LoRaWAN LR1262 Development Board

Integrated with RP2040 & 1.8'' LCD for Long-Range Communication

DataSheet

V1.0

Table of Contents

1 Overview

1.1 Product Description

The LR1262 development board uses RP2040 as the core control unit. This main control chip is based on the dual-core ARM Cortex-M0+ architecture, featuring high performance and low power consumption, and is widely suitable for development needs in various fields such as the Internet of Things, robot control, and embedded systems. Meanwhile, the board integrates the LR1262 node module that supports LoRa and LoRaWAN protocols, providing hardware support for wireless data transmission scenarios and effectively simplifying the user's development process.

The development board excels in interface expandability and function integration. In terms of hardware interfaces, it not only includes standard Crowtail interfaces to be compatible with the same series of modules but also leads out GPIO ports through universal PIN to PIN connectors, and provides 3.3V and 5V dual-voltage outputs, meeting the power supply and communication needs of mainstream sensors and electronic modules. In addition, it reserves industrial-grade interfaces such as RS485, SPI, I2C, and UART, further expanding the range of peripheral compatibility. In terms of functional components, the board is equipped with a buzzer, custom buttons, red-yellow-green three-color indicators, and a 1.8-inch 128×160 resolution SPI interface LCD screen, which can be directly used

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for status indication, human-computer interaction, and data visualization,

enhancing development convenience.

1.2 Core Features

➢ **High-performance main control:** Adopts RP2040 as the main control, equipped with two 32-bit ARM Cortex M0+ processor cores (dual-core) with strong performance.

➢ **Wireless communication capability:** Integrates LR1262 node module, supports 868/915MHz frequency bands, and can be controlled via AT commands.

➢ **Rich interface resources:** Various external interfaces, compatible with Crowtail series modules and other commonly used interface modules on the market.

➢ **Integrated practical functions:** Includes commonly used components such as buzzer, LED lights, and custom buttons to simplify project creation; onboard 1.8-inch 128*160 SPI-TFT-LCD with ST7735S driver chip.

➢ **Strong development compatibility:** Compatible with Arduino/Micropython, facilitating the development of different projects.

1.3 Application Scenarios

➢ **Smart Agriculture**

➢ **Smart City**

➢ **Smart Home**

➢ **Environmental Monitoring**

➢ **Healthcare**

➢ **Industrial Internet of Things (IIoT)**

➢ **Logistics and Asset Tracking**

2 Product Appearance Diagrams

Figure 1:Front view
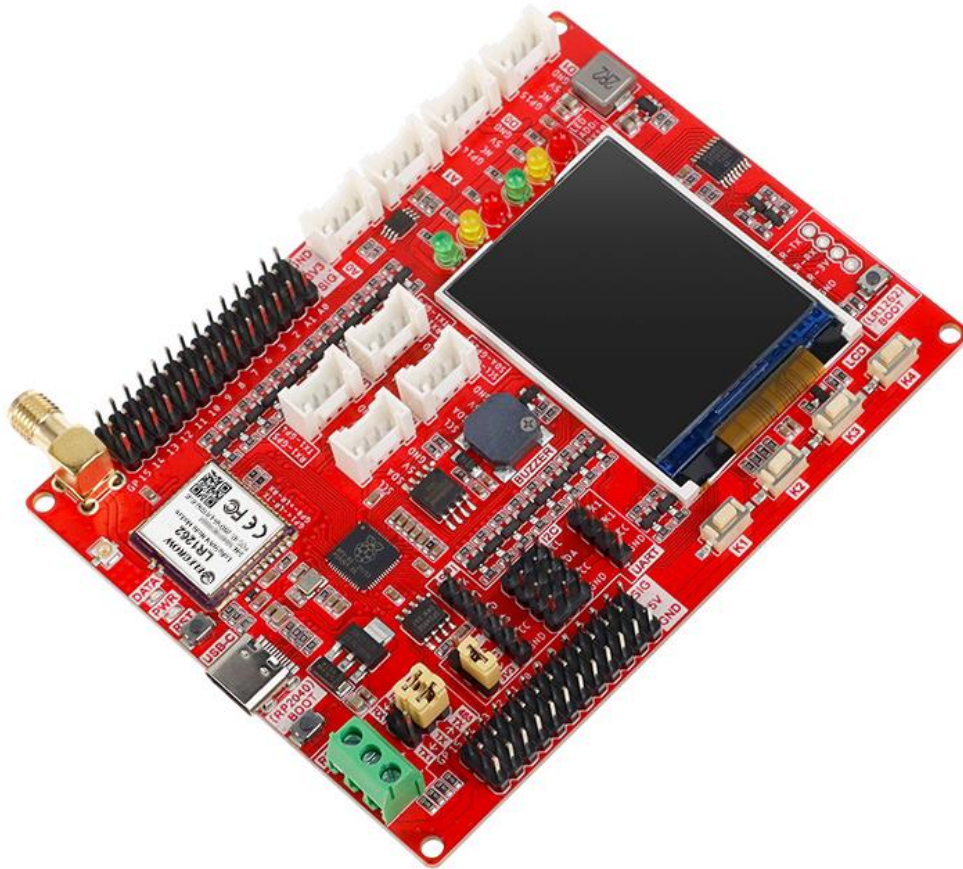
Figure 2:Side view

Figure 3:Back view

3 Dimension Drawing

Figure 4:Dimension Drawing

4 System Block Diagram

5 Hardware Overview

The hardware overview discusses the pin definitions and function descriptions of the LR1262 development board, covering the pin correspondences and specific descriptions of buttons/indicators and various interfaces.

Figure 5:Schematic Diagram of LR1262 Development Board Interfaces

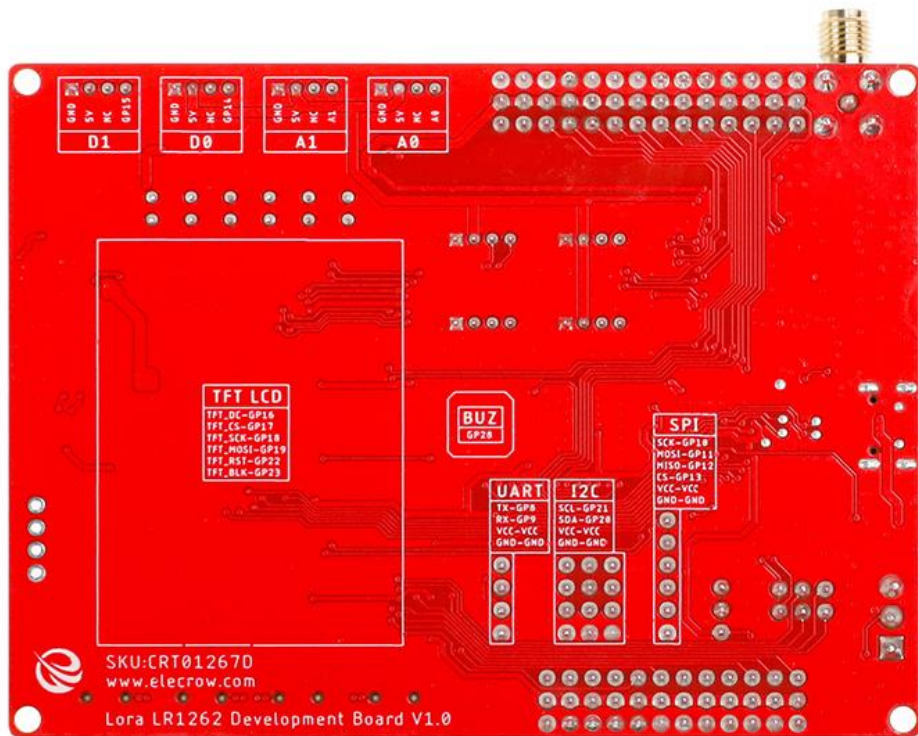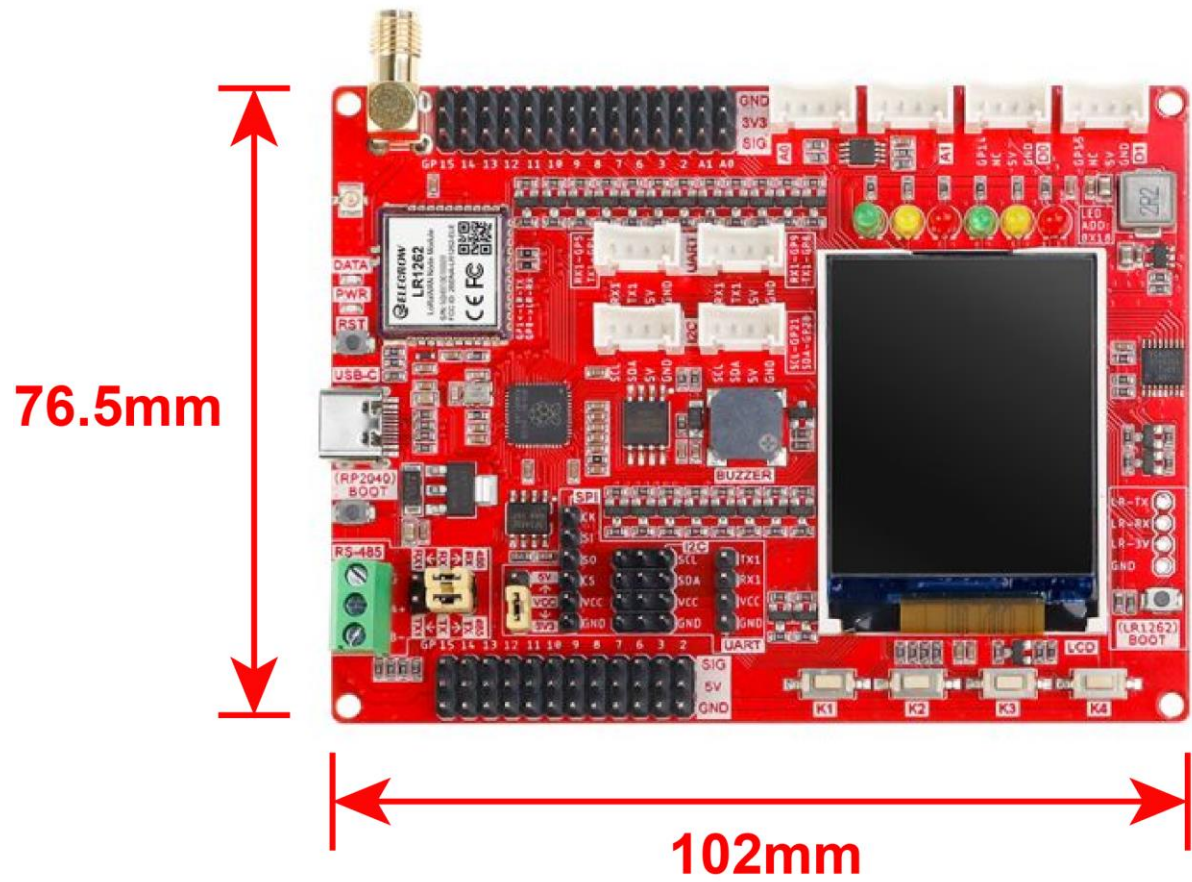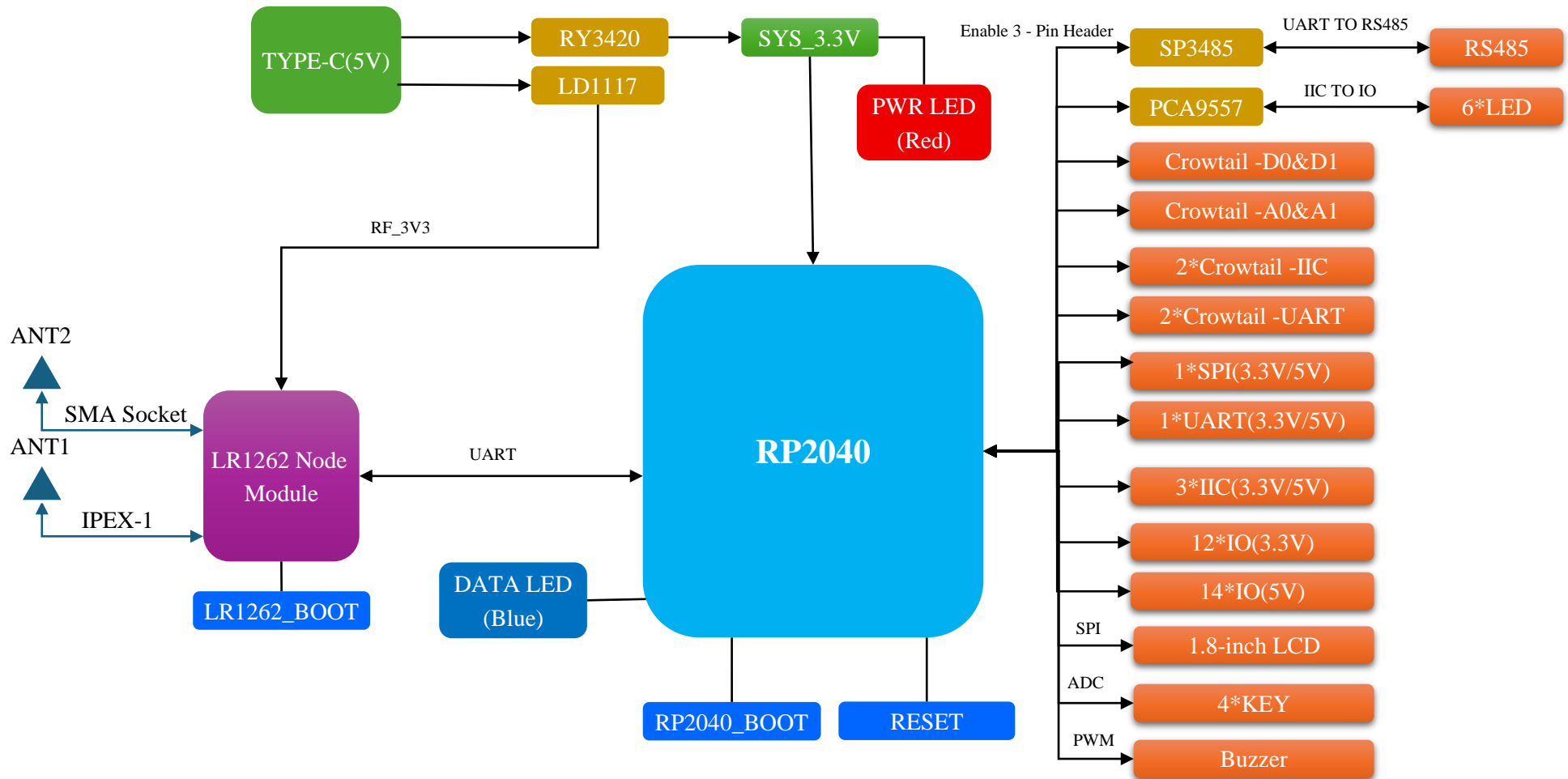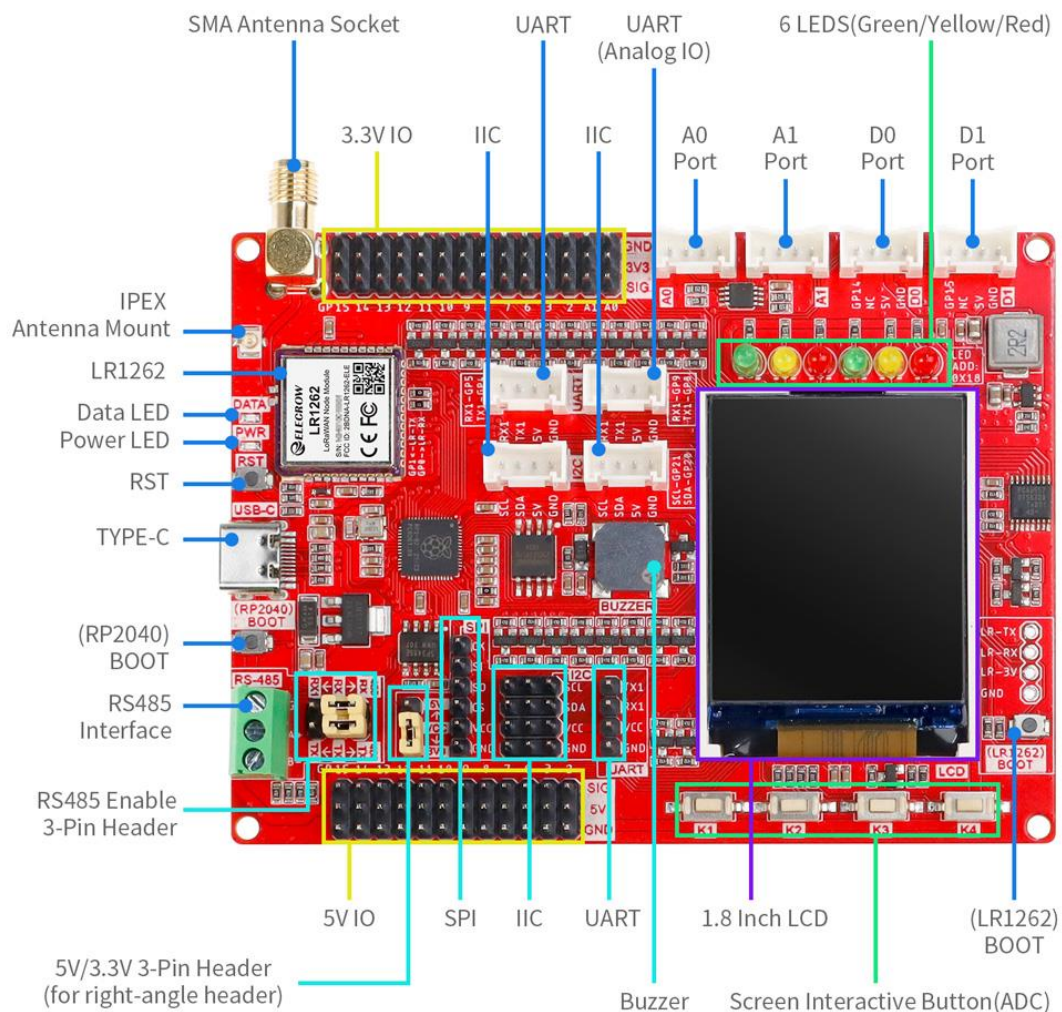## 5.1 Pin Definitions and Functions of Buttons/Indicators

No.	Name of Button/Indicator	Silkscreen	Status	Pin	RP2040 Pin	Description
1	LR1262 BOOT	(LR1262）BOOT	Short press once	LR_BOOT	/	Press the (LR1262) BOOT button, then press the NRST button once, and finally release the BOOT button to put the LR1262 module into programming mode.
2	RP2040 BOOT	(RP2040) BOOT	Short press once	BOOT	/	After the development board is connected to USB, if the "RPI - RP2 (X:)" virtual drive does not appear when connecting to the computer for the first time, long press the (RP2040) BOOT button on the development board, then press the RST button to make the development board enter a recognizable state and start the firmware download mode
3	RESET	RST	Short press once	RESET	RUN	Reset button. Pressing this button can reset the system.
4	Screen Interactive Button(ADC)	K1,K2,K3,K4	4 buttons, short press once	A3	GPPIO29/ ADC3	4 user-defined buttons. Pressing them changes the pin voltage, and the function is triggered by ADC collection.
5	DATA LED	DATA	BLUE LED	D25	GPIO25	Blue indicator light, associated with data transmission and reception of the LR1262 node module, flashes during data interaction.
6	POWER LED	PWR	RED LED	3V3	/	Red power indicator light, lights up when the system power supply is normal.

7	6 LEDS	/	Red/Yellow/ Green LED	RED1 YEL1 GRE1 RED2 YEL2 GRE2	/	Controlled by PCA9557 expansion. Light up/extinguish is realized through I2C commands and is used to connect 6 programmable LEDs.

5.2 Pin Definitions and Functions of Interfaces

No.	Interface Name	Silkscreen	Pin	RP2040 Pin	Voltage	Description
1	SMA Antenna Socket	/	/	/	/	External 868MHz/915MHz rubber antenna, used for wireless transmission and reception of the LR1262 module.
2	2*Crowtail-IIC	I2C	D20/SDA0_H D21/SCL0_H	GPIO20 GPIO21	5V	I2C bus, used to connect I2C devices.
3	2* Crowtail-UART	UART	D4/TX1_H D5/RX1_H	GPIO4 GPIO5	5V	External Crowtail-5V-HY-4P-2.0 port. It can be used to connect sensors or modules for 5V Crowtail UART serial communication.
			D8/TX1_H D9/RX1_H	GPIO8 GPIO9	5V	External Crowtail-5V-HY-4P-2.0 port. It can be used to connect sensors or modules for 5V Crowtail UART serial communication.
4	Crowtail-A0 Crowtail-A1	A0 A1	A0_IN A1_IN	GPIPO26/ADC0 GPIPO27/ADC1	5V	External Crowtail-5V-HY-4P-2.0 port. It can be used to connect sensors or modules with 5V Crowtail analog signals. Analog input channel, which can collect voltage signals of external sensors (such as the 0 - 5V analog voltage output by temperature sensors and potentiometers). The internal ADC of RP2040 will convert

						the voltage value into a digital quantity, which is used to realize the function of "analog signal detection + data processing".
5	Crowtail-D0 Crowtail-D1	D0 D1	D14_H D15_H	GPIO14 GPIO15	5V	External Crowtail-5V-HY-4P-2.0 port. It can be used to connect sensors or modules with 5V Crowtail digital signals. Digital IO port, which can be configured as input (reading level signals of buttons/sensors) or output (controlling LEDs and relays) to realize digital signal interaction.
6	12*GPIO Header (3P)	SIG 5V GND	D2_H D3_H D6/SDA1_H D7/SCL1_H D8/TX1_H D9/RX1_H D10/SCK_H D11/MOSI_H D12/MISO_H D13/CS_H D14_H/Crowtail-D0 D15_H//Crowtail-D1	GPIO2 GPIO3 GPIO6 GPIO7 GPIO8 GPIO9 GPIO10 GPIO11 GPIO12 GPIO13 GPIO14 GPIO15	5V	General-purpose IO expansion, which can be custom-connected to peripherals (such as sensors, actuators).
7	14* GPIO Header (3P)	GND 3V3 SIG	A0/Crowtail-A0 A1/Crowtail-A1 D2 D3 D6/SDA1 D7 D8/TX1 D9/RX1 D10/SCK	ADC0 ADC1 GPIO2 GPIO3 GPIO6 GPIO7 GPIO8 GPIO9 GPIO10	3.3V	General-purpose IO expansion, which can be custom-connected to peripherals (such as sensors, actuators).

			D11/MOSI	GPIO11		
			D12/MISO	GPIO12		
			D13/CS	GPIO13		
			D14	GPIO14		
			D15	GPIO15		
			3.3V	/		
			GND	/		
8	1*UART Switchable Interface	UART	D8/TX1_P D9/RX1_P VCC GND	GPIO8 GPIO9	3.3V/5 V	4P-UART header interface, which can be used to connect external UART serial communication modules and devices. The power supply voltage can be switched between 3.3V and 5V.
9	3*IIC Switchable Interface	I2C	D20/SDA0_P D21/SCL0_P VCC GND	GPIO20 GPIO21	3.3V/5 V	3*4P-IIC header interface, which can be used to connect external I2C interface communication modules and devices. The power supply voltage can be switched between 3.3V and 5V.
10	1*SPI Switchable Interface	SPI	D10/SCK_P D11/MOSI_P D12/MISO_P D13/CS_P VCC GND	GPIO10 GPIO11 GPIO12 GPIO13	3.3V/5 V	6P-SPI header interface, which can be used to connect external SPI interface communication modules and devices. The power supply voltage can be switched between 3.3V and 5V.
11	1.8-inch LCD	LCD	LCD_DC LCD_CS LCD_SCK LCD_DIN LCD_RST LCD_BLK 3V3	GPIO16 GPIO17 GPIO18 GPIO19 GPIO22 GPIO23 /	3.3V	The SPI interface controls the display screen and transmits image and text data for information display.

			LED-	/		
12	Buzzer	BUZZER	A2	GPIO28/ADC2	3.3V	Buzzer drive pin, which outputs PWM to realize sound prompts.
13	RS485 enable 3-pin Header	RX1←RX →485RX	D9/RX1_C D9/RX1 RS_RX	GPIO9	3.3V	3P Header Interface: Communication Pin Switching Interface between RS485 Chip and RP2040 1.When using the RS485 module: A jumper cap is required to short "RX" and "485RX". At this time, the RP2040 receives data from the RS485 module through this path. 2.When not using the RS485 module: By default, a jumper cap is used to short "RX" and "RX1", and the receiving path is switched to RX1.
		TX1←TX →485TX	D8/TX1_C D8/TX1 RS_TX	GPIO8	3.3V	3P Header Interface: Communication Pin Switching Interface between RS485 Chip and RP2040 1.When using the RS485 module: Use a jumper cap to short "TX" and "485TX". The RP2040 sends data to the RS485 module through this path. 2.When not using the RS485 module: By default, a jumper cap is used to short "TX"

No.	Name				Voltage	Description
						and "TX1", and the sending path is switched to TX1.
		/	D24	GPIO24	3.3V	It is used to control the enable state of the RS485 interface. The RS485 communication function can be turned on or off by changing the pin connection through methods such as a jumper cap.
14	5V/3.3V 3-Pin Header	5V ↑ VCC ↓ 3V3	5V 3V3	/	3.3V/5V	3P header interface. Power selection interface for 6P-SPI interface, 3*4P-IIC interface, and 4P-UART interface. The operating voltage of these 3 interfaces can be selected.
15	RS485 Interface	RS485	A+ B – GND	/	3.3V	RS485 bus interface, used for communicating with external RS485 modules.
16	Type-C Interface	USB-C	D+ D- USB_D+ USB_D-	USB_D+ USB_D-	5V	USB communication interface, used for program download and debugging log transmission.
17	IPEX Antenna Mount	/	/	/	/	External LoRa spring antenna (868MHz/915MHz), wireless signal channel.
18	LR1262 node Module	/	LR-BOOT NRST RF_RX RP_D0/TX0 RP_D1/RX0 RF_TX	/ / / GPIO0 GPIO1 /	3.3V	UART communication between LR1262 and RP2040, transmitting wireless data and configuration instructions.

6 Technical Specifications

No.	Item Group	Item	Parameter
1	Raspberry Pi Chip RP2040	Processor	Dual-core Arm Cortex-M0+ @ 133MHz
2		SRAM	264KB
3		Flash	4M
4	LR1262 Node Module	TX Transmit Power	+20dBm(Max)
5		RX Receive Sensitivity	-125dBm@SF7
6		LoRaWAN® Protocol	Supports Class A/Class B/Class C (compliant with LoRaWAN 1.0.3 specification)
7		Supported Frequency Bands	EU8685、US915
8		Frequency Range	803 MHz to 930 MHz
9		Signal Modulation Method	LoRa®、（G）FSK、（G）MSK 、BPSK
10		Operating Voltage	5V/1A
11		Supported Interface	IPEX-1
12	1.8-inch SPI-TFT-LCD	Resolution	128*160 dots
13		Driver Chip	ST7735S
14		LCD Active area	28.03 (W)*35.04 (H)mm
15		Communication Interface	4-wire SPI Interface
16	Antenna Measurement Distance	Urban Communication Distance	868:1km 915:1.2km
17	Mechanical Characteristics	Dimensions	102*76.5mm
18	Electrical Characteristics	Operating Input Voltage	DC 5V/1A
19		Standby Power Consumption	0.1W
20	Interface	Communication Interface	➤ 1*RS485 communication interface ➤ 8*5V Crowtail interfaces (2 analog interfaces, 2 digital interfaces, 2 UART interfaces, 2 IIC interfaces) ➤ 12*5V general - purpose header IO interfaces

			➢ 14*3.3V general - purpose header IO interfaces ➢ 1*3.3V/5V switchable SPI interface ➢ 1*3.3V/5V switchable UART interface ➢ 3*3.3V/5V switchable IIC interfaces
21	Other Functions	Buttons & LEDs	➢ 1*passive buzzer ➢ 4*user - defined buttons ➢ LR1262_BOOT ➢ RP2040_BOOT,RP2040_RESET ➢ 6* programmable LEDs
22	Antenna	External Antenna	External rubber antenna (868MHz/915MHz)
23			Lora spring antenna (868MHz/915MHz)

7 Environmental Characteristics

7.1 Extreme Operating Conditions

NO.	Item	Description	Minimum Value	Maximum Value	Unit
1	VCCmr	Supply Voltage	4.5	5.5	V
2	Tmr	Ambient Temperature	-40	+85	°C

7.2 Normal Operating Conditions

NO.	Item	Description	Minimum Value	Typical Value	Maximum Value	Unit
1	VCCop	Supply Voltage	4.5	5	5.5	V

8 Related Documents

➢ **LoRaWAN LR1262 Development Board Product Link**
➢ **LR1262 Node Board Product Link**
➢ **LR1262 LoRaWAN Node Module Datasheet**
➢ **SX1261/2 Datasheet**

9 Revision History

Date	Version	Release Notes
2025/8/31	V1.0	First release