华北工控
NORCO

EMB-3531

V2.2

用户手册
USER'Manual

Industrial & Communication Computer

做中国最可信赖的工控产品

EMB-3531

V2.2

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Safety Instructions

1． Please read the product manual carefully before using this product.

2．Put all the unused or uninstalled boards or electronic components in a static dissipative surface or static shielding bag.

3．Always ground yourself to remove any static discharge before touching the board, to place your hands on grounding metal object for a while or wear a anti-static wrist strap at all times.

4．When taking or fetching the boards or cards, please wear antistatic gloves and have the habit of holding the boards by its edges.

5．Make sure that your power supply is set to the correct voltage in your area. Incorrect voltage may cause personal injuries and damage the system.

6．To prevent electronic shock hazard or any damage to the product, please ensure that all power cables for the devices are unplugged when adding or removing any devices or reconfiguring the system.

7．To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

8．When adding or removing devices to or from the system, ensure that all the power cables for the devices are unplugged in advance.

9．To prevent any unnecessary damage to the products due to frequent power on/off, please wait at least 30 seconds to restart the unit after the shutdown.

10．If system goes wrong during the operation, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

11．This product is classified as Class A product, which may cause radio interference in our living environment. On this occasion, users need to take measures to handle the interference.

Content

Packing List

Thanks for purchasing NORCO products. Please check the accessories as per the packing list when you open the package. If you find any components/parts defected, damaged or lost, please contact your vendor ASAP.

■ EMB-3531 V2.2 motherboard 1pcs

Chapter One

Product Introduction

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Chapter One

Product Introduction

1.1 Hardware Specification

Size

●Size:146mmX102mm

Processor

●CPU：RK3399，hexa-core (dual-core A72 2GHz + quad-core A53 1.5GHz)

System Memory

●On board Memory：on board 2G/4G DDR3

Display

●Provides 1xDP port，supporting resolution: 4Kx2K@60Hz

●Provides 1xLVDS port，supporting resolution: 1920 x1080@60Hz

●Provides 1xHDMI port, supporting resolution: 4Kx2K @60Hz

●Supports independent dual display；

Storage

●Provides1xTF card slot，memory up to 64G

●On board 16G/32G/64G EMMC

AUDIO

●Applies ES8316+NS4258T audio control chip

●Provides one 2X4 connector，support dual-channel power amplifier output and 1xMic-in

●On board power amplifier chip，support 5W dual-channel power amplifier，one on board CTIA standard headphone jack

LAN

●On board RJ45 Ethernet port，supports 100/1000M network

I/O

●Serial port：Provides 6x serial port，COM1/3->RS232/RS485/TTL；COM4-7->RS232/TTL

●USB: Provides 7xUSB ports；4xUSB3.0 and 2xUSB2.0，1xOTG port

●Provides: 1xPWM

●Provides: 1xI2C port

Expansion Port：

●1xMINI PCIe slot, supports 3G/4G /WLAN optional

●1xSIM card slot；supports NANO SIM card

●1xPCIEX4 slot，supports PCIE network card

●2xMIPI_CSI port，supports MIPI CAMERA

●1xCIF CAMERA port；

●1x2.00mm 2x6PIN JFP front panel interface

●1x2x15PIN GPIO port，including 12xGPIO（configurable SPI/I2S）,1xMIPI_DSI

●Provides: 1x on board WIFI module

Power Supply

●Single supply+12V，supports hardware and software switch for system auto boot upon power on

Watchdog

●Supports hardware reset function

Operating Environment

●Operating Temperature：0℃~60℃

●Humidity：5%~95%，RH, non-condensing

Chapter Two

Hardware Function

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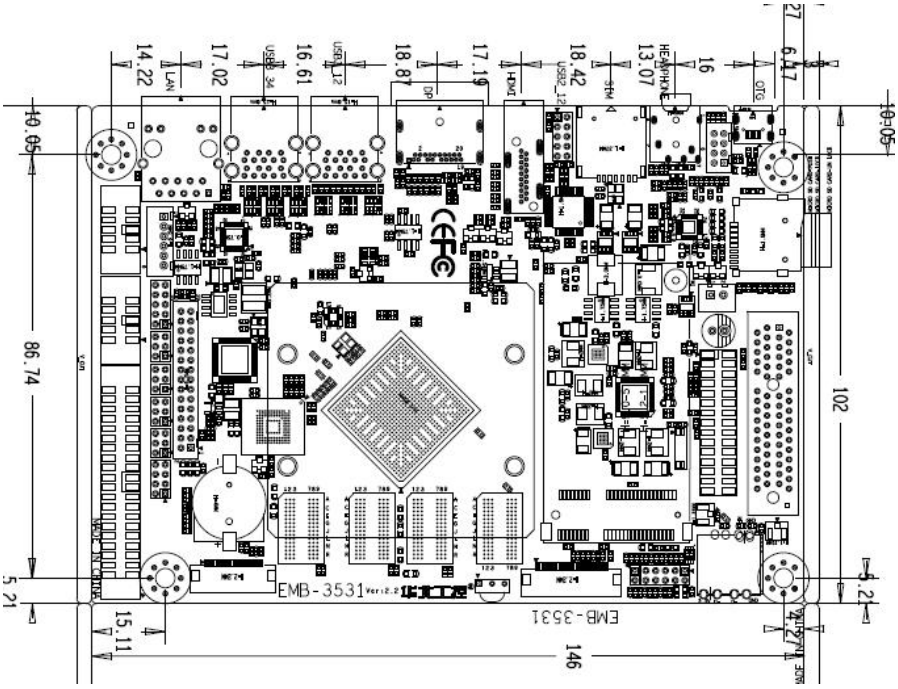
Chapter Two

Hardware Function

2.1 Interface Location and Dimensional Drawing

Following is the front interface location and dimensional drawing of EMB-3531 V2.2 .Please be careful during the installation. Improper installation may lead to system failure.



Note: In case of any electrostatic damage caused to some components, please wear anti-static gloves to install the motherboard.

2.2 Installation

Please refer to following steps to assemble your computer:

1. Adjust all jumpers on board EMB-3531 V2.2 according to the user manual.
2. Install other expansion card.

3．Connect all signal line, cable, ,panel control circuit, and power supplier.

⚠ **Key components of this motherboard are Integrated circuit and these components could be easily damaged by electrostatic influence. So, before installing this unit, please always keep the following precautions in mind:**

1．Hold the board by edges and don’t touch any components, plugs or socket pins.

2．Wear anti-static gloves/wrist strap while touching the integrated circuit components, such as CPU, RAM, etc.

3．Put those unused or uninstalled components in static shielding bags or trays.

4．Please first check the power switch is off before connecting the power plug.

Before installing the computer accessories

Following the instructions below will help to prevent your computer from being damaged, and also ensuring your personal safety.

1．Please make sure your computer is disconnected from the power supply.

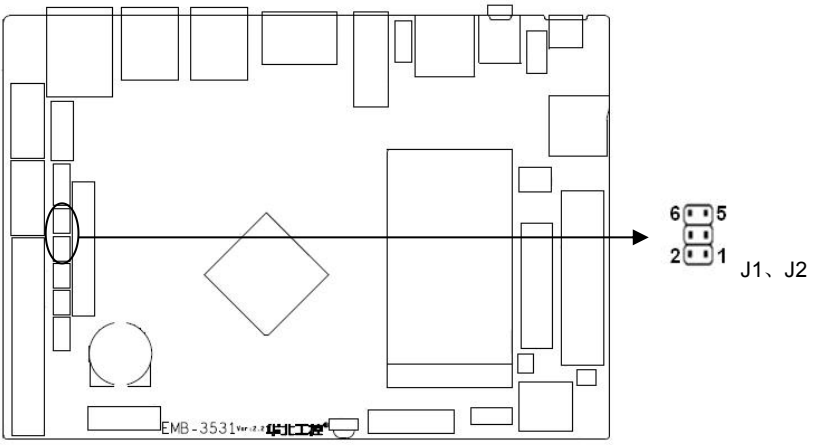
2．Please always wear anti-static strap or gloves to operate the board in case that you may touch the integrated circuit components, such as RAM.

2.3 Jumper Settings

Please refer to following instructions to do jumper settings before installing your hardware devices.

Remark: How to identify the PIN1 of all jumpers and interfaces: Please observe the mark near the plug and socket, which is a “1” or bold line or triangular symbol; And please look at the back of PCB, the one in the shape of square is the PIN 1; and PIN1 for every jumper is remarked by a white narrow near it.

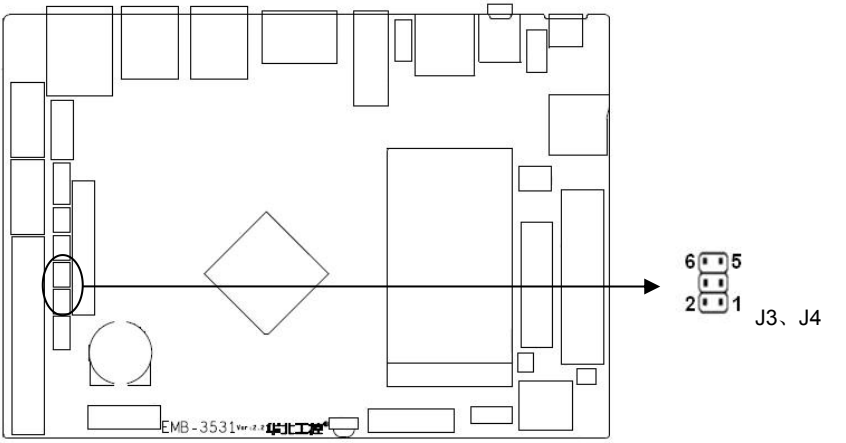
2.3.1 COM1 Jumper Settings（J1，J2）



J1、J2:

COM1 AS RS232 PORT		COM1 AS RS485 PORT	
J1	1-2	J1	3-4 5-6
J2	1-3 2-4	J2	3-5 4-6

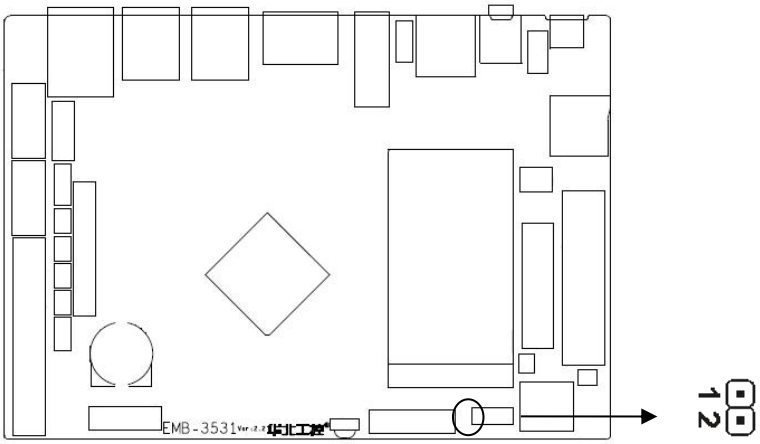
2.3.2 COM2_3 Jumper Settings（J3，J4）



J3、J4:

COM3 AS RS232 PORT		COM3 AS RS485 PORT	
J3	1-2	J3	3-4 5-6
J4	1-3 2-4	J4	3-5 4-6

2.3.3 JDOWNLOAD（JD）



JD

JD:

JD	
1-2	Down load
NC	Default

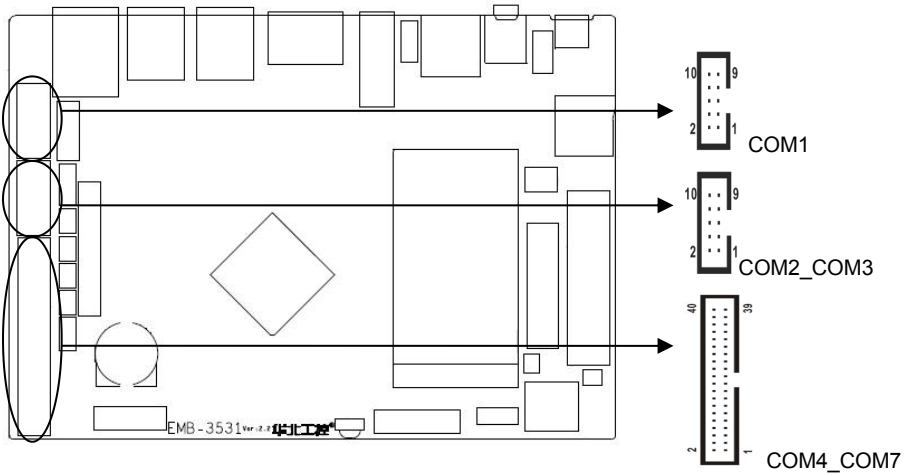
2.4 Interfaces Description

⚠ **Please read this manual carefully before installing any external connectors, in case of any damage to the motherboard!**

2.4.1 Serial Ports（COM1，COM2_COM3，COM4_COM7）

6x serial ports ， COM1/3 supports RS232/RS485/TTL mode ， COM4-7 supports

RS232/TTL mode，COM2 is debugging Port (Not Used as Common Serial Port).



COM1：

Signal Name	Pin		Signal Name
DATA-	1	2	NC
DATA+/RXD	3	4	RTS
TXD	5	6	CTS
NC	7	8	NC
GND	9	10	GND

COM2_3：

Signal Name	Pin		Signal Name
DATA-	1	2	DB_RXD
DATA+/RXD	3	4	DB_TXD
TXD	5	6	NC
NC	7	8	NC
GND	9	10	GND

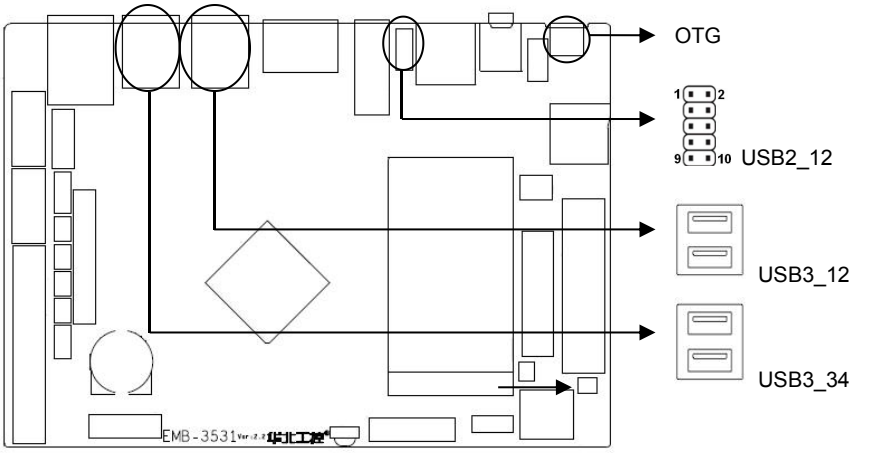
COM4_7：

Signal Name	Pin		Signal Name
NC	1	2	NC

RXD	3	4	RTS
TXD	5	6	CTS
NC	7	8	NC
GND	9	10	GND
NC	11	12	NC
RXD	13	14	RTS
TXD	15	16	CTS
NC	17	18	NC
GND	19	20	GND
NC	21	22	NC
RXD	23	24	RTS
TXD	25	26	CTS
NC	27	28	NC
GND	29	30	GND
NC	31	32	NC
RXD	33	34	RTS
TXD	35	36	CTS
NC	37	38	NC
GND	39	40	GND

2.4.2 USB Ports（USB2_12，USB3_12，USB3_34 ，OTG)

Provides 7xUSB ports，in which 4xUSB3.0 and 2xUSB2.0 ports. Provides 1xOTG port.

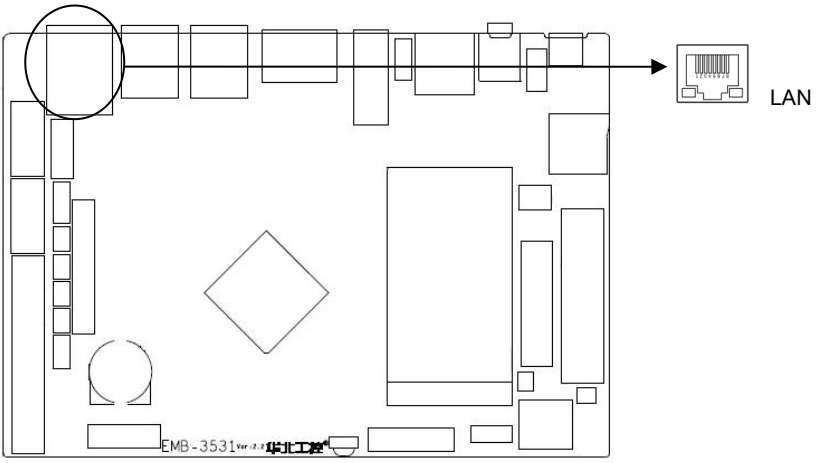


USB2_12：

Signal Name	Pin		Signal Name
VCC	1	2	GND
HUB_1-R	3	4	GND
HUB_1+R	5	6	HUB_2+R
GND	7	8	HUB_2-R
GND	9	10	VCC

2.4.3 Ethernet Port（LAN）

Provides 1xRJ45 Ethernet port ， the yellow one indicates data transmission status, and the green one indicates network connection status.

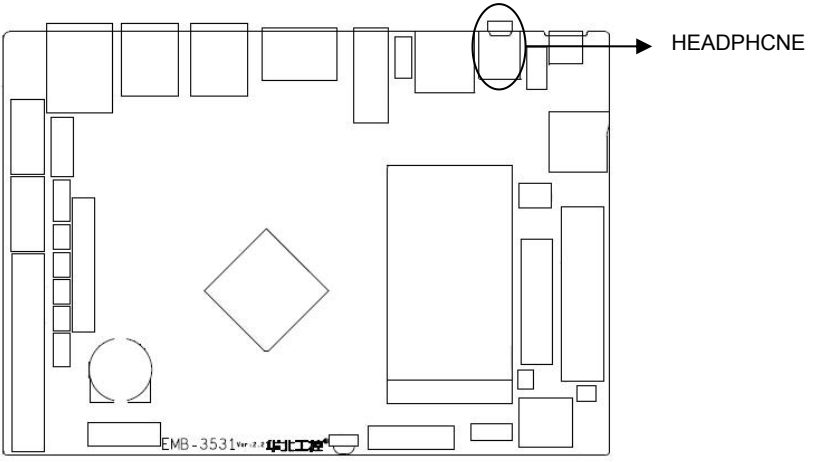


RJ45 LAN LED Status Description:

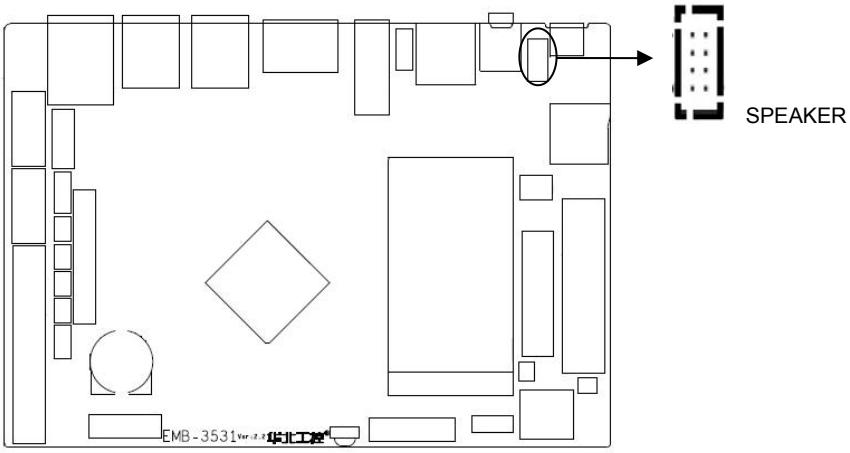
LILED（Green）Status	Function	ACTLED（Yellow）status	Function
ON	100/1000M link	FLASH	Data transmission
OFF	10M link or closed	OFF	Data stopped

2.4.4 Headphone Jack（HEADPHCNE）

Provides 1xheadphone jack



2.4.5 Power Amplifier Interface（SPEAKER）

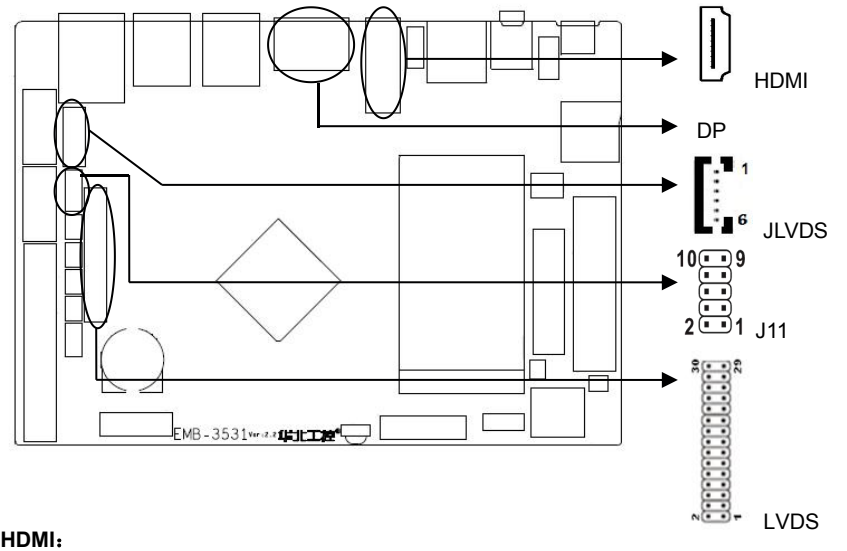


SPEAKER：

Signal Name	Pin		Signal Name
VCC3	1	2	OUTPL
GND	3	4	OUTNL
MIC+	5	6	OUTNR
MIC-	7	8	OUTPR

2.4.6 Display Port（HDMI ，LVDS，JLVDS，J11，DP）

Provides 1x HDMI high definition display port，provides 1x LVDS port，provides 1x JLVDS backlight port, and 1xDP port.



HDMI：

Signal Name	Pin		Signal Name
D2+	1	2	D2 Shield
D2-	3	4	D1+
D1 Shield	5	6	D1-
D0+	7	8	D0 Shield
D0-	9	10	CK+
CK Shield	11	12	CK-
CE Remote	13	14	NC
DDC CLK	15	16	DDC DATA
GND	17	18	+5V
HP DET	19	20	NC

LVDS：

Signal Name	Pin		Signal Name
VDD_PANEL	1	2	VDD_PANEL
VDD_PANEL	3	4	NC
GND	5	6	GND

TX0_N	7	8	TX0_P
TX1_N	9	10	TX1_P
TX2_N	11	12	TX2_P
GND	13	14	GND
CLK1_N	15	16	CLK1_P
TX3_N	17	18	TX3_P
TX4_N	19	20	TX4_P
TX5_N	21	22	TX5_P
TX6_N	23	24	TX6_P
GND	25	26	GND
CLK2_N	27	28	CLK2_P
TX7_N	29	30	TX7_P

J11：

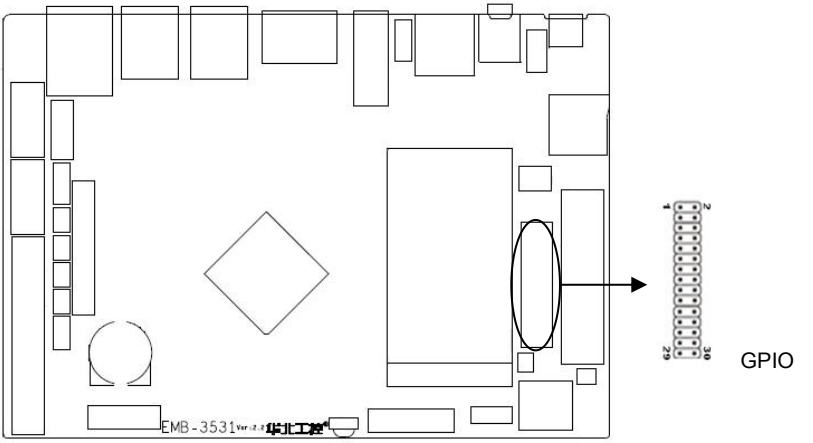
Signal Name	Pin		Signal Name
VCC3	1	2	VCC3
VDD_PANEL	3	4	VDD_PANEL
VCC5	5	6	VCC5
VDD_PANEL	7	8	VDD_PANEL
12VDC_OUT	9	10	12VDC_OUT

JLVDS（LVDS backlight）：

Pin	Signal Name
1	GND
2	GND
3	LCD_PWM
4	LCD_EN

5	12VDC_OUT
6	12VDC_OUT

2.4.7 Programmable Input and Output Port（GPIO）



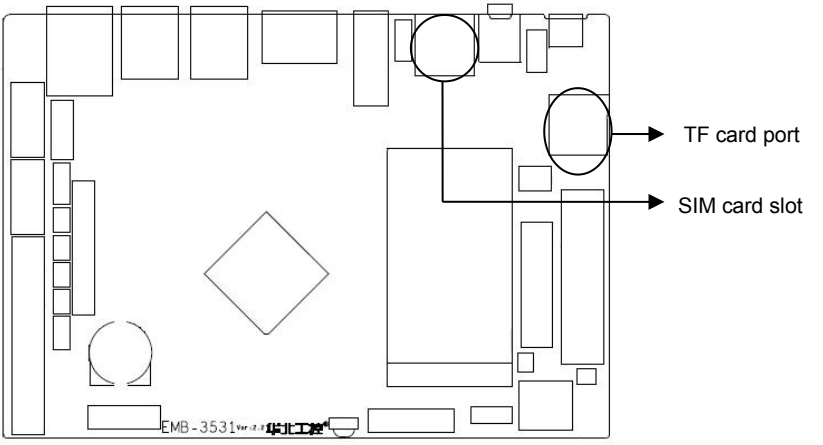
GPIO：

Signal Name	Pin		Signal Name
3.3V	1	2	3.3V
PWM	3	4	SPI5_RX_33
I2C4_SCL	5	6	SPI5_TX_33
I2C4_SDA	7	8	SPI5_CLK_33
GPIO	9	10	SPI5_CS_33
GND	11	12	GND
I2S_SDI	13	14	I2S_SCLK
I2S_SDO	15	16	I2S_LRCK_RX
I2S_CLK	17	18	I2S_LRCK_TX
GND	19	20	GND
MIPI_TX0_D0N	21	22	MIPI_TX0_D0P

MIPI_TX0_D1N	23	24	MIPI_TX0_D1P
MIPI_TX0_CLKN	25	26	MIPI_TX0_CLKP
MIPI_TX0_D2N	27	28	MIPI_TX0_D2P
MIPI_TX0_D3N	29	30	MIPI_TX0_D3P

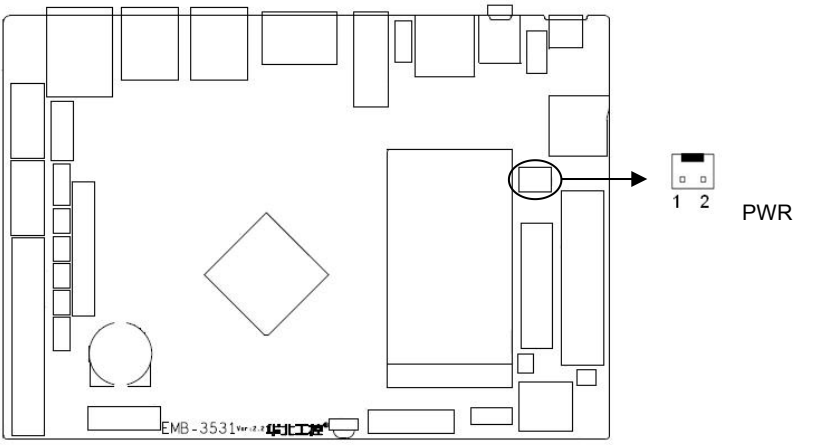
2.4.8 Ports（SIM、TF）

Provides 1x SIM card slot and TF card port.



2.4.9 Power Port（PWR）

Provides one green European power socket and one 1x2 Pin connector.

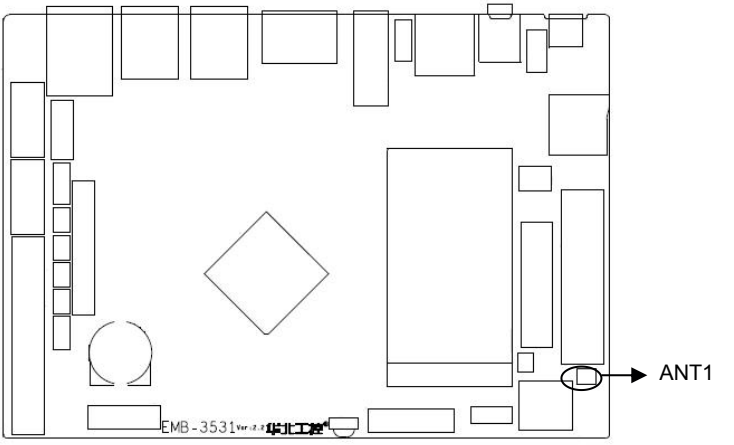


PWR:

Pin	Signal Name
1	+12V
2	GND

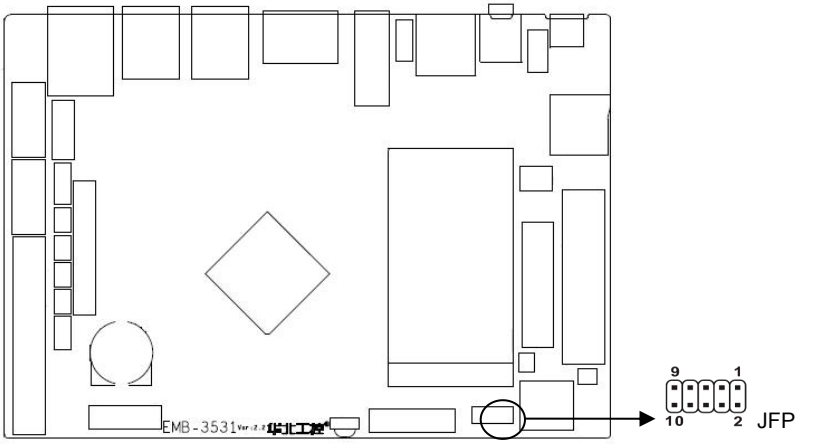
2.4.10 WIFI port（ANT1）

Provide 1x WIFI port.



2.4.11 Front Panel Port（JFP）

JFP connects power button and indicator on the front panel.



JFP：

Signal Name	Pin		Signal Name
PWR_LED	1	2	GND
ADC0	3	4	ADC3
ADC2	5	6	ADC4
RESET	7	8	GND
PWRSW	9	10	GND

Please connect following chart below, and pay attention to the anode (+) and cathode (-). If it is falsely connected, it may not function well.

DOWN LOAD
RESET
PWRSW

2）Reset Button Pins（Pin7, Pin8 for RESET BUTTON）

Connect the reset button cable to these two pins. When system fails, the reset button will restart the system to back to work so there is no need to turn on / off power. It can extend the

service life of the system.

3）Power ON/OFF Pins（Pin9, Pin10 POWER BUTTON）

Connect these two pins to the bounce switch on the chassis to connect or disconnect the power Supply

.

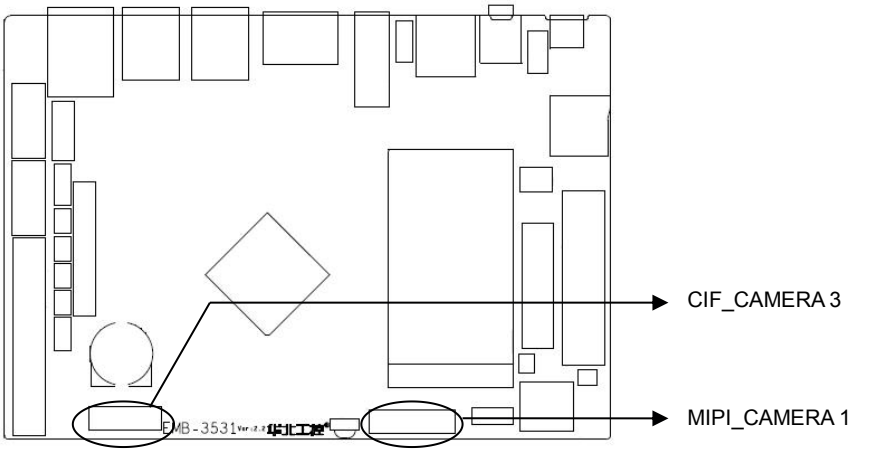
2.4.12 MINI PCIe Port

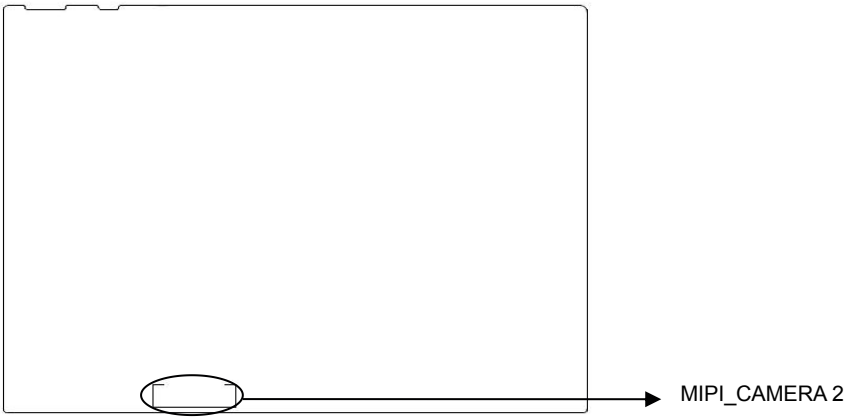
Provides 1xMINI PCIe slot，you are able to expand MINI PCIe device according to your requirement, like 3G/4G module.

2.4.13 PCIe Port

Provides 1xPCIe port，you are able to expand PCIe device according to your requirement.

2.4.14 CIF_CAMERA and MIPI_CAMERA Port (CIF_CAMERA3，MIPI_CAMERA1-2)





MIPI_CAMERA1：

Signal Name	Pin		Signal Name
GND	1	2	RX1_D0N
RX1_D0P	3	4	GND
RX1_CLKN	5	6	RX1_CLKP
GND	7	8	RX1_D1N
RX1_D1P	9	10	GND
RX1_D2N	11	12	RX1_D2P
GND	13	14	RX1_D3N
RX1_D3P	15	16	GND
MCLK1	17	18	GND
PWDN	19	20	RESET
SCL_MIPICM2	21	22	SDA_MIPICM2
GND	23	24	VCC_2V8_CAM
GND	25	26	NC
VCCA1V8_CAM	27	28	VCC_1V2_CAM
VCC_2V8_CAM	29	30	NC

MIPI_CAMERA2：

Signal Name	Pin		Signal Name
GND	1	2	RX0_D0P
RX0_D0N	3	4	GND
RX0_CLKN	5	6	RX0_CLKP

GND	7	8	RX0_D1N
RX0_D1P	9	10	GND
RX0_D2N	11	12	RX0_D2P
GND	13	14	RX0_D3N
RX0_D3P	15	16	GND
MIPI_MICLK0	17	18	GND
PWDN	19	20	RESET
SCL_MIPICM1	21	22	SDA_MIPICM1
GND	23	24	VCC_2V8_CAM
GND	25	26	NC
VCCA1V8_CAM	27	28	VCC_1V8_CAM
VCC_2V8_CAM	29	30	NC

CIF_CAMERA3：

Signal Name	Pin		Signal Name
NC	1	2	NC
CIF_D2	3	4	CIF_D1
CIF_D3	5	6	CIF_D0
CIF_D4	7	8	CIF_CLKI
CIF_D5	9	10	GND
CIF_D6	11	12	CIF_MCLK
CIF_D7	13	14	VCCA1V8_CAM
VCCA1V8_CAM	15	16	CIF_HREF
DVP_PDN0_H	17	18	CIF_VSYNC
GPIO0_B3	19	20	SCL_CIF
VCC_2V8_CAM	21	22	SDA_CIF
GND	23	24	GPIO_B2

Chapter Three

Software Function

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Chapter Three

Software Function

3.1 Android 7.1 System

3.1.1 HDMI

Supports HDMI output

Instruction: Use HDMI cable to connect motherboard and display, and you can see Android interface when you turn on computer.

3.1.2 DP

Supports DP output

Instruction: Use DP cable to connect motherboard and display, and you can see Android interface when you turn on computer.

3.1.3 LCD

Supports lvds lcd port output

Drivers need to be customized according to the actual use of LCD screen.

3.1.4 USB

Support 4xUSB3.0 2xUSB2.0（Pin）

Instruction: connect USB flash disk to USB port, and check USB flash disk device: /mnt/media_rw/.

3.1.5 COM

Support 6xserial port

Device node：CPU self contained: /dev/ttyS0~/dev/ttyS1, expanding: ttyVIZ0-ttyVIZ3

Instructions: Install ComAssistant program, short circuit rx, tx. Select the device node above and click Send. It will be regarded as normal if the data sent by the sender can be seen in the receiving area. (Note that there are many serial ports, short circuit rx tx should be correspondence accordingly)

3.1.6 CAN

Nonsupport

3.1.7 TF card

Support

Instruction: Insert TF card into USB port, and check USB flash disk device: /mnt/media_rw/

3.1.8 WIFI

Support，See the Android interface for details

Instruction: In the system open setting-> Wireless & networks-> Wi-Fi, turn on Wi-Fi, and you can see wireless router SSID on the right, connect one of them, and input router password if needed. Enter a password if the router has a password.

3.1.9 BT

Support

Default motherboard does not support BT. If BT is to be supported, the WiFi + BT module should be replaced with the sales communication. The software needs no modification and is compatible.

3.2.0 3/4G

Support

Customize drive according to 3/4G module customer used.

3.2.1 Ethernet

Support，See Android interface for specific operation

Instructions for use: Open the network cable under the system - > more - > Ethernet, select HDCP or Static IP according to actual needs.

3.2.2 Sound Card

Support，Local sound card output, HDMI sound output

Instructions:

The default sound is output from the local power amplifier. If HDMI port is needed to output

sound, the system needs to be re-customized.

3.2.3 DVP Camera

Support,

Customized Driver for DVP Camera Model Based on Customer's Actual Use

3.2.4 PCIE Port

Support

Drivers should be customized according to the actual use of PCIe equipment by customers.

Appendix

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Appendix

Appendix 1: Glassory

ACPI

Advanced Configuration and Power Management. ACPI specifications allow operating system to control most power of the computer and its add-ons. Windows 98/98SE，Windows 2000 and Windows ME supports this specification.

BIOS

Basic input/output system. It is software including all in/out control code interface in PC. The software will detect hardware when it auto boot, operate OS, and provide an interface between OS and hardware. BIOS is stored in a ROM chip.

BUS

BUS is a channel for different devices to exchange data in computer system. It is hardware circuit. BUS here refers to partial lines inside CPU and the main components of system memory.

Chipset

Chipset is a Integrated set of chips for executing one or more related functions。Here it refers to a system level chipset structured by Southbridge & Northbridge; Chipset decides the structure and main functions of motherboard.

CMOS

Complementary Metal-Oxide Semiconductor, which is a widely used semiconductor with the characteristics of high-speed and low-power. COMS here refer to part of space on-board CMOS RAM for saving date, time, system information and system parameter, ect.

COM

Cluster Communication Port. A universal serial communication interface, usually adopts

normative DB 9 connector.

DIMM

Dual-Inline-Memory-Modules. It is a small circuit board with memory chipset providing 64 bit memory bus width.

DRAM

Dynamic Random Access Memory. It is a general type of memory for regular computer which usually store 1 bit with a transistor and a capacitance. With the development of the technology, more and more types of DRAM with different specifications exist in computer applications. For example: SDRAM/DDR SDRAM/RDRAM

LAN

Local Area Network. Network grouped by correlative computers in a small area, generally in a company or a building. Local area network is buildup by sever, workstation, some communications links. Terminals can access data and devices anywhere through cables, which enables users to share costly devices and resource.

LED

Light-Emitting Diode. A semiconductor device that lighted when power supply is connected, It is often used to indicate information directly, for example, to indicate power on or HDD working normally.

PnP

Plug-and-Play. It is a specification that allows PC to configure its external devices automatically and it works independently without the manual operation. To achieve this function, BIOS should be able to support PnP and a PnP expansion card

POST

Power On Self Test. While the system is booting, BIOS will keep testing the system which including RAM, keyboard, hard disk driver to check if all the components are connected directly and function well.

PS/2

A keyboard & mouse connective interface specification developed by IBM.PS/2 is a DIN interface with only 6PIN; it also can connect other devices, like modem

USB

It is the Universal Serial Bus for short. A hardware interface adapts to low speed peripherals, and is always used to connect keyboard, mouse etc. One PC can connect maximum 127 USB devices, providing 12Mbit/s transmit bandwidth USB supports hot swap and multi- data stream, namely, you can plug USB devices while system is running, system can auto-detect and makes it work on.

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