# SIM7020E NB-IoT HAT

# Introduction

NB-IoT HAT for Raspberry Pi, Based on SIM7020E

# **User Manual**

### Overview

This is an NB-IoT (NarrowBand-Internet of Things) HAT for Raspberry Pi, controlled via serial AT commands, supports communication protocols like LWM2M/COAP/MQTT, etc. Due to the advantages of low delay, low power, low cost, and wide coverage, it is the ideal choice for IoT applications such as intelligent instruments, asset tracking, remote monitoring, and so on.

### Features

- Raspberry Pi connectivity, compatible with any revision
- Supports communication protocols such as LWM2M/COAP/MQTT/TCP/UDP/HTTP/HTTPS, etc.
- Onboard USB interface, for power supply OR debugging
- 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 onboard jumper
- SIM card slot, supports NB-IoT specific card
- 2x LED indicators, easy to monitor the working status
- Baudrate: 300bps~921600bps (115200bps by default)
- Control via AT commands (V.25TER, 3GPP TS 27.007, and SIMCOM AT Commands)
- Comes with development resources and manual (examples for Raspberry Pi/Arduino/STM32/Python)

### **Specification**

### Communication

- Band
  - FDD-LTE B1/B3/B5/B8/B20/B28
- Data rate
  - Uplink≤62.5Kbps
  - Downlink≤26.15Kbps

- SMS
  - Text mode and PDU mode (depends on the NB card)

### General

- Power supply: 5V
- Logic level: 5V/3.3V (3.3V by default)
- Overall current (idle mode): ~18mA
  - Single module current (VBAT=3.3V):
  - Idle mode: 5.6mA
  - Sleep mode: 0.4mA
  - PSM mode: 5uA
  - eDRX mode: 70uA (eDRX=655.36s)
- Dimension: 30.5mm x 65.0mm

### Interfaces

PIN	Description
5V	5V power inut
GND	Ground
RX1	Data receive of Serial port 1
TX1	Data send of Serial port 1
DTR	Sleep Control, High: Sleep; Low: Wake up ( need to be set with "AT+CSCLK=1")
RI	Interrupt PIN, High by default. It becomes Low (120ms) when message received or URC reported) (need to be set with "AT+CFGRI=1")
RX2	Data receive of Serial port 2

TX2	Data send of Serial port 2
PWR	Power control
RESET	Reset

### Jumpers

Jumpers	Descriptions
VCCIO	Set the operating voltage to 3.3V or 5V
PWR	Set the power control, set to controllable by P4 (BCM) pin of Raspberry Pi by default

### Indicators

LEDs	Descriptions
PWR	On: The module is powered on
NET	On(64ms)&OFF(800ms): Internet isn't registered On(64ms)&OFF(3000ms): Internet is registered On(64ms)&OFF(300ms): Data are transmitting OFF: Power off or PSM Sleep Mode

### Working with Windows PC

### Hardware connection

The external components required:

- A special sim card which supported NB-IoT
- A USB to TTL module (Recommend CP2102 USB to UART Module)

#### Connection:

- 1. Insert sim card to the backside card slot, connect LTE antenna (The **LTE antenna** must be rotated to the outside of the board)
- 2. Connect CP2102 module to UART1 (or UART2) of SIM7020E NB-IoT HAT(SIM7020 hereafter), and connect to your PC by USB cable
- 3. Power on SIM7020. (PWR:On ; NET: OFF)
- 4. Press PWRKEY buttons for about 1s (NET: Blinking)
- 5. Download the serial assistance software and open it. Set it 115200 8N1, and check the newline options
- 6. Click Extend to get the pre-configure commands. Testing



#### **Quick testing**

Herein we list some common commands which can be used to quick test the SIM7020.

Command	Description	Return
AT	Check module status	ОК
ATE	ATE1:Echo Mode On; ATE0: Echo Mode Off	ОК
AT+CSQ	Check Internet Signals Quality	ОК
AT+CGMR	Check Firmware Version	ОК
AT+CGREG?	Check Internet register status	ОК
AT+CGACT?	Check PDP status	ОК

AT+COPS?	Check Internet Information	ОК
AT+CGCONTRDP	Check Internet status	ОК
AT+CFUN=0	Turn off RF	ОК
AT*MCGDEFCONT	Set APN, e,g: AT*MCGDEFCONT="IP","3GNET"	ОК
AT+CFUN=1	Turn On RF	ОК

```
AT
OK
AI+CPIN?
+CPIN: READY
                                                                                                                                                                                                                                 ~
0K
AT+CSQ
+CSQ: 20,0
OK
AT *CGREG?
*CGREG: 0,2
OK
AT +CGREG?
+CGREG: 0, 1
OK
AT+CGACT?
+CGACT: 1,1
OK
AI+COPS?
+COPS: 0,2,"46000",9
OK
AT +CGCONTEDP
+CGCONTEDP: 1, 5, "3GHET", "100.90.251.126.255.255.255.0"
OK
AT+CFVN=0
+CPIN: NOT READY
OK
AT*MCGDEFCONT="IP", "3GNET"
OK
AT+CFUN=1
OK
+CPIN: READY
AT+CGMR
1752B07SIM7020C
OK
AT+CPIN?
+CPIN: READY
0K
AT+CSQ
+CSQ: 20,0
OK
AT +CGREG?
+CGREG: 0,2
OK
AT *CGREG?
*CGREG: 0,2
OK
AT *CGREG?
*CGREG: 0, 1
OK
AT+CGACT?
+CGACT: 1,1
OK
```

### **TCP/IP Communication**

SIM7020 cannot support transparent and server mode.

TCP/IP of SIM7020 is multiple client structure, supports up to 5 sockets (like TCP or UDP)



Connect modules and test network connection by following instruction above before TCP/IP communicating.

For more information about TCP, UDP, DNS, etc. Please refer to SIM7020 Series\_TCPIP\_Application\_Note

### 【TCP Client】

Commands	Description	Return
AT+CSOC=1,1,1	Create TCP socket, <socket_id>=0</socket_id>	ОК
AT+CSOCON=0,2317,"118.190.93.84"	Connect to remote server	ОК
AT+CSOSEND=0,0,"Hello World"	Send data	ОК
AT+CSOCL=0	Close socket	ОК
AT+CSOSENDFLAG	Enable Send ACK	ОК
AT+CSORCVFLAG	Enable receive ACK	ОК

AT+CSOCON?	Check communication port and type	ОК
Commands	Descriptions	Return
AT+CSOC=1,2,1	Create UDP socket, <socket_id>=0</socket_id>	ОК
AT+CSOCON=4,524,"116.247.119.165"	Connect remote server	
AT+CSOSEND=4,0,"Waveshare"	Send data	ОК
AT+CSOCL=0	Close socket	ОК
AT+CSOSENDFLAG	Enable send ACK	ОК
AT+CSORCVFLAG	Enable receive ACK	ОК
AT+CSOCON?	Check communication port and types	ОК

### [Multiple Scokets]

The image below shows you how to create five sockets communication at the same time using one SIM7020. Please refer to Commands of 【TCP Client】 【UDP Client】

AT+CSOC=1, 1, 1 +CSOC: 0	^ 3	δ条字符串发送 stm32/GD32 ISP   STC/IAP15 ISP			
1000.0	E		13/6/五代平	Ľ	10000
OK		TUP Ulient		<u> </u>	1000
NI ~C50C0R=0, 2517, 110.190.95.04		AT+CSUC=1, 1, 1	它版里TCP socket	Ľ	1000
AT+CSOSEND=0,0, "Waveshare Send to Socket id 0"		AT+CSUCUN=2, 2317, 118.190.93.84	<u>连接远端</u> TCP server	Ľ	1000
UK		AT+CSUSENU=2, U, Waveshare Send to Socket 1d 2	友法TCP数据	Ľ	1000
SEND: 0,29		AT +CSULE=4	天闭TCP socket	Ľ	1000
+CSONNT: 0.29 Wayawhaya Sand to Socket id 0		AT +CSUSENUFLAG=1	使能TCP 友法ACK回机	Ľ	1000
AT+CSOC=1, 1, 1		AI *CSURCVPLAG=1	便配TCP 接收ACK回机	Ľ	1000
+CSOC: 1	16		imp cl.	Ľ	1000
OK	16	UDF Client		Ľ.	1000
AT+CSOCON=1, 2317, "118. 190. 93. 84"	16	AI "COUL-I, 2, I	它的主UDF socket	Ľ	1000
AT+CSOSEND=1.0. "Waveshare Send to Socket id 1"	16	AT COCORTA, 2017, 110.100.00.00	<u>1生授)兀</u> 彌UUP peer	Ľ.	1000
OK	16	AT-CSOSERD-4, 0, Haveshare Send to Socket 14 4 using our		Ľ.	1000
SRITE: 1.29	16	AT 402000002	大団 SOCKet Add Socket	ŀ	1000
	16	AT COUCH?	位直输口作通信关望	ŀ	1000
+CSONNMI: 1,29, Waveshare Send to Socket id 1	16	WTTP POCT		ŀ	1000
+CSOC: 2	16	AT+CHTTPCRFATE="L++n //130 217 0 40-8080/"	GIZE WITTO BEALERANS	Ľ,	1000
or		AT +CHTTPCON=0	<u> 日月主 川 11 版方谷3</u> 南 法協 server	Ĕ.	1000
AT+CS0C0N=2, 2317, "118, 190, 93, 84"	16	2736174656c6c697465223a2235222a2276646c74616765223a22342a322274	<u>注接</u> server	ĥ	1000
OK	- IF	AT +CHTTPDTSCON=0	<u>反因</u> 加口 间不	Ĕ.	1000
AT+CSUSEND=2, U, Waveshare Send to Socket 1d 2 OK		AT+CHTTPDESTROV=0	出知すたなの	Ĕ.	1000
			37天注释	Ĕ.	1000
SEND: 2,29		HTTP GRT	HTTP:	Ĕ.	1000
+CSONMI: 2,29, Waveshare Send to Socket id 2		AT+CHTTPCREATE="https://www.waveshare.com/"	前的書HTTP Host 无例	ĥ	1000
AT+CSOC=1, 2, 1		AT +CHTTPCON=0	法接 server	Ŭ,	1000
-C206. 3		AT+CHTTPSEND=0.0. "/index html"		ĥ.	1000
OK		AT+CHTTPDISCON=0	新开连接	6	1000
AI +CSUCUN=3, 2317, 118.190.93.84		AT+CHTTPDESTROY=0	释抗消毁 HTTP 元例	ĥ	1000
AT+CSOSEND=3,0, "Waveshare Send to Socket id 3 using UDP"		AT+CHTTPCREATE?	44开注释	6	1000
OK			45无注释	6	1000
+CSONNE: 3,39, Waveshare Send to Socket id 3 using UDP		LW162M	46无注释	6	1000
AT +CSOC=1, 2, 1 +CSOC = 4		AT+CLMCONF="182.150.27.21", "5683", "1222", "sim7020test", "IPv4", 10	创建 LNM2M 连摘	0	1000
-C000. 4		AT +CLMADDOBJ=0, 5, 2, 8, 0, 1, 2, 3, 4, 5, 6, 7	创建对象	0	1000
OK		AT +CLMDELOBJ=0, 5	間除对象	0	1000
AT+CSOCON=4, 2317, "118. 190. 93. 84"		AT +CLMREAD=0, 5, 2, 1, 1, "S", 5, "abode"	读取	0	1000
AT+CSOSEND=4, 0, "Waveshare Send to Socket id 4 using UDP"		AT+CLMWRITE=0,0	写操作	0	1000
OK		AT+CLMEXECUTE=0, 0	执行	0	1000
+CSONMI: 4,39, Waveshare Send to Socket id 4 using UDP		AT+CLMNOTIFY=0, 5, 2, 3	通知配置	0	1000
AT+CSOCL=0		AT+CLMDEL=0	断开并删除实例	0	1000
OK AT+CSOCI=1			55无注释	0	1000
OK			56无注释	0	1000
AT+CSOCL=2		AT +CMQNEW="198.41.30.241", "1883", 12000, 100	创建 MQTT 连接	0	1000
AT +CSOCL=3		AT+CMQCON=0, 3, "myclient", 600, 0, 0	发送 MQTT 请求	0	1000
OK -	10	AT+CMQSVB=0, "mytopic", 1	订阅主题	0	1000
AT+CSUCL=4		AT+CMQPUB=0, "mytopic", 1, 0, 0, 8, "31323334"	发布主题和消息	0	1000
		AT +CMQUNSUB=0, "mytopic"	取消订阅主题	0	1000 🗸
- 	<u> </u>	发送文件 值止 寄发送区 局前 [ Endish 保存參数 ] 隐藏 —		-	
				-	
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□ RTS □ DTR 波特率: 115200 🔽 AT		~			
为了更好地发展SSCOM软件					
请您注册嘉立创『结尾客户 友 达		×			

### [DNS and Ping]

Functions of DNS and Ping are only available when network is acceasble

Commands	Description	Return
AT+CIPPING	Ping commands. e.g. AT+CIPPING="61.135.169.121"	ОК
AT+CDNSGIP	DNS, e.g. AT+CDNSGIP="www.baidu.com"	ОК

```
AT +CIPPING="61.135.169.121"
OK
+CIPPING: 1,61.135.169.121,13,53
+CIPPING: 2,61.135.169.121,11,53
+CIPPING: 3,61.135.169.121,10,53
+CIPPING: 4,61.135.169.121,13,53
AT +CDNSGIP="www.baidu.com"
OK
+CDNSGIP: 1, "www.baidu.com", "111.13.100.91"
```

#### HTTP

SIM7020 supports two types of HTTP communicating, HTTP GET and HTTP POST

For more information about AT commands of HTTP communication, please refer to SIM7020 Series\_HTTP\_Application\_Note

[HTTP GET]

Commands	Description	Return
AT+CHTTPCREATE=" <u>https://www.waveshare.com/</u> "	Create HTTP Host example	ОК
AT+CHTTPCON=0	Connect to server	ОК
AT+CHTTPSEND=0,0,"/index.html"	Send HTTP Request	ОК
AT+CHTTPDISCON=0	Disconnect	ОК
AT+CHTTPDESTROY=0	Release and clear HTTP example	ОК
AT+CHTTPCREATE?	Check HTTP connecting status	ОК

Note: Request time is a little long because of NB-IoT network when testing HTTP commands, please be patient.

CHITPCREATE="https://www.wareshare.com/" A	多条字符串发送 stm32/6032 ISP STC/IAP15 ISP		
TIPCREATE: 0	E lat-cruses	开放时	To 1:000
	T 47-028	空间形木	0 100
CHITPCOB=0		12天注释	0 100
	AT-CIP2TING="61 135 169 121"	Pin_424544-4644	0 1000
TIPEER: 0, -2	AT "CIMPGIP="www.baidu.com"	解析和认为解系器抽针	0 1000
A11700-0		16平注程	0 1000
CMTTPSEED=0, 0, "/index. html"	TTT flight		0 1000
	AT-CSDC=1.1.1	SEPTTR sucket	0 1000
TTPSMIH: 0,200,719, Date: Sun, 06 Jan 2019 14:46:16 GMT	2740000 11111 27400000860 2217, "118 190 92 84"	法論(子)が TFE Sources	0 1000
tent-Type: text/html; charact=WTF-8	at a Concern, Lott, 100 to the Socket id 9"	HERE THE PARTY OF	0 100
aster-macoding: connect		A DE TUR KRAM	0 100
Coakie:		AND	0 100
ires"Mon, Od-Jan-20 14:48:14 GMT; path=/; domain=.waveshare.com;		夜転に「友法和和当地	0 1000
y: Arcept-Encoding	KI COUL VELADAL	教能にど 換代和為如何	0 1000
evered By: 712/5. 5. 25		100.011	0 1000
Coskie: frentend@rr2/k2grm/hltSab3u51996s/3; expired@sm, 00~jan-2019 16:15 (207: Maarkaam5400: aakbe/	UP Client	-OUF Client-	0 1000
irez: Thu, 19 New 1981 08:52:00 GMT	AT*CS00*1, 2, 1	Signife socket	0 1000
he-Centrel: no-store, no-cache, wust-revalidate, post-check=0, pre-	AT+CSUCUB+4, 2317, 118, 190, 93, 84	连接达课UL beet	0 1000
me' romanhe	AT*CSUSEND=4, 0, "Waveshare Send to Socket id 4 using NDP"	发送/IIP数据	0 1000
ct-CT: max-age=604800, report-uri="https://report-	AT CSOCL-4	美团 zocket	0 100
cloudflare.com/cdx-cgi/beacon/expect-ct	AT +CS0C0B?	检查演口和通信类型	0 1000
er: cloudilare AY: 494ef914dfs3s2b4-9000			0 100
	HTTP FOST		0 100
THEFT.	AT "CHITPCREATE="http://139.217.9.49:0000/"	仓储 HTTP 服务器编	0 100
32023, 500, 3x21444.643545950452068746.86x3x0x3x68746.86x20786.86x6x733.822687	AT -CHITPCOB-0	達捜 server	0 100
103 v2 li2 £7T777T72 vT7332 v6 £72672 £313939392 £7060746 d6 v2220706 d6 v3 v6 v616 v673 d	2736174656c6d697465223d2235222d276656c74616765223d22342x322278	发送 http 清求	0 1000
16 e222208 e616 e6 73 e222656 e2223 e0 e3 e686561643 e0 e3 e6 e65 74612068 74 74 702 e65 71 756 Láronno Anna 10 Anna fa Arna 1 tagagoa Janzonna ja fa Jaana Janza Janza Janza Janza Janza Janza Janza Janza Janza	AT-CHITFDISCOM-0	顺开连接	0 100
726E6405343122202E3+0 x3+6465746120687474702405717569763422436E6+74656+7	AT -CHITPDESTROP-0	績額HTTF实例	0 100
4797065222063686e74656e743d22746578742860746d6v3h20636861727365743d7574			0 100
£38222202 ± 3+0 +3+c /469 /46 ±053 +5 /61 /1665 /36061 /266220456 c6563 /4 /26 ±6+6963 /33 c2 89746, 463 -0	HTTP GET-	町田福金	0 100
43-82257617605736861726520456~656374726£6+6963732<2044696+692850432<20446	AT-CHITPCHEATE="https://www.wavethare.com/"	自然NTT? Heat示例	0 100
956 +6 £706 d656 + 7420 426 £61 726 42 + 2050 726 £6 7726 16 & d65 722 + 2044 6562 756 76 765 72	AT -CHITPCOB-0	连接 server	0 100
10465137423636503665046262041646170146512262626222222556063665746120666 95382268657977667796473222063666,174956,274382575617665736861726520456,6563	AT-CHITESEND=0.0. "/index html"	世洋 http: 清学	0 100
28 £6 #8963 732 c204 &690 #892 &604 32 c204468 76856 c6 £ 706 &656 #7420426 £61 72642 c205	AT-CHITEDISCON-0	新正法論	10 100
16677261636365722×204465627567676572	AT SCHITTED SCIENCE	ETABLES THE TO THE	0 100
TPRAIC:	AT ACHIER DE LA CONTRECE DE LA CONTR	SWARPERS ALLE ADDE	0 100
32023, 500, 2 c205465737420536£636b65742 c20416461707465722 c2 c2 c2 c2202£3 e0 c3		10 T :+ 12	0 100
157461206+6164653422726562957473222063656+74656+743422494+4445582+48456 19772200267-0112.4857461206-01645714222063656+74656+743422494+4445582+48454		40万注释 47万注释	0 100
769647468346465766963652477696474682x20696x697469616x247363616x6534312x		<u> の方主類</u>	0 100
206 å61 78696 å 756 å2 å 7363616 «653 å312 «302 «2075 7365 722 å 7363616 «61626 «653 å6»6	A CLADURE 102.150.27.21, 5005, 1222, Elerodutest, 1294,10	三世紀 しめため 1年後	0 100
202 £340 µ0 µ3 x6x69646 µ20 72656 x3 422696 36 £6 µ222068 1265663 42268 74 74 70 733 µ2 £2 £ 1772 µ 776 1 7667 75676 1 75677 µ256 k5 ½0 µ656 µ5 µ666 1 76666 1 76666 1 7666 1 766	AT*CLMAIDOD.]*0. 5. 2. 0. 0. 1. 2. 3. 4. 5. 6. 7		0 100
156536342+706+67222074797065332269636167652178236963656+2220213+0+3+6+69	AT 4CIMUELOS J 40, 6	100 A 100	0 100
2072656 x342273686 £72746375742069636 £6 x222068 7265663 42268 747470733 x2 £2 £7	AT+CLMEEEAD+0, 5, 2, 1, 1, 3, 5, abcde	16.10	0 100
12+110170001300017200240300042104030001210400012104001700003000421040000017002 ##3636342_mThE_#672220174,793D#533226863616346297823#386636464222202922302434634040434644	AT*CLMREITE=0, 0	与投作	0 100
b2072656-34226170706-6524746f7563682469636f6+24707265636f64706f73656422	AT CIMERECUTE-0.0	执行	0 100
17265663422687474707334242E77777724776176657368617265246364646864696	AT-CIMBOTIFF=0, 5, 2, 3	通知政策	0 100
0180120012001002010000001212210000000000	AT-CIMDEL-0	断开并删除实例	0 100
TTP:MIC:		历无注释	0 100
32023, 500, 6661756+74266+667665£312+706+67223+0+0+3+6+696+612072656+342 🤘	IT I	和平注缩	In Iton
abatean [ Ar er de M ]	NEW COLOR AND CAMERA AND AND -		

1/3733d228-865/16656-332022340-63-86120687265663d228874/1470733d2 E2E7717772477 A	多条字符串发送   stm32/GB32 ISP   STC/IAP15 ISP		
470692£626£617264732+687464223+0+3+7370616+3+426£617264733+2£7370616+3+0+	AT +CFIR+L	开启班	0 1000 #
2 (613 eDs3 e2 (6 e693 e0 s3 e6 e6920636 e61 73733 d226 e65 76656 e3320223 e0 s3 e612060 726 e3 20 e62 7 4 3 12 23 e 0 57 23 27 23 e 3 e 1 best 23 e69 e 20 e52 e 20 e53 e53 e51 20 e 20 e 20 e 20 e 20 e 2	AT+DBE	音询版本	0 1000
63622661414701338222217711724776176857366817268736681726566666676573246674642234043	E CONTRACTOR OF CONTRACTOR OFO	12元注释	0 1000
0616+3+50616365616705733c2£7370616+3+	AT+CIPPING="61.135.160.121"	Pine解析出地址	0 1000
HTTP:MUC:	AI *CONSELP="www.baids.com"	解析Baida服务器地址	0 1000
1, 32023, 500, 0 a3 a2 £613 a0 a3 a2 £6 a693 a0 a3 a6 a6920636 a61 73733 &226 a6576656 a33202	E	15元注释	0 1000
HUNDREIDER 726566536226674 F47073362 E2177 F777247161 7665736661 726562 463616421 1726 E64 7563742 E64696 4692 470632 E7261 737062657272792 470692 E646973706-61 79732	TCP Client-	TCP Client	0 1000
87464223+0+3+7370616+3+446973706+6179733+2f7370616+3+0+3+2f613+0+3+2f6+69	AT+CS0C=1, 1, 1	()itTCP socket	0 1000
0 4346 46820636 461 73 7334226 466 18856 43520223 40 43 4612068 7266663 42268 74 74 70 733 42 4 77 77 77 2 47 761 7666 73666 172662 4636 66 42 4 70 726 664 7663 742 46 4666 4682 4 70 632 4 72	AT +CSOCO9=2, 2317, "118. 190. 93. 84"	這接远達 TCP server	0 1000
7370626572727924706925636164657261732+687464223+0+3+7370616+3+43616465726	AT+CSOSEMD=2.0, "Waveshare Send to Socket id 2"	发送TCP数据	0 1000
33x217370616x3x0x3x21613x0x3x216x693x0x3x6x66920636x61737334226x6576656x33 x223x0x3x6120x872x65xx3422x68747470733x24257777772x778178x6573686173x88x172x652x638.66	AT+C30CL=4	关闭TCP socket	0 1000
£70726£647563742£648964692470632£7261737062657272792470692£68617473246874	AT +CODERTPLAG=1	使能TCP 发送ACE回执	0 1000
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### MQTT

For more information about MQTT, please refer to SIM7020 Series\_MQTT\_Application\_Note

[Subscribe and send message]

Herein show you how use MQTT by using MQTT test tool which is found online

Command	Description	Description	Return
AT+CMQNEW="198.41.30.241","1883",12000,100	Create MQTT connection	ОК	
AT+CMQCON=0,3,"myclient",600,0,0	Send MQTT request	ОК	

AT+CMQSUB=0,"mytopic",1	Subscribe	ОК	
AT+CMQPUB=0,"mytopic",1,0,0,8,"31323334"	Publish theme and message	ОК	
AT+CMQUNSUB=0,"mytopic"	Unsubscirbe	ОК	
AT+CMQDISCON=0	Disconnect MQTT	ОК	

Note: Request time is a little long because of NB-IoT network when testing HTTP commands, please be patient.

▲ SSCOM V5.13.1 串口/网络数据调试器,作者:大虾丁丁,2618058@qq.com. QQ群: 52502449(最新版本)		_		×
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### Working with Raspberry Pi

SIM7020X NB-IoT HAT is compatible with Raspberry Pi 40PIN GPIO, can directly plug to most types of Raspberry Pi. The used pins are as below:

SIM7020X NB-loT HAT	Raspberry Pi
5V	5V
GND	GND

RXD	TXD (BCM:P14)
TXD	RXD(BCM: P15)
PWR	P7 (BCM: P4)

#### Software Setting

- Download demo code, copy SIM7020x folder to /home/pi/ of your Raspberry Pi
- Open Terminal, and execute:

chmod 777 sim7020\_nbiot\_hat\_init

- Set script auto-executing:
  - Modify rc.local file:

sudo nano /etc/rc.local

• Add the line in front of exit 1 as below

```
sh /home/pi/SIM7020X/sim7020_nbiot_hat_init
```

#### **Serial Setting**

To work with Raspberry Pi, you need to enable hardware serial and disable serial login shell function.

•	Enter	raspi-	configure	

sudo raspi-config

- Choose Interfacing Options->Serial->no->yes
- Open /boot/config.txt file, check if the line was added:

```
enable_uart=1
```

• Reboot

#### **Testing with minicom**

Connect SIM7020 to Raspbery Pi, install minicom to your Raspberry Pi:

sudo apt-get install minicom

Execute minicom -D /dev/ttyS0 to enter the minicom (ttyS0: Pi 3B/3B+, ttyAMA0: Zero/2B)

#### **Demo codes**

Download demo codes. Rename bcm2835 folder to SIM7020X and copy it to /home/pi of Raspberry Pi

[Install BCM2835 libraries]

Enter SIM7020X/bcm2835 directory, install the libraries with commands:

```
./configure & make & sudo make check & sudo make install
```

#### [Compile and run]

#### The files tree:

pi > SIM7020X >	> pi > SIM7020X > examples >	> pi → SIM7020X → examples → AT
名称	名称	石砂
bcm2835 examples isim7020_nbiot_hat_init	AT HTTP MQTT TCP UDP en arduPi.cpp arduPi.h en sim7020x.cpp sim7020x.h	AT.cpp
ł /home/pi/SIM7020X/exa do make clean && sudo 1	mples/AT nake && sudo ./main	

### Working with STM32

SIM7020X NB-IoT HAT is compatible with STM32 MCU. The used pins are as below (Waveshare Open103V STM32F103V) :

SIM7020X NB-IoT HAT	STM32F103V
5V	5V
GND	GND
RXD	PA2 (对应USART2的TX)
TXD	PA3 (对应USART2的RX)

Coming soon...

## Resources

- Schematic
- Source code

# Tools

- sscom (with SIM7020 AT commands)
- MQTT test tool

### SIM7020 Datasheets

- SIM7020\_SPEC\_EN
- SIM7020 Series\_AT Command Manual\_V1.02
- SIM7020 Hardware Design\_V1.02
- SIM7020 SIM7020 Series MQTT Application Note
- SIM7020 Series\_MQTT(S)\_Application Note\_V1.03
- SIM7020 Series\_CoAP\_Application\_Note\_V1.0
- SIM7020 Series\_CoAP\_Application Note\_V1.02
- SIM7020 Series\_FOTA\_Application\_Note\_V1.01
- SIM7020 Series\_HTTP\_Application\_Note\_V1.1

- SIM7020 Series\_HTTP\_Application Note\_V1.02
- SIM7020 Series\_Low Power Mode\_Application Note\_V1.02
- SIM7020 Series\_Low Power Mode\_Application Note\_V1.03
- SIM7020 Series\_LWM2M\_Application Note\_V1.02
- SIM7020 Series\_TCPIP\_Application\_Note\_V1.02
- More...

# Firmware upgrade

- 1752B07SIM7020E Firmware
- 1752B10SIM7020E Firmware
- 1752B11SIM7020E Firmware
- 1752B12SIM7020E Firmware
- 1752B13SIM7020E Firmware
- Upgrade tool
- Upgrade Video