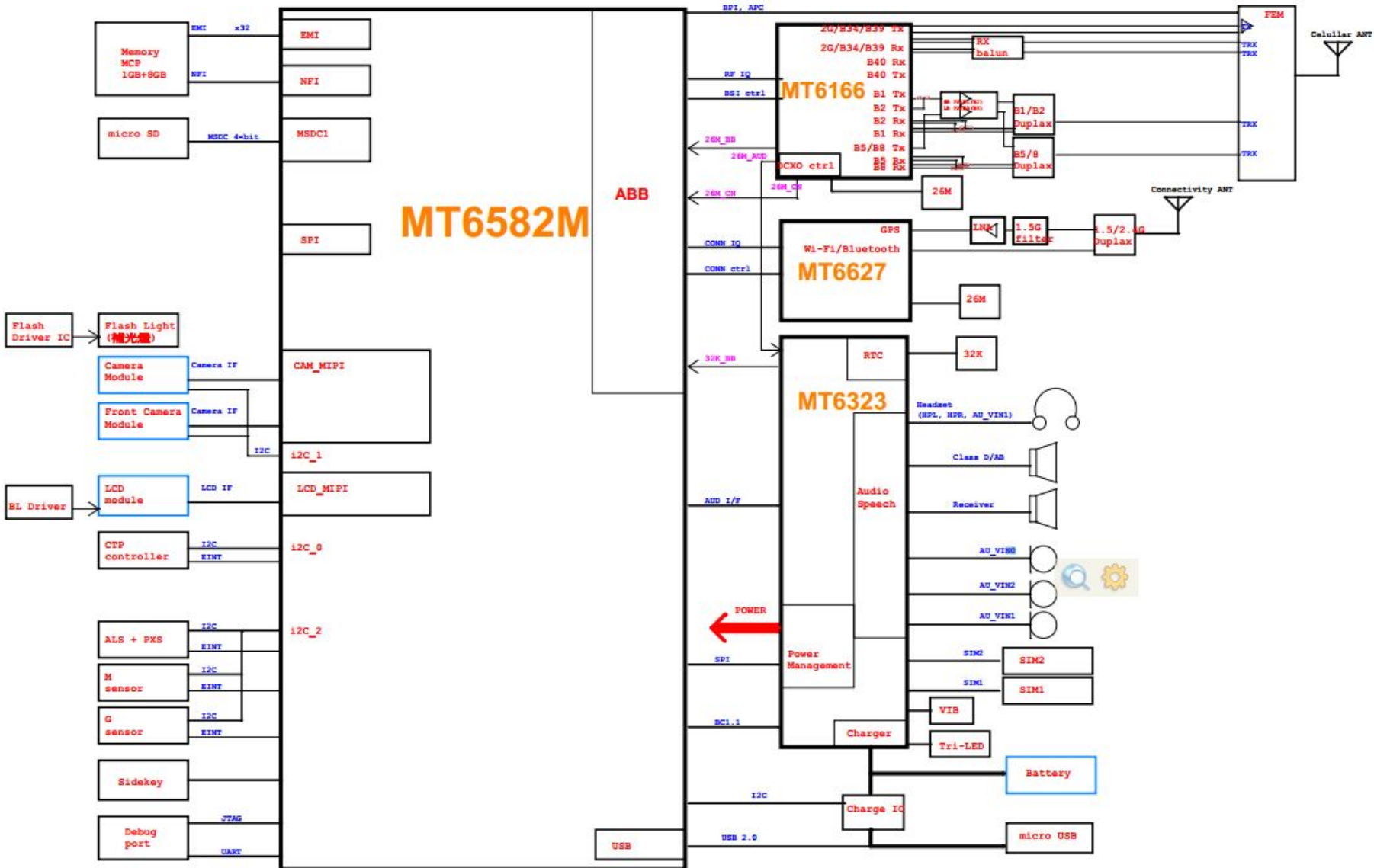


Lenovo S660 Service Manual

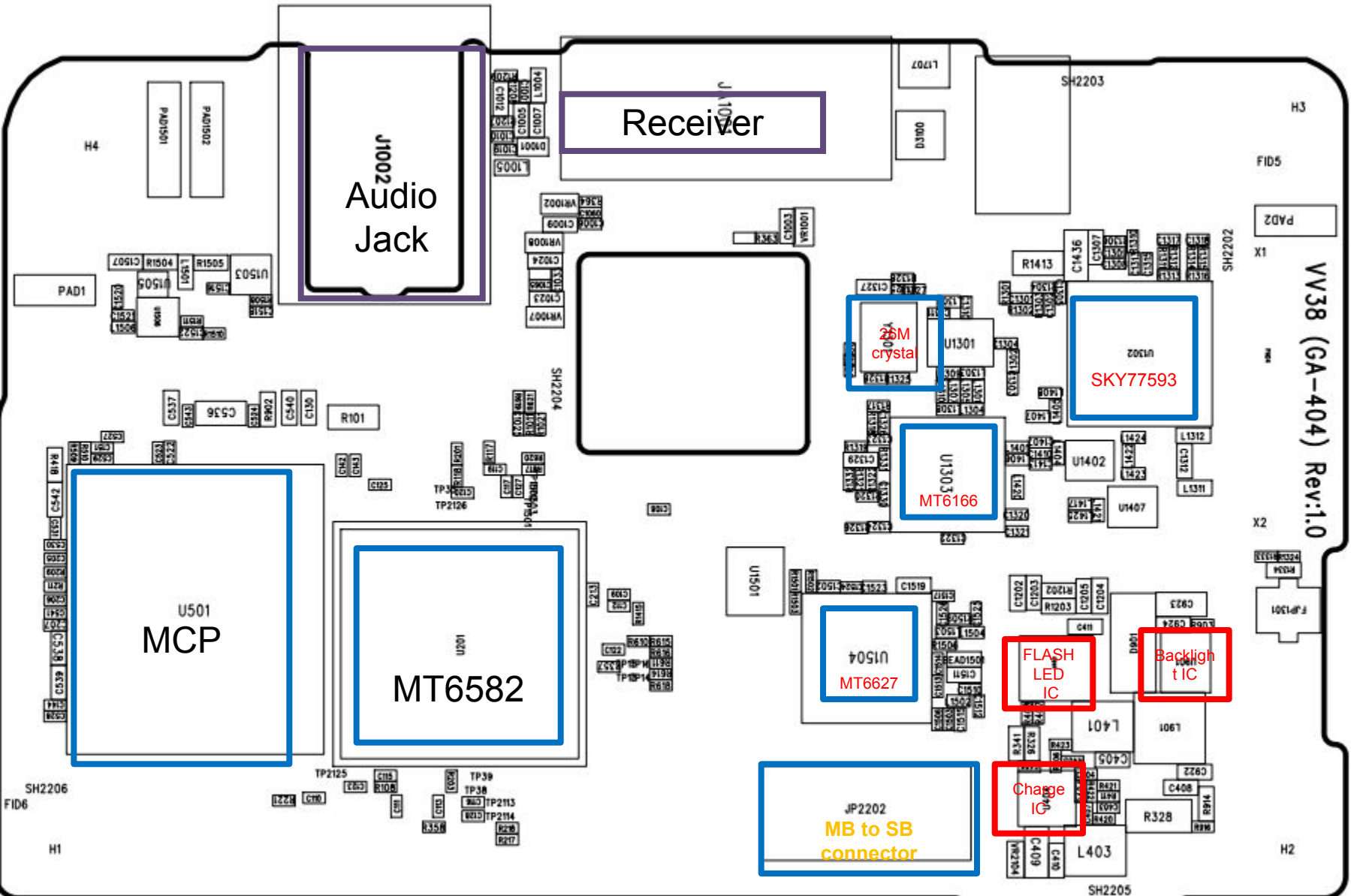
Publisher: NJD HW Team

Date: 2014.02.28

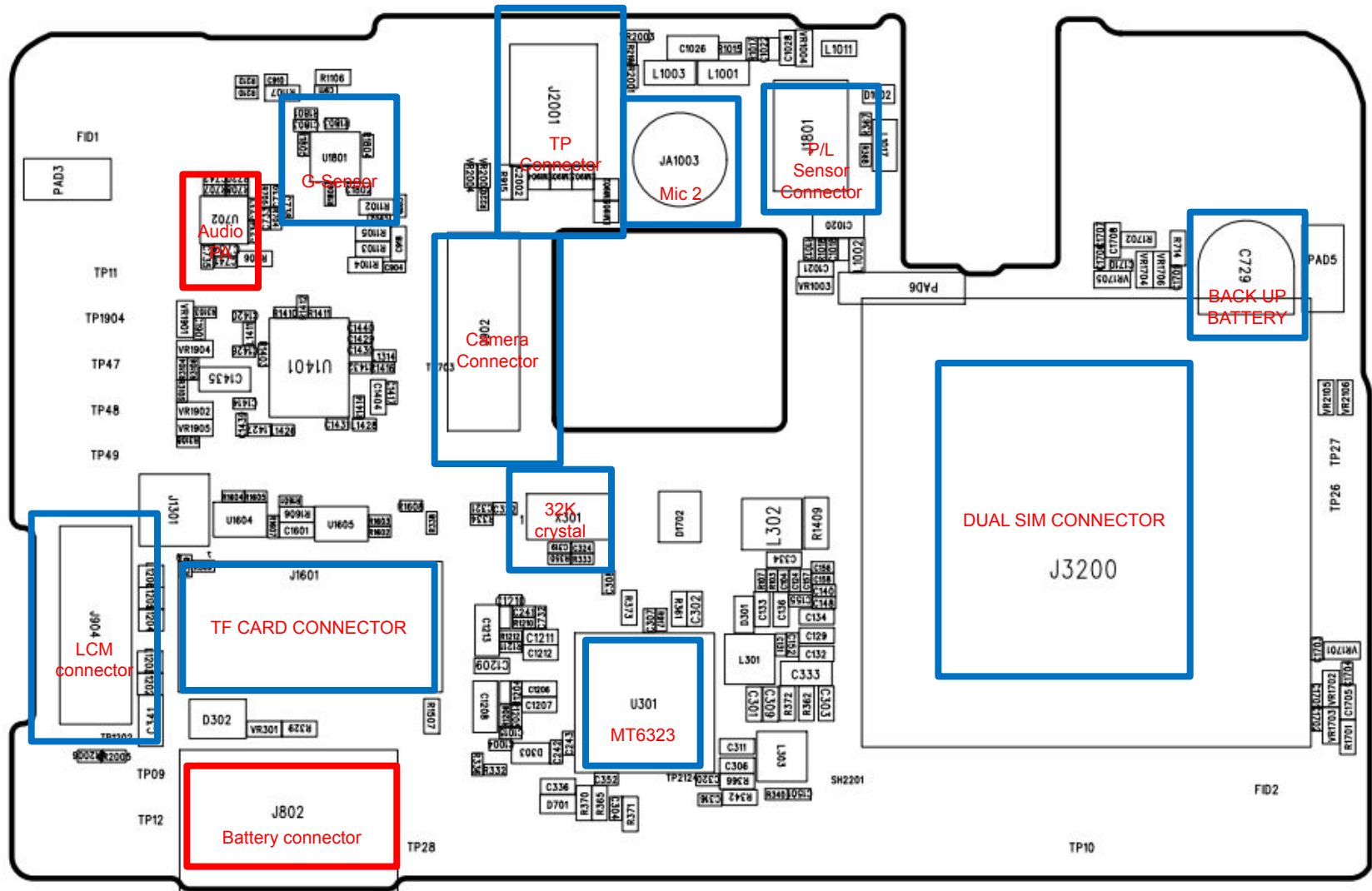
Function Block



M/B Top Placement #1



M/B Bottom Placement #2

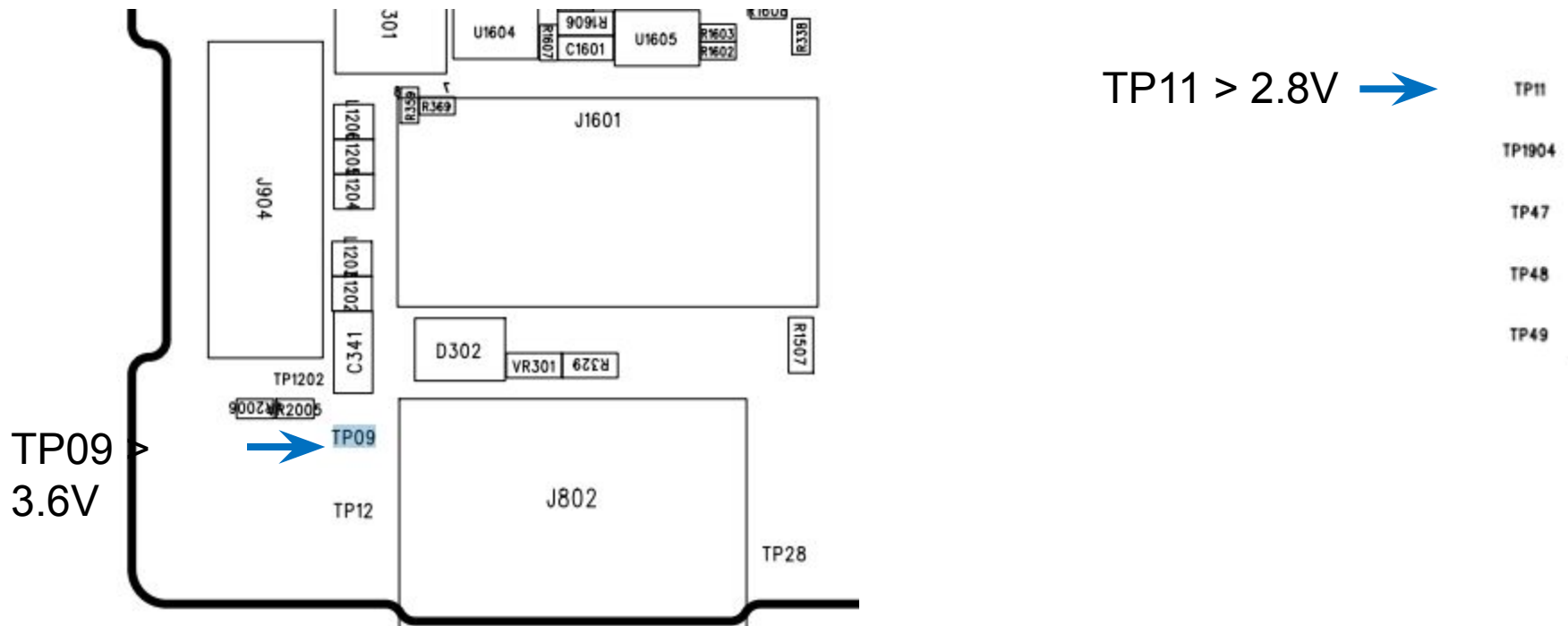


BB Common Question

- **BB-1 Power on failure (無法開機)**
- **BB-2 Firmware update failure (無法更新軟件)**
- **BB-3 Charging failure (無法充電)**
- **BB-4 SIM Card identified error (SIM卡無法識別)**
- **BB-5 LCD display error (畫面無法顯示或顯示異常)**
- **BB-6 Sensor function failure (感測器不良)**
- **BB-7 Touch Panel function failure (無法觸屏)**
- **BB-8 Vibrator function failure (馬達無振動)**
- **BB-9 Camera shooting failure (無法攝像)**
- **BB-10 MIC function failure (麥克風無作用)**
- **BB-11 Speaker function failure (喇叭無聲)**
- **BB-12 Audio function failure (Audio 不良)**
- **BB-13 SD Card function failure (SD Card無作用)**

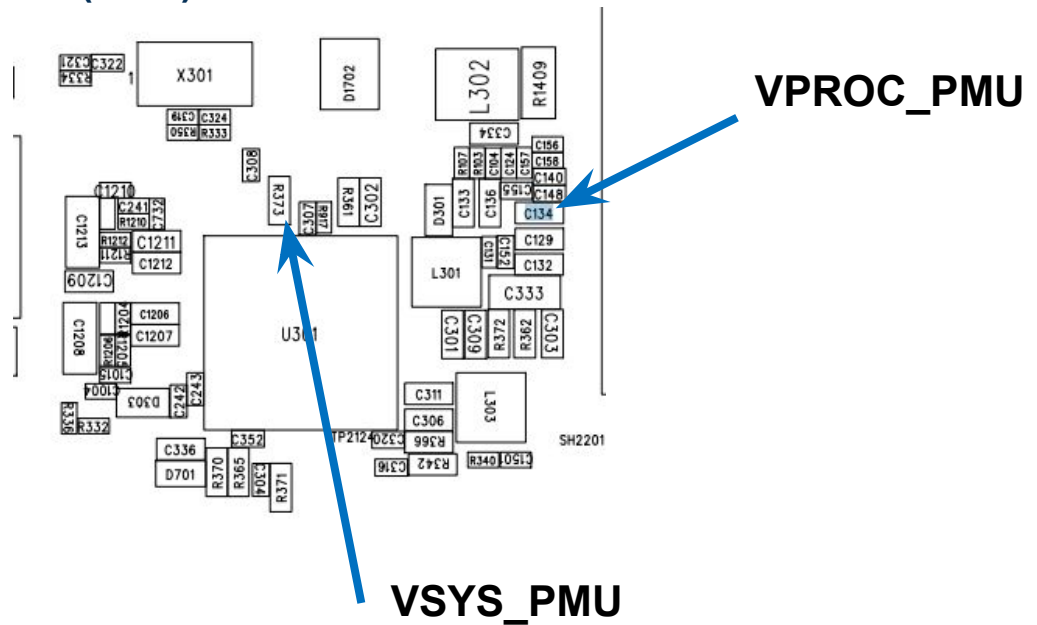
BB-1 Can not power on (無法開機) (1/3)

- 1. Check if battery power level is low (確認電池是否有電?)
 - VBATT (TP09 > 3.6V)
- 2. Check if J802 soldering condition is good (確認J802吃錫狀況是否正常?)
- 3. Check if power button is functional (確認開機鍵是否正常?)
 - PWRKEY(TP11 > 2.8V)
 - TP11 connect with ground wire to power on (跟地短路後可將系統開機)



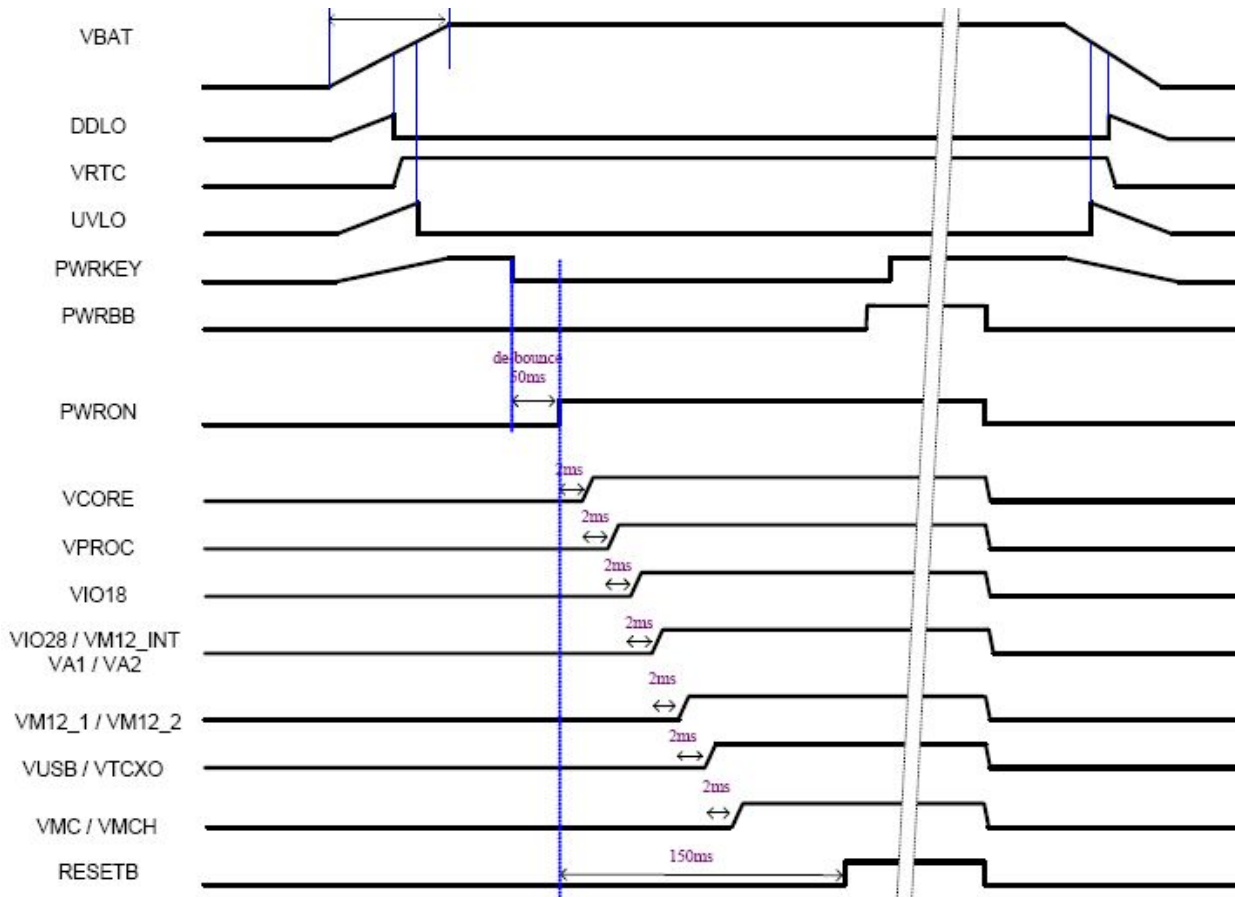
BB-1 Can not power on (無法開機) (2/3)

- 5. Please check whether MT6323 voltage is normal (請確認MT6323周圍電壓是否正常?)
 - VPROC_PMU should be between C134 (0.9V~1.1V)
 - VSYS_PMU should at R373 (1.8V)



BB-1 Can not power on (無法開機) (3/3)

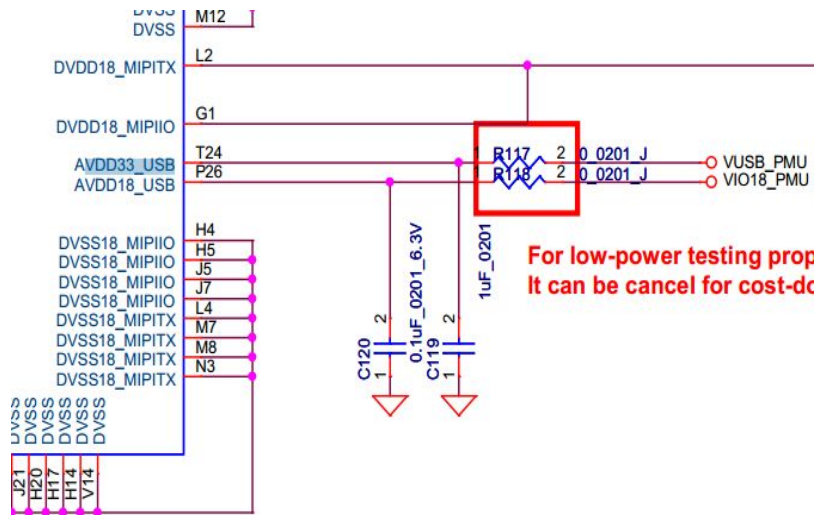
MT6323 Power On/Off sequence



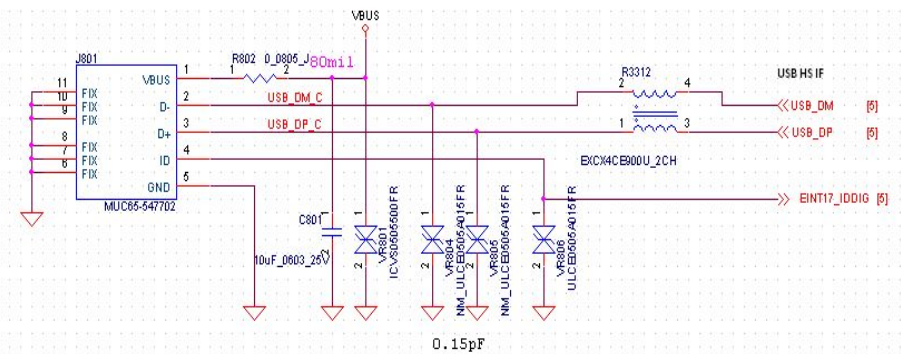
VCORE≈0.7V~1.3V
VPROC≈0.7V~1.3V
VIO18=1.8V
VIO28=2.8V
VM12_INT=1.2V
VA1=2.5V
VA2=2.5V
VUSB=3.3V
VTCXO=2.8V
VMC=3.3V
VMCH=3.3V
RESET=1.8V

BB-2 Can not download (無法更新軟件) (1/3)

- 1. Please check whether current is normal after boot (確認開機後電流起跳正常)
- (記憶體中無代碼時, 電池電流約在0.1A左右)
- 2. If current in booting process is larger or less than normal, USB port will be unidentified (開機過程中如果電流過大或過小, 會造成USB port無法識別)
- 3. Please check if R3312 is solid soldering on (檢查SB的R3312是否空焊)

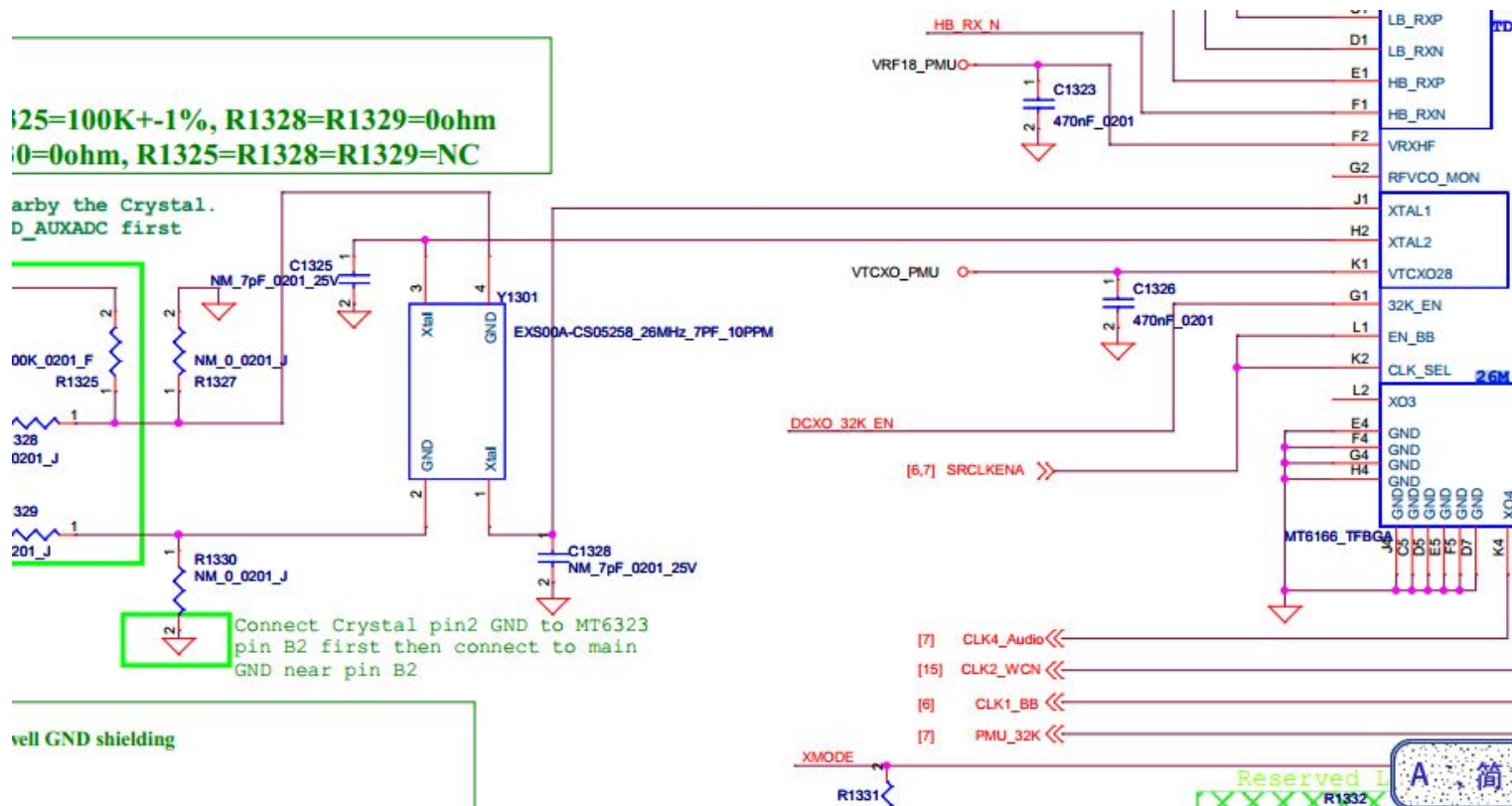


USB Conn.



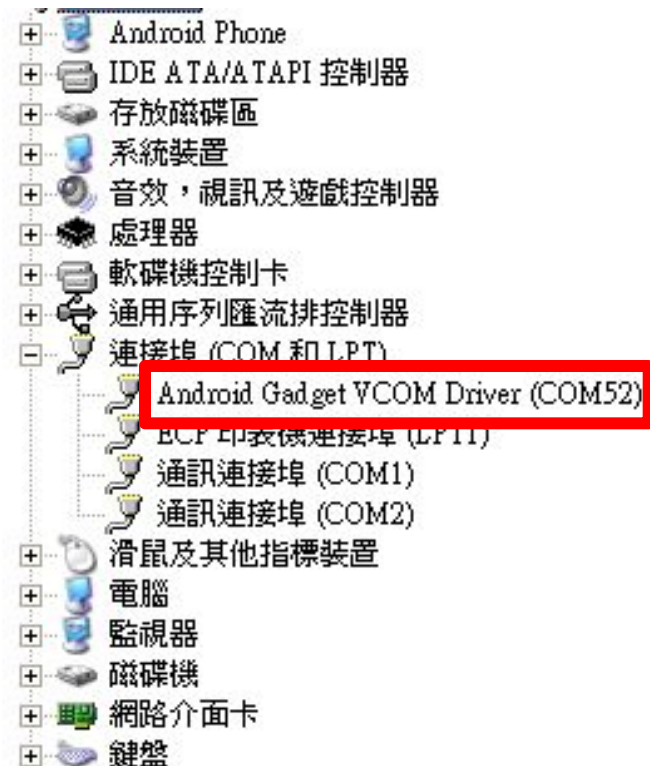
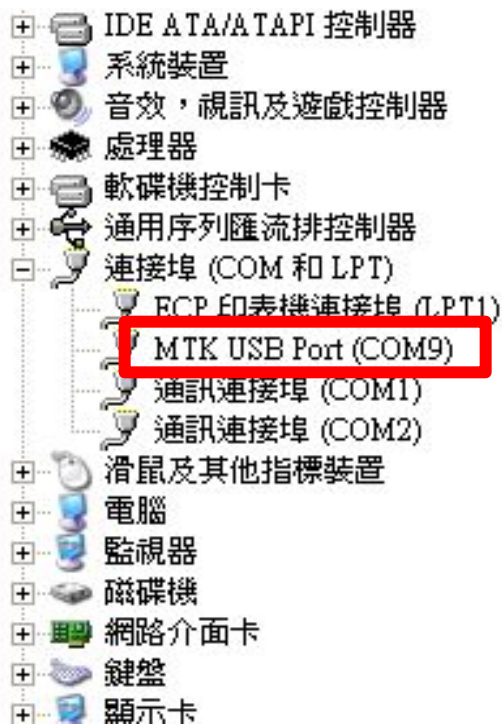
BB-2 Can not download (無法更新軟件) (2/3)

- 4. If DL is passed, and META mode is un-entered, check RF transceiver 26MHz and RF chip function (若可以正常DL, 但無法進入META mode, 檢查RF transceiver 26MHz及RF chip是否正常。)



BB-2 Can not download (無法更新軟件) (3/3)

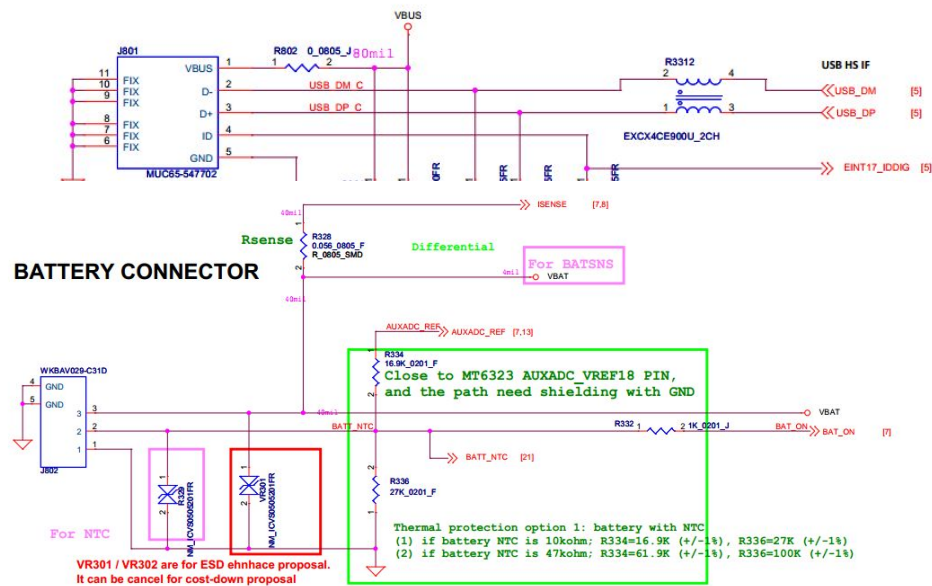
- 5. Check if com port is correct (確認com port是否正確)



BB-3 Can not charging (無法充電) (1/2)

- 1. Check if battery resistance R332 Pin1(BAT_ID) is 10kΩ when battery is installed (確認電池內阻R332 Pin1 (BAT_ID), 當接上電池後阻抗應該約10kΩ.)
- 2. Check battery voltage, if 0V reveals open circuit (確認電池電壓是否為正常, 異常為0V (開路))
- 3. Check if J801 USB connector failure (確認J801 USB connector 是否有異狀?)

USB Conn.

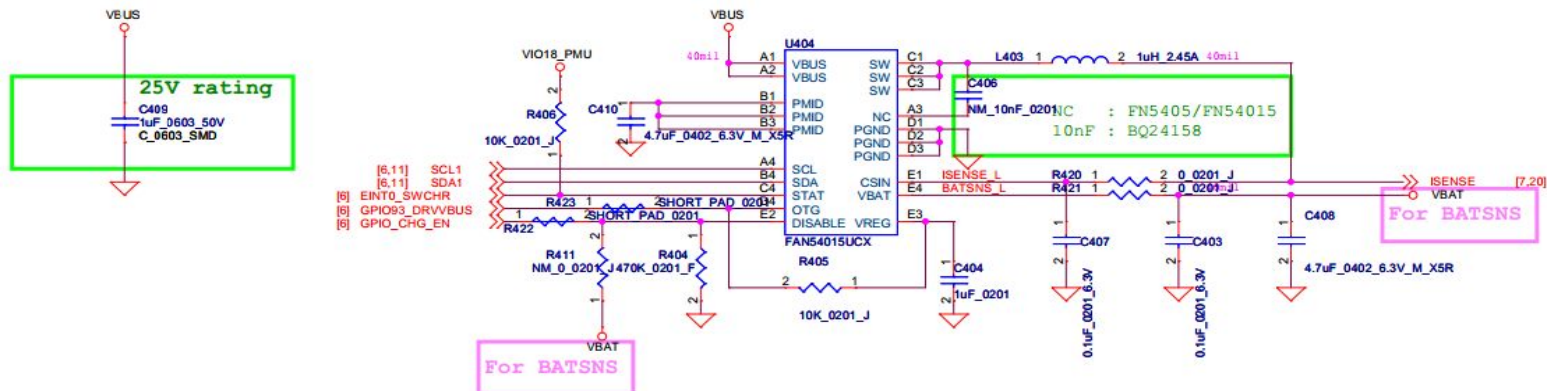


BB-3 Can not charging (無法充電) (2/2)

- 4. Check charging IC and related circuit soldering condition is good (確認充電IC及周圍電路焊接是否正確。)
 - When USB port has be inserted, VBUS should be at 5V output (VBUS在USB插入時， 是否有5V左右的電壓輸出。)

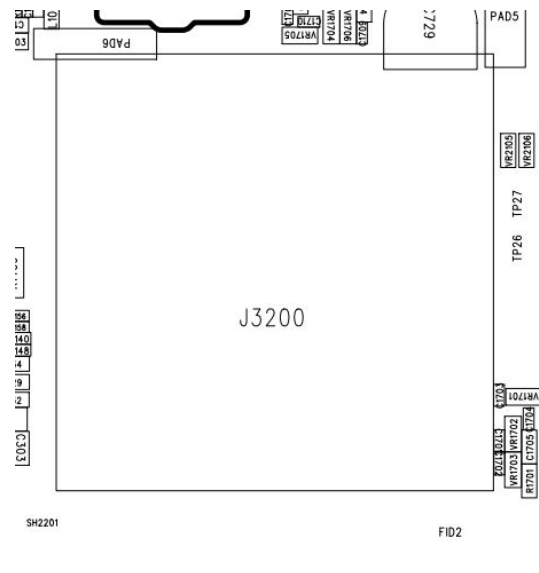
Switching Charger

Need to update charger IC P/N to FAN54015



BB-4 SIM Card Identification error (SIM卡無法識別) (1/2)

- 1. Check if SIM Card is in normal condition (更換SIM卡, 確認卡片是否正常?)
- 2. Check if J3200 soldering condition is normal (確認J3200吃錫狀況是否正常?)
- 3. Check SIM related signal SRST, VSIM, SIO and SCLK (確認SIM 相關訊號)
 - SRST, VSIM, SIO and SCLK



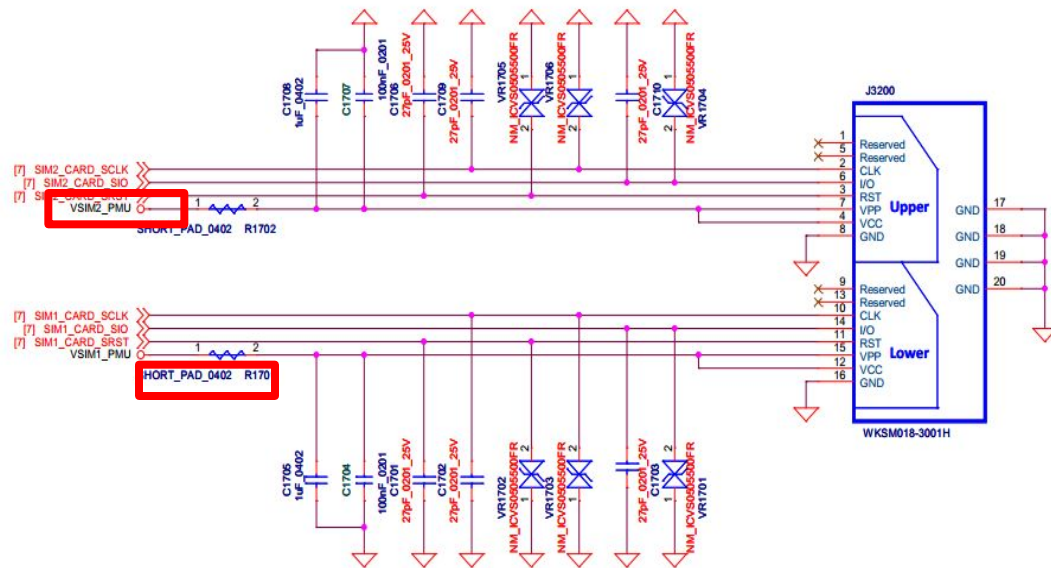
BB-4 SIM Card Identification error (SIM卡無法識別) (2/2)

SIM1/SIM2的供电电压各来自PMU的两组LDO output

SIM1/SIM2 output voltage are coming from two LDO output of PMU

SIM1和SIM2的DATA/RST/CLOCK单独分开使用

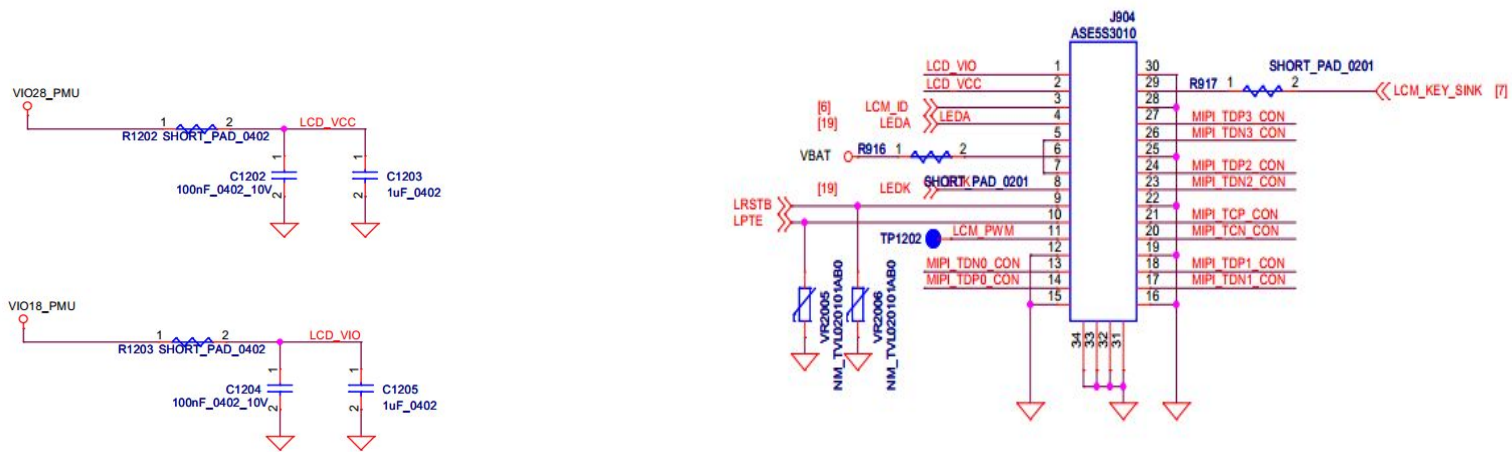
DATA/RST/CLOCK of SIM1 and SIM2 are used seperately



BB-5 Can not display (畫面無法顯示或顯示異常)

- 1. Check J904 soldering condition (確認J904是否有異狀[錫短 or 空焊]?)
- 2. Replace LCD (更換LCM)
- If failure still exists after LCM replacement (若更換良品後, 現象還存在)
- 3. Check L1202 L1203 L1204 condition (檢查L1202, L1203, L1204否有異狀?)
- 4. Check if LCM voltage (VIO28_PMU及VIO18_PMU) are correct (確認LCM 電壓 (VIO28_PMU及VIO18_PMU)位準是否正確?)
- 5. Check U901, L901, D901, R903 if back light is in failure (若無背光,確認U901, L901, D901, R903)

LCM兩組工作電壓



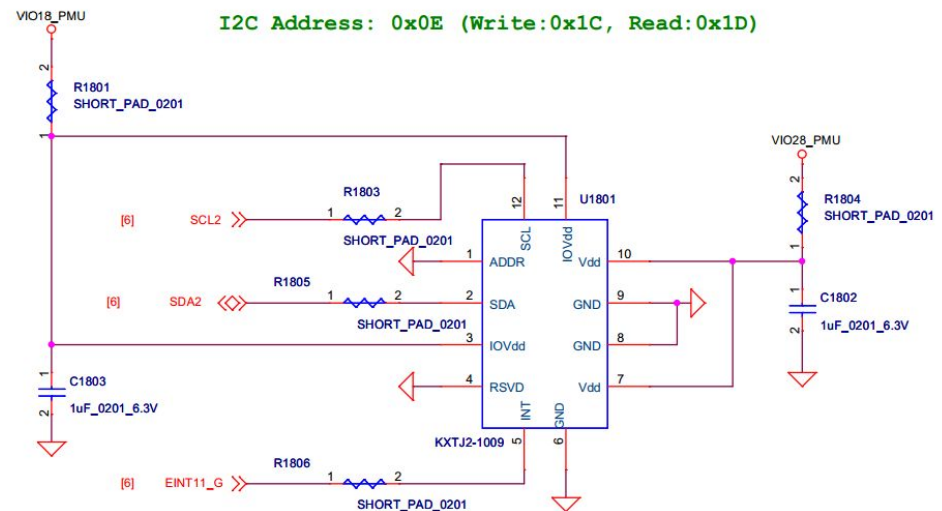
BB-6 sensor function fail (感測器不良) (1/2)

- 所有的sensor都是由I2C總線，中斷信號，電源組成I2C總線上sensor間會相互影響，所以維修某個 sensor不良時需要同步檢查其他sensor路徑。
- All sensors are consisted by I2C bus, interrupt signal and power. Sensors on I2C bus are affected by each other, therefore related sensors checking is needed when repairing sensor.

G-sensor供电电压。该电压等同于VIO18，该电压异常系统就无法开起来，所以sensor不良不用check此电位。

G-Sensor voltage is as same as VIO18. if this voltage is in error, system will not boot on. Therefore it is not necessary to check this voltage when sensors are on failure

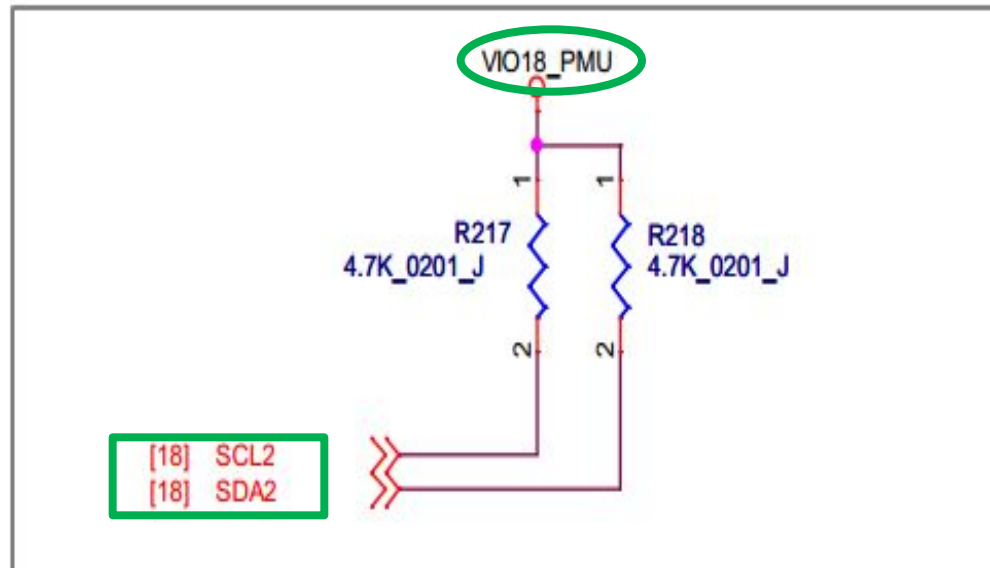
G-Sensor



BB-6 sensor function fail (感測器不良) (2/2)

G-sensor I2C通過上拉電阻連接到CPU, 此I2C與touch panel共用, VDD18_PMU異常會造成所有sensor fail。

G-sensor I2C connect to CPU with Pull-up resistor, which share with touch panel, VDD18_PMU error will lead to all sensors failure.



BB-7 Touch Panel no function (無法觸屏) (1/2)

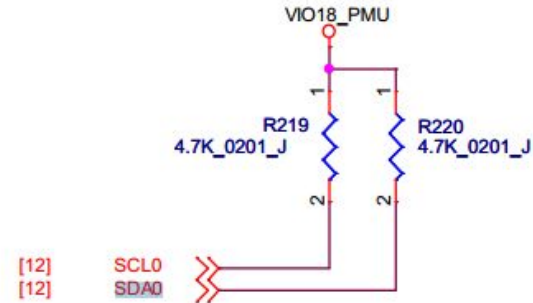
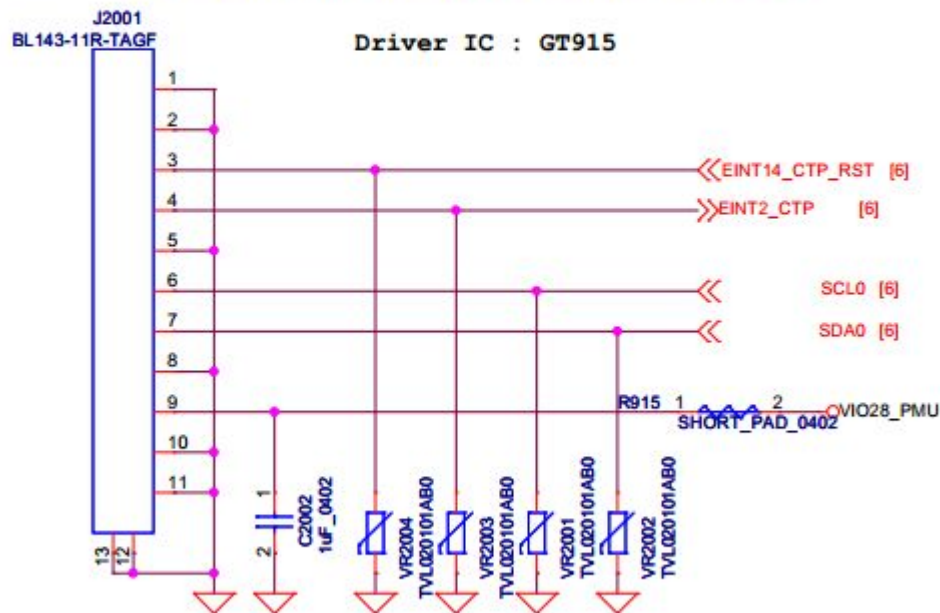
- 1. Check if TP connector is loosen (確認TP Connector 是否鬆脫?)
- 2. Replace TP (更換TP)
- If failure still exists after TP replacement (若更換後良品後, 現象還存在)
- 3. Check if J2001 is on failure (確認J2001是否有異狀[錫短 or 空焊]?)
- 4. Check TB voltage(VDD28_PMU and VDD1V8_PMU) is correct (確認TB 電壓(VDD28_PMU及VDD1V8_PMU)位準是否正確?)
- 5. Check control signal of I2C, Reset, INT are correct (確認控制訊號 I2C, Reset, INT動作是否正常?)

BB-7 Touch Panel no function (無法觸屏) (2/2)

- TP circuit

Touch Panel

I2C Address: 0x (Write:0x, Read:0x)



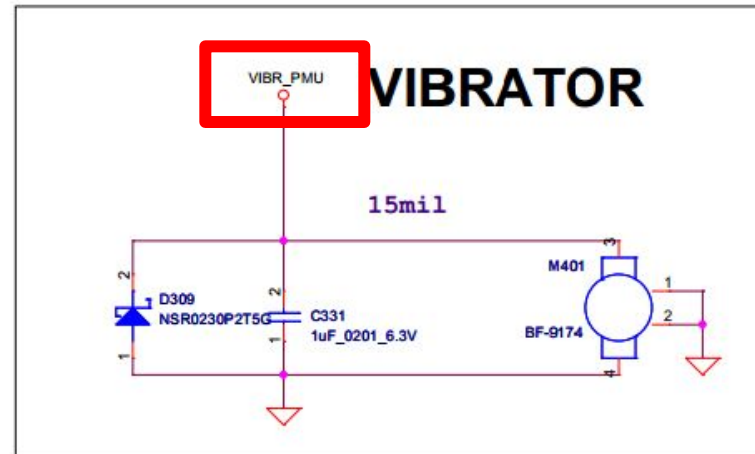
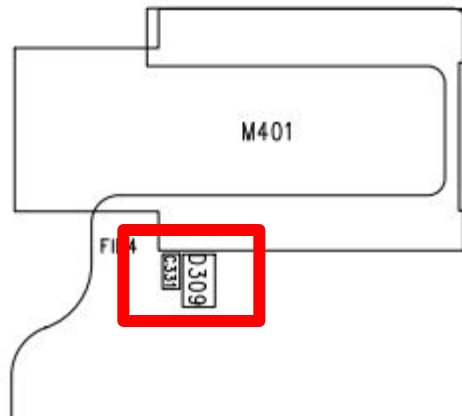
復位信號
Reset Signal

← TP工作電壓
2.8V/1.8V

TP Working Voltage
2.8v/1.8v

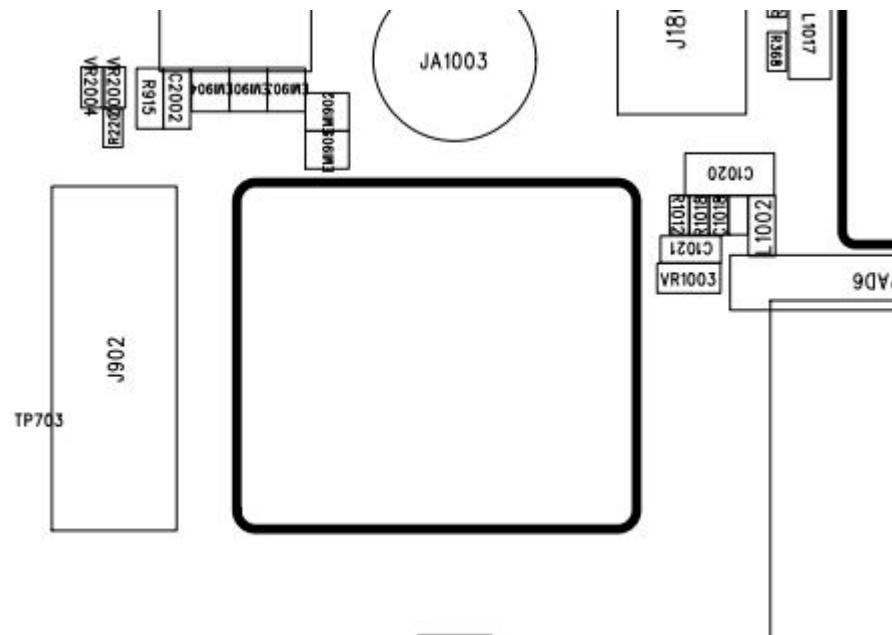
BB-8 Vibrator no function (馬達無振動)

- 1. Check if motor is in normal condition (Resistance is 30Ω) (確認馬達是否正常 (馬達阻抗約30Ω))
- 2. Check if motor soldering condition (確認馬達是否有異狀[錫短 or 空焊]?)
- 3. Check if D309 is reversed, C331 soldering condition is good (檢查D309是否反向, C331焊接是否有異常[錫短 or 空焊]?)
- 4. VIBR_PMU voltage is normal when booting (啟動時VIBR_PMU電壓是否正常)



BB-9 Camera can not turn on (無法攝像) (1/4)

- 1. Check camera module has been well assembled (確認組裝是否到位?)
- 2. Replace camera module (更換camera module)
- If failure still exists after camera module replaced (若更換後良品後, 現象還存在)
- 3. Check J902 is in normal condition (確認J902是否有異狀[錫短 or 空焊]?)
- 4. Check EMI901, EMI902, EMI903, EMI904, EMI905 soldering condition (確認EMI901, EMI902, EMI903, EMI904, EMI905是否有異狀[錫短 or 空焊]?)
- 5. Check camera voltage(VCAMD_IO_PMU, VCAMA_PMU, VCAMD_PMU) are correct (確認Camera 電壓 (VCAMD_IO_PMU, VCAMA_PMU, VCAMD_PMU)位準是否正確?)

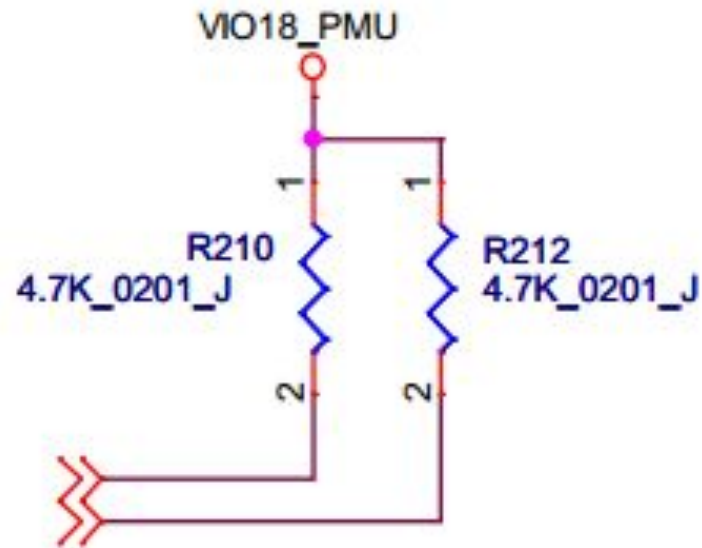


BB-9 Camera can not turn on (無法攝像) (2/4)

- 主camera的4組工作電壓均是由PMU LDO輸出通過給camera
- All 4 working voltage of main camera are inputted from PMU LDO

Camera
I2C
源頭路徑

[8,11]	SCL1
[8,11]	SDA1



BB-9 Camera can not turn on (無法攝像) (3/4)

- **1:無法進入拍攝模式,此為camera無法通過I2C信號被CPU正常識別造成,此不良主要查供電/reset/CLK/PWD是否正常**
- **1. Camera shooting model is not accessible. The main cause is camera cannot be identified by CPU via I2C, need to check power supply for camera.**
- **2:拍攝黑屏/油畫:此現象為手機進入拍攝模式后,但無法讀取景物,此類不良主要是camera無法通過DATA路徑將信號傳給CPU正常處理造成,此類不良主要檢查camera的DATA。**
- **2. Photos are blurry/black when shooting, camera is not able to capture scenery after entering shooting model. The main cause is camera cannot pass signal to CPU to process via Data path. Need to check camera DATA path.**

BB-9 Camera can not turn on (無法攝像) (4/4)

VREF/HREF: Sensor垂直/水平參考信號

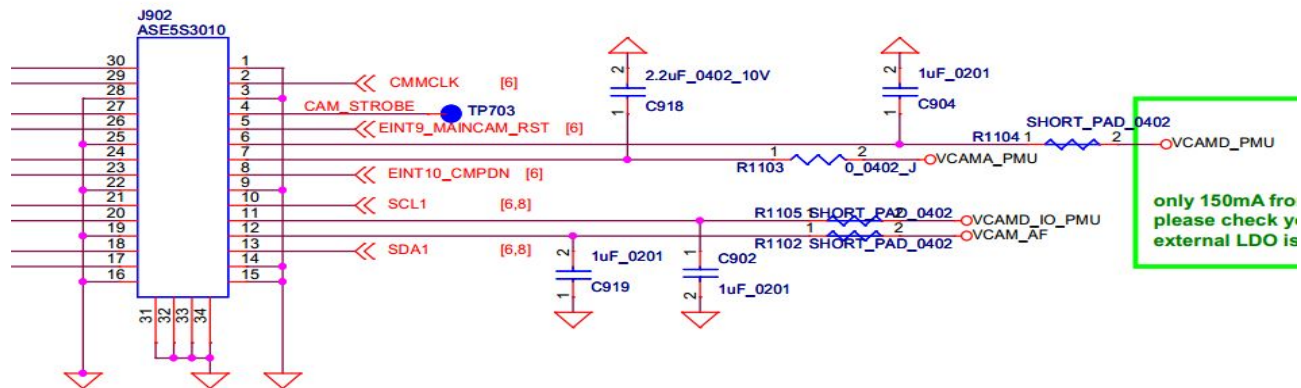
Sensor reference of horizon and vertical

MCLK: 來自CPU的主時鐘輸出

Main clock from CPU

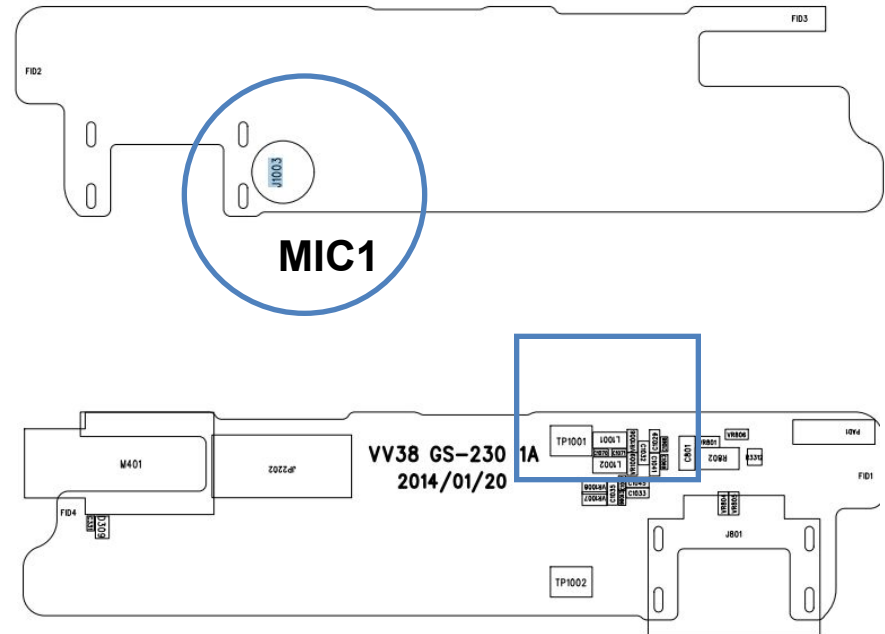
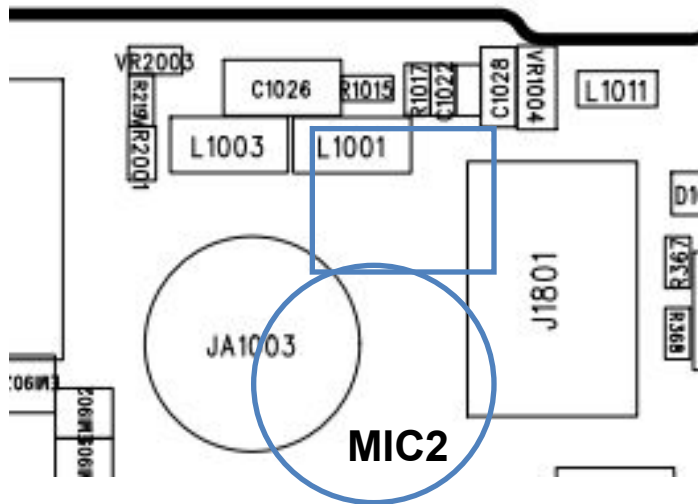
PCLK: 象數時鐘輸入

Clock input from image-numerology



BB-10 MIC no function (麥克風無作用)

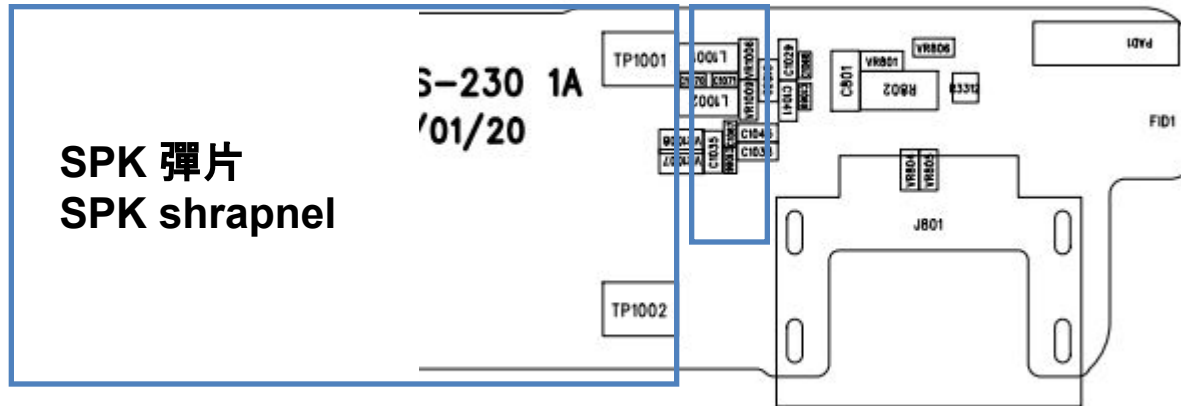
- 1. 確認J1003 Microphone是否正常 (正常Mic阻抗約0.95KΩ)
 - Check if J1003 Microphone is in normal condition, MIC resistance should be at 0.95KΩ.
- 2. 確認MIC 周邊電路是否有異狀[錫短 or 空焊]?
 - Check MIC and related circuit soldering condition.



BB-11 Speaker no function (喇叭無聲)

- 1. 確認MB to SB FPC是否連接ok
- Check MB to SB FPC is well connected
- 2. 確認Speaker彈腳及阻抗是否正常 (正常阻抗約8Ω)
- Check speaker shrapnel and resistance are at normal condition (normal resistance is 8Ω)
- 3. 確認Speaker周邊電路是否異常?[錫短 or 空焊]?
- Check if speaker and related circuit are at normal condition

SPK周邊電路
SPK circuit around



BB-12 Audio function fail (Audio 不良) (1/4)

Audio类不良针对不同测试项fail,检查不同的路径.

1:wave play back fail □测的是SPK路径.

2:receiver fail □测的是手机听筒路径.

3:headset fail □测的是耳机左右声道路径.

4:phone mic1 to headset fail □测的是手机MIC1路径.

5:phone mic1 to headset fail □测的是手机MIC1路径.

6:headsetmic to headset fail □测的是耳机MIC路径.

Check relevant path for different test item failure for Audio error

1:wave play back fail □ check SPK path

2:receiver fail □ Check receiver path.

3:headset fail □ check earphone L/R channel path.

4:phone mic1 to headset fail □ Check phone MIC1 path.

5:phone mic1 to headset fail □ Check phone MIC1 path.

6:headsetmic to headset fail □ Check phone MIC path

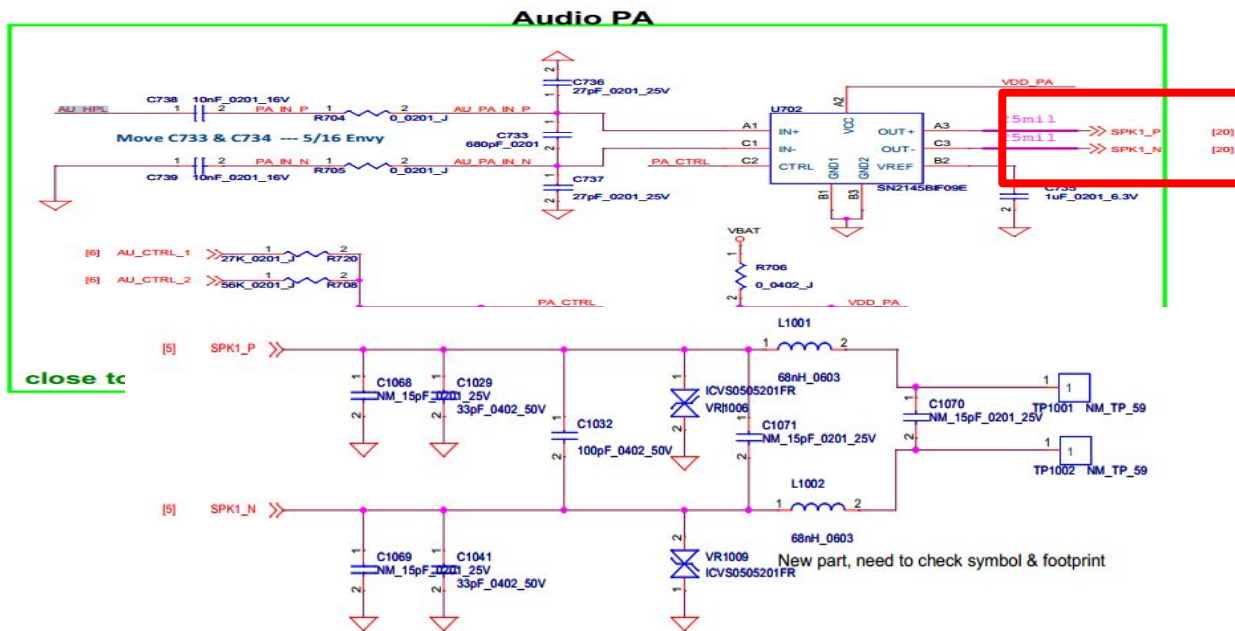
BB-12 Audio function fail (Audio 不良) (1/4)

Speaker path:



PMU 給出 SPK 信號進入 Audio PA 進行放大處理

PMU output SPK signal to Audio PA to amplify

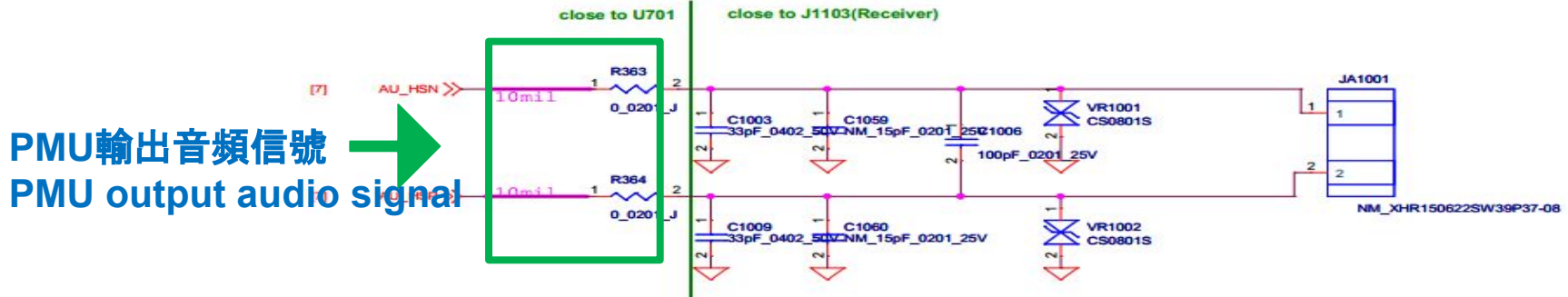


Audio PA 輸出放大后的 SPK 信號

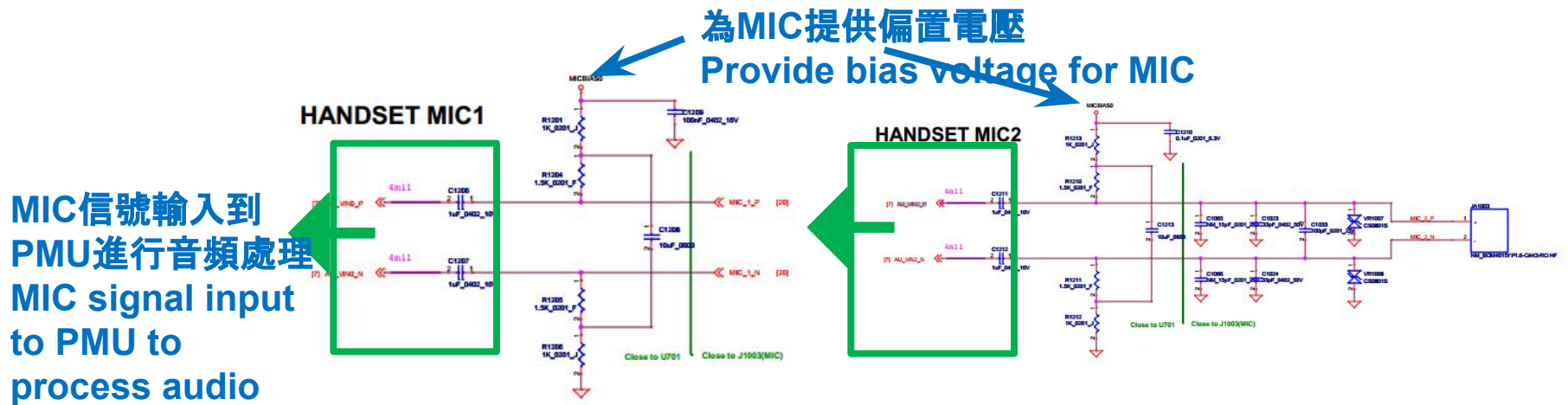
Audio PA output SPK signal after amplifying

BB-12 Audio function fail (Audio 不良) (2/4)

- Receiver path: 聽筒無聲, 優先check 0om是否導通
Check 0Com first if receiver is not functional



- Phone MIC path

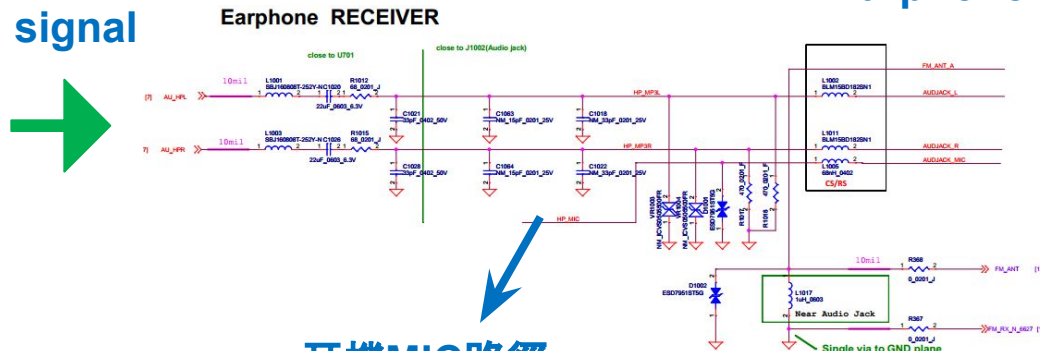


BB-12 Audio function fail (Audio 不良) (3/4)

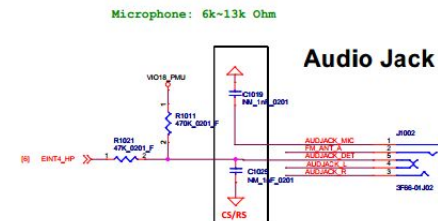
耳機左右聲道電路: Earphone L/R channel circuit

PMU輸出耳機音頻信號
PMU output earphone audio signal

耳機左右聲道連接至audio jack
Earphone L/R channel link to audio jack



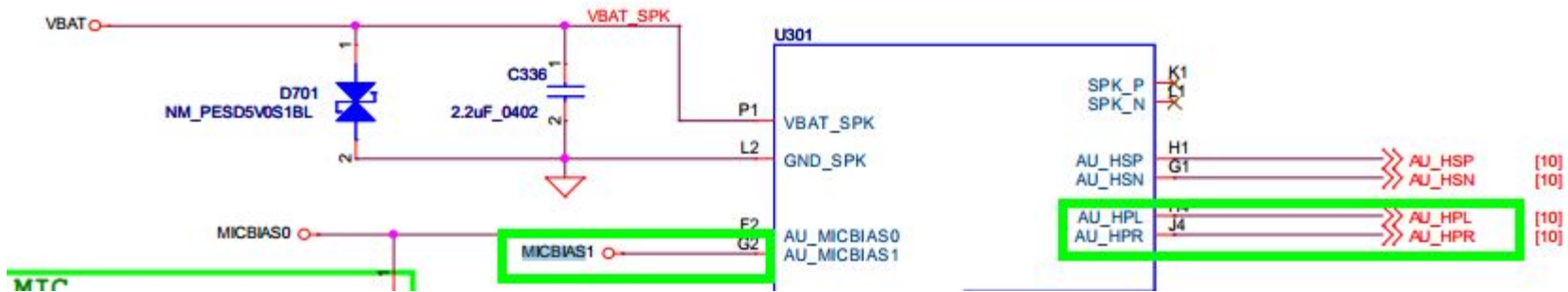
耳機MIC路徑
Earphone MIC path
耳機掛機鍵偵測信號
Earphone dial-button detection



耳機插入偵測PIN
Earphone insert detection pin

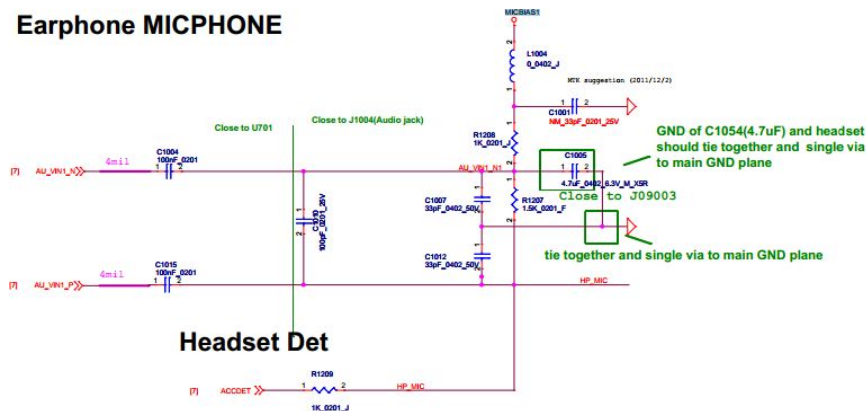
BB-12 Audio function fail (Audio 不良) (4/4)

耳機MIC電路 Earphone MIC Circuit:



為耳機MIC提供偏置電壓
Provide bias voltage for
earphone MIC

Earphone MICPHONE



耳機MIC信號通過差分電路進入PMU作音頻處理

Earphone MIC signal output to PMU to be process
by differential circuit

BB-13 SD Card no function (SD Card無作用)

- 1. Check SD card is been inserted properly (確認SD CARD有確實卡到位)
- 2. Check SD card related circuit are in good condition (確認SD Card周邊電路是否異常?[錫短 or 空焊]?)

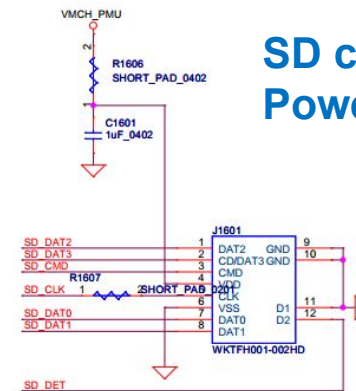
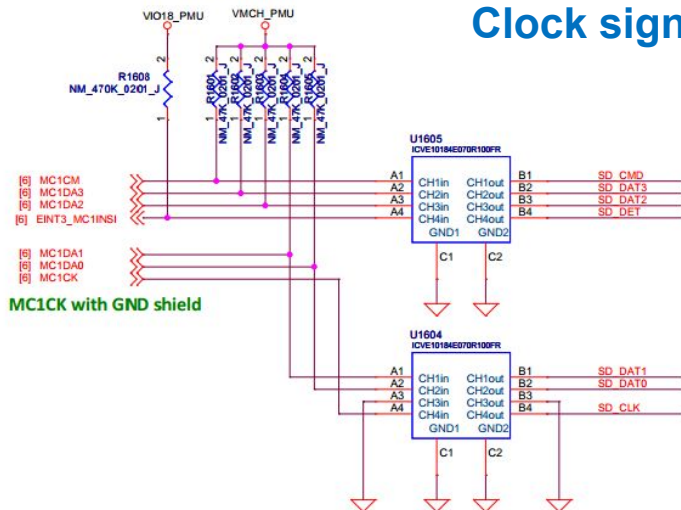
SD card 數據傳輸
Data transmission

SD card 控制信號
Control signal

SD card 時鐘信號
Clock signal

SD card 偵測信號
SD card signal
detect

SD card 供電端
Power supply

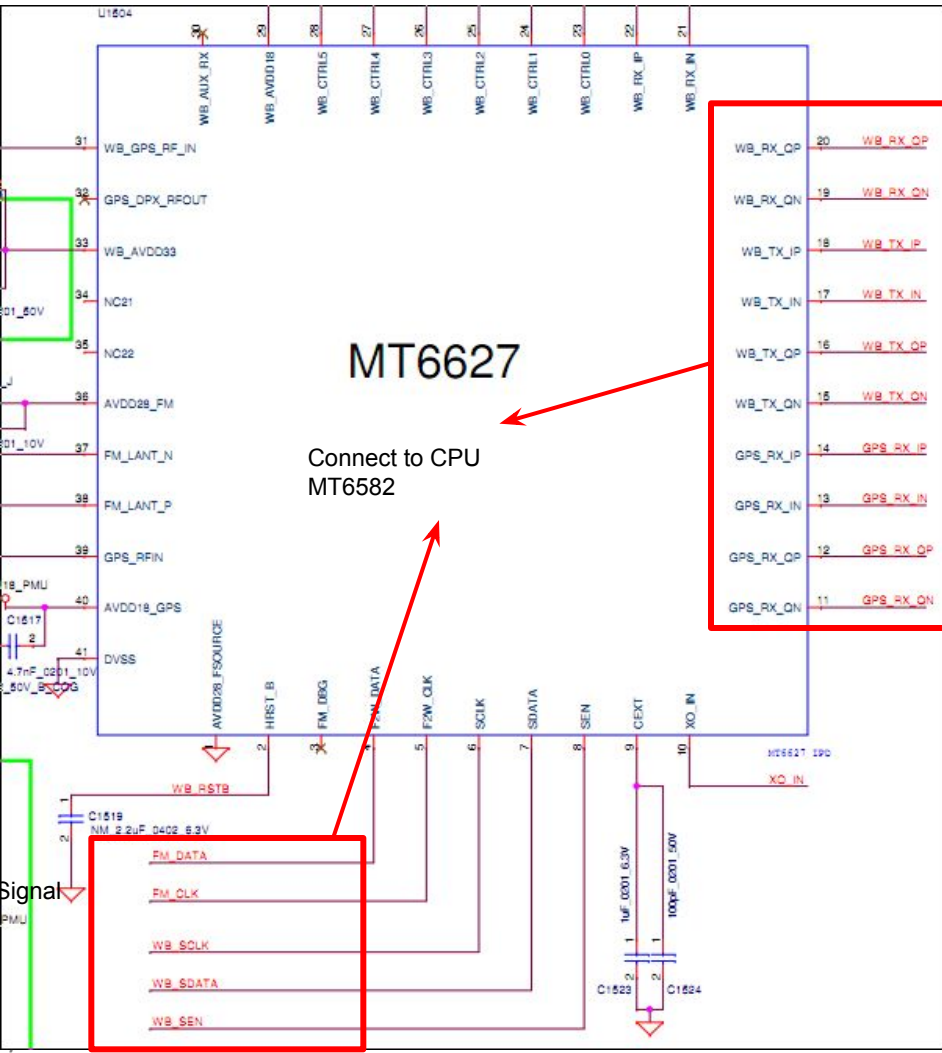


針對SD card fail,優先check U1604和U1605是否空焊導致
CMD/CLK/DET/DATA被中斷

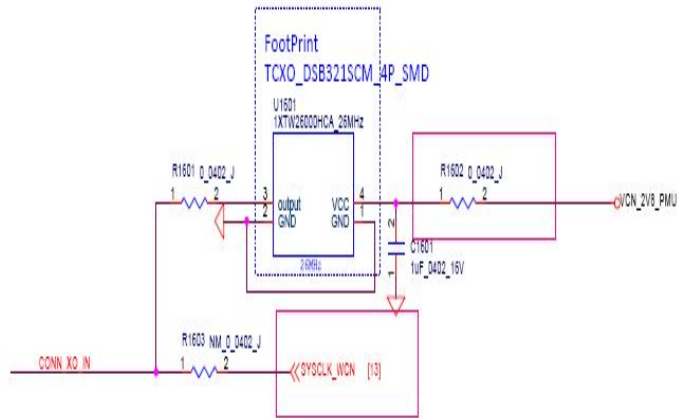
Check U1604 and U1605 soldering condition first if SD card fail.

WIFI/BT/GPS

WIFI/BT/GPS 功能使用的IC為MTK MT6627
 WIFI/BT/GPS IC are MTK MT6627

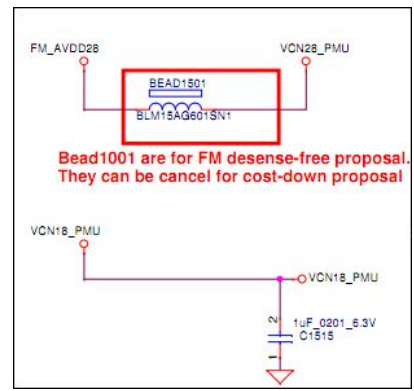
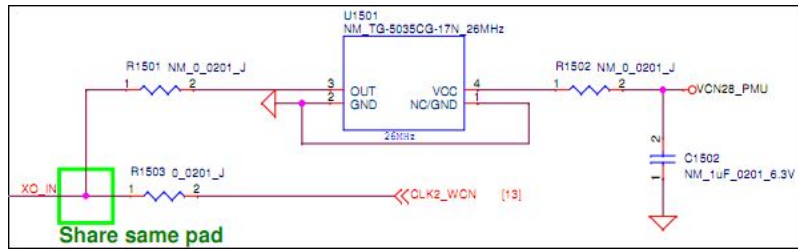
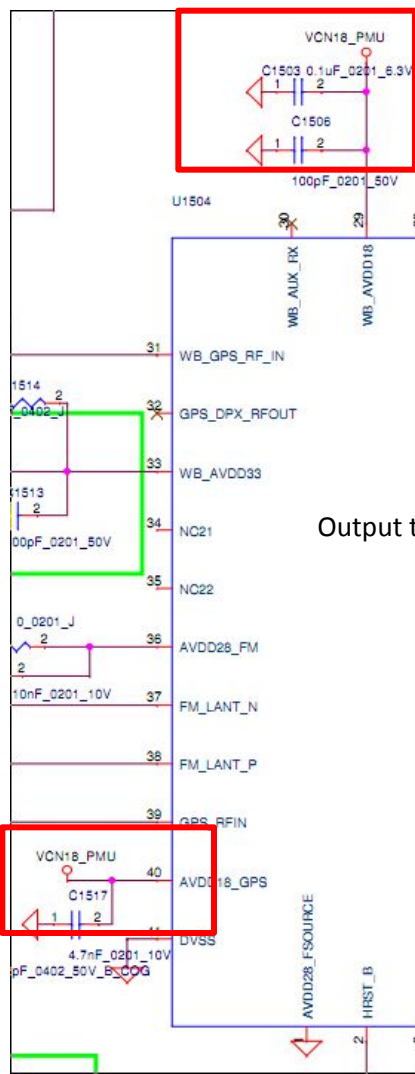


I/Q Signal



獨立的26M TCXO, Output
 Clock to MT6627
 Separate 26M TCXO, output
 clock to MT6627

MT6627 Power Supply

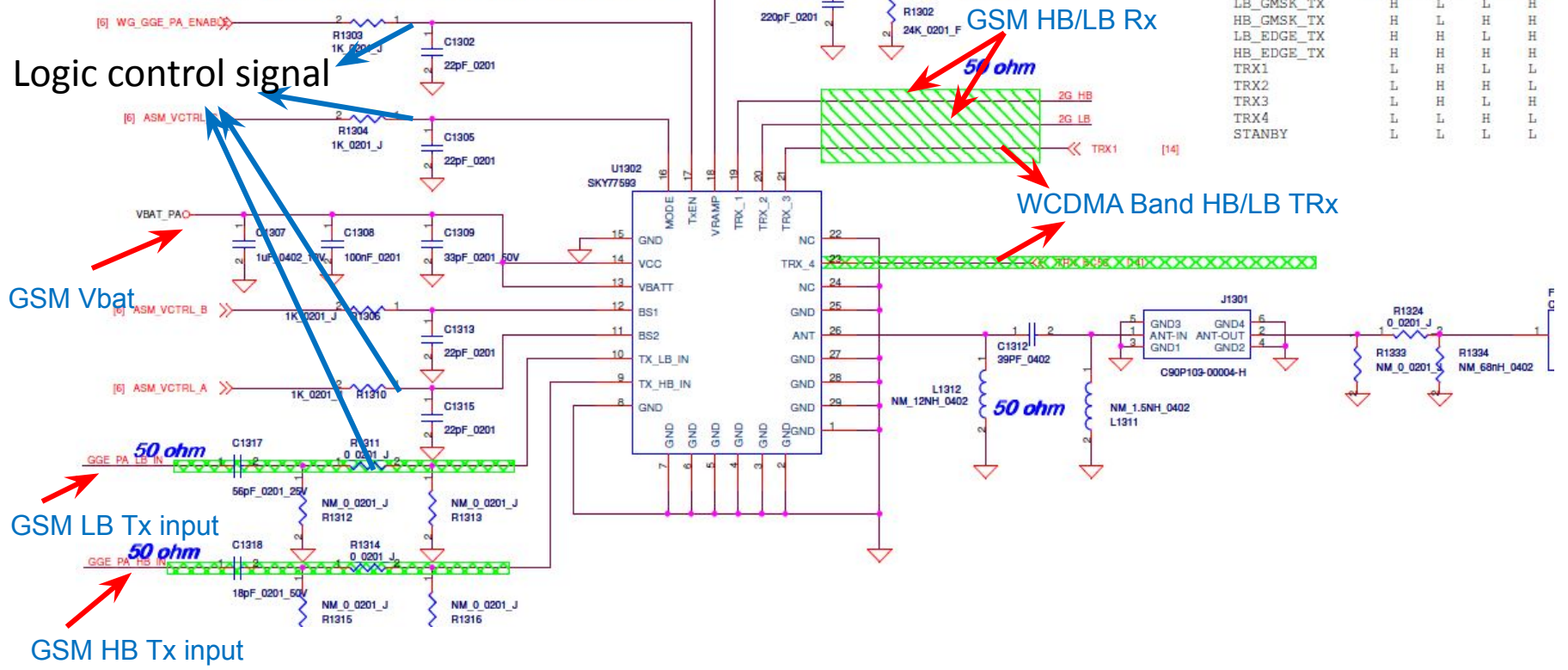


Output to MT6627

From PMU MT6323

GSM PA + Switch

RF_FEM with GSM Dual PA

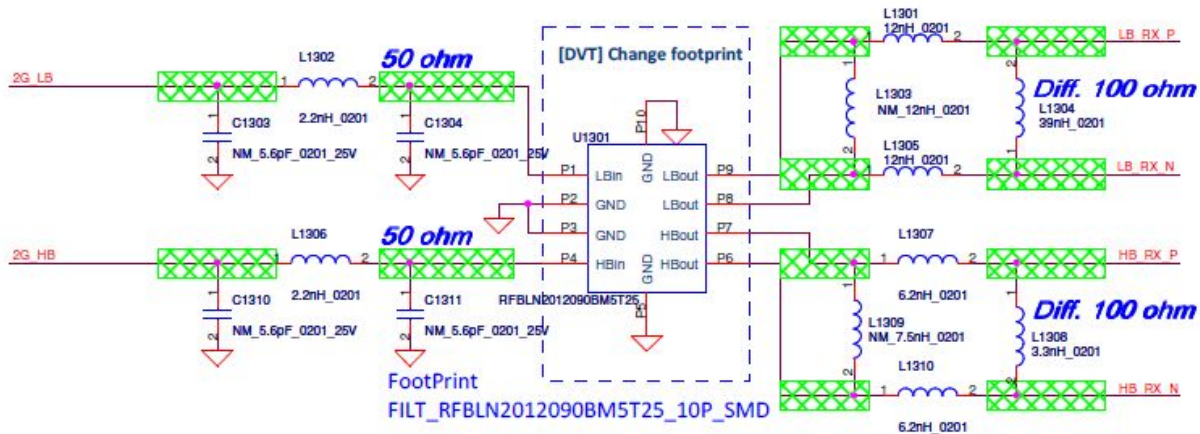


GSM RX

GSM HB/LB Circuit:

2G LB Rx

2G HB Rx

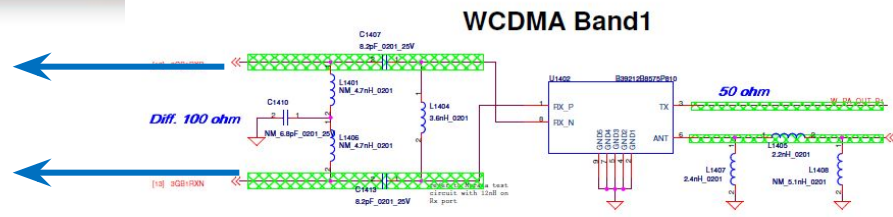


Balance output to transceiver LB Port

Balance output to transceiver HB Port

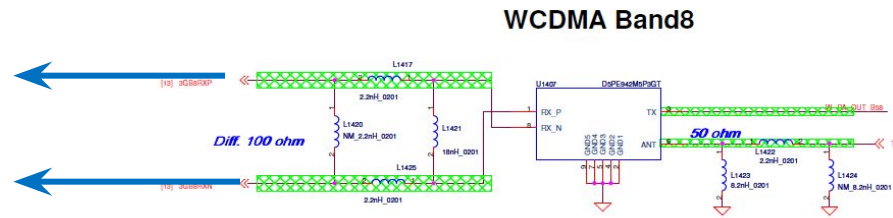
WCDMA Band1/8 TRx (VV36/38)

Rx balance to transceiver



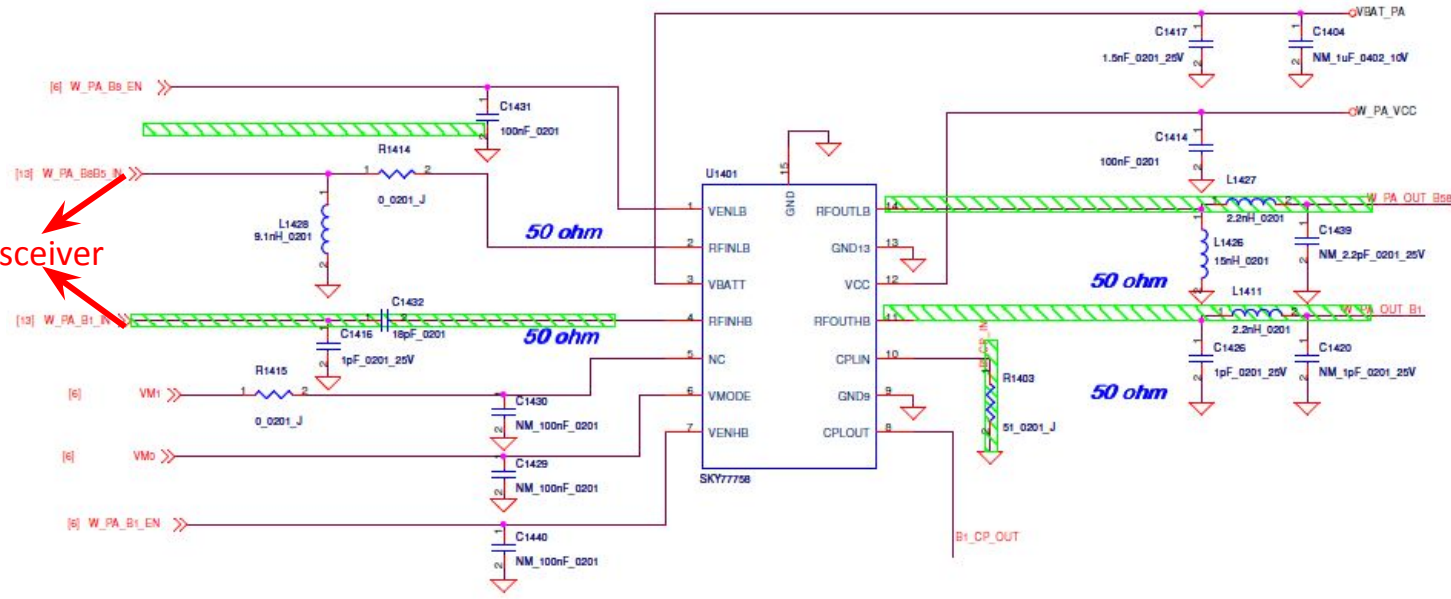
TRx connect with ANT Switch

Rx balance to transceiver



TRx connect with ANT Switch

Tx from Transceiver



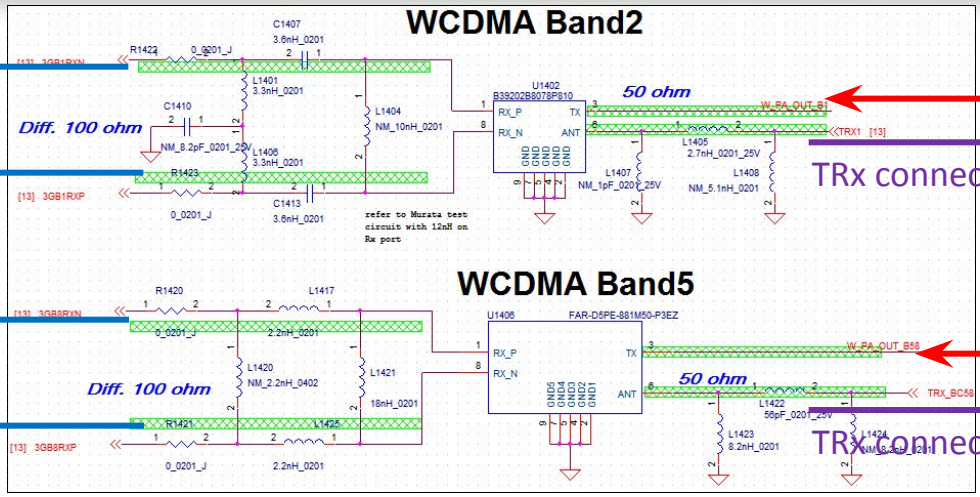
Band 8 Tx

Band 1 Tx

WCDMA Band2/5 TRx (VV37)

Rx balance to transceiver

Rx balance to transceiver



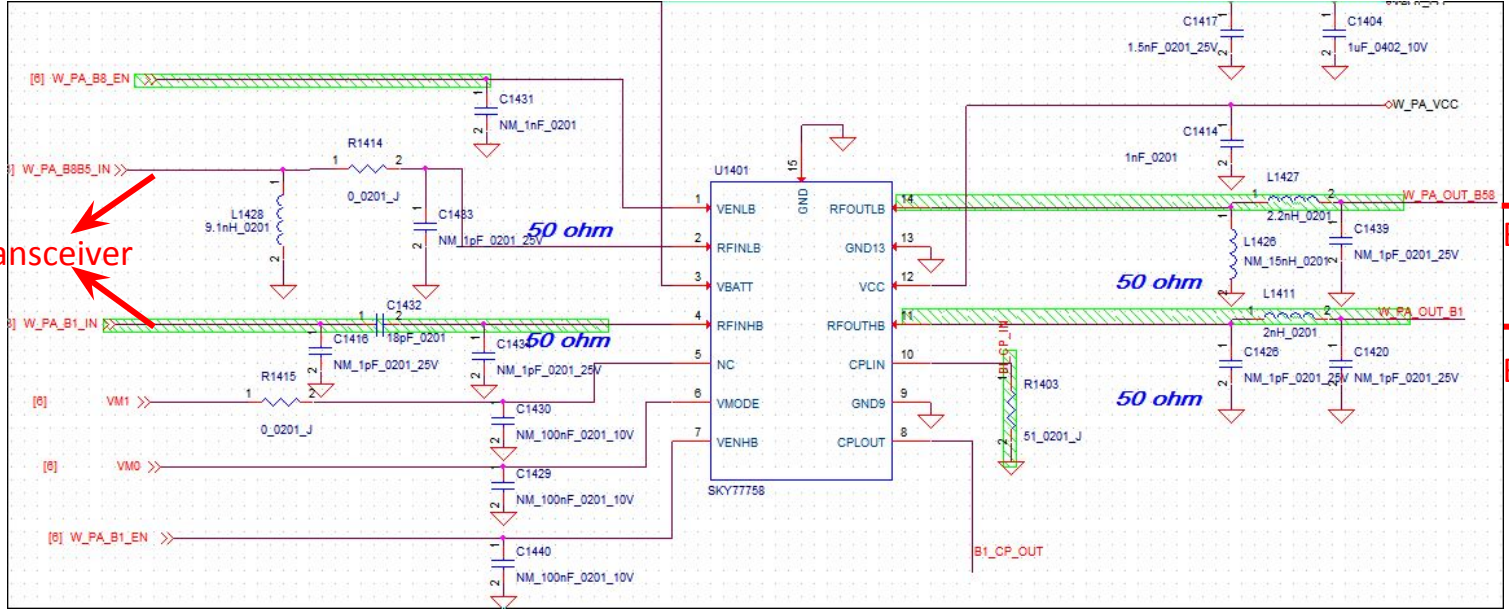
TRx connect with ANT Switch

TRx connect with ANT Switch

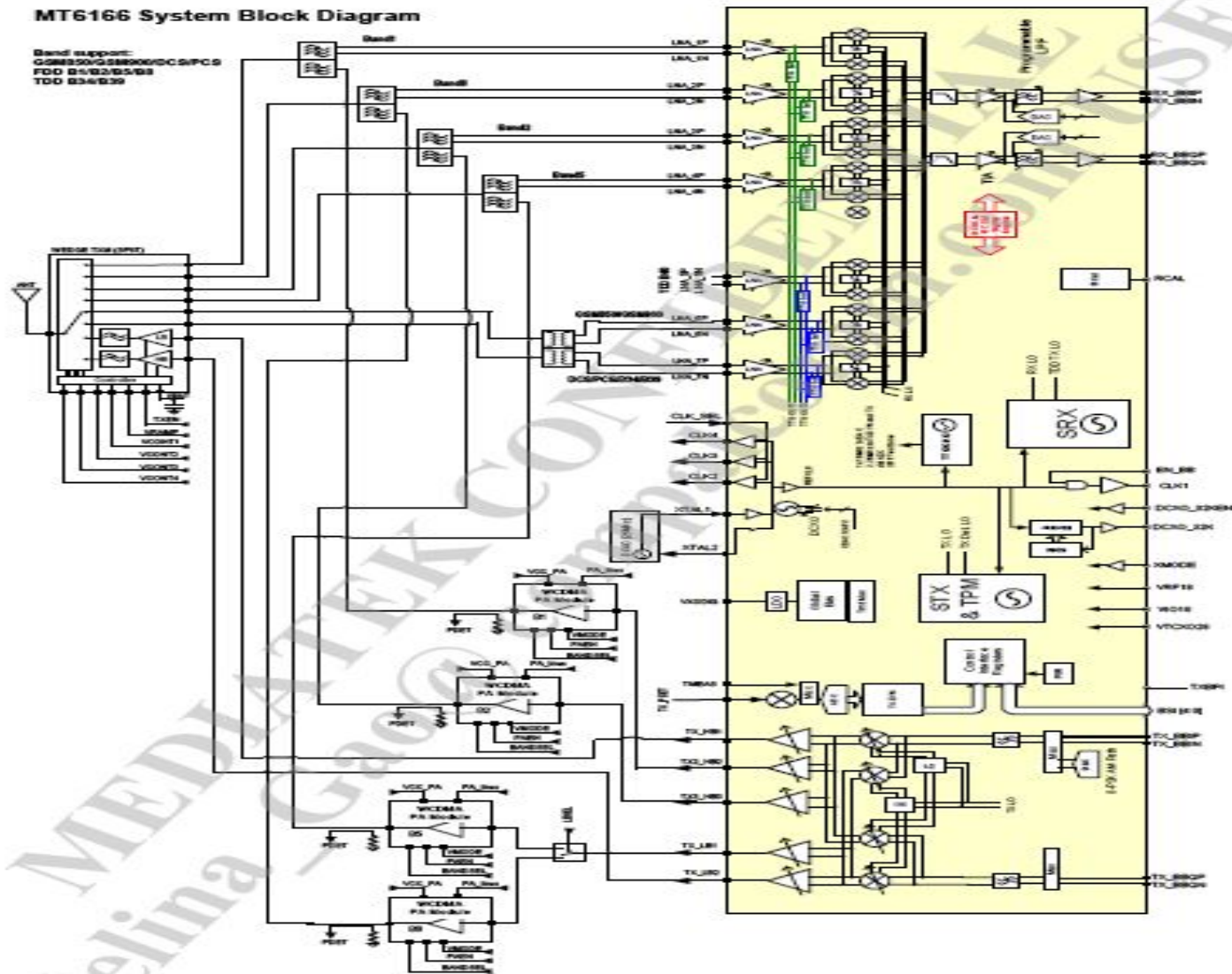
Tx from Transceiver

Band 5 Tx

Band 2 Tx

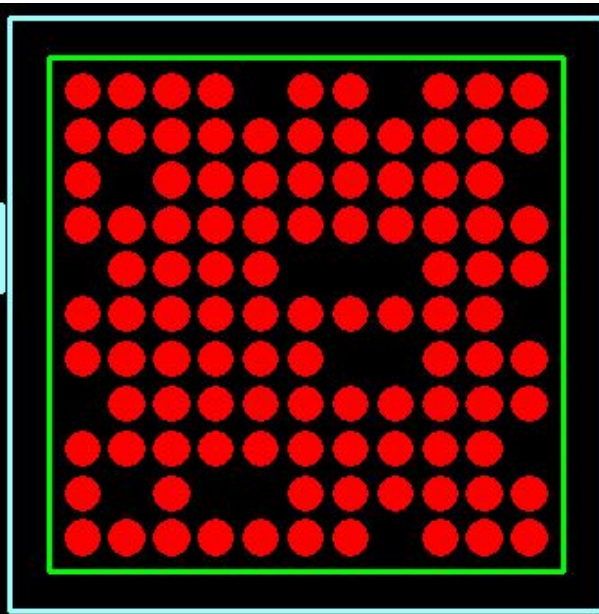


RF introduction: MT6166 Function Block



RF introduction: MT6166 Pin assignment

Ball Assignment

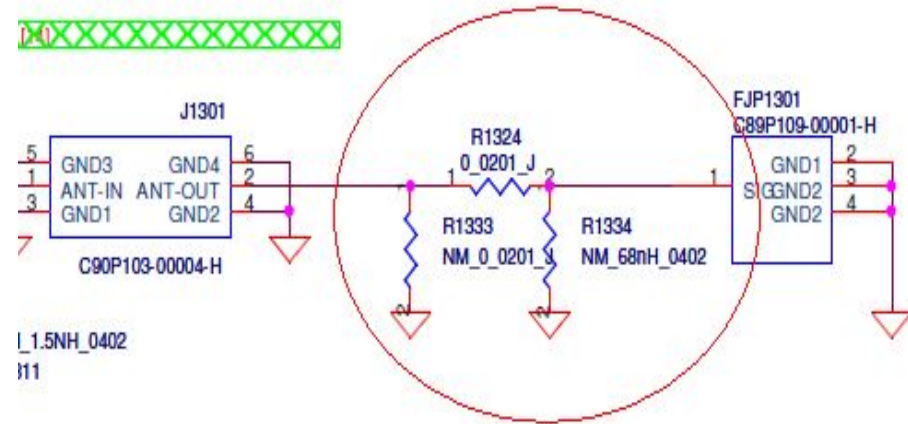


	1	2	3	4	5	6	7	8	9	10	11	
A	B40_RXP	3GB1_RXP	3GB1_RXN		3GB2_RXP	3GB8_RXP		3GH1_TX	3GH2_TX	3GL5_TX	2GLB_TX	A
B	B40_RXN		3GB5_RXP	3GB5_RXN	3GB2_RXN	3GB8_RXN	GND	2GHB_TX		GND	VTXHF	B
C	LB_RXP	GND	GND	GND	GND	GND	GND	GND	GND	GND	TMEAS	C
D	LB_RXN		GND	GND	GND	GND	GND	GND	GND	DETGND	DET	D
E	HB_RXP		GND	GND	GND	GND	GND	GND	GND	V28		E
F	HB_RXN	VRXHF	GND	GND	GND	GND		BSI_DATA0	GND	3GTX_QP	3GTX_QN	F
G	32K_EN	RFVCO_M0N	GND	GND		BSI_EN		BSI_DATA2	GND	3GTX_IP	3GTX_IN	G
H		XTAL2	GND	GND		BSI_CLK		BSI_DATA1	GND	TXBPI		H
J	XTAL1	GND	GND	GND	GND	GND	GND	GND	GND	RCAL	VTXLF	J
K	VTXO28	CLK_SEL	XO2	XO4	OUT32K	AVDD_VIO18	VXODIG	RX_IN	RX_QN	RX_QP	TST2	K
L	EN_BB	XO3		XO1	XMODE		VRXLF	RX_IP		TST1	TXVCO_M0N	L
	1	2	3	4	5	6	7	8	9	10	11	

RF introduction: Antenna Circuit

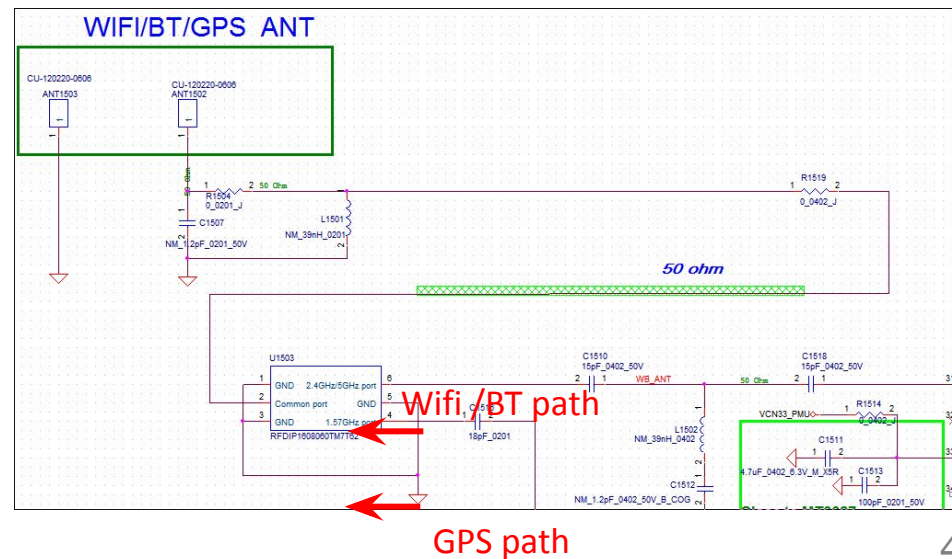
- Antenna Circuit
RF天線主要包含了
2G/3G/WIFI/GPS,
其匹配電路分別描述如下

Main ANT RF Paths

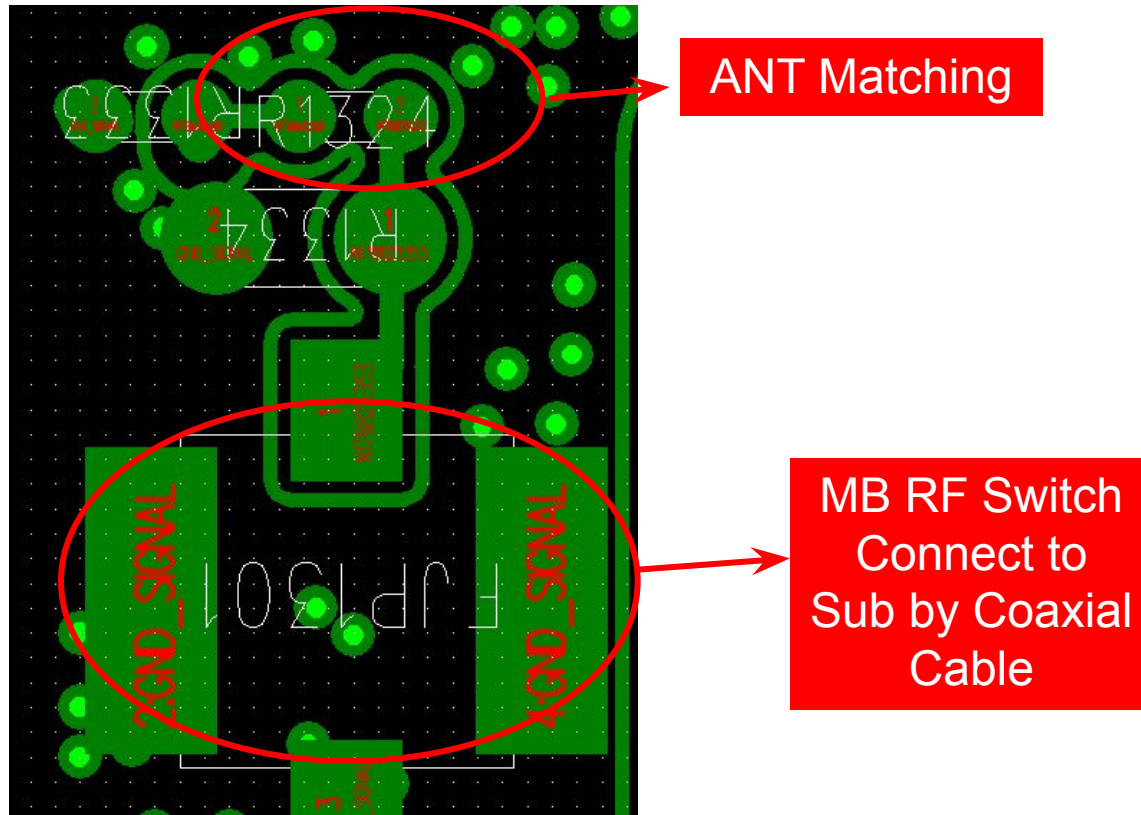


- RF antenna consists
2G/3G/WIFI/GPS,
Description as right diagram

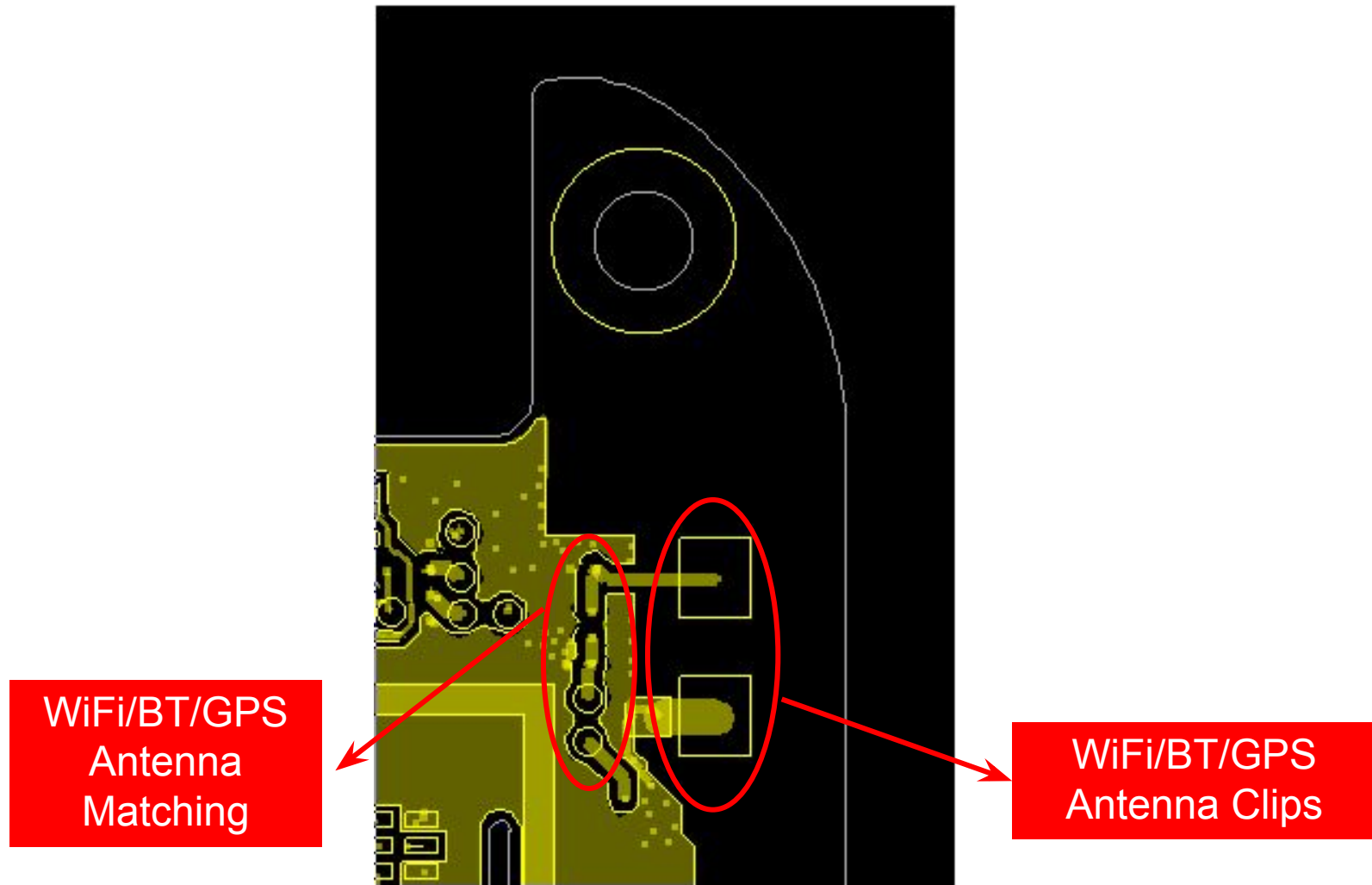
WIFI ANT RF Paths



RF introduction:2G/3G Main Antenna Position



RF introduction: WIFI Antenna Position



RF common issue

RF-1:Network function error

RF-2:GSM problem

RF-3:WCDMA problem

RF-4:GSM/WCDMA Rx error

RF-5:WIFI problem

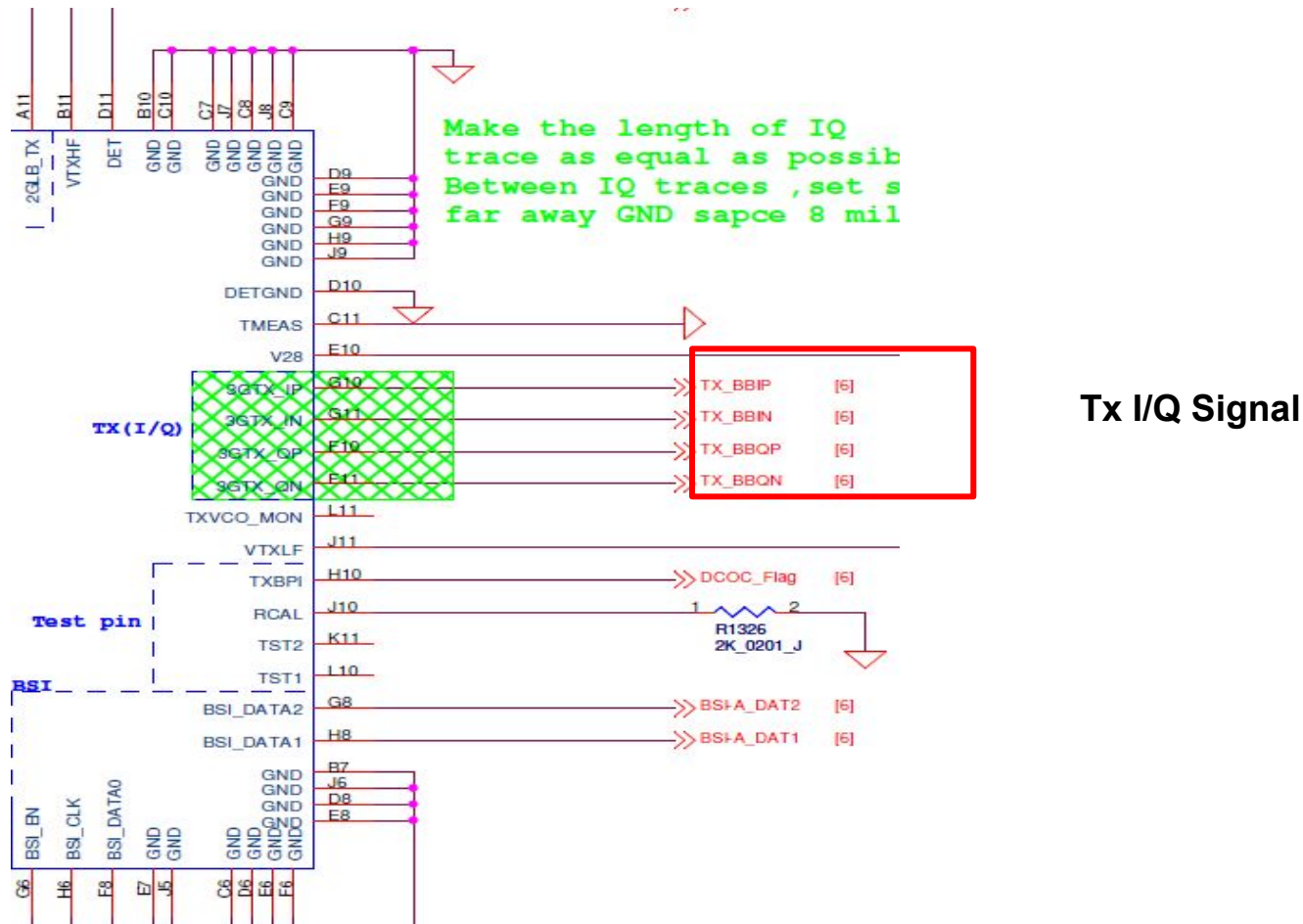
RF-1: Network function error

- 若2G/3G 網路功能異常,請檢查螢幕天線格數,SIM card是否裝好? Coaxial cable和是否組好?
- If 2G/3G network is on failure, check reception level on screen, SIM card inserted properly and Coaxial cable connected well.



RF-2:GSM Trouble shooting (1/3)

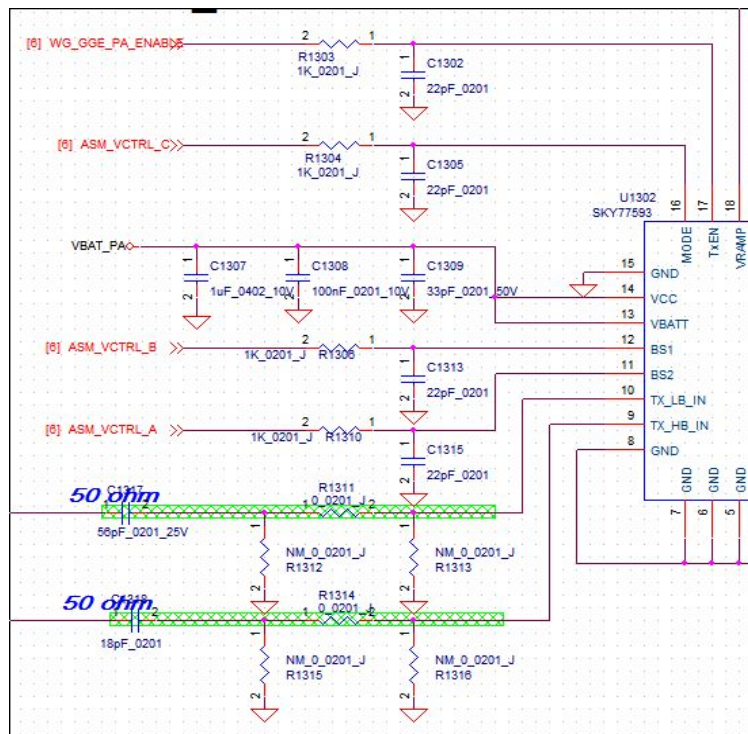
- Check GSM transmission path (検査GSM發射路徑)



RF-2:GSM Trouble shooting (2/3)

• GSM發射路徑 GSM transmission path

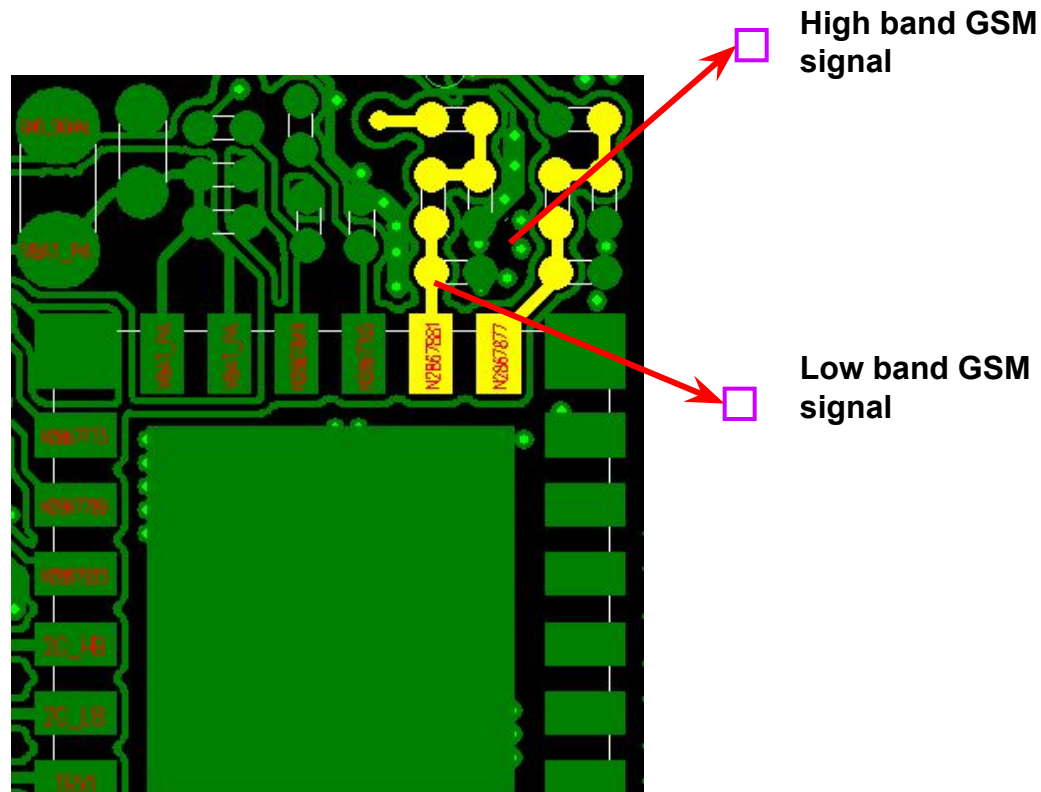
- 由於2G PA和ASM整合在U1302,檢查發射時對應邏輯控制電壓是否正確
- Due to 2G PA and ASM assembly in U1302, check logical control voltage is correct when transmission testing
- 使用示波器量測下圖所標 腳位的電壓是否符合右下列表
- Use oscilloscope test below pins voltage if they match the right bottom table



AP6693/SKY77593 control logic table				
	Enable	VctC	VctB	VctA
LB_GMSK_TX	H	L	L	H
HB_GMSK_TX	H	L	H	H
LB_EDGE_TX	H	H	L	H
HB_EDGE_TX	H	H	H	H
TRX1	L	H	L	L
TRX2	L	H	H	L
TRX3	L	H	L	H
TRX4	L	L	H	L
STANDBY	L	L	L	L

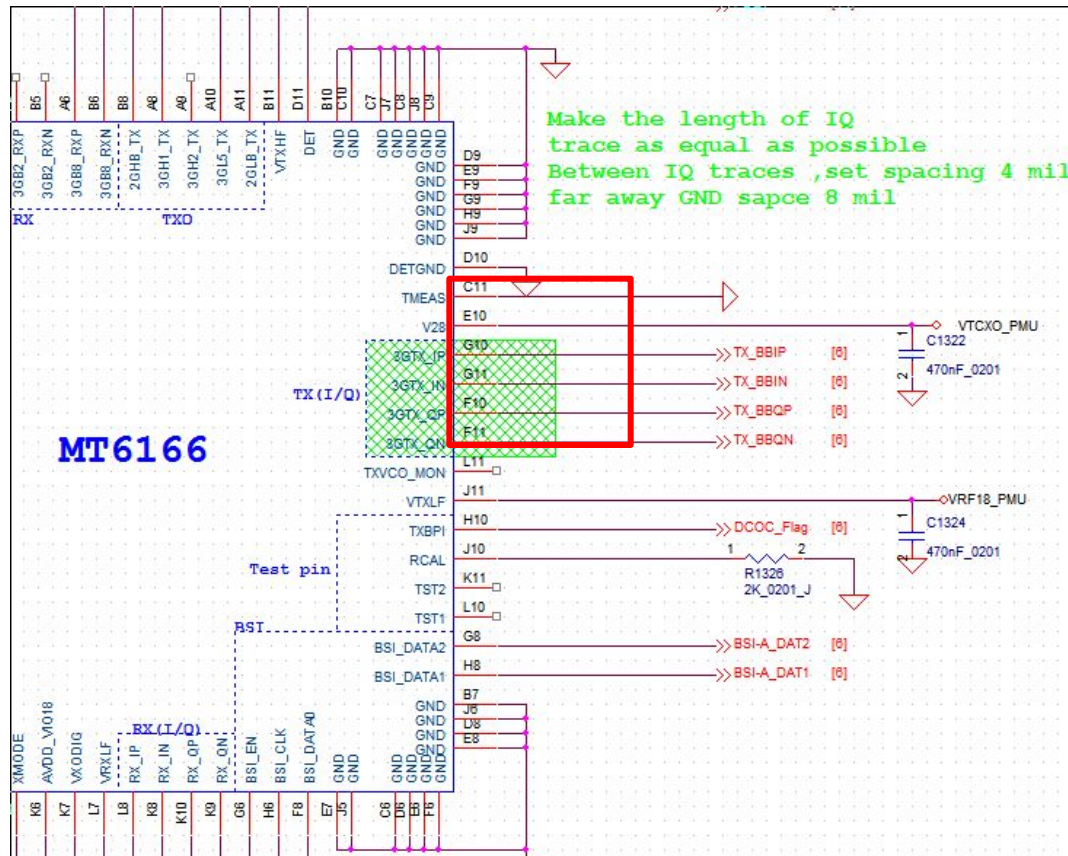
RF-2:GSM Trouble shooting (3/3)

- **GSM發射路徑 GSM transmission path**
 - 檢查發射路徑的功率
 - check power of transmission path
 - 使用spectrum probe量測下列標駐點,測量其功率
 - Use spectrum probe to measure below points' power



RF-3:WCDMA Trouble shooting (1/5)

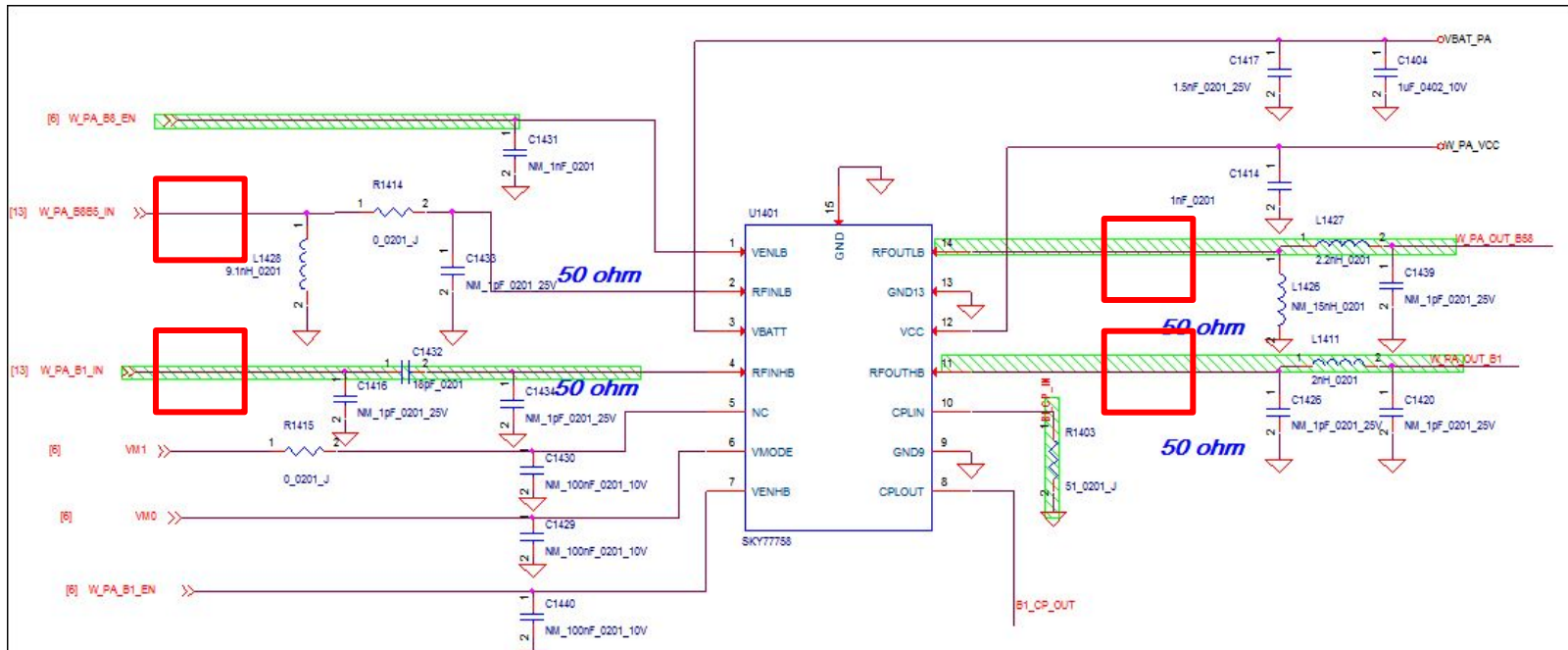
- WCDMA發射路徑 WCDMA transmission path
 - 確認IQ路徑
 - Check IQ path
 - 使用示波器量測下圖所標之腳位,檢視其波形
 - Use oscilloscope to check below points, check waveform.



RF-3:WCDMA Trouble shooting (2/5)

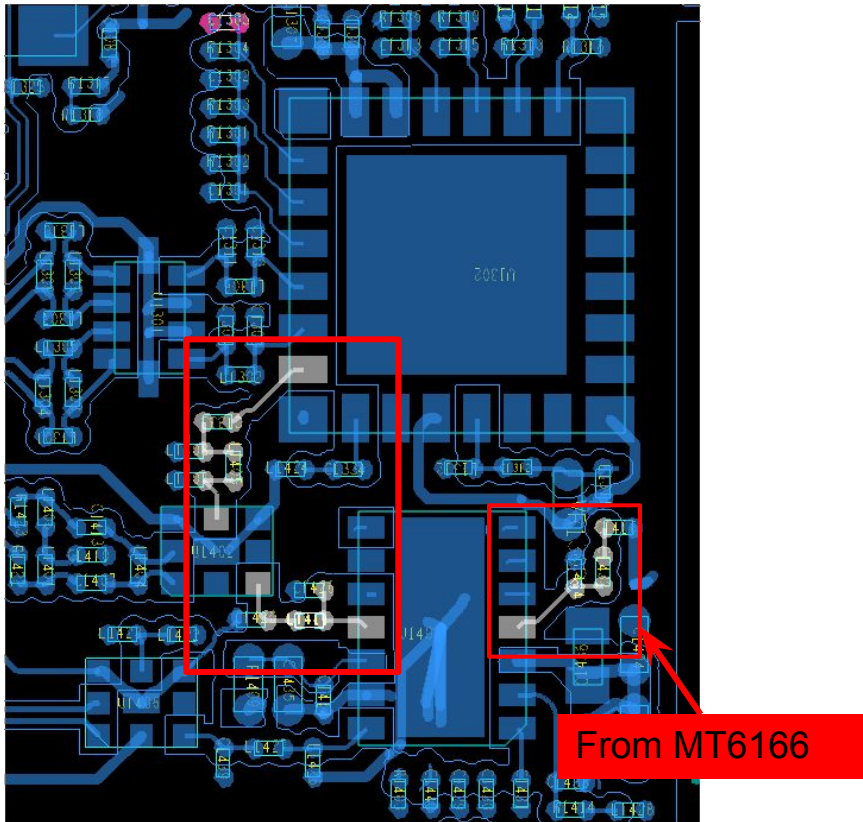
- **WCDMA發射路徑 WCDMA transmission path**

- 確認發射路徑
- Check signal transmission path
- 使用频谱仪量測下圖所標之腳位,檢視其Power
- Use oscilloscope to test below point and power

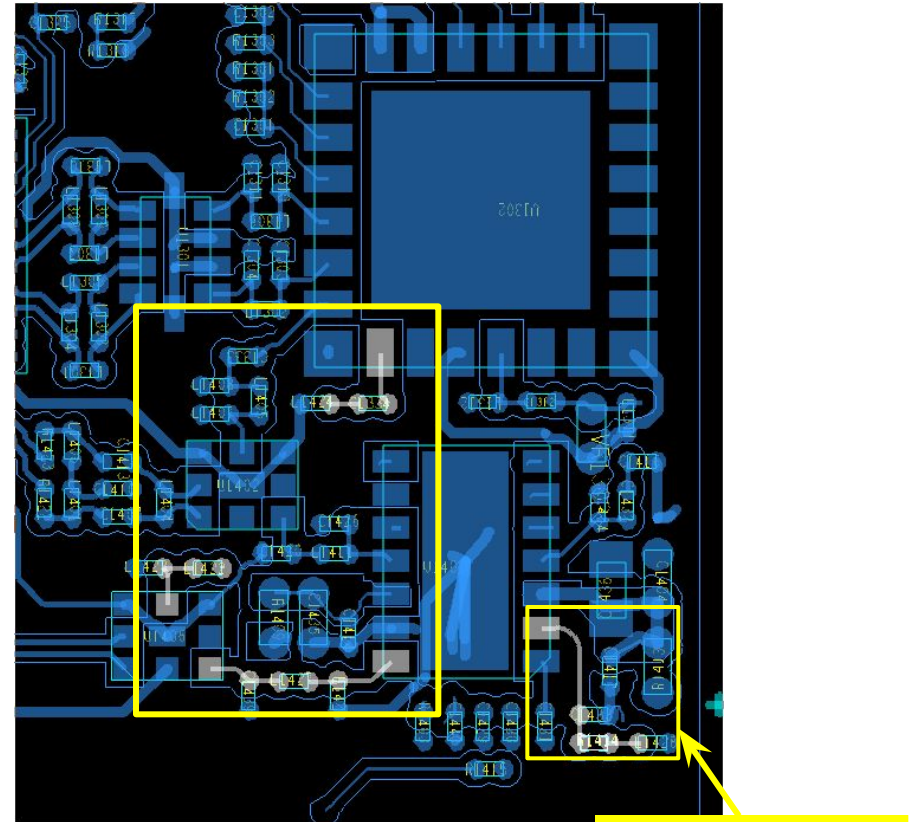


RF-3:WCDMA Trouble shooting (3/5)

- WCDMA發射路徑 WCDMA transmission path
Transceiver-3G PA, PA-Duplexer



□ WCDMA BAND 1/2 signal



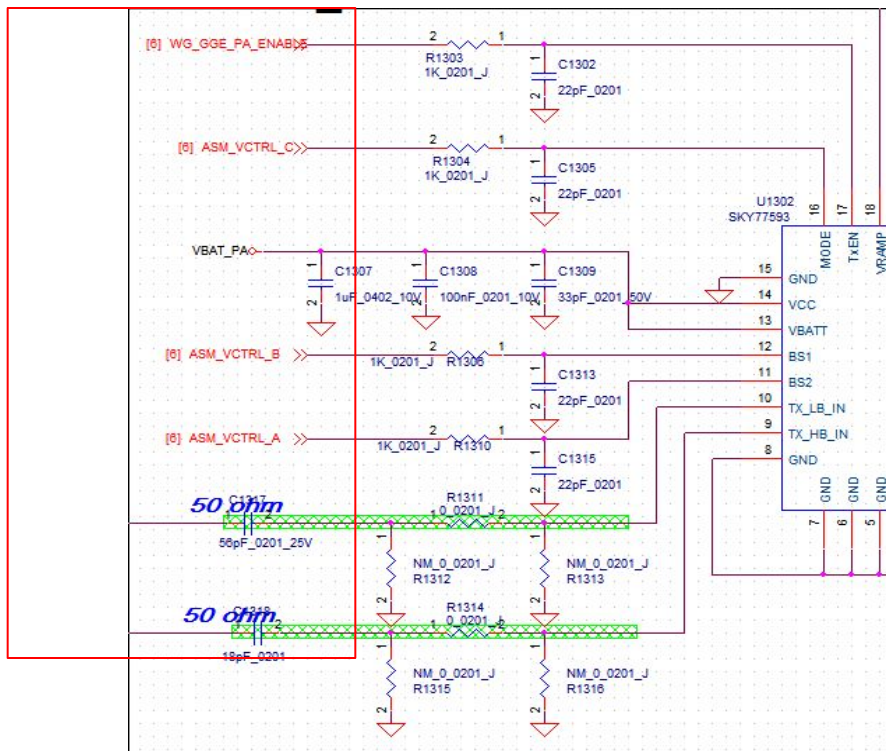
□ WCDMA BAND 1/2 signal

From MT6166

RF-3:WCDMA Trouble shooting (4/5)

WCDMA發射路徑 WCDMA transmission path

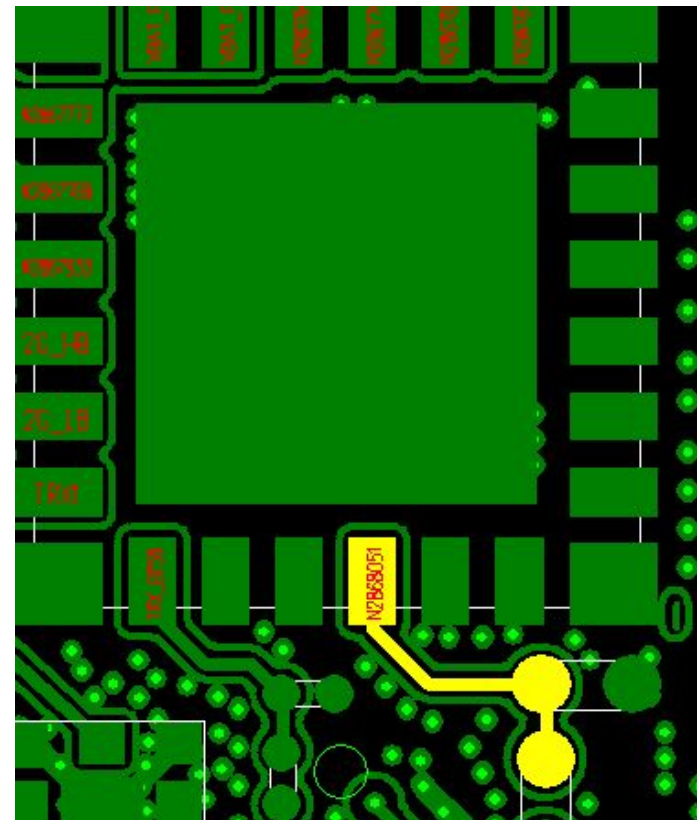
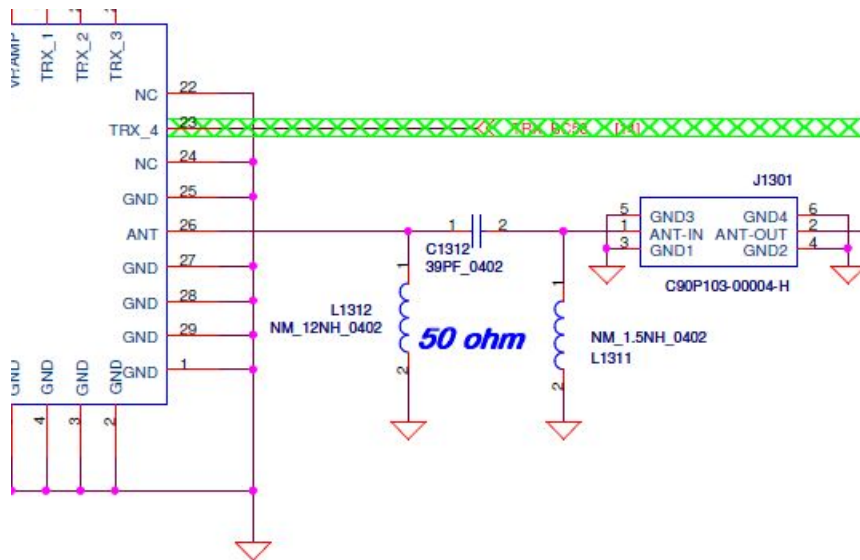
- 檢查ASM 邏輯控制電壓
- Check ASM logical control voltage
- 使用示波器量測下圖所標 腳位的電壓,是否符合右下列表
- Use oscilloscope test below pins voltage if they match the right bottom table



AP6693/SKY77593 control logic table				
	Enable	VctC	VctB	VctA
LB_GMSK_TX	H	L	L	H
HB_GMSK_TX	H	L	H	H
LB_EDGE_TX	H	H	L	H
HB_EDGE_TX	H	H	H	H
TRX1	L	H	L	L
TRX2	L	H	H	L
TRX3	L	H	L	H
TRX4	L	L	H	L
STANDBY	L	L	L	L

RF-3:WCDMA Trouble shooting (5/5)

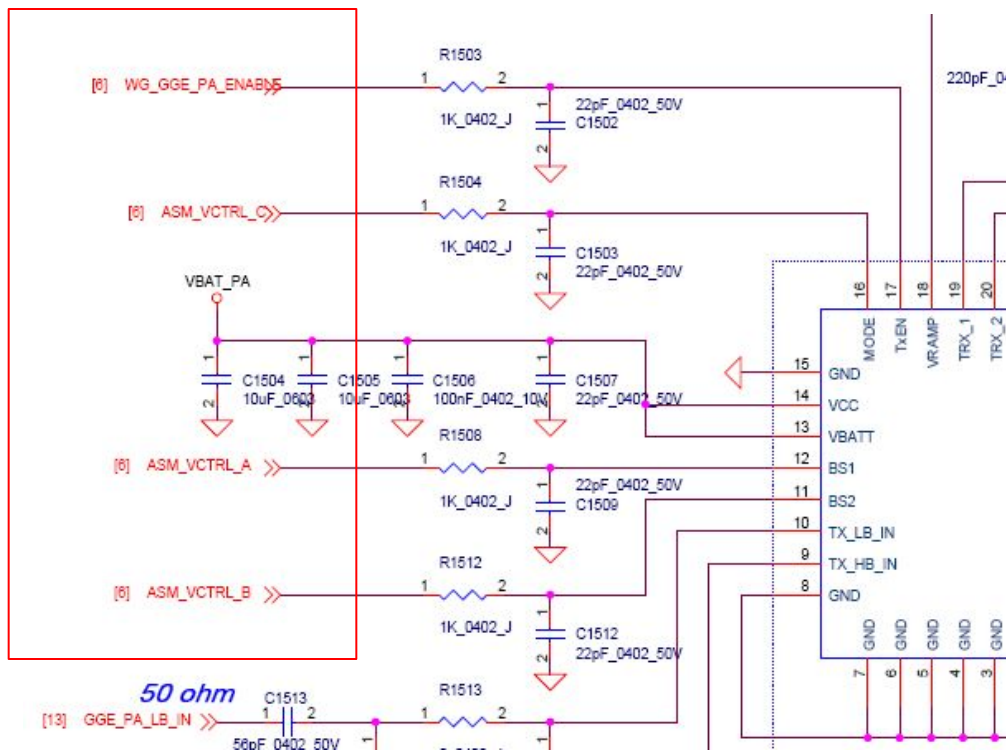
- 發射路徑 ASM-RF Con (GSM + WCDMA)
- Transmission Path ASM-RF Con (GSM + WCDMA)



RF-4:GSM/WCDMA Trouble shooting

• 接收路徑 Receiving Path

- 檢查 Antenna switch Module邏輯控制電壓
- Check Antenna switch module logical control voltage
- 使用示波器量測下圖所標 腳位的電壓是否符合右下列表
- Use oscilloscope test below pins voltage if they match the right bottom table



SKY77590 control logic table

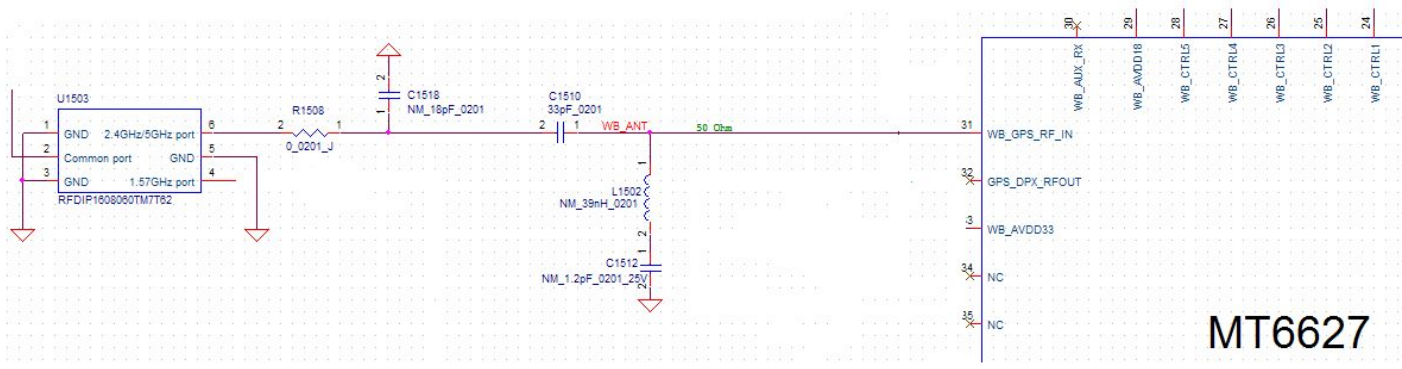
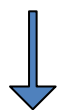
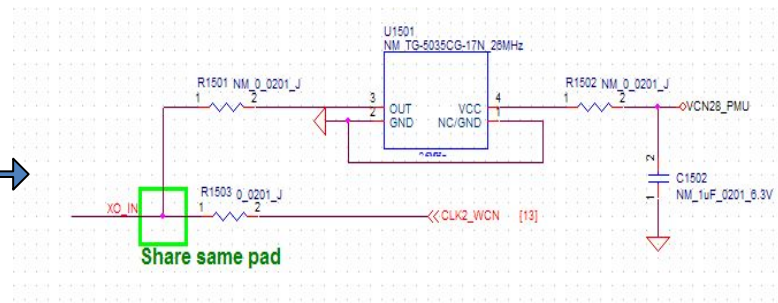
	Enable	VctC	VctA	VctB
LB_GMSK_TX	H	L	L	H
HB_GMSK_TX	H	L	H	H
LB_EDGE_TX	H	H	L	H
HB_EDGE_TX	H	H	H	H
TRX1 [2G_HB]	L	H	L	L
TRX2 [2G_LB]	L	H	H	L
TRX3 [3G_B1]	L	H	L	H

WIFI/BT/GPS

WIFI/BT/GPS IC: MTK MT6627

BT/WIFI:

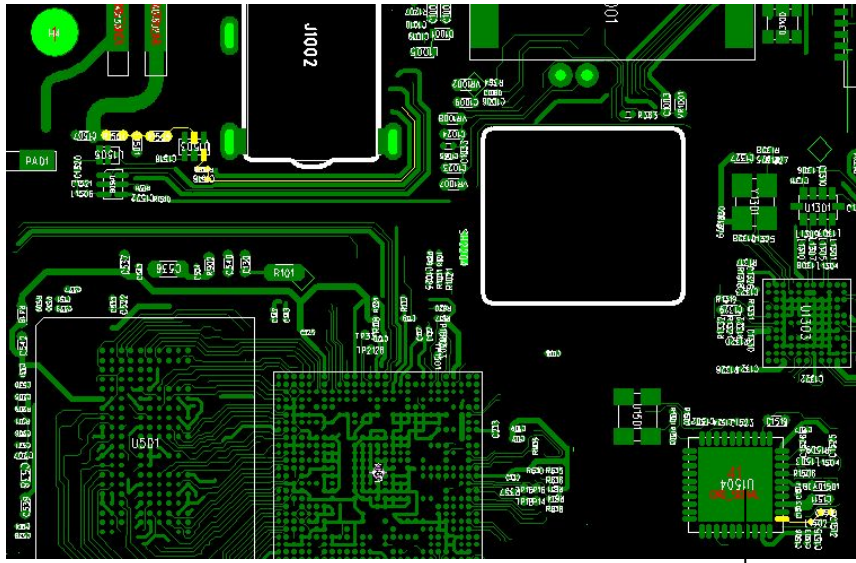
- 1. Check whether the antenna of BT\WIFI damaged
- 2. Check whether BT\WIFI R1503 has output frequency of 26M (co _ clock design)
- 3. Check BT\WIFI TRX path



MT6627

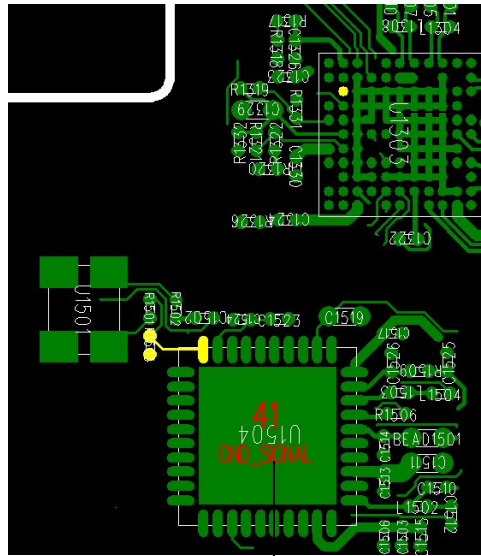
WIFI/BT/GPS

BT/WIFI TRX path :



MT6627 U1504

Co_clock design :



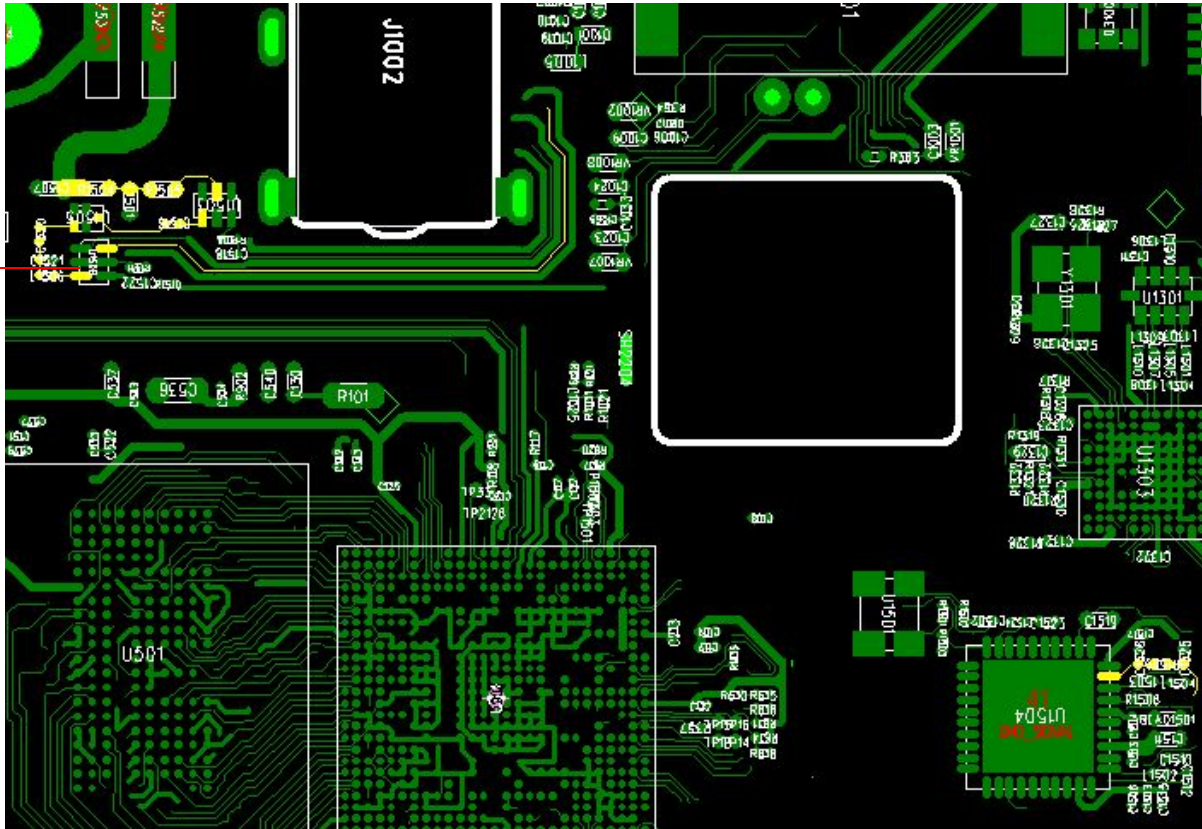
MT6166
U1303

MT6627 U1504

WIFI/BT/GPS

GPS RX path

U1506



MT6627 U1504

Thank You !