XT1225/XT1254
BASEBAND TROUBLESHOOTING GUIDE

Sept 18, 2014

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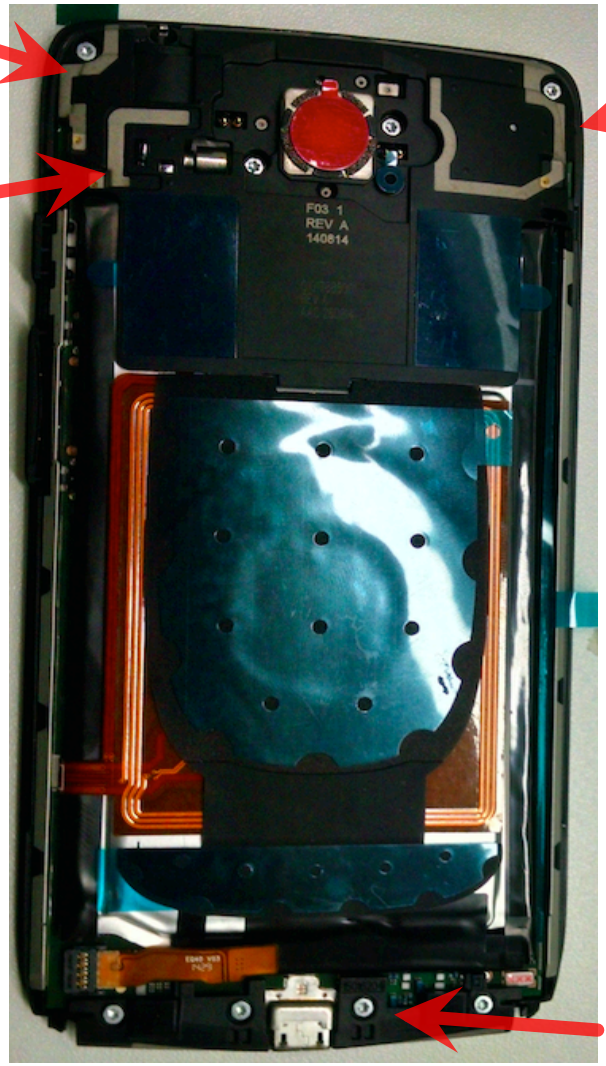
Antenna Locations

GPS Rx Only

Diversity Rx Only

BT/WLAN Tx/Rx

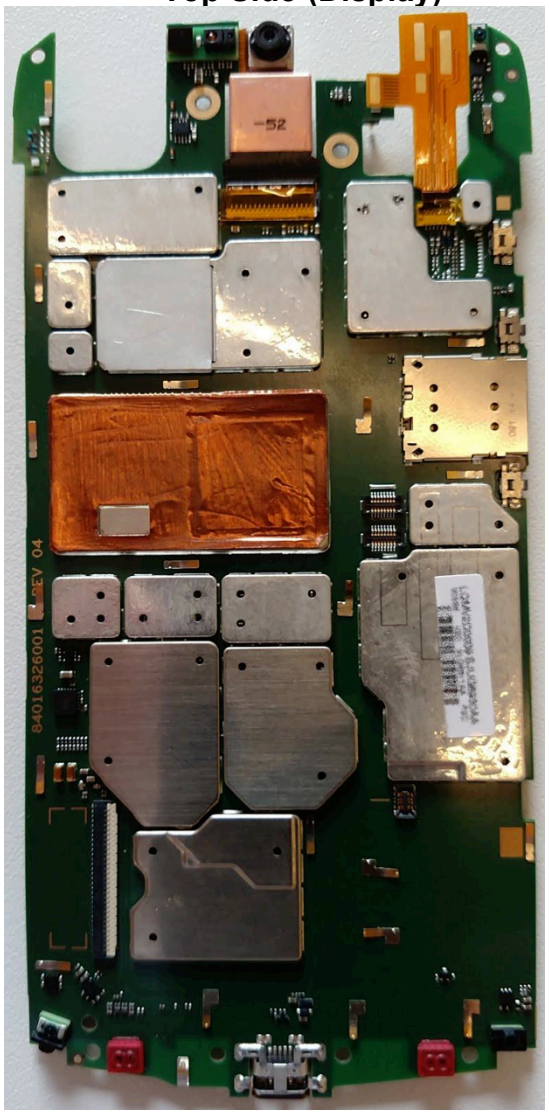


Main Antenna Tx/Rx

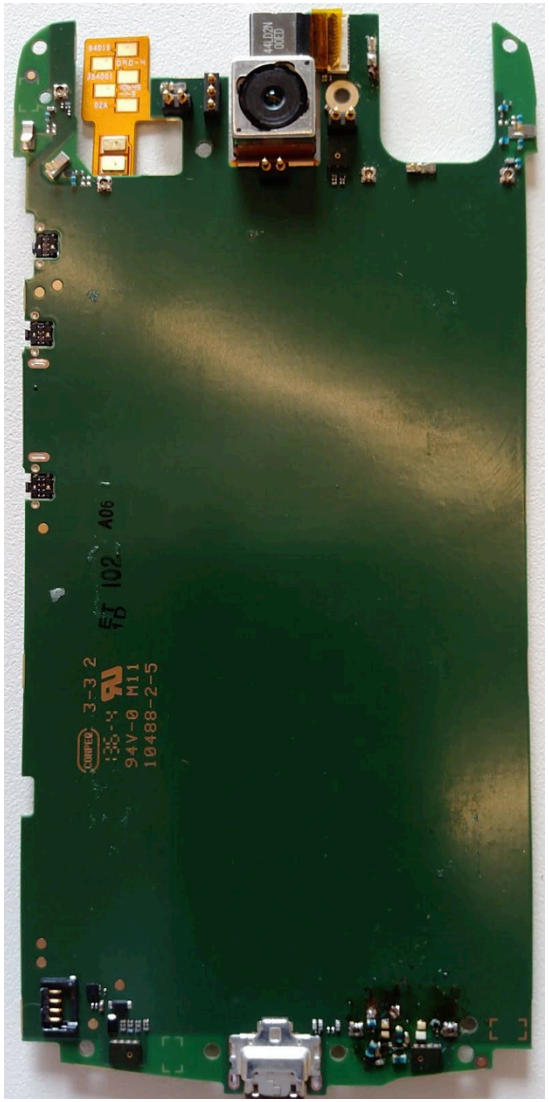
SNAPSHOTS/PLOTS OF MAIN BOARD

Snapshots of Main PCB

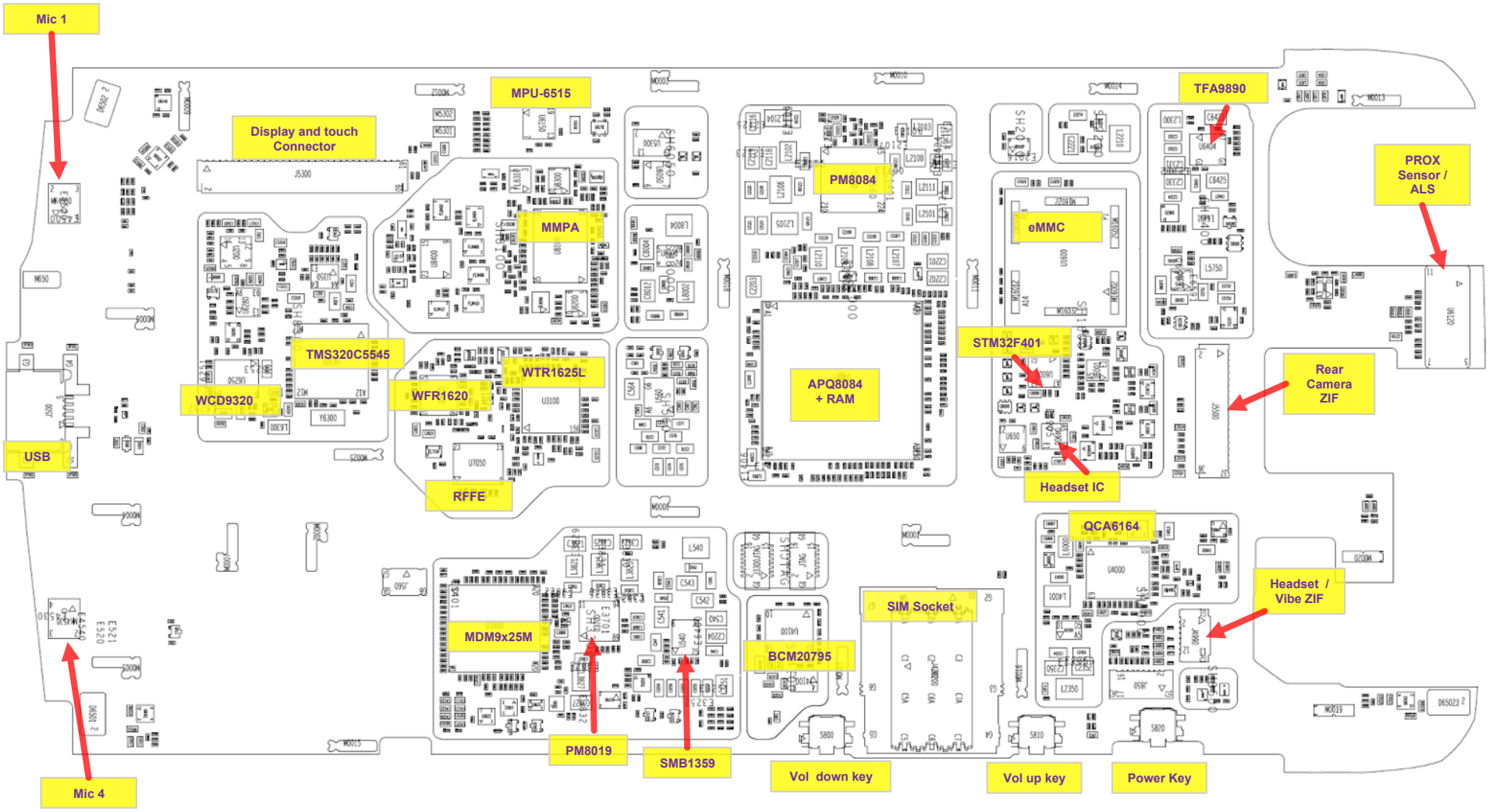
Top Side (Display)



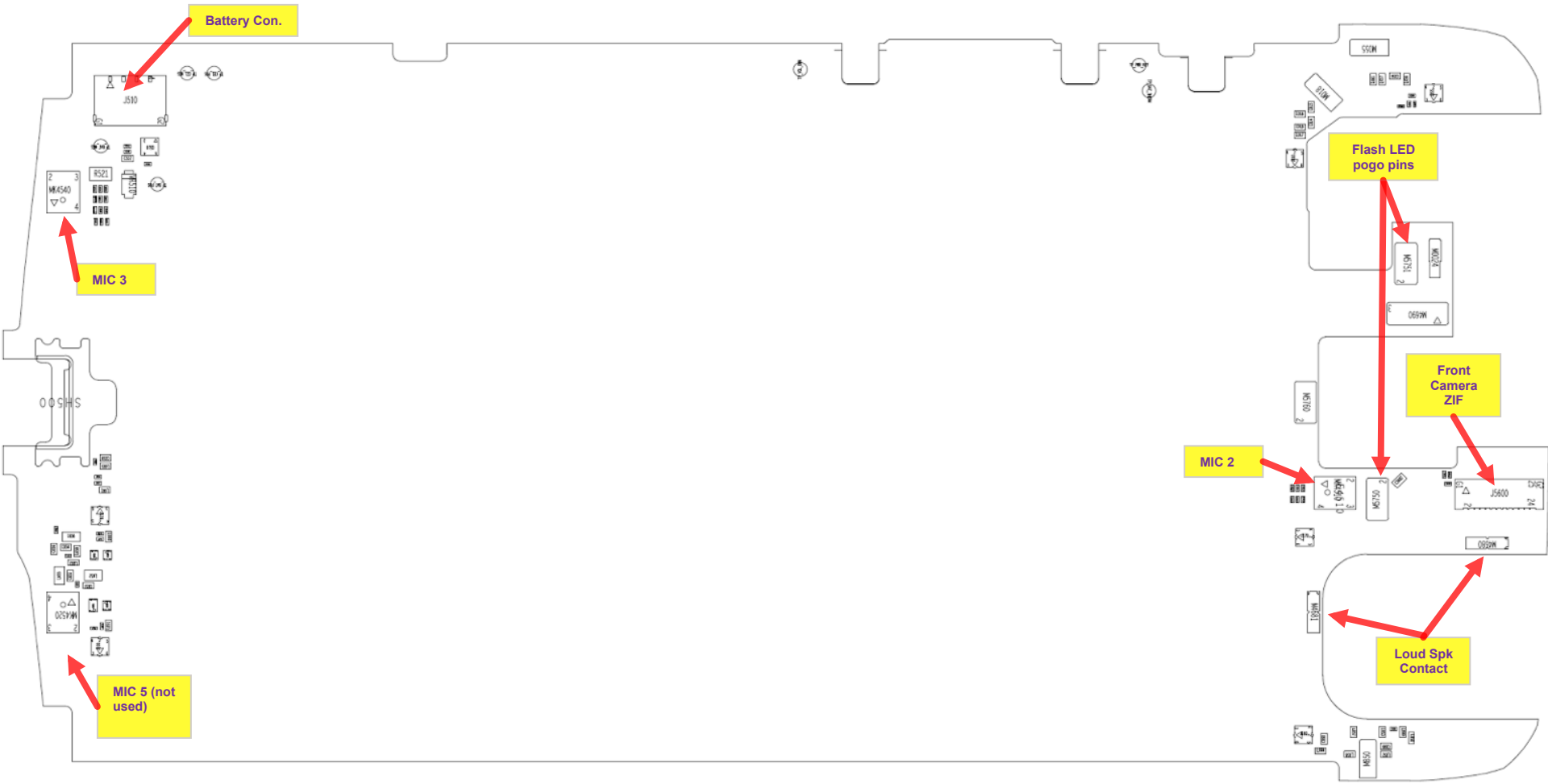
Bottom Side (Battery)



Main Board – Top Placement



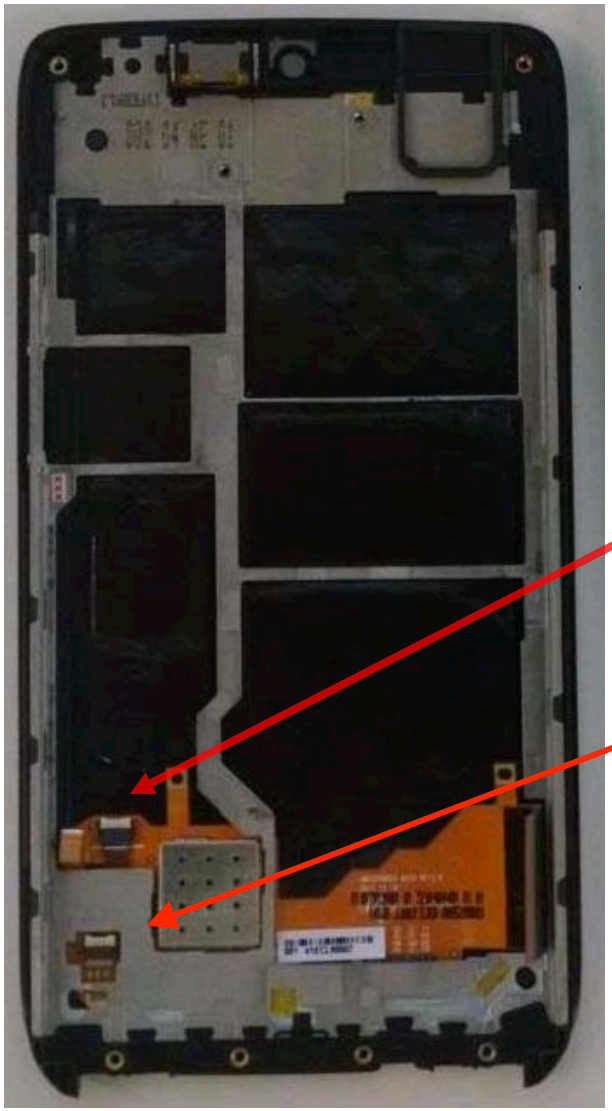
Main Board – Bottom Placement



TOUCH TROUBLESHOOTING

Main Board – Location of LCD and touch ZIF connectors

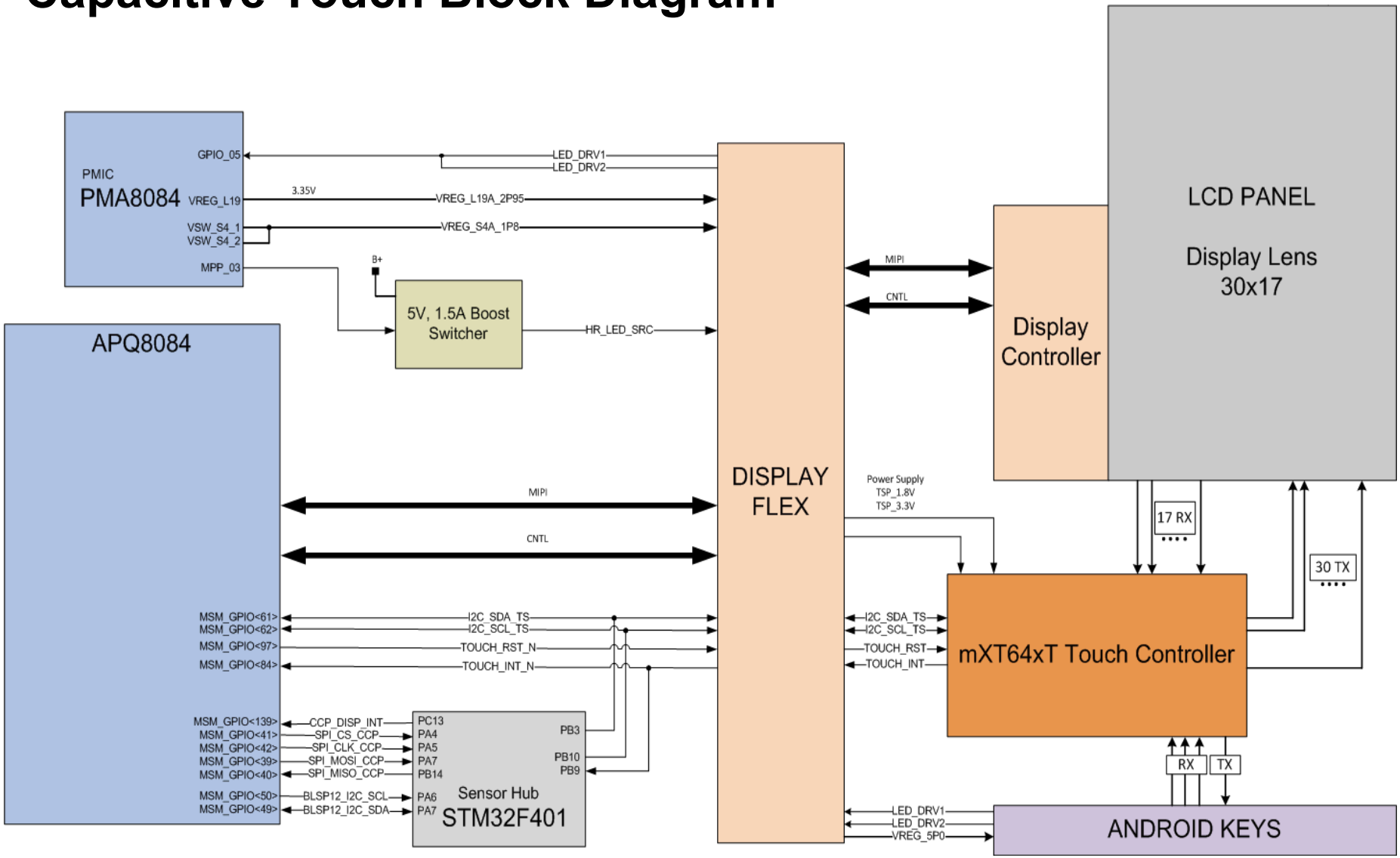
Display ZIF



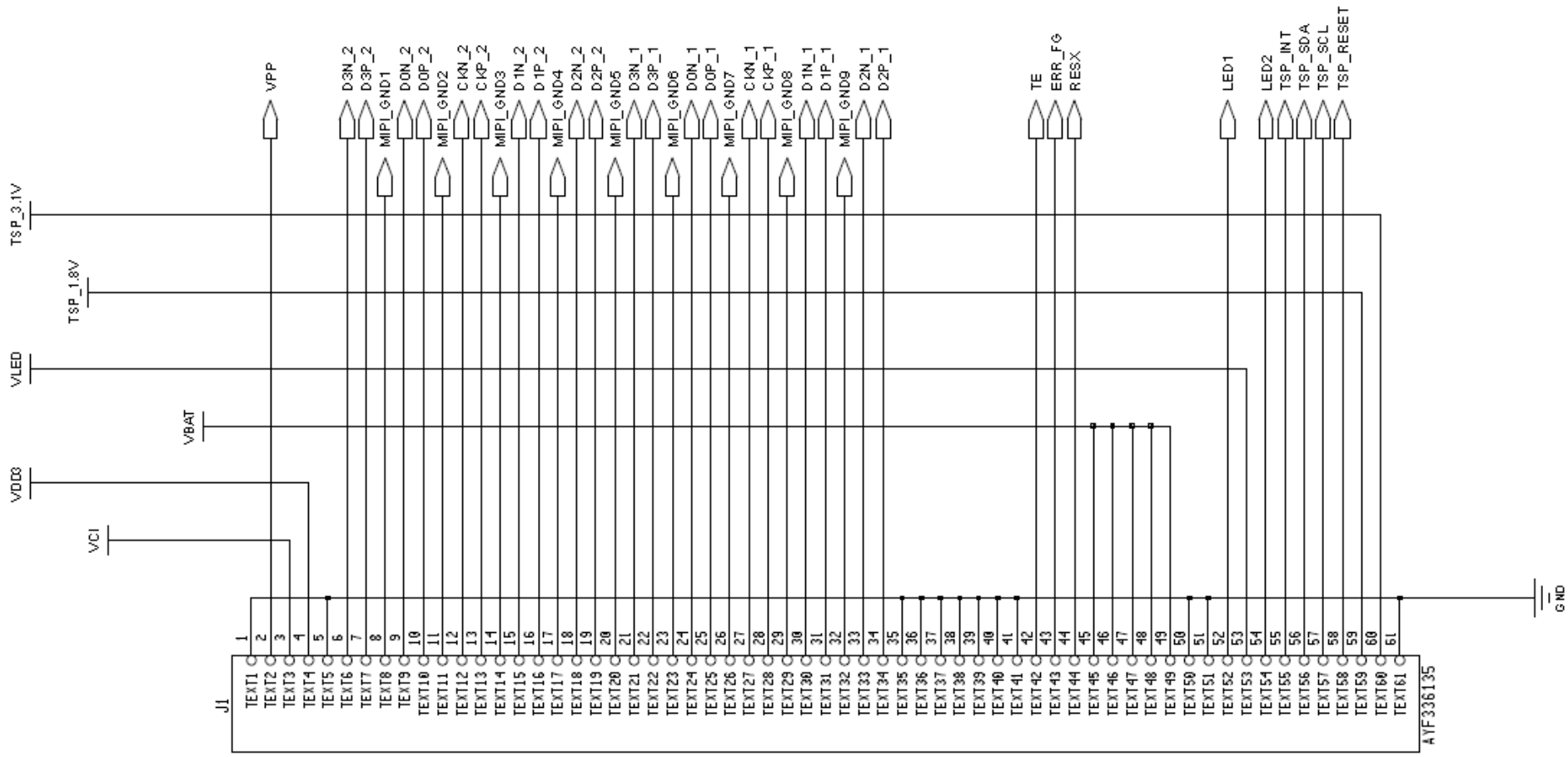
Touch ZIF

TSB ZIF

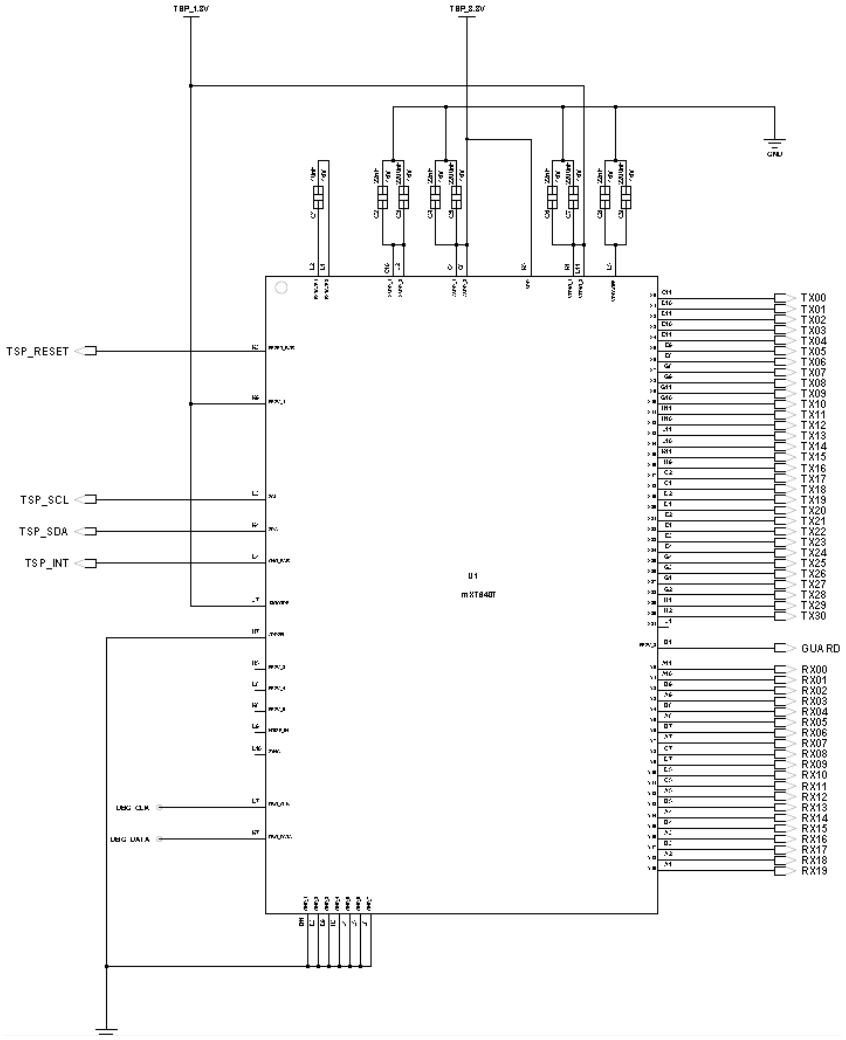
Capacitive Touch Block Diagram

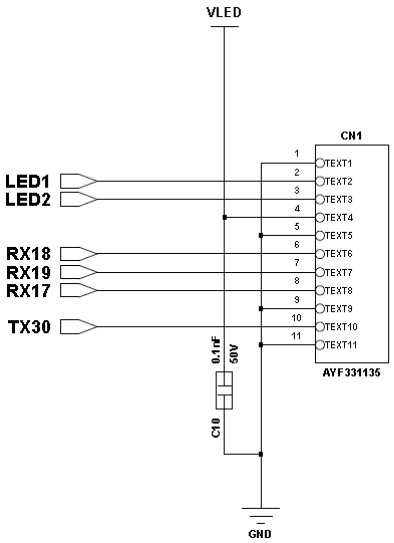


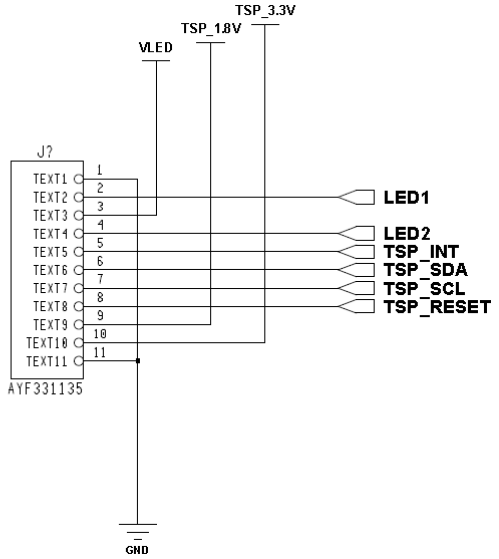
Display/Touch Connector



Touch IC Schematic







Touch Troubleshooting

1. No Touch response when display touched
    - Swap display panels with known good panel. If touch works, problem with display flex or IC (Go to 3). If still not working, problem with main board (Go to 2).

2. Main Board Issue
    - Check touch connector for proper insertion of flex.
    - Ensure 3.2VDC power is at the display ZIF.
    - Verify Reset signal is high, IRQ is high.
    - I2C Data and I2C Clock at 1.8VDC.

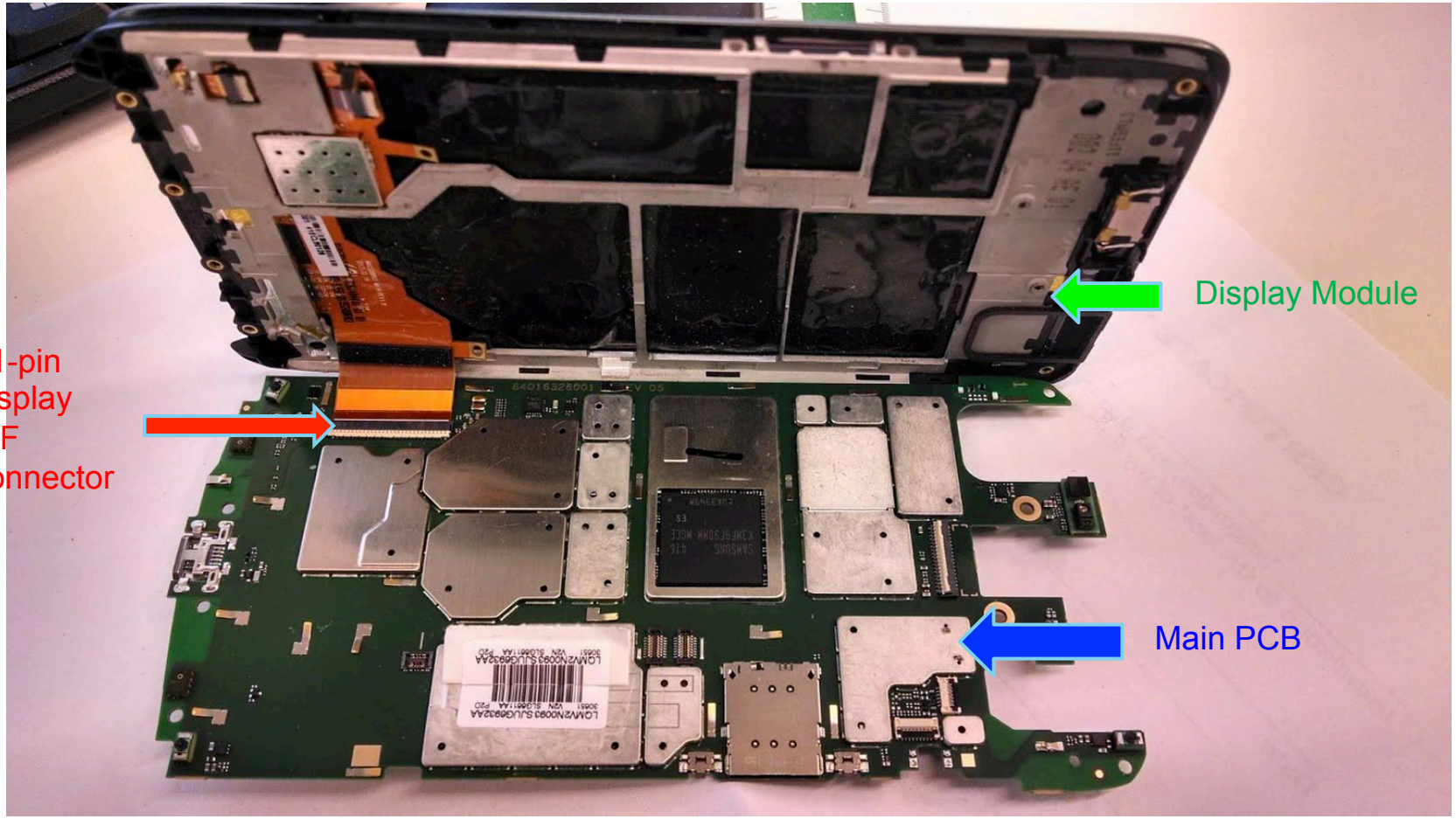
3. Display panel issue
    - Check Touch flex for any damage.
    - Ensure 3.2VDC and 1.8 VDC supplies are at the touch ZIF.
    - Verify Reset signal is high, IRQ is high, I2C Data and Clock at 1.8VDC.
    - When touching panel, INT should toggle low, I2C data and clk will toggle.

DISPLAY TROUBLESHOOTING

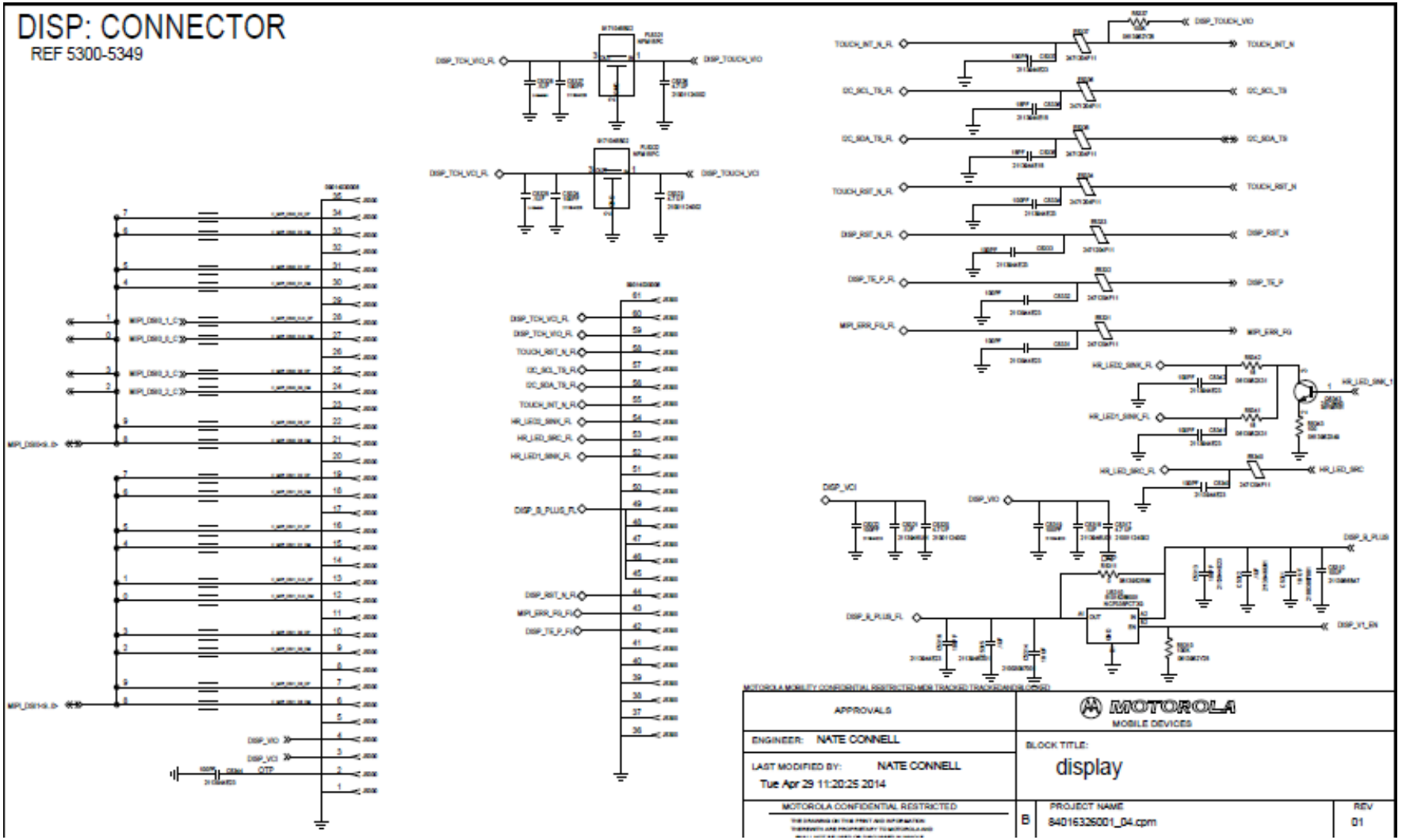
Display

- This display is a color Active Matrix Organic Light Emitting Diode (AMOLED) of glass construction with White pixels on a Black background.
- The display consists of high density pixels with a color depth of 16.7M colors (24 bpp). The display interface is two MIPI DSI ports MIPI in command mode.
- Chip-on-glass (COG) with the driver located at bottom front of panel.
- 2 LEDs on flex for android key backlighting.
- Display operates in MIPI command mode with onboard RAM.

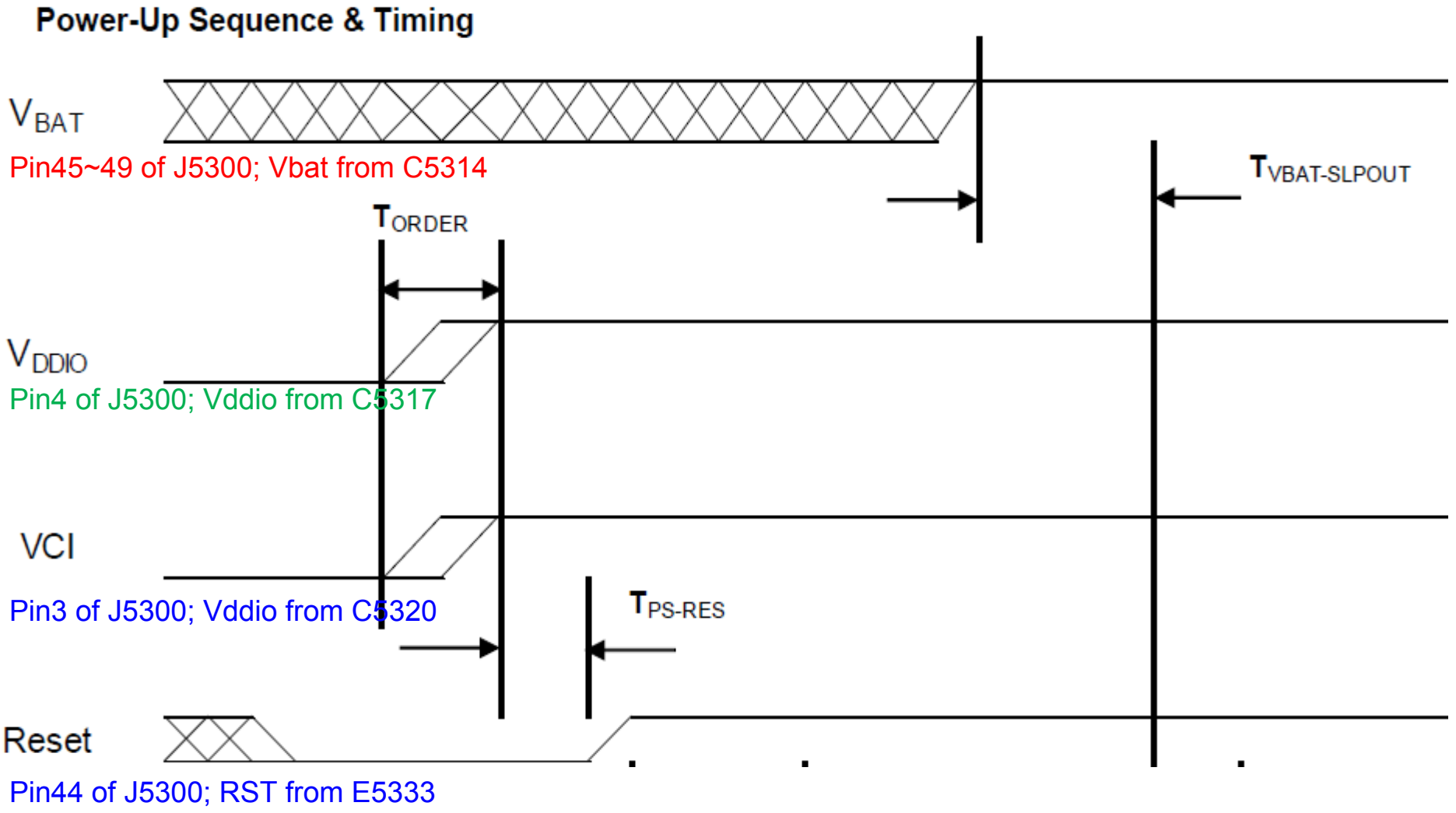
Assembly



Display Main Schematic



Power-up Sequence

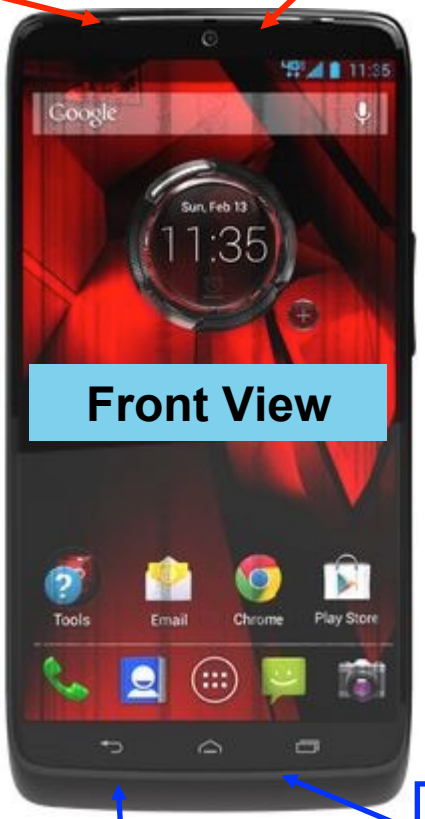


Display Troubleshooting

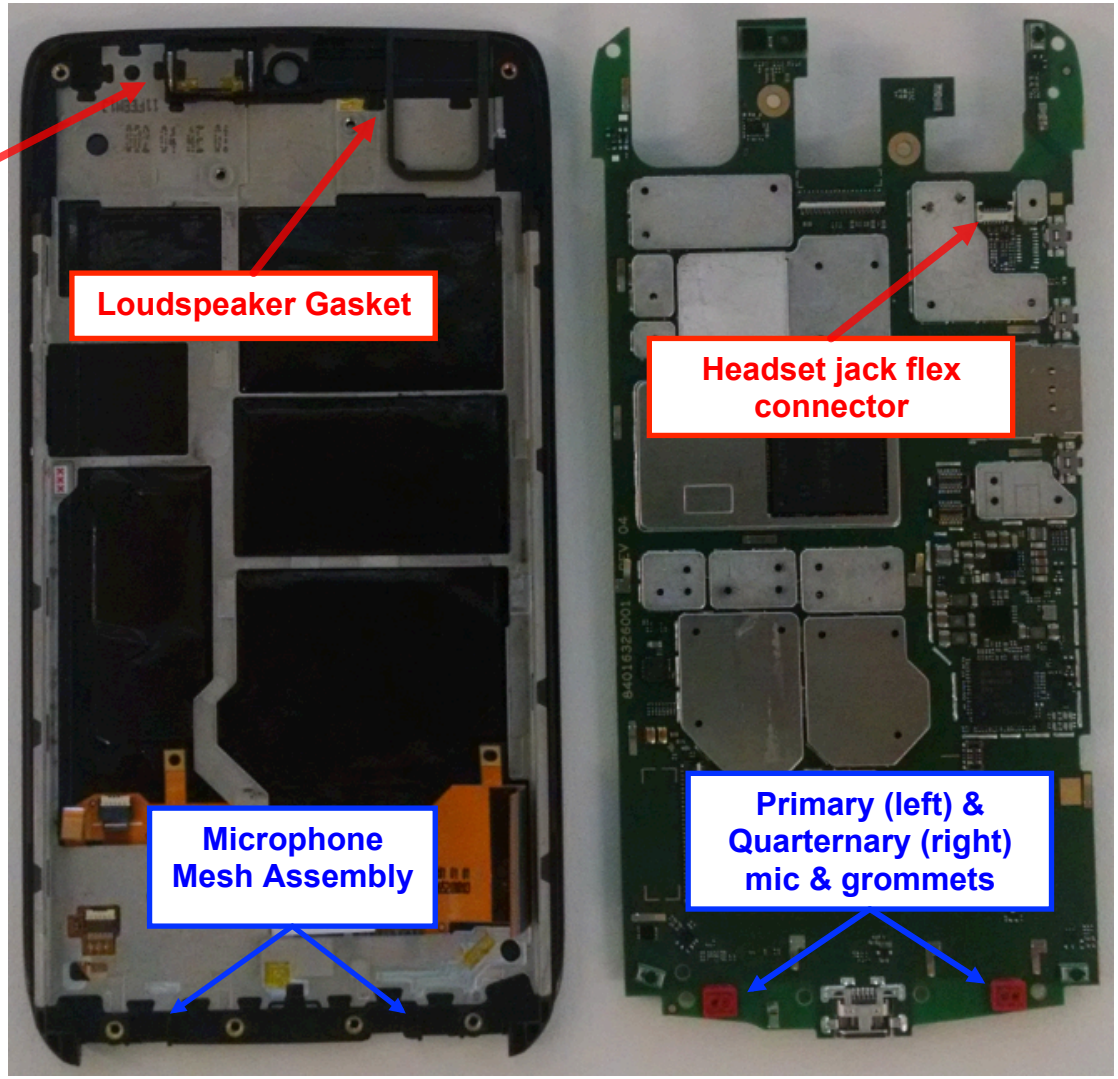
- Check 61pin display ZIF connector
  1. Properly inserted
  2. Any damage to ZIF receptacle on main PCB or plug on disp flex tail
  3. Swap in known good main PCB or good disp module to see if issue follows main PCB or display flex
- If the issue follows main PCB
  1. Check DISP_B_PLUS (Vbat) voltage (3.15 to 4.4VDC) at Pin45~49 of J5300
  2. Check DISP_VIO voltage (1.8VDC) at Pin4 of J5300
  3. Check DISP_VCI voltage (3.1VDC) at Pin3 of J5300
  4. Check above 3 voltages after phone power up. If they are not turned on, check them during phone power up.
- If the issue follows display module, replace the module.

AUDIO TROUBLESHOOTING

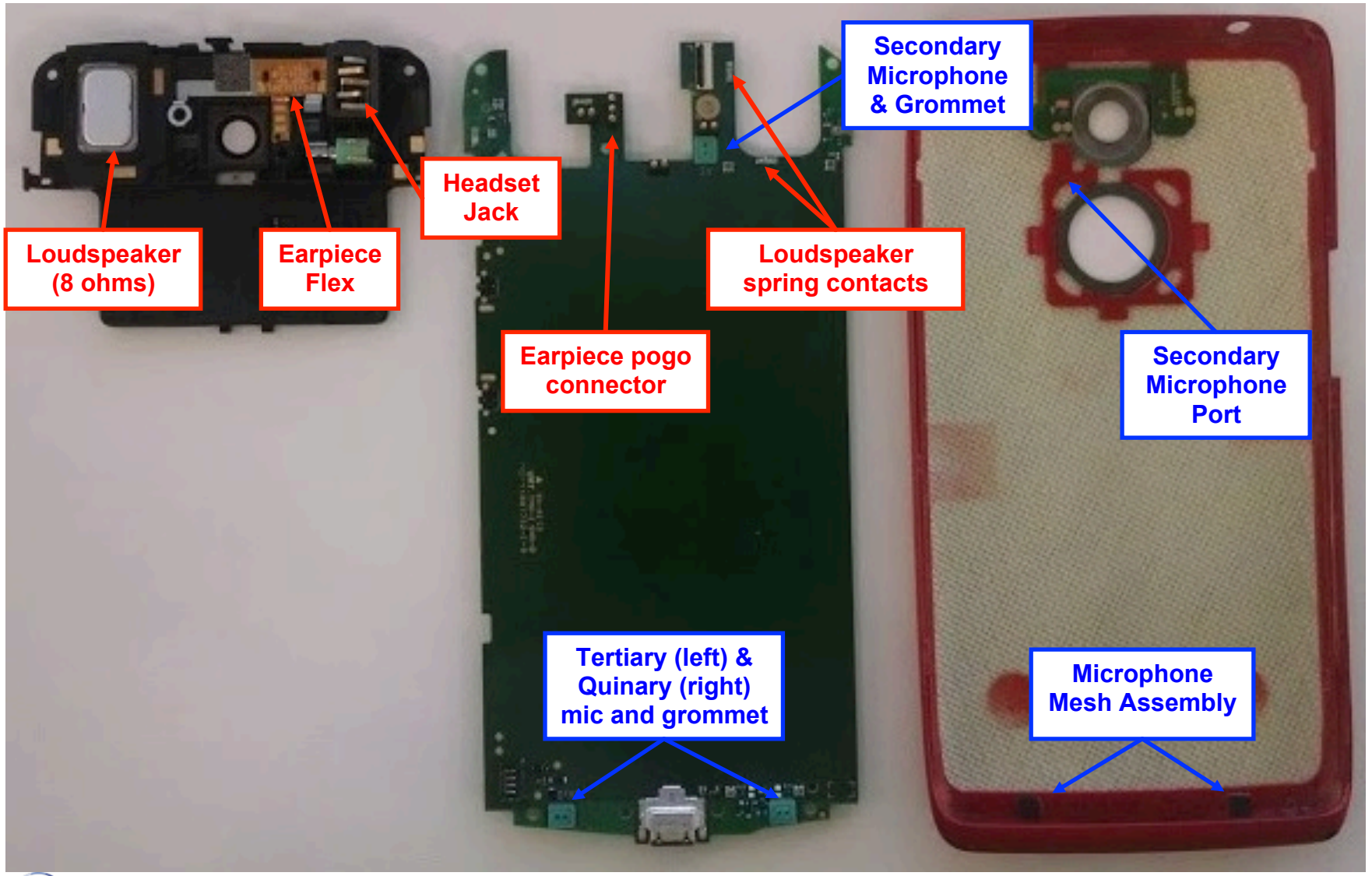
Audio Devices



Audio Devices (PCB View)



Audio Devices (PCB View)



CQA Application

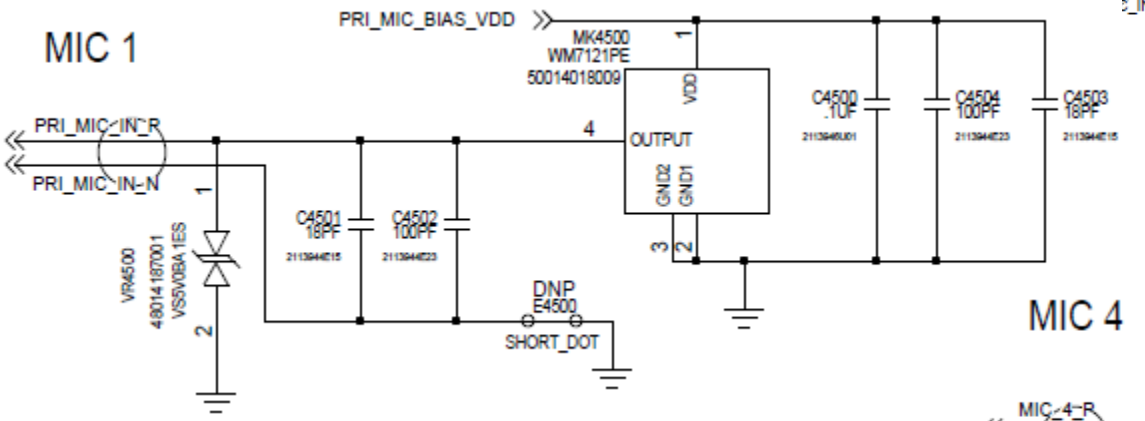
- Launching the CQA app will help resolve and root-cause the vast majority of problems
- **Go to the phone/dialer and enter *#*#2486#*#***
- The CQA main menu will pop-up – select “Start CQA Test in Menu Mode”
- Select the appropriate debug area – for Audio, primarily you will use AUDIO and HEADSET
- The AUDIO CQA area has test capability for both mics, earpiece and loudspeaker
- The HEADSET CQA area should be used to debug any detection, or lack of audio on the headset jack path

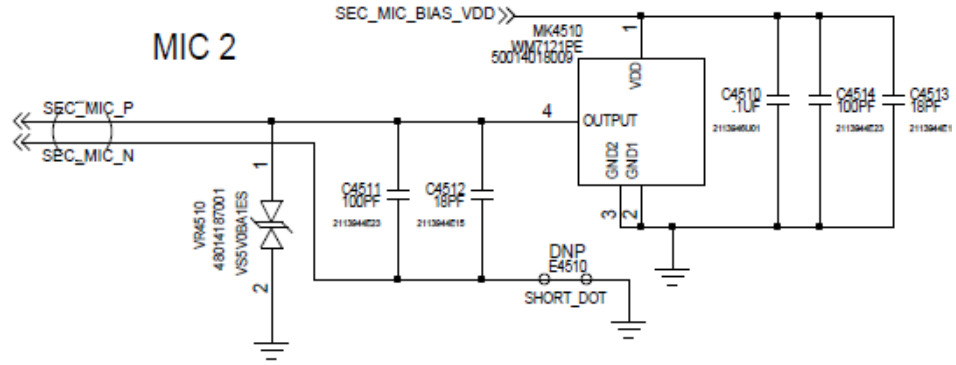
“No Audio” Complaints

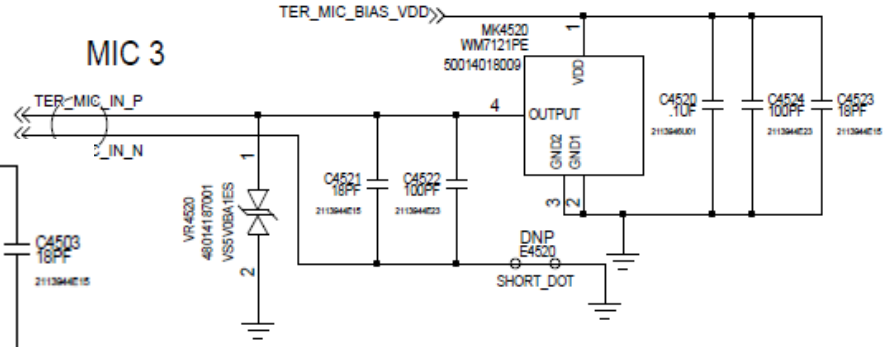
- The CQA apk can be used to verify a broken audio path. Under the “Audio” menu, select “Mic Loopback”.
  - The “PRIMARY MIC” setting allows a mic1 to earpiece loopback **(recommended)**
    - Note* - The “DEFAULT MIC” setting also allows this, if a headset device is not plugged in.
  - The “SECONDARY MIC” setting loops mic2 to the earpiece, and so on.
  - *NOTE* The “SECONDARY MIC LPA” path does not exist in HW and will not loopback any audio.

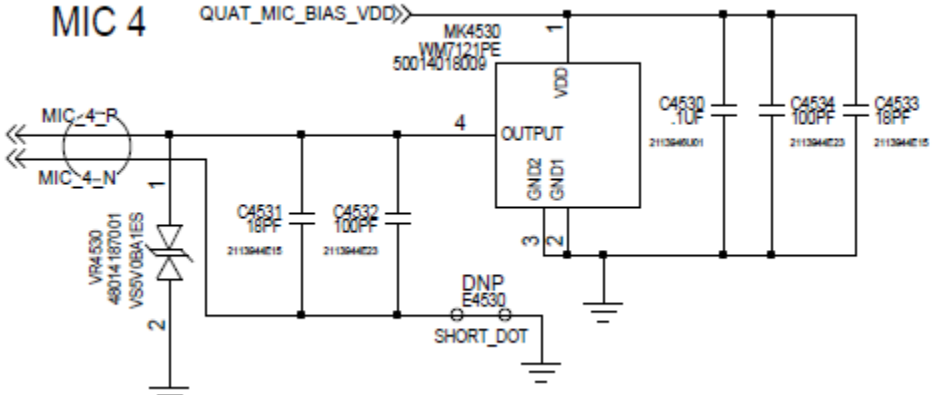
- If both of those are not functional, the earpiece speaker path is likely damaged. In the “AUDIO” menu of the CQA apk, select “Ear Speaker” and then “Play Harvard speech pattern” and/or “Buzz Sweep”.
- The loudspeaker can be tested by selecting “Loudspeaker” via the CQA apk. A musical composition should start playing and be easily heard.
- If audio is not present on the HEADSET path, select the “Headset” entry in the main menu of the CQA app, then plug-in the headset device to view whether the lack of audio is a detection-cycling issue or other anomaly.

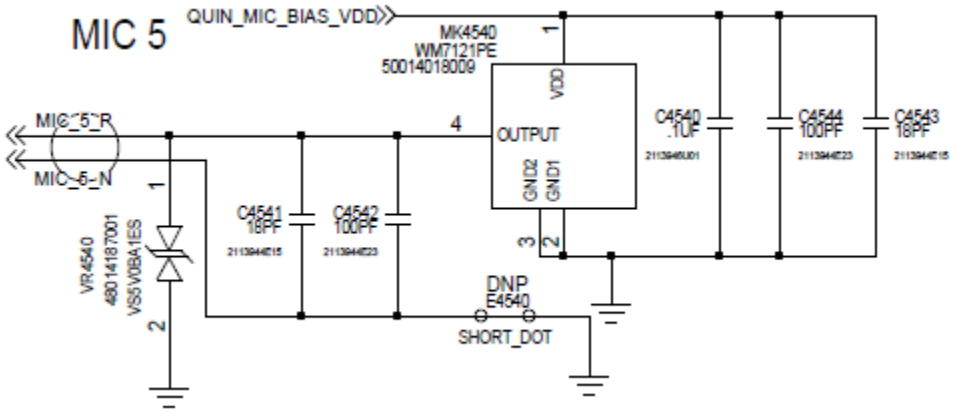
Microphones









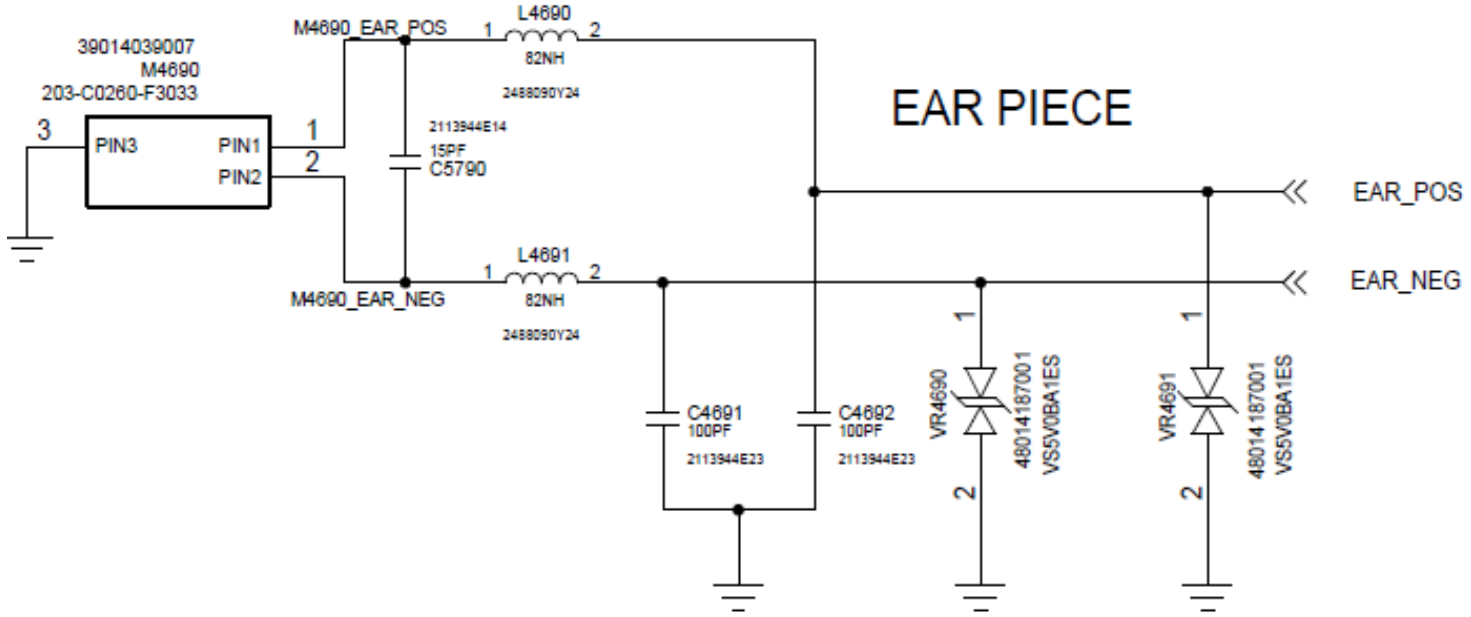


Microphones Troubleshooting

If a mic is not functioning…

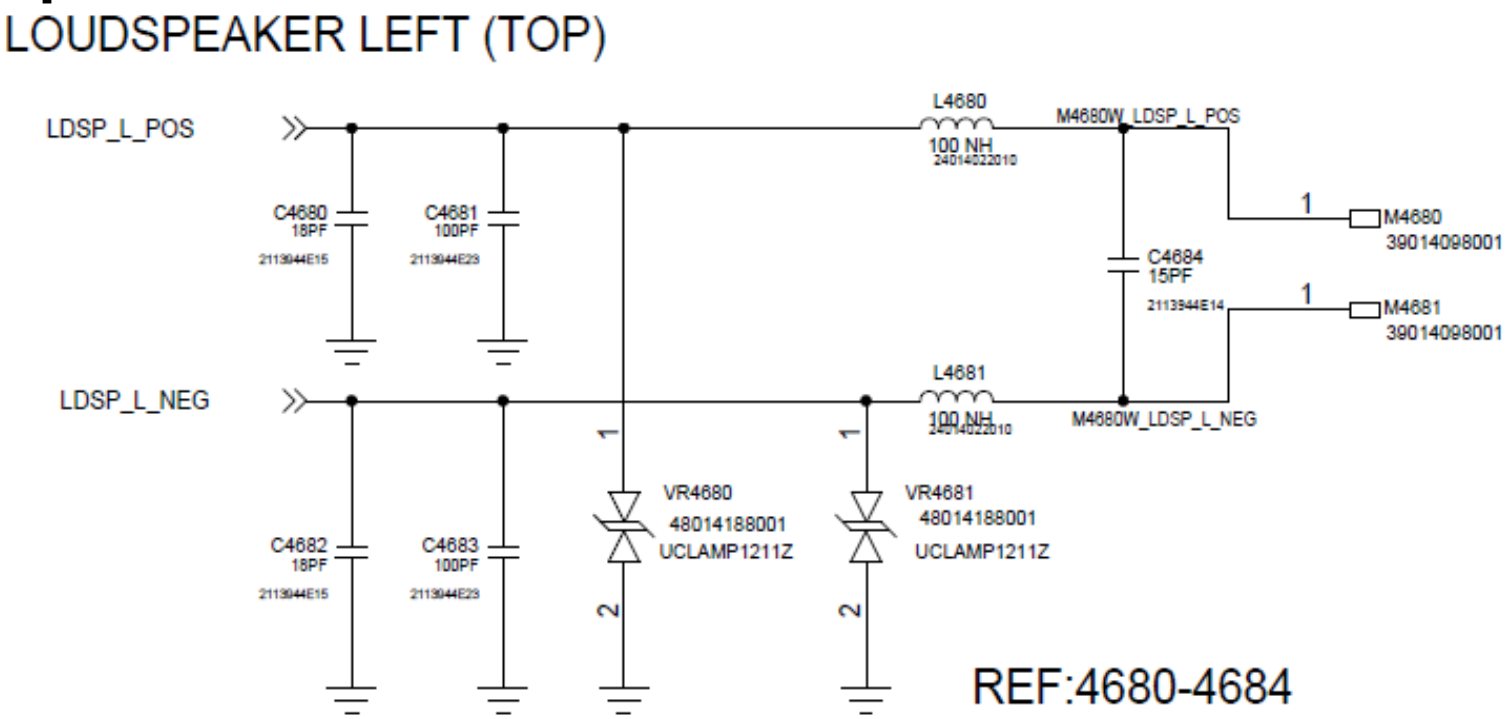
- Check to make sure the microphone and mic ports are not blocked.
- Check to make sure the mic gasket and mic grommets are seated properly.
- Check the microphone for diaphragm debris indicating a shattered diaphragm. Look under a microscope to view inside the microphone port for damage or debris.
- Check to make sure none of the capacitors on the mic lines are shorted or damaged.
- Check the mic bias C4500 (Mic1), C4510 (Mic2), C4520 (Mic3), C4530 (Mic4), C4540 (Mic5). The mic bias should be 2.8V when the microphone is enabled.
- If the failure is no microphone audio, check mic loopback through CQA at the board level with a display connected. (Mic loopback may be easier to check with a headset plugged in)
- If there is no audio during mic loopback, inject a 35mVrms, 1kHz sine wave onto the MIC_IN_P side of C4501 (Mic1), C4511 (Mic2), C4521 (Mic3), C4531 (Mic4), C4541 (Mic5) and listen for the tone during loopback. If you can hear the tone now, you know either the mic is bad, or there's a process defect with the mic-to-PCB connection.
- X-ray the mic to check for process defects.
- If there is an issue with Mic5 LPA path, also check U6281 and the components around it for process defects.

Earpiece Speaker (Handset Mode DOWNLINK)



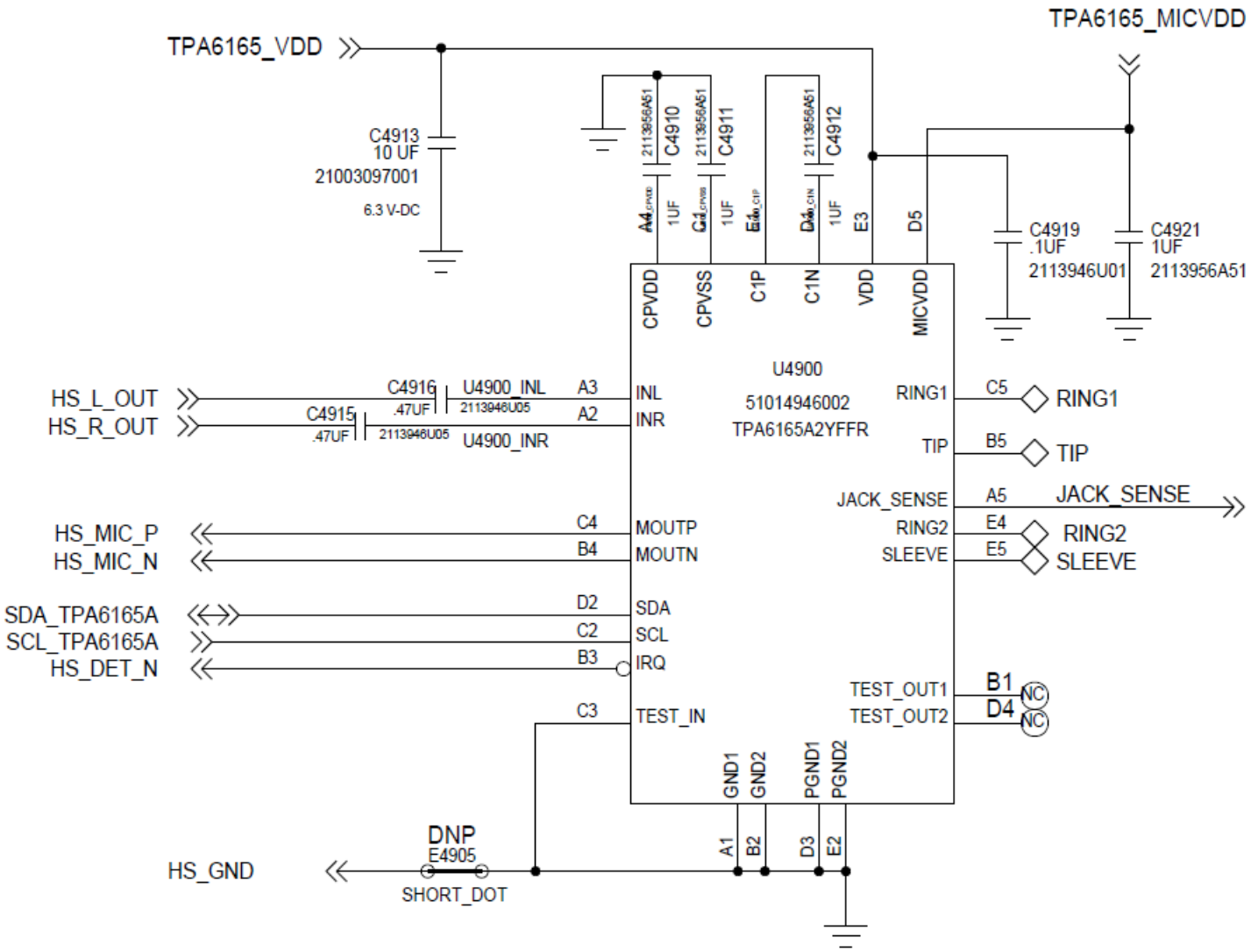
- Check that the impedance of the earpiece speaker is 32 ohms, and that the spring contacts are not bent.
- Check that the earpiece flex is seated properly in the top carrier with no debris on it. You should also be able to see slight imprints in the gold pads where both the speaker contacts and PCB pogo contacts were touching the flex.
- Check that the earpiece pogo connector on the PCB is seated properly with no bent or stuck pogos.
- Check that L4690 and L4691 are not damaged or skewed. Also check C4691, C4692, C5790, VR4690 and CR4691 for any placement issues.

Loudspeaker

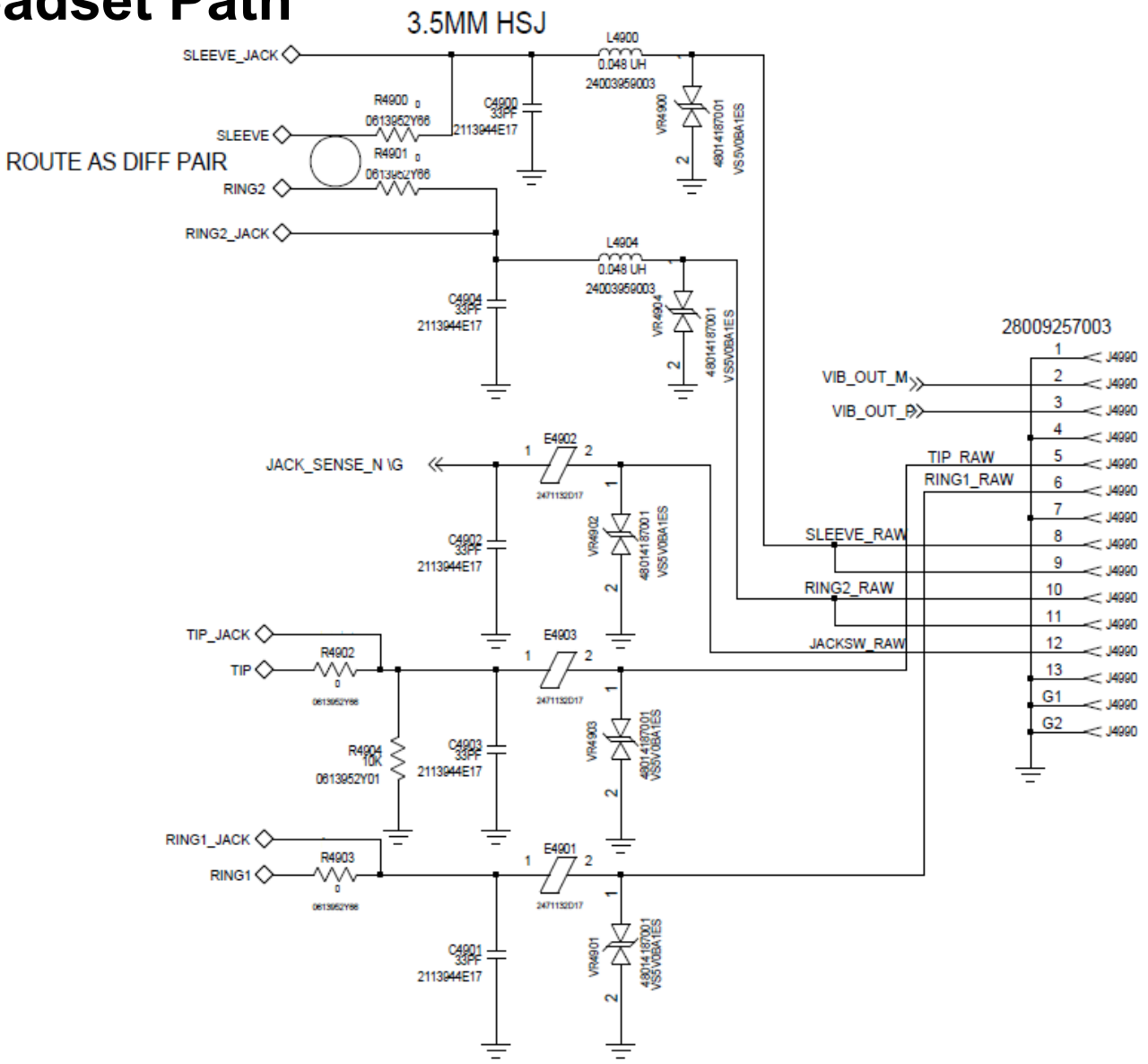


- Verify the impedance of the loudspeaker is 8 ohms.
- Verify the loudspeaker gasket is placed correctly.
- Lack of mechanical contact should also be checked (bent loudspeaker pins on PCB).
- Make sure L4680 and L4681 are not skewed or damaged.
- Check C4684, C4680, C4681, C4682, C4683, VR4680, and VR4681 for any placement issues.

3.5mm Headset Path



3.5mm Headset Path



3.5mm Headset Troubleshooting

- Check the pins on the headset jack for any bent pins or missing pins (Top Carrier)
- Check to make sure the headset jack flex is properly aligned and fully inserted into the zif connector on the PCB.

- **On the PCB:**
  - Series components L4900, E4901, E4903, and L4904 must be physically placed and measured using a DMM. Replace if any are found to be open circuit.
  - ESD Diodes VR4900, VR4901, VR4902, VR4903, VR4904 must be open circuit. Measure these with a DMM to ground. If any short circuit is found, replace the ESD diode.
  - Shunt caps C4900, C4901, C4902, C4903, and C4904 must not be shorted across.
  - Resistors R4900, R4901,R4902, and R4903 must be placed. These can be probed with a DMM, where continuity must exist.
  - U4900 must have voltage on the VDD line, and can be probed on C4913 or C4919. This should measure 1.8V nominally.
  - U4900 must have voltage on the MICVDD line (for uplink/headset mic audio to work). This can be probed at C4921. This should measure ~2.8V.

NO POWER UP DEBUGGING

Glossary

AP	APQ	APQ8084	U1000
BP	MDM	MDM	U3300
AP PMIC	PMA8084		U1000
BP PMIC	PM8019		U3700
SMB	Charger		U540
Kung Pow	Factory Kill IC	Battery Pull IC	U650/Q510
B_PLUS	VSYS	System Battery Voltage	
VBUS	USB Voltage	Charger Voltage	

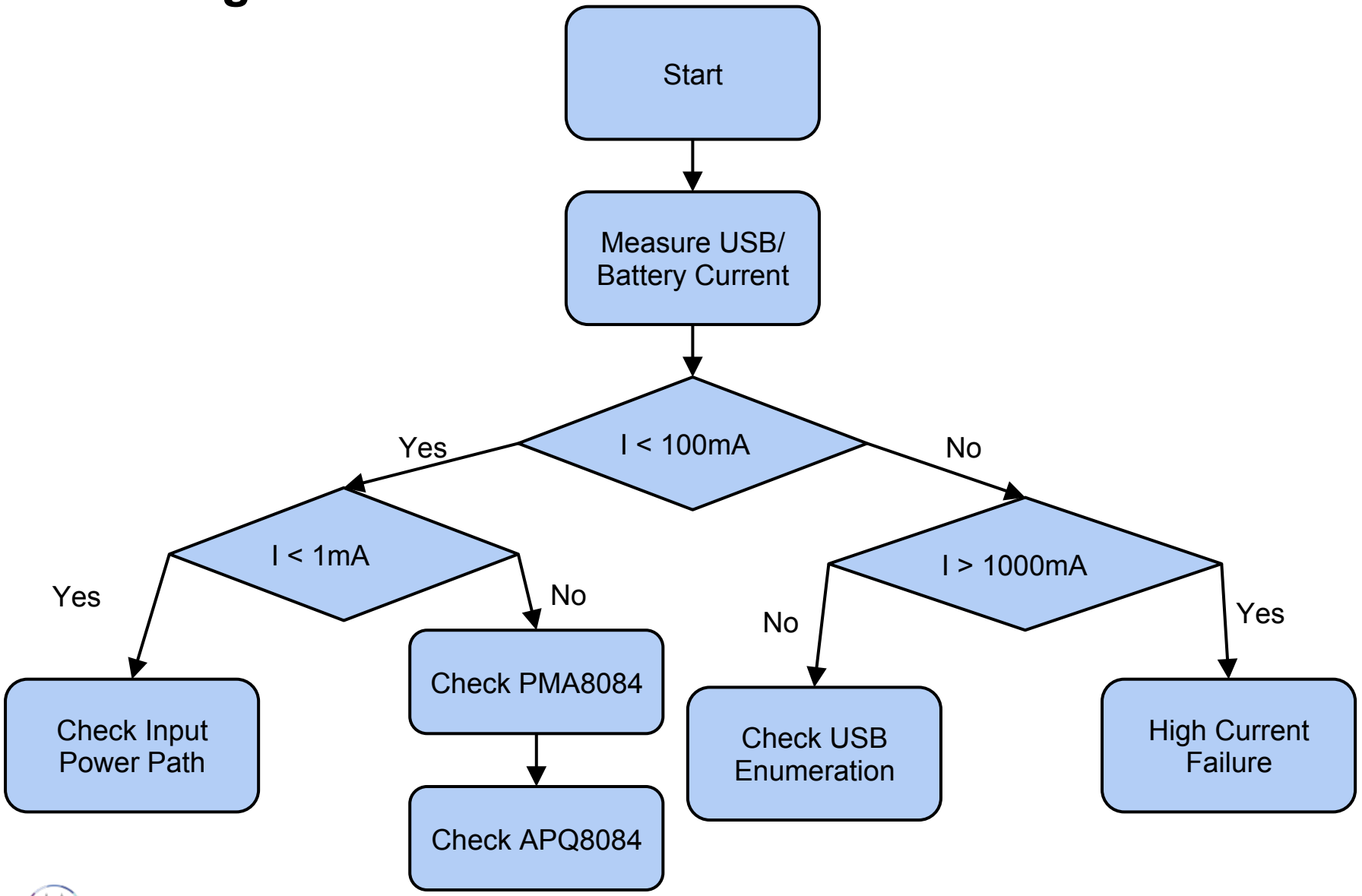
Debug Procedure

- Generally the first step to troubleshooting a no turn on PCB is to look at its boot current. A blank board (no software flashed yet) will normally draw about 60mA at a constant level.
- Also it is helpful to find out what level of functionality is available. These distinct modes were observed:

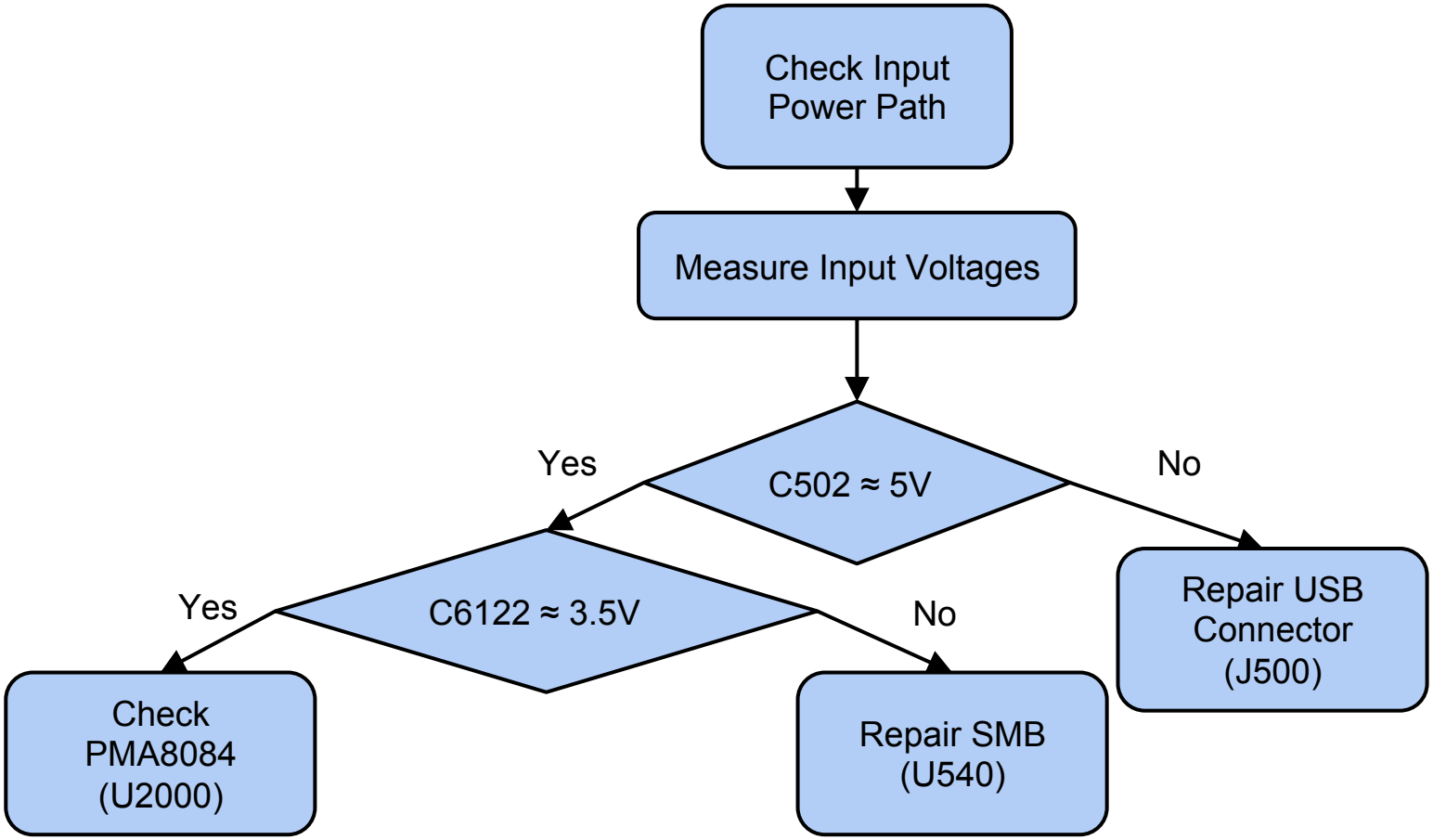
    1. Blank Flash mode
        - Normally will enter this mode for a newly built PCB.
        - Can be forced by shorting debug connector as shown in later slides.
    2. Fastboot mode
        - Normally will enter this mode after blank flashing bootloader into newly built PCB.
        - Can be forced using volume down key
    3. Full Power up
        - Will enumerate to PC as Motorola Network device and ready for board test.

- Failed boards will be able to achieve one of these modes but fail to get to the next. This bit of information is useful for debugging.
- Start with the phone off, then plug in the USB cable. If the phone does not turn on when the USB cable is inserted, there is most likely an issue with the connector.
- If the current is abnormally high for a blank board, the root cause is most likely a short. Going through the power on sequence is helpful for finding shorts, it is shown on the next page.

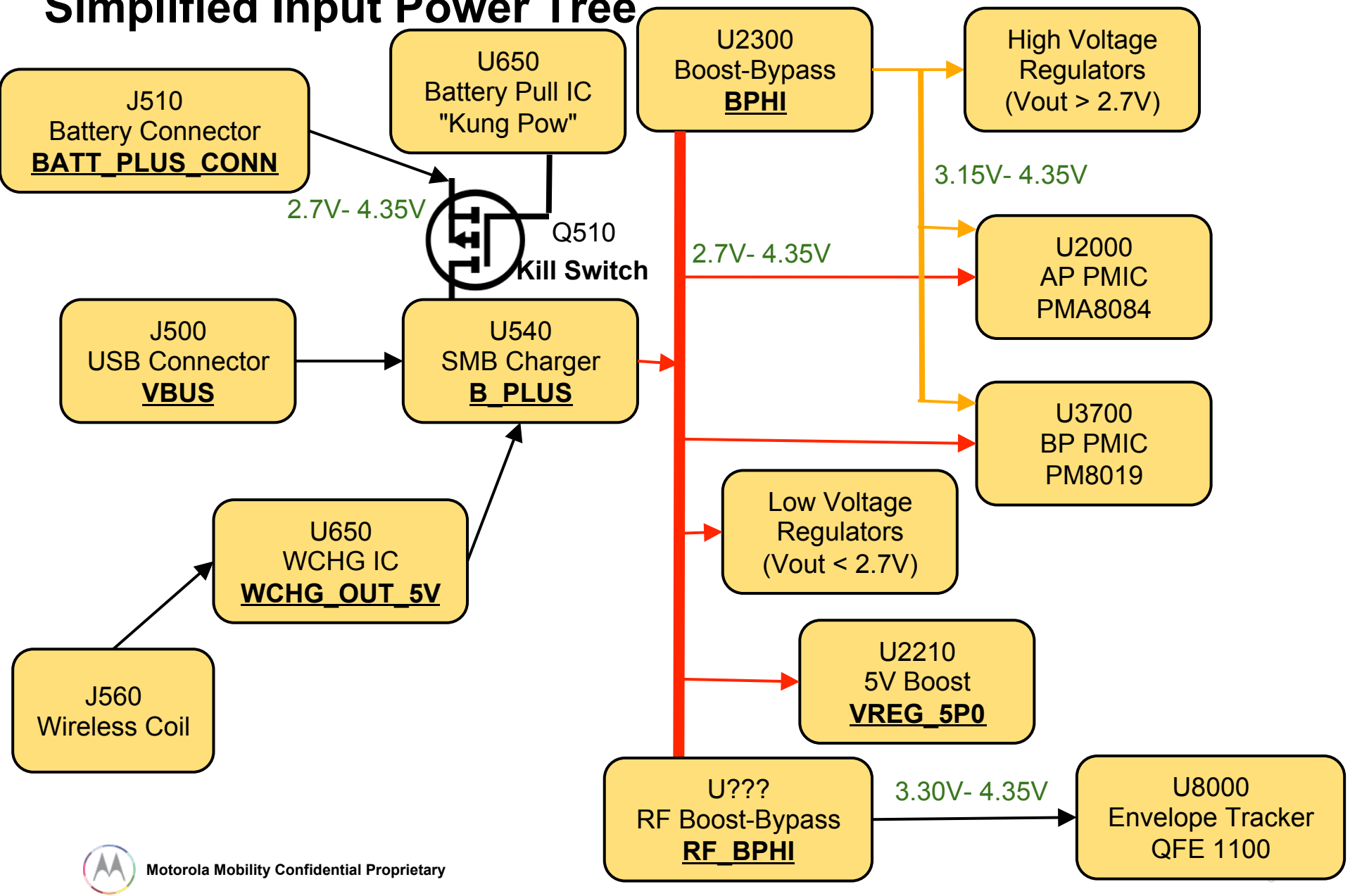
NTO Debug Flow Chart



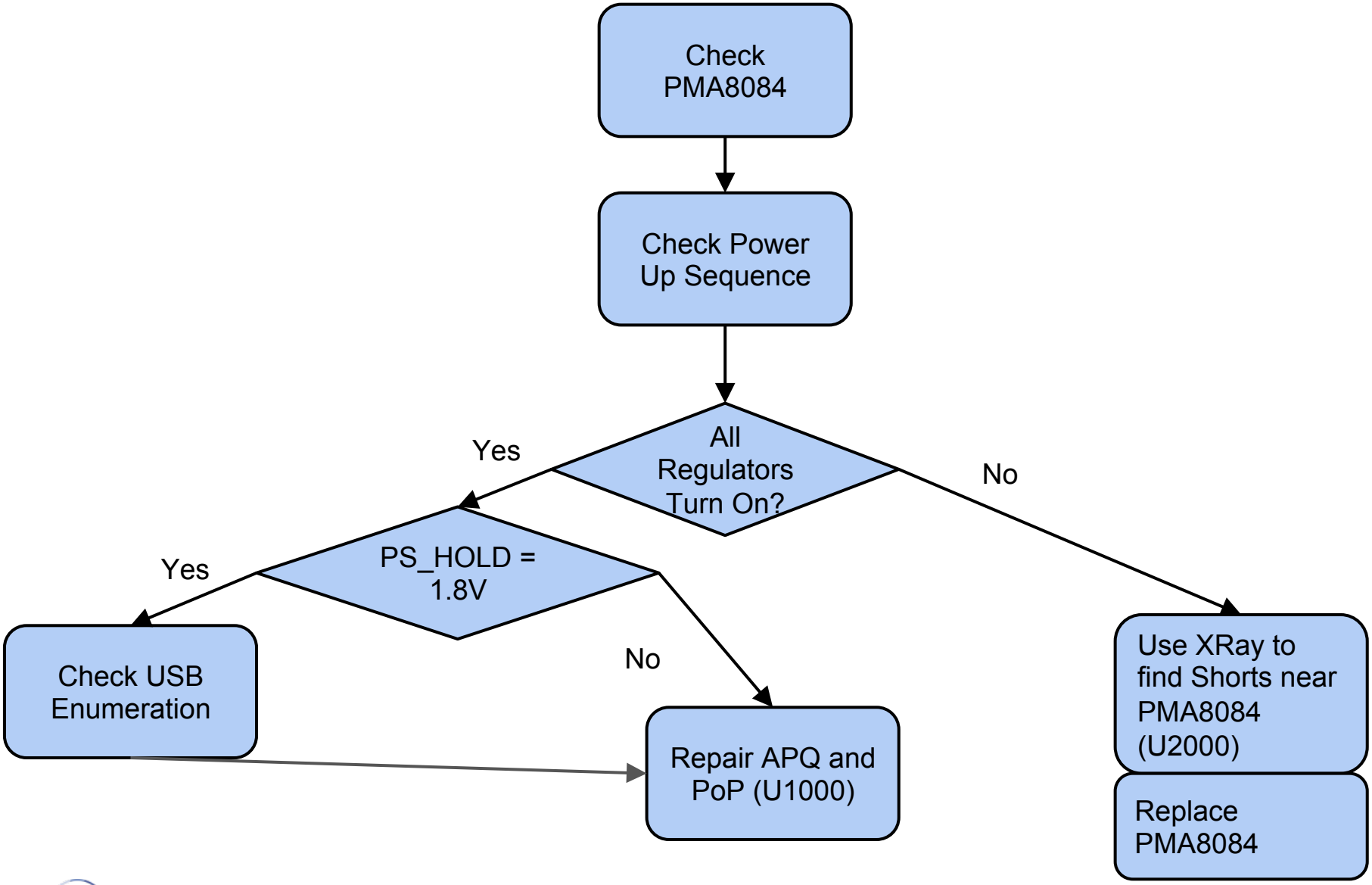
Check Input Power Path



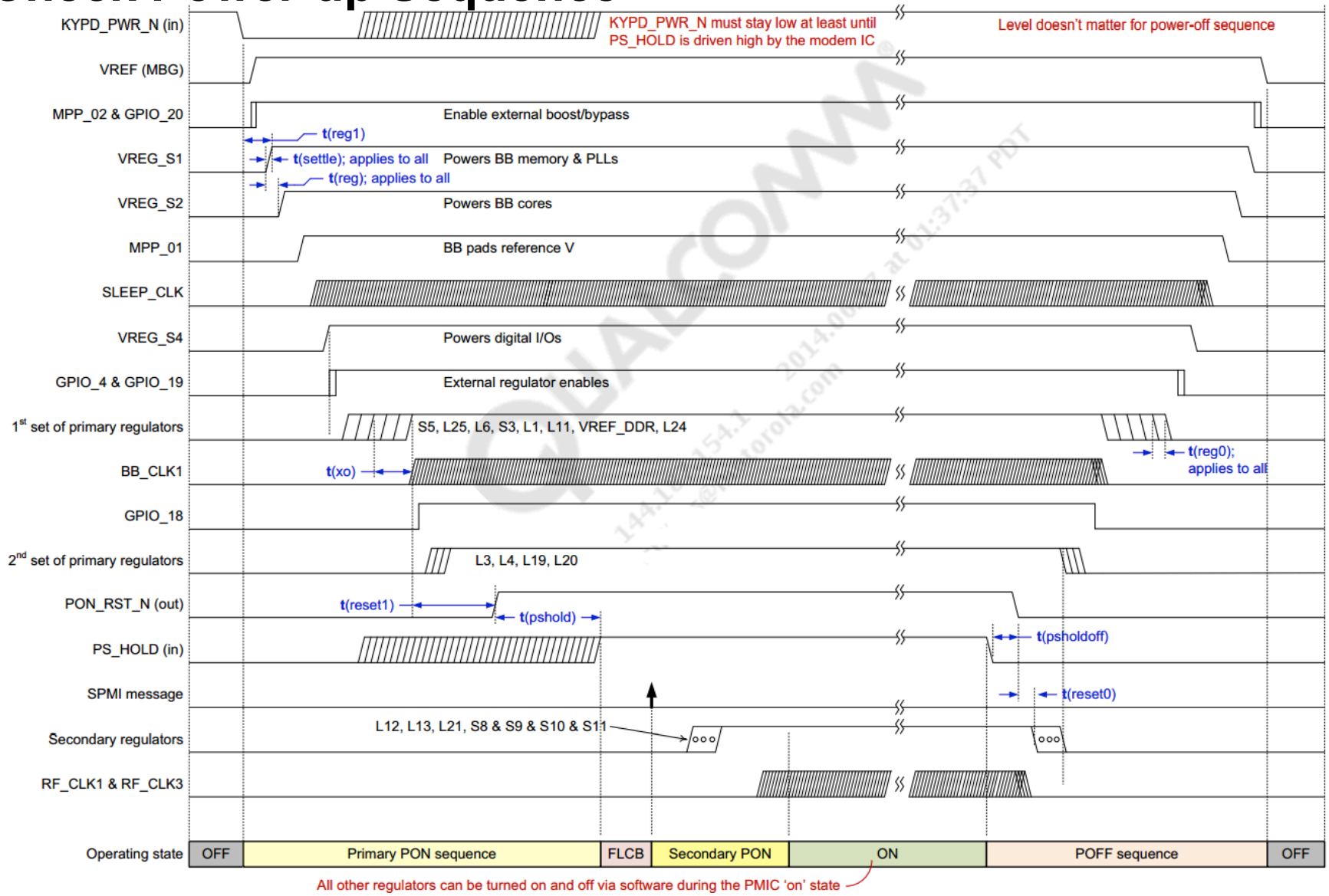
Simplified Input Power Tree



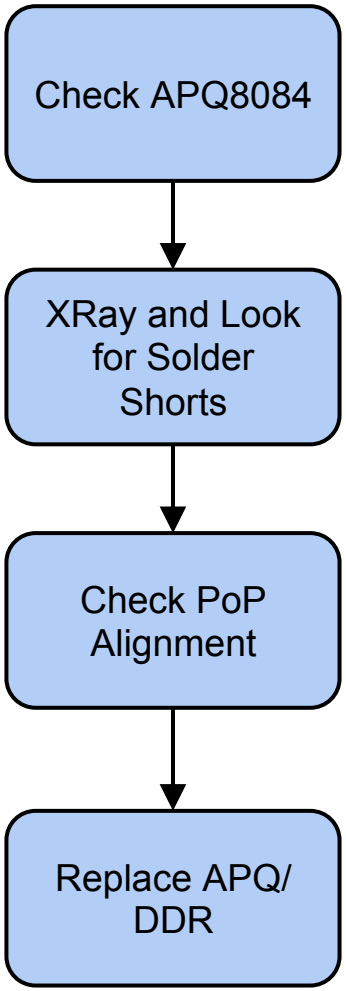
Check PMA8084



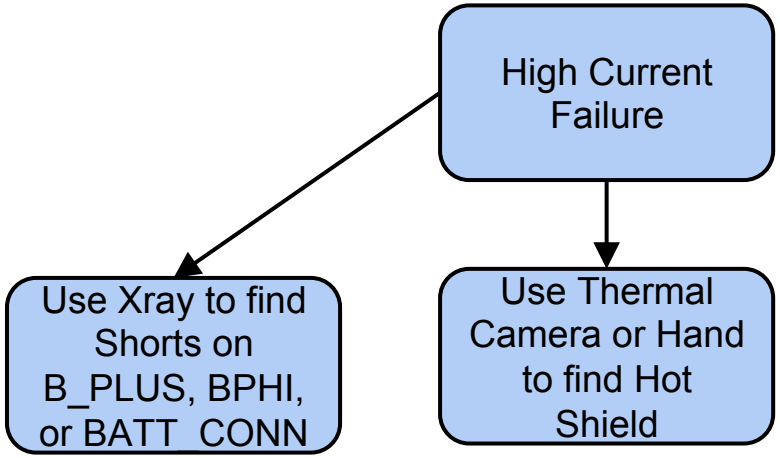
Check Power-up Sequence



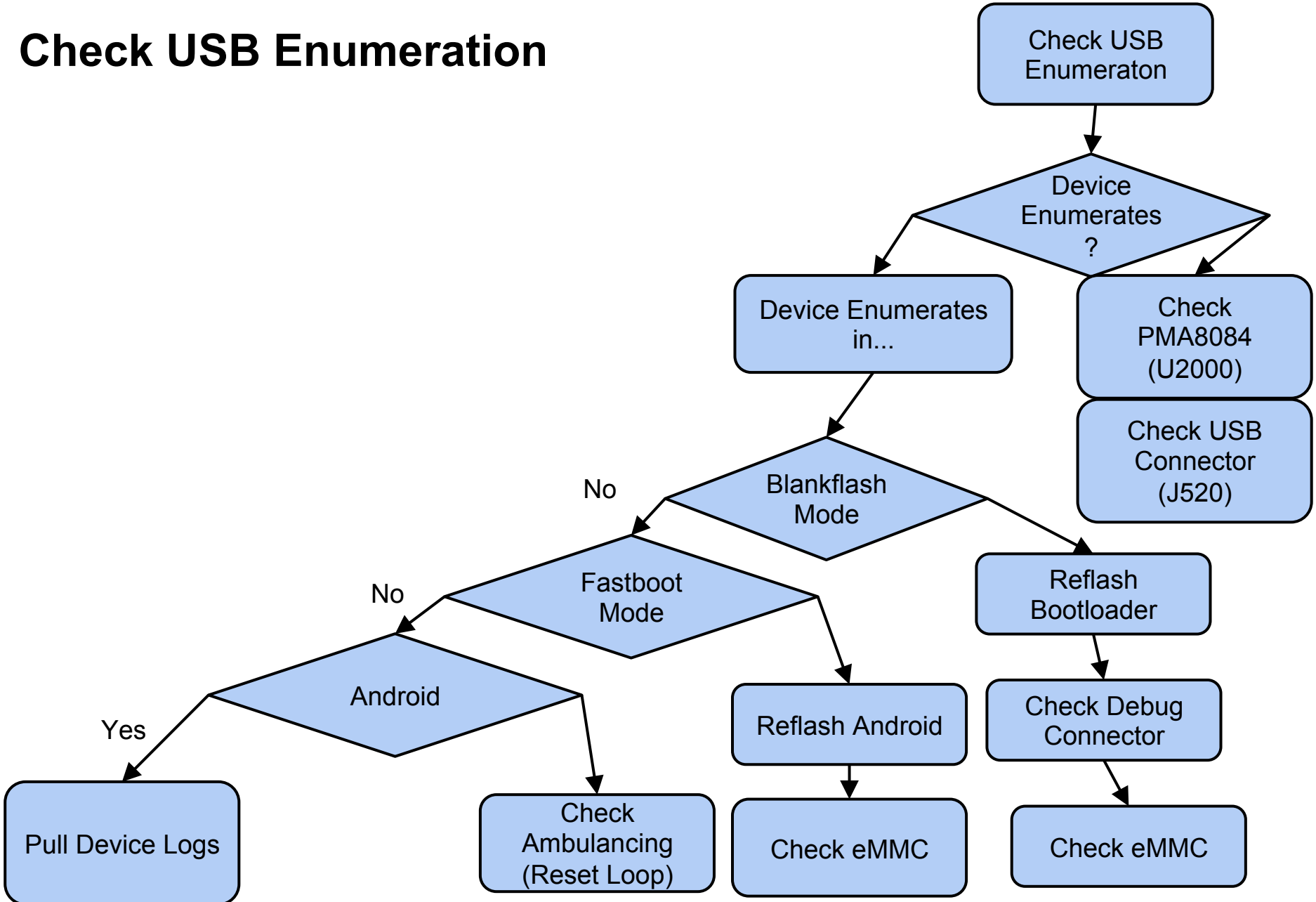
Check APQ8084



High Current Failure

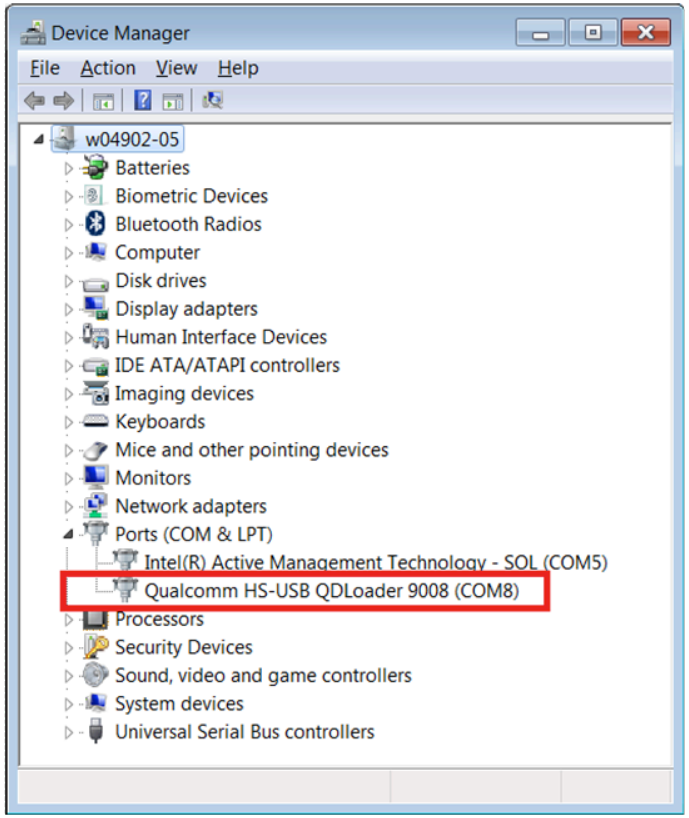


Check USB Enumeration



Debug Procedure

- If the current looks normal, check for enumeration to Qcom blank device.



- Sometimes if a board has software already flashed, or there was some problem with software, a board can be forced into this mode by shorting two highlighted pins on the debug connector:
- Then when board is in this mode, blank flashing can be attempted to find more information on the failure.

Debug Examples – Hang at Boot

- When a board is in fastboot mode, you can attempt to flash with full software. It is possible that there was some issue with flashing software and reflashing will fix it. This was not tried yet on these boards, but most of the time it is some hardware issue.

- Next step will be to attempt to reflash the boards. If that results in same behavior, take logs to determine where the boot is failing. It may point to some peripheral that is broken and is necessary to complete boot, etc.

BATTERY & CHARGER TROUBLESHOOTING

Battery Terminals Connections

There could be an issue with the battery safety control FETs or safety IC, or an intermittent or broken trace or via in the battery PCB or the flex, or with the board-to-board connection of the battery to the board.

The battery can be replaced, or the components such as battery FET or potential shorts (by foreign object) or opens (by mechanical stress) on relevant components reworked.

Inspect these signals with USB or wireless charging accessory connected.

```
B_PLUS

BATT_PLUS

BAT_FET_N

BATT_ID to Batt_Neg=130K

BATT_therm to CSCP_DP = 8-12K at room temp

VREF_BATT_THM
```

USB Charging

Inspect the battery for any damage or abuse. Ensure the battery pack voltage and cell plus sense voltage levels are according to the expected charge current level. Inspect the wireless charge/NFC coil to ensure the battery thermistor is sound and as expected.

There could be an issue with the USB connector or its connections to the board and the PMIC. The PMIC itself could be damaged or have damaged or intermittent BGAs.

Connect a wall charger to phone with battery and verify the signals below.

Ensure the phone current drain does not exceed the charger supply current capacity.

```
USB_PWR = 9V for inbox turbo charger, 5V for others.
EMU_ID_RAW (Phone On)
EMU_ID_RAW (Phone Off)
EMU_DM
EMU_DP
```

Wireless Charging

Perform the wireless charging factory end-of-line test.

There could be an issue with the wireless receiver coil or its connections to the board, so first ensure the coil is not disconnected or skewed. Inspect it for broken flex, etc. Carefully disconnect the current coil and connect a good one as a quick check.

Also ensure no shorts or foreign objects such as debri or metallic material is present. Ensure there are no shorts between any of the pins of the coil connector pins.

Align the phone on an inductive charge pad to phone and verify the signals below.

Ensure the phone current drain does not exceed the inductive charger or transmitter module supply current capacity. Otherwise, there will not be battery charging.

There could also an issue with the wireless power receiver/rectifier or its peripheral components, or the connection between its output to the SMB.

Any anomalies compared to the expected values below is indication that there is a defect in the wireless charge circuitry. Reflow then replace as needed the wireless receiver/rectifier.

Wireless Charging (cont.)

Charge_out

DCIN

Vrect

V Ilim

V Fod

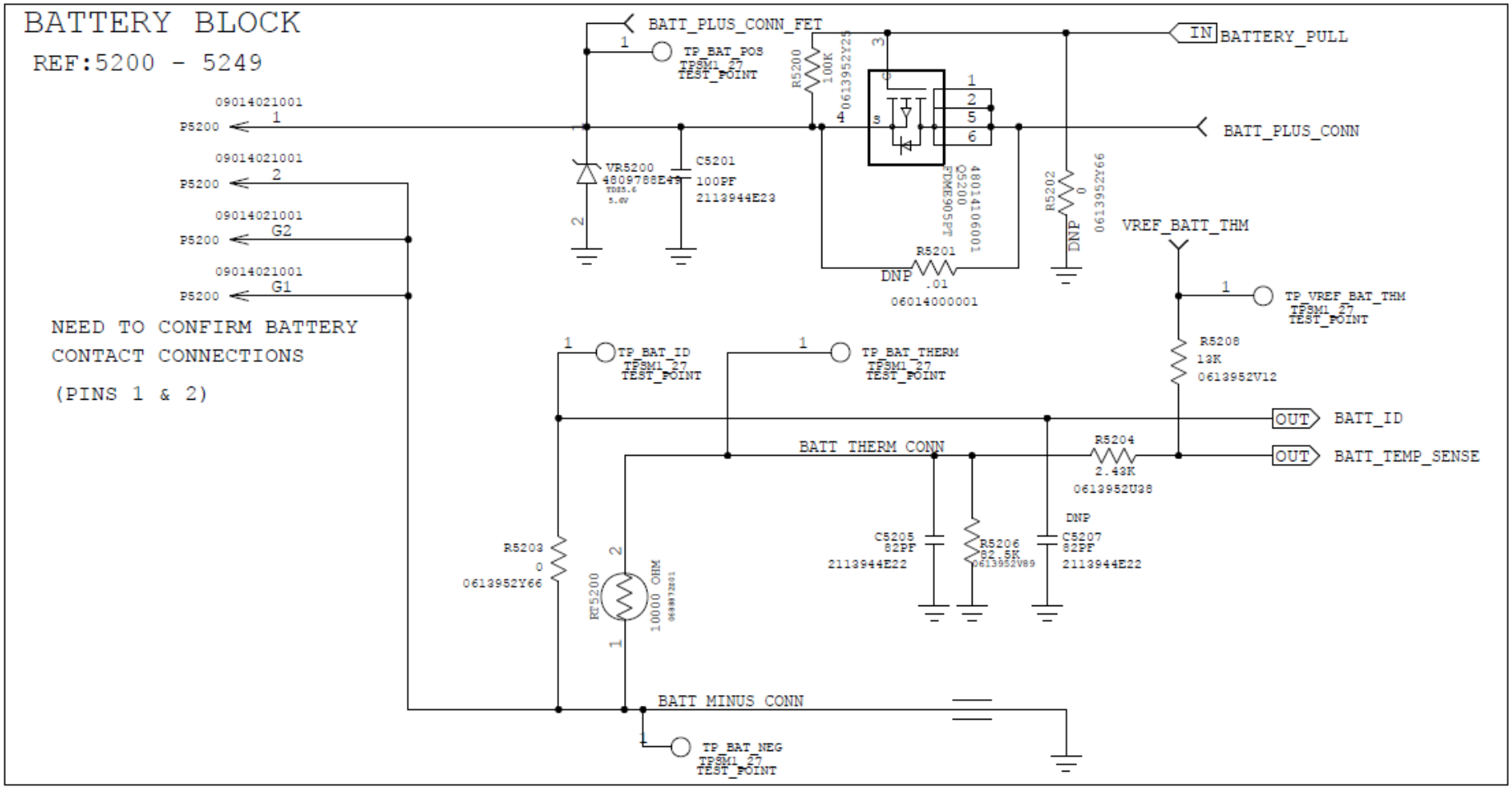
Charge_en

Charge_terminate

Charge_complete_n

Coil L,H (AC1,2) AC: 20V, <200 Hz (Ktyp: 155 KHz)

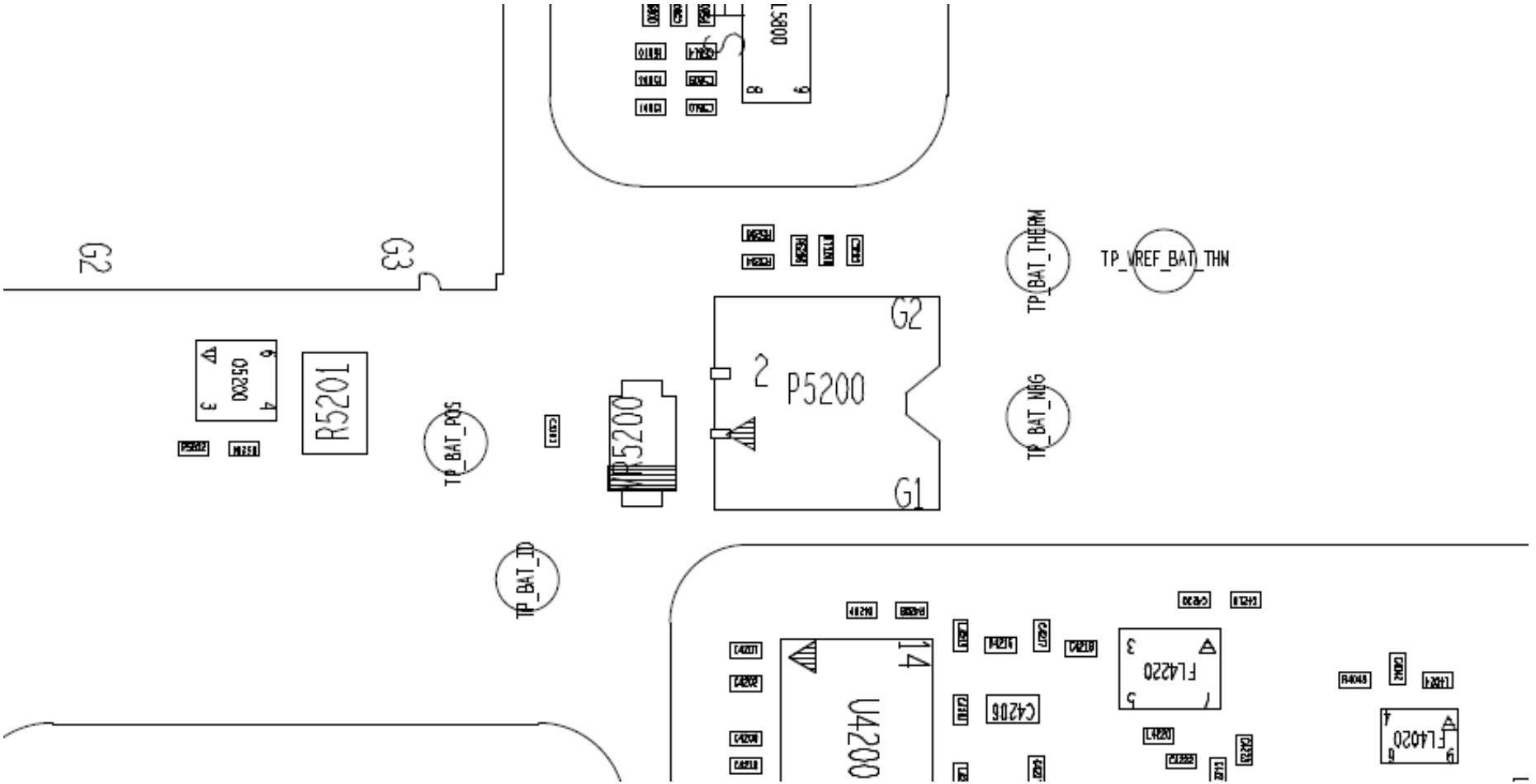
Battery Component



Debug Procedure: Battery Level

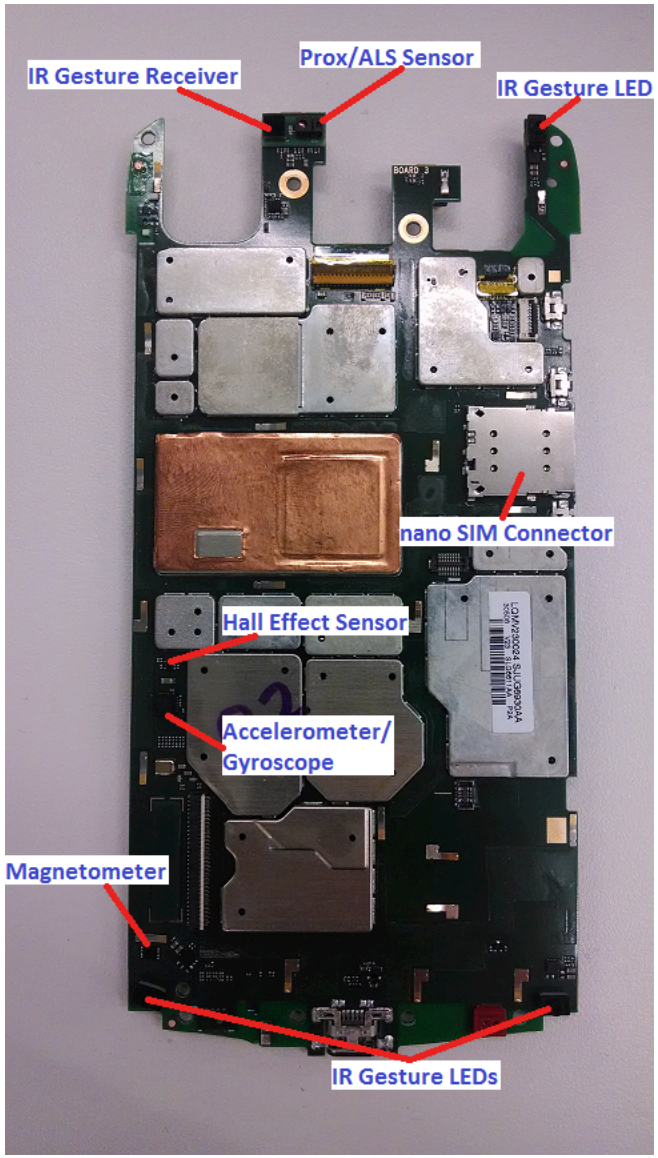
- If battery level reads 0%
  - Unplug factory cable, wait at least 3 seconds, then plug back in
  - If this does not work, try plugging in charger. If charge level is 1% or higher, leave on charger until 100% is reached.
- If battery level is too low but 1% or higher
  - Plug in charger and leave until 100% full

Debug Procedure: Battery Thermistor



SENSORS & SIM TROUBLESHOOTING

Sensors


IR Gesture Receiver
Prox/ALS Sensor
IR Gesture LED
nano SIM Connector
Hall Effect Sensor
Accelerometer/
Gyroscope
Magnetometer
IR Gesture LEDs

Sensor Hub Troubleshooting

- Firmware download failing/no communication with hub
  - Check U6000 supply at C6000 - Should be 2.25V
  - Verify that U6009 is DNPed
  - Check I2C pull-ups R1115 and R1116 - Should be 2.2 kOhm and pulled up to 1.8V

Proximity Sensor Troubleshooting

- Proximity Sensor is located on spacer PCB at top of board (U1000 on 84016356001).

- If reading is failing:
  - Check black grommet in housing is placed, not upside-down, and not damaged.
  - Try replacing spacer module 84016356001.

- If no reading at all:
  - Check part orientation for U1000 on spacer PCB with known good board.
  - Verify voltage at C6121 is 2.85V.
  - Verify voltage at R6000 and R6001 is 1.8V.
    - If voltage is missing, try replacing spacer module, then PMIC.

Ambient Light Sensor (ALS) Troubleshooting

- ALS Sensor is same as Proximity Sensor (U1000 on spacer PCB 84016356001).

- If reading is failing:
  - Check black grommet in housing is placed, not up-side-down, and not damaged.
  - Inspect opening in lens. It should be translucent when holding front housing up to a light. Try swapping front housings.
  - Try replacing spacer module 84016356001.
  - Test on different fixture, bulbs in fixture may be too old and dim.

- If no reading at all (error code):
  - Check part orientation for U1000 on spacer PCB with known good board.
  - Verify voltage on C6121 is 2.85V.
  - Verify voltage at R6000 and R6001 is 1.8V.
    - If voltage is missing, try replacing spacer module, then PMIC.

IR Gesture Troubleshooting

- No Reading/Low Reading for one LED:
  - Check IR LEDs (on spacers) for orientation/damage vs. known good board.
- No Readings/Low Readings for all LEDs:
  - Check gesture receiver supply at C6500 - Should be 10V.
  - Check that U6500 and U6501 are placed.
  - Check supplies at C6504 and C6510 - Should be 2.85V.
- Saturated Readings for all LEDs:
  - Check orientation of U6502.

Accelerometer/Gyroscope Troubleshooting

- Accelerometer Part is U6150.

- If no reading:
  - Check U6150 orientation.
  - Check that supplies at C6142 and C6151 are 1.8V.
  - Replace U6150, or possibly PMIC.

- If reading is failing:
  - Replace U6150, damaged accelerometer part.

Magnetometer Troubleshooting

- Magnetometer Part is U6140.

- If no reading:
  - Check U6140 orientation.
  - Check that supply at C6142 is 2.85V.
  - Check that supply at C6141 is 1.8V.

- If reading is failing:
  - Replace U6140, damaged magnetometer part.

Hall Effect Sensor Troubleshooting

- Hall Effect Part is U6170.

- If no toggling:
  - Check U6170 orientation.
  - Check that supply at C6170 is 1.8V.
  - Make sure U6001 is placed and oriented correctly.
  - Replace U6170, damaged hall effect part.

Vibrator Troubleshooting

- Check that the spring contacts on the vibrator motor are not bent (Top Carrier).
- Check that the headset/vibrator flex is properly aligned and fully inserted into the zif connector on the PCB.
- Measure the resistance across the vibrator, it should be 14ohms +/- 4ohms.
- Check that E4601 and E4602 are not skewed or damaged.
- Check C4606, C4605, C4607, VR4601, and VR4602 for damage or any process related defects.
- Check the motor itself by applying 2.4V across the spring contacts, it should spin freely and continuously.

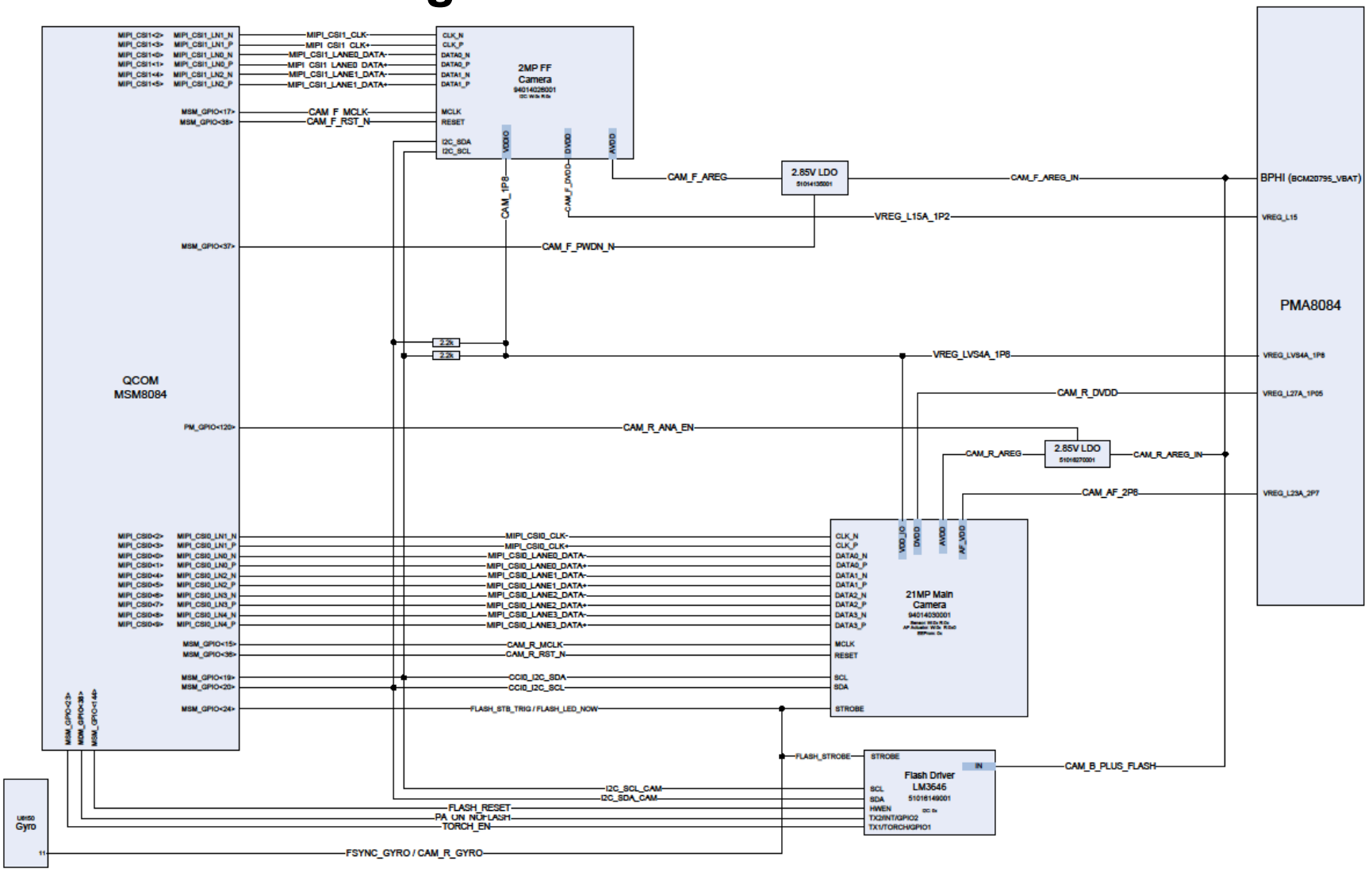
NOTE: If motor does not spin, or if motor stutters, but starts working normally after turning it manually, it has a “dead-spot”. Consider it a failure and replace the motor.

UIM (uSIM) Troubleshooting

- If SIM card errors occur:
  - Check orientation on ESD parts.
  - Inspect card reader for bent or broken contacts.
  - Use multimeter to check connection between gold SIM contacts and pins on back of connector.
  - Verify a 1.8V voltage on Pin “card_det” when card is removed.
  - Verify 0 Volts on Pin “card_det” when card is inserted.
  - Check for unexpected shorts to ground on Pins C1,C2,C3, and C7 (factory cable, USB, and battery must be removed).

CAMERA TROUBLESHOOTING

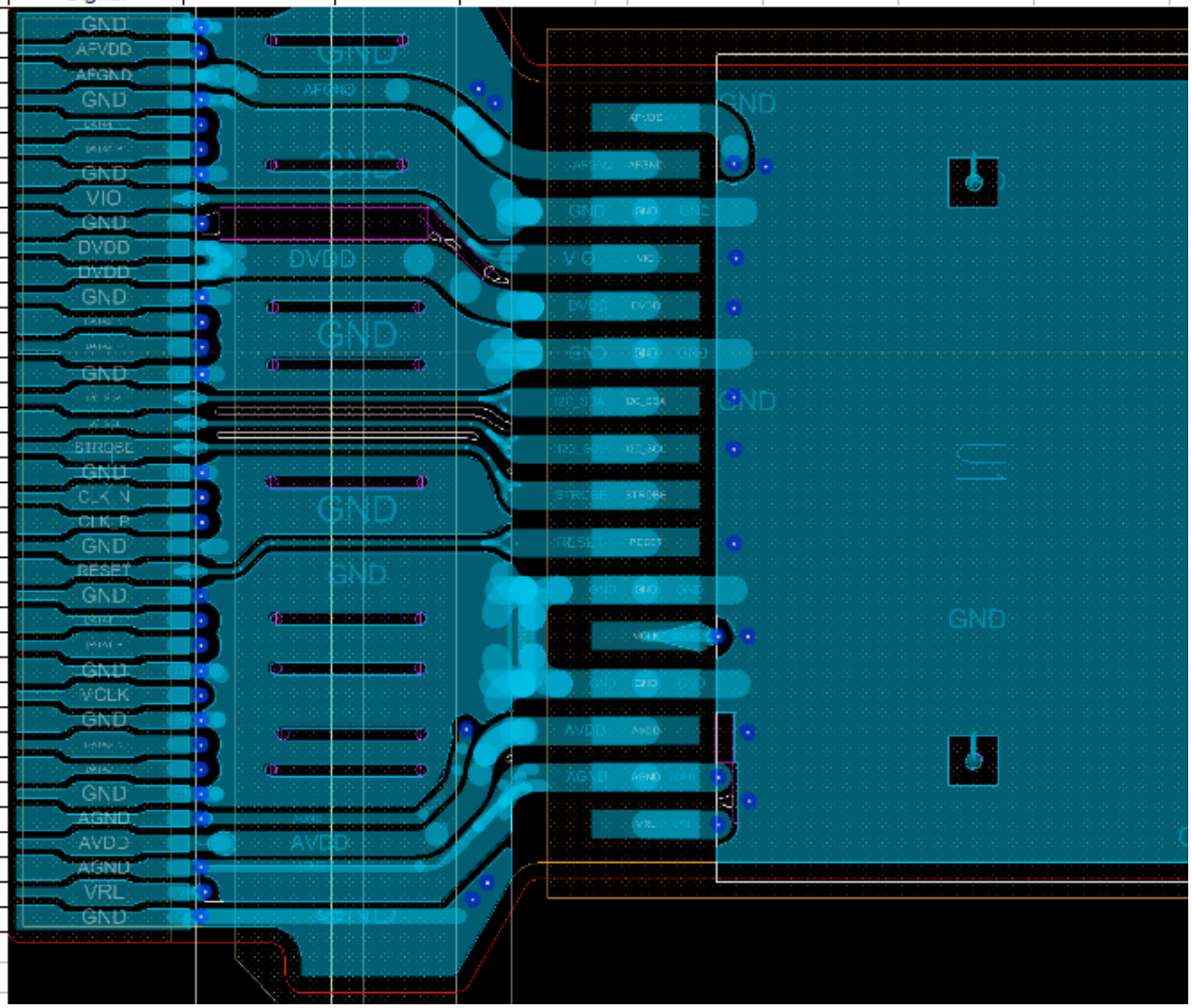
Camera Block Diagram



Camera Pinout - Rear

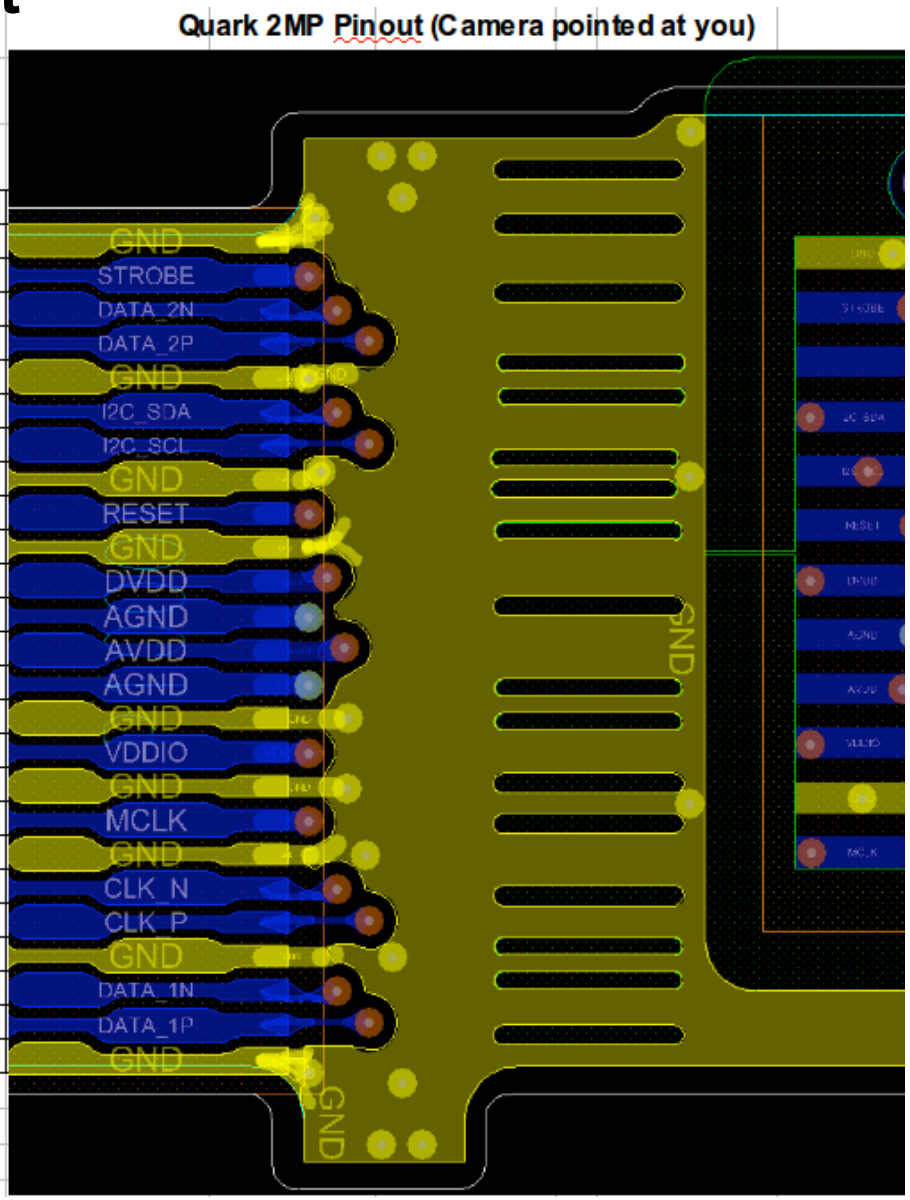
Flex TOP view (Camera pointed at you)

MSM net	Function	ZIF Pin#	Signal
DGND		37	
VREG_L23A_2P7		36	
DGND		35	
DGND		34	
MIPI_CSI0<8>	**MIPI_D4-**	33	
MIPI_CSI0<9>	**MIPI_D4+**	32	
DGND		31	
VREG_LVS4A_1P8		30	
DGND		29	
VREG_L27A_1P05		28	
VREG_L27A_1P05		27	
DGND		26	
MIPI_CSI0<4>	**MIPI_D2-**	25	
MIPI_CSI0<5>	**MIPI_D2+**	24	
DGND		23	
I2C_SDA_CAM_R_F		22	
I2C_SCL_CAM_R_F		21	
FLASH_STROBE		20	
DGND		19	
MIPI_CSI0<2>	**MIPI_Clk-**	18	
MIPI_CSI0<3>	**MIPI_Clk+**	17	
DGND		16	
CAM_R_RST_F		15	
DGND		14	
MIPI_CSI0<0>	**MIPI_D1-**	13	
MIPI_CSI0<1>	**MIPI_D1+**	12	
DGND		11	
CAM_R_MCLK_FL		10	
DGND		9	
MIPI_CSI0<6>	**MIPI_D3-**	8	
MIPI_CSI0<7>	**MIPI_D3+**	7	
DGND		6	
CAM_R_AGND		5	
CAM_R_AREG		4	
CAM_R_AGND		3	
VRL_CAP		2	
DGND		1	

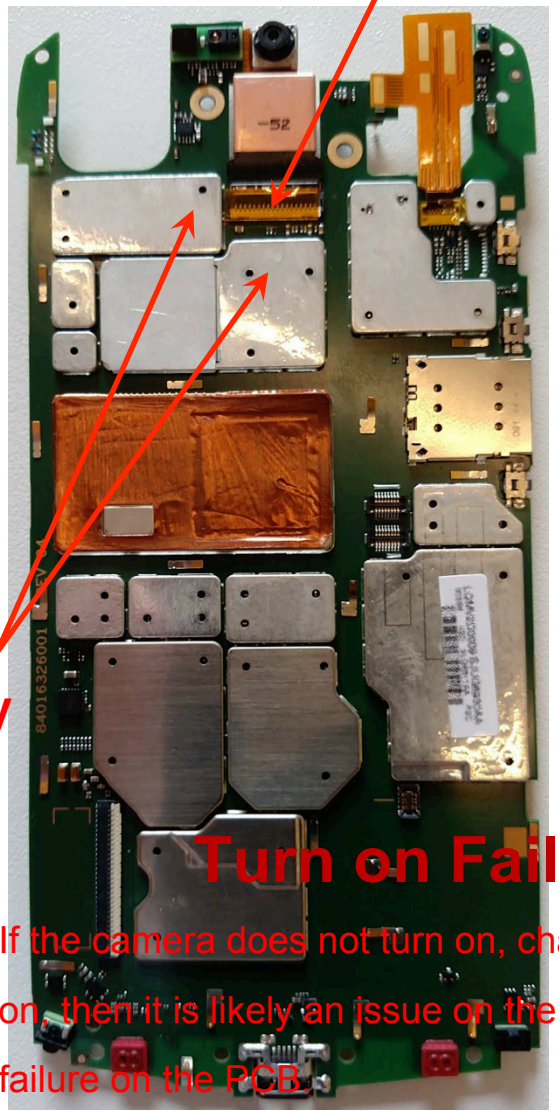


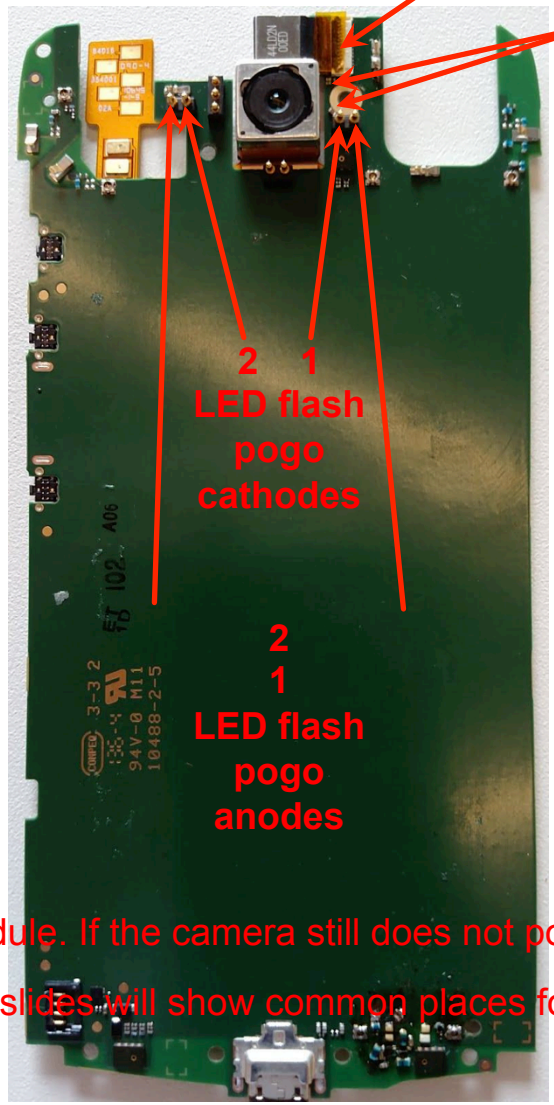
Camera Pinout - Front

ZIF Pin#	Signal
25	DGND
24	STROBE
23	MIPI_D2_N
22	MIPI_D2_P
21	DGND
20	SDA
19	SCL
18	DGND
17	RESET
16	DGND
15	DVDD
14	AGND
13	AVDD
12	AGND
11	DGND
10	VDDIO
9	DGND
8	MCLK
7	DGND
6	MIPI_CLK_N
5	MIPI_CLK_P
4	DGND
3	MIPI_D1_N
2	MIPI_D1_P
1	DGND



Turn On Failures





Turn on Failures

If the camera does not turn on, change the camera module. If the camera still does not power on, then it is likely an issue on the main PCB. The next slides will show common places for failure on the PCB.

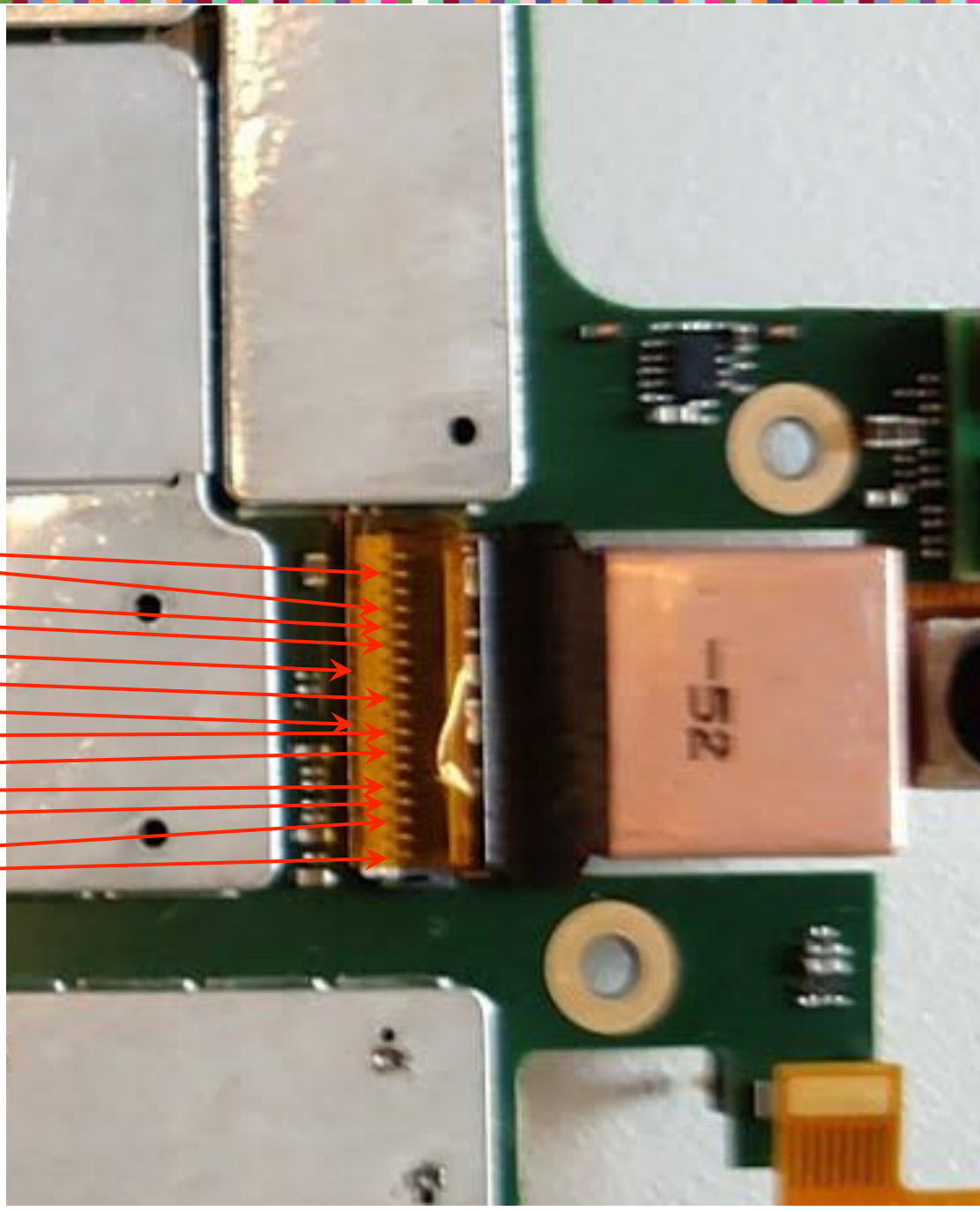
Rear Camera

Rear Camera Troubleshooting Tips:

1) Even pins are available for gentle probing on ZIF connector.

2) If the camera is not turning on, the only time you will see these signals is during boot, right before the vibrator turns on. The best way to catch the signal is to set an oscilloscope to single trigger.

- Test available signals
  - Pin4: AVDD (2.8v)
  - Pin8: DATA3_N (Check MIPI exist on all MIPI lines)
  - Pin10: MCLK (24MHz @ 1.8v)
  - Pin12: DATA1_P (Check MIPI exist on all MIPI lines)
  - Pin15: RESET (1.8v) (Odd pin under ZIF door)
  - Pin18: CLK_N (Check MIPI exist on all MIPI lines)
  - Pin21: I2C_SCL (1.8v communication present)
  - Pin22: I2C_SDA (1.8v communication present)
  - Pin24: DATA2_P (Check MIPI exist on all MIPI lines)
  - Pin28: DVDD (1.0v)
  - Pin30: VIO (1.8v)
  - Pin32: DATA4_P (Check MIPI exist on all MIPI lines)
  - Pin36: AFVDD (2.7v)

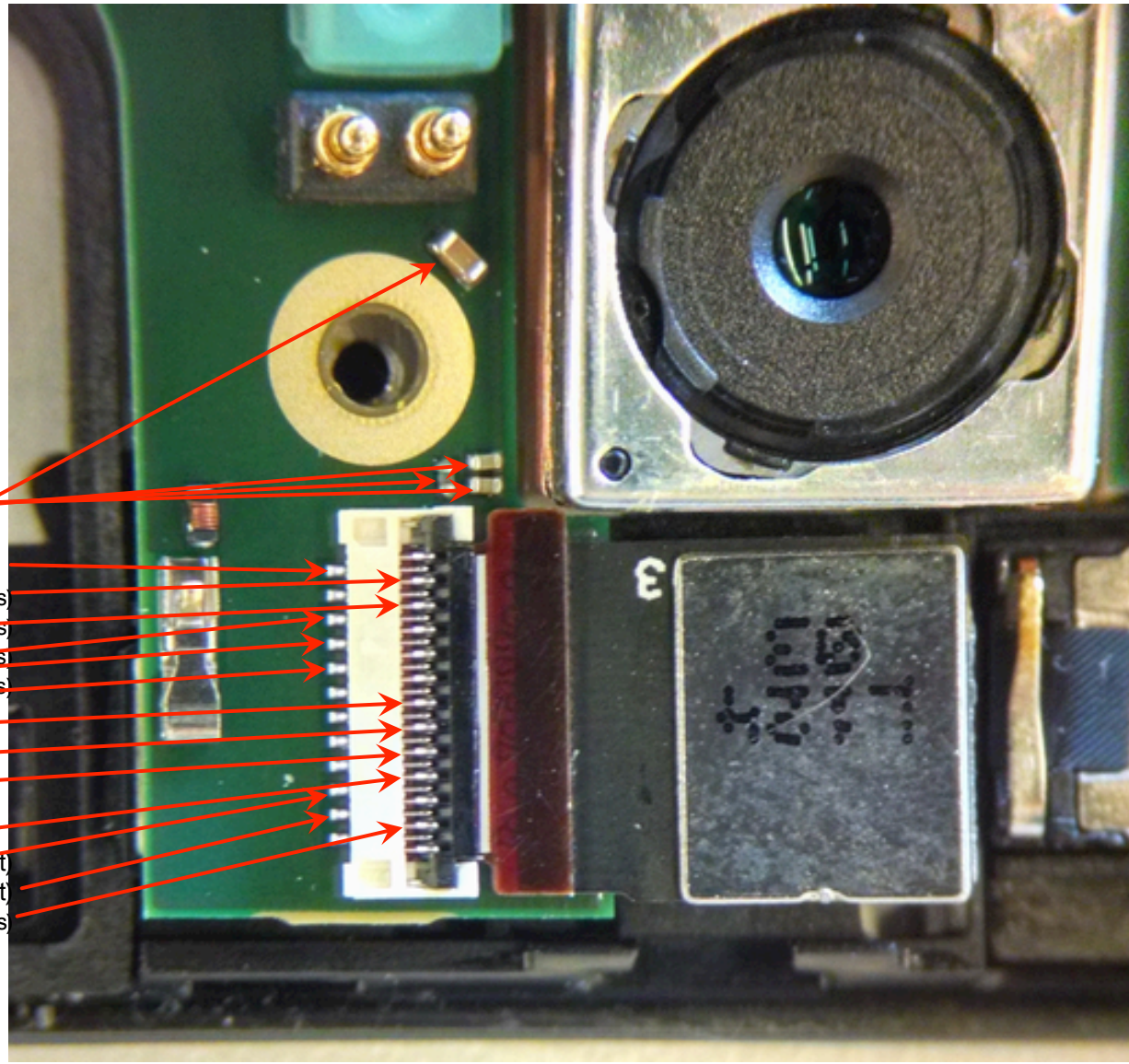


Front Camera

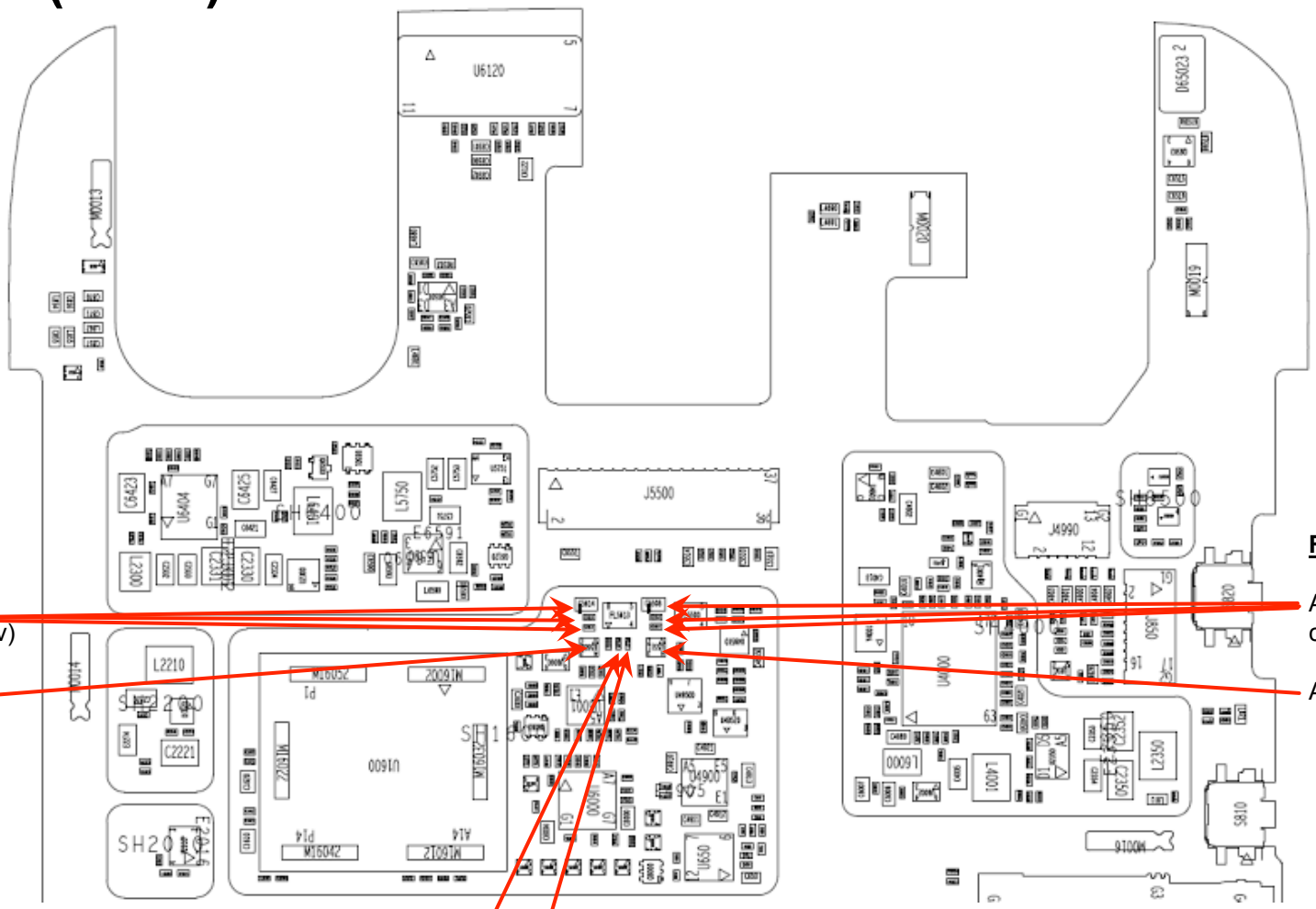
Front Camera Troubleshooting Tips:
1) Pins are available for gentle probing at ZIF connector.
2) If the camera is not turning on, the only time you will see these signals is during boot, right before the vibrator turns on. The best way to catch the signal is to set an oscilloscope to single trigger.

o Check that these components are not damaged

o Test available signals:
Pin2: DATA1_P (Check MIPI exist on all MIPI lines)
Pin3: DATA1_N (Check MIPI exist on all MIPI lines)
Pin5: CLK_P (Check MIPI exist on all MIPI lines)
Pin6: CLK_N (Check MIPI exist on all MIPI lines)
Pin8: MCLK (24MHz @ 1.8v)
Pin10: VDDIO (1.8v)
Pin13: AVDD (2.8v)
Pin15: DVDD (1.2v)
Pin17: RESET (1.8v)
Pin19: I2C_SCL (1.8v communication present)
Pin20: I2C_SDA (1.8v communication present)
Pin22: DATA2_P (Check MIPI exist on all MIPI lines)
Pin23: DATA2_N (Check MIPI exist on all MIPI lines)



Camera (cont.)



Front camera:

AVDD output capacitors (2.85v)

AVDD regulator

Rear camera:

AVDD output capacitors (2.85v)

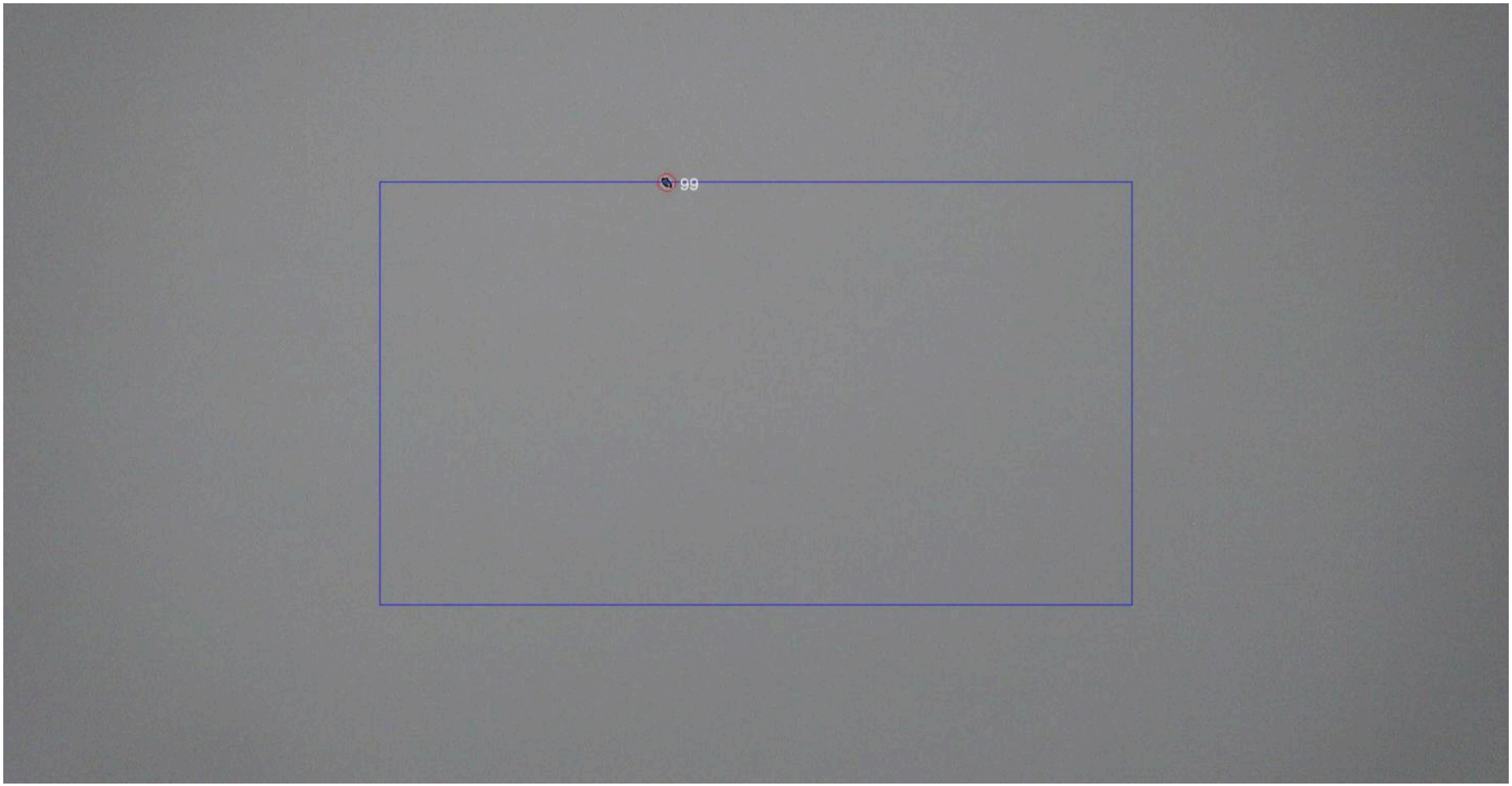
AVDD regulator

SCL SDA

Shared camera I2C pull-up resistors

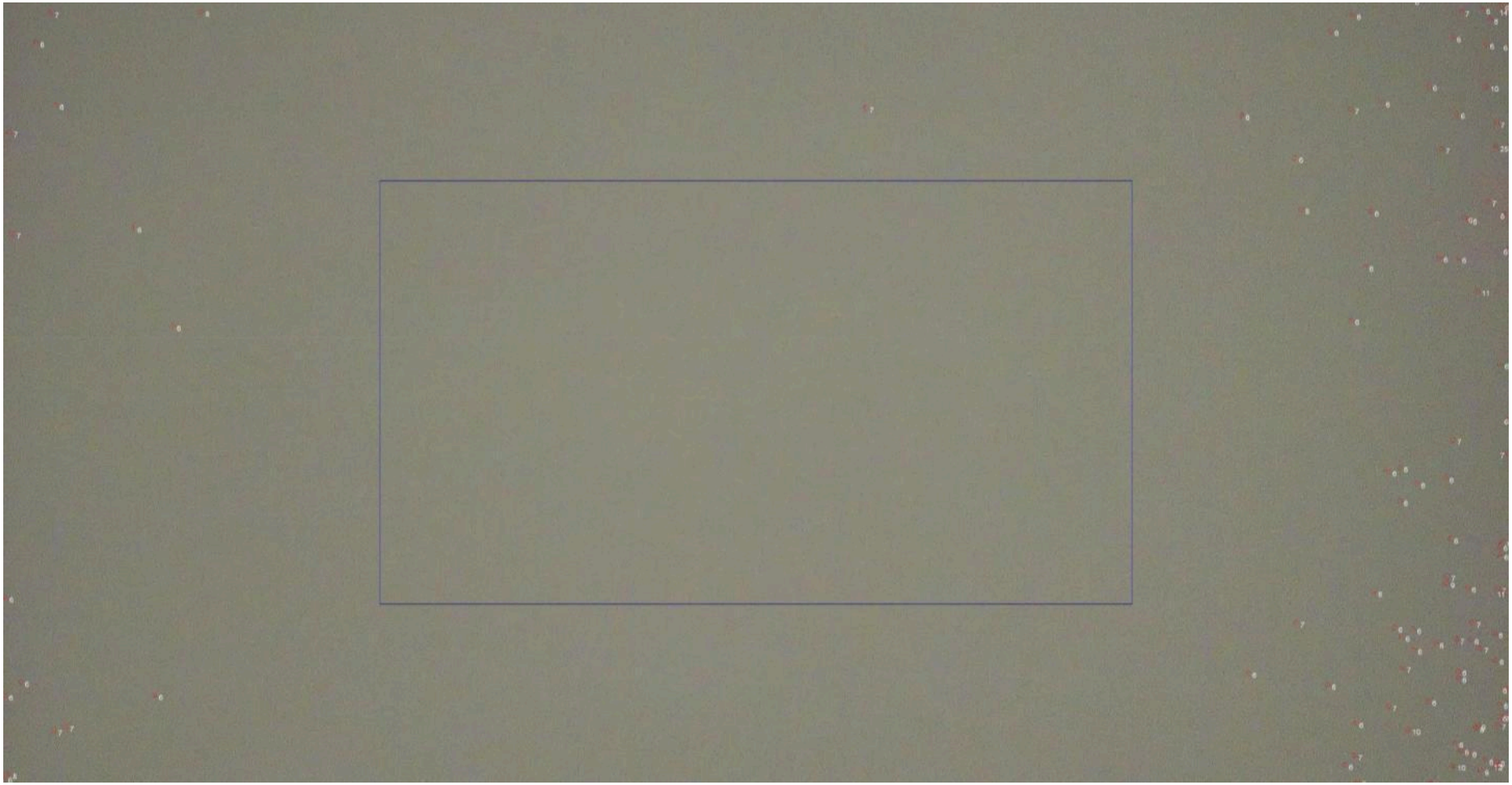
Blemish Example #1

Blemish failure due to FM. This FM is most likely beneath the lens.



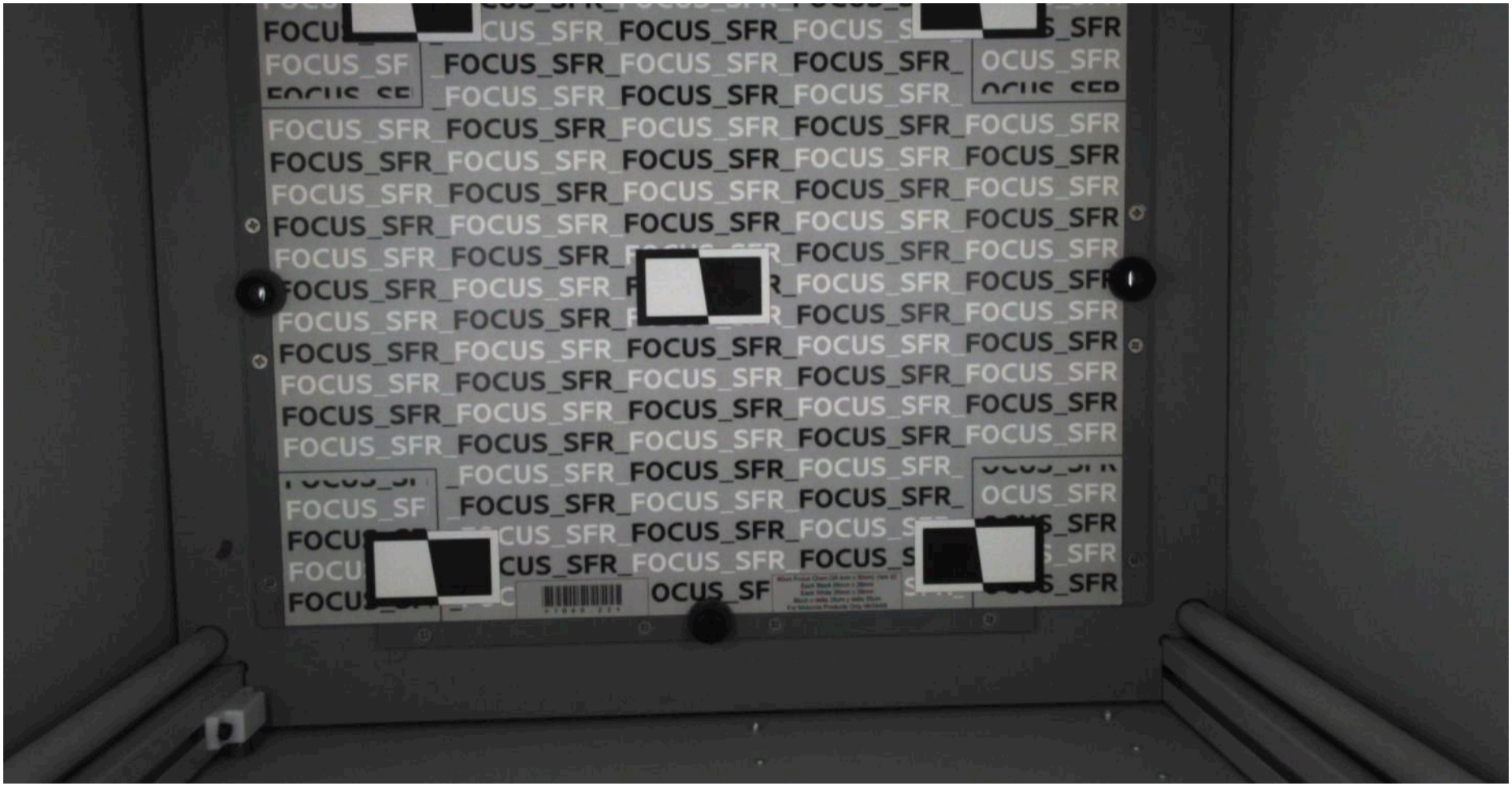
Blemish Example #2

Blemish failure due to FM. The blue box and red circle are part of the annotated image. Annotated images end with _BLEMISH in the file name. These annotations are drawn by the analysis software and not part of the real image. The blemish that is circled however is real and indicates FM or a defect in the lens.



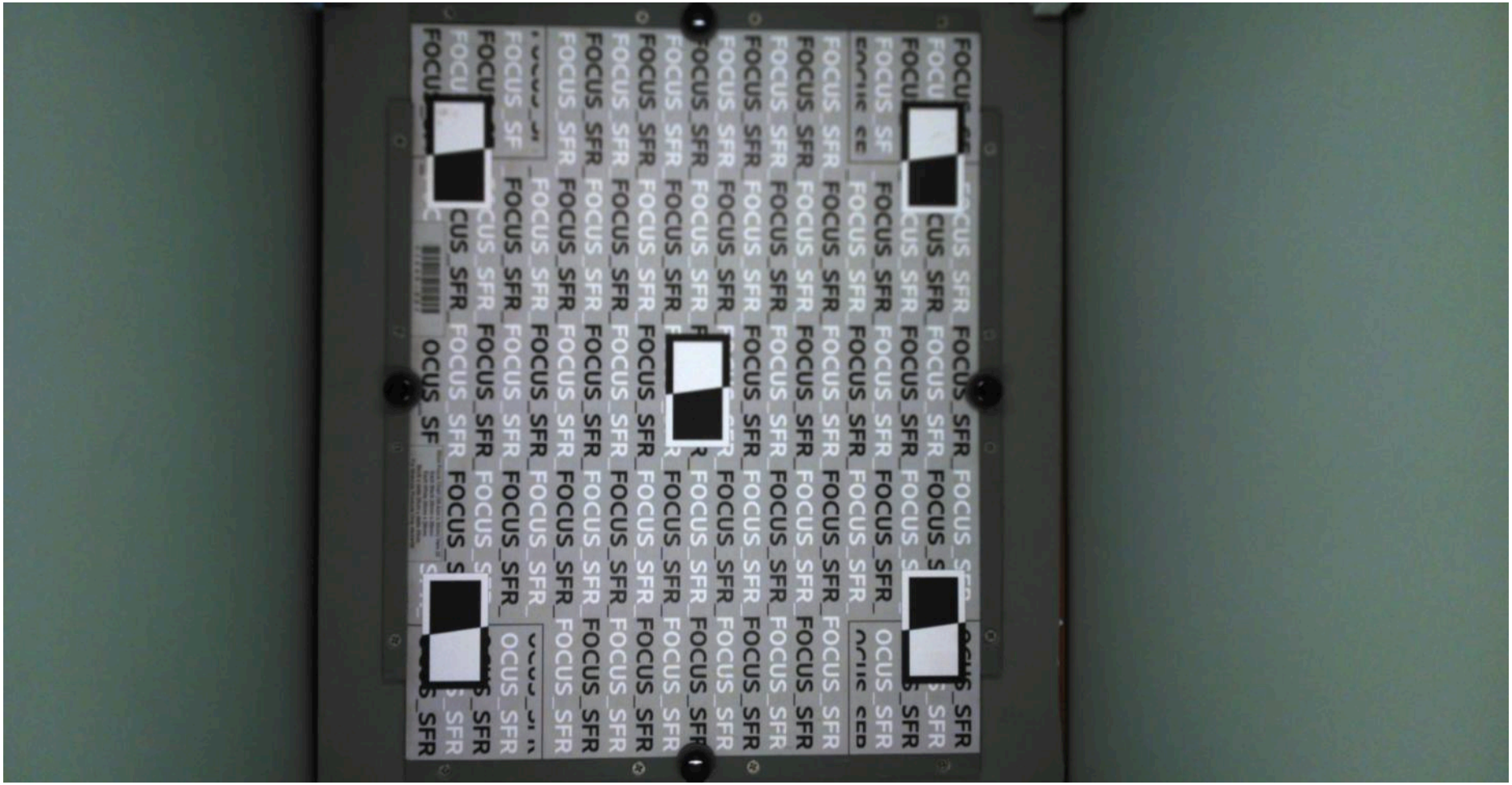
Blemish Example #3

Blemish failure due to noise. There are no particles or lens defects in this module, but the noise is so bad that it is getting mistaken for blemishes. This is most likely a problem with the sensor.



Placement Error Example

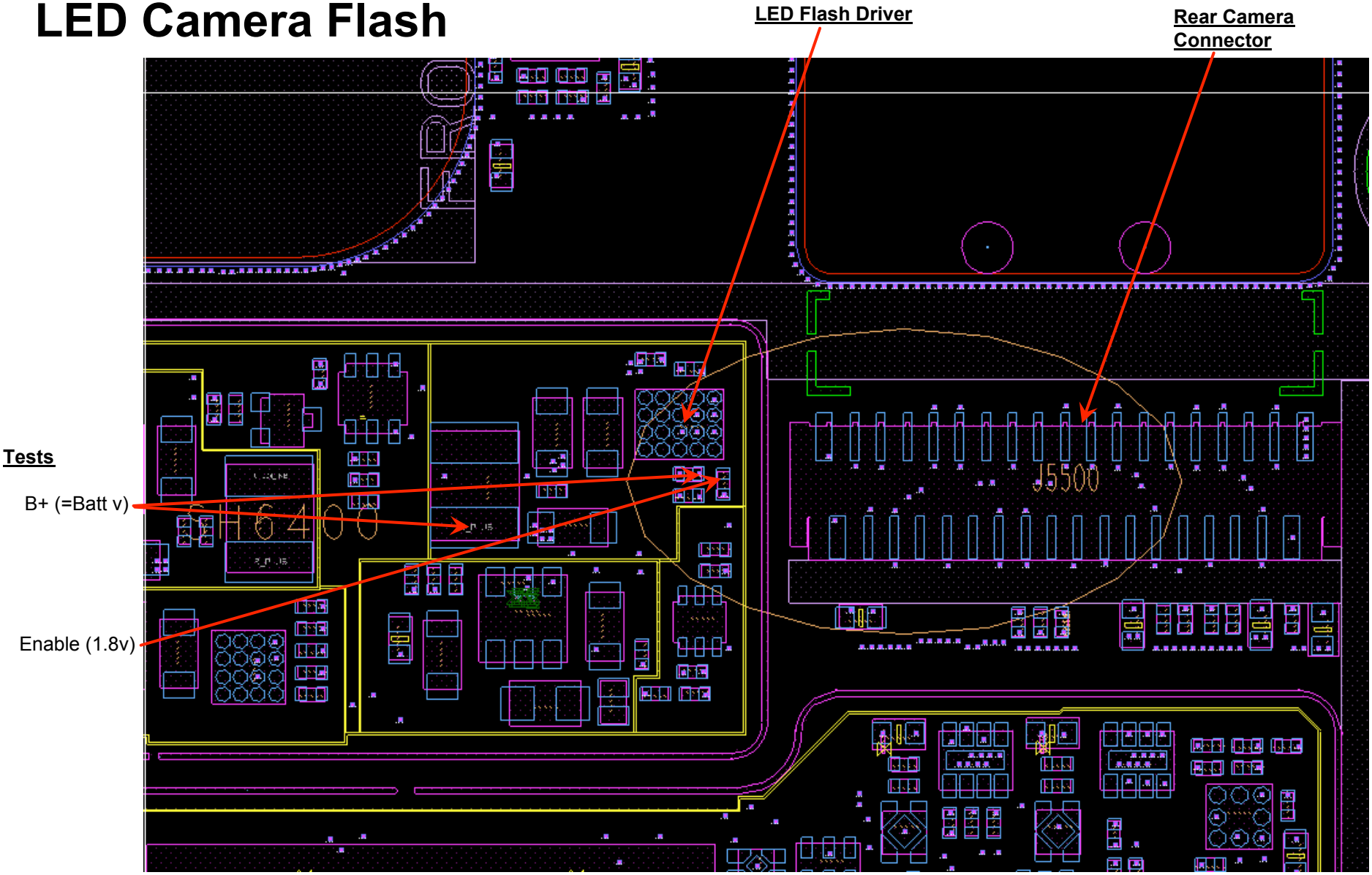
This picture shows a really severe case of the focus chart not being centered within the camera's view. This case is most likely caused by operator error when placing the phone into the test chamber.



Focus Error Example

The top side of this image is blurry. This will most likely be a problem with the lens placement inside the module.

LED Camera Flash



BT & WIFI TROUBLESHOOTING

BT/WiFi

Purpose:

In the testing, the IC is checked to make sure Bluetooth and WiFi can powered on fine. The Bluetooth output power and 2.4/5GHz WiFi output power are also checked.

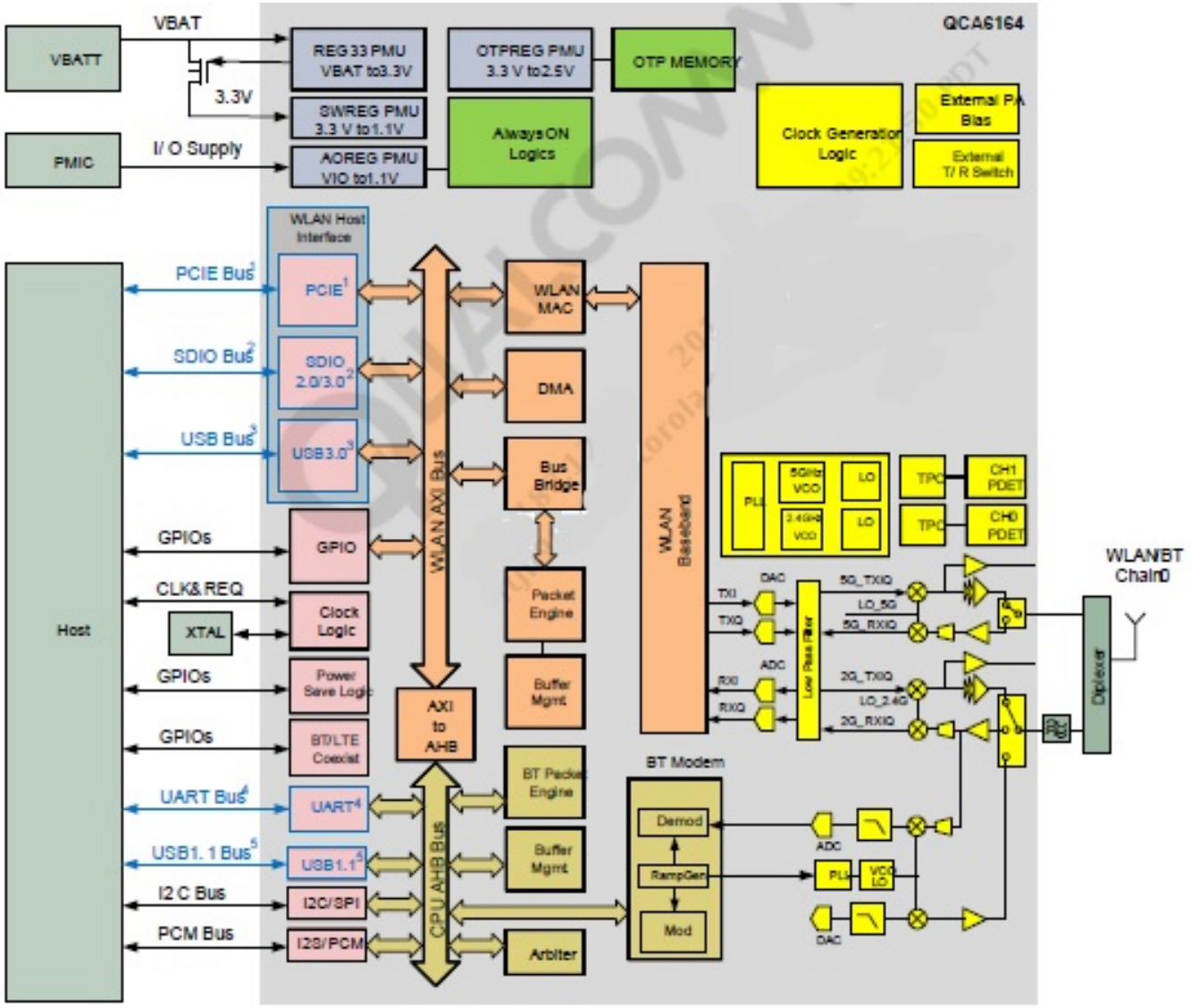
Before start troubleshooting:

Please check MQS Failure Code with spec limits.
Please test the unit at multiple stations.

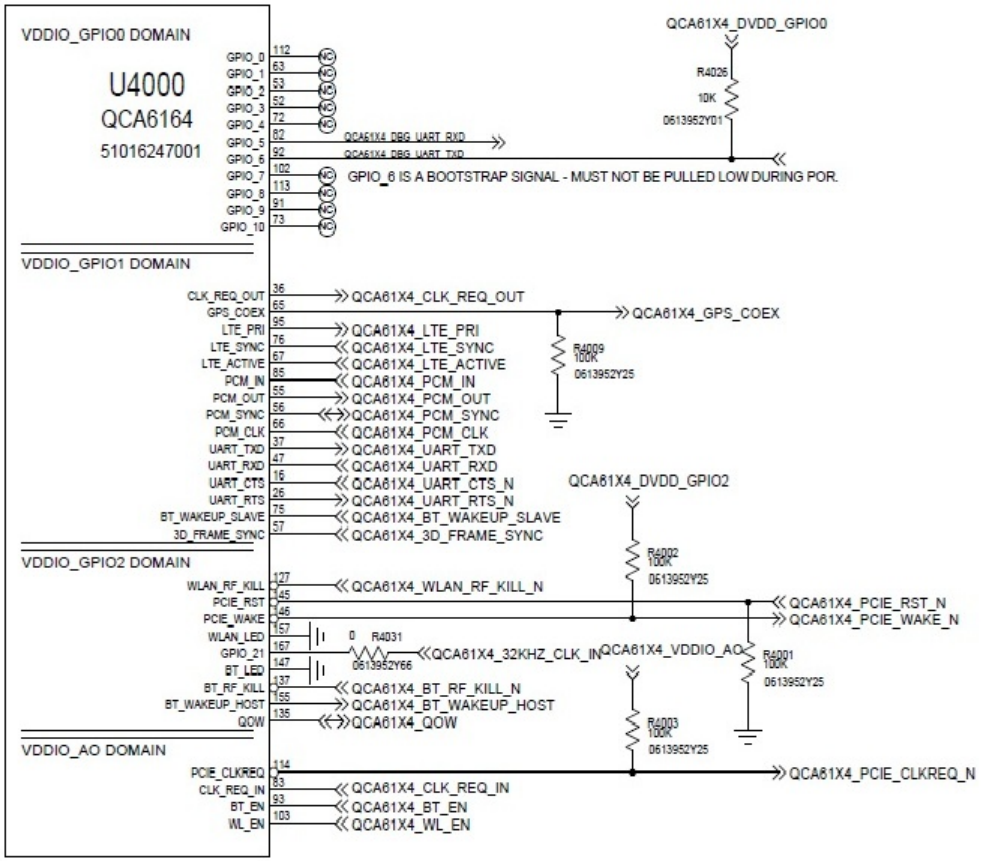
Overview of WiFi / Bluetooth circuit

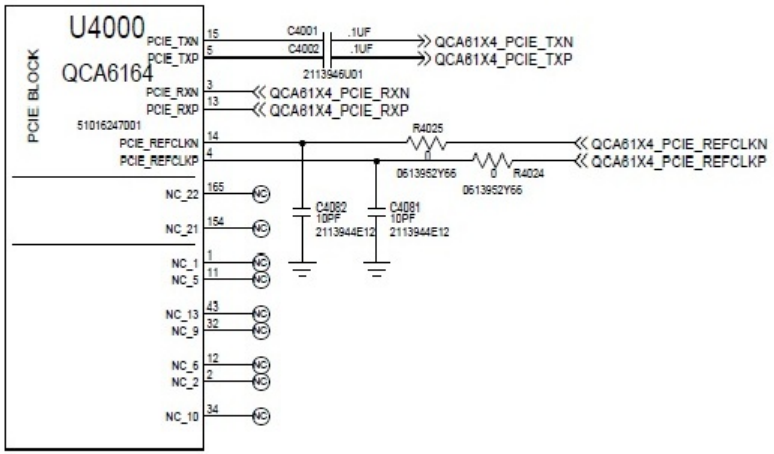
Quantum is using Qualcomm QCA6164 as the WiFi/BT chipset. QCA6164 is a single-die wireless local area network (WLAN) and Bluetooth (BT) combo solution to support 1x1 IEEE802.11 a/b/g/n/ac WLAN standards and BT 4.1 + HS enabling seamless integration of WLAN/BT and Low Energy technology.

BT/WiFi – Block Diagram

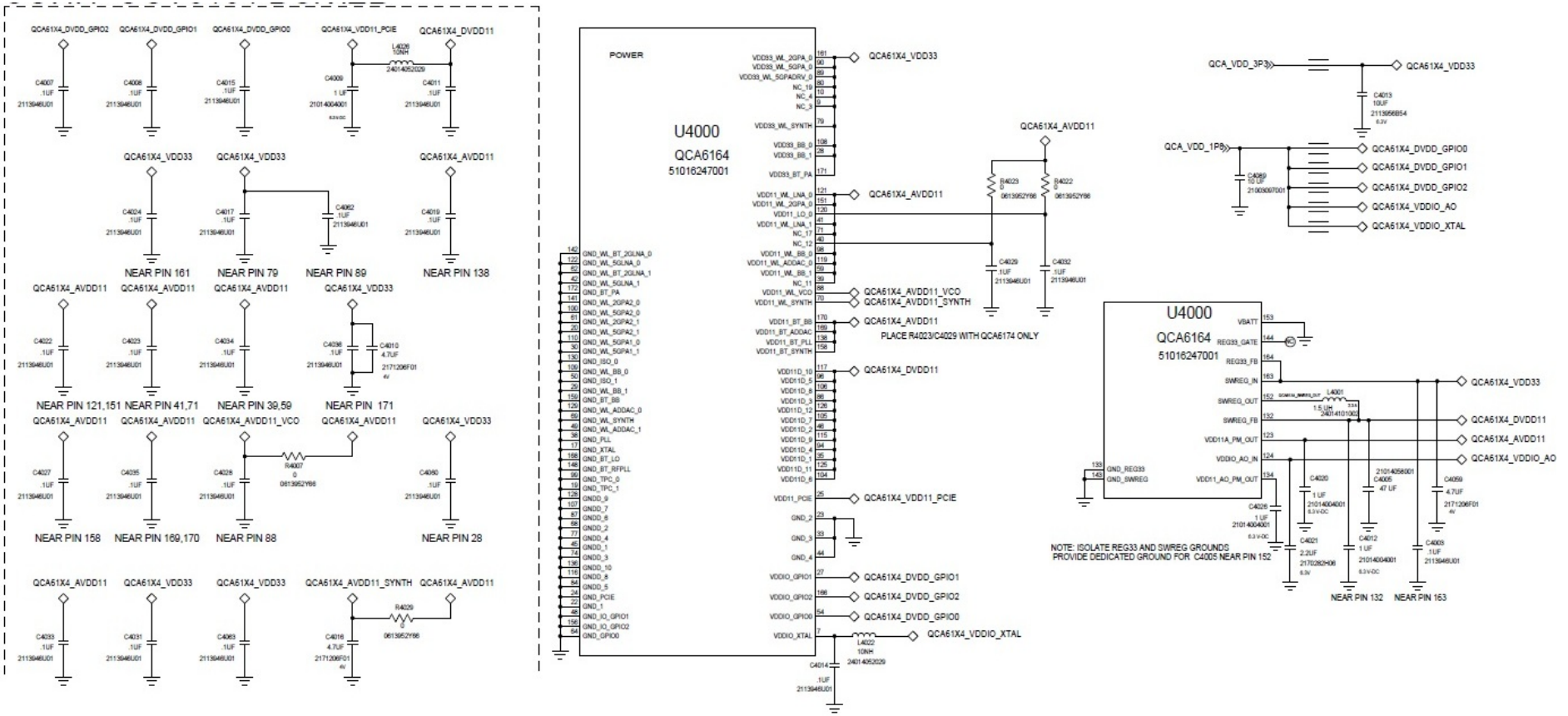


BT/WiFi – Schematic

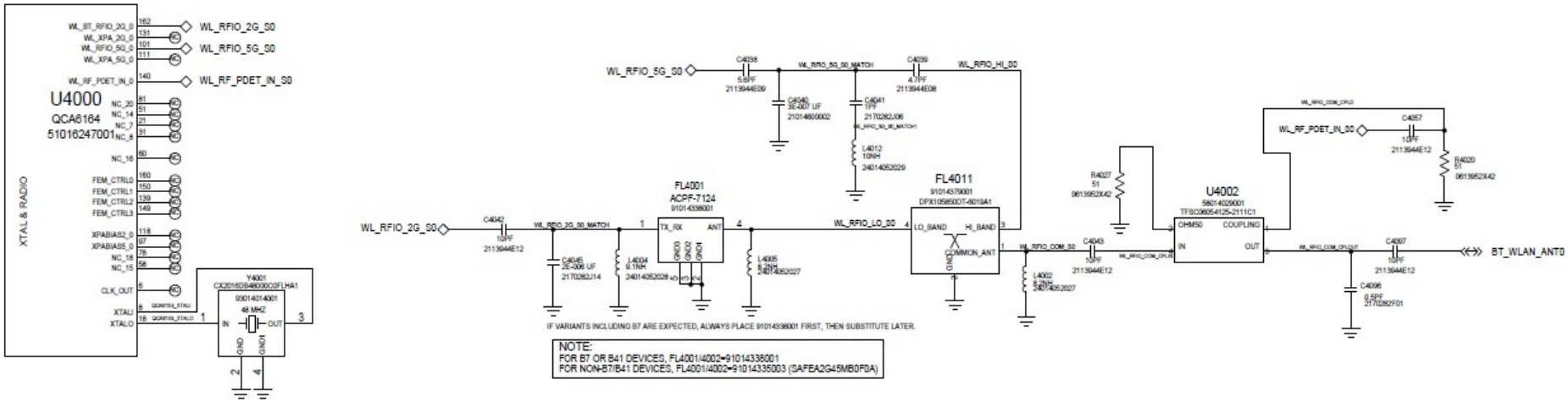




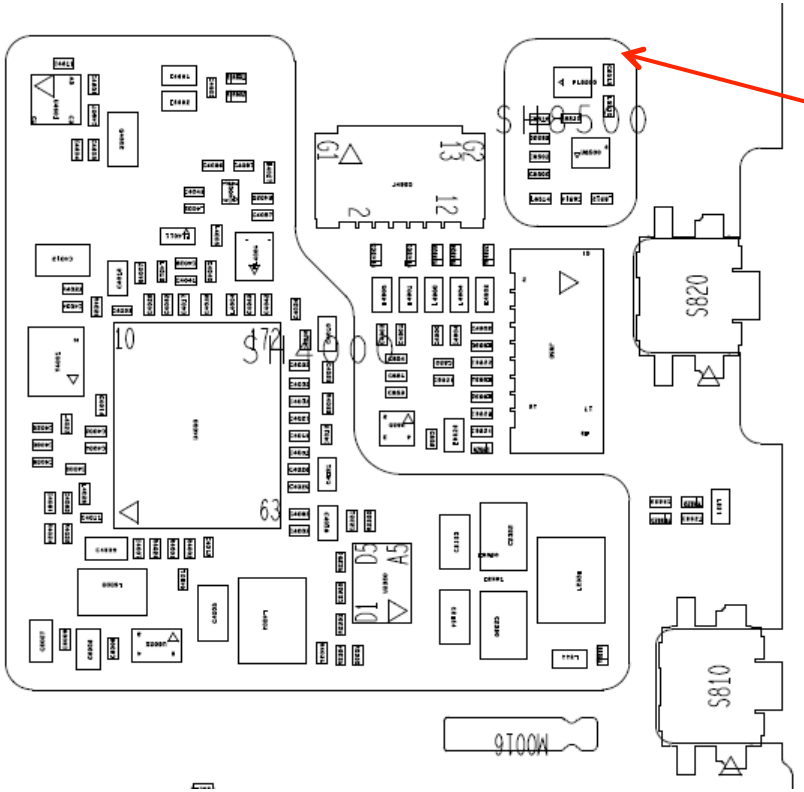
BT/WiFi – Schematic (cont.)



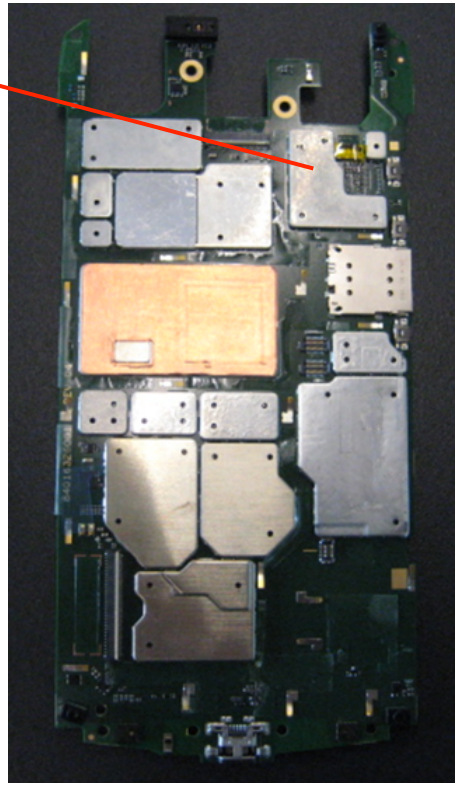
BT/WiFi – Schematic (cont.)



BT/WiFi – Schematic (cont.)



Location on board



BT/WiFi – WiFi Module Current Drain and MAC Address

The WiFi is turned on via the test command “WLAN download test firmware”. Even though it is called download test firmware, WLAN IC is actually off before this test.

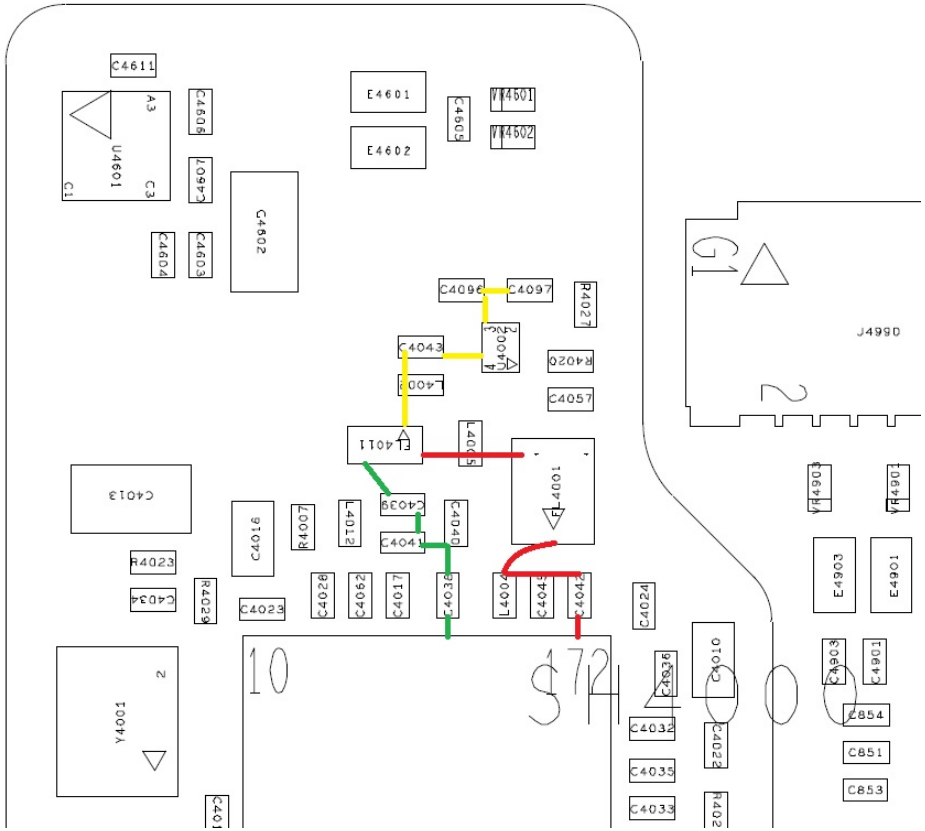
So if this test fails, please check all the power supplies: 3.3V, 1.8V and 1.1V. They should be present. If not, please look at the possible problem with the power management IC PMA8084 and 3.3V buck boost IC U2350.
Please also check the 48 MHz clock at the crystal Y4004.

The “WLAN module drain” is obtained by subtracting “WLAN Module Off Current” from “WLAN Module On Current”.

There is a wide limit for “WLAN Module Off Current” from “WLAN Module On Current”. But if you fail “WLAN module drain”, you should pay attention to these 2 values. If the “WLAN Module Off Current” is abnormally low, it might indicate that there is a problem at somewhere else in the board.

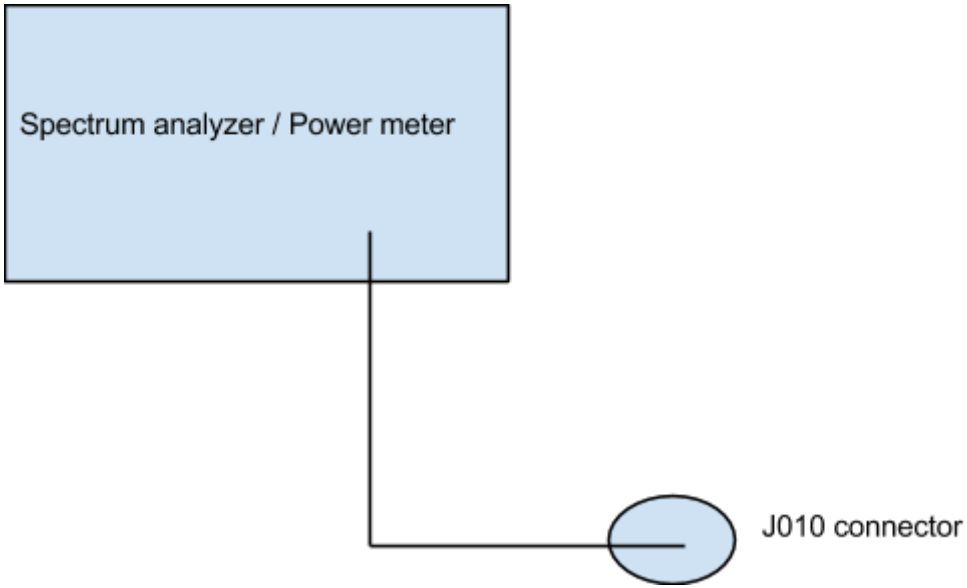
BT/WiFi – WiFi 2.4/5 GHz TX Power and Current Drain

If it fails either the TX power measurement or the current drain measurement, it indicates that there is a problem with RF path starting from the IC to the antenna connector. Please check the components along the path as highlighted below.



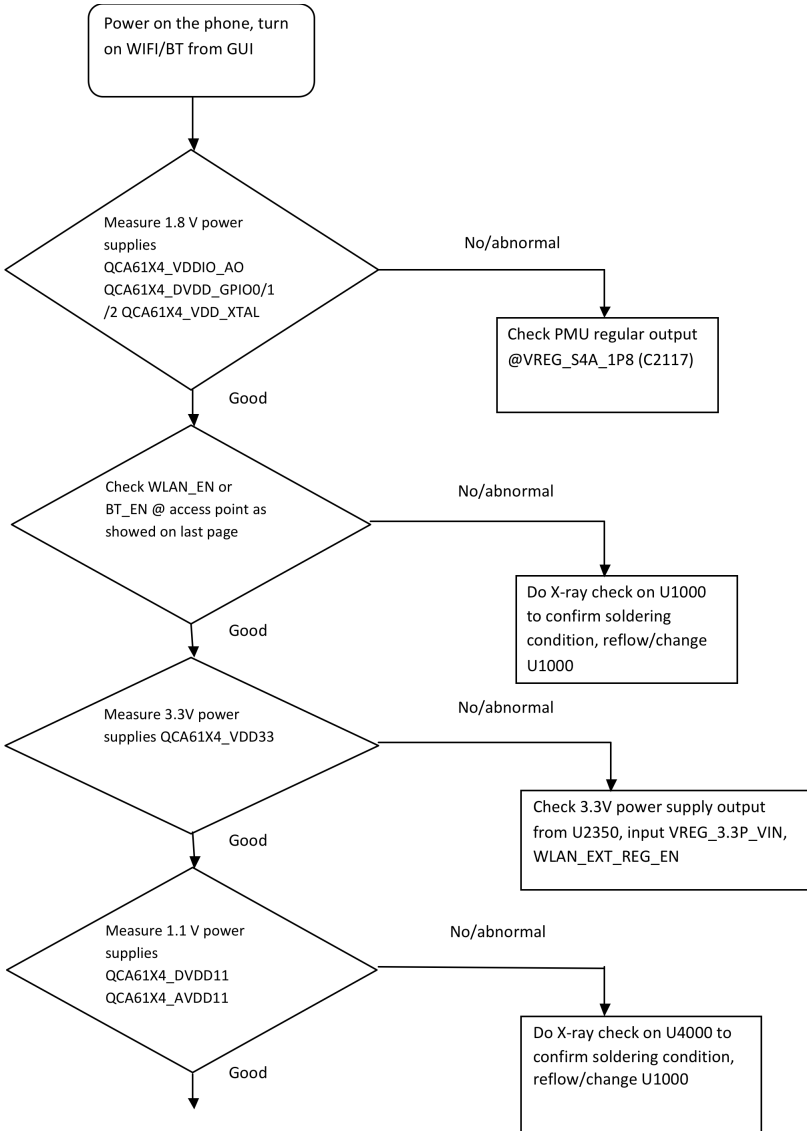
BT/WiFi – Measure Power on Bench

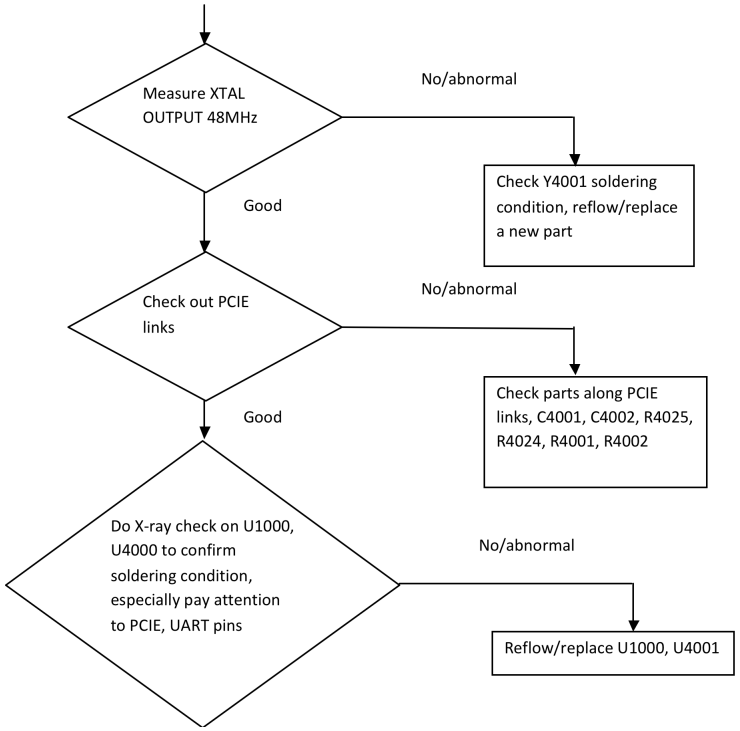
Just connect the spectrum analyzer or power meter directly to J010 connector as following:



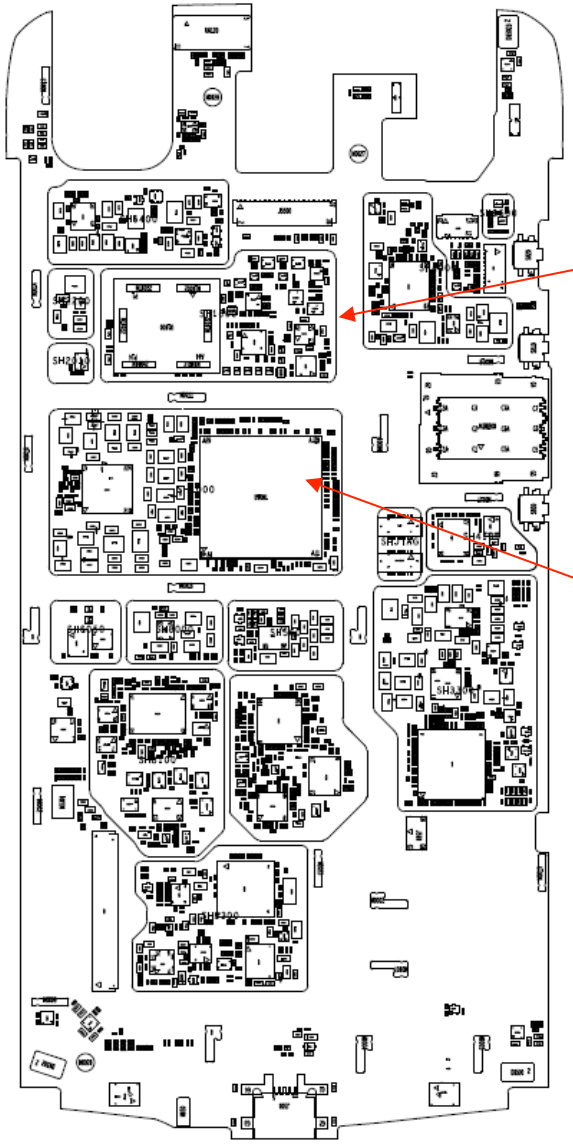
The WiFi signal is 20 MHz wide. If you use a spectrum analyzer, you should pick a wide enough span to measure the channel power across 20 MHz. Or if your spectrum analyzer can support 20 MHz resolution bandwidth, you can just use zero span.

BT/WiFi – No Turn On Issue Analysis Procedure





BT/WiFi – No Turn On Issue Analysis Procedure (cont.)



Exposed VIA of BT_EN

Exposed VIA of WLAN_EN

NFC TROUBLESHOOTING

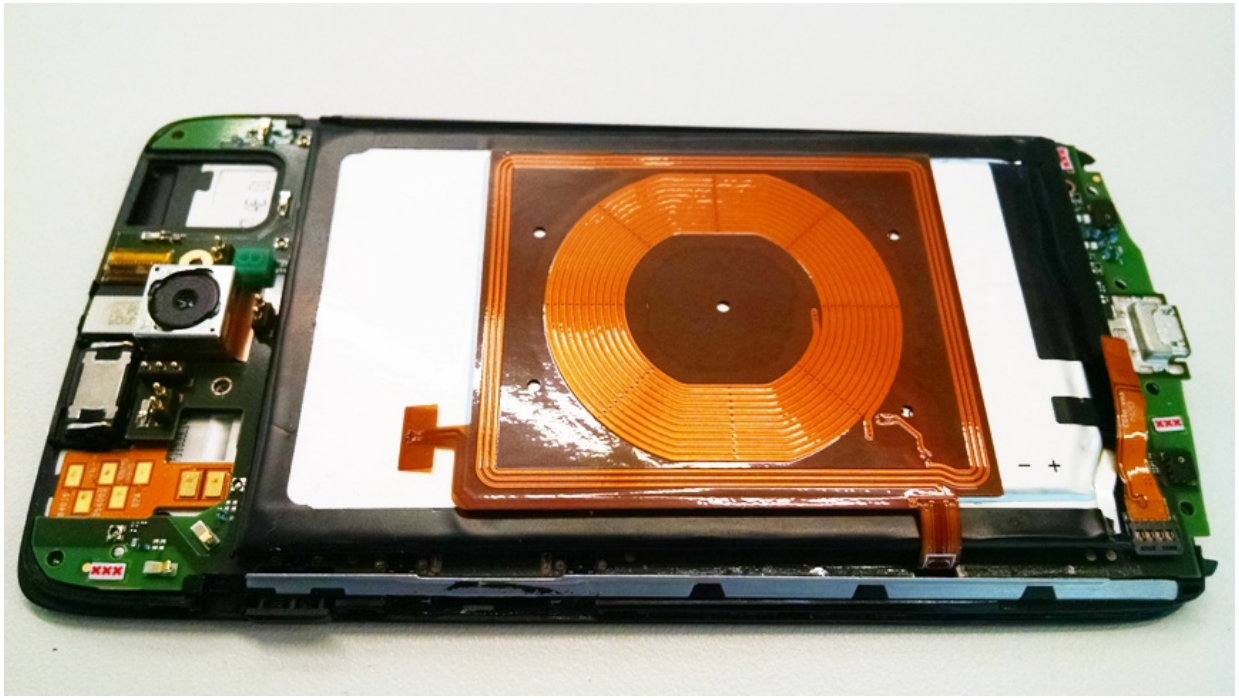
NFC

Here are the various test cases for NFC:

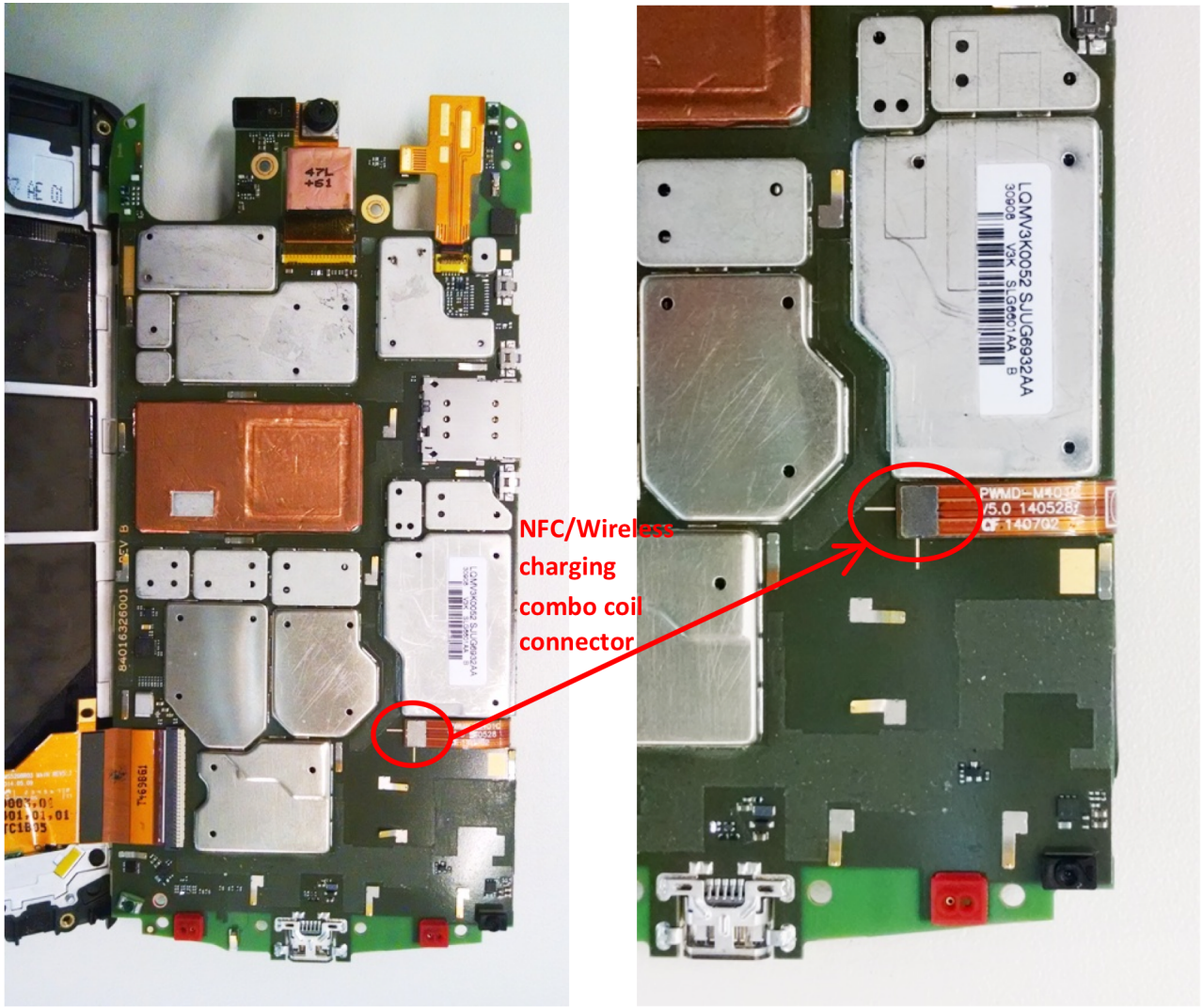
- NFC Antenna Self Test Status
- NFC Antenna SWP Line Test
- NFC Tag test

NFC – Debugging Procedure

1. Verify NFC antenna exists, is connected, and verify it is properly seated.

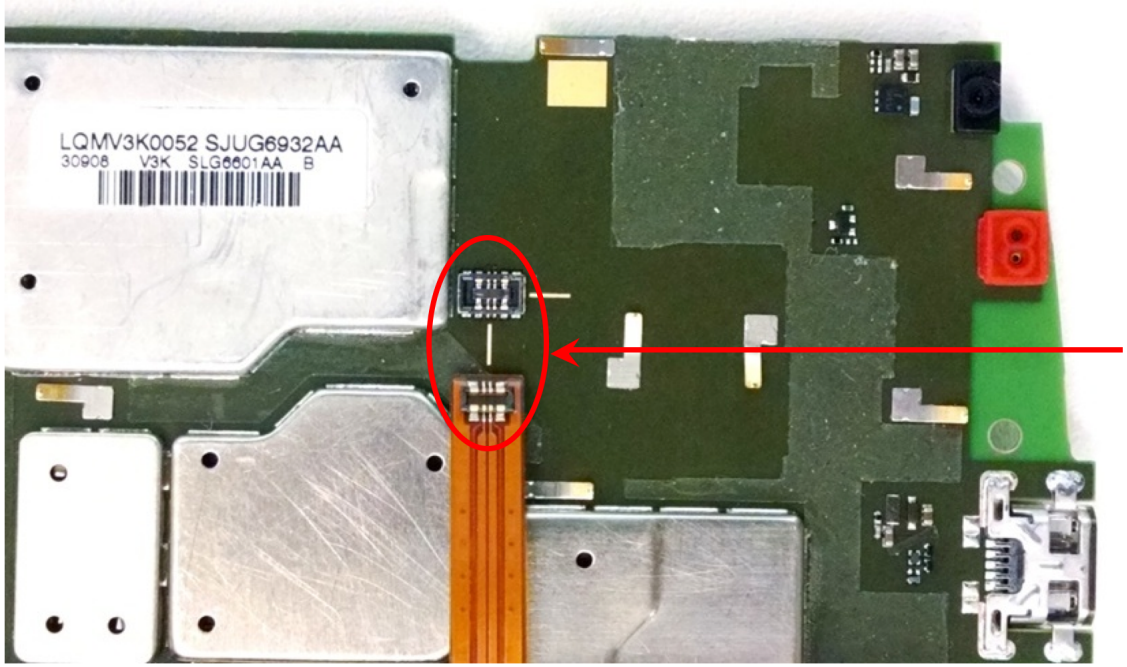


NFC – Debugging Procedure (cont.)



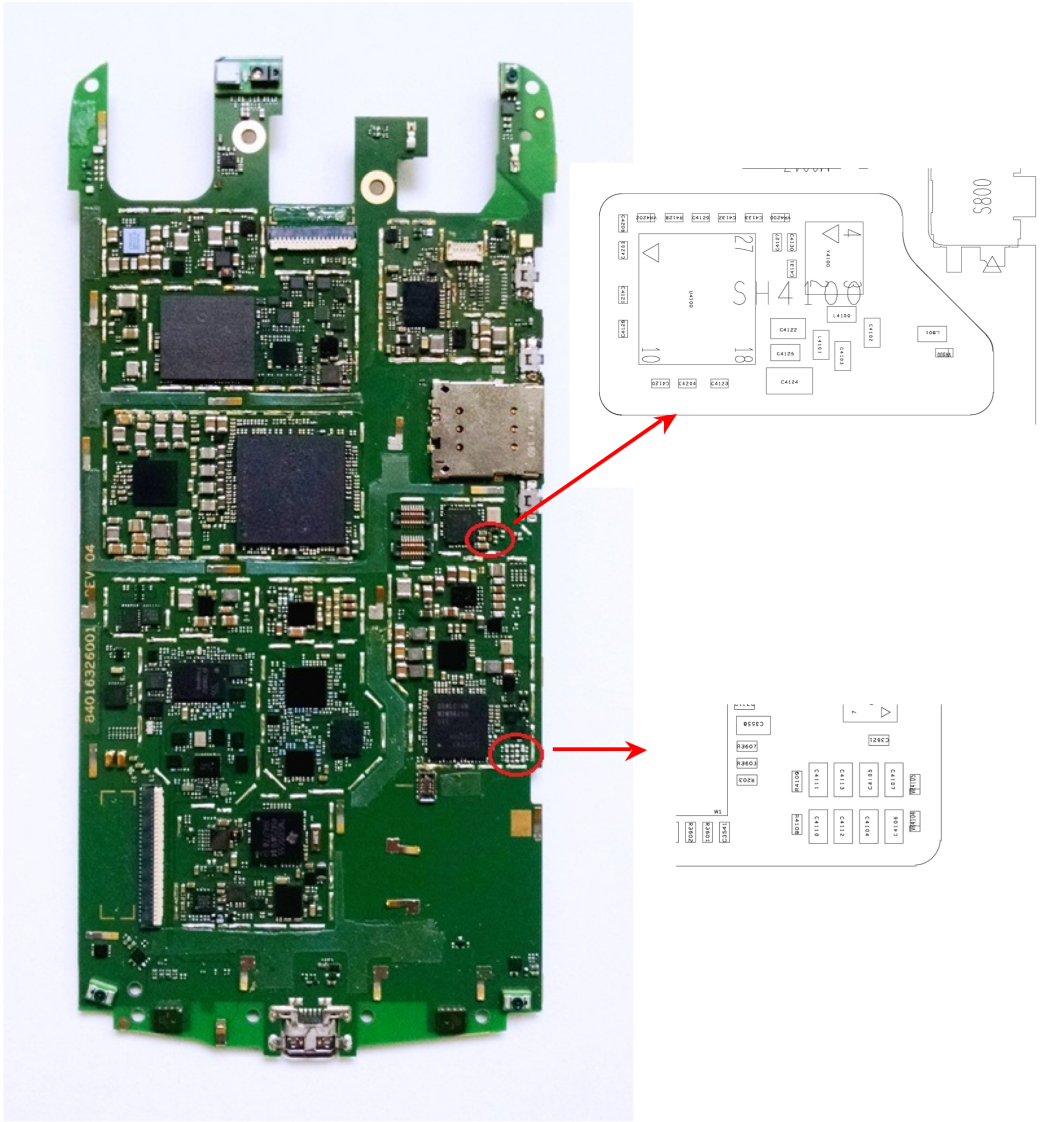
NFC – Debugging Procedure (cont.)

2. Verify NFC antenna connector is not damaged on flex or on PCB. There may be soldering defects, such as shorts, broken pads. There may also be broken pins within the connector. Often broken pins can occur through improper insertion of connector.

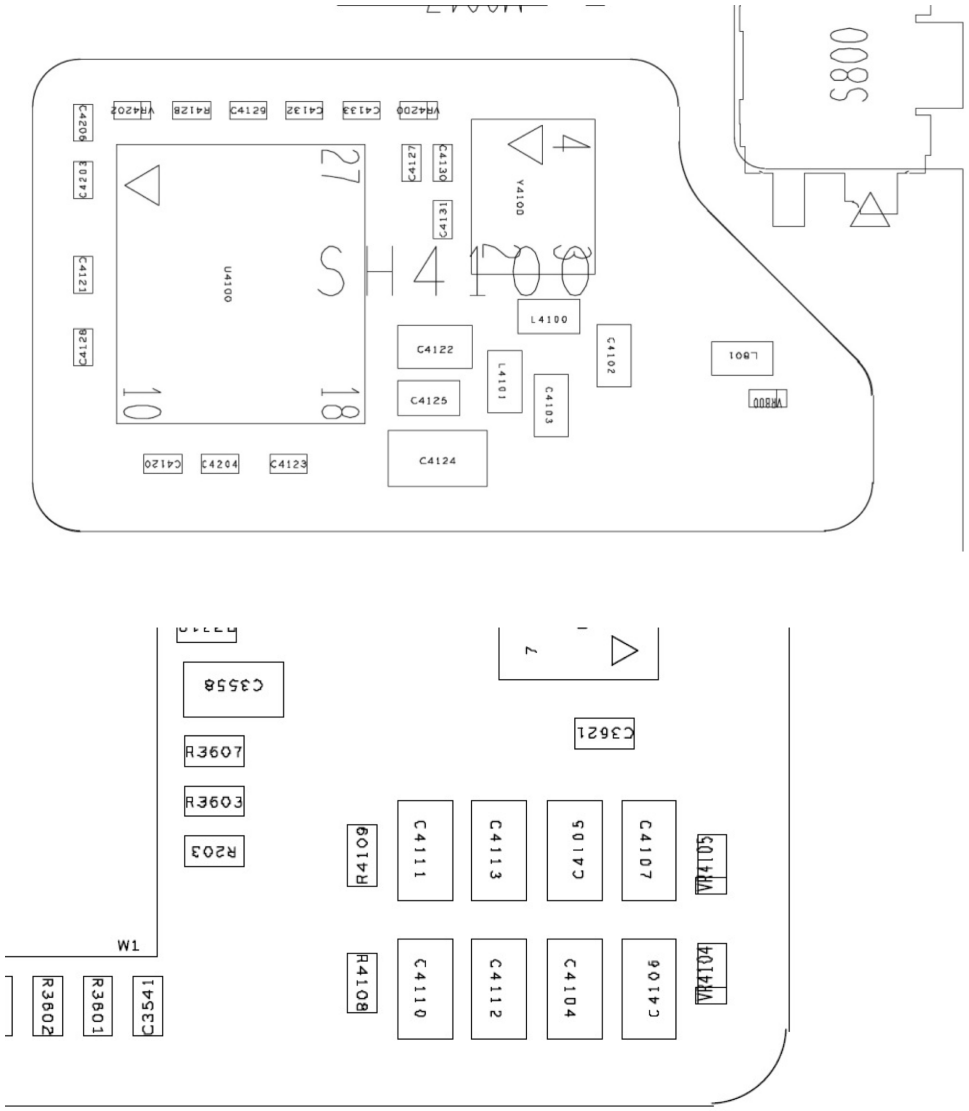


3. Replace NFC antenna to see if it follows antenna itself.
4. Ensure NFC antenna matching components are not damaged.

NFC – Debugging Procedure (cont.)



NFC – Debugging Procedure (cont.)



NFC – Debugging Procedure