User Manual for SL101EU

LoRaWAN Temperature and Humidity Sensor

V1.0

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SL101EU is long range low power temperature and humidity sensor based on Semtech SX1262.

Main features:

Sensirion High Sensitivity Sensor

2.9 -inch Screen Local Display

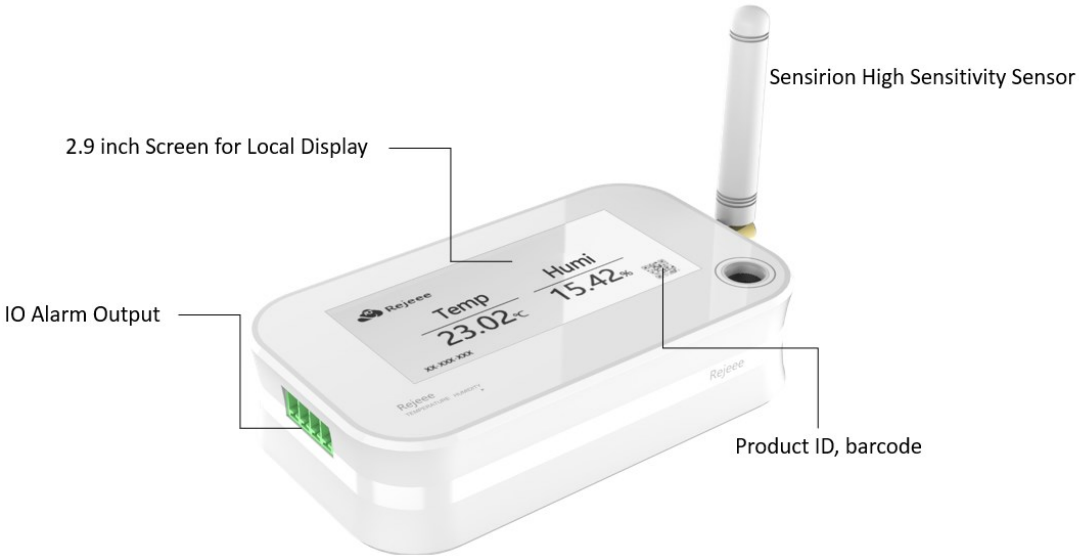
IO Alarm Output

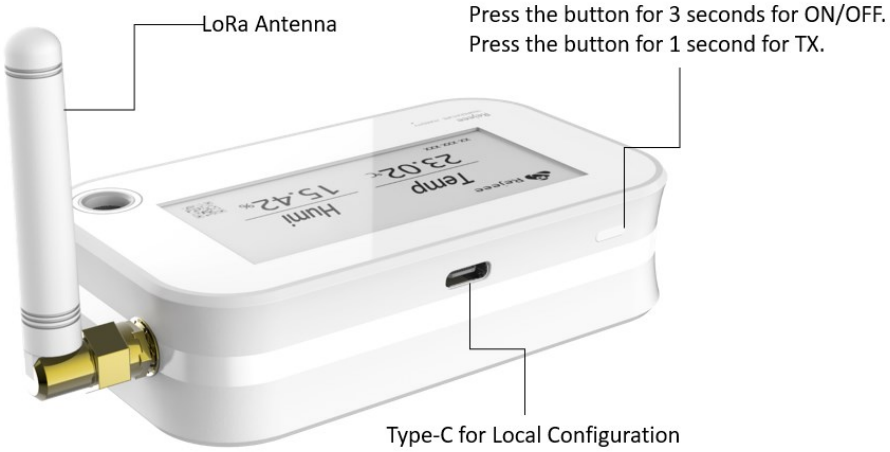
Type-C for Local Configuration

Internal Battery Up to 5 Years

LoRa SX1262, Long Range Low Power

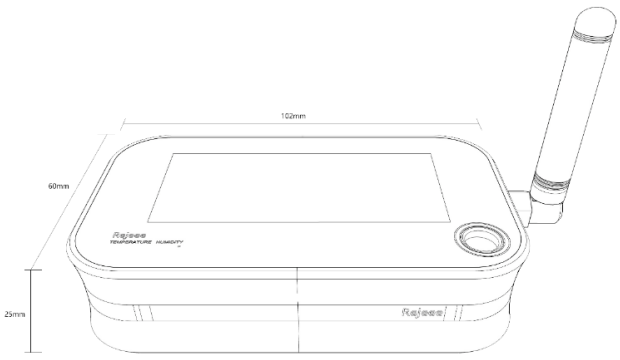
1. Details:





Parameter	Feature
CPU	M0+
Wireless	LoRaWAN(SX1262)
Encryption	AES128 Optional
Power	Built-in Li-battery
Working Temperature	-45℃~+ 85℃
Working Humidity	0-100%RH
Communication	Half duplex
Accuracy	Temperature：±0.3℃ Humidity：±3%RH
Power Capacity	4800mAh
Lifespan	3 Years(Every times for data uploading)
Data Speed	300bps-62.5k bps
Size	102mm*60mm*25mm
TX Power	22dBm Max
RX Sensitivity	-140 dBm
Frequency	470MHz~510MHz 868MHz 915MHz

2. Size: 102*65*25mm



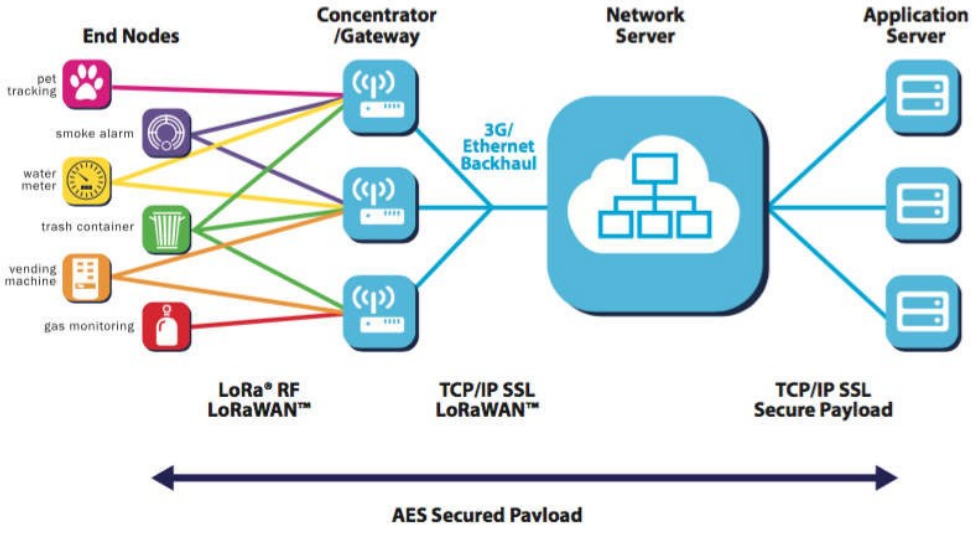
3. Installation:

Hang on the wall

Lay the product flat on the table

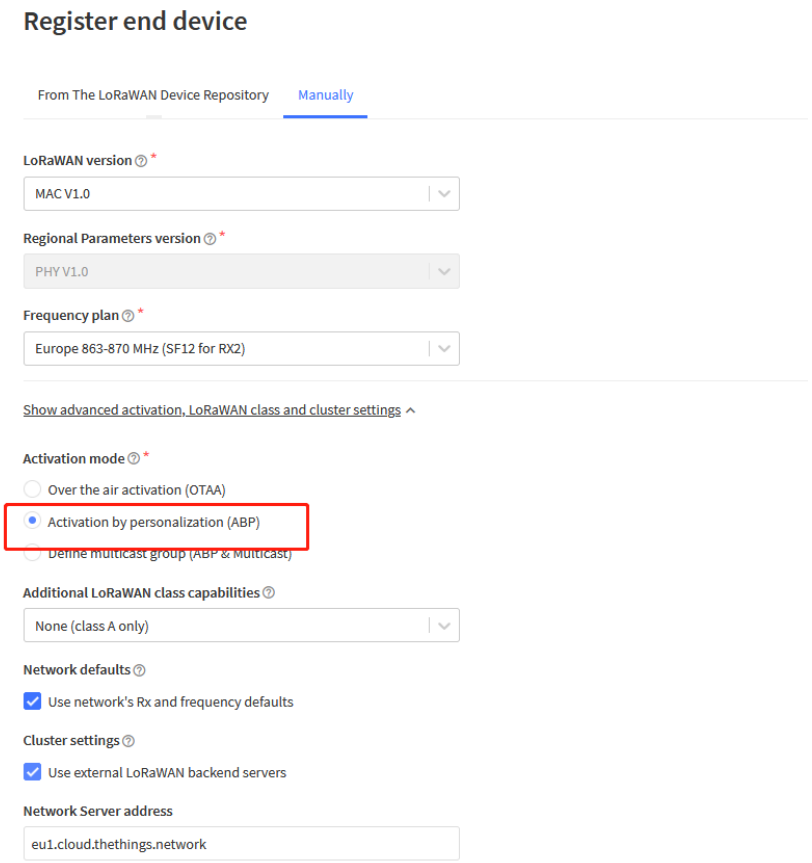
4. Connect to LoRaWAN Network

LoRaWAN Network Structure



SL101EU temperature and humidity sensor is based on standard LoRaWAN Class A, so you can connect to any LoRaWAN network as below:
SL101EU sensor data uplink format with LoRaWAN by ABP, ABP parameter as below:

AppKey: 11223344556677889900aabbccddeeff
ADDR: Sensor ID as display on screen
DEVUI: Customer can add 4 bytes based on sensor ID displayed on screen, or customer can read 8 bytes ID through UART with Rejeee AT command.
Connecting to The Things Network, please make sure choose manually connect and ABP as below:



5. Wireless LoraWAN Sensor Data Format

Sensor Data		
Data 1	…	Data N
Type+Data N Bytes	Type+Data N Bytes	Type+Data N Bytes

LoRaWAN Format:
In order to connect to LoRaWAN network, the sensor support ABP data uploading.

AT+SIP=02(Start LoRaWAN format)

AT+AK=<32 Hex Chars>, which means AppKey, NwkSKey and AppSKey share the same secret key.

AT+ADDR=<8 Hex Char> or AT+ADDR? That means customers can set his own ADDR or choose sensor ADDR as LoRaWAN DevAddr.

AT+TFREQ=<8 Hex Char> according to different zone to set the starting frequency(By default, there are 8 frequencies), If the area standard frequency point is discontinuous, AT+NET=00 can be used to fix the transmission frequency point.

Picture as below, FRMPayload is sensor data, MIC replaces CRC.

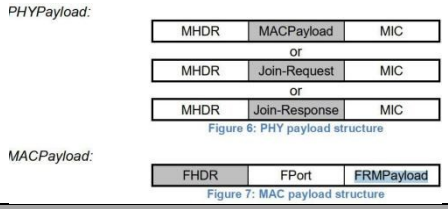


Figure 6: PHY payload structure

Figure 7: MAC payload structure

MHDR	FHDR	FPort	FRMPayload=Sensor Data(Message)			MIC
			Data 1	...	Data N	4 Bytes
			Type+Data N Bytes	Type+Data N Bytes	Type+Data N Bytes	

6. Sensor Data Definition

Device(0x00)

Type 1 Byte	Value 2 Byte		
Status	Version 3bit	Level 5bit	Reserve 1 bit
0x00	000 x xxxx yyyyyyy First 3 is version, last 5 is battery level		

Temperature(0x04)

Type 1 Bytes	Value 2 Bytes	Notes
0x04	Temperature	2-byte signed integer with negative value below zero The default unit is 0.1 degrees, that is, 201 means 20.1 degrees

e.g: 0xFF88 is -120 (-12℃), Network byte order mode is {04 FF 88}

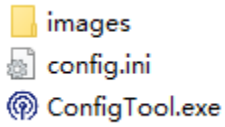
Humidity(0x05)

Type 1 Bytes	Value 1 Bytes	Notes
0x05	Humidity	Unsigned integer of 1 byte The default unit is 1%, that is, 10 means 10%

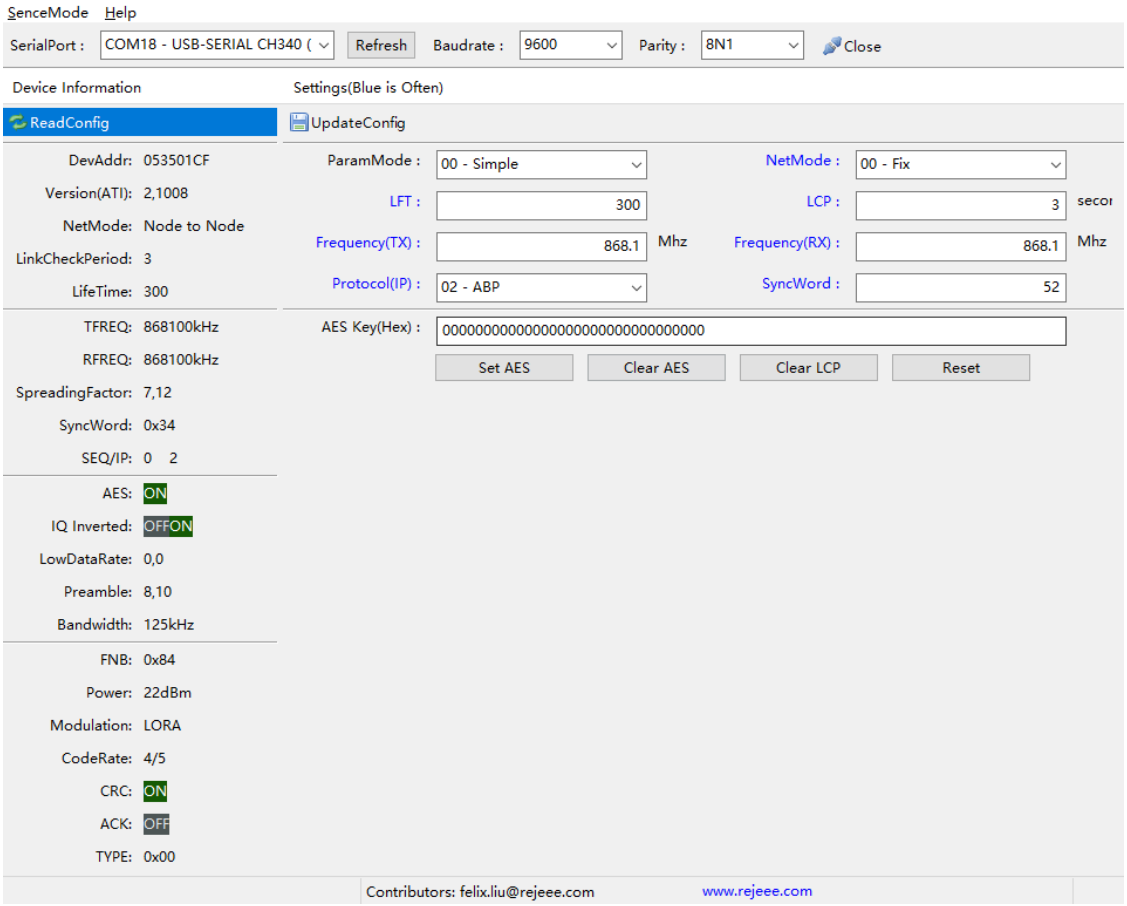
7. Local Configuration:

Note: Factory reset data uploading is every 10 mins, customers can change data uploading frequency as below:

Connect sensor with a USB-C cable to computer for local configuration, through local configuration, you can change the packet frequency. Download config tool here: http://www.rejeee.com/#/w, unpack the document as below:

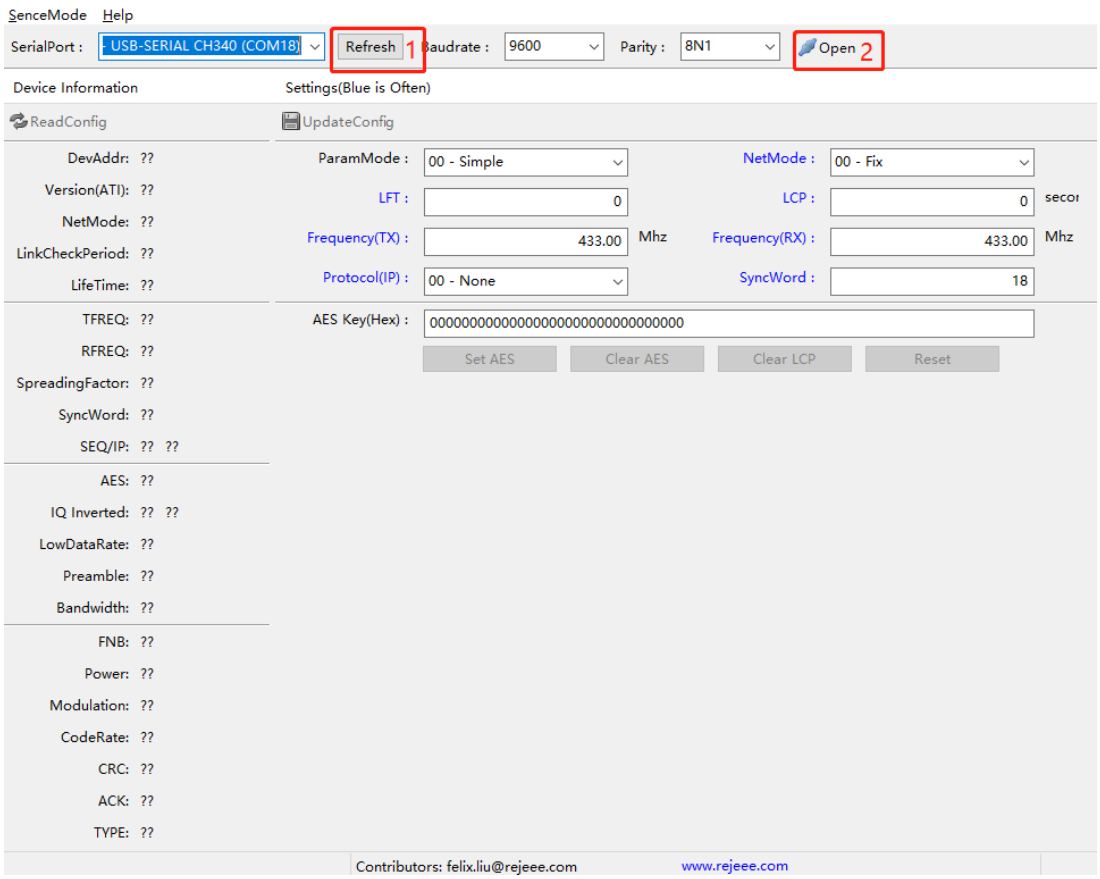


Double click ConfigTool.exe to the page below, this is the factory reset parameter, and you can change each one to connect to other network, but normally customer only need to change data uploading frequency.

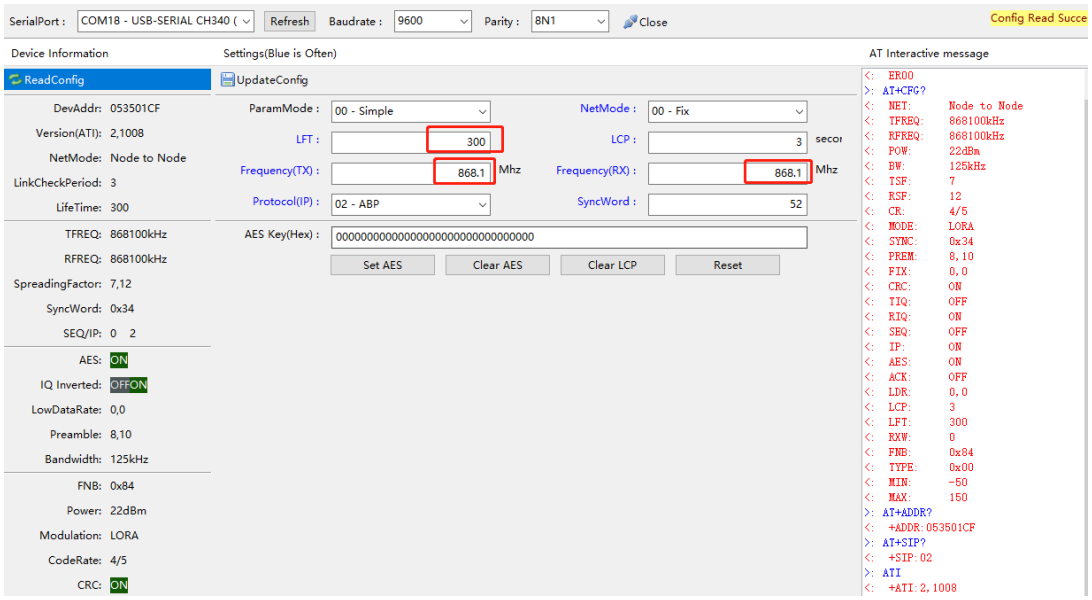


Following below steps to change packet uploading frequency:

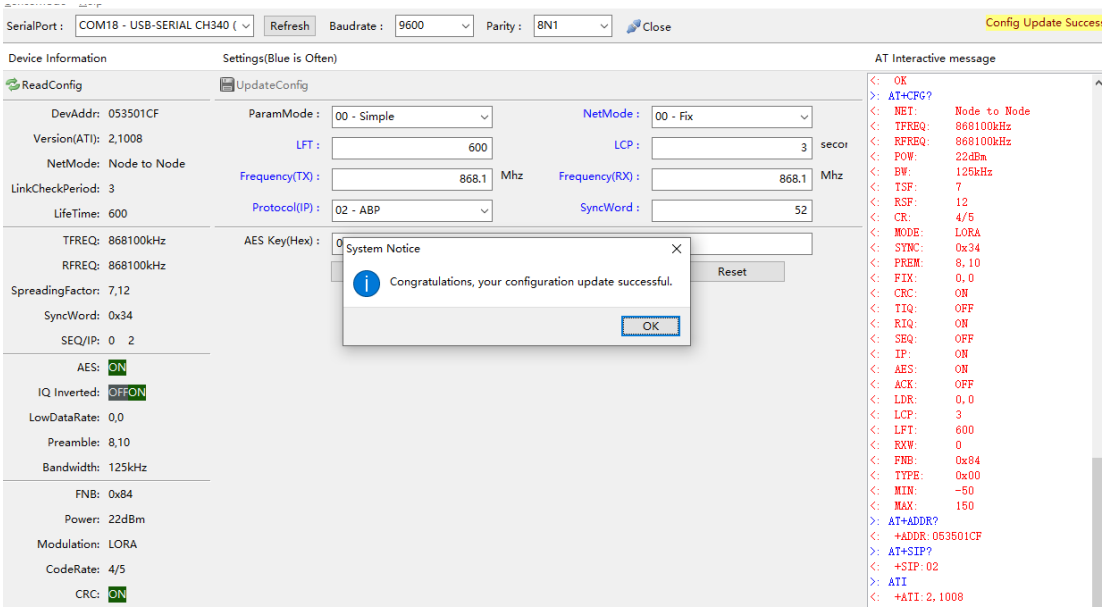
1. Refresh
2. Open the serial port



3. Read config information
4. Update the date uploading frequency for LCP and LFT. LCP is the frequency for sensor data collecting, LTF is the frequency for data uploading.



5. Update config, and when configuration update successfully, close the config tool, and local configuration has been finished.


SerialPort : COM18 - USB-SERIAL CH340 (
Refresh
Baudrate : 9600
Parity : 8N1
Close
Config Update Succes
Device Information
Settings(Blue is Often)
AT Interactive message
ReadConfig
UpdateConfig
DevAddr: 053501CF
Version(ATI): 2,1008
NetMode: Node to Node
LinkCheckPeriod: 3
LifeTime: 600
TFREQ: 868100kHz
RFREQ: 868100kHz
SpreadingFactor: 7,12
SyncWord: 0x34
SEQ/IP: 0 2
AES: ON
IQ Inverted: OFFON
LowDataRate: 0,0
Preamble: 8,10
Bandwidth: 125kHz
FNB: 0x84
Power: 22dBm
Modulation: LORA
CodeRate: 4/5
CRC: ON
ParamMode : 00 - Simple
NetMode : 00 - Fix
LFT : 600
LCP : 3
Frequency(TX) : 868.1 Mhz
Frequency(RX) : 868.1 Mhz
Protocol(IP) : 02 - ABP
SyncWord : 52
AES Key(Hex) :
Reset
System Notice
Congratulations, your configuration update successful.
OK
<: OK
>: AT+CFG?
<: NET: Node to Node
<: TFREQ: 868100kHz
<: RFREQ: 868100kHz
<: POW: 22dBm
<: BW: 125kHz
<: TSF: 7
<: RSF: 12
<: CR: 4/5
<: MODE: LORA
<: SYNC: 0x34
<: PREM: 8,10
<: FIX: 0,0
<: CRC: ON
<: TIQ: OFF
<: RIQ: ON
<: SEQ: OFF
<: IP: ON
<: AES: ON
<: ACK: OFF
<: LDR: 0,0
<: LCP: 3
<: LFT: 600
<: RXW: 0
<: FNB: 0x84
<: TYPE: 0x00
<: MIN: -50
<: MAX: 150
>: AT+ADDR?
<: +ADDR:053501CF
>: AT+SIP?
<: +SIP:02
>: ATI
<: +ATI:2,1008