E35-2G4T10S/SX

TLSR8208 2.4GHz ISM Band 10dBm Wireless Transmission Module



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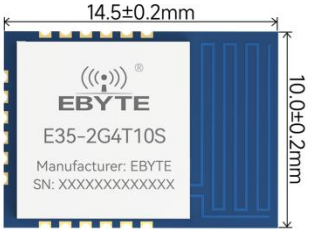
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1 Introduction

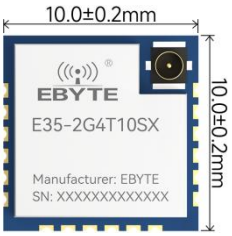
1.1 Brief Introduction

E35-2G4T10S/SX series is a new generation of 2.4GHz wireless serial module designed based on Telink's TLSR8208 chip solution. It has various transmission modes, operates in 2400~2480MHz frequency band, adopts standard stamp-hole SMD package, and has UART communication interface, which is convenient for users to develop and use.

E35-2G4T10S/SX series is a wireless data transmission module working in ISM band. It supports wireless transparent transmission, fixed-point transmission, broadcast transmission, serial port upgrade, communication encryption and other functions, and can provide customized development services.



E35-2G4T10S



E35-2G4T10SX

1.2 Features

- Designed based on the TLSR8208 chip solution from Telink Microelectronics (Telink);
- Supports communication key function, which greatly improves the security of user data;
- Supports serial port upgrade with standard YMODEM protocol;
- Supports RSSI signal strength indication function of received data packets, which is used to evaluate signal quality, improve communication network and range measurement;
- Supports fixed-point transmission, broadcast transmission, channel listening;
- Supports deep hibernation, the whole power consumption in this mode is about 1 μA;
- Support 100 Kbytes data continuous transmission;
- Supports global licence-free ISM 2.4GHz band;
- Efficient watchdog design to ensure stable programme operation;
- Supports data transfer rate from 250Kbps to 2Mbps;
- Supports 1.9~4.2V power supply, typical 3.3V supply voltage;
- Baud rate support 9600bps～115200 bps.
- E35-2G4T10S uses PCB on-board antenna.
- E35-2G4T10SX adopts 3rd generation IPEX antenna holder.
- The industrial grade standard design supports long time use at -40 to +85℃;

1.3 Application

- Power grid, military applications

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- Home security alarms and remote keyless entry;
- Smart home as well as industrial sensors;
- Wireless alarm security systems;
- Building automation solutions;
- Wireless industrial grade remote controls;
- Healthcare products;
- Automotive industry applications.

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2 Specification

2.1 RF parameters

RF parameters	Parameter value	Note
Frequency band	2400～2480MHz	Supports ISM bands
Transmit power	10 dBm	Software adjustable
Receiving Sensitivity	-98 dBm	Air Rate 500Kbps
FIFO	1024 Byte	-
Maximum packet length	48 Byte	Support 23Byte～48Byte packet size, adjustable by software, default 23Byte.
Air Rate	250Kbps～2Mbps	Software adjustable, default airspeed 250Kbps
Modulation Method	FSK	-
E35-2G4T10S communication distance	490m	Clear and open environment, PCB antenna on board, antenna height 1.5m, air rate 250kbps
E35-2G4T10SX Communication Distance	540m	Clear and open environment, antenna gain 3dBi, antenna height 1.5m, air rate 250kbps

2.2 Hardware parameters

Hardware parameters	Descriptions	Note
Communication Interface	UART	-
Package	SMD	-
Interface Mode	Stamp Hole	Pin spacing 1.1mm
E35-2G4T10S External Dimensions	14.5*10.0mm	±0.2mm
E35-2G4T10SX External Dimensions	10.0*10.0mm	
E35-2G4T10S Antenna Type	PCB On-Board Antennas	Equivalent impedance approx. 50Ω
E35-2G4T10SX Antenna Type	IPEX Generation 3	
E35-2G4T10S Net Weight	0.5g	±0.1g
E35-2G4T10SX Net Weight	0.5g	

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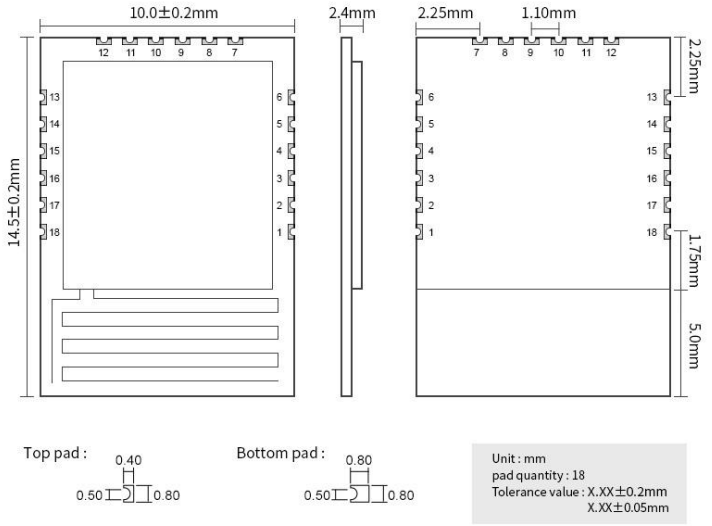
2.3 Hardware parameters

Electrical parameters	Minimum value	Typical value	Maximum values	Work unit	Note
Supply Voltage	1.9	3.3	4.2	V	≥3.3V can guarantee the output power, more than 4.2V permanent burn module
Communication level	-	3.3	-	V	Using 5V TTL it is recommended to add level conversion, otherwise it may damage the module.
Transmit Current	-	24	-	mA	3.3V power supply, the antenna interface for the standard 50 ohm impedance, transmit power 10dBm instantaneous power consumption
Receive Current	-	11	-	mA	-
Sleep Current	-	1.0	-	μA	Software shutdown
Operating Temperature	-40	20	85	℃	Industrial Grade Design
Operating Humidity	10	60	90	%	-
Storage Temperature	-40	20	125	℃	-

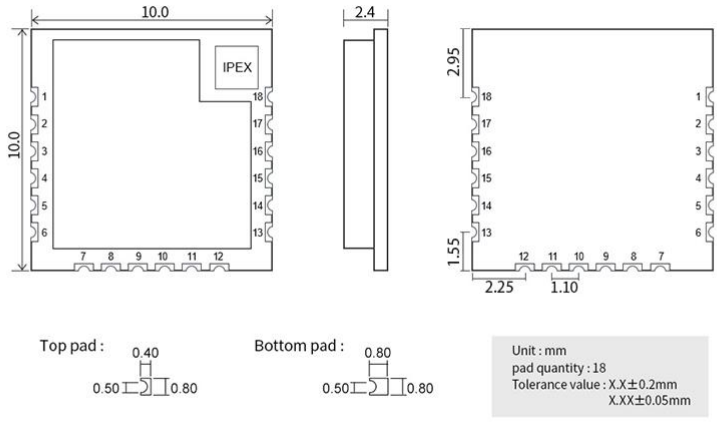
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3 Mechanical Dimensions and Pin Definitions



E35-2G4T10S



E35-2G4T10S

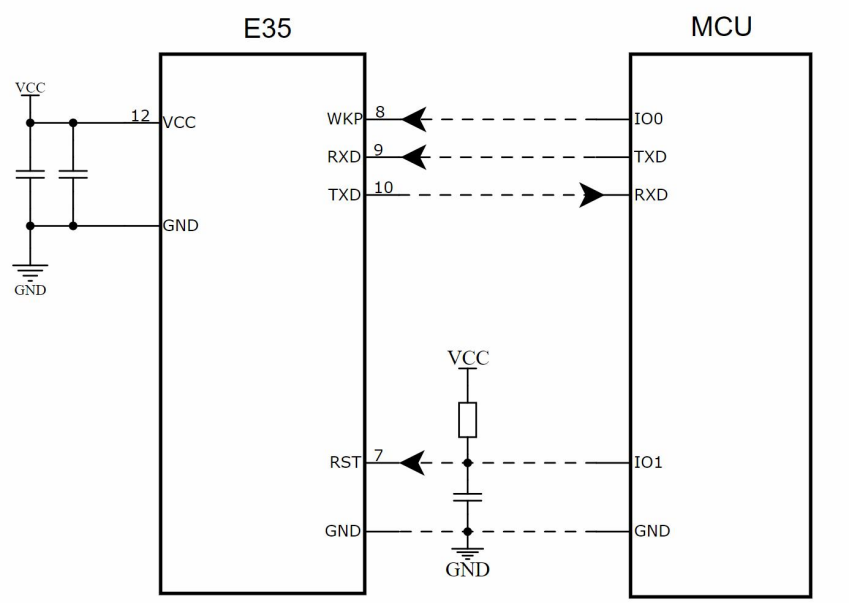
No	Pin Name	Pin orientation	Pin Function	Note
1	GND	Input	Power Ground	-
2	PD6	-	-	General purpose GPIOs that users don't have to care about
3	PD7	-	-	General purpose GPIOs that users don't have to care about
4	PA3	-	-	General purpose GPIOs that users don't have to care about

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5	PA7	-	-	General purpose GPIOs that users don't have to care about
6	PB2	-	-	General purpose GPIOs that users don't have to care about
7	RST	Input	Reset Pin	Low level reset
8	WKP	Input	Wake Up Pin	Wake: falling edge;
9	RXD	Input	Serial Port	Sleep: rising edge.
10	TXD	Output	Serial Port	Serial Input Pins
11	GND	Input	Power Ground	-
12	VCC	Input	Power Positive	Power supply, support DC 1.9V ~ 4.2V power supply
13	PB7	-	-	General purpose GPIO, no need for user concern
14	PC0	-	-	General purpose GPIO, no need for user concern
15	PC1	-	-	General Purpose GPIO, no need to care
16	PD2	-	-	General purpose GPIO, no need to care
17	PD1	-	-	General purpose GPIO, no need for user concern
18	GND	Input	Power Ground	-

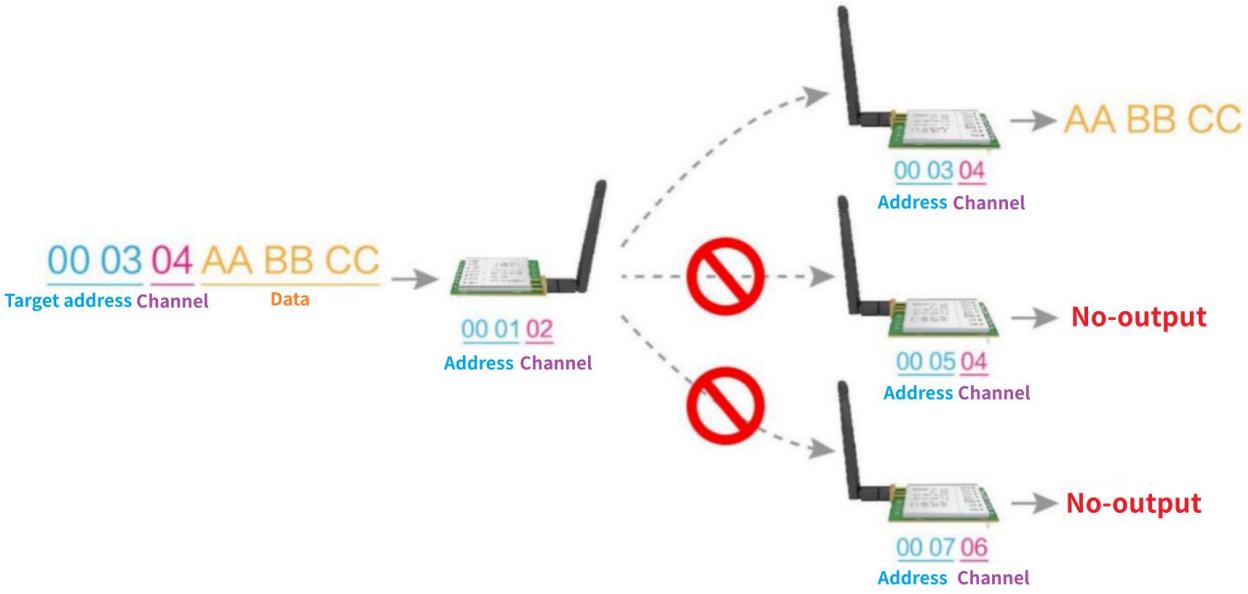
4 Recommended Connectivity Charts



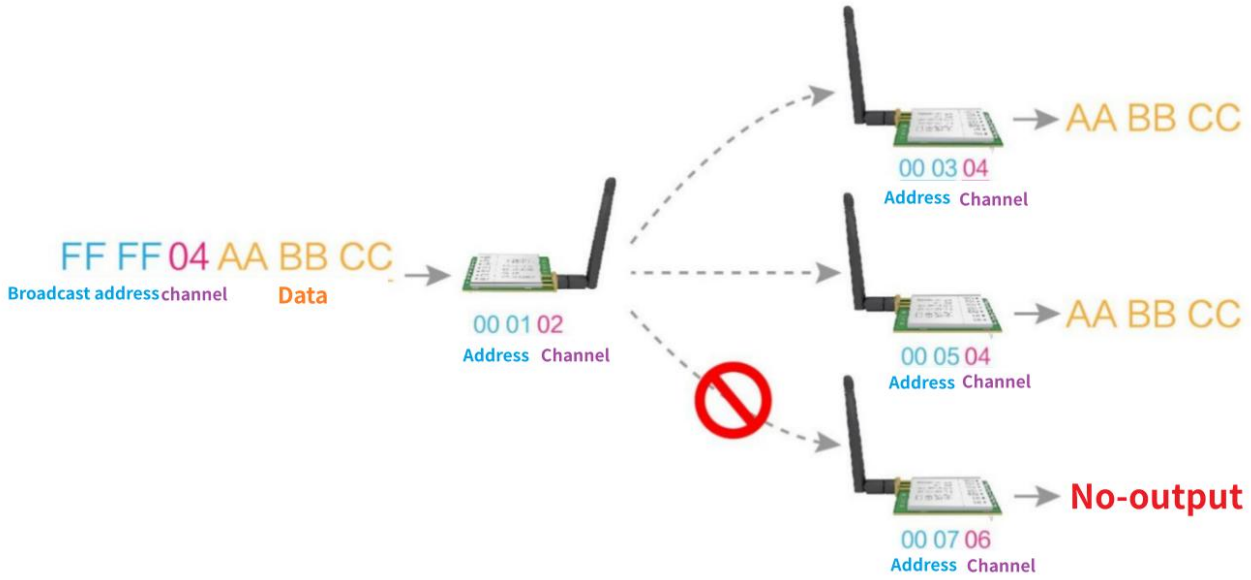
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5 Functions in detail

5.1 Fired at a fixed point



5.2 Broadcast emission



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5.3 Broadcast address

- Example: set module A address to 0xFFFF (i.e. 255, 255) and channel to 0x04.
- When module A is used as a transmitter (same mode, transparent transmission method), all receiving modules under channel 0x04 can receive the data for the purpose of broadcasting.

5.4 Broadcast address

- Example: set module A address to 0xFFFF (i.e. 255, 255) and channel to 0x04.
- When module A is used as a receive, it can receive all the data under channel 0x04 to achieve the purpose of listening.

5.5 Module reset

- After the module is powered on, the hardware self-test and initialization, and the working mode is set according to the user parameters; The default module is Transparent when powered on, and the mode Settings are not saved when powered off, so Transparent is the starting point for the normal work of the module.

5.6 Module reset

- Buffer:

1, the internal 1024 byte buffer data, are written to the wireless chip (automatic sub-packet);

2, the user continuously initiated less than 1024 bytes of data, will not overflow, the module automatically in accordance with the maximum sub-packet length of 48 byte for sub-packet processing to send;

- Switching mode process by AT command:

1, the module detects the AT command to switch mode;

2, in the current configuration as well as the current mode for command response;

3, exit the current task mode, and then according to the mode flag to determine the new mode, reconfigure the serial port or RF parameters;

4, enter the new mode task, complete mode switching, note that there will be differences in mode switching time between different modes.

- Hibernation mode process:

1, the hibernation function is off by default, you need to go to the configuration mode to turn on, the hibernation pin function will be enabled;

2、After the hibernation function is enabled in configuration mode, in order to prevent hibernation immediately after switching to a new mode, the hibernation pin needs to be pulled low when configuring the hibernation function;

3、After the hibernation function is enabled, the switching mode takes effect immediately, the pin is pulled high to enter hibernation, and pulled low to wake up the module;

4、After waking up the module, the module will undergo a process similar to a reset to re-initialise the hardware parameters.

5, the sleep function is not affected by the AT switching command, regardless of the transmission mode or configuration

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mode, in the case of the sleep function is enabled and in effect, the pin is pulled high into the sleep as.

Notes.

No	Cautions
1	Since there is no pin to detect whether the mode switching is completed, so it is recommended that customers carry out an appropriate delay according to the actual needs to ensure that the mode switching is completed.
2	Under the fixed-point sending mode, it is recommended that the length of each packet should not exceed 48 bytes.
3	After AT command mode switching and command answer, the module is not switched to the target mode at this time, so it is recommended to delay appropriately.
4	From sleep to wake up, the module will undergo a reset-like process.

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6 Operating mode

The module has two operating modes, which are switched and set by AT commands; details are shown in the following table:

Mode（0-1）	Introduction to the model	Note
0 transfer mode	Serial port open, wireless open for wireless transmission	None
1 Configuration Mode	Users can access the registers through the serial port to control the working status of the module.	Configuration under baud rate 9600 8N1

The module has two operating states, which are controlled by the low-power pin; they take effect when the low-power pin function is turned on, as detailed in the table below:

State	State Introduction	Note
Wake	Low power pin pull low to stay in wake-up state	None
Sleep	Low power pin pull-high to keep in sleep state	None

6.1 Mode switching

No	Note
1	● User can set the mode and query the module working mode by AT command; ● Mode command answer in the current configuration as well as in the current mode; ● AT command mode switching and command answer, the module has not switched to the target mode at this time. ● If the module has serial data that has not yet finished transmitting over the wireless, it can only enter the new working mode after the transmission is finished; ● If the module receives wireless data and sends out the data through the serial port, it needs to finish transmitting before entering the new working mode;
2	● For example, if the user inputs a large amount of data continuously and switches modes at the same time, there may be mode switching commands and unprocessed data sticking, resulting in the commands being processed as data ● So the general recommendation is: mode switching when the module is idle.
3	● When the module wakeup state is switched to hibernate, if there is data that has not been processed; ● The module will process this data (both receive and transmit) before it can enter the hibernation state. This feature can be used for fast hibernation, thus saving power consumption; for example: the transmitter module works in mode 0, the user initiates the serial data "12345", and then does not have to wait for the module to be idle, it can directly pull up the hibernation control pin to switch to the hibernation mode, and the user's main MCU immediately hibernate, the module will automatically send all the user data through the wireless and then automatically enter the hibernation mode. The module will automatically send out all the user data through the wireless and then automatically enter the hibernation mode; ● Thus saving the MCU's working time and reducing power consumption.

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6.2 Transmission mode (mode 0)

Type	**The module operates in mode 0**
Transmitter	The user can input data through the serial port and the module will start wireless transmitting.
Receive	The module's wireless receiving function is turned on, and the received wireless data will be output through the TXD pin of the serial port.

6.3 Configuration mode (mode 1)

Type	Module works in mode 1
Transmitter	RF off, serial interaction only
Receive	RF off, serial interaction only

6.4 Dormant state

Type	Low power pin function is turned on and the pin is pulled high
Transmitter	Cannot transmit wireless data.
Receive	Unable to receive wireless data.
Attention	The module reconfigures the parameters when going from sleep mode to other modes.

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7 AT Commands

- There are three functions (types) of instructions involved in : query (query instruction), setup (parameter setting instruction), and operation (operation instruction).
- The different modes of can support different instructions. All instructions end with a carriage return line feed, i.e., with "\r\n" at the end.
- Instruction error or instruction parameter error will return "=ERR\r\n".
- Configuration mode (mode 1), the serial port fixed parameters 9600, 8N1, parameter configuration commands take effect after switching modes and power down to save.

7.1 Common directive

Such commands are supported for use in both transport mode and configuration mode.

1、AT+MODE，mode switching command

	inquire	**Setting**
command	AT+MODE=?\r\n	AT+MODE=<mode>\r\n
Back	① AT+MODE=<mode>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter description	None	mode:Configured operation mode 0~1
Return description	① mode: current operation mode ① mode:current operation mode ① mode=0,means transmission mode mode=1, means configuration mode. ② "=ERR\r\n": Command Error	"=OK\r\n":Successful setup. "=ERR\r\n":Command Error
note	Mode switching starts after an answer. mode=0, means transmission mode. mode=1, means configuration mode. Module power on or reboot default in mode=0, i.e. transmission mode.	

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7.2 Configuration mode-specific commands

Such commands are only supported in configuration mode.

1. AT+HELP, the help command, queries all AT commands

Type	inquire
Command	AT+HELP=?\r\n
Back	① Export all supported commands ② =ERR\r\n
Parameter Description	None
Description of return	① All supported instructions ② "=ERR\r\n": instruction error
Note	Outputs all supported commands, with "\r\n" spacing between commands.

2、AT+DEVTYPE，module model query command

Type	inquire
Command	AT+DEVTYPE=?\r\n
Back	① AT+DEVTYPE=<devtype>\r\n ② =ERR\r\n
Parameter Description	None
Description of return	① devtype:module type ② "=ERR\r\n":Command Error
Note	Full response "AT+DEVTYPE=E35-2G4T10S/SX\r\n"

3、AT+FWCODE，module firmware version query command

Type	inquire

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Command	AT+FWCODE=?\r\n
Back	① AT+FWCODE=<fwcode>\r\n ② =ERR\r\n
Parameter Description	None
Description of return	① fwcode:module firmware version ② "=ERR\r\n":Command error
Note	None

4. AT+ADDR, module data transfer address configuration instruction

Type	inquire	Setting
Command	AT+ADDR=?\r\n	AT+ADDR=<addh>,<addl>\r\n
Back	① AT+ADDR=<addh>,<addl>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① addh: module address high byte, 0~255 ② addh: low byte of module address, 0~255
Description of return	① addh:module address high byte, 0~255 ② addh:module address low byte, 0~255 ③ "=ERR\r\n":instruction error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	The switching mode takes effect after the parameter is set; the default values of addl and addh are 0	

5. AT+UART, module serial port parameter configuration command

Type	inquire	Setting

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Command	AT+UART=?\r\n	AT+UART=<baud>,<stopbit>,<parity>\r\n
Back	① AT+UART=<baud>,<stopbit>,<parity>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① baud: serial port baud rate, 0~4 ② stopbit: serial port stop bit, 0 ~ 2 ③ parity: serial port parity bit, 0~2
Description of return	① baud: serial port baud rate, 0~4 ② stopbit: serial port stop bit, 0 ~ 2 ③ parity: serial port parity bit, 0~2 ④ "=ERR\r\n": command error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After parameter setting, switching mode takes effect; default parameters, baud=0,stopbit=0,parity=0 baud=0,baud rate 9600bps stop=0,1 stop bit parity=0,no parity baud=1,baud rate 19200bps stop=1,1.5 stop bits parity=1,even parity baud=2,Baud rate 38400bps stop=2,2 stop bits parity=2,odd parity baud=3, baud rate 57600bps baud=4, baud rate 115200bps	

6. AT+RATE, module data transmission airspeed configuration command

Type	inquire	Setting
Command	AT+RATE=?\r\n	AT+RATE=<rate>\r\n
Back	① AT+RATE=<rate>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter	None	① rate:RF airspeed,0~3

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Description		
Description of return	① rate:RF air speed, 0~3 ② "=ERR\r\n":Command Error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; default parameter rate=0 rate=0, means 250Kbps rate=1,500Kbps rate=2,indicates 1Mbps rate=3, means 2Mbps.	

7. AT+POWER, module RF transmit power configuration command

Type	inquire	Setting
Command	AT+POWER=?\r\n	AT+POWER=<power>\r\n
Back	① AT+POWER=<power>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① power:RF power,0~26
Description of return	① power:RF power, 0~26 ② "=ERR\r\n":Command error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; default parameter power=0 power=0,means 10dBm power=1,means 9dBm power=2,indicates 8dBm power=3,means 7dBm power=4,means 6dBm power=5, means 5dBm	

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	Power=6, means 4dBm. Power=7, means 3dBm. Power=8, means 2dBm. Power=9, means 1dBm. power=10,means 0dBm power=11, indicates -1dBm power=12, means -2dBm power=13, means -3dBm power=14,means -4dBm power=15,means -5dBm power=16, means -6dBm power=17, indicates -7dBm power=18, means -8dBm power=19,means -9dBm power=20,indicates -11dBm power=21, means -13dBm power=22, indicates -15dBm power=23, means -18dBm power=24,means -24dBm power=25, means -30dBm Power=26, indicates -50dBm

8 AT+CHANNEL, Module RF Transmission Channel Configuration Command

Type	inquire	Setting
Command	AT+CHANNEL=?\r\n	AT+CHANNEL=<channel>\r\n
Back	① AT+CHANNEL=<channel>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n

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Parameter Description	None	① channel: RF channel, 0 ~ 80
Description of return	① channel:RF channel, 0~80 ② "=ERR\r\n":Command error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; default parameter channel=0 RF frequency = 2400 + channel, unit: MHz	

9 AT+TRANS, module data transfer mode configuration command

Type	inquire	Setting
Command	AT+TRANS=?\r\n	AT+TRANS=<trans>\r\n
Back	① AT+TRANS=<trans>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① trans:transmission mode, 0~1
Description of return	① trans:Transmission mode, 0~1 ② "=ERR\r\n":Instruction error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; the default parameter trans=0 trans=0, means transparent transmission. trans=1, means fixed-point transmission.	

10 AT+PACKET, module data transmission packet length configuration command

Type	inquire	Setting
Command	AT+PACKET=?\r\n	AT+PACKET=<packet>\r\n

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Back	① AT+PACKET=<trans>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① packet:packet length, 23~48
Description of return	① packet:packet length, 23~48 ② "=ERR\r\n":Command Error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	The switching mode takes effect after the parameter is set; the default parameter packet=23	

11 AT+DRSSI, module packet RSSI configuration command

Type	inquire	Setting
Command	AT+DRSSI=?\r\n	AT+DRSSI=<drssi>\r\n
Back	① AT+DRSSI=<drssi>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① drssi: packet RSSI switch, 0~1
Description of return	① drssi:Packet RSSI switch, 0~1 ② "=ERR\r\n":Command error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; default parameter drssi=0 drssi=0, means turn off the RSSI (signal strength of received data) data output of the received packet. drssi=1, means to enable RSSI (signal strength of received data) data output of received packet, which will be output at the end of the packet.	

12 AT+ENCRYPT, module data transmission encryption function configuration command

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Type	inquire	Setting
Command	AT+ENCRYPT=?\r\n	AT+ENCRYPT=<encrypt>\r\n
Back	① AT+ENCRYPT=<encrypt>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① encrypt: encrypt transmission data, 0~1
Description of return	① encrypt:Transmission data encryption, 0~1 ② "=ERR\r\n":Command error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; default parameter encrypt=0 encrypt=0, means data transmission encryption is off. encrypt=1, means to enable data transmission encryption, encryption method AES128.	

13 AT+KEY, module data transfer encryption key configuration command

Type	inquire	Setting
Command	AT+KEY=?\r\n	AT+KEY=<key0>,<key1>\r\n
Back	① AT+KEY=<key0>,<key1>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① Key0: Transmit data encryption key bit 0. ② Key1: Transmit data encryption key bit 1.
Description of return	① Key0: Transmit data encryption key bit 0. ② Key1:Transmit data encryption key bit 1.	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error

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	③ "=ERR\r\n":Command error	
Note	After the parameter setting, the switching mode takes effect, the default parameter key0 = 192, key1 = 193 The range of key0 and key1 is 0~255.	

14 AT+LPWR，Module Low Power Function Configuration Instructions

Type	**inquire**	**Setting**
Command	AT+LPWR=?\r\n	AT+LPWR=<lpwr>\r\n
Back	① AT+LPWR=<lpwr>\r\n ② =ERR\r\n	① =OK\r\n ② =ERR\r\n
Parameter Description	None	① lpwr:Enable low power pin, 0~1
Description of return	① lpwr:Enable low power pin, 0~1 ② "=ERR\r\n":Instruction error	① "=OK\r\n":Successful setup ② "=ERR\r\n":Command Error
Note	After the parameter is set, the switching mode takes effect; the default parameter lpwr=0 lpwr=0, means turn off the low-power pin. lpwr=1,means turn on the low-power pin, after turning on this function, pull the lpwr pin high to enter the low-power mode, and pull it low to keep it in the normal working state. When exiting low power, the module will automatically reset and restart once due to the soc low power mechanism. Note that the lpwr pin is pulled high by default.	

15 AT+IAP, enter module IAP upgrade state command

Type	**Operate**
Command	AT+IAP
Back	① =OK\r\n

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	② =ERR\r\n
Parameter Description	None
Description of return	① "=OK\r\n":Instruction is correct. ② "=ERR\r\n":Instruction error
Note	When the command is correct, it will enter the upgrade state

16 AT+RESET, module reset restart command

Type	**Operate**
Command	AT+RESET
Back	① =OK\r\n ② =ERR\r\n
Parameter Description	None
Description of return	① "=OK\r\n":Instruction is correct. ② "=ERR\r\n":Instruction error
Note	When the command is correct, save the parameters in the current configuration mode and perform a reset reboot

17 AT+DEFAULT,Module Restore Default Parameter Values command

Type	**Operate**
Command	AT+DEFAULT
Back	① =OK\r\n ② =ERR\r\n

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Parameter Description	None
Description of return	① "=OK\r\n":Instruction is correct. ② "=ERR\r\n":Instruction error
Note	When the command is correct, the configuration parameters will revert to the default parameters, which take effect after switching modes

18 AT+UID, module unique UID command

Type	**inquire**
Command	AT+UID=?\r\n
Back	① AT+UID=<uid>\r\n ② =ERR\r\n
Parameter Description	None
Description of return	① uid:module 16 bytes uid ② "=ERR\r\n":instruction error
Note	UID read the results of the output is read from the actual value of the SOC, did not do HEX to ASCLL processing, so it may be garbled, this is a normal phenomenon!

7.3 Factory Default Parameters

SKU	**Factory Default Parameter Values**						
	frequency	address	channel	airspeed	baud	Serial Port Format	firing power
E35-2G4T10S/SX	2400MHz	0,0	0	250Kbps	9600	8N1	10dbm

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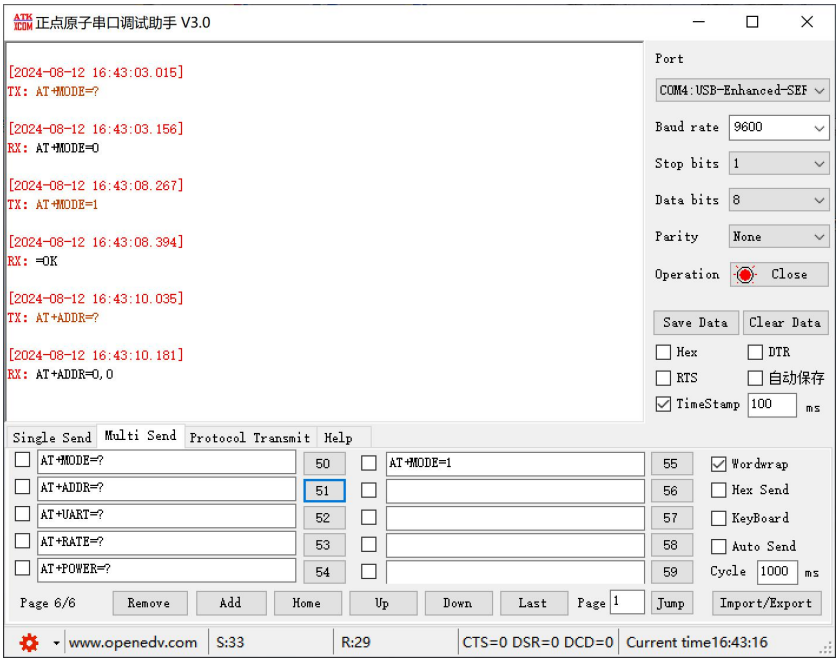
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7.4 Examples of commands

Common commands are the basic commands to be used in the process of using, through the operation of these commands, you can achieve the configuration of the basic parameters of the module and realize the communication.

Commands	Description
AT+MODE	Operating mode operation
AT+ADDR	Module Data Transfer Address
AT+UART	Module serial port
AT+RATE	Module data transmission airspeed
AT+POWER	Module RF Transmit Power
AT+CHANNEL	Module RF Transmission Channel

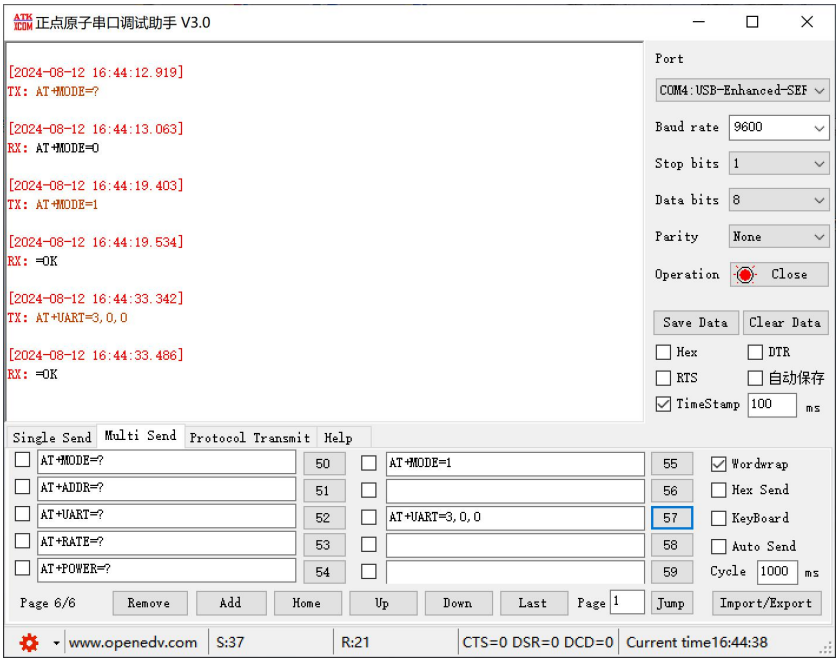
The following example shows the mode query and mode switching to configuration mode with the AT command and the query of the module address:



The following example shows the mode query and mode switching to configuration mode through AT commands, and configures the serial port parameters to 9600 8N1, note that the parameter configuration commands take effect and are saved only after switching modes:

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8 Configuration instructions for the host computer

The following picture is the display interface of the upper computer configuration, the user can switch to the command mode through the upper computer, and quickly configure and read the parameters in the upper computer.



In the configuration of the host computer, the module address, communication channel, and key are in decimal display mode; where each parameter takes a range of values:

Module address high: 0 to 255, default 0

Module address low: 0 to 255, default 0

Communication channel: 0～80, default 0

Key high bit: 0 to 255, default 0, can not be read after writing.

Key low: 0 to 255, default 0, cannot be read after writing.

9 Hardware design

- It is recommended to use a DC regulated power supply to power this module, the power supply ripple factor is as small as possible, and the module needs to be reliably grounded;
- Please pay attention to the correct connection of the positive and negative terminals of the power supply, such as reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure that it is between the recommended supply voltages, if it exceeds the maximum value it may cause permanent damage to the module;
- Please check the power supply stability, the voltage should not fluctuate significantly and frequently;

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- In the design of power supply circuit for the module, it is often recommended to retain more than 30% of the margin, there is the whole machine is conducive to long-term stable work;
- Module should be as far away as possible from the power supply, transformers, high-frequency alignments and other electromagnetic interference in the larger part;
- High-frequency digital alignment, high-frequency analog alignment, power supply alignment must be avoided below the module, if you really need to go through the module below, assuming that the module is welded in the Top Layer, the Top Layer in the contact part of the module to lay the ground copper (all paved with copper and a good ground), it must be close to the digital part of the module and alignment in the Bottom Layer;
- Assuming that the module is soldered or placed in the Top Layer, it is also wrong to randomly route the module in the Bottom Layer or any other layer, which will affect the spuriousness of the module as well as the reception sensitivity to varying degrees;
- Assuming that there is a large electromagnetic interference around the module device will also greatly affect the performance of the module, according to the intensity of the interference is recommended to stay away from the module, if the situation permits you can do appropriate isolation and shielding;
- Assume that there is a large electromagnetic interference around the module alignment (high-frequency digital, high-frequency analog, power supply alignment) will also greatly affect the performance of the module, according to the intensity of the interference is recommended to be appropriate away from the module, if the situation permits you can do appropriate isolation and shielding;
- Communication line if you use 5V level, must be connected in series with 1k-5.1k resistor (not recommended, there is still a risk of damage);
- Try to stay away from some TTL protocols where the physical layer is also 2.4GHz, e.g. USB3.0;
- The antenna mounting structure has a big impact on the module performance, make sure the antenna is exposed and preferably vertically upward;
- When the module is installed inside the chassis, use a good quality antenna extension cable to extend the antenna to the outside of the chassis;
- The antenna must not be installed inside the metal shell, which will lead to a great weakening of the transmission distance.

10 Common problems

10.1 Unsatisfactory transmission distance

- When there are linear communication barriers, the communication distance will decay accordingly;
- Temperature, humidity, and co-channel interference, which will lead to higher communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test results are poorer near the ground;
- Seawater has a strong ability to absorb radio waves, so the effect of the seaside test is poor;
- Metal objects near the antenna, or placed in a metal shell, the signal attenuation will be very serious;
- Wrong power register setting, air rate setting is too high (the higher the air rate, the closer the distance);
- Low voltage of power supply at room temperature is lower than the recommended value, the lower the voltage the lower the hair power;
- The use of antenna and module matching degree is poor or the antenna itself quality problems.

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10.2 Modules are fragile

- Please check the power supply to ensure that it is between the recommended supply voltages, if it exceeds the maximum value it will cause permanent damage to the module;
- Please check the power supply stability, the voltage can not be substantial frequent fluctuations;
- Please ensure that the installation and use process anti-static operation, high-frequency device electrostatic sensitivity;
- Please ensure that the installation and use of the process of humidity should not be too high, part of the components for humidity-sensitive devices;
- If there is no special demand is not recommended to be used at too high or too low a temperature.

10.3 BER is too high

- Near the same frequency signal interference, away from the source of interference or modify the frequency and channel to avoid interference;
- Poor power supply may also cause garbled code, be sure to ensure the reliability of the power supply;
- Extension cords, feeder cords of poor quality or too long, can also cause high BER.

11 Welding instructions

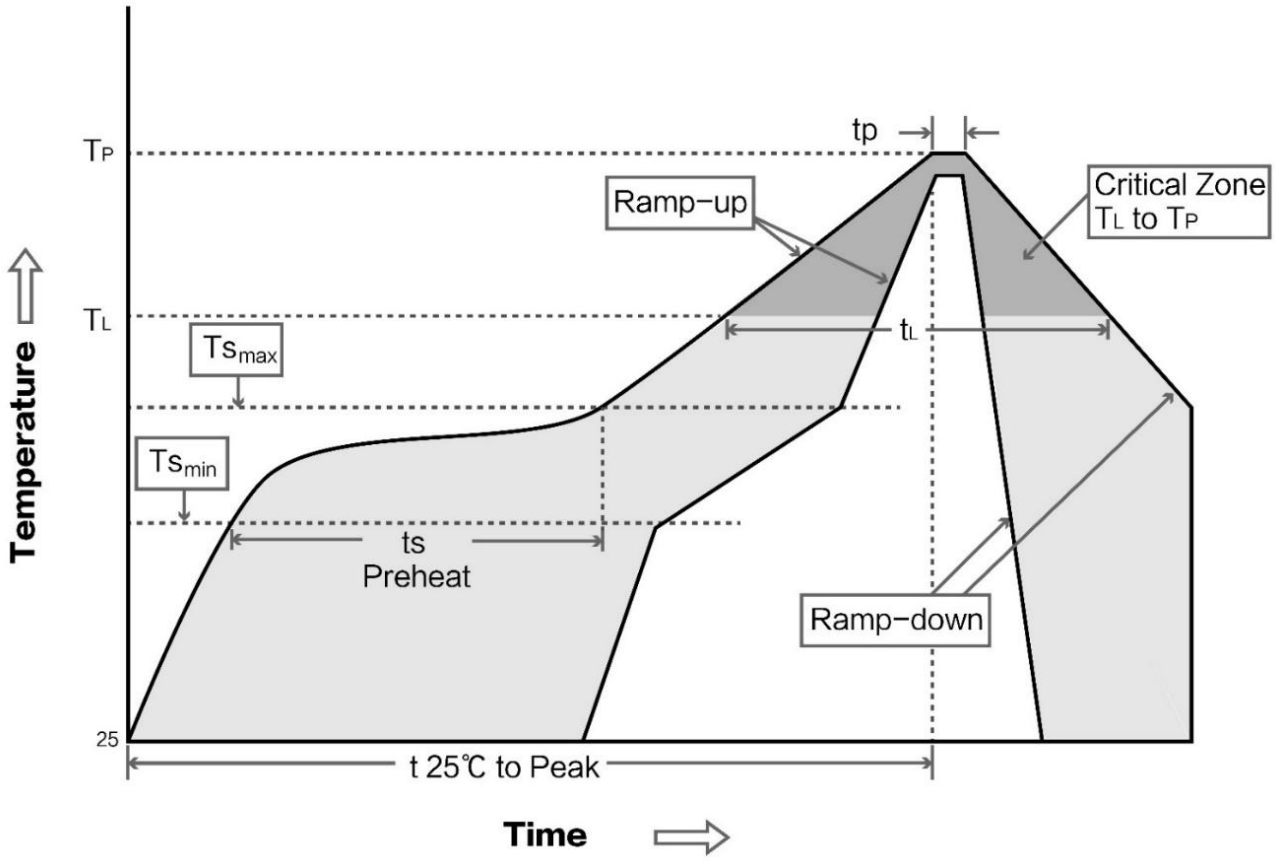
11.1 Reflow temperature

Profile Feature	Curve Characteristics	**Sn-Pb Assembly**	**Pb-Free Assembly**
Solder Paste	Solder Paste	Sn63/Pb37	Sn96.5/Ag3/Cu0.5
Preheat Temperature min （Tsmin）	Minimum Preheat Temperature	100℃	150℃
Preheat temperature max (Tsmax)	Maximum Preheat Temperature	150℃	200℃
Preheat Time (Tsmin to Tsmax)(ts)	Preheat Time	60-120 sec	60-120 sec
Average ramp-up rate(Tsmax to Tp)	Average Rise Rate	3℃/second max	3℃/second max
Liquidous Temperature (TL)	Liquid phase temperature	183℃	217℃
Time（tL）Maintained Above（TL）	Time above liquid phase line	60-90 sec	30-90 sec
Peak temperature（Tp）	Peak temperature	220-235℃	230-250℃
Aveage ramp-down rate（Tp to Tsmax）	Average rate of descent	6℃/second max	6℃/second max
Time 25℃ to peak temperature	Time from 25℃ to peak temperature	6 minutes max	8 minutes max

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11.2 Reflow temperature



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12 Related Models

Product Model	carrier frequency Hz	firing power dBm	Test Distance km	Package form	Product Size mm	communications interface
E22-230T22S	230M	22	5	SMD	16*26	TTL
E22-230T30S	230M	30	10	SMD	20*40.5	TTL
E22-400T22S	433/470M	22	5	SMD	16*26	TTL
E22-400T30E	433/470M	30	10	SMD	20*40.5	TTL
E22-900T22S	868/915M	22	5	SMD	16*26	TTL
E22-900T30S	868/915M	30	10	SMD	20*40.5	TTL
E22-400M22S	433/470M	22	7	SMD	14*20	SPI
E22-400M30S	433/470M	30	12	SMD	24*38.5	SPI
E22-900M22S	868/915M	22	7	SMD	14*20	SPI
E22-900M30S	868/915M	30	12	SMD	24*38.5	SPI

Revision history

Version	Date	Description	Issued by
1.0	2024.8.13	Initial version	Bin
1.1	2024.9.19	Correct E35-2G4T10SX size chart	Bin
1.2	2024.10.31	Fix AT+UID instruction description	Bin
1.3	2025.01.16	Content revision	Bin

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