Ingenic® RD4740_PAVO
Reference Design

Hardware Manual

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Hardware Manual

Release history

Date	Revision	Change
Sep. 2007	1.2	First release
Mar. 2009	1.3	Update serial port configuration on page9
Oct. 2009	1.3.2	1. Change some resisters and capacitors parameter.
		2. Update audio circuit.
		3. Add information about quick start WINCE system.

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Content

1   Overview

JZ4740 is a multimedia application processor, which has a very high performance and low power 32-bit RISC engine. JZ4740 integrates various peripherals for embedded application, such as memory controller, USB1.1 host and USB2.0 device interface, On-chip audio CODEC, multi-channel SAR-ADC, , LCD controller, CMOS sensor interface, MMC/SD controller, SSI interface, I2C interface, UART, IrDA, GPIO, and so on.

The RD4740_PAVO is a reference design with JZ4740 addressing to consumer electronic equipment, which help engineer to quickly develop their own products in hardware and software. This design also provides flexible interface to extend other module.

With this reference design, there have richness development package include supporting WinCE™, Linux™, and RTOS

1.1   Functions of RD4740_PAVO

- High-performance processor JZ4740 running up to 360MHz, supports Linux and Windows CE.
- SDRAM: HY57V561620FTP-H X 2 ， 64MB.
- FLASH: NAND FLASH K9GAG08 2GB
- LCD: 480X272 4inch TFT with touch panel.
- Multimedia: stereo record with gain control; stereo line/headphone output with bass/treble control; FM Module can receive FM radio.
- 8 keys can provide sound-button and soft power on/off, reset, etc.
- USB1.1 Host / USB2.0 Device interface.
- 2-UART: support GPS+GSM module extension.
- MMC/SD extend interface.
- Backlight control with PWM.
- Advanced power manager: Lithium-Ion battery charge; support RTC alarm and power up; very low power consumption: less than 200MA in normal condition; battery charging status indicator, and battery voltage monitor.
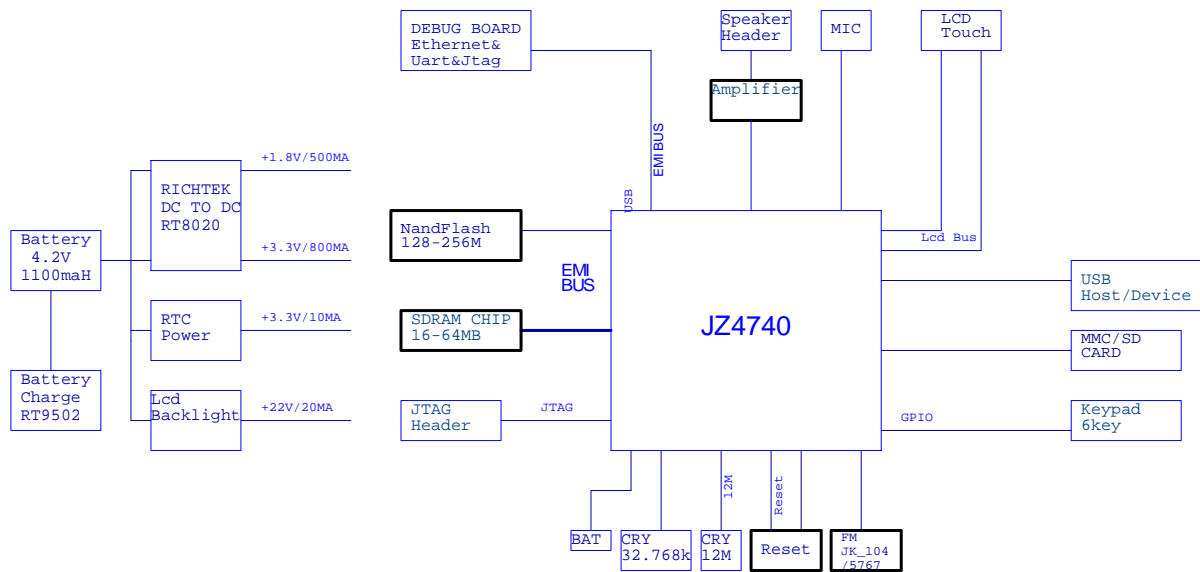
1.2 RD4740_PAVO System Architecture

Figure 1-1 RD4740_PAVO System Architecture

2 Hardware Description

In this section, will describe every hardware module of this design, please refer to the user's manual of JZ4740 first. For the other components, please refer to relative datasheet. For the details of the design, please refer to the schematic design.

2.1 RD4740_PAVO Layout

Figure 2-1shows the layout of main components and connectors。
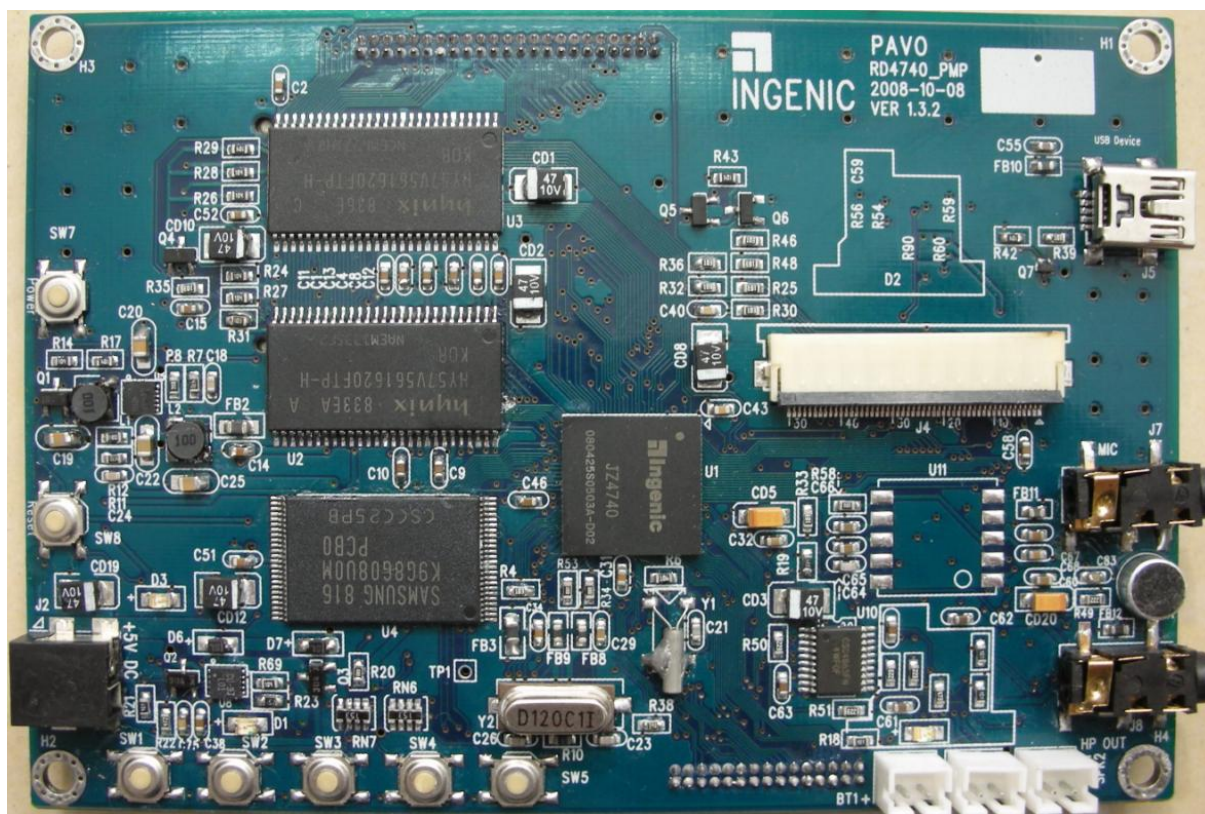
Figure 2-1 RD4740_PAVO Layout

2.2 Power

The RD4740_PAVO board is powered by 3.7V Lithium-Ion battery, via header BT1. The button SW7, is power on/off switch. Either adaptor, USB or Battery supply for the board the first, system can power on. As the system is running, long push SW7 will assert an interrupt to CPU, and then the hardware in IC can set PW_ON_N port 1 to power off the board after associated processing. And when long push SW7 again will power on the board and the CPU should output 0 on PW_ON_N port in order to turn on the power.

The main power chip is U5-RT8020, +3.3V, and +1.8V power supply. The LED D1 indicates that +3.3V power is normal.

The LCD backlight power is generated by U9 –MP1518, can provide about 20mA current.

U6 – XC6206 provides +3.3V power for RTC.

J2 is the external power supply jack, should connect with 5-6V 1A DC power adapter, together for battery charge. LED D3 indicates the charge status that light when charging, and inform to CPU. The charge current is 500mA.

This board also can be powered with USB device port when connect to PC, and charge the battery together. PW_ON_N status can adjust the charge circuit that is different in power on (500mA) and off (100mA) status.

2.3 System Reset

U7 (MIC811) or RC circuit can provide the hardware system reset signal to all components when power on. SW8 is the manual reset button.

2.4 Bootstrap

There has two modes of boot start in this design:

- Bootstrap from USB
- Bootstrap from NAND Flash
- Bootstrap from Nor flash

Table 2-1 describes the setting of boot start.

Table 2-1   BOOT SETUP

BOOT_SEL[1:0]	Boot status
00	Boot from external ROM or Nor flash at CS4
01	Boot from USB device
10	Boot from 512 page NAND flash at CS1
11	Boot from 2k page NAND flash at CS1

For details about boot select setting, please refer to the JZ4740 Hardware Manual.

2.5 SDRAM

This board has 64MB SDRAM, consist of two chips – U2 and U3, 4Banks X 4M X 16Bit.

2.6 LCD Interface

J4 is the LCD interface, which can directly connect to SAMSUNG™ LTP400WQ-F02 LCD with touch panel. Or extend to connect to other LCD panel. Table 2-1 lists the signals definition of J4.

Table 2-1 LCD Interface（J4）Signals Definition

Pin Number	Signal	Pin Number	Signal
1	GND	2	GND
3	+3.3V	4	+3.3V
5	LCD_SPL	6	LCD_CLS
7	LCD_D12	8	LCD_D13
9	LCD_D14	10	LCD_D15
11	LCD_D16	12	LCD_D17
13	LCD_PS	14	LCD_REV
15	LCD_D6	16	LCD_D7
17	LCD_D8	18	LCD_D9
19	LCD_D10	20	LCD_D11
21	GND	22	GND
23	LCD_D0	24	LCD_D1
25	LCD_D2	26	LCD_D3
27	LCD_D4	28	LCD_D5
29	GND	30	LCD_PCLK
31	DISP_OFF_N	32	LCD_HSYNC
33	LCD_VSYNC	34	LCD_DE
35	LCD_3.3V	36	PWM4
37	GND	38	GND
39	TSX+	40	TSY+
41	TSX-	42	TSY-
43	GND	44	GND
45	GND	46	VLED-
47	VLED+	48	GND
49	GND	50	GND

There have some special control signals for some LCD panel: 1-LCD_SPL; 2-LCD_CLS; 3-LCD_PS; 4-LCD_REV. For details please refer to JZ4740 User's Manual.

2.7 USB Interface

There has one USB 1.1 host port on debug board, one USB 2.0 device port on main board (J5) furthermore.

2.8 Audio System

JZ4740 provides an internal CODEC I2S/AC97 which is audio CODEC with 18 bits DAC and 16 bits ADC. The audio system of this design makes use of the internal CODEC to implement the input and output of audio. It consists of MIC-in jack J7, headphone jack J8, an amplifier for external speaker connecting to the header SPK1 and SPK2. When plug a headphone in J11, the amplifier will be off.

The audio system provides stereo record with gain control; stereo line/headphone outputs with bass/treble boost and output volume control by software.

2.9 Keypad Interface

There have six keys reserved for extending accessorial application by software control.

2.10 MMC/SD Card

J3 is the MMC/SD card socket for extension memory, supports MMC or SD card.

2.11 LCD Backlight

By adjusting the PWM4 signal duty cycle, make the dimming control of LCD backlight consecutively and easily.

2.12 Debug Board Interface（RD4740_PAVO_DEBUG）

In order to make the system debugging facility, there has a debug board – RD4740_PAVO_DEBUG, connecting to the main board through head J1 and J6. It provides JTAG port, UART port (DB9, RS-232), and Ethernet port (RJ45).

2.13 System Status LED

There have three LEDs for system status indicator:

- LED D1 indicates the 3.3V power status

- LED D2 is controlled by software for system status.
- LED D3 indicates the charge status that light when charging.

2.14 FM Module

There has FM Module on board which can receive FM radio signal and play back though internal Codec.

3   Quick Start RD4740_PAVO

When you get the RD4740_PAVO board, it has been initialized with U-Boot, Linux kernel and file system on the main board and SD card. Before power on the board, you should do the following step:

- Connecting the debug board – RD4740_PAVO_DEBUG
- Connecting serial port – UART to a host PC as console，the configuration is 57600-8N1
- Connecting to your LAN
- Connecting a battery to BT1, or use external DC power (5V, 1A)

Three manual have been used as:

- SW7: system power on/off and wakeup manual. Long pushing it will switch on the board, long pushing will switch off then. When in sleep mode, long pushing it will wake up the system.
- SW8: system reset manual.

Start Linux system (default):
After power on the board, there will be output on the console via serial port and LCD panel. After a moment, the demo of a QTOPIA application will be launched, letting you into a rich and colorful multimedia world.

Note: It is same as with Linux system to start the board which programmed with WINCE system. After power on the board, there will be output on the console via serial port and LCD panel. After a moment, the WINCE application will be launched.

4   Appendix GPIO Definition sheet

Pin Number	Default Port Name	NAME for Real Size	INPUT/OUTPUT/BIDIRECTIONAL	ACTIVE	Function
P8	GPD27	PWM4	Output	PWM Wave	LCD Backlight Control and for LCD Reset
N8	GPD28	LED_ON	Output	High	System status indicate and Battery voltage detect Enable
C9	GPB17	LCD_CLS	Output	Clock	LCD SPI Interface clock
D9	GPB18	LCD_SPL	Output	Low	LCD SPI Interface Enable
A6	GPC11	LCD_D12	Output	Data	LCD SPI Interface Data
R9	GPB27	EXT_INT	Input	Low	Reserve for Ethernet IC Interrupt
K3	GPB22	RDWR_N	Output		SDRAM and Ethernet controller Read or Write control
D10	GPD14	SD_CD_N	Input	Low	SD Card insert detect
A10	GPD16	SD_WP	Input	Low	SD Card Write protect
C10	GPD17	SD_Vcc_EN_N	Output	Low	SD Card Power Enable
B13	GPD6	USB_DETE	Input	High	USB Insert Detect
A13	GPD7	DC_DETE_N	Input	Low	Adaptor or USB Power Insert Detect
C10	GPD15	CHARG_STAT_N	Input	Low	Battery Charge status indicate
M13	GPD22	DISP_OFF_N	Output	High	LCD Power Enable

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