



Wireless Data Transceiver

E32-DTU

User Manual



This manual may be modified based on product upgrade, please refer to the latest version.
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1. Product Description

1.1. Brief description

E32-DTU series are wireless data transceivers of 170M/433M/490M//868M/915MHz with standard RS232/RS485 connectors. They are half-duplex TX & RX modems with LoRa technology and transparent transmission mode. Voltage supply ranges from 8V to 28V.

The LoRa direct sequence spread spectrum technology enables the longer communication distance and better power density concentration as well as superior anti-interference ability. The FEC algorithm enables higher coding efficiency and correction ability. The interfered data packets will be corrected proactively upon sudden interference, which significantly improves reliability and communication distance. Without FEC, the interfered data packet will be dropped. The transceivers feature data encryption and compression. The data transmitted in air features randomness, the rigorous algorithm makes data interception meaningless. The data compression function has possibility to reduce the data transmission time, which in turn reduces the possibility of being interfered, thus improves the reliability and communication efficiency.

As a communication media, similar as optical fiber, microwave and cable, the wireless data transceiver can be applied in specific scope: it provides real-time and reliable data transmission of specific network monitor signal under some special conditions, it features cost-efficiency, easy installation, simple maintenance, super diffraction ability, flexible networking structure, large area covering and so on. It is suitable for multiple points under complex environment, and it is applicable for connecting with PLC, RTU, hyetometer, level gauge and so on.

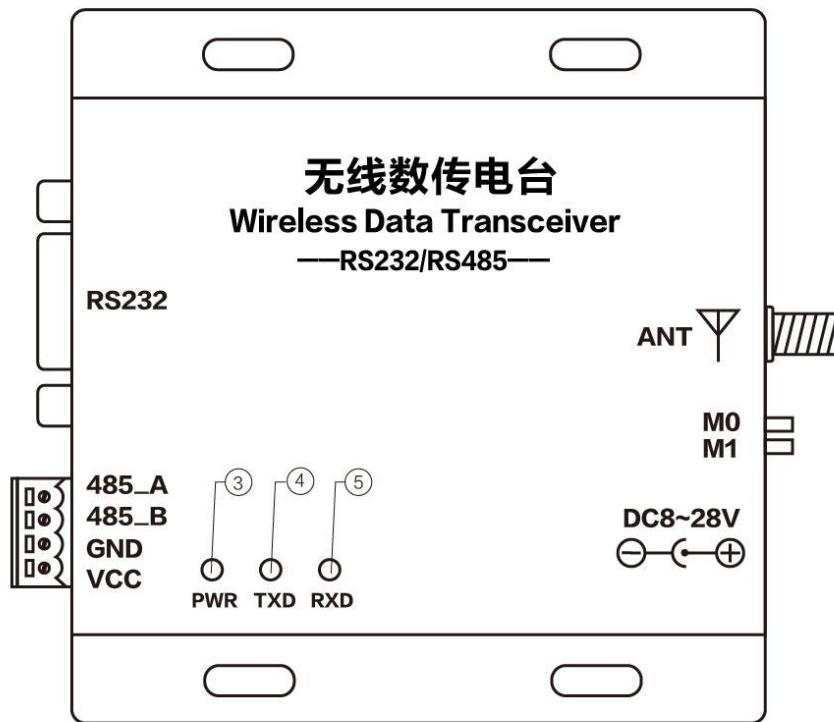
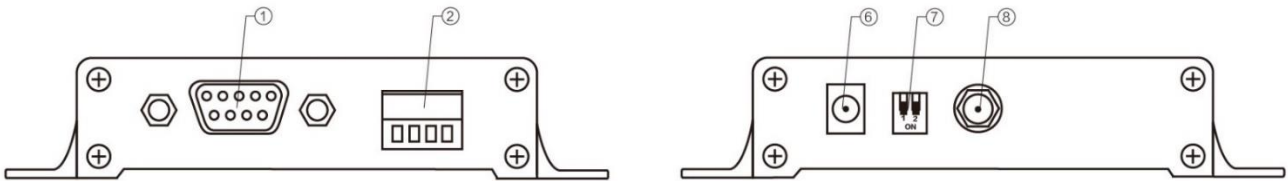
E32-DTU series strictly follow FCC, CE, CCC and such standards, and meet various certification requirements and can be applied all over the world.

1.2. Features

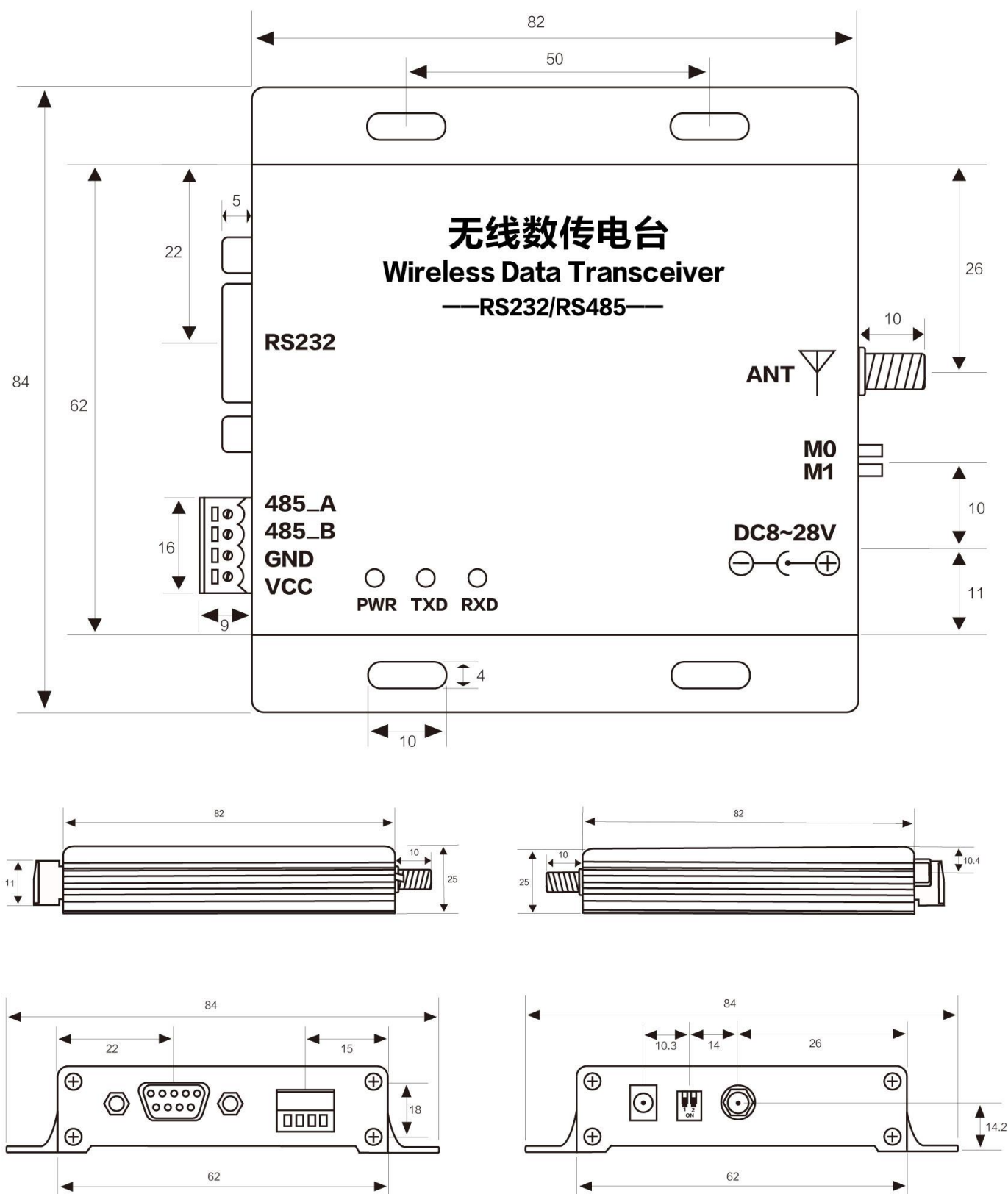
- ★ All core components are originally imported, our transceiver modems have much advanced functions with smaller size and lower cost.
- ★ TX power ranges from 0.5W to 5W, all technical parameters meet European industrial standards.
- ★ Temperature compensators are adopted to make the frequency stability better than $\pm 1.5\text{PPM}$.
- ★ Operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$, applicable for various harsh environment, it is real industrial grade products.
- ★ Aluminum alloy case, compact size, great heat dispersion; good shielding, prime electromagnetic compatibility and strong anti-interference.
- ★ Power reverse & overload protection and antenna surge protection functions significantly improve the reliability.
- ★ Parameters can be configured by programming, such as TX power, frequency point, air data rate, address and so on.
- ★ Ultra-low power consumption, standby current is only 50mA (even lower under power-saving and sleep modes), TX current $\leq 1.2\text{A}$ (under 5W).
- ★ Embedded watch-dog and precise time layout, modem will restart automatically upon abnormal situation and work with previous parameters.
- ★ The transceivers adopt original SEMTECH SX1276/SX1278 chips, customers highly comment the products because of the super reliability.

2. Installation Specifications

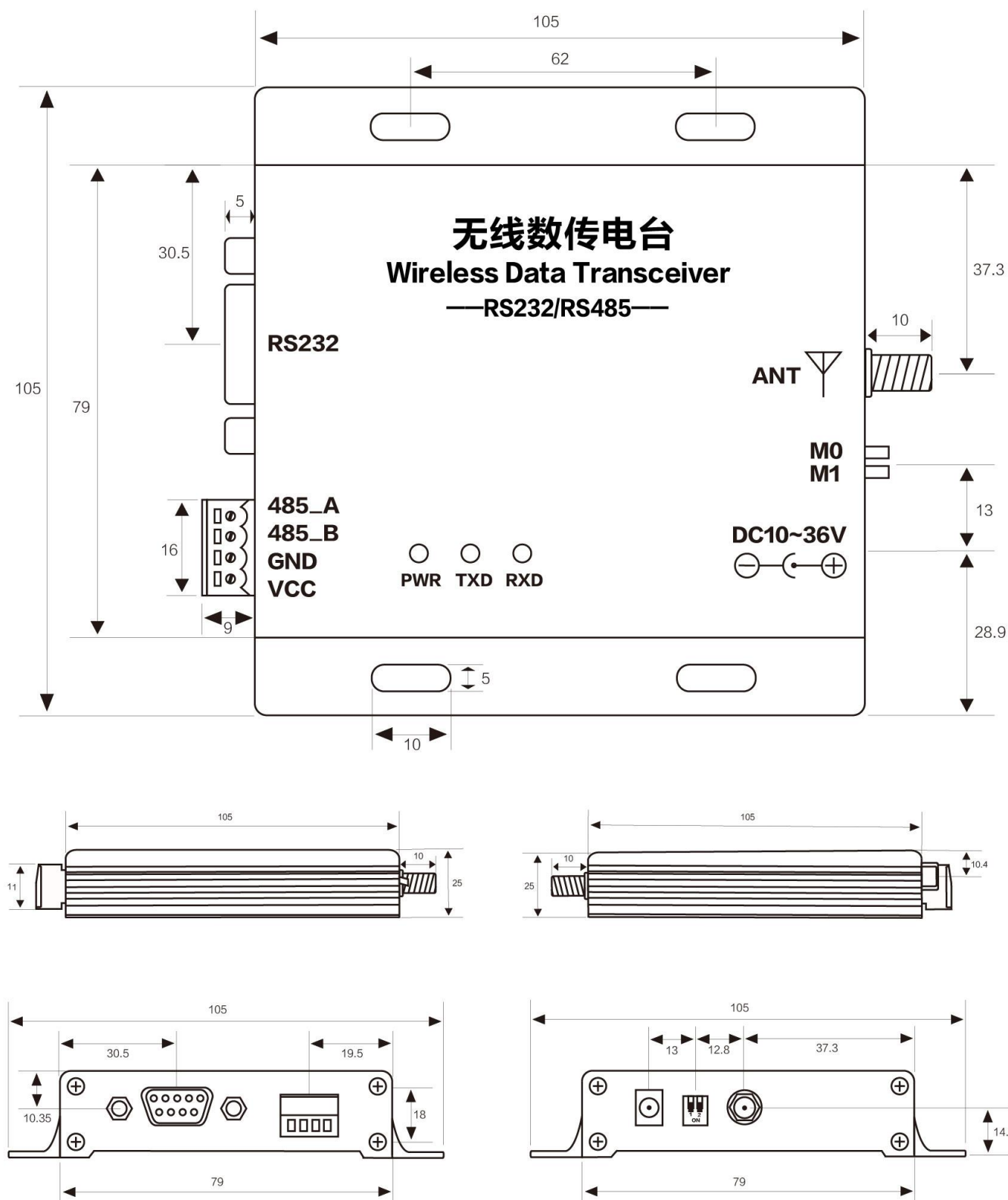
2.1. Structure



No.	Name	Function	Description
1	DB-9 female connector	RS-232 connector	Standard RS-232 connector
2	3.81 wiring connector	RS-485, power connector	Standard RS-485 connector and line-pressing power source connector
3	PWR-LED	Power source indicator	Red, light on when power on
4	TXD-LED	TX indicator	Yellow, flicker when transmitting data
5	RXD-LED	RX indicator	Yellow, flicker when receiving data
6	DC power connector	Power source connector	Drop-in round hole, 5.5mm external diameter, 2.5mm internal diameter
7	Toggle switch	Toggle switch	Operation mode control
8	Antenna interface	SMA-K connector	External screw and inner hole, 10mm long, 50Ω characteristic impedance



★Notes: Type A size means the size of those models of below 2W TX power, including below models:
 E32-DTU(433L20), E32-DTU(433L27), E32-DTU(433L30), E32-DTU(868L20), E32-DTU(868L30), E32-DTU(915L20), E32-DTU(915L30),
 E32-DTU(170L30)

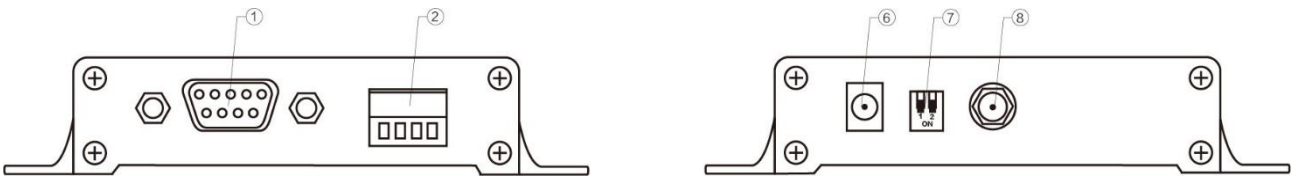


Note: Type B size means the size of the model of 5W TX power, including below model:

E32-DTU (433L37)

3. Interface Definition

3.1. Power source interface definition



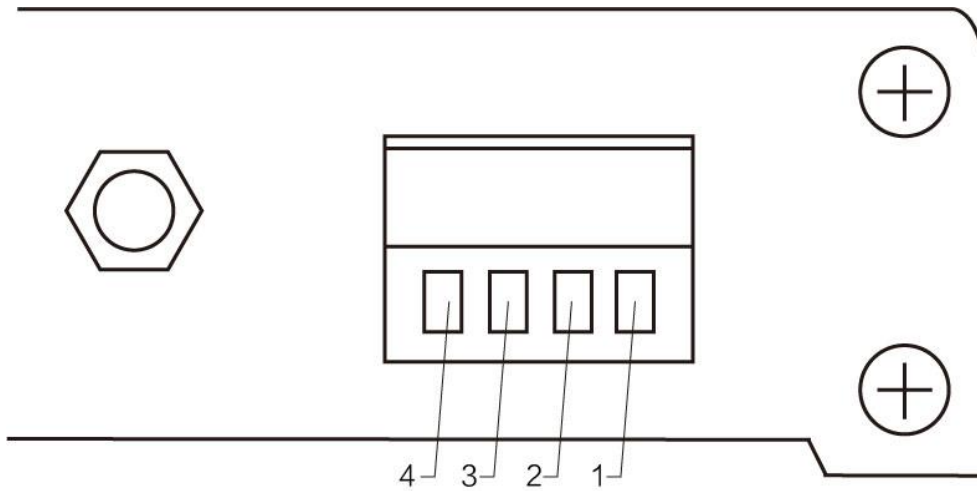
Users could select ⑥ DC connector for power supply using external diameter 5.5mm & internal diameter 2.5mm power adaptor;
 Or select ② VCC terminal and GND terminal for power supply, select just one method.
 E32-DTU can be powered with 10~28V DC, 12V or 24V DC is recommended.

3.2. RS232 interface definition

E32-DTU can be connected through standard DB-9 connector to RS-232 devices.

3.3. RS485 interface definition

E32-DTU can be connected through ② 485_A terminal and 485_B terminal to equipment RS-485 A terminal and B terminal accordingly.



Pin	Definition	Function	Description
1	VCC	Line pressing power connector, anode	10~28V DC, 12V or 24V recommended
2	GND	Line pressing power connector, cathode	Power cathode connects to system ground and case
3	485_B	RS-485 interface, B connector	RS-485 B connector connects to equipment B connector
4	485_A	RS-485 interface, A connector	RS-485 A connector connects to equipment A connector

★ Notes: If one transceiver connects to multi devices and communication fails, please add 12Ω resistor in parallel between 485_A and 485_B.

4. Technical Specifications

4.1. Models and specifications

Model	Frequency	TX power	Distance	Features	Recommended application conditions
	MHz	W	km		
E32-DTU (433L20)	433	0.1	3	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (433L27)	433	0.5	5	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (433L30)	433	1	8	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (433L37)	433	5	20	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (868L20)	868	0.1	3	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (868L30)	868	1	8	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (915L20)	915	0.1	3	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (915L30)	915	1	8	LoRa, long distance, anti-interference	Small data packet, long distance, interference
E32-DTU (170L30)	170	1	8	Super diffraction, very reliable	Small data packet, long distance, blockages

★ Test conditions: clear weather, open area, no blockage, 12V24A power, 5dBi gain sucker antenna, 2 meters above ground, default parameters,

4.2. General specifications

Model	Size	Weight	Temperature	Impedance	Voltage	Interface	Baud rate	Address code
E32-DTU(433L20)	82 * 62 * 25mm	131g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(433L27)	82 * 62 * 25mm	135g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(433L30)	82 * 62 * 25mm	135g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(433L37)	124 * 105 * 25 mm	240g±5g	-40 ~ 85°C	50 Ω	10 ~ 36V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(868L20)	82 * 62 * 25mm	131g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(868L30)	82 * 62 * 25mm	131g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(915L20)	82 * 62 * 25mm	131g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(915L30)	82 * 62 * 25mm	135g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0
E32-DTU(170L30)	82 * 62 * 25mm	135g±3g	-40 ~ 85°C	50 Ω	8 ~ 28V DC	RS232/RS485	Default 9600	Default 0

★ Notes: Operating temperature: it is recommended to be lower than 70°C. Antenna impedance: standard 50Ω characteristic impedance. Voltage: higher than max value will damage the transceiver. Communication interface: standard DB9 hole/3.81 connector. Baud rate: 1200~115200. Address: 65536 addresses.

4.3. Frequency range and channel number

Model	Default frequency	Frequency range	Channel interval	Channel number
	MHz	MHz	MHz	
E32-DTU(433L20)	433	425~450.5	0.1	32, half-duplex
E32-DTU(433L27)	433	425~450.5	0.1	32, half-duplex
E32-DTU(433L30)	433	425~450.5	0.1	32, half-duplex
E32-DTU(433L37)	433	425~450.5	0.1	32, half-duplex
E32-DTU(868L20)	868	862 ~ 893	1	32, half-duplex
E32-DTU(868L30)	868	862 ~ 893	1	32, half-duplex
E32-DTU(915L20)	915	900~931	1	32, half-duplex
E32-DTU(915L30)	915	900~931	1	32, half-duplex
E32-DTU(170L30)	170	160~173.5	0.1	55, half-duplex

★ Notes: When multiple pairs work in same area, please set at least 2MHz channel interval between each pair to avoid interference.

4.4. TX power grade

Model	10mW	25mW	50mW	100mW	135mW	250mW	500mW	1w	5W
E32-DTU(433L20)	√	√	√	√					
E32-DTU(433L27)	√	√	√	√					
E32-DTU(433L30)					√	√	√	√	
E32-DTU(433L37)									√
E32-DTU(868L20)	√	√	√	√					
E32-DTU(868L30)					√	√	√	√	
E32-DTU(915L20)	√	√	√	√					
E32-DTU(915L30)					√	√	√	√	
E32-DTU(170L30)					√	√	√	√	

★ Notes: The lower the TX power, the shorter the communication distance. The current will not decrease at equal scale. Max power is recommended.

4.5. Air data rate grade

Model	Default air data rate	Grade number	Air data rate grade
	Kbps		Kbps
E32-DTU(433L20)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(433L27)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(433L30)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(433L37)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(868L20)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(868L30)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(915L20)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(915L30)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2
E32-DTU(170L30)	2.4	6	0.3、1.2、2.4、4.8、9.6、19.2

★ Notes: The higher the air rate, the quicker the transmission and the shorter the distance. So lower air rate is recommended.

4.6. Current values

Model	TX current (mA)		Standby current (mA)	
	12V DC	24V DC	12V DC	24V DC
E32-DTU(433L20)	134	81	28	28
E32-DTU(433L27)	384	207	29	29
E32-DTU(433L30)	684	356	29	29
E32-DTU(433L37)	1050	540	44	36
E32-DTU(868L20)	134	81	28	28
E32-DTU(868L30)	698	213	39	34
E32-DTU(915L20)	134	81	28	28
E32-DTU(915L30)	693	361	40	34
E32-DTU(170L30)	624	326	36	32

★ Notes: At least 50% current allowance is recommended when selecting power source in order to ensure long-term stable operation.

4.7. TX/RX length and sub-packing

Model	Flash	Sub-packing
E32-DTU(433L20)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(433L27)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(433L30)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(433L37)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(868L20)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(868L30)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(915L20)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(915L30)	512 bytes	Auto sub-packing 58 bytes
E32-DTU(170L30)	512 bytes	512 bytes flash area

★ Notes:

1. If single data packet is beyond allowed volume (100 bytes), the exceeded data will be left to the second transmission until it is sent completely.
2. The single RX data packet should not exceed the flash volume.

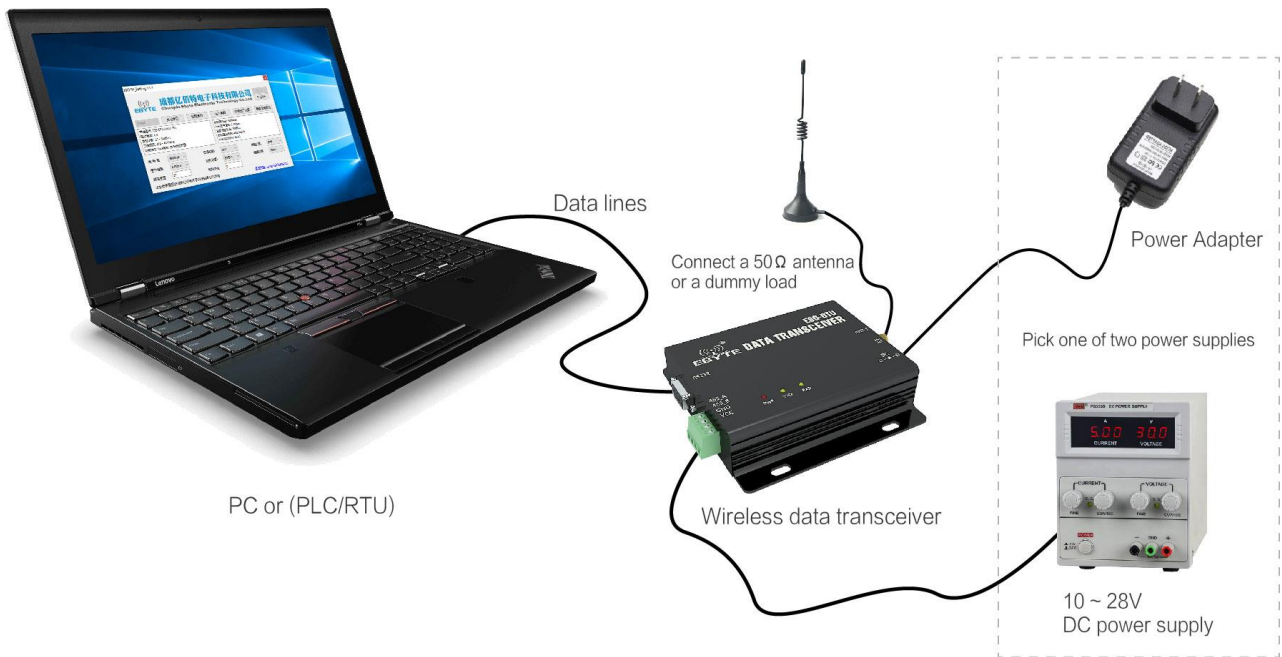
5. Operation Modes

E32-DTU transceivers have four operation modes. Please configure to general mode (M0) if no harsh low consumption required.

The transceivers are set to general mode (M0) by default.

	Mode	M1	M0	Notes
Mode 0	Common mode	On	On	Serial port open, RF on, transparent transmission
Mode 1	Wake-up mode	On	Off	Wake-on-air TX mode, data packet includes wake-up codes
Mode 2	Power-saving mode	Off	On	Wake-up RX mode, saving RX power, TX not allowed
Mode 3	Sleep mode	Off	Off	In sleep mode, configuration commands allowed

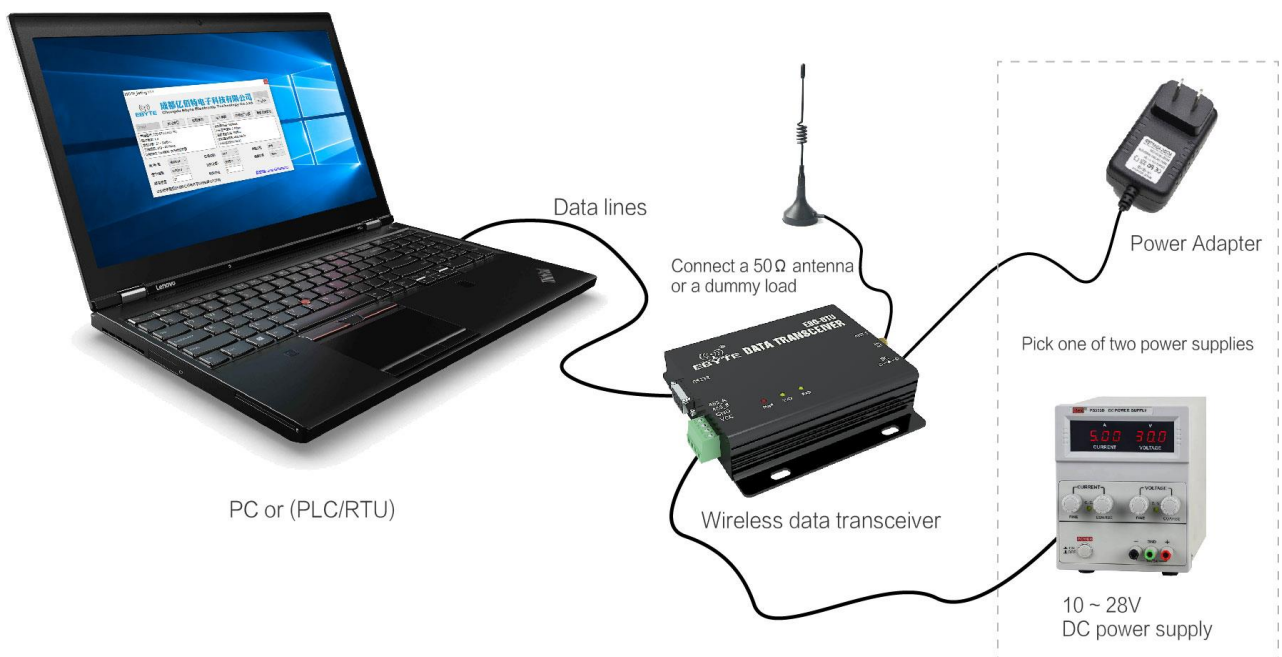
6. Connection Diagram for Configuration



	Mode	M1	M0	Notes
Mode 0	General mode	On	On	Serial port open, RF on, transparent transmission
Mode 1	Wake-up mode	On	Off	Wake-on-air TX mode, data packet includes wake-up codes
Mode 2	Power-saving mode	Off	On	Wake-up RX mode, saving RX power, TX not allowed
Mode 3	Sleep mode	Off	Off	In sleep mode, configuration commands allowed

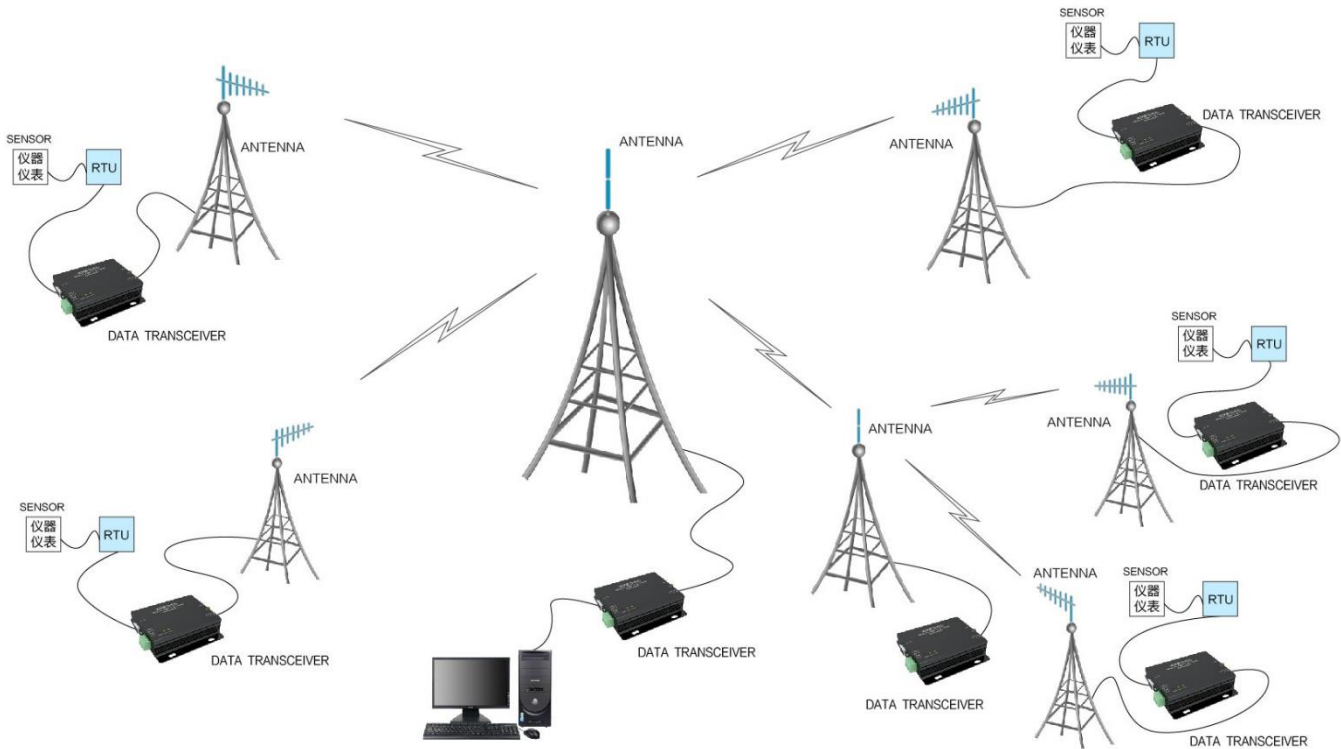
★ Notes: Configuration is allowed only under specific mode (refer to above table), please make sure the transceiver is under correct mode.

7. Connection Diagram for Testing & Operation



8. Applicable Industries

Ebyte wireless data transceiver is applicable for kinds of point-to-point, point-to-multipoint transmission systems, such as smart home, IoT upgrade, power grid load monitor, networking automation, utility water pipeline monitor, hydrology measuring, city lights monitor, air warning control, railway signal monitor, railway water supply control, oil & gas pipeline monitor, GPS positioning system, remote meter reading, electronic crane scale, automatic scoring system, earthquake reporting and so on. Please refer to below figure:



9. Important Notes

1. Please do not operate the devices at or near inflammable or explosive areas.
2. Please select stable DC power supply sources, which should have strong anti-interference ability and low ripple as well as load capacity; it is better to have overcurrent or overvoltage and lightning protection in order to ensure normal operation.
3. Please do not use the devices at environment that exceeds the limitation such as high temperature, high humidity, low temperature, strong electromagnetic or dusty environment.
4. Please do not make the devices work continuously at overload status, or it will damage the devices.
5. The ground electrode of the transceiver should be connected firmly to the external device's (PC, PLC, ETC.) and power source ground electrode, or it is easy to damage the communication interfaces; please do not plug on or off the serial port with power on.
6. When testing the transceivers, matched antennas or 50Ω dummy load must be connected, or it is easy to damage the devices; if antenna connected, human body should be at least 2 meters from the antenna to avoid injury, and do not touch the antenna when it is transmitting.
7. Under different environment, the communication distance will be different. Communication distance will be affected by temperature, humidity, blockage density, blockage size and electromagnetic environment; in order to have stable communication, at least 50% communication allowance is recommended to be kept.
8. If the tested communication distance is not ideal, please also consider about improving the antenna quality and antenna installation. Or please contact support@cdebyte.com for help.
9. When selecting power source, besides keeping at least 50% current allowance, please also keep the power ripple below 100mV.

10. Important Declarations

- All rights to interpret and modify this manual belong to Ebyte.
- This manual will be updated based on the upgrade of firmware and hardware, please refer to the latest version.
- Please refer to our website for new product information.

Technical support: support@cdebyte.com

Documents and RF Setting Software downloading: www.cdebyte.com

Tel: +86-28-61399028 (ext. 812)

Fax: +86-28-64146160

Web: www.cdebyte.com

Address : Innovation Center D347, 4# XI-XIN Road, Chengdu, Sichuan, China

