E30T-433T20S Product Specification

433MHz 100mW TTL wireless module



Chengdu Ebyte Electronic Technology Co.,Ltd.

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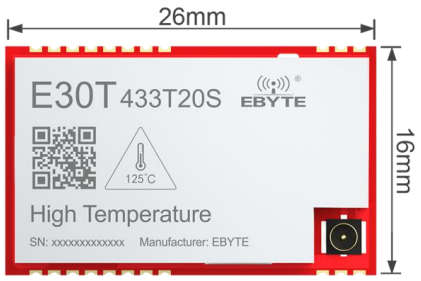
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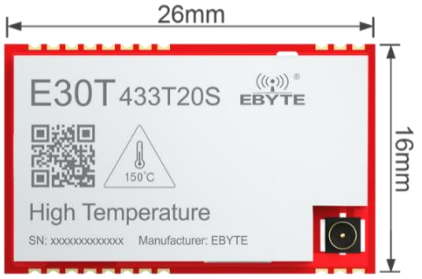
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1 Product Overview

1.1 Product introduction

E30T-433T20S is a high temperature wireless serial port module (UART) , half duplex, integrated transceiver, transparent transmission, SMD type, TTL level output, working frequency band 4 25 ~ 4 50.5MHz , transmit power 100 mW , can work in -40 ~ +125 ℃ environment, suitable for high temperature operation scenarios . This model has two versions: 125℃ and 150℃.





Software algorithm: The module has software FEC forward error correction algorithm, which has high coding efficiency and strong error correction ability. In the case of sudden interference, it can actively correct the interfered data packets, greatly improving reliability and transmission distance. In the absence of FEC, such packets can only be dropped. The module has data encryption and compression functions. The data transmitted by the module in the air is random, and the data interception is meaningless through strict encryption and decryption algorithms. The data compression function has the possibility to reduce the transmission time, reduce the probability of being interfered, and improve reliability and transmission efficiency.

Hardware design: The modules are made of high temperature resistant components, which are especially suitable for applications in high temperature environments, such as metallurgy, chemical industry, exploration, mines, etc. The circuit design strictly abides by FCC, CE, ROHS and other domestic and foreign design specifications, meets various RF-related certifications, and meets export requirements.

1.2 Features

- Support fixed-point transmission/broadcast transmission/channel monitoring;
- Support air wake-up (ultra-low power consumption), suitable for battery-powered applications;
- Support FEC forward error correction, effectively improve communication stability;
- Under ideal conditions, the communication distance can reach 3.5km;
- maximum transmit power is 100mW, and the software is multi-level adjustable;
- Support global license-free ISM 433MHz frequency band;
- Support data transmission rate of 1k ~ 25kbps;
- Support 2.7 ~ 5.5 V power supply, and the best performance can be guaranteed when the power supply is greater than 3.3 V ;
- Industrial-grade standard design, support long-term use at −40～+150℃（Typical value +125℃/+150℃） ;
- Dual antennas are optional (IPEX/ stamp hole), users can choose to use according to their own needs.

1.3 Application scenarios

- Home security alarm and remote keyless entry;
- Smart home and industrial sensors, etc.;
- Wireless alarm security system;
- Building automation solutions;
- Wireless industrial grade remote control;

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- Intelligent intelligent agriculture, oilfield solutions;

2 Specifications

2.1 Limit parameters

The main parameters	performance		Remark
	minimum	maximum value	
Supply voltage (V)	0	5.5	Exceeding 5.5 V may permanently burn the module
Blocking power (dBm)	-	10	The probability of burning at close range is small
Working temperature (℃)	-40	+125	Industrial grade

2.2 Working parameters

The main parameters		performance			Remark
		minimum	Typical value	maximum value	
Working voltage (V)		2.7	5.0	5.5 _	≥ 3.3 V guaranteed output power
Communication level (V)			3.3		Risk of burnout with 5V TTL
Working temperature (℃)	E30T-433T20S(125℃)	-40	+125	+150	Vehicle gauge grade design
	E30T-433T20S(150℃)	-40	+150	+155	
Operating frequency band (M Hz)		410	-	450	Factory default 4 33MHz , support ISM frequency band
Power consumption	TX current (mA)		120		Instantaneous power consumption
	Receive current (mA)		20		
	Sleep current (μA)		450		software shutdown
Maximum transmit power (dBm)		19.4	20.0	20.5	
Receive Sensitivity (dBm)		-120	-121	-122	The air rate is 1kbps
Air rate (bps)		1k	1k	25k	User programming control

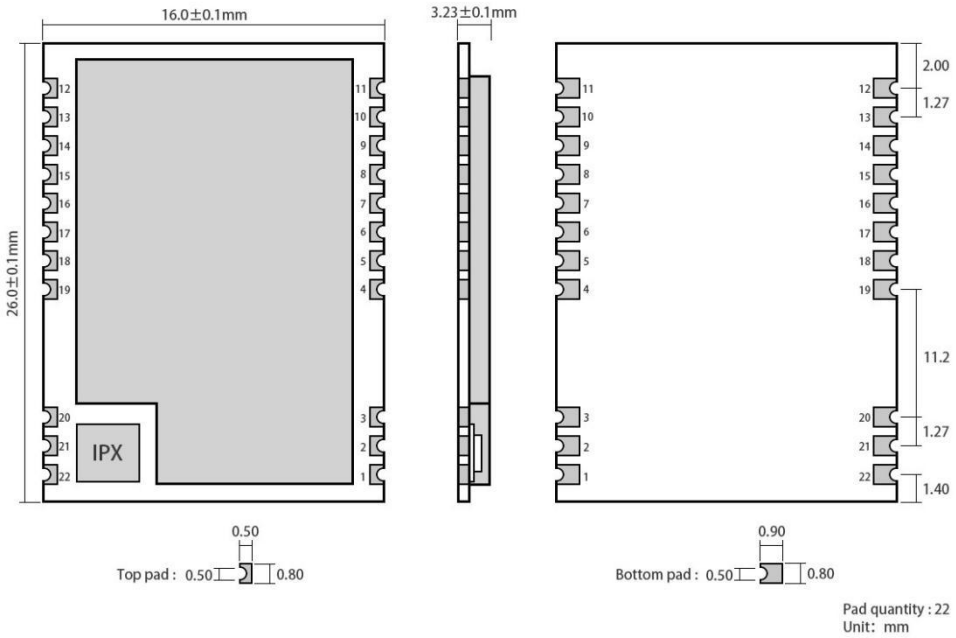
The main parameters	describe	Remark
reference distance	3 500m	Line of sight, antenna gain 3.5dBi , antenna height 2.5m, air rate 1kbps
Subcontracting	58 Byte	The maximum capacity of a single package, it will be automatically sub-packaged when it exceeds.
Cache capacity	128 Byte	
Modulation	GFSK	
Communication Interface	TTL	TTL level
Packaging method	SMD	
interface	1.27mm	

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Dimensions	16*26mm	
Antenna interface	I PEX/ External	Equivalent impedance is about 50 Ω

3 Mechanical Dimensions and Pin Definition



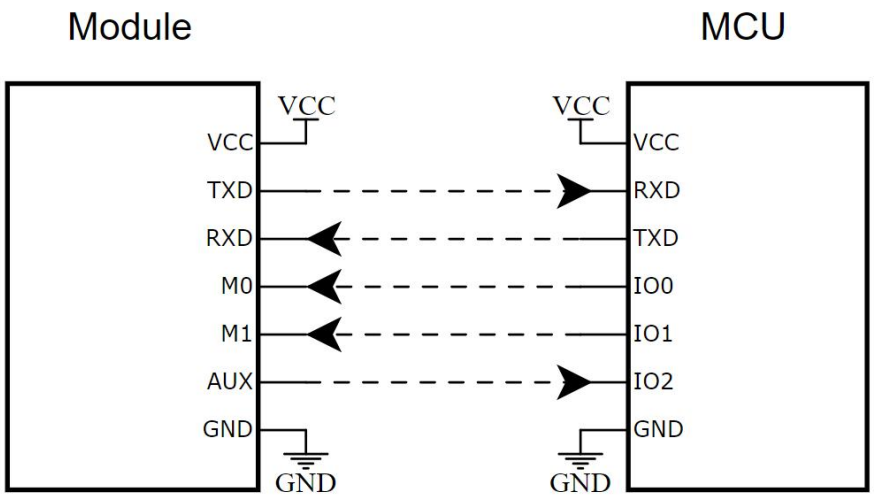
pin number	pin name	pin orientation	Pin usage
1	GND		Module ground wire
2	GND		Module ground wire
3	GND		Module ground wire
4	GND		Module ground wire
5	M0	Input (very weak pull-up)	Cooperate with M1 to determine the 4 working modes of the module (can not be suspended, if not used, it can be grounded)
6	M1	Input (very weak pull-up)	Cooperate with M0 to determine the 4 working modes of the module (can not be suspended, if not used, it can be grounded)
7	RXD	enter	TTL serial port input, connected to the external TXD output pin; Can be configured as open-drain or pull-up input, see parameter settings for details.
8	TXD	output	TTL serial output, connected to external RXD input pin; Can be configured as open-drain or push-pull output, see parameter settings for details.
9	AUX	output	It is used to indicate the working status of the module; the user wakes up the external MCU, and outputs a low level during the power-on self-test initialization; it can be configured as open-drain output or push-pull output, see parameter settings for details. (can be left floating)
10	VCC		Positive reference for module power supply, voltage range: 2.7~ 5.5 V DC
11	GND		Module ground wire

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12	VDD		Chip power positive reference, voltage range: 3.3 V DC
13	GND		Module ground wire
14 to 1 8	NC		
19	GND		Module ground wire
20	GND		Module ground wire
21	ANT		antenna
22	GND		Module ground wire

4 Recommended Wiring Diagram



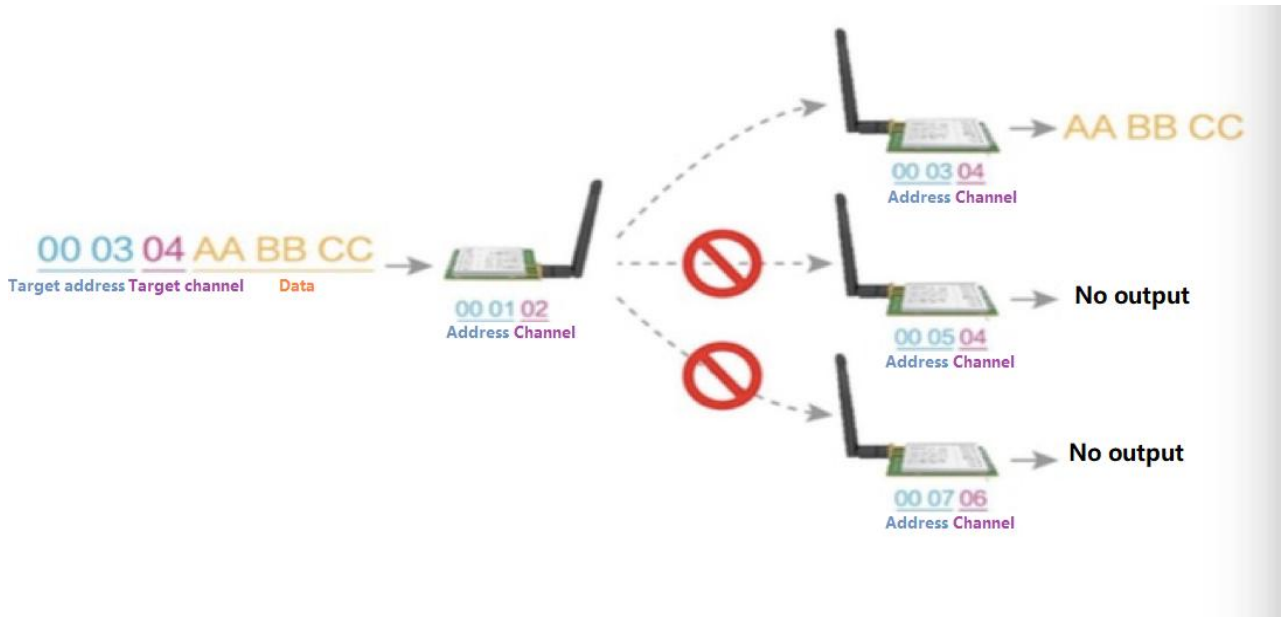
serial number	A brief description of the connection between the module and the microcontroller (the above picture takes the STM8L microcontroller as an example)
1	The wireless serial port module is TTL level, please connect with TTL level MCU.
2	Some 5V microcontrollers may need to add 4 ~ 10K pull-up resistors to the TXD and AUX pins of the module.

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5 Function Details

5.1 Fixed - point transmission (1 hexadecimal)



5.2 Broadcast transmission (1 hexadecimal)



5.3 Broadcast address

- Example: Set the address of module A to 0xFFFF or 0x0000, and the channel to 0x04 ;

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- When module A is used as a transmitter (same mode, transparent transmission mode), all receiving modules under the 0x04 channel can receive data to achieve the purpose of broadcasting.

5.4 Listening address

- Example: Set the module A address to 0xFFFF or 0x0000, and the channel to 0x04.
- When module A is used as a receiver, it can receive all the data under the 0x04 channel to achieve the purpose of monitoring.

5.5 Module reset

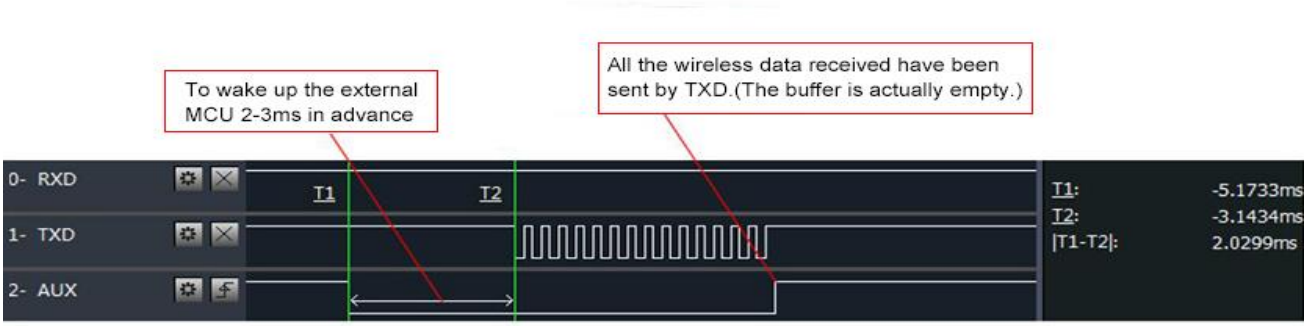
- After the module is powered on, AUX will output a low level immediately, perform hardware self-check, and set the working mode according to user parameters ;
  During this process, AUX maintains a low level, and after completion, AUX outputs a high level, and starts to work normally according to the working mode composed of M1 and M0 ;
  Therefore, the user needs to wait for the rising edge of AUX as the starting point for the normal operation of the module.

5.6 Detailed AUX

- AUX is used for wireless transceiver buffer indication and self-check indication;
- It indicates whether the module has data that has not been transmitted wirelessly, or whether the wireless data has been received and not all sent through the serial port, or the module is in the process of initializing and self-checking.

5.6.1 Serial port data output indication

- Used to wake up the external MCU in sleep ;



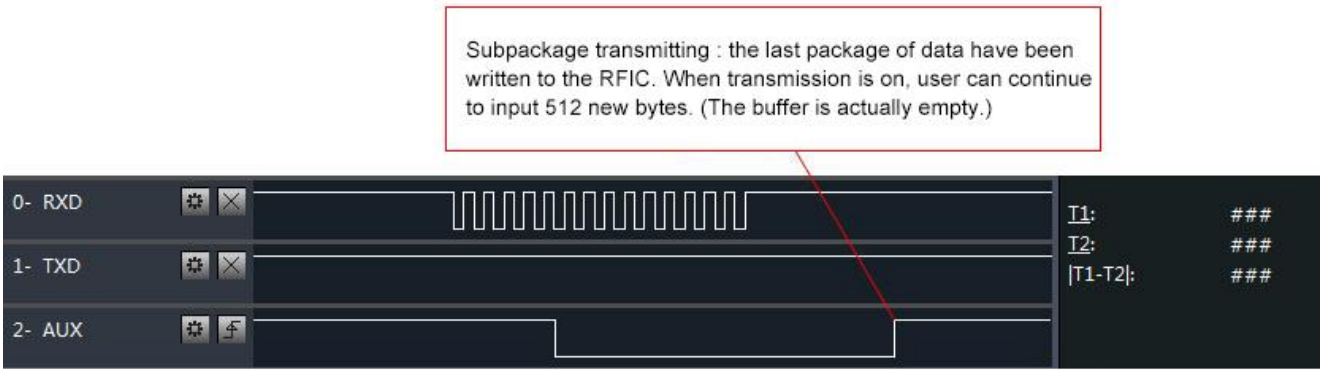
Timing Sequence Diagram of AUX when TXD pin transmits

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5.6.2 Wireless transmission indication

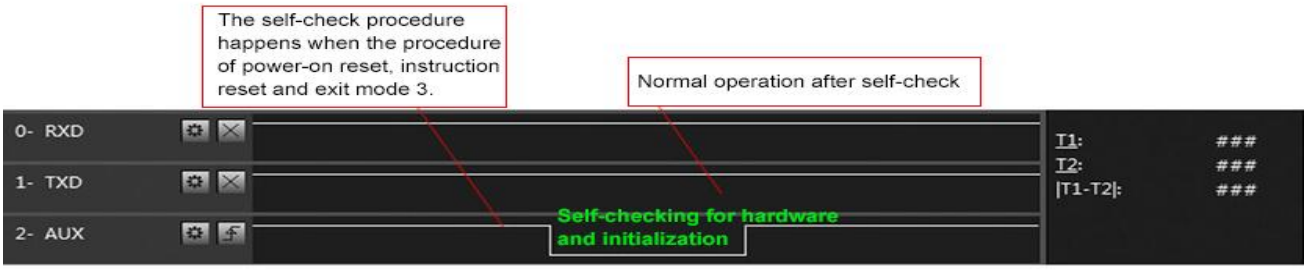
- Buffer empty: The data in the internal 128 -byte buffer is written to the wireless chip (automatic packetization).
- When AUX=1, the user continuously initiates data less than 128 bytes without overflow. When AUX=0, the buffer is not empty: the data in the internal 128 -byte buffer has not been written to the wireless chip and the transmission is started. At this time, the module may be waiting for the end of the user data to time out, or the wireless packet transmission is in progress. .
- [Note]: When AUX=1, it does not mean that all serial port data of the module has been transmitted wirelessly, or the last packet of data may be being transmitted.



Timing Sequence Diagram of AUX when RXD pin receives

5.6.3 The module is being configured

- Only at reset and when exiting sleep mode



Timing Sequence Diagram of AUX when self-check

5.6.4 AUX Notes

- For the above functions 1 and 2, the output low level is given priority, that is, if any one of the output low level conditions is satisfied, the AUX outputs the low level; when all the low level conditions are not satisfied, the AUX outputs the high level ;
- When AUX outputs a low level, it means that the module is busy, and the working mode detection will not be performed at this time; when the module AUX outputs a high level within 1ms, the mode switching will be completed ;
- After the user switches to the new working mode, the module will enter this mode at least 2ms after the rising edge of AUX; if AUX is always at a high level, the mode switching will take effect immediately ;

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- When the user enters other modes from mode 3 (sleep mode) or during the reset process, the module will reset the user parameters, during which AUX outputs a low level.

6 Working Mode

The module has four working modes, which are controlled by pins M 0, M 1 Settings; details are shown in the table below:

mode (0-3)	M 0	M 1	Mode introduction	Remark
0 transfer mode	0	0	serial port is opened, the wireless is opened, and the module sends and receives data according to the set transmission mode i.	The transmission method of the sender and receiver must be the same
1 R SSI mode	1	0	the wireless is turned off and the serial port is turned on, the module will periodically output the RSSI signal strength value of the current channel for 200 ms .	Relative intensity values only
2 Configuration Mode	0	1	Wireless off, can receive serial commands, see command list, baud rate fixed 9 600 , 8 N1	parameter configuration
3 Sleep Mode	1	1	The module goes to sleep standby, the serial port and wireless are closed	low power sleep

6.1 Mode switch

- Users can combine M0 and M1 with high and low levels to determine the working mode of the module. The 2 GPIOs of the MCU can be used to control the mode switching; when M0 and M1 are changed: the module is idle, and after 1ms, it can start working in the new mode; if the module has serial port data that has not been wirelessly transmitted yet, after the transmission is completed, can enter the new working mode; if the module receives the wireless data and sends out the data through the serial port, it needs to send the data before entering the new working mode; so the mode switching can only be valid when the AUX output is 1, otherwise it will be delayed switch.
- For example: in mode 0 or mode 1, the user continuously inputs a large amount of data and performs mode switching at the same time. At this time, the mode switching operation is invalid; the module will process all user data before performing a new mode detection; so The general suggestion is: Detect the output state of the AUX pin, wait for 2ms after the AUX output is high, and then switch.
- When the module is switched from other modes to sleep mode, if there is data that has not been processed yet; the module can only enter sleep mode after processing these data (including receiving and sending). This feature can be used for fast sleep to save power consumption; for example: the transmitter module works in mode 0, the user initiates serial port data "12345", and then does not need to wait for the AUX pin to be idle (high level), and can directly switch to sleep mode, The main MCU of the user is put to sleep immediately, and the module will automatically go to sleep within 1ms after sending all the user data wirelessly, thereby saving the working time of the MCU and reducing power consumption.
- In the same way, any mode switching can use this feature. After the module processes the current mode event, it will automatically enter the new mode within 1ms; thus saving the user's work of querying AUX, and achieving the purpose of fast switching; For example, switching from the transmit mode to the receive mode; the user MCU can also go to sleep in advance before the mode switch, and use the external interrupt function to obtain the AUX change to perform the mode switch.
- This operation mode is very flexible and efficient, and is completely designed according to the user's MCU operation convenience, and can reduce the workload of the entire system as much as possible, improve system efficiency, and reduce power consumption.

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6.2 Transmission Mode (Mode 0)

type	When M0 = 0, M1 = 0, the module works in mode 0
TX	The module receives user data from the serial port, and the length of the wireless data packet transmitted by the module is 58 bytes. When the amount of data input by the user reaches 58 bytes, the module will start wireless transmission. At this time, the user can continue to input the data to be transmitted; when the user needs When the transmitted bytes are less than 58 bytes, the module waits for 5 ms (at 9 600 baud rate). If there is no user data to continue to input, the data is considered to be terminated. At this time, the module sends all data packets wirelessly; when the module receives After the first user data, the AUX output is low level. When the module puts all the data into the RF chip and starts the transmission, the AUX output is high level; at this time, it indicates that the last packet of wireless data has been transmitted, and the user Data up to 128 bytes can continue to be input ; data packets sent through mode 0 can only be received by the receiving module in mode 0.
RX	The module has always turned on the wireless receiving function, and can receive data packets from mode 0; After receiving the data packet, the module AUX outputs a low level, and after a delay of about 3 ms, it starts to send wireless data through the serial port TXD pin. After all wireless data is output through the serial port, the module outputs AUX high level.

6.3 R SSI Mode (Mode 1)

type	When M0 = 1, M1 = 0, the module works in mode 1
TX	Wireless transmission is not possible, and the received serial data will be discarded
RX	Can not receive air wireless data, only scan the signal strength of the current channel, output a strength value (relative value) through the serial port every 200 ms . Numerical calculation method: signal strength = - data (decimal) dBm. If the hexadecimal value output by the serial port is 0x 50 , the actual signal strength is -80 (decimal) = -80 dBm.

6.4 Configuration Mode (Mode 2)

type	When M0 = 0, M1 = 1, the module works in mode 2
TX	Wireless transmission is not possible
RX	Wireless reception is not possible
configure	Can be used for module parameter setting, using serial port 9600 , 8N1 . Set the module working parameters through a specific command format.

6.5 Sleep Mode (Mode 3)

type	When M0 = 1, M1 = 1, the module works in mode 3
TX	Unable to transmit wireless data.
RX	Unable to receive wireless data.
other	In a low power consumption state, all other functions of the module are turned off, and the sleep mode can only be exited by switching the states of M1 and M0 .
Notice	When entering other modes from sleep mode, the module will reconfigure parameters. During the configuration process, AUX remains low level; after completion, it outputs high level, so it is recommended that users detect the rising edge of AUX.

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7 Command Format

In sleep mode (mode 3: M0=1, M1=1), the list of supported commands is as follows (**work only at 9600 and 8N1 parity**):

serial number	Instruction format	Detailed description
1	C0+ working parameters	Send C0+5 bytes working parameters in hexadecimal format, a total of 6 bytes, must be sent continuously (power-off save)
2	C1+C1+C1	Send three C1s in hexadecimal format, and the module returns the saved parameters, which must be sent continuously.
3	C2+ working parameters	Send C2+5 bytes working parameters in hexadecimal format , a total of 6 bytes, must be sent continuously (not saved when power off)
4	C3+C3+C3	Three C3s are sent in hexadecimal format, and the module returns version information, which must be sent continuously.
5	C4+C4+C4	Send three C4s in hexadecimal format, the module will generate a reset and must be sent continuously.

7.1 Factory default parameters

model	Factory default parameter value: C0 00 00 18 5C 44						
Module model	frequency	address	channel	air speed	baud rate	Serial port format	transmit power
E30T-433T20S	433MHz	0x0000	0x5C	1kbps	9600	8N1	100mW

7.2 Reading of working parameters

Instruction format	Detailed description
C1+C1+C1	In the configuration mode (M0= 0 , M1=1), send a command (HEX format) to the module serial port: C1 C1 C1, the module will return the current configuration parameters, such as: C0 00 00 1A 17 44.

7.3 version number read

Instruction format	Detailed description
C3+C3+C3	In configuration mode (M0=0, M1=1), send commands to the module serial port (HEX format): C3 C3 C3, The module will return the current configuration parameters, such as: C3 30 XX YY; C3 is the command prefix, 30 represents the product model, XX represents the version number, and YY represents the interface format + the maximum power value of the module (hexadecimal). TTL interface is 0x10, RS232 is 0x40, RS485 is 0x80

7.4 Reset command

Instruction format	Detailed description
C4+C4+C4	In the configuration mode (M0= 0 , M1=1), send a command to the module serial port (HEX format): C4 C4 C4, the module will generate a reset; during the reset process, the module will perform self-check, AUX output low level, reset After completion, AUX outputs high level, and the module starts to work normally. At this point, a mode switch can be performed or the next instruction can be initiated.

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7.5 Temperature reading command

Instruction format	Detailed description
C5+C5+C5	In the transmission mode (M0= 0 , M1=0), send a command to the module serial port (HEX format): C5 C5 C5, The module will return the current temperature. For example: 25(HEX) = 37℃. The temperature acquisition range is 0 - 150℃.

7.6 Parameter setting instructions

serial number	name	describe				Remark
0	HEAD	Fixed 0xC0 or 0xC2, indicating that this frame data is a control command				Must be 0xC0 or C2 C0: The set parameters will be saved after power off ; C2: The set parameters will not be saved after power off.
1	ADDH	Module address high byte (default 00H)				00H-FFH
2	ADDL	Module address low byte (default 00H)				00H-FFH
3	SPED	7	6	Serial check digit		Serial port verification is not supported
		0	0	8N1 (default)		
		0	1	8N1		
		1	0	8N1		
		1	1	8N1		
		5	4	3	TTL serial port rate (bps)	The baud rates of both communication parties can be different ; The serial port baud rate has nothing to do with wireless transmission parameters, and does not affect the wireless transceiver characteristics.
		0	0	0	Serial port baud rate is 1200	
		0	0	1	Serial port baud rate is 2400	
		0	1	0	Serial port baud rate is 4800	
		0	1	1	Serial port baud rate is 9600 (default)	
		1	0	0	Serial port baud rate is 19200	
		1	0	1	Serial port baud rate is 38400	
		1	1	0	Serial port baud rate is 57600	
		1	1	1	Serial port baud rate is 115200	
		2	1	0	Wireless air rate (bps)	The lower the air rate, the longer the distance, the stronger the anti-jamming performance and the longer the transmission time. ; The air wireless transmission rate of both
		0	0	0	Air rate is 1k (default)	
		0	0	1	Air rate is 1 k	
		0	1	0	Air rate is 1k	
		0	1	1	Air rate is 10k	

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<table>
<tr><td></td><td></td><td>1</td><td>0</td><td>0</td><td>Air rate is 10k</td><td>parties must be the same.</td></tr>
<tr><td></td><td></td><td>1</td><td>0</td><td>1</td><td>Air rate is 25k</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>1</td><td>0</td><td>Air rate is 25k</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>1</td><td>1</td><td>Air rate is 25k</td><td></td></tr>
<tr><td>4</td><td>CHAN</td><td colspan="5">communication channel
7～ 0, corresponding to (410M+CHAN*0.25M), default 5CH (433M)</td><td>00H-A0H, corresponding to 410 ~ 450MHz</td></tr>
<tr><td rowspan="15">5</td><td rowspan="15">OPTION</td><td>7</td><td colspan="4">Fixed-point transmit enable bit (like MODBUS)</td><td rowspan="3">When it is 1, the first 3 bytes of each user data frame are used as high and low addresses and channels. When transmitting, the module changes its own address and channel, and after completion, restores the original settings.</td></tr>
<tr><td>0</td><td colspan="4">Transparent transmission mode (default)</td></tr>
<tr><td>1</td><td colspan="4">Fixed point transmission mode</td></tr>
<tr><td>6</td><td colspan="4">IO drive mode (default 1)</td><td rowspan="3">This bit is used to enable the module's internal pull-up resistor. Open-drain mode has better level adaptability, and external pull-up resistors may be required in some cases</td></tr>
<tr><td>1</td><td colspan="4">TXD, AUX push-pull output, RXD pull-up input (default)</td></tr>
<tr><td>0</td><td colspan="4">TXD, AUX open circuit output, RXD open circuit input</td></tr>
<tr><td>5</td><td>4</td><td>3</td><td colspan="2">reserve</td><td></td></tr>
<tr><td>2</td><td colspan="4">FEC switch</td><td rowspan="3">, the actual data transmission rate is improved, but the anti-interference ability is weakened .</td></tr>
<tr><td>0</td><td colspan="4">Turn off FEC error correction</td></tr>
<tr><td>1</td><td colspan="4">Turn on FEC error correction (default)</td></tr>
<tr><td>1</td><td>0</td><td colspan="3">Transmit Power (Approx.)</td><td rowspan="5">The external power supply must provide a current output capability of more than 250mA , and ensure that the power supply ripple is less than 100mV ;
It is not recommended to use low power transmission, and its power utilization efficiency is not high.</td></tr>
<tr><td>0</td><td>0</td><td colspan="3">20dBm (default)</td></tr>
<tr><td>0</td><td>1</td><td colspan="3">17dBm</td></tr>
<tr><td>1</td><td>0</td><td colspan="3">14dBm</td></tr>
<tr><td>1</td><td>1</td><td colspan="3">10dBm</td></tr>
<tr><td colspan="7">Example (meaning of serial number 3 "SPED" byte):</td></tr>
<tr><td colspan="2">the binary bit of the byte</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
<tr><td colspan="2">Specific value (user configuration)</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">representative meaning</td><td colspan="2">Serial check bit 8N1</td><td colspan="3">Serial port baud rate is 9600</td><td colspan="3">Air rate is 1k</td></tr>
<tr><td colspan="2">corresponding hexadecimal</td><td colspan="4">1</td><td colspan="4">8</td></tr>
</table>

8 Hardware Design

- It is recommended to use a DC regulated power supply to supply power to the module, the power supply ripple coefficient should be as small as possible, and the module should be reliably grounded;
- Please pay attention to the correct connection of the positive and negative poles of the power supply, such as reverse connection may cause permanent damage to the module;

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- Please check the power supply to ensure that it is between the recommended supply voltages, if exceeding the maximum value will cause permanent damage to the module;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently;
- When designing the power supply circuit for the module, it is often recommended to reserve more than 30% of the margin, so that the whole machine can work stably for a long time;
- The module should be kept away from parts with large electromagnetic interference such as power supply, transformer, and high-frequency wiring as far as possible;
- High-frequency digital traces, high-frequency analog traces, and power traces must be avoided under the module. If it is absolutely necessary to pass under the module, assuming that the module is soldered on the Top Layer, the top layer of the contact part of the module should be covered with ground copper (all copper). And well grounded), it must be close to the digital part of the module and routed on the Bottom Layer ;
- Assuming that the module is soldered or placed on the Top Layer, it is also wrong to arbitrarily route wires on the Bottom Layer or other layers, which will affect the stray and receiving sensitivity of the module to varying degrees ;
- Assuming that there are devices with large electromagnetic interference around the module, it will also greatly affect the performance of the module. It is recommended to stay away from the module according to the strength of the interference. If the situation allows, appropriate isolation and shielding can be done;
- Assuming that there are traces with large electromagnetic interference around the module (high-frequency digital, high-frequency analog, power traces), it will also greatly affect the performance of the module. It is recommended to stay away from the module according to the intensity of the interference. isolation and shielding;
- If the communication line uses 5V level, a 1k-5.1k resistor must be connected in series (not recommended, there is still a risk of damage) ;
- Try to stay away from some TTL protocols whose physical layer is also 2.4GHz, for example: USB3.0;
- The antenna installation structure has a great influence on the performance of the module, and it is necessary to ensure that the antenna is exposed and preferably vertically upward;
- When the module is installed inside the case, the antenna can be extended to the outside of the case; if the antenna is installed inside the metal case, the transmission distance will be greatly weakened.

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9 Frequently Asked Questions

9.1 The transmission distance is not ideal

- When there is a straight-line communication obstacle, the communication distance will be correspondingly attenuated ;
- Temperature, humidity, and co-channel interference will increase the communication packet loss rate ;
- The ground absorbs and reflects radio waves, and the test effect close to the ground is poor ;
- Seawater has a strong ability to absorb radio waves, so the seaside test effect is poor ;
- If there is a metal object near the antenna, or placed in a metal shell, the signal attenuation will be very serious ;
- The power register is set incorrectly, and the air speed is set too high (the higher the air speed, the closer the distance) ;
- The low voltage of the power supply at room temperature is lower than the recommended value, and the lower the voltage, the lower the output power ;
- The antenna and the module are poorly matched or the quality of the antenna itself is a problem.

9.2 Modules are easily damaged

- Please check the power supply to ensure that it is between the recommended supply voltages, if exceeding the maximum value will cause permanent damage to the module ;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently ;
- Please ensure anti-static operation during installation and use, and high-frequency components are electrostatically sensitive ;
- Please ensure that the humidity during installation and use should not be too high, and some components are humidity-sensitive devices ;
- If there is no special requirement, it is not recommended to use it at too high or too low temperature.

9.3 Bit error rate is too high

- There is co-frequency signal interference nearby, stay away from the interference source or modify the frequency and channel to avoid interference;
- If the power supply is not ideal, it may also cause garbled characters. Be sure to ensure the reliability of the power supply;
- Poor quality or too long extension lines and feeders can also cause high bit error rates.

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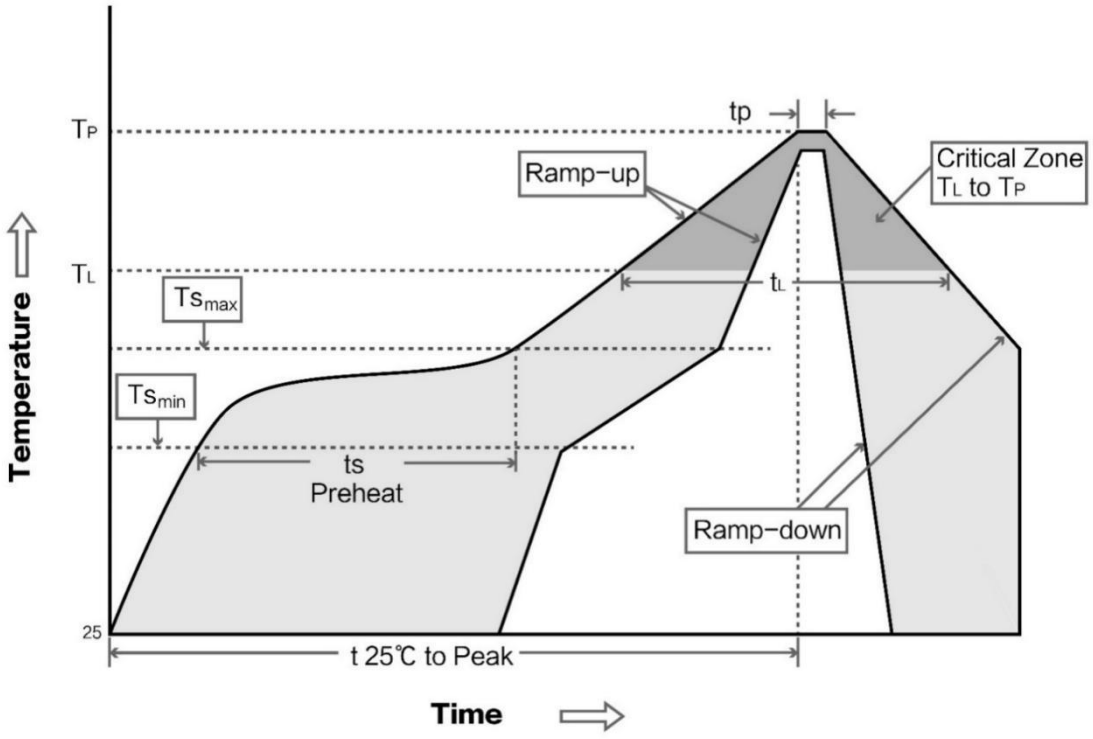
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10 Welding Operation Instructions

10.1 Reflow soldering temperature

Profile Feature	Curve feature	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	60-120sec	60-120sec
Average ramp-up rate(Tsmax to Tp)	average rate of ascent	3 ℃ /second max	3 ℃ /second max
Liquidous Temperature (TL)	liquidus temperature	183 ℃	217 ℃
Time(tL)Maintained Above(TL)	time above liquidus	60-90sec	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	25 ℃ to peak temperature	6 minutes max	8 minutes max

10.2 Reflow Soldering Curve



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11 Related Models

Product number	Chip solution	frequency Hz	power dBm	distance km	air speed bps	package	Product Size mm	Antenna form
E30-170T20D	SI4463	170M	20	2.0 _	1k ~ 25k	DIP	21*36	SMA-K
E30-170T27D	SI4463	170M	27	5.0 _	1k ~ 25k	DIP	24*43	SMA-K
E30-433T20S 3	SI4438	433M	20	2.5	1k ~ 25k	SMD	16*26	IPEX/ stamp hole
E30T-433T20S	SI4438	433M	20	2.5	1k ~ 25k	SMD	17*30	IPEX/ stamp hole
E30-433T20D	SI4438	433M	20	2.5	1k ~ 25k	DIP	21*36	SMA-K
E30-490T20S	SI4438	490M	20	2.5	1k ~ 25k	SMD	17*30	IPEX/ stamp hole
E30-490T20D	SI4438	490M	20	2.5	1k ~ 25k	DIP	21*36	SMA-K
E30-780T20S	SI4463	780M	20	2.5	1k ~ 25k	SMD	17*30	IPEX/ stamp hole
E30-868T20D	SI4463	868M	20	2.5	1k ~ 25k	DIP	21*36	SMA-K
E30-868T20S	SI4463	868M	20	2.5	1k ~ 25k	SMD	17*30	IPEX/ stamp hole
E30-915T20D	SI4463	915M	20	2.5	1k ~ 25k	DIP	21*36	SMA-K
E30-915T20S	SI4463	915M	20	2.5	1k ~ 25k	SMD	17*30	IPEX/ stamp hole

12 Antenna Guidelines

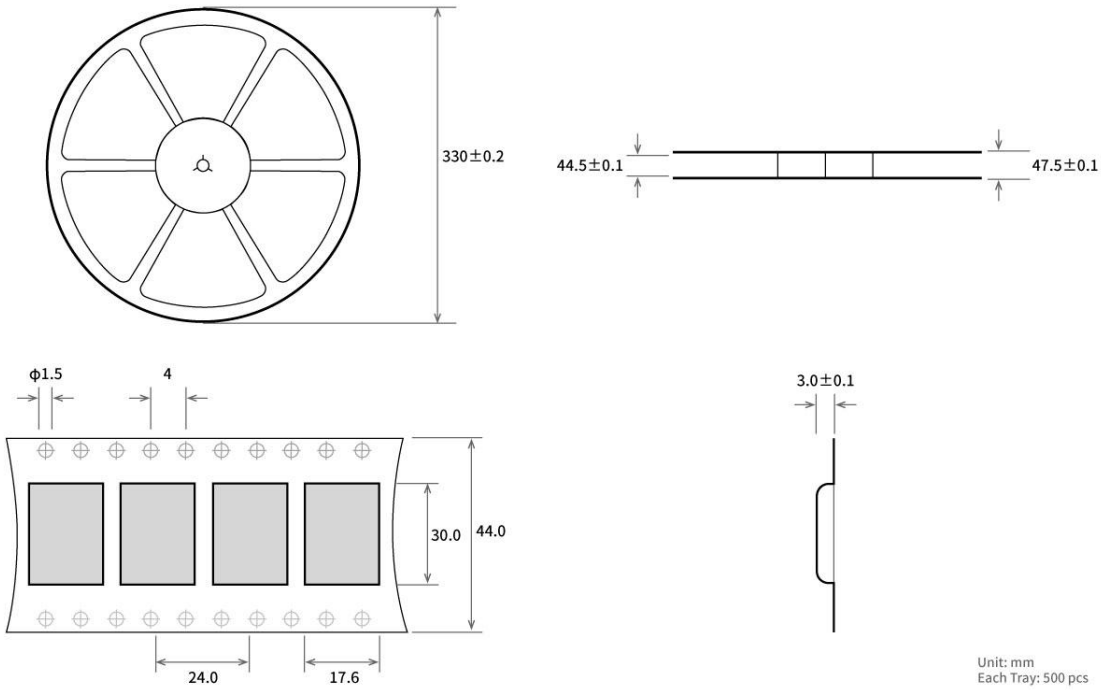
Antennas play an important role in the communication process, and often inferior antennas will have a great impact on the communication system. Therefore, our company recommends some antennas as antennas with excellent performance and reasonable price for our wireless modules.

Product number	type	frequency band	gain	size	feeder	interface	Features
		Hz	d B i	m m	c m		
T X433-NP-4310	Foldable	433M	2.0 _	1 0x43	-	welding	Flexible FPC Soft Antenna
T X433-JZ-5	Rubber	433M	2.0 _	30	-	SMA-J	Ultra-short straight, omnidirectional
T X433-JZG-6	Rubber	433M	2.5 _	50	-	SMA-J	Ultra-short straight, omnidirectional
T X433-JW-5	Rubber	433M	2.0 _	50	-	SMA-J	Fixed bent , omnidirectional
T X433-JWG-7	Rubber	433M	2.5 _	110	-	SMA-J	Fixed bent , omnidirectional
T X433-JK-11	Rubber	433M	2.5 _	110	-	SMA-J	Bendable Rubber , omnidirectional
T X433-JK-20	Rubber	433M	3.0	200	-	SMA-J	Bendable Rubber , omnidirectional
T X433-XPL-100	sucker antenna	433M	3.5	185	100	SMA-J	Small suction cup antenna , cost -effective
T X433-XP-200	sucker antenna	433M	4.0	190	200	SMA-J	Small suction cup antenna , low loss
T X433-XPH-300	sucker antenna	433M	6.0 _	965	300	SMA-J	Small suction cup antenna , high gain

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13 Package for bulk orders



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Revision History

Version	revision date	Revision Notes	Maintenance man
1.0	2022-08-10	initial version	Ning
1.1	2022-08-11	parameter correction	Yan
1.2	2022-09-23	parameter correction	Yan
1.3	2024-10-16	Add 150℃model,add temperature acquisition, modified the description of serial check bits	Lei

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