Moto X Pure Edition/Moto X Style Baseband TROUBLESHOOTING GUIDES V1.0

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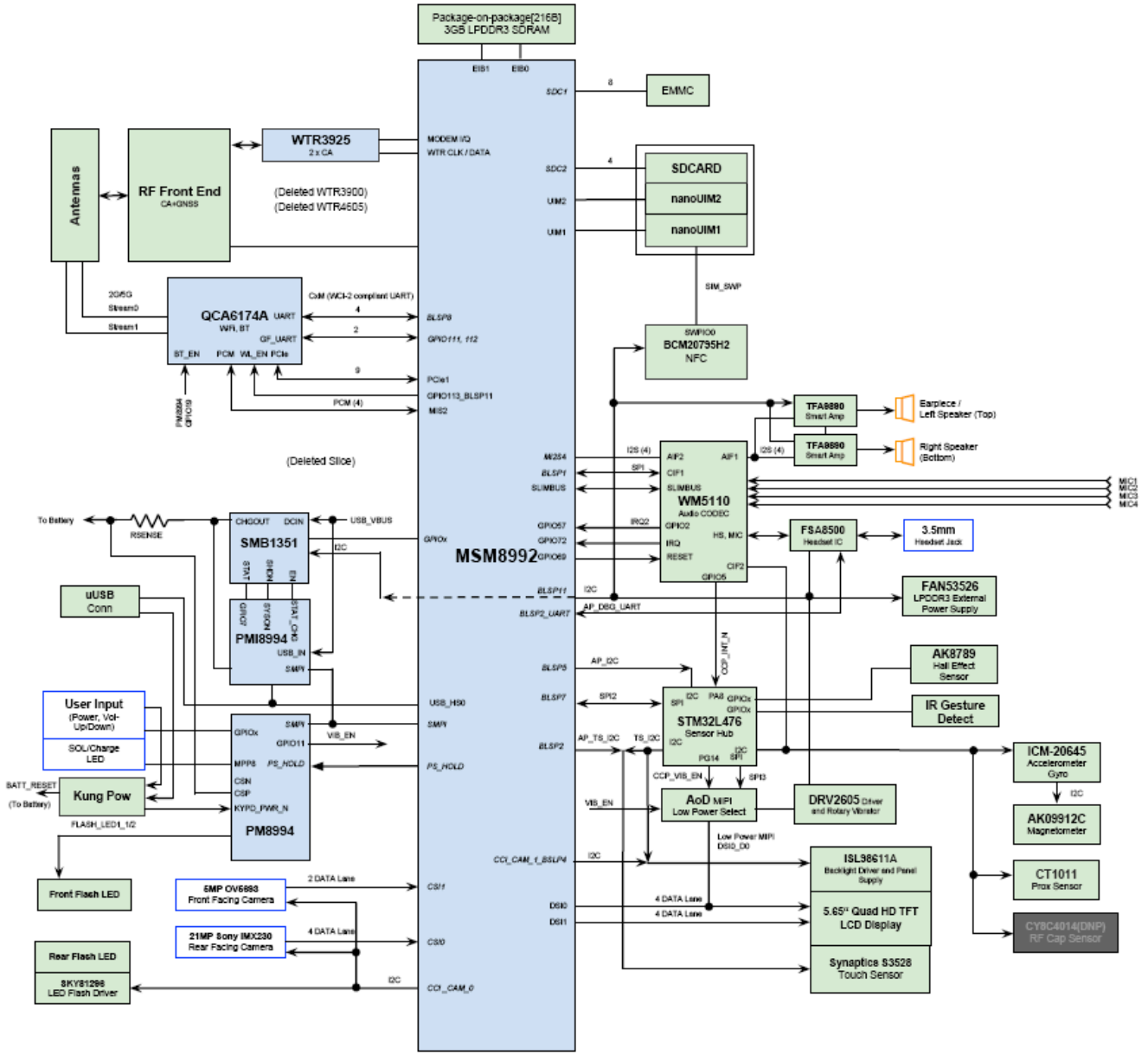
OVERALL BLOCK DIAGRAM

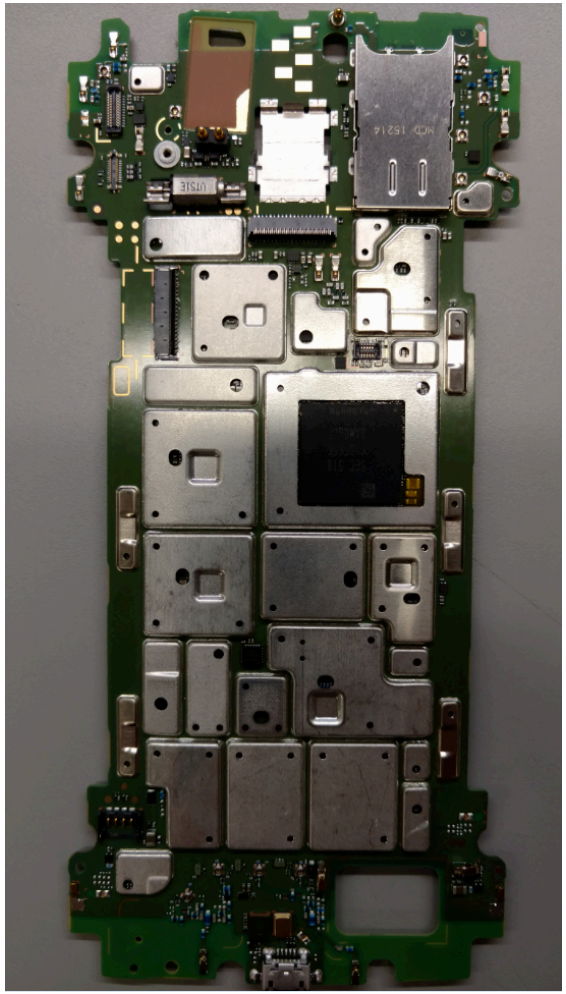

Package-on-package[216B]
3GB LPDDR3 SDRAM
EBI1
EBI0
MSM8992
EMMC
SDCARD
nanoUIM2
nanoUIM1
Antennas
RF Front End
CA+GNSS
WTR3925
2 x CA
(Deleted WTR3900)
(Deleted WTR4605)
MODEM I/Q
WTR CLK / DATA
SDC1
SDC2
UIM2
UIM1
SIM_SWP
QCA6174A
WiFi, BT
UART
GF_UART
BT_EN
PCM
WL_EN
PCIe
2G/5G
Stream0
Stream1
CoM (WCI-2 compliant UART)
BLSP8
GPIO111, 112
PCIe1
GPIO113_BLSP11
MIS2
PCM (4)
BCM20795H2
NFC
(Deleted Slice)
TFA9890
Smart Amp
TFA9890
Smart Amp
Earpiece /
Left Speaker (Top)
Right Speaker
(Bottom)
I2S (4)
MI2S4
BLSP1
SLIMBUS
WM5110
Audio CODEC
AIF2
AIF1
CIF1
CIF2
HS, MIC
IRQ
RESET
GPIO2
GPIO5
MIC1
MIC2
MIC3
MIC4
FSA8500
Headset IC
3.5mm
Headset Jack
IRQ2
GPIO57
GPIO72
GPIO69
GPIOx
SMB1351
CHGOUT
DCIN
USB_VBUS
RSENSE
To Battery
I2C
PMI8994
USB_IN
SMPI
uUSB
Conn
BLSP11
AP_DBG_UART
BLSP2_UART
FAN53526
LPDDR3 External
Power Supply
AP_I2C
BLSP5
AK8789
Hall Effect
Sensor
User Input
(Power, Vol-
Up/Down)
SOL/Charge
LED
BLSP7
SPI2
STM32L476
Sensor Hub
SPI
I2C
PA8
PG14
IR Gesture
Detect
USB_HS0
SMPI
VIB_EN
GPIO11
PS_HOLD
AP_TS_I2C
TS_I2C
BLSP2
ICM-20645
Accelerometer
Gyro
AK09912C
Magnetometer
CT1011
Prox Sensor
CY8C4014(DNP)
RF Cap Sensor
CCP_VIB_EN
SPI3
AoD MIPI
Low Power Select
DRV2605 Driver
and Rotary Vibrator
Low Power MIPI
DSI0_D0
CCI_CAM_1_BSLP4
ISL98611A
Backlight Driver and Panel
Supply
5.65" Quad HD TFT
LCD Display
Synaptics S3528
Touch Sensor
4 DATA Lane
DSI0
DSI1
PM8994
MPP8
PS_HOLD
CSN
CSP
KYPD_PWR_N
Kung Pow
BATT_RESET
(To Battery)
FLASH_LED1_1/2
Front Flash LED
Rear Flash LED
SKY81296
LED Flash Driver
5MP OV5693
Front Facing Camera
2 DATA Lane
21MP Sony IMX230
Rear Facing Camera
4 DATA Lane
CSI1
CSI0
I2C
CCI_CAM_0

SNAPSHOTS OF MAIN BOARD

Snapshots of Main PCB – Top and Bottom

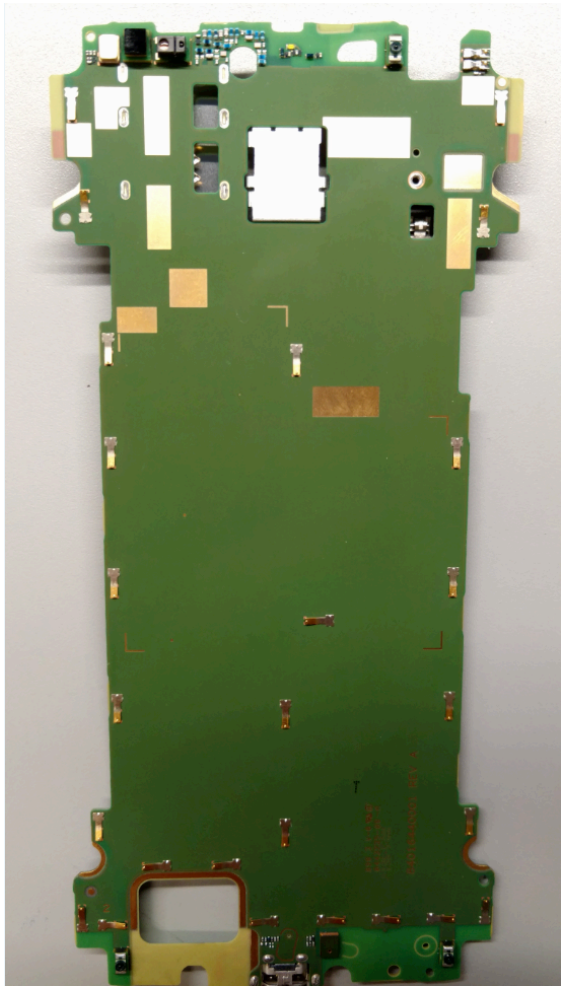
Top Side

(Battery side)

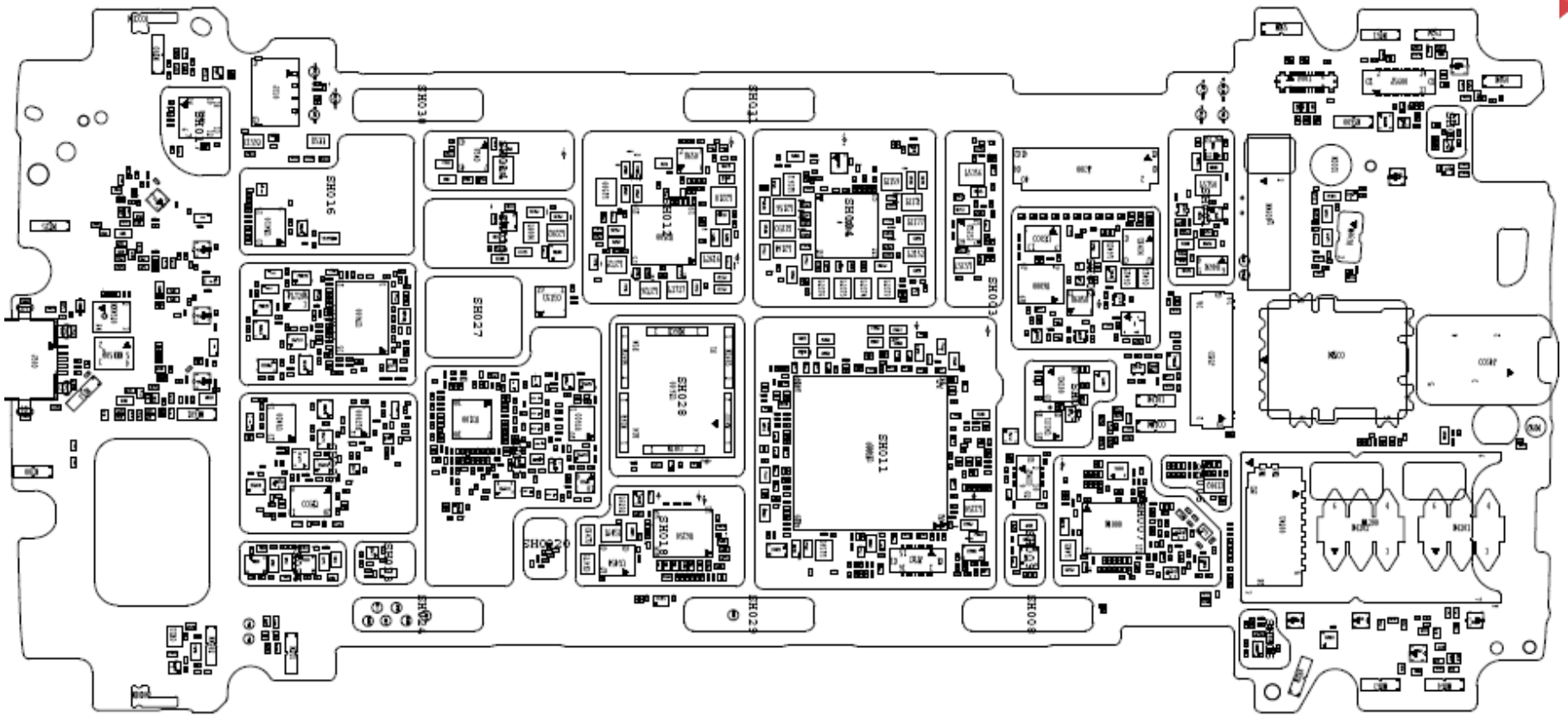


Bottom Side

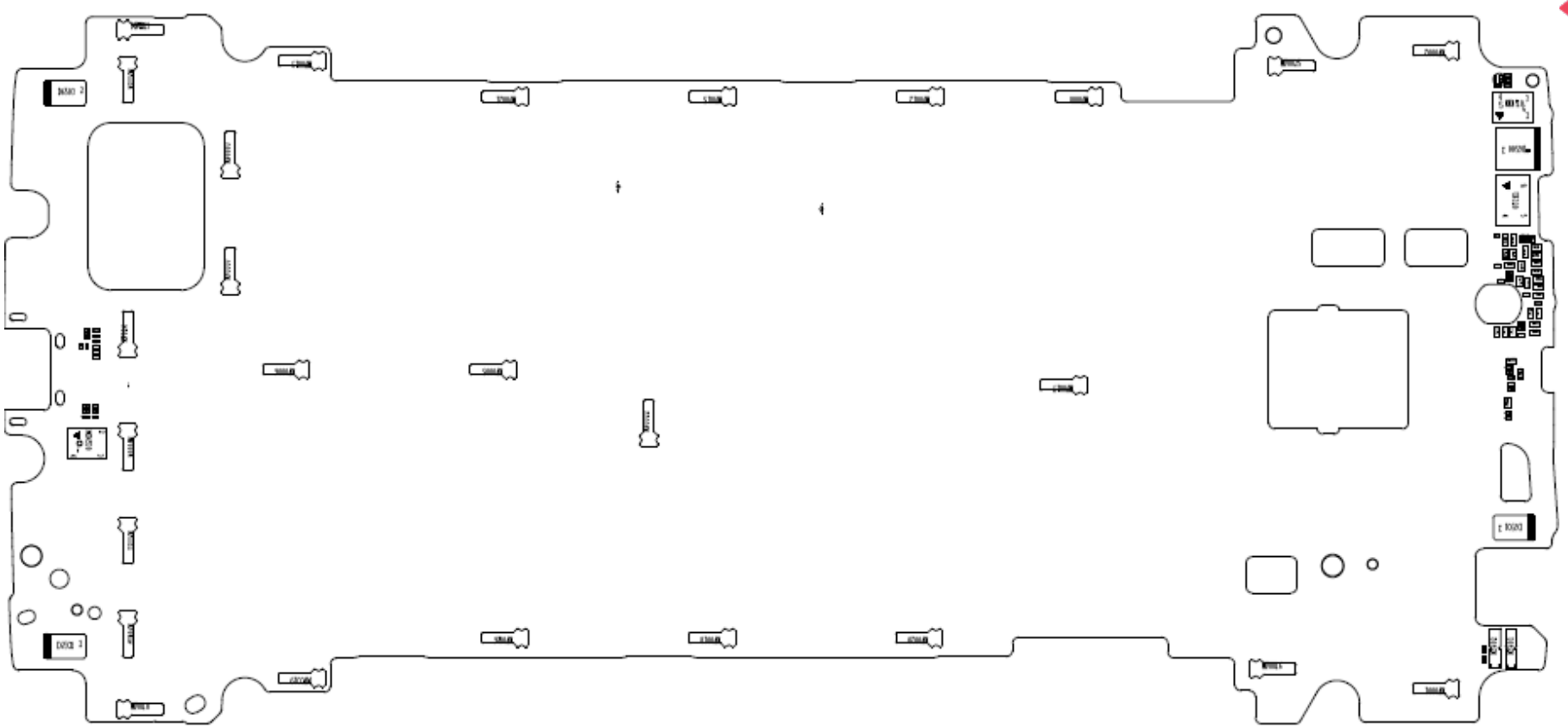
(Display side)



Main Board – Top Placement



Main Board – Bottom Placement

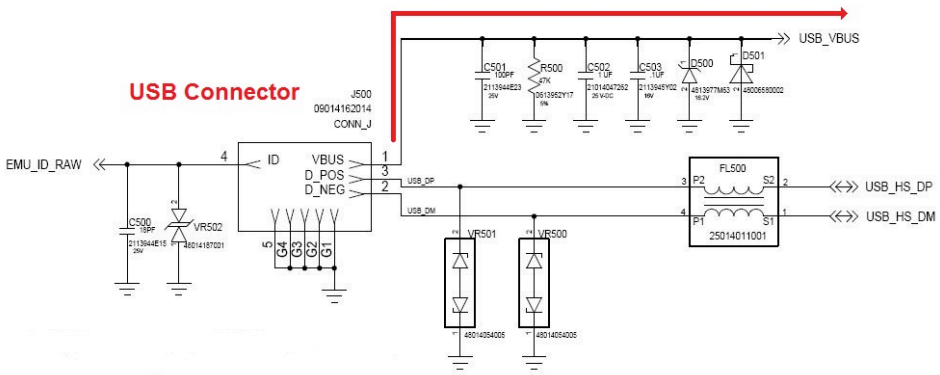


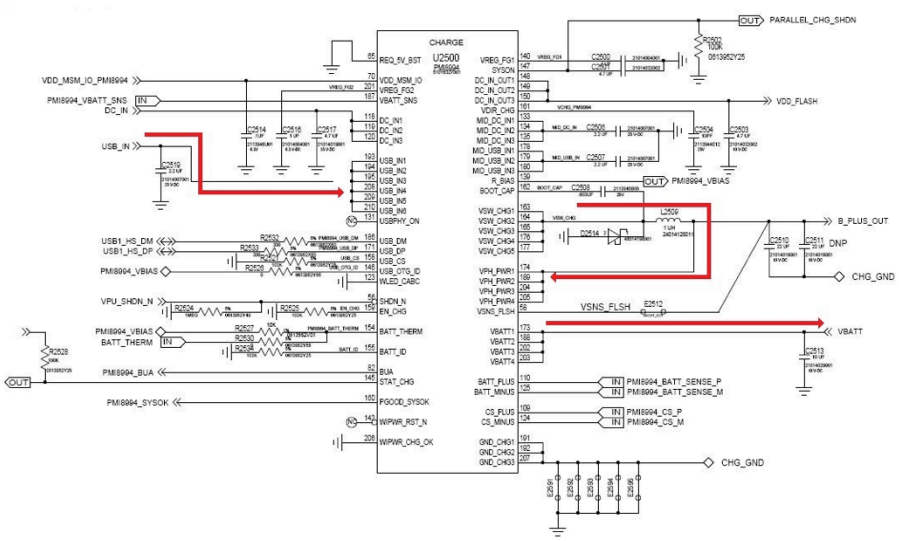
CHARGING TROUBLESHOOTING

CHARGING TROUBLESHOOTING

- Uses two charger ICs in parallel. The primary IC is U2500 and the secondary IC is U540 (used for turbo charging only).
- Charge Path (1 of 2, primary charger IC):

  USB Connector J500(pin1) -> Charger IC U2500(pin 193,194, 195,208,209,209,210) -> L2509 -> Charger IC U2500(pin 174,189,204,205) -> Charger IC U2500(pin 173,188,202,203) -> R521 ->Battery Connector, J510 Pin 4

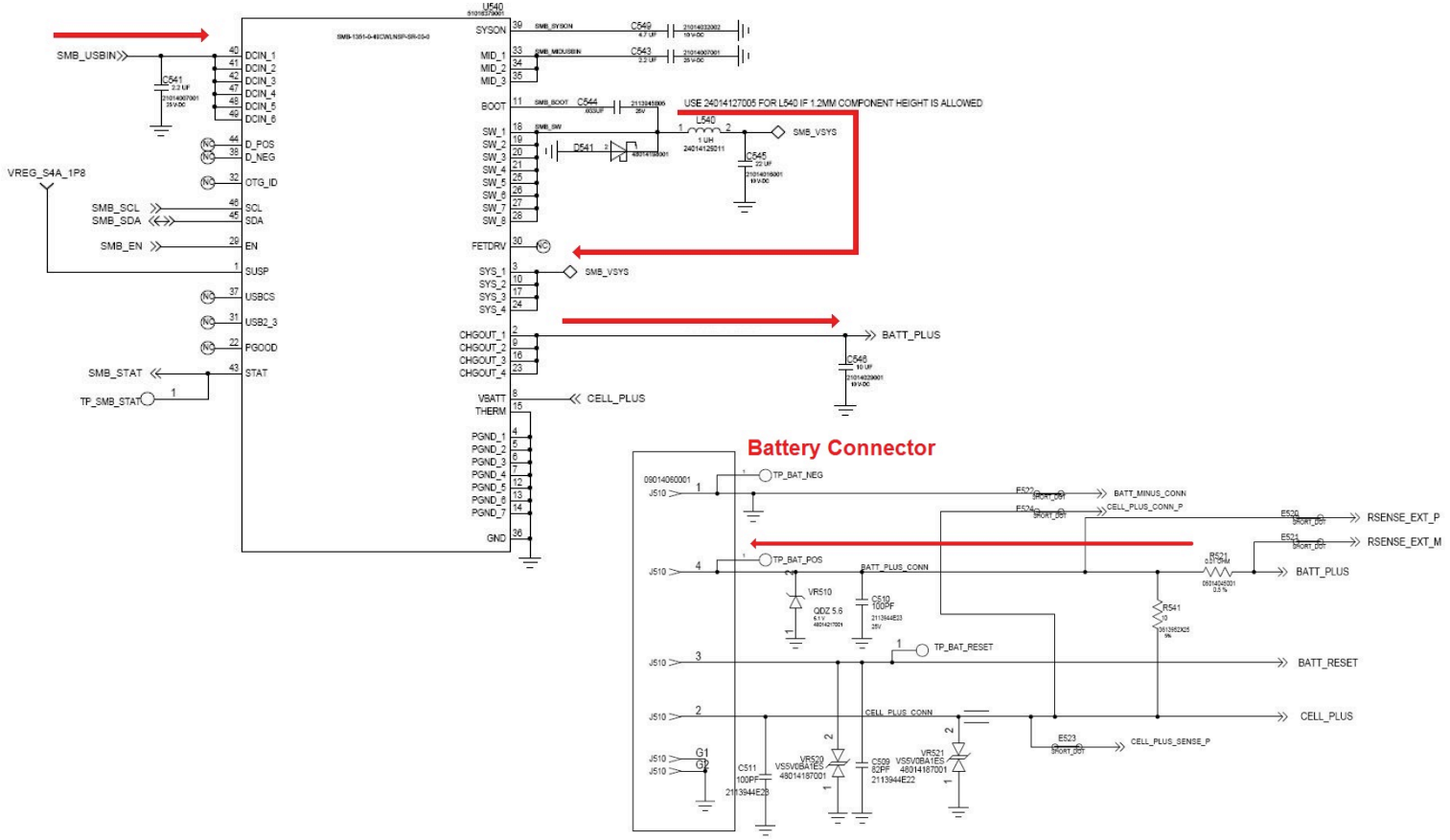




CHARGING TROUBLESHOOTING (cont'd)

- Charge Path (2 of 2, secondary charger IC):

  -> Charger IC U540(pin 40,41,42,47,48,49) -> Charger IC U5201(pin 2,9,16,23) -> R521 -> Battery Connector J510(pin 4)



CHARGING TROUBLESHOOTING (cont'd)

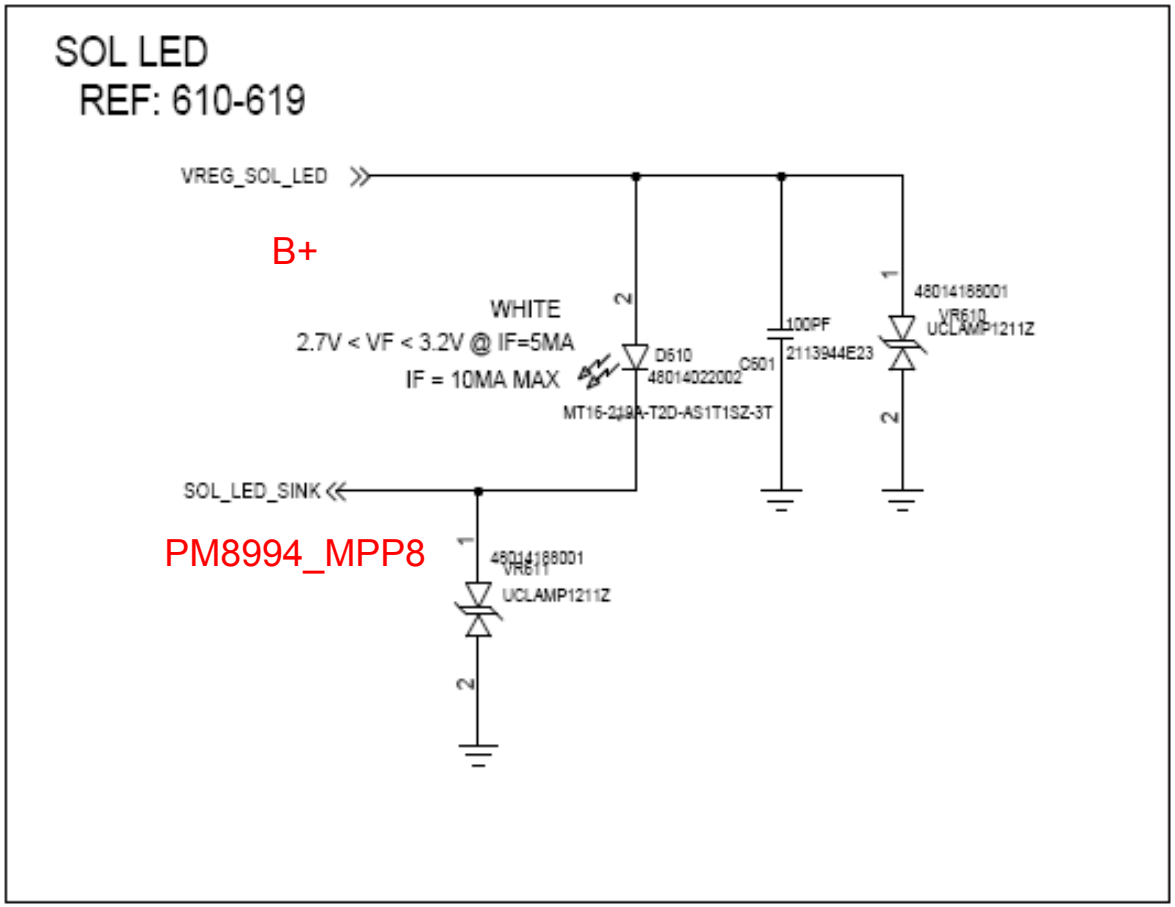
In the event of charging issues :

- Do visual inspection on USB connector and battery connector.
- Check charging voltages along the charging path.
  - Measure USB_PWR charger input voltage at C541 (SMB1351 Input) and C2518 (PMI8994 input). The voltage should be between 4.3V ~ 9.90V.
  - Check B_PLUS voltage at C2510. It should be 4.35V or lower.
  - Check battery voltage at J510 pin 4. It should be 4.40V or lower. If battery is below 2.1V, there maybe a short in the circuit somewhere and the battery protection circuit is triggered.
  - Check battery ground path - J510 pin 1.
- Battery temperature should be between 0ºC ~ 45ºC to be fully charged. Read the phone temperature using the following steps: Attach a USB cable to a powered on phone. In a terminal window, type "adb root", "adb shell", "cat /sys/class/power_supply/battery/temp".
- The temperature will be returned with 3 digits, with no decimal so 25C will read 250.

LED/PROXIMITY & IR SENSOR/USIM/uSD CARD TROUBLESHOOTING

SOL (Sign of Life) LED

- SOL LED (White) is driven by U2000 PM8994 SOL_LED_SINK (PM8994_MPP8) and B_PLUS



White SOL LED

In the event of SOL LED issue:

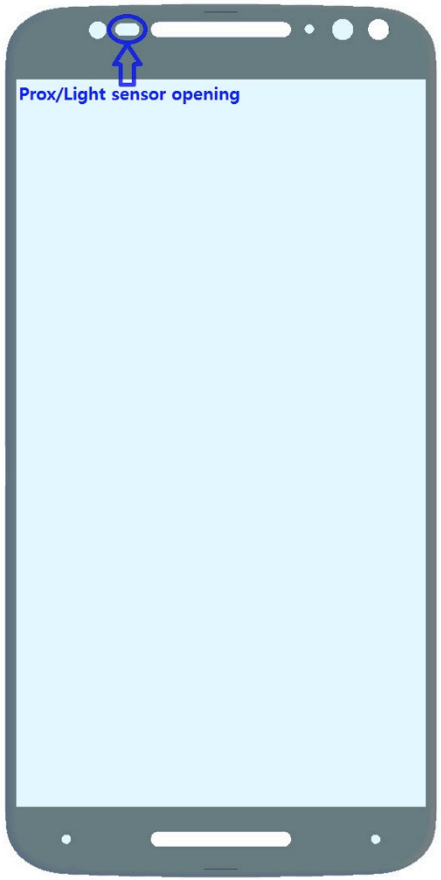
- Check voltage at LED Anode (pin 2) and Cathode (pin 1) of D610
- LED Vf @If,10mA = V_anode - V_cathode = 2.7V(typ.), 3.1V(max)
- If LED is working, Vf should be in the available range, about 2.8V.

	LED On	LED Off
FTM power, w/o battery	V_Anode: 3.15V~3.2V V_Cathode: 0.3V Vf = 2.8V	V_Anode: 3.15V~3.2V V_Cathode: 0.95V Vf = 2.2V
FTM power, w/ battery(3.8V)	V_Anode: VBatt+ 0.1V, 3.9V V_Cathode: 1.05V Vf = 2.85V	V_Anode: VBatt+ 0.1V, 3.9V V_Cathode: 1.66V Vf = 1.95V

IR Proximity Sensor – Ambient Light Sensor

IR Proximity & Ambient Light Sensor circuit is located on a mainboard. In the event of IR proximity or ambient light sensor issue at phone level:

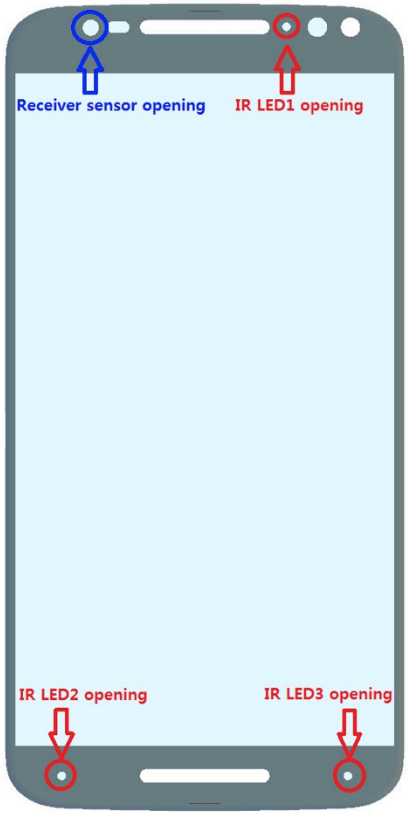
- Visually check under a microscope if the grommet is placed on the sensor correctly (whether the grommet blocks the lens opening)



IR Sensor

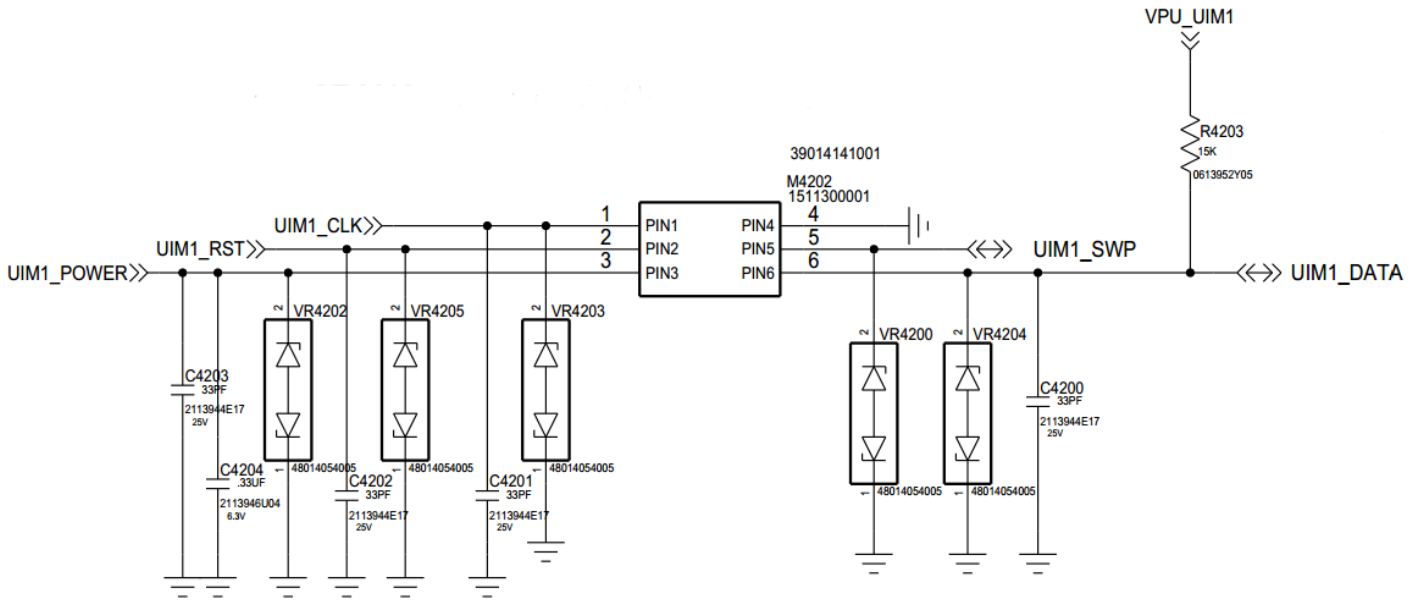
There are 1 receiver sensor and 3 IR LEDs for operating IR sensor.
IR receiver sensor and 3 LED circuits are located on a mainboard. In the event of IR sensor issue at phone level:

- Visually check under a microscope if the grommet is placed on the sensor correctly (whether any of the grommets block the lens openings)



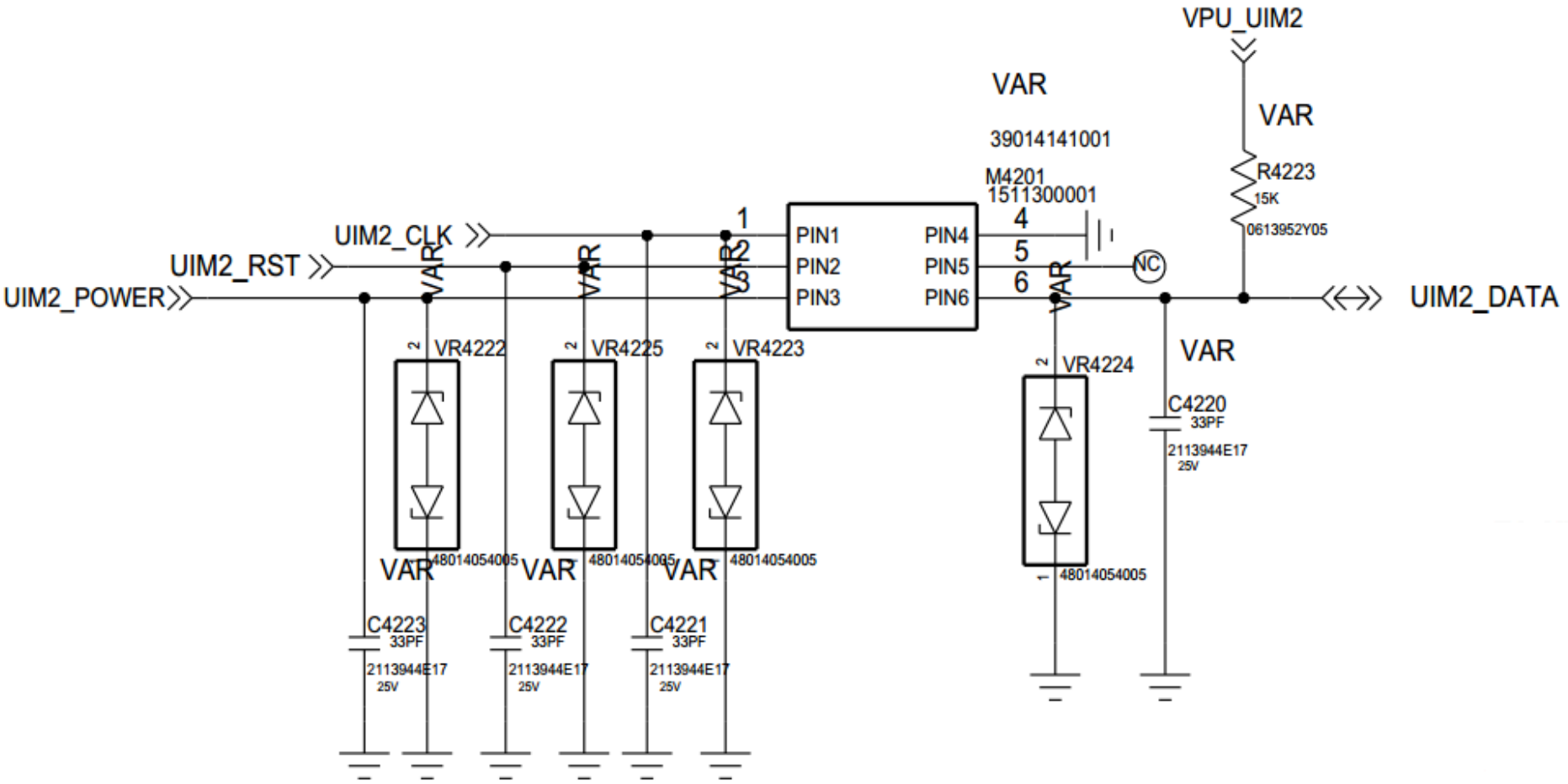
SIM

- Depending on the PCB board variant, there are up to 2 SIM connectors on PCB board.
- Each SIM connector is operated independently with its own power, detection and SIM bus interface.



SIM (cont'd)

Secondary SIM: These components may be DNI depending on sku.



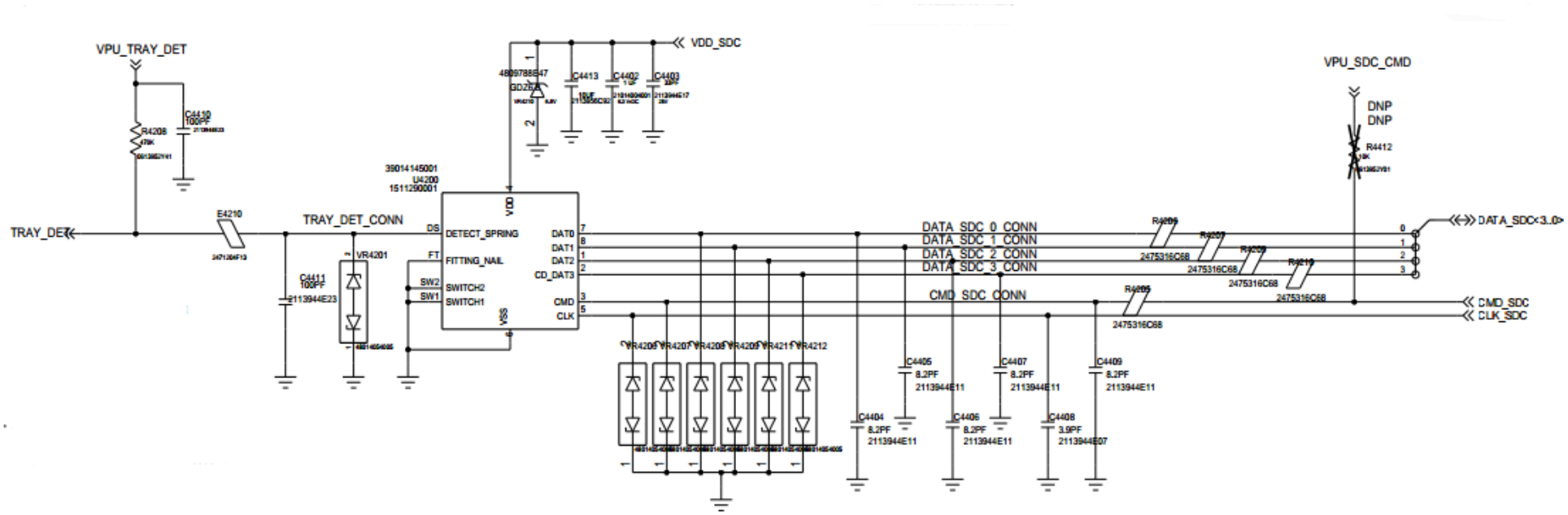
SIM (cont'd)

In the event of SIM issue:

- Do a thorough visual check on SIM connector M4201 and M4202 for any sign of mechanical contact issues.
- Inspect all SIM circuit components on PCB.
- Check SIM power at C4203 (for primary SIM) and at C4223 (for secondary SIM) and SIM card detection signal TRAY_DET at E4210. TRAY_DET is high when tray is inserted.
- Check SIM bus interface signal activities during SIM access (UIMx_RST, UIMx_CLK, UIMx_DATA).

uSD CARD

- Probe VDD_SDC at C4413 to check for 2.7-3.6V
- Probe TRAY_DET at E4210 for 1.8V



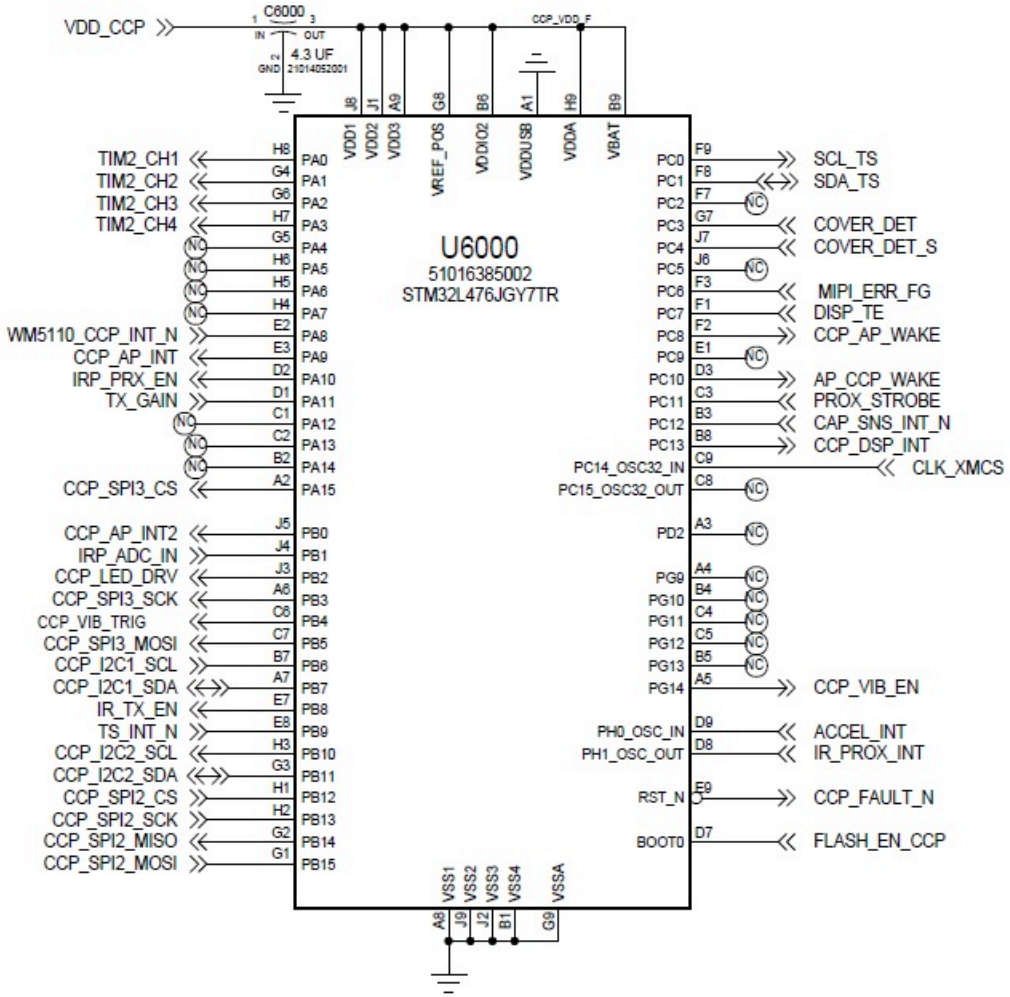
SENSORS TROUBLESHOOTING

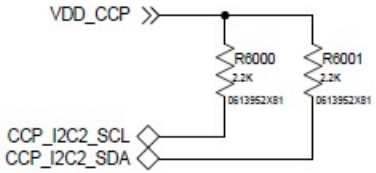
Sensor hub

In the event of sensor hub failure:

- Inspect physical placement U6000 and their related components on main PCB board (see sensor hub schematic page on next slide).
- When all sensors stop reporting readings, please inspect the power supply on sensor hub. If the power is present, then please send the board back to Chicago for DE analysis.

Sensor Hub


VDD_CCP
C6000
4.3 UF
CCP_VDD_F
U6000
51016385002
STM32L476JGY7TR
TIM2_CH1
TIM2_CH2
TIM2_CH3
TIM2_CH4
WM5110_CCP_INT_N
CCP_AP_INT
IRP_PRX_EN
TX_GAIN
CCP_SPI3_CS
CCP_AP_INT2
IRP_ADC_IN
CCP_LED_DRV
CCP_SPI3_SCK
CCP_VIB_TRIG
CCP_SPI3_MOSI
CCP_I2C1_SCL
CCP_I2C1_SDA
IR_TX_EN
TS_INT_N
CCP_I2C2_SCL
CCP_I2C2_SDA
CCP_SPI2_CS
CCP_SPI2_SCK
CCP_SPI2_MISO
CCP_SPI2_MOSI
SCL_TS
SDA_TS
COVER_DET
COVER_DET_S
MIPI_ERR_FG
DISP_TE
CCP_AP_WAKE
AP_CCP_WAKE
PROX_STROBE
CAP_SNS_INT_N
CCP_DSP_INT
CLK_XMCS
CCP_VIB_EN
ACCEL_INT
IR_PROX_INT
CCP_FAULT_N
FLASH_EN_CCP


VDD_CCP
R6000
R6001
2.2K
CCP_I2C2_SCL
CCP_I2C2_SDA

Accelerometer

In the event of accelerometer failure:

- Inspect physical placement U6150 and their related components on main PCB board (see accelerometer schematic page on next slide).
- Connect the board to a display and power the board/display with battery or factory cable. Launch CQA app, test each accelerometer at a time. Look for accelerometer G-force activity on all axis X,Y,Z. As you change the board orientation to have positive X,Y,Z accelerometer reading. Good accelerometer IC will have G-force reading for each positive axis closed to 9.8 else the IC is faulty.

Gyroscope

In the event of Gyroscope failure:

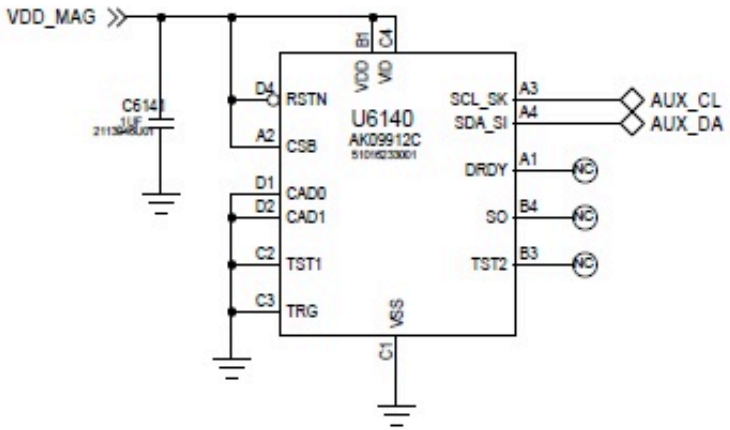
- Inspect physical placement U6150 and their related components on main PCB board (see gyroscope schematic page on next slide).
- Connect the board to a display and power the board/display with battery or factory cable. Launch CQA app, test each gyroscope at a time. Look for gyroscope activity on all axis X,Y,Z. As you rotate the board orientation, gyroscope reading will register reading accordingly. When the board is stationary, all gyroscope reading should be 0.

Accelerometer and Magnetometer

MAGNETOMETER

REF:6140-6149

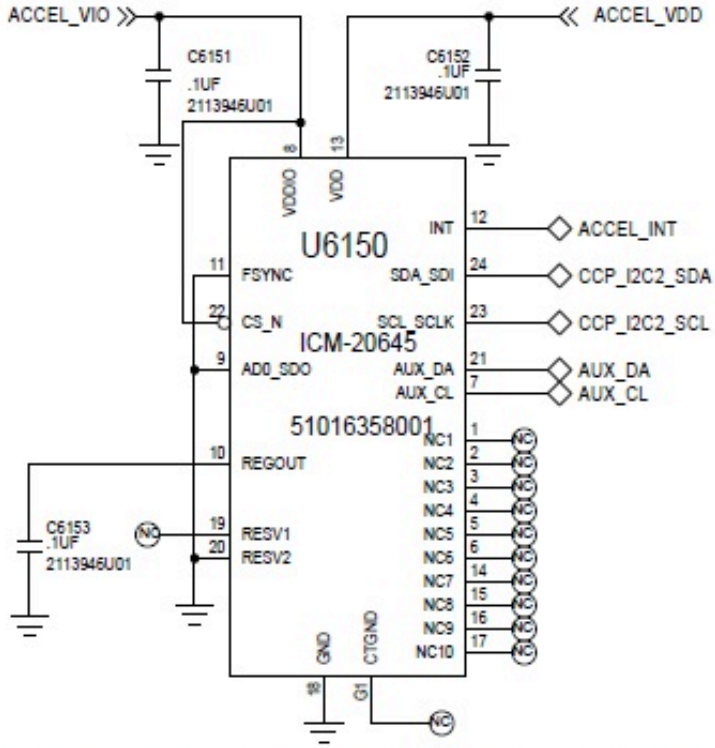
I2C ADDR: 0X0C



ACCELEROMETER+GYRO

REF:6150-6159

I2C ADDR: 0X68



PRODUCTS MUST FOLLOW BUNKER HILL PCB ORIENTATION

Magnetometer

In the event of Magnetometer failure:

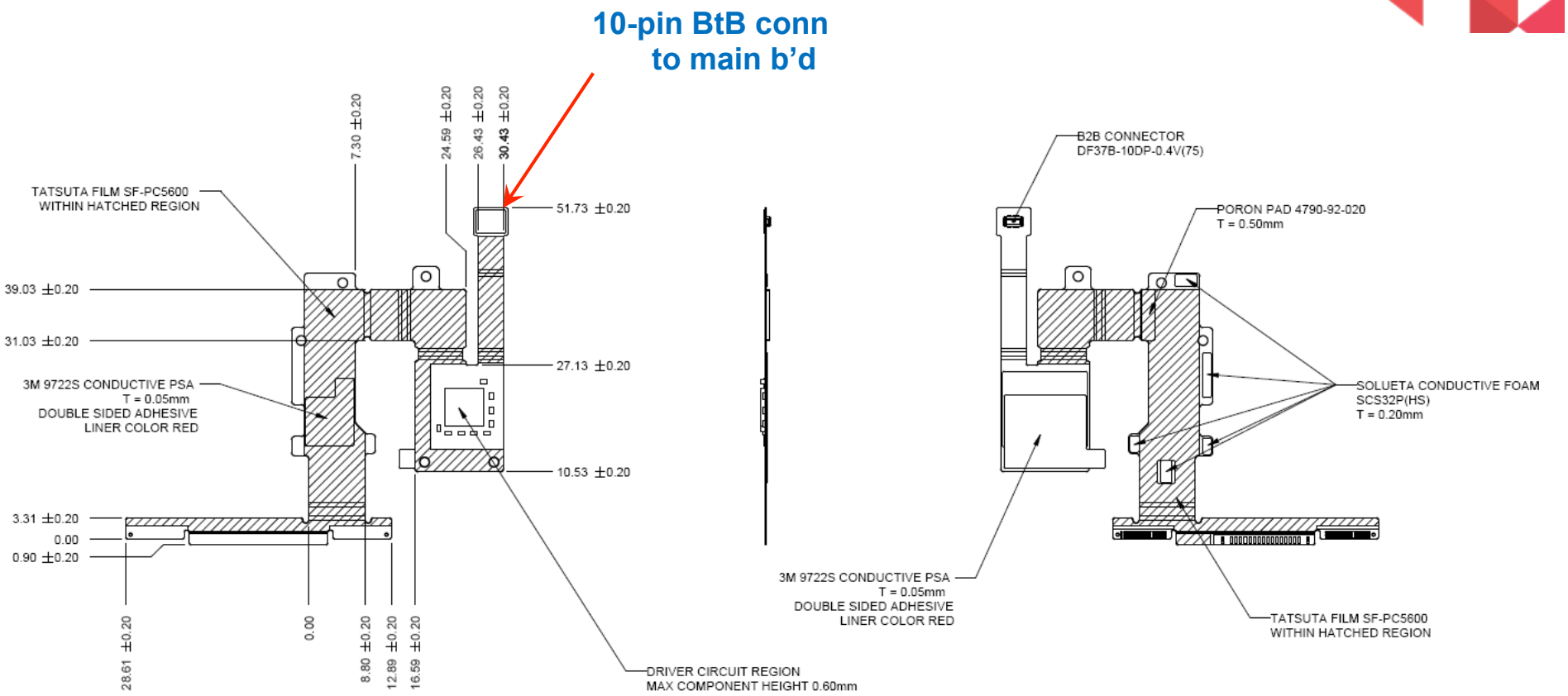
- Inspect physical placement U6140 and their related components on main PCB board.
- Connect the board to a display and power the board/display with battery or factory cable. Launch CQA app, test each magnetometer. Look for magnetometer on all axis X,Y,Z. As you rotate the board orientation, magnetometer reading will register reading accordingly.

TOUCH TROUBLESHOOTING

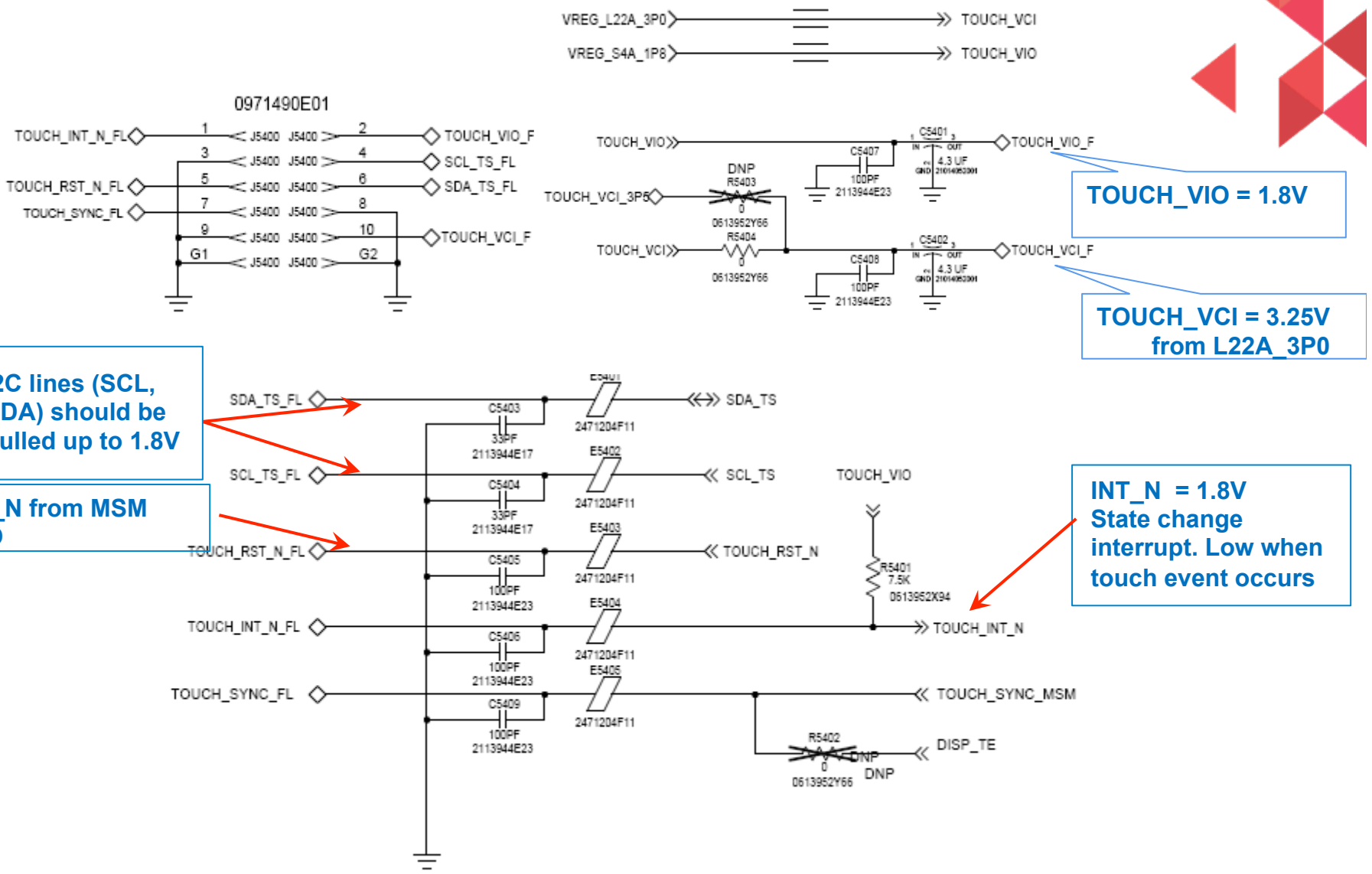
Touch Design

- Two Layers Touch
  - INX
    - Synaptics S3528
    - 16 TXs * 28RXs

Touch Design - Mechanical



Touch Design - Electrical



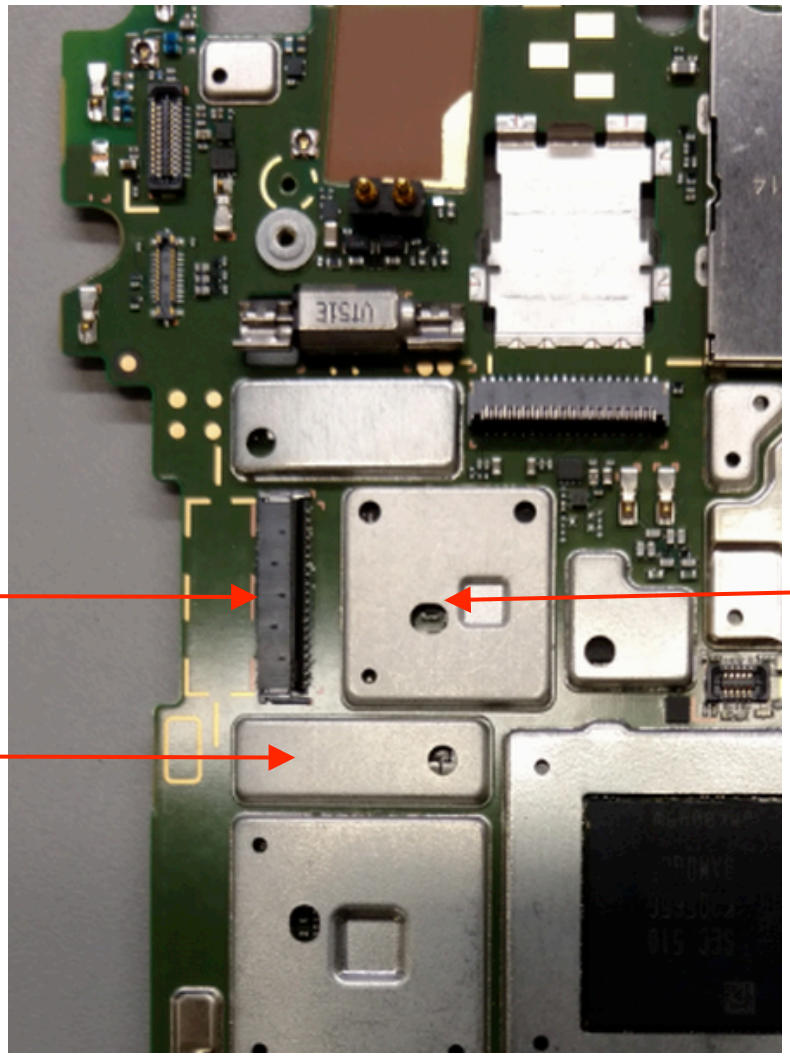
Touch Design - Troubleshooting

- No touch and abnormal touch:
    1) Check power supply voltages
    2) Check a touch connector and flexes on display flex
    3) Check a panel crack
    4) Check firmware version

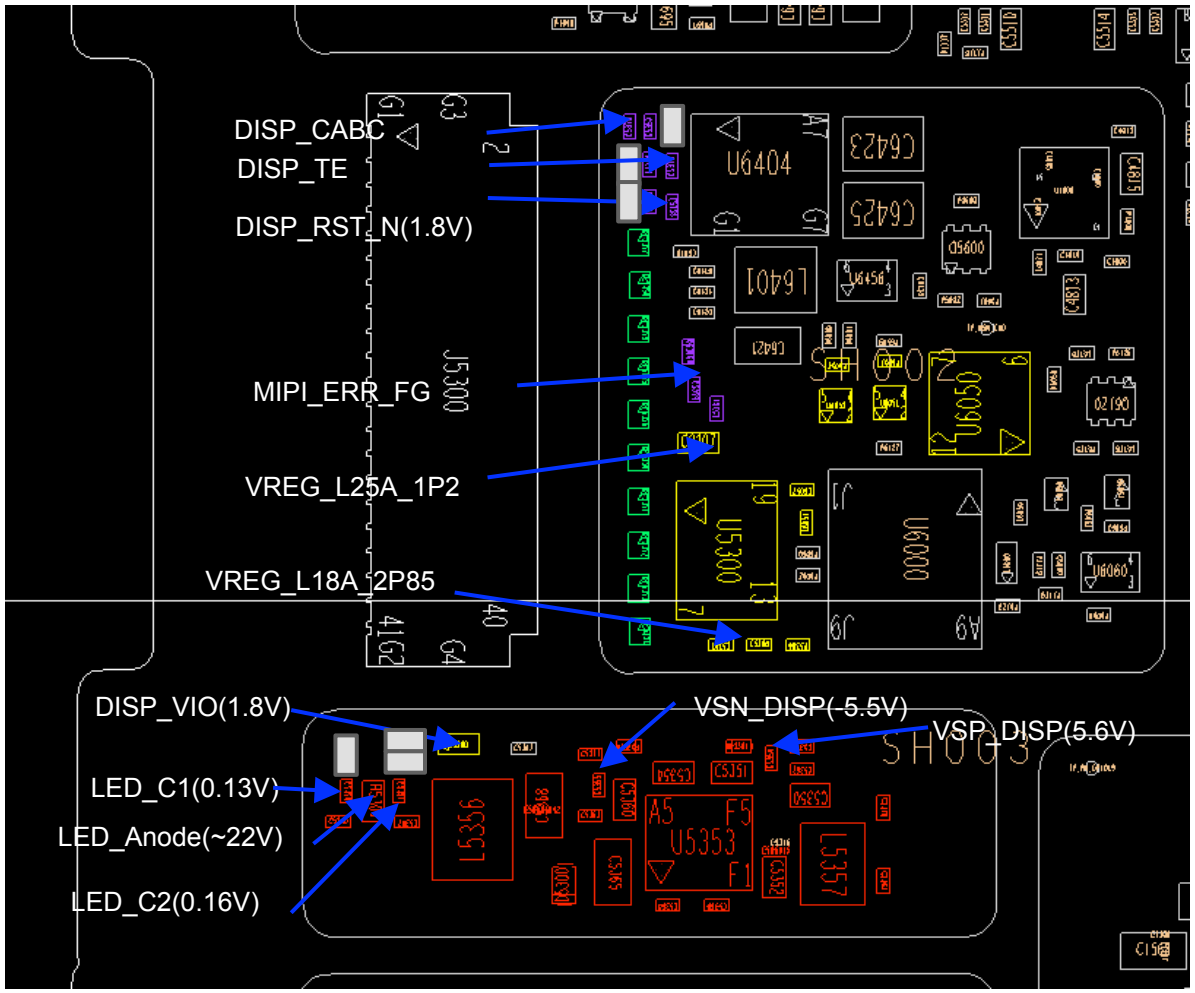
       adb shell cat /sys/bus/i2c/devices/2-0020/ic_ver

DISPLAY TROUBLESHOOTING

Display Circuit Location



Display & Backlight signal check
Colorful components placed, Gray components NOT placed



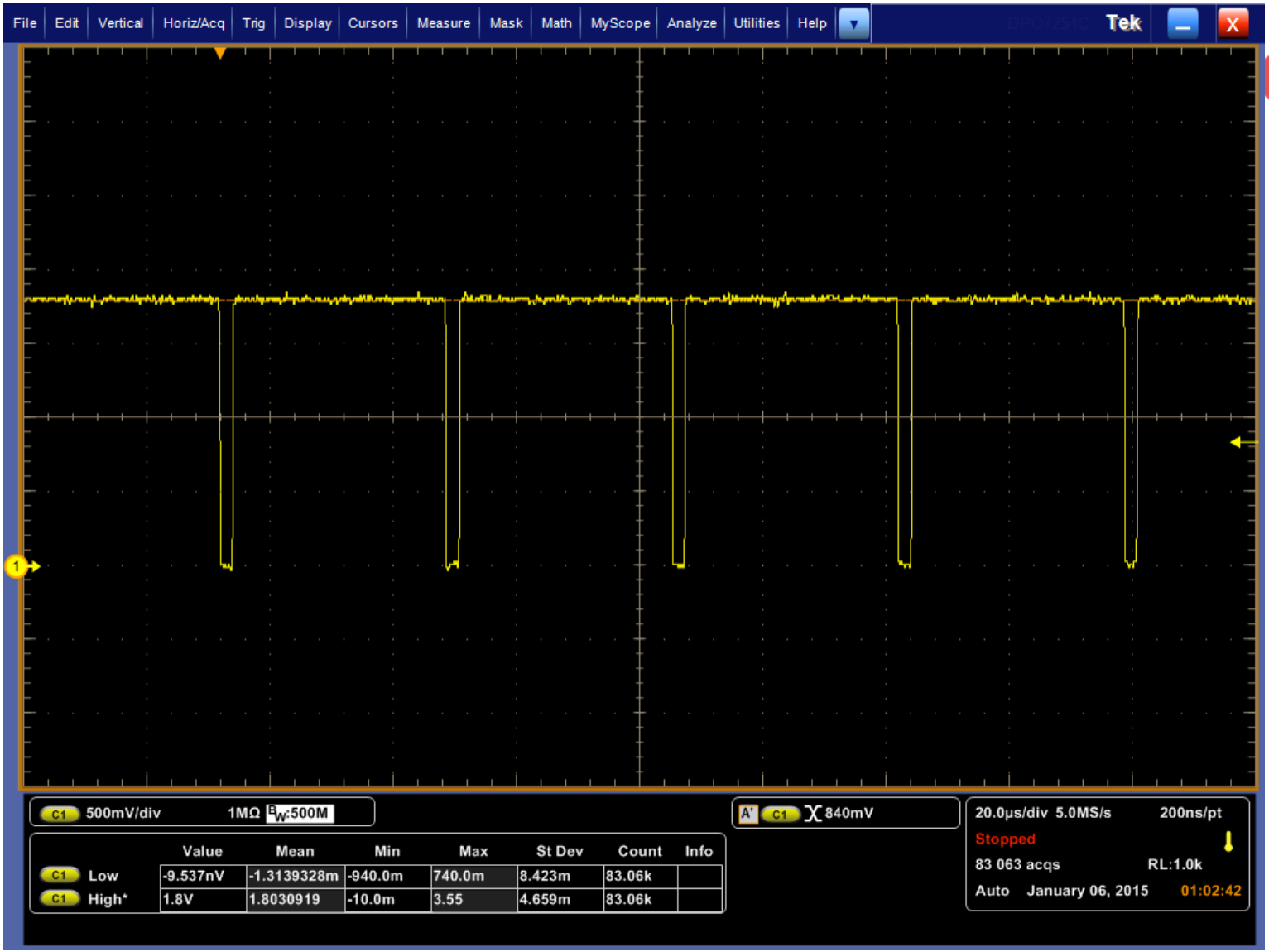
MIPI Signals

Display Control Signals

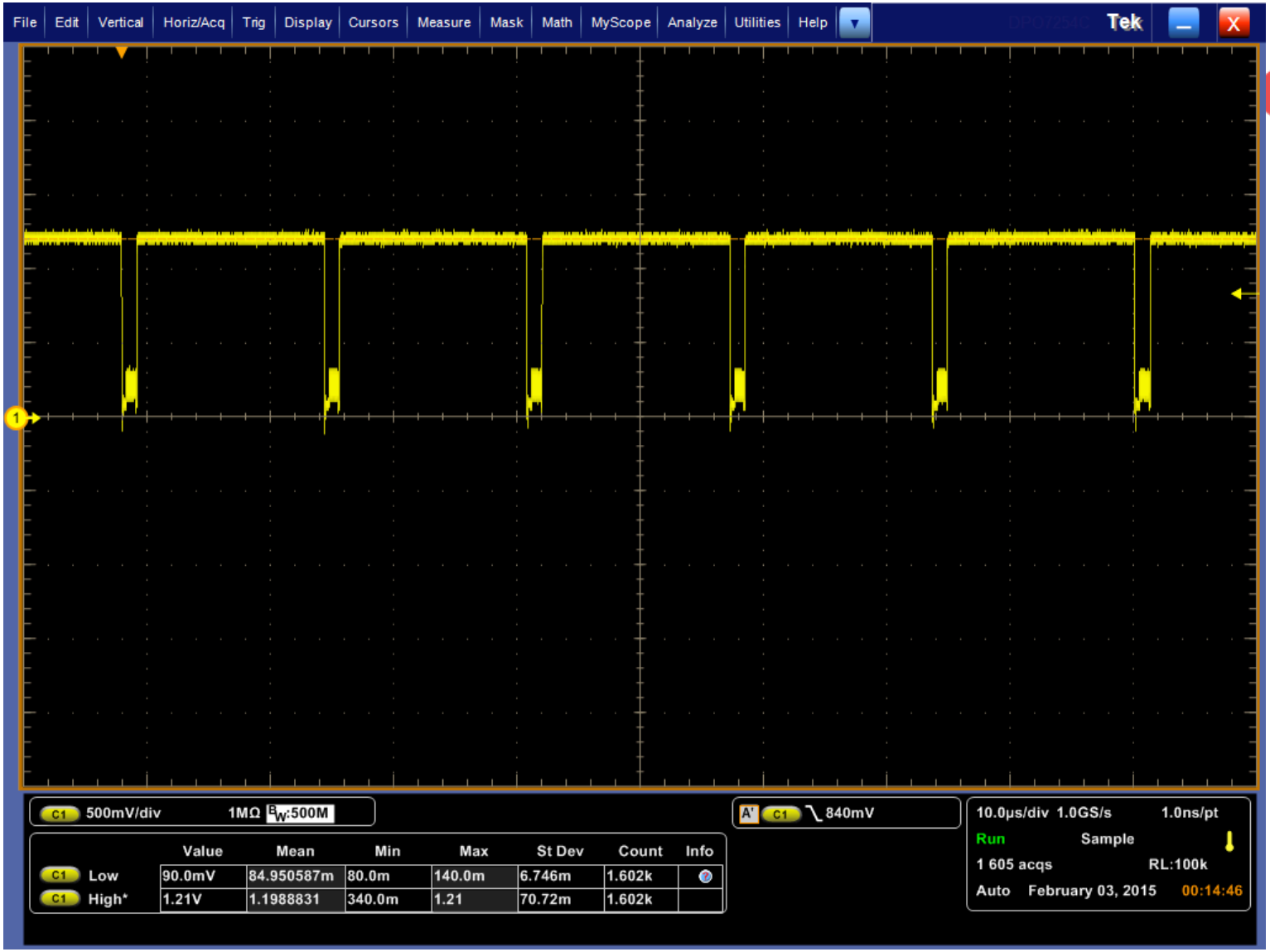
AoD signals

Display B/L & Panel Drive

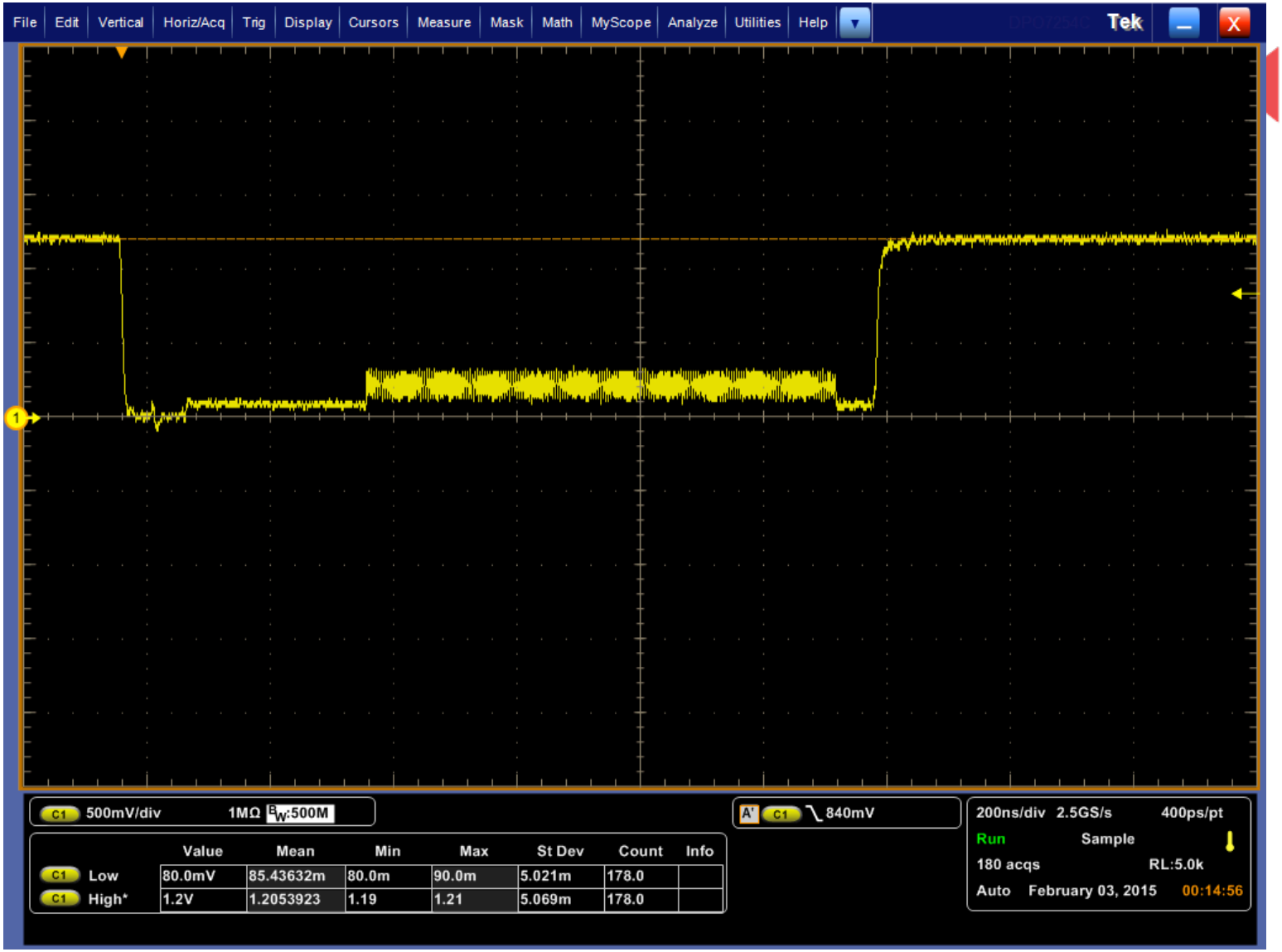
CABC Signal as seen on an oscilloscope



MIPI Signal as seen on an oscilloscope (zoomed out)



MIPI Signal as seen on an oscilloscope (zoomed in)



CAMERA TROUBLESHOOTING

Rear Facing Imager Troubleshooting (cont'd)

In the event of No-Preview Issue:

- Check first if this issue follows rear imager module or main PCB by swap test with known good module.
- In the meantime, check if receptacle and plug of B-to-B connector are mated properly without poor assembly.
    - If the issue follows rear Imager module - Send the defective module to module supplier for further analysis.
    - If the issue follows main PCB - Please check power supplies level, control signals and MIPI signals as directions on the next slide to find further information about failure.

Rear Facing Imager Troubleshooting (cont'd)

Check if I2C_SCL/SDA activity is present at No.7&8 pins of FL5500.

Check if CAM_R_RST is high at No.5 pin of FL5500. It should be high level.

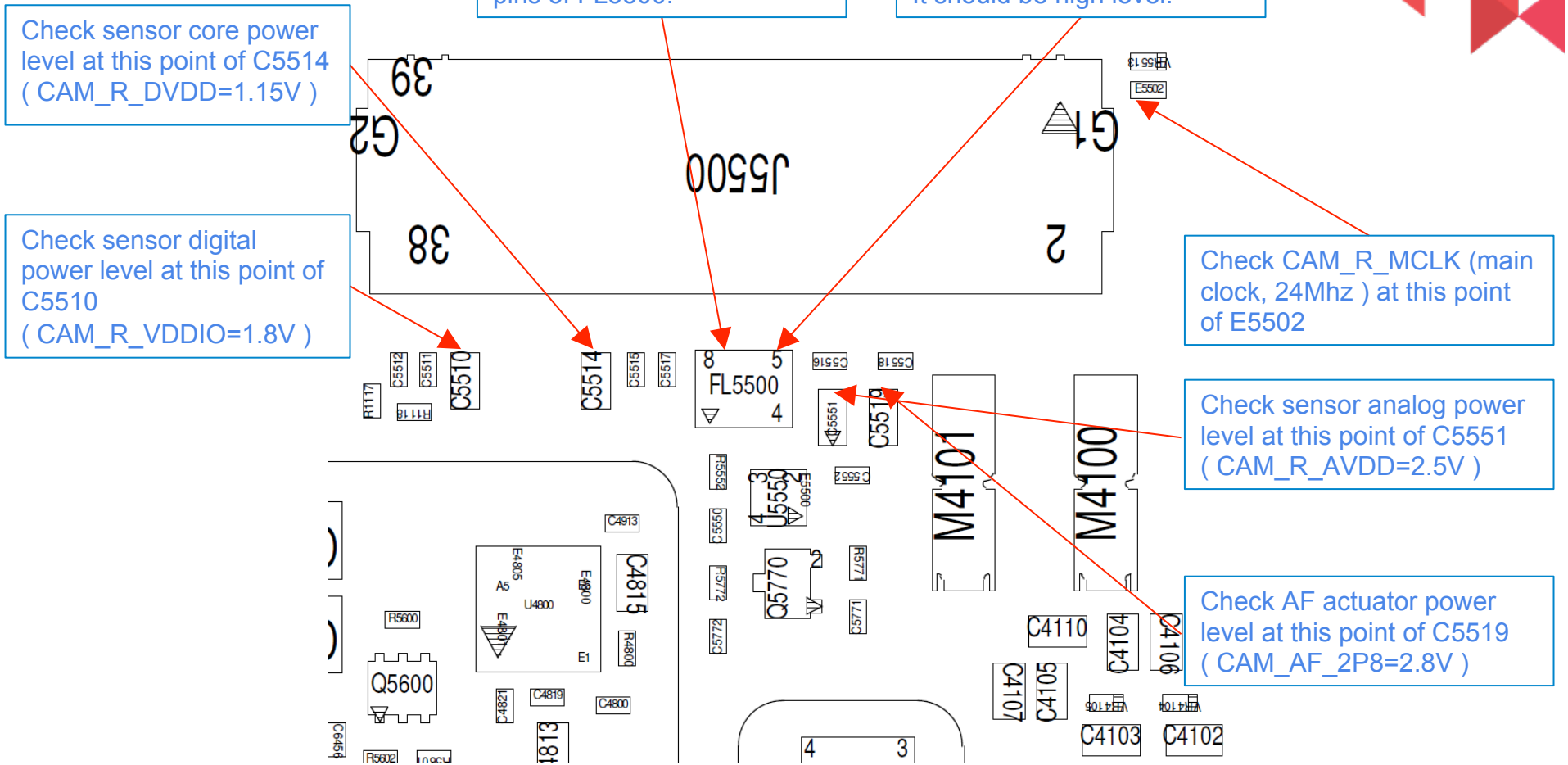
Check sensor core power level at this point of C5514 (CAM_R_DVDD=1.15V)

Check sensor digital power level at this point of C5510 (CAM_R_VDDIO=1.8V)

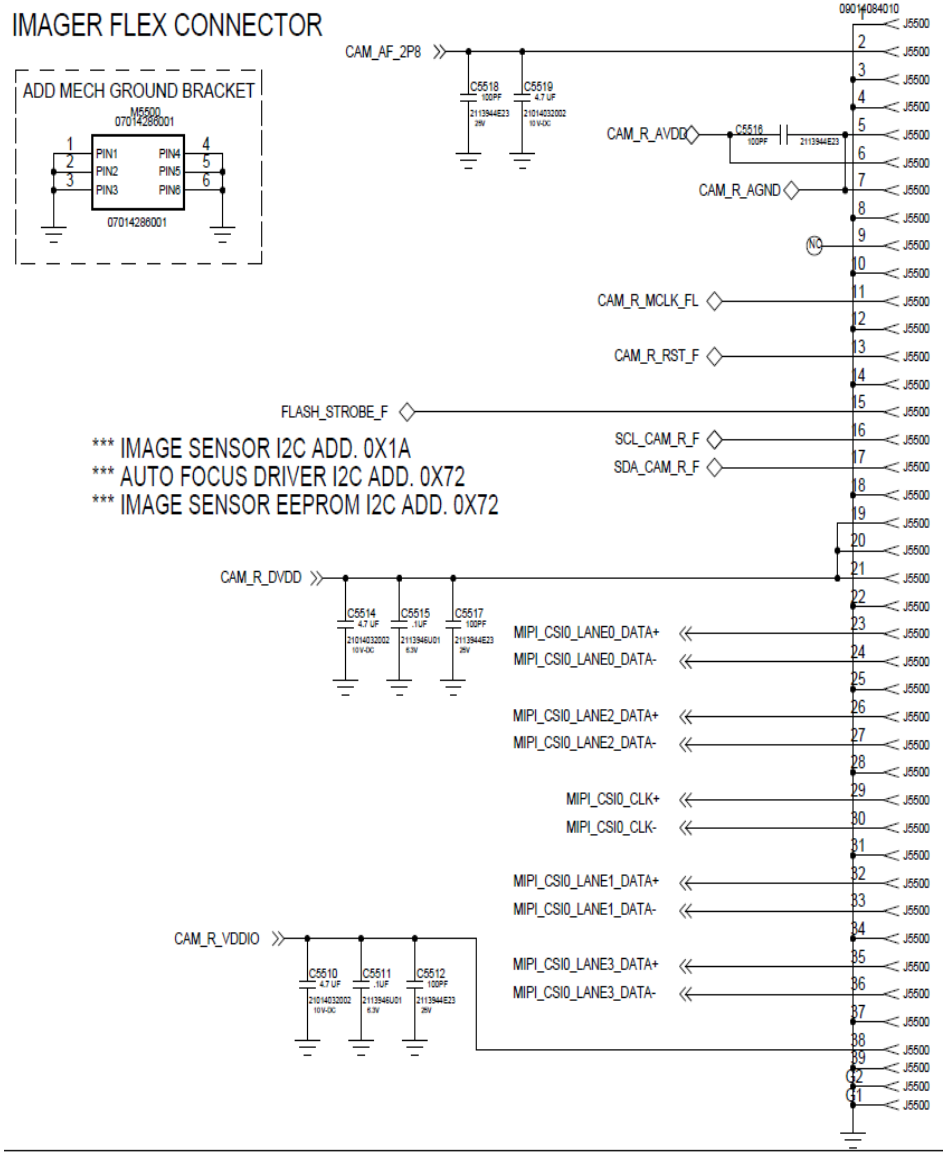
Check CAM_R_MCLK (main clock, 24Mhz) at this point of E5502

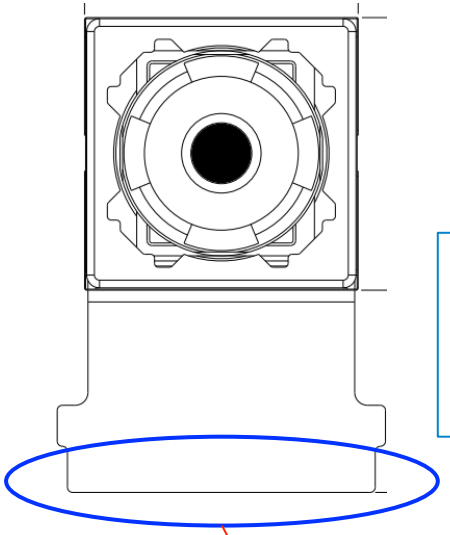
Check sensor analog power level at this point of C5551 (CAM_R_AVDD=2.5V)

Check AF actuator power level at this point of C5519 (CAM_AF_2P8=2.8V)

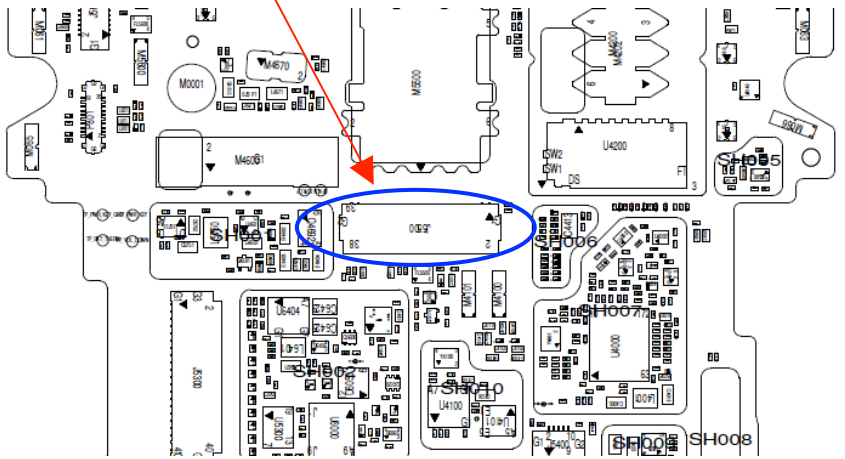


Rear Facing Imager Troubleshooting (cont'd)





Zif fingers of rear imager module will be inserted into zif connector on main PCB as below (top contact type)



Front Facing Imager Troubleshooting (cont'd)

In the event of No-Preview Issue:

- Check if this issue follows front imager module or main PCB by swap test with known good module first.
- In the meantime, check if receptacle and plug of B-to-B connector are mated properly without poor assembly.
    - If the issue follows front Imager module - Send the defective module to module supplier for further analysis.
    - If the issue follows main PCB - Please check power supplies level, control signals and MIPI signals as directions on the next slide to find further information about failure.

Front Facing Imager Troubleshooting (cont'd)

Check sensor analog power level at this point of C5605 (CAM_F_AVDD=2.85V)

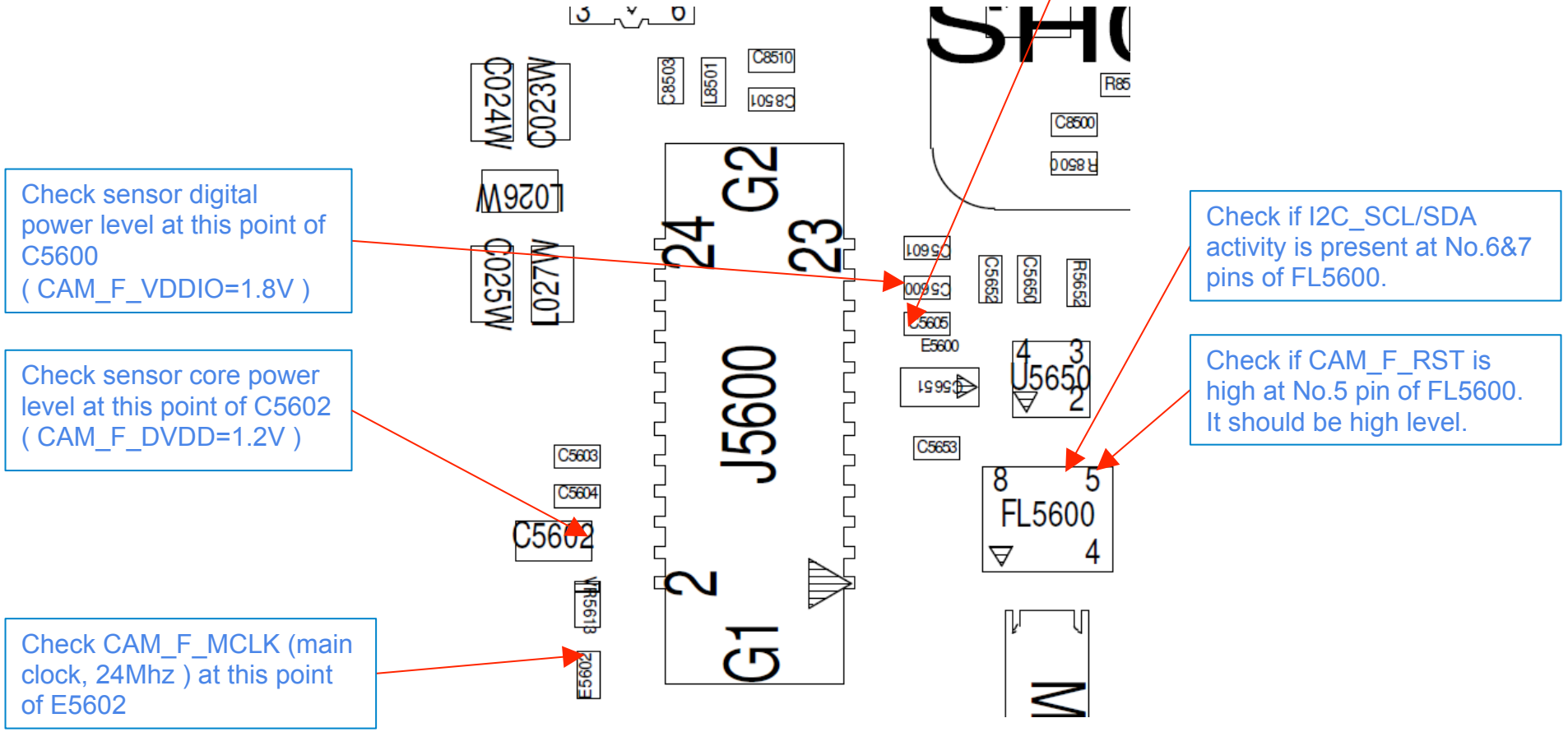
Check sensor digital power level at this point of C5600 (CAM_F_VDDIO=1.8V)

Check sensor core power level at this point of C5602 (CAM_F_DVDD=1.2V)

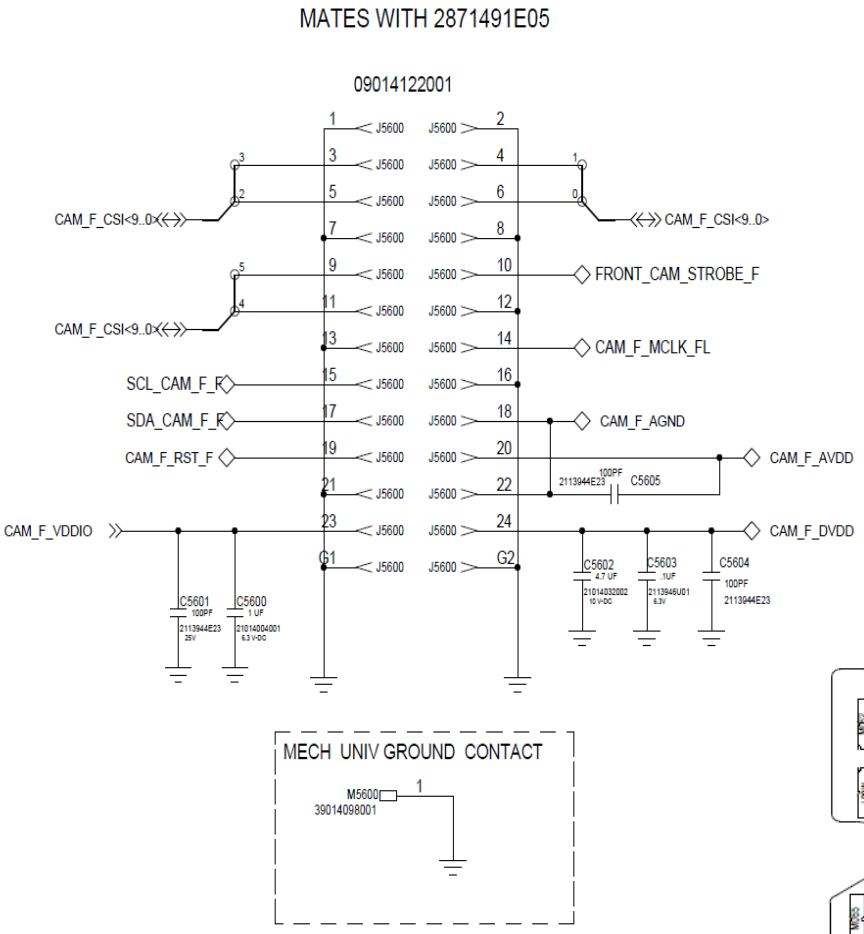
Check CAM_F_MCLK (main clock, 24Mhz) at this point of E5602

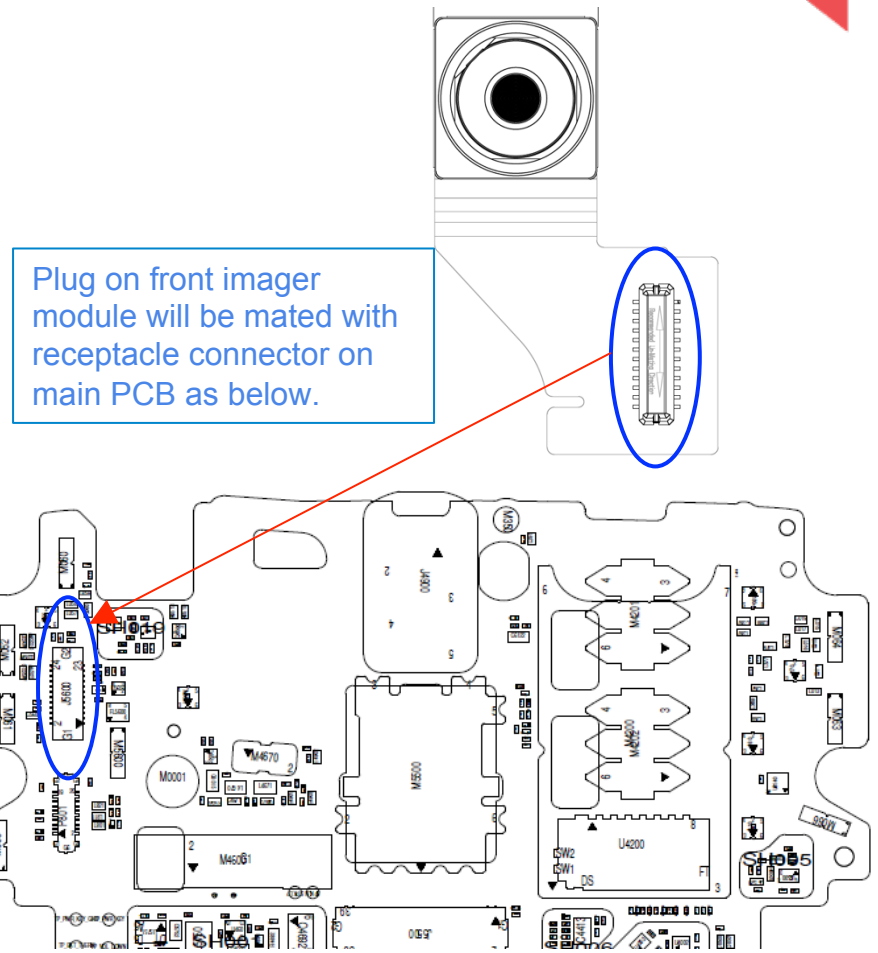
Check if I2C_SCL/SDA activity is present at No.6&7 pins of FL5600.

Check if CAM_F_RST is high at No.5 pin of FL5600. It should be high level.



Front Facing Imager Troubleshooting (cont'd)

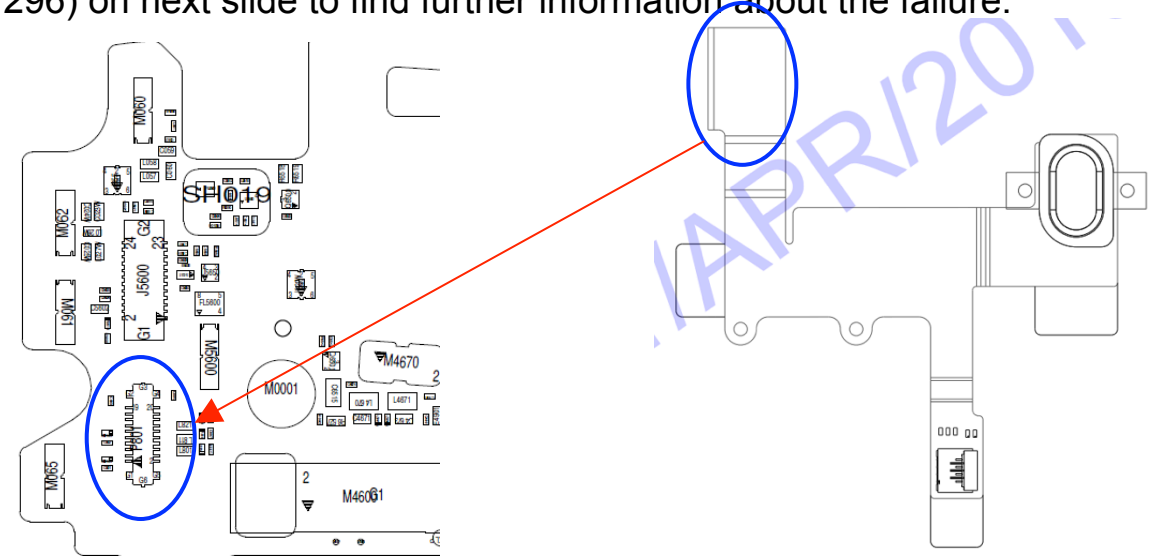




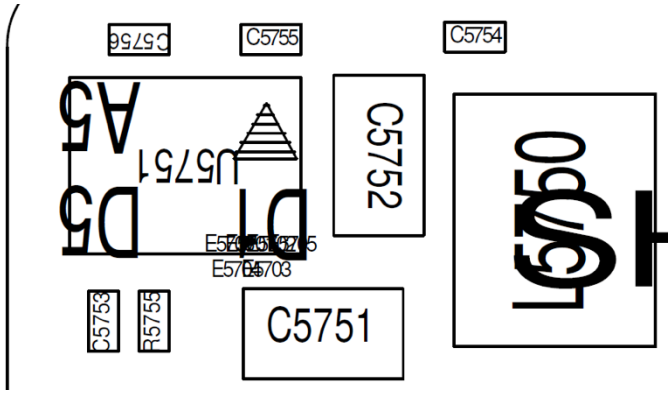
Rear Imager Flash LED (cont'd)

In the event of No turn-on LED Issue:

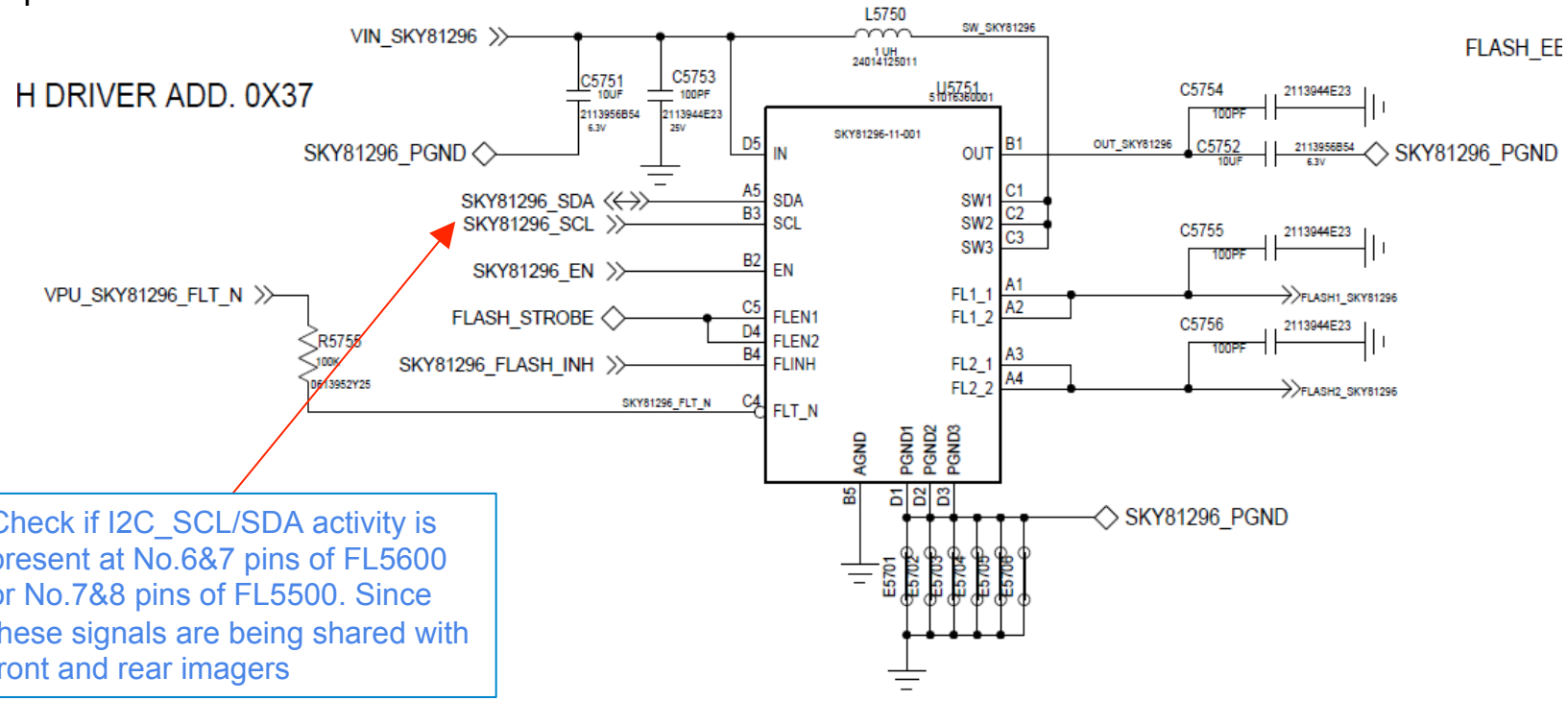
- Check if this issue follows rear imager flash led flex by swap test with known good flex module first.
- In the meantime, check if receptacle and plug of B-to-B connector are mated properly without poor assembly.
  - If the issue follows rear imager flash led flex - Check if led was damaged and send the module to led supplier without removing LEDs on flexible PCB for further analysis if it is the case.
  - If the issue follows main PCB - Please check the operation of flash driver IC (SKY81296) on next slide to find further information about the failure.



Rear Imager Flash LED (cont'd)



Check the SMT status if there is cold soldering or part damage associated with flash driver IC circuitry on main PCB

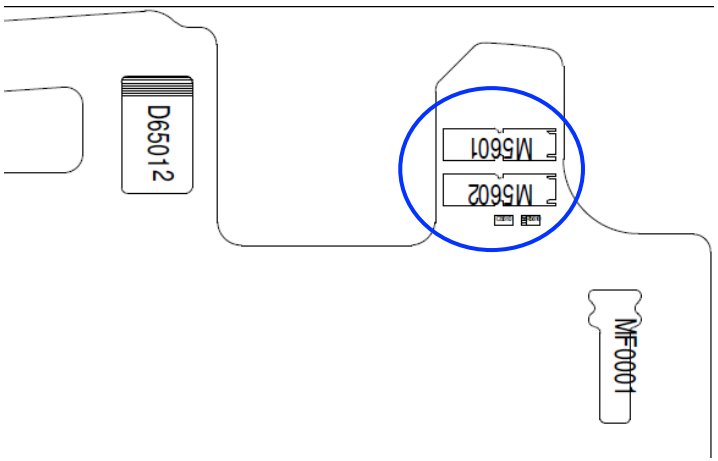


Check if I2C_SCL/SDA activity is present at No.6&7 pins of FL5600 or No.7&8 pins of FL5500. Since these signals are being shared with front and rear imagers

Front Imager Flash LED

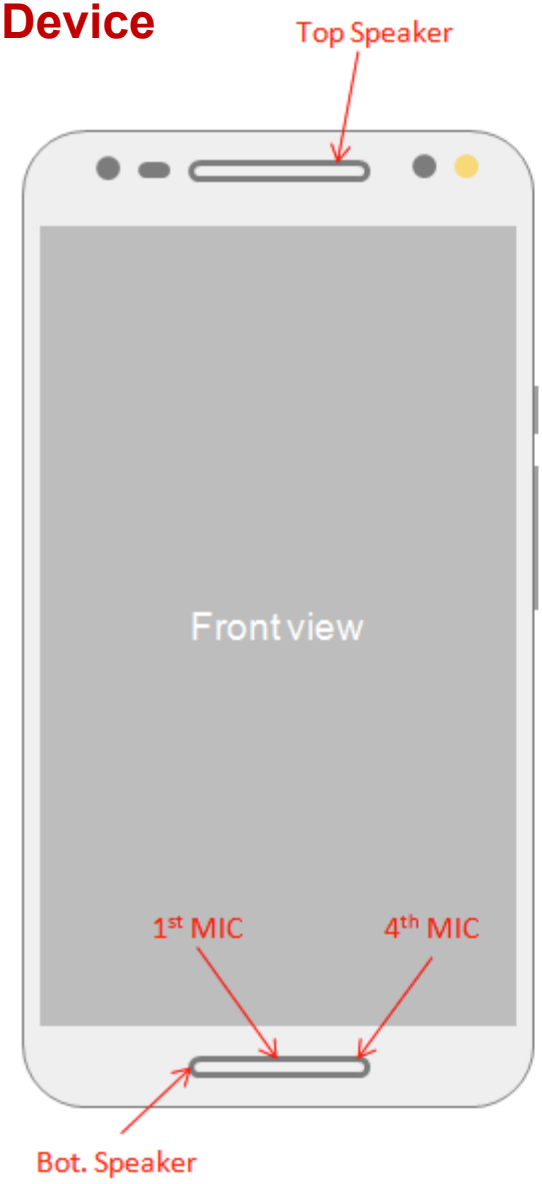
In the event of No turn-on LED Issue:

- Check if this issue follows front imager flash PCB by swap test with known good PCB module first.
- In the meantime, check if universal contacts (M5601 and M5602) are mated properly without poor assembly.
    - If the issue follows front imager flash PCB - Check if led was damaged and send the module to led supplier without removing LEDs on flexible PCB for further analysis if it is the case.

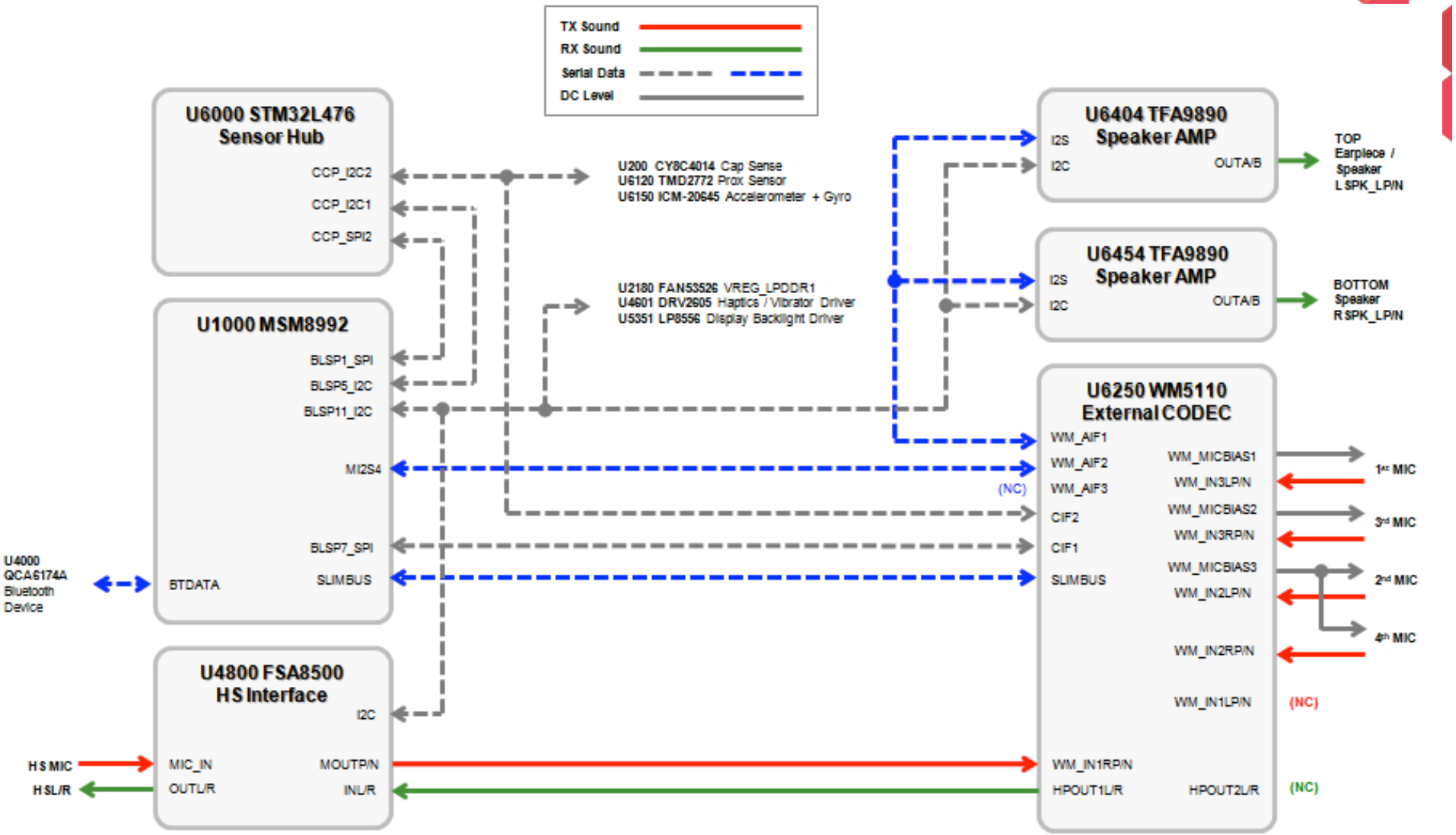


AUDIO & VIBRATOR TROUBLESHOOTING

Audio Device



Audio Block Diagram



Use Cases

- **Microphone**

* 1st MIC
  - Main microphone for handset mode voice call
  - Main microphone for AoV mode
* 2nd MIC
  - Noise cancellation MIC for handset mode voice call
  - Main microphone for HHHF mode voice call
  - Recording microphone for stereo camcording
* 3rd MIC
  - Beam forming microphone for AoV mode
  - Recording microphone for stereo camcording
* 4th MIC
  - Supporting microphone for AoV mode
* HS MIC
  - Main microphone for headset mode voice call
  - Main microphone for AoV mode

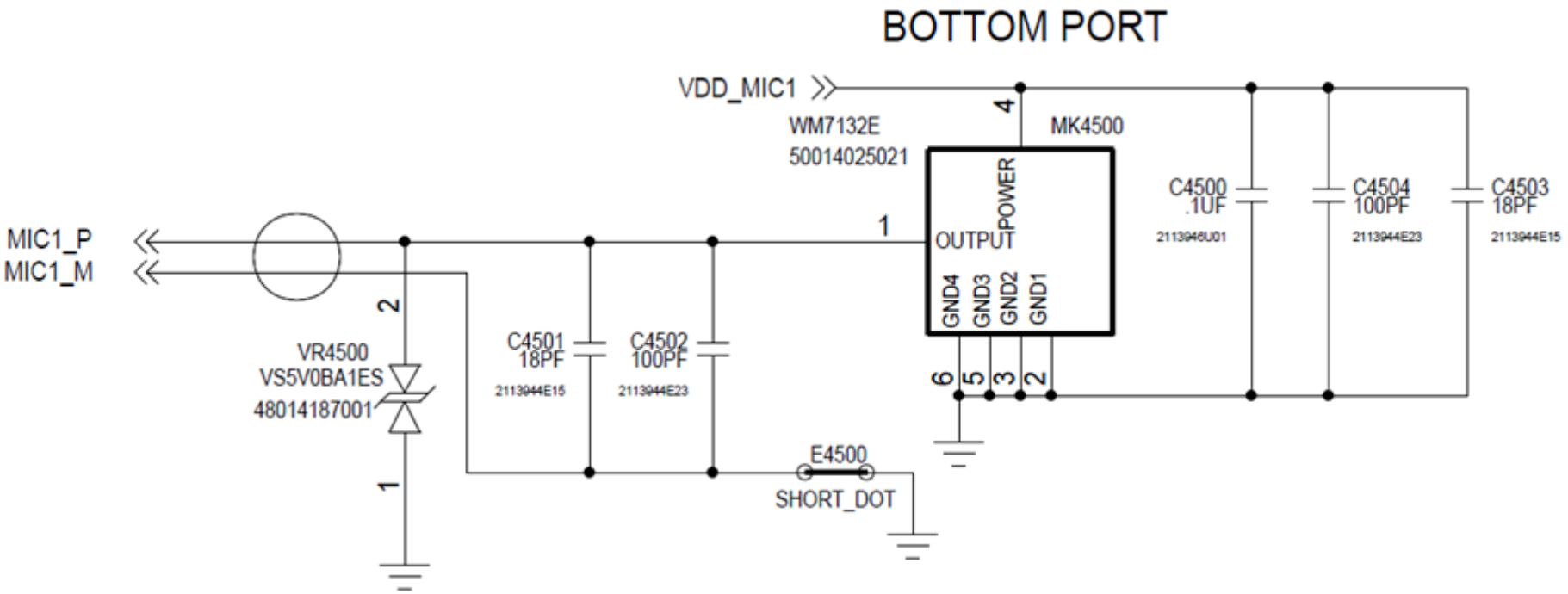
  (While wired headset has been inserted)

- **Top speaker**
  - Output stereo sound (Left channel)
  - Output Rx voice at handset mode voice call
- **Bottom speaker**
  - Output stereo sound (Right channel)
  - Output Rx voice at HHHF mode voice call
- **Vibrator**
  - Alert vibration
  - Haptic vibration

“No Audio” Complaints (For non-user SW)

- The CQA apk can be used to verify a MIC paths with top speaker. Under the “Audio” menu, select “Mic Loopback”.
  - The “PRIMARY MIC” setting loops 1st MIC to the top speaker in earpiece mode.
  - The “SECONDARY MIC” setting loops 2nd MIC to the top speaker in earpiece mode.
  - The “TERTIARY MIC” setting loops 3rd MIC to the top speaker in earpiece mode.
  - The “MIC 4” setting loops 4th MIC to the top speaker in earpiece mode.
  - The “HEADSET MIC” setting loops headset MIC to the wire headset speakers.
- If both of those are not function, Top speaker path may be damaged. In the “Audio” menu of the CQA apk, select “Ear Speaker” and then “Play Harvard speech pattern”.
- The loudspeakers can be tested by selecting “Loudspeaker” under the “Audio” menu. Music should start playing.
- The headset audio can by tested by first plugging in a headset with a microphone and then selecting “Mic Loopback”. The headset microphone’s audio should be heard through the headset.
- Headset detection can be verified by selecting “Headset Info” under the CQA apk “Headset” menu. Information about whether a headset is plugged in and the headset type should be displayed. Headset “SEND/END” button press detection status should be displayed as well.

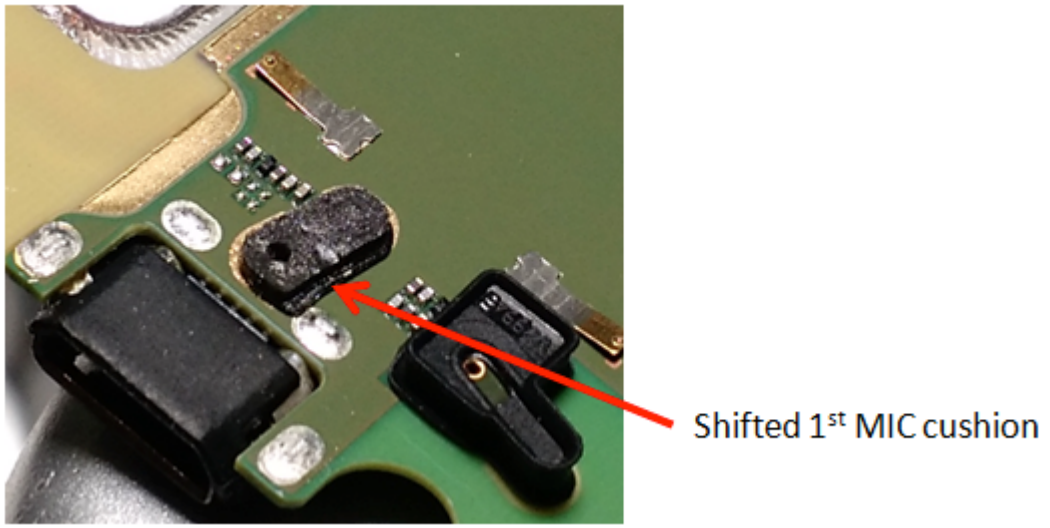
Primary Microphone Circuit



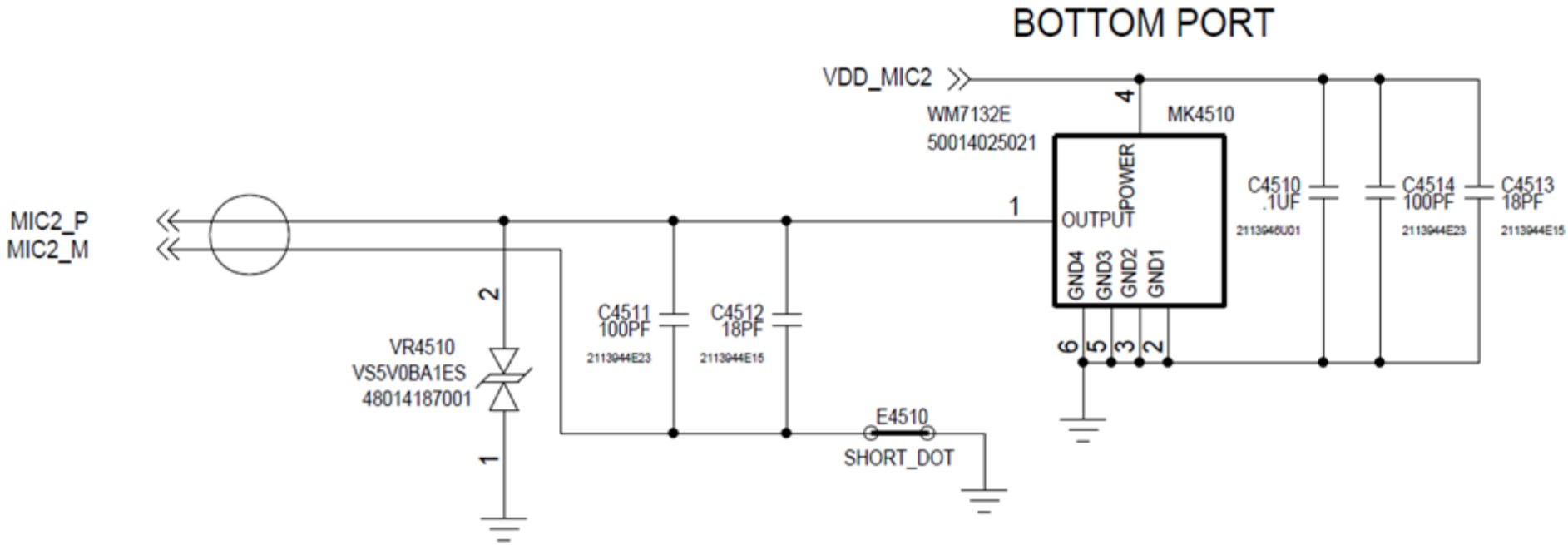
Primary Microphone

If the Primary MIC is not functioning …

- Check MIC bias at C4500 or C4504 or C4503. This should be 1.7~1.8V when the microphone is enabled.
- Check the 1st microphone sealing cushion at bottom PCB. If the cushion has been shifted, the MIC hole could be blocked. (See image below)
- Check the microphone output at C4501 or C4502. The AC amplitude should increase (Output DC bias should be around 0.7V), when audio is present.



Secondary Microphone Circuit

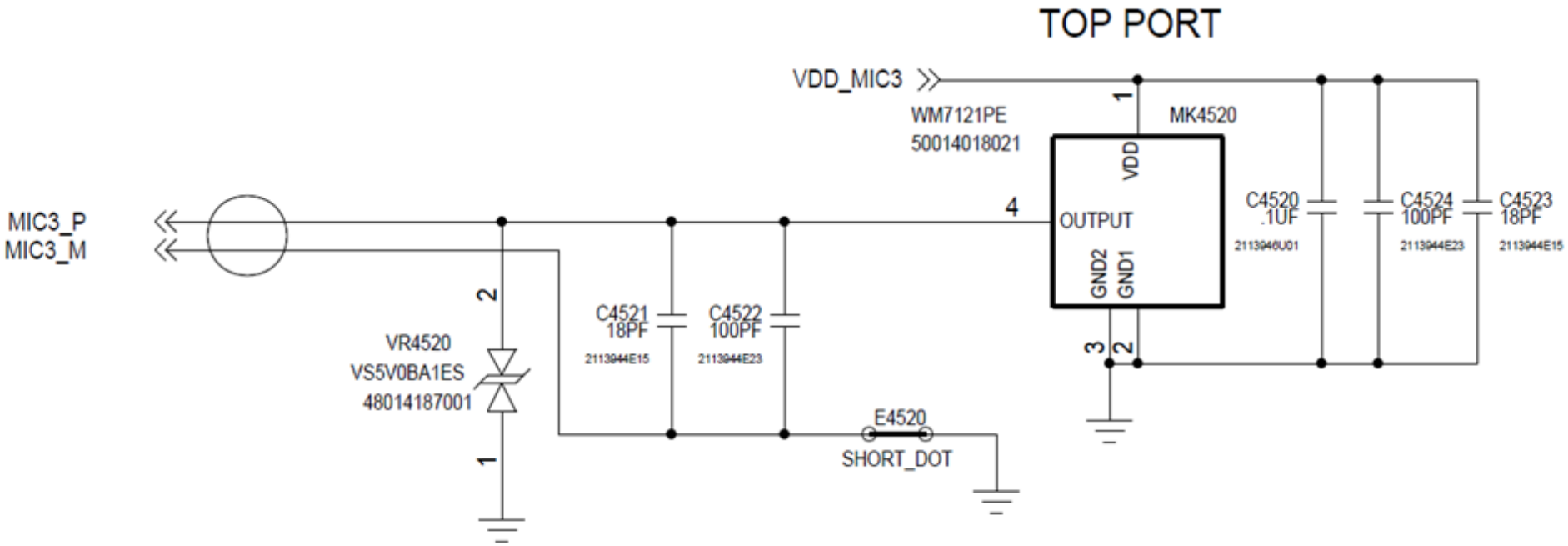


Secondary Microphone

If the Secondary MIC is not functioning …

- Check MIC bias at C4510 or C4514 or C4513. This should be 1.7~1.8V when the microphone is enabled.
- Check the 2nd microphone sealing cushion at rear housing. If the cushion has been shifted, the MIC hole could be blocked while it has been assembled.
- Check the microphone output at C4511 or C4512. The AC amplitude should increase (Output DC bias should be around 0.7V), when audio is present.

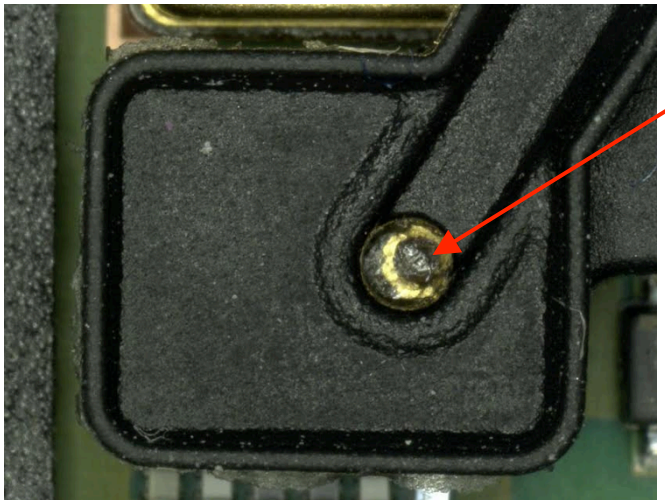
Tertiary Microphone Circuit



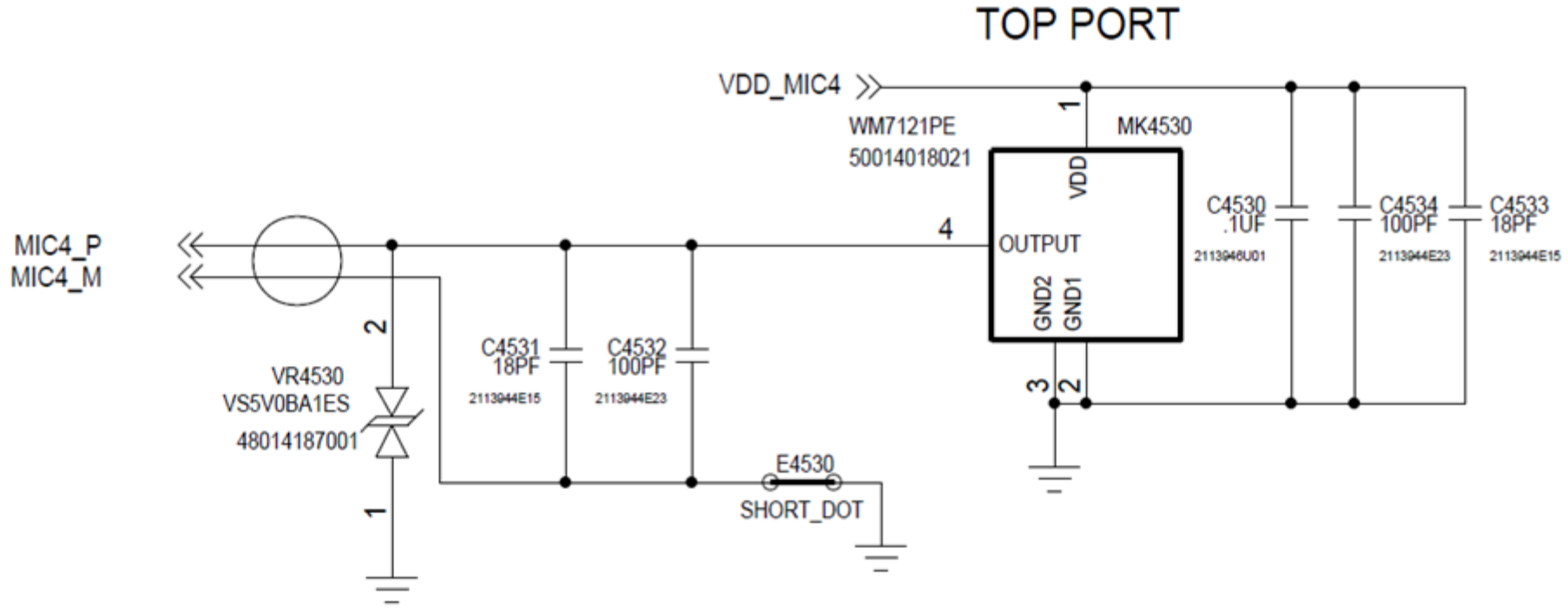
Tertiary Microphone

If the Tertiary MIC is not functioning …

- Check MIC bias at C4520 or C4524 or C4523. This should be 1.7~1.8V when the microphone is enabled.
- Check the 3rd microphone sealing grommet and adhesive on the 3rd MIC part. If the grommet and adhesive have been assembled abnormally, the MIC hole could be blocked while it has been assembled. (See image below)
- Check the microphone output at C4521 or C4522. The AC amplitude should increase (Output DC bias should be around 0.7V), when audio is present.



Quaternary Microphone Circuit

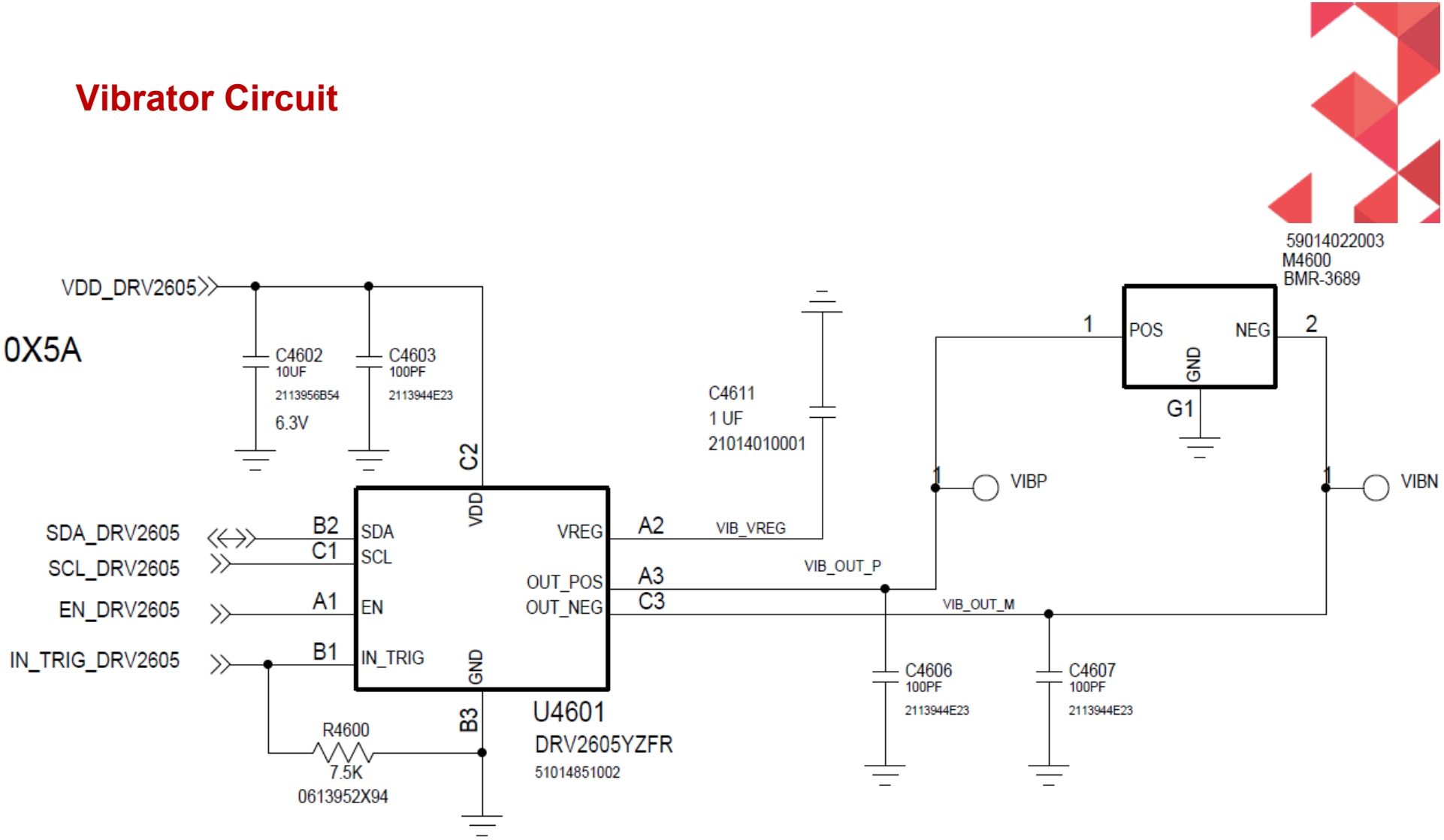


Quaternary Microphone

If the Quaternary MIC is not functioning …

- Check MIC bias at C4530 or C4534 or C4533. This should be 1.7~1.8V when the microphone is enabled.
- Check the 4th microphone sealing grommet on the 4th MIC part. If the grommet has been assemble abnormally, the MIC hole could be blocked while it has been assembled.
- Check the microphone output at C4531 or C4532. The AC amplitude should increase (Output DC bias should be around 0.7V), when audio is present.

Vibrator Circuit

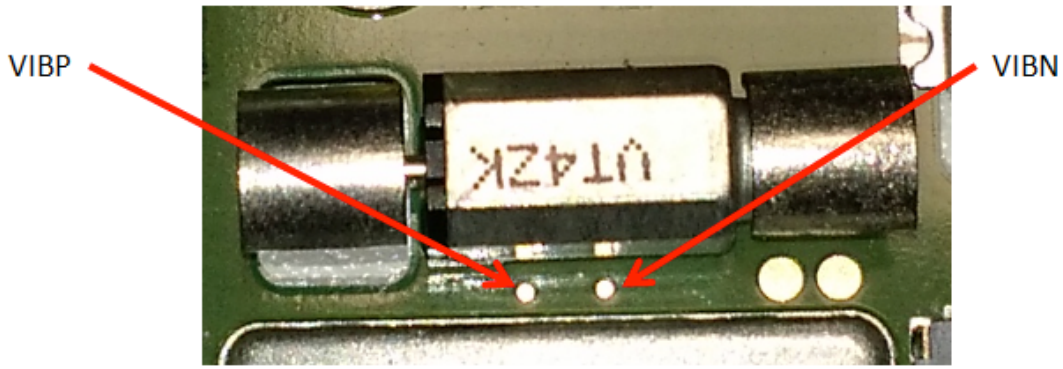


Vibrator Circuit

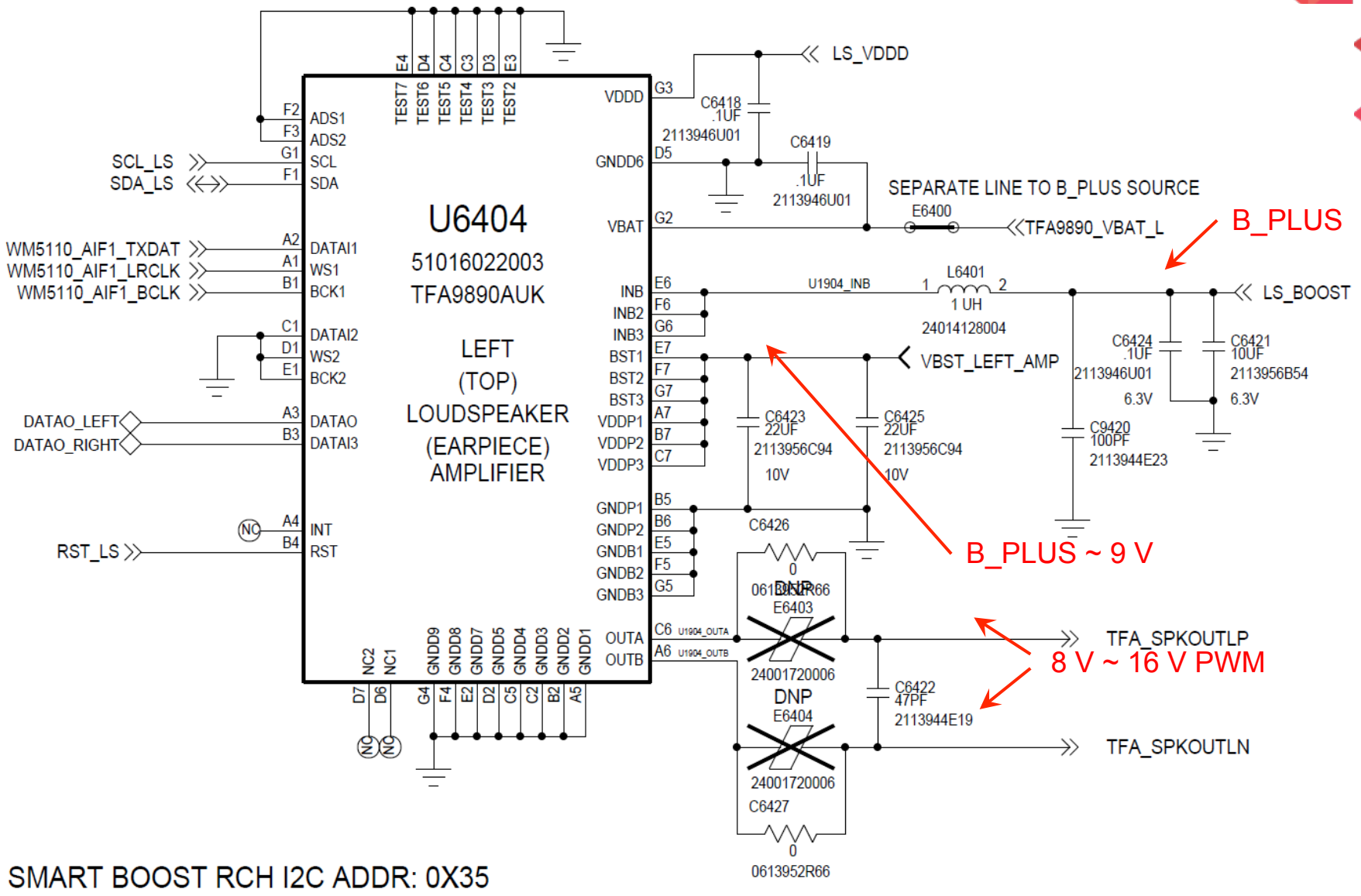
The rotary vibrator is used for both haptic and vibration alert function.

If the Vibrator is not functioning …

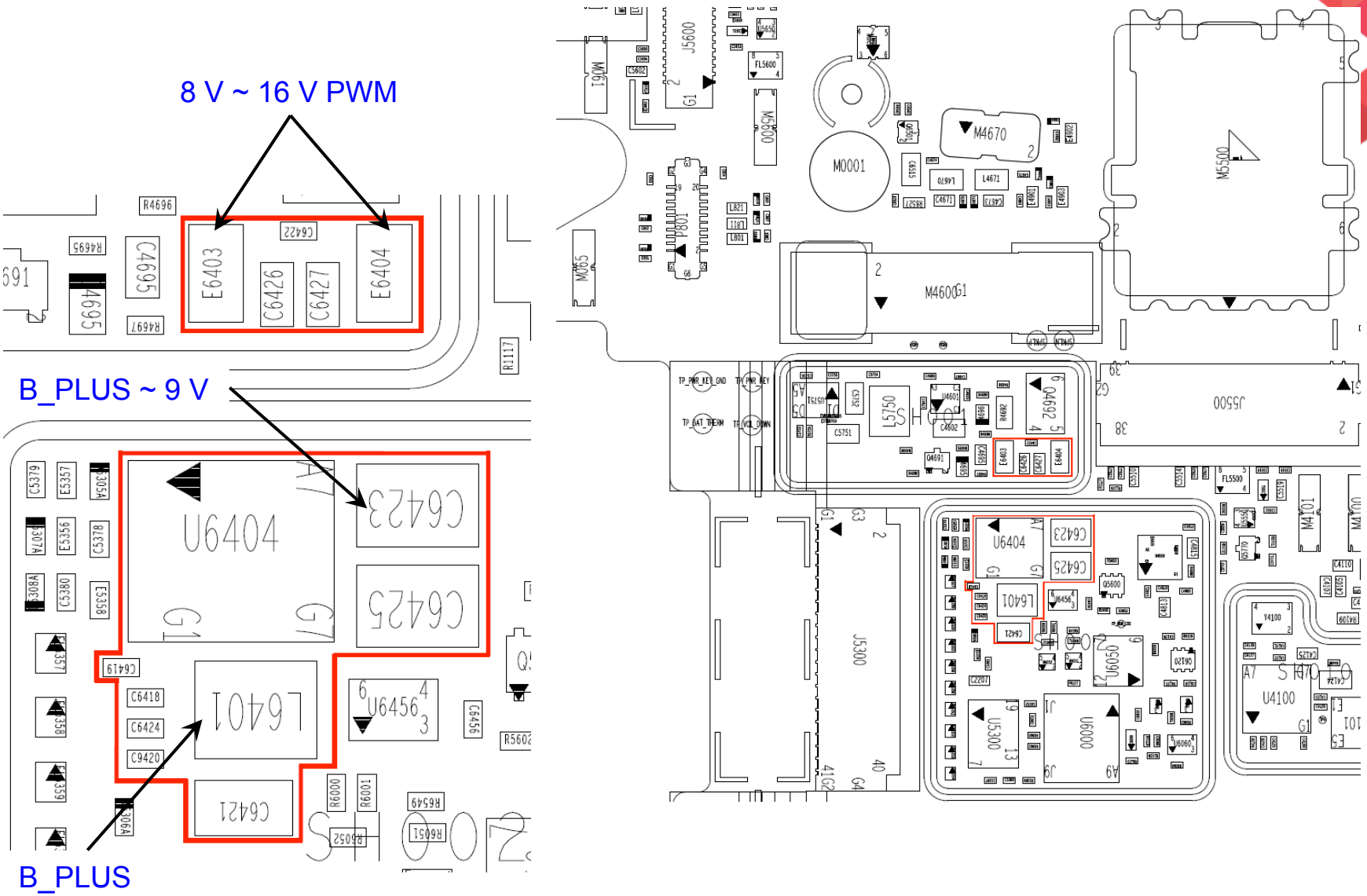
- Inspect physical placement of the rotary vibrator and its related components on main PCB board. (See schematic on the previous slide)
- Check vibrator driver IC VDD at C4602 or C4603. The VDD voltage level should be 5V when the phone powered on. (This power should be always turned on)
- Check vibrator part DC armature resistance on test points VIBP and VIBN (see image below) to verify the solder connection between vibrator and PCB and PCB traces. The DC armature resistance should be about 11 ~ 19 ohms.
- The voltage difference between VIBP and VIBN when the vibrator is operating is about 2.5 V~4.5 V.



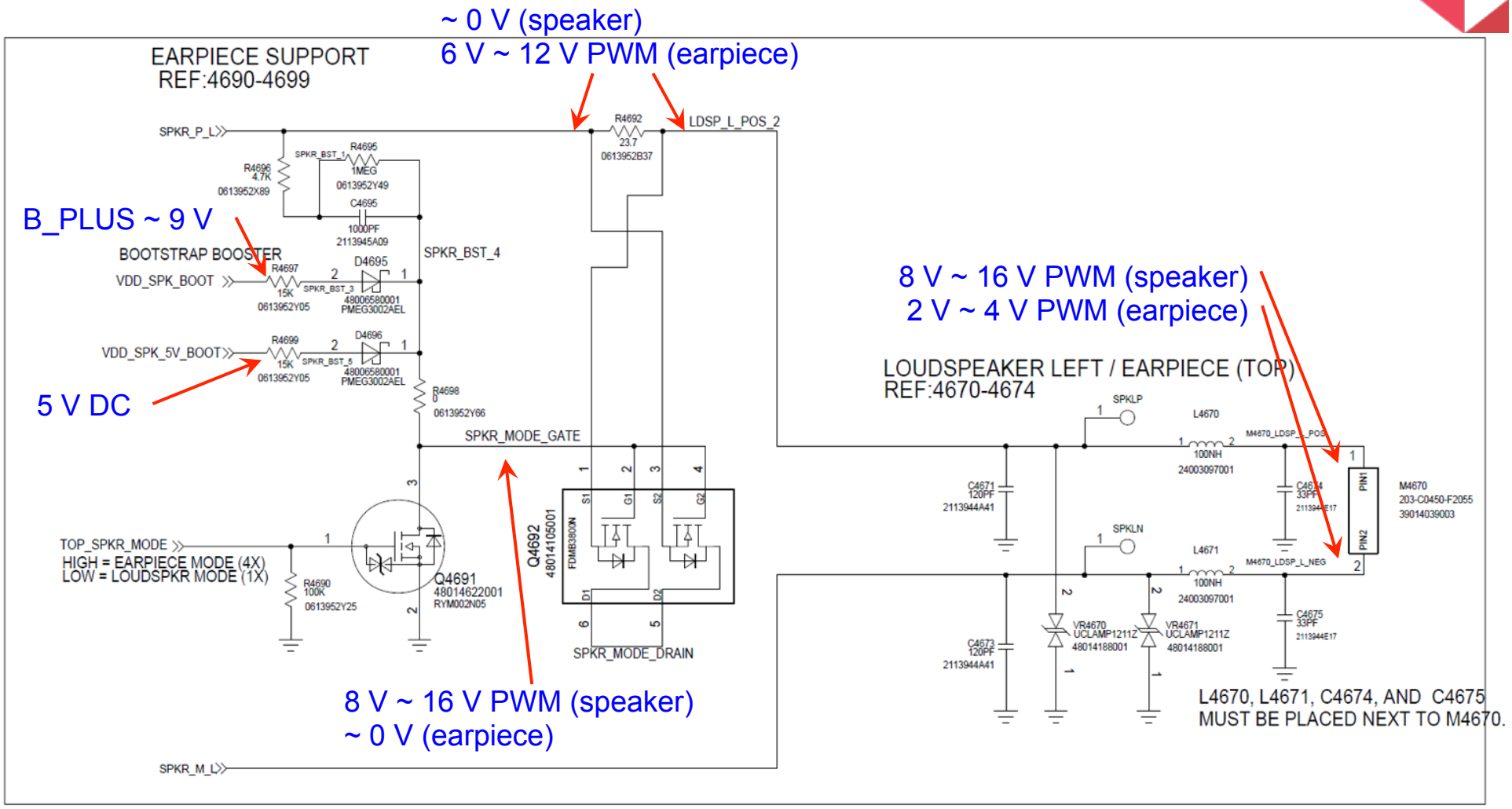
Top Speaker Boost IC Circuit



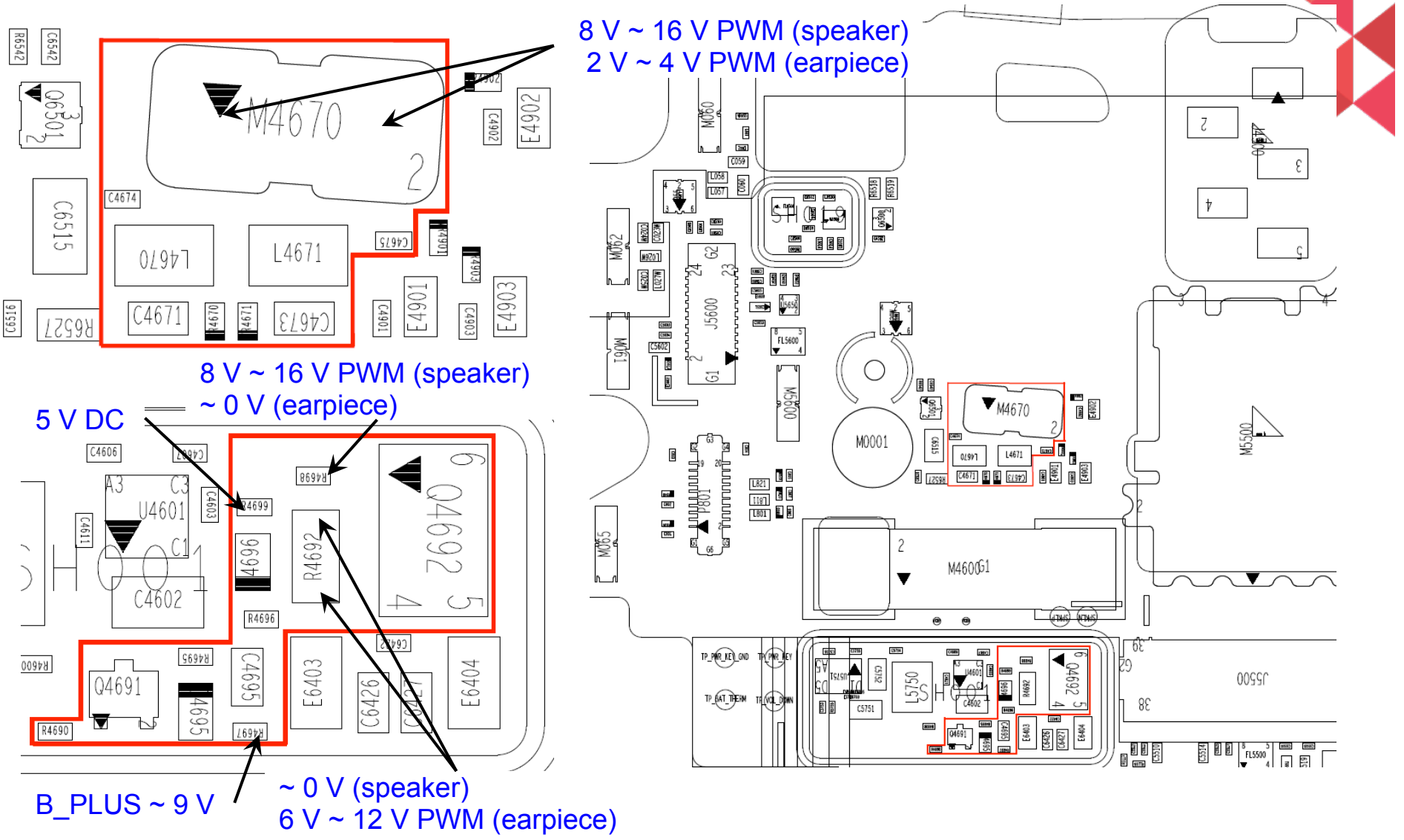
Top Speaker Boost IC Circuit



Top Earpiece and Speaker Circuit



Top Earpiece and Speaker Circuit



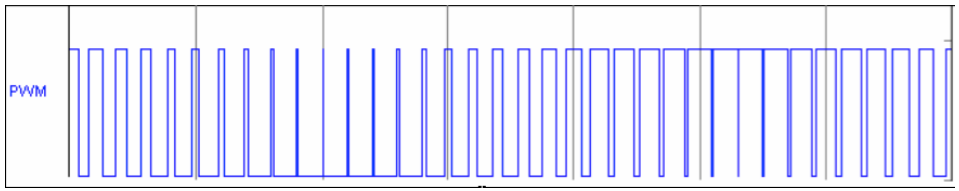
Top Earpiece and Speaker Circuit

- Inspect the physical placement of U6404 and its related components on main PCB. (See schematic in the previous slides)

- Verify that B_PLUS voltage is present on the LS_BOOST node, the junction of C6421 and C6424.

- Connect an 8Ω speaker to the contacts on M4670 with short, thick wires. While playing audio at normal to high volume, use an oscilloscope to verify that the voltage on the VBST_LEFT_AMP node, the junction of C6423 and C6425, alternates between B_PLUS voltage and approximately 9 V, depending on the audio content.

- While playing media audio at normal to high volume, probe the voltage across C6422. A 384 kHz PWM waveform should be observed, similar to the example shown below. The waveform amplitude should vary between 2 x B_PLUS up to 18 V p-p depending on the audio content.



Earpiece (cont'd)

- Inspect the "Earpiece Support" and "Loudspeaker / Earpiece (Top)" components on the main PCB. (See schematic in the previous slides)

- Connect an 8Ω speaker to the contacts on M4670 with short, thick wires. While playing media audio at normal to high volume, use an oscilloscope measure the differential voltage on the test speaker. A 384 kHz PWM waveform should be observed, similar to the example shown on the previous slide. The waveform amplitude should vary between 2 x B_PLUS up to 18 V p-p depending on the audio content.

- Check the voltage on the VDD_SPK_BOOT node (R4697) and verify that it alternates between B_PLUS voltage and approximately 9 V, depending on the audio content.

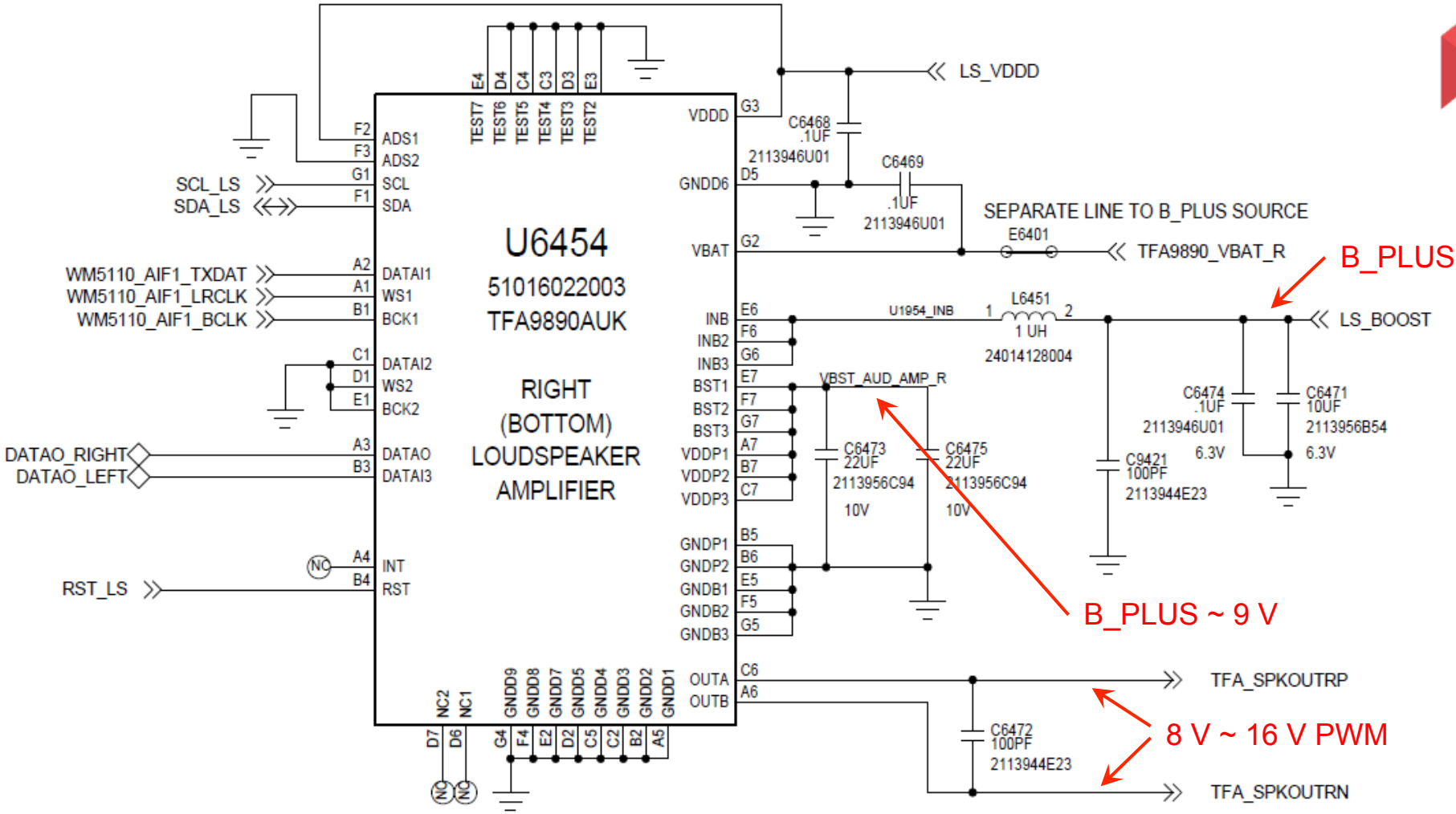
- Check the voltage on the VDD_SPK_5V_BOOT (R4699) and verify that it is 5 V DC.

- Check the differential voltage across R4692, it should be about 0 V.

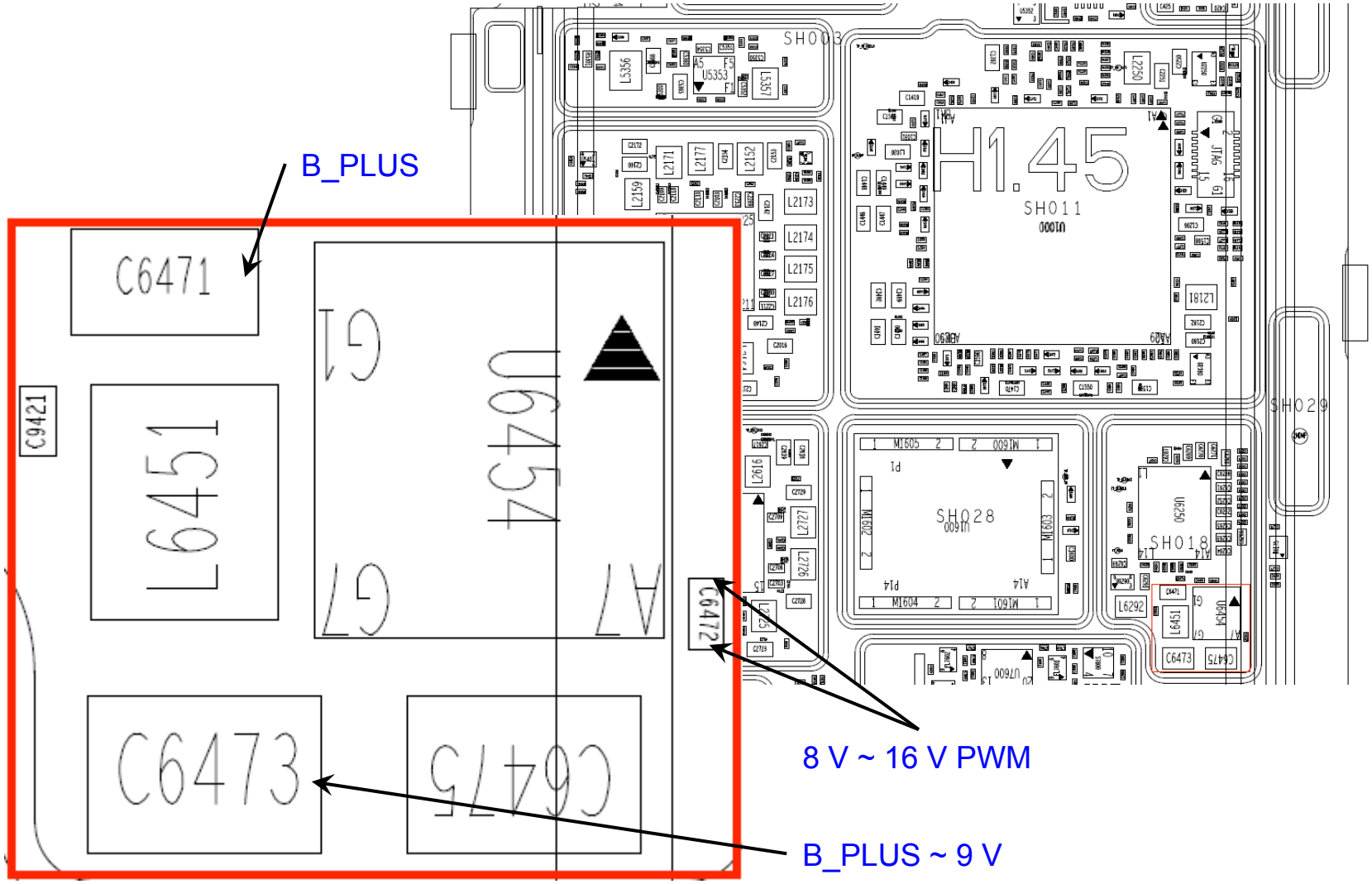
- Probe the voltage at the SPKR_MODE_GATE node (R4698) and verify that it is a PWM waveform that varies between about 8 V and 16 V.

- In the "Audio" menu of the CQA apk, select "Ear Speaker" and then "Play Harvard speech pattern". The playback volume should be much lower than it was with media playback. Probe the voltage at the SPKR_MODE_GATE node (R4698) and verify that it is near 0 V.

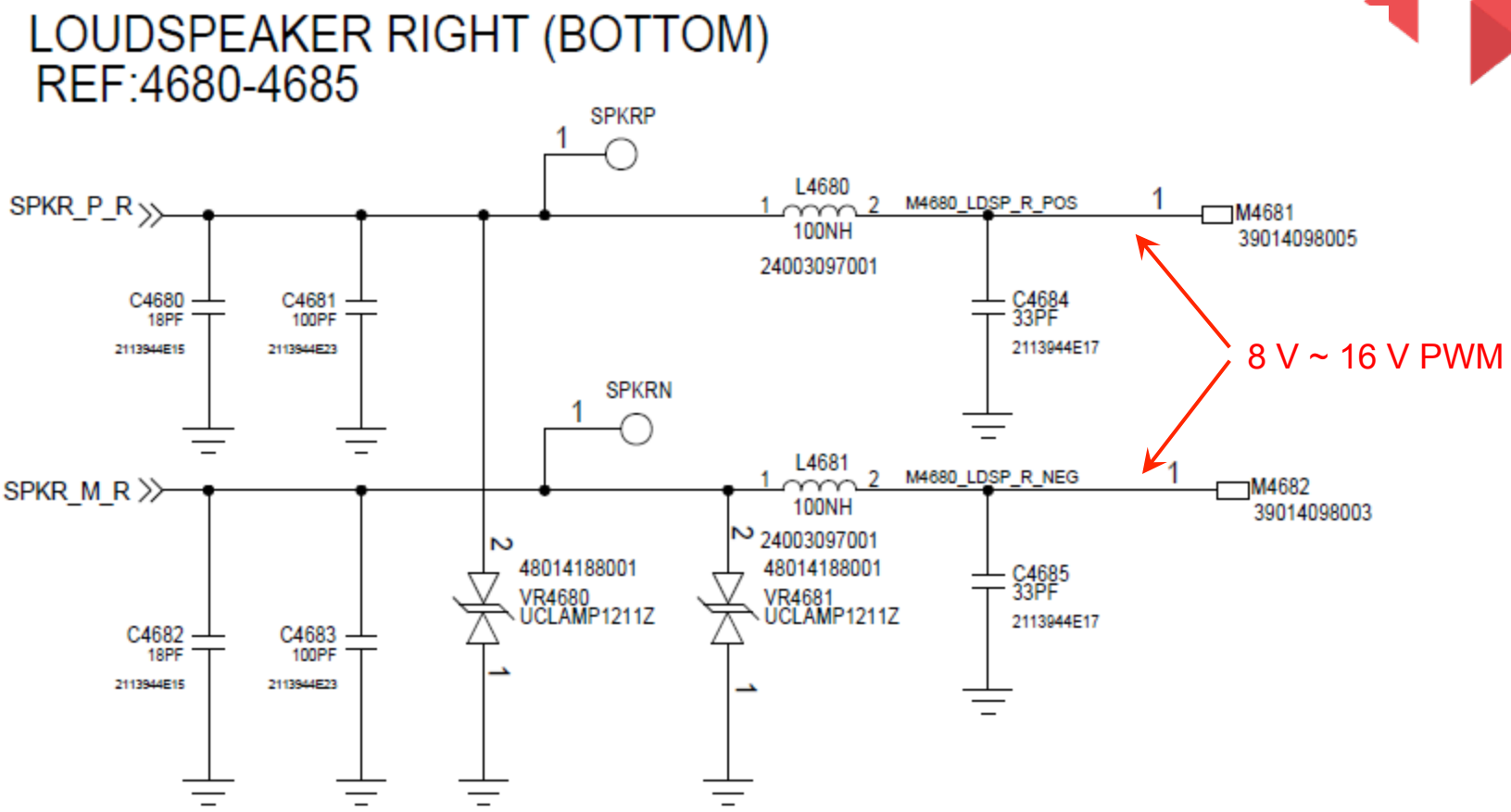
Bottom Speaker Boost IC Circuit



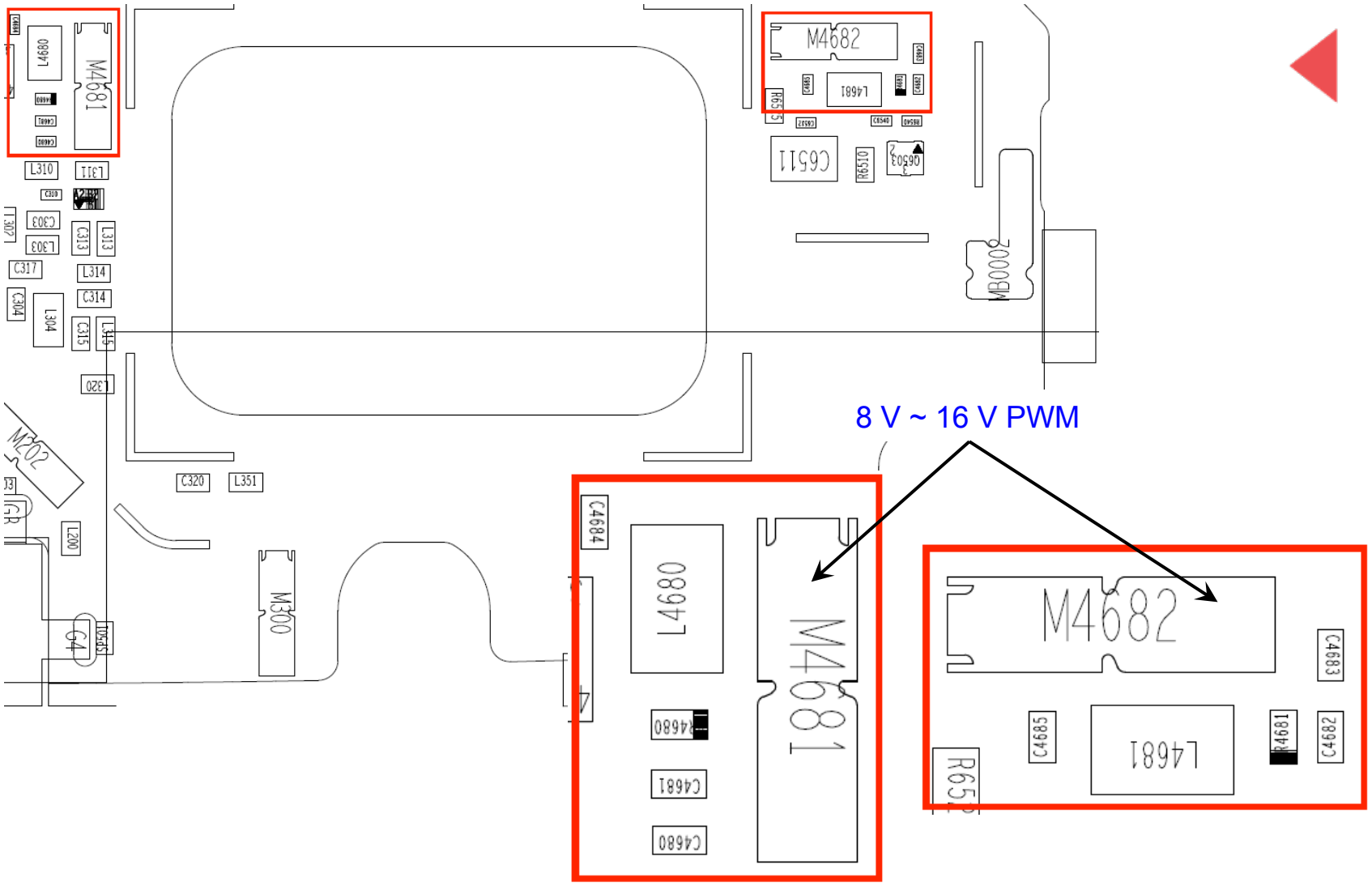
Bottom Speaker Boost IC Circuit



Bottom Speaker Circuit



Bottom Speaker Circuit



Bottom Speaker Circuit

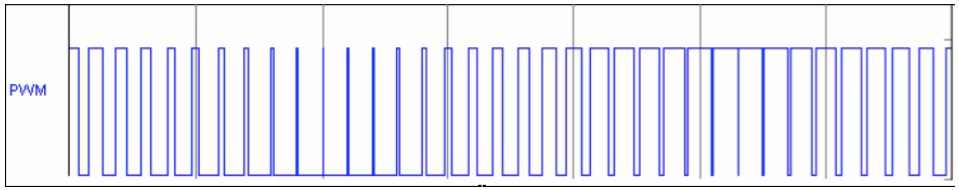
- Inspect the physical placement of U6454 and its related components on main PCB. (See schematic in previous slides)

- Inspect the “Loudspeaker/Earpiece (Bottom)” components on the main PCB. (See schematic in the previous slides)

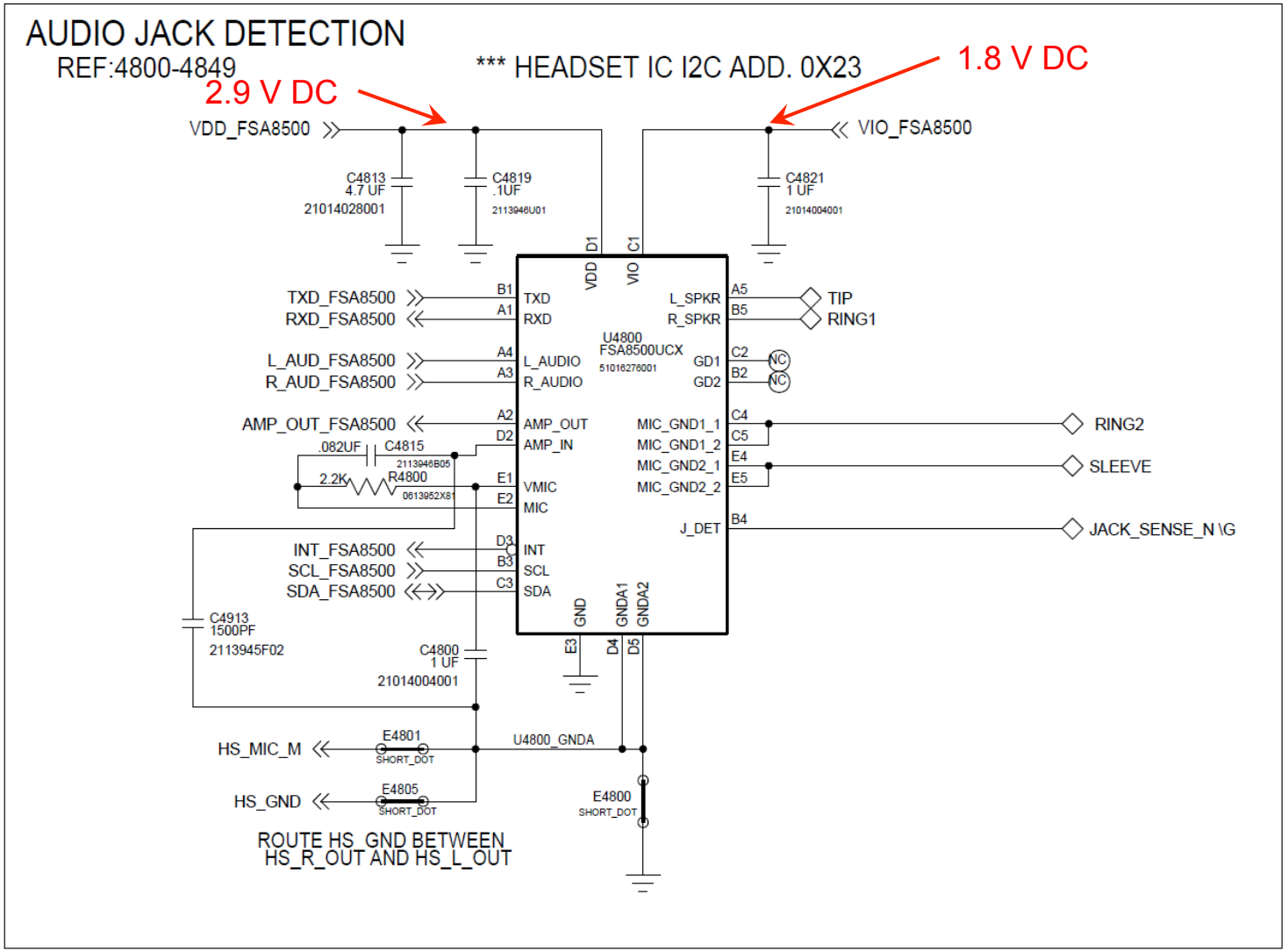
- Verify that B_PLUS voltage is present on the LS_BOOST node, the junction of C6471 and C6474.

- Connect an 8Ω speaker to contacts M4681 and M4682 with short, thick wires. While playing audio at normal to high volume, use an oscilloscope to verify that the voltage on the VBST_AUD_AMP_R node, the junction of C6473 and C6475, alternates between B_PLUS voltage and approximately 9 V, depending on the audio content.

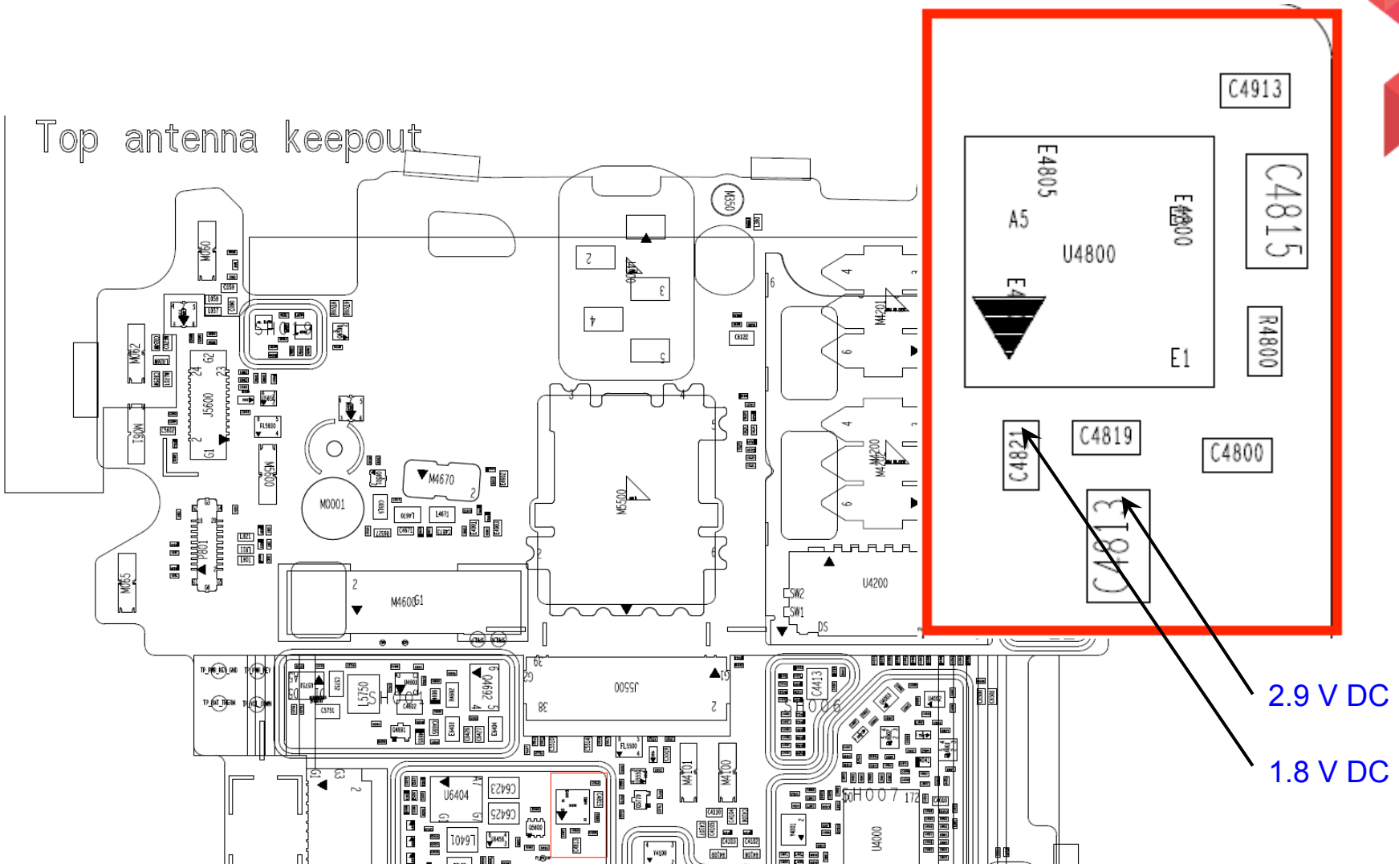
- While playing media audio at normal to high volume, use an oscilloscope measure the differential voltage on the test speaker. A 384 kHz PWM waveform should be observed, similar to the example shown on the previous slide. The waveform amplitude should vary between 2 x B_PLUS up to 18 V p-p depending on the audio content.



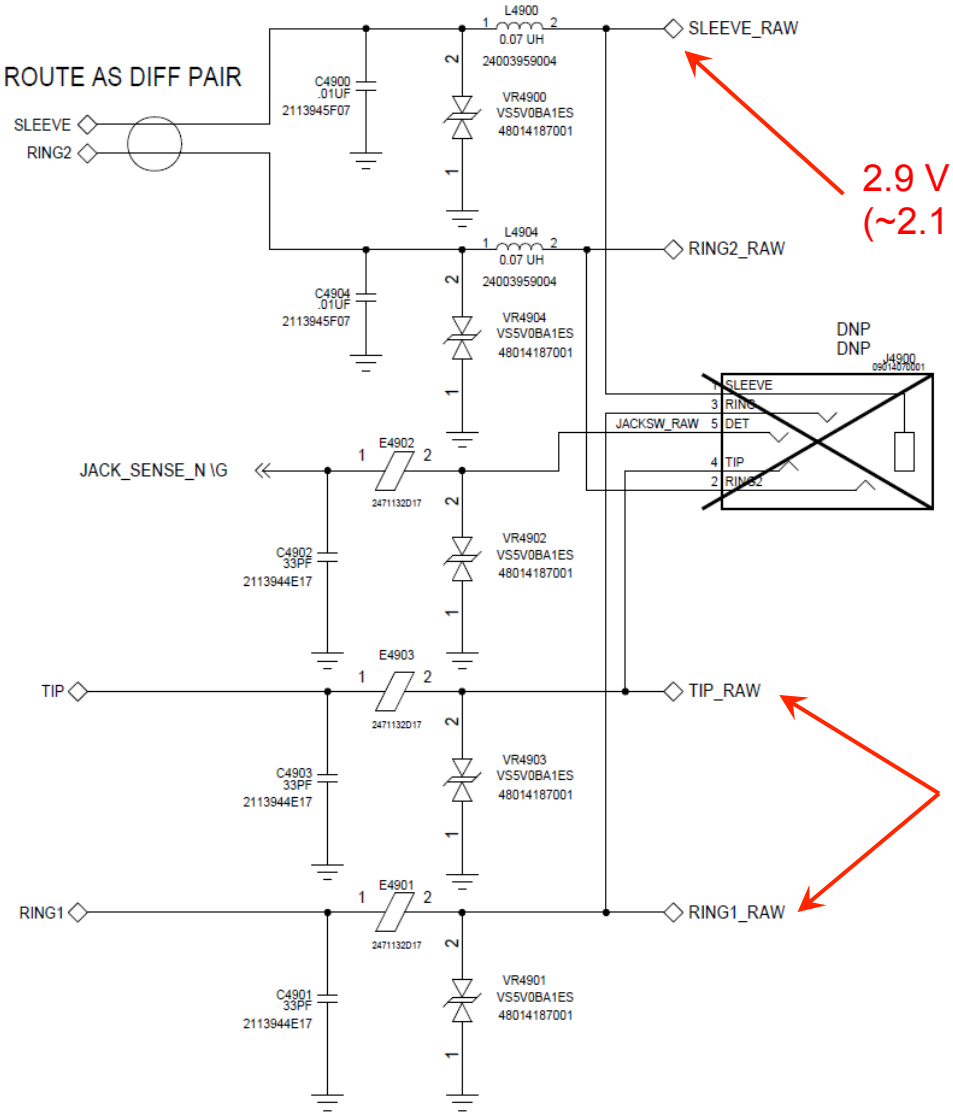
Universal Headset Detect IC Circuit



Universal Headset Detect IC Circuit



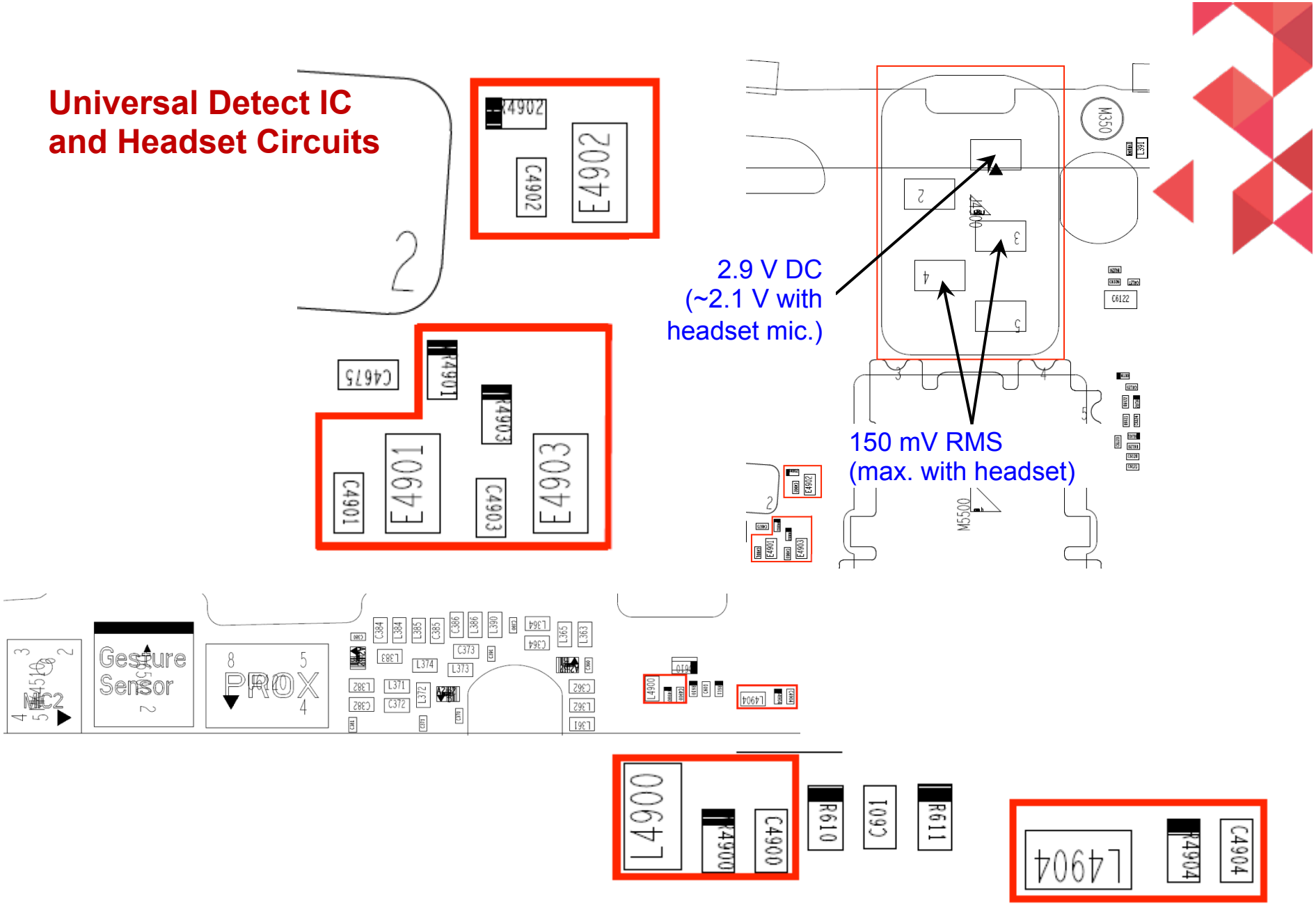
Headset Circuit



2.9 V DC
(~2.1 V with headset mic.)

150 mV RMS
(max. with headset)

Universal Detect IC and Headset Circuits



Headset Troubleshooting

- Inspect the headset jack socket J4900 and its components on the main PCB. (See schematic in the previous slides) Verify that the socket and its contacts are free of dirt, moisture, and other contaminants or foreign materials.

- Inspect the physical placement of U4800 and its related components on main PCB. (See schematic in previous slides)

- Verify that the supply voltage VDD_FSA8500 (C4813, C4819) is 2.9 V DC.

- Verify that the supply voltage VIO_FSA8500 (C4821) is 1.8 VDC.

- Verify that the open circuit voltage on the headset socket SLEEVE contact is 2.9 V DC. The SLEEVE contact voltage drops to about 2.1 V DC when a standard (“non OMTP”) headset with a microphone is plugged in.

- While playing media with a headset plugged in, use an oscilloscope verify that audio signals are present on the TIP contact (left channel) and on the RING1 contact (right channel). The expected amplitude is 150 mV maximum at the highest volume setting.

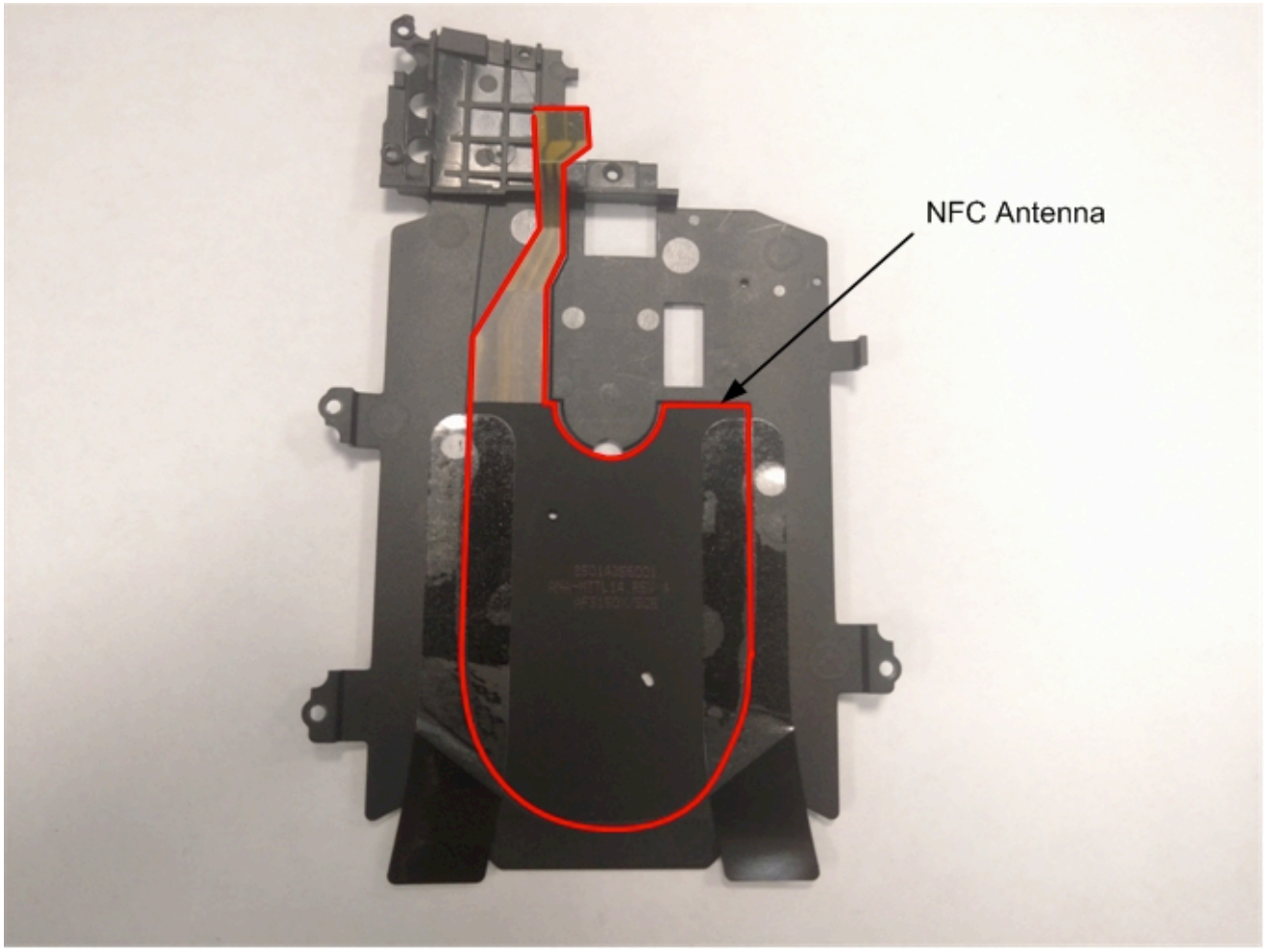
NFC TROUBLESHOOTING

NFC Failure Modes

- NFC Measured RF Power (Radio Level)
- SWP Line Status (with NFC SIM Inserted)
- NFC Tag Detected

Troubleshooting NFC Measured RF Power and NFC Tag Detection

1. Verify that NFC antenna is connected and properly seated.

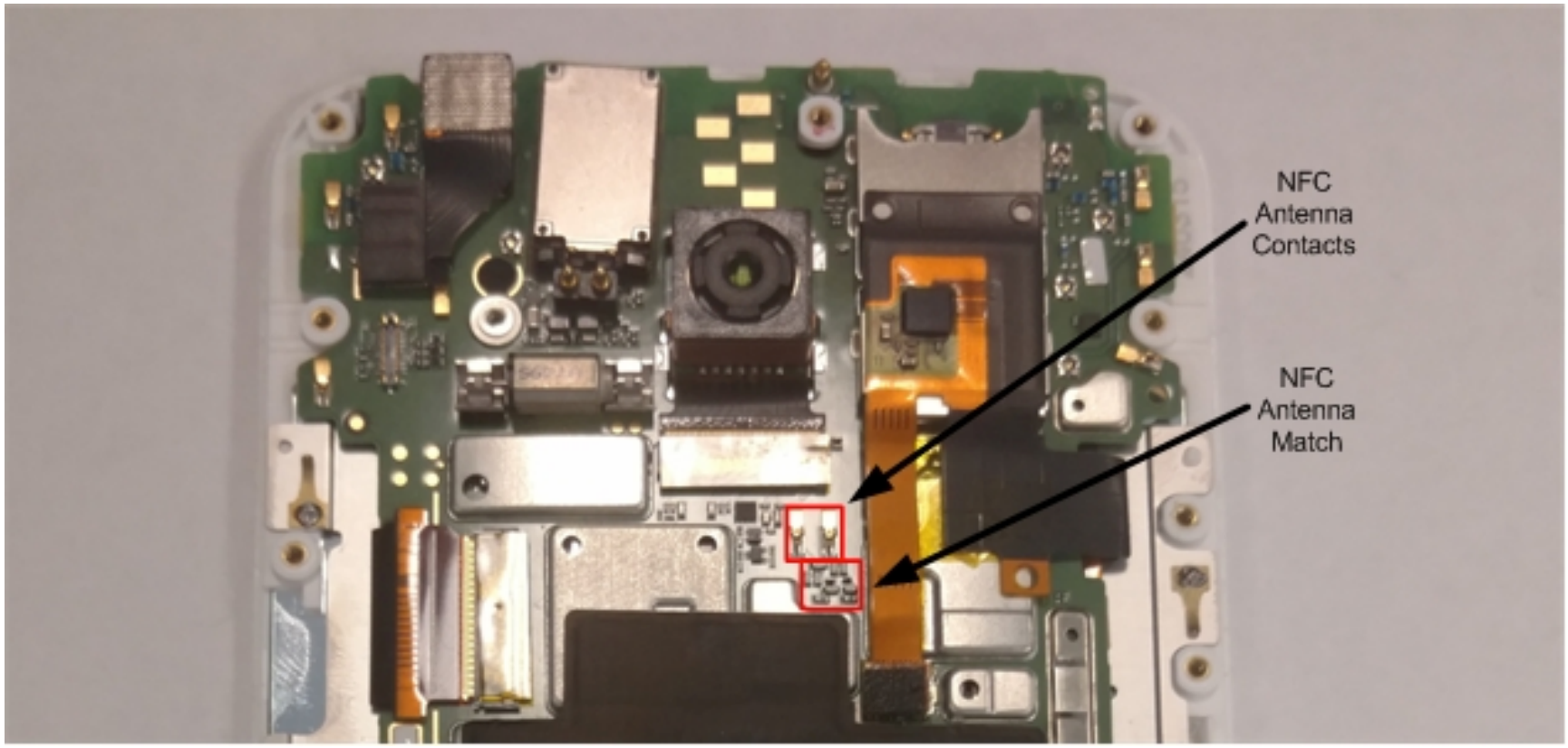


Troubleshooting NFC Measured RF Power and NFC Tag Detection

1. Verify that NFC antenna is connected and properly seated (continued)

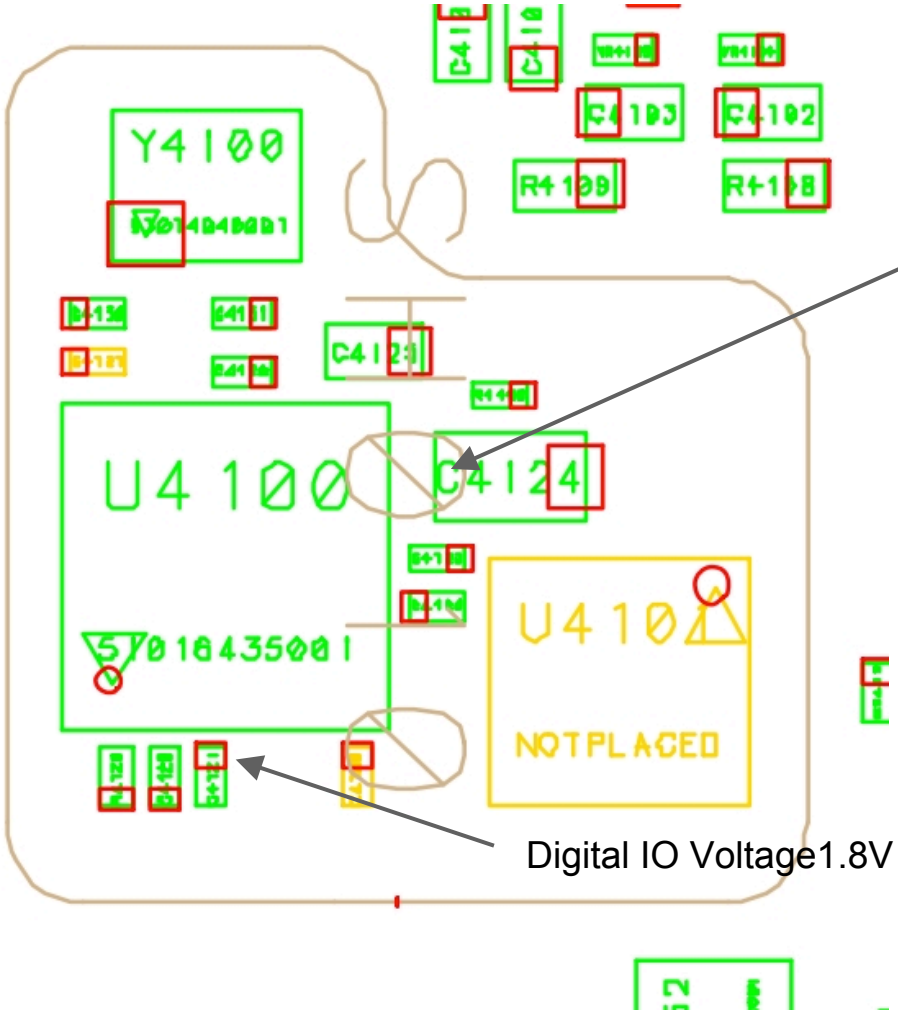
Troubleshooting NFC Measured RF Power and NFC Tag Detection

1. Verify that NFC antenna is connected and properly seated (continued)
2. Visually inspect NFC antenna match for any damaged or missing parts
3. Visually inspect NFC antenna contacts for damage



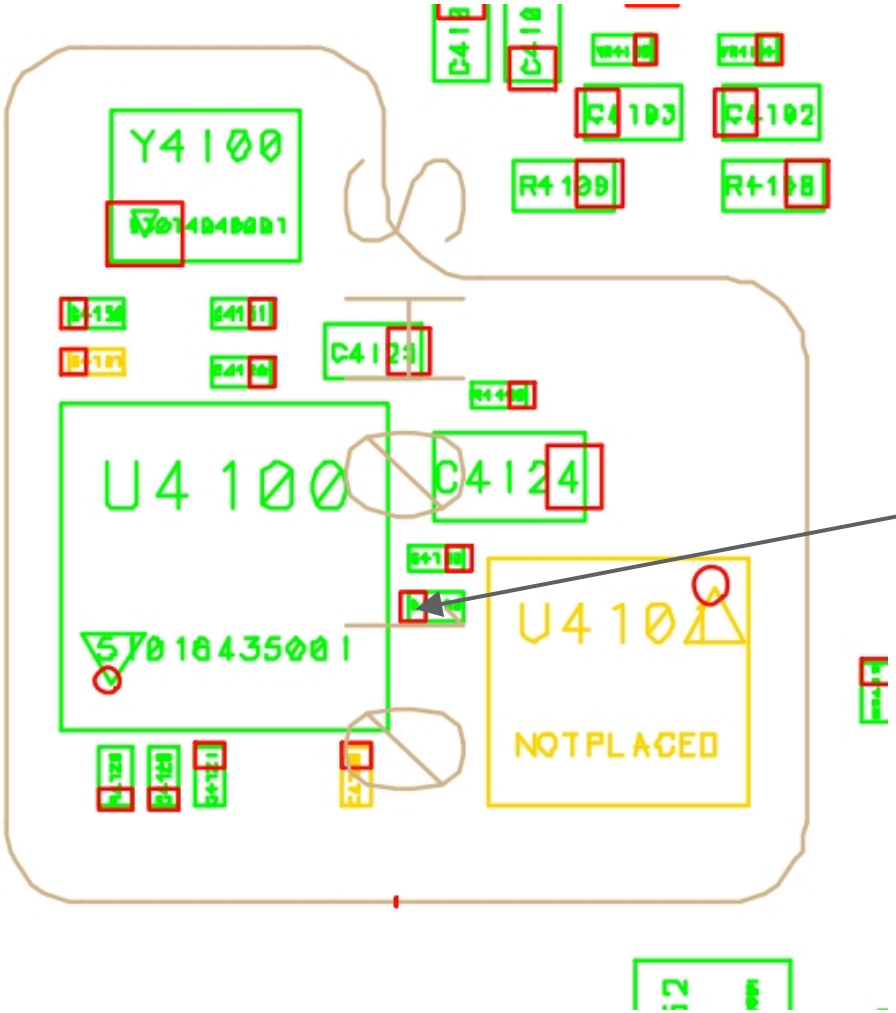
Troubleshooting NFC Measured RF Power and NFC Tag Detection

1. Probe the below parts in NFC circuit and check specified voltage level:



Troubleshooting SWP Line Status (with SIM inserted)

1. Probe the below parts in NFC circuit and check specified voltage level:



Troubleshooting SWP Line Status (with SIM inserted)

2. Check that a SIM card can be read from primary SIM slot. If card cannot be read, then this test will fail. Refer to UIM section for troubleshooting.