



# Product Service Manual

Service Manual for BenQ:  
K61

Applicable for All Region

Version: 001  
Date:2010/06/18

*Notice:*

- For RO to input specific "Legal Requirement" in specific NS regarding to responsibility and liability statements.
- Please check BenQ's eSupport web site, <http://esupport.benq.com>, to ensure that you have the most recent version of this manual.

First Edition (Jun., 2010)  
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# 1. About This Manual

This manual contains information about maintenance and service of BenQ products. Use this manual to perform diagnostics tests, troubleshoot problems, and align the BenQ product.

## 1.1. Trademark

The following terms are trademarks of BenQ Corporation:

BenQ

### *Importance*

*Only trained service personnel who are familiar with this BenQ Product shall perform service or maintenance to it. Before performing any maintenance or service, the engineer MUST read the "Safety Note".*

## 2. Introduction

This section contains general service information, please read through carefully. It should be stored for easy access place for quick reference.

### 2.1. RoHS (2002/95/EC) Requirements – Applied to all countries require RoHS.

The RoHS (Restriction of Hazardous Substance in Electrical and Electronic Equipment Directive) is a legal requirement by EU (European Union) for the global electronics industry which sold in EU and some countries also require this requirement. Any electrical and electronics products launched in the market after June 2006 should meet this RoHS requirements. Products launched in the market before June 2006 are not required to compliant with RoHS parts. If the original parts are not RoHS compliant, the replacement parts can be non ROHS compliant, but if the original parts are RoHS compliant, the replacement parts MUST be RoHS compliant.

If the product service or maintenance require replacing any parts, please confirming the RoHS requirement before replace them.

### 2.2. Safety Notice

1. Make sure your working environment is dry and clean, and meets all government safety requirements.
2. Ensure that other persons are safe while you are servicing the product.  
DO NOT perform any action that may cause a hazard to the customer or make the product unsafe.
3. Use proper safety devices to ensure your personal safety.
4. Always use approved tools and test equipment for servicing.
5. Never assume the product's power is disconnected from the mains power supply. Check that it is disconnected before opening the product's cabinet.
6. Modules containing electrical components are sensitive to electrostatic discharge (ESD). Follow ESD safety procedures while handling these parts.
7. Some products contain more than one battery. Do not disassemble any battery, or expose it to high temperatures such as throwing into fire, or it may explode.
8. Refer to government requirements for battery recycling or disposal.

### 2.3 .Compliance Statement

Caution: This Optical Storage Product contains a Laser device. Refer to the product specifications and your local Laser Safety Compliance Requirements.

### 2.4. General Descriptions

This Service Manual contains general information. There are 3 levels of service:

- Level 1: Cosmetic / Appearance / Alignment Service
- Level 2: Circuit Board or Standard Parts Replacement
- Level 3: Component Repair to Circuit Boards

### 2.5. Related Service Information

BenQ Global Service Website: <http://www.benq.com/support/>  
eSupport Website: <http://esupport.benq.com/v2>

## 3. Product Overview

### 3.1 Specification

#### 3.1.1 Introduction

This is a code name for e-Book reader device which is targeted at the specific book reading purpose. It adopts e-paper panel as the main display to reach low power consumption and get better feeling when reading. The embedded QReader can support several popular e-book formats, like DPF, ePub, Html and several image formats, like JPEG, PNG and BMP. This e-book device is capable to communicate to a Wifi Router or 3G Station directly. User can easily download the content from Internet or operator service platform. The User Interface uses AUO capacitive in-cell touch and enables the handwriting capability. User can add a bookmark or make a note easily when reading. The whole system adopts mobile technology and materials to reach lowest power consumption and slim industrial design.

Item		Unit	Specification	Note
General Information	Screen Size	inch	6(Diagonal)	A060SE02 V2
	Display Resolution	dot	800(H)x600(V)	
	Overall Dimension	mm	192(H)x130(V)x99(T)	
	Gray Level	--	16	
	Weight	g	299	
	Touch Panel		Capacitive Type	90% transmitting rate
	Touch Scan Rate	Hz	Up to 85 Hz	
Optical Specification	Reflectance	R	30	
	Contrast Ratio	CR	6:1	

#### 3.1.2 Operational Specification

##### 3.1.2.1 Feature List-Electrical

Category	Item	Specification	Remark	
Electrical	SOC	S3C2416 ARM 9 400MHz	65nm process; 330-FBGA, 0.65mm pitch	
	Memory	Mobile DDR	128 MB	16-bit data bus I/F
		SLC NAND Flash	NA	
		MLC NAND Flash	2 GB	Samsung Movi-Nand
	Connector	USB Host	USB 1.1 Host	A type
		USB Device	USB 2.0 Device	Micro USB-B type
		SD slot	Yes	
		Earphone jack	Yes	
	Audio	Amplifier	n/a	
		Speaker	Single	
	Sensors	Tilt sensor	n/a	
		G-sensor	n/a	
	Battery	Charger	Yes	

	Build-in battery	1480 mAh	
	Standby mode lifecycle	15 days	
	Reading mode Page	Above 7500 Pages	
LEDs		Charging	
Keys	Menu	Yes	
	Page up*2	Yes	
	Page down*2	Yes	
	Back	Yes	
	System wake-up / Off	Tact Switch	
Connectivity	TDS-CDMA	TD HSDPA/ TD-SCDMA/GSM/GPRS/EDGE	LeadCore 5730+

### 3.1.3 Software Features

#### 3.1.3.1 General Features Summary

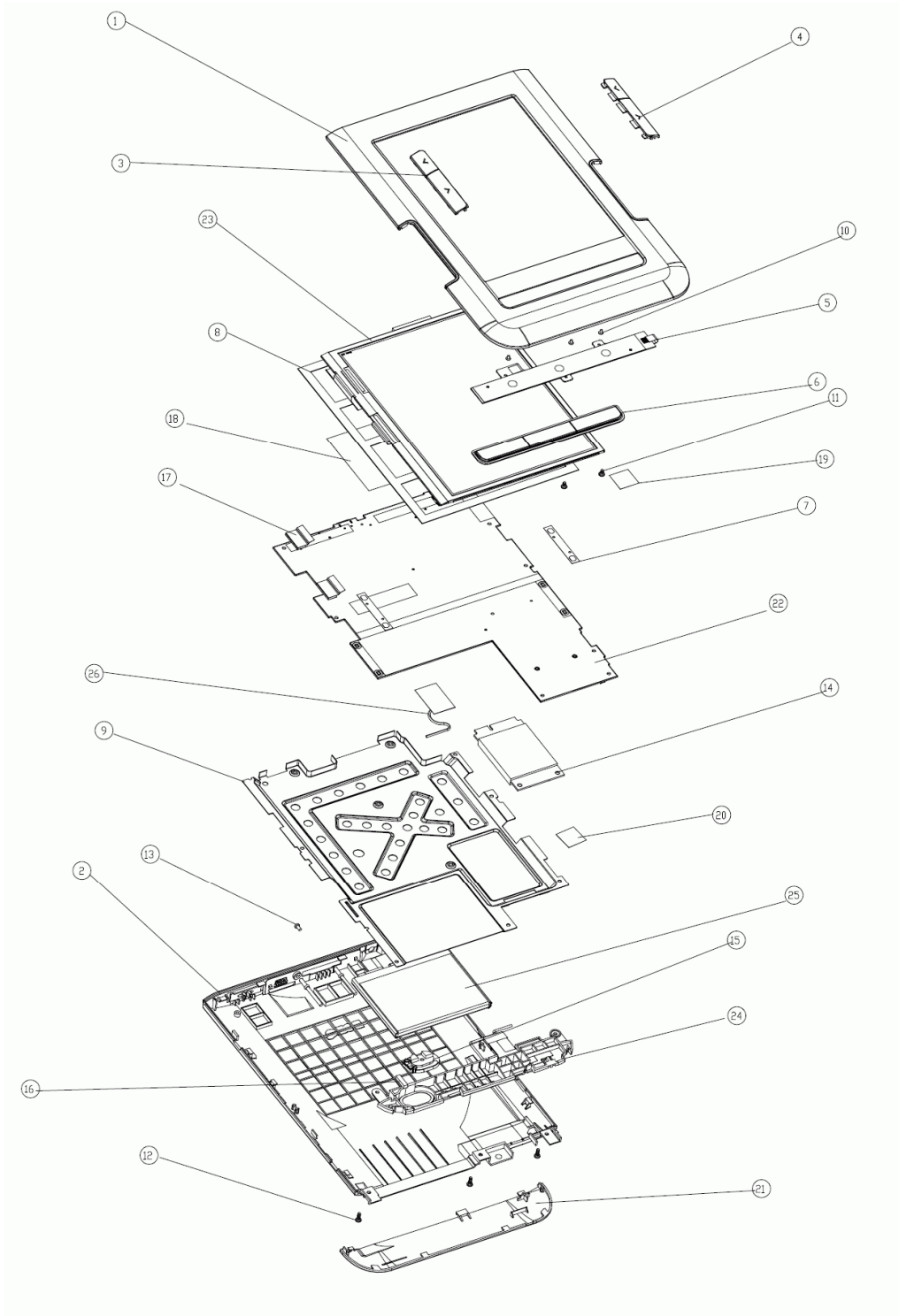
Item	Description	Specification	Remark
OS	Description	V 2.6.21	
Middleware	Qt	V4.5.1	
Document format	PDF (Adobe)	Yes	Adobe Mobile Reader 9
	HTML	Yes	Webkit
	TXT	Yes	Qisda
	EPUB	Yes	Adobe Mobile Reader 9
	Meb	Yes	
Image Format	JPEG	*.jpg	
	PNG	*.png	
	BMP	*.bmp	
Audio Format	MP3	Yes (audio book)	
	AAC	n/a	
e-Book DRM	ePub, PDF	Adobe CS4	
Reader Mode	Font size adjustment	Yes, 3 font sizes	(Small, Medium, Large)
	Book list	Recent (download/import) books, Unread books, Books by title, Books by Author, Books by Date, My favorite books	
	Bookmarks	Add, Delete, List, View	
	Note Tool (Footnote)	Yes	
	Software keyboard	English, Number, Symbols	
	Audio book (TTS)	n/a	
	File management	Yes	
	Background music	Yes	
	Book Search	Yes	
	Keyword Search	Yes	
	Favorite List	Yes	
	Picture Mode	Photo information	Yes
Next / Prev.		Yes	
Rotate		Yes	
Audio Mode	File management	Yes	
	Music information	Yes	
	File Sorting	File Name	





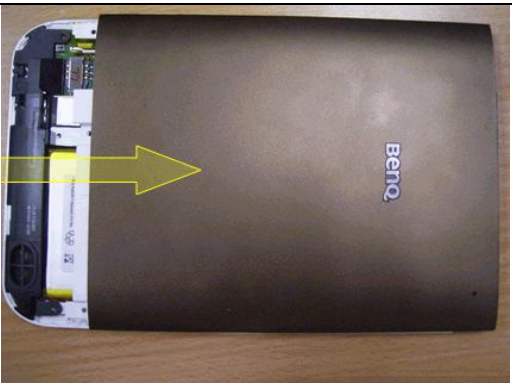
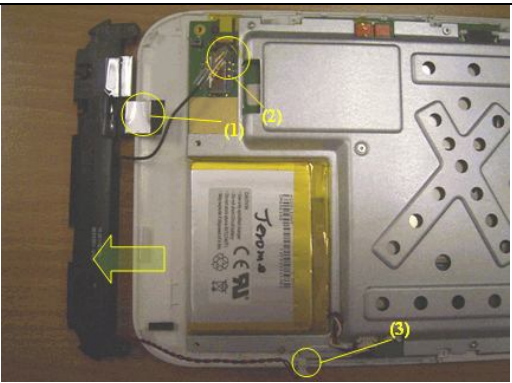
	Next/ Prev.	Yes	
	Repeat/Random	Yes	
	Stop/Pause/Play	Yes	
	Volume control	Mute/1/2/3/4/5	
Settings	Low battery warning	Yes	3.45V for warning message 3.3V for system booting
	Power Management Setting	Yes	When enabling PM, device will enter sleeping mode after 30 seconds .
	FW upgrade	Yes	SD Card Mode
	Device information	0. Linux version 1.File system version 2.Kenerl Version 3.Boot code version 4.Waveform(LUT) version 5.T-CON firmware version 6.Temperature 7.DRAM size 8Free Flash Memory Size	

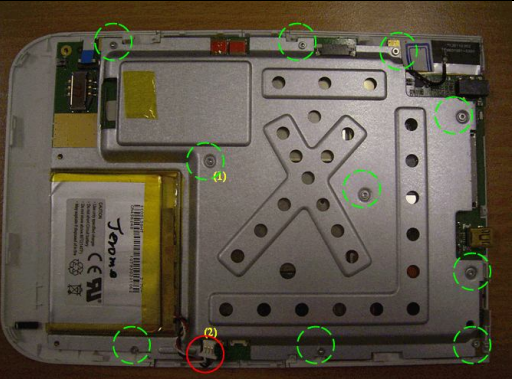
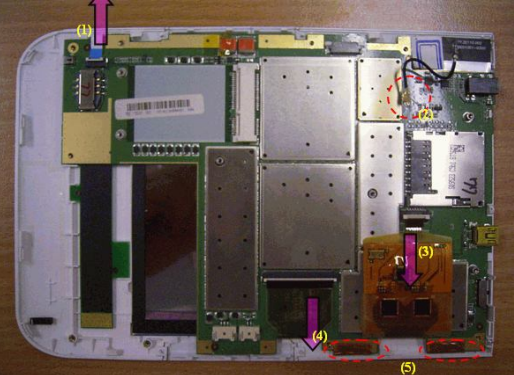
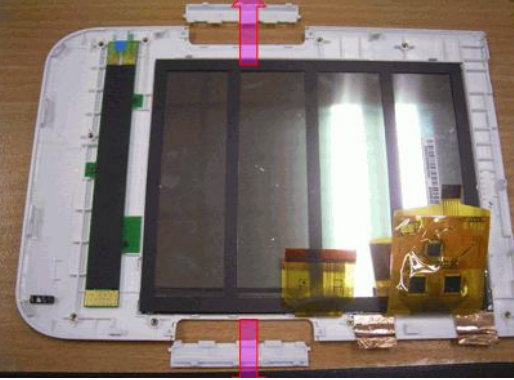
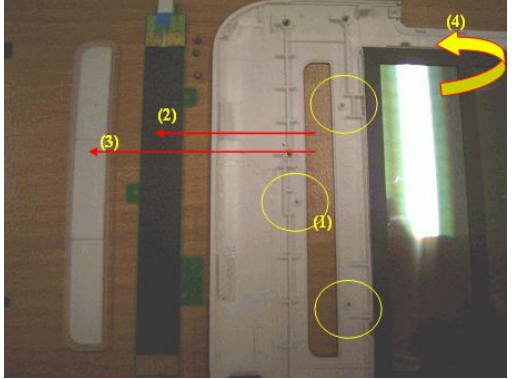
# 4. Disassembly /Assembly

## 4.1. . Exploded View



## 4.2. Disassembly /Assembly

<p>1</p>	<p>Turn off power and remove attachments. (shown in following figure)          (1) Antenna cover (2) Screw x 3</p>	
<p>2</p>	<p>Screw off screw from top of rear case</p>	
<p>3</p>	<p>Remove case rear</p>	
<p>4</p>	<p>Separate antenna holder: Disconnect          (1) Mylar          (2) Switch wire (from 3G module)          (3) SPK connector</p>	

<p>5</p>	<p>Separate metal sheet :  (1) remove screw( x10)  (2) disconnect Batt. connector</p>	
<p>6</p>	<p>Separate main board from front case:  (1)Disconnect key FFC  (2)Disconnect Wifi antenna wire  (3)Disconnect Panel FFC  (4)Disconnect Touch FFC  (5)Remove Cu foil (x2)</p>	
<p>7</p>	<p>Take page keys out from front case</p>	
<p>8</p>	<p>Separate function key and EPD from housing:  (1) unscrew x 3  (2) remove key PCB  (3) take out keypad  (4) remove EPD</p>	



### 4.3. Packing DEVICE LABEL LOCATION



**WARRANTY SEAL**

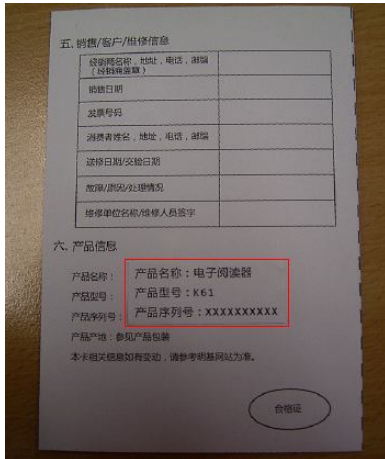
**SPEC LABEL**



**NETWORK PERMISSION LABEL**

## GIFT BOX PACKING DESCRIPTION

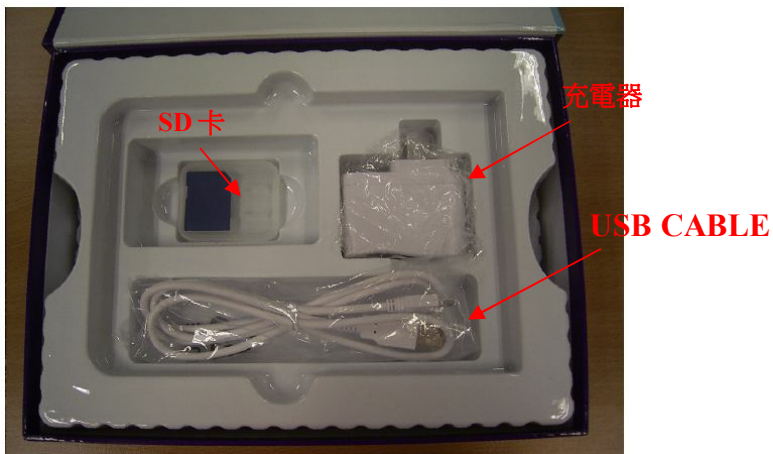
(1)將 S/N LABEL 貼在保卡上



(1) 再依序將保卡、QSG、說明書(封面朝上)、皮套(印有 G3 logo 面朝上)擺放於彩盒底部



(2) 將內襯放入盒內，再將 SD 卡、充電器及 USB CABLE 如下圖所示，放入相應位置



(3) 將耳機放在 SD 卡上



(4) 最後將機器置於最上層，並蓋上透明內襯蓋

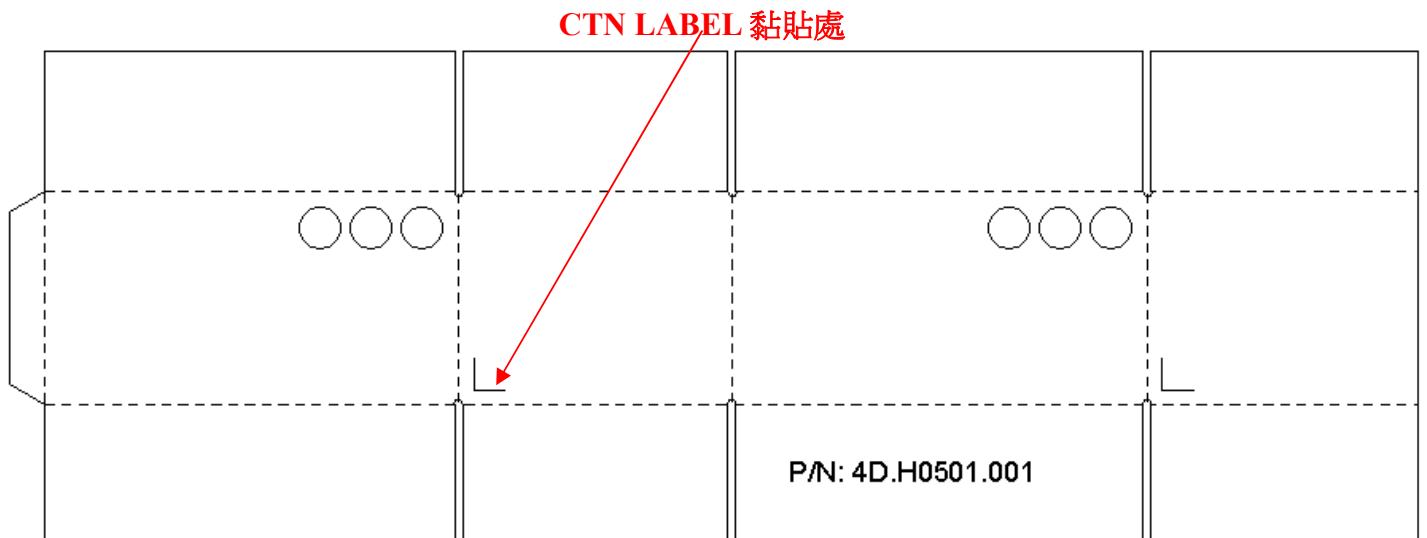


## GIFT BOX LABEL LOCATION



**GIFT BOX LABEL**  
請沿標籤定位線黏貼

## CARTON LABEL LOCATION





## 5. Level 1 Cosmetic / Appearance / Alignment Service

### 5.1 Software / Firmware Upgrade Process

本文件描述如何透過 SD 卡將 uboot, kernel (zImage),root file system 更新到 e-book 上.

#### 5.1.1. Put download images in SD card

直接在 Windows 下, 將所需要更新的 images 依照下面規定的目錄結構放入 SD card. 附檔名請固定小寫(bin).

- Firmware 包含
  - u-boot and zImage.
  - rootfs.ext3.00 and rootfs.ext3.01

#### Directory layout for download images (目錄名稱要小寫)

/qdutil/

upfw/

u-boot.bin  
zImage  
rootfs.ext3.00  
rootfs.ext3.01

#### 5.1.2. Start SD Download

**Step 1:** 插入準備好的 SD-Card

**Step 2:** e-book 進入系統設置-高級設置-/軟件升級-由存儲卡上進行升級

在進行軟件升級時,電池電力需有 2 格,

如已彈出提示電力不足時,請回到首頁,插入 USB cable 後,重新進入系統設置,選取由存儲卡上進行升級

另有強制升級的方式:在開機狀態中,同時按住 e-book page up and page down key, 再按一下 reset key

**Step 3:** 當看到”軟件更新中的畫面” 即已啟動 Firmware Upgrade

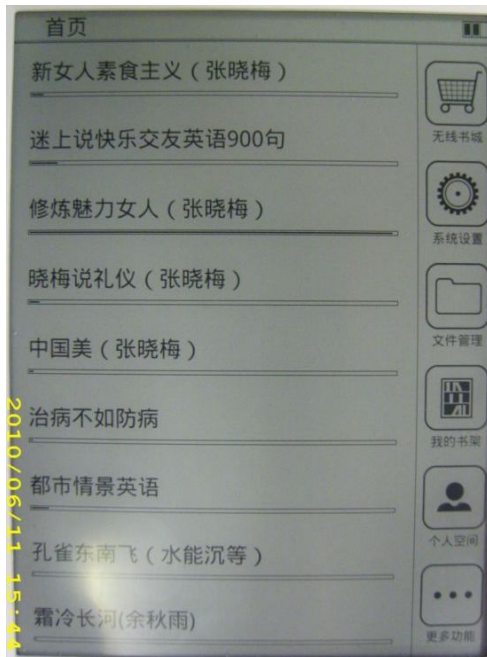
**Step 4:** 當方塊條全黑表示 download 完成



**Step 5: Firmware Upgrade** 完成後,e-book 自動開機,進入時間設置,,設定時間後,畫面回到首頁



開機中



畫面回到首頁

**更新時間說明:** 約在 4 分鐘內完成一次更新操作, 其中, uboot.bin and zImage 約花 10 秒, rootfs.ext3.00 and rootfs.ext3.01 約花 230 秒

## 6. Level 2 Circuit Board and Standard Parts Replacement

### 6.1 System block diagram:

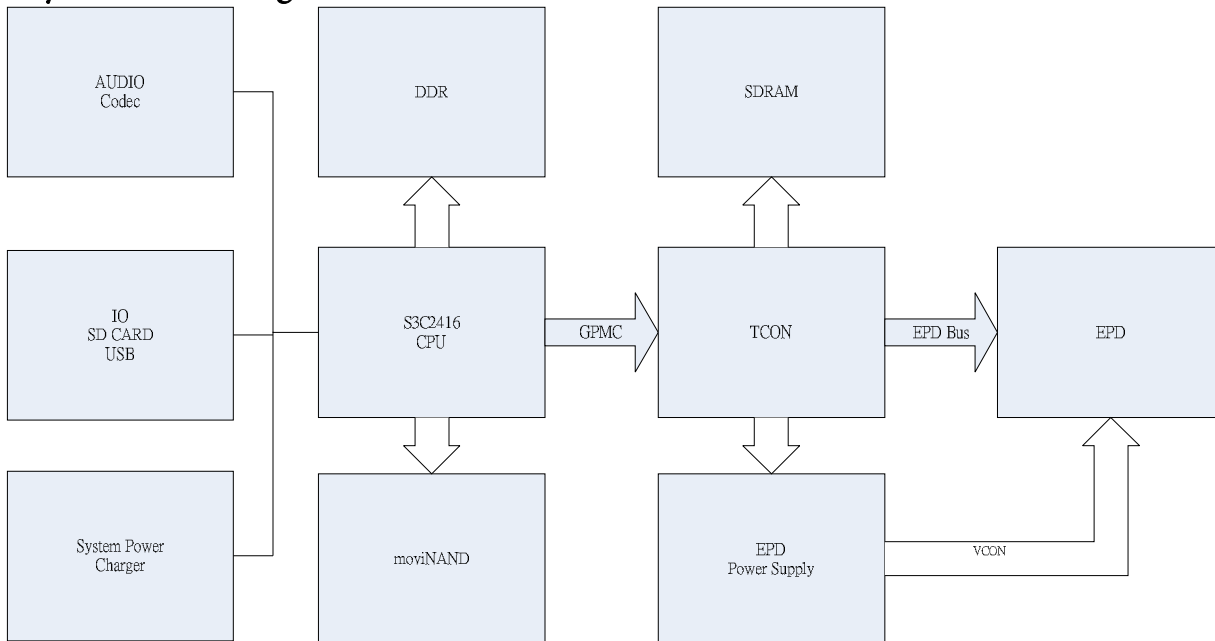


Fig. 2

Some key components of above diagram:

#### **DDR:**

The 128MB low power DDR memory is for system software to execution the eReader software and operating system kernel.

#### **moviNAND:**

The 2GB internal moviNAND storage is used for store the system software and books content during power off.

#### **Audio Codec:**

The features of audio codec include: Audio DAC, Class-D Audio Power Amplifier and Earphone driver.

#### **TCON:**

The timing controller for display panel is made by FPGA.

#### **SDRAM:**

The frame buffer for display data.

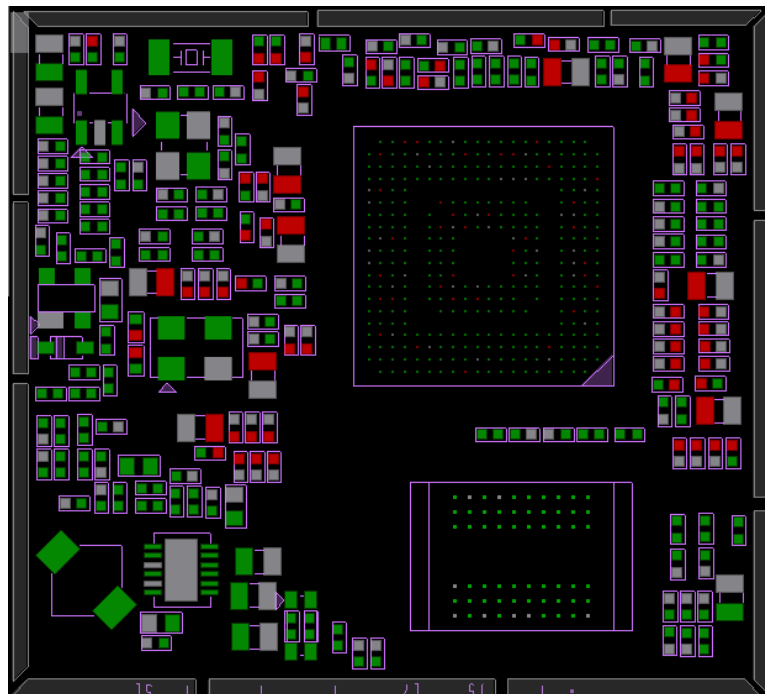
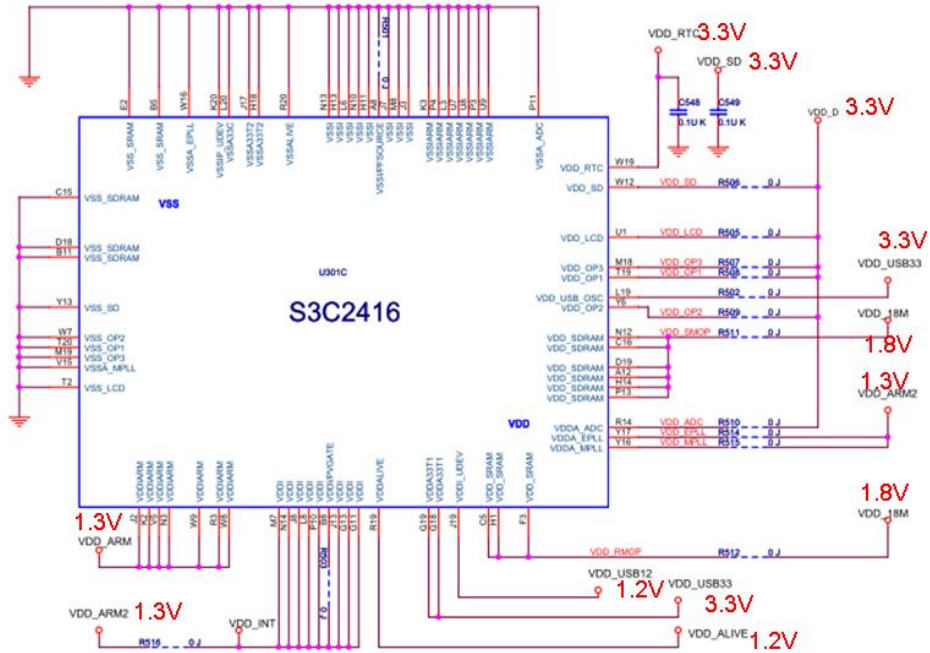
#### **EPD:**

The display panel.

## 6.2 SMDK2416

### 6.2.1 CPU System: Power (Page 5)

#### 6.2.1.1 Function Circuit/ Layout



## 6.2.1.2 Recommended Operating Conditions

Table 1-1. Recommended Operating Conditions (400MHz)

Parameter	Symbol	Min	Typ	Max	Unit
DC Supply Voltage for Alive Block	VDDalive	1.15	1.2	1.25	V
DC Supply Voltage for Core Block	ARMCLK / HCLK				
	400/133 MHz VDDIarm VDDI VDDA_MPLL VDDA_EPLL	1.25	1.3	1.35	
DC Supply Voltage for I/O Block1	VDD_OP1**	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for I/O Block2	VDD_OP2	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for I/O Block3	VDD_OP3	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for USBOSC PAD	VDD_USBOSC	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for SRAM I/F	VDD_SRAM	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for SDRAM I/F	VDD_SDRAM	1.7	1.8 / 2.5	2.7	
DC Supply Voltage for RTC	VDD_RTC	1.7	1.8 / 2.5 / 3.0	3.3	
DC Supply Voltage for CAM/SD/LCD	VDD_CAM	1.7	1.8 / 2.5 / 3.3	3.6	
	VDD_SD	1.7	1.8 / 2.5 / 3.3	3.6	
	VDD_LCD	1.7	1.8 / 2.5 / 3.3	3.6	
DC Supply Voltage for USB PHY 3.3V	VDDA33x	3.3-5%	3.3	3.3+5%	
DC Supply Voltage for USB PHY 1.2V	VDDI_UDEV	1.2-5%	1.2	1.2+5%	
DC Supply Voltage for ADC	VDDA_ADC	3.0	3.3	3.6	
DC Input Voltage	V <sub>IN</sub>	3.0	3.3	3.6	
		2.3	2.5	2.7	
		1.7	1.8	1.95	
DC Output Voltage	V <sub>OUT</sub>	3.0	3.3	3.6	
		2.3	2.5	2.7	
		1.7	1.8	1.95	
Operating Temperature	TA	Industrial	-40 to 85		
		Extended	-20 to 70		

### 6.2.1.3 Circuit Operation:

1. Adaptor in, Power ON device
2. 工作電壓, System Clock 起來

### 6.2.1.4 Debugging Process

#### 6.2.1.4.1 Possible failure symptoms

系統開不了機、螢幕不會亮、連接周邊 IO 介面無 Function.

#### 6.2.1.4.2 Debugging steps

1. 目視相關元件是否正常
2. Check 2416 power rail
3. 有問題再去作分析問題所在!

## 6.2.2 MOBILE DRAM CONTROLLER: (Page3, 6)

### 6.2.2.1 Description

The S3C2416 Mobile DRAM Controller supports three kinds of memory interface - (Mobile) SDRAM and mobile DDR and DDR2. Mobile DRAM controller provides 2 chip select signals (2 memory banks), these are used for up to 2 (mobile) SDRAM banks or 2 mobile DDR banks or 2 DDR2 banks. Mobile DRAM controller can't support 3 kinds of memory interface simultaneous, for example one bank for (mobile) SDRAM and one bank for mobile DDR.

Mobile DRAM controller has the following features:

- Support little endian
- Mobile DDR SDRAM and (Mobile) SDRAM
  - Supports 32-bit for SDRAM and 16-bit data bus interface for mDDR and DDR2.
  - Address space: up to 128Mbyte
  - Supports 2 banks: 2-nCS (chip selection)
  - 16-bit Refresh Timer
  - Self Refresh Mode support (controlled by power management)
  - Programmable CAS Latency
  - Provide Write buffer: 8-word size
  - Provide pre-charge and active power down mode
  - Provide power save mode
  - Support extended MRS for mobile DRAM)
    - ◆ DS, TSCR, PASR

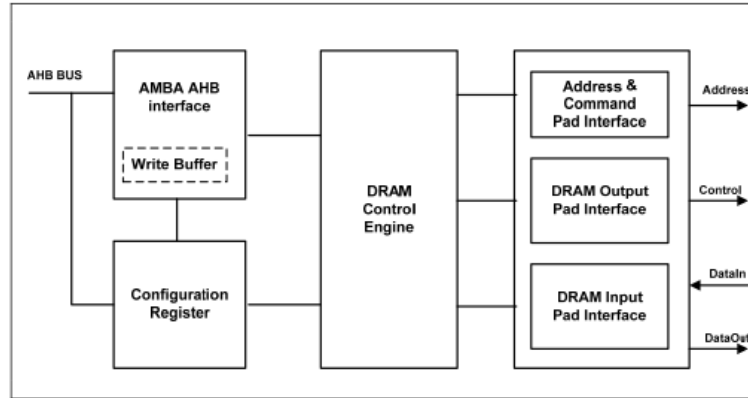
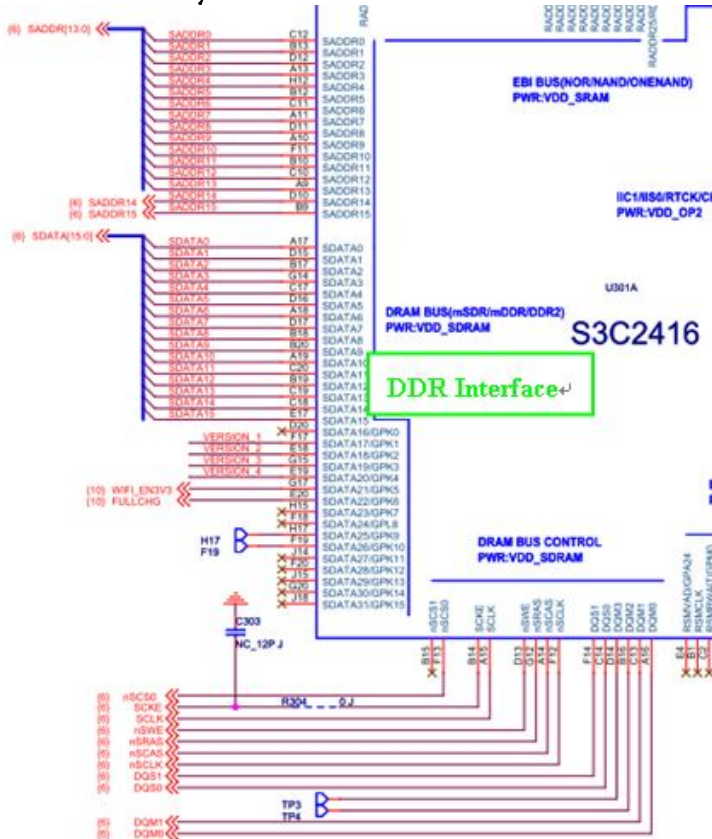
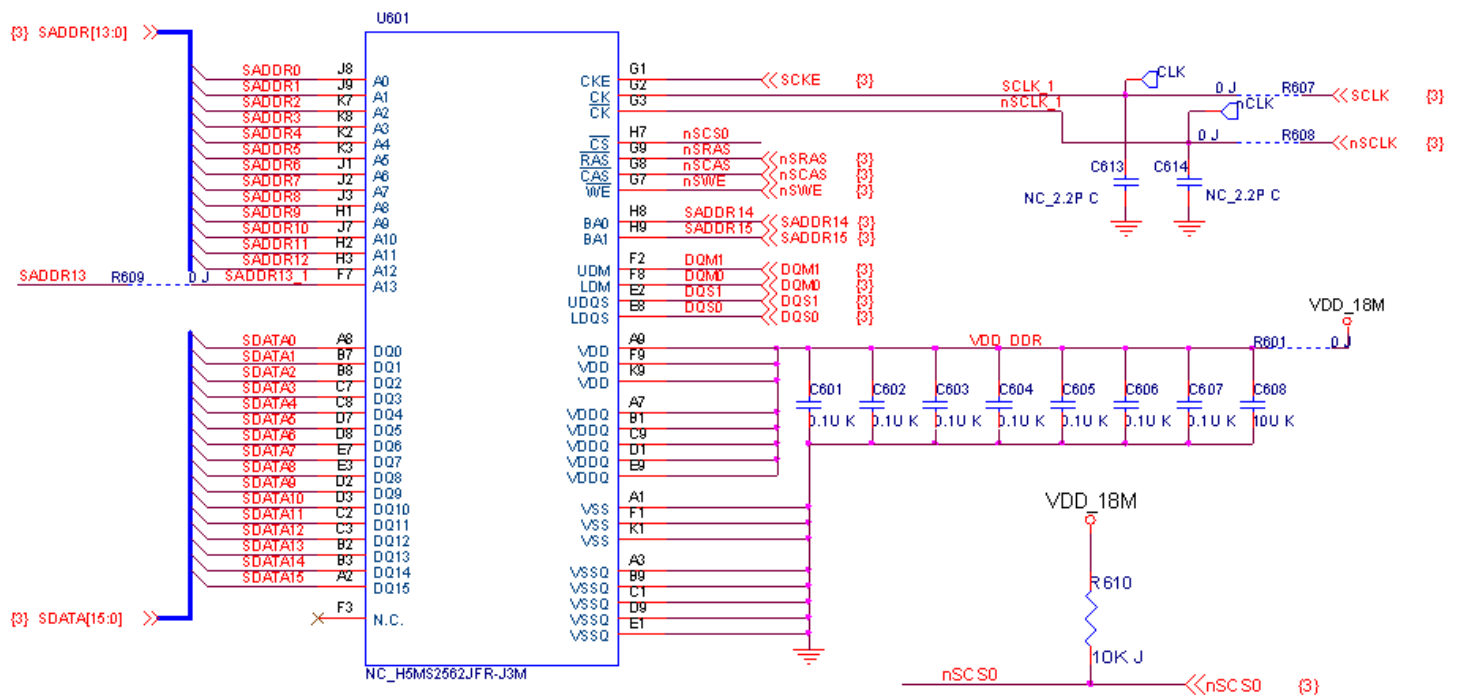


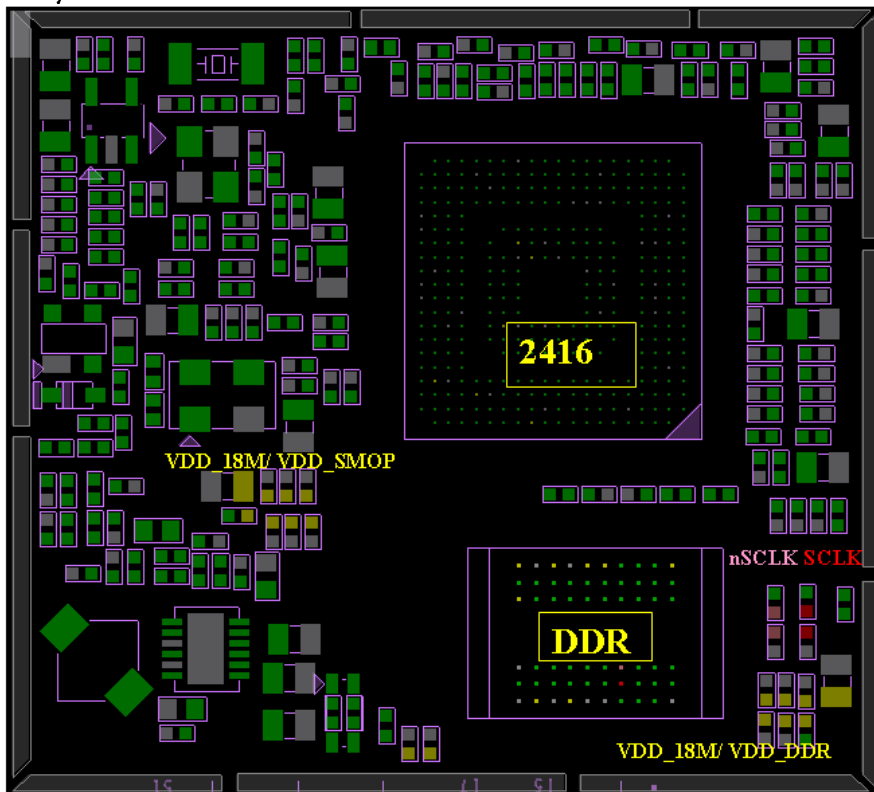
Figure 6-1. Mobile DRAM Controller Block Diagram

### 6.2.2.2 Function Circuit and Layout





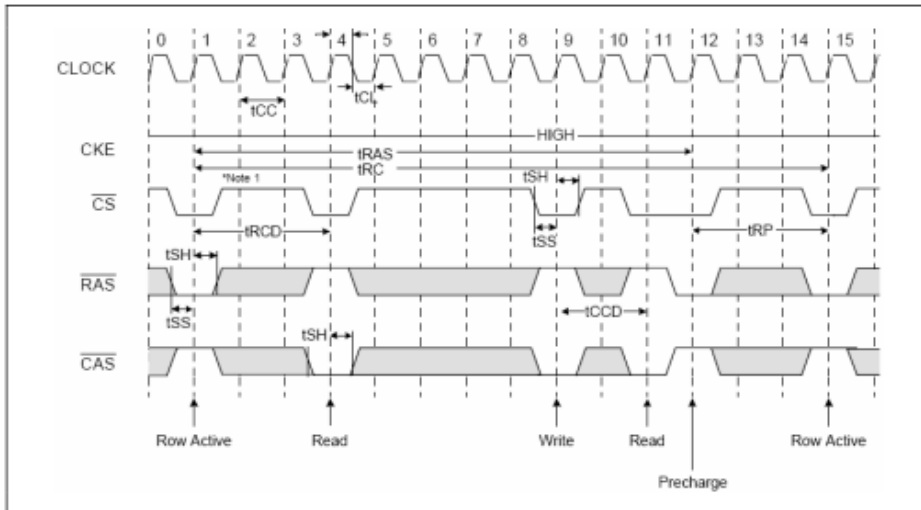
Layout:



### 6.2.2.3

#### Circuit Operation:

1. Adaptor in, Power ON device
2. DDR Interface 工作電壓和 Clock 起來
3. DRAM Timing Diagram



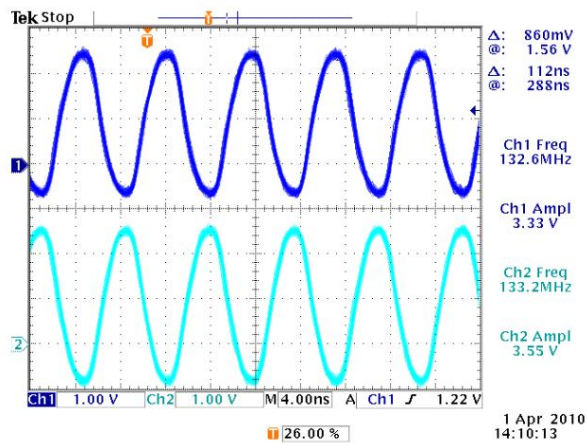
### 6.2.2.4 Debugging Process

#### 6.2.2.4.1 Possible failure symptoms

系統開不了機、螢幕不會亮、連接周邊 IO 介面無 Function.

#### 6.2.2.4.2 Debugging steps

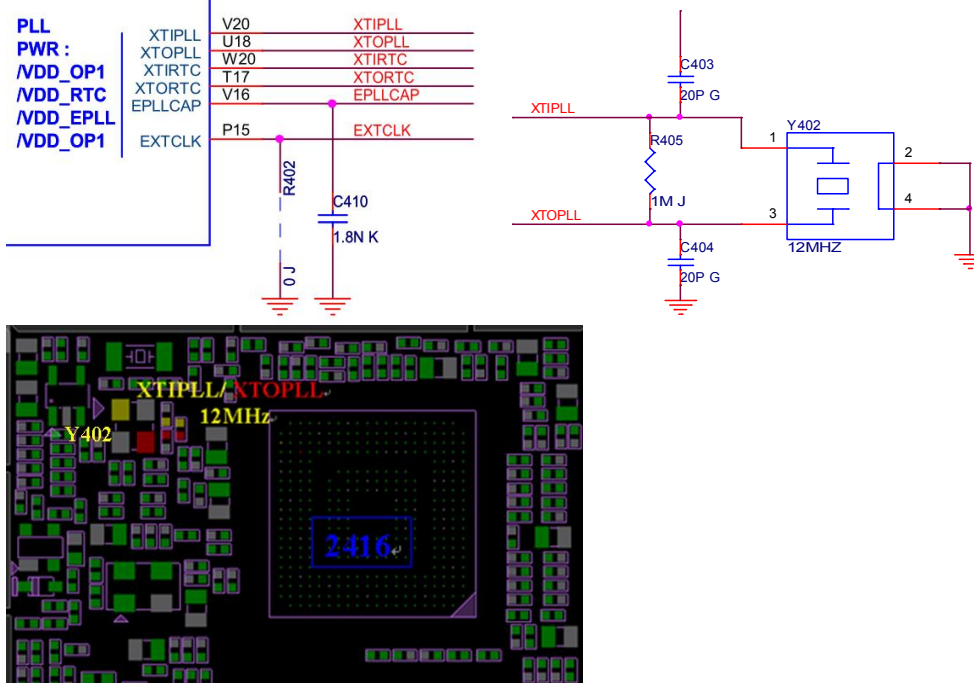
1. 目視相關元件是否正常
2. Check DDR power: VDD\_18M/ VDD\_DDR => 1.8V
3. Check 2416 DDR power: VDD\_18M/ VDD\_SMOP => 1.8V
4. Check DDR Clock: SCLK, nSCLK
5. Check DDR IO block 有問題再去作分析問題所在?





## 6.2.3 System Clock: 12MHz (Page 4)

### 6.2.3.1 Function Circuit and Layout



### 6.2.3.2 Circuit Operation:

1. Adaptor in
2. Clock 起來

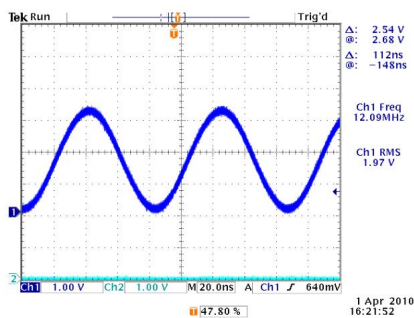
### 6.2.3.3 Debugging Process

#### 6.2.3.3.1 Possible failure symptoms

系統開不了機、螢幕不會亮、連接周邊 IO 介面無 Function.

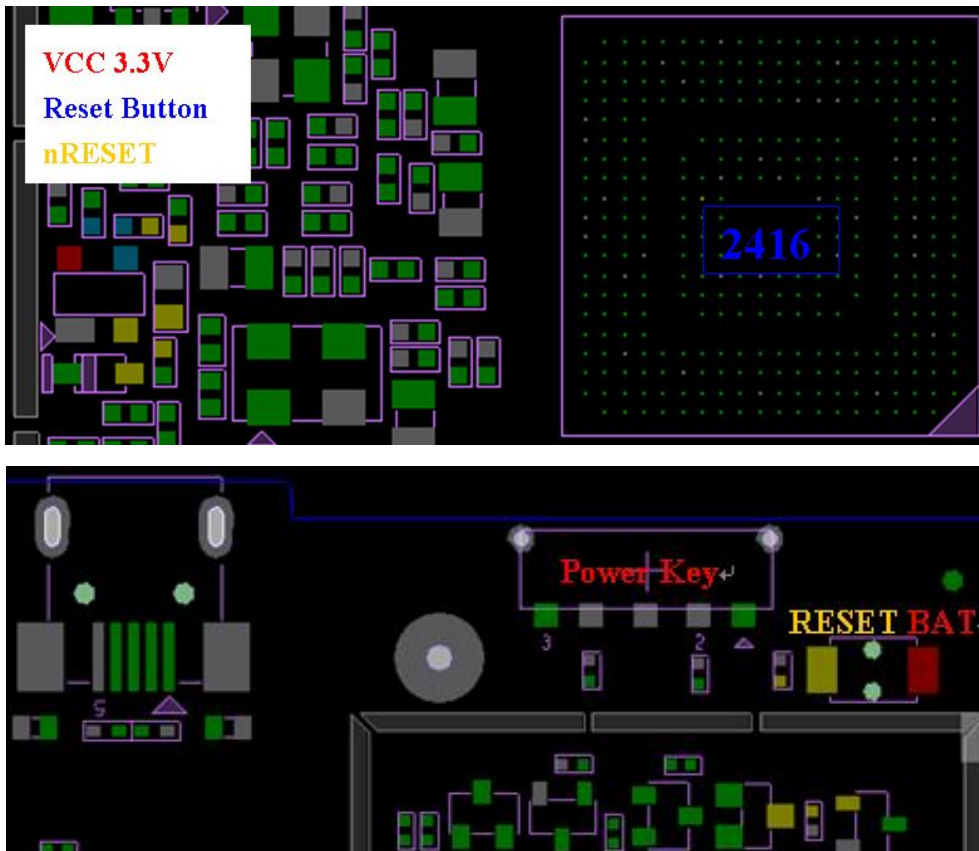
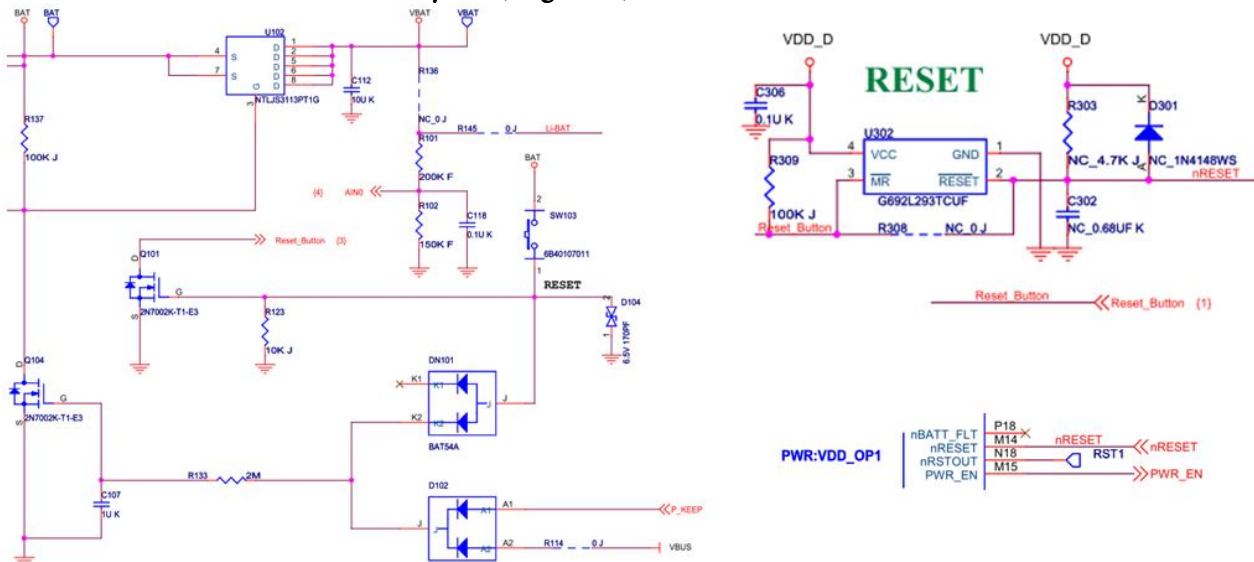
#### 6.2.3.3.2 Debugging steps

1. 目視 Clock 相關元件是否正常
2. Clock: XTIPLL, XTOPLL =>12MHz
3. 有問題再去作分析問題所在!



## 6.2.4 System Reset

### 6.2.4.1 Function Circuit/ Layout (Page 1, 3)



#### 6.2.4.2 Circuit Operation:

1. Adaptor in, Power ON device
2. Press Reset Button, system reset (Re-start)

#### 6.2.4.3 Debugging Process

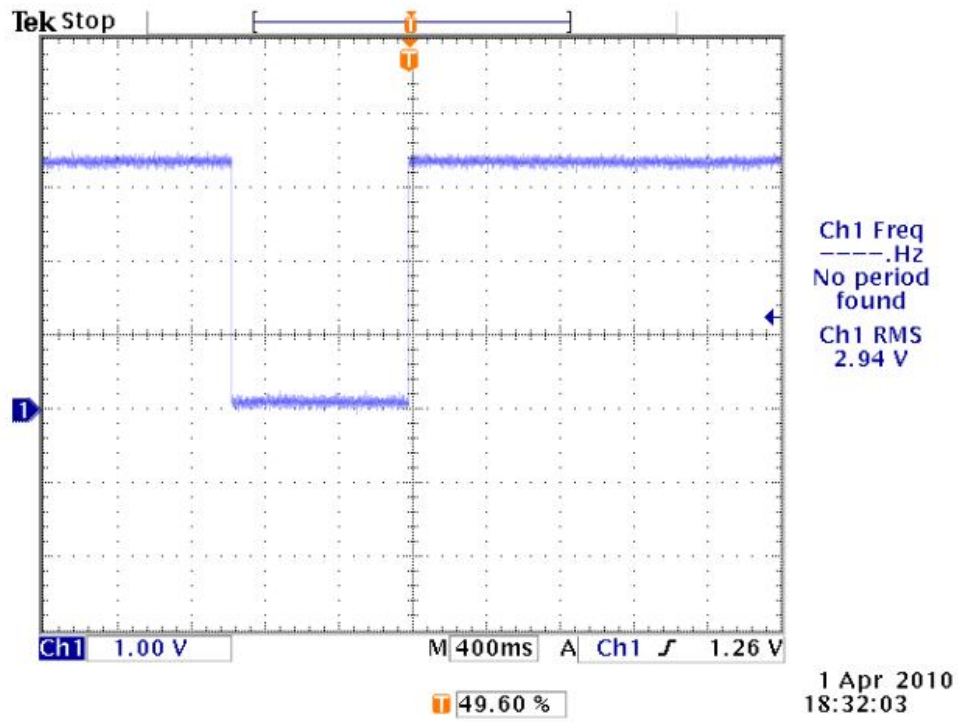
##### 6.2.4.3.1 Possible failure symptoms

系統無法 Reset

### 6.2.4.3.2

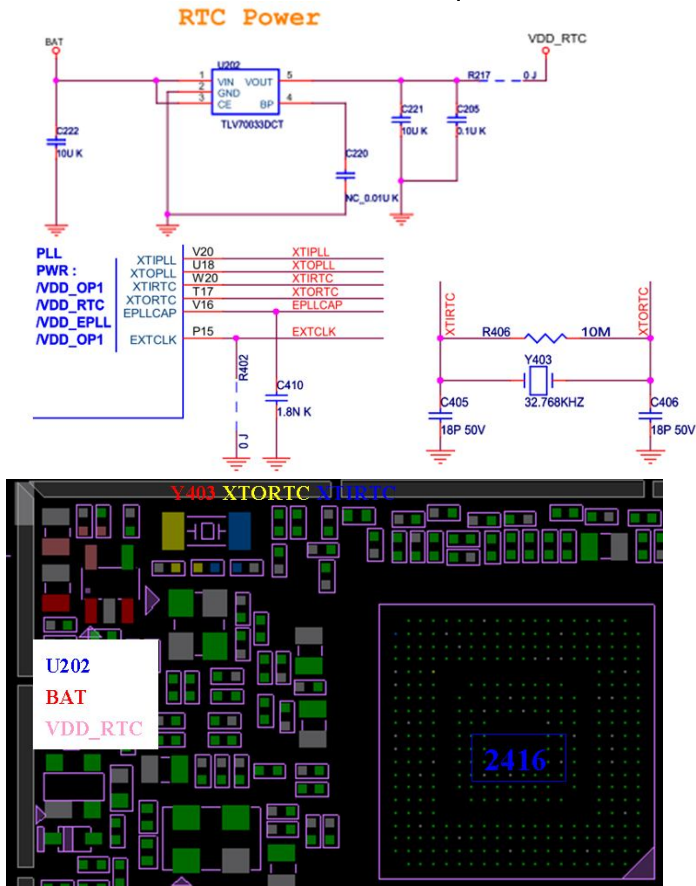
#### Debugging steps

1. 目視 Reset 相關元件是否正常
2. Check nRESET 訊號是否正常
3. 有問題再去作分析問題所在!



## 6.2.5 System RTC: 32.768KHz (Page 2, 4)

### 6.2.5.1 Finction Circuit/ Layout



### 6.2.5.2 Circuit Operation:

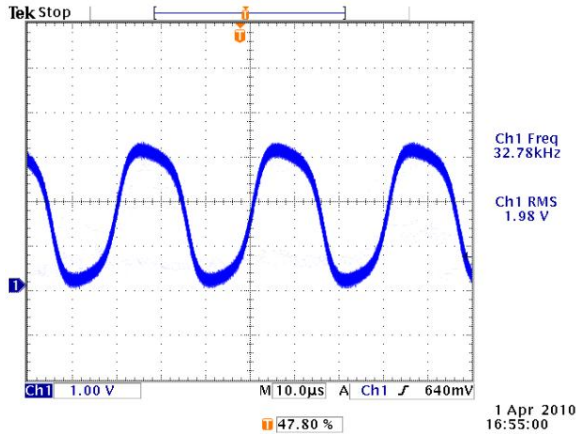
1. With battery
2. VDD\_RTC 工作電壓起來
3. RTC Clock 起來

### 6.2.5.3 Debugging Process

#### 6.2.5.3.1 Possible failure symptoms RTC fail

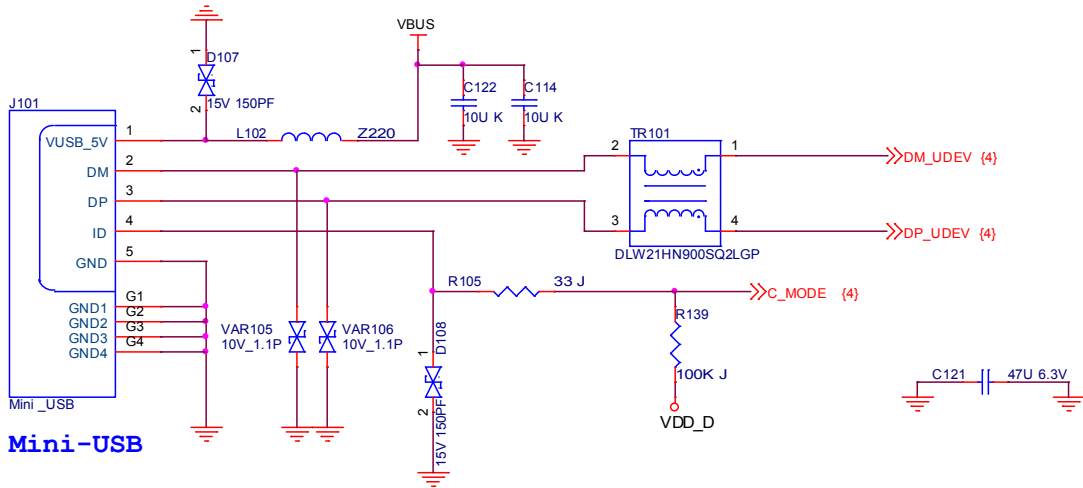
#### 6.2.5.3.2 Debugging steps

1. 目視 RTC 相關元件是否正常
2. Check RTC LDO U202, check VDD\_RTC=>3V
3. Check RTC clock => 32.768KHz
4. 有問題再去作分析問題所在!

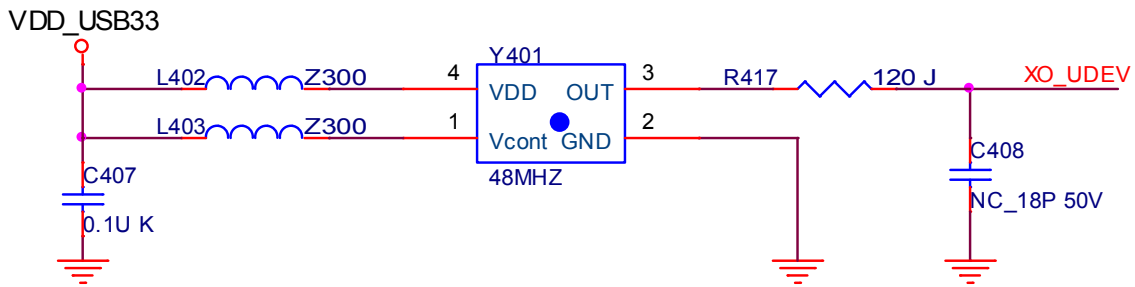


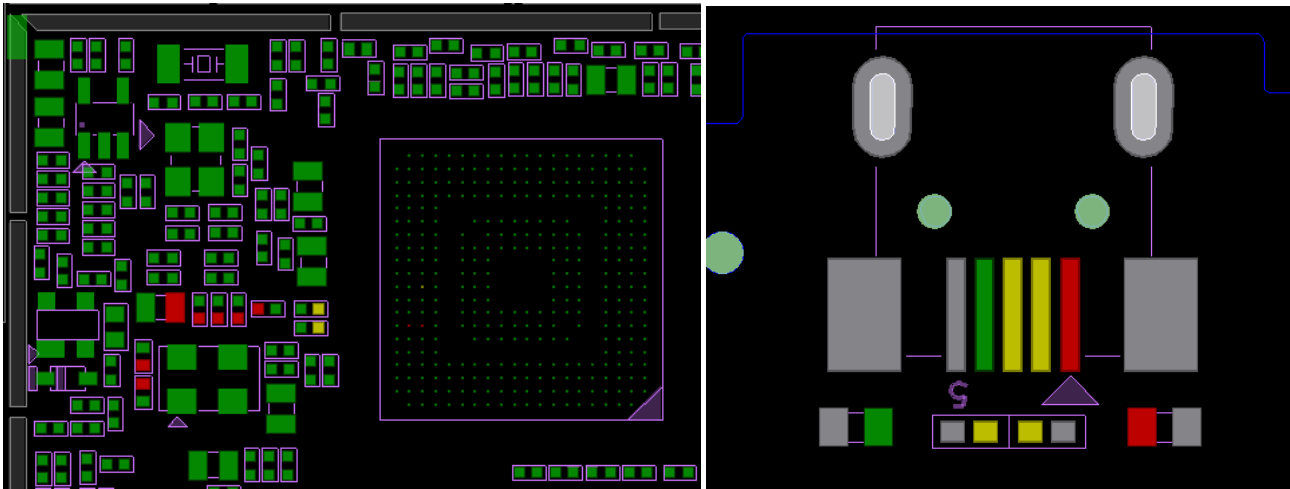
## 6.2.6 USB 2.0 (USB Client) (Page 1, 4)

### 6.2.6.1 Function circuit and layout



#### USB Internal Clock (48MHz)





### 6.2.6.2 Circuit Operation:

1. Adaptor IN, Device Power ON
2. VDD\_USB\_33 工作電壓起來, USB Clock: XO\_UDEV 起來
3. Plug in USB cable, connect device to PC, => VBUS=5V
4. 畫面點選起動 U 盤模式
5. Check D+/D- 是否有訊號



### 6.2.6.3 Debugging Process

#### 6.2.6.3.1 Possible failure symptoms

USB Fail

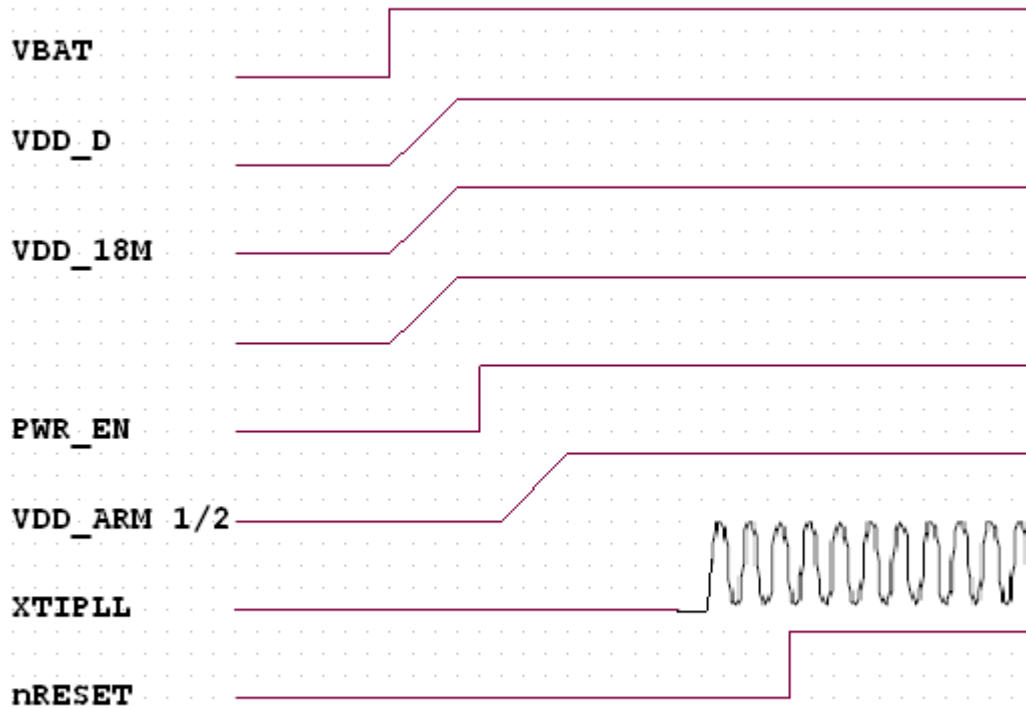
#### 6.2.6.3.2 Debugging steps

1. 目視 USB 相關元件是否正常
2. Check VDD\_USB\_33=>3.3V
3. Check USB Clock: XO\_UDEV => 32.768KHz
4. Plug in USB cable, connect device to PC, => VBUS=5V
5. Check D+/D- 是否有訊號
6. 有問題再去作分析問題所在!

### 6.3 Power management circuit Basic Circuit operation introduction

Power on & power sequence

In Battery mode, when pressed SW101, will enable VDD\_D & VDD\_18M, then PMIC has 3.3V & 1.8V output and SSC2416 power on, then going on following boot sequence.



#### 6.3.2 Debugging process

##### 6.3.2.1 Possible failure symptoms

1. Large leakage current
2. Cannot boot, debug board did not run.

##### 6.3.2.2 Debugging steps

1. Plug-in Battery, check leakage current, it should under 0.1 mA .
2. a. Power on system, check U101 power, check VBAT power, if no VBAT, check U102
- b. Check U201 power, check VDD\_D(3.3V/Pin 8) , VDD\_18M (1.8V/Pin 25) , VDD\_ARM (1.29V/Pin 1) , VDD\_ARM2 (1.29V/Pin 1),if no power found ,check U201,L201,L202,L203 .
- c. Check power on sequence, check XTIPLL CLK, if no clock found, replace Y402



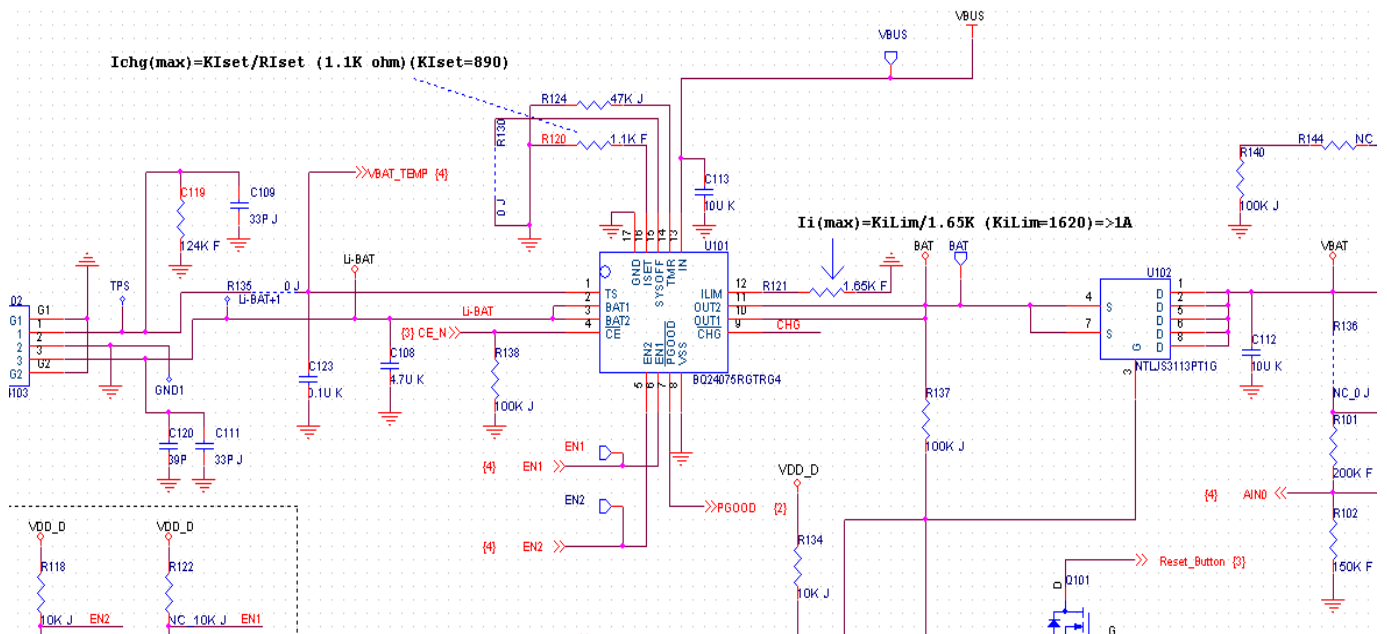
- d. Check CPU nRESET, it should be high if normal power on sequence finished. Then roll back every signal at power sequence and check trimming.

## 6.4 Battery Charger circuitDescription:

The Battery charging circuit is designed for charging single cell Li+ or Li-poly battery, the input power source can be from USB host or AC Adapter. The charging IC include power source selection feature, it can automatically to select system power from battery or external power input during charging.

### 6.4.2 Function block or circuit

#### a. Charging Schematic



### 6.4.3 Basic Circuit operation introduction

When the adapter and the Battery in,  $VBUS > UVLO$  AND  $VBUS > VBAT + VIN(DT)$  AND  $VBUS < VOVP$  and  $-1^{\circ}C < VBAT\_TEMP < 50^{\circ}C$  and the EN1 and EN2 pins indicate that the USB suspend mode is not enabled  $[(EN1, EN2) \neq (HI, HI)]$ , all internal timers and other circuit blocks are activated, If the condition is confirmed, CE\_Enable Pin will pull Low and CHG Pin will pull low and PGOOD Pin will Pull High, then charging function will start.

When VBAT in.....

Trickle charge mode :  $VBAT < 2.8V$ , charging current = 89mA

CC Mode : Capacity < 90%, charging current = 890mA

CV Mode : it will auto switch from CC to CV when  $VBAT = 4.2V$

Note :



- (1) UVLO: 4.5V
- (2) VIN(DT) : 55~130mV
- (3) VOVP : 6.4~6.6V

#### 6.4.4 Debugging process

##### 6.4.4.1 Possible failure symptoms

Use the power supply (5V) to supply the Adapter .  
If .....

1. Power supply current is under 150 mA (see the 2.3.4.2)
2. Power supply current is over 1A (see the 2.3.4.3)
3. LCD no display

##### 6.4.4.2 Debugging steps

Probable Cause	Verification and Remedy
(a) Check U101 signal	1. check the below signal : a. $5V < IN(\text{ Pin } 13) < 6.8V$ b. $OUT1 \text{ and } OUT2 (\text{ Pin } 10 \text{ and } \text{ Pin } 11) > 4.2V$ 2. If it is still no output, proceed to b.
(b) Components NG	1. Visually inspect the U101 . If the pins of the U101 and contact NG, re-solder the pins. 2. Visually inspect the U102, If any component is not contacted well, replace the component. If it is necessary, change a new one.

##### 6.4.4.3 Debugging steps

Probable Cause	Verification and Remedy
(a) Check U101 signal	1. check the below signal : a. $IN(\text{ Pin } 13)$ is short with GND b. $OUT1 \text{ and } OUT2 (\text{ Pin } 10 \text{ and } \text{ Pin } 11)$ is short with GND c. Take off U201, then check a and b step again 2. If it is short with GND, proceed to b. 3. If it is good, proceed to c
(b) Components NG	1 Visually inspect the U101 . If the pins of the U101 and contact NG, re-solder the pins. 2 Visually inspect the U102, If any component is not contacted well, replace the component. If it is necessary, change a new one.
(a) Check U201 signal	1. check the below signal a. $VDCDC1 (\text{ Pin } 8), VDCDC2 (\text{ Pin } 25), VDCDC3 (\text{ Pin } 1)$

	<p>is short with GND</p> <p>2. If it is still short with GND, proceed to d</p>
(d) Components NG	<p>1. Visually inspect the U201 . If the pins of the U201 and contact NG, re-solder the pins.</p> <p>2. Visually inspect the U201,L201,L202,L203, If any component is not contacted well, replace the component. If it is necessary, change a new one.</p>

## 6.4.5 PMIC

### 6.4.5.1 Description:

#### 6.4.5.1.1 Function purpose

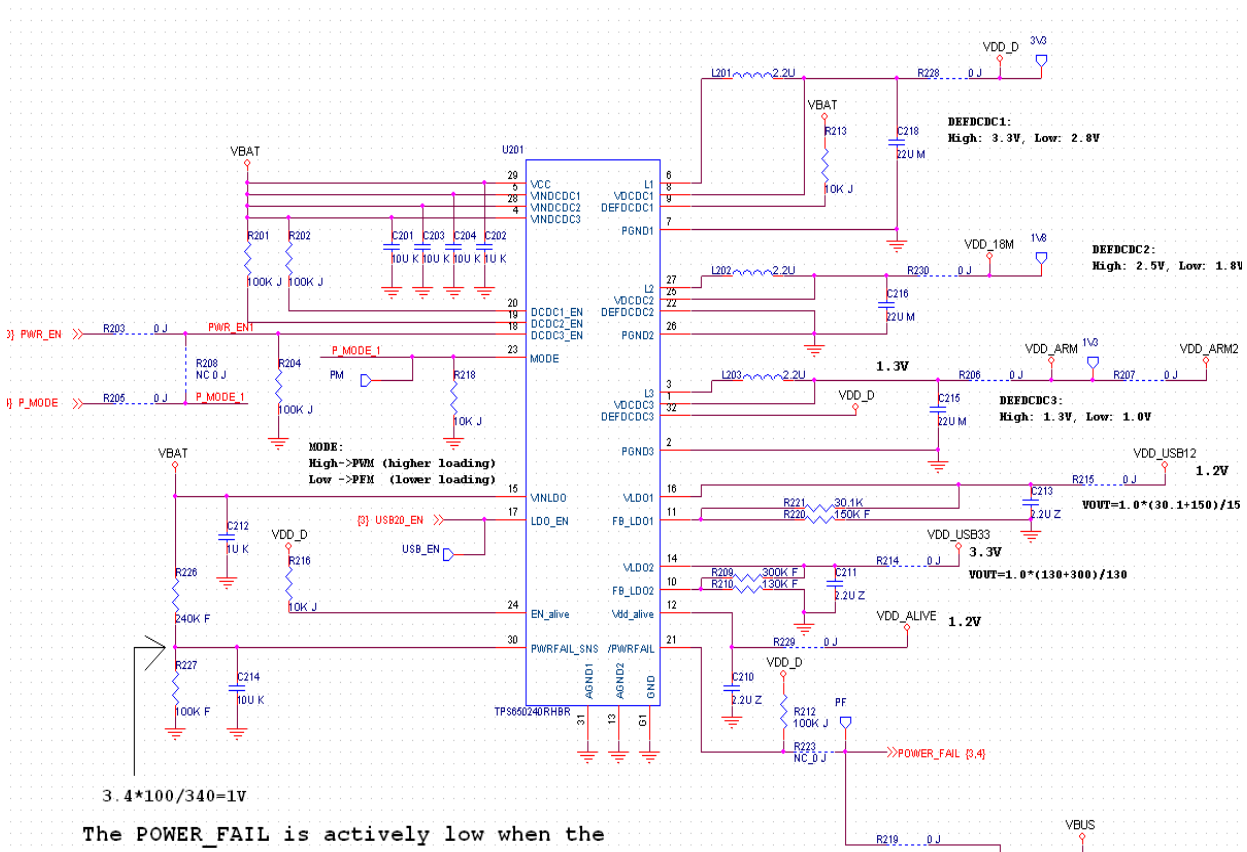
Power providing for the core voltage ,peripheral, I/O and memory .

#### 6.4.5.1.2 Major components list

1. PMIC(U201)
2. CHIP PWR IND 2.2U(L201,L202,L203)

### 6.4.5.2 Function block or circuit

#### 6.4.5.2.1 PMIC circuit



### 6.4.5.3 Basic Circuit operation introduction

1. When the adapter in or Battery in , press Power on key, U101 will provide a regulated output VBAT to PMIC, PMIC DCDC1\_EN & DCDC2\_EN Pin will be enabled by VBAT, then PMIC will provide regulated output VDD\_D and VDD\_18M
2. After VDD\_D output is stable, PMIC EN\_alive Pin will be enabled by VDD\_D, then PMIC will provide a regulated output VDD\_ALIVE (1.2V)
3. After VDD\_D and VDD\_18M output voltage are stable, S3C2416 will send PWR\_EN to DCDC3\_EN, then PMIC will provide a regulated output VDD\_ARM 1/ 2 (1.3V)

### 6.4.5.4 Debugging process

#### 6.4.5.4.1 Possible failure symptoms

Use the power supply (5V) to supply the Adapter .

If .....

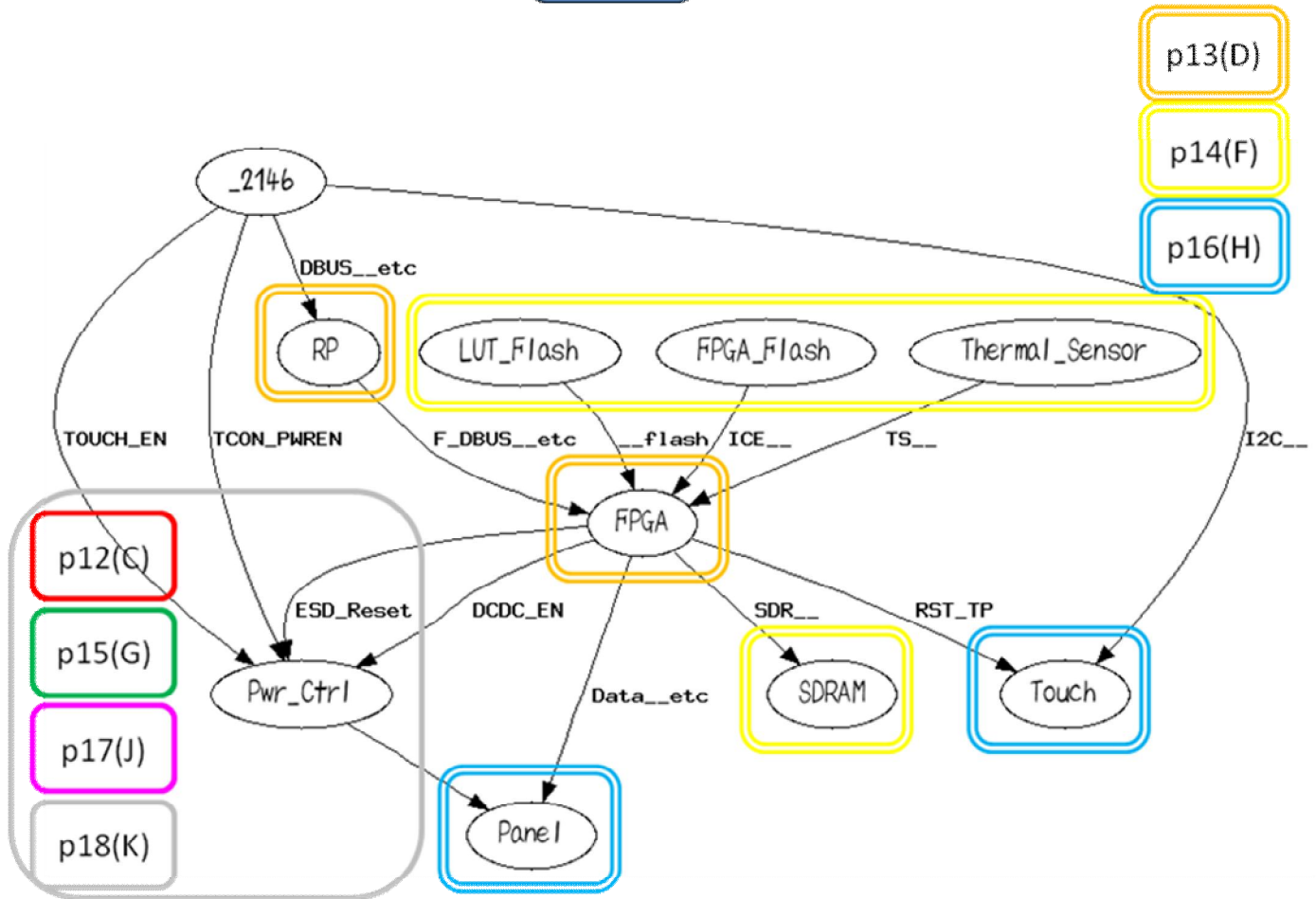
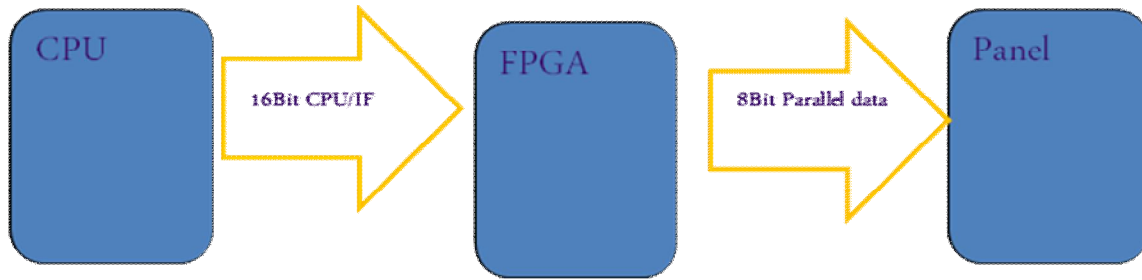
1. Power supply current is under 150 mA
2. LCD no display
3. Can't boot

#### 6.4.5.4.2 Debugging steps

Probable Cause	Verification and Remedy
(a) Check U201 signal	<ol style="list-style-type: none"> <li>3 check the below signal</li> <li>4 VCC (Pin 29),VINDCDC1(Pin5), VINDCDC1(Pin28) VINDCDC2(Pin4),DCDC1_EN(Pin20), DCDC2_EN(Pin19), &gt; 4.2V</li> <li>5 VDCDC1 (Pin 8)&gt;3.3V</li> <li>6 VDCDC2 (Pin 25)&gt;1.8V</li> <li>7 DCDC3_EN (Pin 18) &gt; 3.3V</li> <li>8 VDCDC3 (Pin 1)&gt;1.29V</li> <li>9 If it is still no output, proceed to d</li> </ol>
(b) Components NG	<ol style="list-style-type: none"> <li>1 Visually inspect the U201. If the pins of the U201 contact NG, re-solder the pins.</li> <li>2 Visually inspect the L201, L202, L203. If any component is not contacted well, replace the component. If it is necessary, change a new one.</li> </ol>

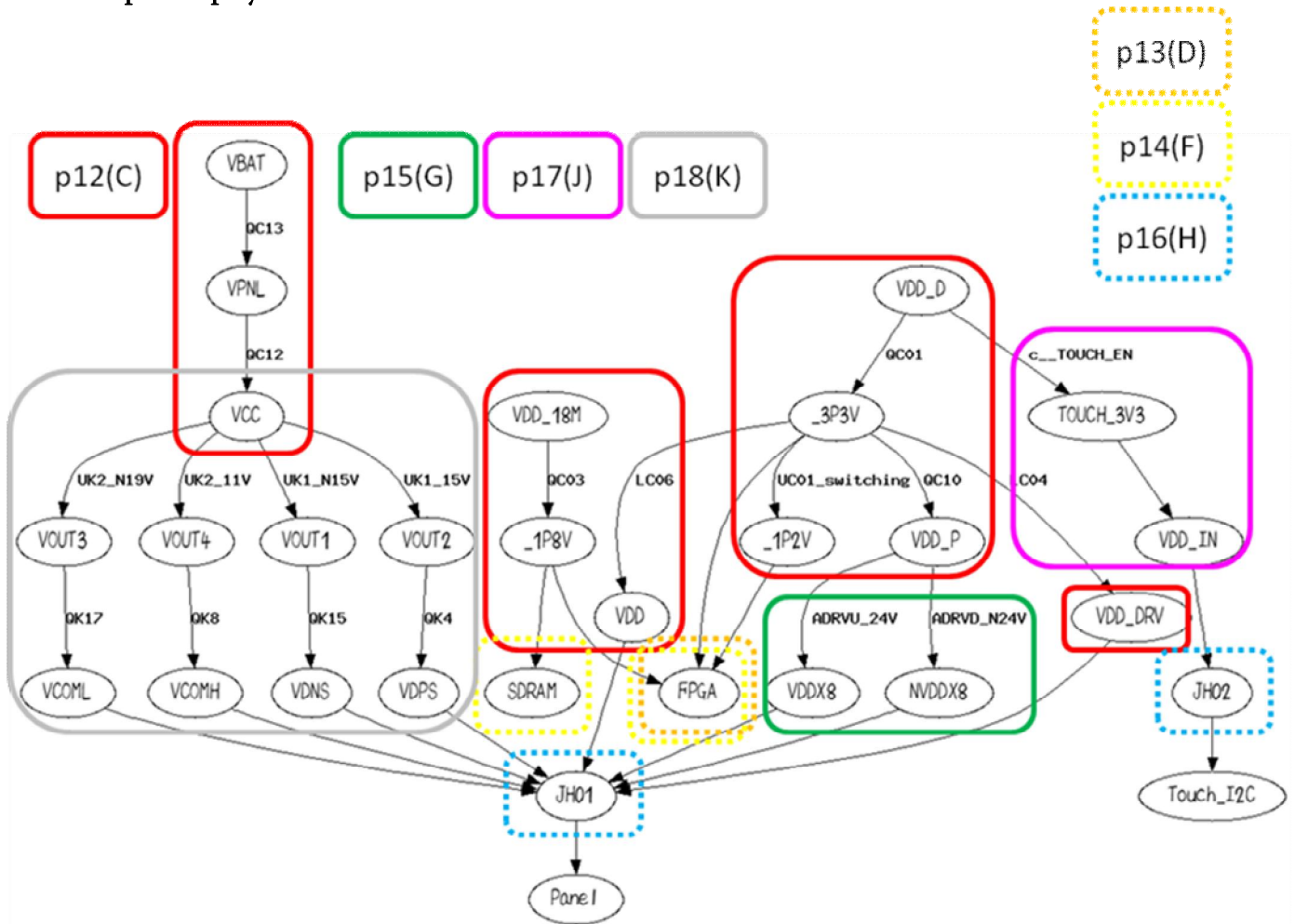
## 6.5 Display E-Paper Display Function Block

(CPU → TCON → Panel)

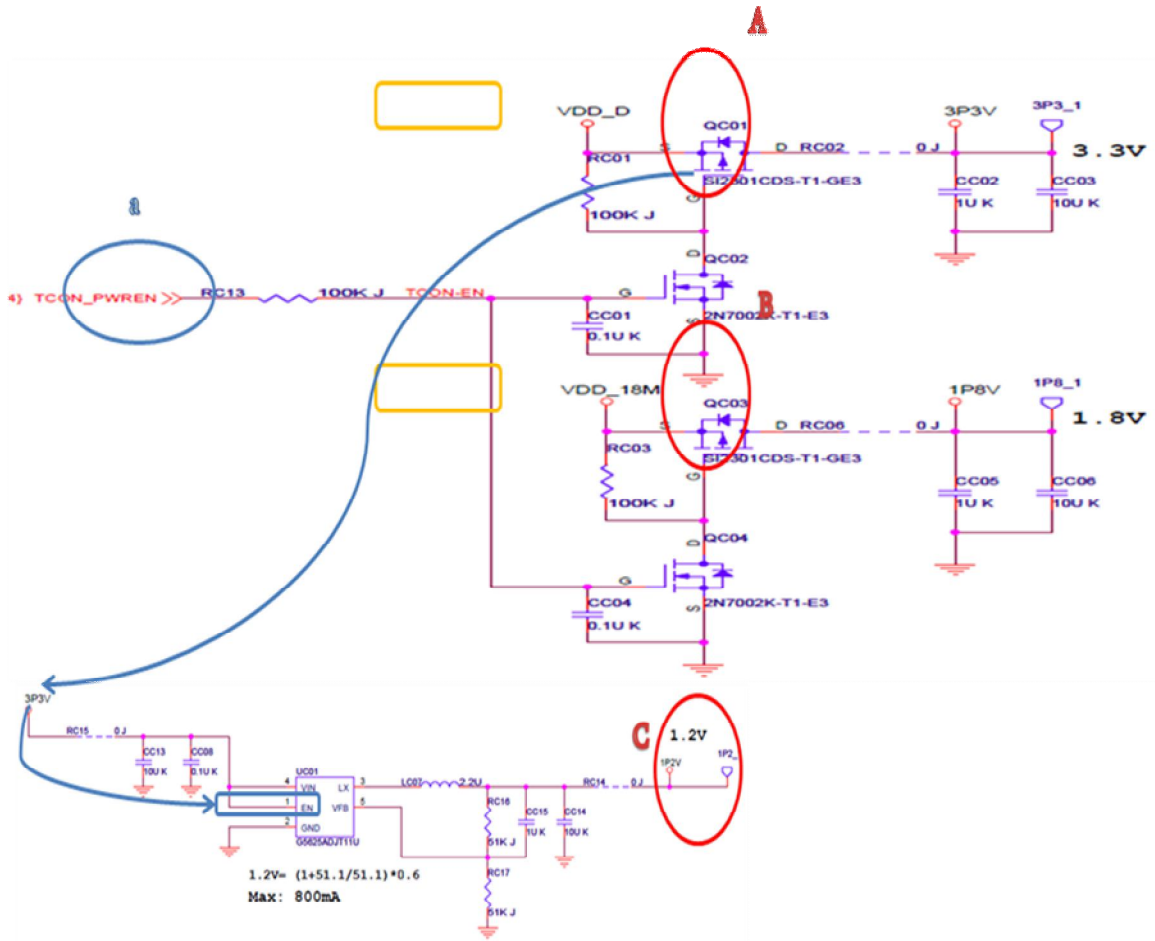


- TCON FPGA  
TCON FPGA is an EPD controller for E-Book application, the outputs have 2 bit output per pixel. The timing controller provides control signals for the source driver and gate drivers. AUO-K1900(TCON) provides a high performance, low cost solution for Sipix EPDs (Electronic Paper Display), it also includes external mobile SDRAM controller, built in temperature sensor. Multi-region and concurrent display updates resulting in high responsive screen changes are also embedded in special timing controller for these applications.
- FPGA Flash  
Store pre-programmed FPGA code for TCON function.
- LUT Flash  
Store source/gate driving waveform Look-Up-Table for different temperature and different display mode

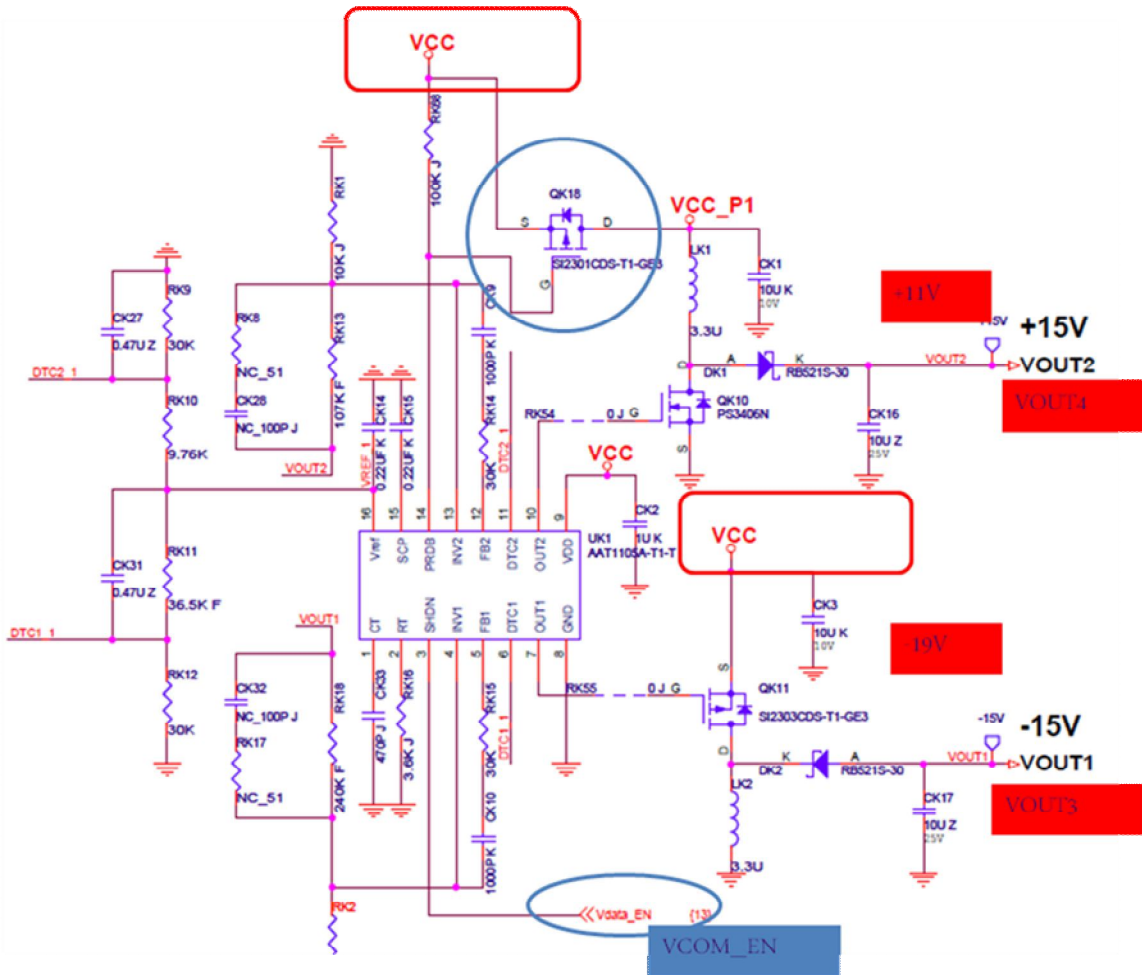
- Thermal Sensor  
Detect E-Paper environment temperature. (目的是偵測 EPD 溫度，調整 LUT 參數)
- SDRAM  
TCON display buffer and working space.  
E-Paper Display Power Distribution



FPGA Power

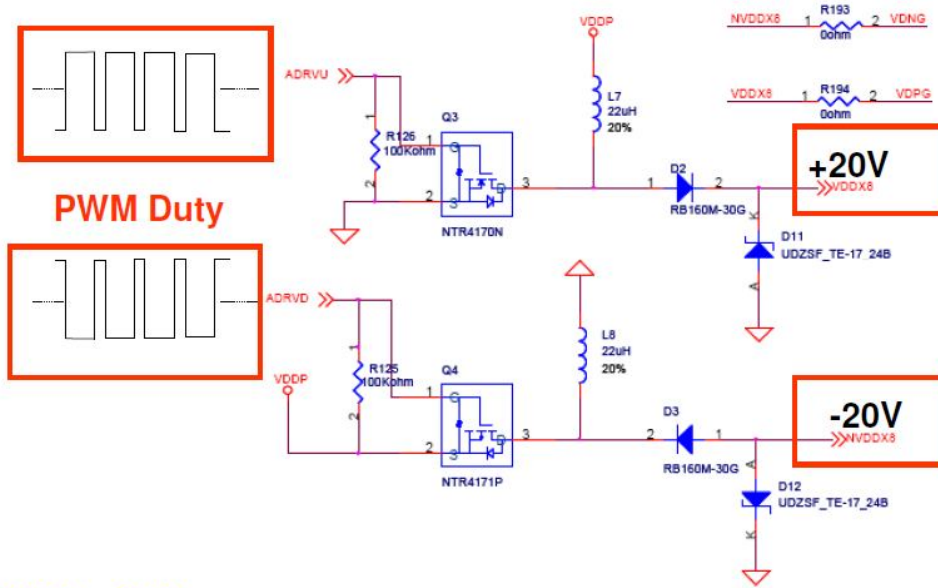


Panel power Source & VCOM



Panel Gate power

## Panel application circuit page:



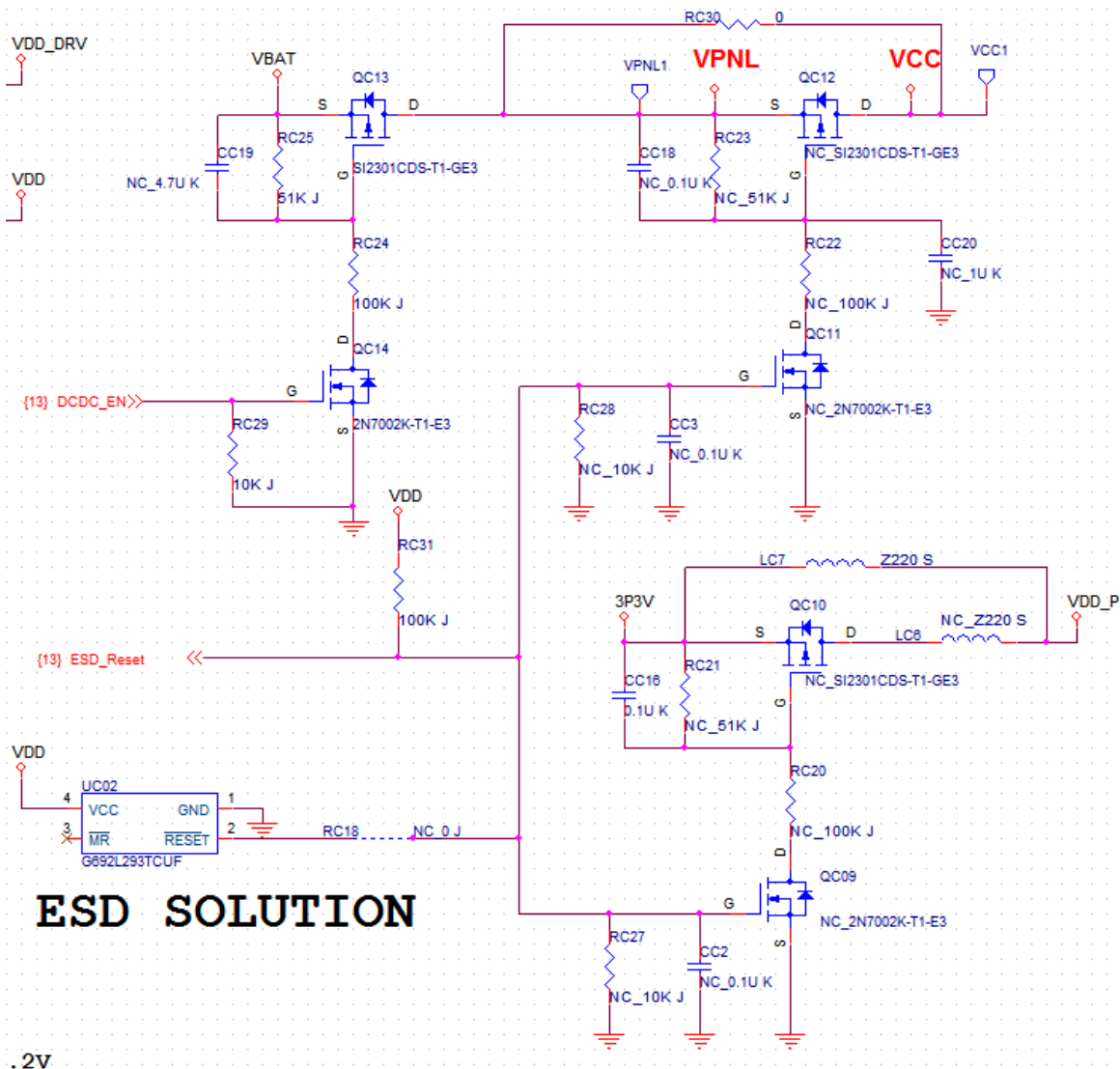
◆ VDDP = 3.3V

◆ ADRVU and ADRV are PWM output

◆ VDDX8 can output +20V and NVDDX8 can output -20V to panel

Panel power sequence control

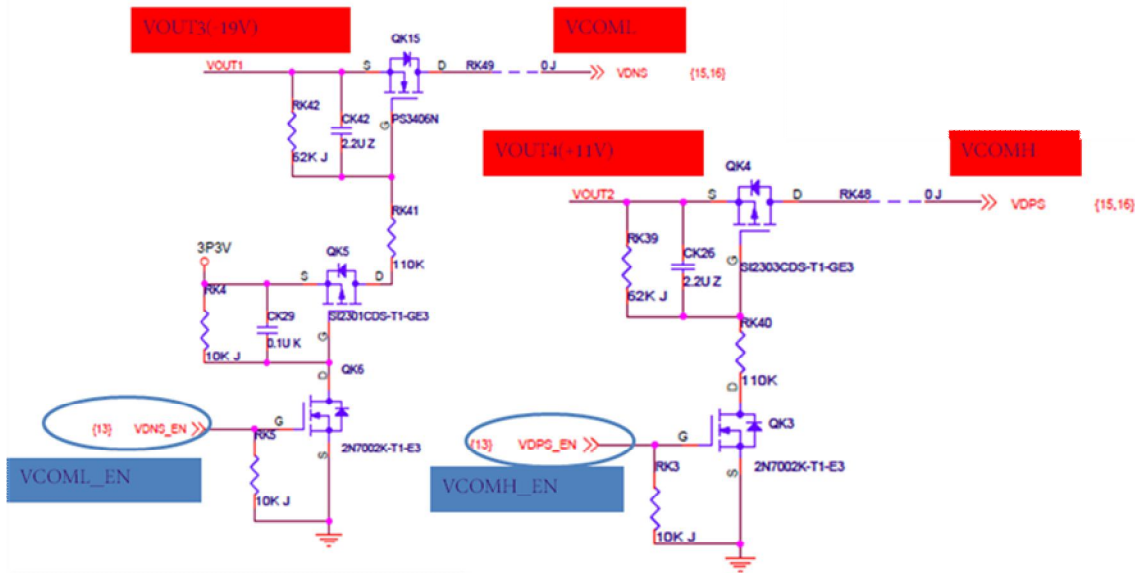




Disable ESD reset circuit for panel

⇒ Set RC20 RC22 RC21 RC23 LC6 CC18 QC10 QC12 QC09 QC11 to NC

## Panel power sequence control



## 6.5.2 Panel trouble shooting guide

**Important!!!** : Before removing panel, **Please disconnect any power source ( Battery and USB) first and wait for 30 seconds.**

Symptom	Probable Cause	Verification and Remedy
1.No display	Device hangs.	<ol style="list-style-type: none"> <li>1. Connect debug board, check system is alive or not.</li> <li>2. If device hangs, check CPU and other relate circuit first.</li> </ol>
	Panel defect.	<ol style="list-style-type: none"> <li>1.Remove panel, connect USB to prevent device go into sleep mode, power on device, check panel power <math>\pm 15V</math>, +11.5V, -18.5V</li> <li>2. If power OK, disconnect power and replace panel, and check again</li> </ol>
	TCON fail	<ol style="list-style-type: none"> <li>1. Check TCON power source, 3.3V, 1.8V and 1.2V, if power fail, check relate circuit.</li> <li>2. Check TCON oscillator ,should be 33M</li> <li>3. Check SDRAM and TCON Flash and LUT Flash relate circuit.</li> <li>4. If all above looks OK, replace TCON flash and LUT flash with FW inside, check again.</li> <li>5. If 4 fail, replace SDRAM and check again.</li> <li>6. If 5 fail, replace TCON.</li> </ol>

2. Has display, but abnormal	Panel power fail	<ol style="list-style-type: none"> <li>1. Check schematic P.12 VCC1 and VDD_P, if fail, check QC11~ QC14, and TCON_PWREN signal.</li> <li>2. Check panel power. <math>\pm 15V</math>, +11.5V, -18.5V, If fail, check P.18 page components.</li> <li>3. Check VDDX8 &amp; NVDDX8 ( need to connect panel) if no power (<math>\cong \pm 20V</math>) check QG01, QG02, ZDG1, ZDG2, DG01, DG2, DG03 and P.15 relate circuit.</li> </ol>
	Panel defect.	<ol style="list-style-type: none"> <li>1. Remove panel, connect USB to prevent device go into sleep mode, power on device, check panel power <math>\pm 15V</math>, +11.5V, -18.5V</li> <li>2. If power OK, disconnect power and replace panel, and check again</li> </ol>
	TCON Fail	<ol style="list-style-type: none"> <li>1. Check TCON power source, 3.3V, 1.8V and 1.2V, if power fail, check relate circuit.</li> <li>2. Check TCON oscillator ,should be 33M</li> <li>3. Check SDRAM and TCON Flash and LUT Flash relate circuit.</li> <li>4. If all above looks OK, replace TCON flash and LUT flash with FW inside, check again.</li> <li>5. If 4 fail, replace SDRAM and check again.</li> <li>6. If 5 fail, replace TCON.</li> </ol>

## 6.6 WIFI Description:

### Wifi :

High speed for wireless LAN connection: IEEE802.11b/g up to 54Mbps data rate by incorporating Direct Sequence Spread Spectrum (DSSS) and OFDM data modulation.

### Main Components:

Main module is USI WM-G-MT03 and MTK MT5921 inside, wifi RF trace is controlled as 50 ohm, wifi antenna is PIFA type and paste on board.

WM-G-MT03 Block Diagram:

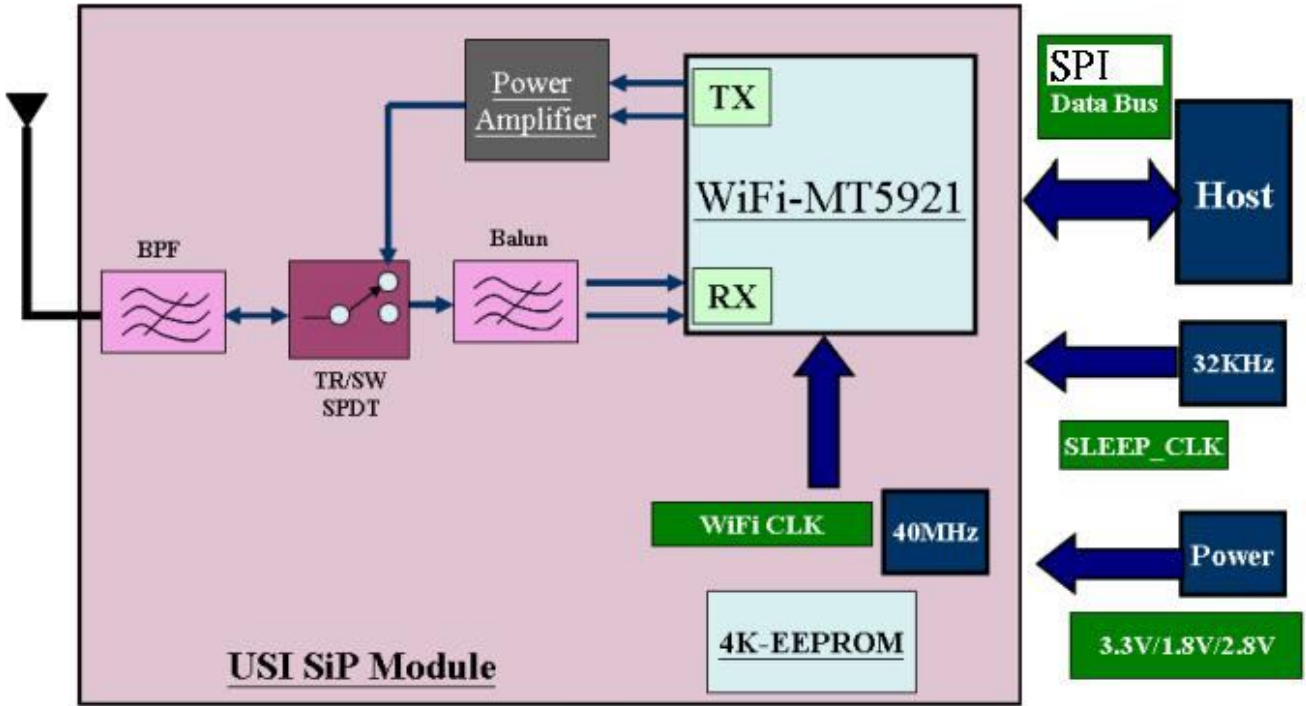
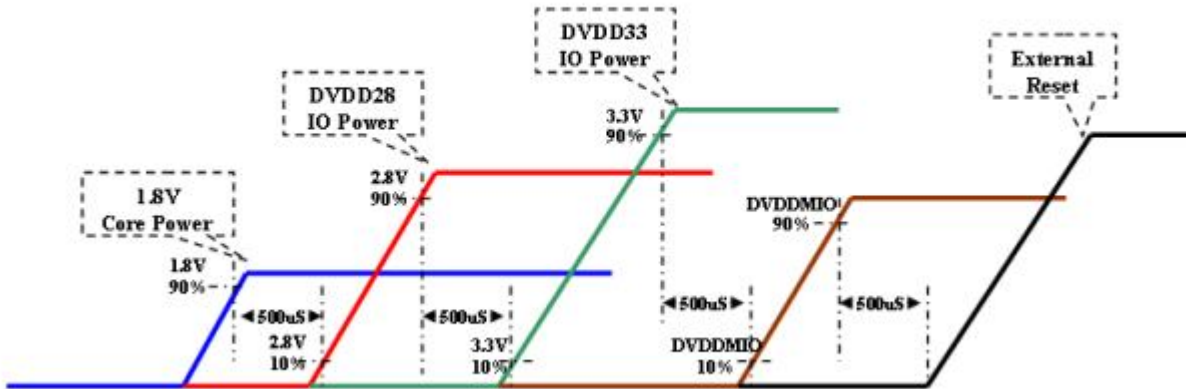


Figure1-Block Diagram of WiFi Module

### 6.6.2 POWER ON SEQUENCE

The recommend power on sequence:  
 DVDD18→DVDD28→DVDD33→DVDDMIO→Release EXT\_RST\_N



### 6.6.3 Basic Circuit operation introduction

- Step 1 : System supply 3.3V and 1.8V power, then Enable “WIFI\_EN1V8\_1” and “WIFI\_EN3V3\_1” to switch on it.
- Step 2 : When power in Wifi module, system will issue reset signal “EXT\_N\_RST” to module.
- Step 3 : System will drive Wifi-BT to initial its Function.

Step 4 : Form OS, wifi will search AP after you tune on wifi function.

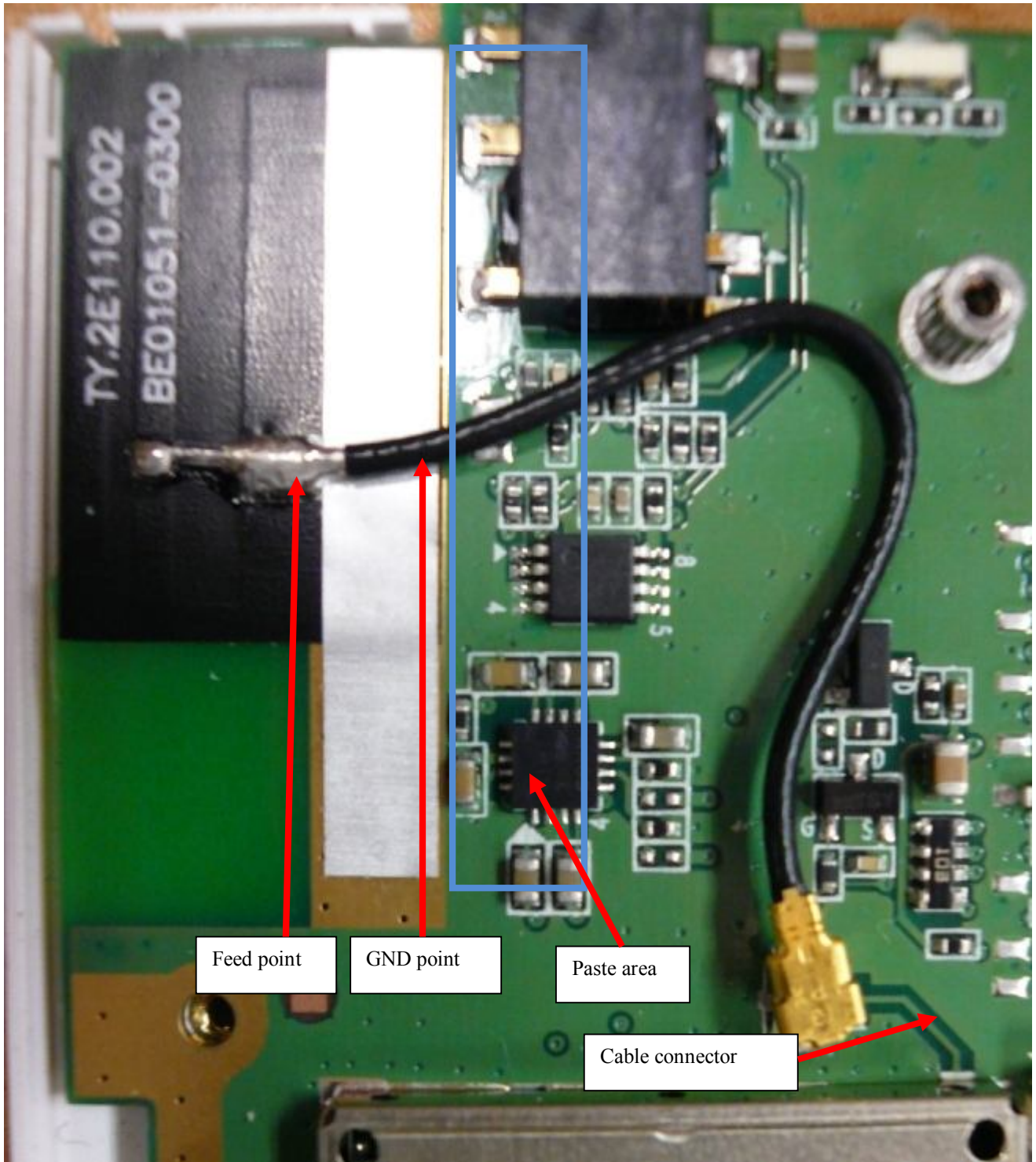
#### **6.6.4** Debugging process

##### **6.6.4.1** possible failure symptoms

1. NO response after tune on Wifi from OS
2. Wireless connection distance is not enough.

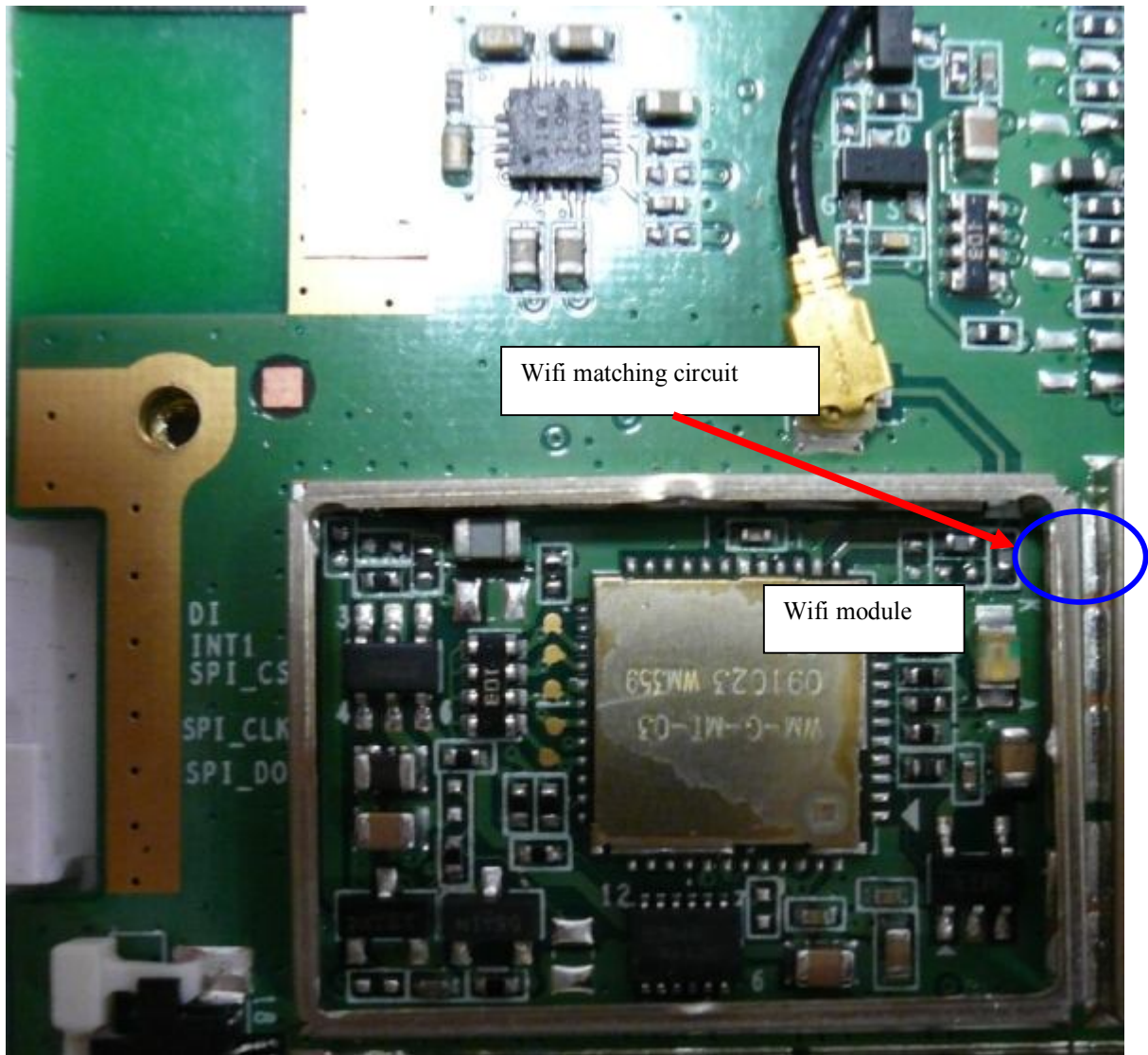
##### **6.6.4.2** Debugging steps

Wifi PIFA antenna



Wifi module





#### Failure symptom

##### A. NO response after tune on Wifi from OS

1. Check all parts of wifi block are correct parts and soldering well.
2. Check UA03 pin3 logic level is "H" and pin1 is 1.8V
3. Check UA03 pin4 logic level is "H" and pin6 is 3.3V
4. After power in, check Net "EXT\_N\_RST" change logic level from "L" to "H".
5. Check SPI interface signal (compare with normal one).
6. Check UA02 pin43 is 32KHz clock
7. When device is searching AP, check UA02 pin5 power delivery is controlled by UA02 pin3. If pin3 level is "H", pin5 voltage is VBATT.

##### B. Wireless connection distance is not enough

1. Check wifi antenna feed point and GND point soldering is well.
2. Check wifi antenna pasted area is well (confirm antenna GND point and PCBA GND is well connection).
3. Check wifi matching circuit value(CA15 and CA17).

4. Check cable connector.
5. change a new wifi antenna.

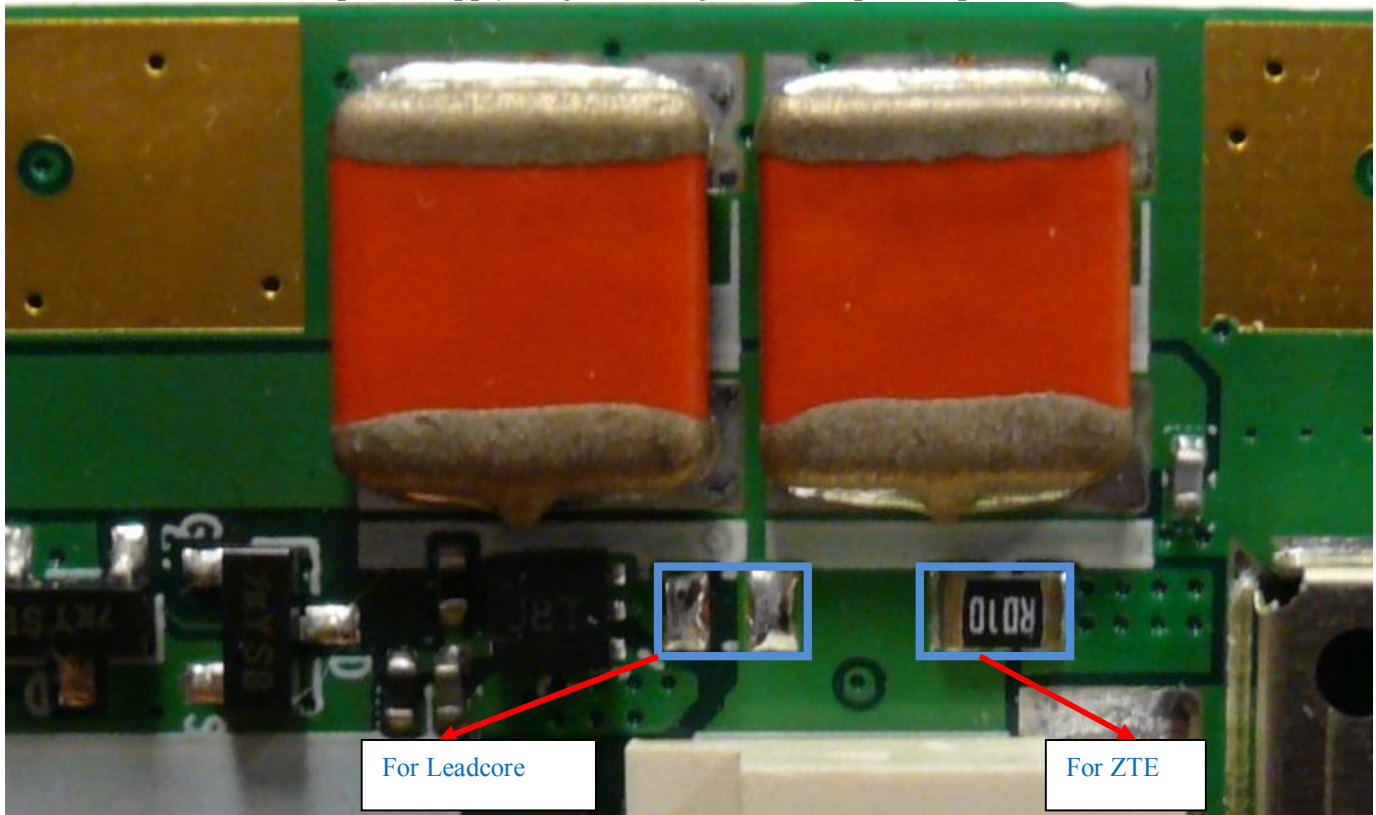


## 6.7 WWAN function (3G Modem)Description:

There are 2 PCI Express Mini Card Module option as below,

1. Leadcore : Support TD-SCDMA, E-GSM, DCS1800 and PCS1900. Power supply 3.2 ~4.2V.
2. ZTE : Support WCDMA, HSPDA, E-GSM, DCS1800 and PCS1900, power supply 3.3~3.6V

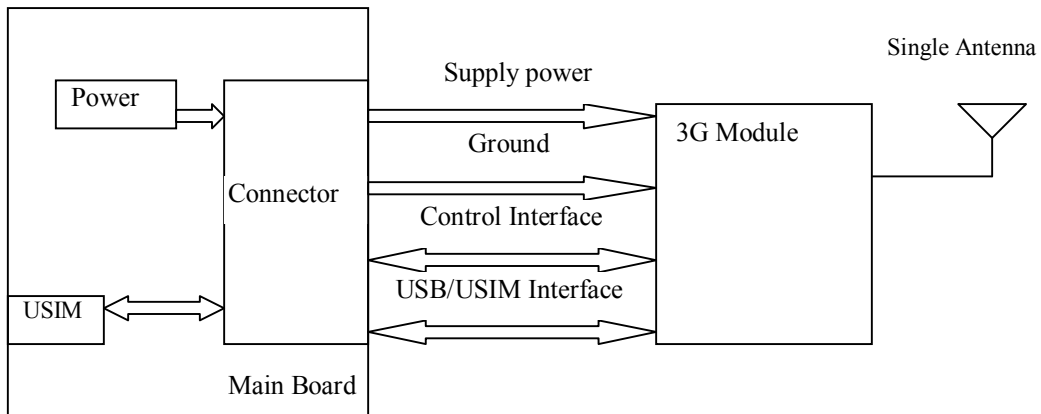
Different power supply range, we design different power options for these 3G modem.



### Main Components:

1. 3G module (Leadcore LC5730 or ZTE MF200)
2. 2G/3G SIM card
3. Power supply to 3G module
4. Antenna

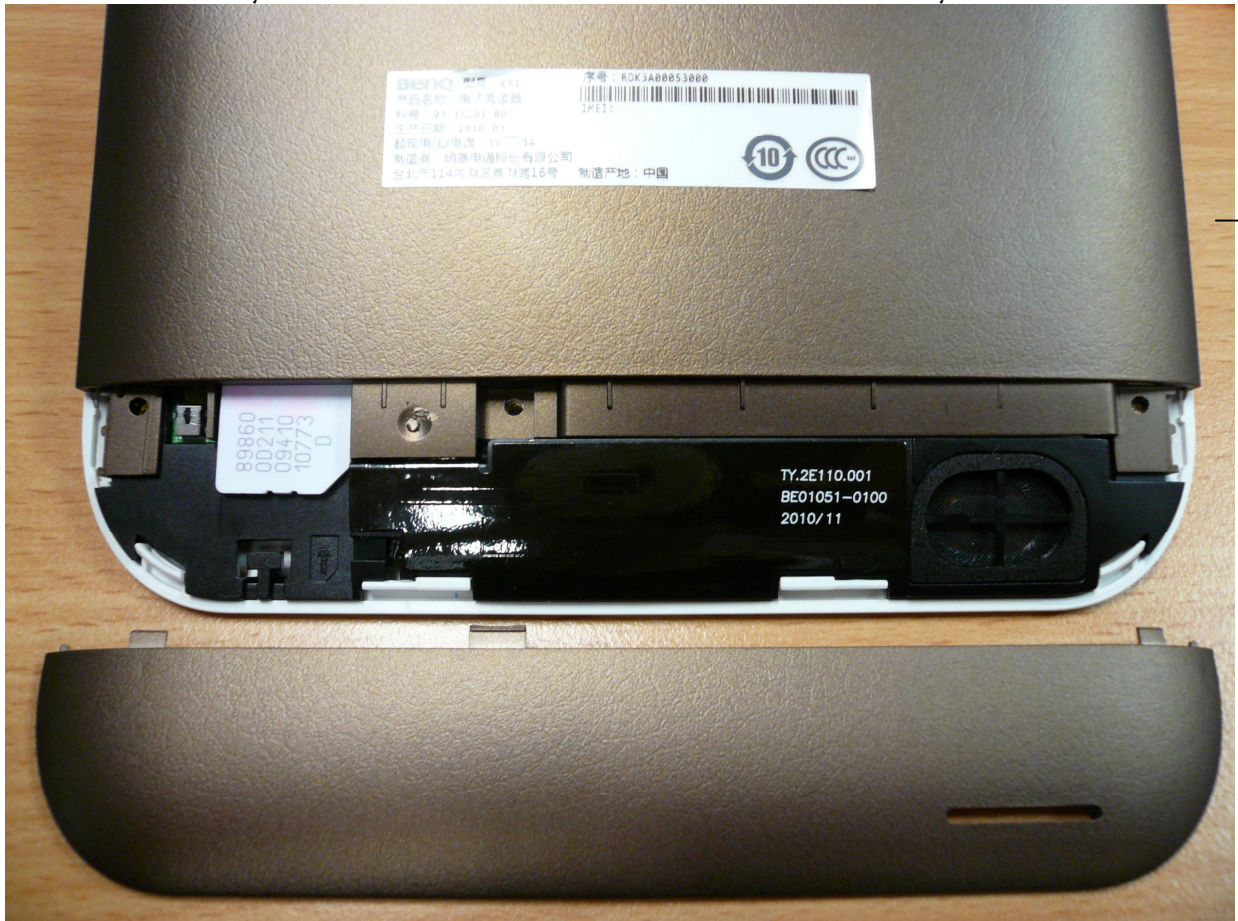
## 6.7.2 Function block or circuit



## 6.7.3 Debugging process

### 6.7.3.1 Possible failure symptoms

Before you want to net web book store by 3G, confirm the correct SIM card and back cover assembly well. 3G won't enable if back cover don't be assembly well.



1. Can't net to web book store by 3G from OS
2. Wireless connection quality is not stable

### 6.7.3.2 debugging steps

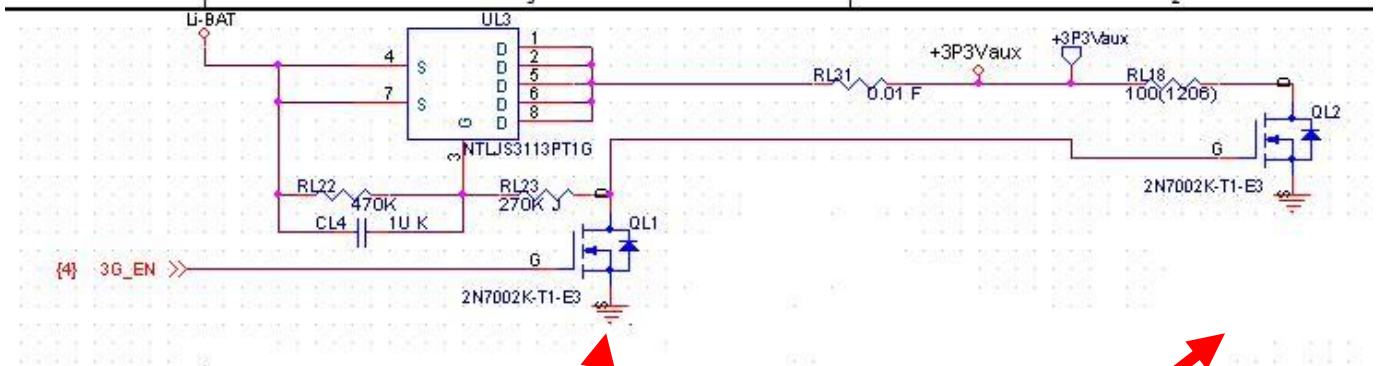
#### Failure symptom

#### A. Can't net to web book store by 3G from OS

##### a. Power trace:

Leadcore LC5730:

1. Check RL31 mounted and impedance less than 0.04 ohm.
2. Check below part mounted, soldering well and NET "3G\_EN" is high level



3G RF cable to PIFA antenna

H10 module

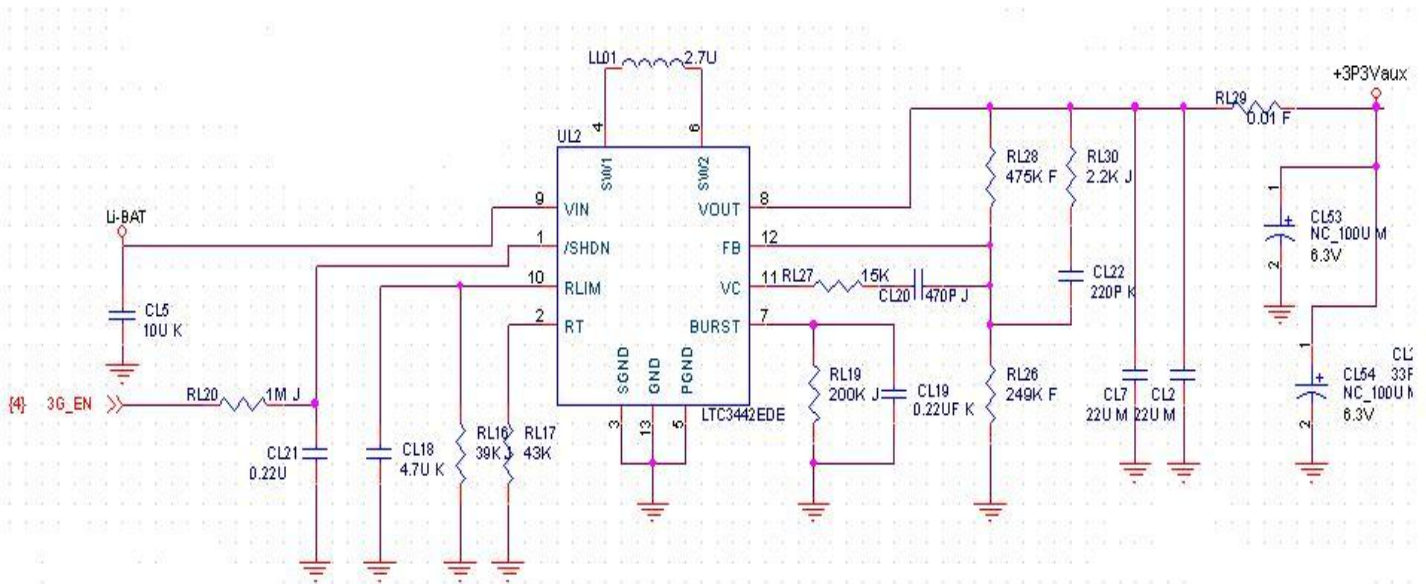
Connector

3. Confirm +3P3Vaux power level is the same with Li-BAT (3.4~4.2V)

ZTE MF200:

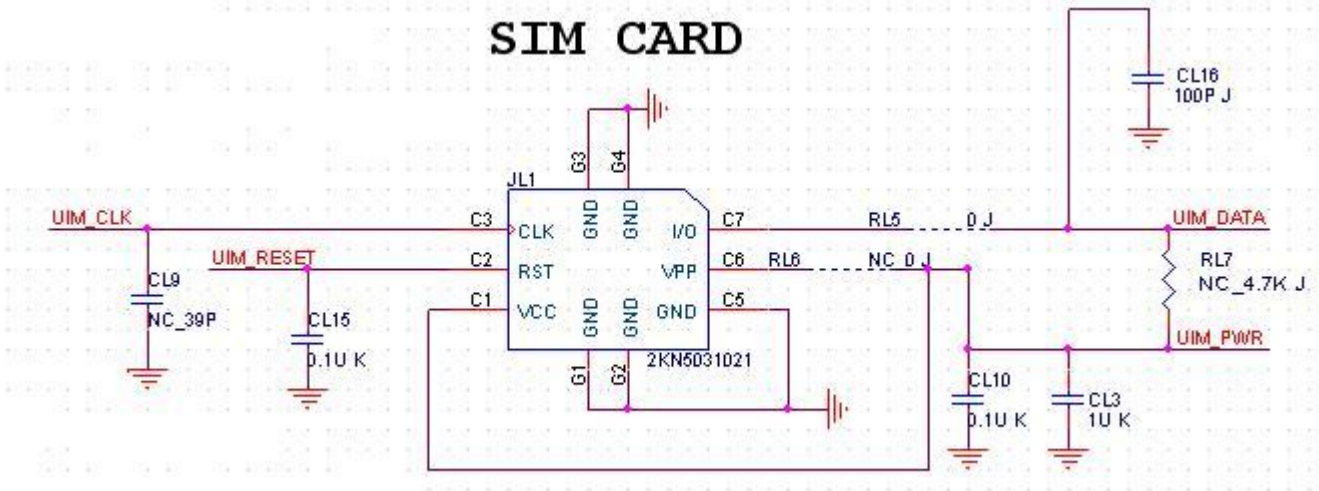
1. Check RL29 mounted and impedance less than 0.04 ohm.
2. Check below part mounted (inside shielding case), soldering well and NET "3G\_EN" is high level.



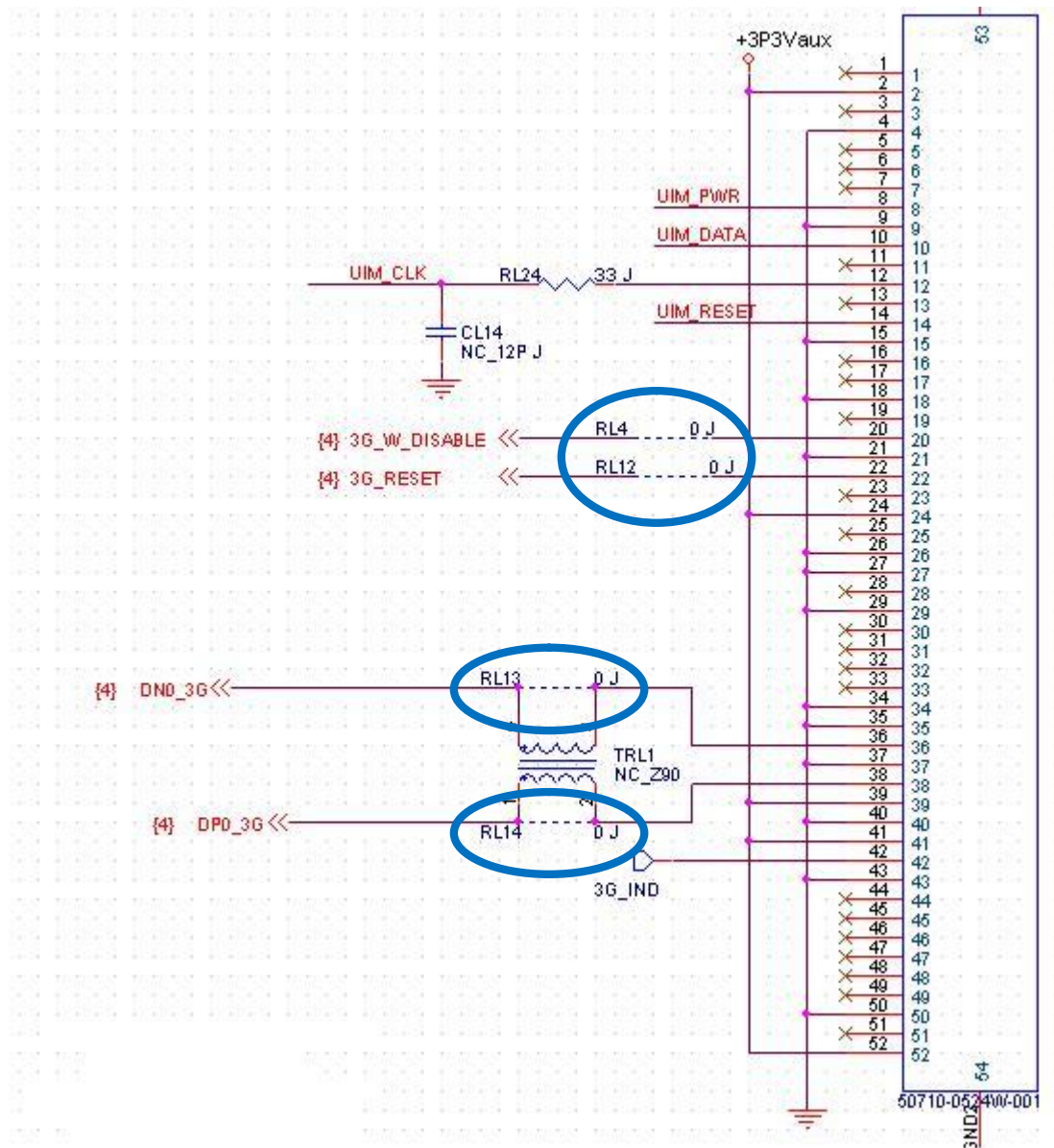


3. Confirm +3P3Vaux power is about 3.45V
- b. Check SIM card connector and relative part mounted and soldering well.

## SIM CARD



- c. Check PCI Express Mini Card connector soldering and interface component.



- d. If you find system reset at enable 3G module or 3G fail at re-enable it quickly, you need check soft-start key part CL4 or CL21, and discharge parts RL18 and QL2.

B. Wireless connection quality is not stable

1. Check RF cable and connector well join.
2. Check conductive test.
3. Check antenna version (mark on antenna)
4. Swap 3G module and single antenna to confirm failure in which one.
5. Change a new one for failure part.

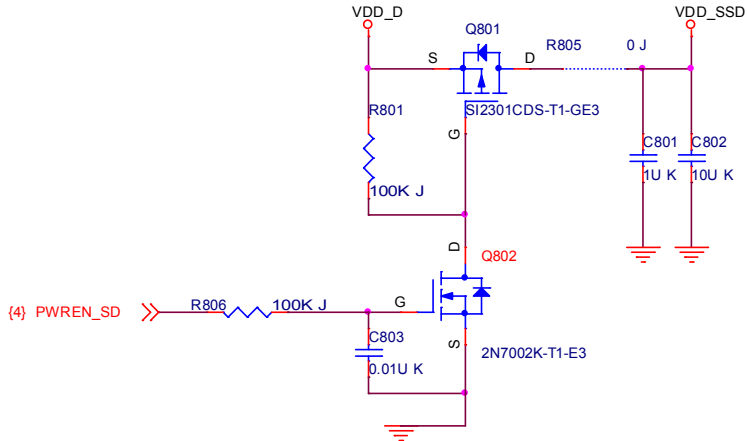


## 6.8 OthersSD-card Function introduction

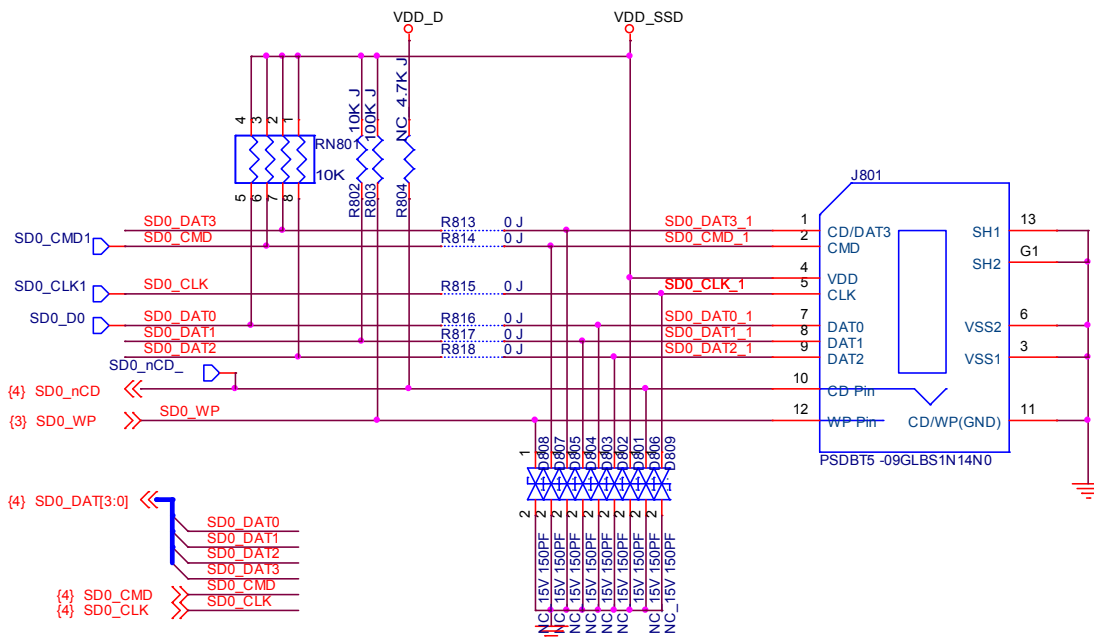
### 6.8.1.1 Description:

S3C2416 read/writes SD card by SDIO interface. The components includes Q801/Q802(power switch), J801(SD-card connector), and S3C2416 SDIO interface.

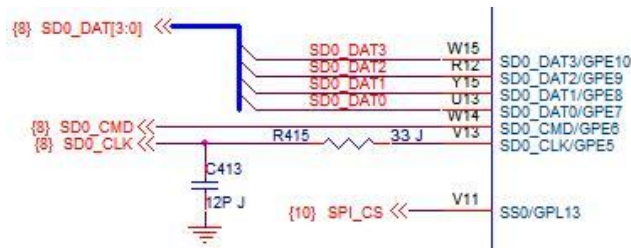
### 6.8.1.2 Function block or circuit (also can put the PCB layout picture)



(1) SD card power switch



(2) S3C2416 SDIO interface



(3) S3C2416 SDIO interface

### 6.8.1.3 Basic Circuit operation introduction

1. When SD-card inserted, SD0\_WP 3.3V -> 0V, and generate a interruption to Host
2. Host pull high PWREN\_SD, and turn on VDD\_SSD
3. Host start to send SD0\_CLK and SD0\_CMD to SD-card
4. SD-card and Host deliver data by SD0\_DAT0 ~ SD0\_DAT3

### 6.8.1.4 Debugging process possible failure symptoms

As Host can't configure SD-card or Host can't read/write SD-card data

#### 6.8.1.4.2 debugging steps

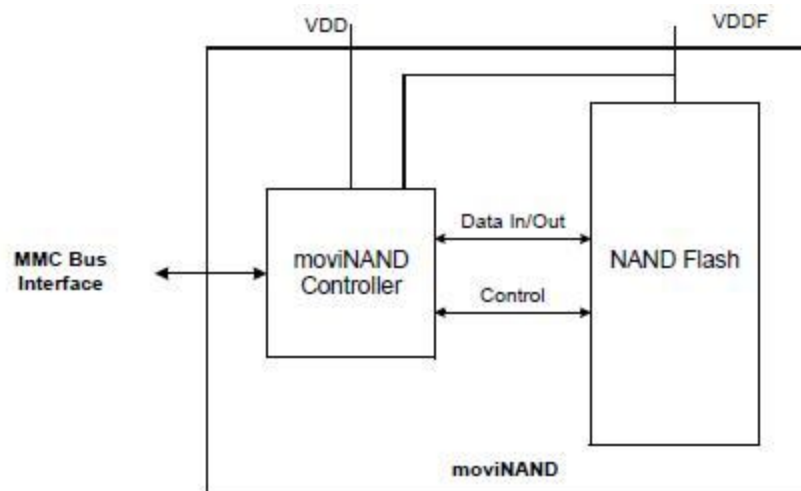
1. U301 and J801 SMT well? If not, need to repair it.
2. When SD-card inserted, does SD0\_WP pull low? If not, check WP pin components.
3. Check PWREN\_SD is high ; VDD\_SSD is 3.3V? If not, check SD power components.
4. Check SD0\_CLK is normal(24MHz)? If not, check SD0\_CLK components.
5. Check SD0\_CMD is normal? If not, check SD0\_CMD components.
6. Check SD0\_DAT0~3 are normal? If not, check SD0\_DAT0~3 components

## 6.8.2 moviNAND Function introduction

### 6.8.2.1 Description:

Homer use SAMSUNG moviNAND which is a embedded MMC solution. moviNAND operation is identical to a MMC card and therefore is a simple read and write to memory using MMC protocol v4.3 which is a industry standard. moviNAND consists of NAND flash and a MMC controller.

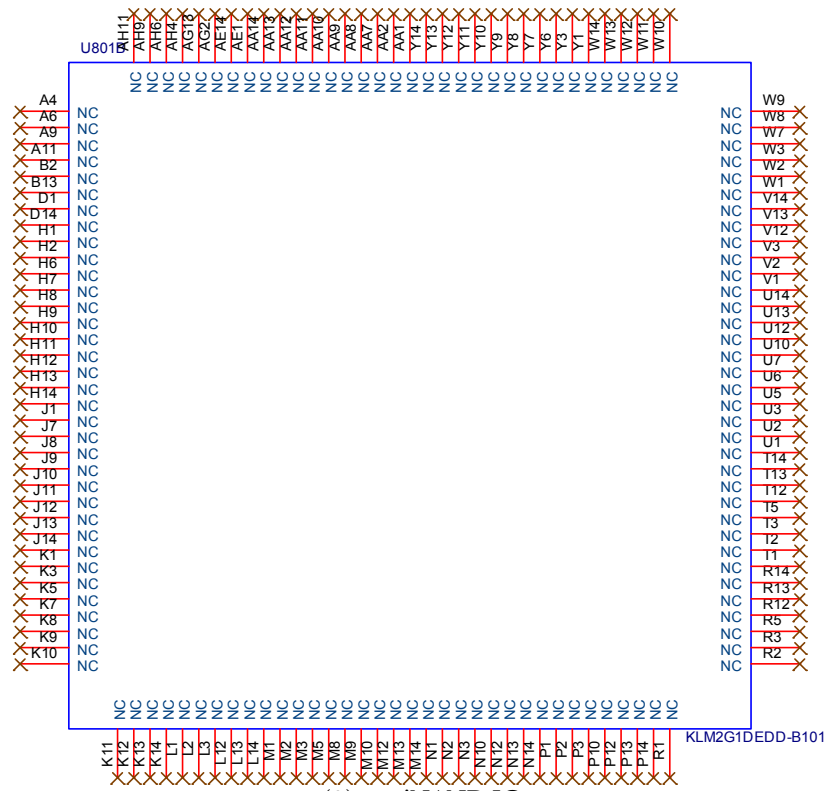
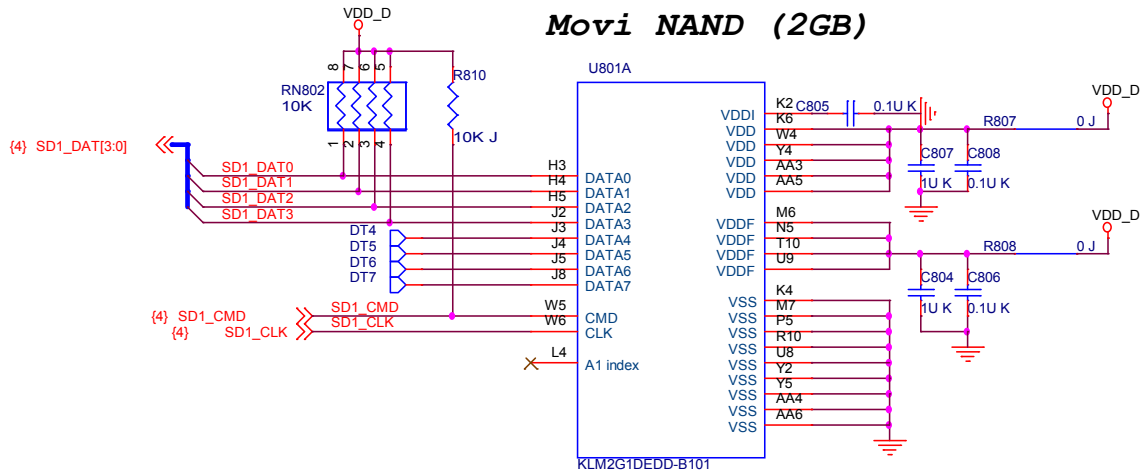
### 6.8.2.2 Function block or circuit ( also can put the PCB layout picture)



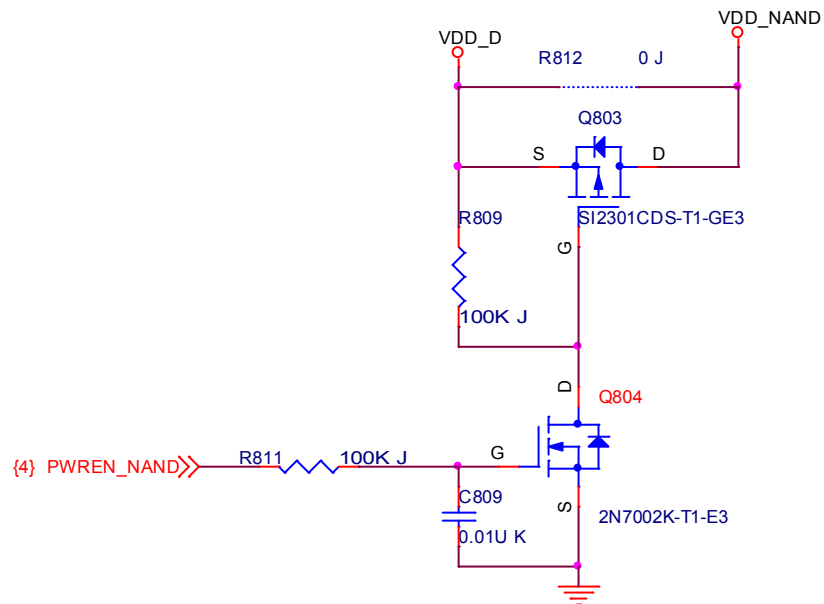
(1) moviNAND block diagram



## Movi NAND (2GB)



(2)moviNAND IC



(3) moviNAND power switch

### 2.9.1.3 Basic Circuit operation introduction

1. Host pull up PWREN\_NAND to turn on VDD\_NAND
2. Host start to send clock(SD1\_CLK) and command(SD1\_CMD) to moviNAND
3. Host and moviNAND deliver data by SD1\_DAT0 ~ SD1\_DAT3

### 6.8.2.3 Debugging process

#### 6.8.2.3.1 possible failure symptoms

As Host can't read/write moviNAND

#### 6.8.2.3.2 debugging steps

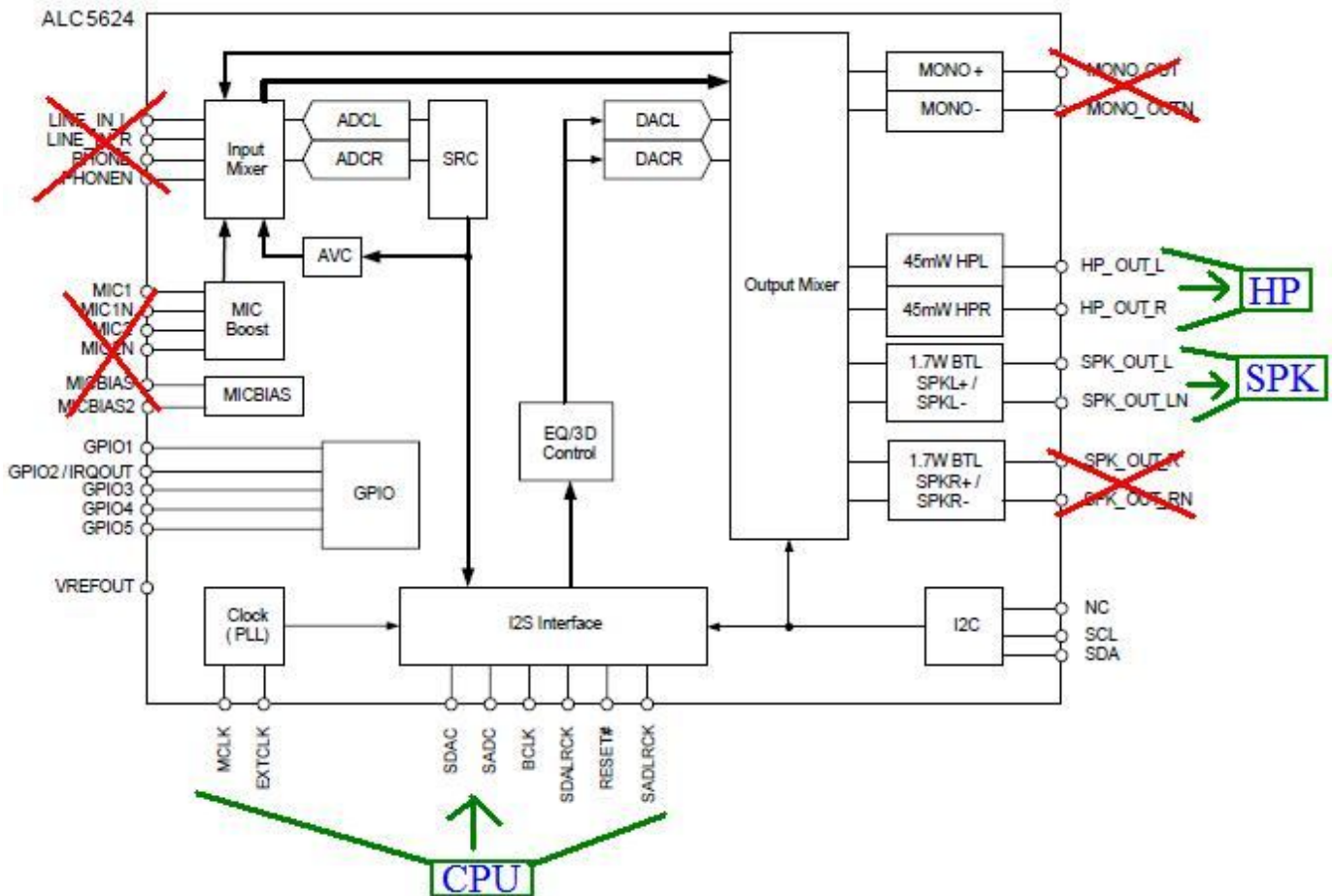
1. U801 SMT well? If not, need to repair it.
2. Check PWREN\_NAND is high; VDD\_NAND is 3.3V?  
If not, check NAND power components.
3. Check SD1\_CLK is normal(24MHz)? If not, check SD1\_CLK components.
4. Check SD1\_CMD and SD1\_DAT0~3 is normal?  
If not, check SD1\_CMD and SD1\_DAT0~3 components.

### 6.8.3 Audio Function Block

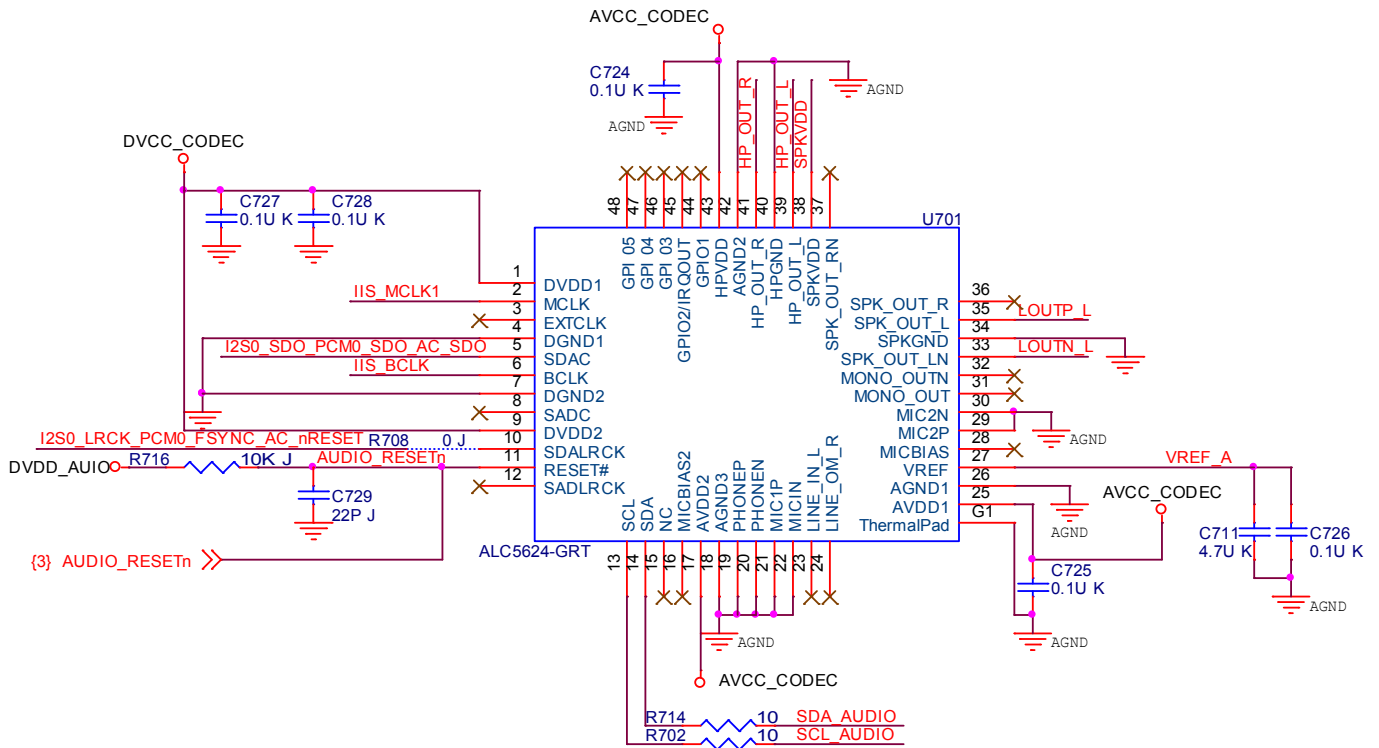
#### 6.8.3.1 Description: (Function purpose and the major components list)

Homer has an audio codec ALC5624 on main PCBA. It is a highly-integrated I2S/PCM interface audio codec. Differential input/output connections efficiently reduce noise interference, providing better sound quality. Class-AB or Class-D amplifiers are easily swapped via simple register configuration.

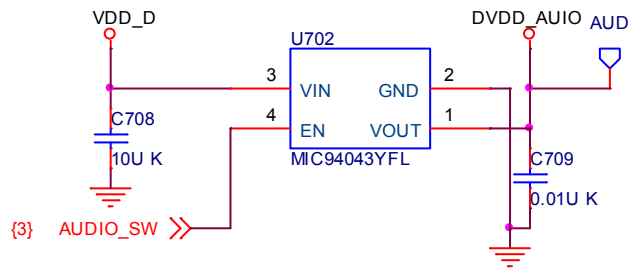
#### 6.8.3.2 Function block or circuit ( also can put the PCB layout picture)



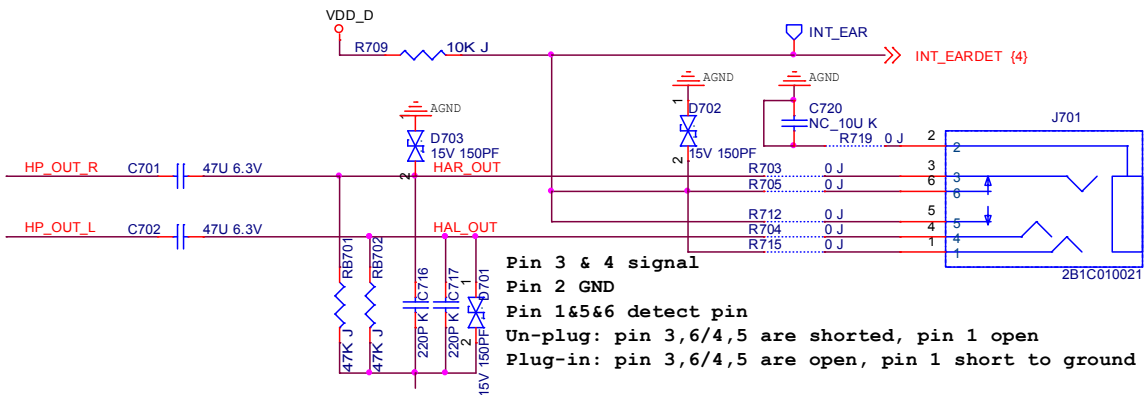
(1) Audio function block



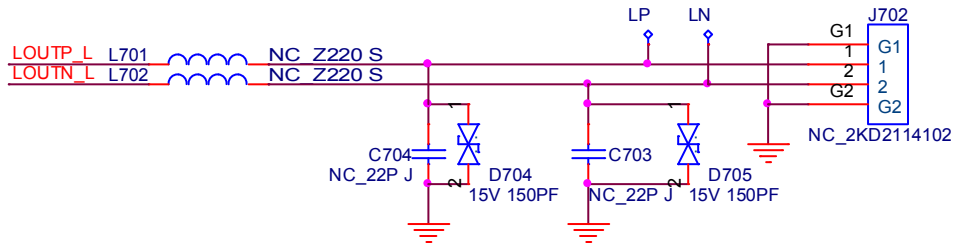
(2) Audio Codec



(3) Power Source



(4) Audio Jack



(5) Loudspeaker and on board microphone

### 6.8.3.3 Basic Circuit operation introduction

- (1,2) Audio Codec: Use ALC5624 to process audio signals, input come from S3C2416(CPU), output connect to HP and speaker.
- (3) Codec power control by GPIO (AUDIO\_SW)
- (4) Audio Jack: Stereo headsets
- (5) Loudspeaker: Mono / differential

### 6.8.3.4 Debug Process

#### 6.8.3.4.1 possible failure symptoms

- (1) Speaker NG
- (2) HP NG

#### 6.8.3.4.2 debugging steps

Probable Cause	Verification and Remedy
(a) Speaker is not good	<ol style="list-style-type: none"> <li>1. Check Speaker is good or not.</li> <li>2. If Speaker is not good, replace Speaker.</li> <li>3. If Speaker is good, proceed to (b).</li> </ol>
(b) Speaker contact NG with pad on PCB	<ol style="list-style-type: none"> <li>1. Disassembly to visually inspect the pad on PCB. If the pins of J702 are poor-contact cause speaker no sound. Please solder the pad.</li> <li>2. If they are good, proceed to (c)</li> </ol>
(c) Components shift	<ol style="list-style-type: none"> <li>1. Visually inspect the L701, L702, D704, D705, C734~C737. If any component isn't contacted well, replace the components.</li> <li>2. If they are good, proceed to (d).</li> </ol>
(d) ALC269 chip fault	<ol style="list-style-type: none"> <li>1. Measure the waveforms of the L701 and L702. If no audio signal is exist when speaker function is executed, it means the ALC5624 chip is at fault.</li> <li>2. Check the voltage, reset pin, and clock of ALC5624. If all of them is well, replace ALC5624 chip.</li> </ol>

(1) Speaker NG debugging steps

Probable Cause	Verification and Remedy
(a)HP is not good	<ol style="list-style-type: none"> <li>1. Check HP is good or not.</li> <li>2. If HP is not good, replace HP.</li> <li>3. If HP is good, proceed to (b).</li> </ol>
(b) HP contact NG with pad on PCB	<ol style="list-style-type: none"> <li>1. If the pads of J801 are poor-contact, it will cause the HP no sound. Please solder the pads.</li> <li>2. If they are good, check INT_EARDET(R709, R719)</li> <li>3. If INT_EARDET are good, proceed to (c).</li> </ol>
(c)HP amplifier chip fault	<ol style="list-style-type: none"> <li>1. Visually inspect U703, If isn't contacted well, replace it.</li> <li>2. Measure the waveforms of the HP_SD, C706, C707, L703, L709. If HP_SD is High and C706, C707 waveform are normal, but L703, L709 no signal. Do step 3.</li> <li>3. Check the component of RB701, RB702, C716, C717, D701~D703, If any component isn't contacted well, replace the components.</li> <li>4. If they are good, proceed to (d).</li> </ol>
(d) ALC5624 chip fault	<ol style="list-style-type: none"> <li>1. Measure the waveforms of the C706 and C707. If no audio signal is exist when speaker function is executed, it means the ALC5624 chip is at fault.</li> <li>2. Check the voltage, reset pin, and clock of ALC5624. If all of them is well, replace ALC5624 chip.</li> </ol>

(2) HP NG debugging steps

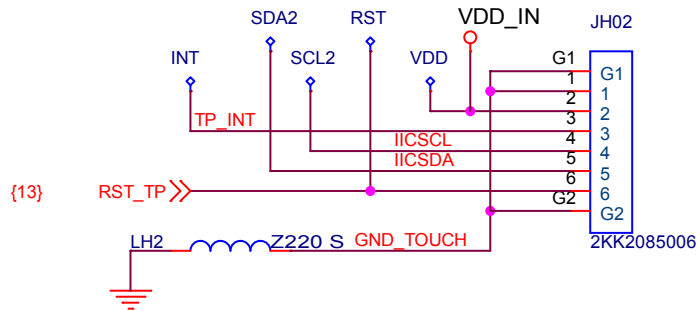
## 6.8.4 Touch Function Block

### 6.8.4.1 Description:

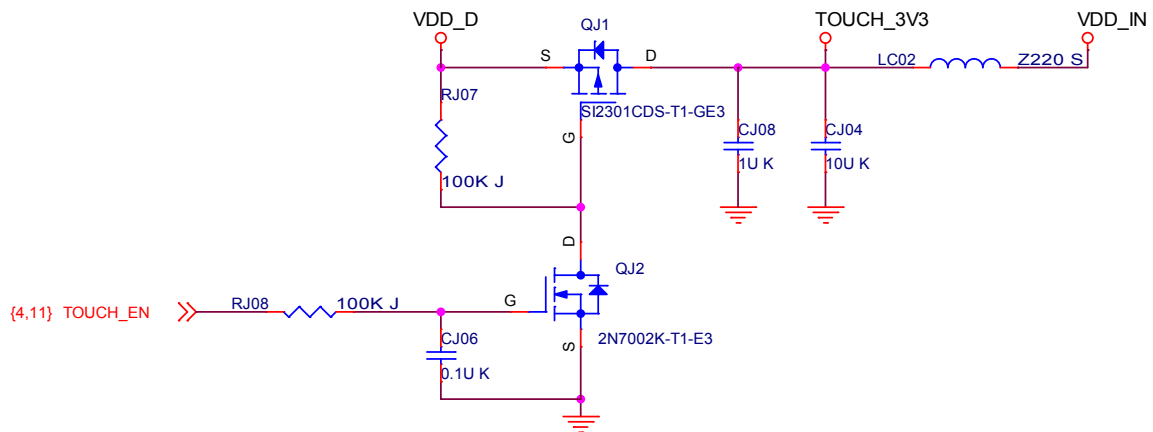
Touch function implement by I2C interface

### 6.8.4.2 Function block or circuit

#### For Touch system



(1) Touch connector



(2) Touch power

### 6.8.4.3 Basic Circuit operation introduction

Touch power always turn on except sleep mode

### 6.8.4.4 Debug Process

#### 6.8.4.4.1 possible failure symptoms

Touch no response or action abnormally

#### 6.8.4.4.2 Debugging steps

1.Touch is no response

Probable Cause	Verification and Remedy
----------------	-------------------------

(a) Touch contact NG with pad on PCB	<ol style="list-style-type: none"> <li>1. If the pads of JH02 are poor-contact, it will cause the touch no response. Please solder the pads</li> <li>2. If JH01 contact well, proceed to (b)</li> </ol>
(b) Power Components shift	<ol style="list-style-type: none"> <li>1. TOUCH_EN is High and VDD_IN is 3.3V. If not, check the components on TOUCH_EN and VDD_IN(QJ1, QJ2, LC02). If any component isn't contacted well, replace the components.</li> <li>2. If they are good, proceed to (c).</li> </ol>
(c) Components shift	<ol style="list-style-type: none"> <li>1. Visually inspect the QH01, QH2, RH1, RH2. If any component isn't contacted well, replace the components.</li> <li>2. If they are good, proceed to (d).</li> </ol>
(d) Touch IC fault	<ol style="list-style-type: none"> <li>1. Measure the waveforms of TP_INT, QH01, QH2. If signal is abnormal, then re-calibration the panel by JTAG.</li> <li>2. Measure the waveforms of TP_INT, QH01, QH2. If no signal exists when panel is pressed, it means the Touch chip is at fault.</li> </ol>

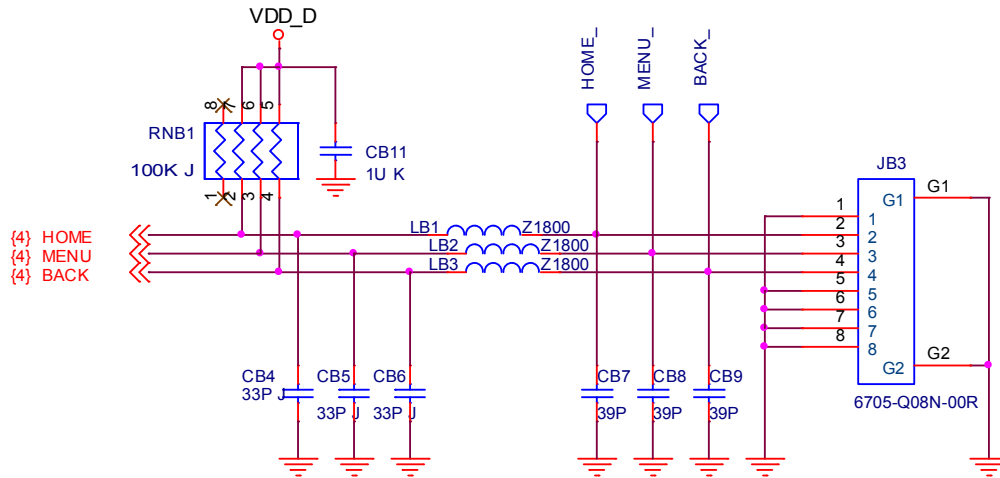
## 6.8.5 Key Function Block

### 6.8.5.1 Description:

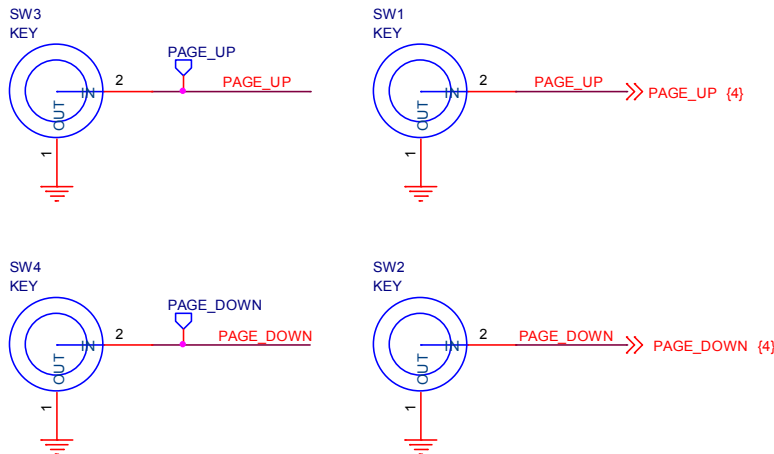
Key function include menu/ home/ back/ page up/ page down that implement GPIO.



### 6.8.5.2 Function block or circuit



(1)HOME/ MENU/ BACK Key



(2)PAGE\_UP/ PAGE\_DOWN Key

### 6.8.5.3 Basic Circuit operation introduction

Interruption occur as key button be pressed, GPIO will be pull from high to low.

### 6.8.5.4 Debug Process

#### 6.8.5.4.1 possible failure symptoms

Key function no action as pressed

#### 6.8.5.4.2 Debugging steps

Probable Cause	Verification and Remedy
(a) Key contact NG with pad on PCB	<ol style="list-style-type: none"> <li>If the pads of JB3 are poor-contact, it will cause the key no response. Please solder the pads</li> <li>If SW1~4 are poor-contact, it will cause the page key no response. Please repair the pads</li> <li>If JB3, SW1~4 contact well, proceed to (b)</li> </ol>

(b) Components shift	1. Visually inspect the LB1~3, CB4~9. If any component isn't contacted well, replace the components.
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