



QY-1808EK Development Board

Hardware Manual

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◆ We give full play to the technical accumulation in ARM platform and Windows CE, Linux, Android operating system for many users providing custom service (OEM/ODM), to realize embedded products into the market stably, reliably and quickly.

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I . Suggestion for Using QY-1808EK

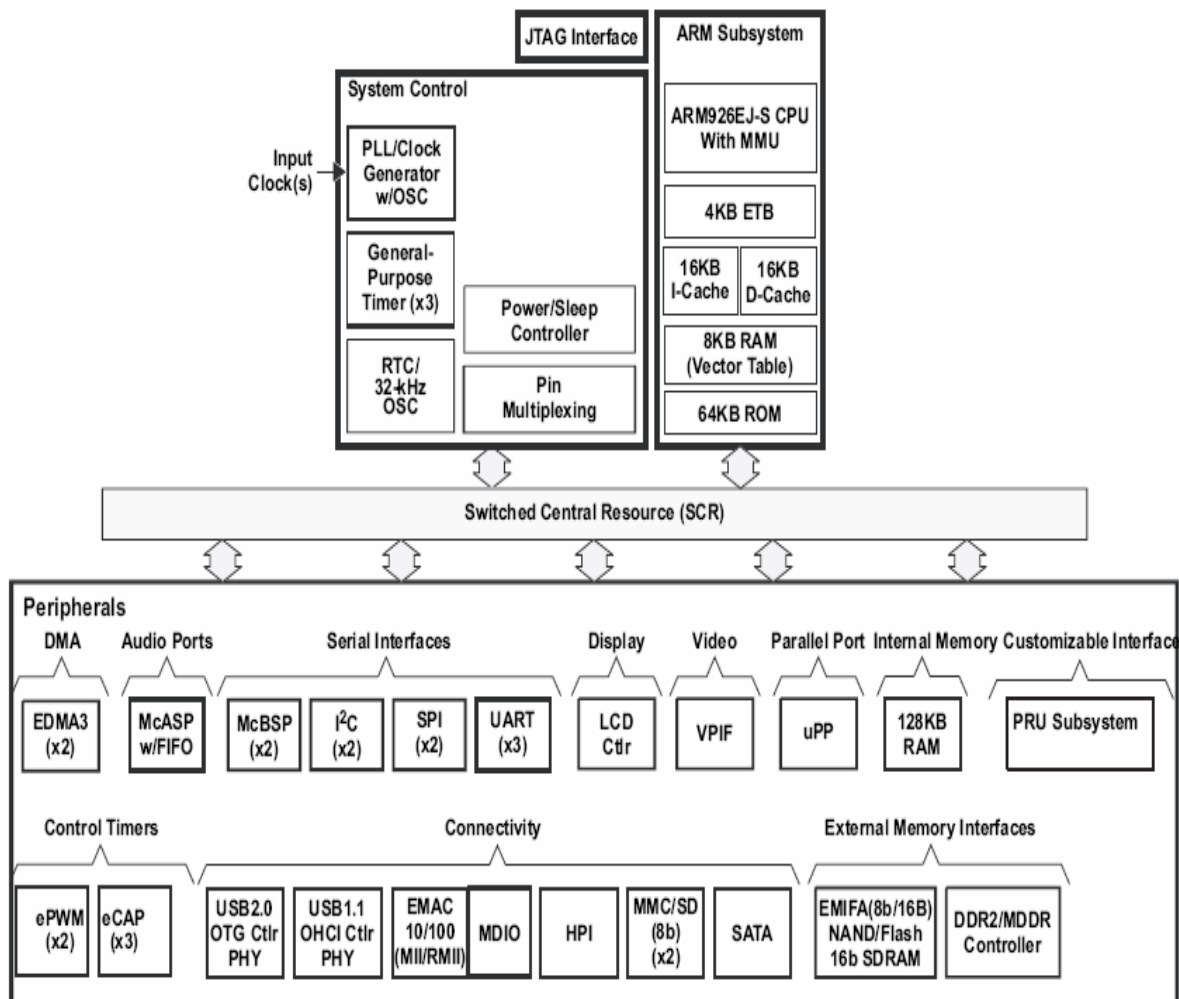
- (1) Please read the instructions first, before using the development board;
- (2) Please check the packing list before use, whether there is a missing file in the CD;
- (3) Please understand the basic structure and composition of the development board, including the hardware resource allocation, each pin definition of core board and back plane etc.;
- (4) If you need to develop in Linux system, burning program on the development board, in addition to the document, also suggest reading another document *QY-1808EK Linux User Manual*;

II . Board Features

2.1 Board Function Introduction

QY-1808EK adopts TI AM1808 as the main control chip, which is ARM926EJ-S kernel with LCD controller and maximum frequency is up to 456MHz. It supports USB2.0 OTG and USB1.1 HOST modes; integrates 100MHz Ethernet interface, 3*UART, 2*PRU modules, which can expand 8-ch full-duplex serial port; other interface modules: VPIF video interface, parallel uPP, SATA controller, advanced PWM, SPI, I2C, AC97, etc.

2.2 Block Diagram



Picture 1

- ◆ ARM926EJ-S kernel, 456MHZ;
- ◆ 128MB/256MB NandFlash (K9F1G08/K9F2G08; Max: 1GB NandFlash);
- ◆ 16-bit LCD controller; Max: 24-bit;
- ◆ Touch panel: Support 4 wire resistive touch panel;
- ◆ 1*100M network port, external PHY chip with RMII mode;
- ◆ 3*RS232/485 serial ports, 1 port (com0) as the debug UART;
- ◆ 2*PRU Modules, which can extend to 8-ch full-duplex serial ports;
- ◆ USB, USB 1.1 HOST, USB 2.0 OTG;
- ◆ Real-time Clock;
- ◆ SD card interface;
- ◆ 1.5Gbps/3Gbps SATA interface;
- ◆ 8*8 matrix keyboard port, support external matrix keyboard, and can be used as an ordinary I/O port;

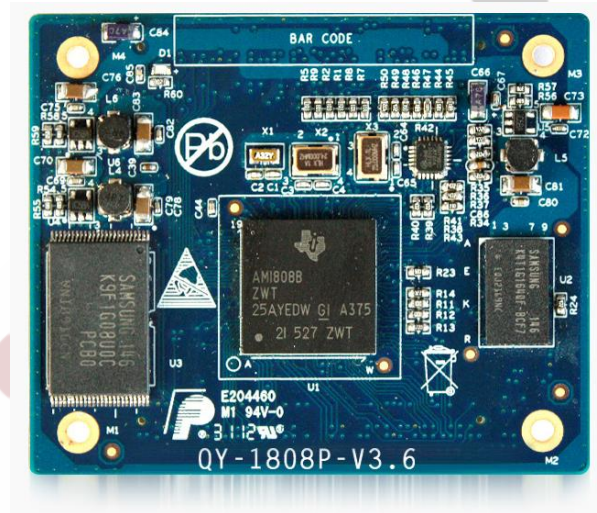
- ◆ AD/DA interface, can be extended to multi channel ADC/DAC;
- ◆ VGA video interface;
- ◆ Audio input/output interface;
- ◆ EMI bus interface can expand SDRAM.

2.3 Development Board Resources

Hardware Resources	Core Board	CPU	TI AM1808 CPU, ARM926EJ-S kernel, 456 MHz
		RAM	128MB DDR2 SDRAM
		Flash	128MB NandFlash
		Network	LAN8720 net chip, support 10M/100M adaptable Ethernet with RMII mode
		SATA	Clock synthesizer chip supporting
		Power	Single 5V power input, low power consumption
	Back plane	Communication	3*RS232/485 serial ports, 1 port (com0) as the debug UART;
			2*USB interfaces: USB 2.0 OTG, USB 1.1 HOST
			1*10/100Mbps Ethernet port, with ACT/LINK indicator
		Display	16-bit TFT-LCD(18, 24), 2048 x 2048 resolution
			VGA interface, can be connected with universal display
		Audio	Linear input/output
		Input Interface	4-wire resistive touch panel
			8*8 matrix keyboard
		Expansion Bus	EMIF bus interface, expand SRAM and other peripherals
			2*PRU modules, can expand to 8-ch serial ports
			AD/DA-digital expansion interface
		Memory Interface	SD card interface
			1.5Gbps/3Gbps SATA HD interface
Other Device	Reset circuit, wake-up function, real-time clock, buzzer, JTAG interface		
Power Input	+12V power supply, can support +4.75V~+18V wide range voltage supply		
Linux CD Resource	Device Manual	The component data manual	
	Virtual Machine	VMware-workstation-full-9.0.2	
	Ubuntu	Ubuntu 12.04	
	Cross-compiler	arm-arago-linux-gnueabi.tar.gz(gcc version 4.5.3)	
	Tool Terminal	Common terminal development debugging tool	
	Source Code	Bootloader, kernel, fs source code	
	Test Program	Interface using demo test program and test program source code	
	Image File	Operating system image file	
	User Manual	Development board user manual	

	Schematic	PDF development board schematic		
	Structure Size Chart	Back plane structure size chart		
Electrical Specification	Structure Size	Core board	74mm*53mm	
		Back plane	142mm*112mm	
	PCB Specification	Core board	6-layer high precision immersion gold process	
		Back plane	4-layer high precision immersion gold process	
	Main Board Power Consumption	< 2W		
	Operating Temperature	-20℃ ~ +70℃		
	Humidity Range	5% ~ 95%, Non-Condensing		

2.4 Core Board Resources



Picture 2

The core board has high precision technology of 6-layer PCB board with the best electric performance and anti-interference performance; hardware resources: integration of CPU, DDR2, NandFlash, PHY network on chip, crystal oscillator, as many as 200 pins.

- ◆ TI AM1808 CPU, 456 MHz;
- ◆ 128MB DDR2 SDRAM, 128MB NandFlash;
- ◆ LAN8720 network chip, support 10M/100M adaptable Ethernet with RMI mode;
- ◆ Size: 74mm*53mm, only a size of a business card is suitable for various embedded

applications;

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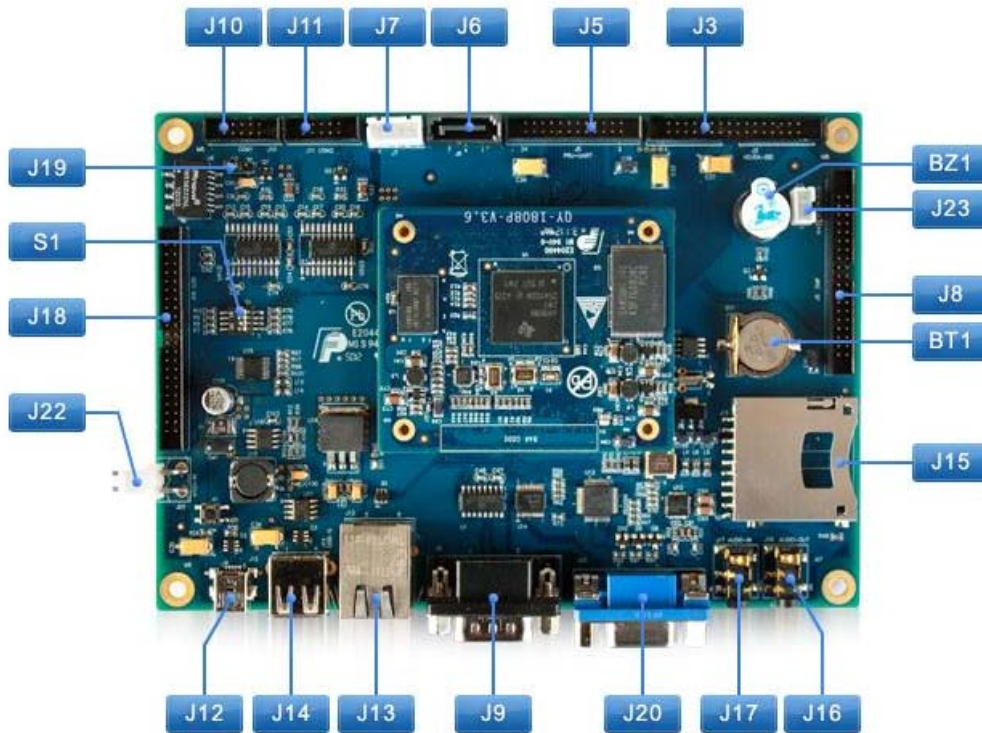
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- ◆ Core board on each two sides is using 100PIN B2B connector to boot all resources of cpu, which is convenient for hardware clipping and multiple platforms using.
- ◆ Power Supply: 5V, low power consumption, power consumption is less than 2W.

2.5 Back plane Resource

It expands the standard DEMO back plane, using high precision 4-layer process with the best electric performance and anti-interference ability for logic control, design of high speed industrial, which users can customize it based on their own needs.



Picture 3

Basic Interface Function Description:

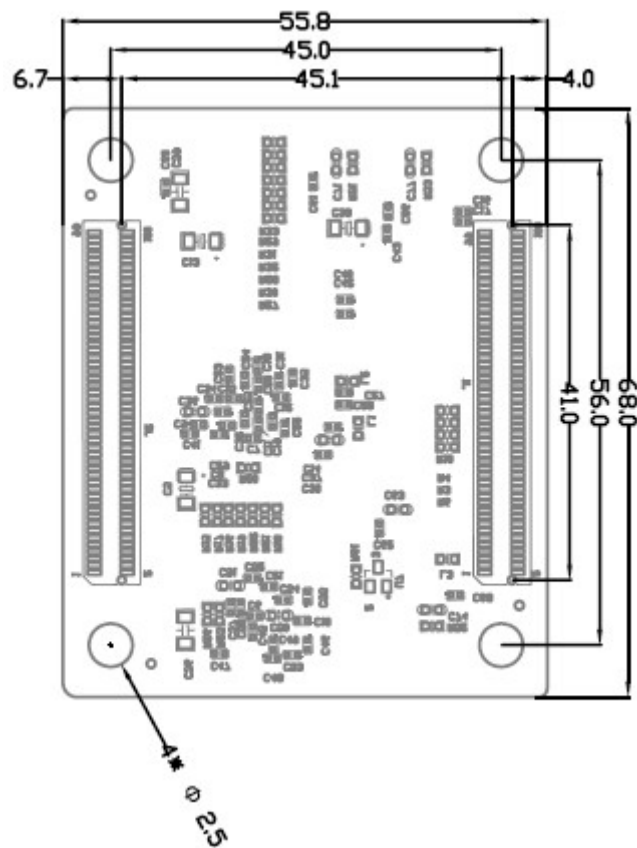
Label	Name	Function	Description
J3	AD/DA	GPIO SPI Expansion	2*GPIO ports: SPI expansion, 8x8 keyboard expansion
J5	PRU	2*PRU real time unit	Maximum expansion: 8-ch serial ports

J6	SATA interface	External SATA HD	The AHCI 1.1 specification, support 1.5Gbps/3Gbps rate
J7	SATA power	HD power supply	5V, 12V power out
J8	EMI bus	Expand SRAM and other peripherals	8-bit address width, 16-bit data width, 2-ch chip select
J9	COM0	Serial port 0	Debug port
J10	COM1	RS232, support flow control /isolation	Multiplexing with RS485
J11	COM2	RS232, support flow control /isolation	Multiplexing with RS485
J12	USB0	USB 2.0 OTG	Up to 480Mbps
J13	LAN	10M/100M adaptive full duplex	Standard network communication
J14	USB1	USB 1.1 HOST	Up to 12Mbps
J15	SD card	SD memory card	Support various capacity SD card
J16	Audio	Audio output	JACK interface
J17	Audio	Audio input	JACK interface
J18	LCD interface	LCD interface	External TFT-LCD panel, 4-wire resistive touch panel
J19	LCD Power Supply	LCD power supply	3.3V/5V power supply jumper optional
J20	VGA	VGA output	External standard display
J22	Power input	Power input	Support +4.75~+18V wide voltage power supply
S1	Dial Switch	Select the startup code	Refer to the AM1808 boot manual
BT1	Backup lithium battery	System clock power supply	Real-time clock system
BZ1	Buzzer	Alarm	Alarm device

III. Size & Structure Chart

3.1 Core Board Size

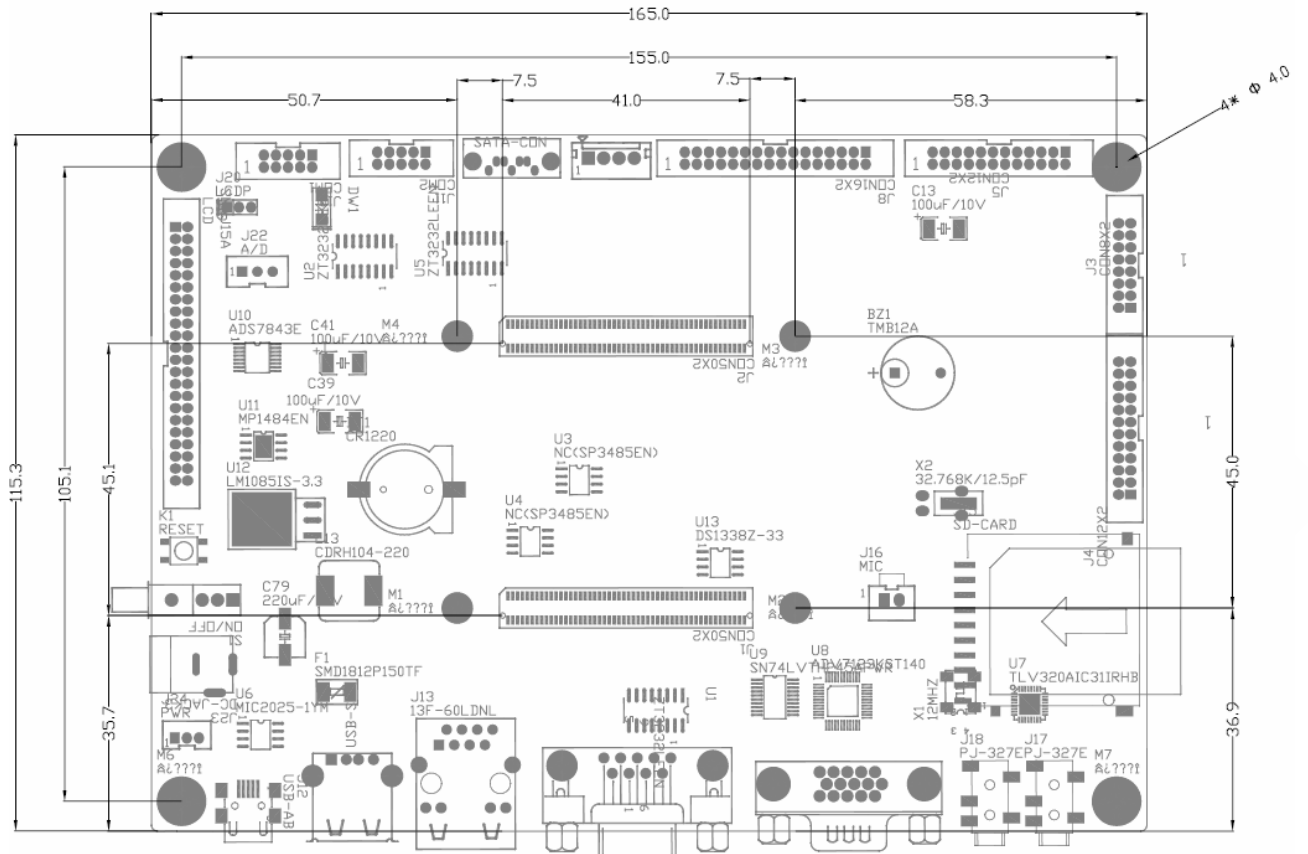
Unit: mm, if you need connector size, please email: supports@qiyangtech.com



Picture 4

3.2 Back Plane Size

Unit: mm, if you need connector size, please email: supports@qiyangtech.com



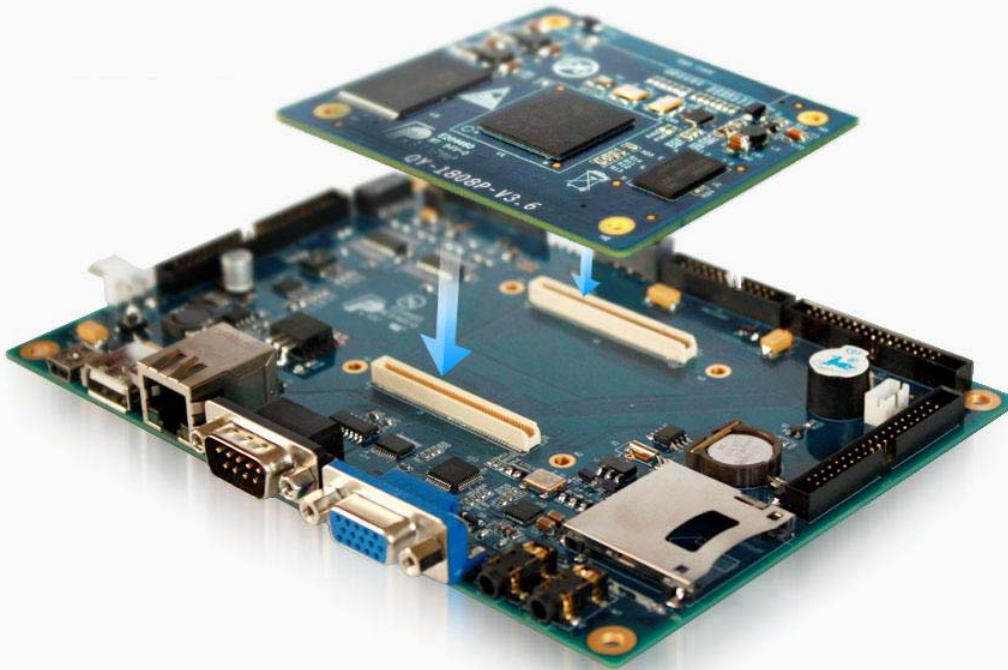
Picture 5

4. Device Connection Pictorial View

At the aspect of hardware, QY-1808EK adopts back-insert form, and connects to back plane by a double 2*100PIN pin board, which constitutes the complete intelligent equipment, the connection mode is as shown:

Remark:

J1 of Core board insert to J1 of back plane;
J2 of Core board insert to J2 of back plane;



Picture 6

V. Detailed Hardware Specifications

The following information of all the chips mentioned are available in the CD, follow the datasheet folder, please query if you need it. For more information, please refer to each function module:

AM1808/AM1810 ARM Microprocessor Technical Reference Manual.pdf

AM1808 ARM Microprocessor Datasheet.pdf

5.1 Power Management Module

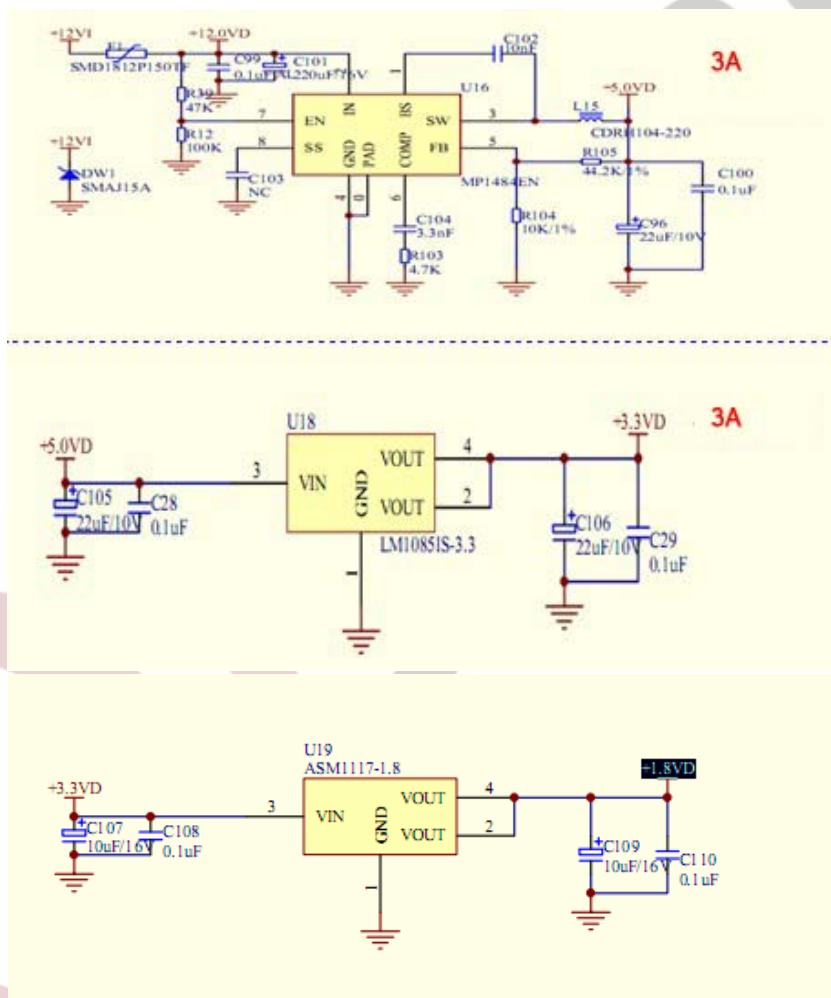
The power supply of QY-1808EK core board and back plane are separated,

and overall board is supplied 12V alone through back plane.

It outputs all the voltages that the back plane required through MP1484EN, LM1085 and ASM1117 power management modules.

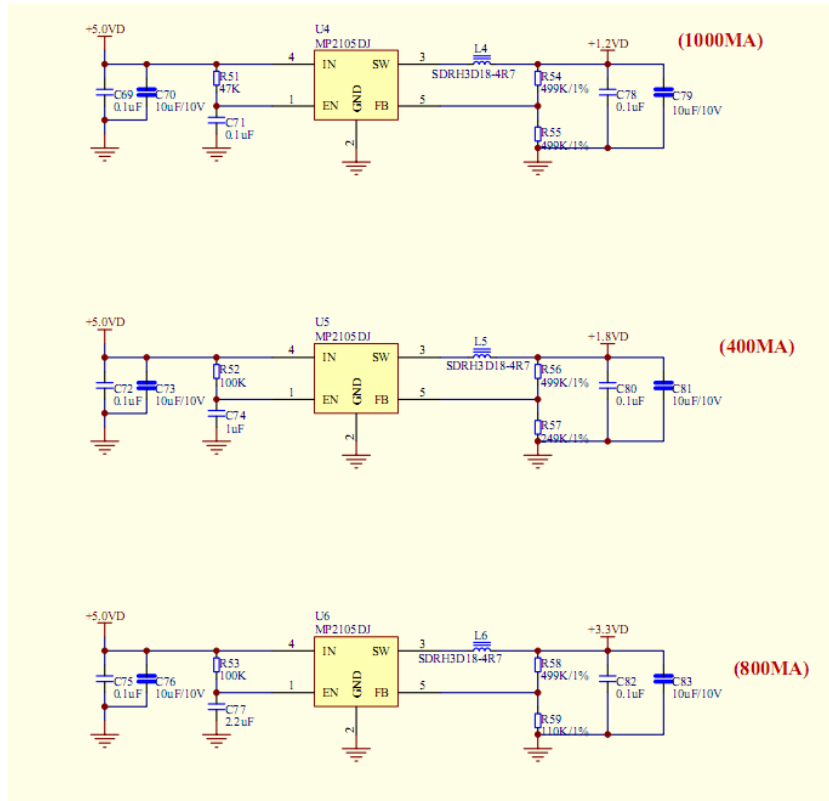
It outputs all the voltage that the core board required through MP2105 power management module.

Back plane Power Management Module:



Picture 7

Core Board Power Management Module



Picture 8

5.2 DDR2 Storage

QY-1808EK core board uses the 128M byte DDR2 SDRAM with a 16-bit data width of DDR2 SDRAM Storage (U2); the data and CLK signal lines run up to 400 MHz.

5.3 NAND Flash Storage

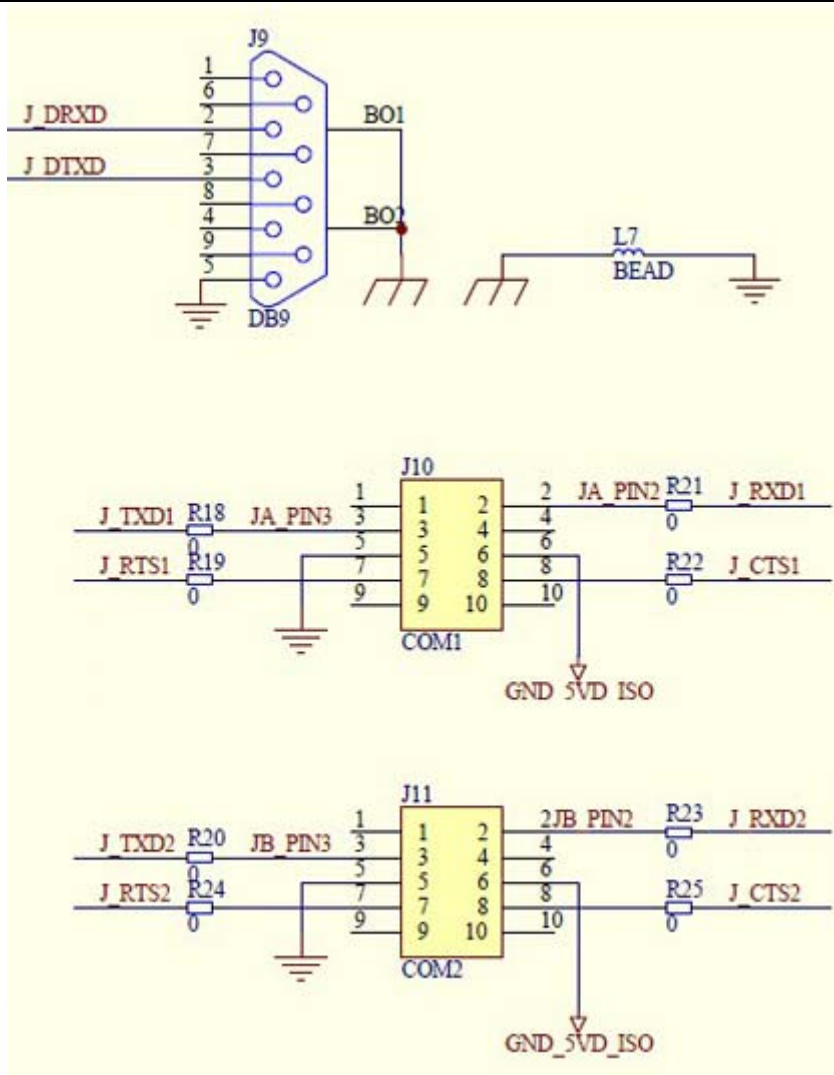
QY-1808EK core board has 128MB NAND Flash storage (U3); and the user can make system curing and storage area distribution operations.

Current the standard is 128MB; the capacity can be adjusted according to customer's requirements, supporting 256MB and 512MB for batch order

customers only. Also it can replace -40 ~+85 °C industrial-grade temperature of chip.

5.4 RS232/RS485 Serial Port

QY – 1808EK back plane provides 3*serial ports, including com0 as default debug UART, com1~com2 as 5-wire RS232 serial port, multiplexing 2*RS485; Outputting RS232 or RS485 is according to the requirement to replace the chip. The back plane has isolating circuit, and the user can add isolation chip if necessary.

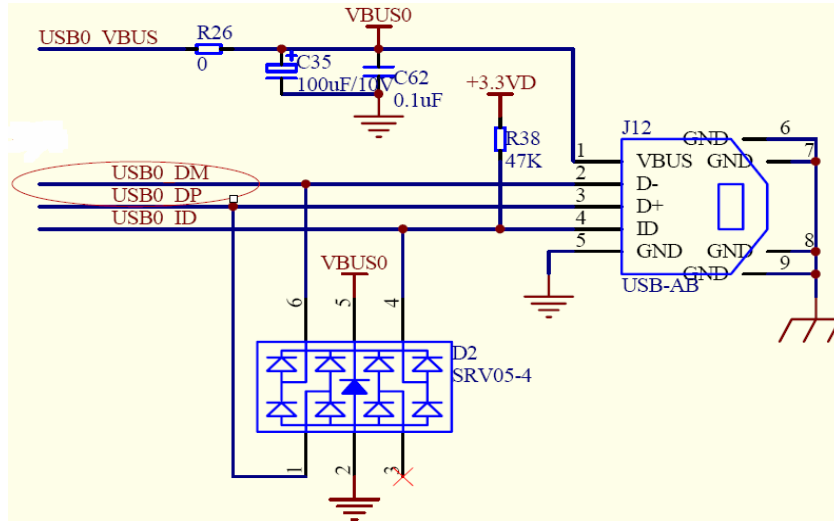


Picture 9

5.5 USB

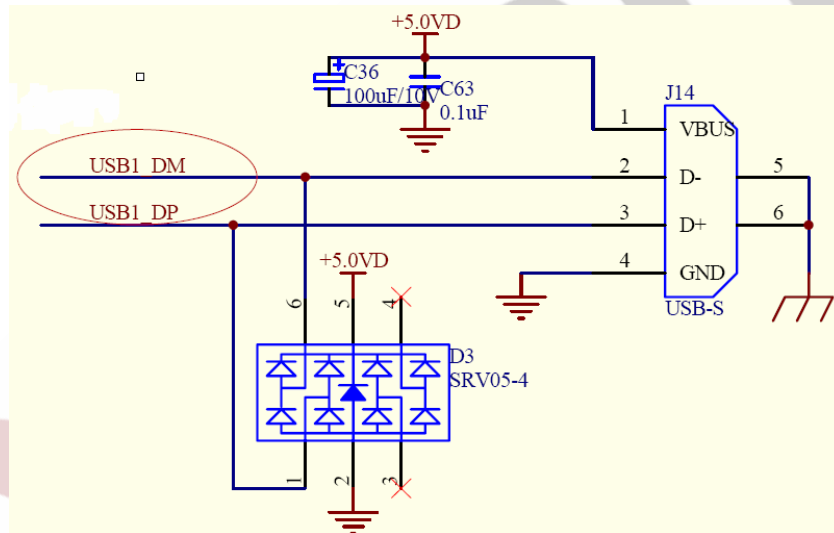
QY-1808EK back plane provides 2*USB interfaces, 1*USB OTG 2.0, 1*USB1.1 HOST, and supports USB flash drive, mobile hard disk, all kinds of USB Hub, USB mouse, keyboard , etc

USB OTG:



Picture 10

USB HOST:



Picture 11

5.6 Ethernet

QY-1808EK back plane provides 1*RMII Ethernet interface (J13), comply with IEEE802.3 Ethernet physical layer specifications. Support 10/100M adaptively Ethernet port, standard RJ45 interface, and integrated network transformer, with LNK and ACT network lights.

5.7 TFT-LCD

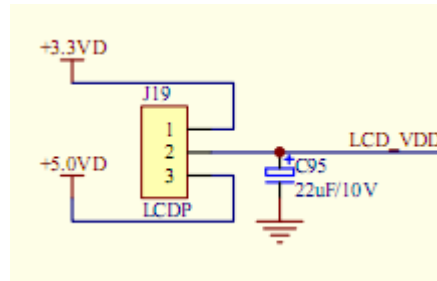
QY-1808EK back plane provides 1-16bit (RGB565 mode) TFT-LCD and touch panel interface, using 2.0 spacing 44 pin socket, can drive TFT-LCD panel, in theory, resolution can support to 2048*2048; in practical, we suggest using maximum support to 800*600 which is the best result without dithering, ghosting and other bad phenomena, the last 4 pins of J18 are 4-wire resistive touch panel interface, pins are defined as follows:

J18 pin definition: LCD interface

1	GND	2	LCD_PCLK
3	LCD_HSYNC	4	LCD_VSYNC
5	GND	6	GND
7	LCD_D11	8	LCD_D12
9	LCD_D13	10	LCD_D14
11	LCD_D15	12	GND
13	LCD_D5	14	LCD_D6
15	LCD_D7	16	LCD_D8
17	LCD_D9	18	LCD_D10
19	GND	20	GND
21	LCD_DO	22	LCD_D1
23	LCD_D2	24	LCD_D3
25	LCD_D4	26	GND
27	LCD_DE	28	LCD_VDD
29	LCD_VDD	30	PULL UP
31	LCD_MCLK	32	NC
33	NC	34	NC
35	GND	36	NC
37	NC	38	NC
39	NC	40	NC
41	TSC_XP	42	TSC_YP
43	TSC_XM	44	TSC_YM

Remark: Confirm the drive voltage for the LCD, select 3.3V/5V by jumper (J19)

J19 pin definition: LCD power supply, select voltage according to LCD panel.



Picture 12

Instruction:

Pin1 connect with pin2 is +3.3V power supply

Pin2 connect with pin3 is +5V power supply

Remark: If LCD needs 5V power supply, jumper 3.3V may appear unstable voltage and flash screen situation;

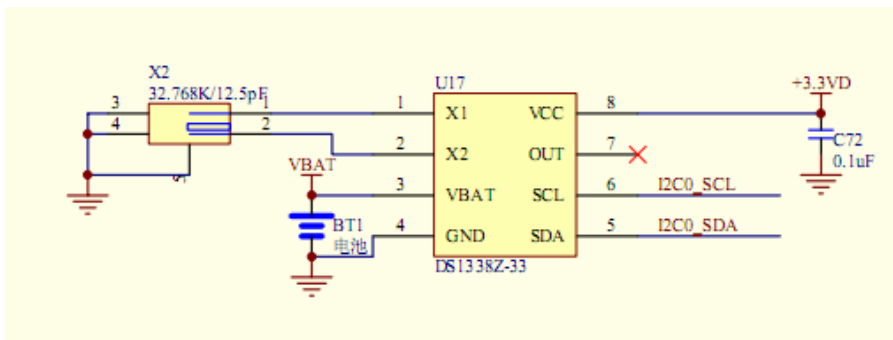
If LCD needs 3.3V power supply, jumper 5V may appear dithering, ghosting screen and long time work may cause LCD damage.

5.8 VGA

QY-1808EK back plane provides 1*VGA interface, support 640*480, 800*600, 1024*768 standard resolution; can connect universal display.

5.9 RTC

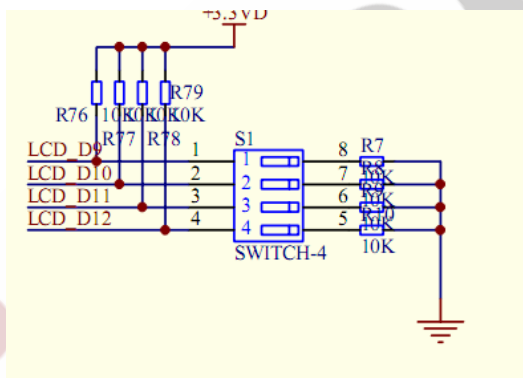
QY-1808EK back plane can extend precise clock circuit with high reliability and stability, and adopt DS1307 clock chip with 3.3V high capacity button battery, ensuring power on for a long time and accurate travel time in outage.



Picture 13

5.10 Dial Switch Jumper Illustration

QY-1808EK back plane support various startup modes, support the switch required dialing.



Picture 14

LCD_D9~LCD_D12 is corresponding to BOOT1~BOOT4 bit separately, other BOOT5~BOOT7 and BOOT0 are low level.

Table 8. Boot Mode Selection

BOOT[7:0] ⁽¹⁾	Boot Mode	AIS
0000 0010	NOR	Yes ⁽²⁾
0000 1110	NAND 8	Yes
0001 0000 ⁽³⁾	NAND 16	Yes
0000 0000	I2C0 EEPROM	Yes
0000 0110	I2C1 EEPROM	Yes
0000 0001	I2C0 Slave	Yes
0000 0111	I2C1 Slave	Yes
0000 1000	SPI0 EEPROM	Yes
0000 1001	SPI1 EEPROM	Yes
0000 1010	SPI0 Flash	Yes
0000 1100	SPI1 Flash	Yes
0001 0010	SPI0 Slave	Yes
0001 0011	SPI1 Slave	Yes
xxx1 0110 ⁽⁴⁾	UART0	Yes
xxx1 0111 ⁽⁴⁾	UART1	Yes
xxx1 0100 ⁽⁴⁾	UART2	Yes
0000 0100	HPI	No
0001 1110	Emulation Debug	No

Picture 15

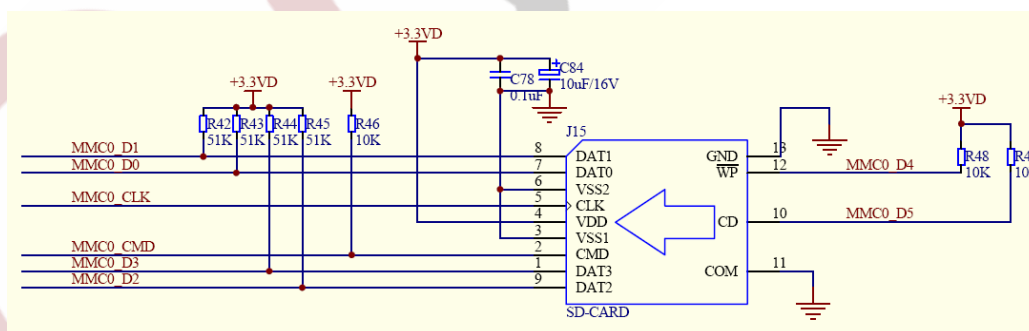
For more information, please refer to *AM1808 BOOT manual*.

5.11 Buzzer

QY-1808EK back plane provides 1*BZI for alarm.

5.12 SD Card

QY-1808EK back plane provides 1*SD interface (J15) and standard SD card interface, also supports various capacity universal SD cards.

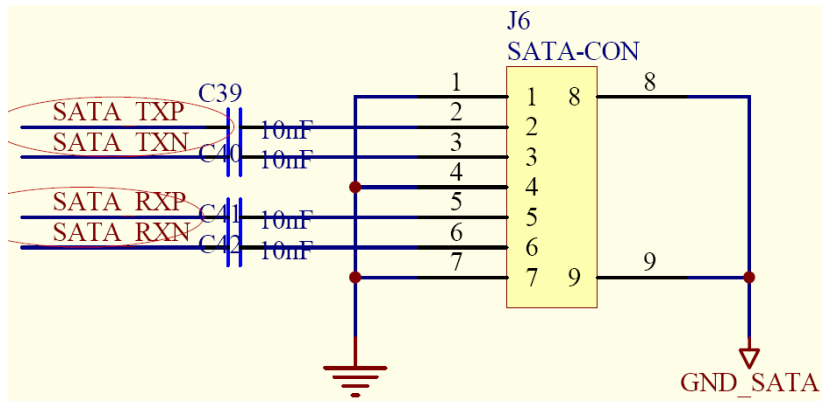


Picture 16

5.13 SATA

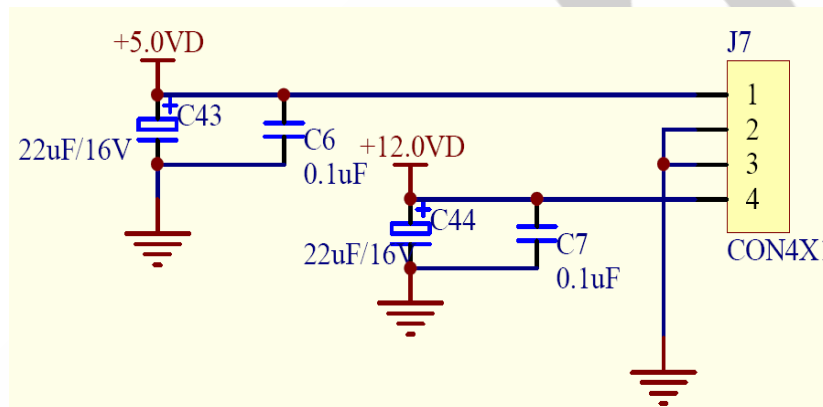
QY-1808EK back plane provides 1*SATA (J6) interface, support hard device SATA interface etc. SATA controller use SATA1.1. It supports 1.5Gbps and

3Gbps linear velocity. If you need to connect SATA, please connect as follows:



Picture 17

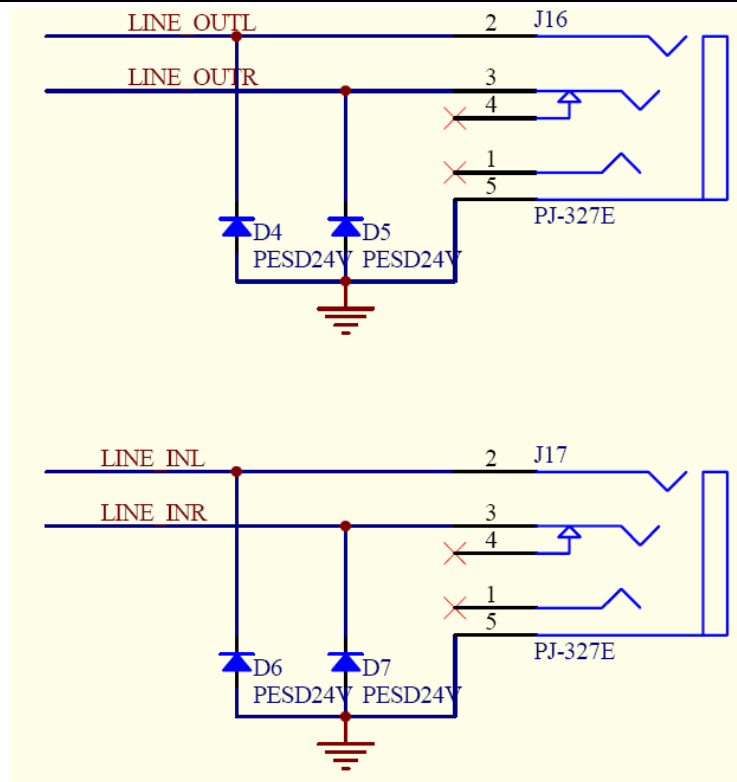
SATA Power Supply Interface



Picture 18

5.14 Audio

Audio Interface



Picture 19

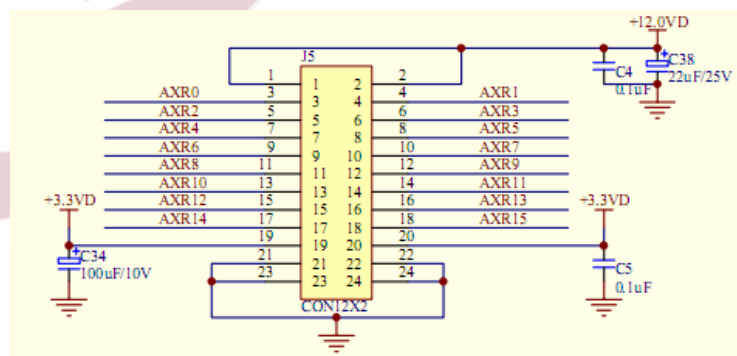
J16 is audio linear output

J17 is audio linear input

Standard JACK audio interface supports direct access for audio output device as earbud, audio etc.

5.15 PRUSS

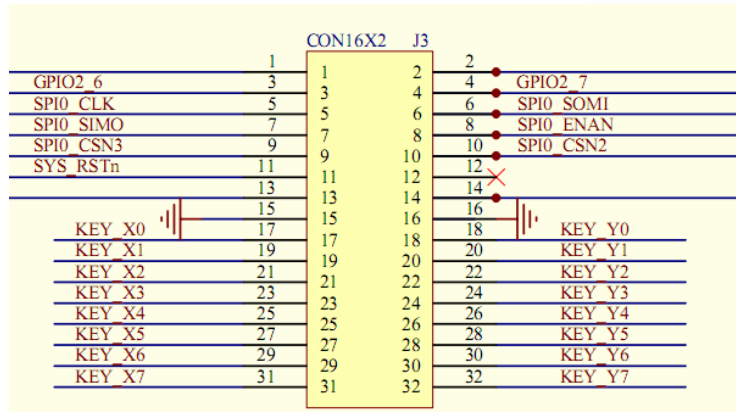
TI AM1808 CPU integrates 2*PRU modules to program and achieve user-defined function. Provides 8*PRUSS (PRU SOFT SUAR) (J5) interfaces. It can extend up to 8-ch serial ports.



Picture 20

5.16 Digital Expansion Interface

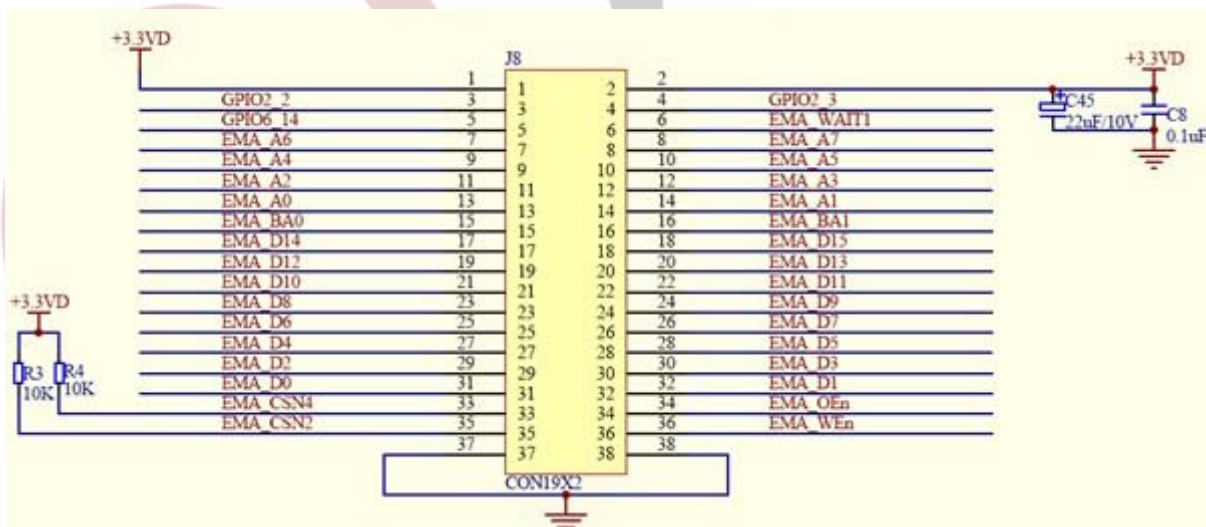
QY-1808EK back plane provides 1*SPI (2-ch chip select), 8*8 matrix keyboard and 2*GPIO to extend digital interface (j3). Extensible multi-channel high speed AD/DA and multiple GPIO.



Picture 21

5.17 EMIF Bus Expansion Interface

QY-1808EK back plane provides extended interface of EMI bus to extend SRAM.



Picture 22

Provides csn2 csn4 2*asynchronous data interfaces, 8-bit address bus, and

16-bit data bus.

VI. Software Description

QY-1808EK provides Linux system; please refer to *QY-1808EK Linux User Manual*.

VII. Remark

1. Before connect to LCD, confirm LCD power specification.
2. Please use the original connecting accessories, avoid damaging the main board.
3. We ensure offering communication technology support through E-mail, telephone for lifelong technical support service.
4. We ensure offering 6 months repair service for free, if malfunction occurs in warranty because of quality problem, contact our retailer or our company with purchase receipt in warranty period, we will repair or replace it.
5. Under these circumstances, we do not offer repair for free:
 - Over warranty time;
 - Do not have purchase receipt;
 - Liquid inlet, Damp or Mold;
 - Malfunction and damage is not due to product quality but drops, intense sharking, arbitrarily modify, disoperation after purchase;
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