reComputer R1225 LoRaWAN Gateway Overview

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Description

reComputer R1225 is a powerful and flexible industry Raspberry Pi IoT LoRaWAN gateway & controller, CM4-powered, with AI capabilities. With 3*RS485, dual-ethernets, BACnet, and Modbus support, equipped with all the necessary features that a robust and reliable industrial

edge IoT device needs. With compatibility with AI NPU accelerator, it's a perfect fit for remote access control, especially BMS, BAS, and iBMS.

Feature

Designed for Building Automation System

- Multiple isolated RS485 channels supports high and low speeds communication.

- Supports BACnet, Modbus RTU, and Modbus TCP/IP protocol

- Up to 4GB RAM supports the processing of thousands of data points, ensuring efficient performance

- Clear dual-sided LED indicators help check operational status quickly

- High-quality metal case, compatible with DIN-rail and Wall installation

- Open-source Software Seeed Gateway OS，ChirpStack, Basics™ Station, Packet Forward build in. Supports customization and derivative development.

Powerful Performance

- Powered by Raspberry Pi CM4

- Broadcom BCM2711 quad-core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz

- Up to 4GB RAM and 32GB eMMC

Rich Wireless Capabilities

- On-chip Wi-Fi

- On-chip BLE

- Mini-PCIe1: LTE

    - 4G version pre-installed with LTE module:
        - EU868: EC25-EUX-mini-PCIe (LTE Cat 4)
        - US915: EC25-AFXGA-mini-PCIe (LTE Cat 4)

- Mini-PCIe2: Pre-installed SPI LoRa® module

    - EU868: Wio-WM1302 LoRaWAN Gateway Module (SPI) - EU868

    - US915: Wio-WM1302 LoRaWAN Gateway Module (SPI) - US915
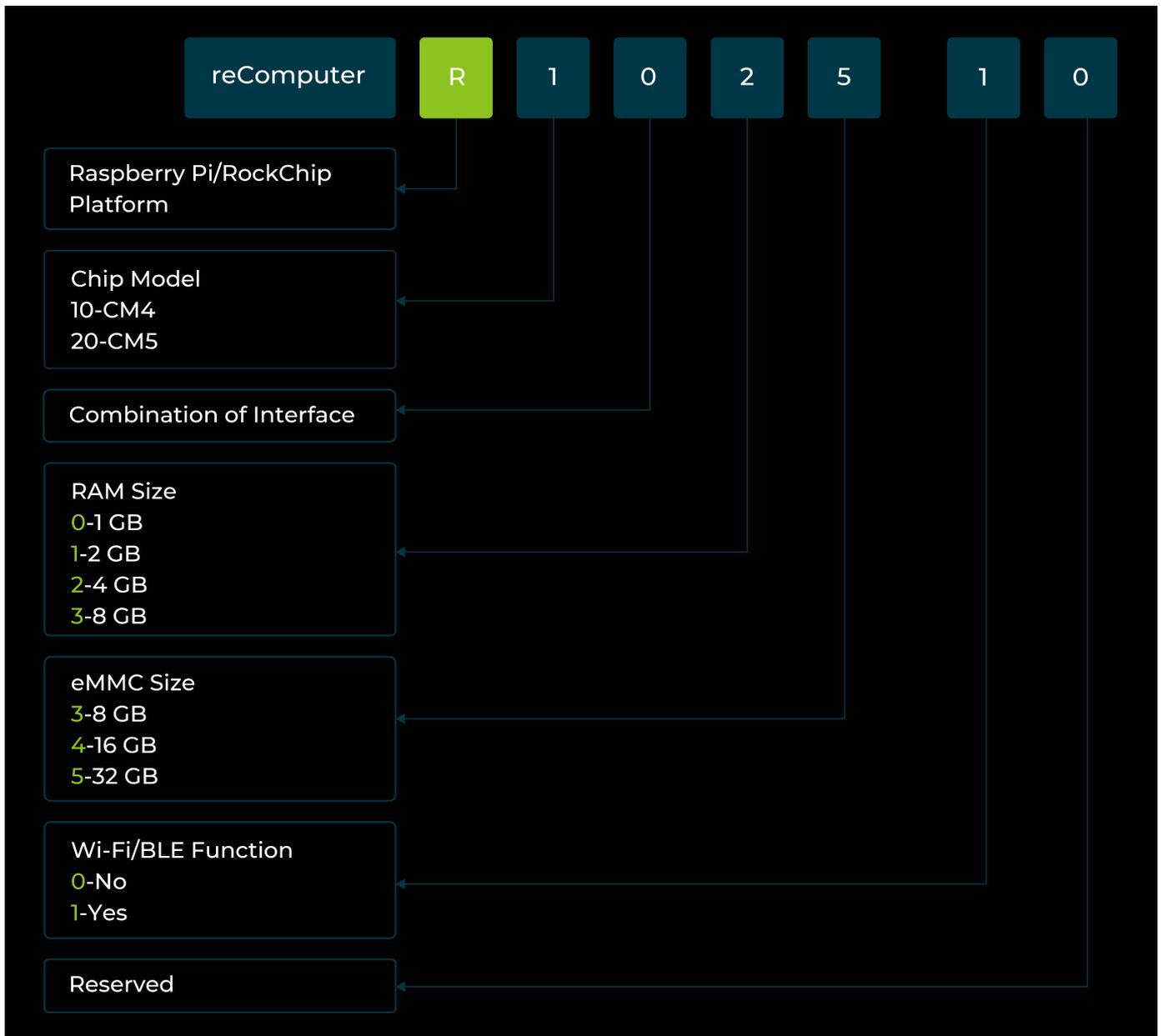
Rich Interfaces

- 3x RS485 (isolated)

- 1x 10M/100M/1000M Ethernet (Support PoE)

- 1x 10M/100M Ethernet

- 1x HDMI 2.0

- 2x Type-A USB2.0

- 1x Type-C USB2.0 (USB console for OS update)

- 1x SIM card slot

Safety and Reliability

- Hardware Watchdog

- UPS Supercapacitor(**included**)

- Metal casing with PC side panels

- ESD: EN61000-4-2,level 3

- EFT: EN61000-4-4, level 2

- Surge: EN61000-4-5, level 2

- Production Lifetime: reComputer R1225 will remain in production until at least December 2030

Naming Conventions

| reComputer | R | 1 | 0 | 2 | 5 | 1 | 0 |

Raspberry Pi/RockChip Platform

Chip Model
10-CM4
20-CM5

Combination of Interface

RAM Size
0-1 GB
1-2 GB
2-4 GB
3-8 GB

eMMC Size
3-8 GB
4-16 GB
5-32 GB

Wi-Fi/BLE Function
0-No
1-Yes

Reserved

Specifications

Parameter	Description
Hardware Spec	
CPU	Raspberry Pi CM4, Quad-core Cortex-A72@ 1.5GHz
Operating System	Raspberry Pi OS, Ubuntu
RAM	4GB
eMMC	32GB

System Spec	
Input	2-pin Terminal Block
PoE(as powered device)	IEEE 802.3af Standard 12.95W PoE
Supply Voltage(AC/DC)	12~24V AC/9~36V DC
Overvoltage Protection	40V
Power Consumption	Idle:2.88W; Full Load:5.52W
Power Switch	No
Reboot Switch	Yes
Interface	
Ethernet	1 x 10/100/1000 Mbps(supports PoE*)
	1 x 10/100 Mbps IEEE802.3/802.3u
USB	2 x USB-A 2.0 Host
	1 x USB-C 2.0 (For flashing OS)
RS485	3 x 3-pin Terminal Block (isolated)
HDMI	1 x HDMI 2.0
SIM Card Slot	supports Standard SIM Card
M.2 Slot	supports M.2 NVMe SSD
LED	6 x LED indicators
Buzzer	1
Reset Button	1

DSI(reserved)	supports LCD*(on board within the enclosure)	
Wireless Communication		
Wi-Fi 2.4/5.0 GHz	On-chip Wi-Fi	Yes
BLE 5.0	On-chip BLE	Yes
LoRa®(Occupied)	SPI LoRa®	
4G Cellular(Optional)	4G LTE*	
Standards		
EMC	ESD: EN61000-4-2, Level 3	
	EFT: EN61000-4-4, Level 2	
	Surge: EN61000-4-5, Level 2	
Certification	CE, FCC	
	RoHS	
	Ambient Conditions	
Ingress Protection	IP40	
Operating Temperature	-30~70 °C	
Operating Humidity	10~95% RH	
Storage Temperature	-40~80 °C	
Others		
Supercapacitor UPS	SuperCAP UPS LTC3350 Module	
Hardware Watchdog	1~255s	

RTC	High Accuracy RTC
Security	Encryption Chip TPM 2.0*
	ATECC608A
Heat Dissipation	Fanless
Warranty	2 years
Production Lifetime	Until December 2030

Component and Interface Status Statement

Reserved	Designated for future use or expansion.
Optional	Non-essential components, users can choose to include or exclude.
Occupied	Currently in use and integral to product functionality.
Included	Essential components provided with standard package.

Mechanical

| Dimension(W x H x D)	130 mm x 93 mm x 49.6 mm
Enclosure	6061 Aluminum Alloy Casing with Transparent PC Side Panels
Mounting	DIN-rail/Wall
Weight(Net)	待重新称重补充

Statement

Options marked with * require additional purchase according to the accessories list.

Hardware Overview

1	1000M Ethernet		**7**	SIM Slot
2	100M Ethernet		**8**	Boot Switch
3	Serial Console		**9**	Reset Hole
4	3 x Isolated RS485		**10**	Power In
5	LED		**11**	HDMI
6	2 x Reserved Antenna Ports for Wireless		**12**	USB Host

Power Diagram
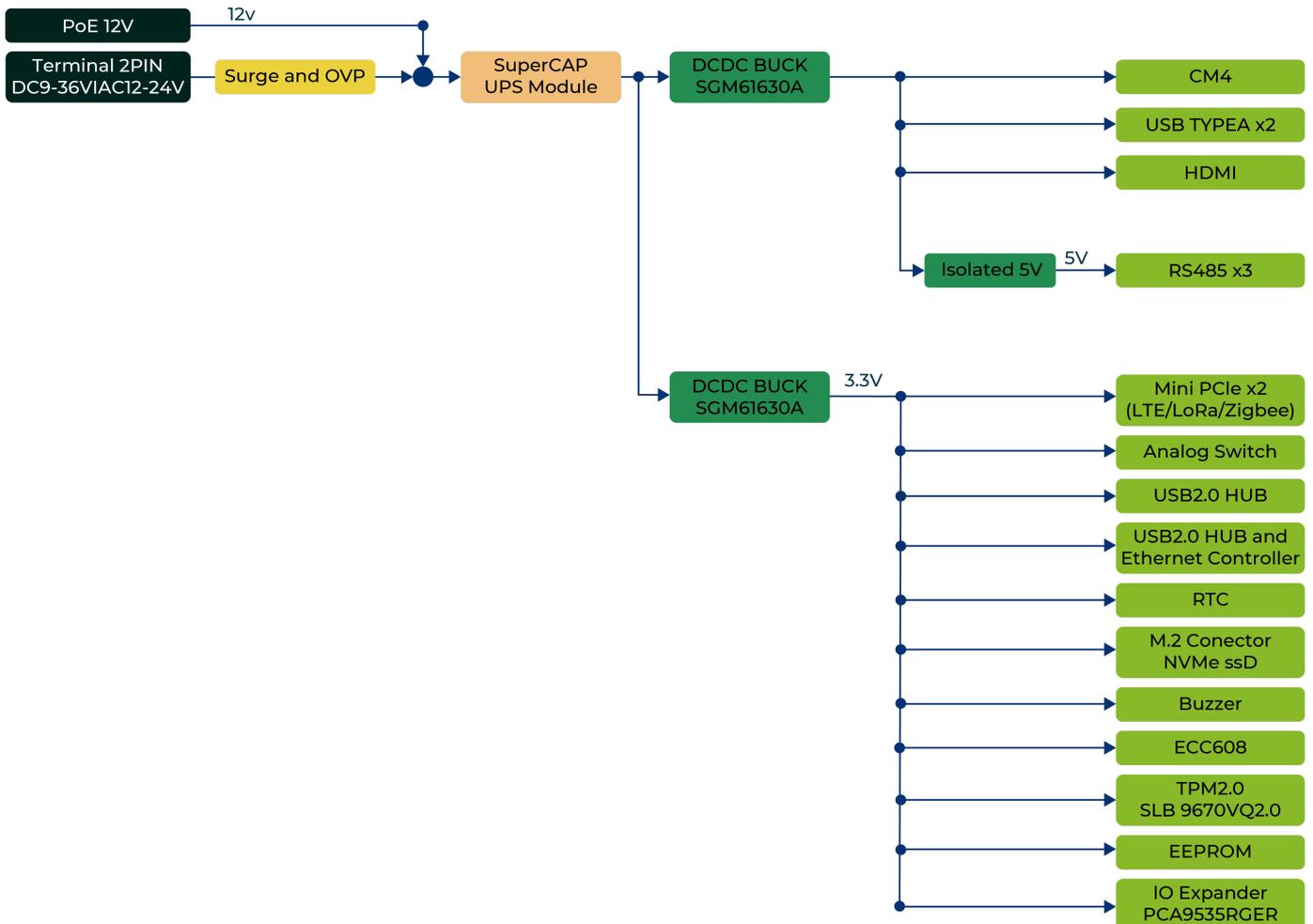
The reComputer R1225 supports three power supply options: AC, DC terminal and PoE port. By default, the reComputer R1225 is powered through the AC/DC terminal (Official regional power adapter SKU:110061505/110061506), while **the PoE power supply(PoE module, SKU:110991925) is included**. This provides flexibility in power supply selection and allows for easy integration with various power sources.

2-Pin Power terminal
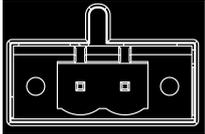
The reComputer R1225 is supplied with a nominal AC voltage of 12~24 V or DC voltage of 9~36V. The power supply is connected via the 2-pin power terminal block connector. To ground the reComputer R1225, the ground wire can be secured to the screw located at the top left corner of the power terminal.

> **NOTE**
>
> The power solution utilizes a bridge rectifier diode for reverse polarity protection and is compatible with both AC and DC inputs. This ensures that **regardless of how the power supply's positive and negative terminals are connected**, the circuit will not be damaged. By using a bridge rectifier, the output voltage polarity remains fixed irrespective of the input DC polarity, providing effective reverse polarity protection.

POE (included)

With the PoE module installed, the ETH0 port of reComputer R1225 can support PoE power supply, providing a convenient and efficientway to power the device over Ethernet. This option simplifies the installation process and reduces the amount of cabling required, making it an ideal solution for applications with limited power sources or where power outlets are not readily available.

- PoE input: Range 44~57V; Typical 48V
- PoE output: 12V, 1.1A Max.

> **NOTE**
>
> It's worth noting that the PoE module provided with the reComputer R1225 is compliant with the IEEE 802.3af standard and can provide a maximum power supply of 12.95W. **Therefore, if there is a need to connect high-power peripherals such as SSD or 4G**

modules, the PoE power supply may not be sufficient. In this case, it's recommended to use the AC/DC terminal for power supply instead to ensure stable and reliable operation of the device.

Power Consumption

Please refer to the table below for the tested power consumption of reComputer R1225 in Seeed Studio's laboratory. Please note that this value is for reference only, as the test methods and environment can result in variations in the results.

待测试

| Status	Voltage	Current	Power Consumption	Description
Shutdown	24V	mA	W	Static power consumption test in shutdown and power-off state.
Idle	24V	mA	W	To test the input current when supplying 24V power to the reComputer R1225 device without running any test programs.
Full Load	24V	mA	W	Configure CPU to run at full load using the "stress -c 4" command. No external devices connected.

Power On and Power Off

The reComputer R1225 does not come with a power button by default, and the system will automatically start up once power is connect- ed. When shutting down, please select the shutdown option in the operating system and wait for the system to fully shut down before cutting off power. To restart the system, simply reconnect to the power.

> **NOTE**
>
> Please note that after shutting down, please wait for **at least 10 seconds** before restarting the system to allow for the internal capacitors to fully discharge.

Block Diagram

IIC Diagram
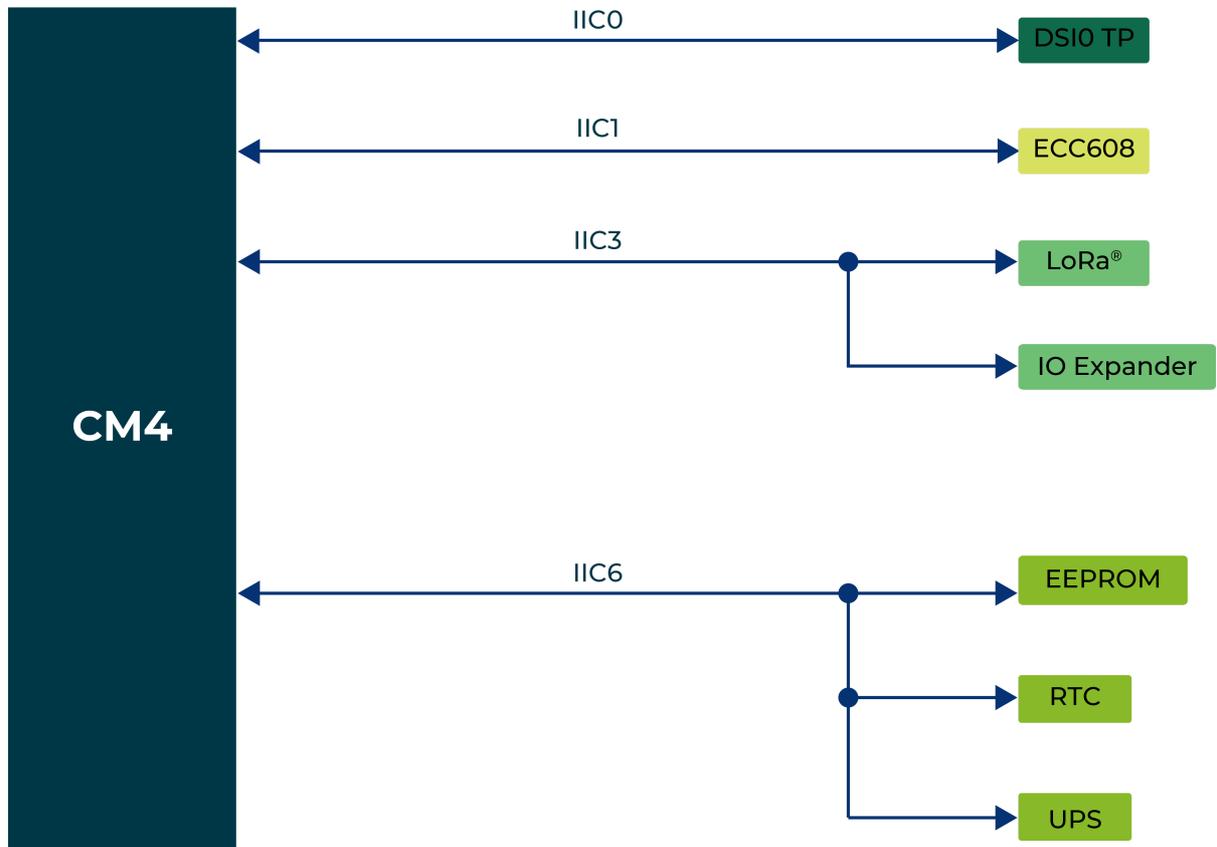
Interface	
Ethernet	1 x 10/100/1000 Mbps IEEE 1588-2008(supports PoE)
	1 x 10/100 Mbps IEEE802.3/802.3u
USB	2 x USB-A 2.0 Host
	1 x USB-C 2.0 (for flashing OS)
RS485	3 x 3-pin Terminal Block (isolated)

Interface

HDMI	1 x HDMI 2.0
SIM Card Slot	supports Standard SIM Card
M.2 Slot	supports M.2 NVMe SSD
LED	6 x LED indicators
Buzzer	1
Reset Button	1
HDMI	1 x HDMI 2.0
DSI	supports LCD*(on board within the enclosure)

To query GPIO mappings and offsets, please use following command:

```
cat /sys/kernel/debug/gpio
```

```
seeed@raspberrypi:~ $ cat /sys/kernel/debug/gpio
gpiochip0: GPIOs 512-569, parent: platform/fe200000.gpio, pinctrl-bcm2711:
 gpio-512 (ID_SDA              )
 gpio-513 (ID_SCL              )
 gpio-514 (GPIO2               )
 gpio-515 (GPIO3               )
 gpio-516 (GPIO4               )
 gpio-517 (GPIO5               )
 gpio-518 (GPIO6               )
 gpio-519 (GPIO7               |spi0 CS1            ) out hi ACTIVE LOW
 gpio-520 (GPIO8               |spi0 CS0            ) out hi ACTIVE LOW
 gpio-521 (GPIO9               )
 gpio-522 (GPIO10              )
 gpio-523 (GPIO11              )
 gpio-524 (GPIO12              )
 gpio-525 (GPIO13              )
 gpio-526 (GPIO14              )
 gpio-527 (GPIO15              )
 gpio-528 (GPIO16              )
 gpio-529 (GPIO17              )
 gpio-530 (GPIO18              )
 gpio-531 (GPIO19              )
 gpio-532 (GPIO20              |led-red             ) out hi ACTIVE LOW
 gpio-533 (GPIO21              |buzzer              ) out lo
 gpio-534 (GPIO22              )
 gpio-535 (GPIO23              )
 gpio-536 (GPIO24              )
 gpio-537 (GPIO25              )
 gpio-538 (GPIO26              |led-green           ) out hi ACTIVE LOW
 gpio-539 (GPIO27              |led-orange          ) out hi ACTIVE LOW
 gpio-540 (RGMII_MDIO          )
 gpio-541 (RGMIO_MDC           )
 gpio-542 (CTS0                )
 gpio-543 (RTS0                )
 gpio-544 (TXD0                )
 gpio-545 (RXD0                )
 gpio-546 (SD1_CLK             )
 gpio-547 (SD1_CMD             )
 gpio-548 (SD1_DATA0           )
 gpio-549 (SD1_DATA1           )
 gpio-550 (SD1_DATA2           )
```

LED Indicator Status

The reComputer R1225 features 6 LED indicators that serve to signal the machine's operational status. Please refer to the table below for the specific functions and status of each LED:

LED Indicator	Color	Status	Description
PWR	Green	On	The device has been connected to power.
		Off	The device is not connnected to power.
ACT	Green		Under Linux this pin will flash to signify eMMC access. If any error occurs during booting, then this LED will flash an

LED Indicator	Color	Status	Description
			error pattern which can be decoded using the look up table on the Raspberry Pi website.
USER	Green/Red/Blue		Need to be defined by user.
RS485-1	Green	Off	No data transfer on RS485 channel 1.
		Blink	RS485 channel 1 is receiveing or sending data.
RS485-2	Green	Off	No data transfer on RS485 channel 2.
		Blink	RS485 channel 2 is receiveing or sending data.
RS485-3	Green	Off	No data transfer on RS485 channel 3.
		Blink	RS485 channel 3 is receiveing or sending data.

ACT Status table

Long flashes	Short flashes	Status
0	3	Generic failure to boot
0	4	start*.elf not found
0	7	Kernel image not found
0	8	SDRAM failure
0	9	Insufficient SDRAM
0	10	In HALT state
2	1	Partition not FAT
2	2	Failed to read from partition

Long flashes	Short flashes	Status
2	3	Extended partition not FAT
2	4	File signature/hash mismatch - Pi 4
4	4	Unsupported board type
4	5	Fatal firmware error
4	6	Power failure type A
4	7	Power failure type B

If the ACT LED blinks in a regular four blink pattern, it cannot find bootcode (start.elf) If the ACT LED blinks in an irregular pattern then booting has started. If the ACT LED doesn't blink, then the EEPROM code might be corrupted, try again without anything connected to make sure. For more detail please check the Raspberry Pi forum: STICKY: Is your Pi not booting? (The Boot Problems Sticky) - Raspberry Pi Forums For more detail please check the Raspberry Pi forum.

Customizable LED lights via the Luci interface

Control LED lights via commands

To control the user LEDs, we recommend using sysfs, a pseudo-filesystem provided by the Linux kernel that exposes information about various kernel subsystems, hardware devices, and their associated drivers. On the reComputer R1225, we have abstracted the user LED interface into three device files (led-red, led-blue, and led-green), enabling users to control the LED lights simply by interacting with these files. The examples are as follows:

1. To turn on the red LED, please enter following command in the Terminal:

```
echo 1 | sudo tee /sys/class/leds/led-red/brightness
```
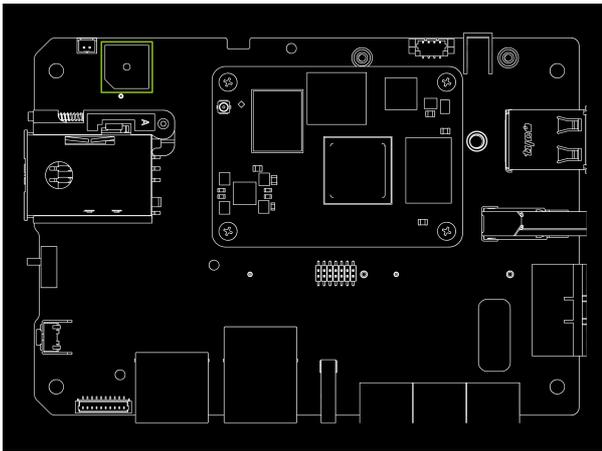
2. To turn off the red LED, please enter following command in the Terminal:

```
echo 0 | sudo tee /sys/class/leds/led-red/brightness
```

3. You can turn on red and green LED at the same time, please enter following command in the Terminal:

```
echo 1 | sudo tee /sys/class/leds/led-red/brightness
echo 1 | sudo tee /sys/class/leds/led-green/brightness
```

Buzzer

The reComputer R1225 features an active buzzer, which can be used for various purposes such as alarm and event notifications.

For reComputer R1225 users(**R1225 is based on the R1000 v1.1 hardware platform**), the buzzer is connected to PCA9535 P15, to turn off(on) the buzzer, Please enter following command in the Terminal :

```
echo 591 | sudo tee /sys/class/gpio/export
echo out | sudo tee /sys/class/gpio/gpio591/direction
echo 1 | sudo tee /sys/class/gpio/gpio591/value # turn on
echo 0 | sudo tee /sys/class/gpio/gpio591/value # turn off
```

RS485
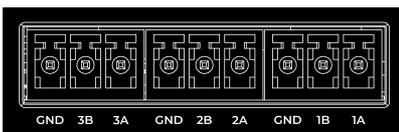
The reComputer R1225 is equipped with 3 sets of RS485 interface using 3-pin connector, which is isolated for both signal and power to ensure safe and reliable operation in industrial and automation applications. The RS485A and RS485B signals are isolated using capacitive isolation, which provides excellent EMI immunity and meets the high-speed communication requirements of the RS485 interface. **By default, 120Ω terminal resistors is not installed. However, the**

packaging box includes five surface-mount resistors. If needed, users should solder the resistor onto the device themselves.

> **NOTE**
>
> The RS485 interface uses an isolated power supply, which means that the ground signal for external devices connected to the RS485 interface should be connected to the GND_ISO pin.

These are the pins related to the 485 interface of reComputer for the data table.

RS485	RS485_POWER_EN	OS device file	P14	default(High)
TX5		/dev/ttyAMA5	GPIO12	
RX5			GPIO13	
TX2	ID_SD	/dev/ttyAMA2	GPIO0/ID_SD	
RX2	ID_SC		GPIO1/ID_SC	
TX3		/dev/ttyAMA3	GPIO4	
RX3			GPIO5	
RS485_1_DE/RE	(Hight/DE || Low/RE)	/dev/ttyAMA2	GPIO6	default Low
RS485_2_DE/RE		/dev/ttyAMA3	GPIO17	default Low

| RS485	RS485_POWER_EN	OS device file	P14	default(High)
RS485_3_DE/RE		/dev/ttyAMA5	GPIO24	default Low

By default, the power enable port of the RS485 port is high. And each RS485 interface is in the accepting state. You can do a simple experiment.

The 485 port that connects the pc to the reComputer-R.

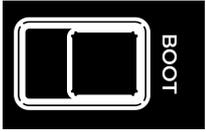Enter in the terminal of reComputer:

```
cat /dev/ttyAMA2
```

Then send some data in the serial debugging tool of your computer, you can observe the data in the terminal window of reComputer.
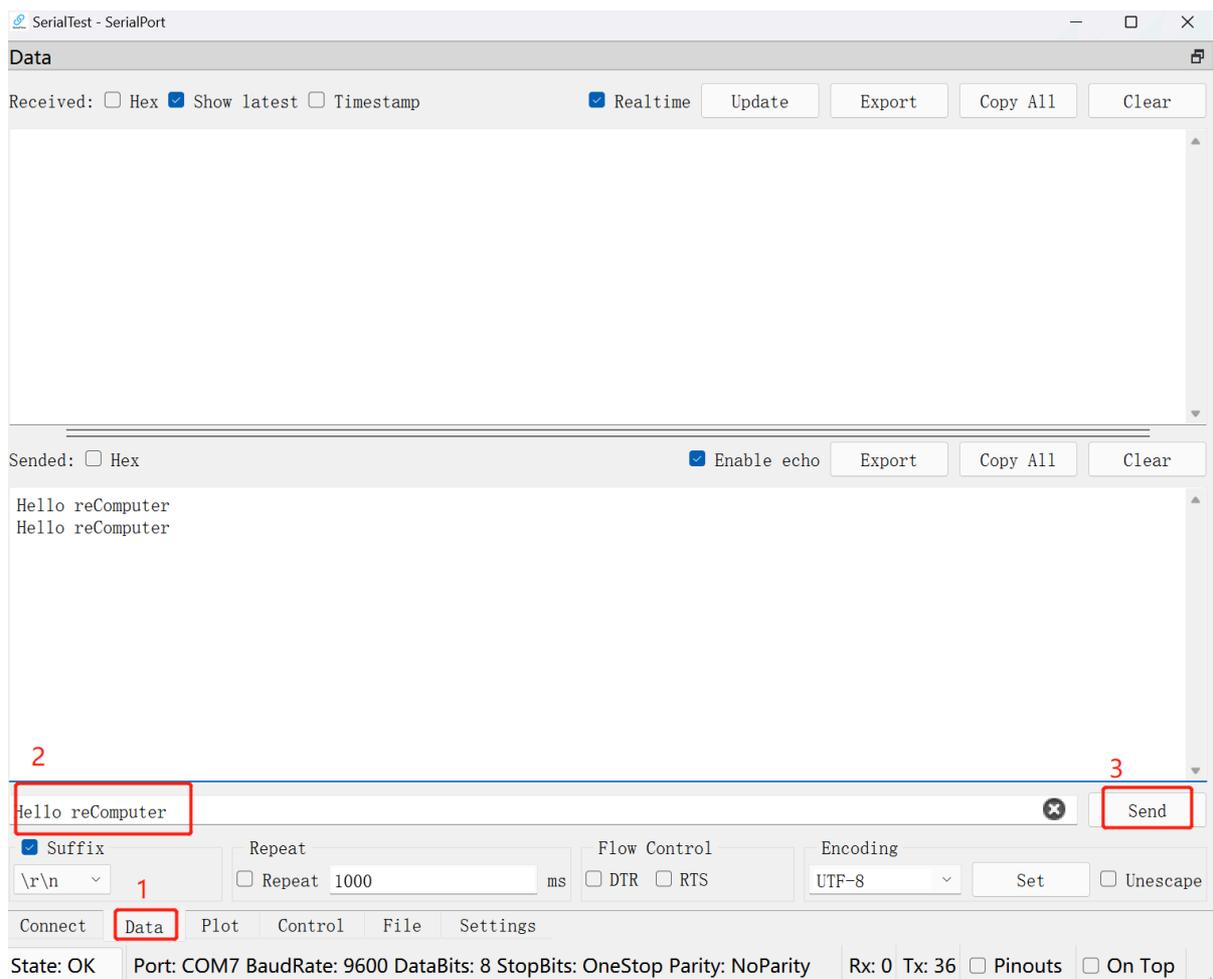
```
seeed@raspberrypi:~ $ cat /dev/ttyAMA2
Hello reComputer
```

Boot Switch



The Boot Switch of the reComputer R1225 is connected to the nRPI_BOOT pin of CM4. This switch provides users with the option to select the boot source between eMMC and USB. In normal mode, the switch should be set away from the side with the "BOOT" label, enabling the system to boot from eMMC. Conversely, when users need to flash the system image, they should set the switch towards the "BOOT" label, allowing the system to boot from the Type-C USB interface.

Switch Position	Mode	Description	nRPI-BOOT
	Normal mode	Boot from eMMC	Low
	Flash mode	Boot from USB	High

> ⓘ **NOTE**
>
> **In Boot mode, the POE power supply function is unavailable.**

USB
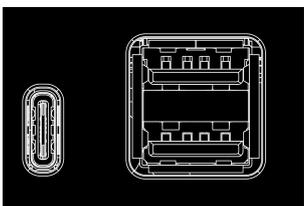
The reComputer R1225 is equipped with one USB Type-C port and two USB Type-A ports. Please refer to the table below for their functions and descriptions.

Type	Quantity	Protocol	Function	Description
Type-C	*1	USB2.0	USB-Device	Used for serial port debugging, burning image, etc.
Type-A	*2	USB2.0	USB-Host	Connect different USB devices such as flash drives, USB keyboards or mouses.

Check if the USB hub is detected by running the **lsusb** command. This command lists all connected USB devices, including hubs.

```
lsusb
```

```
seeed@raspberrypi:~ $ lsusb
Bus 001 Device 008: ID 17ef:6099 Lenovo Lenovo Traditional USB Keyboard
Bus 001 Device 007: ID 4842:0001 HAOBO Technology USB Composite Device
Bus 001 Device 004: ID 0424:2514 Microchip Technology, Inc. (formerly SMSC) USB 2.0 Hub
Bus 001 Device 003: ID 0424:ec00 Microchip Technology, Inc. (formerly SMSC) SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9512 Microchip Technology, Inc. (formerly SMSC) SMC9512/9514 USB Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Running this command should display information about the USB devices connected to your system, including any USB hubs that are present.

If the USB hub is functioning properly, you should see its details listed in the output of the **lsusb** command. If it's not listed, there may be an issue with the hub or its connection to the system. In such cases, you may need to troubleshoot the USB hub or its connections.

SIM Slot

The reComputer R1225 uses a standard-size SIM card slot commonly found in industrial applications, which requires a standard SIM card with dimensions of 25mm x 15mm.

> **NOTE**
>
> The reComputer R1225 is available in a 4G version. If you purchase the standard edition (without the 4G module), you can buy a 4G module separately for installation. Bazaar Mall currently offers two 4G modules:Europe(EMEA & Thai **SKU 113991135**) and America(North America **SKU 113991134**)

SSD Slot

GND	1		2	3V3
GND	3		4	3V3
NC	5		6	NC
NC	7		8	NC
GND	9		10	NC
NC	11		12	3V3
NC	13		14	3V3
GND	15		16	3V3
NC	17		18	3V3
NC	19		20	NC
GND	21		22	NC
NC	23		24	NC
NC	25		26	NC
GND	27		28	NC
NC	29		30	NC
NC	31		32	NC
GND	33		34	NC
NC	35		36	NC
NC	37		38	NC
GND	39		40	NC
PCIE_RX_N	41		42	NC
PCIE_RX_P	43		44	NC
GNC	45		46	NC
PCIE_TX_N	47		48	NC
PCIE_TX_P	49		50	PCIE_RST
GNC	51		52	PCIE_CLK_NREQ
PCIE_CLK_N	53		54	PCIE_WAKE
PCIE_CLK_P	55		56	NC
GND	57		58	NC
NC	67		68	SUSCLK
NC	69		70	3.3V
GND	71		72	3.3V
GND	73		74	3.3V
GND	75			

The SSD slot on the reComputer R1225 is designed to accommodate NVMe M.2 2280 SSDs for 128GB, 256GB, 512GB and 1TB in capacity. This slot allows for high-speed storage expansion, enabling users to enhance the performance and capacity of their system.

To list the disks, including the SSD, you can use the *fdisk -l* command. Here's how:

```
sudo fdisk -l
```

This command will display a list of all disks connected to your system, including the SSD if it's properly detected. Look for entries that represent your SSD. They typically start with /dev/sd

followed by a letter (e.g., /dev/sda, /dev/sdb, etc.). Once you identify the entry corresponding to your SSD, you can proceed with partitioning or formatting it as needed.
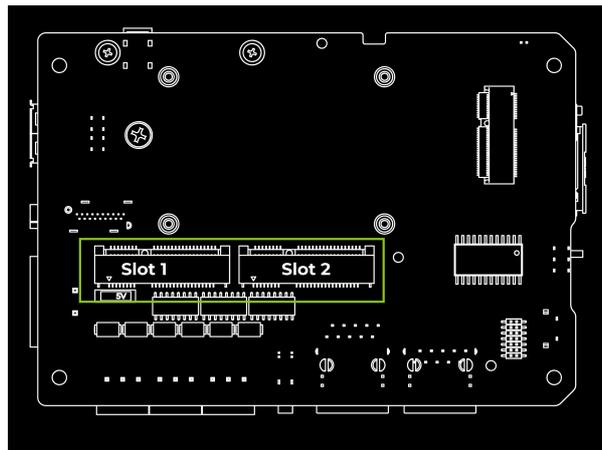
> **ⓘ NOTE**
>
> There are two main uses for SSD cards:
>
> 1.High Capacity Storage: SSD cards can be utilized for high-capacity storage needs.
>
> 2.Boot Drive with Image: Another usage involves using the SSD both as a high-capacity storage and for storing system images, allowing booting directly from the SSD card.
>
> It's important to note that not all SSD cards available in the market support the second usage. Therefore, if you intend to use it as a boot drive and are unsure about which model to purchase, we recommend opting for our recommended 1TB SSD(SKU 112990267). This model has been tested and verified for boot functionality, reducing the risk of compatibility issues and minimizing trial and error costs.

Mini-PCIe Slot

Slot 1

NC	1		2	3V3
NC	3		4	GND
NC	5		6	NC
NC	7		8	NC
GND	9		10	USIM_VDD
NC	11		12	USIM_DATA
NC	13		14	USIM_CLK
GND	15		16	USIM_RST
NC	17		18	GND
NC	19		20	NC
GND	21		22	LTE_RST/Zigbee_RST
NC	23		24	NC
NC	25		26	GND
GND	27		28	NC
GND	29		30	NC
NC	31		32	NC
NC	33		34	GND
GND	35		36	USB-
GND	37		38	USB+
3V3	39		40	GND
3V3	41		42	NC
GND	43		44	USIM_PRESE
NC	45		46	NC
NC	47		48	NC
NC	49		50	GND
NC	51		52	3V3

Slot 2

NC	1		2	3V3
NC	3		4	GND
NC	5		6	NC
NC	7		8	NC
GND	9		10	SX1262_RST
NC	11		12	NC
NC	13		14	NC
GND	15		16	NC
NC	17		18	GND
NC	19		20	NC
GND	21		22	SX1302_RST/Zigbee_RST
NC	23		24	3V3
SX1262_CS	25		26	GND
GND	27		28	NC
GND	29		30	CM4_IIC3_SCL
NC	31		32	CM4_IIC3_SDA
NC	33		34	GND
GND	35		36	USB-
GND	37		38	USB+
3V3	39		40	GND
3V3	41		42	NC
GND	43		44	NC
CM4_SPI0_SCLK	45		46	NC
CM4_SPI0_MISO	47		48	NC
CM4_SPI0_MOSI	49		50	GND
CM4_SPI0_CE1	51		52	GND

Slot	Supported Protocol
Mini-PCIe 1	4G LTE
Mini-PCIe 2	SPI LoRa®

> ⓘ **NOTE**
>
> The reComputer R1225 comes in standard and 4G versions: For the standard version, Mini-PCIe 1 is left vacant; For the 4G version, Mini-PCIe 1 is pre-installed with 4G LTE.

This device features two Mini-PCIe interfaces, namely Mini-PCIe Slot 1 and Mini-PCIe Slot 2. Slot 1 connects to SIM card slot and supports USB protocols, while Slot 2 supports both USB and SPI protocols but doesn't connect to SIM card slot. Therefore, devices such as 4G LTE can be connected through Slot 1, while SPI LoRa® devices can be connected through Slot 2.

Reset Hole

◎ RESET

There is a Mini Push Button Switch located in the reset hole of reComputer R1225. By pressing this button with a thin object, the CM4 can be reset. This pin when high signals that the CM4 has started. Driving this pin low resets the module.

Ethernet RJ45
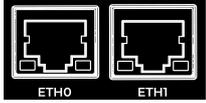
Name	Type	Speeds	PoE
ETH0	CM4 native Gigabit Ethernet	10/100/1000 Mbit/s	Pre-installed
ETH1	Converted from USB	10/100 Mbit/s	Not Supported

The reComputer R1225 comes with two Ethernet RJ45 ports. ETH0 is a CM4 native Gigabit Ethernet interface that supports three different speeds: 10/100/1000 Mbit/s. An additional PoE module can be purchased to enable power-over-Ethernet (PoE) delivery through this interface, providing power to the reComputer R1225. Another one ETH1 supports 10/100 Mbit/s which is converted from USB.

HDMI
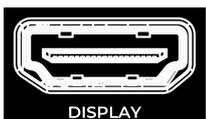
The reComputer R1225 features a native HDMI interface from CM4, supporting up to 4K @ 60 fps video output. It is ideal for applications that require multiple displays, allowing users to output their content to external large screens.

RTC

The reComputer R1225 features an RTC circuit that comes pre-installed with a CR2032 battery, enabling it to maintain timekeeping functionality even in the event of power loss.

To test the Real-Time Clock (RTC) functionality, follow these steps:

1. Disable automatic time synchronization:

```
sudo systemctl stop systemd-timesyncd
sudo systemctl disable systemd-timesyncd
```

2. Set the time to 12:00 PM on March 20, 2024:

```
sudo hwclock --set --date "2024-03-20 12:00:00"
```

3. Synchronize the RTC time to the system:

```
sudo hwclock --hctosys
```

4. Check the RTC time:

```
sudo hwclock -r
```

This command will read and display the time stored in the RTC. 5. Disconnect the power source from the RTC, wait a few minutes, then reconnect it and check the RTC time again to see if it retained the correct time.

Watchdog

The reComputer R1225 comes equipped with an independent hardware watchdog circuit that ensures automatic system reboot in case of abnormal system crashes. The watchdog circuit is implemented through RTC and allows for flexible feeding times from 1 to 255 seconds.

To perform a watchdog test, follow these steps:

1. Install the watchdog software:

```
sudo apt install watchdog
```

2. Edit the watchdog configuration file:

```
# make sure you install vim already, if haven't, can install by the command below
sudo apt-get install vim
sudo vim /etc/watchdog.conf
```

Modify the configuration as follows:

```
watchdog-device  = /dev/watchdog
# Uncomment and edit this line for hardware timeout values that differ
# from the default of one minute.vi
watchdog-timeout = 120
# If your watchdog trips by itself when the first timeout interval
# elapses then try uncommenting the line below and changing the
# value to 'yes'.
#watchdog-refresh-use-settimeout = auto
# If you have a buggy watchdog device (e.g. some IPMI implementations)
# try uncommenting this line and setting it to 'yes'.
#watchdog-refresh-ignore-errors = no
# ===================== Other system settings ========================
#
# Interval between tests. Should be a couple of seconds shorter than
# the hardware time-out value.
interval  = 15
max-load-1  = 24
#max-load-5  = 18
#max-load-15  = 12
realtime  = yes
priority  = 1
```

You can adjust other settings as needed. 3. Ensure the watchdog service is running:

```
sudo systemctl start watchdog
```

4. To test the watchdog functionality, execute the following command to simulate a system hang:

```
sudo su
echo 1 > /proc/sys/kernel/sysrq
echo "c" > /proc/sysrq-trigger
```

> ⚠ **WARNING**
>
> This command triggers a kernel crash and should cause the watchdog to reboot the system.

5. Monitor the system to confirm that it reboots after the specified timeout period. These steps will help you test and ensure the functionality of the watchdog timer on your system.

Optional Interfaces and Modules

Wi-Fi/BLE(included)

The reComputer R1225 is powered by the CM4 with an onboard Wi-Fi/BLE version, providing the same Wi-Fi/BLE parameters as the CM4. For detailed parameter information, please refer to the Raspberry Pi official website.

> **NOTE**
>
> It is important to note that due to the reComputer R1225's metal casing, Wi-Fi/BLE signals may have difficulty penetrating the metal exterior. Therefore, if you require this feature, we recommend installing the external antenna we have prepared for you.

Connect wifi

Connect to Wi-Fi via the Luci UI

Command to connect to Wi-Fi

step1. To scan for Wi-Fi networks:

```
nmcli dev wifi list
```

step2. Connect to the wifi network:

```
sudo nmcli dev wifi connect network-ssid password "network-password"
sudo nmcli --ask dev wifi connect network-ssid
```

step3. After the device is powered on, it will automatically connect to wifi.
If you want to delete the saved WiFi information:

```
nmcli con del network-ssid
```

After the connection is disconnected, connect to another wifi.

Connect bluetooth devices

Before adding a Bluetooth device, the Bluetooth service on your computer must be started and running. You can check this with the systemctl command.

```
sudo systemctl status bluetooth
```

```
seeed@raspberrypi:~ $ sudo systemctl status bluetooth
● bluetooth.service - Bluetooth service
     Loaded: loaded (/lib/systemd/system/bluetooth.service; enabled; preset: enabled)
     Active: active (running) since Wed 2024-05-01 08:11:46 BST; 1 week 1 day ago
       Docs: man:bluetoothd(8)
   Main PID: 863 (bluetoothd)
     Status: "Running"
      Tasks: 1 (limit: 3910)
        CPU: 250ms
     CGroup: /system.slice/bluetooth.service
             └─863 /usr/libexec/bluetooth/bluetoothd
```

If the Bluetooth service status is not active, you must enable it first. Then start the service so that it starts automatically when you start your device.

```
sudo systemctl enable bluetooth
sudo systemctl start bluetooth
```

You can use the bluetoothctl tool to connect and manage Bluetooth, the following are some common commands and comments:

```
#Scan attachments to the device
bluetoothctl scan on

#To make your Bluetooth adapter discoverable to other devices, use the
following command:
bluetoothctl discoverable on


#Replace A4:C1:38:F4:83:2E below with the Media Access Control (MAC) address
you want to connect to
#Pair a new Bluetooth device
bluetoothctl pair A4:C1:38:F4:83:2E

#Connect previously paired devices
bluetoothctl connect A4:C1:38:F4:83:2E

#View the list of devices paired with the system
bluetoothctl paired-devices

#When a Bluetooth device is trusted, the system automatically connects to it
```

```
after discovering it
bluetoothctl trust A4:C1:38:F4:83:2E

#Cancel trust
bluetoothctl untrust A4:C1:38:F4:83:2E

#Remove a paired Bluetooth device
bluetoothctl remove A4:C1:38:F4:83:2E

#Disconnect the Bluetooth connection, but do not remove it from the paired
list
bluetoothctl disconnect A4:C1:38:F4:83:2E

#Block specific devices from connecting to your system
bluetoothctl block A4:C1:38:F4:83:2E

#Unblock device
bluetoothctl unblock A4:C1:38:F4:83:2E


#Use interactive mode and exit
bluetoothctl
exit
```

4G Module(optional)

The reComputer R1225 LoRaWAN Gateway is available in Standard and 4G versions. The Mini-PCIe Slot 1 on the Standard version is vacant, while the 4G version comes with a pre-installed Mini-PCIe module tailored for Europe(EMEA & Thai **SKU 113991135**) and America(North America **SKU 113991134**) respectively.

LoRa® Module(included)

The Mini-PCIe Slot 2 on the reComputer R1225 LoRaWAN Gateway is occupied by the SPI LoRa® module.

PoE(included)

The reComputer R1225 LoRaWAN Gateway comes equipped with a PoE module, eliminating the need for users to purchase, solder, and assemble one themselves.

M.2 Slot(optional)

The reComputer R1225 supports 2280 NVMe SSD and AI accelerator(Hailo) through the use of a PCIe slot(J62) below two Mini-PCIe slots on board. It is important to note that the CM4's PCIe is gen2.0 with a maximum theoretical speed of 5Gbps. If you are using a Gen3.0 or higher SSD, it may not be able to achieve the SSD's maximum speed. After testing, the reTerminal DM with installed SSD can achieve a maximum write speed of 230MB/s and a maximum read speed of 370MB/s. If you are unsure which SSDs are compatible, you can purchase following the accessories list below.

Please click here for assemble instruction.

	NVMe M.2 2280 SSD 1TB	112990267
	512GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD	112990247
SSD card	256GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD	112990246
	128GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD	112990226

> **NOTE**
>
> Please note that:
> 1- The speed test results may vary depending on the SSD model, testing method, and testing environment. The values provided here are for reference purposes only and were obtained in Seeed's laboratory.
>
> There are two main uses for SSD cards:
> 1.High Capacity Storage: SSD cards can be utilized for high-capacity storage needs.
> 2.Boot Drive with Image: Another usage involves using the SSD both as a highcapacity storage and for storing system images, allowing booting directly from the SSD card.
> It's important to note that not all SSD cards available in the market support the second usage. Therefore, if you intend to use it as a boot drive and are unsure about which model to purchase, we recommend opting for our recommended **1TB SSD(SKU [112990267])**. This model has been tested and verified for boot functionality, reducing the risk of compatibility issues and minimizing trial and error costs.

Encryption Chip TPM 2.0(optional)

The TPM features Infineon's OPTIGA™ TPM SLB9670 which is compliant to the Trusted Computing Group (TCG) TPM 2.0 specification is recommened as encryption chip to the reComputer R1225. The chip features an SPI interface applied for port J13 on board, to enable a root of trust for platform integrity, remote attestation, and cryptographic services.

> **ⓘ NOTE**
>
> [Please click here for assemble instruction](#).

If you connect TPM 2.0 module to device, the following code can help check TPM connection.

```
ls /dev | grep tpm
```

If you see **tpm0** and **tpmrm0** in the output, it means that TPM (Trusted Platform Module) devices are detected and available on your system. This indicates that the TPM hardware is recognized and accessible, which is a good sign. You can proceed with using TPM-related functionalities or applications knowing that the devices are present and accessible.

UPS(included)
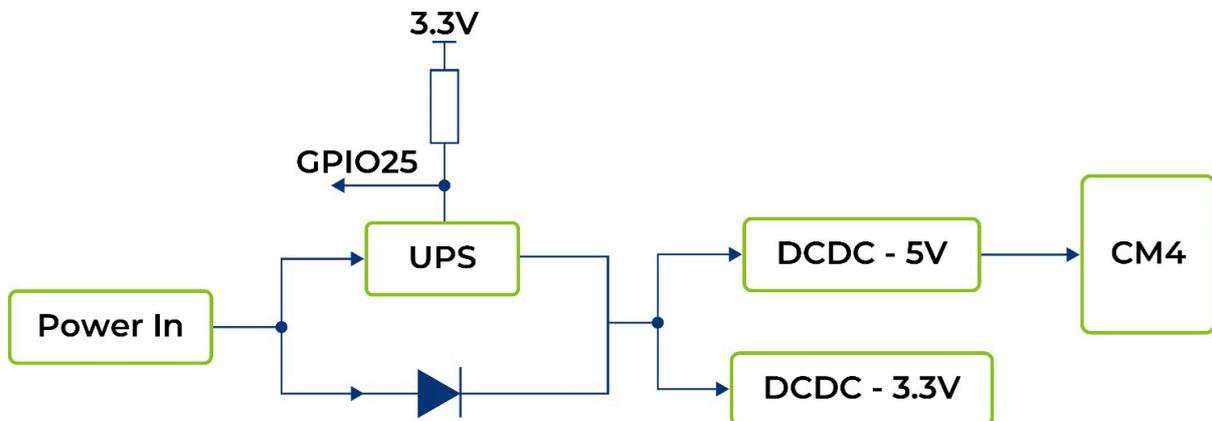
The UPS is 7F, which operates in series. The UPS module is positioned between the DC5V and CM4 components, with a GPIO signal utilized to alert the CPU in the event of a power loss from the 5V supply. Upon receiving this signal, the CPU executes an urgent script before the super capacitor's energy is depleted, initiating a "$ shutdown" command.

The backup duration provided by the UPS heavily relies on the system load. Below are some typical scenarios tested with a CM4 module featuring 4GB RAM, 32GB eMMC storage, and a Wi-Fi module.

Mode of Operation	Time(s)	Remark
Idle	37	Testing under idle conditions with official driver program loaded
Full load of CPU	18	stress -c 4 -t 10m -v &

> **NOTE**
>
> For UPS function please contact us for more information, and the alarm signal is active LOW.

A GPIO25 between CPU and DC/AC power in is used to alarm CPU when the 5V power supply is down. Then the CPU should do something urgent in a script before energy exhaustion of super capacitor and run a `$ shutdown`

Another way to use this function is Initiate a shutdown when GPIO pin changes. The given GPIO pin is configured as an input key that generates KEY_POWER events. This event is handled by systemd-logind by initiating a shutdown. Use `/boot/overlays/README` as reference, then modify `/boot/config.txt`.

```
dtoverlay=gpio-shutdown,gpio_pin=25,active_low=1
```

The python code below is a demo for detecting the working mode of supercapacitor UPS through GPIO25, and automatically saving data and shut down when the system is powered off.

```python
import RPi.GPIO as GPIO
import time,os

num = 0

GPIO.setmode(GPIO.BCM)
#set GPIO25 as input mode
#add 500ms jitter time for software stabilization
GPIO.setup(25,GPIO.IN,pull_up_down = GPIO.PUD_UP)
GPIO.add_event_detect(25,GPIO.FALLING, bouncetime = 500)
while True:
  if GPIO.event_detected(25):
    print('...External power off...')
```

```python
    print('')
    os.system('sync')
    print('...Data saving...')
    print('')
    time.sleep(3)
    os.system('sync')
    #saving two times
    while num<5:
        print('-----------')
        s = 5-num
        print('---' + str(s) + '---')
        num = num + 1
        time.sleep(1)
    print('---------')
    os.system('sudo shutdown -h now')
```

DSI(optional)

One DSI (J24) are reserved on board, for special usage. Users are requested to purchase plug-ins according to your own needs.

Additional Resources

- reComputer R1225 3D File
- reComputer R1225 Schematic Desing, PCB Desing
- reComputer R1225 (R1000 v1.1) Pin Assignment

Tech Support & Product Discussion

Thank you for choosing our products! We are here to provide you with different support to ensure that your experience with our products is as smooth as possible. We offer several communication channels to cater to different preferences and needs.

✎ Edit this page

*Last updated on **Jan 4, 2026** by **Kian***

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