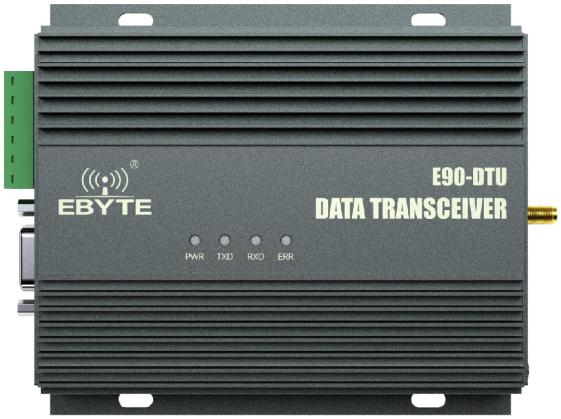
Wireless Modem
User Manual



Chengdu Ebyte Electronic Technology Co.,Ltd.

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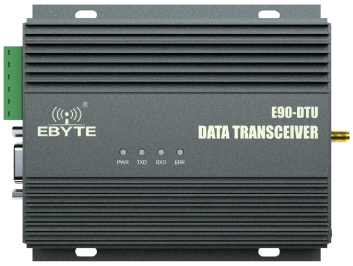
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1. Overview

1.1 Introduction



E90-DTU(xxxSL42) series is a real high-quality industrial-grade wireless digital transmission radio (the radio won the national design patent ZL202030009845.3), the radio adopts LORA spread spectrum technology, and its strong anti-jamming ability makes the wireless communication more stable and reliable in the industrial site.

It has a variety of transmission modes, the radio provides transparent RS232/RS485 interface.LoRa direct-sequence spread spectrum technology will bring more communication distance, and has the advantage of strong anti-interference ability. The module has software FEC forward error correction algorithm, which has high coding efficiency and strong error correction capability, and can actively correct the interfered data packets in case of sudden interference, greatly improving reliability and transmission distance. In the absence of FEC, such packets can only be discarded. The radio has data encryption function, the data transmitted by the radio in the air, with randomness, through the strict encryption and decryption algorithms, which makes the data interception lose its significance; it supports the sub-packet length setting, and supports different real-time and data packets.

Wireless digital transmission radio as a communication medium, and optical fiber, microwave, open wire, has a certain scope of application: it provides some special conditions in the dedicated network of real-time, reliable data transmission of monitoring signals, has a low cost, easy installation and maintenance, bypassing the shooting ability, flexible networking structure, coverage of the characteristics of the long range, suitable for multi-point and location of dispersed, geographically complex and other occasions, can be combined with the PLC, RTU. It can be connected with PLC, RTU, rain gauge, liquid level meter and other data terminals.

1.2 Features

- Ambient field strength dynamic indication, packet RSSI dynamic indication;
- Hardware and software dual watchdog;
- Transmission distance up to 30+KM under ideal conditions;
- Dust and moisture proof;
- Product is simple and easy to use, the upper computer configuration;
- Adopts the latest LoRa technology, which has a longer distance and more powerful performance than traditional LoRa digital radio;
- Adopts military-grade LoRa modulation technology with data encryption and programmable sub-packet length;
- Single packet supports 32~240 bytes;
- Simple and efficient power supply design, using the pressure line method, supporting 12V power supply;
- Transmit power up to 15W;

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- Supports LBT function, the radio automatically waits for transmission according to the current environmental noise intensity. Greatly improve the communication success rate of the module in harsh environments;
- Supports communication key function, which effectively prevents data from being intercepted;
- Can realize multi-level relay networking, effectively extend the communication distance and realize ultra-long-distance communication;
- Adopts temperature-compensated crystal, with frequency stability better than ±1PPM;
- Full aluminum alloy shell, compact size, easy installation, good heat dissipation; perfect shielding design, good electromagnetic compatibility, strong anti-interference ability;
- All parameters can be set by programming: such as power, frequency, air rate, address ID, etc;
- Temperature monitoring, antenna anomaly monitoring, and at the same time with temperature overheating, antenna anomaly protection function;.

2. Quick Start

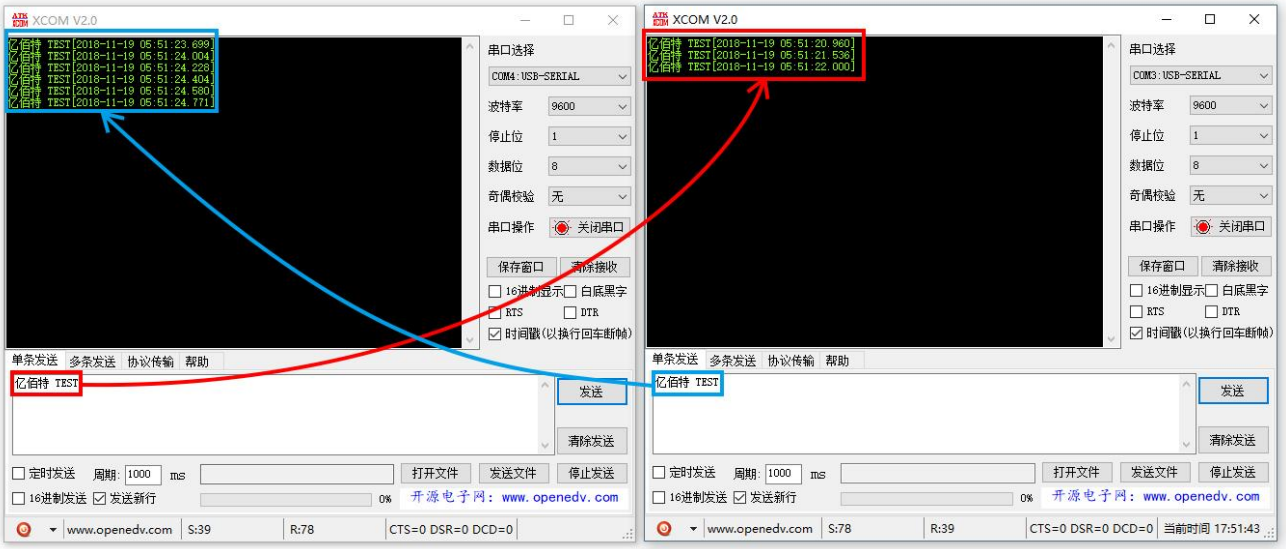
Note: When using this device must be external 50 ohm impedance antenna, at the same time two devices and antennas must be used more than 6 meters apart, otherwise there is a risk of damage to the device!!!!

You need to prepare E90-DTU(230SL42) radio, antenna, 12V/4A power supply, serial connection cable.

1, first install the antenna to the digital transmission radio, and then install the power supply, only support the pressure line method, at this time the power light is on, no indication of abnormal light;

2、Use USB to RS-232 or USB to RS-485 to make the computer connected to the digital radio;

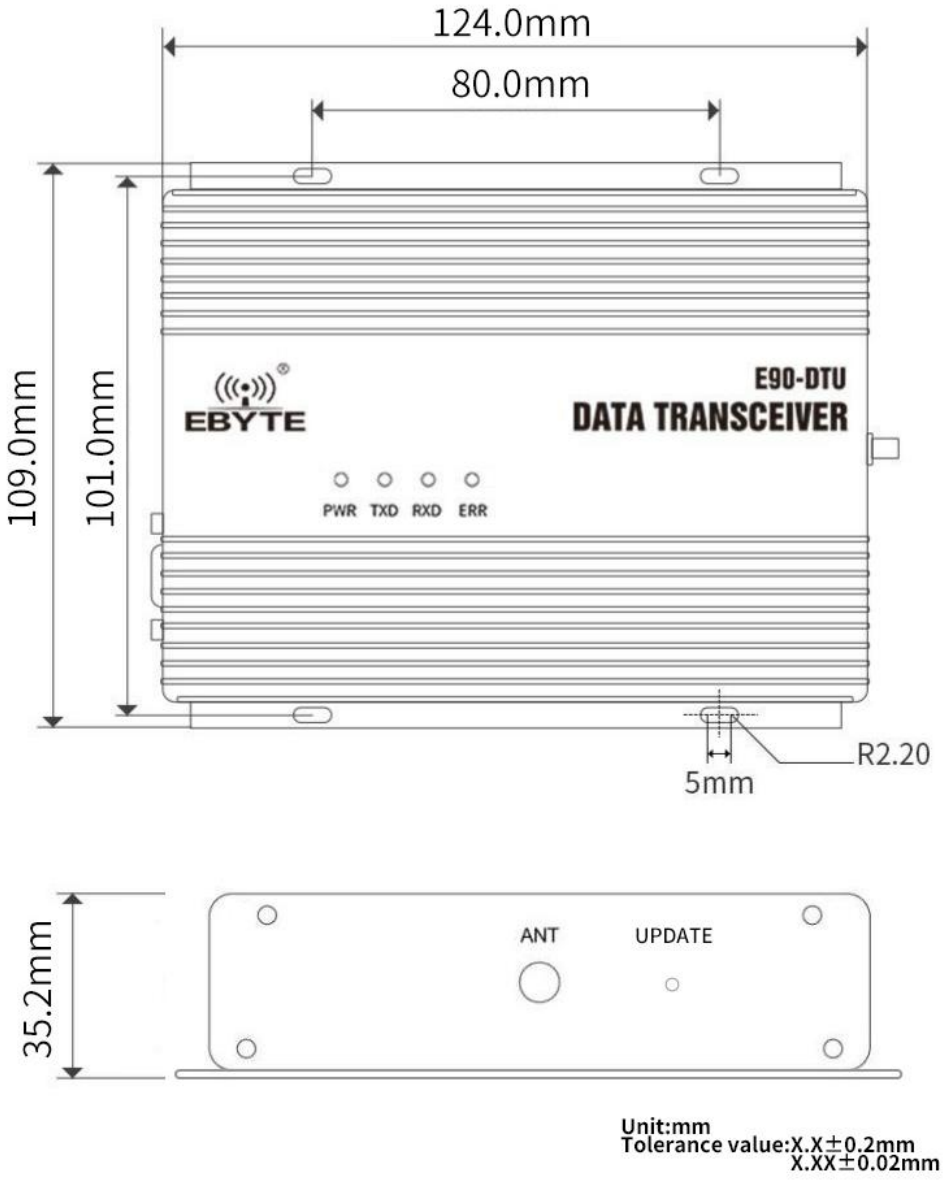
3, start the two serial port debugging assistant, select the serial port baud rate of 9600bps, checksum method for 8N1, you can realize the serial port transmission;



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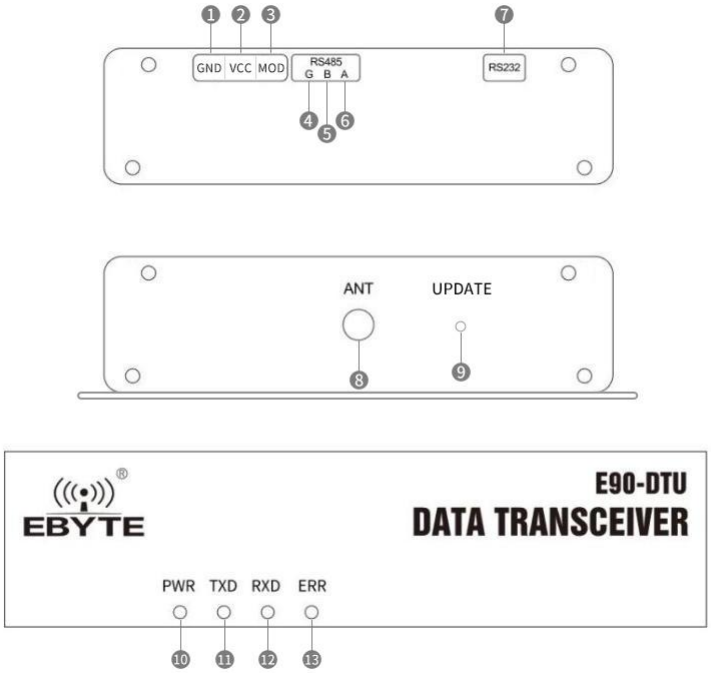
4.If customers need to modify the parameters, please short the MOD pin to GND, enter the configuration mode, open the E90-DTU SL digital radio configuration software, you can modify the relevant parameters, after completing the configuration, please put the MOD pin to the empty state.

3. Product Size



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3.1 Interfaces and Indications



No	Name	Function	Instruction
1	GND	Crimp Wire Power Supply Input Negative	Power Reference Ground
2	VCC	Crimp-wire power input positive	Power Input (12V/4A)
3	MOD	Mode Control	Suspended, general mode; grounded, configuration mode
4	RS485 G	RS485 Interface G	RS485 interface G connected to device GND interface (recommended connection)
5	RS485 B	RS485 Interface B	RS485 interface B connected to device B interface
6	RS485 A	RS485 Interface A	RS485 interface A to device A interface
7	RS232	RS232 interface	Standard RS232 interface
8	ANT	SMA-K interface	External threaded bore, 10mm long, 50Ω characteristic impedance
9	UPDATE		Concealed keypad, no need to concern the user
10	PWR	Power indicator	Red, illuminates when power is on
11	TXD	Serial Data Transmit Indicator	Yellow, blinking when sending data
12	RXD	Serial Data Receive Indicator	Yellow, blinking when receiving data
13	ERR	Warning Indicator	Unconnected antenna or abnormal voltage or

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			temperature, need to re-power on after solving the abnormality of unconnected antenna to work normally.

4. Interface Definitions

4.1 Power connector description

User-powered by crimp wire, 12V/4A DC power supply

4.2 RS232 Interface Definition

The E90-DTU can be connected to the device via RS232 using a standard DB9 interface.

4.3 RS485 Interface Definition

E90-DTU can use RS485 interface A, B and G to connect with RS485 of the device A, B and G respectively.

Note: Poor communication occurs when connecting the radio to multiple devices, but not with a single device, try connecting a 120Ω matching resistor in parallel between the 485_A terminal and the 485_B terminal.

5. Technical indicators

5.1 Model Specification

Model	Operating Frequency	Emission power	Reference Distance	Specification Characteristics	Recommended Scenarios
	Hz	W	km		
E90-DTU(230SL42)	230M	15	30	LoRa spread spectrum anti-interference	Suitable for long distances and interference-prone environments

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E90-DTU(400SL42)	433.125M	15	30	LoRa spread spectrum anti-interference	Suitable for long distances and interference-prone environments
E90-DTU(900SL42)	868.125MHz	15	30	LoRa spread spectrum anti-interference	Suitable for long distances and interference-prone environments

Note: Sunny weather, open environment without obstruction, 12V/4A power supply, 6dBi fiberglass antenna, antenna height of 2 meters from the ground, use factory default parameters.

5.2 General Specification Parameters

No.	Projects	Norm	Description
1	Product Size	124*109.0*35.2mm	See mounting dimensions for details
2	Weight	425g	Weight tolerance 5g
3	Working Temperature	-40℃ ~ +85℃	Meets the needs of industrial grade use
4	Antenna Impedance	50Ω	Standard 50Ω characteristic impedance
5	Voltage Range	12±1V DC	Recommended to support instantaneous current 4A
6	Communication Interface	RS232/RS485	Standard DB9 hole type/5.08 terminal block
7	Baud rate	出厂 default9600	Baud rate range 1200 ~ 115200
8	Address Code	出厂 default0	Total 65536 address codes can be set

5.3 Frequency range and number of channels

Model	Default frequency	Frequency range	Channel spacing	Channel Count
	Hz	Hz	Hz	
E90-DTU(230SL42)	230M	225 ~ 236M	0.25M	45，half-duplex
E90-DTU(400SL42)	433.125M	410.125 ~ 493.125M	1M	84，half-duplex
E90-DTU(900SL42)	868.125M	850.125 ~ 930.125M	1M	81，half-duplex

Note: When using multiple sets of digital transmission radios in the same area to communicate one-to-one at the same time, it is recommended that each set of digital transmission radios be set up with a channel spacing of 2 MHz or more.

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5.4 Transmit power level

Model	10/15W
E90-DTU(230SL42)	Software adjustable, default 15W
E90-DTU(400SL42)	Software adjustable, default 15W
E90-DTU(900SL42)	Software adjustable, default 15W

5.5 Air Rate Class

Model	Default Air Rate	level	Air Rate Class
	bps		kbps
E90-DTU(230SL42)	2.4k	7	0.3、0.6、1.2、2.4、4.8、9.6、15.6、
E90-DTU(400SL42)	2.4k	8	0.3、1.2、2.4、4.8、9.6、19.2、38.4、62.5
E90-DTU(900SL42)	2.4k	8	0.3、1.2、2.4、4.8、9.6、19.2、38.4、62.5

Note: The higher the air rate setting, the faster the transmission rate and the closer the transmission distance; therefore, it is recommended that the lower the air rate, the better, if the rate meets the usage requirements.

5.6 Current parameters

Model	Supply Voltage（V）	Emitting current （A）	Watching the current（mA）
E90-DTU(230SL42)	12±1	2.5~3.5	45
E90-DTU(400SL42)	12±1	2.5~3.5	45
E90-DTU(900SL42)	12±1	2.5~3.5	30

Note: It is recommended to keep more than 50% current margin when selecting the power supply, which is conducive to the long-term and stable operation of the radio, lower or more than the power supply range of the equipment may trigger the internal protection of the equipment can not work, please ensure the stability of the power supply voltage when using.

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5.7 Receiving and dispatching lengths and subcontracting modalities

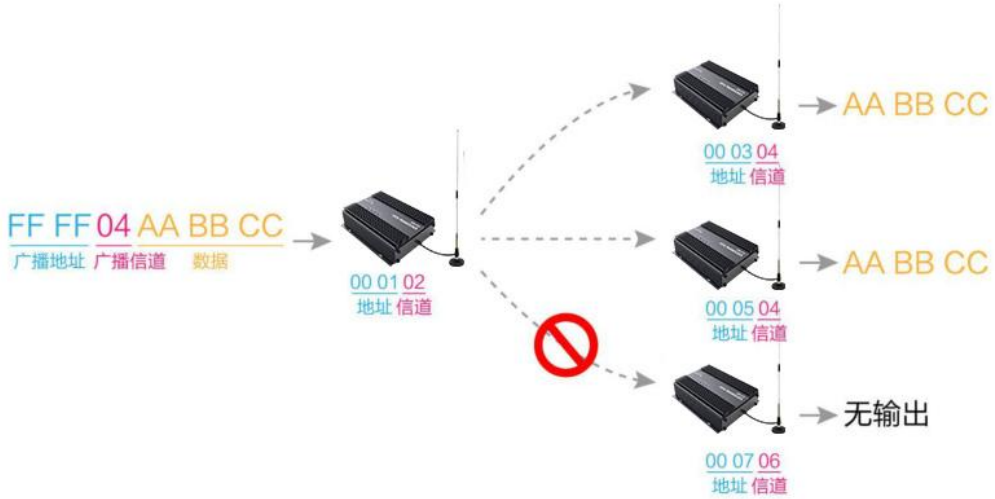
Model	Cache size	Subcontracting
E90-DTU(230SL42)	1000 字节	Command-set packetized 32/64/128/240 byte transmissions
E90-DTU(400SL42)	1000 字节	Command-set packetized 32/64/128/240 byte transmissions
E90-DTU(900SL42)	1000 字节	Command-set packetized 32/64/128/240 byte transmissions

Note: 1. If the radio's single reception data is larger than the single packet capacity, the exceeding part of the data will be automatically assigned to the second transmission until the transmission is completed;
The data received by the radio station at one time cannot be larger than the cache capacity.。

6. Functions

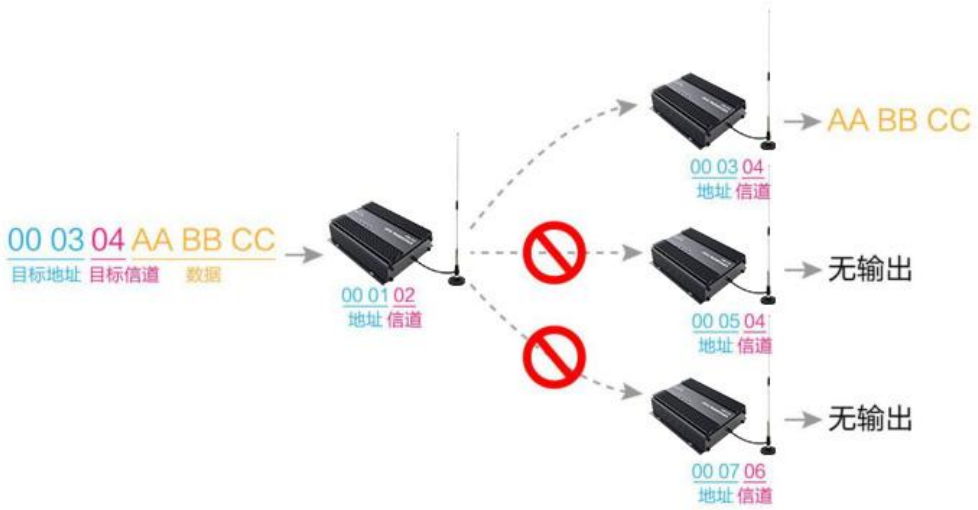
6.1 Fixed-point launch (hexadecimal)

For fixed-point transmission, the module recognizes the first three bytes of the received serial data as:
Address High + Address Low + Channel and uses it as the wireless transmit target.



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6.2 Broadcast transmissions (hexadecimal)



6.3 Broadcast address

- Example: set module A address to 0xFFFF 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.

6.4 Listening address

- Example: set module A address to 0xFFFF 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.

6.5 Exception Work Status Log Printing Details

1.The ERR indicator blinks according to the following table based on the specific abnormal operating status.

Abnormal working condition	Thresholds for determining anomalous states	ERR indicator blinking condition
undervoltage	Supply voltage <11V	500ms blinks once
Overvoltage	Supply voltage >13V	1s blinks once

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Overheating	Module temperature > 120°C	2s blinking once
Overvoltage and overheating	Supply voltage >13V and module temperature >120°C	Constant
Unplugged antenna	Transmission without antenna	Constant light

2. The module will temporarily turn off the RF transmitting function under abnormal working condition until it returns to normal working condition, then it will restart to turn on the transmitting.

3.The module will carry out cyclic log printing (can be turned on/off) every 500ms in the abnormal state to inform the user of the current abnormal working state, and the format of the print log is shown in the following table:

Abnormal working condition	Print Log Format
Under Voltage!!!	Under Voltage!!!
Over Voltage!!!	Over Voltage!!!
Over Temperature!!!	Over Temperature!!!
Over Voltage & Over Temperature!!!	Over Voltage & Over Temperature!!!
WARNING!!!: No antenna	WARNING!!!: No antenna

Note: Exception log printing enable bit (bit2 of instruction register 04H) 0: off 1: on Default is 0 (off)

7. Working mode

E90-DTU has two working modes, MOD pin is suspended, general mode, i.e. the radio communicates normally; MOD pin is grounded, configuration mode.

Type	marginal notes
General Mode	Serial on, wireless on, transparent transmission (factory default mode)
Configuration Mode	The user can access the registers through the serial port to control the working state of the radio, and the user can configure the module through the upper computer configuration software.

7.1 General mode

Type	Module operates in general mode (MOD pin suspended state)
transmitter	The user can enter data through the serial port and the module will initiate wireless transmission.
reception (of transmitted signal)	The module's wireless reception function is switched on, and wireless data will be output via the serial port pins when received.

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7.2 Configuration Mode

Type	Module operating in configuration mode (MOD pin grounded state)
transmitter	Wireless Transmit Off
reception (of transmitted signal)	Wireless receive off
configure	User access to registers to configure module operating parameters

8. Register read/write control

8.1 Command format

The list of supported commands in configuration mode is as follows (only 9600, 8N1 format is supported at setup):

No	Command format	Particular
1	Setup Registers	Instruction: C0 + start address + length + parameters Response: C1 + start address + length + parameters Example 1: Configure the channel as 0x09 Command Start address Length Parameters Send: C0 05 01 09 Return: C1 05 01 09 Example 2: Configure module address (0x1234), network address (0x00), serial port (9600 8N1) and airspeed (1.2K) at the same time Send: C0 00 04 12 34 00 61 Return: C1 00 04 12 34 00 61
2	Read registers	Command: C1 + start address + length Response: C1 + start address + length + parameters Example 1: Read channel Command Start address Length Parameters Send: C1 05 01 Return: C1 05 01 09 Example 2: Read module address, network address, serial port, airspeed at the same time Send: C1 00 04 Return: C1 00 04 12 34 00 61
3	formatting error	Format Error Response FF FF FF FF

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8.2 Register Descriptions

<table>
<tr><th>Address</th><th>Read Write</th><th>Name</th><th colspan="5">description</th><th>Note</th></tr>
<tr><td>00H</td><td>Read/ Write</td><td>ADDH</td><td colspan="5">ADDH（default0）</td><td rowspan="2">● Module address high byte and low byte. Note: When the module address is equal to FFFF, it can be used as the broadcast and listen address, i.e.: at this point the module will not be address filtered1</td></tr>
<tr><td>01H</td><td>Read/ Write</td><td>ADDL</td><td colspan="5">ADDL（default0）</td></tr>
<tr><td>02H</td><td>Read/ Write</td><td>NETID</td><td colspan="5">NETID（default0）</td><td>● Network address for distinguishing networks. It should be set to the same when communicating with each other.</td></tr>
<tr><td rowspan="11">03H</td><td rowspan="11">Read/ Write</td><td rowspan="11">REG0</td><td>7</td><td>6</td><td>5</td><td>UART serial port rate（bps）</td><td rowspan="11">● The serial baud rates can be different for the two modules of communicating with each other. The checksum method can also be different.
● When transmitting larger data packets continuously, users need to consider the data blocking and even possible loss caused by the same baud rate. It is generally recommended that the baud rate of both sides of the communication is the same.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>The serial baud rate is 1200</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>The serial baud rate is 2400</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>The serial baud rate is 4800</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>The serial baud rate is 9600（default）</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>The serial baud rate is 19200</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>The serial baud rate is 38400</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>The serial baud rate is 57600</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>The serial baud rate is 115200</td></tr>
<tr><td>4</td><td>3</td><td colspan="2">serial port parity bit</td><td></td></tr>
</table>

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<table>
<tr><td rowspan="16"></td><td rowspan="16"></td><td rowspan="16"></td><td>0</td><td>0</td><td colspan="3">8N1（default）</td><td rowspan="16"></td></tr>
<tr><td>0</td><td>1</td><td colspan="3">8O1</td></tr>
<tr><td>1</td><td>0</td><td colspan="3">8E1</td></tr>
<tr><td>1</td><td>1</td><td colspan="3">8N1（equal to 00）</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">1</td><td rowspan="2">0</td><td colspan="2">wireless air speed（bps）</td><td rowspan="11">● Both sides of the communication must be the same.
● The higher the rate, the lower the delay and the longer the distance</td></tr>
<tr><td>E90-DTU(230SL42)</td><td>E90-DTU(400SL42)
E90-DTU(900SL42)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>airspeed 0.3k</td><td>airspeed 0.3k</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>airspeed 0.6k</td><td>airspeed 1.2k</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>airspeed 1.2k</td><td>airspeed 2.4k
（default）</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>airspeed 2.4k
（default）</td><td>airspeed 4.8k</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>airspeed 4.8k</td><td>airspeed 9.6k</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>airspeed 9.6k</td><td>airspeed 19.2k</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>airspeed 15.6k</td><td>airspeed 38.4k</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>airspeed 15.6k</td><td>airspeed 62.5k</td></tr>
<tr><td rowspan="11">04H</td><td rowspan="11">Read/
Write</td><td rowspan="11">REG1</td><td>7</td><td>6</td><td colspan="3">Subcontracting Settings</td><td rowspan="6">● user sends data less than the packet length, the serial port output at the receiving end presents as uninterrupted continuous output.
● If the data sent by the user is larger than the packet length, the serial port at the receiving end will output in packets.</td></tr>
<tr><td>0</td><td>0</td><td colspan="3">240 bytes（default）</td></tr>
<tr><td>0</td><td>1</td><td colspan="3">128 bytes</td></tr>
<tr><td>1</td><td>0</td><td colspan="3">64 bytes</td></tr>
<tr><td>1</td><td>1</td><td colspan="3">32 bytes</td></tr>
<tr><td>5</td><td colspan="4">RSSI Environmental Noise Enable</td><td rowspan="5">● When is enabled, the register can be read by sending instruction C0 C1 C2 C3 instruction in transmission mode.
● register 0x00 : current ambient noise RSSI
● register 0X01 : RSSI of the last received data. (The current channel</td></tr>
<tr><td>0</td><td colspan="4">disable（default）</td></tr>
<tr><td>1</td><td colspan="4">enable</td></tr>
</table>

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<table>
<tr><td></td><td></td><td></td><td></td><td></td><td>noise is: dBm =-(256-RSSI))
● instruction format: C0 C1 C2 C3 + start address + read length
● return: C1 + address address + read length + read the effective value; for example: send C0 C1 C2 C3 00 01
● Return C1 00 01 RSSI (address can only start from 00)</td></tr>
<tr><td></td><td></td><td></td><td>4</td><td>3</td><td>reserve</td><td></td></tr>
<tr><td></td><td></td><td></td><td>2</td><td colspan="2">Abnormal operation status log printing enable</td><td rowspan="3">According to the different abnormal working status to print the corresponding different format log, for details, see section 6.5, abnormal working status log printing details.</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td colspan="2">disable（default）</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td colspan="2">enable</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>0</td><td>Emission power</td><td rowspan="5">● Power and current are non-linearly related, and the power supply is most efficient at maximum power.
● Current does not decrease proportionally with power</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>0</td><td rowspan="3">41.5±0.5dBm（default）</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>1</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>0</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>1</td><td>40dBm</td></tr>
<tr><td>05H</td><td>Read/ Write</td><td>REG2</td><td colspan="3">Channel Control (CH)
0~44 represent a total of 45 channels respectively E90-DTU(230SL42)
0-83 represent a total of 84 channels respectively E90-DTU(400SL42)
0-81 represent a total of 82 channels respectively E90-DTU(900SL42)</td><td>● Actual frequency = 225+CH*0.25M
● Actual frequency = 410.125+CH*1M
● Actual frequency = 850.125M +CH * 1M</td></tr>
<tr><td>06H</td><td>Read/ Write</td><td>REG3</td><td>7</td><td colspan="2">Enable RSSI bytes</td><td rowspan="2">When it is enabled, the module receives wireless data, which</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td colspan="2">Disable (default)</td></tr>
</table>

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			1	Enable	will follow an RSSI intensity byte when output through the serial port TXD.
			6	Transmission method	The module will recognize the first three bytes of the serial data as: address high + address low + channel, and will use them as the wireless transmit target.
			0	Transparent transmission (default)	
			1	Fixed-point transmission	
			5	Relay function	● When the relay function is enabled, the module will initiate a forwarding if the destination address is not the module itself. ● In order to prevent data backhauling, it is recommended to use with fixed point mode. That is, the destination address is different from the source address.
			0	Disable relay function (default)	
			1	Trunking Enable	
			4	LBT Enable	● When it is enabled, wireless data will be listened to before transmitting, which can avoid interference to a certain extent, but may bring data delays ● The maximum dwell time of LBT is 2 seconds, and it will be forced to send out when it reaches two seconds.
			0	Disable (default)	
			1	Enable	
			3	Reserved	
			2	1 0 Reserved	
07H	Write	CRYPT_H	Key High Byte（default0）		● write-only, read returns 0 ● used for user

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08H	Write	CRYPT_L	Key Low Byte（default0）	encryption to avoid interception of over-the-air wireless data by similar modules. ● The module will internally use these two bytes as a calculation factor to transform the encryption process of the over-the-air wireless signal.
80H~86H	Read Only	PID	7 bytes of product information	● 7 bytes of product information

8.3 Factory Default Parameters

Model	**E90-DTU(230SL42) Factory Default Parameter Values ： 00 00 00 63 00 17 03 00 00** **E90-DTU(400SL42) Factory Default Parameter Values ： 00 00 00 62 00 17 03 00 00** **E90-DTU(400SL42) Factory Default Parameter Values ： 00 00 00 60 00 12 03 00 00**						
Model	Frequency	Address	Channel	Air Rate	Baud rate	Serial Format	Transmit Power
E90-DTU (230SL42)	230MHz	0x0000	0x17	2.4kbps	9600	8N1	41.5±0.5dBm
E90-DTU (400SL42)	433.125MHz	0x0000	0x17	2.4kbps	9600	8N1	41.5±0.5dBm
E90-DTU (900SL42)	868.125MHz	0x0000	0x12	2.4kbps	9600	8N1	41.5±0.5dBm

9. Trunking Network Mode Usage

No	Description of trunking mode
1	After setting the relay mode through configuration, switching to the general mode, the relay starts to work.
2	In relay mode ADDH,ADDL is no longer used as module address, but corresponds to NETID forwarding pairing respectively, and if it receives one of the networks, it forwards to the other network. The repeater's own network ID is invalid.

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3	In relay mode, the serial port of the repeater module can not send and receive data, and can not perform low-power operation.

Trunking Networking Rules Description:

1, forwarding rules, relay can forward data in both directions between two NETIDs.

2, In relay mode, ADDH\ADDL is no longer used as the module address, as NETID forwarding pair.

3、In relay mode, the data sent should not exceed the set single packet packetization byte

As shown:

① Level 1 relay

"Node 1" NETID is 08.

"Node 2" NETID is 33.

The ADDH\ADDL of relay 1 is 08, 33 respectively.

So the signal sent by node 1 (08) can be forwarded to node 2 (33)

Meanwhile, node 1 and node 2 have the same address, so the data sent by node 1 can be received by node 2.

② Secondary Relay

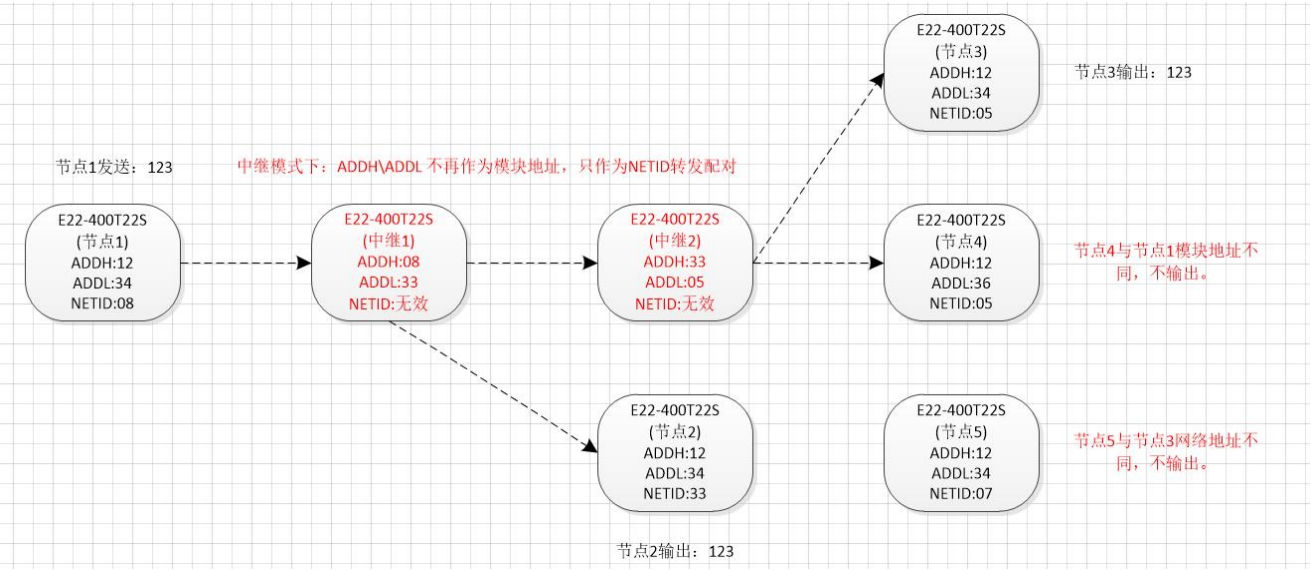
The ADDH\ADDL of relay 2 is 33, 05 respectively.

So relay 2 can forward data from relay 1 to network NETID: 05.

Thus node 3 and node 4 can receive node 1 data. Node 4 outputs data normally, and node 3 has a different address from node 1, so it does not output data.

③ Bidirectional Relay

As configured in the figure: the data sent by node 1 can be received by nodes 2 and 4, and the data sent by nodes 2 and 4 can be received by node 1.



10. Configuration instructions for the host computer

The following figure shows the E90-DTU SL configuration host computer display interface, users can switch to the

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configuration mode through the MOD pin grounding, in the host computer for fast parameter configuration and reading.



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

Network address: 0-65535

Frequency channel: 0-83

Network ID: 0-255

Key: 0-65535

users need to pay special attention when using the upper computer to configure the relay mode, because in the upper computer, each parameter is decimal display mode, so the module address and network ID need to be filled in by converting the conversion system. For example, if the network ID inputted by transmitter A is 02, and the network ID inputted by receiver B is 10, then when relay R sets the module address, it will convert the hexadecimal value 0X020A to the decimal value 522 as the module address filled by relay R. That is to say, at this time, relay R needs to fill in the module address. That is, the module address value to be filled in by relay R is 522.

11. IAP Online Firmware Upgrade

IAP (In Application Programming) means in-line application programming, this module uses this method to upgrade the firmware on-line through the serial port.

upgraded by upper computer command

1. through the MOD pin ground to make the module enter the configuration mode (Note: the baud rate in the configuration mode is 9600);

2. open the official website to configure the host computer "RF_Setting(E22-E9X(SL)) V2.9.exe", select Serial Port > Open Serial Port;

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3 Click Read Parameters to view the module information in the left window of the upper computer;



4 Click Firmware Upgrade > Click Open File (select the firmware .bin file) > Click Start Download;



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5 Click OK and the firmware starts to upgrade;



6 When the firmware upgrade is complete, click OK and the firmware upgrade is complete.



Upgrade logic of upper computer command: upper computer sends: "AT+IAP", module replies: "AT+IAP=OK", wait for the module to reset into IAP upgrade mode automatically. The serial port output "C" character indicates that the module is waiting to receive the firmware bin file, after the host computer detects the character "C", it will start to send the bin file in packets automatically. After the module finishes receiving, it will automatically reset to enter the application program and the upgrade is completed.

12. Related Products

Model	Interface	working frequency Hz	transmitter power W	communication distance km	Functional Features

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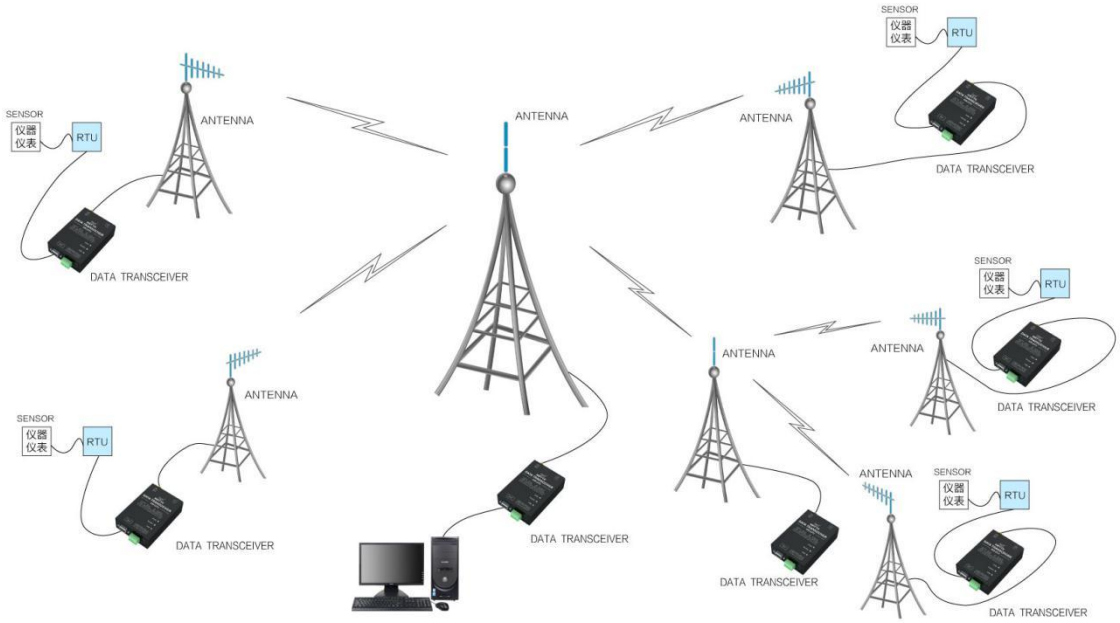
E90-DTU(230SL22)	RS232 RS485	230M	0.16	5	LoRa Spread Spectrum, Wireless Configuration, Network Transmission for Complex Environments
E90-DTU(230SL30)	RS232 RS485	230M	1	10	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, for Complex Environments
E90-DTU(400SL22)	RS232 RS485	433\470M	0.16	5	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, Long Distance Anti-Interference
E90-DTU(400SL30)	RS232 RS485	433\470M	1	10	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, Long Distance Anti-Interference
E90-DTU(900SL22)	RS232 RS485	868\915M	0.16	5	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, Long Distance Anti-Interference
E90-DTU(900SL30)	RS232 RS485	868\915M	1	10	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, Long Distance Anti-Interference
E90-DTU(170L30)	RS232 RS485	170M	1	8	LoRa Spread Spectrum, Wireless Configuration, Network Transmission, Long Distance Anti-Interference
E90-DTU(433L30)	RS232 RS485	433M	1	8	LoRa Spread Spectrum, Long Distance Anti-Jamming
E90-DTU(433L37)	RS232 RS485	433M	5	20	LoRa spread spectrum, 20km ultra-long distance, anti-interference
E90-DTU(433C30)	RS232 RS485	433M	1	3	High-speed continuous transmission, support ModBus protocol
E90-DTU(433C33)	RS232 RS485	433M	2	4	High speed continuous transmission, support ModBus protocol
E90-DTU(433C37)	RS232 RS485	433M	5	10	High speed continuous transmission, supports ModBus protocol, long distance
E90-DTU(230N27)	RS232 RS485	230M	0.5	5	Low frequency and narrow band, suitable for complex environment
E90-DTU(230N33)	RS232 RS485	230M	2	8	Low frequency narrow band, for complex environments
E90-DTU(230N37)	RS232 RS485	230M	5	15	Low Frequency Narrow Band for Complex Environments, Ultra Strong Round Shot

13. Practical application areas

EBYTE digital transmission radio is suitable for all kinds of point-to-point and point-to-multipoint wireless data transmission systems, such as smart home, Internet of Things transformation, power load monitoring, distribution network automation, hydrological and water condition measurement and reporting, water mains network monitoring,

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urban street light monitoring, air-raid alarm control, railroad signal monitoring, centralized control of water supply to the railroads, monitoring of oil and gas supply pipeline network, GPS positioning system, remote meter reading, electronic crane weighing, automatic target reporting, seismic measurement and reporting, fire prevention and burglary, environmental monitoring, and other industrial automation systems, as the following figure:



14. Precautions for use

- Please keep the warranty card of this equipment, the warranty card has the factory number of the equipment (and important technical parameters), which is an important reference value for the user's future maintenance and new equipment.
- Radio in the warranty period, if due to the quality of the product itself and not man-made damage or damage caused by lightning and other natural disasters, enjoy free warranty; please do not repair the user, the problem is to get in touch with our company, EBYTE provide first-class after-sales service.
- Do not operate the radio when it is in the vicinity of flammable places (e.g. coal mine) or explosive hazardous objects (e.g. detonators for detonation).
- Should choose a suitable DC regulated power supply, which is required to have strong resistance to high-frequency interference, small ripple, and sufficient load-carrying capacity; it is also preferable to have the functions of over-current and over-voltage protection as well as lightning protection, etc. to ensure the normal work of the digital transmission radio.
- Don't use it in the working environment beyond the environmental characteristics of the digital radio, such as high temperature, humidity, low temperature, strong electromagnetic field or dusty environment.
- Do not allow the digital radio to continuously transmit at full load, or the transmitter may be burned out.
- The ground wire of the digital radio should be well connected with the ground wire of the external equipment (such as PC, PLC, etc.) and the ground wire of the power supply, or it may easily burn out the communication interface, etc.; do not plug or unplug the serial port with electricity.
- When testing the digital radio, you must connect a matching antenna or 50Ω dummy load, otherwise it is easy to

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damage the transmitter; if you connect an antenna, it is better to keep the human body away from the antenna at a distance of more than 2 meters to avoid injury, and do not touch the antenna when transmitting; when using a suction cup antenna, the suction cup must be adsorbed on a metal surface.

- Wireless digital transmission radio in different environments often have different communication distance, communication distance is often affected by temperature, humidity, obstacle density, obstacle volume, electromagnetic environment; in order to ensure that you can get stable communication, it is recommended to reserve more than 50% of the communication distance margin.
- If the measured communication distance is not ideal, it is recommended to analyze the improvement of the communication distance starting from the antenna quality and the antenna installation method. You can also contact support@cdebyte.com for assistance.
- When selecting the power supply, in addition to the need to retain 50% of the current margin in accordance with the recommendations, more attention should be paid to its ripple should not exceed 100mV.
- Wireless communication products need to be connected to the impedance matching antenna in order to work properly, even if it is a short period of time test should not be omitted, if the product damage caused by this reason will not be covered by the warranty.

Important Notice

EBYTE reserves the right of final interpretation and modification of all contents in this manual.
Due to the continuous improvement with the hardware and software of the product, this manual may be changed without further notice, and the latest version of the manual should prevail in the end.

Revision history

Version	Date	Revised Description	Maintainer
1.0	2023-05-16	Initial Version	Bin
1.1	2023-08-03	Error Correction	Bin
1.2	2023-10-23	Add E90-DTU(230SL42)	Hao
1.3	2023-12-27	Add E90-DTU(900SL42)	Hao

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