8. Level 3 Repair

8-1. Components Layout

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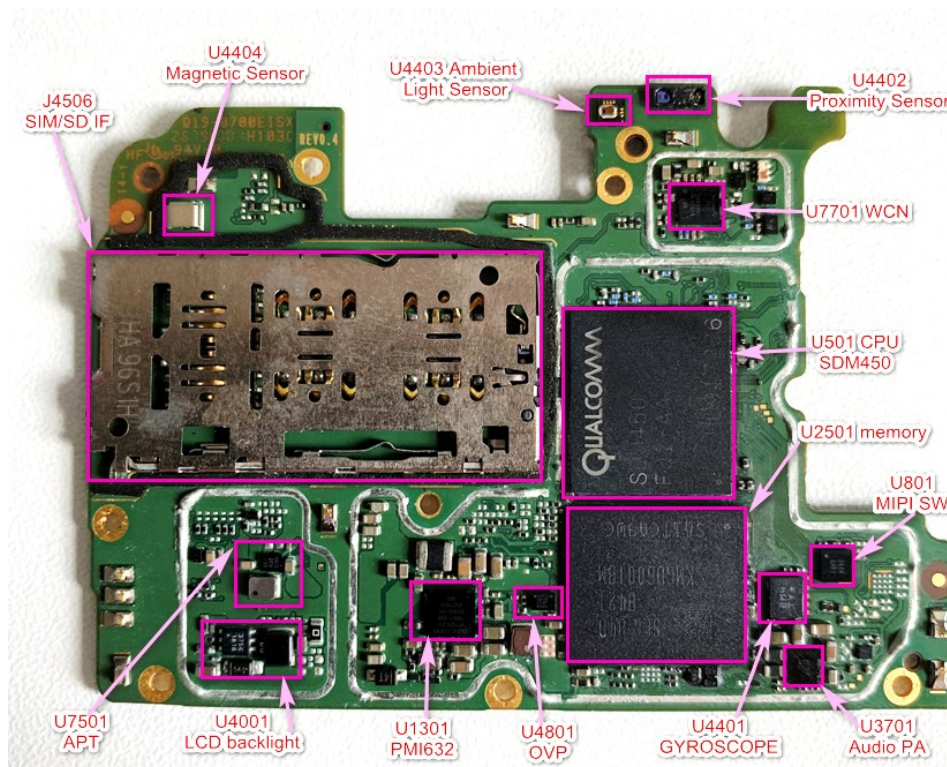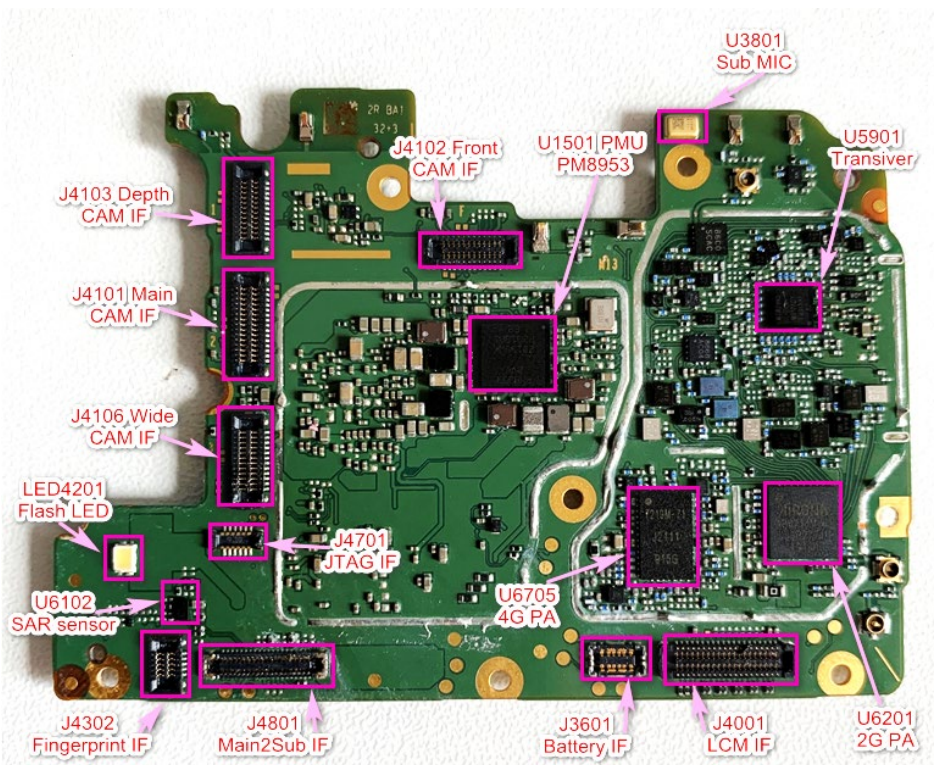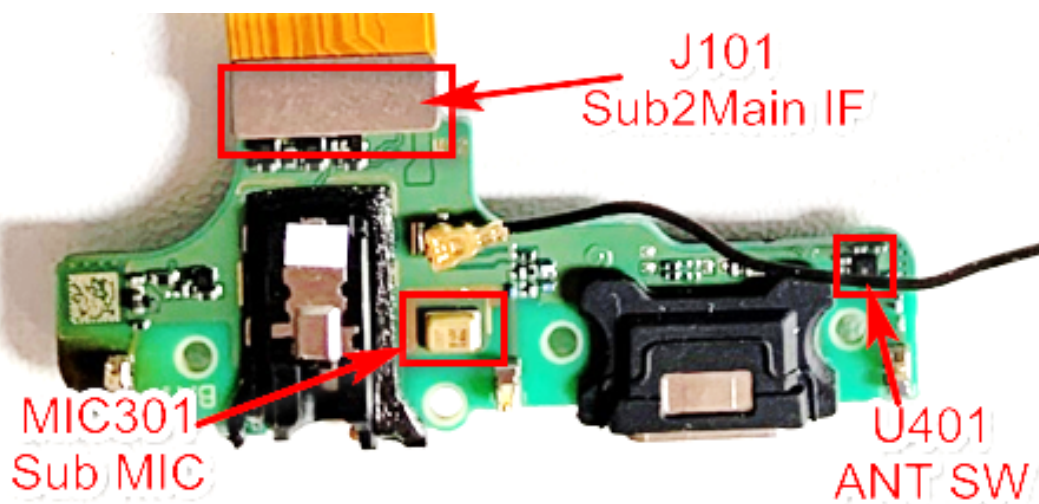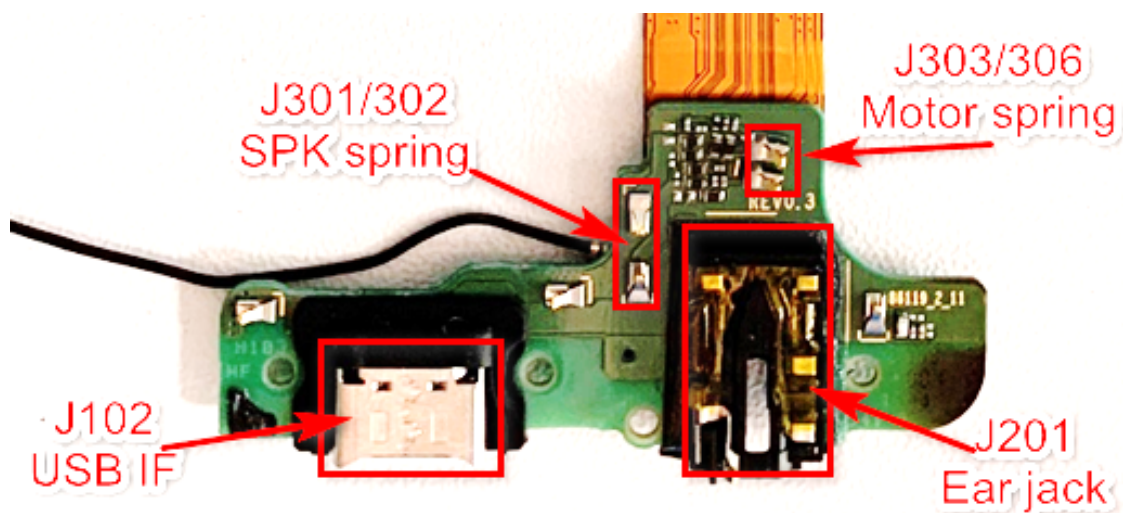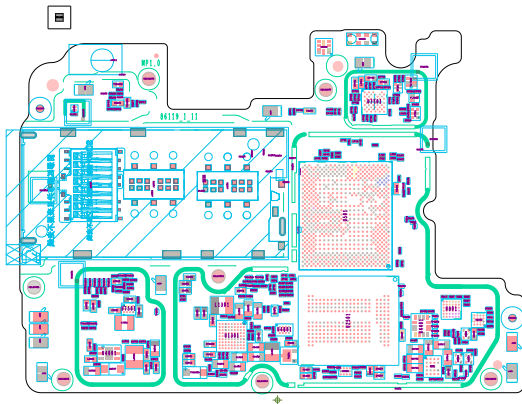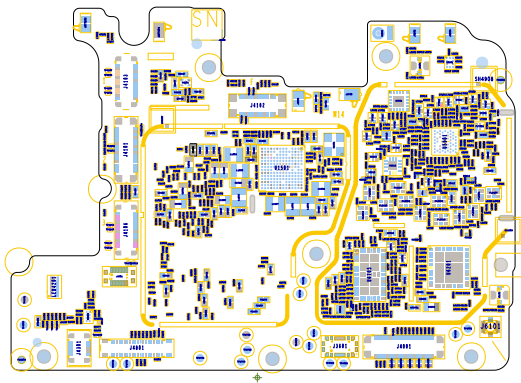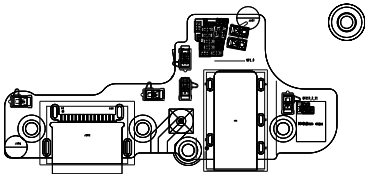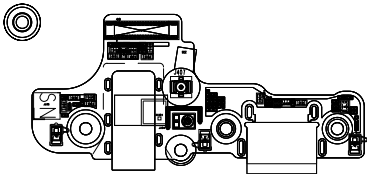
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Memory support
- EBI
- SDC1

Multimedia
- MIPI_DSI
- MIPI_CSI
- CCI + timing

Internal functions
- Debug & mode controls
- CXO input & clock outputs

Connectivity
- SDC2
- USB
- UIM
- MI²S
- BLSP (UART, I²C, SPI)
- Keypad
- Sensors and Others

Chipset & RFFE interfaces
- WWAN Tx and Tx feedback analog baseband
- WWAN Rx and GNSS analog baseband
- WLAN Tx/Rx analog baseband
- WLAN command and SSBI for WCN devices
- MIPI_RFFEs
- Audio PDM, SPMI, & I²C for PM
- System clocks

8. Level 3 Repair

8-3. Flow chart of Troubleshooting.
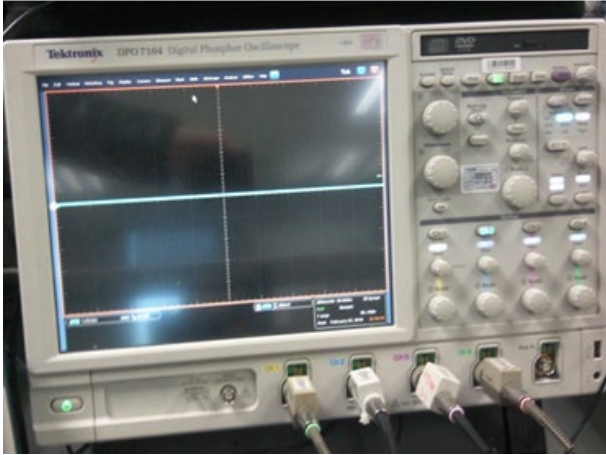
Oscilloscope	**Digital Multimeter**
Power Supply	**+ driver, ESD Safe Tweezer**
8960 & Spectrum Analyzer	**Soldering iron**
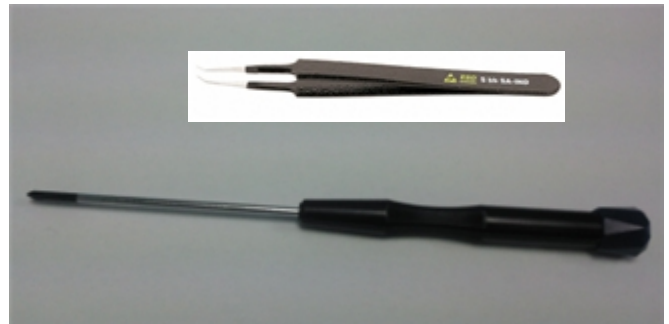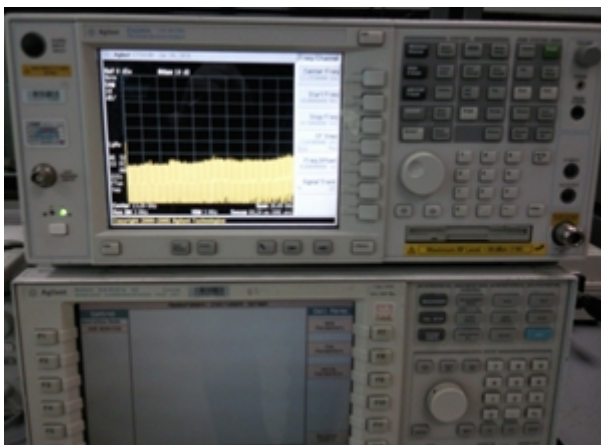
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8-4-1. Power On

: **Checking Power signal (Battery connector, PMU, Clock)**

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
                    ╱─────────────╲
                   ╱ Battery voltage╲        NO        ┌──────────────────┐
                   ╲ higher than 3.5V?╱──────────────▶ │ Change battery or │
                    ╲───────────────╱                  │ Charging battery  │
                           │                           └──────────────────┘
                          YES                                    ┊
                           │                                     ┊
                           ▼                                     ┊
                    ╱─────────────╲  ◀┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┘
                   ╱ Check power   ╲        NO        ┌──────────────────┐
                   ╲   voltage     ╱──────────────▶   │ Re-solder or      │
                    ╲─────────────╱                   │ Change PMU        │
                           │                          └──────────────────┘
                          YES                                  ┊
                           │                                   ┊
                           ▼                                   ┊
                    ╱─────────────╲  ◀┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┘
                   ╱  Check clock  ╲        NO
                   ╲               ╱──────────────▶
                    ╲─────────────╱
                           │
                          YES
                           │
                           ▼
           ┌─────────────────────┐   ◀┈┈┈┈┈┈  ┌──────────────────────┐
           │  Device can power on │            │ Re-solder or Change  │
           └─────────────────────┘            │ X1501、 U2501、U501   │
                                              └──────────────────────┘
```
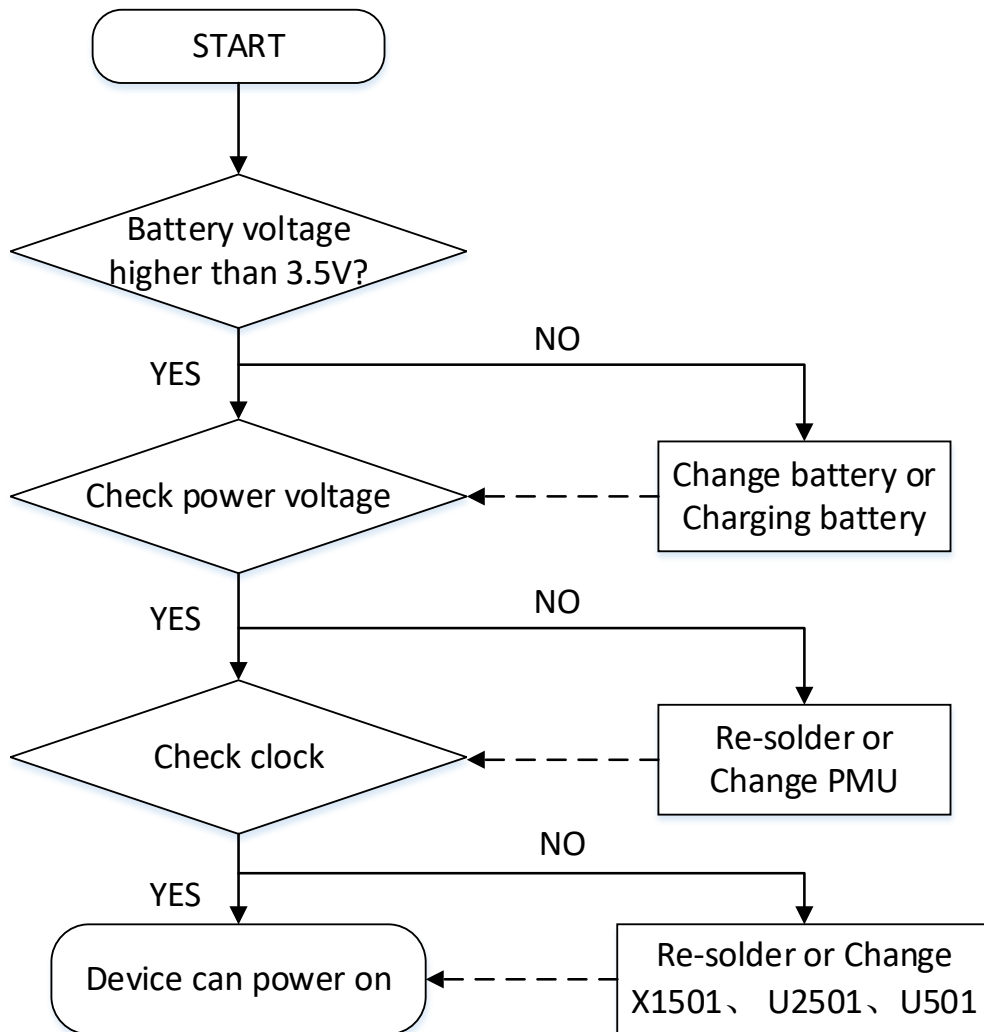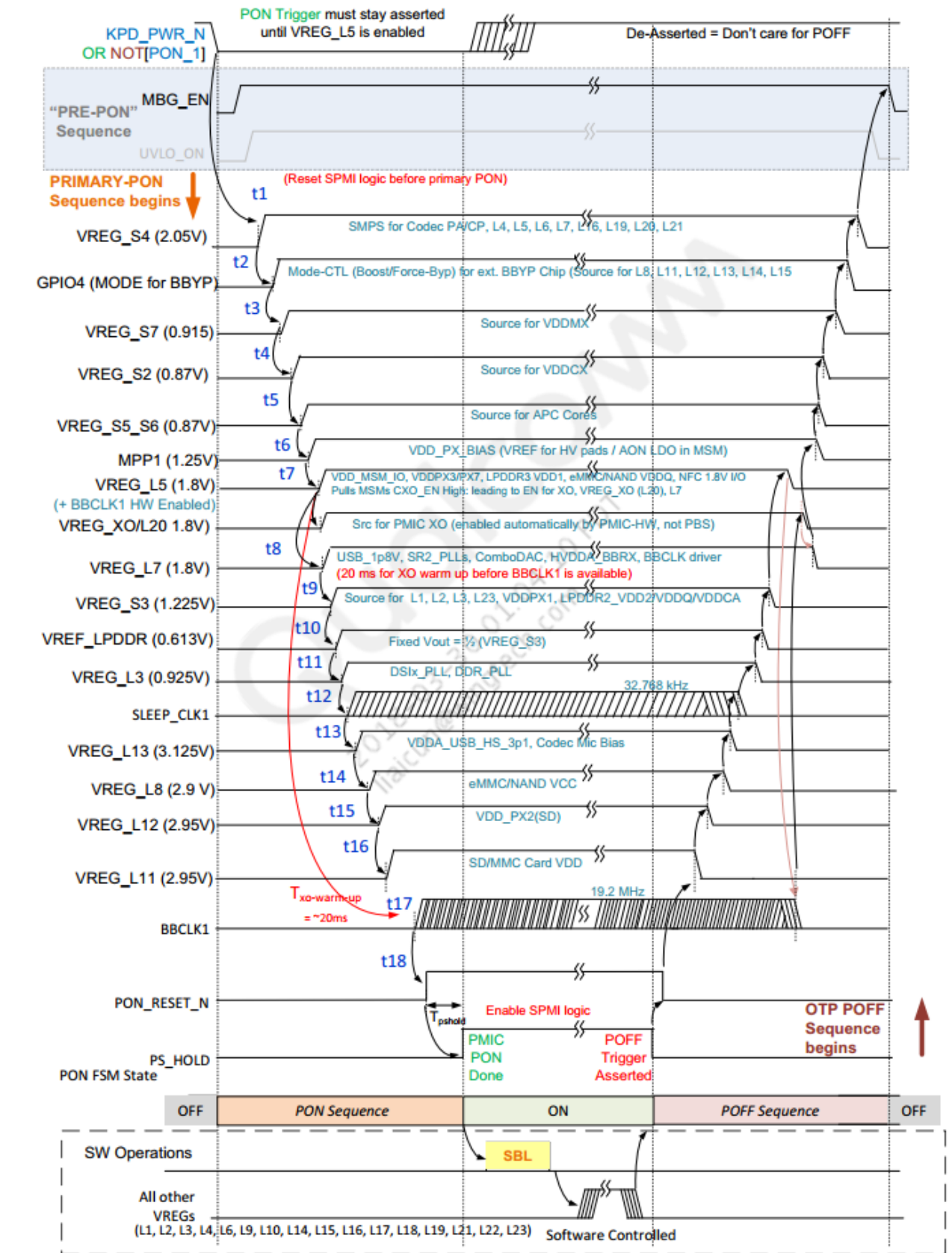
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Fig. PM8953 power-on sequence

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8-4-2. Charging
: The charging controlled by PMU chip PMI632 (U1301)

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
                  ◇ Check VBUS(TP1) voltage ◇ ──── NO ────┐
                           │                              │
                          YES                             ▼
                           │                    ┌──────────────────┐
                           ▼                    │   Re-solder or   │
                     ◇ Check TP2 ◇ ◄ ─ ─ ─ ─ ─ │  change USB J102 │
                           │                    └──────────────────┘
                          YES              NO ───────┐
                           │                         │
                           ▼                         ▼
                     ◇ Check TP3 ◇              ┌──────────────────┐
                           │       ◄ ─ ─ ─ ─ ─  │   Re-solder or   │
                          YES                   │  change J4801/FPC│
                           │                    └──────────────────┘
                           │              NO ───────┐
                           ▼                         ▼
                   ◇ Check Battery ◇           ┌──────────────────┐
                           │       ◄ ─ ─ ─ ─ ─ │   Re-solder or   │
                          YES                   │   change U4802   │
                           │                    └──────────────────┘
                           │              NO ───────┐
                           ▼                         ▼
                     ◇ Check TP4 ◇            ┌──────────────────┐
                           │       ◄ ─ ─ ─ ─ ─│  Change battery  │
                          YES                  └──────────────────┘
                           │              NO ───────┐
                           ▼                         ▼
              ┌───────────────────────┐     ┌──────────────────┐
              │ Charge function is OK │ ◄ ─ │   Re-solder or   │
              └───────────────────────┘     │   change U1301   │
                                            └──────────────────┘
```
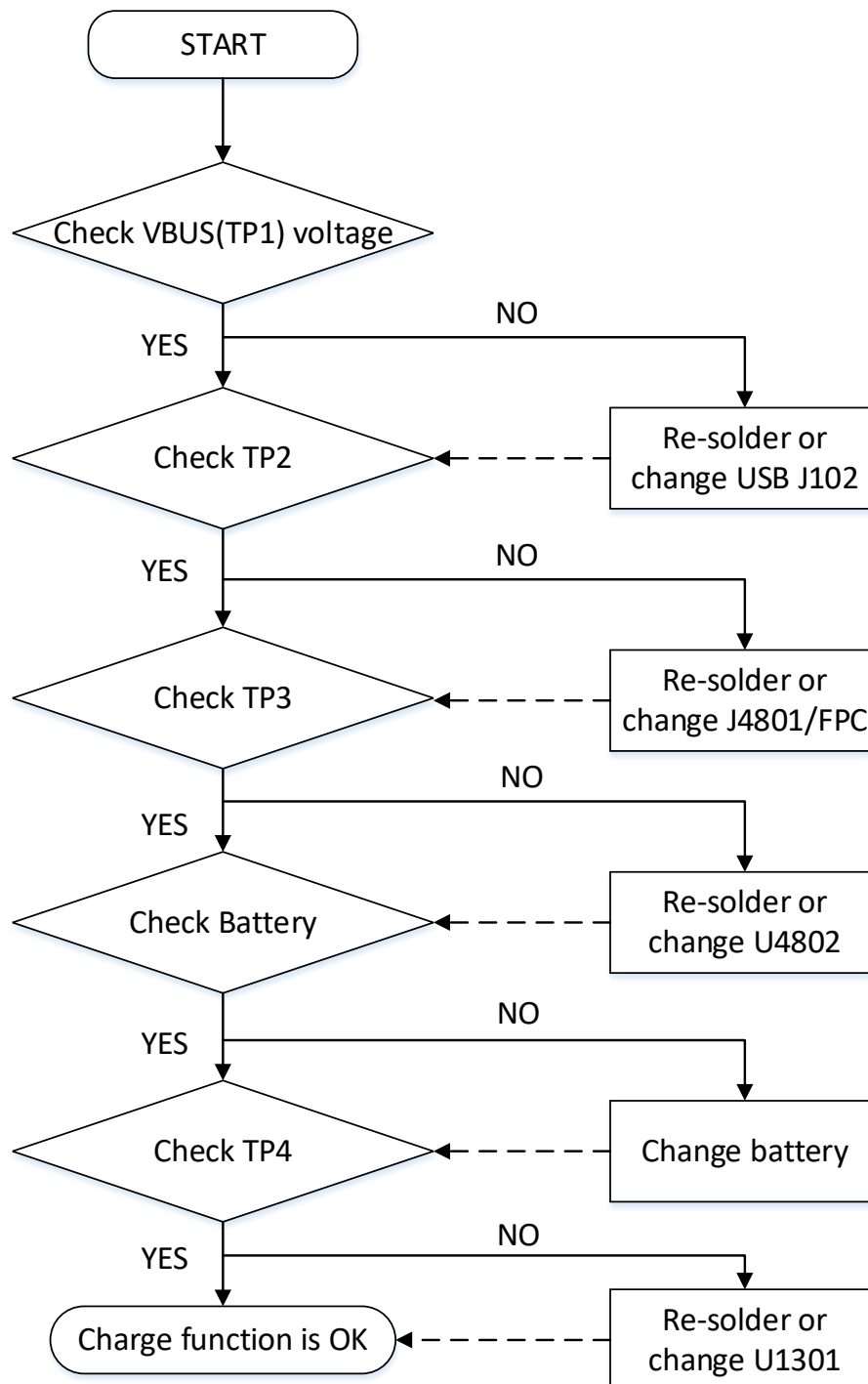
8. Level 3 Repair

8-4-3. USB
: I/O connector is used as the USB port.

```
                        ┌──────────────┐
                        │    START     │
                        └──────┬───────┘
                               │
                               ▼
                        ◇ Check sub-board ◇──────── NO ──────────┐
                               │                                  │
                              YES                                 ▼
                               │                          ┌──────────────────┐
                               ▼                          │ Change sub-board │
                 ◇ Check TP4702/4703/4704/4762/4765 ◇◄──── │                  │
                               │                          └──────────────────┘
                              YES              NO
                               │                                  ┌──────────────────────┐
                               ▼                                  │ Check                │
                        ◇ Check U1301 ◇◄──────────────────────────│ R4801/4802/4810/4811 │
                               │                                  │ /4865/4866 etc.      │
                              YES              NO                 └──────────────────────┘
                               │                          ┌──────────────────┐
                               ▼                          │ Re-solder or     │
                        ◇ Check U501 ◇◄──────────────────│ change U1301     │
                               │                          └──────────────────┘
                              YES              NO
                               │                          ┌──────────────────┐
                               ▼                          │ Re-solder or     │
                 ┌──────────────────────┐◄────────────────│ change U501      │
                 │ USB function is OK   │                 └──────────────────┘
                 └──────────────────────┘
```
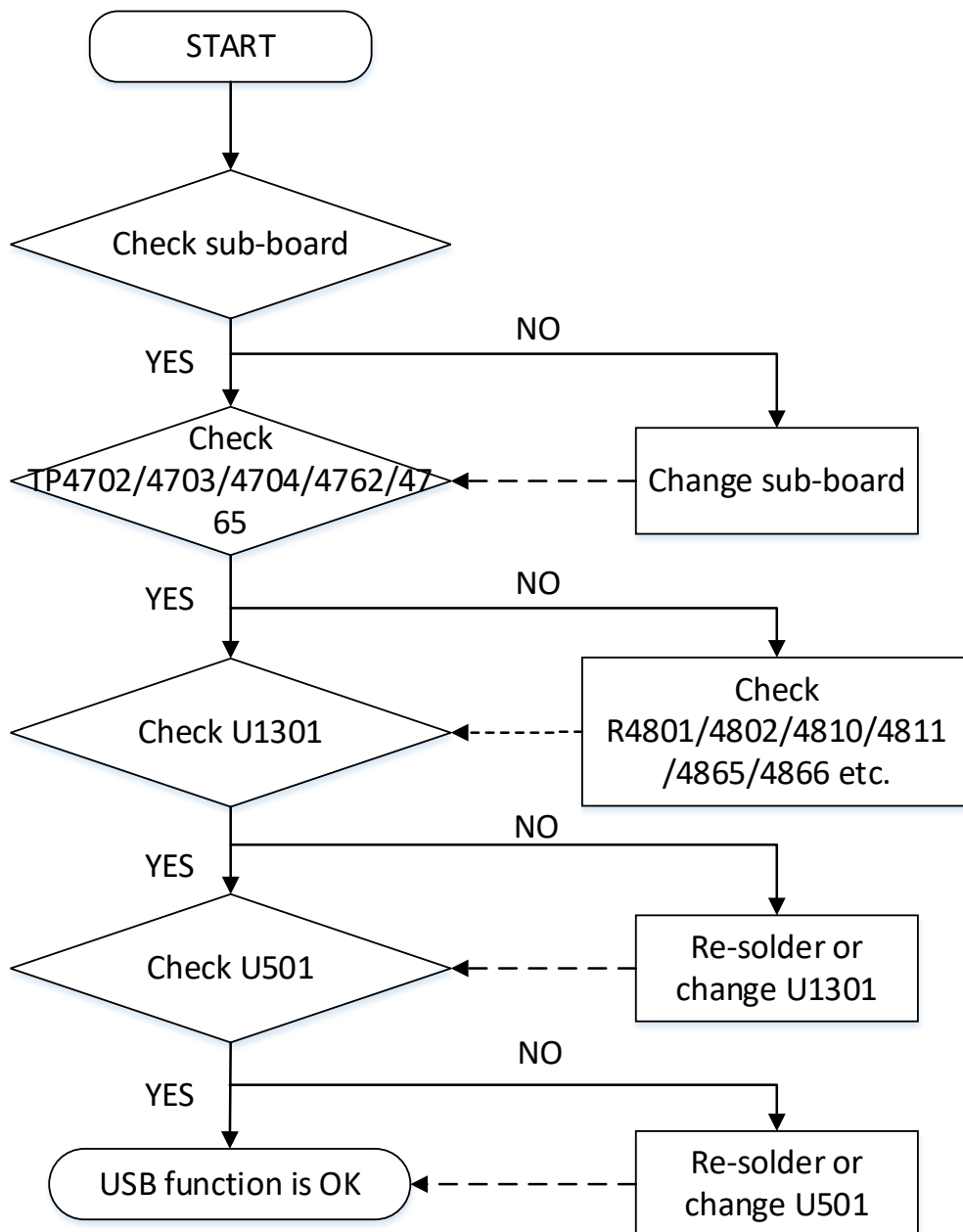
8. Level 3 Repair

8-4-4. Audio_speaker

: The Speaker control signals are generated by BBIC SDM450(U0501) and Audio PA   AW87329(U3701). The ICs and other related components should be checked.

```
                    ┌──────────────┐
                    │    START     │
                    └──────┬───────┘
                           │
                           ▼
                    ╱─────────────╲
                   ╱ Check sub-board╲
                   ╲  and SPK box   ╱ ──── NO ────┐
                    ╲─────────────╱               ▼
                   YES │                  ┌────────────────┐
                       │            ◀╌╌╌╌ │ Change sub-board│
                       ▼                  │  or SPK box    │
                    ╱─────────────╲       └────────────────┘
                   ╱ Check audio PA ╲
                   ╲Power and  signals╱ ──── NO ────┐
                    ╲─────────────╱                 ▼
                   YES │                  ┌────────────────┐
                       │            ◀╌╌╌╌ │ Re-solder or   │
                       ▼                  │ change U3701   │
                    ╱─────────────╲       │ etc.           │
                   ╱Check codec(U1501)╲   └────────────────┘
                   ╲    signals      ╱ ──── NO ────┐
                    ╲─────────────╱                ▼
                   YES │                  ┌────────────────┐
                       │            ◀╌╌╌╌ │ Re-solder or   │
                       ▼                  │ change U1501   │
                    ╱─────────────╲       └────────────────┘
                   ╱ Check BB(U501) ╲
                   ╲  ctrl signals  ╱ ──── NO ────┐
                    ╲─────────────╱               ▼
                   YES │                  ┌────────────────┐
                       │            ◀╌╌╌╌ │ Re-solder or   │
                       ▼                  │ change U501    │
                ┌──────────────┐          └────────────────┘
                │ SPK function │
                │   is OK      │
                └──────────────┘
```
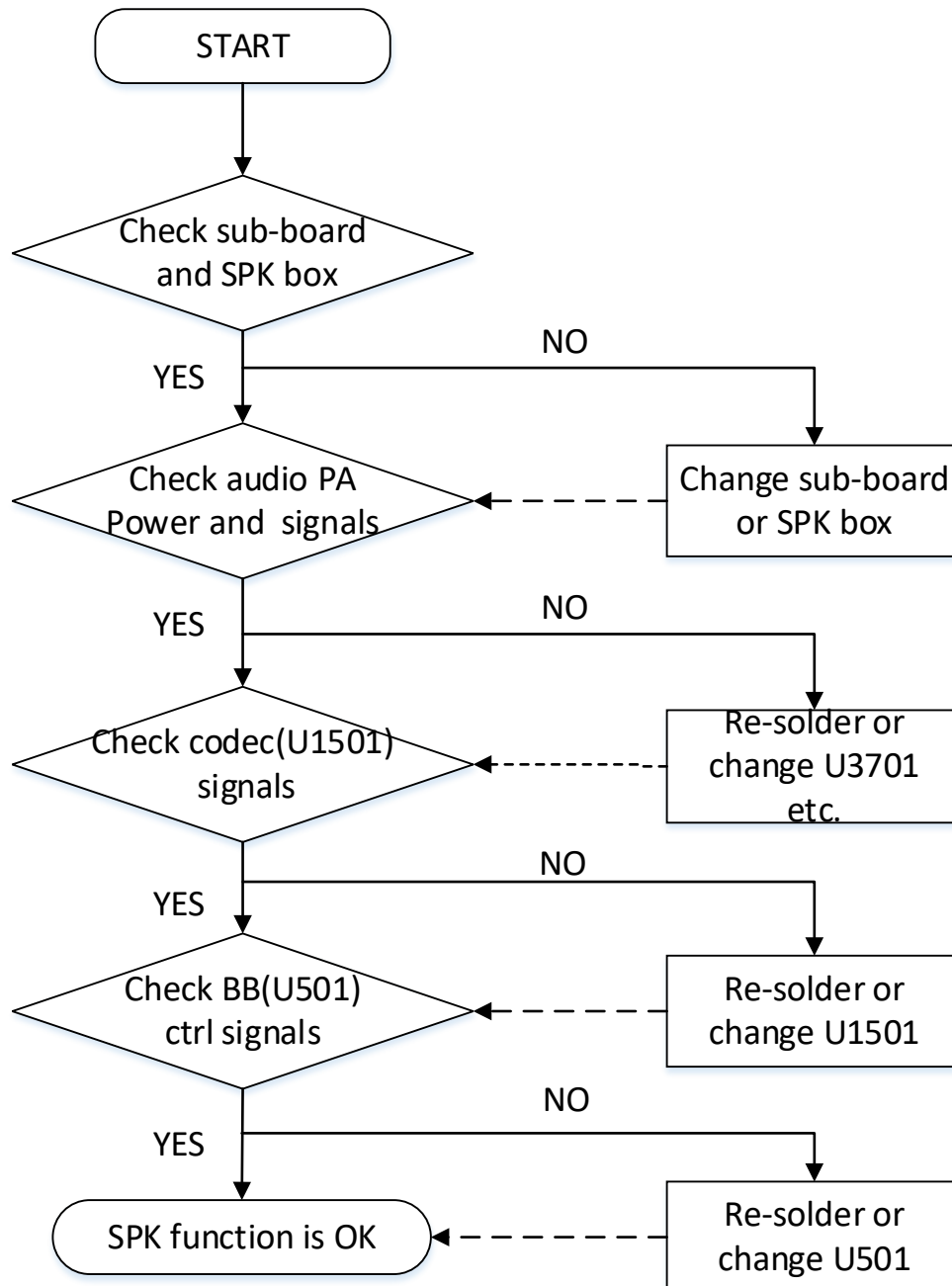
8. Level 3 Repair

8-4-5. Audio_Main MIC

: The MIC control signals are generated by PMU chip PM8953 (U1501), the PMIC、
the MIC and other related components should be checked.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
                    ╱─────────────╲
                   ╱  Check MIC power╲
                   ╲   And signals   ╱
                    ╲─────────────╱
                           │                    NO          ┌──────────────────┐
                      YES  │─────────────────────────────▶  │   Re-solder or   │
                           │                                │  change related  │
                           ▼                                │    components    │
                    ╱─────────────╲       ◀ ─ ─ ─ ─ ─ ─     └──────────────────┘
                   ╱   Check MIC    ╲
                   ╲(sub board MIC301)╱
                    ╲─────────────╱
                           │           NO                   ┌──────────────────┐
                      YES  │─────────────────────────────▶  │   Re-solder or   │
                           │                                │  change MIC301   │
                           ▼                                └──────────────────┘
                    ╱─────────────╲       ◀ ─ ─ ─ ─ ─ ─
                   ╱ Check codec(U1501)╲
                   ╲    signals       ╱
                    ╲─────────────╱
                           │           NO                   ┌──────────────────┐
                      YES  │─────────────────────────────▶  │   Re-solder or   │
                           │                                │  change U1501    │
                           ▼                                └──────────────────┘
                    ┌─────────────┐       ◀ ─ ─ ─ ─ ─ ─
                    │MIC function is OK│
                    └─────────────┘
```
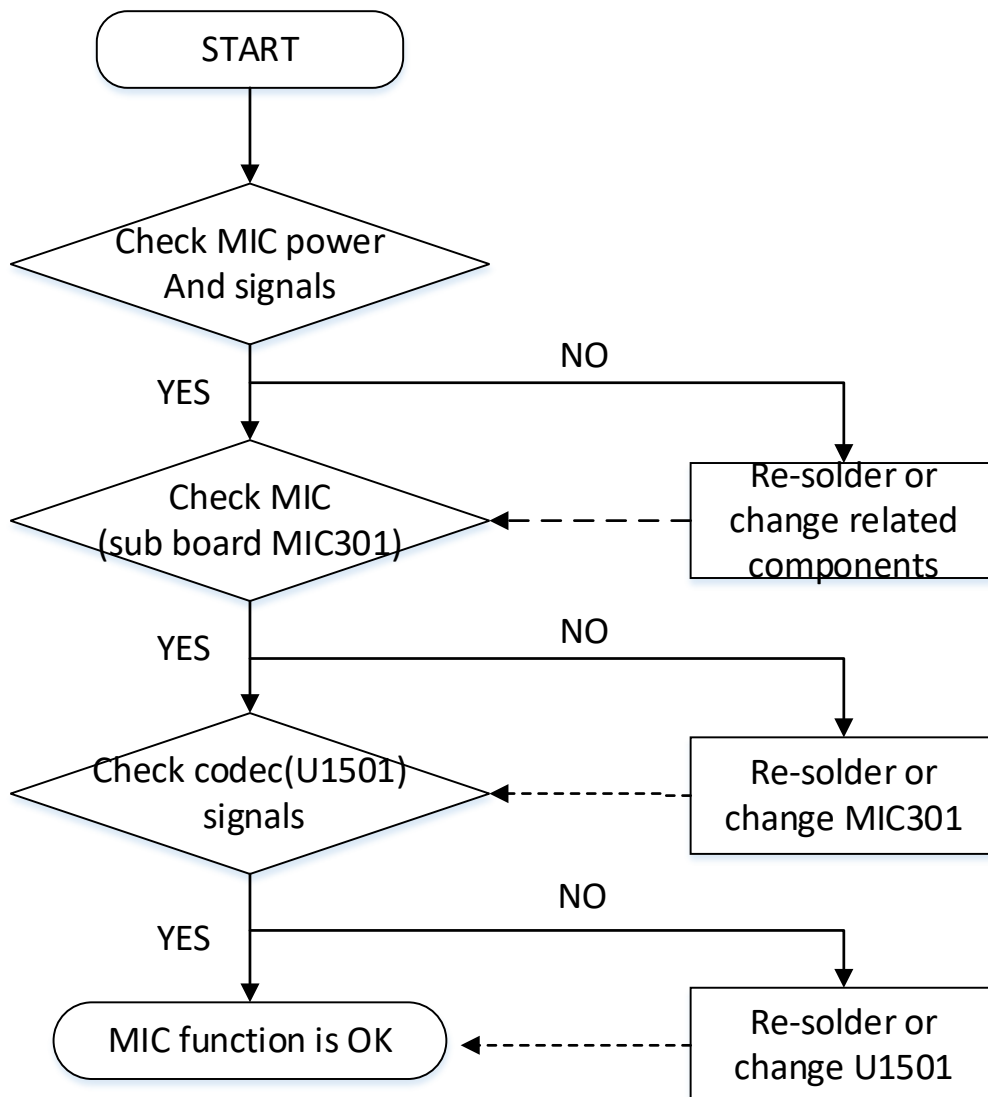
8. Level 3 Repair

8-4-6. Accelerometer sensor

: The 3G-Accelerometer sensor is calibrated by using SW algorithm.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
                  ◇ Check U4401 soldering ◇ ──── NO ────┐
                           │                             │
                          YES                            ▼
                           │                    ┌──────────────────┐
                           ▼                    │  Re-solder or     │
                  ◇ Check BBIC U501 ◇ ◄─ ─ ─ ─ │  change U4401     │
                           │                    └──────────────────┘
                          YES          ──── NO ────┐
                           │                        │
                           ▼                        ▼
               ╭──────────────────────╮   ┌──────────────────┐
               │ ACCE function is OK   │◄─ │  Re-solder or    │
               ╰──────────────────────╯    │  change U501     │
                                           └──────────────────┘
```
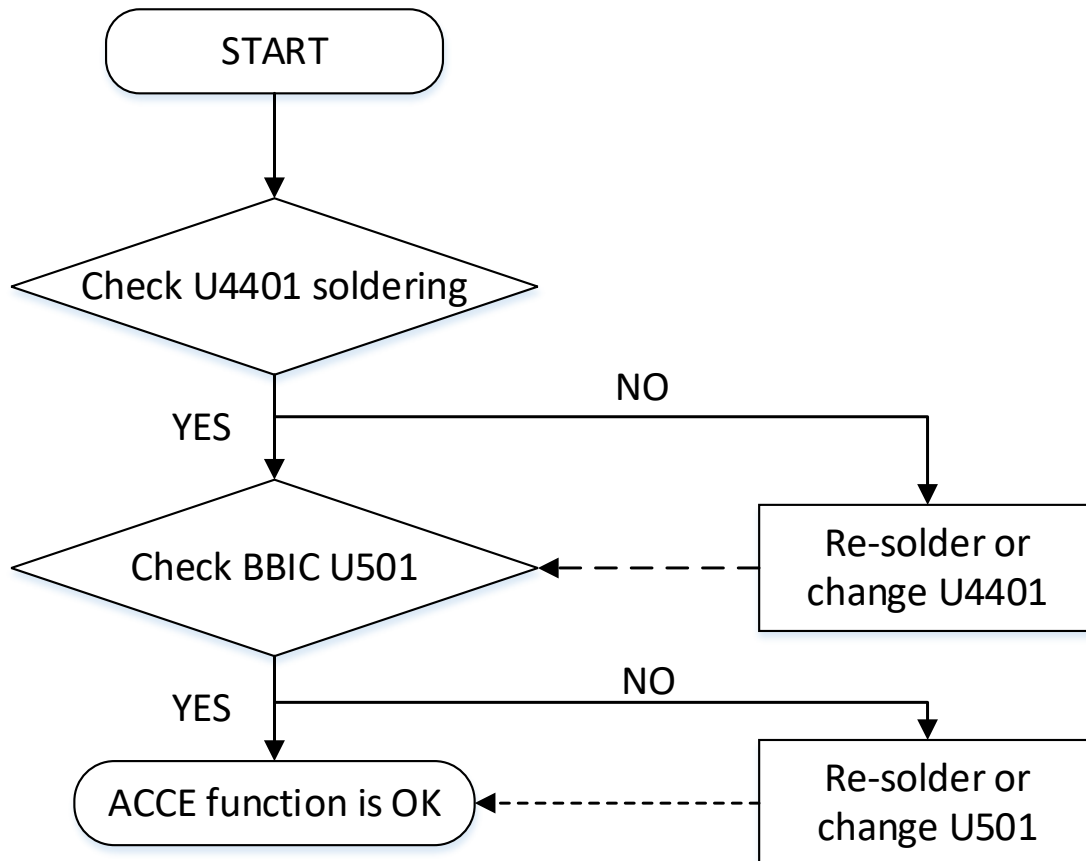
8. Level 3 Repair

8-4-7. Proximity and light sensor

: Proximity and Light Sensor is worked as below: Control the screen's on/off operation automatically while making phone calls, and adjust the screen brightness according to ambient light.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
                  ◇ Check power and signals ◇ ────NO────┐
                           │                             │
                          YES                            ▼
                           │                   ┌──────────────────┐
                           ▼                   │  Re-solder or    │
                  ◇ Check U4402 ◇ ◄────────────│    change        │
                           │                   │ R714/R715/R4402  │
                          YES        NO────────────────┐ └────────┘
                           │                           ▼
                           ▼                   ┌──────────────────┐
                  ◇ Check BBIC ◇ ◄─────────────│  Re-solder or    │
                           │                   │  change U4402    │
                          YES       NO─────────────────┐ └───────┘
                           │                           ▼
                           ▼                   ┌──────────────────┐
          ( Proximity sensor is OK ) ◄─────────│  Re-solder or    │
                           │                   │  change U501     │
                           ▼                   └──────────────────┘
                  ◇ Check U4403 ◇
                           │
                          YES        NO────────────────┐
                           │                           ▼
                           ▼                   ┌──────────────────┐
                  ◇ Check BBIC ◇ ◄─────────────│  Re-solder or    │
                           │                   │  change U4403    │
                          YES       NO─────────────────┐ └───────┘
                           │                           ▼
                           ▼                   ┌──────────────────┐
          ( Light sensor is OK ) ◄─────────────│  Re-solder or    │
                                               │  change U501     │
                                               └──────────────────┘
```
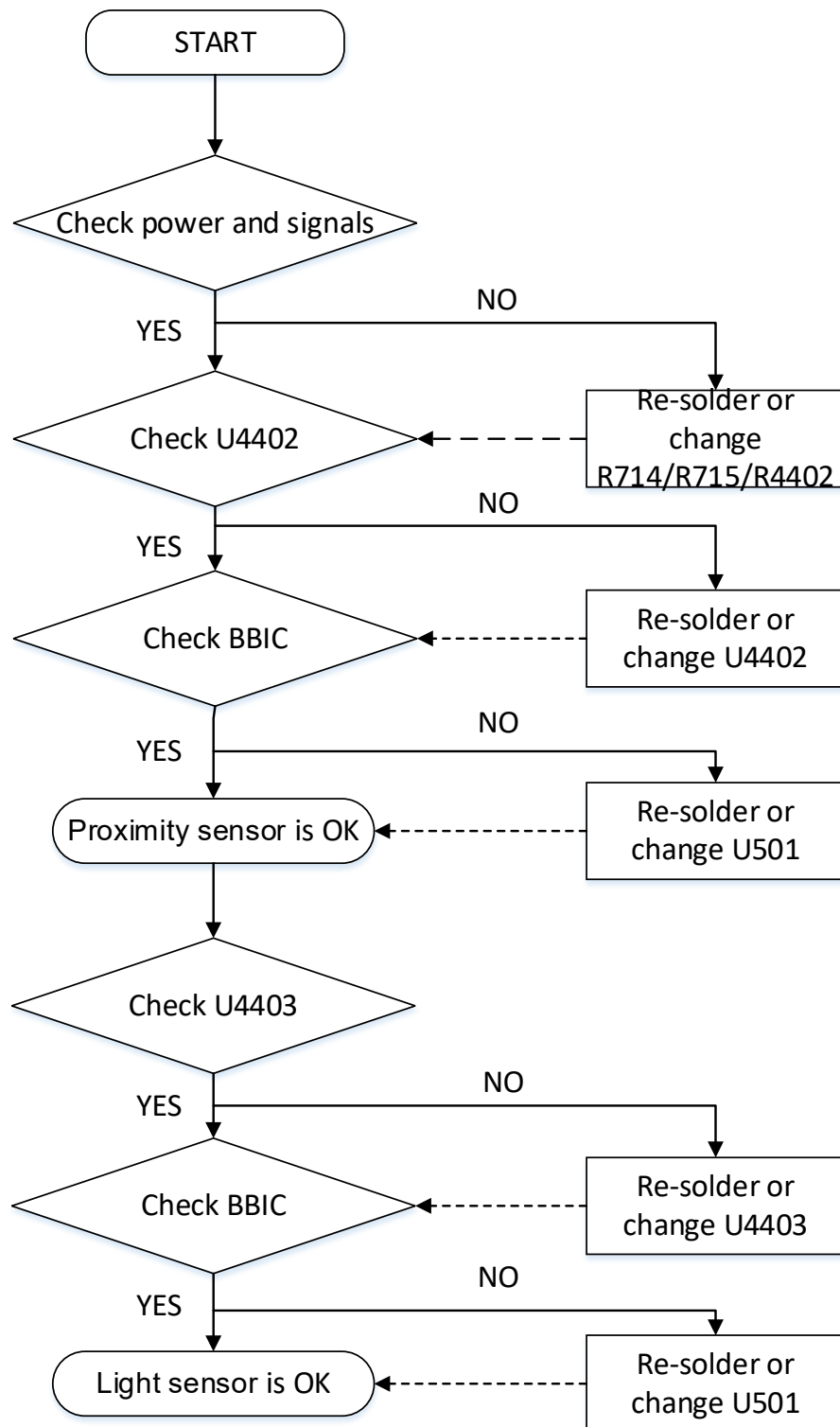
8. Level 3 Repair

8-4-8. Magnetic Sensor

: Magnetic Sensor is usually used for compass and the control signals are generated by SDM450

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
                     ◇ Check power and signals ◇ ──── NO ───┐
                           │                                 │
                          YES                                ▼
                           ▼                        ┌──────────────────┐
                     ◇ Check U4404 ◇ ◄─ ─ ─ ─ ─ ─   │  Re-solder or    │
                           │                         │  change          │
                          YES           NO           │  R714/R715/R4416 │
                           ▼            │            └──────────────────┘
                     ◇ Check BBIC ◇ ◄─ ─ ─ ─ ─ ─    ┌──────────────────┐
                           │                         │  Re-solder or    │
                          YES           NO           │  change U4404    │
                           ▼            │            └──────────────────┘
               ┌──────────────────┐    │            ┌──────────────────┐
               │ Magnetic sensor  │◄─ ─ ─ ─ ─ ─ ─   │  Re-solder or    │
               │    is OK         │                 │  change U501     │
               └──────────────────┘                 └──────────────────┘
```
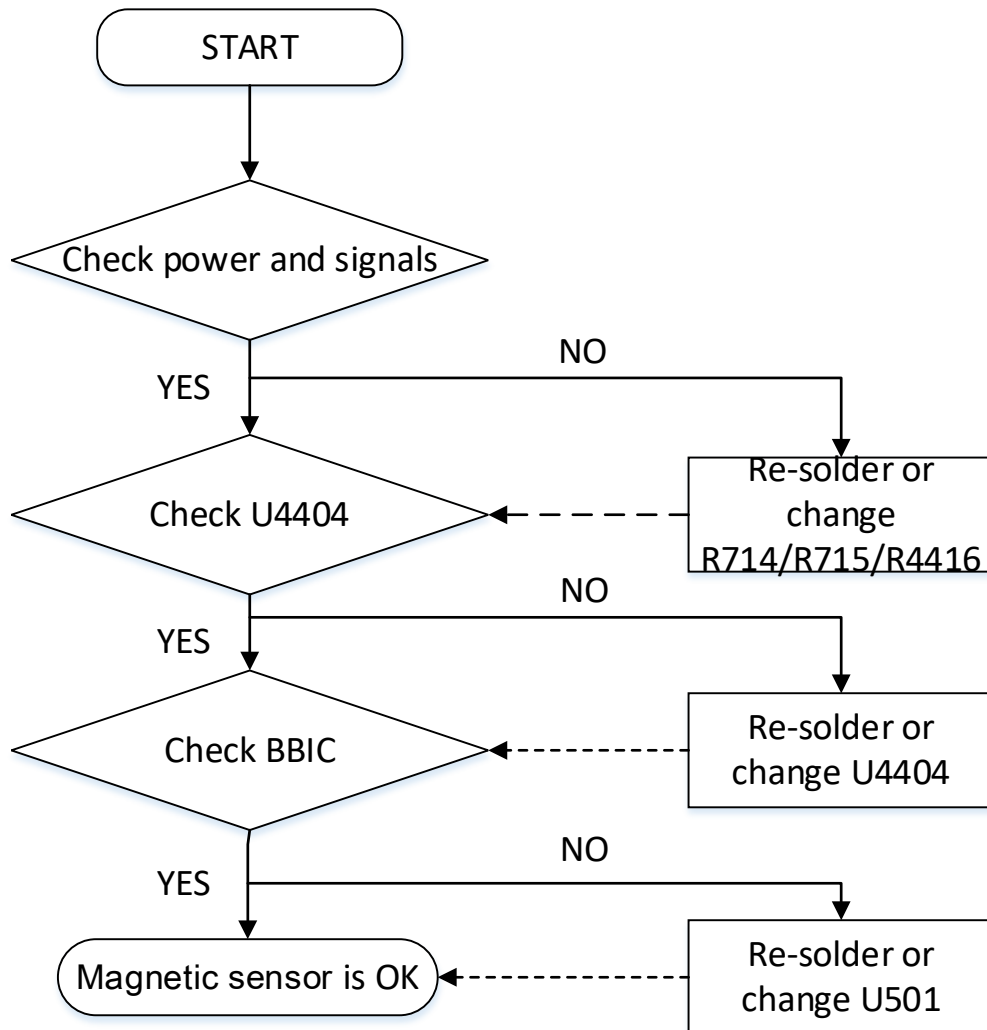
8. Level 3 Repair

8-4-9. TOUCH SCREEN

: The Touch control signals are generated by SDM450. It is assembled with LCD.

```
                        ┌─────────────┐
                        │    START    │
                        └─────────────┘
                               │
                               ▼
                        ╱─────────────╲
                       ╱  Check J4001  ╲─────── NO ──────┐
                       ╲   soldering   ╱                 │
                        ╲─────────────╱                  ▼
                          │                     ┌──────────────────┐
                        YES                     │  Re-solder or    │
                          │                     │  change J4001    │
                          ▼                     └──────────────────┘
                        ╱─────────────╲                  │
                       ╱ Check signals ╲◀ ─ ─ ─ ─ ─ ─ ─ ─┘
                       ╲ from TP1 to TP6╱
                        ╲─────────────╱
                          │
                        YES              NO
                          │                     ┌──────────────────┐
                          ▼                     │  Re-solder or    │
                 ┌─────────────────┐            │  change U501     │
                 │ Touch function  │◀ ─ ─ ─ ─ ─ └──────────────────┘
                 │    is OK        │
                 └─────────────────┘
```
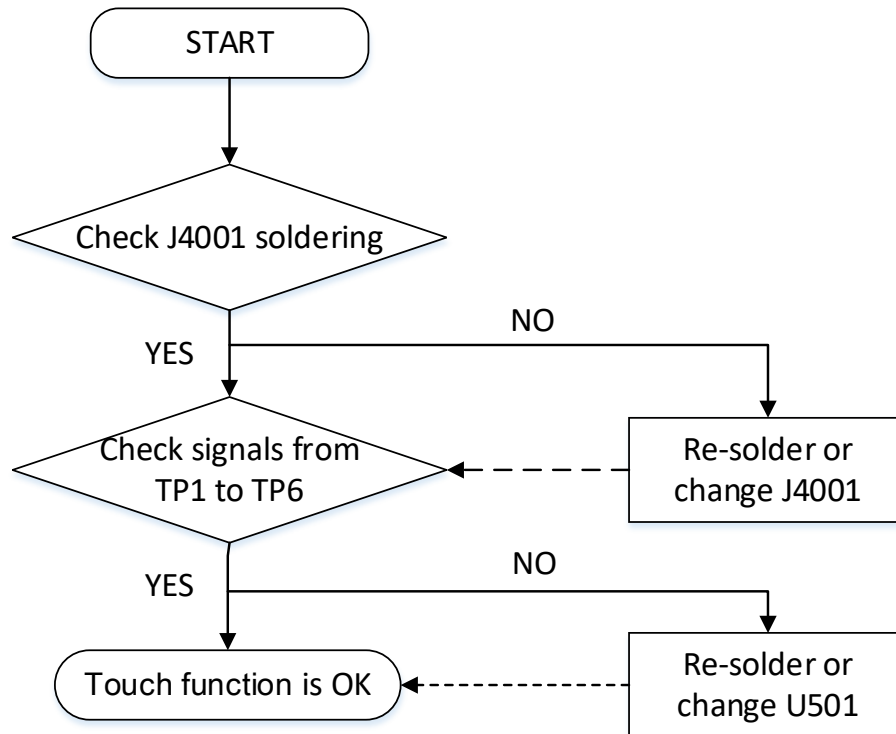
8. Level 3 Repair

8-4-10. Vibrator

: The Vibrator control signals are generated by PMI632.

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
                    ◇ Check TP1~TP4 ◇ ──── NO ──────┐
                           │                          ▼
                          YES              ┌────────────────────┐
                           │               │   Re-solder or     │
                           ▼               │ change sub board   │
                    ◇ Check Main&Sub BTB ◇◄┈┈┈ components       │
                           │               └────────────────────┘
                          YES ──── NO ──────┐
                           │                 ▼
                           ▼        ┌────────────────┐
                    ◇ Check TP5 ◇◄┈┈│  Re-solder or  │
                           │         │  change BTB    │
                          YES ── NO ─┤                │
                           │         └────────────────┘
                           ▼         ┌────────────────┐
              ┌──────────────────┐   │  Re-solder or  │
              │ Vibrator function │◄┈┈│    change      │
              │      is OK        │   │  U1301/R1409   │
              └──────────────────┘   └────────────────┘
```
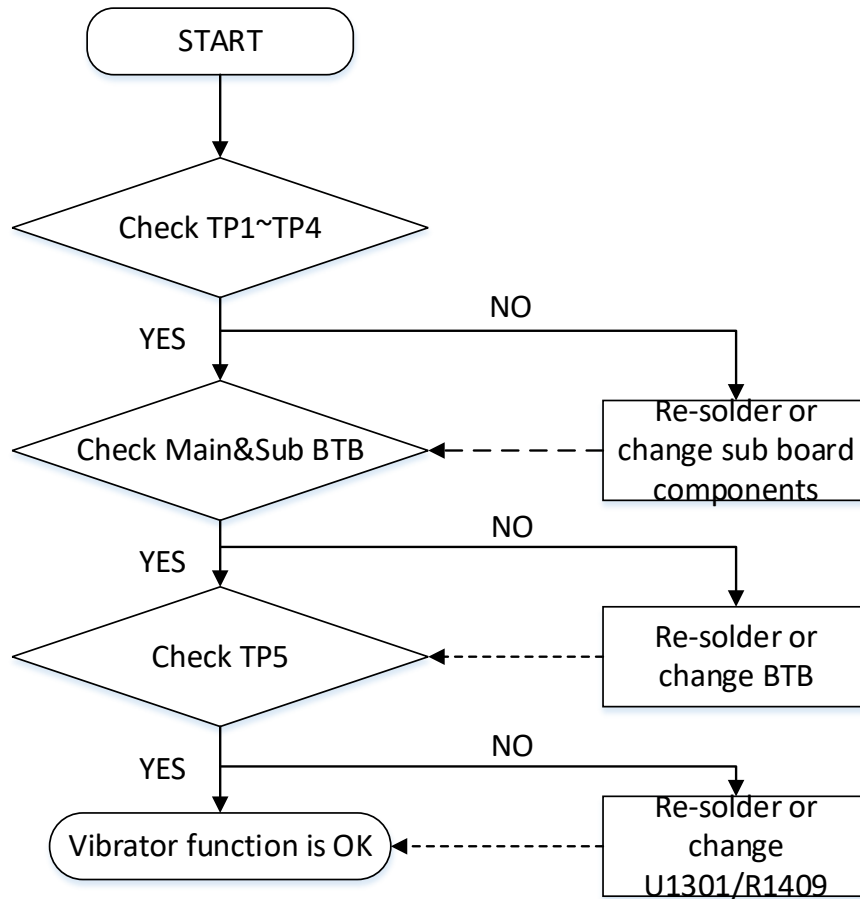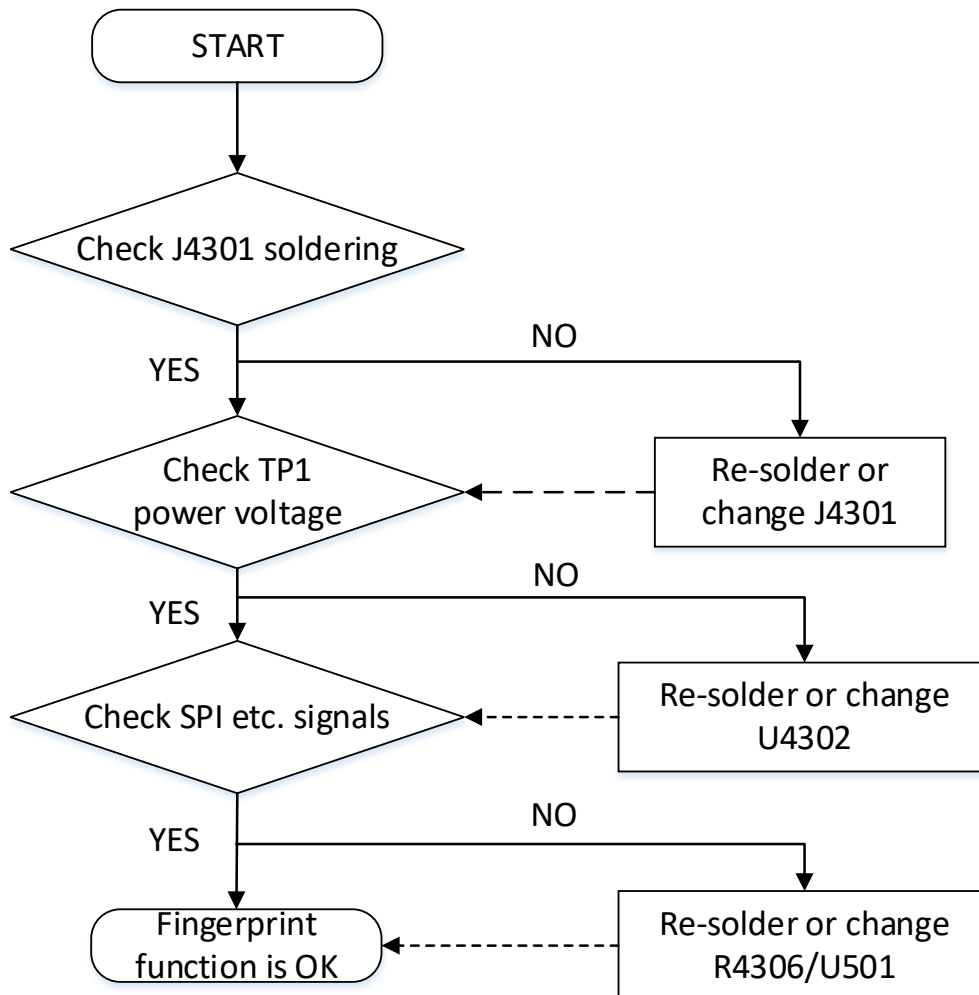
8. Level 3 Repair

8-4-11. Rear Camera
: The camera control signals are generated by SDM450. Other cameras' analysis methods refer to the rear camera.

```
                    ┌──────────────┐
                    │    START     │
                    └──────┬───────┘
                           │
                           ▼
                     ╱──────────────╲
            ◄────NO──┤ Check J4101    │
            │        ╲  soldering    ╱
            │         ╲────┬────────╱
            │          YES │
            │              ▼
            │        ╱──────────────╲        ┌──────────────┐
            └───────►│ Check TP1~TP3 │◄---NO--│ Re-solder or │
                     ╲ power voltage╱         │ change J4101 │
                      ╲────┬────────╱         └──────────────┘
                       YES │
                           ▼
```

Check J4101 soldering — NO → Re-solder or change J4101

Check TP1~TP3 power voltage — NO → Re-solder or change R4104/R4127/U1501/U4101

Check IIC&RST etc. signals — NO → Re-solder or change R4137/L709/R4133/R716/R717/U501

Check MIPI signals — NO → Re-solder or change U501

YES → **Rear CAM is OK**
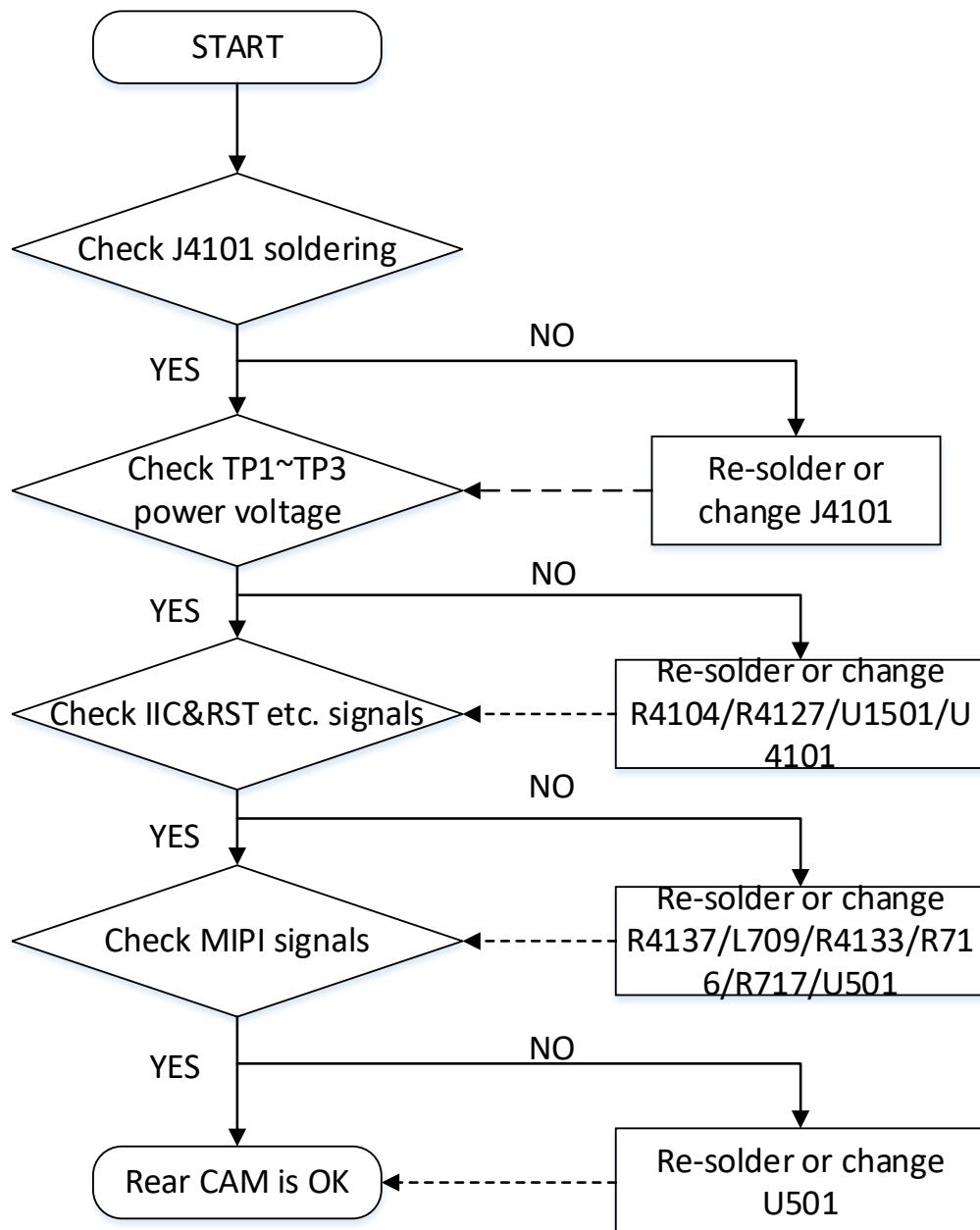
8. Level 3 Repair

8-4-12. Fingerprint

: The Fingerprint control signals are generated by SDM450.

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
                    ◇ Check J4301 soldering ◇──── NO ──────────┐
                           │                                    ▼
                          YES                          ┌─────────────────┐
                           │                           │  Re-solder or   │
                           ▼                           │  change J4301   │
                    ◇ Check TP1        ◇◄------------- └─────────────────┘
                    ◇ power voltage    ◇──── NO ──────────┐
                           │                              ▼
                          YES                    ┌─────────────────────┐
                           │                     │  Re-solder or change │
                           ▼                     │       U4302          │
                    ◇ Check SPI etc. signals ◇◄--└─────────────────────┘
                           │       │──── NO ──────────┐
                          YES                         ▼
                           │                 ┌─────────────────────┐
                           ▼                 │  Re-solder or change │
                    ┌─────────────┐          │     R4306/U501       │
                    │ Fingerprint │◄---------└─────────────────────┘
                    │function is OK│
                    └─────────────┘
```

8. Level 3 Repair

8-4-13. LCD

: The LCD control signals are generated by SDM450.

```
                    ┌──────────────┐
                    │    START     │
                    └──────┬───────┘
                           │
                           ▼
                    ╱─────────────────╲
                    ╲ Check J4001      ╱ ──── NO ──────────────┐
                     ╲  soldering     ╱                        │
                           │ YES                               ▼
                           ▼                          ┌──────────────────┐
                    ╱─────────────────╲               │  Re-solder or    │
                    ╲ Check TP1~TP2    ╱ ◄ - - - - - - │  change J4001    │
                     ╲  power         ╱                └──────────────────┘
                           │ YES
                           │          ──── NO ──────────────┐
                           ▼                                 ▼
                    ╱─────────────────╲        ┌──────────────────────────┐
                    ╲ Check TP3 power  ╱ ◄- - - │ Re-solder or change      │
                     ╲                ╱         │ U1301 or other related   │
                           │ YES                │ components               │
                           │    ──── NO ────────└──────────────────────────┘
                           ▼                                 ▼
                    ╱─────────────────╲        ┌──────────────────────────┐
                    ╲ Check MIPI signals╱ ◄- - │ Re-solder or change      │
                     ╲                ╱         │ U4001 or other related   │
                           │ YES                │ components               │
                           │   ── NO ───────────└──────────────────────────┘
                           ▼                                 ▼
                    ┌──────────────┐           ┌──────────────────────────┐
                    │  LCD is OK   │ ◄ - - - - │ Re-solder or change      │
                    └──────────────┘           │ U501 or CMFs             │
                                               └──────────────────────────┘
```
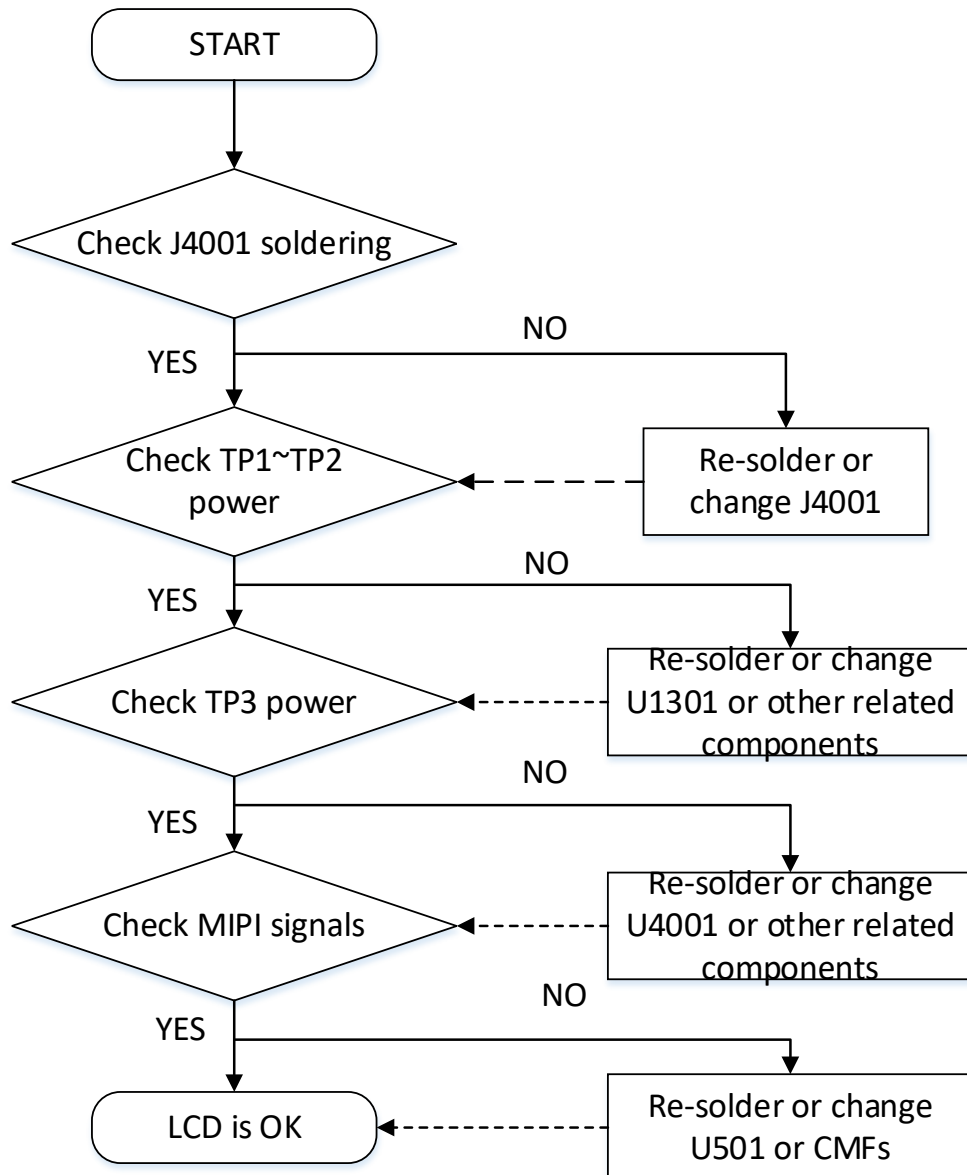
8. Level 3 Repair

8-5. Service Schematics

- *U501_SDM450_BB chip IC , Digital Baseband Processor(Top)*

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8. Level 3 Repair