



**成都亿佰特电子科技有限公司**  
Chengdu Ebyte Electronic Technology Co.,Ltd.

## E30(915T20S)-User Manual-V1.0

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# 1. Introduction

## 1.1 Feature

E30(915T20S) is a 100mW wireless transceiver module(UART), half-duplex& transparent transmission, which operates at 907~922.5MHz(default: 915MHz), TTL Level, compatible with the 3.3V and 5V IO port.

The module has the function of data encryption & compression. The data of the module transmitted over the air features randomness. And with the rigorous encryption & decryption, data interception becomes pointless. The function of data compression can decrease the transmission time & probability of being interfered, while improving the reliability & transmission efficiency.

No.	Usage	Description
1	Ultra-low power consumption	It supports WOR to reduce overall power consumption. In power-saving mode(Mode 2), it can regulate overall power consumption by setting receiving response delay; The maximum receiving response delay can be configured as 2000ms , and the average current is about 30uA.
2	Fixed transmission	Module can communicate with other modules which work in different channels and addresses, it is easy for networking and repeater. For example: module A transmits AA BB CC to module B (address: 0x00 01, channel: 0x80), HEX format is 00 01 80 AA BB CC (00 01 refers to the address of module B, 80 refers to the channel of module B), then module B receives AA BB CC (only module B).
3	Broadcast transmission	Set the module address as 0xFFFF, then the module can communicate with other modules in same channel.
4	FEC	Forward Error Correction, high coding efficiency & good correction performance. In the case of sudden interference, it can correct the interfered data packets proactively, so that the reliability & transmission range are improved correspondingly. Without FEC, those data packets can only be dropped.
5	Sleep mode	When the module works in sleep mode (mode 3), transmitting & receiving is not available, while the configuration is available. The typical current is 5.0uA in this mode.
6	Application	With better capability of penetration and diffraction than 2.4G, E30(915T20S) is suitable for the open environment with few obstacles.

## 1.2 Electrical Parameters

No.	Parameter item	Parameter details	Description
1	Size	17 * 30mm	-
2	Weight	2.3g	Average weight
3	Frequency Band	907~922.5MHz	Default: 915MHz, channel:16
4	Process	Lead-free, SMT	To ensure the consistency and reliability
5	Connector	11PIN-2.0mm	SMD
6	Supply voltage	2.1 ~ 5.5V DC	Note: the voltage higher than 5.5V is forbidden

7	Communication level	Maximum 5.2V	The difference with supply voltage should be less than 0.3V to reduce power consumption
8	Operation Range	2000m	Clear and open area, 20dBm, antenna gain: 2dBi , height: 2m , air data rate: 1kbps
9	Transmitting power	20dBm	Four optional level: 20, 17, 14, 10dBm
10	Air data rate	1kbps	Eight optional level: 1, 2, 5, 8, 10, 15, 20, 25kbps
11	Standby current	5.0uA	M1=1, M0=1 ( Mode 3 )
12	Transmitting current	89mA@20dBm	The proposed power supply current is not less than 200mA
13	Receiving current	16mA	Mode 0 or 1
14	Communication interface	UART	8N1, 8E1, 8O1 , eight kinds of UART baud rate, from 1200 to 115200 bps ( Default: 9600 )
15	Driving mode	UART	Can be configured to push-pull/high pull, open-drain
16	Transmitting length	512 bytes buffer	58 bytes per package
17	Receiving length	512 bytes buffer	58 bytes per package
18	Address	65536	Easy for network, broadcast and fixed transmission
19	WOR	Available	Minimum average power consumption is about 30uA (applicable for battery powered applications)
20	Antenna type	Stamp hole	IPX+stamp hole+spring antenna to lead out, 50Ω characteristic impedance
21	Operating temperature	-40 ~ +85°C	-
22	Operating humidity	10% ~ 90%	Relative humidity, no condensation
23	Storage temperature	-40 ~ +125°C	-
24	Sensitivity	-138dBm@0.3kbps	Sensitivity has nothing to do with baud rate or timing

## 2. UART functional description (default)

### 2.1 Fixed transmission

	Hex	Description
The format: Hexadecimal, such as : 00 03 04 AA BB CC 00 03 is the address of receiving module ; 04 is the channel ; AA BB CC is the transmission data.		
Transmitting module A	Hexadecimal	Address : 00 01 ; Channel 02
Receiving module B	Hexadecimal	Address : 00 03 ; Channel 04
Receiving module C	Hexadecimal	Address : 00 05 ; Channel 04
Receiving module D	Hexadecimal	Address : 00 07 ; Channel 06
Module A must be in fixed mode.		
Module A Transmitting data	Hexadecimal	00 03 04 AA BB CC
Module B receiving data	Hexadecimal	AA BB CC
Module C receiving data	Hexadecimal	No
Module D receiving data	Hexadecimal	No
Only the modules with matched address and channel can receive the data. In fixed transmission, modules only support 1 packet length (pls refer to electrical parameters). If the data packets exceed, then it need to be subcontracted automatically.		

### 2.2 Broadcast transmission

	Hex	Description
The format: Hexadecimal, such as : FF FF 04 AA BB CC FF FF is the address ; 04 is the channel of receiving module ; AA BB CC is the transmission data.		
Transmitting module A	Hexadecimal	Address : 00 01 ; Channel : 02
Receiving module B	Hexadecimal	Address : 00 03 ; Channel 04
Receiving module C	Hexadecimal	Address : 00 05 ; Channel 04
Receiving module D	Hexadecimal	Address : 00 07 ; Channel 06
Module A must be in fixed mode.		
Module A Transmitting data	Hexadecimal	FF FF 04 AA BB CC
Module B receiving data	Hexadecimal	AA BB CC
Module C receiving data	Hexadecimal	AA BB CC
Module D receiving data	Hexadecimal	No
All the module with this channel can receive the data. In fixed transmission, modules only support 1 packet length (pls refer to electrical parameters). If the data packets exceed, then it need to be subcontracted automatically.		

### 2.3 Broadcast address

1. For example, set the address of module A as 0xFF FF, and the channel as 0x04.
2. When module A works as the transmitter (transparent transmission), all the receiving module with the channel 0x04 can receive the data, so as to realize the broadcast.

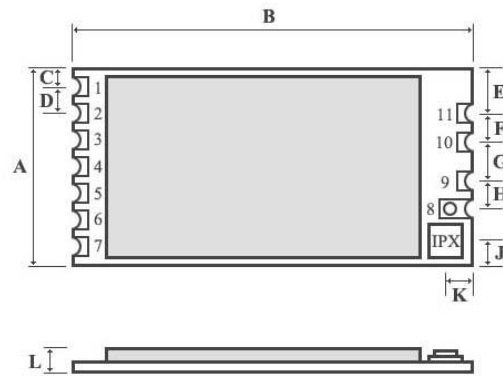
### 2.4 Monitoring address

1. For example, set the address of module A as 0xFF FF, and the channel as 0x04.
2. When module A works as the receiver, all the receiving module with the channel 0x04 can receive the

data, so as to realize the monitoring.

### 3. Functional description

#### 3.1 Pin definition

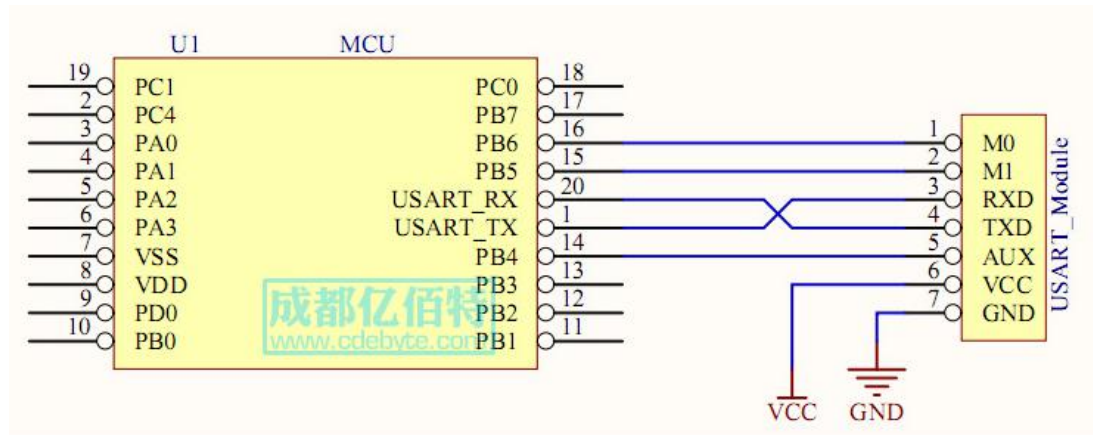


Units: mm

	MIN	NOR	MAX
A	16.90	17.00	17.10
B	29.90	30.00	30.10
C	2.45	2.50	2.55
D	2.00	2.00	2.00
E	4.97	5.00	5.03
F	2.00	2.00	2.00
G	2.96	3.00	3.04
H	2.00	2.00	2.00
J	1.97	2.00	2.03
K	2.45	2.50	2.55
L	3.40	3.50	3.60

Pin No.	Pin item	Pin direction	Pin application
1	M0	Input ( weak pull-up )	Work with M1 & decide the four operating modes. <b>Floating is not allowed, can be ground.</b>
2	M1	Input ( weak pull-up )	Work with M0 & decide the four operating modes. <b>Floating is not allowed, can be ground.</b>
3	RXD	Input	TTL UART inputs, connects to external (MCU, PC) TXD output pin. Can be configured as open-drain or pull-up input.
4	TXD	Output	TTL UART outputs, connects to external RXD (MCU, PC) input pin. Can be configured as open-drain or push-pull output
5	AUX	Output	To indicate module ' s working status & wakes up the external MCU. During the procedure of self-check initialization, the pin outputs low level. Can be configured as open-drain output or push-pull output ( <b>floating is allowed</b> ).
6	VCC		Power supply 2.1V~5.5V DC
7	GND		Ground
8	ANT		Antenna
9	GND		Ground
10	GND		Ground
11	GND		Ground

### 3.2 Connect to MCU



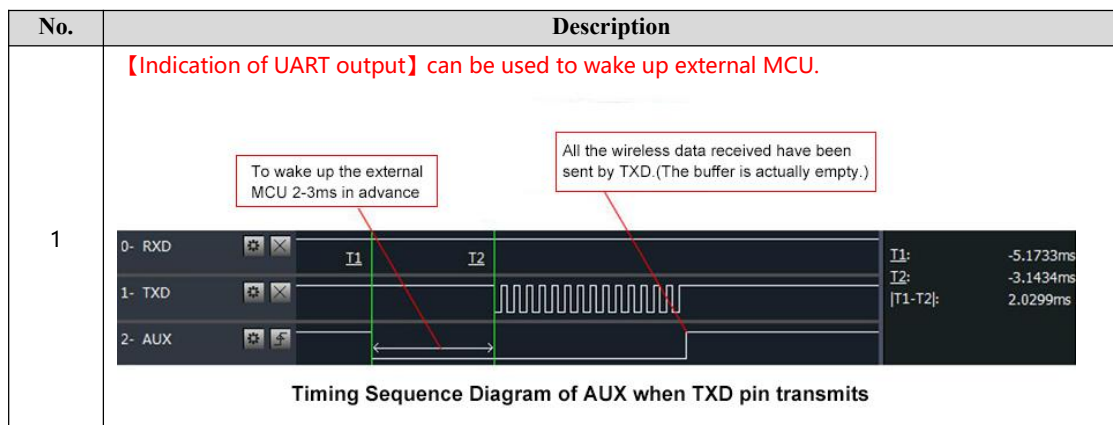
No.	Description ( STM8L MCU )
1	The UART module is TTL level.
2	For some MCU works at 5VDC, it may need to add 4-10K pull-up resistor for the TXD & AUX pin.


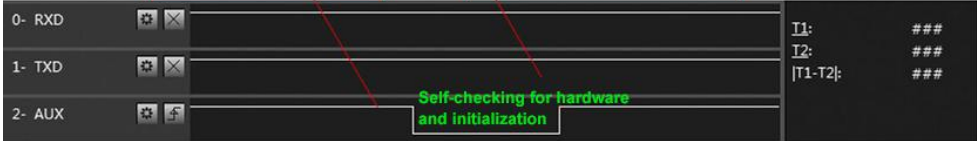
### 3.3 Reset

No.	Description
1	When the module is powered, AUX outputs low level immediately, conducts hardware self-check and sets the operating mode on the basis of the user parameters. During the process, the AUX keeps low level. After the process completed, the AUX outputs high level and starts to work as per the operating mode combined by M1 and M0. Therefore, the user needs to wait the AUX rising edge as the starting point of module' s normal work.

### 3.4 AUX description

AUX Pin can be used as indication for wireless send & receive buffer and self-check. It can indicate whether there are data that are yet to send via wireless way, or whether all wireless data has been sent through UART, or whether the module is still in the process of self-check initialization.



2	<p><b>【Indication of wireless transmitting】</b></p> <p>Buffer (empty): the internal 512 bytes data in the buffer are written to the RFIC (Auto subpackage). When AUX=1, the user can input data less than 512 bytes continuously without overflow.</p> <p>Buffer (not empty): when AUX=0, the internal 512 bytes data in the buffer have not been written to the RFIC completely. If the user starts to transmit data at this circumstance, it may cause overtime when the module is waiting for the user data, or transmitting wireless subpackage.</p> <p>Notes: When AUX = 1, it does not mean that all the UART data of the module have been transmitted already, perhaps the last packet of data is still in transmission.</p> <div style="border: 1px solid red; padding: 5px; margin: 10px auto; width: fit-content;">                 Subpackage transmitting : the last package of data have been written to the RFIC. When transmission is on, user can continue to input 512 new bytes. (The buffer is actually empty.)             </div>  <p style="text-align: center;"><b>Timing Sequence Diagram of AUX when RXD pin receives</b></p>
3	<p><b>【Configuration procedure of module】</b></p> <p>Only happened when power-on resetting or exiting sleep mode.</p> <div style="border: 1px solid red; padding: 5px; margin: 10px auto; width: fit-content;">                 The self-check procedure happens when the procedure of power-on reset, instruction reset and exit mode 3.             </div> <div style="border: 1px solid red; padding: 5px; margin: 10px auto; width: fit-content;">                 Normal operation after self-check             </div>  <p style="text-align: center;"><b>Timing Sequence Diagram of AUX when self-check</b></p>

No.	Notes for AUX
1	For function 1 & function 2 mentioned above, the priority should be given to the one with low level output, which means if it meets each of any low level output condition, AUX outputs low level, if none of the low level condition is met, AUX outputs high level.
2	When AUX outputs low level, it means the module is busy & cannot conduct operating mode checking. Within 1ms since AUX outputs high level, the mode switch will be completed.
3	After switching to new operating mode, it won' t be work in the new mode immediately until AUX rising edge 2ms later. If AUX is on the high level, the operating mode switch can be effected immediately.
4	When the user switches to other operating modes from mode 3 (sleep mode) or it' s still in reset process, the module will reset user parameters, during which AUX outputs low level.

## 4. Customization

★Please contact us for customization.

★Ebyte has established profound cooperation with various well-known enterprises.



## 5. About us



Chengdu Ebyte Electronic Technology Co., Ltd. (Ebyte) is specialized in wireless solutions and products.

- ◆We research and develop various products with diversified firmware;
- ◆Our catalogue covers WiFi, Bluetooth, Zigbee, PKE, wireless data transceivers & etc.;
- ◆With about one hundred staffs, we have won tens of thousands customers and sold millions of products;
- ◆Our products are being applied in over 30 countries and regions globally;
- ◆We have obtained ISO9001 QMS and ISO14001 EMS certifications;
- ◆We have obtained various of patents and software copyrights, and have acquired FCC, CE, RoHs & etc.



## **FCC Statement**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device .

## **FCC Radiation Exposure Statement**

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ALPH-E30 Or Contains FCC ID: 2ALPH-E30"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.