment it to enable the UART. You can directly append it at the end of file as well.

enable_uart=1

Then reboot.

5.3. Minicom for UART debugging on Raspberry Pi

Inserting the module to Raspberry Pi and plug the jumper B,

Install minicom, minicom is a text-based modem control and terminal emulation program for Linux:

						- i
						1
						- i
1 .						- i
SUGO	apt-det	Install	minicom			
	-1 J					- i
						- I
						1

Execute command: minicom -D /dev/ttyS0 (ttyS0 is the UART of Raspberry Pi 3B)

Baud rate is 115200 by default. If you need to change the baud rate, for example 9600, you can add the parameter -b 9600.

The user UART device of Raspberry Pi 2B/Zero is ttyAMA0, and ttyS0 of Raspberry Pi 3B

Testing Bluetooth function as examples:

• <u>1</u> Raspberry Pi 3 Model B+ ×	• 2 Raspberry Pi 3 Model B+	× +	<
AT			^
AT			
CTRL-A Z for help 115200 8	N1 NOR Minicom 2.7	VT102 Offline ttyS0)
>			=
	⊜ SSH2 vtern	t∺ 94x27 in 5.1 2.4	
SSN,7 prov 152, 100.0, 154,22	E SSILE XLEIN	· · · · · · · · · · · · · · · · · · ·	



5.4. Examples

Download the demo code from wiki and copy to the Raspberry Pi (for example, /home/pi/SIM7000X)

Enter the bcm2835 directory, compile and install the BCM2835 library:

chmod +x configure && ./configure && sudo make && sudo make install

pi@raspberrypi:~/SIN7000X/bcm2835 \$./configure & make & sudo make check & sudo make install
[1] 26103
[2] 26104
[3] 26105
make all-recursive
make[l]: Entering directory '/home/pi/SIM7000X/bcm2835'
Making install in src
Making check in src
Making all in src
make[l]: Entering directory '/home/pi/SIM7000X/bcm2835/src'
make[l]: Entering directory '/home/pi/SIM7000X/bcm2835/src'
make test
make[2]: Entering directory '/home/pi/SIM7000X/bcm2835/src'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/pi/SIM7000X/bcm2835/src'
Making all in doc
make[2]: Entering directory '/home/pi/SIM7000X/bcm2835/doc'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/pi/SIM7000X/bcm2835/doc'
make[2]: Entering directory '/home/pi/SIM7000X/bcm2835/src'
make[2]: Entering directory '/home/pi/SIM7000X/bcm2835/src'
make[2]: Entering directory '/home/pi/SIM7000X/bcm2835'
/bin/mkdir -p '/usr/local/lib'
gcc -g -O2 -o test test.o ./libbcm2835.a -lrt
/usr/bin/install -c -m 644 libbcm2835.a '/usr/local/lib'

5.4.1. AT_Test

cd example/AT_Test && sudo ./AT_Test

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<u>1</u> Raspberry Pi 3 Model B+ × <u>2</u> Raspberry Pi 3 Model B+ ×	
<pre>pi@raspberrypi:-/SIM7000X \$ clear pi@raspberrypi:-/SIM7000X \$ cd example/ pi@raspberrypi:-/SIM7000X/example \$ ls AT_Test GPS_Positioning NB-IoT pi@raspberrypi:-/SIM7000X/example \$ cd AT_Test/ pi@raspberrypi:-/SIM7000X/example/AT_Test \$ ls AT_Test AT_Test.cpp pi@raspberrypi:-/SIM7000X/example/AT_Test \$ sudo ./AT_Test Module is ready. Please input the AT command :AT AT OK Please input the AT command :AT+CSQ AT+CSQ +CSQ: 21,99</pre>	
OK Please input the AT command :^C pi@raspberrypi:~/SIM7000X/example/AT_Test \$ []	

5.4.2. GPS_Positioning

cd example/GPS_Positioning && sudo ./GPS_Positioning



• <u>1</u> Raspberry Pi 3 Model B+ × • <u>2</u> Raspbe	erry Pi 3 Model B+ × +						
<pre>pi@raspberrypi:~/SIN7000X \$ cd example/GPS_Positioning/ pi@raspberrypi:~/SIN7000X/example/GPS_Positioning \$ ls GPS_Positioning_GPS_Positioning.cpp pi@raspberrypi:~/SIN7000X/example/GPS_Positioning Failed to open /dev/mem, try checking permissions. Failed to map the physical GPIO registers into the virtual memory space. bcm2835_init: Unable to open /dev/mem: Permission denied pi@raspberrypi:~/SIN7000X/example/GPS_Positioning \$ sudo ./GPS_Positioning Module is ready. Ready for GPS positioning, please connect the GPS antenna and place it outdoors 1,0,,0,,12,,42,.</pre>							
OK The GPS position message is not correct 1,0,,,,,0,,,,12,,,,43,,	OK The GPS position message is not correct,please waiting 1,0,,0,,12,43,,						
OK The GPS position message is not correct,please waiting The GPS position message is: 1,1,20180601073419.000,22.544040,114.077940,80.700,0.00,176.5,1,,0.7,,,12,9,,,44,,							
OK UTC time is :20180601073419 Latitude is :22.544040 Longitude is :114.077940 Turn off the GNSS power.		, v					
- 仅将文本发送到当前选项卡		- =					
ssh://pi@192.168.6.134:22	🗟 SSH2 xterm 📫 100x28 🚊 28,1 2 会活 👚 🖊	CAP NUM					

5.4.3. NB-IOT (TCP_IP)

cd example/NB-IoT &	x sudo ./TC	P_IP				
• 1 Raspberry Pi 3 Model B+ × • 2 Raspberry Pi 3 Mod	el B+ × +		< → -	(1) Protocol	[Receive from 117.61.135.201 : 41317]:	
pigroenhorrupi, //STN7000X/oxomlo/NR-ToT_\$_cudo	(TCR IR		A	TCP Server 🔹	Waveshare	
Module is ready.	/ ICF_IF			Locar host IP		
The signal value is:21 The valid ann is:ctnb				192.168.6.168		
Setting network apn to ctnb successfully.				(3) Local host port		
Bring up wireless connect successfully! Local IP is 10.167.203.89						
Start up TCP connection remate conver is:112 81	222 170,1022			Disconnect		
Send data: 'Waveshare' successfully.	.232.178:1022			Room Ontions		
Start receiving data for 10 seconds				Begeive to file		
SIM7000 NB-IOT TCP Test Succefully				Add line return		
Close connect successfully.				🗌 Receive As HEX		
				Receive Pause		
				<u>Save</u> <u>Clear</u>		
				Send Options		
				🗌 Data from file		
				🕅 Auto Checksun		
				Auto Clear Input		
				Send As Hex	Power: All Connections T	
				Interval 1000 mr		
			~	Load Clear	SIM7000 NB-IOT TCP Test Succefully	Send
Q将文本发送到当前选项卡			• =			
ssh://pi@192.168.6.134:22	12 xterm 1 100x28	15,1 2 会话	T SAP NUM 📑	💣 Ready!	Send : 263 Recv : 330	Reset //

5.4.4. For more demo code, please visit the website wiki.