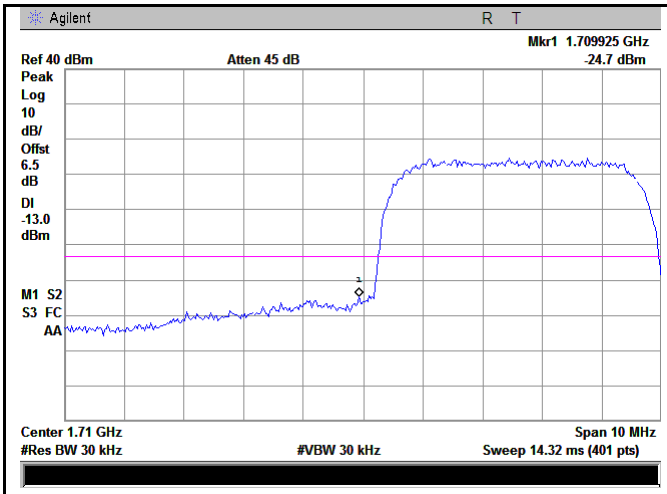
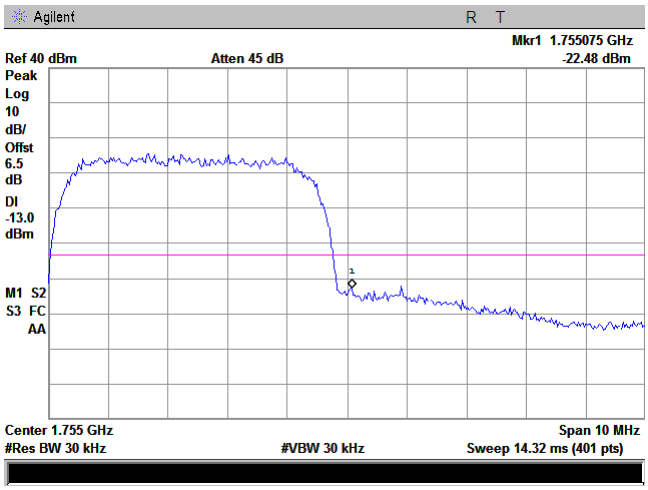



UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log (47.28/30)=4.5+2.0=6.5 dB



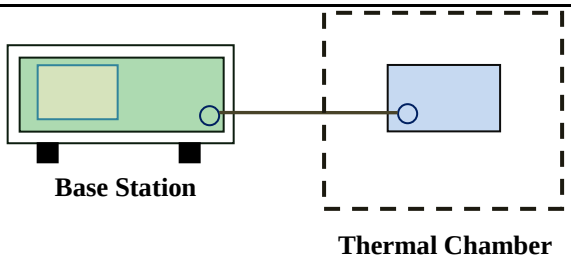

UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.5) + 10log (47.23/30)=4.5+2.0=6.5 dB

## 6.8 Frequency Stability

| | |
|---|---|
| Temperature | 25 °C |
| Relative Humidity | 57% |
| Atmospheric Pressure | 1023mbar |
| Test date : | December 27, 2017 |
| Tested By : | Loren Luo |

**Requirement(s):**

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:<br>Frequency Tolerance for Transmitters in the Public Mobile Services
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<tr><td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr>
<tr><td>50 to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr>
<tr><td>45□to 512</td><td>2.5</td><td>5.0</td><td>□0</td></tr>
<tr><td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr>
<tr><td>928 to □29.</td><td>5.0</td><td>N/A</td><td>N/A</td></tr>
<tr><td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr>
<tr><td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.</td><td>☑</td></tr>
<tr><td>Test setup</td><td colspan="3"> 
</td></tr>
</table>

| | |
| --- | --- |
| Procedure | A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.<br>Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency. |
| Remark | |
| Result | ☑ Pass ☐ Fail |

**Test Data** ☑ Yes ☐ N/A

**Test Plot** ☐ Yes (See below) ☑ N/A

GSM Voice:

## Cellular Band (Part 22H) result

| Middle Channel, $f_o$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 19 | 0.0227 | 2.5 |
| 0 | | 17 | 0.0203 | 2.5 |
| 10 | | 17 | 0.0203 | 2.5 |
| 20 | | 13 | 0.0155 | 2.5 |
| 30 | | 16 | 0.0191 | 2.5 |
| 40 | | 17 | 0.0203 | 2.5 |
| 50 | | 22 | 0.0263 | 2.5 |
| 55 | | 18 | 0.0215 | 2.5 |
| 25 | 4.2 | 20 | 0.0239 | 2.5 |
| | 3.5 | 17 | 0.0203 | 2.5 |

## PCS Band (Part 24E) result

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 12 | 0.0064 | 2.5 |
| 0 | | 15 | 0.0080 | 2.5 |
| 10 | | 13 | 0.0069 | 2.5 |
| 20 | | 13 | 0.0069 | 2.5 |
| 30 | | 15 | 0.0080 | 2.5 |
| 40 | | 15 | 0.0080 | 2.5 |
| 50 | | 18 | 0.0096 | 2.5 |
| 55 | | 17 | 0.0090 | 2.5 |
| 25 | 4.2 | 18 | 0.0096 | 2.5 |
| | 3.5 | 19 | 0.0101 | 2.5 |

RMC:

UMTS-FDD Band V (Part 22H)

| Middle Channel, $f_o$ = 835 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 15 | 0.0180 | 2.5 |
| 0 | | 15 | 0.0180 | 2.5 |
| 10 | | 18 | 0.0216 | 2.5 |
| 20 | | 14 | 0.0168 | 2.5 |
| 30 | | 12 | 0.0144 | 2.5 |
| 40 | | 8 | 0.0096 | 2.5 |
| 50 | | 19 | 0.0228 | 2.5 |
| 55 | | 13 | 0.0156 | 2.5 |
| 25 | 4.2 | 18 | 0.0216 | 2.5 |
| | 3.5 | 16 | 0.0192 | 2.5 |

UMTS-FDD Band II (Part 24E)

| Middle Channel, $f_o$ = 1880 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 18 | 0.0096 | 2.5 |
| 0 | | 18 | 0.0096 | 2.5 |
| 10 | | 17 | 0.0090 | 2.5 |
| 20 | | 16 | 0.0085 | 2.5 |
| 30 | | 15 | 0.0080 | 2.5 |
| 40 | | 17 | 0.0090 | 2.5 |
| 50 | | 21 | 0.0112 | 2.5 |
| 55 | | 19 | 0.0101 | 2.5 |
| 25 | 4.2 | 18 | 0.0096 | 2.5 |
| | 3.5 | 16 | 0.0085 | 2.5 |

UMTS-FDD Band IV (Part 27)

| Middle Channel, $f_o$ = 1733 MHz | | | | |
|---|---|---|---|---|
| Temperature (℃) | Power Supplied ($V_{DC}$) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -10 | 3.7 | 22 | 0.0263 | 2.5 |
| 0 | | 15 | 0.0180 | 2.5 |
| 10 | | 17 | 0.0204 | 2.5 |
| 20 | | 16 | 0.0192 | 2.5 |
| 30 | | 16 | 0.0192 | 2.5 |
| 40 | | 15 | 0.0180 | 2.5 |
| 50 | | 19 | 0.0228 | 2.5 |
| 55 | | 21 | 0.0251 | 2.5 |
| 25 | 4.2 | 20 | 0.0240 | 2.5 |
| | 3.5 | 17 | 0.0204 | 2.5 |

# Annex A. TEST INSTRUMENT

| Instrument | Model | Serial # | Cal Date | Cal Due | In use |
|---|---|---|---|---|---|
| **RF Conducted Test** | | | | | |
| Agilent ESA-E SERIES SPECTRUM ANALYZER | E4407B | MY45108319 | 09/14/2017 | 09/13/2018 | ☑ |
| Power Splitter | 1# | 1# | 08/30/2017 | 08/29/2018 | ☑ |
| Universal Radio Communication Tester | CMU200 | 121393 | 09/23/2017 | 09/22/2018 | ☑ |
| Temperature/Humidity Chamber | UHL-270 | 001 | 10/07/2017 | 10/06/2018 | ☑ |
| DC Power Supply | E3640A | MY40004013 | 09/15/2017 | 09/14/2018 | ☑ |
| RF Power Sensor | Dare RPR3006C/P/W | AY554013 | 09/15/2017 | 09/14/2018 | ☑ |
| **Radiated Emissions** | | | | | |
| EMI test receiver | ESL6 | 100262 | 09/15/2017 | 09/14/2018 | ☑ |
| OPT 010 AMPLIFIER (0.1-1300MHz) | 8447E | 2727A02430 | 08/30/2017 | 08/29/2018 | ☑ |
| Horn Antenna | BBHA9170 | 3145226D1 | 09/27/2017 | 09/26/2018 | ☑ |
| Microwave Preamplifier (1 ~ 26.5GHz) | 8449B | 3008A02402 | 03/23/2017 | 03/22/2018 | ☑ |
| Bilog Antenna (30MHz~6GHz) | JB6 | A110712 | 09/19/2017 | 09/18/2018 | ☑ |
| Bilog Antenna (30MHz~2GHz) | JB1 | A112017 | 09/19/2017 | 09/18/2018 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71259 | 09/22/2017 | 09/21/2018 | ☑ |
| Double Ridge Horn Antenna (1 ~18GHz) | AH-118 | 71283 | 09/22/2017 | 09/21/2018 | ☑ |
| SYNTHESIZED SIGNAL GENERATOR | 8665B | 3744A01293 | 09/15/2017 | 09/14/2018 | ☑ |
| Power Amplifier | SMC150D | R1553-0313 | 03/08/2017 | 03/07/2018 | ☑ |
| Power Amplifier | S41-25D | R1553-0314 | 05/26/2017 | 05/25/2018 | ☑ |

| | | | | | |
| --- | --- | --- | --- | --- | --- |
| Tunable Notch Filter | 3NF-800/1000-S | AA4 | 08/30/2017 | 08/29/2018 | ☑ |
| Tunable Notch Filter | 3NF-1000/2000-S | AM 4 | 08/30/2017 | 08/29/2018 | ☑ |

# Annex B. EUT And Test Setup Photographs

## Annex B.i. Photograph: EUT External Photo

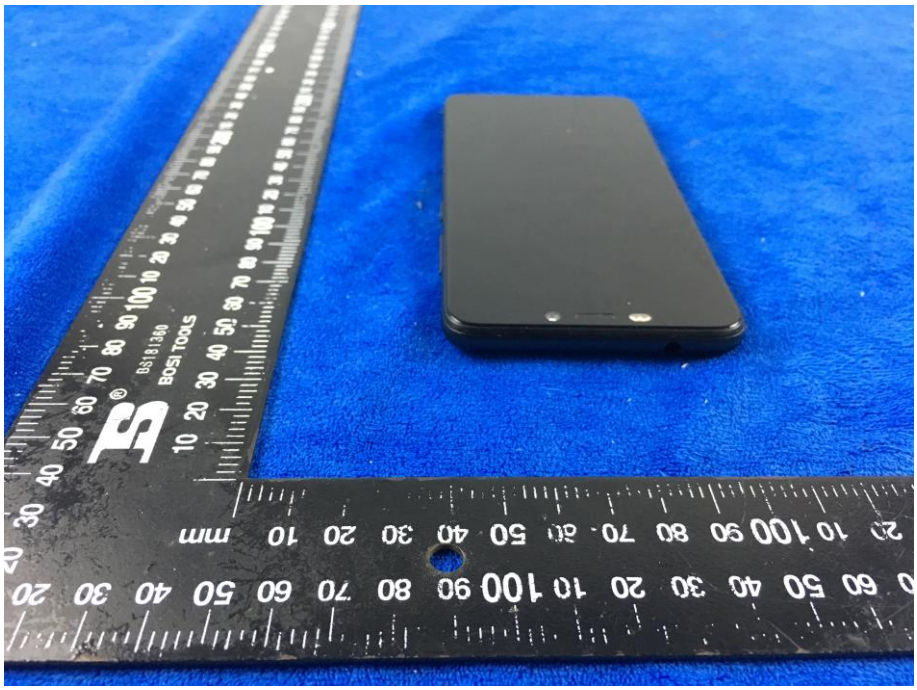
Whole Package View


Adapter - Lable View

EUT - Front View

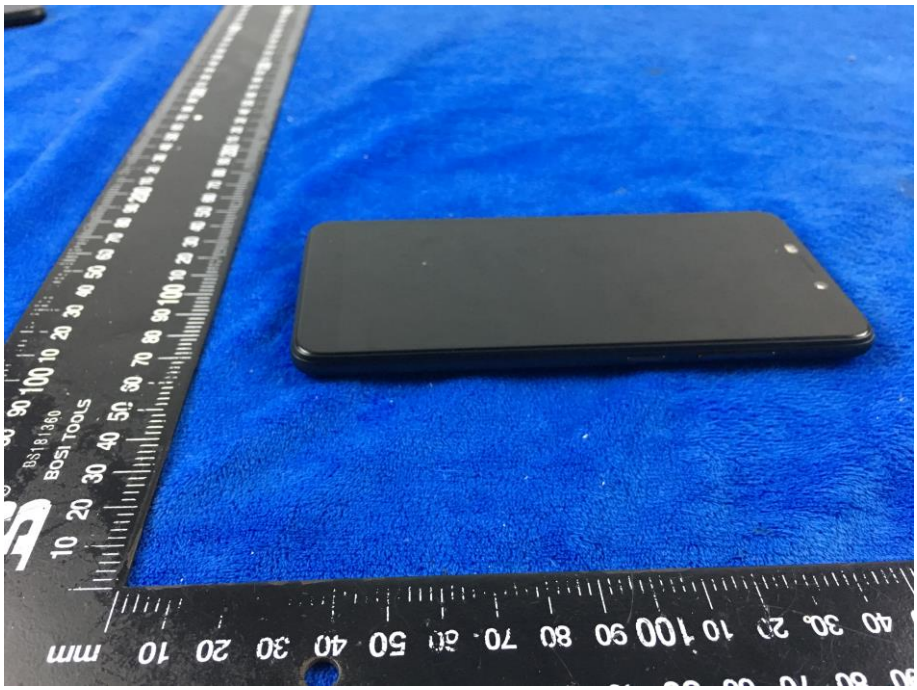
EUT - Rear View

EUT - Top View

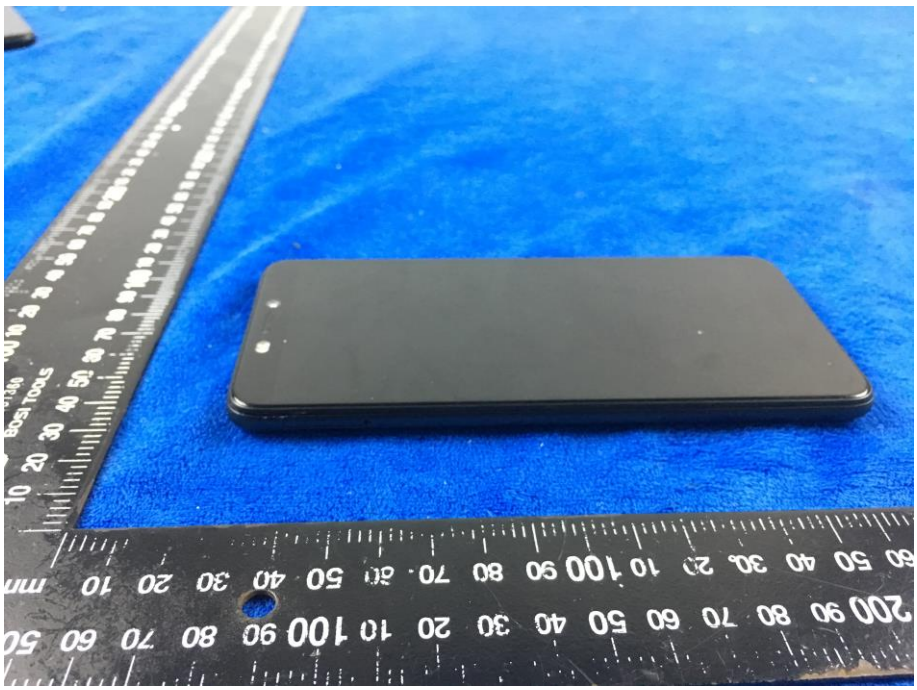


EUT - Bottom View

EUT - Left View



EUT - Right View



## Annex B.ii. Photograph: EUT Internal Photo

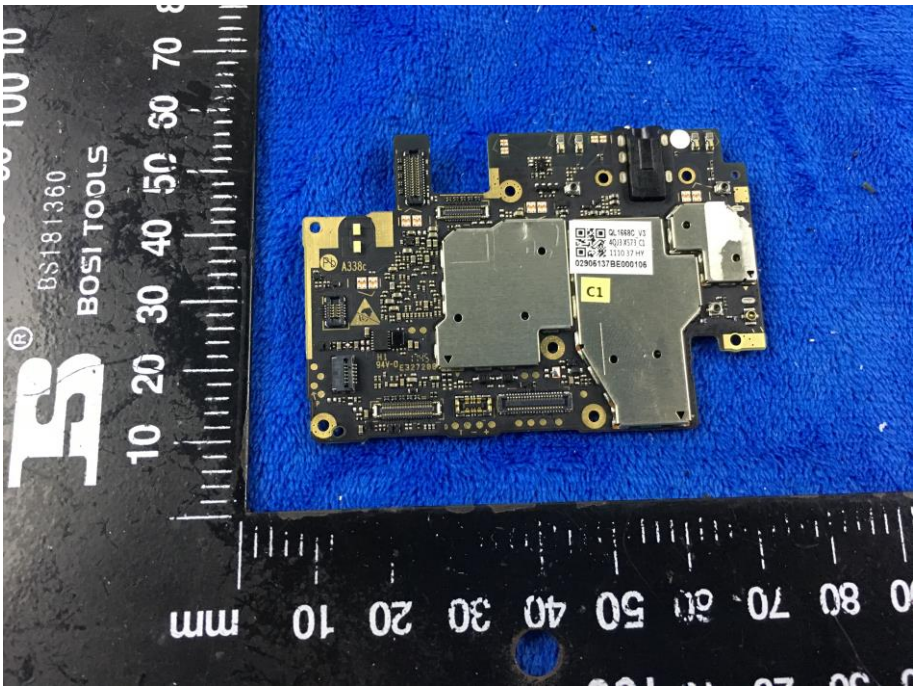
Cover Off - Top View 1


Cover Off - Top View 2

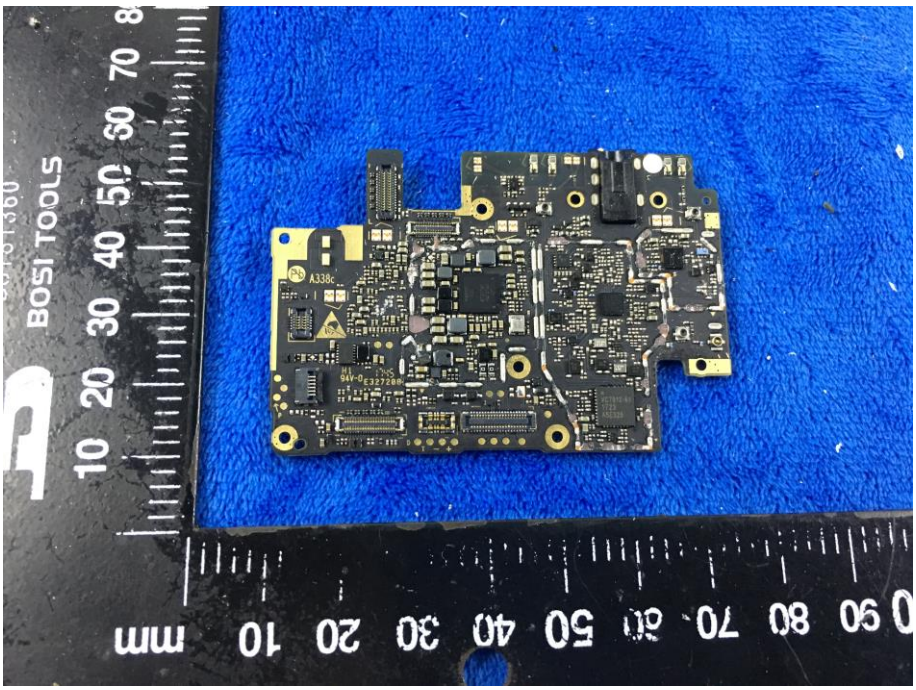
Battery - Front View


Battery - Rear View

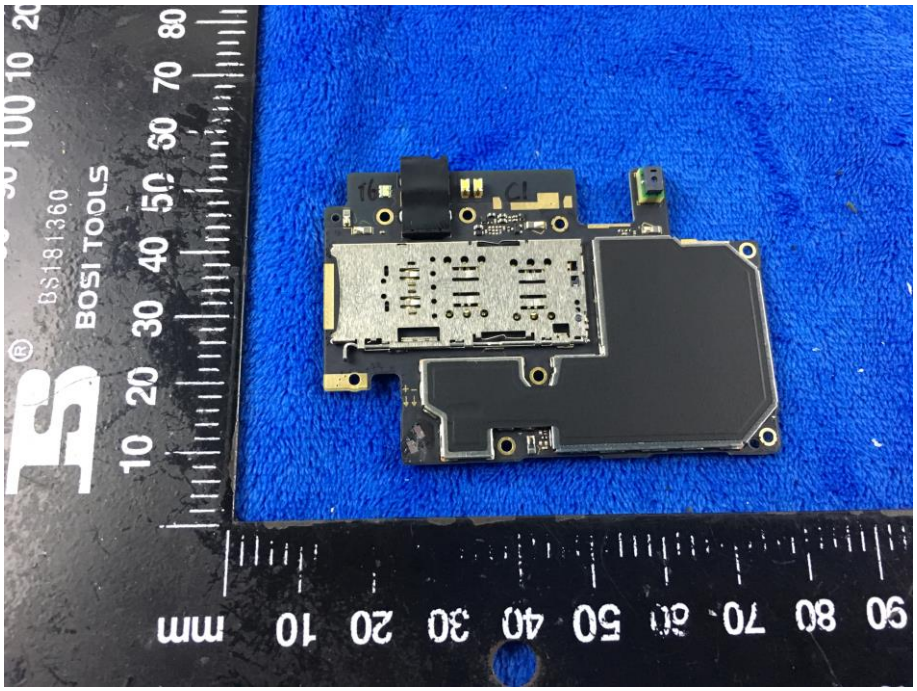
Mainboard with Shielding - Front View



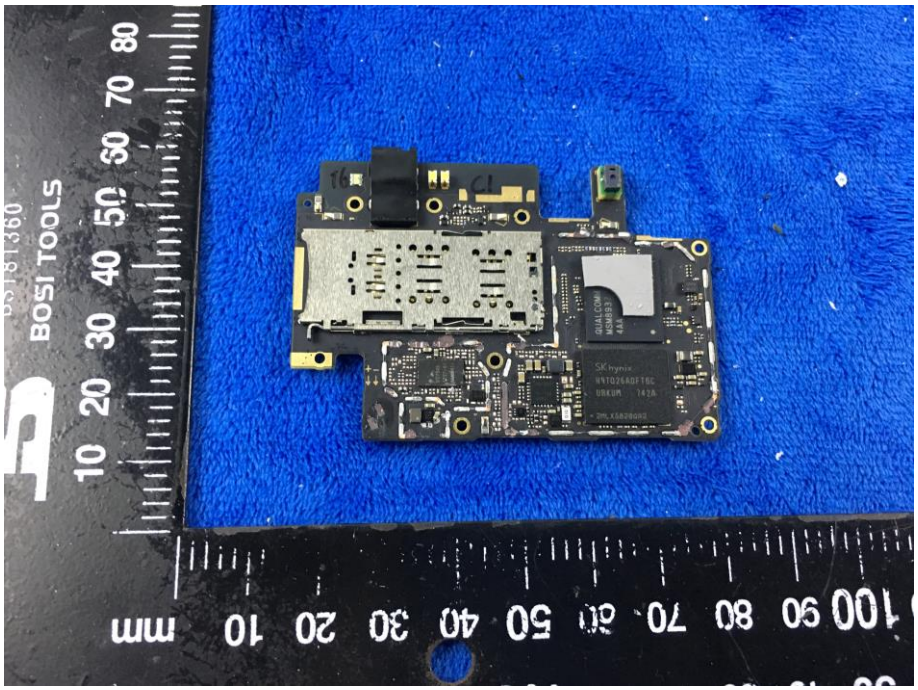

Mainboard with Shielding - Rear View



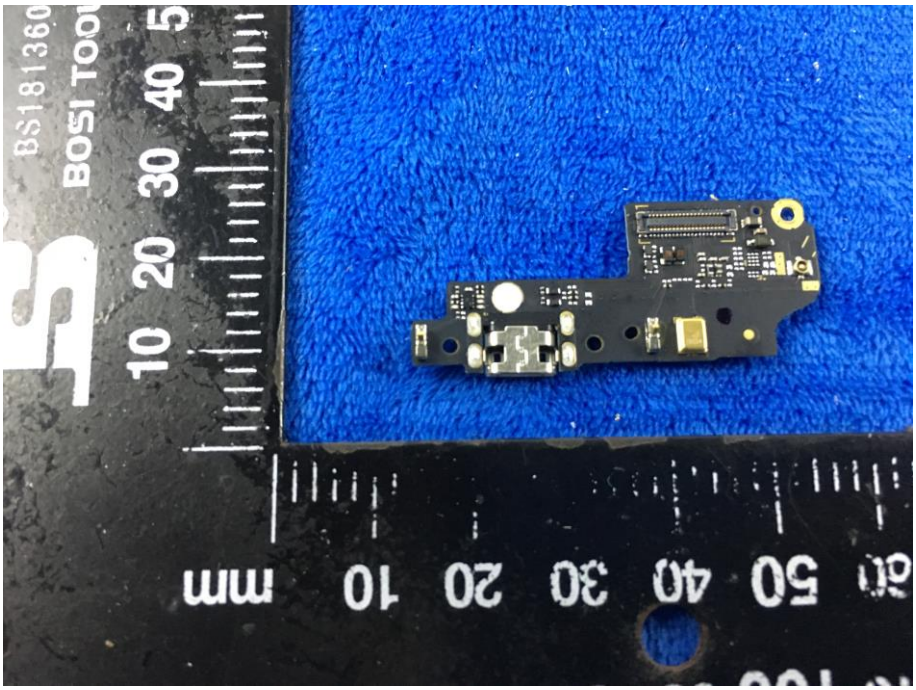
Mainboard without Shielding – Front View



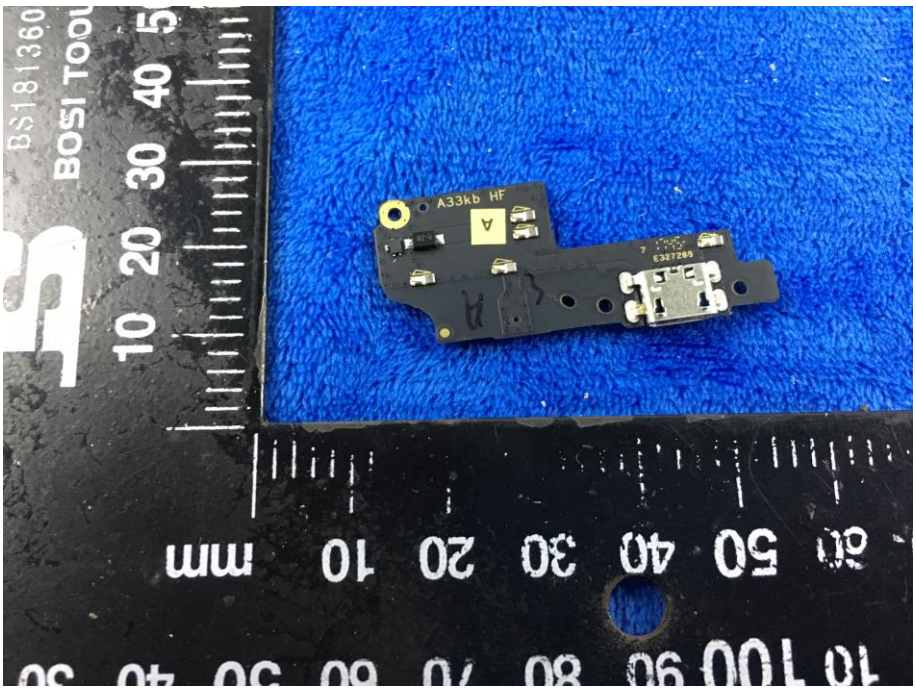

Mainboard without Shielding – Rear View



Smallboard – Front View



Smallboard – Rear View

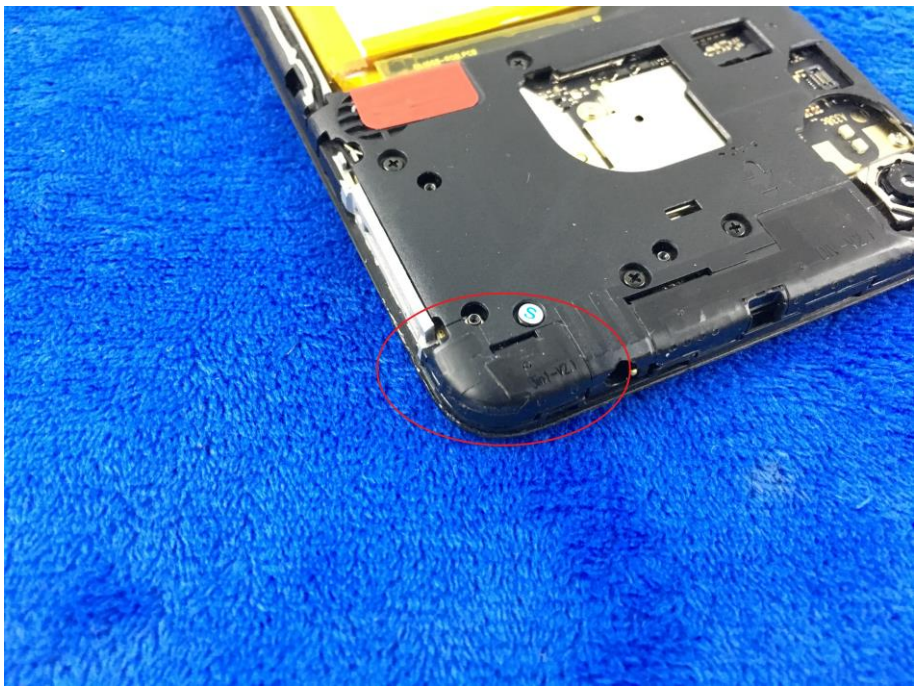


LCD – Front View


LCD – Rear View

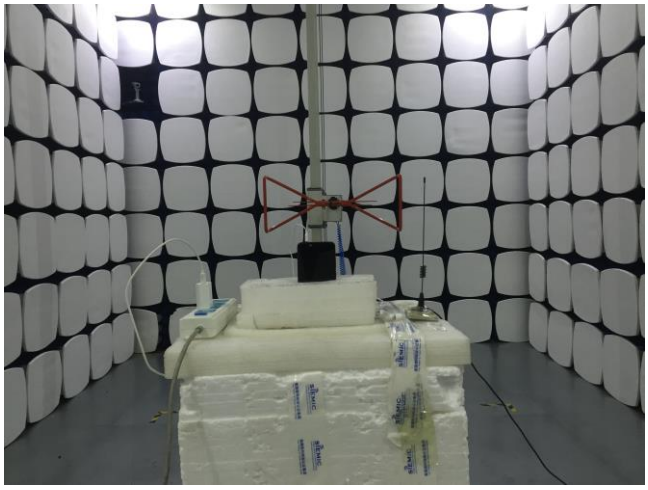
GSM/PCS/U MTS-FDD/LTE Antenna View


WIFI/BT/BLE/GPS - Antenna View



RXD- Antenna View

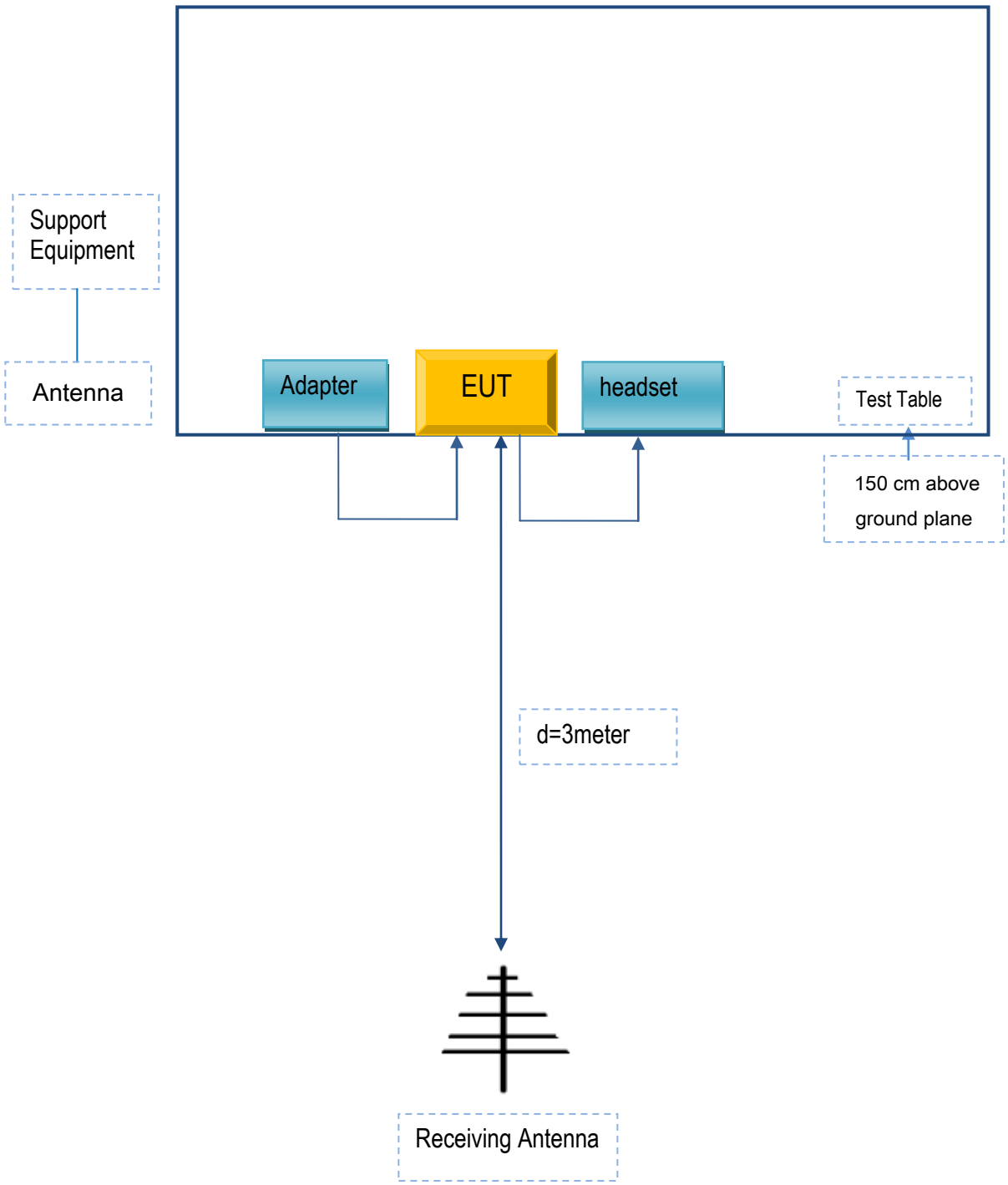
## Annex B.iii. Photograph: Test Setup Photo

| | |
|---|---|
|  |  |
| Radiated Spurious Emissions Test Setup Below 1GHz | Radiated Spurious Emissions Test Setup Above 1GHz |

# Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

## Annex C.ii. TEST SET UP BLOCK

### Block Configuration Diagram for Radiated Emissions



## Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

**Supporting Equipment:**

| Manufacturer | Equipment Description | Model | Serial No |
| --- | --- | --- | --- |
| TECNO MOBILE LIMITED | Adapter | A88-502000 | N/A |
| TECNO MOBILE LIMITED | headset | X573 | N/A |

**Supporting Cable:**

| Cable type | Shield Type | Ferrite Core | Length | Serial No |
| --- | --- | --- | --- | --- |
| USB Cable | Un-shielding | No | 0.8m | N/A |

# Annex C.ii. EUT OPERATING CONKITIONS

N/A

# Annex D. User Manual / Block Diagram / Schematics / Partlist

Please see the attachment

# Annex E. DECLARATION OF SIMILARITY

N/A