

Lierda Cat1 & NB-IoT Module Universal Development Board User Manual

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Revision History

Document version	Change date	Reviser	Reviewer	Change content
Rev1.0	2022-11-25	CZT、LCZ	SLY	Initial Version
Rev1.1	2023-01-29	MZJ	SLY/YMX	1. Change some image formats; 2. Add PCIe interface description.
Rev1.2	2023-07-19	HKJ	LCZ	Please provide the reference documents for the NB modules and some Cat1 modules.
Rev2.0	2025-11-04	ZH	YMX	Translate the document into English and update the images with Chinese text

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Safety Instructions

Users are responsible for complying with relevant regulations regarding wireless communication modules and devices in other countries and specific environmental regulations. By following the following safety principles, personal safety can be ensured and help protect products and work environments from potential damage. Our company is not responsible for any related losses caused by customers' failure to comply with these regulations.



Road safety comes first! When driving, please do not use handheld mobile devices unless they have hands-free capabilities. Please pull over before making a call!



Please turn off your mobile devices before boarding. The wireless function of mobile devices is prohibited from being turned on in the airplane to prevent interference with the aircraft communication system. Ignoring this prompt may jeopardize flight safety and even violate the law.



When in a hospital or healthcare facility, pay attention to whether there are restrictions on the use of mobile terminal devices. RF interference can cause medical equipment to malfunction, so it may be necessary to turn off mobile terminal devices.



Mobile terminal devices do not guarantee effective connection in all circumstances, such as when there is no credit on the mobile terminal device or the SIM card is invalid. In case of an emergency under the above circumstances, please remember to use emergency calls, and ensure that your device is powered on and in an area with sufficient signal strength.



Your mobile terminal device will receive and emit radio frequency signals when it is turned on, which may cause radio frequency interference when near a TV, radio, computer, or other electronic devices.



Please keep mobile terminal devices away from flammable gases. When you are near gas stations, oil depots, chemical plants, or explosive operation sites, please turn off the mobile terminal device. Operating electronic devices in any potentially explosive environment poses a safety hazard.

Module selection for application

Serial number	Module model	Feature symbol	Support frequency band	Dimensions	Module introduction
1	Lierda full range NB-IoT modules	-	-	-	-
2	Lierda full range of Cat1 modules	-	-	-	-

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1 Basic Overview

This document mainly introduces the common functions and usage methods of Lierda IoT Technology Co., Ltd.'s Cat1 and NB-IoT series module development boards, helping users to quickly and conveniently carry out software development and debugging work related to the modules.

For the convenience of narration, the universal development board mentioned later in this article will be collectively referred to as "LIoT-EVK", and the physical diagram is as follows:

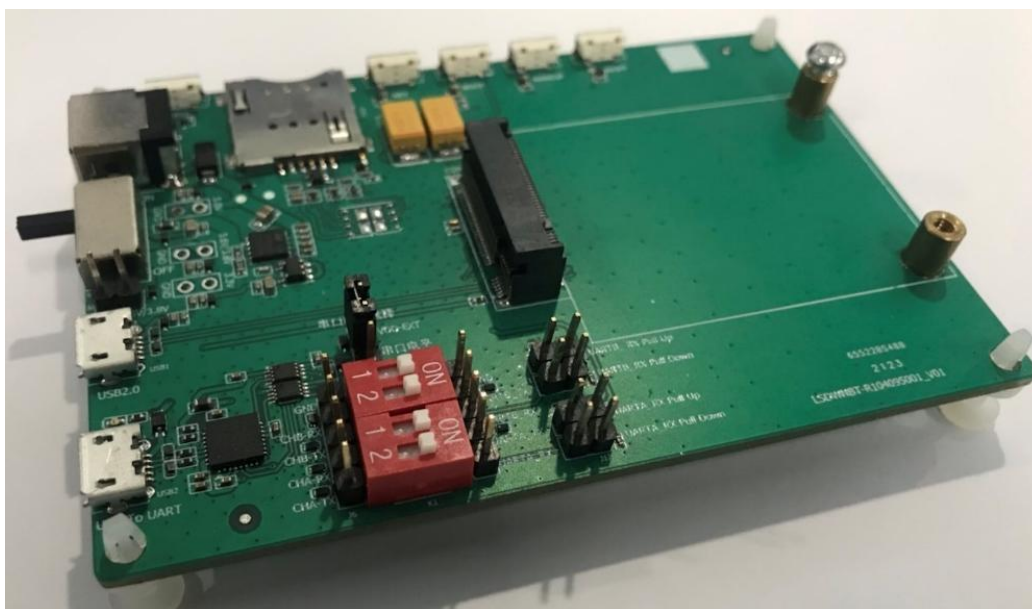


Figure 1.1 Development Board Physical Picture

1.1 Introduction description

LIoT-EVK is a feature-rich, easy-to-use IoT module debugging and evaluation board, providing interfaces such as USB2.0, UART, M.2, buttons, etc., supporting micro SIM card and soldering SIM card functions. It allows users to quickly get started with Cat1, NB-IoT modules, and can also be used for software function debugging and development.

1.2 Development board resources

The resources of Lierda IoT-EVK are as follows:

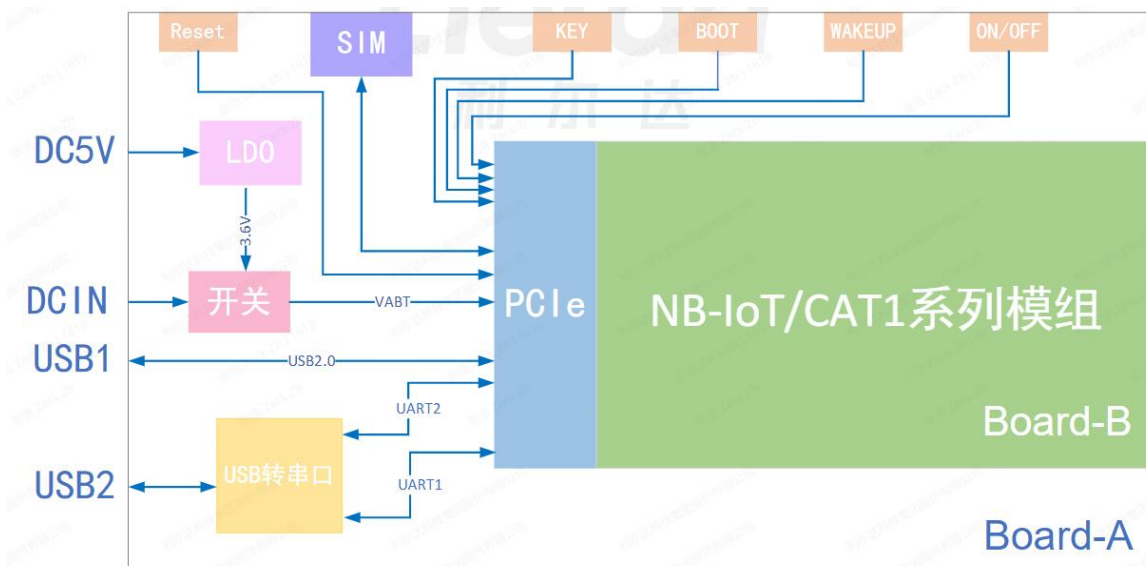
Table-1 Lierda LIoT-EVK Resource Introduction1

Function	Explanation
Multiple power supply methods	◆ DC JACK: 5.0V ◆ External power supply pin: 3.8V ◆ Micro USB: 5.0V (consider power supply capability when in use)
M.2 interface	M.2 Key B interface, used for connecting module subboard
SIM interface	◆ Support 1.8V/3.0V plug-in SIM card ◆ Support 1.8V/3.0V surface mount SIM card
USB interface	◆ USB1 is used for USB 2.0 communication. ◆ USB2 is used to convert into 2 UART ports and can also power LIoT-EVK.
UART interface	◆ 2-channel UART: UARTA and UARTB ◆ Switchable via a switch: connect to the M.2 interface, or use directly by plugging in the pins ◆ Configurable serial port reference level: on-board 3.3V, or module VDD_EXT ◆ Configurable serial port pull-up and pull-down
Key interface	◆ Reset button ◆ KEY button ◆ BOOT button ◆ WAKEUP button ◆ Power button

1.3 Development board functional block diagram

The functional block diagram of LIoT-EVK is as follows:

Figure 1.2 Development Board Functional Block Diagram



2 Development Board Interface Introduction

2.1 Front interface of the development board

LIoT-EVK has rich peripheral interfaces, the front interface diagram is as follows:

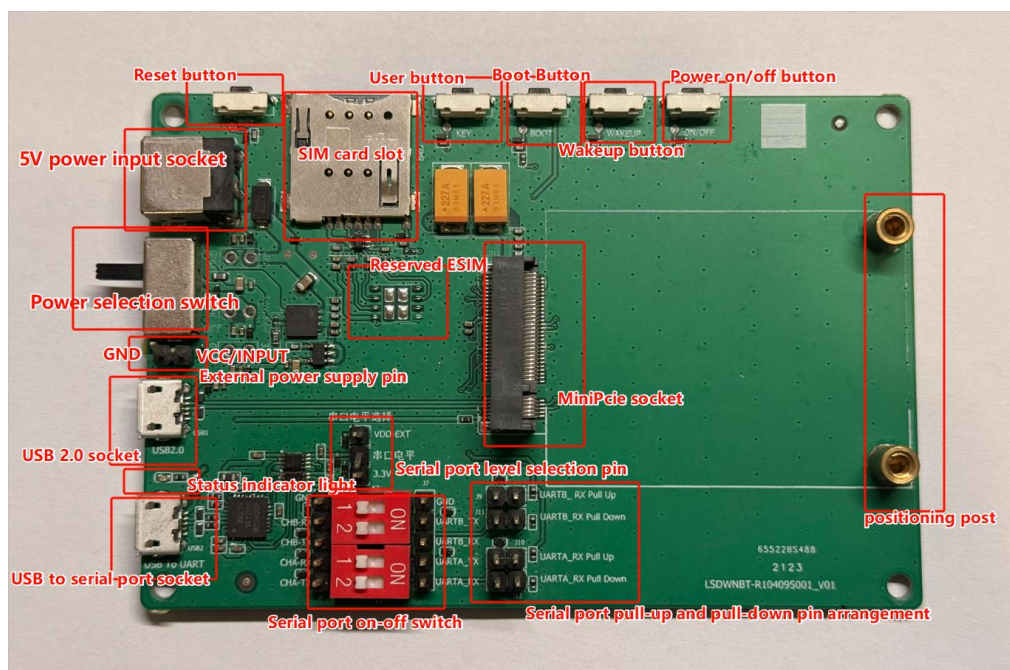


Figure 2.1 Front Interface Diagram of Development Board

2.2 Development board back interface

The back of the LIoT-EVK has no interfaces. The physical image of the back is as follows:

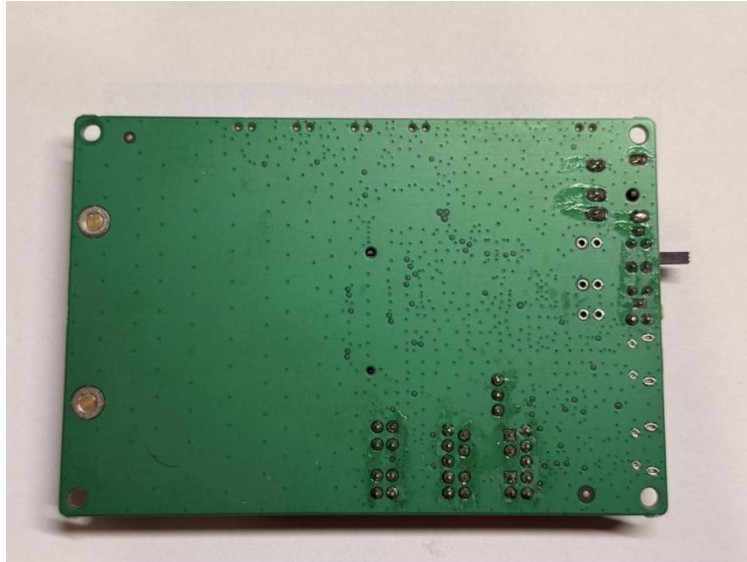


Figure 2: Physical image of the back of the development board2

2.3 Development board interface with module

The LIoT-EVK uses an M.2 Key B interface for the module daughter board, and the physical interface diagram is as follows:

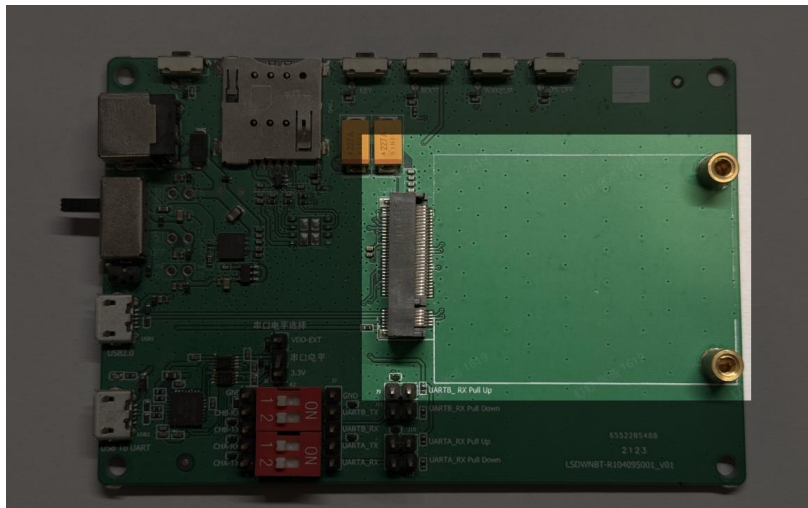


Figure 2.3 Development Board M.2 Key B Interface Diagram

All functional modules of LIoT-EVK are connected to the M.2 Socket, the wiring

sequence of the M.2 Socket is as follows:

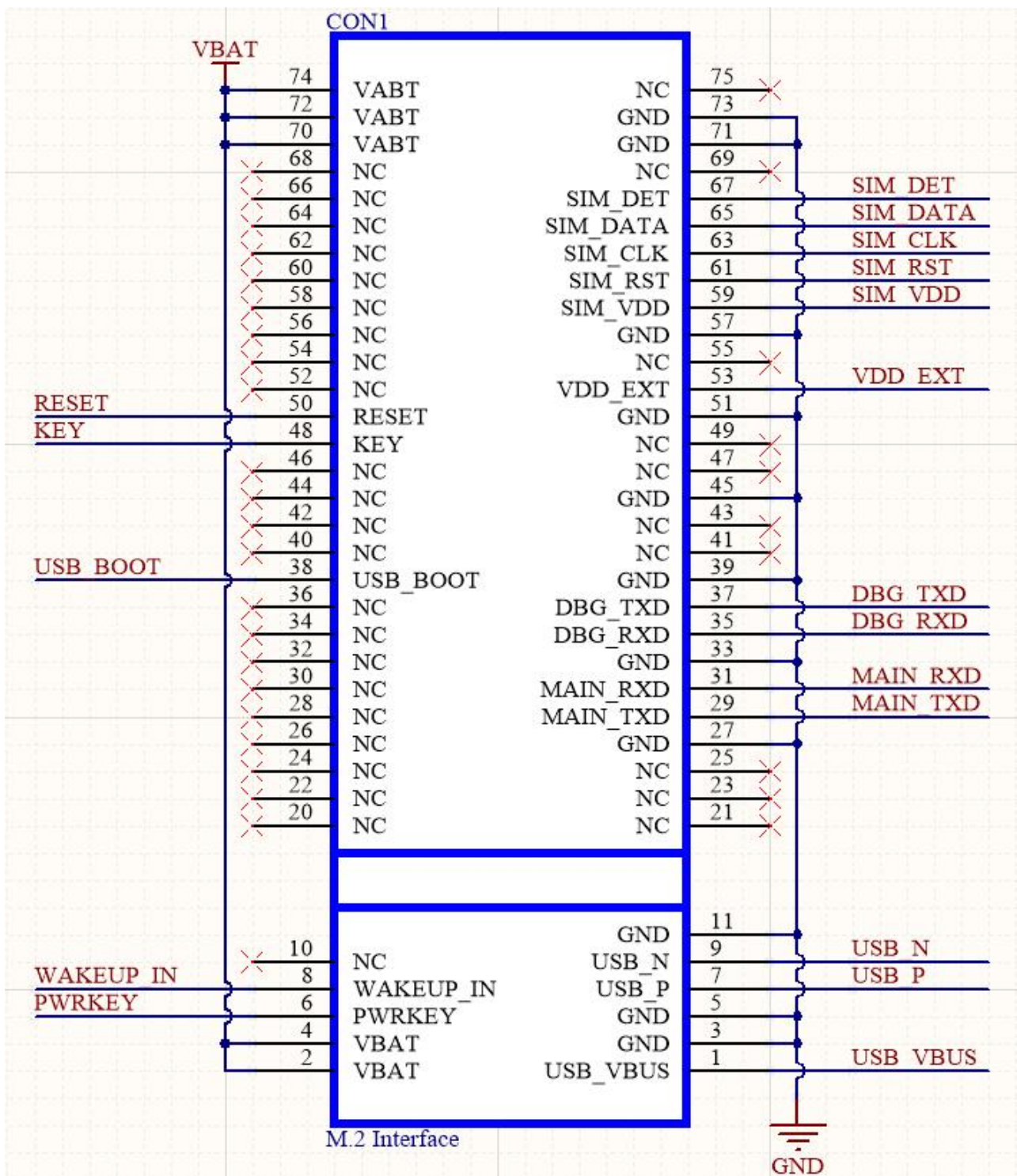


Figure 2.4 Definition Diagram of M.2 Socket Interface

Notes:

When using NB-IoT or Cat1 modules with LIoT-EVK, a M.2 interface adapter board is generally included.

The pinout of the gold fingers of the M.2 interface adapter board should correspond to the pinout of the LIoT-EVK.

2.4 Development board configuration

When using it, insert the Cat1 or NB-IoT series module subboard into the M.2 interface according to the indicated direction. Please ensure that the gold fingers are clean and free of foreign objects to prevent foreign objects from entering the socket and causing oxidation of the contact points, leading to poor contact. As shown in the figure below:

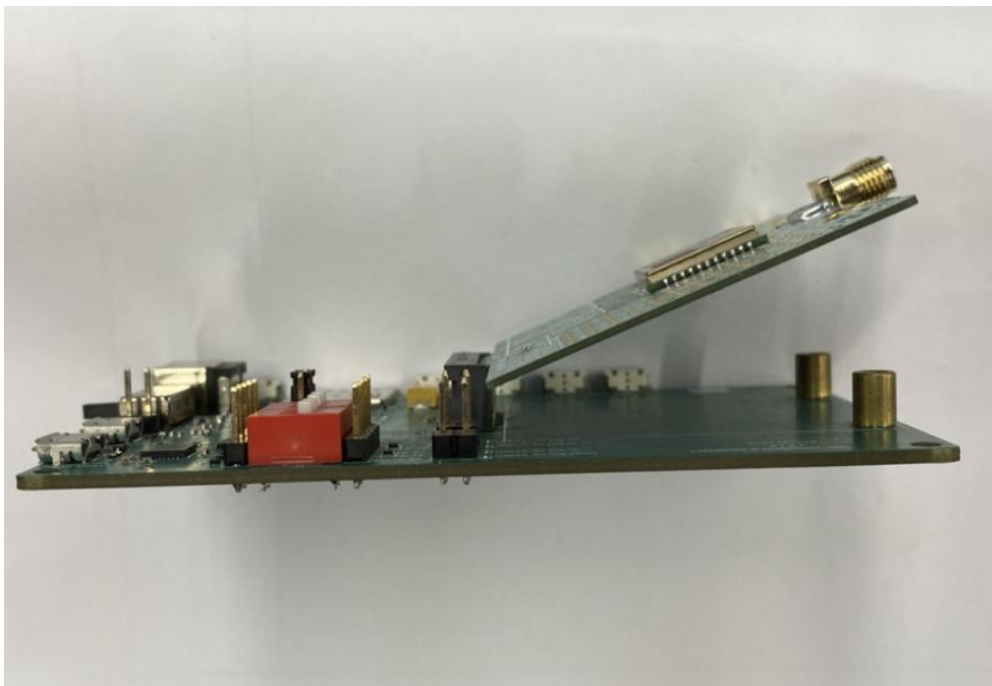


Figure 2.4 Module Sub-board Assembly Diagram

And use screws to fix the module debugging subboard, as shown in the following figure:

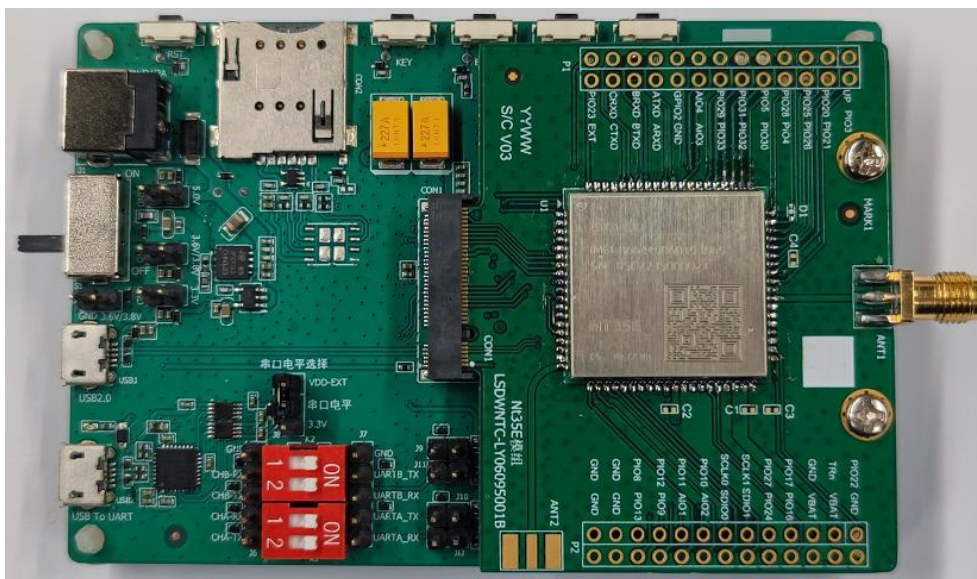


Figure 2.5 Module Sub-board Fixing Diagram

3 Function Detailed Explanation

3.1 Introduction to power supply

3.1.1 Power supply method

The LIoT-EVK has three power supply methods, namely USB, DC JACK, and DCIN, as shown in the logic diagram below:

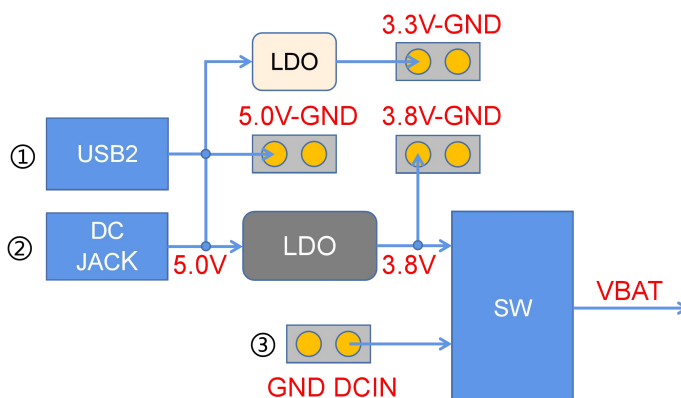


Figure 3.1 Power Supply Logic Block Diagram of Lierda LIoT-EVK

The physical operation diagram for the power supply is as follows:

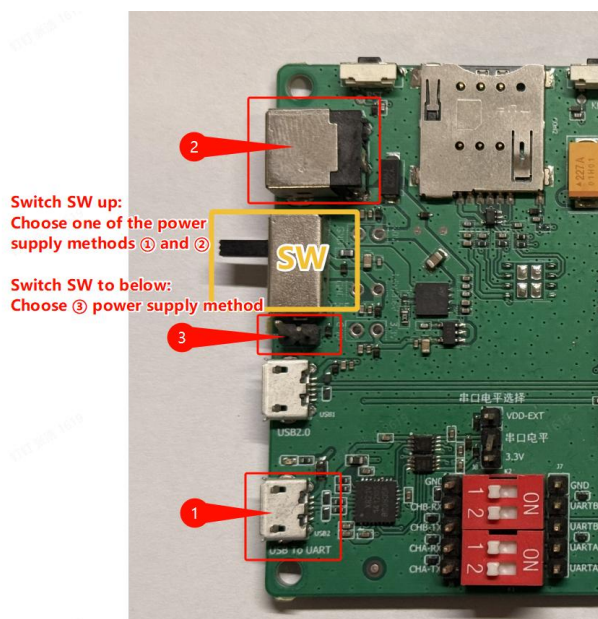


Figure 3.2 Lierda LloT-EVK Power Supply Operation Instructions

Notes:

◆ Both USB2 and DC JACK can be used for power supply simultaneously, with reverse current protection diode for USB2.

3.1.2 Output power interface

LloT-EVK provides power output interfaces such as 5V, 3.8V, 3.3V, etc. The power interface is described as follows:

Table 3-1 Power Interface Introduction

Serial number	Power	Function	Note
1	5.0V	Power LDO1 output to 3.8V. Power LDO2 with an output of 3.3V.	From VBUS or DC JACK of USB2, can be used for external power supply, the load capacity is determined by the input power.
2	3.8V	Power the Cat1 or NB-IoT module.	From LDO1, used to power the module, can also be used for external power supply, with a maximum load capacity of 2A.
3	3.3V	3.3V is mainly used for reference voltage.	From LDO2, used for on-board serial port reference level, can also be used for external power supply, with a maximum load capacity of 500mA.

The physical diagram of the power interface is as follows:

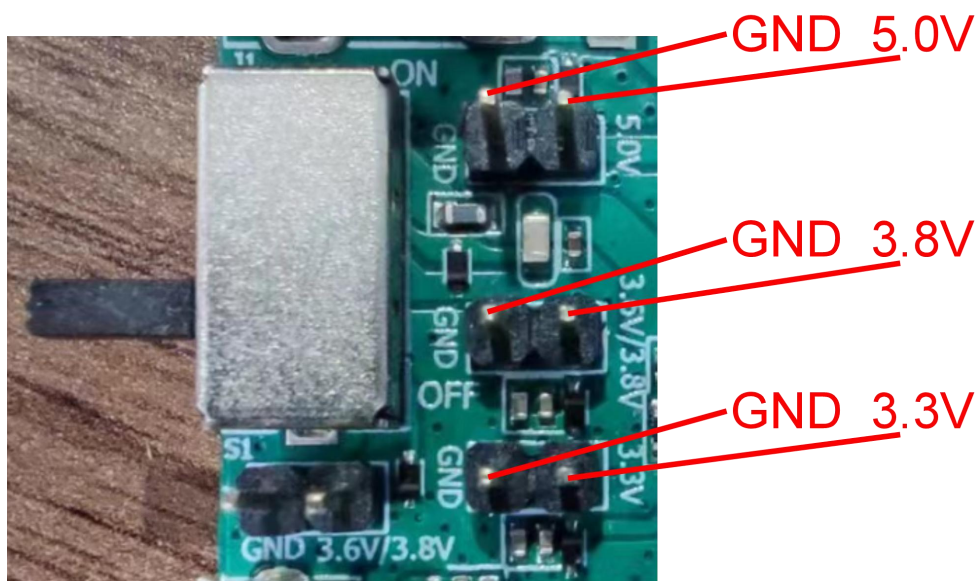


Figure 3.3 Power Physical Interface Diagram

3.2 USB 2.0 function

The USB1 of the LIoT-EVK is a Micro USB interface, mainly providing USB 2.0 communication function. The USB 2.0 data line and VBUS are connected to the M.2 Socket interface, allowing communication with modules that have USB functionality.

The interface schematic diagram is as follows:

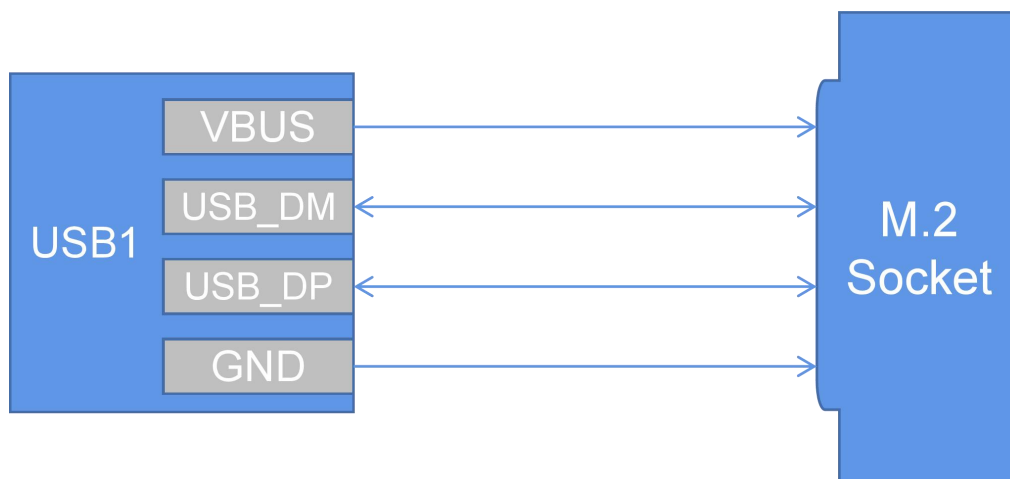


Figure 3.4 USB 2.0 Interface Connection Diagram

Physical diagram of USB2.0 interface is as follows:

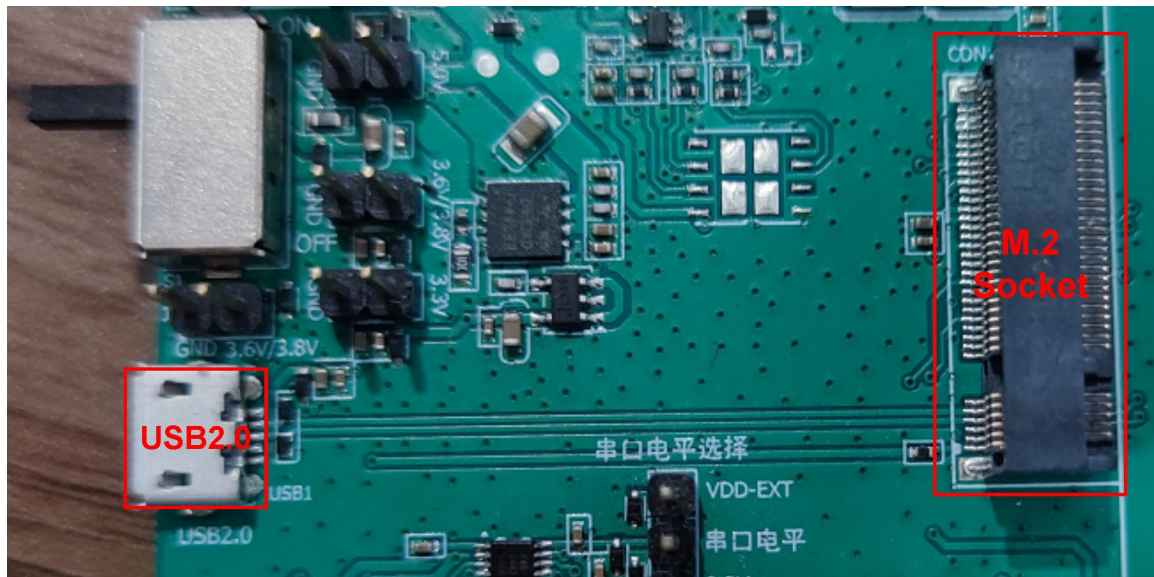


Figure 3.5 USB 2.0 interface physical diagram

Notes:

When using the USB 2.0 function, you may also need to install the corresponding USB driver for the module.

3.3 UART function

The USB2 of LioT-EVK is a Micro USB interface used to convert USB to 2 UARTs: UARTA and UARTB. The logic diagram is as follows:

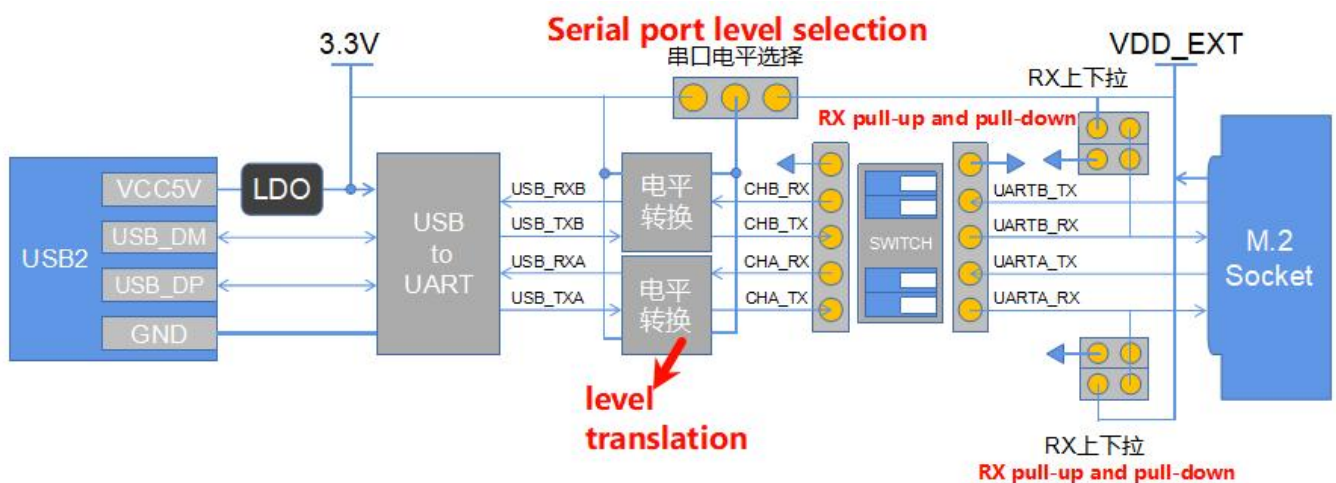


Figure 3.6 USB to UART Logic Block Diagram

The physical operation diagram of USB to UART is as follows:

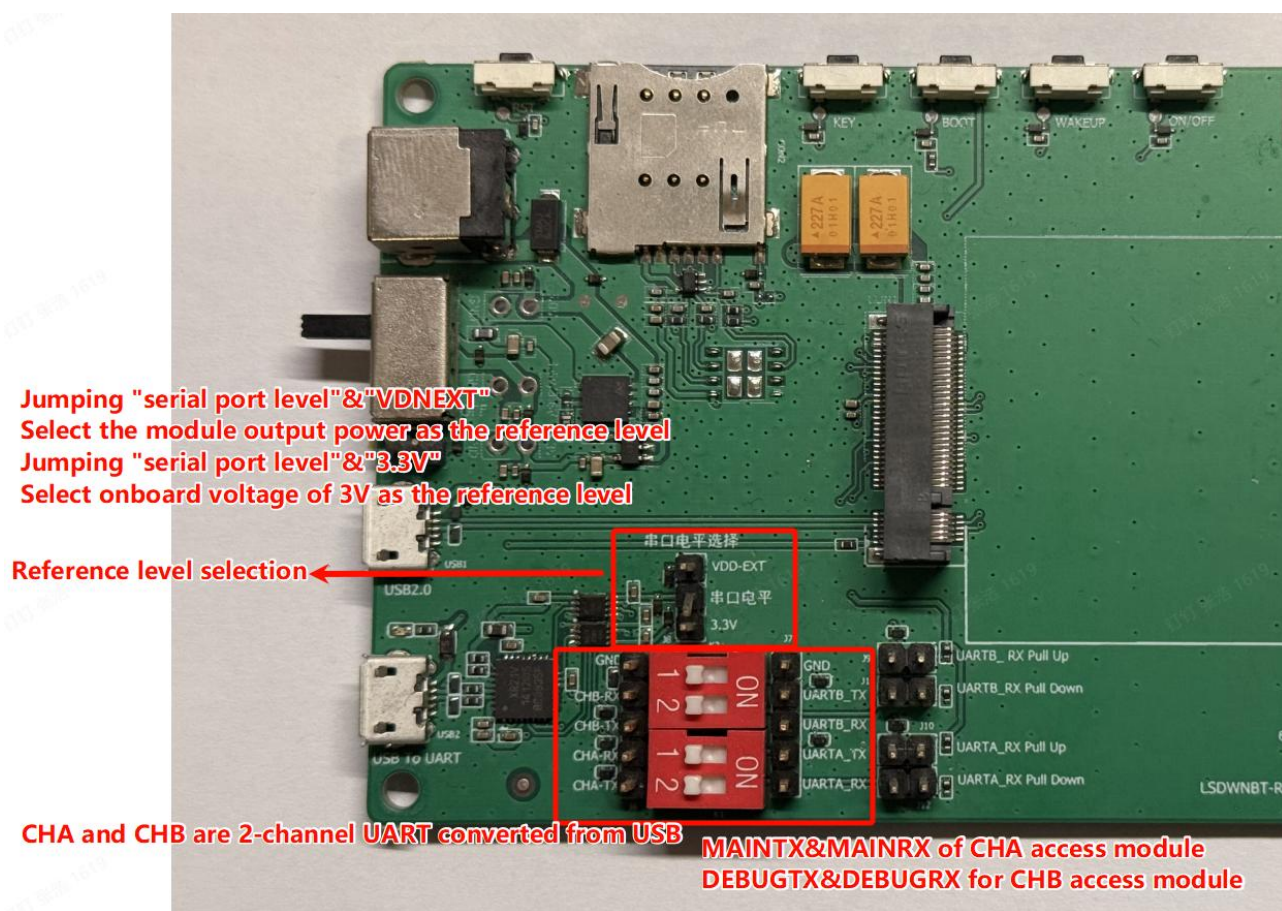


Figure 3.7 Physical diagram of USB to UART interface

Notes:

- ◆ To use the USB to UART function, you need to install the driver for the XR21V1412IL32 chip. Refer to Chapter Four for installation instructions.
- ◆ The UART function of the LIoT-EVK can also be used for external devices via jumpers.

3.4 Key press

There are 5 buttons on the LIoT-EVK, with the following default functions: RST, KEY, BOOT, WAKEUP, ON/OFF, connected to the M.2 Socket interface.

The physical diagram of the keypad is as follows:

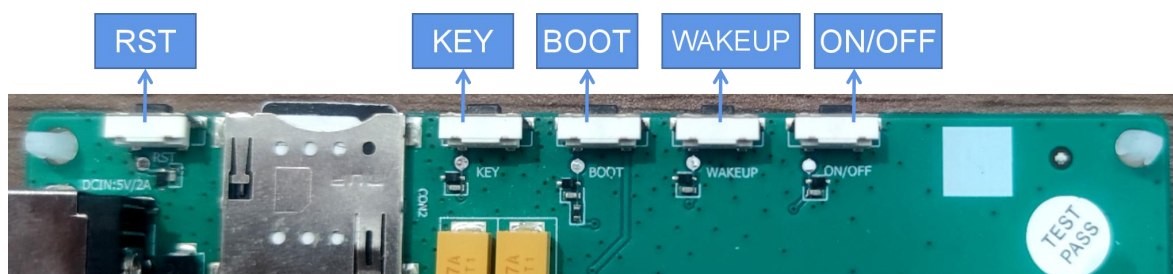


Figure 3-8 Physical diagram of the keypad interface

3.4.1 RST button

The RST button is a momentary push button, in its default state it is floating, and goes low when pressed.

For example, for the NT35E module, connect the RESET pin of the module to the button. In the powered-on state of the module, pressing the RST button for more than 500ms will reset and restart the module.

3.4.2 KEY button

The KEY button is a touch button, which is normally in a floating state. It becomes low level after being pressed and can be used for custom functions.

3.4.3 BOOT button

The BOOT button is a momentary push button, which is normally open. When pressed, it connects to the output reference power supply of the module.

For example, for the NT35E module, connecting the BOOT pin of the module to this button, together with the RST button, can put the module into download mode, enabling firmware upgrade functionality. The logic timing function of the button may vary for different modules, refer to the corresponding module's hardware design manual for specific details.

3.4.4 WAKEUP button

The WAKEUP button is a touch button, the default state is floating, and becomes low level after being pressed.

For example, connecting this button to the WAKEUP pin of the module can be used to

wake up the module from the PSM state and enter working mode. Please refer to the hardware design manual of the corresponding module for the logic timing function of the button.

3.4.5 ON/OFF button

The ON/OFF button is a tactile button, with the default state being floating. When pressed, it goes to a low level. The logic timing function of the button may vary for different modules, please refer to the hardware design manual of the corresponding module for specific details.

For example, for the NT35E module, connect the PWRKEY pin of the module to the corresponding button. When the system power is normal, the module defaults to the off state. Press and hold the ON/OFF button for more than 500ms to turn on the module; when the module is turned on, press and hold the ON/OFF button for more than 3s and then release it to turn off the module.

3.5 SIM card interface

The SIM card of Lierda's LIoT-EVK can be a Micro SIM card or an embedded SIM card. There is a Micro SIM card slot soldered on the PCBA. To use it, simply insert the SIM card into the locked state. In addition, there are solder pads on the PCBA reserved for the embedded SIM card, which can be mounted as needed.

Physical SIM card image is as follows:

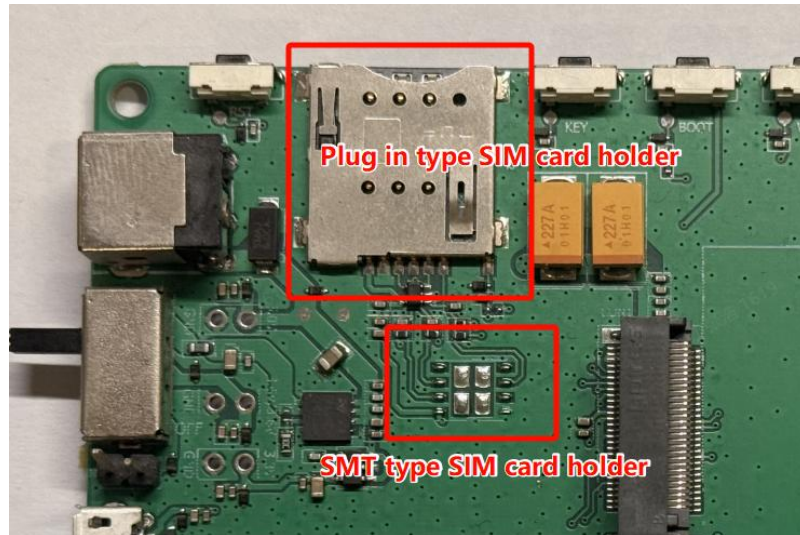


Figure 3.9 Physical Diagram of the Keypad Interface

Please note:

- ◆ The Micro SIM card slot supports SIM card detection function;
- ◆ Micro SIM cards and SIM stickers cannot be used simultaneously. Do not insert a Micro SIM card when using a SIM sticker.

3.6 Status indicator LED

There is a red LED on the development board as the power status indicator. The LED lights up when powered by USB2 or DC JACK. The physical picture of the status indicator is as follows:

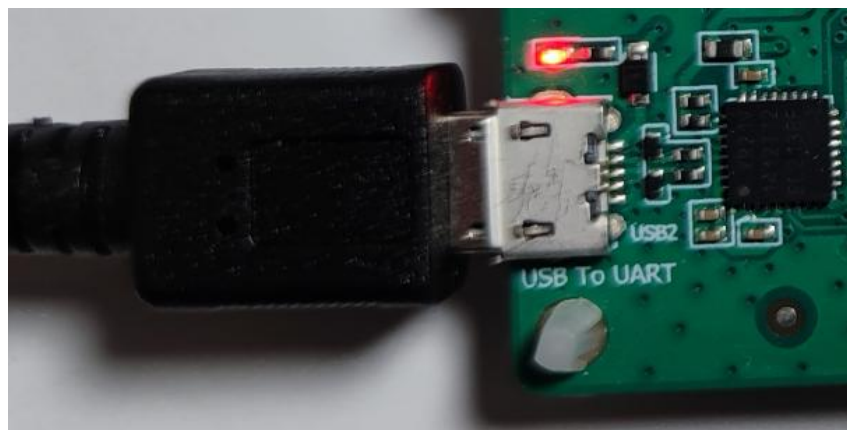


Figure 3.10 Physical diagram of power status indicator

4 Preparation work

4.1 Install drivers and verify.

4.1.1 Installation and verification of Lierda IoT-EVK UART driver

To use the Micro USB to UART function on the LIoT-EVK, you need to install the XR21V1412IL32 chip driver.

The driver program is: [XRUSB-Windows-DriversOnly-Vers2.2.0.0.](#)

Installation method is as follows:

Double-click the "xrusbser_ver2200_installer.EXE" file in the driver installation package.

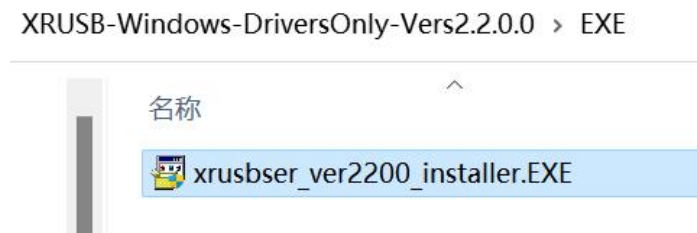


Figure 4.1 Lierda LIoT-EVK UART Driver Installation

1) Follow the prompts to install the driver until the installation is complete.

After the installation of the UART driver for Lierda's LIoT-EVK is completed, connect the LIoT-EVK to the computer via the USB2 port using a Micro USB cable. If the driver installation is successful, you can check the following port information in the computer's Device Manager:

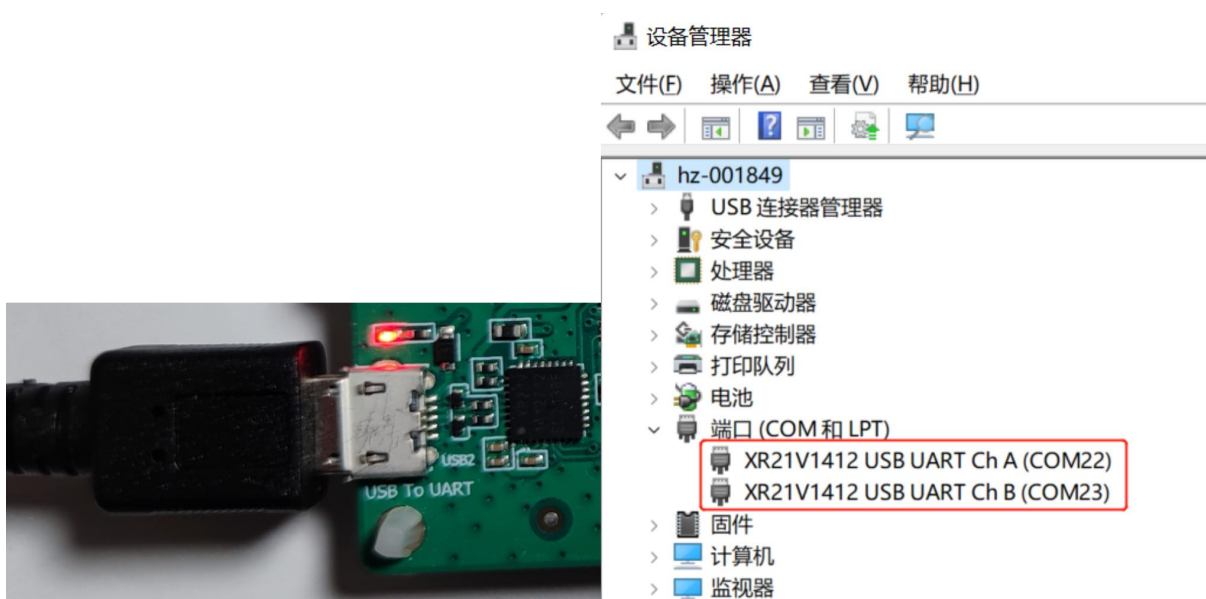


Figure 4.2 Lierda IoT-EVK UART Port Information

4.1.2 Installation and verification of the USB driver module

For Cat1 modules that support USB functionality, you need to install the corresponding module's driver. Refer to the driver installation manual of the corresponding module for the installation and verification methods of the module's USB driver, for example:

Table 4-1 Module USB Driver Installation and Verification Method

Serial number	Module model	Installation method	Note
1	NT26E series module	Lierda NT35E&NT26E-CN Driver Installation Manual_V1.1_220120.pdf	
2	NT35E series module	Lierda NT35E&NT26E-CN Driver Installation Manual_V1.1_220120.pdf	
3	NT26U series module		

4.2 Module firmware download and version verification

The methods and software used for flashing firmware on modules may vary across

different platforms. Please refer to the firmware burning/upgrading guide for the specific module you are using for detailed instructions. For example:

Table 4-2 Module Firmware Download and Verification Methods

Serial number	Module model	Installation method	Note
1	NT26E series module	Lierda NT35E&NT26E-CN Firmware Upgrade Guide Instructions_V1.1_220121.pdf	
2	NT35E series module	Lierda NT35E&NT26E-CN Firmware Upgrade Guide Instructions_V1.1_220121.pdf	
3	NT26U series module	Lierda_NT26U_Module_Firmware_Burning_User_Guide_V1.0.pdf	

5 Relevant documents and terminology abbreviations

5.1 Reference document

The following documents provide the name of the document, please refer to the latest version for accuracy.

Table 5-1 Related Documents

Serial Number	Document Name	Annotation
[1]	Lierda NT26E Series Hardware Design Manual	
[2]	Lierda NT26E-PQ Series Hardware Design Manual	
[3]	Lierda NT26E Y0C-P Series Hardware Design Manual	
[4]	Lierda NT35E Series Hardware Design Manual	
[5]	Lierda NT35E-L Series Module_Hardware Design Manual	
[6]	Lierda NT26U Series Hardware Design Manual	
[7]	Lierda NT35 Series Hardware Design Manual	
[8]	Lierda NT90 Series Hardware Design Manual	
[9]	Lierda MB260 X0C series Hardware Design Manual	
[10]	Lierda MB960 X0C Series Hardware Design Manual	
[11]	Lierda NB860 X0C Series Hardware Design Manual	
[12]	NB-IoT module hardware application manual MB261	
[13]	NB-IoT module hardware application manual MB961	
[14]	NB-IoT module hardware application manual NB861	
[15]	Lierda MB962 Series Hardware Design Manual	
[16]	Lierda NB862 Series Hardware Design Manual	
[17]	Lierda MB26-S Y0A Series Hardware Design Manual	
[18]	Lierda MB26-S Y0B&YAB Series Hardware Design Manual	
[19]	Lierda MB26-S Y0C&YAC Series Hardware Design Manual	

[20]	Lierda MB26-A Y0B Series Hardware Design Manual	
[21]	Lierda MB26-A Y0C Series Hardware Design Manual	
[22]	NB-IoT module hardware application manual MB26 Y0B	
[23]	NB-IoT module hardware application manual MB26	
[24]	Lierda NB81-S Series Hardware Design Manual	
[25]	NB-IoT module hardware application manual NB81	

5.2 Term abbreviation

This document involves abbreviations and their explanations as follows:

Table 5-2 Term Abbreviations

Abbreviation	Full English name	Chinese full name
ANT	Antenna	Antenna
GPIO	General-purpose input/output	Universal Input Output
PSM	Power Saving Mode	Energy saving mode
RF	Radio Frequency	Radio frequency
RX	Receive	Receive
TX	Transmit	Send
UART	Universal Asynchronous Receiver & Transmitter	General asynchronous receiver and transmitter
USIM	Universal Subscriber Identification Module	Universal User Identification Module