

# ARM8410 User's Manual

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

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# ***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.

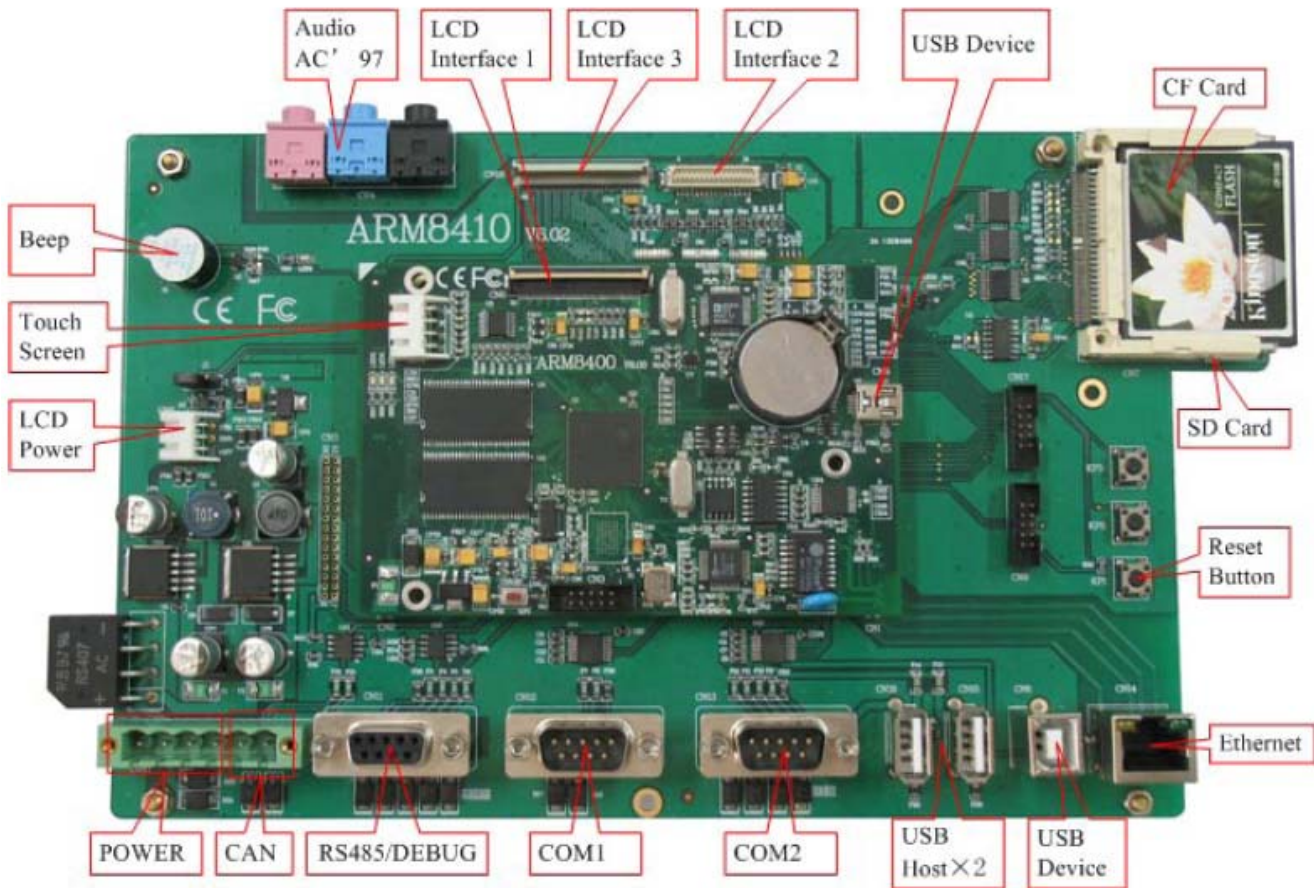
## **Operation Safety Instructions**

- Please read these safety instructions carefully.
- Please read and follow all instructions in the documentation before installing the mainboard and hardware devices.
- Before using ARM8410, 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 1 Overview

ARM8410 is a kind of industrial embedded backplane which designed by Beijing ART Technology Development Co., Ltd. Mainbaord possesses excellent features of high stability, low cost, low power consumption, which has an extensive application in industrial control Man-computer interface, web terminal, POS machine.

ARM8410 can be used with ARM8400 (core board). It uses Atmel Corporation AT91SAM9263 microprocessor, expands an adequate number of storage resources and a typical embedded system interface, and provides complete WinCE and Linux system solutions. ARM8410 has strong anti-interference ability, high integration, easy installation; low power consumption, electromagnetic compatibility, and can work in harsh environments



## Features

### ARM8410 (Supporting ARM8400 Core Board)

#### ※ Display System

LCD Interface: support TFT Liquid Crystal Screen, with 2D speedup, default resolution 800\*600

Touch Screen Interface: support 4-line Resistance Touch Screen

#### ※ Memory Interface

CF Interface: 1, support 256MB~8GB (TRUE IDE mode)

SD Interface: 1, capacity up to 2GB

※ Communication Interface

RS232 Serial Port: one 3-wire serial port, one 5-wire serial port, baud rate up to 115200 bps

Debug Serial Port: one 3-wire serial port, baud rate is set to 115200 bps

RS485 Interface: one, industry-standard RS485 interface

CAN Bus Interface: one, support standard protocol CAN2.0

IIC Bus Interface: one

SPI Bus Interface: one

USB HOST: two, USB2.0 protocol, baud rate up to 12Mbps

USB DEVICE: one, USB2.0 protocol, baud rate up to 12Mbps

Ethernet: one, 10M/100Mbps adaptive

※ Audio System

Interface for AC97: Phone x 1, Line In x 1, MIC x 1

※ Others

LED Indicators: one system running indicator

Button: one reset button

JTAG Interface: download and debug

※ Environment and Structure Characteristics

Operating Temperature: -10°C ~ +60°C

Storage temperature: -20°C ~ +75 °C

Operating Humidity: Maximum relative humidity 90%

Power Supply: 12~36V<sub>DC</sub>

Bottom Size: 239 × 139 × 21 mm

## ARM8400 Core Board (AT91SAM9263)

※ Operation System

Linux 2.6.27

WINCE 5.0

※ CPU: Atmel AT91SAM9263

Master Frequency: 200MHz

※ SYSTEM RAM

Memory: 64MB SDRAM

Nand Flash: 256MB, can be upgraded to 1GB

Data Flash: 4MB

PSRAM: 4MB, 2D-specific

※ Communication Interface

USB DEVICE: one, USB2.0 protocol, baud rate up to 12Mbps

※ Others

LED Indicators: one system running indicator, two controllable indicators

Button: one reset button

JTAG Interface: download and debug

RTC: one

※ Operating Temperature: -10°C ~ +60°C

※ Storage temperature: -20°C ~ +75 °C

※ Operating Humidity: Maximum relative humidity 90%

※ Power Supply: 12~36V<sub>DC</sub>

※ Core Board Size: 110 × 71.5 × 17 mm

## Technical Terms

Technical terms in common use are as follows:

Technical terms	Specifications
CPU	Central processing unit
PC104	BUS criteria in industrial field
GB	Kilomegabytes (1,073,741,824)
MB	Megabytes (1,048,576)
KB	Kilobytes(1,024)
MHz	Megahertz(1,048, 576)
Mbit	Megabits(1,048, 576)
RISC	Reduced instruction set computer
ARM	Advanced RISC Machines

# Chapter 2 Interface Instruction

## 2.1 DIP Switch and Jumper

### DIP Switch

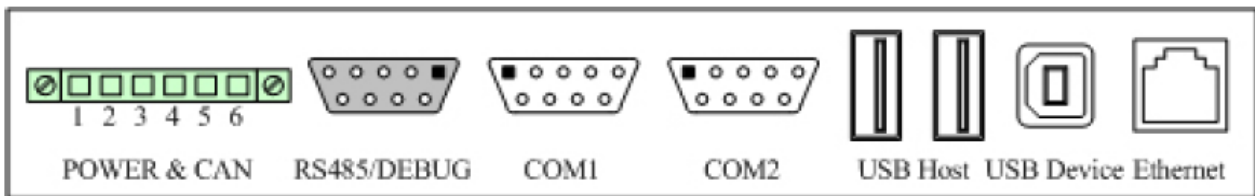
S1: set 1 and 3 to ON, 1: control DataFlash, 3: control NandFalsh.

### Jumper

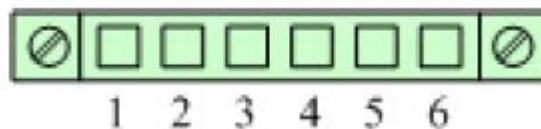
J1: control CCFL, 2tubes LCD backlight power supply, short 2-3 pins when use J1.

## 2.2 General Purpose Interface

ARM8410 interface distribution shown as below



### 2.2.1 Power and CAN Interface:



#### Pin Definition:

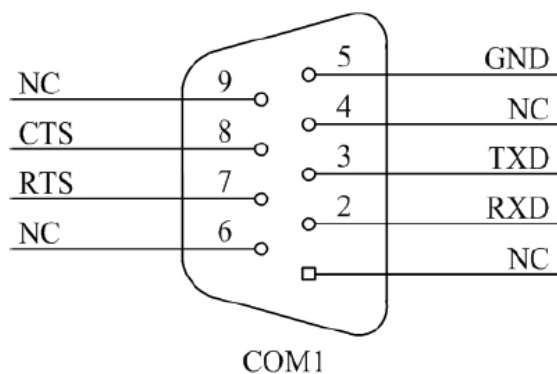
- 1: power +12V~+36V
- 2: ground (GND)
- 3: Case (EGND)
- 4: ground (GND)
- 5: CAN\_P (CAN signal wire)
- 6: CAN\_N (CAN signal wire)

Note: if CAN is used as a terminal, we should add a 120 ohm resistor between CAN\_N and CAN\_P, if it is used as the nodes, then the resistor is not needed.

## 2.2.2 Serial Communication Port

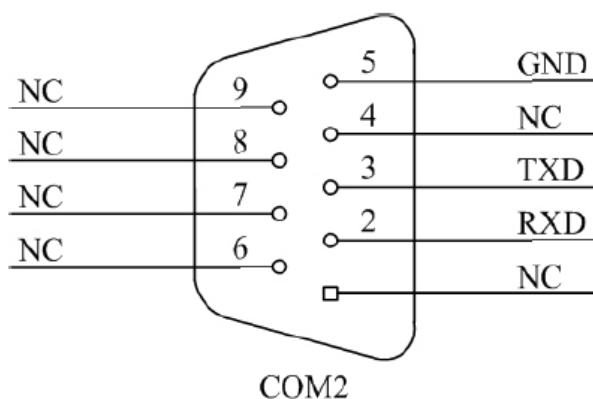
ARM8410 board leads to two RS-232 communication interfaces, 5-wire COM1 (select COM2 corresponding to the software), 3-wire COM2 (select COM1 corresponding to the software), and there is an RS-485 serial interface and a DEBUG port, DEBUG and RS485 serial port are multiplexed serial(select COM4 as software serial number when used as RS-485).

5-wire COM1 Definition:



Pin	Pin Definition	Function
2	RXD	Receive Data
3	TXD	Send Data
5	GND	GND
7	RTS	Send Request
8	CTS	Send Clear
1, 4, 6, 9	NC	NC

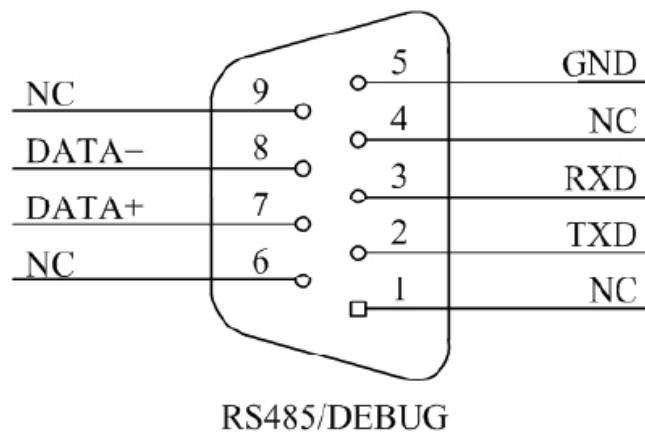
3-wire COM2 Definition:



Pin	Pin Definition	Function
2	RXD	Receive Data
3	TXD	Send Data
5	GND	GND
1, 4, 6, 7, 8, 9	NC	NC



## RS485/DEBUG Definition:



### DEBUG and RS485 multiplex serial port

Pin	Pin Definition	Function
2	DTXD	Debug data sending
3	DRXD	Debug data receiving
5	GND	GND
7	DATA+	RS485 sends data
8	DATA-	RS485 receives data
1, 4, 6, 9	NC	NC

## 2.2.3 USB Interface

Two USB Host interfaces and one USB device interface.

USB Device interface synchronizes with PC, and USB Host interface supports USB keyboard, mouse, U-disk and other devices.

### USB Host interface

Pin	Signal Name	Function
1	USBC_VBUS	signal detection
2	USBC_N	USB host A (B) port data D-
3	USBC_P	USB host A (B) port data D+
4	GND	ground
5, 6	GND_EARTH	ground

### USB Device interface

Pin	Signal Name	Function
1	USBC_VBUS	signal detection
2	USBC_N	USB device port data D-
3	USBC_P	USB device port data D+
4	GND	ground
5, 6	GND_EARTH	ground

## ARM8400 USB Device interface

Pin	Signal Name	Function
1	USBC_VBUS	signal detection
2	USBC_N	USB device port data D-
3	USBC_P	USB device port data D+
4	NC	NC
5~9	GND	ground

## 2.2.4 Ethernet Interface

ARM8410 has one standard RJ-45 Ethernet port, support standard TCP/IP protocol, 100M Ethernet port, with connection and transmission indicator.

Pin	Signal 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+

## 2.2.5 LCD Interface

ARM8410 supports two kinds of LCD, CCFL, 2tubes and LED backlight.

### (1) CCFL, 2tubes backlight LCD

Connect LCD Interface 1 (the CN6 of the core board) with LCD Interface 3 (the CN18 of the ARM8410) through data cable (Note: use un-coplanar cable), then connect LCD screen with the LCD Interface 2 (the CAN3 of the ARM8410). Lead 12V power interface LCD Power (CN8) from ARM8410, we can give the 12V to backlight module of the LCD screen.

The following is LCD interface (CN3) and LCD Power interface (CN8)



CN3

CN8

LCD interface (CN3) definition

Pin	Signal Name	Function
1, 5, 12, 19, 26	GND	ground
2	BDCLK	LCD dot matrix data clock
3	BHS	LCD level sync signal
4	BVS	LCD vertical sync signal
6	LCD_R0	
7~11	VB1~VB5	LCD data bus
13~18	VG0~VG55	LCD data bus
20	LCD_B0	
21~25	VR1~VR5	LCD data bus
27	BDEN	LCD data enable
28~29	3.3V/5V	Select LCD power supply voltage through DIP switch
30	R/LY	Select through DIP switch
31	U/DX	Select through DIP switch

LCD Power interface (CN8) definition

Pin	Signal Name	Function
1	12V	Output
2	GND	Ground
3	LCDCC	Backlight control signal

(2) LED backlight screen

Connect the screen line with the LCD Interface 1 (CN6 of the core board).

LCD interface (CN6) definition

Pin	Signal Name	Function
1, 2, 3, 4	+5V	Power
5, 6, 7, 8, 13, 17, 22, 26, 29, 30, 34, 38, 42, 45, 46	GND	Ground
9, 10, 11, 12	-	NC
14	SPI_CS2	SPI chip selection
15	SPI1_SPCK	SPI clock
16	SPI1_MOSI	SPI output
18	LCDCC	Backlight control
19	U/D	Select through DIP switch
20	R/L	Select through DIP switch
21	LCDDEN	Data enable

23, 24, 25	LCDD23~LCDD21	Data bus
27, 28	LCDD20~LCDD19	Data bus
31, 32, 33	LCDD15~LCDD13	Data bus
35, 36, 37	LCDD12~LCDD10	Data bus
39, 40, 41	LCDD7~LCDD5	Data bus
43, 44	LCDD4~LCDD2	Data bus
47	VSYNC	Level sync signal
48	HSYNC	Vertical sync signal
49	DOTCLK	Dot matrix data clock

## 2.2.6 Touch Screen Interface

ARM8400 touch screen interface (CN4) definition

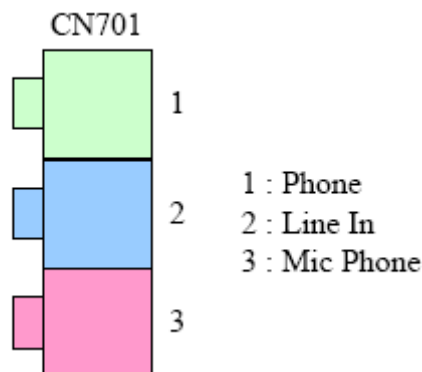
Pin	Signal Name
1	TSYM
2	TSXM
3	TSYP
4	TSXP

## 2.2.7 CF and SD Card Interface

ARM8410 has one CF Card Interface, supports 256MB~8GB (TRUE IDE mode), and an SD card interface, capacity up to 2GB.

## 2.2.8 Audio Interface

ARM 8410 has one AC97 audio interface, Phone can be connected to headphones or a more suitable power speaker. Line\_In is used for tape machine or other audio source recording or broadcast by Audio\_Out, Mic can connect with a microphone.



## 2.2.9 Core Board Interface

ARM8400 core board with two 70P double-pin CN1 and CN2 (connected to the CN1 and CN2 of the ARM84102), leads to the AT91SAM9263 processor pins, which can be more easily connected with the different functions of the backplane.

Core board interface

No.	Pin Name	Signal Name	Function	Pin Name	Signal Name	Function
1		ERX_N	Ethernet ports to receive data RX-		VIN	Power
2		ERX_P	Ethernet ports to receive data RX+		VIN	Power
3		ETX_N	Ethernet ports to send data TX-		GND	
4		ETX_P	Ethernet ports to send data TX+		GND	
5		LED2+	Network port status indicator	PE1	ISI_D1	User interface
6		LED1+	Network port status indicator	PE0	ISI_D0	User interface
7		LED2-	Network port status indicator	PE3	ISI_D3	User interface
8		LED1-	Network port status indicator	PE2	ISI_D2	User interface
9		GND		PE5	ISI_D5	User interface
10		GND		PE4	ISI_D4	User interface
11	PC31	DTXD_RS232	Debug serial port receive	PE7	ISI_D7	User interface
12	PC30	DRXD_RS232	Debug serial port send	PE6	ISI_D6	User interface
13		GND		PE9	ISI_HSYNC	User interface
14		GND		PE8	SIS_PCK	User interface
15	PD0	TXD1	User serial port 1 send	PE11	ISI_MCK	User interface
16	PD1	RXD1	User serial port 1 receive	PE10	ISI_VSYNC	User interface
17	PA28	RTS0	User serial port 0 require	PE13	ISI_D9	User interface
18	PA29	CTS0	User serial port 0 clear	PE12	ISI_D8	User interface
19	PA26	TXD0	User serial port 0 send	PE15	ISI_D11	User interface
20	PA27	RXD0	User serial port 0 receive	PE14	ISI_D10	User interface
21	PD2	TXD2	RS485 send signal	PA16	CTRL1	User interface

22	PD3	RXD2	RS485 receive signal	PA17	CTRL2	User interface
23	PA14	CAN_RX	CAN receive signal	EBI0_A10	EBI0_A10	User interface
24	PA13	CAN_TX	CAN send signal		GND	
25		GND		EBI0_A8	EBI0_A8	User interface
26	PB4	IIC_TWD	I IC data	EBI0_A9	EBI0_A9	User interface
27	PB5	IIC_TCK	I IC clock	EBI0_A6	EBI0_A6	User interface
28	PA8	MCI1_DA0	SD_DA0	EBI0_A7	EBI0_A7	User interface
29	PE18	MCI1_CD	SD_CD	EBI0_A4	EBI0_A4	User interface
30	PA9	MCI1_DA1	SD_DA1	EBI0_A5	EBI0_A5	User interface
31	PA7	MCI1_CDA	SD_CDA	EBI0_A2	EBI0_A2	CF_A2
32	PA10	MCI1_DA2	SD_DA2	EBI0_A3	EBI0_A3	User interface
33	PA6	MCI1_CK	SD_CK	EBI0_A0	EBI0_A0	CF_A0
34	PA11	MCI1_DA3	SD_DA3	EBI0_A1	EBI0_A1	CF_A1
35		GND			GND	
36		GND			GND	
37	HAD_P	USBHAD_P	USB host A	EBI0_D14	EBI0_D14	CF_D14
38	HAD_N	USBHAD_N	USB host A	EBI0_D15	EBI0_D15	CF_D15
39	HDB_P	USBHBD_P	USB host B	EBI0_D12	EBI0_D12	CF_D12
40	HDB_N	USBHBD_N	USB host B	EBI0_D13	EBI0_D13	CF_D13
41	DDN	USBC_N	USB slave	EBI0_D10	EBI0_D10	CF_D10
42	DDP	USBC_P	USB slave	EBI0_D11	EBI0_D11	CF_D11
43		USBC_VBUS	USB slave 5V power	EBI0_D8	EBI0_D8	CF_D8
44		NC		EBI0_D9	EBI0_D9	CF_D9
45		GND		EBI0_D6	EBI0_D6	CF_D6
46		GND		EBI0_D7	EBI0_D7	CF_D7
47	PB13	SPI1_MOSI	SPI1 output	EBI0_D4	EBI0_D4	CF_D4
48	PB12	SPI1_MISO	SPI1 input	EBI0_D5	EBI0_D5	CF_D5
49	PB15	SPI1_CS0	SPI1 chip selection 0	EBI0_D2	EBI0_D2	CF_D2
50	PB14	SPI1_SPCK	SPI1 clock	EBI0_D3	EBI0_D3	CF_D3
51	PB17	SPI1_CS2	SPI1 chip selection 2	EBI0_D0	EBI0_D0	CF_D0
52	PB16	SPI1_CS1	SPI1 chip selection 1	EBI0_D1	EBI0_D1	CF_D1
53	PB29	KEY_INT	Key interrupt		GND	
54	PB28	LED3	System indicator		GND	

55		MR_RST		EBI0_NEW	EBI0_NEW	User interface
56	WKUP	WKUP		PD7	EBI0_NCS5	CF_CS1
57	PB27	BUZZER	Buzzer	PD6	EBI0_NCS4	CF_CS0
58	SHND	SHDN		PA30	IDE_RST	CF_RST
59	PB7	PWMOUT		PD14	EBI0_A25_CFRNW	CF_DIR
60	PC5	WKUP_I0		PD9	EBI0_CFCE1	CF_CE1
61		GND		PD8	EBI0_CFCE0	CF_CE0
62		GND		PD5	IORDY	CF card
63	GND_AUDIO0	GND_AUDIO0		EBI0_NCS0	EBI0_NCS0	User interface
64	GND_AUDIO0	GND_AUDIO0		CFIOW	nIOWR	CF_WR
65		MIC2	Mic input	EBI0_NRD	EBI0_NRD	User interface
66		MIC1	Mic input	CFI0R	nIORD	CF_RD
67		LINE_R	Audio input R	PB21	CD_CF	CF_CD
68		LINE_L	Audio input L	PB20	IDE_IRQ	CF_IRQ
69		HP_R	Audio output R		GND	
70		HP_L	Audio output L		GND	

# *Chapter 3 Software Resource*

ARM8410 embedded provides all function components driver, the specification of the software resource are as follows:

## **3.1 WINCE**

- **Kernel Version**

- WindowsCE.net 5.0

- **Driver Features**

- 10M/100M Ethernet Driver
- NAND FLASH Driver(Identified as a disk on WinCE5.0 operating system)
- CF card driver
- SD card driver
- RTC Driver
- RS232/RS485 Driver
- USB HOST Driver supports USB mouse, keyboard, USB flash device etc.
- USB Device Driver
- USB Wireless LAN Driver
- TFT Liquid Crystal Screen Driver
- Touch Screen Driver
- Backlight Control Driver
- Buzzer Driver



- Audio 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 and other network protocols
- Support BMP, GIF, JPG, PNG and other image codecs
- Support Registry Save Function

## ● Other Features

- When connect motherboard with LCD, the power consumption is more than 2W, the user can set 1~30min 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

## 3.2 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

- 10M/100M Ethernet Driver

- NAND FLASH Driver
- RTC Driver
- CF card driver
- SD card driver
- RS232/RS485 Driver
- USB HOST Driver supports USB mouse, keyboard, USB flash device etc.
- USB Wireless LAN Driver
- TFT Liquid Crystal Screen Driver
- Touch Screen Driver
- Backlight Control Driver
- General- Purpose I/O Driver
- Buzzer Driver
- LED Driver
- Audio driver

## ● Linux Applications and Service Programs

- Busybox
- Telnet, Ftp, TFTP
- ifconfig, ping, route

## ● Embedded Graphics System

- Qt/Embedded, MiniGUI