

# ARM8603 User's Manual

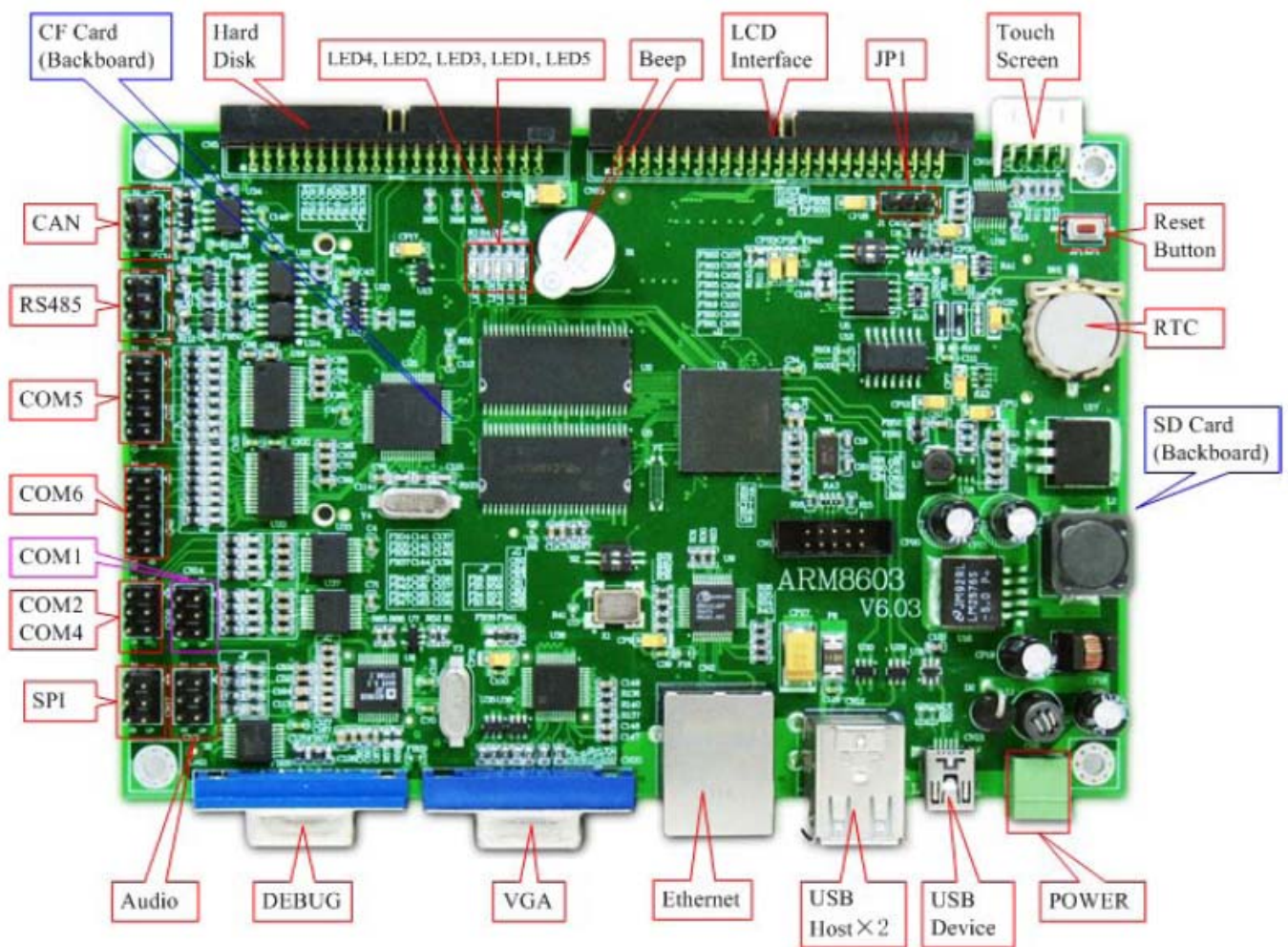
 **Beijing ART Technology Development Co., Ltd.**

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# Chapter 1 Overview

ARM8603 is a kind of industrial mainboard which designed by Beijing ART Technology Development Co., Ltd. CPU used Atmel AT91SAM9263, integrated USB, LAN, AUDIO, VGA, SD, CF, and CAN interface, can run on WinCE, Linux embedded operating systems. 200MHz main frequency, compact and standardized layout, prolific interface resources, and adaptation to the harsh environments, make it at higher speed and stability, low cost and low power consumption in industrial control Man-computer interface, web terminal, POS machine.



## Features

### System

- ✦ Operating System: WinCE 5.0, Linux2.6.30
- ✦ CPU: Atmel AT91SAM9263 processor
- ✦ Main Frequency: 200MHz
- ✦ DataFlash: 4MB, can be used to store the boot code
- ✦ SDRAM: 64MB
- ✦ NandFlash: 256MB, nonvolatile, can be upgraded to 1GB

## External Interface

- ✦ USB: two USB host(USB2.0), baud rate up to 12Mbps  
one USB Client (USB2.0), baud rate up to 12Mbps
- ✦ Serial Ports: one RS-232 serial port, five-wire, baud rate up to 115.2Kbps  
two RS-232 serial port, three-wire, baud rate up to 115.2Kbps  
two full-function serial port, nine-wire, baud rate up to 115.2Kbps  
one debug serial port, three-wire, baud rate up to 115.2Kbps  
two RS485 serial port, industry standard RS485 interface
- ✦ Ethernet: one, 10M/100Mbps adaptive
- ✦ Hard Disk Interface: one, support the hard disk of the laptop
- ✦ Audio Interface: one
- ✦ CF Card Interface: one, 256MB~8GB(TrueIDE Mode)
- ✦ SD Card Interface: one, up to 2GB
- ✦ CAN Bus Interface: one , support standard CAN2.0 protocol
- ✦ SPI Bus Interface: one
- ✦ Power Supply Interface: 12V~36V DC

## Display System

- ✦ LCD Interface: support TFT LCD (default resolution 800\*600)
- ✦ VGA Interface: can accessed by an ordinary computer monitor (resolution 800\*600)
- ✦ Touch Screen Interface: support 4-wire resistive touch screen

## Other Device

- ✦ LED Lights: one system power indicator (LED1)  
two CPU status indicator (LED2, LED3)  
one CF card indicator (LED4)  
one disk indicator (LED5)
- ✦ JTAG Interface: support download and debugging function
- ✦ Reset Circuit: one reset button
- ✦ RTC: the external low-power accurate RTC of the IIC bus interface

## Work Environment and Structural Characteristics

- ✦ Technics Characteristic: 6 layer PCB design, high stability
- ✦ Working Temperature: -10°C~+60°C
- ✦ Storage Temperature: -20°C~+75°C
- ✦ Working Humidity: maximum relative humidity 90%
- ✦ Power Supply: 12V~36V DC
- ✦ Size: 150mm\*100mm

# *Chapter 2 Important Safety Instructions*

## **Electrical Safety Instructions**

- In order to forbid damage, before moving mainboard, please cut off the power of the mainboard.
- Whether add hardware devices to system or move out hardware devices from system, please must first connect hardware devices' signal line, and then connect the power cord.
- Make sure power supply has been adjusted to the standard voltage.
- It mustn't cut off power during the start-up, or it may damage NANDFLASH.

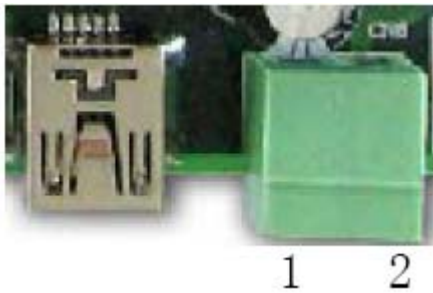
## **Operation Safety Instructions**

- Please read these safety instructions carefully.
- Please read and follow all instructions in the documentation before installing the mainboard and hardware devices.
- Before using ARM8603, please make sure all the plat cables and power cord have been connected rightly. Check for any damage, if it is damaged, please contact us or notify the local dealer or sales for a replacement or repair.
- In order to avoid electric short circuit, please take back all unwanted snails, clips and other components from the mainboard.
- Mainboard life time can be affected by dust, humidity and exquisite temperature change, so we should put it away from these places.
- Please contact technical support staff when you have any problem in technology.
- When the system is in the process of being start-up, keep the electric power supply. Or else, the NOR FLASH might be damaged.

# Chapter 3 General Purpose Interface

## Power Interface

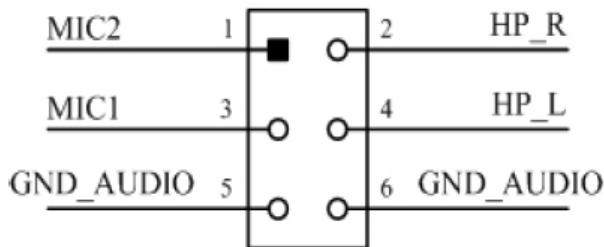
Power interface shown as below, close to the USB interface is the positive port of the power supply, the pin is defined as the following:



- 1: power 12V~36V
- 2: ground (GND)

## Audio Interface

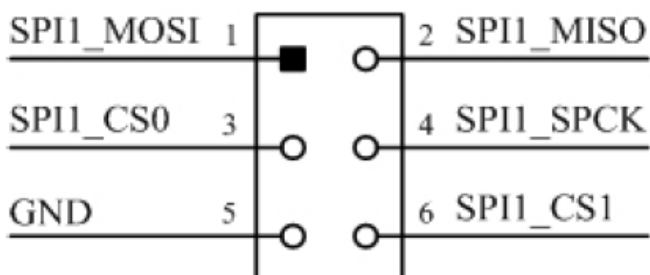
The ARM8603 leads an audio input and output interface CN3 to support multimedia sound, the interface pin description



No.	Pin Name	Function
1	MIC2	Microphone Input
2	HP_R	Left Channel Output
3	MIC1	Microphone Input
4	HP_L	Left Channel Output
5	GND_AUDIO	Audio Ground
6	GND_AUDIO	Audio Ground

## SPI Interface

SPI (CN17) definition:

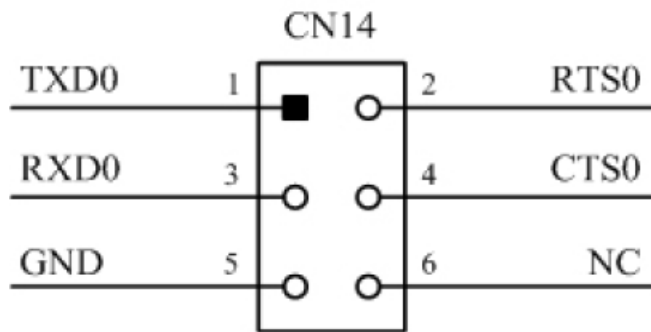


No.	Pin Name	Function
1	SPI1_MOSI	SPI1 Output
2	SPI1_MISO	SPI1 Input
3	SPI1_CS0	SPI1 Chip Select 0
4	SPI1_SPCK	SPI1 Clock
5	GND	Ground
6	SPI1_CS1	SPI1 Chip Select 1

## Serial Port

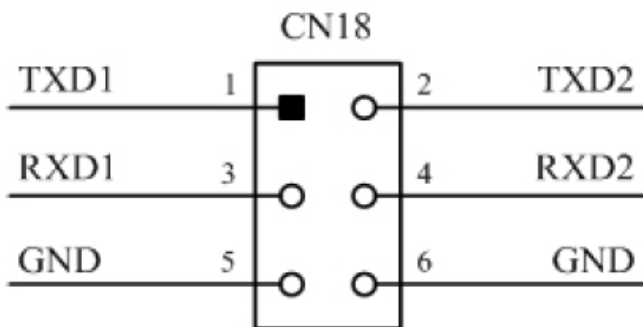
ARM8603 has three RS-232 serial ports, for software, CN14 (five-wire) corresponds to the COM1, two 3-wire serial ports CN18 corresponds to the COM2 and COM4, two 9-wire full-function serial port CN7 corresponds to the COM5, CN8 corresponds to the COM6, two RS-485 interface CN9 CN7 corresponds to the COM7 and COM8, one debug serial port CN11.

RS-232 5-wire serial port CN14 (COM1) definition



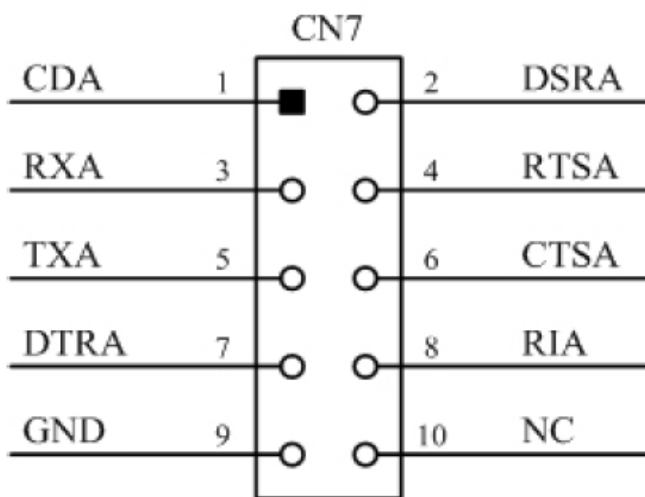
No.	Pin Name	Function
1	TXD0	Send Data
2	RTS0	Send Require
3	RXD0	Receive Data
4	CTS0	Send Clear
5	GND	Ground
6	NC	NC

RS232 3-wire serial port CN18 (COM2 and COM4) definition



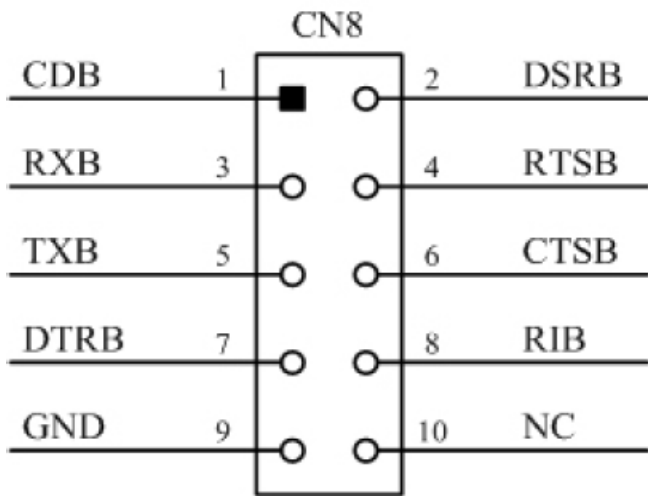
No.	Pin Name	Function
1	TXD1	COM2 Send Data
2	TXD2	COM4 Send Data
3	RXD1	COM2 Receive Data
4	RXD2	COM4 Receive Data
5	GND	Ground
6	GND	Ground

9-wire serial port CN7 (COM5) definition



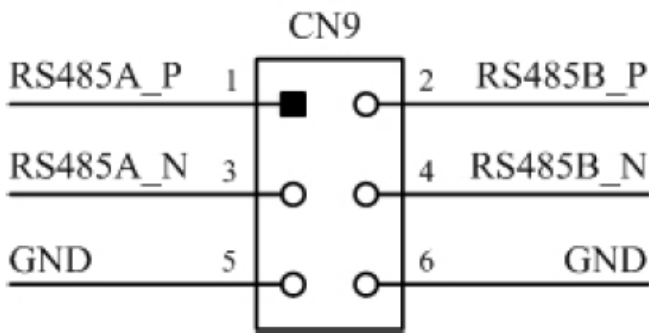
No.	Pin Name	Function
1	CDA	Carrier Detection
2	DSRA	Data Setting is Ready
3	RXA	Receive Data RX+
4	RTSA	Send Require
5	TXA	Send Data TX-
6	CTSA	Clear Sending
7	DTRA	Data Terminal is Ready
8	RIA	Ringing Detection
9	GND	Ground
10	NC	NC

9-wire serial port CN8 (COM6) definition



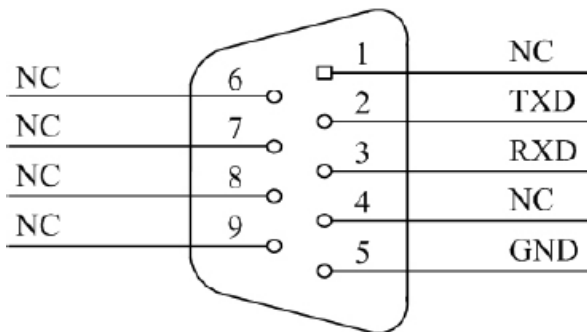
No.	Pin Name	Function
1	CDA	Carrier Detection
2	DSRA	Data Srtting is Ready
3	RXA	Receive Data RX+
4	RTSA	Send Require
5	TXA	Send Data TX-
6	CTSA	Clear Sending
7	DTRA	Data Terminal is Ready
8	RIA	Ringing Detection
9	GND	Ground
10	NC	NC

RS-485 serial port CN9 (COM7 and COM8) definition



No.	Pin Name	Function
1	RS485A_P	COM7 Data Sending
2	RS485B_P	COM8 Data Sending
3	RS485A_N	COM7 Data Receiving
4	RS485B_N	COM8 Data Receiving
5	GND	Ground
6	GND	Ground

Debug serial port CN11 definition

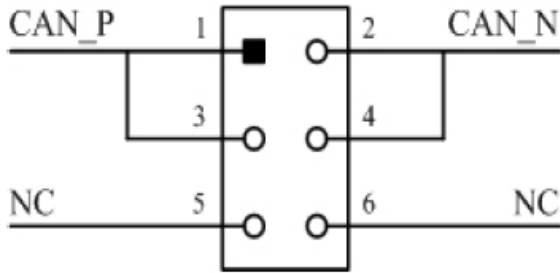


No.	Pin Name	Function
2	TXD	Debug Data Sending
3	RXD	Debug Data Receiving
5	GND	Ground
1, 4, 6 7, 8, 9	NC	NC



## CAN Interface

CAN interface (CN19) definition



No.	Pin Name	Function
1、 3	CAN_P	CAN Signal Wrie
2、 4	CAN_N	CAN Signal Wrie
5、 6	NC	NC

## USB Interface

ARM8603 supports two USB Host interfaces and one USB Device. USB Host interface supports USB keyboard, mouse, U-disk and other devices.

Two USB Host interface definition

No.	Pin Name	Function
1	VBUS	Signal Detection
2	USBHA(B)D_N	Data D- of the A(B) port of the USB Host port
3	USBHA(B)D_P	Data D+ of the A(B) port of the USB Host port
4	GND	Ground
5、 6	GND_EARTH	Earth

One USB Device interface definition

No.	Pin Name	Function
1	USBC_VBUS	Signal Detection
2	USBC_N	the data D- of the USB Device port
3	USBC_P	the data D+ of the USB Device port
4	GND	Ground
5、 6	GND_EARTH	Earth

## Ethernet Interface

ARM8603 has one standard RJ-45 Ethernet port, support standard TCP/IP communication protocol, 10/100M Ethernet ports, with the connection and transmission indicator.

### Ethernet interface definition

No.	Pin Name	No.	Pin Name
1	TX+	2	TX-
3	RX+	4、 5	NC
6	RX-	7、 8	NC
9、 10	GND_EARTH	11	LED1+
12	LED1-	13	LED2-
14	LED2+		

### Touch Screen:

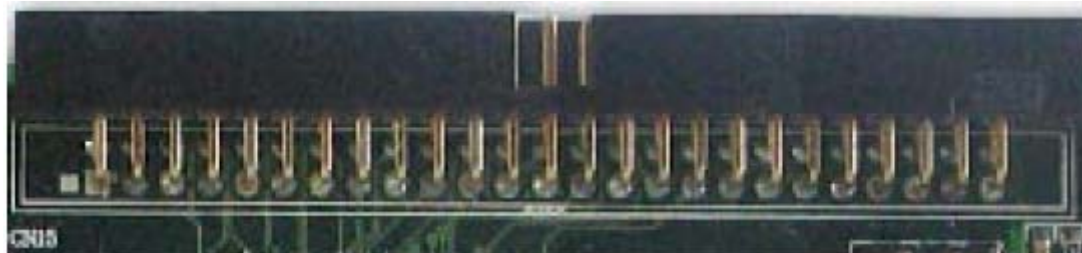
#### ARM8603 touch screen interface (CN16) definition



No.	Pin Name	Function
1	TSYM	X-axis positive input
2	TSXM	Y-axis positive input
3	TSYP	X-axis negative input
4	TSXP	Y-axis negative input

## LCD Interface

ARM8603 supports LED backlight LCD screen.



The connection line can be connected with LCD Interface (CN15) directly.

LCD interface definition

No.	Pin Name	Function
2	DOTCLK	dot matrix data clock
3	HSYNC	horizontal sync signal
4	VSYSN	vertical sync signal
7、8、10、11、12	VR1~VR5	data Bus
14、15、16、18、19、20	VG0~VG5	data Bus
23、24、26、27、28	VB1~VB5	data Bus
30	LCDDEN	data enable
31	R/L	left/right direction scan select
32	U/D	up/down direction scan select
33	LCDC	backlight control
39	TSXP	touch-screen X-axis positive input
40	TSYP	touch-screen Y-axis positive input
41	TSXM	touch-screen X-axis negative input
42	TSYM	touch-screen Y-axis negative input
47~50	+5V/+3.3V	can be selected by JP1
1、5、9、13、17、21、25、29、34、38、43、44、45、46	GND	Ground
6、22、35、36、37	-	NC

J1: used to select the power of the LCD, when shorted 1-pin and 2-pin, the power is +3.3V, shorted 2-pin and 3-pin, the power is +5V.

ARM8603 can use with LDI\_064\_104 adapter board to connect with the 6.4-inch or 10.4-inch LCD screen. Please see the appendix.

## VGA Interface

ARM8603 has one 15-pin VGA interface (CN20), can connect with all displays of standard VGA interface.

VGA definition

No.	Pin Name	Function
1	IOR	Red
2	IOG	Green
3	IOB	Blue
13	HSYNC	Level Signal
14	VSYNC	Vertical Signal
5、7、10	VGND	Ground
4、9、11、12、15	NC	NC
6、8		

## Hard Disk Interface

ARM8603 can connect with the laptop hard disk through the disk interface (CN5).

## CF and SD Card Interface

ARM8603 has one CF card interface, supports 256MB~8GB (TRUE IDE mode) and one SD card interface, the capacity can up to 2GB.

# Chapter4 Software Resource

## Software Resource

ARM8603 embedded mainboard provides all function components driver, the specification of the software resource are as follows:

### WINCE

#### ● Kernel Version

- WindowsCE.net 5.0

#### ● Driver Features

- 10M/100M Ethernet driver
- NAND FLASH driver (Identified as a disk, the test read speed of copy the file is 1.2MByte/S, the write speed is 1.8MByte/S)
- Hard disk driver, the test read speed of copy the file is 1.2MByte/S, the write speed is 2.7MByte/S
- CF card driver, the test read speed of copy the file is 1.2MByte/S, the write speed is 2.7MByte/S
- SD card driver, the test read speed of copy the file is 1.2MByte/S, the write speed is 2.7MByte/S
- RTC driver
- RS232/RS485 driver
- USB HOST driver supports USB mouse, keyboard, USB flash device etc.
- USB Device driver, support files downloading and synchronization debugging
- USB Wireless LAN driver, support 802.11b/g protocol
- TFT LCD driver (with 2D acceleration, can play the screen file in full screen smoothly)
- Touch Screen driver
- Backlight Control driver
- Buzzer Driver
- CAN Driver

#### ● Component Features

- Support ActiveSync, Microsoft Excel Viewer, Microsoft Word View, Word Pad application
- Support. NET Compact Framework 2.0, COM, DCOM, MFC, SQL Server CE 3.0, MSXML 3.0
- Support RAS/PPP, TAPI 2.0, TCP/IP, Ping, IE6, FTP Server, Telnet Server, web server and other network protocols
- Support BMP, GIF, JPG, PNG and other image codecs
- Support Registry Save Function

#### ● Other Features

- the user can set 2~30min into the IDLE status to reduce power consumption, and the backlight automatic closing (click touch screen or mouse can wake-up)
- Support transition screen display

## Linux

### ● Kernel Version

- Linux2.6.30

### ● Support File Systems

- Yaffs (file system can be read/wrote, recommend)
- Cramfs (only read file system, recommend when does not update data online)
- NFS (network file system)
- Ext2
- Ramdisk

### ● Driver Features

- RS232/RS485 driver
- 10M/100M Ethernet driver
- NAND FLASH driver
- CF card driver, the test read speed of copy the file is 1.2MByte/S, the write speed is 2.7MByte/S
- SD card driver, the test read speed of copy the file is 1.2MByte/S, the write speed is 1.8MByte/S
- RTC driver (can save the time when power off)
- USB HOST Driver supports USB mouse, keyboard, USB flash device etc.
- USB Wireless LAN driver (optional)
- TFT LCD driver
- Backlight Control driver
- General- Purpose I/O driver
- Buzzer driver
- LED driver
- CAN driver

### ● Linux Applications and Service Programs

- Busybox (Linux tool, including the common Linux commands)
- Telnet, Ftp, TFTP (Network tools and services)
- ifconfig, ping, route (Common network commands)

### ● Embedded Graphics System

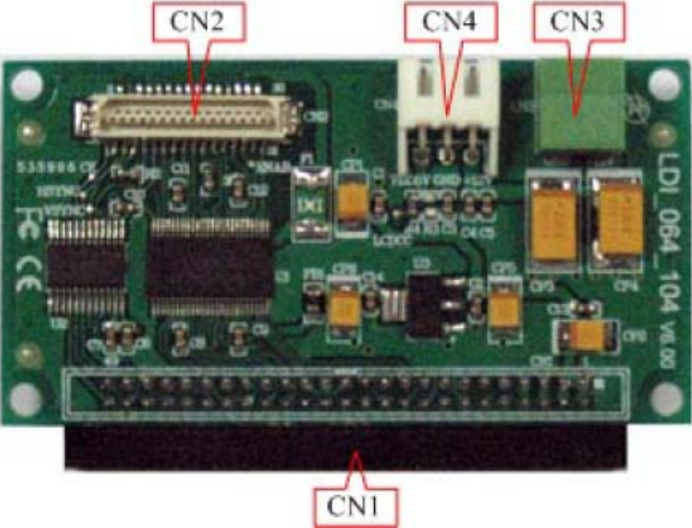
- Qt/Embedded, MiniGUI (Provide the source code and technical support)

### ● Application Source Code

- Supply the demo of all driver interfaces

# Appendix: LDI\_064\_104

LDI\_064\_104 is the adapter board of the ARM8603, can connect with 6.4-inch and 10.4-inch LCD, about the interfaces, please see the flowing figure:



## CN1 Interface

CN1 can connect with the LCD Interface (CN15) of the ARM8603.

Interface definition

No.	Pin Name	Function
2	DOTCLK	dot matrix data clock
3	HSYNC	horizontal sync signal
4	VSYNC	vertical sync signal
7、8、10、11、12	VR1~VR5	data Bus
14、15、16、18、19、20	VG0~VG5	data Bus
23、24、26、27、28	VB1~VB5	data Bus
30	LCDDEN	data enable
31	R/L	left/right direction scan select
32	U/D	up/down direction scan select
33	LCDDCC	backlight control
39	TSXP	touch-screen X-axis positive input
40	TSYP	touch-screen Y-axis positive input
41	TSXM	touch-screen X-axis negative input
42	TSYM	touch-screen Y-axis negative input
47~50	+5V/+3.3V	can be selected by JP1
1、5、9、13、17、21、25、 29、34、38、43、44、45、46	GND	Ground
6、22、35、36、37	-	NC



## CN2 Interface

LCD interface (CN2), shown as the flowing:



No.	Pin Name	Function
1、 5、 12、 19、 26	GND	Ground
2	HDOTCLK	LCD dot matrix data clock
3	HHSYNC	LCD horizontal sync signal
4	HYSYNC	LCD vertical sync signal
6	R0	
7~11	HLCDD19~HLCDD23	LCD Data Bus
13~18	HLCDD10~HLCDD15	LCD Data Bus:
20	B0	
21~25	HLCDD3~HLCDD7	LCD Data Bus
27	HLCDDEN	LCD Data Enable
28~29	VCC	
30	HR/L	
31	HU/D	

## CN3 Interface

CN3: external +12V input terminal.

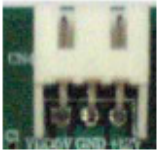


1 2

No.	Pin Name	Function
1	GND	Ground
2	+12V	External +12V terminal

## CN4 Interface

On-board 12V output interface (CN4), can supply power for 12V backlight module.



1 2 3

No.	Pin Name	Function
1	VDD5V	+5V Output
2	GND	Ground
3	+12V	+12V Output