

# ARM8020 User's Manual

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

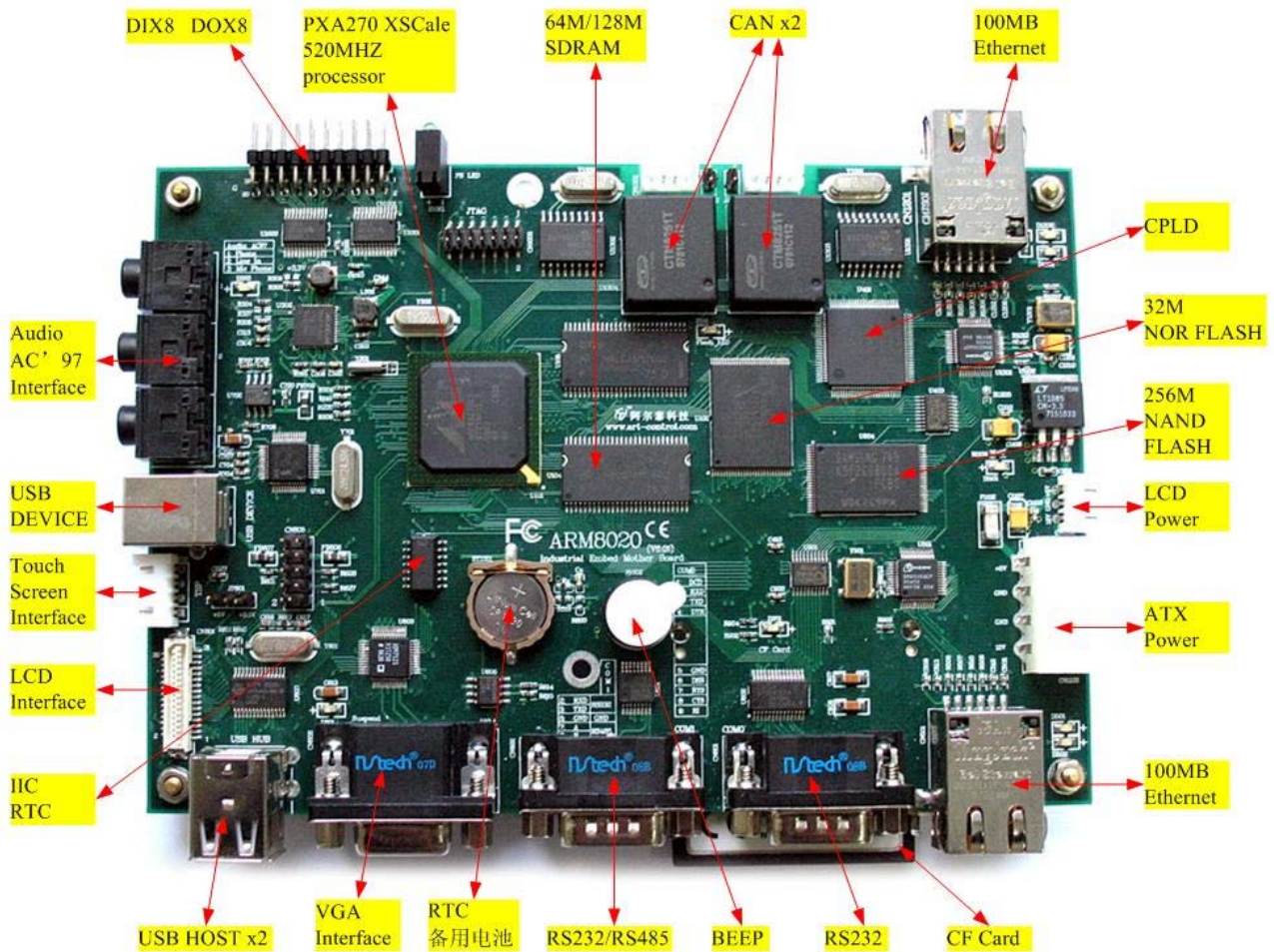
# *Contents*

<i>Contents</i> .....	2
<i>Chapter 1 overview</i> .....	3
<i>Chapter 2 Product Summary</i> .....	7
<i>Chapter 3 Interface Instruction</i> .....	8
<i>Chapter4 Electrical Specification</i> .....	12

# Chapter 1 Overview

ARM8020 is a kind of industrial mainboard which conform to CAN Bus criterion designed by Beijing ART Technology Development Co., Ltd. CPU used Intel XScale series PXA270, Basic Frequency is could reach equal to 520MHz, the power consumption is only 5W, ARM8020 could process multi-Computing tasks by running Embedded Linux operation system or WinCE operation system.

ARM8020 uses embedded CPU with Ultra-low Power Consumption without fan control system, super-wide operating temperature  $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$ , excellent performance on low temperature operating. Solving the problem of failure caused by the fan thoroughly on high working temperature. ARM8020 mainboard 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.



## Hardware Features

- Mainboard Size: 165mm x 115mm x 20mm
- CPU: Intel XScale series PXA270

Operating Frequency Range: 104MHz~520MHz  
Basic Frequency: 520MHz

Power Consumption: 750mW

- ✚ SDRAM: Industrial grade 64MB PCI SDRAM
- ✚ Solid State Memory
  - NorFlash: 32MB (Intel StrataFlashMemory)
  - NandFlash: 256MB (Samsung NandFlash Memory)
  - CF Card: 256MB~8GB (TrueIDE Mode)
- ✚ Display System
  - Interface for LCD: Supports both DSTN and TFT Liquid Crystal Screen, the highest resolution is 80x600
  - Interface for VGA: Supports CRT Display with external VGA connector, the resolution is 800x600
- ✚ Audio System
  - Interface for AC97: Phone x 1, Line In x 1, MIC x 1
  - Interface for Touch Screen: Supports 4-line Resistance Touch Screen
- ✚ Communication Interface:
  - RS232 Serial port: 1x 3-line serial port, baud rate-- 921.6Kbps
  - Full-function Serial port: 1x9-line serial port, baud rate-- 921.6Kbps
  - Interface for RS485: 1x Industrial Grade standard RS485
- ✚ USB HOST: 2x USB2.0, baud rate-- 12Mbps
- ✚ USB Client: 1x USB2.0, baud rate-- 12Mbps
- ✚ Ethernet: Ethernet Controller, Industrial Grade chip, 10M/100Mbps Self-adaptive,
- ✚ CAN Bus: 2 x CAN2.0 A/B
- ✚ Other Device:
  - 1 x DC buzzer
  - 2 x LED
  - RTC and Backup Battery
  - Independent Watchdog Timer
  - General- Purpose I/O, 8 cache digital input/output
  - JTAG Debug Interface
- ✚ Technics Characteristic
  - 6 layer PCB Design, high stability, anti-interference
- ✚ Operation Temperature
  - Industrial Grade Operation Temperature: -10°C ~+60°C

## Software Resource

ARM8020 embedded mainboard provides all function components driver, the specification of the software resource are as follows:

- NandFlash Driver(Identified as a disk on WinCE5.0 operating system)
- USB HOST Driver supports USB mouse, keyboard, USB flash device etc.
- USB Device Driver
- 10M/100M Base-T Ethernet Controller Driver
- WLAN Card Driver(choice)
- TFT/DSTN Liquid Crystal Screen Driver
- VGA Interface Driver
- AC97 Interface Driver

- Touch Screen Driver
- Full-function Serial Port Driver
- RS232 Driver, Standard Serial Port Driver
- RTC Driver
- CF Card Driver
- General- Purpose I/O Driver
- Buzzer Driver
- LED Driver

## Preface

The <User's Manual> provides you the structural layout, component installation, setting and standard requirement of ARM8020Embedded Industrial-control mainboard. Users must read the <User's Manual> before you use the products to avoid any unexpected.

## Proper Reader

The <User's Manual> is suitable for eligible technician but isn't appropriate the common readers.

## Product Statement

The <User's Manual> provides products information of Beijing ART Technology Development Co., Ltd. the document is not awarded any Intellectual Property permission and not indicate award any Intellectual Property permission. Beijing ART Technology Development Co., Ltd has no responsibility for anything except the products sales clause and product statement of the company. Besides, Beijing ART Technology Development Co., Ltd has no clear or implicit Guarantee about the sales or use of the products, including the feasibility of special use, salability, the tort liability of patent rights, copyrights and other Intellectual Property. The product of the Beijing ART Technology Development Co., Ltd does not design for Medical, life saving, the Beijing ART Technology Development Co., Ltd could make modification of the products at any moment and will not give notice.

## *Chapter 2 Product Summary*

ARM8020 Embedded Industrial-control mainboard owns high performance, which structure and size are most compact. ARM8020 Embedded Industrial-control mainboard has CAN bus interface.

ARM8020 Embedded Industrial-control mainboard owns ARM controller framed by 32 bit RISC .This processor is provided with high performance, Basic Frequency is could reach equal to 520Hz, the power consumption is only 750mW, so the whole power consumption could equal to less than 5W, ARM8020 provides abundant interfaces, integrating the two serial ports, two USB main interfaces, one USB device interface, one AC'97,one LCD and Touch Screen interface, which makes peripheral design more simple, more reliable, the software and hardware cost lower.

VGA interface, which resolution could reach equal to 800 x 600 and could connect to the CRT display with the keyboard and USB mouse, which could make up of a industrial computer with low power consumption, Industrial grade serial port and 100M Base-T Ethernet Controller can easily connect to kinds of industrial control module.

# Chapter 3 Interface Instruction

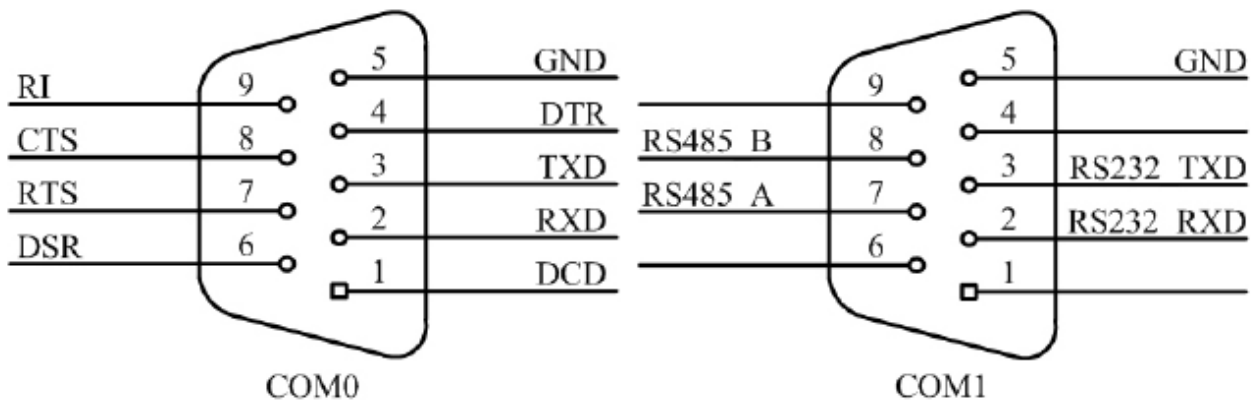
Power Sources: System power supply and liquid crystal screen inverter power supply output.

Pin	Signal Name
1	VDD 5V
2	GND
3	GND
4	VDD 12V

Interface for VGA output: can connect with all displays of standard VGA interface

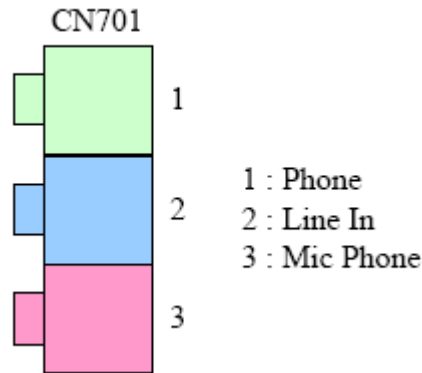
Pin	Signal Name	Pin	Signal Name
1	red	2	green
3	blue	4	NC
5	GND	6	
7	GND	8	
9	NC	10	GND
11	NC	12	NC
13	HSYNC	14	VSYNC
15	NC		

Serial port: COM 0 and COM 1.





Interface for Audio Frequency: standard AC97 Audio Frequency interface.



Interface for USB: two USB main interface, one USB device interface.

The Universal Serial Bus (USB) is a 4-wire bus that supports communication between host and a number of peripherals. The host controller allocates the USB bandwidth to attached devices through a token based protocol. The bus supports hot plugging, unplugging, and dynamic configuration of the devices. All transactions are initiated by the host controller.

ARM8020 industrial control mainboard has 1-wire USB Device and 4-wire USB Host interface, USB Device interface synchronizes with PC, and USB Host interface supports USB keyboard, mouse, U-disk and other devices.

Table 1 2-channel USB Host (CN603) interface

Pin	Signal Name	Pin	Signal Name
1、 5	VDD 5V Power	4、 8、 9	GND
2	HUSBDM2	3	HUSBDP2
6	HUSBDM3	7	HUSBDP3

Table 2 2-channel USB Host (CN605) interface

Pin	Signal Name	Pin	Signal Name
1、 2	VDD 5V Power	7、 8	GND
4	HUSBDM1	6	HUSBDP1
3	HUSBDM4	5	HUSBDP4

Interface for Liquid Crystal Screen and Touch Screen: supports 31 chips TFT LCD module. (Such as: LQ104V1DG51, PD064VT5)

The following table shows ARM8020LCD Interface Pin Description

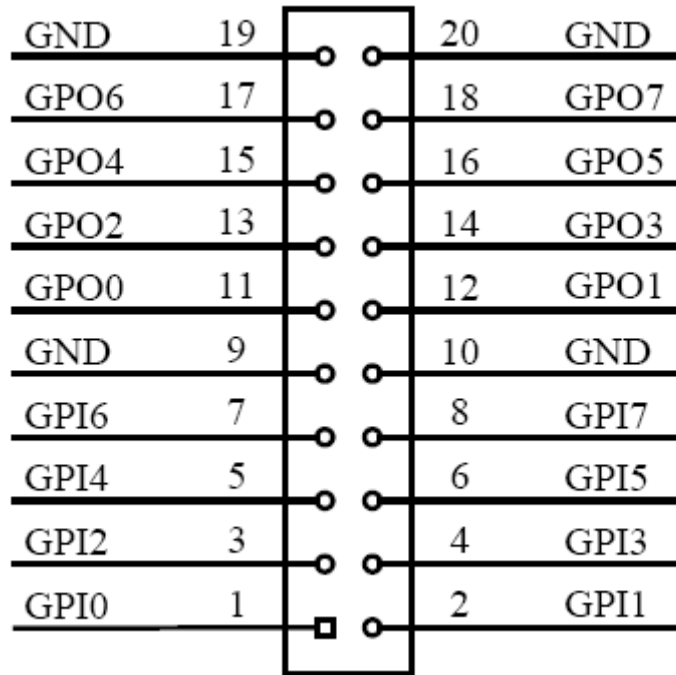
Pin	Signal Name
1, 5, 6, 12, 19, 20, 26, 31	Ground
21~25	LDD16~ LDD 23
13~18	LDD 5~ LDD 10
7~11	LDD 11~ LDD 15
2	L_PCLK, LCD
4	VSYNC

27	L_BIOS
3	HSYNC
28、29、30	VDD, 5V power supply

Notes: Users can choose the supply voltage of LCD from 3.3V to 5V by JP801 jumper.

Ethernet: Interface for 100M Ethernet.

Interface for General- Purpose I/O: 8 Input/Output.



Interface for CF Card: The interface can supply 3.3v power supply and control the signals, so it does not support 5V CF card.

Interface for CAN Bus: 2 x CAN bus, the signal definition is as follows:

Pin	Description
1	NC
2	CANL
3	CANH
4	FGND

Interface for JTAG: ARM8020 has JTAG interface which can be used to write and debug the program.

Table 3 Pin Description List (NH is unconnected)

Pin	Signal Name	Pin	Signal name
1	VCC3.3V	2、10	GND

3	nTRST	14	nRST_IN
4	CPLD_TDI	5	TDI
6	CPLD_TMS	7	TMS
8	CPLD_TCK	9	TCK
12	CPLD_TDO	13	TDO

RTC: The RTC is a set of counters for measuring time when system power is on, and optionally when it is off. It uses little power in Power-down mode. On the ARM8020, there is a RTC in support battery interface BT1001, when the mainboard power is off, it can supply the power to System Real-time Clock by an external battery with the specification CR1220.

# Chapter4 Electrical Specification

## Limit Parameters

The following tables are the definition of the Limit Parameters of Electrical and Heating, those parameters will avoid the burnout of the ARM8020Embedded Industrial-control mainboard.

### Limit Parameters

Symbol	Parameter	Conditions	Minimum value	typical value	Maximum value	Unit
VDD5V	working supply voltage of Mainboard		+4.85	-	+5.5	V
-5V	supply voltage of expansion board		none	-	无	V
+12V	supply voltage of expansion board		+12.45	-	+11.75	V
-12V	supply voltage of expansion board		none	-	none	V
VCC	operating voltage of CPU I/O		+2.7	-	+3.3	V
T <sub>stg</sub>	storage temperature 【2】	Industrial products	-40	-	+105	°C
P <sub>tot</sub>	Power consumption of whole mainboard 【3】	No Liquid Crystal Screen	2.5	-	5.0	W

[1] The specifications of Limit Parameters are as follows:

- 1) There has Inner protection circuit of the product interface, do not use the parameters overstep the utmost operation parameter, avoiding the burnout of the chip or the board.
- 2) It is valid to operate the parameters in the scope of the operating temperature.

[2] Depending on product grade.

[3] System running normally, not in the low-power or dormant state.

## Static Characteristic

Symbol	Parameter	Conditions	Minimum value	typical value	Maximum value	Unit
V <sub>IH</sub>	Input High Volt		0.8VCC	-	VCC+0.1	V
V <sub>IL</sub>	Input Low Volt		VSS-0.1	-	0.2VCC	V
V <sub>OH</sub>	Output High Volt	I <sub>OH</sub> = -4mA	VCC-0.3	-	VCC	V
V <sub>OL</sub>	Output High Volt	I <sub>OL</sub> = -4mA	VSS	-	VSS+0.3	V