


SOM-6501
USER' Manual V1.0

用户手册

USER'Manual



Industrial & Communication Computer 

做中国最可信赖的工控产品

SOM-6501

USER' Manual V1.0

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Declaration of conformity



Shenzhen NORCO Intelligent Technology Co.,Ltd.

declares that the product

SOM-6501 V1.0 Digital Signage Special Board

(reference to the specification under which conformity is declared in accordance with 89/336 EEC-EMC Directive)

- | | |
|--|--|
| <input checked="" type="checkbox"/> EN 55022 | Limits and methods of measurements of radio disturbance
Characteristics of information technology equipment |
| <input checked="" type="checkbox"/> EN 50081-1 | Generic emission standard Part 1:
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Signature:  _____

Place/Date: HONG KONG/2013

Printed Name: Anders Cheung

Position/Title: President

Declaration of conformity



Trade Name : Shenzhen NORCO Intelligent Technology Co.,Ltd.

Model Name : SOM-6501 V1.0

Responsible Party : Shenzhen NORCO Intelligent Technology Co.,Ltd.

Equipment Classification : FCC Class B Subassembly

Type of Product : SOM-6501 V1.0 Digital Signage Special Board

Manufacturer : Shenzhen NORCO Intelligent Technology Co.,Ltd.

Supplementary Information:

This device complies with Part 15 of the FCC Rules.Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Signature: _____

A handwritten signature in black ink, appearing to be 'and G.', written over a horizontal line.

Date: 2013

Disclaimer

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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 grounding 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.

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Packing List

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

- SOM-6501 V1.0 Motherboard 1pcs



Chapter 1. Product Introduction

Chapter 1 Product Introduction

1.1 Specifications

Dimension

- Dimension: 80mmX60mm

Processor

- CPU: Onboard, Freescale Cortex™-A9, support i.MX6 series CPU(Single-core/dual-core/Quad Core CPUs)

System Memory

- Onboard Memory, default 1GB, DDRIII800

Storage

- FLASH: onboard 4GB INAND

Expansions

- This is the core board, total 240pin via J6, J7, J8, J9, J10, J11, offer power supply, display (LVDS, HDMI, CSI, LCD signal), IO(USB HOST, USB OTG, PCIE, SATA, GPIO, COM, SPI, CAN, TF, RGMII, I2S, I2C signal)

Power Supply

- 3.3V (main power supply) ,5V (OTG partial power supply)

Operating Environment

- Operating Temperature: 0℃~60℃
- Operating Humidity: 5%~95%, non-condensing



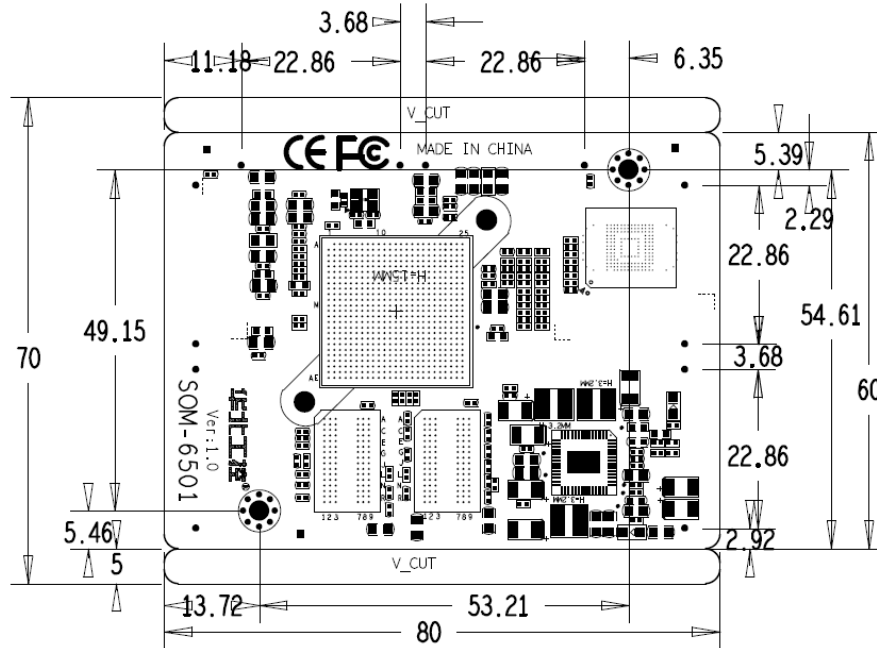
Chapter 2. Hardware Introduction

Chapter 2 Hardware Introduction

2.1 Interfaces Location and Dimension

Following picture illustrates the front interfaces location and dimension of board SOM-6501 V1.0. Please pay attention to the installation steps. Improper installation of some components may lead to system failure.


Note: When installing the board, please wear anti-static gloves in case of any electrostatic damage caused during the installation.



2.2 Installation Steps

Please follow the steps below to assemble your computer:

1. Adjust all the jumper caps on board SOM-6501 V1.0
2. Install other expansion cards;
3. Connect all signal lines, cables, panel control circuits 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 or plug and 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:

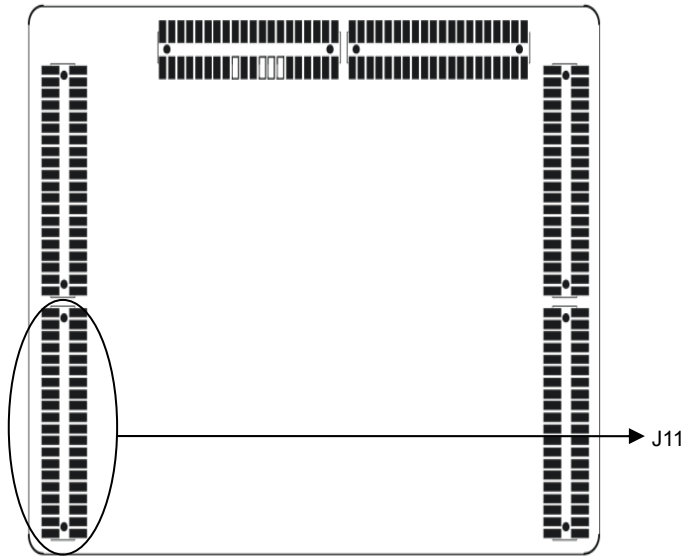
Following the instructions below will help to prevent your computer from being damaged, and also ensuring your personal safety.

1. Please make sure your computer is disconnected from the power supply.
2. Please always wear anti-static wrist strap or gloves to operate the board in case that you may touch the integrated circuit components, such as RAM.

2.3 Interfaces Description

 **Please read the manual carefully to connect external connector so as to avoid any damage to the board!**

2.3.1 J11

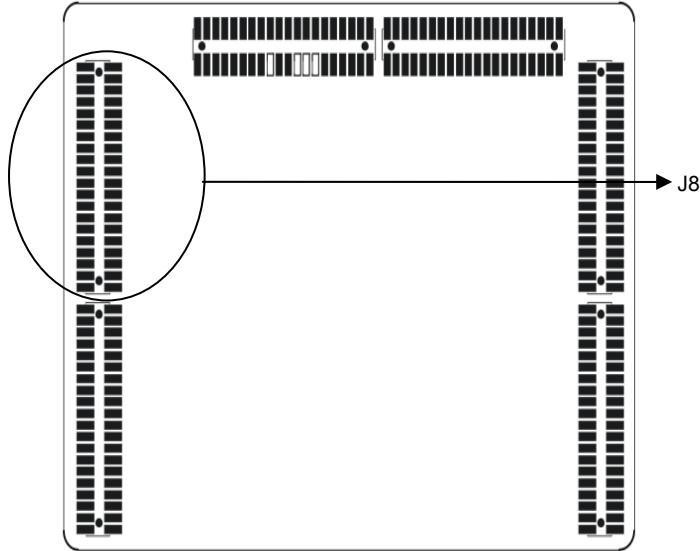


J11:

Signal Name	Pin		Signal Name
GND	1	2	+3.3V
<u>GND</u>	3	4	+3.3V
GND	5	6	+3.3V
GND	7	8	+3.3V
GND	9	10	+3.3V
GND	11	12	+3.3V
GND	13	14	+5V
GND	15	16	+5V
PWRON	17	18	USBHUB_RESET#
DISP0_DAT23	19	20	GND
DISP0_DAT20	21	22	DISP0_DAT16
DISP0_DAT15	23	24	DISP0_DAT19
DISP0_DAT21	25	26	DISP0_DAT11
DISP0_DAT8	27	28	DISP0_DAT6

DISP0_DAT1	29	30	DISP0_DAT2
DISP0_DAT3	31	32	DISP0_DAT10
DISP0_DRDY	33	34	DISP0_DAT13
DISP0_CLK	35	36	DISP0_DAT4
DISP0_DAT18	37	38	DISP0_DAT22
DISP0_DAT14	39	40	DISP0_DAT17

2.3.2 J8

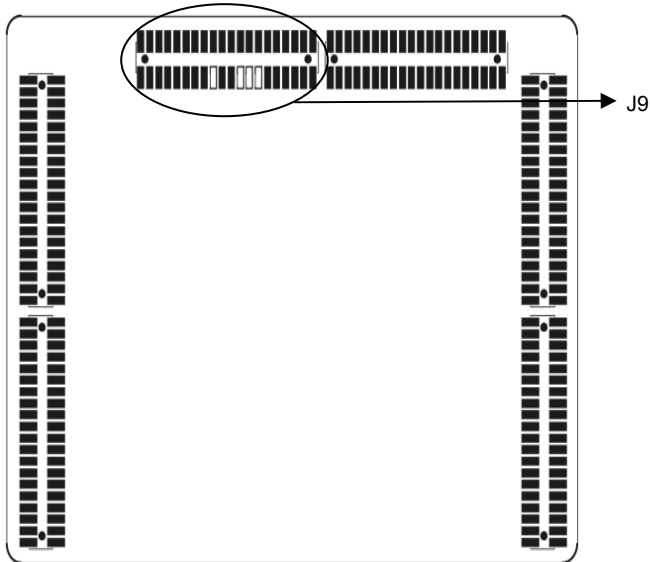


J8:

Signal Name	Pin		Signal Name
DISP0_DAT12	1	2	DISP0_DAT9
DISP0_DAT7	3	4	DISP0_DAT5
DISP0_DAT0	5	6	DISP0_VSYNCH
DISP0_HSYNCH	7	8	GND
GND	9	10	USB_OTG_ID
ETH_WOL_INT	11	12	ENET_REF_CLK
ENET_RXD0	13	14	ENET_TXD0

USB_OTG_PWR_EN	15	16	BUZZER
GND	17	18	GND
EIM_BCLK	19	20	EIM_D30
EIM_A25	21	22	EIM_D29
EIM_D31	23	24	EIM_D20
EIM_CS1	25	26	EIM_OE
EIM_D19	27	28	EIM_CS0
EIM_D25	29	30	EIM_LBA
EIM_D28	31	32	EIM_D24
EIM_D17	33	34	EIM_EB2
EIM_RW	35	36	EIM_D27
EIM_26	37	38	EIM_D23
EIM_18	39	40	EIM_D16

2.3.3 J9



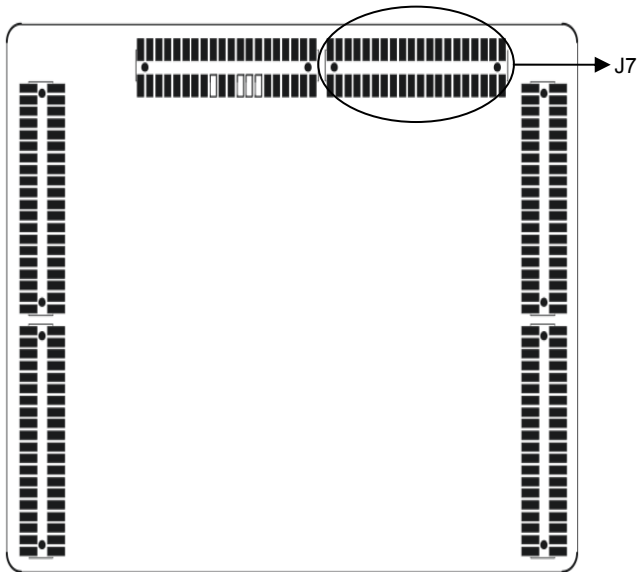
J9:

Signal Name	Pin	Signal Name
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RGMII_RXCLK	1	2	RGMII_RXD3
RGMII_TXEN	3	4	RGMII_RXD2
RGMII_TXD3	5	6	RGMII_RXD1
RGMII_TXD2	7	8	RGMII_RXD0
RGMII_TXD1	9	10	RGMII_INT
RGMII_TXD0	11	12	RGMII_MDIO
RGMII_TXCLK	13	14	RGMII_nRST
GND	15	16	RGMII_MDC
SD1_CMD	17	18	RGMII_RXDV
SD1_DAT0	19	20	GND
SD2_CLK	21	22	AUD4_TXFS
SD1_CLK	23	24	AUD4_TXC
SD1_DAT1	25	26	AUD4_RXD
SD1_DAT2	27	28	AUD4_TXD
SD2_CMD	29	30	BACKLIGHTON
SD1_DAT3	31	32	GND
GND	33	34	NANDF_D7
CABC_EN	35	36	NANDF_D0
CAP_TCH_INT1	37	38	NANDF_D5
CAP_TCH_INT0	39	40	NANDF_D4

2.3.4 J7

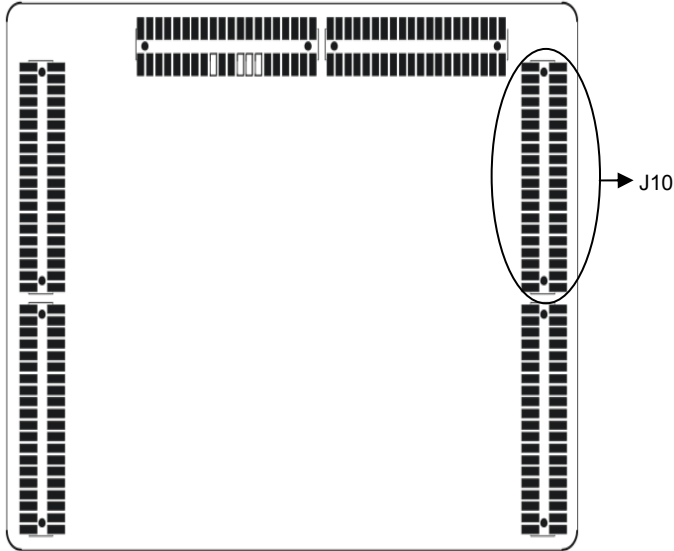


J7:

Signal Name	Pin		Signal Name
GND	1	2	NANDF_D1
SATA_RXP	3	4	NANDF_D6
SATA_RXN	5	6	NANDF_CS1
SATA_TXN	7	8	NANDF_D3
SATA_TXP	9	10	NANDF_D2
GND	11	12	NANDF_CS0
PCIE_TXP	13	14	GND
PCIE_TXM	15	16	SD3_RST
GND	17	18	SD3_DATA3
PCIE_RXP	19	20	SD3_DATA2
PCIE_RXM	21	22	SD3_CLK
GND	23	24	SD3_DATA0
CLK1_P	25	26	SD3_CD
CLK1_N	27	28	SD3_DATA1

GND	29	30	SD3_CMD
USB_OTG_DP	31	32	SD3_DATA6
USB_OTG_DN	33	34	SD3_DATA7
USB_HOST_DP	35	36	GND
USB_HOST_DN	37	38	MX6_ONOFF
GND	39	40	BOOT_MODE1

2.3.5 J10

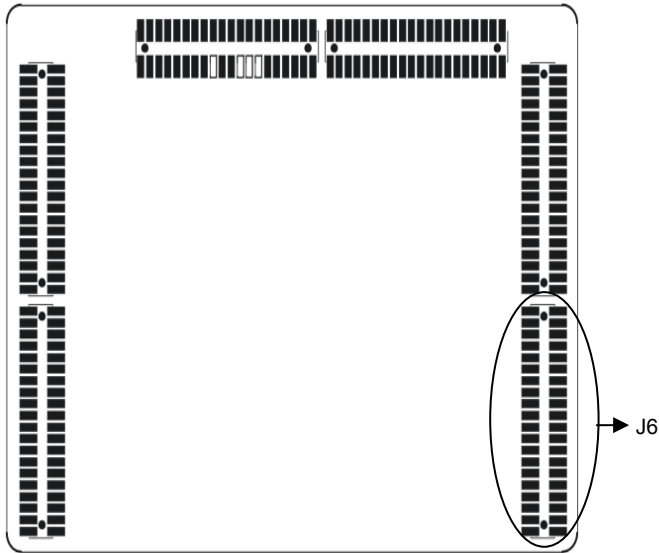


J10:

Signal Name	Pin		Signal Name
CSI0_HSYNC	1	2	KEY_COL2
CSI0_PIXCLK	3	4	KEY_ROW2
CSI0_DAT5	5	6	KEY_COL4
CSI0_DATA_EN	7	8	KEY_ROW4
CSI0_DAT4	9	10	KEY_COL7
CSI0_VSYNC	11	12	KEY_ROW7
CSI0_DAT10	13	14	GND

CSI0_DAT12	15	16	HDMI_HPD
CSI0_DAT13	17	18	HDMI_D2M
CSI0_DAT8	19	20	HDMI_D2P
CSI0_DAT18	21	22	GND
CSI0_DAT9	23	24	HDMI_D1M
CSI0_DAT6	25	26	HDMI_D1P
CSI0_DAT7	27	28	GND
CSI0_DAT15	29	30	HDMI_CLKM
CSI0_DAT11	31	32	HDMI_CLKP
CSI0_DAT14	33	34	GND
CSI0_DAT17	35	36	HDMI_D0M
CSI0_DAT19	37	38	HDMI_D0P
CSI0_DAT16	39	40	GND

2.3.6 J6



J6:

Signal Name	Pin	Signal Name
-------------	-----	-------------

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LVDS1_TX3_N	1	2	LVDS1_TX3_P
LVDS1_TX2_N	3	4	LVDS1_TX2_P
LVDS1_TX1_N	5	6	LVDS1_TX1_P
LVDS1_TX0_N	7	8	LVDS1_TX0_P
LVDS1_CLK_N	9	10	LVDS1_CLK_P
GND	11	12	GND
LVDS0_TX3_N	13	14	LVDS0_TX3_P
LVDS0_TX2_N	15	16	LVDS0_TX2_P
LVDS0_TX1_N	17	18	LVDS0_TX1_P
LVDS0_TX0_N	19	20	LVDS0_TX0_P
LVDS0_CLK_N	21	22	LVDS0_CLK_P
GND	23	24	GND
UART5_TX	25	26	GPIO_0_CLK0
UART5_RX	27	28	GND
UART4_TX	29	30	SPDIF_TX
UART4_RX	31	32	I2C3_SCL
I2C2_SCL	33	34	I2C3_SDA
I2C2_SDA	35	36	GPIO19
CAN1_TX	37	38	KEY_ROW6
CAN1_RX	39	40	KEY_COL6



Chapter 3. Software Functions

Chapter 3 Software Functions

Note: SOM-6501 can only be tested and used together with its bottom board SOMB-7001.

3.1 Android

3.1.1 VGA

Support VGA output

Direction for Use: System default support VGA+HDMI dual display. Use VGA cable connect motherboard to the monitor, you will see the Android interface after system startup.

3.1.2 HDMI

Support

Direction for Use: System default support VGA+HDMI dual display. Use HDMI cable connect motherboard to the monitor, you will see the Android interface after system startup.

3.1.3 LCD

Support LVDS LCD output; Driver is customized as per customers' LCD screen.

3.1.4 USB

U-Disk auto mount directory:/mnt/udisk/

Direction for Use: Insert U-Disk into USB port onboard, open the file browser and go to the directory /mnt/udisk/ and check the files in the U disk.

3.1.5 COM

Serial port operation node:/dev/ttymx0~/dev/ttymx4

Direction for Use:

connect COM2-5 to circuit

```
busybox cp -rf com_arm/ /data/
```

```
cd /data/com_arm/
```

```
Input ./c_android.sh
```

Input the baud rate and test time as per the program prompts

Test result will display after the program completed

3.1.6 CAN

Support 2x CANBUS

3.1.7 TF Card

TF Card auto mount directory: /dev/extsd/

Direction for Use: Insert TF card into the TF card socket, then open file browser and go to directory /mnt/extsd to check the files in TF card.

3.1.8 SATA

Mount directory is customized as per customers' demand

Direction for Use: Under Power off status, insert SATA Hard Disk into the SATA port, then open file browser and go to /mnt/satadisk to check the files in Hard Disk.

3.1.9 WIFI

Support, how to operate, please refer to android interface

Direction for Use: Open "Settings" menu in system->Wireless and Network->Wi-Fi, open WiFi and the wireless router SSID will be list under the search result on the right, select one to connect. If the router has a password, you need to input the password.

3.1.10 3G

Customize driver as per the 3G module that customers utilize

3.1.11 Ethernet

Support, how to operate, please refer to android interface

Direction for Use: Open "Settings" menu in system->Wireless and Network->check the option "Ethernet Configuration"->click "Ethernet Configuration, Ethernet Devices"->Select eth0 for LAN Card1, Select eth1 for LAN Card 2->Connection Type (select HDCP or Static IP based on actual needs).

3.1.12 Audio Card

Support, Android OS realizes switch to local audio card output.

Direction for Use: HDMI audio/video files. Use earphone or other stereo equipment to test audio output. Local Audio Card: alsa_ aplay xx.wav

3.2Linux

3.2.1VGA

Support

Direction for Use: System default support VGA+HDMI dual display. Use VGA cable connect motherboard to the monitor, you will see the Linux interface after system startup.

3.2.2 HDMI

Support

Direction for Use: System default support VGA+HDMI dual display. Use HDMI cable connect motherboard to the monitor, you will see the Linux interface after system startup.

3.2.3 LCD

Support LVDS LCD output; Driver is customized as per customers' LCD screen

3.2.4 USB

Support

Direction for Use: Insert U disk into onboard USB port, check the U-device : `fdisk -l`

Mount U disk to `/dev/sdX1 /mnt` (sdX1 represents the name of the U device)

Open U disk and check the files in it: `cd /mnt`

3.2.5 COM

Device node:`/dev/ttymx0~ /dev/ttymx4`

Direction for Use:

connect COM2-5 to circuit

```
busybox cp -rf com_arm/ /data/
```

```
cd /data/com_arm/
```

```
Input ./c_linux.sh
```

Input the baud rate and test time as per the program prompts

Test result will display after the program completed

3.2.6 CAN

No test

3.2.7 TF Card

Support, need to mount for testing

Direction for Use: Insert TF card into the board USB port and check U-device: `fdisk -l`

Mount TF card to system `/dev/mmcblk1p1 /mnt`

Enter TF card directory and check the files in it : `cd /mnt`

3.2.8 SATA

Support, need to mount for testing

Direction for Use: Insert U disk into board USB port and check U-device: `fdisk -l`

Mount SATA to system `/dev/sdX1 /mnt` (sdX1 represents the name of the SATA hard disk device)

Enter SATA Hard Disk directory and check the files in it : `cd /mnt`

3.2.9 WIFI

Support, need `iwlist iwconfig` for testing

Direction for Use:

Available AP list check: `iwlist wlan0 scan`

Connect WiFi AP: `iwconfig wlan0 essid xxxx`

Setup wlan0 IP address: `iwconfig wlan0 xx.xx.xx.xx`

Ping Route: `ping xx.xx.xx.xx`

3.2.10 3G

Customize driver as per the 3G module that customers utilize

3.2.11 Ethernet

Support, need tool "ifconfig dhcp ping" for testing

Direction for Use:

Check Lan-card: `ifconfig -a`

Allocate Lan-card static IP address: `ifconfig ethX X.X.X.X` or use dynamic allocation:

`dhclient ethX`

Ping Route: `ping xx.xx.xx.xx`

3.2.12 Audio Card

Support, need tool alsa-utils for testing

Direction for Use :

Check Audio Card : `aplay -l`

Run alsamixer to adjust Headphone and PCM to the maximum and play audio file : `aplay XX.wav`

Specify to use HDMI audio output : `aplay -D hw:2,0 XX.wav`



Appendix

Appendix

Appendix 1: Glossary

ACPI

Advanced Configuration and Power Management. ACPI specifications allow O/S to control most power of the computer and its add-ons .

BIOS

Basic input/output system. It is a kind of software including all in/out control code interface in PC. It will do hardware testing while system is booting, and then the O/S runs. BIOS provides a interface between O/S and hardware and is stored in a ROM chip.

BUS

In a computer system, it is the channel among different parts for exchanging data; it is also a set of hardware lines. BUS here refers to part 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; It 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 refers to part of space on-board CMOS RAM for saving date, time, system information and system parameter, ect.

COM

Computer-Output Microfilmer. 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 Memorizer. It is a normal type of memory often with a transistor and a capacitance to store 1 bit. 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

Network interface. 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 shines when power supply is connected, It is often used to denote information directly, for example, to denote power on or HDD working normally.

PnP

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

POST

Self-test when power on. While the system is booting, BIOS will do an uninterrupted testing to the system, including RAM, keyboard, hard disk drive etc. to check if all the components are in normal situation and work 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..



敬请参阅

<http://www.norco.com.cn>

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