

***REXENSE***

**Enhanced Development Board**

DEV20

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## Version History

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## Table of Content

1. Overview .....	4
2.Components and Descriptions.....	4
3. Detailed Definition.....	7
3.1. Power Supply.....	7
3.2. LED Indicators.....	8
3.3. Button.....	8
3.4. LCD Module .....	9
3.5. JTAG Interface.....	9
3.6. SWD Interface.....	10
3.7. Buzzer .....	11
3.8. Serial Port .....	11
3.9. USB Device.....	13
3.10. Sensors.....	14
3.11. AD Testing Circuit.....	14
3.12. SMA Antenna.....	15
3.13 Wireless Module (ZigBee).....	15

## 1. Overview

REXENSE enhanced development board (DEV20) simulates real application environment to help users develop your own application firmware and test the network performance. DEV20 is equipped with multiple program downloading / debugging interfaces (J-TAG, SWD, PTI), a serial communication interface (UART), and other necessary development and test interfaces (USB port and LCD module). With DEV20, developers can complete the software development / debugging of REX2 and REX3 wireless communication modules and the testing of the hardware and peripherals for wireless communication.

## 2.Components and Descriptions

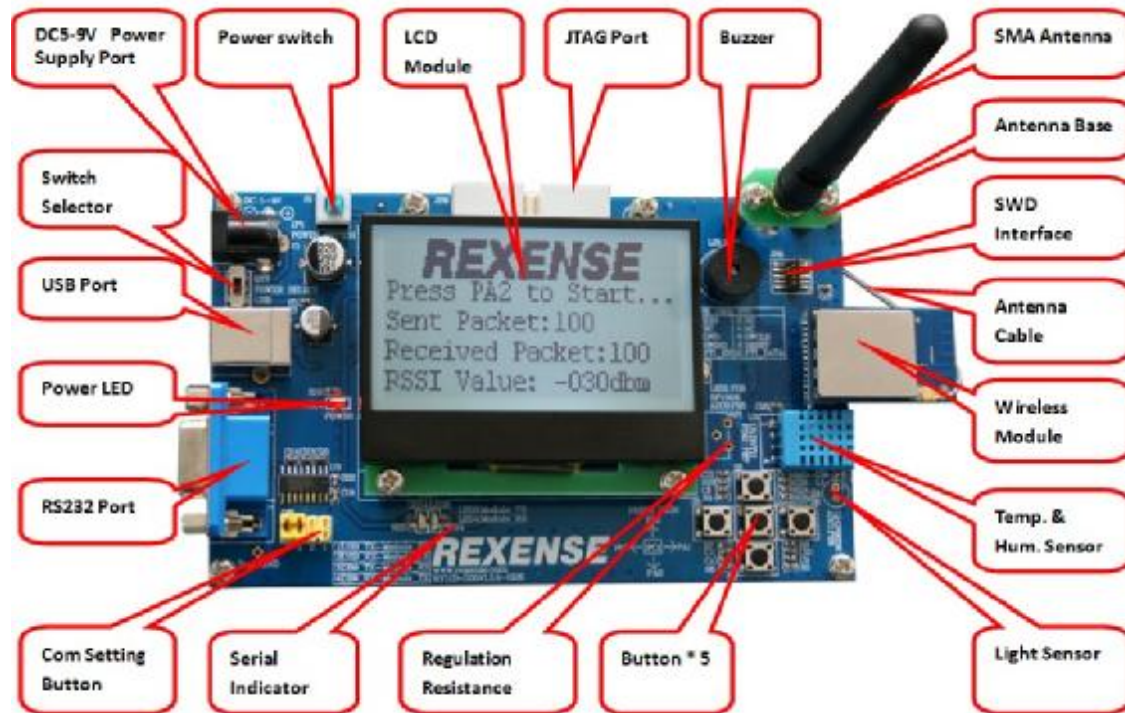


Table 2-01: Components and descriptions

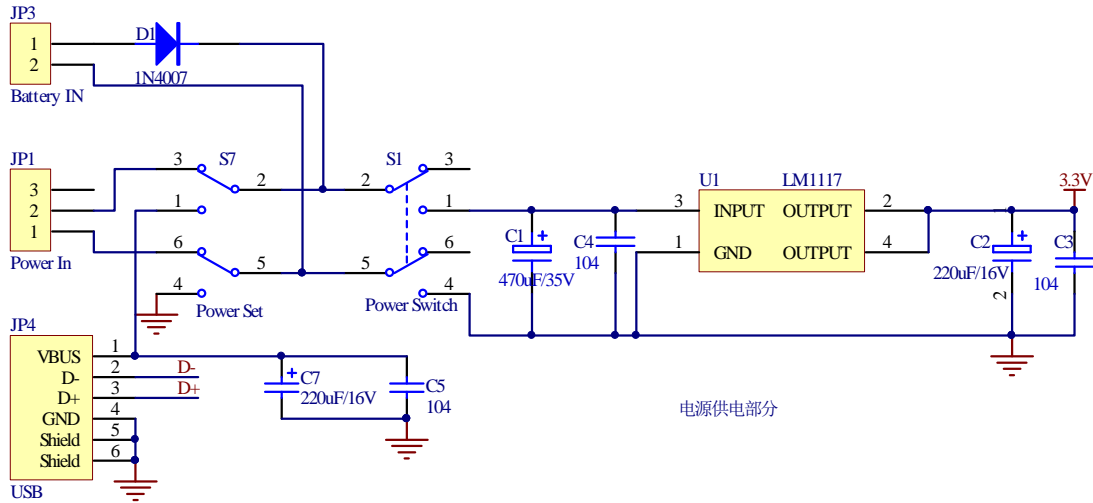
Components	Descriptions
Power Switch (S1)	Power switch (press=on ; release=off)
Power Switch Selector (S7)	Power switch selector, If S7 on the EXT side, DC5-9V power supply is selected; If S7 on the USB side, USB power supply is selected;

Components	Descriptions
DC5-9V Power Supply Port	External DC Power supply port, supply voltage from DC5V-9V. ( Center positive)
Battery Power Supply Port	Battery power supply port with 6-9V group battery.
LCD Display	Resolution=128x64, S6B0724 driver IC used
JTAG Interface	Standard JTAG interface for simulating, debugging and program downloading.
Buzzer	Active buzzer (can also be driven by PWM)
SMA Antenna (Base)	SMA antenna & external antenna base
SWD Interface	SWD interface, supporting SWD and Ember's PTI debugging interface protocol.
Antenna Connecting Cable	U.FL/SMA antenna connecting cable
Wireless Module	<p>Wireless modules (DIP package) can be connected to the DEV board. Now two types of modules (ZigBee and Sub-1GHz) are supported, and the pin of ZigBee and Sub-1GHz modules are compatible.</p> <p><b>* To ensure better communication performance, the module should be installed as that in the above picture.</b></p>
Temperature and Humidity Sensor	To detect the temperature and humidity
Light Sensor	To detect the illumination
Button X5	<p>Five separate buttons control the corresponding I/Os, which are connected with pull-low resistors. When the button is released, the corresponding I/O is pulled low while the button is pressed down, the corresponding I/O is pulled high</p> <p>S2: PB3</p> <p>S3: PA2</p> <p>S4: PC1</p> <p>S5: PC7</p> <p>S6: PA1</p>

<b>Components</b>	<b>Descriptions</b>
<b>Adjustable Regulation Resis.</b>	Adjust the input analog voltage of ADC0
<b>Serial Com. Setting</b>	The communication port of wireless USART module can be selected by a jumper to DB9 (RS232) or USB
<b>RS232 Interface</b>	RS232 interface (DB 9 connector), USART of the wireless module can communicate with PC via SP3223.
<b>USB Port</b>	1) Module power supply port; 2) USB Communication port
<b>LED</b>	Power LEDs and Communication LEDs

### 3. Detailed Definition

#### 3.1. Power Supply



Three types of power supply, controlled by power switch (S1) and power switch selector (S7), are supported by the enhanced DEV board;

- I External DC Power supply port (JP1), supply voltage from DC5V-9V. (Center positive)



- I USB cable power supply, connected to the USB socket (JP4).
- I 6-9V group battery supply, connected to the battery holder on the back of the board. (JP3)

Table 3-01: Power supply configuration

Access Interface	Descriptions	S7	S1
JP1	No group battery connected; external DC5-9V power supply selected; USB power supply invalid;	Switch to EXT 	ON
JP4	No group battery connected; USB power supply selected; External DC5-9V power supply invalid;	Switch to USB 	ON
JP3	Group battery connected; No matter if DC5-9V or USB is connected or not, the board is powered;		ON

JP1、JP3、JP4	S1 disconnected, the board is not powered		OFF
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### 3.2. LED Indicators

To better help users with their development, many LEDs are designed on the board. Detailed function of the LEDs are described as follows:

**Table 3-02: LED Descriptions**

LED No.	Pin Descriptions	Functions
LED1	Low level output for PC6, LED1 ON; High level output for PC6, LED off;	User define LED
LED2	3.3V system power LED	Power LED
LED3	PB1 (TXD) hardware LED	Module (TXD) LED
LED4	PB2 (RXD) hardware LED	Module (RXD) LED

### 3.3. Button

Five separate buttons are designed on the enhanced DEV board.

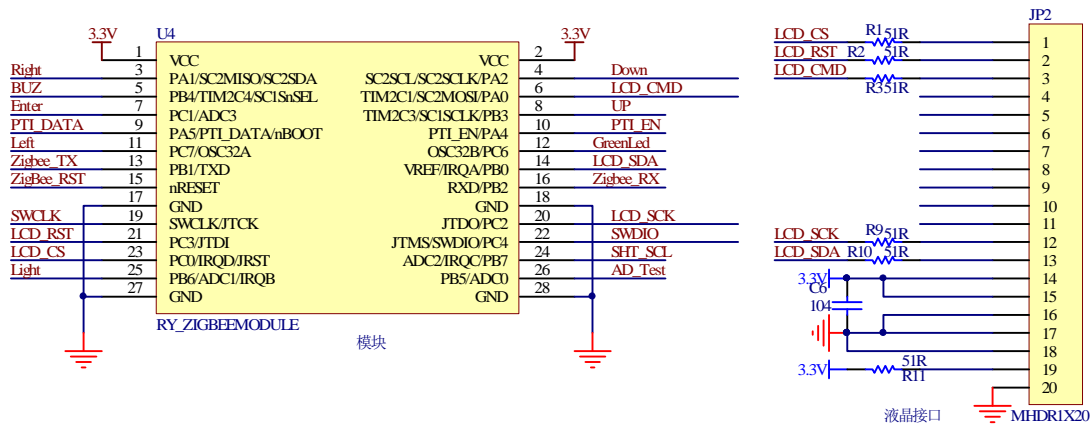
The pin is pulled low when the button is released or pulled high when the button is pressed down.

**Table 3-03: Button description**

Model No.	Functions	Pin descriptions
S2	Up	PB3
S3	Down	PA2
S4	Enter	PC1
S5	Left	PC7
S6	Right	PA1



### 3.4. LCD Module

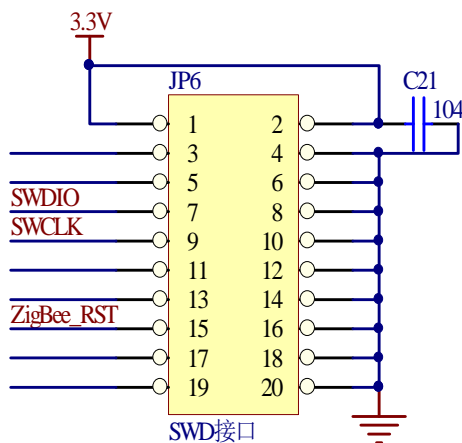


The enhanced DEV board uses 128\*64 LCD display. The data bus supports 8-bit parallel port or serial port mode. Here, the data bus supports serial port only, as shown in the following table.

Table 3-04: Pin descriptions

Pin No.	Definition	Pin Definition
1	LCD_CS	PC0
2	LCD_RST	PC3
3	LCD_CMD	PA0
12	LCD_SCK	PC2
13	LCD_SDA	PB0

### 3.5. JTAG Interface



The DEV board provides users with a standard (spacing=2.54mm) 20-pin interface, via which you can burn your own firmware and application software with ARM simulator.

The pins are defined as follows:

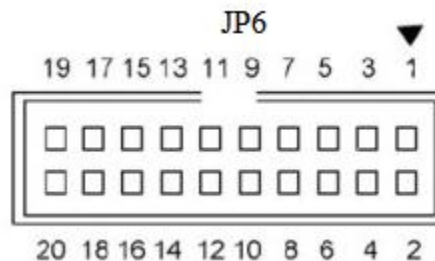
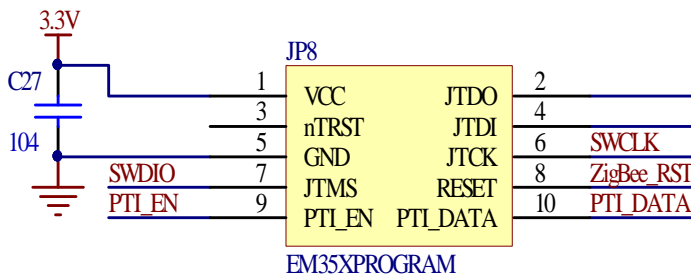


Table3-05: Pin descriptions

Pin No.	Descriptions	Pin No.	Descriptions
1	3.3V Power	2	3.3 Power
3	NC	4	GND
5	NC	6	GND
7	SWDIO(PC4)	8	GND
9	SWCLK	10	GND
11	NC	12	GND
13	NC	14	GND
15	ZigBee_RST(nRESET)	16	GND
17	NC	18	GND
19	NC	20	GND

### 3.6. SWD Interface



SWD is more reliable than JTAG in the high-speed mode, in which case JTAG program downloading will always end up with failure. Compared with JTAG, SWD will be much better in the high-speed mode. In the meanwhile, there are less pins needed in SWD than needed in JTAG. As a result, SWD is recommended compared with JTAG. The SWD interface (JP8) on the enhanced board uses 5\*2 (spacing=1.27mm) pin.

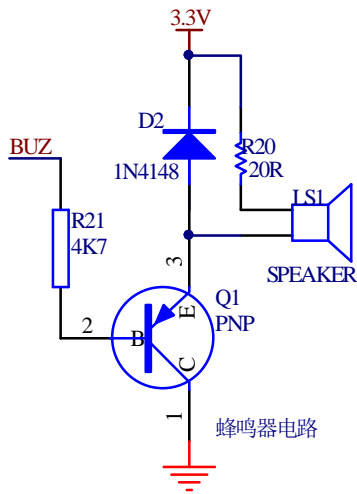
**Table 3-06: SWD Pin Descriptions**

Pin No.	Descriptions
1	VCC
2	NC
3	NC
4	NC
5	GND
6	SWCLK
7	SWDIO
8	ZigBee_RST

9	PTI_EN (for Ember module only)
10	PTI_DATA ( for Ember module only)

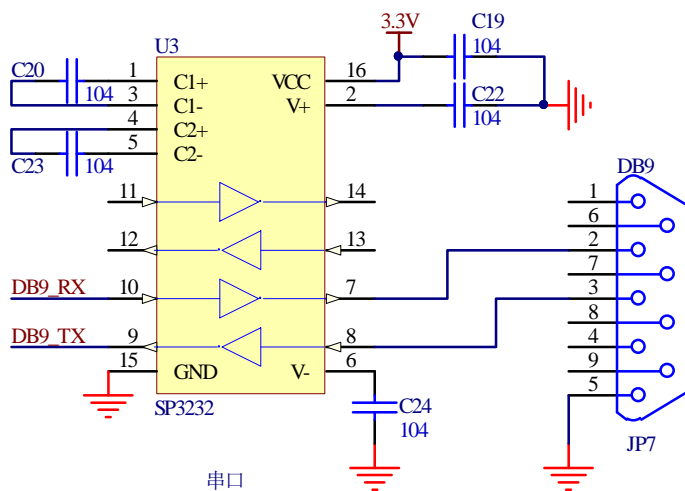
### 3.7. Buzzer

DEV20 is designed with a DC3V active buzzer which is controlled by the I/O of PB4 through a triode. The buzzer will be turned on when PB4 is pulled low and turned off when PB4 is pulled high. When PB4 is used as output of PMW, the users can use the buzzer to simulate PWM experiment.



### 3.8. Serial Port

The DEV board provides two types of serial port communication. One is via DB9 connector (standard RS232 TTL); The other is through USB. The way of communication is up to the configuration of the jumper (JP5).



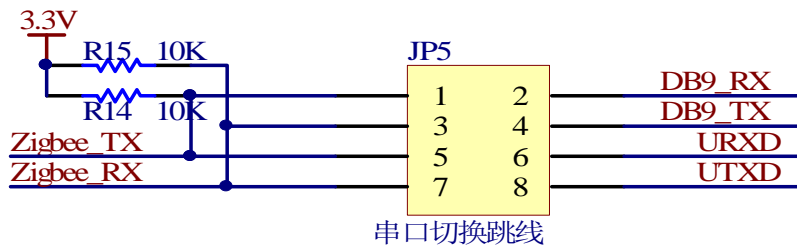
Pin No. of DB9:



**Table 3-07: Pin descriptions**

DB9 Pin No.	Module Pin Signal	Descriptions
2	UART_TXD1	Serial port (TX)
3	UART_RXD1	Serial port (RX)
5	GND	GND
1、6、4、7、8、9	NC	NC

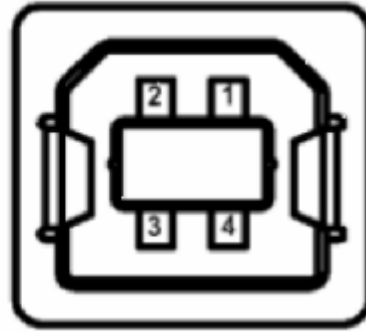
Through the configuration of the jumper (JP5), users are able to choose if use RS232 port or USB. The jumper (JP5) is defined as follow:



**Table 3-08: JP5 configuration**

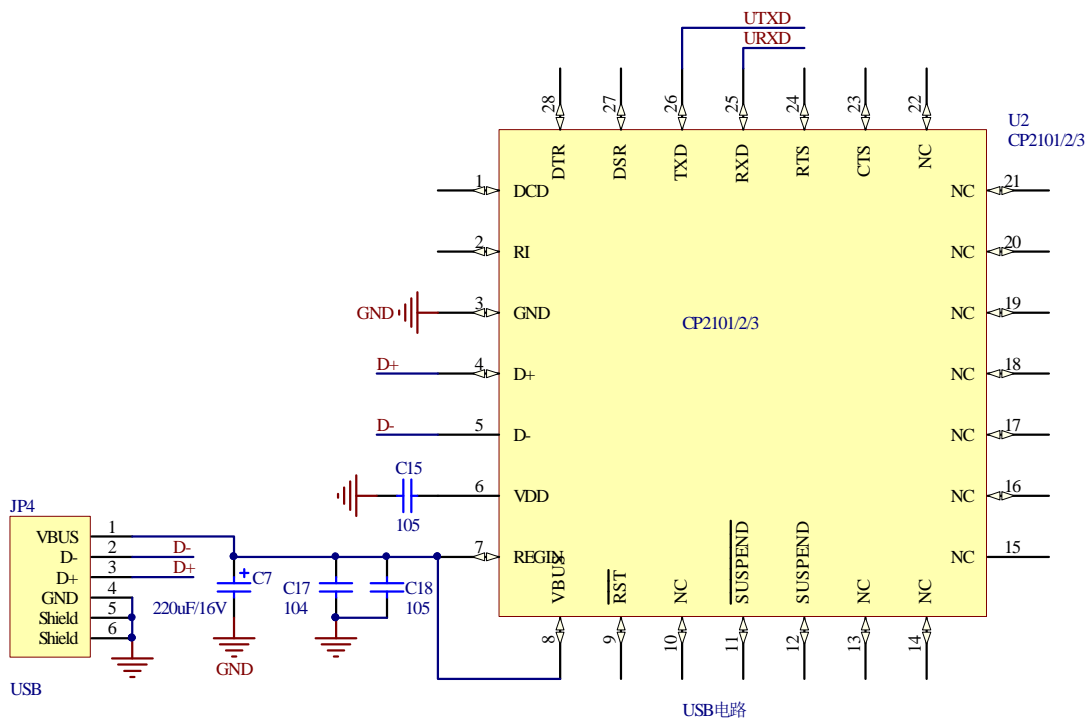
Jumper configuration	Function	JP5 jumper
Short circuit 1 and 2 , 3 and 4 by the jumper	Module communication via DB9	 4 3 2 1
Short circuit 5 and 6 , 7 and 8 by the jumper	Module communication via USB	 4 3 2 1

### 3.9. USB Device



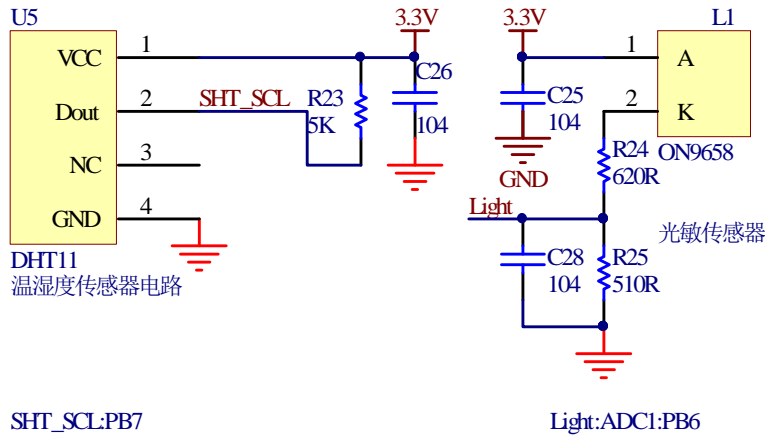
DEV20 is designed with a full speed USB 2.0 port. The users can connect the board to the PC with a connective cable of USB-A to USB-B to power the board. The definition of pins of connectors is listed below:

PIN	Name of Pin	Definition of Signal
1	VBUS	5V DC
2	D-	Differential Signal
3	D+	
4	GND	Signal GND



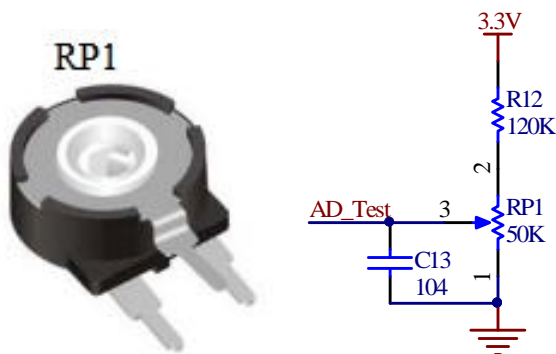
### 3.10. Sensors

DEV20 is designed with a temperature and humidity sensor and a illumination sensor which can detect the environment temperature, humidity and illumination.



Sensor	Footprint	引脚定义
Temp. & Humidity Sensor	SHT_SCL	PB7(ADC2 of the module)
Illumination Sensor	Light	PB6(ADC1 of the module)

### 3.11. AD Testing Circuit



The ADC testing circuit designed on the board can be adjusted by the potentiometer RP1 for learning purpose.

Pin of Module	Definition of module
AD_Test	PB5(ADC0 of

module)

### 3.12. SMA Antenna

The DEV board is designed with a SMA antenna base, on which SMA antenna can be installed to enhance the communication performance.

### 3.13 Wireless Module (ZigBee)

