robustel | User Guide

RAC7000

Android Industrial Personal Computer

Smart Control System

robustOS

Guangzhou Robustel LTD
www.robustel.com

About This Document

This document provides hardware and software information of the RAC7000 android IPC.

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Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Android IPC is used in a normal manner with a well-constructed network, the Android IPC should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Robustel accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the computer, or for failure of the computer to transmit or receive such data.

Safety Precautions

General

- The Android IPC generates radio frequency (RF) power. When using the Android IPC, care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Do not use your Android IPC in aircraft, hospitals, petrol stations or in places where using cellular products is prohibited.
- Be sure that the Android IPC will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the Android IPC should be away from computers, office equipment, home appliance, etc.
- An external antenna must be connected to the Android IPC for proper operation. Only uses approved antenna with the Android IPC. Please contact authorized distributor on finding an approved antenna.
- Always keep the antenna with minimum safety distance of 20 cm or more from the human body. Do not put the antenna inside metallic box, containers, etc.
- RF exposure statements
    1. For mobile devices without co-location (the transmitting antenna is installed or located more than 20cm away from the body of user and nearby person)

Note: Some airlines may permit the use of cellular phones while the aircraft is on the ground and the door is open. Android IPC may be used at this time.

Using the Android IPC in Vehicle

- Check for any regulation or law authorizing the use of cellular devices in vehicle in your country before installing the Android IPC.
- The driver or operator of any vehicle should not operate the Android IPC while driving.
- Install the Android IPC by qualified personnel. Consult your vehicle distributor for any possible interference of electronic parts by the Android IPC.
- The Android IPC should be connected to the vehicle's supply system by using a fuse-protected terminal in the vehicle's fuse box.
- Be careful when the Android IPC is powered by the vehicle's main battery. The battery may be drained after extended period.

Protecting Your Android IPC

To ensure error-free usage, please install and operate your Android IPC with care. Do remember the following:

- Do not expose the Android IPC to extreme conditions such as high humidity / rain, high temperature, direct sunlight, caustic / harsh chemicals, dust, or water.
- Do not try to disassemble or modify the Android IPC. There is no user serviceable part inside and the warranty would be void.

- Do not drop, hit or shake the Android IPC. Do not use the Android IPC under extreme vibrating conditions.
- Do not pull the antenna or power supply cable. Attach/detach by holding the connector.
- Connect the Android IPC only according to the instruction manual. Failure to do it will void the warranty.
- In case of a problem, please contact an authorized distributor.

Regulatory and Type Approval Information

Table 1: Directives

2013/56/EC	Directive 2013/56/EU of the European Parliament and of the Council of 10 February 2013 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
2012/19/EU	Directive 2012/19/EU the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)

Table 2: Standards of the Ministry of Information Industry of the People's Republic of China

SJ/T 11363-2006	"Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products" (2006-06).
SJ/T 11364-2006	"Marking for Control of Pollution Caused by Electronic Information Products" (2006-06). According to the "Chinese Administration on the Control of Pollution caused by Electronic Information Products" (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Hardware Interface Description. Please see **Table 3** for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006.

Table 3: Toxic or Hazardous Substances or Elements with Defined Concentration Limits

Name of the Part	Hazardous Substances					
	(Pb)	(Hg)	(Cd)	(Cr (VI))	(PBB)	(PBDE)
Metal parts	o	o	o	o	o	o
Circuit modules	x	o	o	o	o	o
Cables and cable assemblies	o	o	o	o	o	o
Plastic and polymeric parts	o	o	o	o	o	o

o:
Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

x:
Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials for this part *might exceed* the limit requirement in SJ/T11363-2006.

Document History

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Date	Firmware Version	Document Version	Change Description
Aug. 14, 2018	1.0.0	v.1.0.0	Initial release

Contents

Chapter 1 Product Description

1.1 Product Overview

Designed with ARM® Cortex™-A9 core and Android operating system, Robustel RAC7000 Android IPC is a smart industrial control device with high-performance, high-reliability and high-stability. It supports Android 4.4/6.0 operating environment and powerful system function, and provides users with convenient interactive service between human and the computer. By means of OpenGLES2.0 and OpenVG™1.1 hardware accelerator and full-HD 1080P video codecs, RAC7000 provides users with a smooth and powerful video experience of multimedia playback.

RAC7000 supports Netcom 3G/4G real-time communication. In addition, it has wireless transmit function, rich peripheral interfaces and reliable management system which can access a variety of external devices such as card readers, printers, POS machines, LCD screens, etc., to meet different application scenarios.

- Dual/Quad-core Cortex-A9 processor architecture
- Supporting OpenGLES2.0 and OpenVG™1.1, 2D and 3D graphics acceleration
- Android 4.4/6.0 system
- 1080P HD full-screen video decoding
- Hiding status bar and navigation key
- Specified applications for full-screen auto-run and auto-failover recovery
- 3G/4G cellular network for fast auto dialing
- 3G/4G network link self-detection and self-maintenance mechanism for abnormally fast auto recovery
- APN adaptive dialing
- Expansion of SD card for large storage
- RTC clock synchronization
- Support program automatically awaken when power on and the screen never be locked
- Support to pre-install App
- Supporting Android system for self-development and application installation
- HDMI, LVDS and double-screen display
- Supporting Android Debug Bridge port command
- Support 3.5mm speak and mic standard port output

- WiFi and Bluetooth connections
- Expansion of SD card for large storage
- Supporting double-row pin expansion board, rich peripheral interfaces including serial port, Ethernet, USB, audio, and video for access requirements of different machines
- Supporting hardware watchdog

1.2 Package Contents

Before installing your RAC7000 Android IPC, verify the kit contents as follows.
Note: The following pictures are for illustration purposes only, not based on their actual sizes.

- 1 x Robustel RAC7000 Android IPC (the image is only for reference)

Optional Accessories (sold separately)

- 3G/4G SMA cellular network antenna

- RP-SMA WiFi antenna

- Wall mounting installation kit

- Network cable

- AC/DC power adapter (12V DC, 3 A; EU/US/UK/AU plug optional)

1.3 Specifications

Core

- CPU: Dual/Quad-core Cortex-A9 1.0 GHz
- RAM: 2GB DDR3
- Flash: 8GB EMMC

Cellular Interface

- Number of antennas: 2 (MAIN + AUX)
- Connector: SMA female
- SIM slot: 1 (3.0V/1.8V)
- Standards: GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+/DC-HSPA+/ TD-SCDMA/CDMA (CDMA 1X/EVDO)/FDD LTE/TDD LTE

Display Interface

- 1 x double-row pin LVDS interface with resolution up to 1920 x 1080P, 12V backlight optional
- 1 x HDMI 1.4 Type A interface with resolution up to 1920 x 1080P

WIFI & Bluetooth Interface

- Number of antennas: 1
- Connector: RP-SMA male
- Standard: 802.11a/b/g/n, BT4.0, supporting AP and Client modes
- Frequency band: 2.412 - 2.485 GHz (2.4 GHz ISM band)
- Security: Open, WPA, WPA2, WEP
- Encryption: AES, TKIP, WEP64
- Data speed: 150 Mbps

Daughter Board

- Number of ports: 1
- Type: 2 x 15-pin double row pin

Device Interface

- Ethernet interface: 1 x 10/100 Mbps; can be configured to LAN/WAN port
- Serial port: 5 x RS-232 (DB9 + 3 x 3-pin terminal) + 2 x RS-485 3-pin terminal
- USB port: 6 x USB 2.0 host +1 x Micro USB otg
- GPIO: 2 x DI + 3 x DO

Audio Interface

- Earphone: 1 x 3.5 mm SPK connector
- Microphone: 1 x 3.5 mm MIC connector
- Speaker: 1 x 4 Pin 2.0 pitch male socket, supporting dual track, 4 Ω 5 W

Others

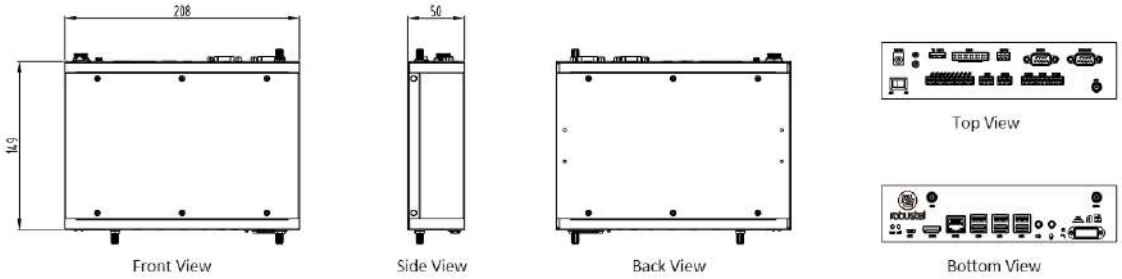
- SIM card: 1 x Standard SIM slot
- SD card: 1 x Micro SD slot
- Buttons: 1x return soft-touch button, 1 x power switch
- LED indicators: RUN/NET
- Battery: RTC button cell available for 5 years

Power Supply and Consumption

- Connector: DC female seat
- Input voltage: 12V DC

- Power consumption: Idle: 350mA @ + 12V DC
  Maximum: 4.5A @ + 12V DC

1.4 Dimension



1.5 Ordering Information

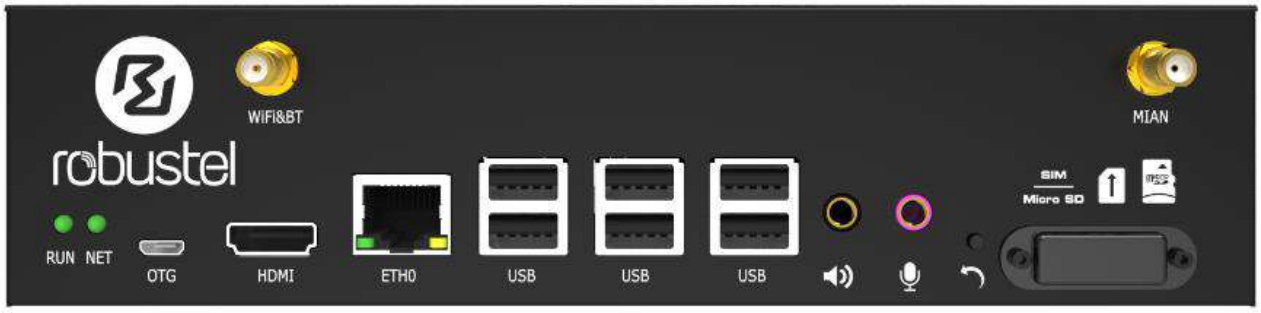
Model	RAC7000-4L
Display Screen Interface Type	HDMI + LVDS
Air Interface	GSM/GPRS/EDGE/ WCDMA /HSDPA/HSUPA/HSPA+/ TD-SCDMA/CDMA (CDMA 1X/EVDO)/UMTS/FDD LTE/TDD LTE
Frequency Bands	FDD LTE B1/B2/B3/B4/B5/B7/B8/B20
4G*	TDD LTE B38/B39/B40/B41
3G	UMTS B1 CDMA(CDMA1X/EVDO) BC0 TD-SCDMA B34/B39 HSDPA/HSUPA/HSPA+: B1/B2/B5/B8
2G	GSM/GPRS/EDGE: 850/900/1800/1900 MHz
Operating Environment	-20 to +70 °C
Relative Humidity	5 to 95% RH

*****_For more information about 4G frequency bands in different countries, please contact your Robustel sales representative_.

Note: LVDS is optional, but the device with LVDS cannot meet the demand of CE certification.

Chapter 2 Hardware Function

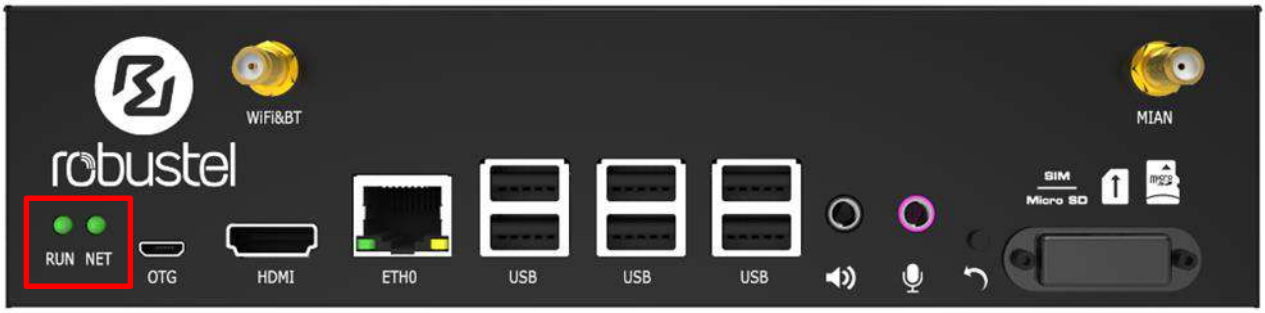
2.1 Front View



2-1 Hardware Front View Interface Diagram

2.1.1 System Operation Status Indicators

Device board has RUN and NET two indicators.

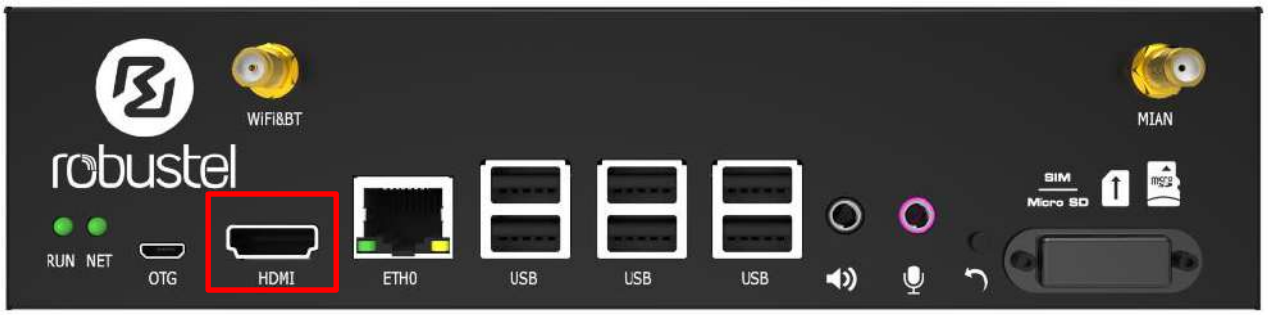


2-1-1 Status Indicators Diagram

Name	Color	Status	Description
RUN	Green	Blinking	System is running
		Off	System logs out
NET	Green	Solid	Connect to the cellular network and the signal is strong
	Yellow	Solid	Connect to the cellular network and the signal is in middle
	Red	Solid	Connect to the cellular network and the signal is weak
		Off	Disconnect to the cellular network

2.1.2 HDMI Interface Definition

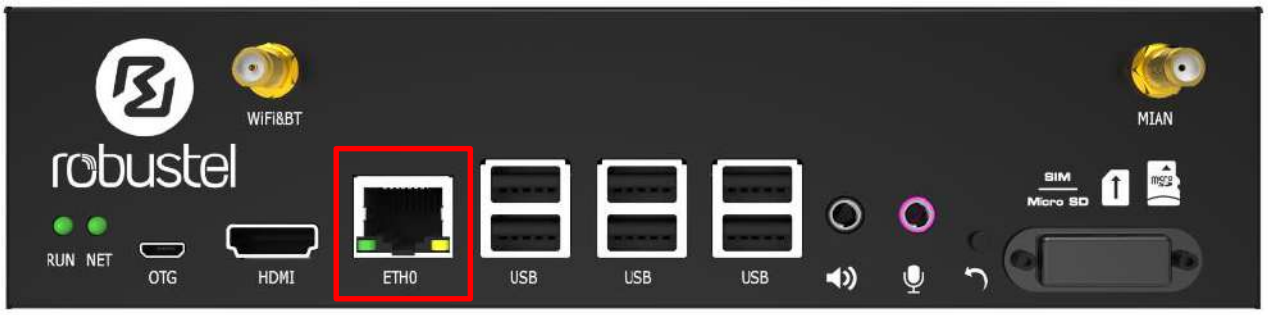
HDMI1.4 standard Type A interface with resolution up to 1920 x 1080P.



2-1-2 HDMI Interface Diagram

2.1.3 Ethernet Interface Definition

One Ethernet interface with two LED indicators, the yellow indicator indicates the rate of link connection, and the green one indicates the validity of link/data. The details can refer to the following table.

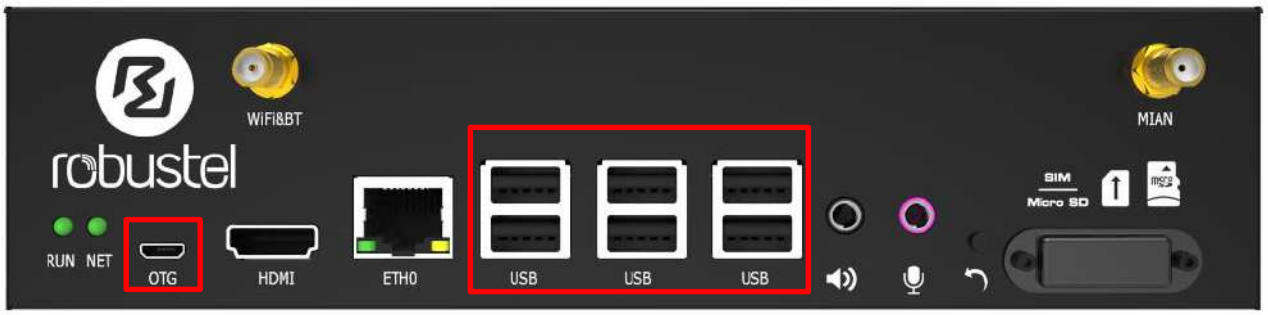


2-1-3 Ethernet Interface Diagram

Indicator	Status	Description
Link/Data validity indicator	Solid	Connection is built
	Blinking	Data is being transmitted
	Off	Disconnect
Rate indicator	Solid	100 Mbps mode
	Off	10 Mbps mode

2.1.4 USB Interface

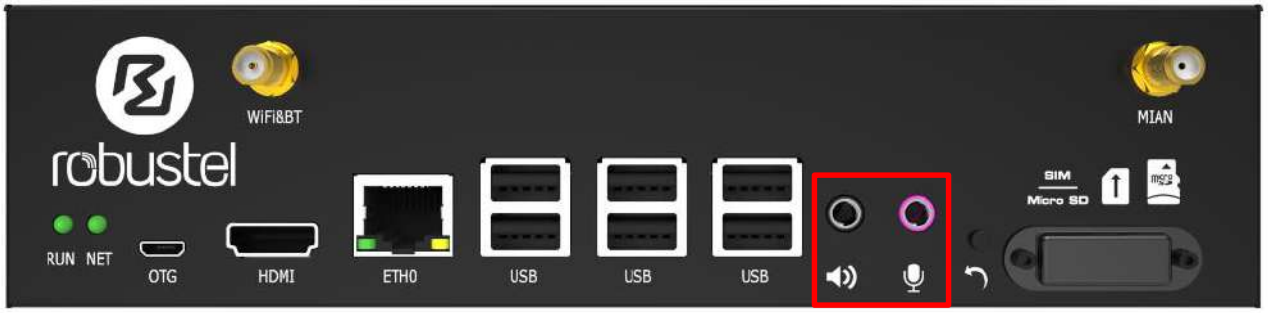
6 USB2.0 HOST (Type-A) functional interfaces, supporting U disk, USB mouse/keyboard, USB touch screen, USB camera and other regular USB devices.
One USB2.0 OTG (Micro) interface is used for firmware programming by default.



2-1-4 USB Interface Diagram

2.1.5 Headphone & Microphone Connector Definition

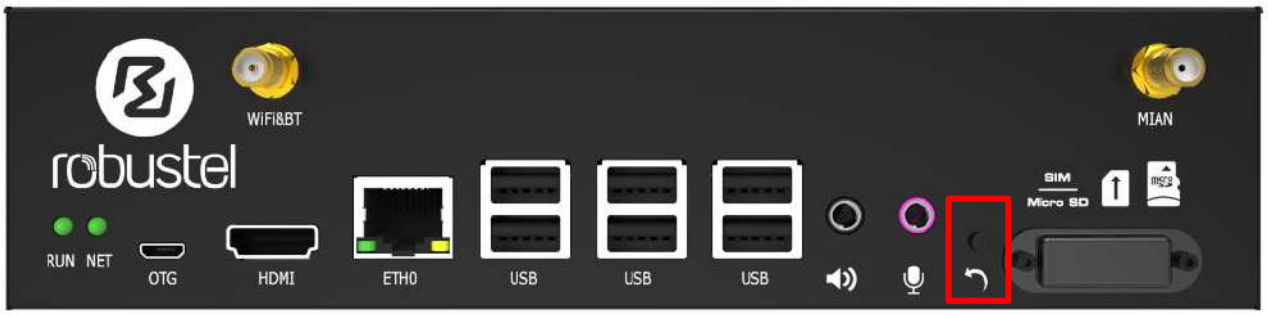
Both headphone and microphone use 3 segment 3.5 mm female audio jacks. The jack signal definition as shown below. The headphone supports left and right channel stereo audio output, and the microphone supports single channel input.



2-1-5 Headphone & Microphone Jacks Diagram

2.1.6 Return Button

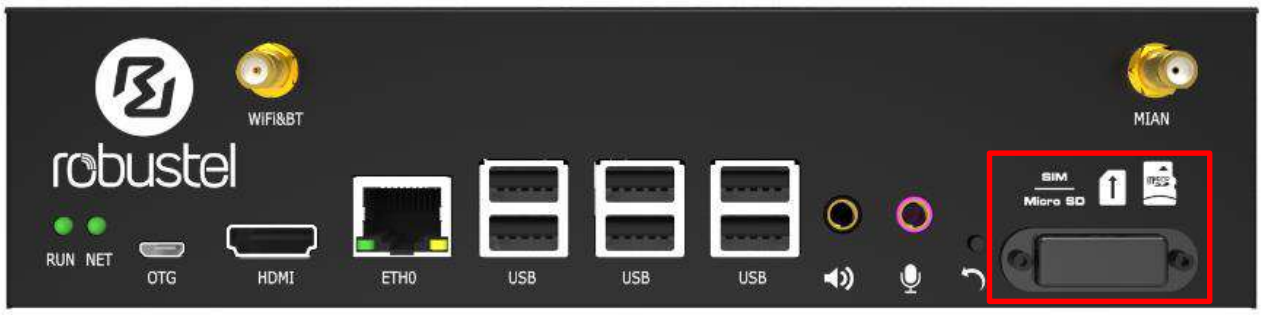
The diameter of the return button is 3.5 mm. Press the button slightly and the contents on the screen will return to the previous interface.



2-1-5 Return Button Diagram

2.1.7 SIM Card/Micro SD Card

RAC7000 has one self-elastic standard SIM slot and one self-elastic Micro SD slot.



2-1-7 SIM Card/Micro SD Card Diagram

- **Insert SIM card/Micro SD card**

1. Confirm power has been disconnected;
2. Insert SIM card/Micro SD, pressing with fingers until hearing a sound;

- **Remove SIM card/Micro SD card**

1. Confirm power has been disconnected;
2. Press SIM card/Micro SD card until hearing a sound, and take the card after the card is being ejected;

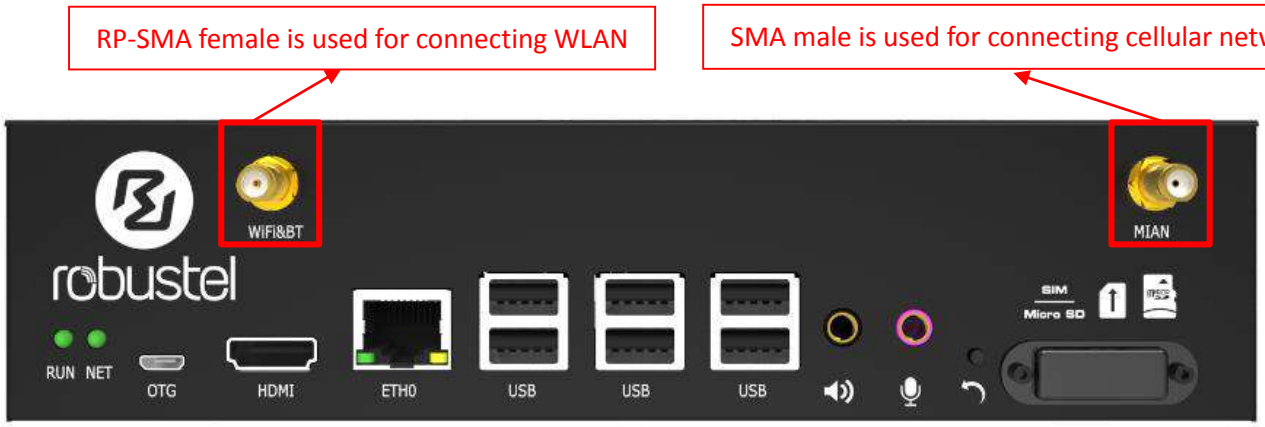
Note:

1. Recommended torque for mounting is 1.0 N.m, and the maximum allowed is 1.2 N.m.
2. Please use the specialized M2M SIM card/Micro SD card when the device is working in the extreme temperature. Because the regular card often disconnects when works in a harsh environment.
3. Do not touch the metal on the card, to preventing information loss or damage.
4. Do not bend or scratch card.
5. Keep card away from magnetic.
6. Must disconnect power before insert or remove the card.

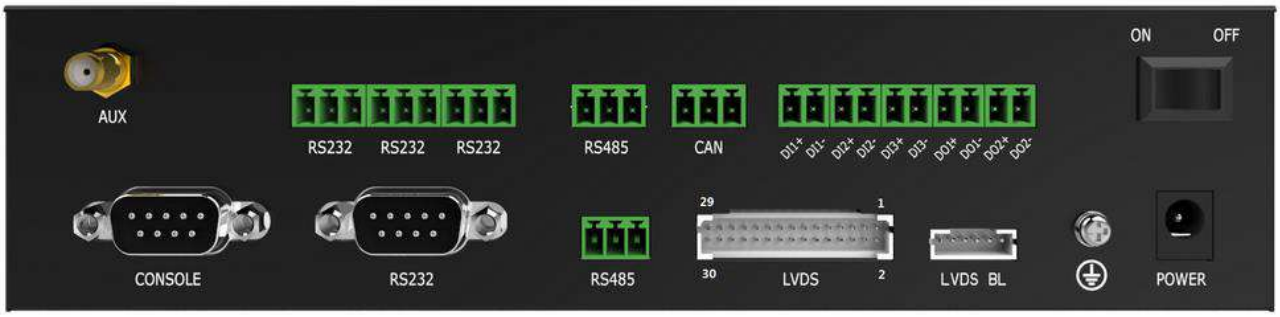
2.1.8 Attach External Antenna (SMA Type)

Attach an external RP-SMA antenna to the device's WIFI&BT antenna connector and twist tightly. Make sure the antenna should support 2.4 GHz and with 50 Ohm impedance. Attach an external SMA antenna to device's MAIN and AUX antenna connector and twist tightly. Make sure the antenna within the corresponding cellular network frequency band range and with 50 Ohm impedance.

Note: Recommended torque for mounting is 0.35 N.m.



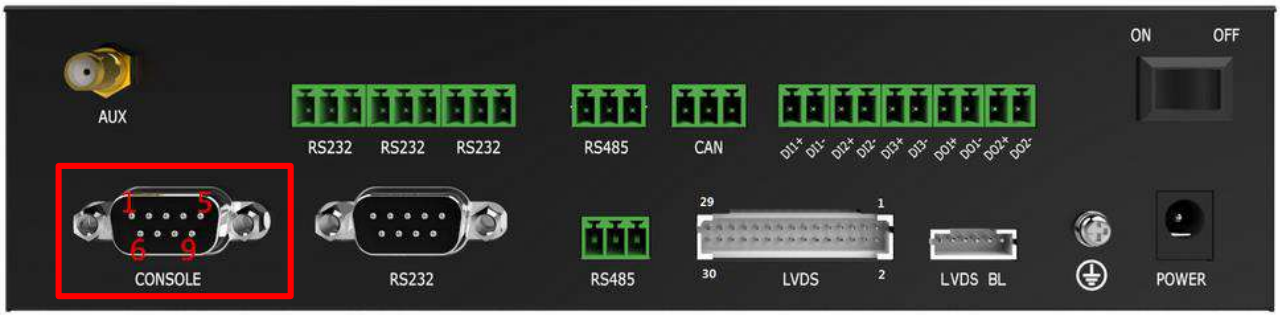
2.2 Back View



2-2 Diagram of Back View Hardware Interface

2.2.1 CONSOLE Definition

Use a standard DB9 male connector and three-wire serial interface.

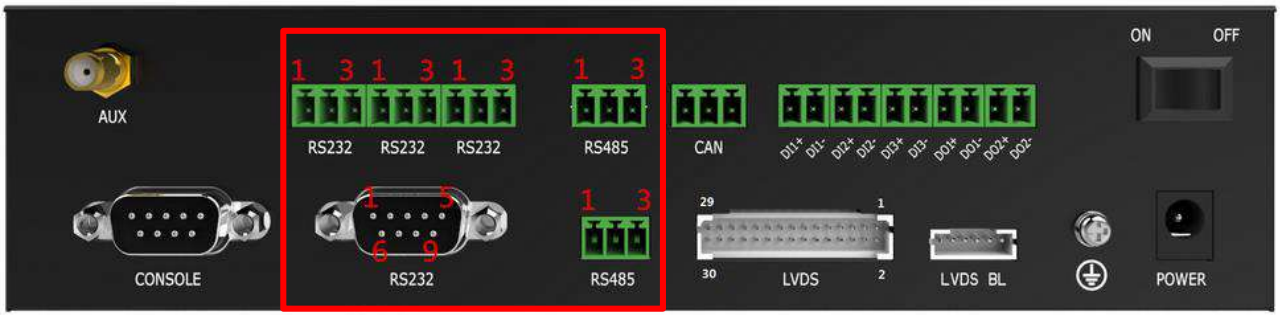


2-2-1 CONSOLE Diagram

PIN	Signal Name	Description
1	-	-
2	RXD	Device receives data
3	TXD	Device sends data
4	-	-
5	GND	Signal ground
6	-	-
7	-	-
8	-	-
9	-	-

2.2.2 Serial Port Definition

Use 5 x 3.0 mm pitch phoenix connector and 1 x standard DB9 male RS232 connector.



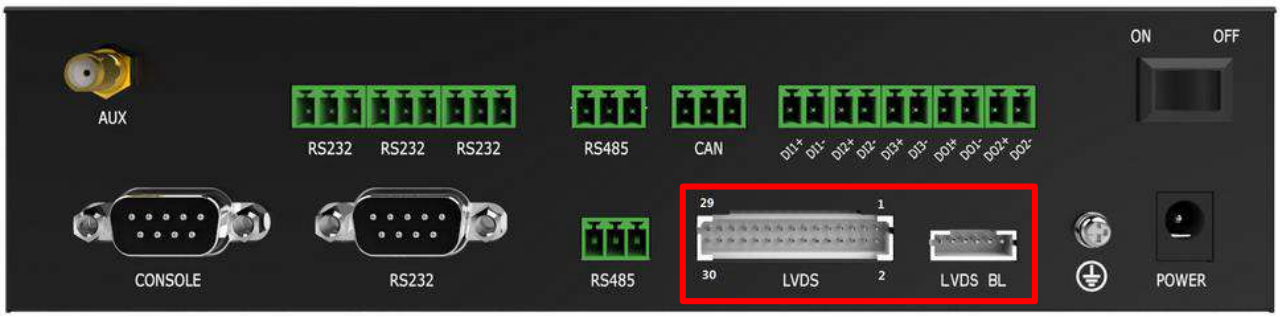
2-2-2 Serial Port Diagram

RS485			RS232_3pin		
PIN	**Signal Name**	**Description**	**PIN**	**Signal Name**	**Description**
1	GND	Signal ground	1	GND	Signal ground
2	A	RS485 data line +	2	TXD	Device sends data
3	B	RS485 data line -	3	RXD	Device receives data

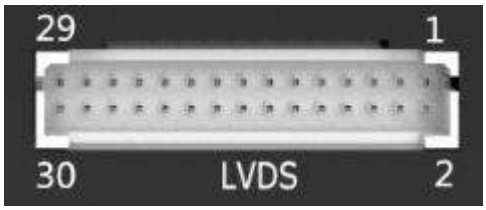
RS232_DB9		
PIN	**Signal Name**	**Description**
1	-	-
2	RXD	Device receives data
3	TXD	Device sends data
4	-	-
5	GND	Signal ground
6	-	-
7	-	-
8	-	-
9	-	-

2.2.3 LVDS Interface Definition

LVDS signal interface of RAC7000 is plug-type 2 x 15 pin pitch 2.0 mm socket; backlight interface is plug-type 1x 6 pin pitch 2.0 mm socket; voltage selected interface is 2 x 3 Pin pitch 2.0 mm pin header.
Definitions of LVDS signal interface, backlight interface, and voltage selected interface are as the following:

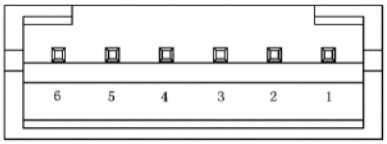


2-2-3 LVDS Interface Diagram



2-2-3-1 LVDS Interface Diagram

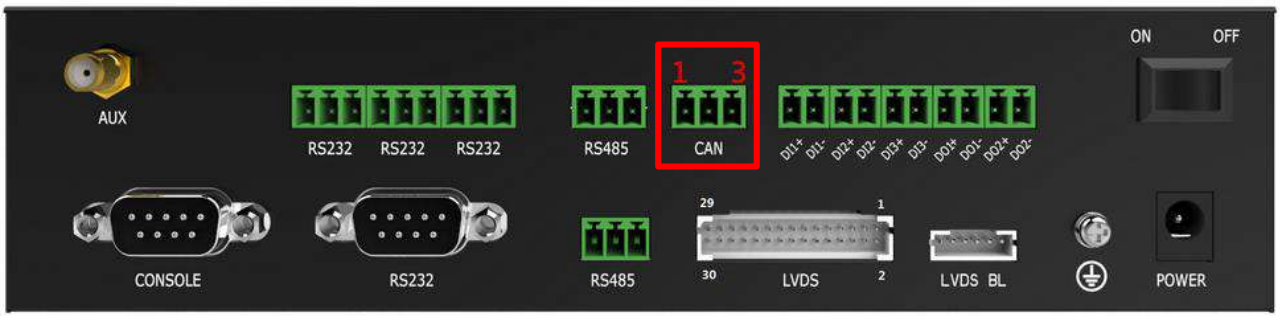
Definition of LVDS Signal Interface PIN		
PIN	**Signal Name**	**Description**
PIN 1~PIN 3	LVDS_PW	LVDS logic drive power; voltage is selected according to the display screen and configured by the jumper on JP3 pin. The default configure voltage is 3.3 V.
PIN 4~PIN 6	GND	Power ground pin
PIN 7~PIN 8	LVDS0_Tx0_N ~ LVDS0_Tx0_P	LVDS0_Tx0 negative and positive pair
PIN 9~PIN 10	LVDS0_Tx1_N ~ LVDS0_Tx1_P	LVDS0_Tx1 negative and positive pair
PIN 11~PIN 12	LVDS0_Tx2_N ~ LVDS0_Tx2_P	LVDS0_Tx2 negative and positive pair
PIN 13~PIN 14	GND	Power ground pin
PIN 15~PIN 16	LVDS0_CLK_N ~ LVDS0_CLK_P	LVDS0 clock negative and positive pair
PIN 17~PIN 18	LVDS0_Tx3_N ~ LVDS0_Tx3_P	LVDS0_Tx3 negative and positive pair
PIN 19~PIN 20	LVDS1_Tx0_N ~ LVDS1_Tx0_P	LVDS1_Tx0 negative and positive pair
PIN 21~PIN 22	LVDS1_Tx1_N ~ LVDS1_Tx1_P	LVDS1_Tx1 negative and positive pair
PIN 23~PIN 24	LVDS1_Tx2_N ~ LVDS1_Tx2_P	LVDS1_Tx2 negative and positive pair
PIN 25~PIN 26	GND	Power ground pin
PIN 27~PIN 28	LVDS1_CLK_N ~ LVDS1_CLK_P	LVDS1 clock negative and positive pair
PIN 29~PIN 30	LVDS1_Tx3_N ~ LVDS1_Tx3_P	LVDS1_Tx3 negative and positive pair



2-2-3-2 LVDS Backlight Interface Diagram

LVDS BL		
PIN	**Signal Name**	**Description**
1~2	12V	LVDS backlight power positive pin
3	EN	LVDS backlight enabled pin
4	PWM	LVDS backlight brightness control pin
5~6	GND	Ground pin

2.2.4 CAN Interface Definition

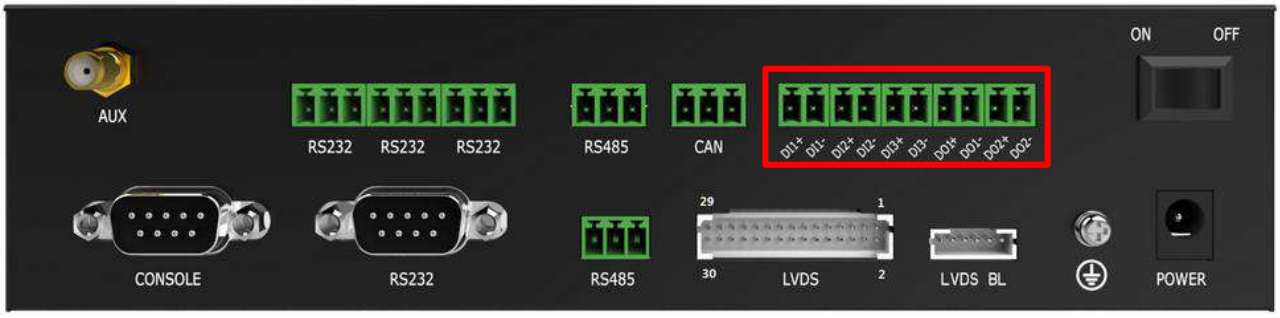


2-2-4 CAN Interface Diagram

PIN	Signal Name	Description
1	GND	Signal ground
2	CAN_H	CAN-High wire
3	CAN_L	CAN-Low wire

2.2.5 DI/DO Interface Definition

3.5 mm pitch Phoenix terminal, 3 x DI and 2 x DO wet node. The maximum voltage is 30V and the maximum current is 10mA.

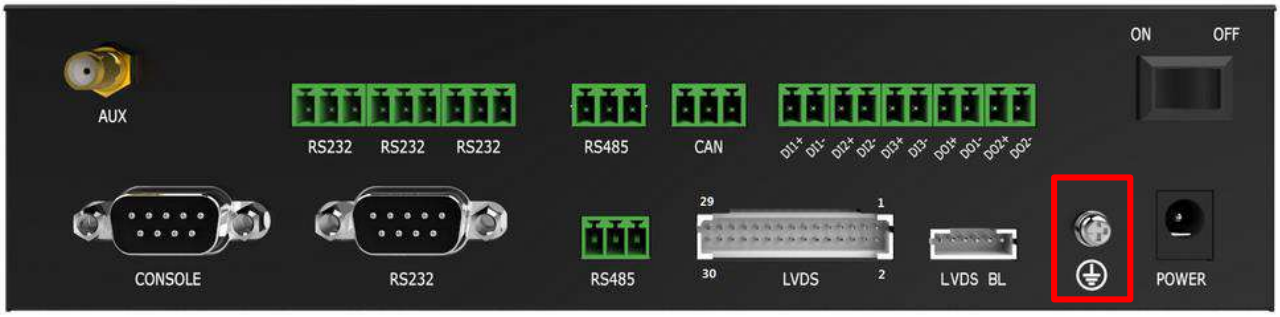


2-2-5 DI/DO Interface Diagram

PIN	Signal Name	Description
PIN1~PIN2	DI1+ ~ DI1-	The positive and negative end of DI1 data input wire

PIN3~PIN4	DI2+ ~ DI2-	The positive and negative end of DI2 data input wire
PIN5~PIN6	DI3+ ~ DI3-	The positive and negative end of DI3 data input wire
PIN7~PIN8	DO1+ ~ DO1-	The positive and negative end of DO1 data output wire
PIN9~PIN10	DO2+ ~ DO2-	The positive and negative end of DO2 data output wire

2.2.6 Grounding Industrial Control Computer



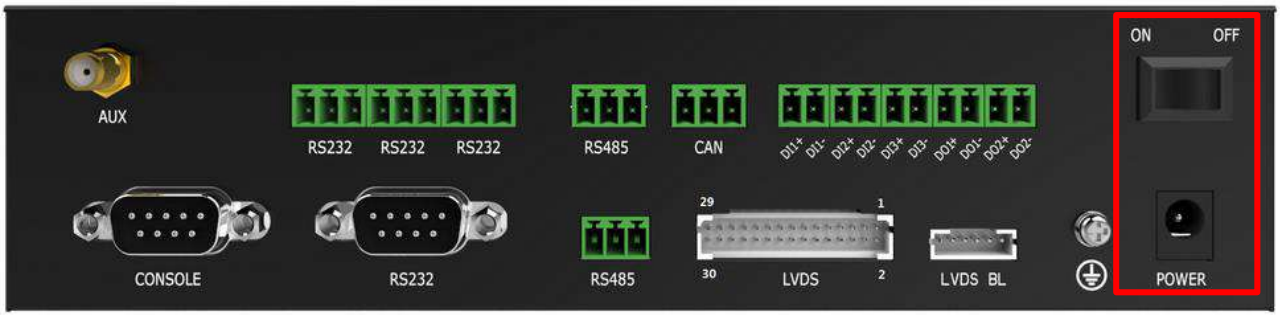
2-2-6 Grounding Industrial Control Computer

Grounding the industrial control computer can prevent the influence of magnetic interference. Make the device grounded by a grounding screw before connecting the device.

Note: the product should be mounted on well-grounded device surface such as a metal plate.

2.2.7 Power Supply

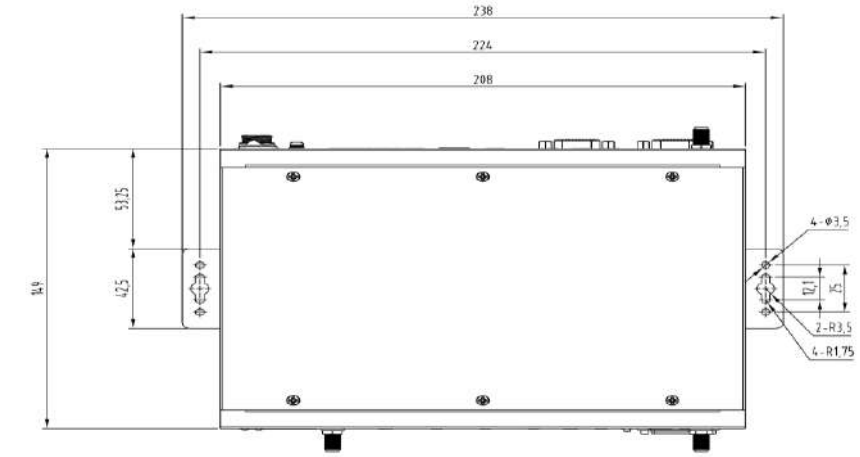
The power voltage is 12V DC and the maximum current is 5A (when the device is fully equipped, and if all USB interfaces reach to 5V/500mA, the LVDS screen is 27-inches or above, and the audio volume reaches to the peak, the device can use the maximum current), and the current is less than 3A on most application conditions. A boat switch and a DC power head are used.

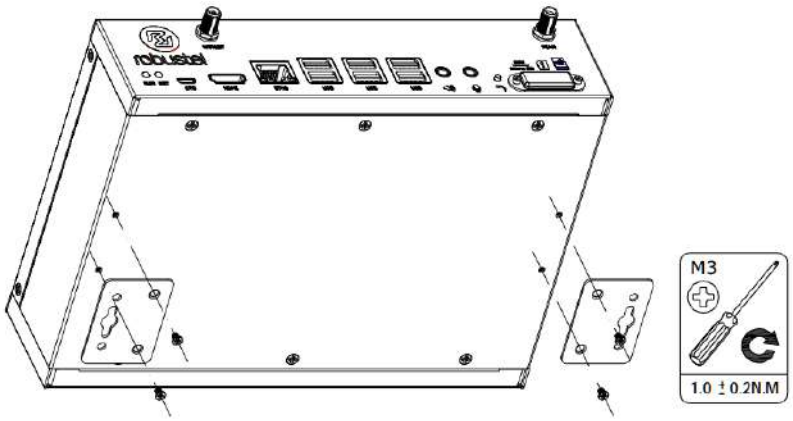


2-2-7 Power Interface Diagram

2.3 Install Industrial Control Computer

The Industrial Control Computer supports desktop and wall mounting (measured by millimeter).





Use 4 pcs of M2.5*4 flat head Phillips screws to fix the wall mounting kit to the industrial control computer, and then use 2 pcs of M3 drywall screws to mount the industrial control computer associated with the wall mounting kit on the wall.

Note: Recommended torque for mounting is 1.0 N.m, and the maximum allowed is 1.2 N.m.

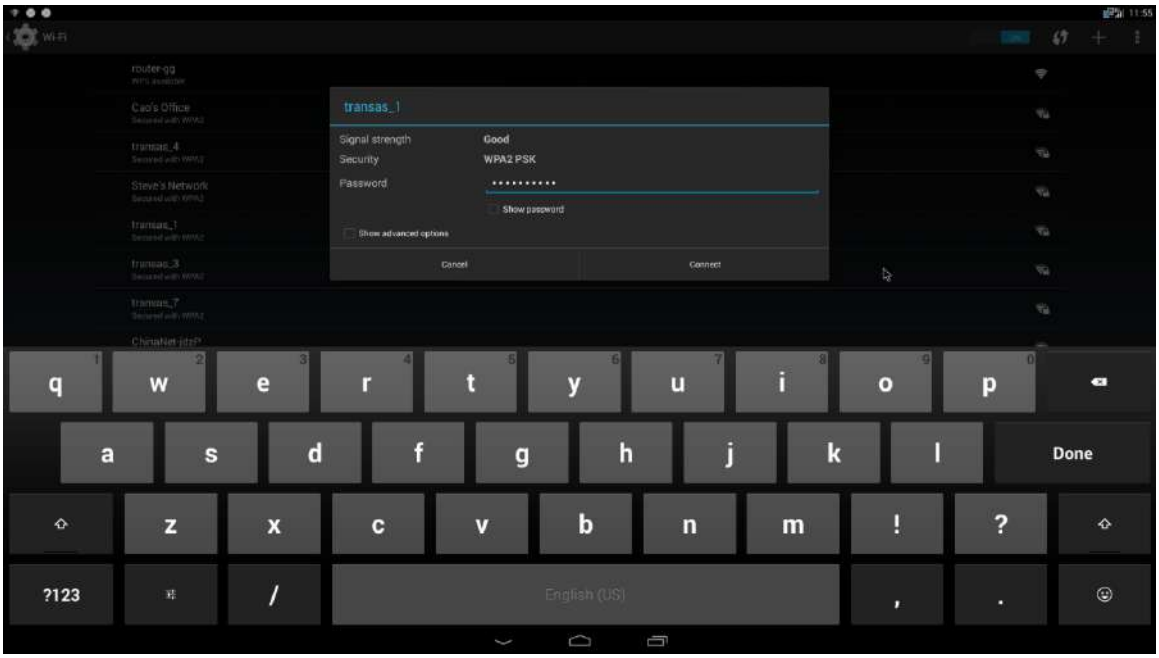
Chapter 3 Software Function

3.1 WIFI and Network

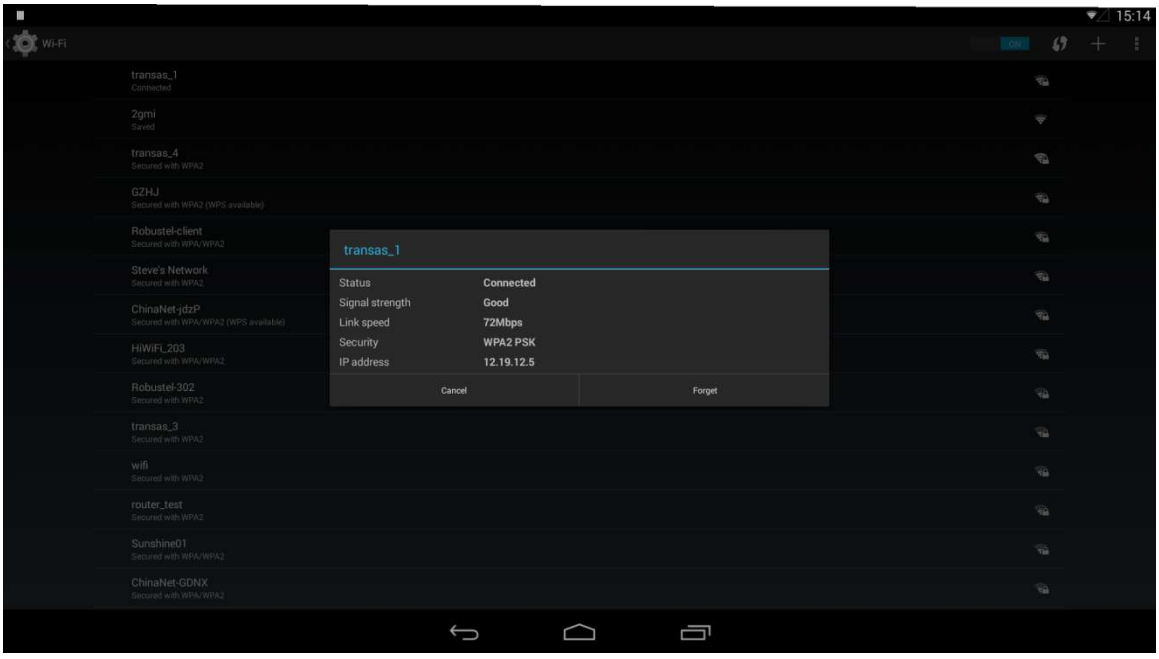
3.1.1 WLAN

Tip: Please confirm the WLAN antenna has been connected before opening WLAN.

Click “Settings” in the application menu, and select “WLAN” to open WLAN. The SSID and security settings of the surrounding WLAN network are automatically scanned in the WLAN list (open network or WPA/WPA2 protection). Select one of the WLAN networks to connect. When you select an encrypted network, the password input box will pop up. After the password is successfully authenticated, you can connect to the network.



When an open network is selected, the connection is automatically made. When the network is successfully connected, clicking on the connected network will display the current network status information, signal strength, connection speed, security and IP address.



When you need to remove the current network, click the current network to pop up the current network information dialog box. Meanwhile, select “Cancel Save”. When you need to connect next time, you need to re-enter the password for authentication.

3.1.2 Mobile Network

In order to meet the needs of clients for different network types, RAC7000 is compatible with Huawei ME909s-120 and ZTE ME3630 modules, supporting 2G/3G/4G networks of various operators.

3.1.3 Ethernet

Click “Settings” in the application menu, and select “Ethernet” to open Ethernet, supporting DHCP and static IP network connection.

3.1.4 LAN

The status of LAN is open by default on setting page. When the device uses the cellular network, connecting a lower computer through a network port, DHCP obtains the network segment corresponding to 192.168.1.1 and can access the internet normally.

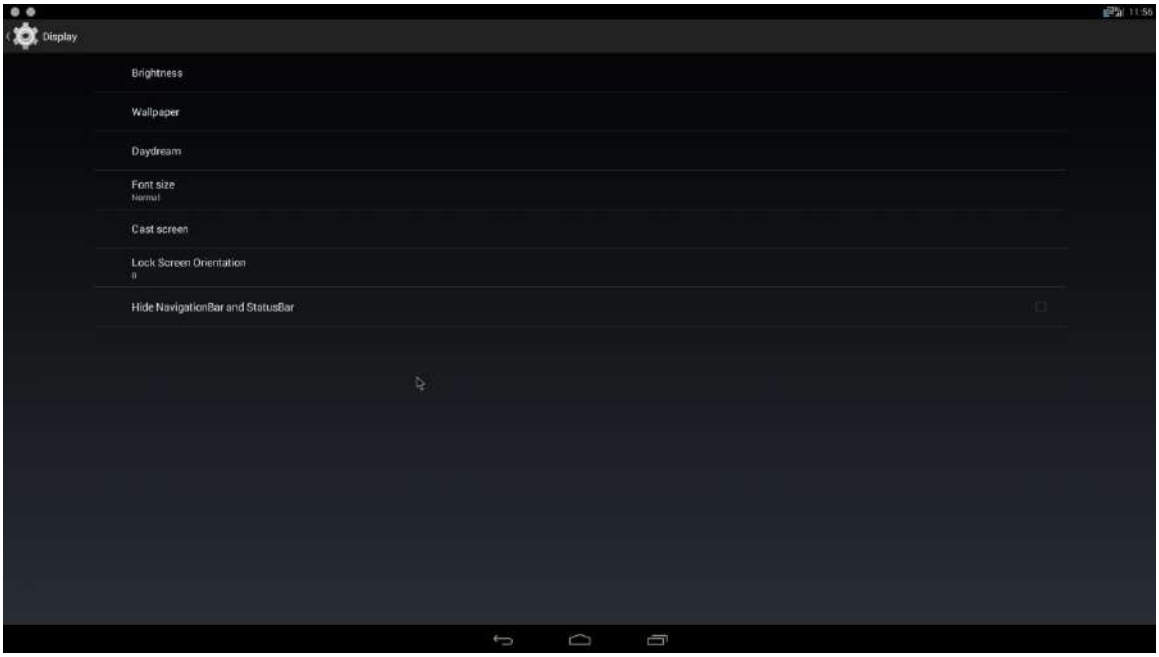
3.2 Indication Function

3.2.1 Display Port & Resolution

Support LVDS, HDMI, and EDP single screen output.
Support LVDS, HDMI, and EDP multiple screens indication.
Default resolution: 1920 x 1080

3.2.2 System Navigation & Notification Bar

System navigation and notification bar open by default, which can be turned off in Settings > Display.

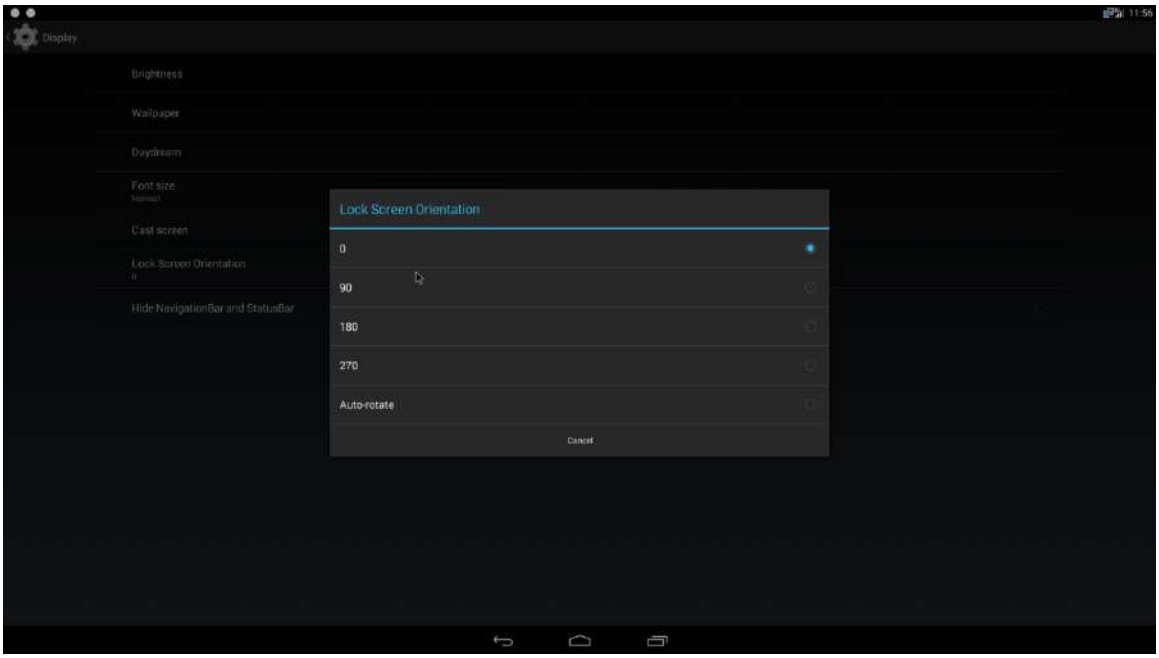


3.2.3 Brightness Adjusting

The brightness can be adjusted in Settings > Display > Brightness Level (the brightness of the HDMI screen can only be adjusted by self-setting).

3.2.4 Switch Landscape or Portrait

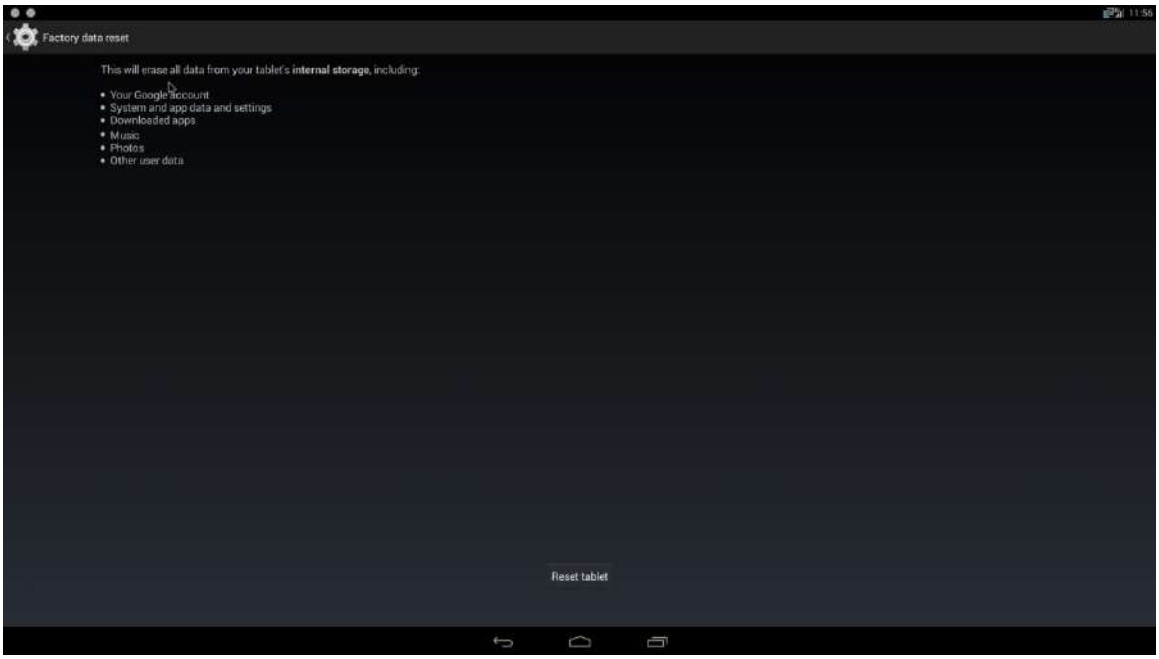
Switch between the system's horizontal and vertical screens in Settings > Display > Lock Screen Orientation.



Note:
The system defaults to the horizontal screen display. If you choose not to lock, the app will display according to the direction it declares.

3.3 Back Up & Reset

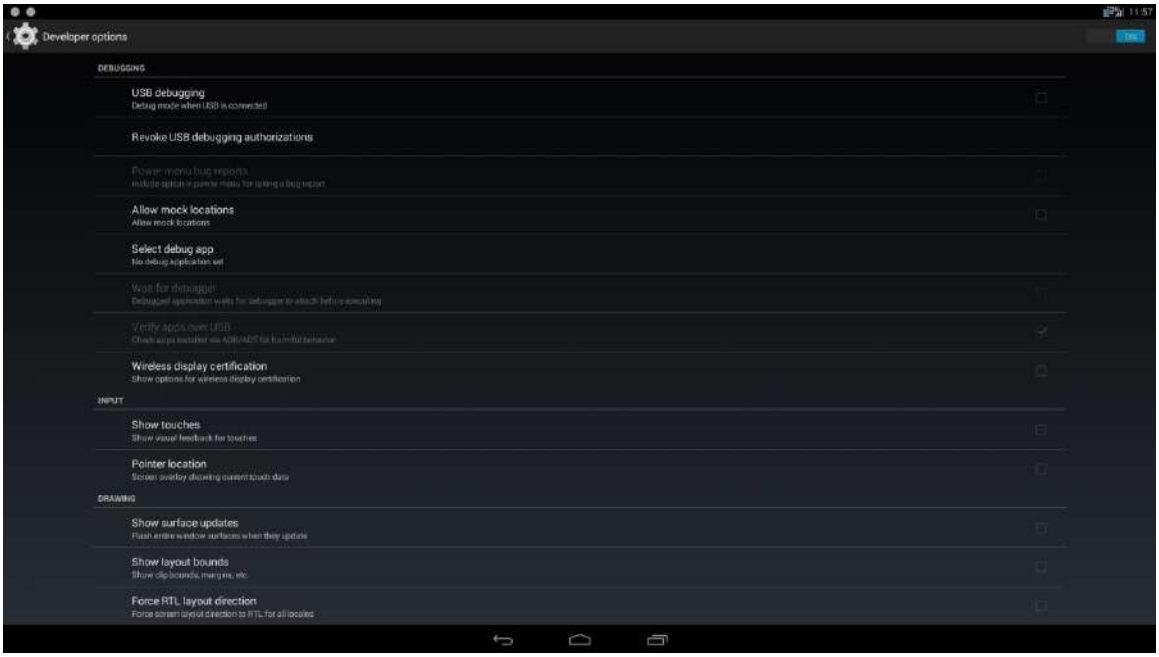
Network reset and factory reset are available in Settings > Back up & Reset.
As shown below, click Reset Settings to reset all networks.



Note: To avoid the wrong operation, after click reset, it is required to confirm again to carry out the operation.

3.4 ADB Debugging

Open Setting> Developer Options, and click the version number 5 times to open the entrance of the developer option, and then open Settings > Developer Options > USB Debugging.



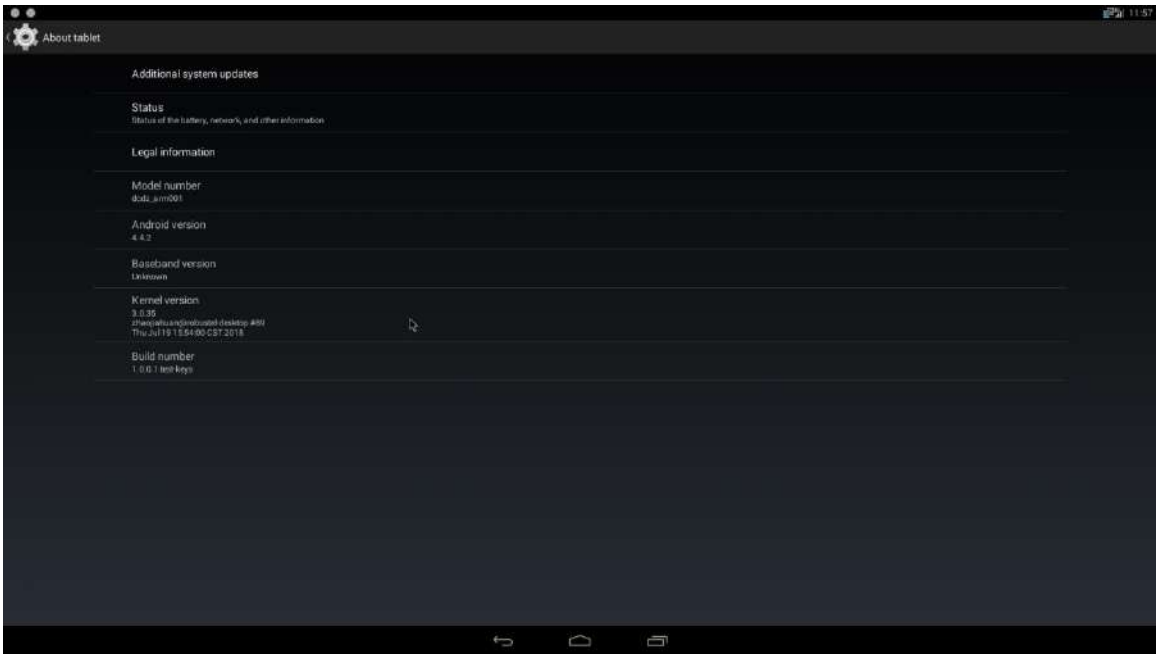
After installing ADB on Windows, you can debug ADB at the command prompt.

3.5 Upgrade Silently

After the third-party App sends upgrade broadcast, the system will silently install the new version installation package according to the accepted installation package information and boot the App.

3.6 System Update

The device supports the "card swipe" automatic upgrade, copy the upgrade firmware to the root directory of the USB flash drive or SD card, and access the device system to automatically detect the firmware for upgrading. After the upgrade is complete, you can find the corresponding version number in Settings > About Tablet.


About tablet
Additional system updates
Status
Legal information
Model number
Android version
4.4.2
Baseband version
Unknown
Kernel version
Build number

Glossary

Abbr.	Description
IPC	Industrial Personal Computer
LAN	Local Area Network
WAN	Wide Area Network
IP	Internet Protocol
MAC	Media Access Control
DHCP	Dynamic Host Configuration Protocol
PPP	Point to Ponit Protocol
NAT	Network Address Translation
DMZ	Demilitarized Zone
VPN	Virtual Private Network
IPSec	IP Security
SSH	Secure SHell
SNMP	Simple Network Management Protocol
DoS	Deny Of Service
POE	Power Over Ethernet
USB	Universal Serial Bus
DI	Digital Input
DO	Digital Output
GRE	Generic Routing Encapsulation
L2TP	Layer Two Tunneling Protocol
PPTP	Point to Point Tunneling Protocol
WiFi	Wireless Fidelity
SDK	Software Development Kit
CLI	Command Line Interface
QoS	Quality of Service

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