



EZ335X-EVB Development Board
Hardware Manual

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Hangzhou Qiyang Technology Co., Ltd. is located at the bank of the beautiful West Lake. It is a high and new technology enterprise which is specializing in R&D, manufacture and sell embedded computer main board with high performance, low power consumption, low cost, small volume, and provides embedded hardware solutions.

We Offer:

◆ Research & develop, manufacture and sell embedded module products which have independent intellectual property rights, and cooperate with TI, ATMEL, Cirrus Logic, Freescale, and other famous processor manufacturers. It has launched a series of hardware products, such as ARM development board, ARM core module, ARM industrial board, sound/video decoding transmission platform, supporting tools and software resources which support user for their next embedded design.

◆ 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 EZ335X-EVB

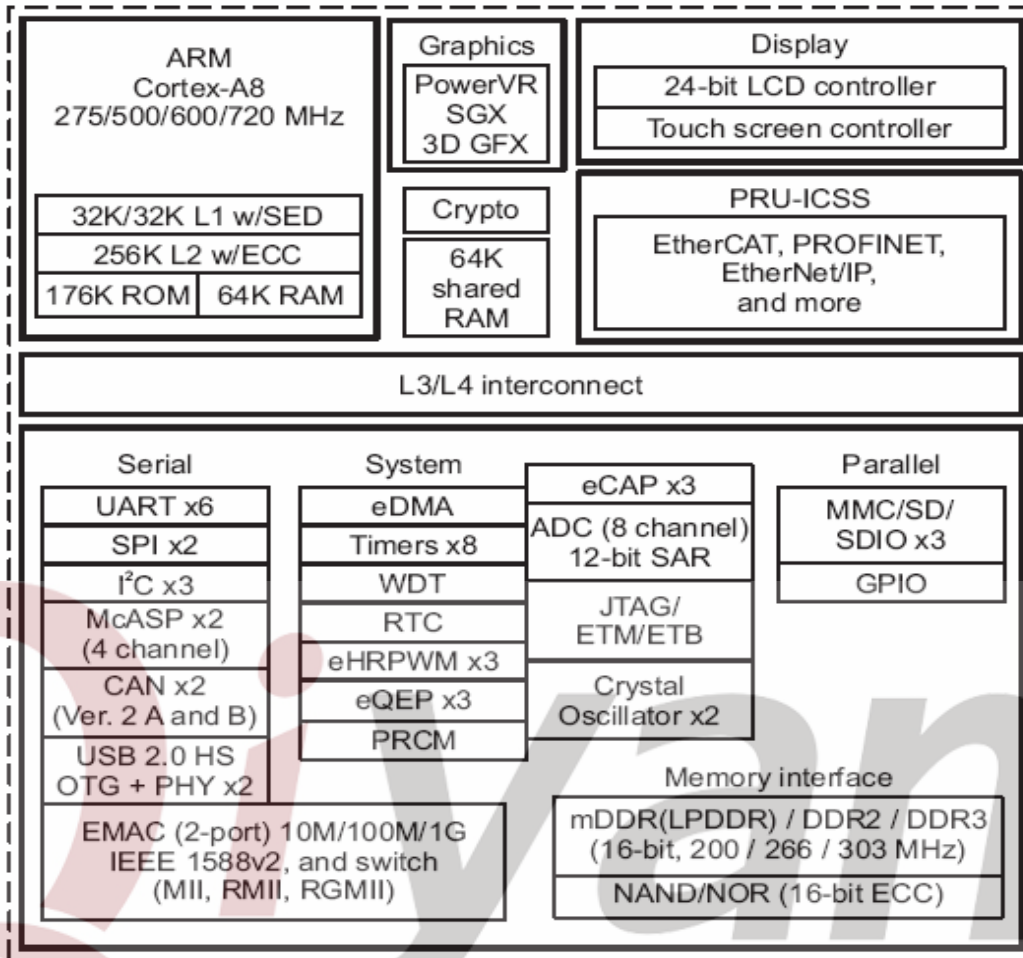
1. Please read the instructions first, before using the development board;
2. Before using, please check the packing list and see whether there is a missing file in the CD;
3. Please understand the basic structure and composition of the development board, including the hardware resource allocation, each pin definition of core board and back plane etc.;
4. If you need to develop on Linux system and burn program into the development board, in addition to this document, we also suggest reading another document *EZ335X-EVB Linux User Manual*;
5. If you need to develop on Linux system and burn program into the development board, in addition to this document, we also suggest reading another document *EZ335X-EVB Linux User Manual*;
6. We accept back plane customized by clients and batch order of core board for EZ335X-EVB.

II . Board Features

2.1 Processor Summary

EZ335X-EVB development board adopts TI AM335X series chip. For batch order users, we can replace different chips to lower cost. Standard configuration is AM3354 development board.

Device Connection Pictorial View:



Picture 1

- ◆ ARM Cortex-A8, 720MHZ;
- ◆ NEON™ SIMD Coprocessor, 32KB of L1 Instruction and 32KB Data Cache with Single-Error Detection (parity); 256KB of L2 Cache with Error Correcting Code (ECC)
- ◆ 24-bit LCD controller and touch panel controller, resolution up to 2048 * 2048;
- ◆ 2-ch USB2.0 OTG integrated PHY;
- ◆ Support Max. 6-ch UART;
- ◆ 2-ch industrial gigabit Ethernet MAC(10/100/1000MHZ);
- ◆ 2-ch CAN ports, support CAN2.0 A&B;
- ◆ Integrated 2-ch PRU modules;
- ◆ 2-ch multifunction audio channel;
- ◆ Common peripheral: Multichannel SPI, IIC, timer, PWM, DMA, RTC, etc.
- ◆ SGX530 3D Graphics Engine.

AM335X series chip:

Label	ARM CPU	ARM MHz (MAX.)	ARM MIPS (MAX.)	Graphics Acceleration	Other Hardware Acceleration
AM3359	1 ARM Cortex-A8	275 600 720	1200 1440	1 3D	2 PRU-ICSS Crypto Accelerator
AM3358	1 ARM Cortex-A8	275 600 500 720	1000 1200 1440	1 3D	2 PRU-ICSS Crypto Accelerator
AM3357	1 ARM Cortex-A8	275 600 720	550 1200 1440		2 PRU-ICSS Crypto Accelerator
AM3356	1 ARM Cortex-A8	275 600 500 720	550 1000 1200 1440		2 PRU-ICSS Crypto Accelerator
AM3354	1 ARM Cortex-A8	275 600 500 720	1000 1200 1440	1 3D	Crypto Accelerator
AM3352	1 ARM Cortex-A8	275 600 500 720	1000 1200 1440		Crypto Accelerator

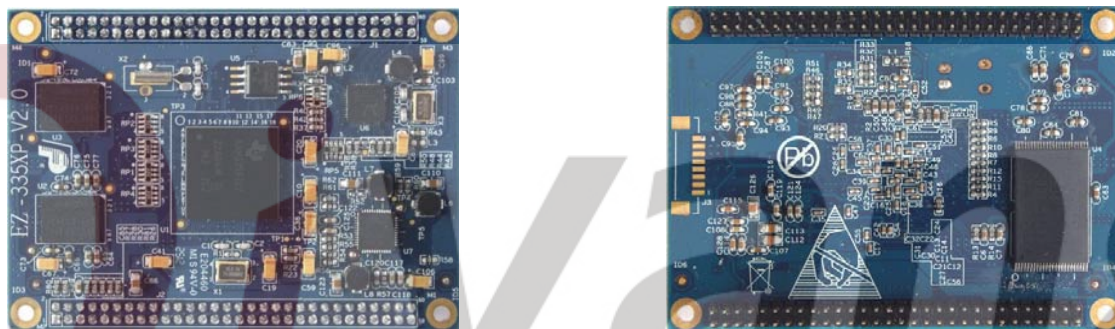
2.2 Development Board Resource

Hardware Resources	Core Board	CPU	TI AM335X CPU, ARM Cortex-A8 720MHz
		RAM	256MB DDR2 SDRAM
		Flash	256MB NandFlash, 2MB DataFlash
		Network	RTL8211E Network Chip, adopt RGMII mode, support 10M/100M/1000M
		Power	Single 5V power input, low power consumption
	Back Plane	Communication	6-ch RS232 serial port, com0 as the debug UART
			2-ch USB2.0, high-speed OTG
			2-ch 10/100/1000Mbps Ethernet port, with ACT/LINK indicator
		Display	16-bit TFT-LCD(Compatible with 18, 24 bits), resolution up to 2048 * 2048
			VGA interface, can be connected with universal display
		Audio	McASP audio interface; binaural input, output; MIC audio input
		Input Interface	4-wire resistive touch panel
		Expansion Bus	2-ch CAN bus interface, support CAN2.0A and CAN2.0B protocol
		Memory Interface	SD card 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-7.1.4-385536	
	Ubuntu	ubuntu-10.10-desktop-i386.iso	
	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	
	PCB Library & BOM	PCB Library of back plane and BOM list	
	Structure Size Chart	Back plane structure size chart	
	TI reference material	TI authority AM335X reference material	
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	
Operation Temperature	-20°C~+70°C	
Humidity Range	5% ~ 95%, Non-Condensing	

2.3 Core Board Resources

High precision 6-layer PCB of core board; hardware resources: integration of CPU, NorFlash, RAM, NAND Flash (the back), network chip, clock chip crystal oscillator, as many as 120 pins.



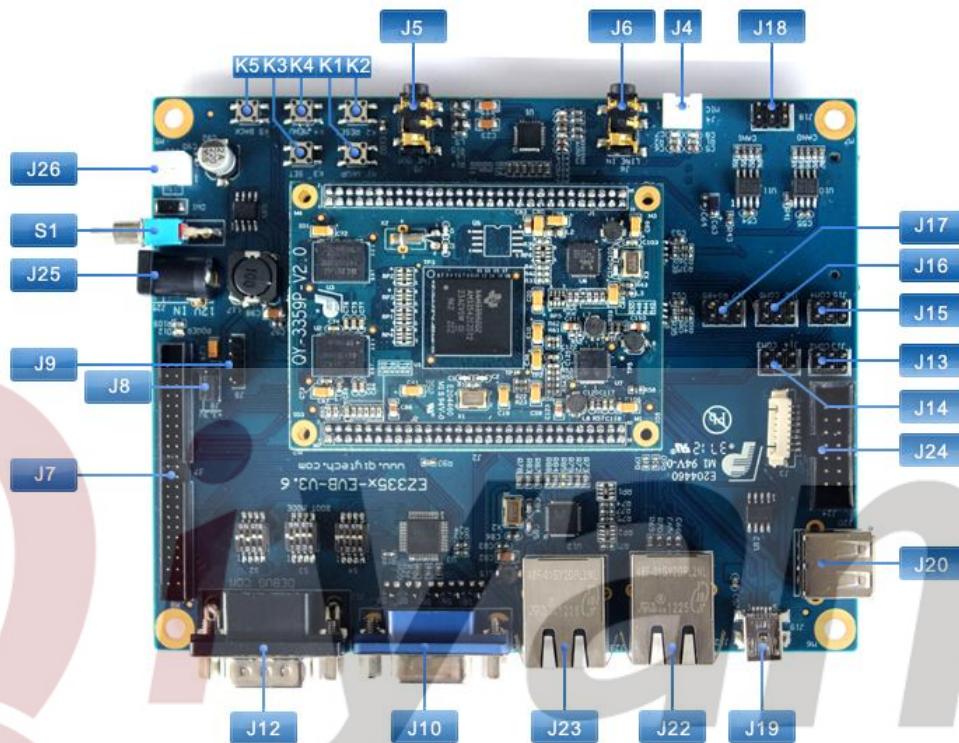
Picture 2

- ◆ TI AM335X CPU(3352/3354/3359),720MHz;
- ◆ 256M DDR2 SDRAM 256MB NandFlash 2MB DataFlash
- ◆ RTL8211E network chip, support 10M/100M /1000M adaptable Ethernet with RMII mode;
- ◆ Size: 74mm*53mm, only a size of a business card, suitable for various embedded applications;
- ◆ Core board on each two sides is using 2 pieces of 2*30 pins connector to lead all resources of cpu, which is convenient for hardware clipping and multiple platforms using.
- ◆ Power Supply: 5V, adopt TI's MPU management chip, output voltages required by core board, low power consumption, power consumption is less than 2W.
- ◆ Provide reset circuit and wake-up function.

2.4 Back plane Resource

It expands the standard DEMO back plane, using high precision 4-layer PCB

with the best electric performance and anti-interference ability for logic control, design of high speed industrial, which users can customize it base on your own needs.



Picture 3

Basic Interface Function Description:

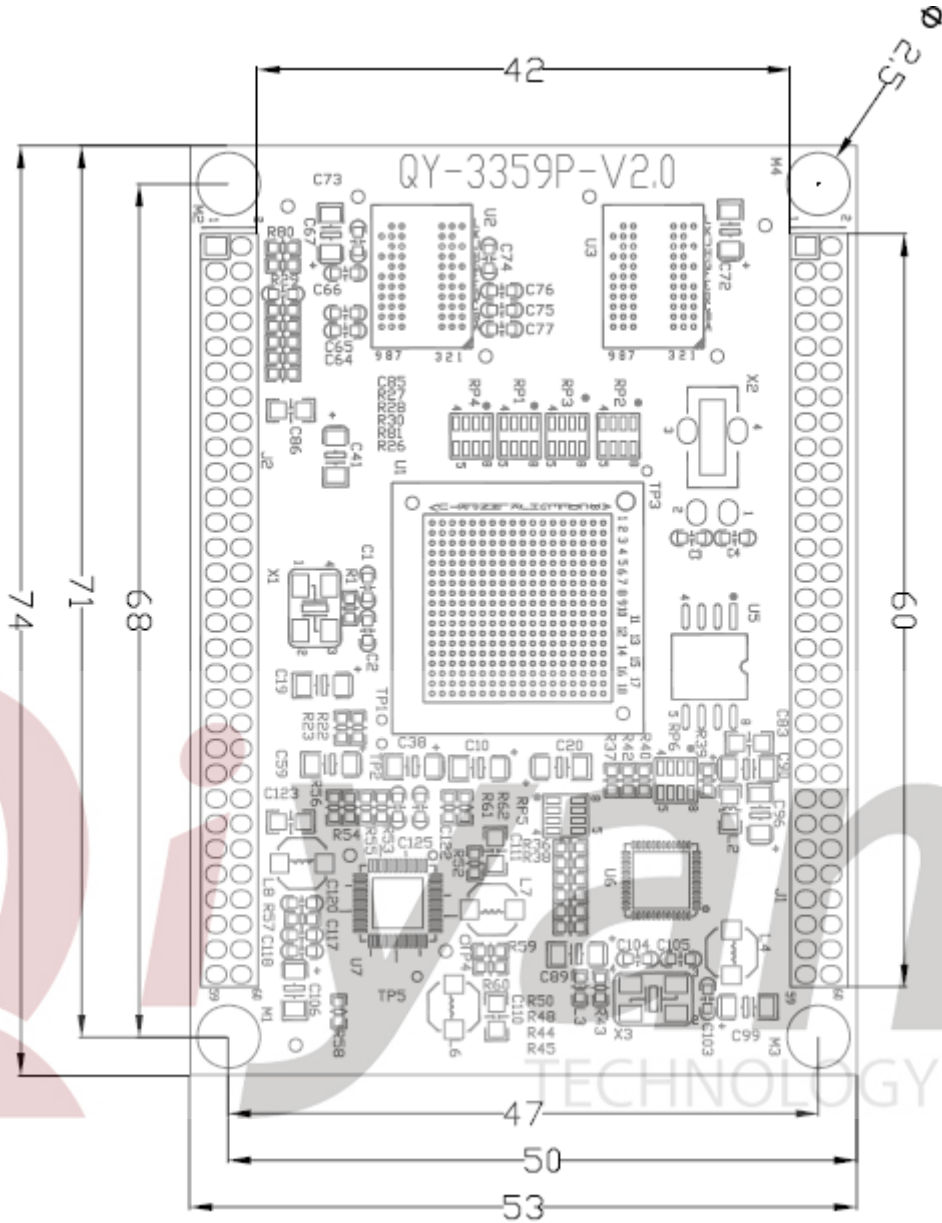
Label	Name	Function	Description
J3	JTAG	Interface reserved	Debug
J4	MIC	MIC Audio Input	For audio application
J5	Audio Output	Binaural Audio Output	For audio application
J6	Audio Input	Binaural Audio Input	For audio application
J7	LCD Interface	LCD Interface	External TFT-LCD Panel
J8	LCD Power Supply	LCD Power Supply	3.3V/5V power supply jumper optional
J9	ADC	4-bit AD input	For ADC application
J10	VGA	VGA Output	External VGA display

J12	Debug UART	Download, Debug	Program download, communication, debugging
J13	COM2	3-wire serial port	RS232
J14	COM3	3-wire serial port	RS232
J15	COM4	5-wire serial port	RS232
J16	COM5	5-wire serial port	RS232
J17	RS485	2-ch RS485	Multiplex with com4,com5
J18	CAN	CAN Bus	CAN Bus Application
J19	USB Device	USB OTG	Used for Host Device
J20	USB host	USB 2.0 host	Connect a USB device
J21	SD Card (the back)	SD/MMC Card Interface	Expand storage application
J22	Ethernet 1	10/100/1000M Ethernet	Program download, network communication application
J23	Ethernet 2	3-wire serial port	Program download, network communication application
J24	JTAG	Simulation, debugging	Simulation, debugging program
J25	Power Input	Power Input	Support +4.75~+18V wide voltage power supply
J26	Power Input	12V Power input	Common use with J24, interface optional
K1	Wake-Up Button	System Wake-up	System Wake-up Function
K2	Reset Button	System reset	System reset function
K3~K5	Custom Button	Custom Button	Custom Button
S1	Power Switch	Power Switch	Power Supply Switch Control
S2/S3/S4	Dial Switch	Select the startup mode	3 startup modes for dial control

III. Size & Structure Chart

3.1 Core Board Size

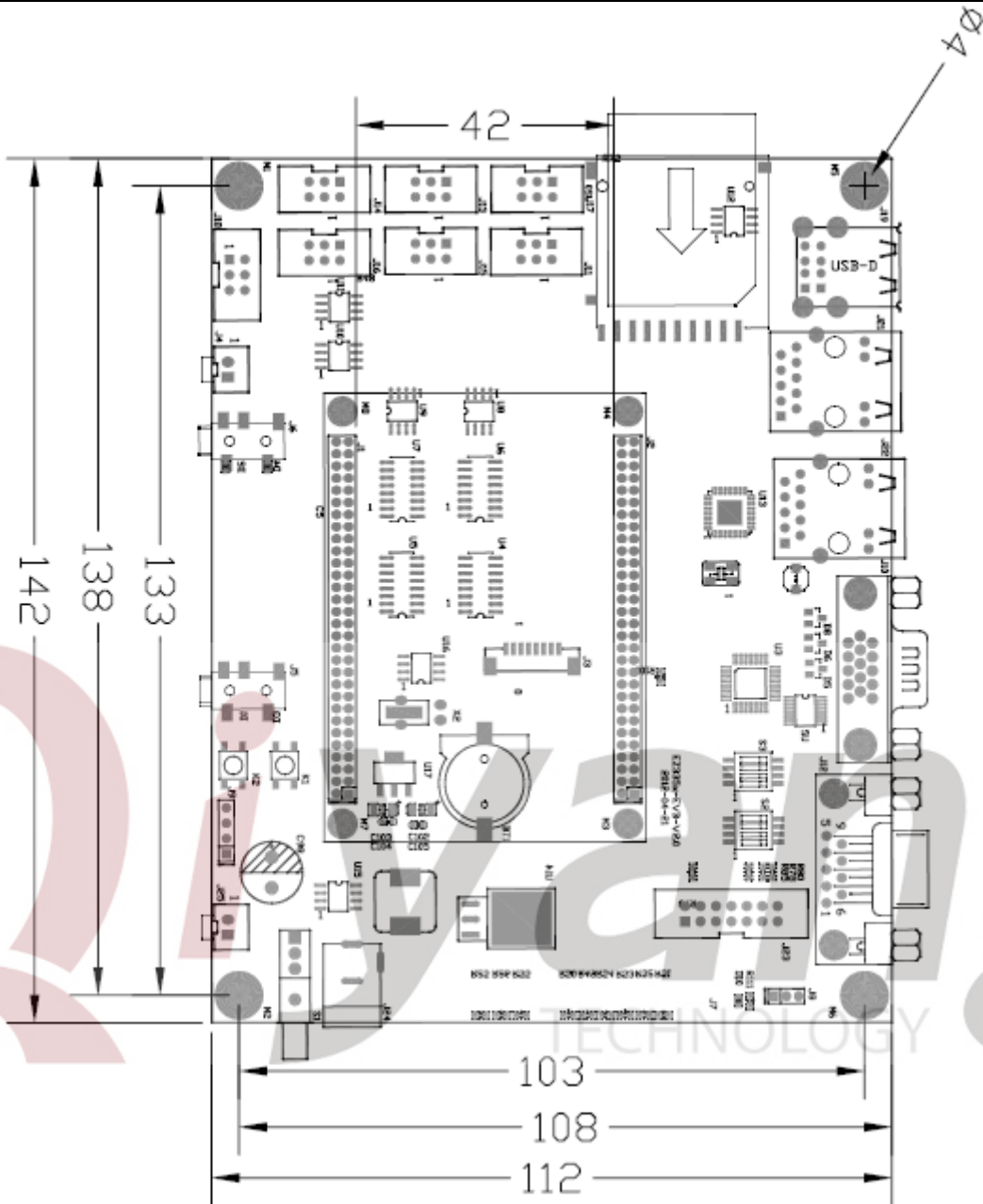
Unit: mm, if you need connector size, please email: supports@qiyangtech.com



Picture 4

3.2 Back plane Size

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

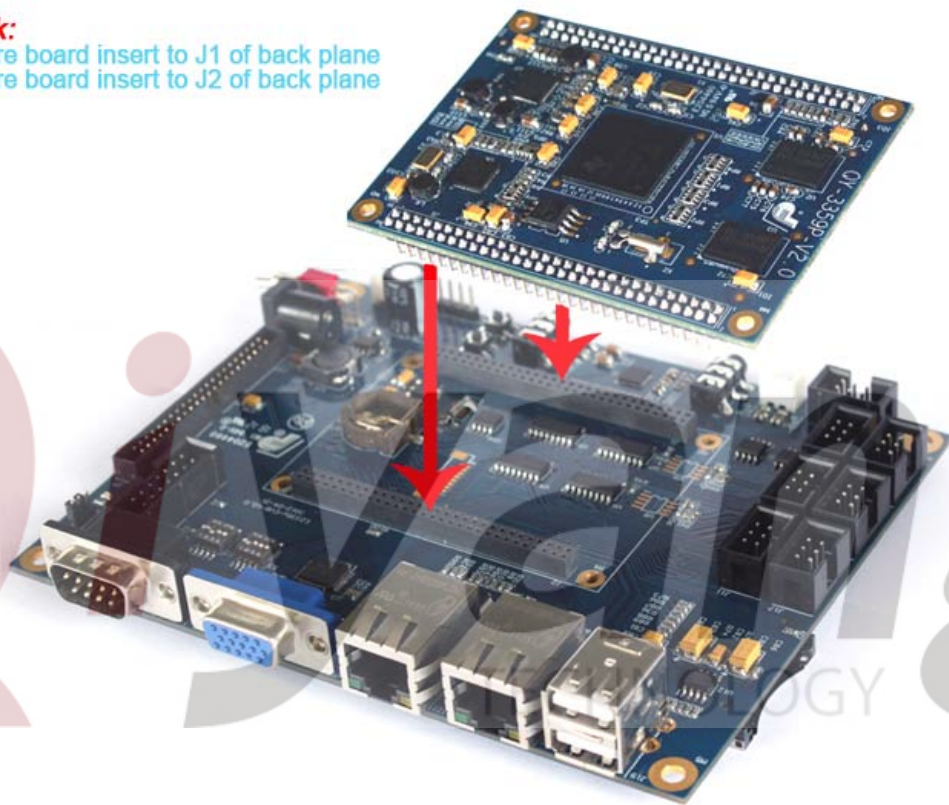


Picture 5

IV. Device Connection Pictorial View

EZ335X-EVB adopts back-insert form, and core board connects to back plane by 2 * 60 pins connector, which constitutes the complete intelligent equipment, the connection mode as shown:

Remark:
J1 of Core board insert to J1 of back plane
J2 of Core board insert to J2 of back plane



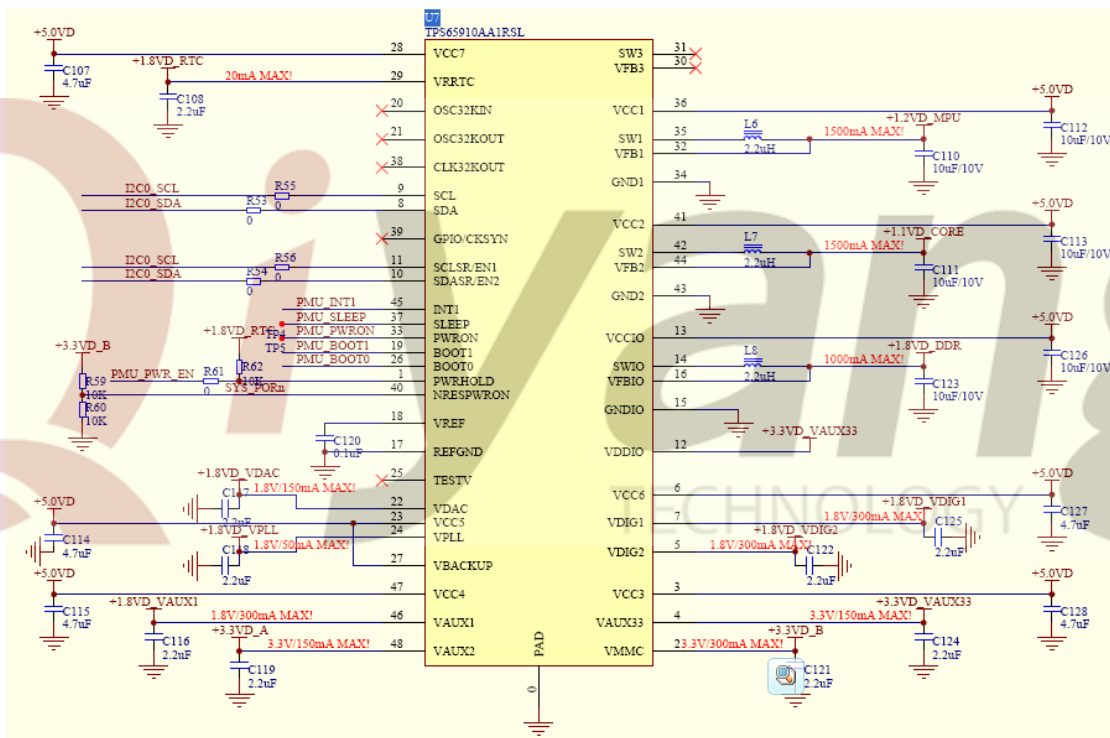
Picture 6

V. Detailed Hardware Specifications

The following information of all the chips mentioned are available in the CD, following the datasheet folder, please query, if necessary.

5.1 Power Management Module

The power supply of EZ335X-EVB core board adopts TI's MPU power management module, needs 5V power supply separately, outputs voltage through TPS65910AA1RSL (U7) power management module.



Picture 7

5.2 DDR2 Storage

EZ335X-EVB core board adopts 256M bytes DDR2 SDRAM, by 2* 8-bit DDR2 SDRAM storage to 16-bit DDR2 SDRAM in parallel, data and CLK signal lines' operating speed are up to 133MHz.

5.3 NandFlash Storage

EZ335X-EVB core board provides with 128MB NAND Flash storage (the back U4): 32MB is used to store system image file. Other space is used to store client's application program, the user can make system curing and storage area distribution operations.

5.4 DataFlash Storage

EZ335X-EVB core board provides 2MB Norflash (U5), Mapping in bank0. Inside can store some startup codes, as storing FIRSTBOOT.nb0 on Data Flash; this is a system bootloader, also can save boot logo (24-bit bmp).

5.5 Debug UART

EZ335X-EVB development board provides Debug UART (J12).Used in development, output system debugging information, but cannot be used as a common serial port.

5.6 RS232 Serial Port

EZ335X-EVB development board provides 4-ch RS232, expand serial port chip ZT3232 (development board U5, U6, U7), com4/com5 multiplex with RS485; J13, J14, J15, J16 are corresponding to COM2, COM3, COM4 and COM5 separately; they are 3-wire serial port. Com4, com5 reserve 5-wire serial port resource, can be fluid control. All interfaces can be DB9 standard serial port connector through serial expansion line. Pins are defined as follows:

J13 pin definition: COM2 Interface

1	RXD2	2	NC
3	TXD2	4	NC
5	GND	6	GND

J14 pin definition: COM3 Interface

1	RXD3	2	NC
3	TXD3	4	NC
5	GND	6	GND

J15 pin definition: COM4 Interface

1	RXD4	2	NC
3	TXD4	4	NC
5	GND	6	GND

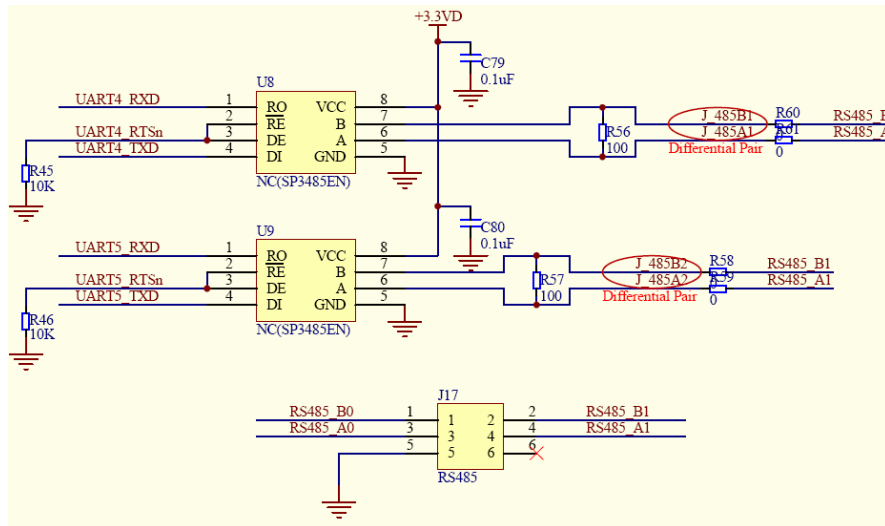
J16 pin definition: COM5 Interface

1	RXD5	2	NC
3	TXD5	4	NC
5	GND	6	GND

5.7 RS485 Serial Port

EZ335-EVB development board provides 2-ch RS485 serial port (J17).

Corresponding expansion chip U8, U9 (SP3485).



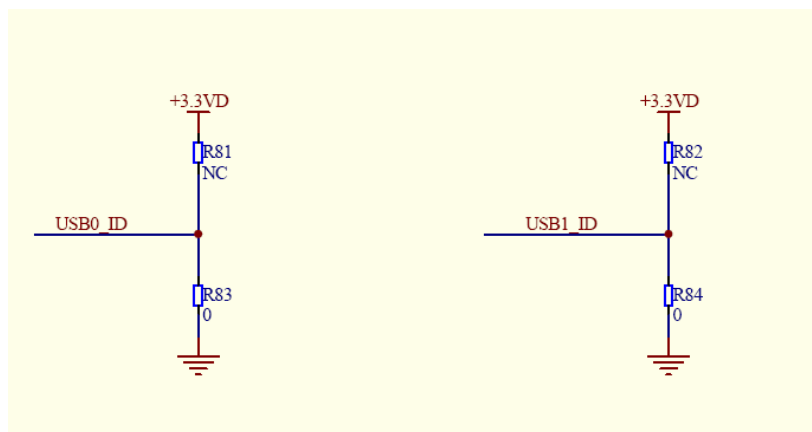
Picture 8

J17 pin definition: RS485

1	RS485+	2	RS485+
3	RS485-	4	RS485-
5	GND	6	

5.8 USB

EZ335X-EVB back plane provides 1-ch USB Host (J20), support USB 2.0, support a variety of USB flash drive, mobile hard disk, all kinds of USB Hub, USB mouse, keyboard, etc.



Picture 9

Remark: USB_ID Signal:

pull up	USB Device
pull down	USB Host

5.9 SD Card

EZ335X-EVB back plane with 1* SD card interface (J21), adopts standard SD socket, support various capacity SD card (32 x 24 x 2.1mm).

5.10 Ethernet

EZ335X-EVB development board provides 2-ch Ethernet interface (J22, J23); RJ45 with Ethernet indicator.

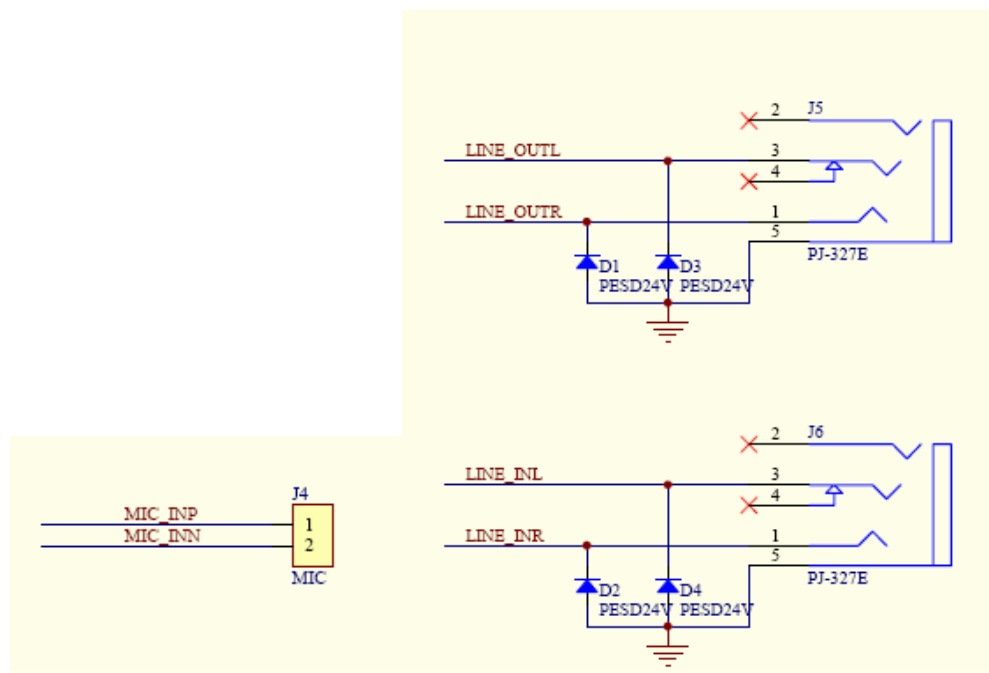
J22: Ethernet expansion chip on core board (U6)

J23: Ethernet expansion chip on back plane (U13)

The above 2*Ethernet ports are gigabit Ethernet port, support 10M/100M/1000M adaptively Ethernet port, connect to standard network cable.

5.11 Audio

EZ335X-EVB back plane provides audio input/output(J4,J5,J6), adopts McASP interface, realize 1-ch audio output, can connect to earphone and active speaker, binaural line input and MIC interface input. Audio expansion chip adopts TI's TLV320AIC31IRHB (U1), specific expansion scheme please view audio part in schematic diagram, input\output interface as shown:



Picture 10

Remark: J4 is MIC audio input, J5 is binaural audio output, and J6 is binaural audio input.

5.12 VGA

EZ335X-EVB back plane provides standard 1-ch VGA interface (J10), standard DB15 interface, can connect to universal display (LCD/CRT).

It expanded by LCD-TTL signal in parallel, specific expansion circuit, please view LCD display part in schematic diagram.

5.13 TFT-LCD

EZ335X-EVB back plane provides 1-ch 16-bit (RGB565 mode) TFT-LCD and touch panel interface (J7), using 2.0 spacing 44 pin socket, can drive TFT-LCD panel, resolution in theory 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 pin of J7 are 4-wire

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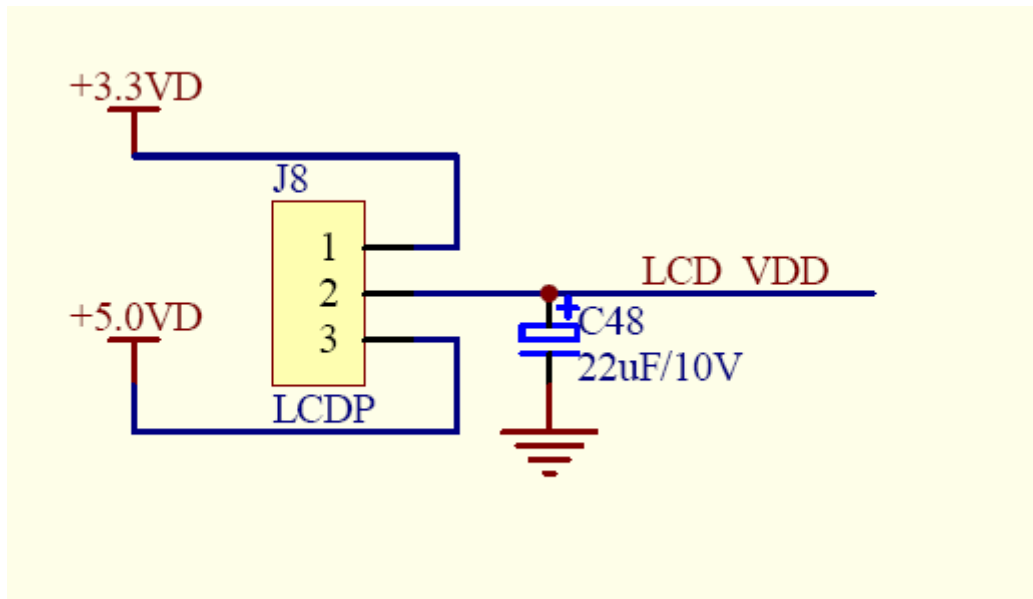
resistive touch panel interface, pins are defined as follows:

J7 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	LCD_L/R
31	LCD_U/D	32	NC
33	LCD_CTL	34	NC
35	GND	36	NC
37	GND	38	GND
39	GND	40	GND
41	AD_IN0	42	AD_IN2
43	AD_IN1	44	AD_IN3

Remark: Confirm the drive voltage for the LCD, select 3.3V/5V by jumper (J8)

J8 pin definition: LCD power supply, select voltage according to LCD panel.



Picture 11

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

5.14 AD Input Interface

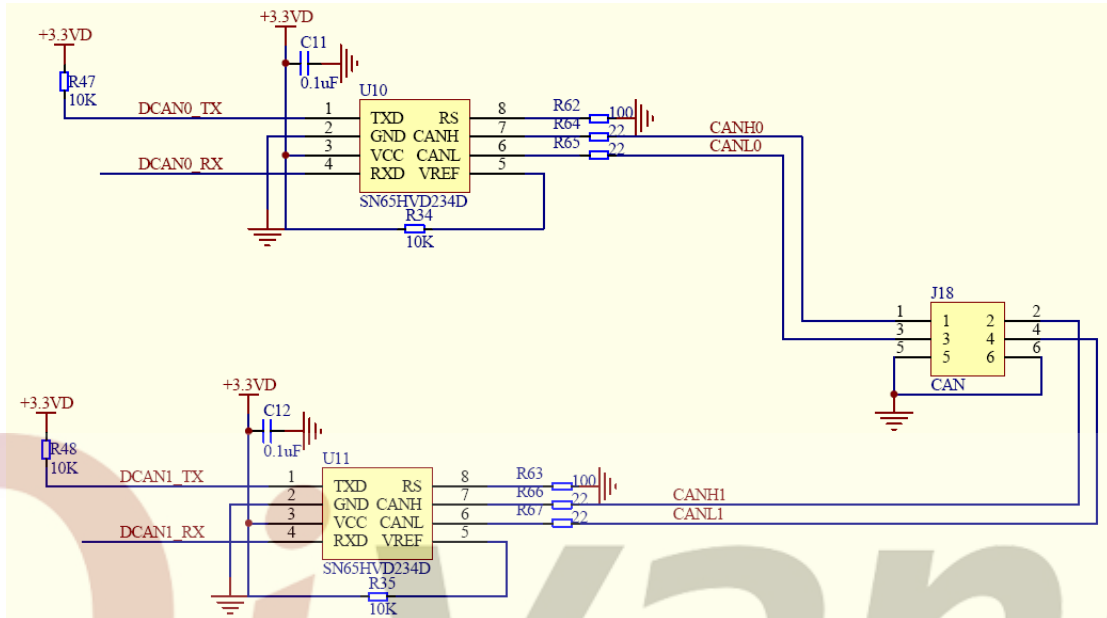
CPU with 8-ch 12-bit ADC: 4-ch 12-bit ADC are for touch panel signal, another 4-ch ADC is in J9.

J9 pin definition: ADC Interface (J9), 4-ch is for AD input.

1	AD_IN4
2	AD_IN5
3	AD_IN6

5.15 CAN Bus Interface

Back Plane expands 2-ch CAN bus (J18), as shown:

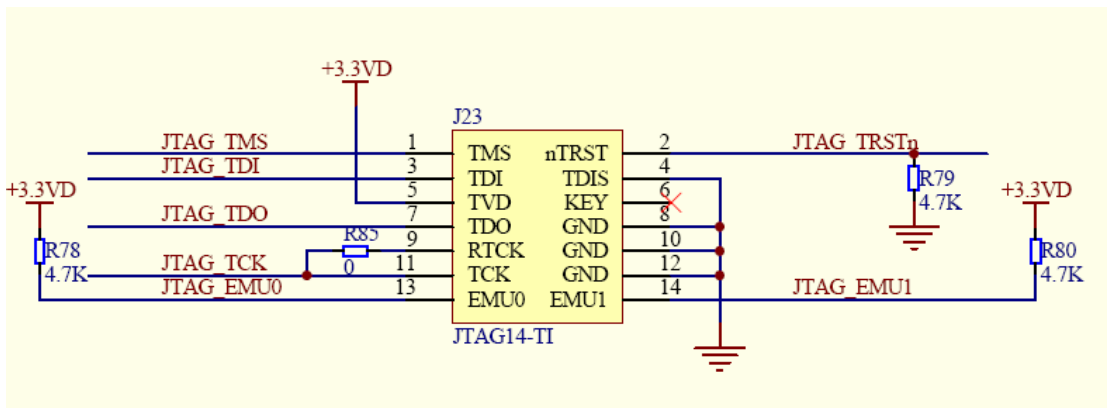


Picture 12

Remark: CAN bus support CAN2.0A and CAN2.0B protocol.

5.16 JTAG

Back plane boots JTAG interface (J24), can do simulation and debugging, interfaces are as follows:



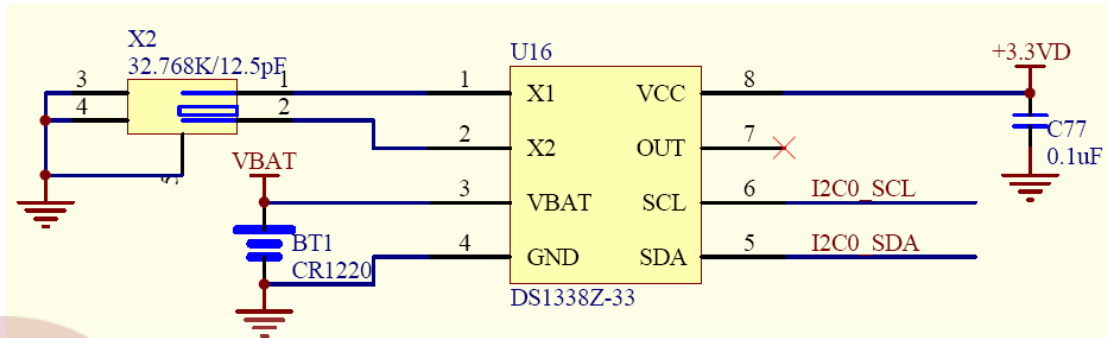
Picture 13

Remark: Users can download bootstrap program through network and serial port,

etc. Not use this interface, specific information, please refer to *EZ335X-EVB Linux user manual*.

5.17 RTC

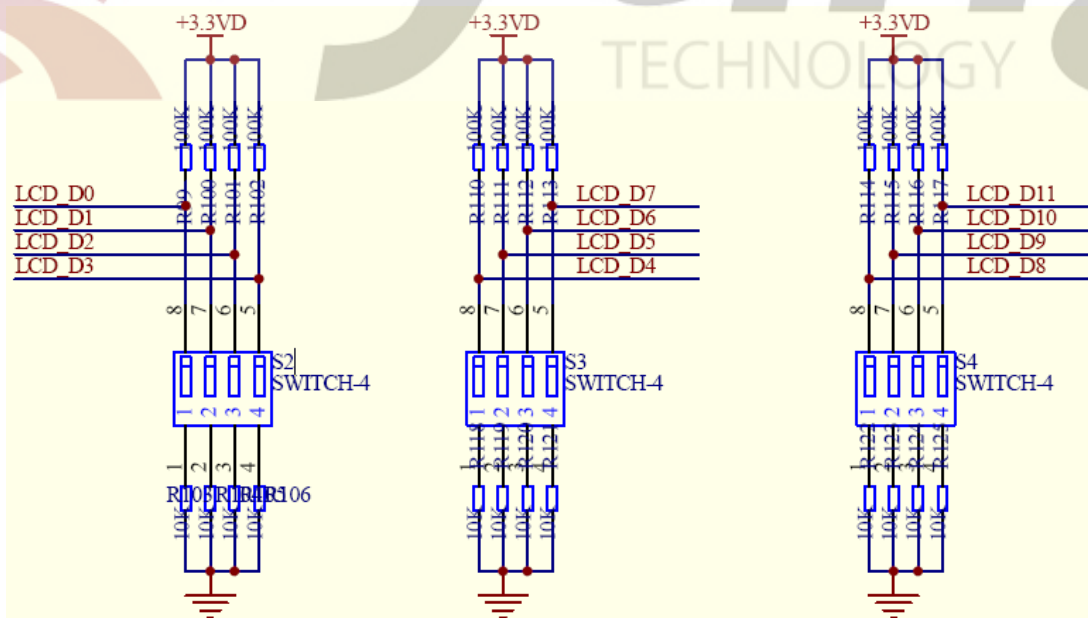
EZ335X-EVB Back plane can extend precise clock circuit, adopts DS1338 clock chip, with 3.3V high capacity button battery.



Picture 14

5.18 Dial Switch Jumper Illustration

EZ335X-EVB back plane supports various startup modes, supports the switch required dialing.



Picture 15

Remark: Pulling down is 1, Pulling up is 0

	S2				S3				S4			
Serial Port Startup	1	0	0	0	0	0	0	0	0	0	0	0
NandFlash Startup	0	1	0	0	1	0	0	0	0	0	0	0
SD Card Startup	1	1	1	0	1	0	0	0	0	0	0	0

VI. 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;
 - Damage of force majeure.
6. We reserve intellectual property for the software and hardware technical

data of IAC-335X-Kit; users can only use them for teaching, testing, researching.

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