

FCC

RF

TEST REPORT

ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**smart phone**

ISSUED TO  
Shenzhen Huadoo Bright Group Limited

Room 13E, jinsong Buiding, Tai ran 4th Rood, chegong miao, Futian  
District, Shenzhen



Prepared by: Zhang Yangqing

Zhang Yangqing  
(Reporting Specialist)

Date Dec 31, 2014

Approved by: Wei Yanquan

Wei Yanquan  
(Chief Engineer)

Date Dec 31, 2014

Report No.: BL-SZ14C0012-605

EUT Type: smart phone

Model Name: Huadoo V4

Brand Name: Huadoo

Test Standard: 47 CFR Part 15 Subpart C

FCC ID: 2ACXS-V4

Test conclusion: PASS

Test Date: Nov 25 2014 ~ Dec 28, 2014

Date of Issue: Dec 31, 2014

*NOTE: This test report can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. BALUN Laboratory. Any objections should be raised within thirty days from the date of issue. To validate the report, please visit BALUN website.*

**Revision History**

| <u>Version</u> | <u>Issue Date</u>   | <u>Revisions</u>     |
|----------------|---------------------|----------------------|
| <u>Rev. 01</u> | <u>Dec 31, 2014</u> | <u>Initial Issue</u> |

**TABLE OF CONTENTS**

|       |                                                          |    |
|-------|----------------------------------------------------------|----|
| 1     | ADMINISTRATIVE DATA (GENERAL INFORMATION) .....          | 4  |
| 1.1   | Identification of the Testing Laboratory.....            | 4  |
| 1.2   | Identification of the Responsible Testing Location ..... | 4  |
| 1.3   | Announce.....                                            | 4  |
| 2     | PRODUCT INFORMATION .....                                | 5  |
| 2.1   | Applicant .....                                          | 5  |
| 2.2   | Manufacturer.....                                        | 5  |
| 2.3   | General Description for Equipment under Test (EUT) ..... | 5  |
| 2.4   | Technical Information .....                              | 5  |
| 2.5   | Ancillary Equipment.....                                 | 6  |
| 3     | SUMMARY OF TEST RESULTS .....                            | 7  |
| 3.1   | Test Standards.....                                      | 7  |
| 3.2   | Verdict.....                                             | 7  |
| 4     | GENERAL TEST CONFIGURATIONS .....                        | 8  |
| 4.1   | Test Environments .....                                  | 8  |
| 4.2   | Test Equipment List.....                                 | 8  |
| 4.3   | Test Configurations .....                                | 9  |
| 4.4   | Description of Test Setup .....                          | 9  |
| 4.4.1 | For Radiated Test (Below 30MHz).....                     | 9  |
| 4.4.2 | For Radiated Test (30MHz-1GHz) .....                     | 10 |
| 4.4.3 | For AC Power Supply Port Test.....                       | 10 |
| 4.5   | Test Conditions .....                                    | 11 |
| 5     | TEST ITEMS .....                                         | 12 |
| 5.1   | Antenna Requirements.....                                | 12 |
| 5.1.1 | Standard Applicable .....                                | 12 |

|         |                                                                      |    |
|---------|----------------------------------------------------------------------|----|
| 5.1.2   | Antenna Anti-Replacement Construction .....                          | 12 |
| 5.1.3   | Antenna Gain .....                                                   | 12 |
| 5.2     | Emission Bandwidth .....                                             | 13 |
| 5.2.1   | Definition .....                                                     | 13 |
| 5.2.2   | Test Procedure .....                                                 | 13 |
| 5.3     | Field Strength of Fundamental Emissions and Radiated Emissions ..... | 14 |
| 5.3.1   | Limit.....                                                           | 14 |
| 5.3.2   | Test Procedure.....                                                  | 15 |
| 5.4     | Frequency Tolerance .....                                            | 16 |
| 5.4.1   | Limit.....                                                           | 16 |
| 5.4.2   | Test Procedure.....                                                  | 16 |
| 5.5     | Conducted Emission .....                                             | 17 |
| 5.5.1   | Limit.....                                                           | 17 |
| 5.5.2   | Test Procedure.....                                                  | 17 |
| ANNEX A | TEST RESULT .....                                                    | 18 |
| A.1     | Emission Bandwidth .....                                             | 18 |
| A.2     | Field Strength of Fundamental Emissions .....                        | 19 |
| A.3     | Radiated Emissions.....                                              | 21 |
| A.4     | Frequency Stability.....                                             | 25 |
| A.5     | Conducted Emissions.....                                             | 26 |
| ANNEX B | TEST SETUP PHOTOS .....                                              | 28 |
| B.1     | Conducted Emissions Test Photo.....                                  | 28 |
| B.2     | Radiated Test Photo.....                                             | 29 |
| ANNEX C | EUT PHOTOS .....                                                     | 30 |
| C.1     | Appearance of the EUT .....                                          | 30 |
| C.2     | Inside of the EUT .....                                              | 35 |

## 1 ADMINISTRATIVE DATA (GENERAL INFORMATION)

### 1.1 Identification of the Testing Laboratory

|              |                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------|
| Company Name | Shenzhen BALUN Technology Co., Ltd.                                                                                             |
| Address      | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6683 3402                                                                                                               |
| Fax Number   | +86 755 6182 4271                                                                                                               |

### 1.2 Identification of the Responsible Testing Location

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Location             | Shenzhen BALUN Technology Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Address                   | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Accreditation Certificate | <p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</p> <p>The laboratory has met the requirements of the IAS Accreditation Criteria for Testing Laboratories (AC89), has demonstrated compliance with ISO/IEC Standard 17025:2005. The accreditation certificate number is TL-588.</p> <p>The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.</p> |
| Description               | All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### 1.3 Announce

- (1) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (2) The test report is invalid if there is any evidence and/or falsification.
- (3) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (4) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

## 2 PRODUCT INFORMATION

### 2.1 Applicant

|           |                                                                                     |
|-----------|-------------------------------------------------------------------------------------|
| Applicant | Shenzhen Huadoo Bright Group Limited                                                |
| Address   | Room 13E, jinsong Buiding, Tai ran 4th Rood, chegong miao, Futian Distrct, Shenzhen |

### 2.2 Manufacturer

|              |                                                                                     |
|--------------|-------------------------------------------------------------------------------------|
| Manufacturer | Shenzhen Huadoo Bright Group Limited                                                |
| Address      | Room 13E, jinsong Buiding, Tai ran 4th Rood, chegong miao, Futian Distrct, Shenzhen |

### 2.3 General Description for Equipment under Test (EUT)

|                                   |                                                                                                                            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| EUT Type                          | smart phone                                                                                                                |
| Model Name                        | Huadoo V4                                                                                                                  |
| Hardware Version                  | MOLY.WR8.W1315.MD.MG.MP.V39                                                                                                |
| Software Version                  | V4_overseas_V5_20141105                                                                                                    |
| Network and Wireless connectivity | 2G Network GSM 850/900/1800/1900, GPRS, EDEG<br>3G Network WCDMA Band 1/Band 2/Band 5                                      |
| About the Product                 | The equipment is smart phone, intended for used with information technology equipment, Only NFC was tested in this report. |

### 2.4 Technical Information

|                         |              |
|-------------------------|--------------|
| Modulation Type         | ASK          |
| Frequency Range         | 13.56MHz     |
| Receiver Categorization | 3            |
| Number of channel       | 1            |
| Tested Channel          | 1            |
| Antenna Type            | PIFA Antenna |

Note: The above EUT information in section 2.3 and 2.4 was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

## 2.5 Ancillary Equipment

|                       |                 |                            |
|-----------------------|-----------------|----------------------------|
| Ancillary Equipment 1 | Battery         |                            |
|                       | Brand Name      | N/A                        |
|                       | Model No        | V4                         |
|                       | Serial No       | N/A                        |
|                       | Capacitance     | 3600mAh                    |
|                       | Rated Voltage   | 3.7V                       |
|                       | Extreme Voltage | Low: 3.3V / High:4.2V      |
| Ancillary Equipment 2 | Charger         |                            |
|                       | Brand Name      | N/A                        |
|                       | Model No        | HJ-0501000                 |
|                       | Serial No       | N/A                        |
|                       | Rated Input     | ~ 100-240V, 0.15A, 50/60Hz |
| Ancillary Equipment 3 | Earphone        |                            |
|                       | Length          | 1.0m                       |
| Ancillary Equipment 4 | USB Data Cable  |                            |
|                       | Length          | 1.0m                       |

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

| No. | Identity                                          | Document Title                                                                                                                                                                            |
|-----|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | 47 CFR Part 15,<br>Subpart C (10-1-13<br>Edition) | Intentional Radiators                                                                                                                                                                     |
| 3   | ANSI C63.4-2014                                   | American National Standard for Standard for Methods of<br>Measurement of Radio-Noise Emissions from Low-Voltage<br>Electrical and Electronic Equipment in the Range of 9 kHz to 40<br>GHz |
| 4   | ANSI C63.10-2013                                  | American National Standard for Testing Unlicensed Wireless<br>Devices                                                                                                                     |

#### 3.2 Verdict

| No.                                                                                                                      | Description                                | FCC Part No.        | Test Result | Verdict                |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------|-------------|------------------------|
| 1                                                                                                                        | Antenna Requirement                        | 15.203              | --          | PASS <sup>Note 1</sup> |
| 2                                                                                                                        | Emissions Bandwidth                        | 2.1049              | ANNEX A.1   | PASS                   |
| 3                                                                                                                        | Field Strength of Fundamental<br>Emissions | 15.225(a)           | ANNEX A.2   | PASS                   |
| 4                                                                                                                        | Radiated Emissions                         | 15.225(d)<br>15.209 | ANNEX A.3   | PASS                   |
| 5                                                                                                                        | Frequency Stability                        | 15.225(e)           | ANNEX A.4   | PASS                   |
| 6                                                                                                                        | Conducted Emission                         | 15.207              | ANNEX A.5   | PASS                   |
| Note 1: The EUT has a permanently and irreplaceable attached antenna, which complies with the<br>requirement FCC 15.203. |                                            |                     |             |                        |

## 4 GENERAL TEST CONFIGURATIONS

### 4.1 Test Environments

During the measurement, the normal environmental conditions were within the listed ranges:

|                            |                         |                |
|----------------------------|-------------------------|----------------|
| Relative Humidity (%)      | 45 - 55                 |                |
| Atmospheric Pressure (kPa) | 100 - 102               |                |
| Temperature                | NT (Normal Temperature) | +22°C to +25°C |
| Working Voltage of the EUT | NV (Normal Voltage)     | 3.7 V          |

### 4.2 Test Equipment List

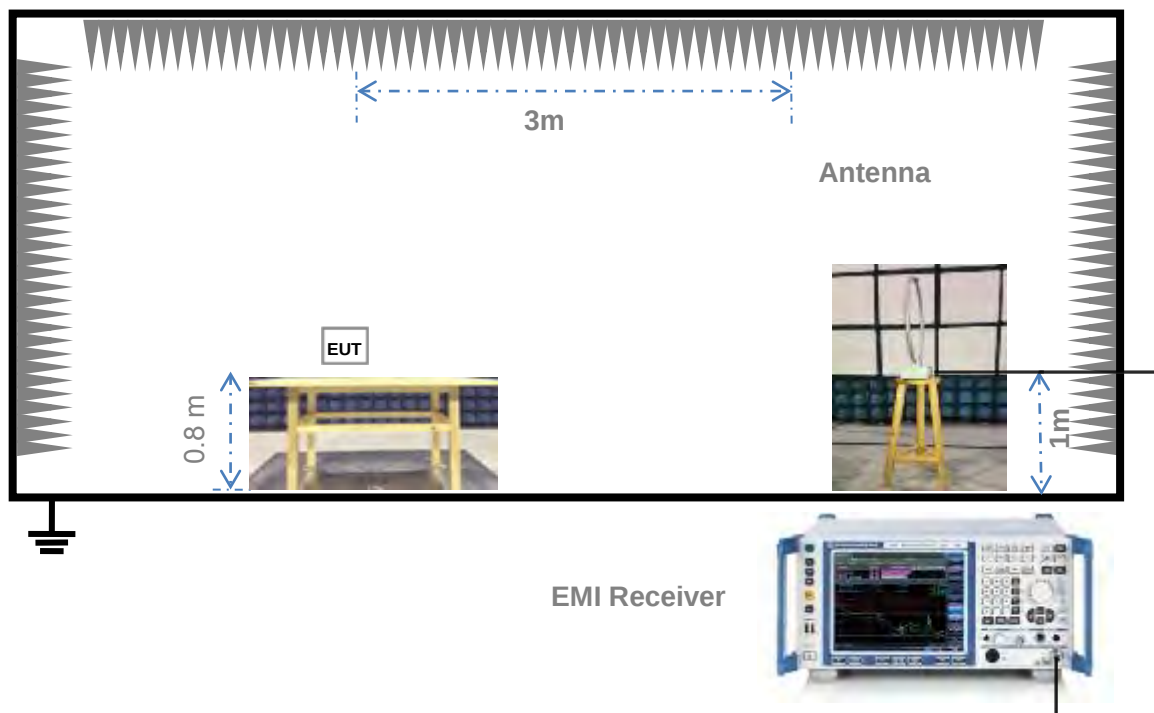
| Description                      | Manufacturer         | Model      | Serial No. | Cal. Date  | Cal. Due   |
|----------------------------------|----------------------|------------|------------|------------|------------|
| Spectrum Analyzer                | AGILENT              | E4440A     | MY45304434 | 2014.07.07 | 2015.07.06 |
| Spectrum Analyzer                | ROHDE&SCHWARZ        | FSL3       | 103640/003 | 2014.07.07 | 2015.07.06 |
| Bluetooth Tester                 | ROHDE&SCHWARZ        | CBT        | 101005     | 2014.07.07 | 2015.07.06 |
| Power Splitter                   | KMW                  | DCPD-LDC   | 1305003215 | 2014.07.07 | 2015.07.06 |
| Power Sensor                     | ROHDE&SCHWARZ        | NRP-Z21    | 103971     | 2014.07.07 | 2015.07.06 |
| Attenuator (20dB)                | KMW                  | ZA-S1-201  | 110617091  | --         | --         |
| Attenuator (6dB)                 | KMW                  | ZA-S1-61   | 1305003189 | --         | --         |
| DC Power Supply                  | ROHDE&SCHWARZ        | HMP2020    | 018141664  | 2014.07.07 | 2015.07.06 |
| Temperature Chamber              | ANGELANTIONI SCIENCE | NTH64-40A  | 1310       | 2014.07.07 | 2015.07.06 |
| Test Antenna-Loop(9kHz-30MHz)    | SCHWARZBECK          | FMZB 1519  | 1519-037   | 2013.07.03 | 2015.07.02 |
| Test Antenna-Bi-Log(30MHz-3G Hz) | SCHWARZBECK          | VULB 9163  | 9163-624   | 2013.07.02 | 2015.07.01 |
| Test Antenna-Horn(1-18GHz)       | SCHWARZBECK          | BBHA 9120D | 9120D-1148 | 2013.07.02 | 2015.07.01 |
| Test Antenna-Horn(15-26.5GHz)    | SCHWARZBECK          | BBHA 9170  | 9170-305   | 2013.07.02 | 2015.07.01 |
| Anechoic Chamber                 | RAINFORD             | 9m*6m*6m   | N/A        | 2014.10.07 | 2015.10.06 |

### 4.3 Test Configurations

| Test Configurations (TC) NO. | Description        |                     |
|------------------------------|--------------------|---------------------|
|                              | Signal Description | Operating Frequency |
| Transmitter                  |                    |                     |
| TC01                         | ASK                | 13.56MHz            |

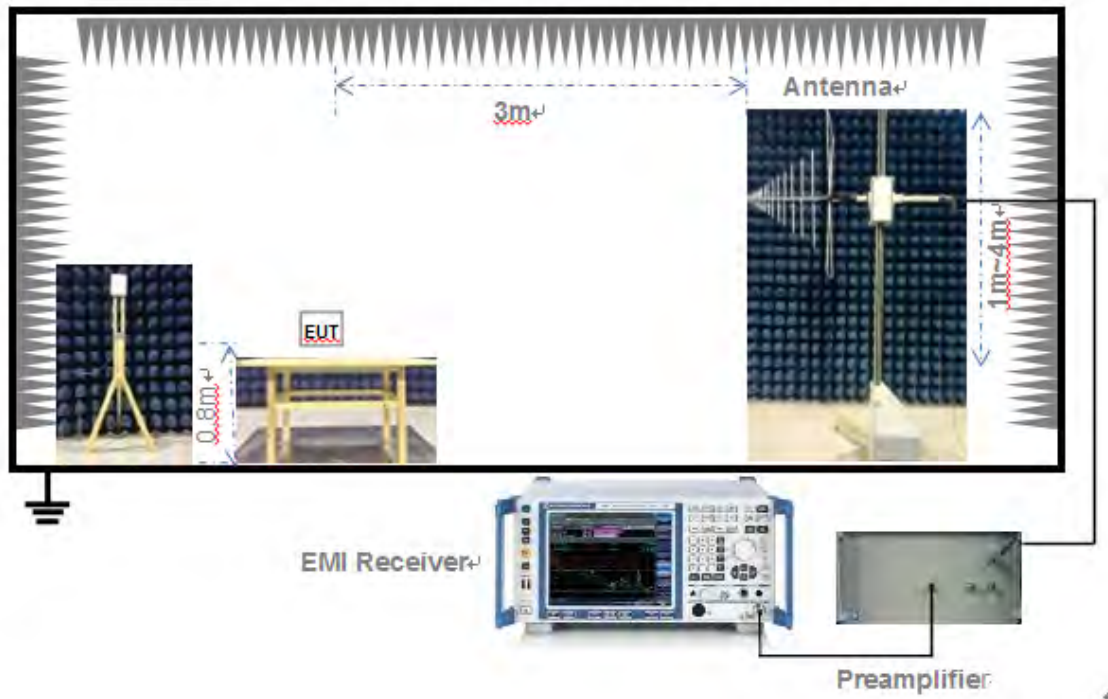
### 4.4 Description of Test Setup

#### 4.4.1 For Radiated Test (Below 30MHz)



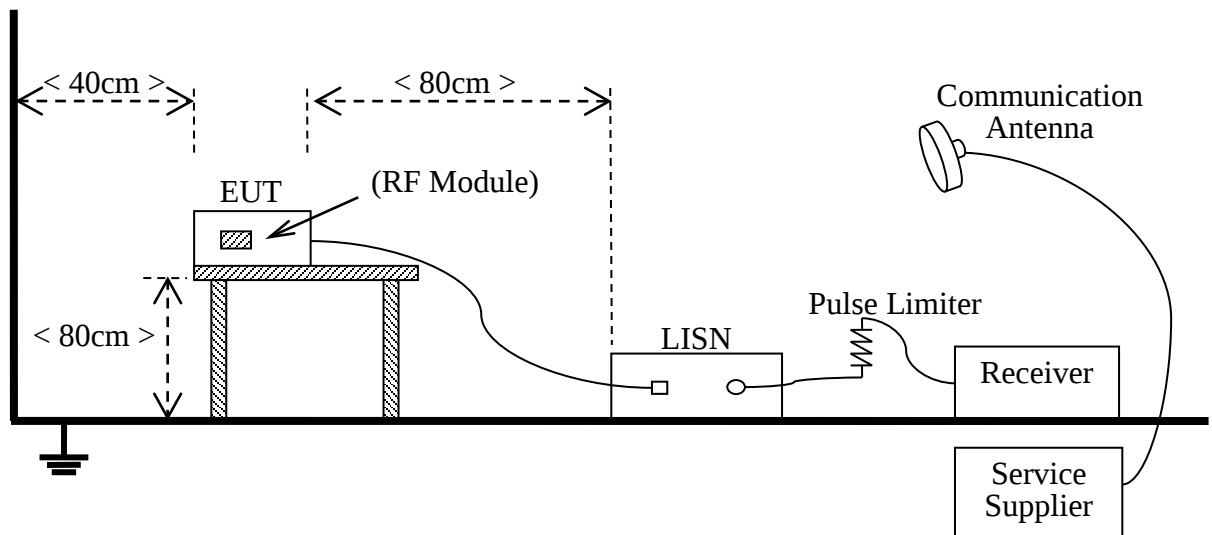
(Diagram 1)

#### 4.4.2 For Radiated Test (30MHz-1GHz)



(Diagram 2)

#### 4.4.3 For AC Power Supply Port Test



(Diagram 3)

## 4.5 Test Conditions

| Test Case                                                                                                                 | Test Conditions |                              |                                      |
|---------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------------|--------------------------------------|
|                                                                                                                           | Test Env.       | Test Setup <sup>Note 1</sup> | Test Configuration <sup>Note 2</sup> |
| Emissions Bandwidth                                                                                                       | NTNV            | Test Setup 1                 | TC01                                 |
| Field Strength of Fundamental Emissions                                                                                   | NTNV            | Test Setup 1                 | TC01                                 |
| Radiated Emissions                                                                                                        | NTNV            | Test Setup 1<br>Test Setup 2 | TC01                                 |
| Frequency Stability                                                                                                       | NTNV            | Test Setup 1                 | TC01                                 |
| Conducted Emission                                                                                                        | NTNV            | Test Setup 3                 | TC01                                 |
| Note:<br>1. Please refer to section 4.4 for test setup details.<br>2. Please refer to section 4.3 for test setup details. |                 |                              |                                      |

## 5 TEST ITEMS

### 5.1 Antenna Requirements

#### 5.1.1 Standard Applicable

FCC §15.203 & 15.247(b)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

#### 5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

| Protected Method              | Description                            |
|-------------------------------|----------------------------------------|
| The antenna is An embedded-in | An embedded-in antenna design is used. |

| Reference Documents | Item                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Photo               |  <p>The left photograph shows the internal components of a device with a black plastic back cover. An orange box highlights the 'NFC Antenna feed point' on the circuit board. The right photograph shows the same device with the back cover removed, revealing the internal components. An orange box highlights the 'NFC Antenna' on the circuit board.</p> |

#### 5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

## 5.2 Emission Bandwidth

### 5.2.1 Definition

FCC §2.1049&15.215(c)

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency.

### 5.2.2 Test Procedure

The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while the EUT is operating in transmission mode.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth

RBW  $\geq$  1% of the 20 dB bandwidth

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

## 5.3 Field Strength of Fundamental Emissions and Radiated Emissions

### 5.3.1 Limit

FCC §15.225(a), (b), (c)

According to FCC section 15.225, for <30MHz, Radiated emissions were measured according to ANSIC63.4. The EUT was set to transmit at the highest output power. The EUT was set 10 meter away from the measuring antenna. The loop antenna was positioned 1 meter above the ground from the center of the loop. The measuring bandwidth was set to 10KHz. (Note: During testing the receive antenna was rotated about its axis to maximize the emission from the EUT)

There was no detected Restricted bands and Radiated suprious emission below 30MHz. The 30m limit was converted to 3m Limit using square factor(x) as it was found by measurements as follows; 3 m Limit(dBuV/m) =  $20\log(X)+40\log(30/3)= 20\log(15848)+40\log(30/3) = 124\text{dBuV}$

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency range (MHz) | Field Strength@30m |                          | Field Strength@3m        |
|-----------------------|--------------------|--------------------------|--------------------------|
|                       | $\mu\text{V/m}$    | $\text{dB}\mu\text{V/m}$ | $\text{dB}\mu\text{V/m}$ |
| Below 13.110          | 30                 | 29.5                     | 69.5                     |
| 13.110 ~ 13.410       | 106                | 40.5                     | 80.5                     |
| 13.410 ~ 13.553       | 334                | 50.5                     | 90.5                     |
| 13.553 ~13.567        | 15.848             | 84                       | 124                      |
| 13.567 ~ 13.710       | 334                | 50.5                     | 90.5                     |
| 13.710 ~14.010        | 106                | 40.5                     | 80.5                     |
| Above 14.010          | 30                 | 29.5                     | 69.5                     |

NOTE:

1. Field Strength ( $\text{dB}\mu\text{V/m}$ ) =  $20*\log[\text{Field Strength } (\mu\text{V/m})]$ .
2. In the emission tables above, the tighter limit applies at the band edges.

FCC §15.225(d)

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (μV/m) |
|-----------------|-----------------------|
| 0.009 - 0.490   | 2400/F(kHz)           |
| 0.490 - 1.705   | 24000/F(kHz)          |
| 1.705 - 30.0    | 30                    |
| 30 - 88         | 100                   |
| 88 - 216        | 150                   |
| 216 - 960       | 200                   |
| Above 960       | 500                   |

Note:

- For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
- For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).

### 5.3.2 Test Procedure

The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented. The power of the EUT transmitting frequency should be ignored.

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz

VBW  $\geq$  RBW

Sweep = auto

Detector function = peak

Trace = max hold

## 5.4 Frequency Tolerance

### 5.4.1 Limit

FCC §15.225(e)

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 5.4.2 Test Procedure

1. The test is performed in a Temperature Chamber.
2. The EUT is configured as MS + DC Power Supply.

## 5.5 Conducted Emission

### 5.5.1 Limit

FCC §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 $\mu$ H/50 $\Omega$  line impedance stabilization network (LISN).

| Frequency range<br>(MHz) | Conducted Limit (dB $\mu$ V) |          |
|--------------------------|------------------------------|----------|
|                          | Quai-peak                    | Average  |
| 0.15 - 0.50              | 66 to 56                     | 56 to 46 |
| 0.50 - 5                 | 56                           | 46       |
| 0.50 - 30                | 60                           | 50       |

### 5.5.2 Test Procedure

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

## ANNEX A TEST RESULT

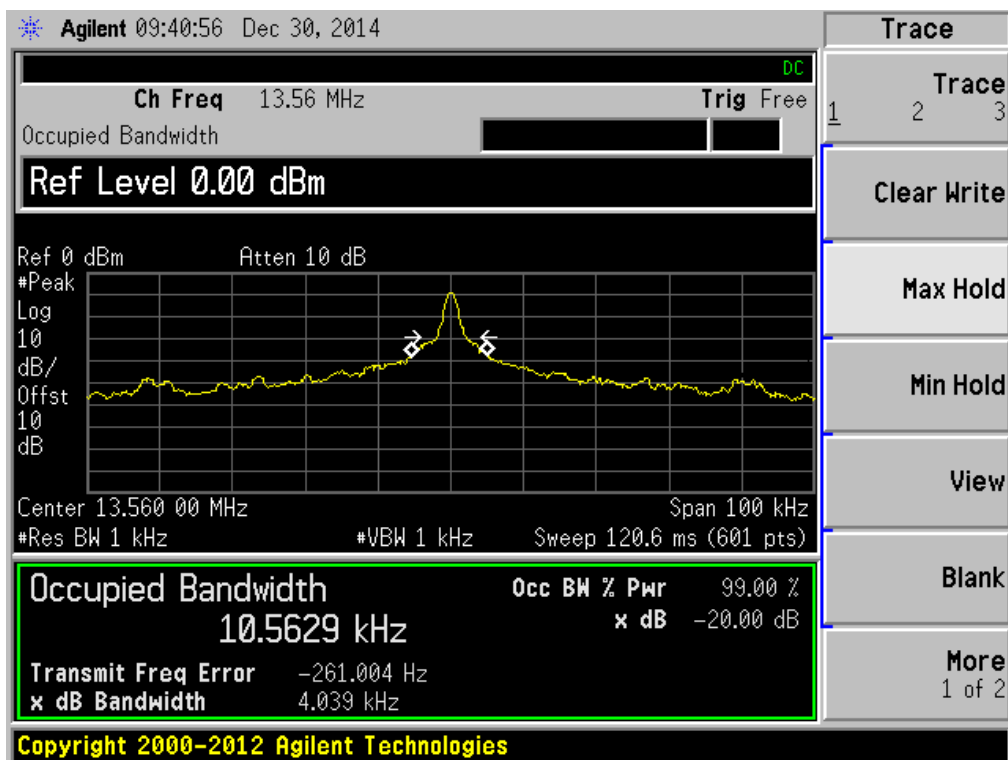
### A.1 Emission Bandwidth

#### Test Data

| Frequency<br>(MHz) | Emission Bandwidth<br>(kHz) |
|--------------------|-----------------------------|
| 13.56              | 4.039                       |

#### Test plots

##### Emission Bandwidth

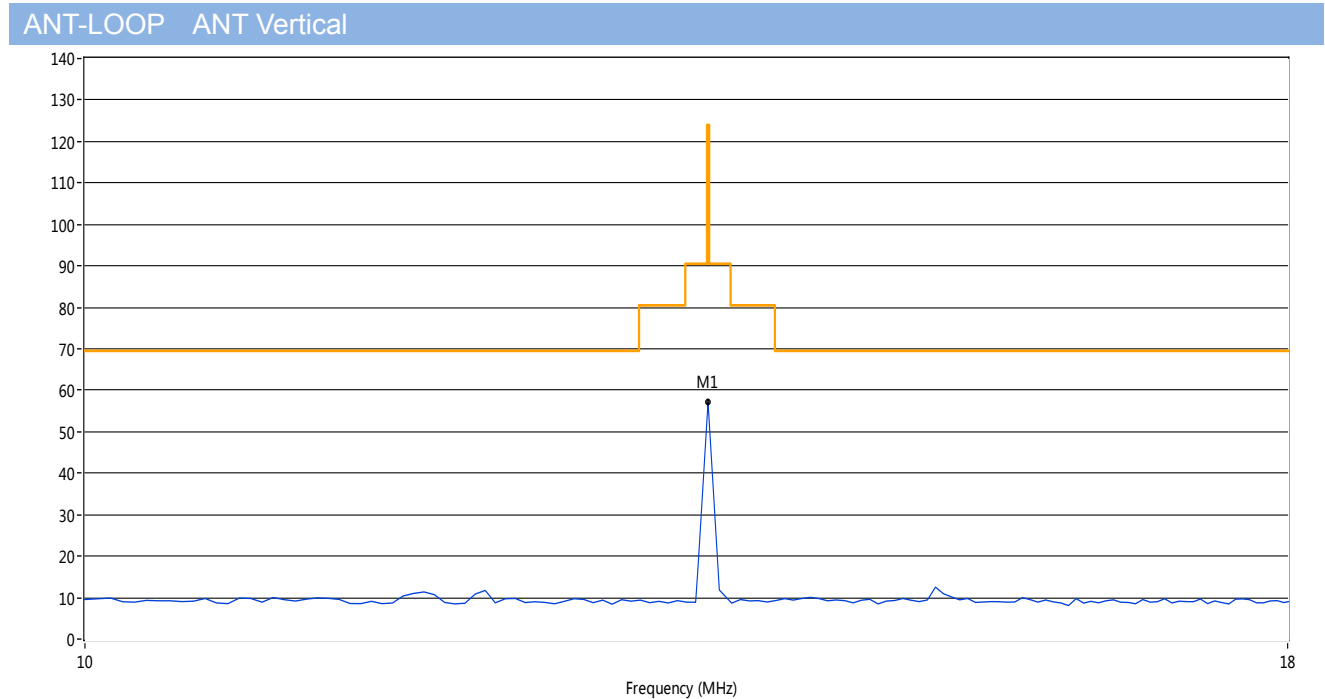


## A.2 Field Strength of Fundamental Emissions

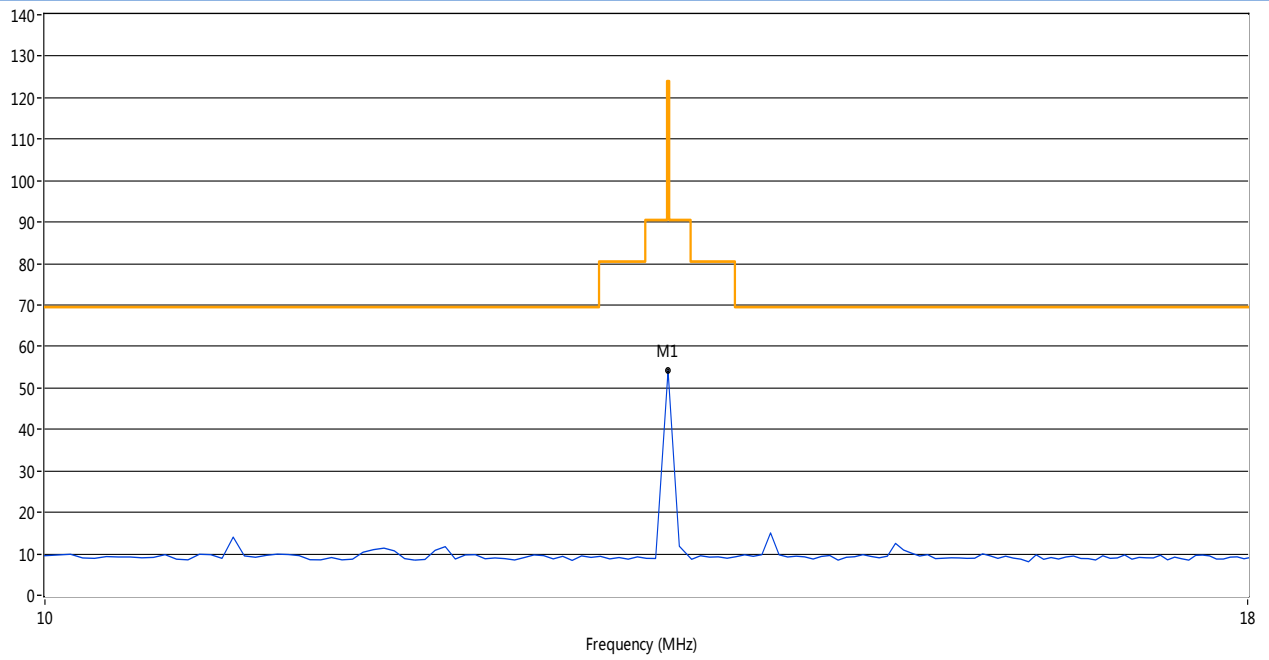
### Test Data

| Field Strength of Fundamental Emissions Value |          |                         |                    |            |             |
|-----------------------------------------------|----------|-------------------------|--------------------|------------|-------------|
| Frequency (MHz)                               | Detector | Field Strength (dBuV/m) | Limit @3m (dBuV/m) | Antenna    | Margin (dB) |
| 13.56                                         | PEAK     | 57.18                   | 124                | Vertical   | 66.82       |
| 13.56                                         | PEAK     | 54.25                   | 124                | Horizontal | 69.75       |

### Test Plot



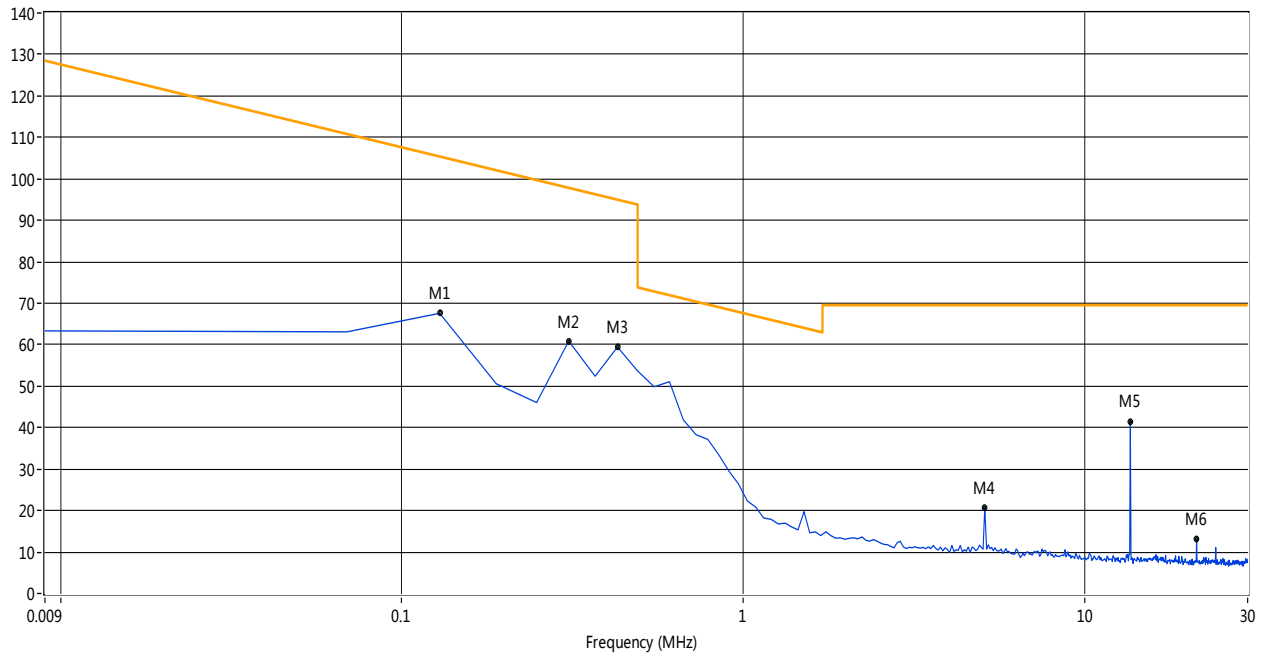
## ANT-LOOP ANT Horizontal



### A.3 Radiated Emissions

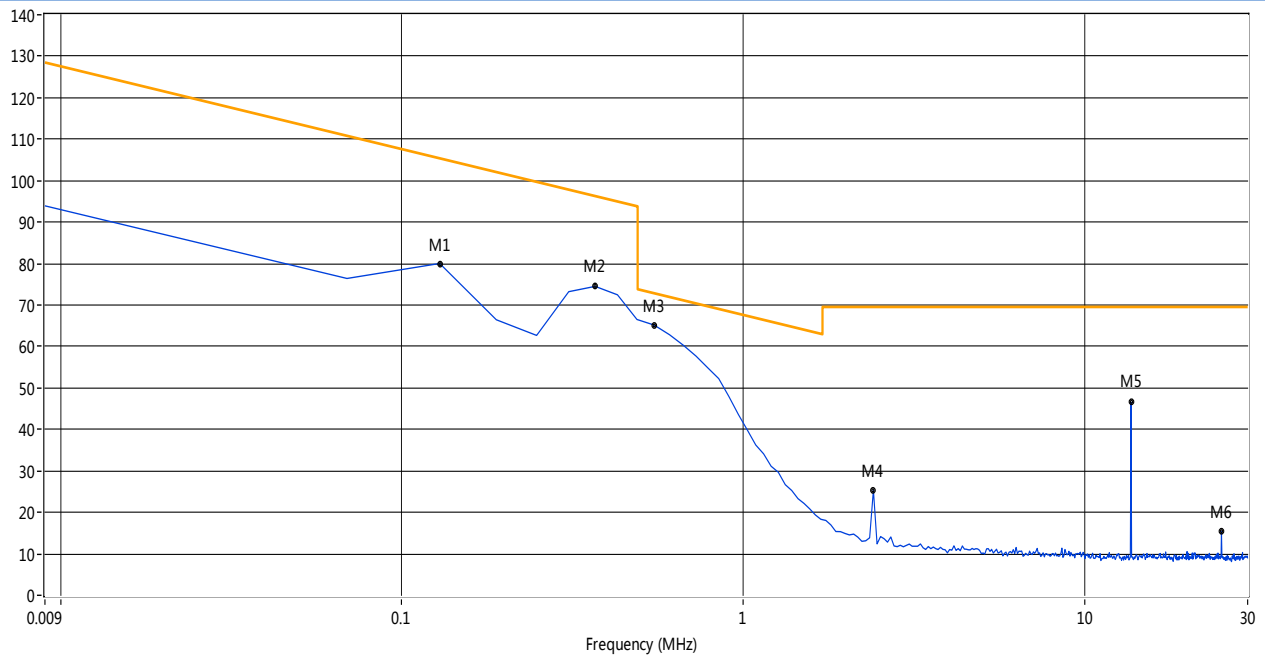
#### The Data and Plots (9kHz ~ 30MHz)

Below 30MHz ANT Vertical



| No. | Frequency (MHz) | Results (dBuV/m) | Factor (dB) | Limit (dBuV/m) | Margin (dB) | Detector | Table (o) | Height (cm) | ANT      | Verdict |
|-----|-----------------|------------------|-------------|----------------|-------------|----------|-----------|-------------|----------|---------|
| 1   | 0.13            | 67.56            | 17.48       | 119.8          | 52.24       | Peak     | 291.40    | 100         | Vertical | PASS    |
| 2   | 0.31            | 60.85            | 21.86       | 106.9          | 46.05       | Peak     | 354.20    | 100         | Vertical | PASS    |
| 3   | 0.43            | 59.45            | 30.16       | 98.3           | 38.85       | Peak     | 135.90    | 100         | Vertical | PASS    |
| 4   | 5.10            | 20.81            | -34.76      | 69.5           | 48.69       | Peak     | 330.10    | 100         | Vertical | PASS    |
| 5   | 13.60           | 41.49            | -34.07      | 69.5           | 28.01       | Peak     | 213.60    | 100         | Vertical | PASS    |
| 6   | 21.26           | 13.04            | -33.76      | 69.5           | 56.46       | Peak     | 92.70     | 100         | Vertical | PASS    |

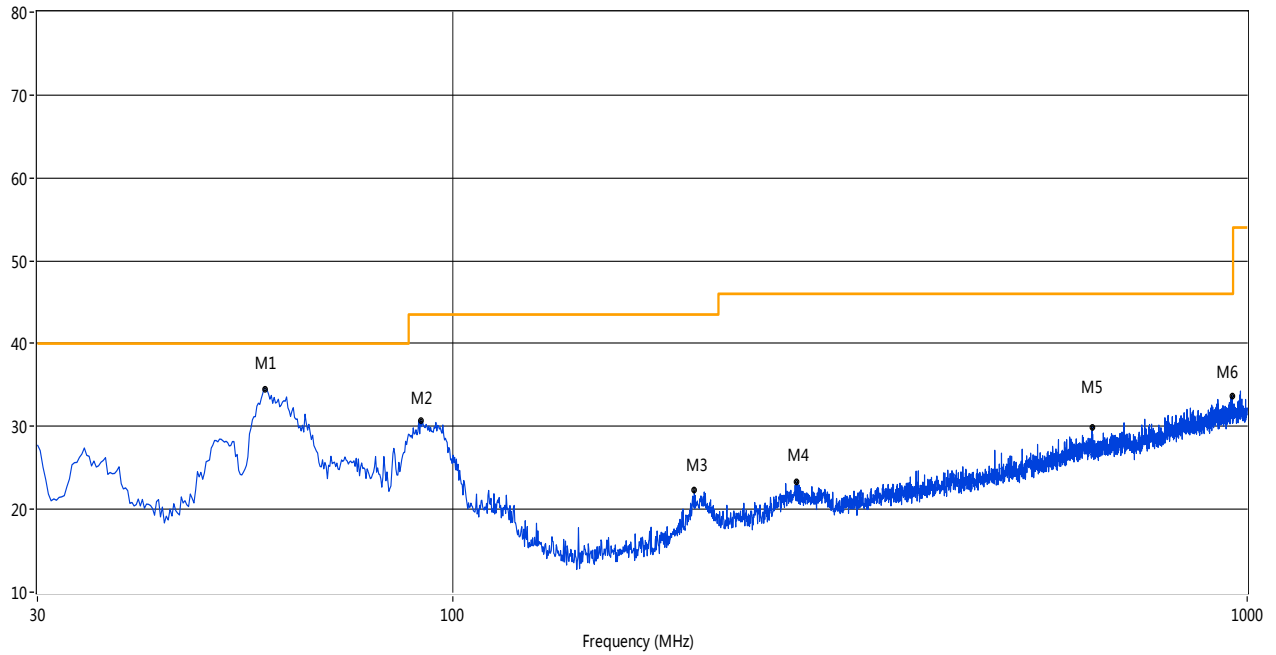
## Below 30MHz ANT Horizontal



| No. | Frequency (MHz) | Results (dBuV/m) | Factor (dB) | Limit (dBuV/m) | Margin (dB) | Detector | Table (o) | Height (cm) | ANT        | Verdict |
|-----|-----------------|------------------|-------------|----------------|-------------|----------|-----------|-------------|------------|---------|
| 1   | 0.13            | 80.02            | 28.56       | 119.8          | 39.78       | Peak     | 270.30    | 100         | Horizontal | PASS    |
| 2   | 0.37            | 74.50            | 37.02       | 102.6          | 28.10       | Peak     | 326.70    | 100         | Horizontal | PASS    |
| 3   | 0.55            | 65.18            | 29.19       | 73.3           | 8.12        | Peak     | 70.70     | 100         | Horizontal | PASS    |
| 4   | 2.40            | 25.36            | -30.09      | 69.5           | 44.14       | Peak     | 31.70     | 100         | Horizontal | PASS    |
| 5   | 13.66           | 46.57            | -34.06      | 69.5           | 22.93       | Peak     | 243.90    | 100         | Horizontal | PASS    |
| 6   | 25.15           | 15.35            | -33.63      | 69.5           | 54.15       | Peak     | 174.60    | 100         | Horizontal | PASS    |

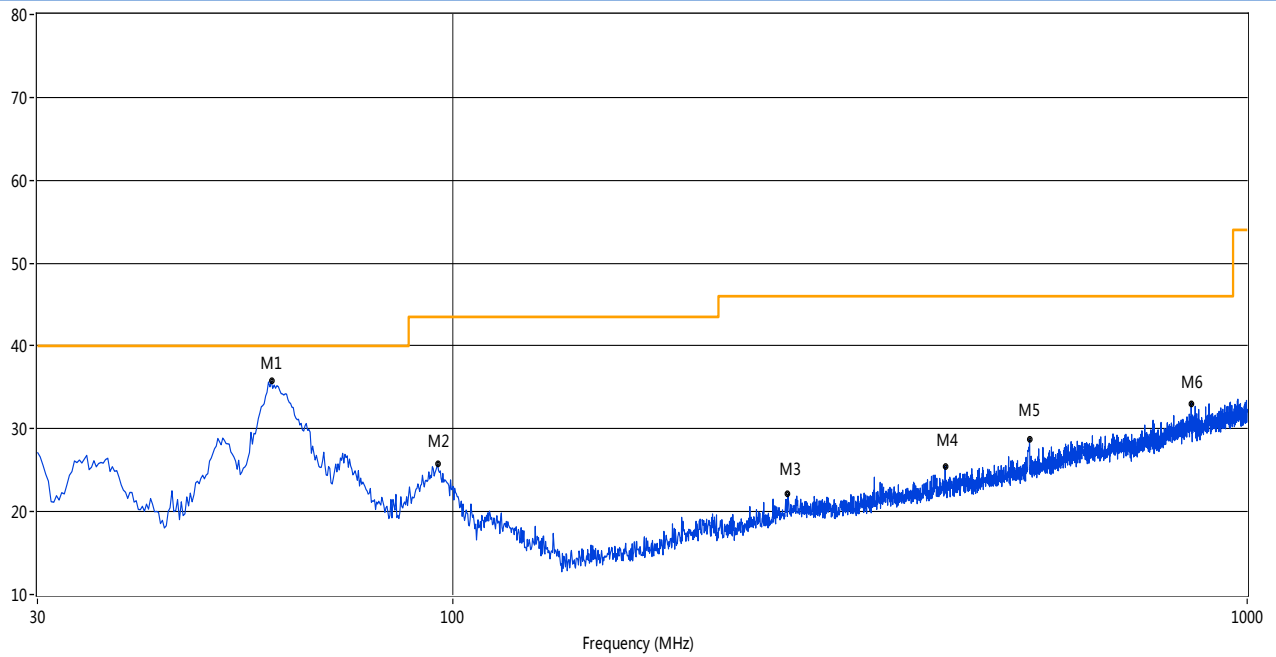
### Test Data and Plots (30MHz ~ 10th Harmonic)

#### 30MHz to 1GHz, ANT Vertical



| No. | Frequency (MHz) | Results (dBuV/m) | Factor (dB) | Limit (dBuV/m) | Margin (dB) | Detector | Table (o) | Height (cm) | ANT      | Verdict |
|-----|-----------------|------------------|-------------|----------------|-------------|----------|-----------|-------------|----------|---------|
| 1   | 58.12           | 34.03            | -19.77      | 40.0           | 5.97        | Peak     | 341.40    | 100         | Vertical | PASS    |
| 2   | 91.09           | 30.76            | -21.68      | 43.5           | 12.74       | Peak     | 254.90    | 100         | Vertical | PASS    |
| 3   | 201.41          | 22.25            | -20.23      | 43.5           | 21.25       | Peak     | 31.80     | 100         | Vertical | PASS    |
| 4   | 270.99          | 23.31            | -18.45      | 46.0           | 22.69       | Peak     | 26.30     | 100         | Vertical | PASS    |
| 5   | 638.28          | 29.92            | -10.25      | 46.0           | 16.08       | Peak     | -0.60     | 100         | Vertical | PASS    |
| 6   | 956.60          | 33.71            | -5.17       | 46.0           | 12.29       | Peak     | 65.30     | 100         | Vertical | PASS    |

## 30MHz to 1GHz, ANT Horizontal



| No. | Frequency (MHz) | Results (dBuV/m) | Factor (dB) | Limit (dBuV/m) | Margin (dB) | Detector | Table (o) | Height (cm) | ANT        | Verdict |
|-----|-----------------|------------------|-------------|----------------|-------------|----------|-----------|-------------|------------|---------|
| 1   | 59.09           | 35.75            | -19.97      | 40.0           | 4.25        | Peak     | 321.90    | 100         | Horizontal | PASS    |
| 2   | 95.70           | 25.72            | -20.84      | 43.5           | 17.78       | Peak     | 321.90    | 100         | Horizontal | PASS    |
| 3   | 264.20          | 22.09            | -18.56      | 46.0           | 23.91       | Peak     | 55.80     | 100         | Horizontal | PASS    |
| 4   | 416.69          | 25.51            | -14.72      | 46.0           | 20.49       | Peak     | 183.40    | 100         | Horizontal | PASS    |
| 5   | 532.09          | 28.76            | -12.40      | 46.0           | 17.24       |          | 244.50    | 100         | Horizontal | PASS    |
| 6   | 850.17          | 33.07            | -6.39       | 46.0           | 12.93       | Peak     | 133.50    | 100         | Horizontal | PASS    |

#### A.4 Frequency Stability

OPERATING FREQUENCY: 13560000 Hz

REFERENCE VOLTAGE: 3.7 V

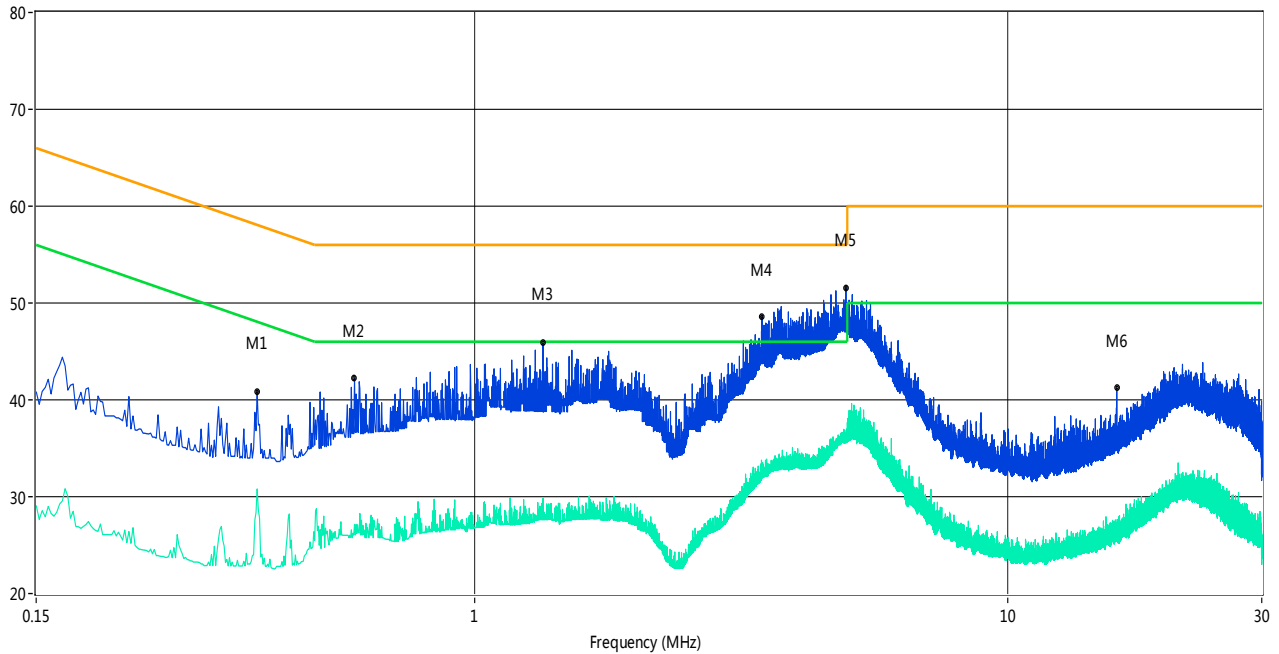
DEVIATION LIMIT:  $\pm 0.01\%$

| VOLTAGE (%)       | Test Conditions |                  | Frequency(Hz) | Deviation(ppm) | Verdict |
|-------------------|-----------------|------------------|---------------|----------------|---------|
|                   | Power (VDC)     | Temperature (°C) |               |                |         |
| 100               | 3.7             | +20°C(Ref)       | 13560684      | -0.00005044    | PASS    |
| 100               |                 | -20              | 13560698      | -0.00005147    |         |
| 100               |                 | -10              | 13560547      | -0.00004034    |         |
| 100               |                 | 0                | 13560563      | -0.00004152    |         |
| 100               |                 | +10              | 13560615      | -0.00004535    |         |
| 100               |                 | +20              | 13560663      | -0.00004889    |         |
| 100               |                 | +25              | 13560458      | -0.00003378    |         |
| 100               |                 | +30              | 13560618      | -0.00004558    |         |
| 100               |                 | +40              | 13560603      | -0.00004447    |         |
| 100               |                 | +50              | 13560706      | -0.00005206    |         |
| Battery End Point | 3.3             | +20              | 13560687      | -0.00005066    |         |
| 115               | 4.2             | +20              | 13560667      | -0.00004919    |         |

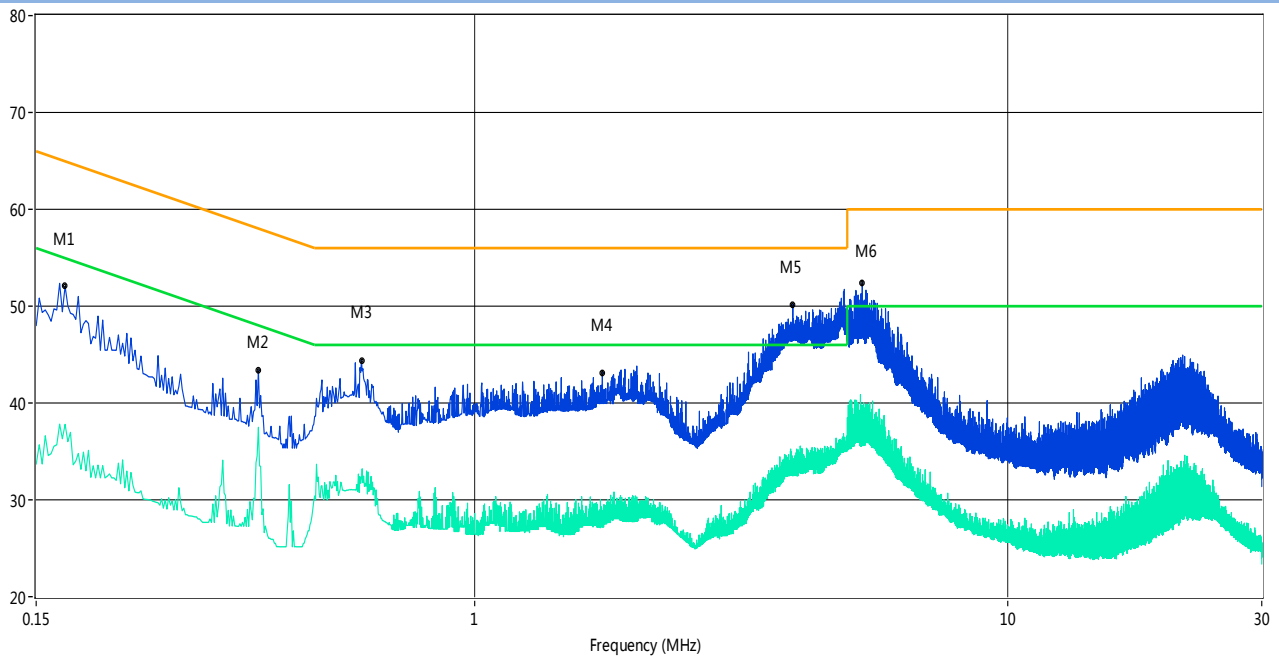
## A.5 Conducted Emissions

### Test Data and Plots

#### PHASE L



# PHASE N



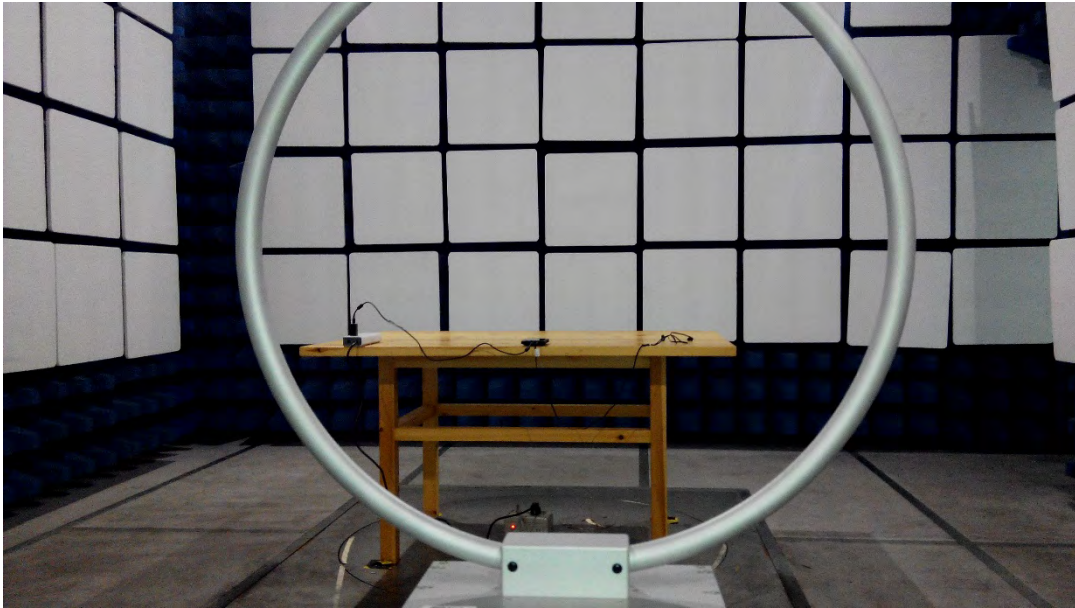
| No. | Frequency (MHz) | Results (dBuV) | Factor (dB) | Limit (dBuV) | Margin (dB) | Detector | Line   | Verdict |
|-----|-----------------|----------------|-------------|--------------|-------------|----------|--------|---------|
| 1   | 0.17            | 52.1           | 13.00       | 65.4         | 13.30       | Peak     | N Line | PASS    |
| 1** | 0.17            | 37.8           | 13.00       | 55.4         | 17.60       | AV       | N Line | PASS    |
| 2   | 0.39            | 43.4           | 13.00       | 59.1         | 15.70       | Peak     | N Line | PASS    |
| 2** | 0.39            | 37.5           | 13.00       | 49.1         | 11.60       | AV       | N Line | PASS    |
| 3   | 0.61            | 44.4           | 13.00       | 56.0         | 11.60       | Peak     | N Line | PASS    |
| 3** | 0.61            | 32.2           | 13.00       | 46.0         | 13.80       | AV       | N Line | PASS    |
| 4   | 1.73            | 43.1           | 13.00       | 56.0         | 12.90       | Peak     | N Line | PASS    |
| 4** | 1.73            | 28.8           | 13.00       | 46.0         | 17.20       | AV       | N Line | PASS    |
| 5   | 3.95            | 50.2           | 13.00       | 56.0         | 5.80        | Peak     | N Line | PASS    |
| 5** | 3.95            | 33.5           | 13.00       | 46.0         | 12.50       | AV       | N Line | PASS    |
| 6   | 5.33            | 52.4           | 13.00       | 60.0         | 7.60        | Peak     | N Line | PASS    |
| 6** | 5.33            | 35.5           | 13.00       | 50.0         | 14.50       | AV       | N Line | PASS    |

## ANNEX B TEST SETUP PHOTOS

### B.1 Conducted Emissions Test Photo



## B.2 Radiated Test Photo



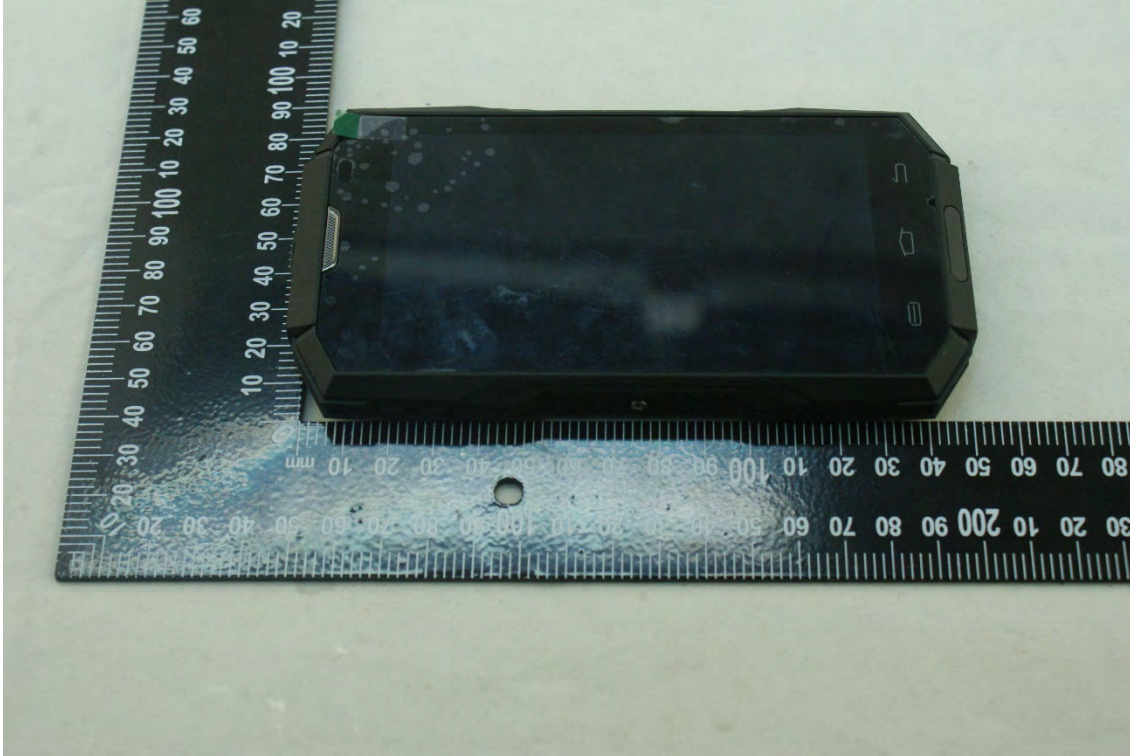
Below 30MHz



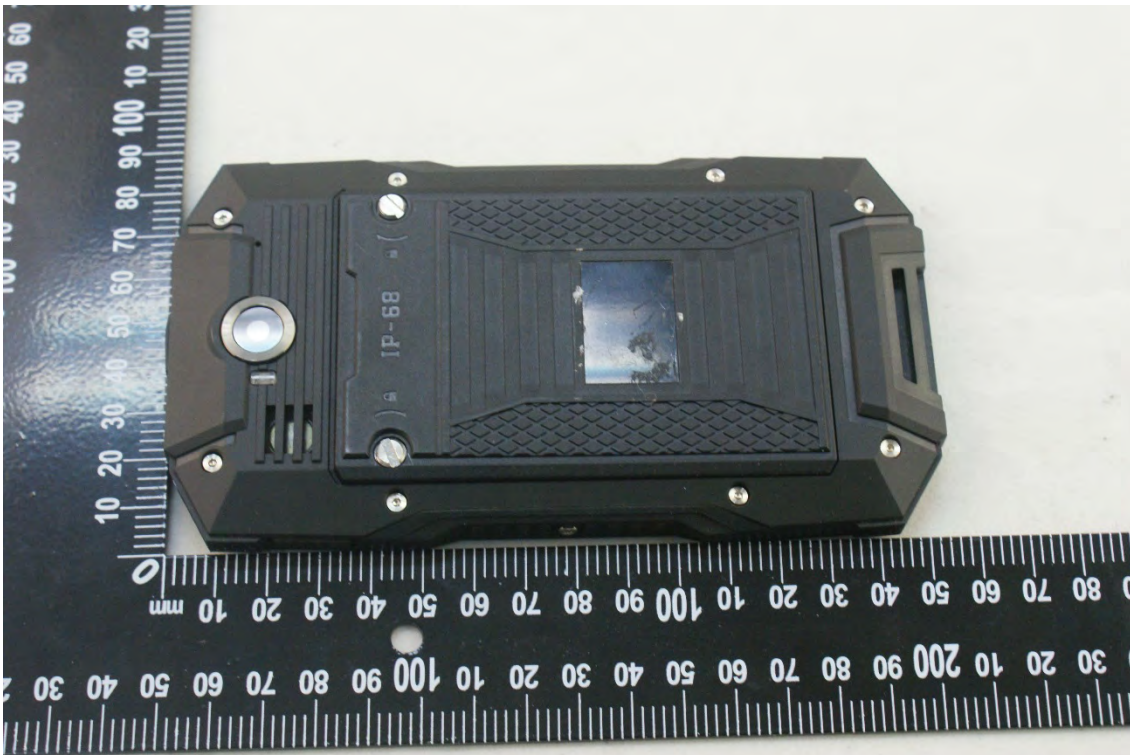
30MHz to 1GHz

## ANNEX C EUT PHOTOS

### C.1 Appearance of the EUT



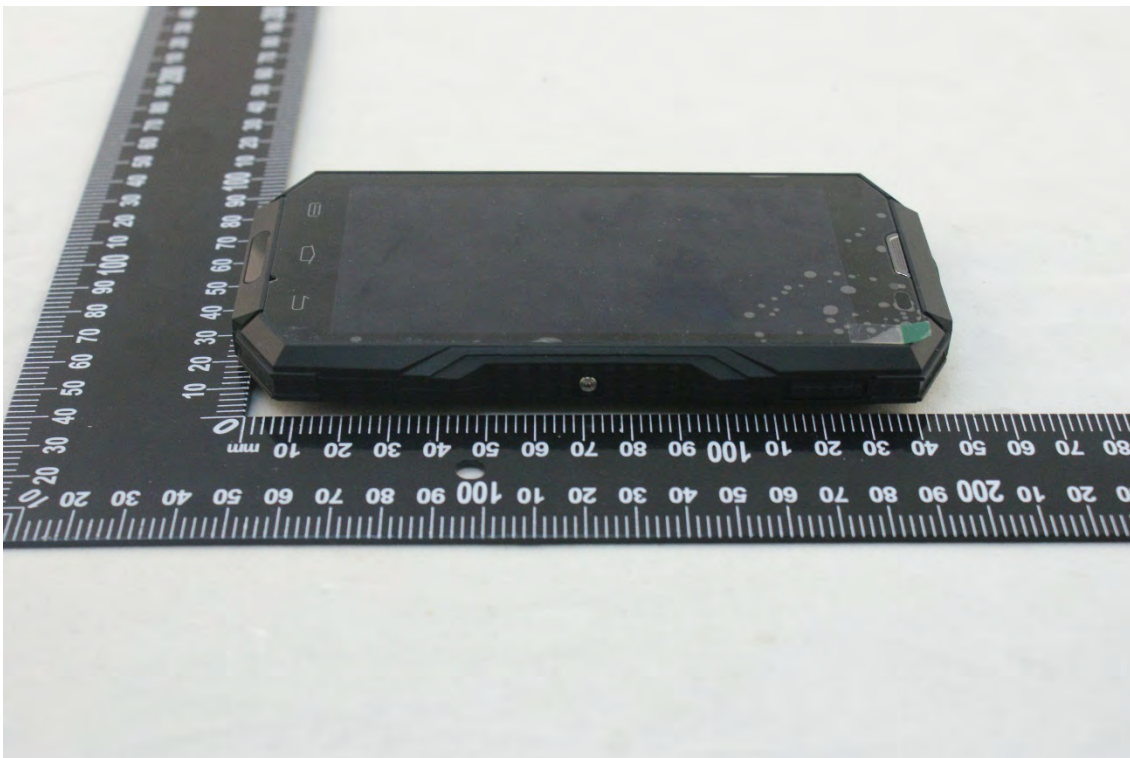
THE FRONT OF EUT



THE BACK OF EUT



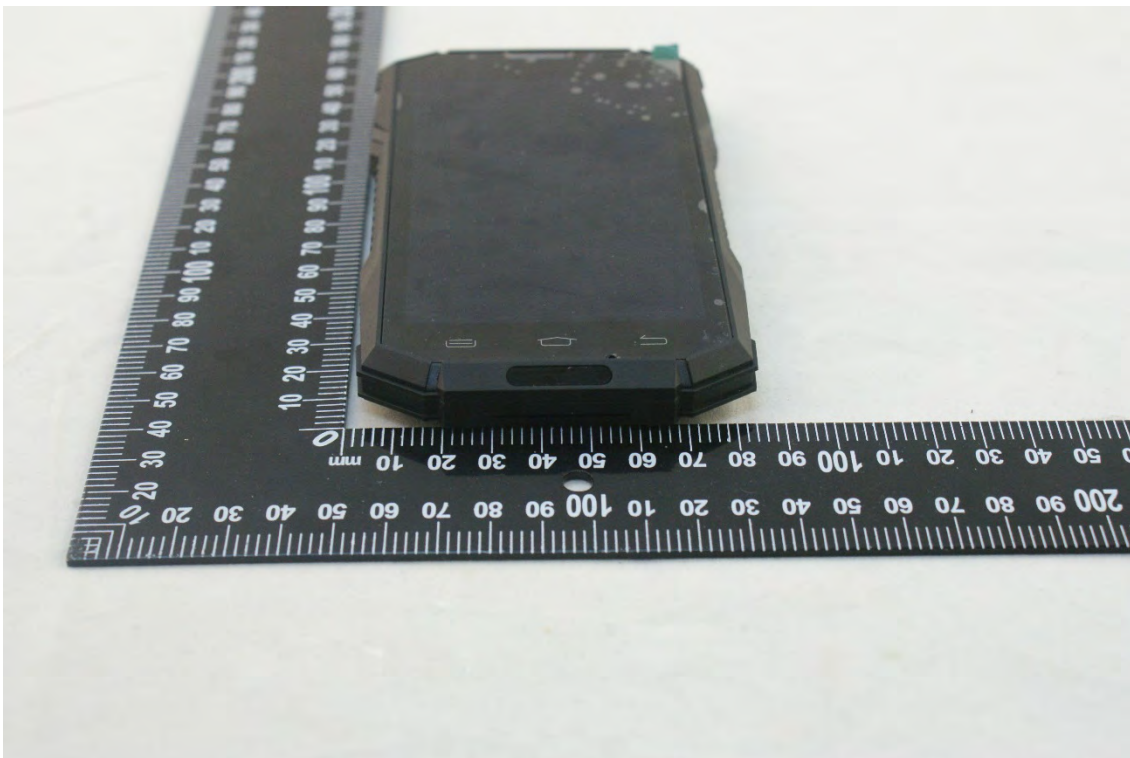
THE LEFT OF EUT



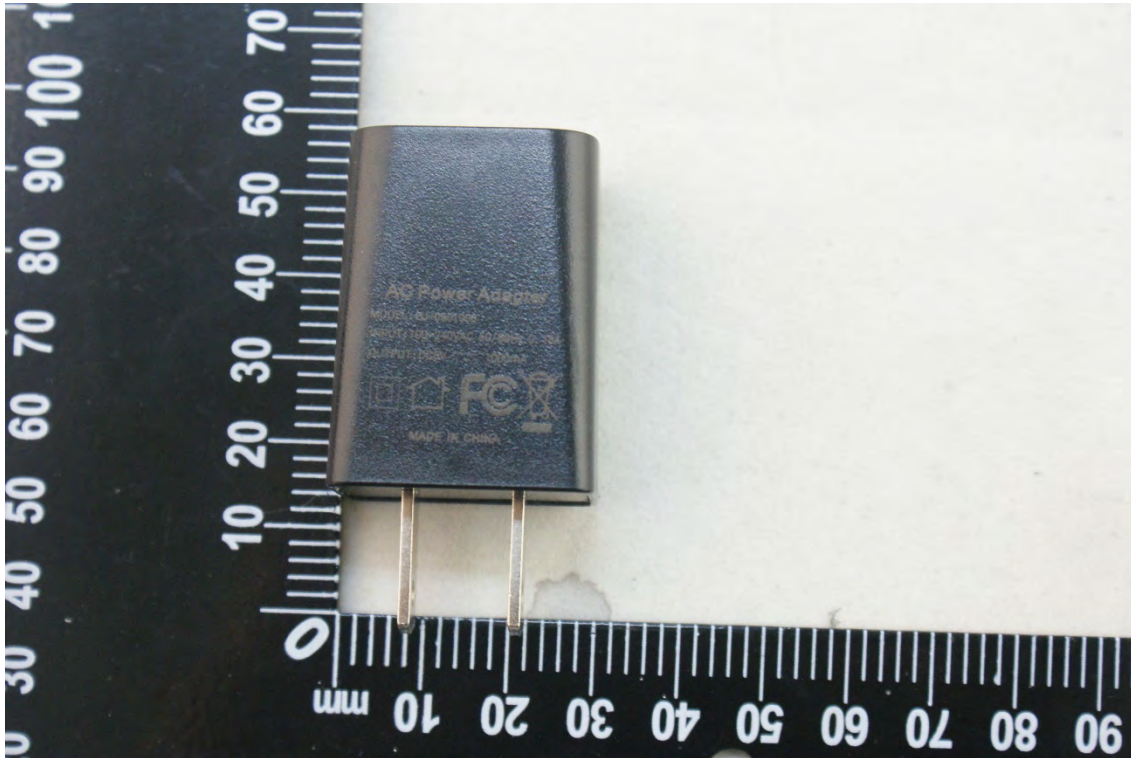
THE RIGHT OF EUT



THE UP OF EUT



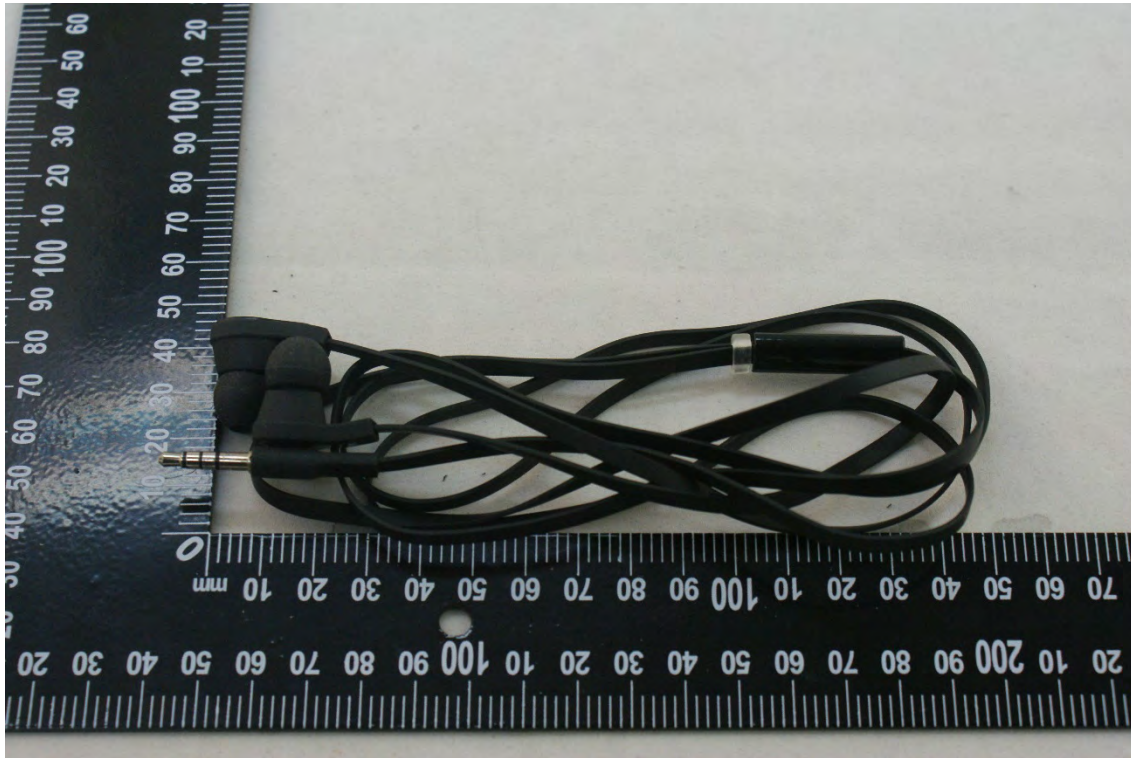
THE DOWN OF EUT



CHARGER

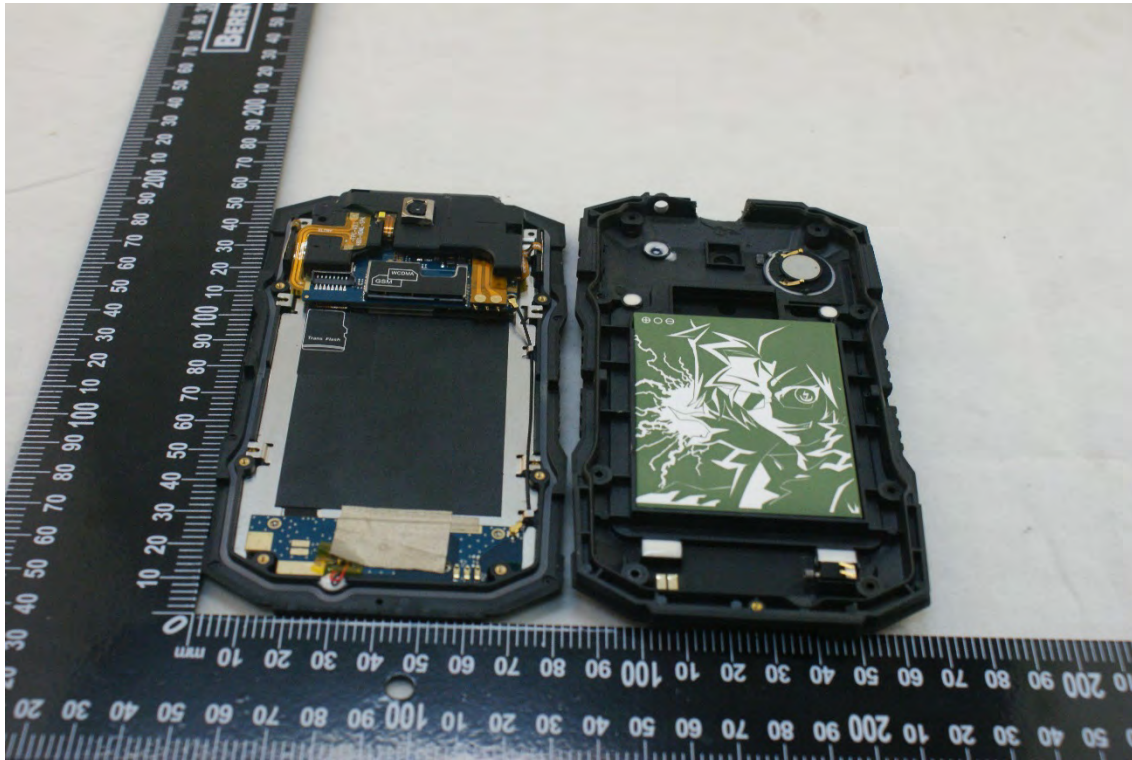


USB CABLE

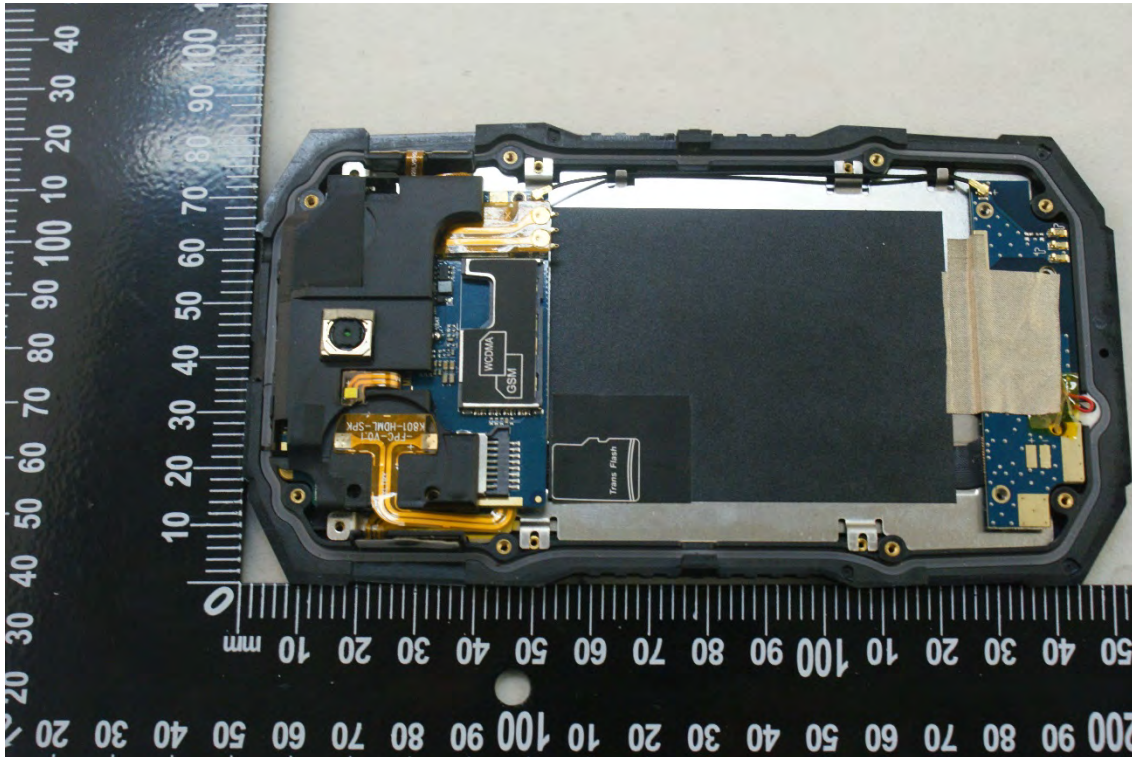


EARPHONE

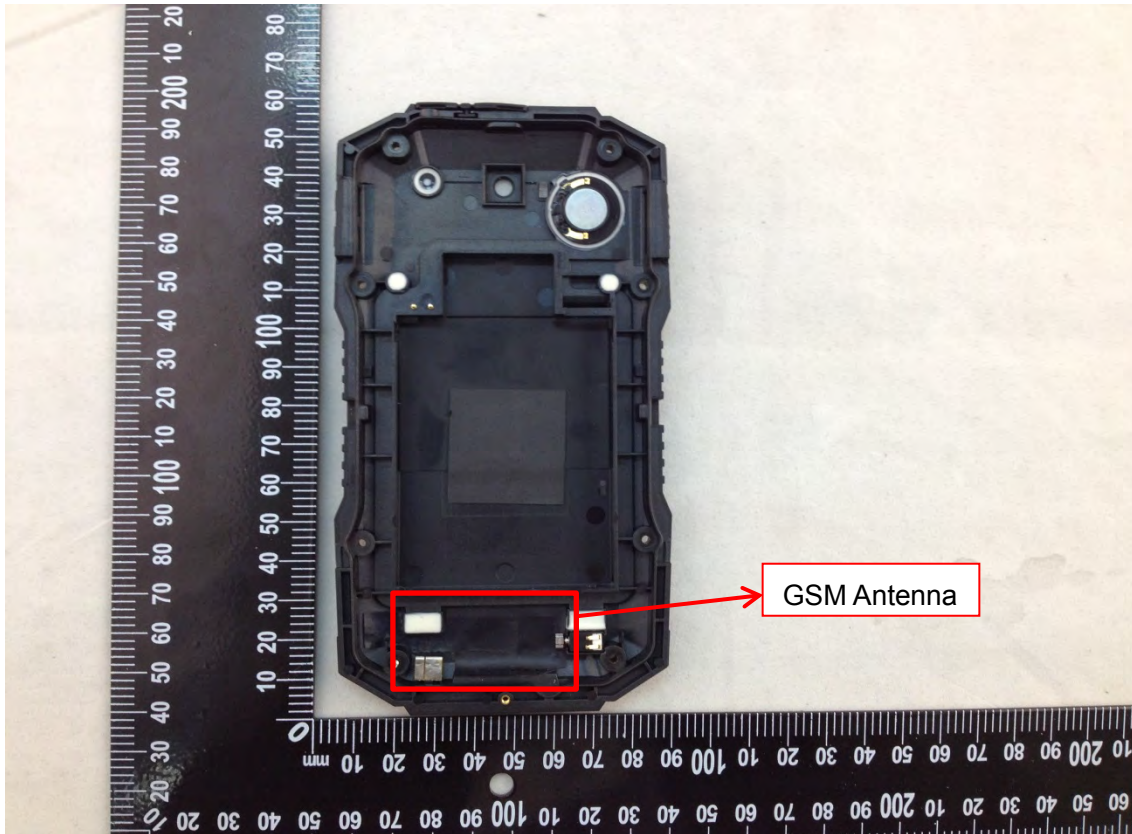
## C.2 Inside of the EUT



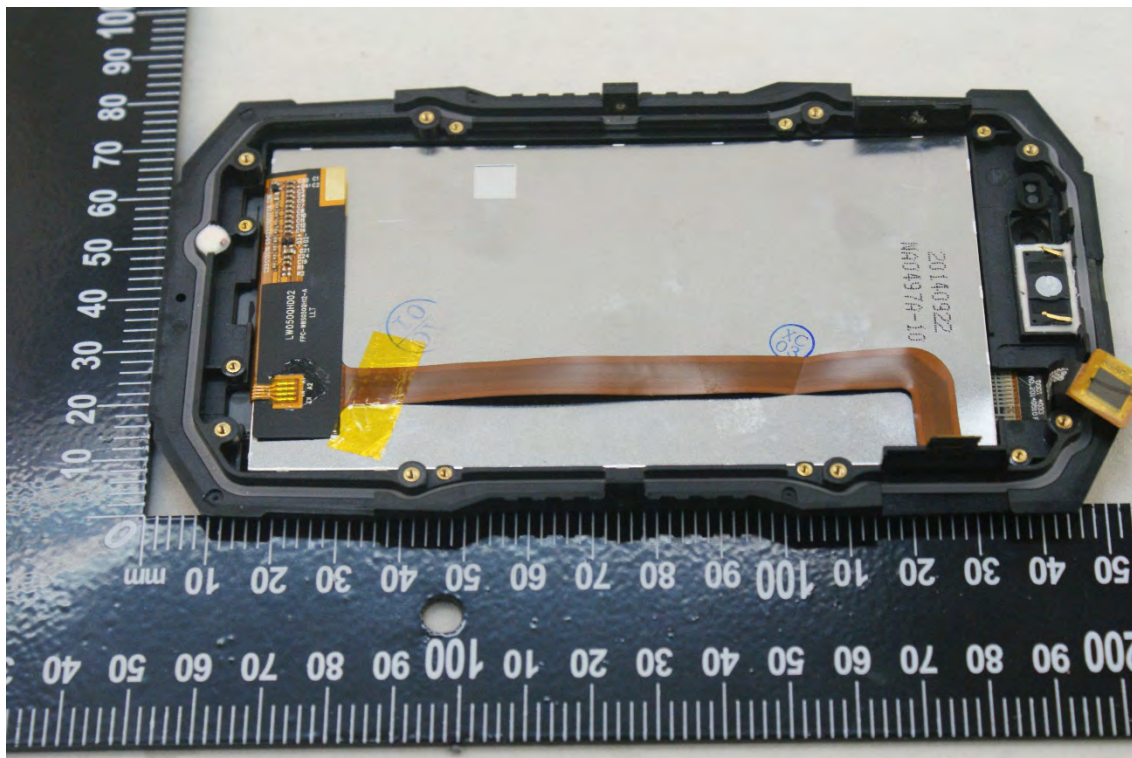
EUT UNCOVER VIEW 1



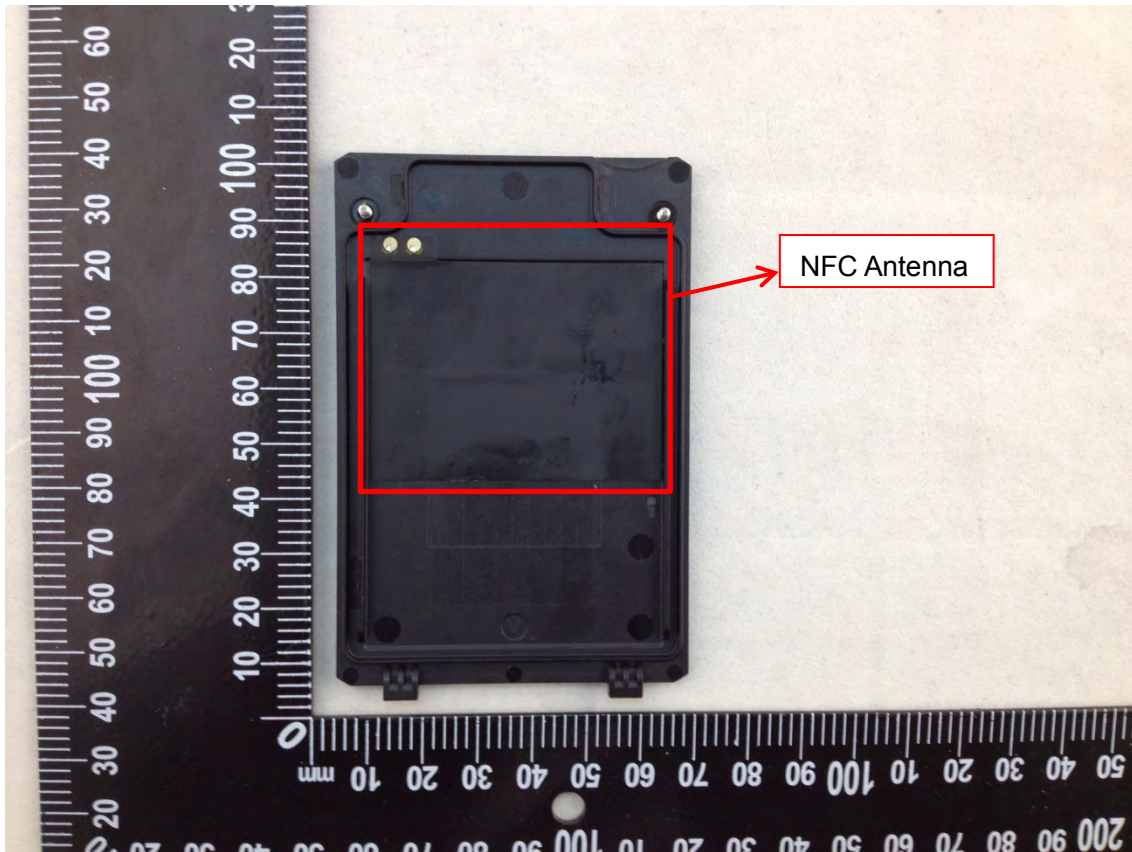
EUT UNCOVER VIEW 2



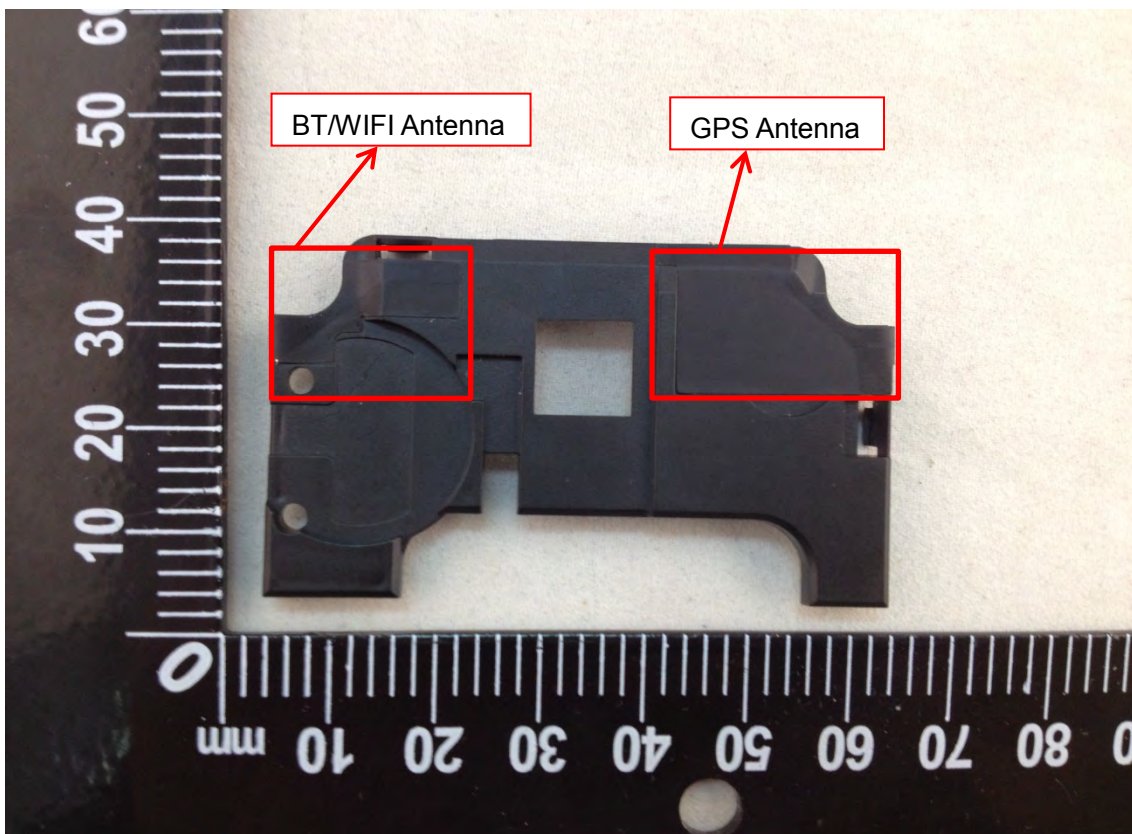
EUT UNCOVER VIEW 3



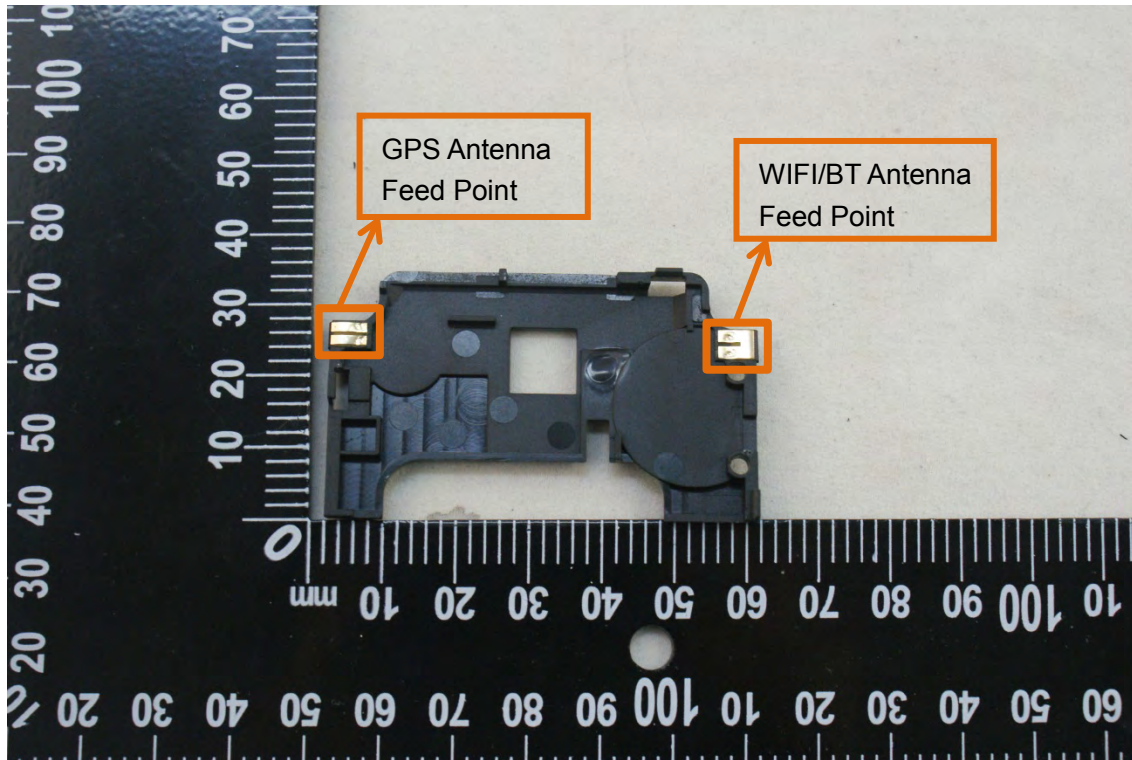
EUT UNCOVER VIEW 4



EUT UNCOVER VIEW 5



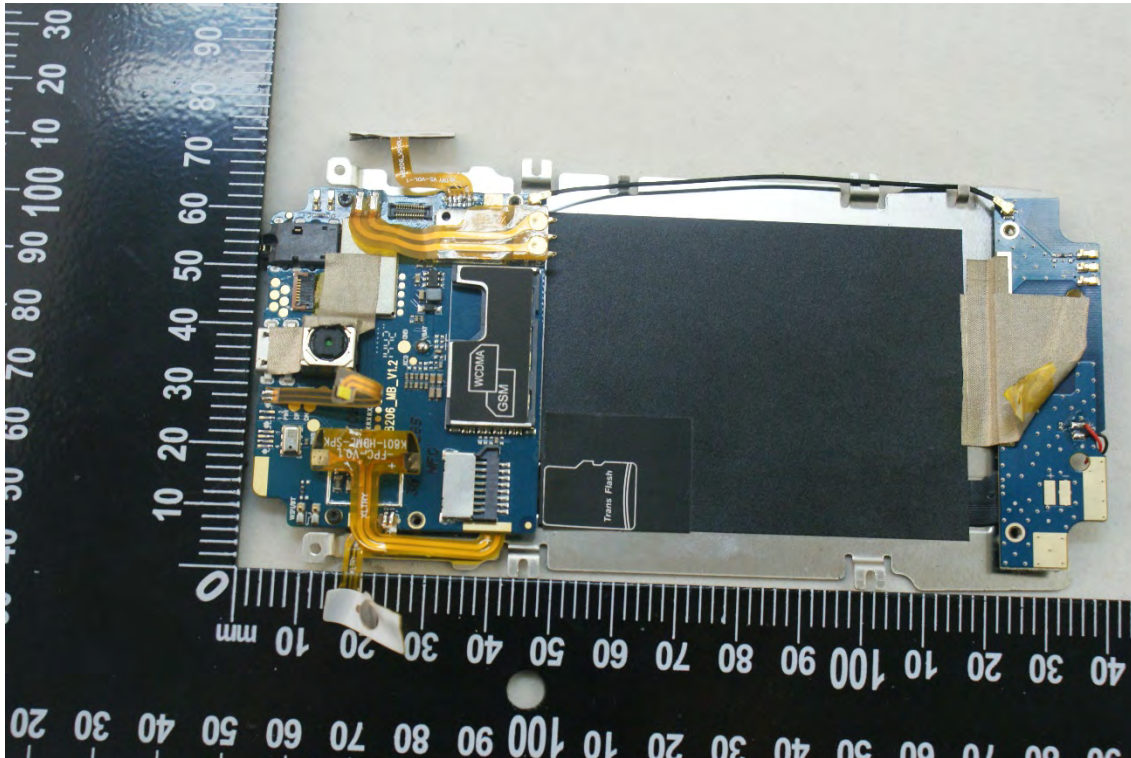
EUT UNCOVER VIEW 6



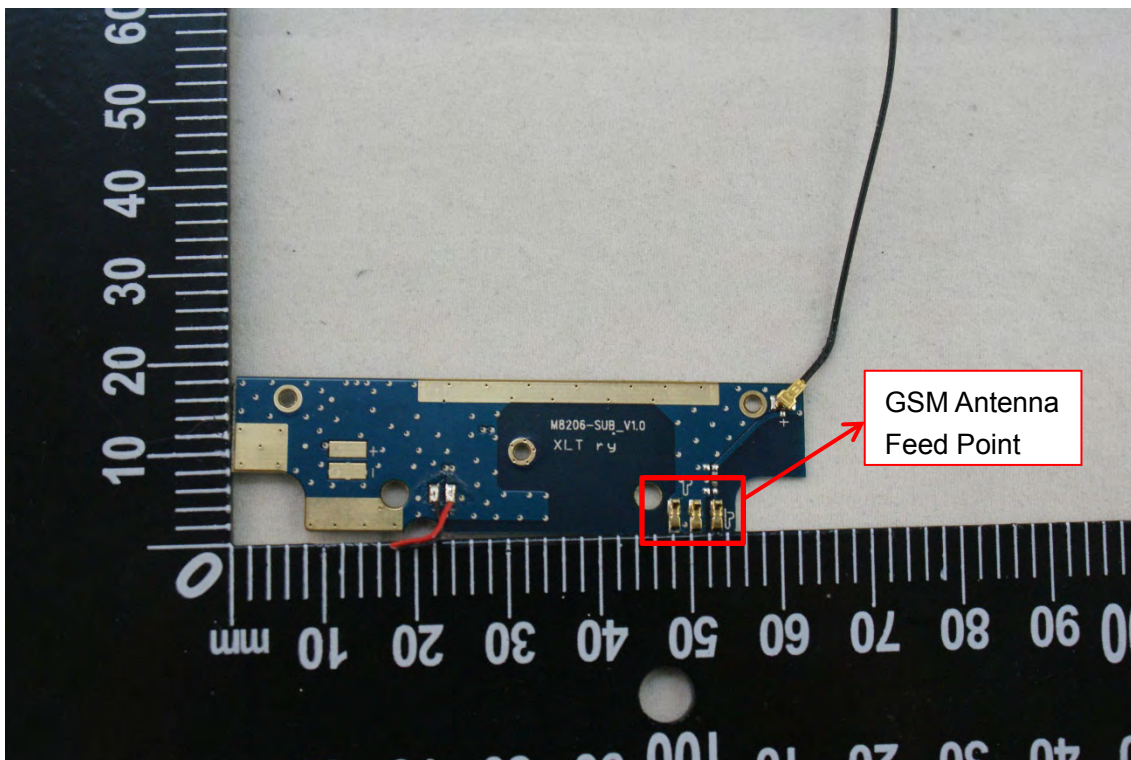
EUT UNCOVER VIEW 7



BATTERY

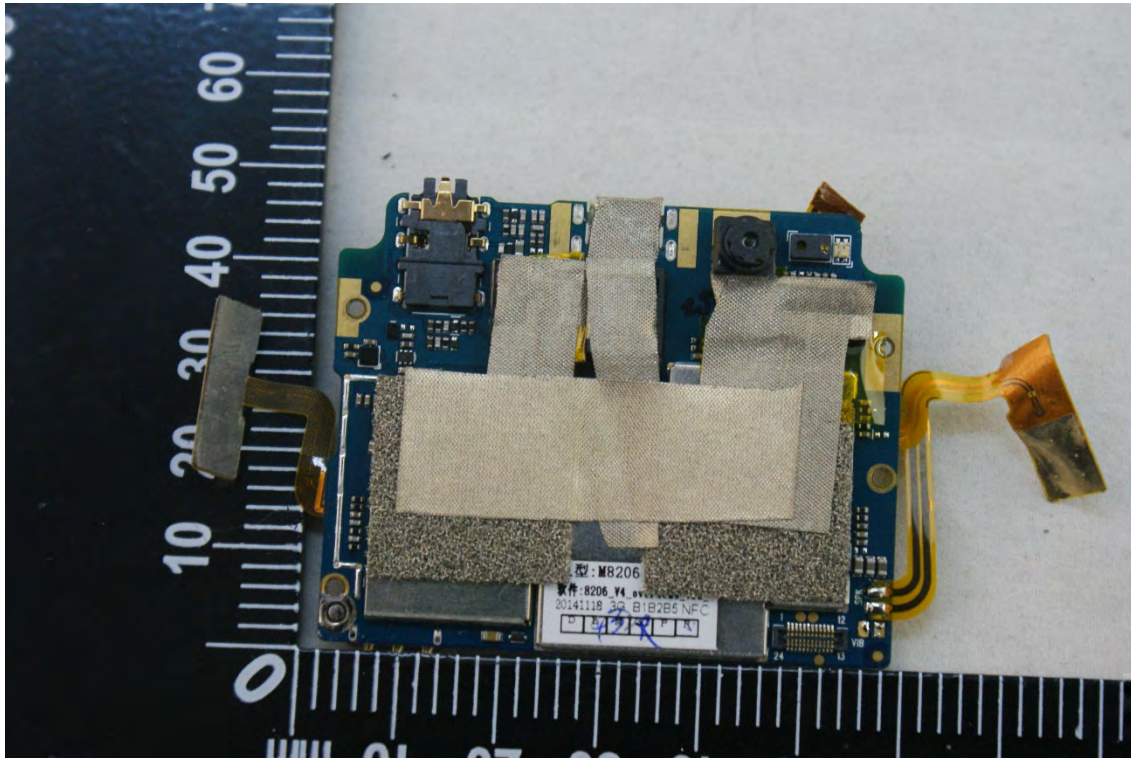


MAIN BOARD TOP VIEW 1

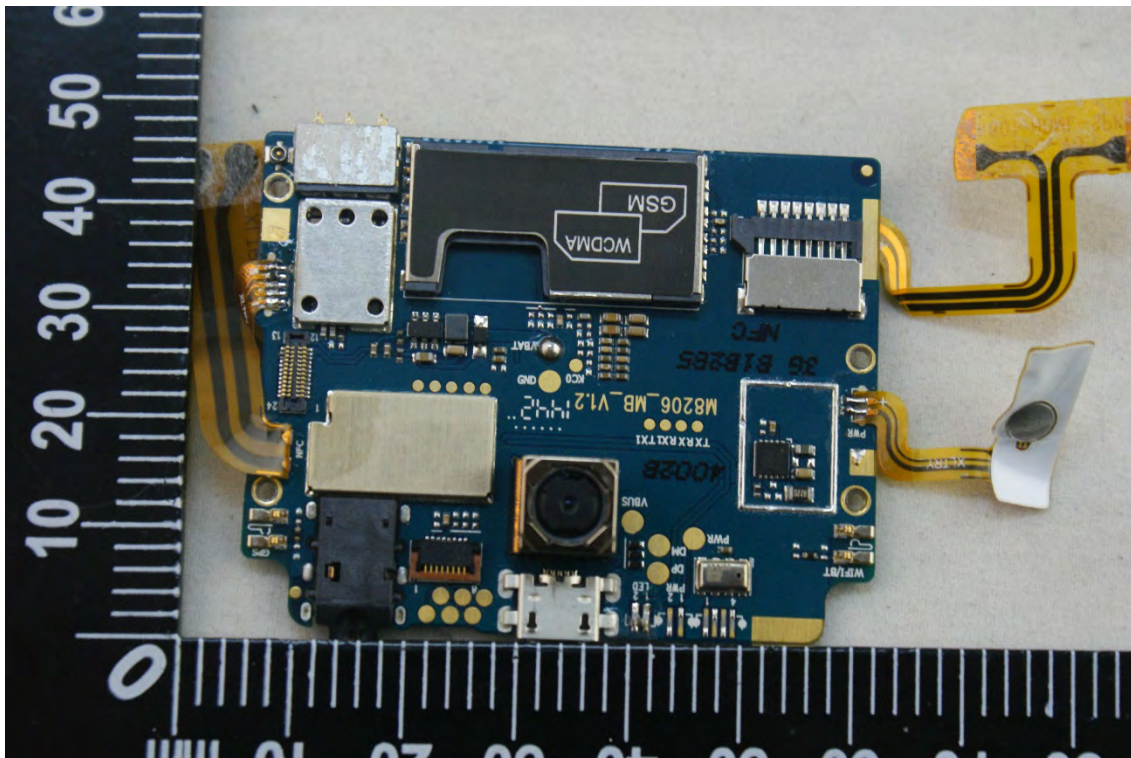


MAIN BOARD TOP VIEW 2

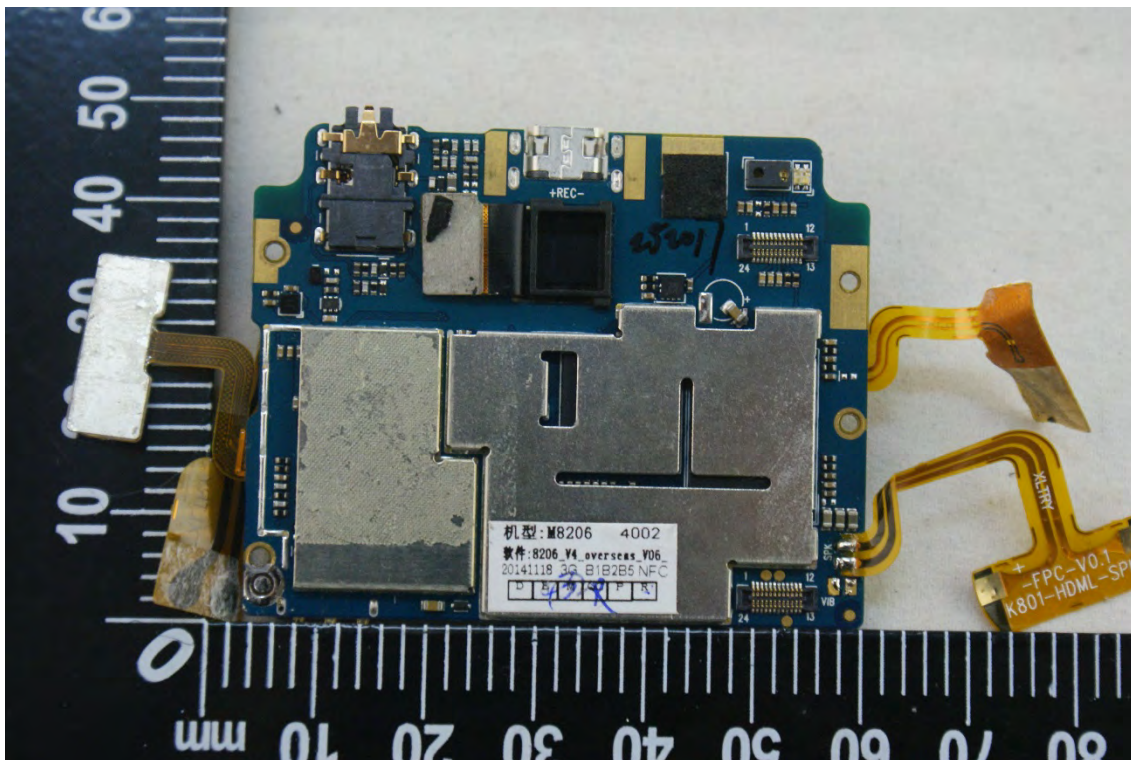




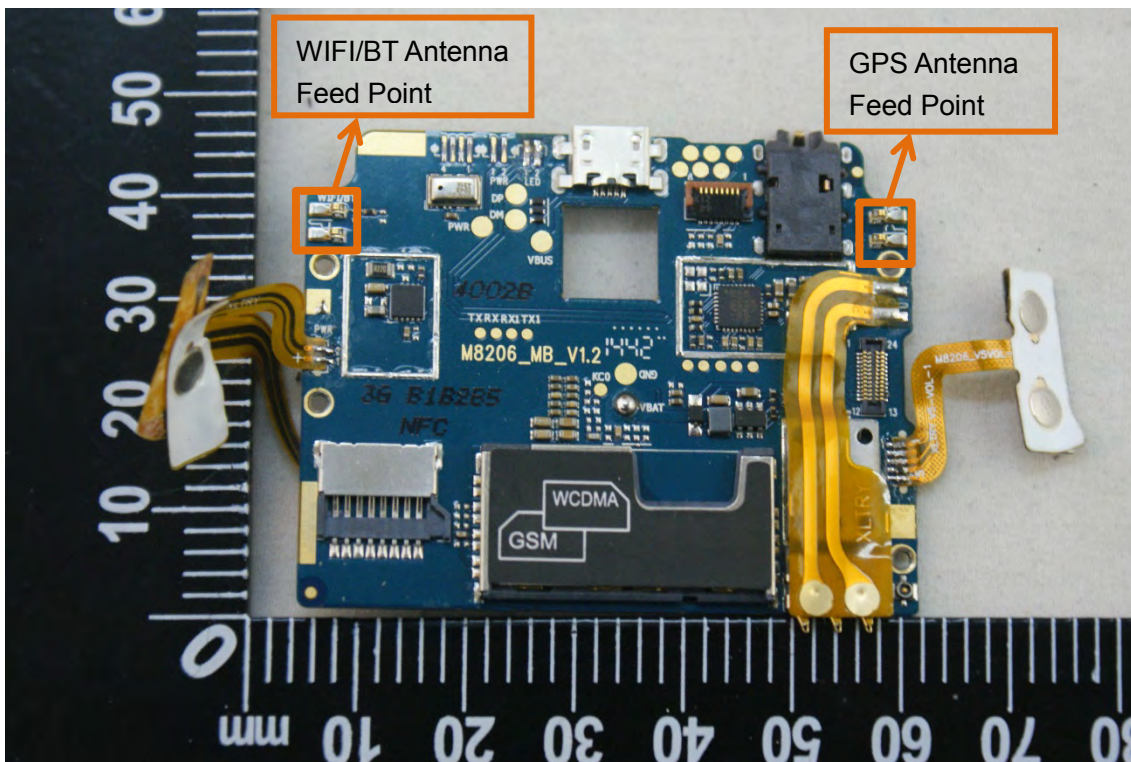
MAIN BOARD BACK VIEW 3



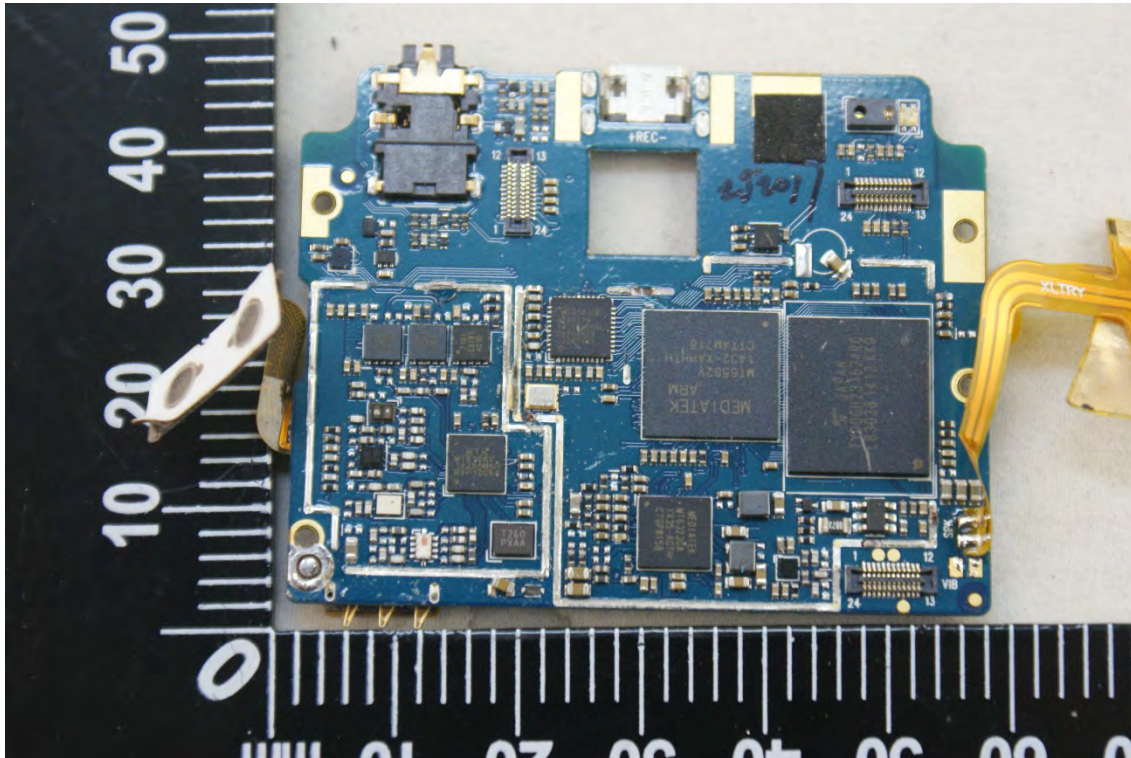
MAIN BOARD TOP VIEW 4



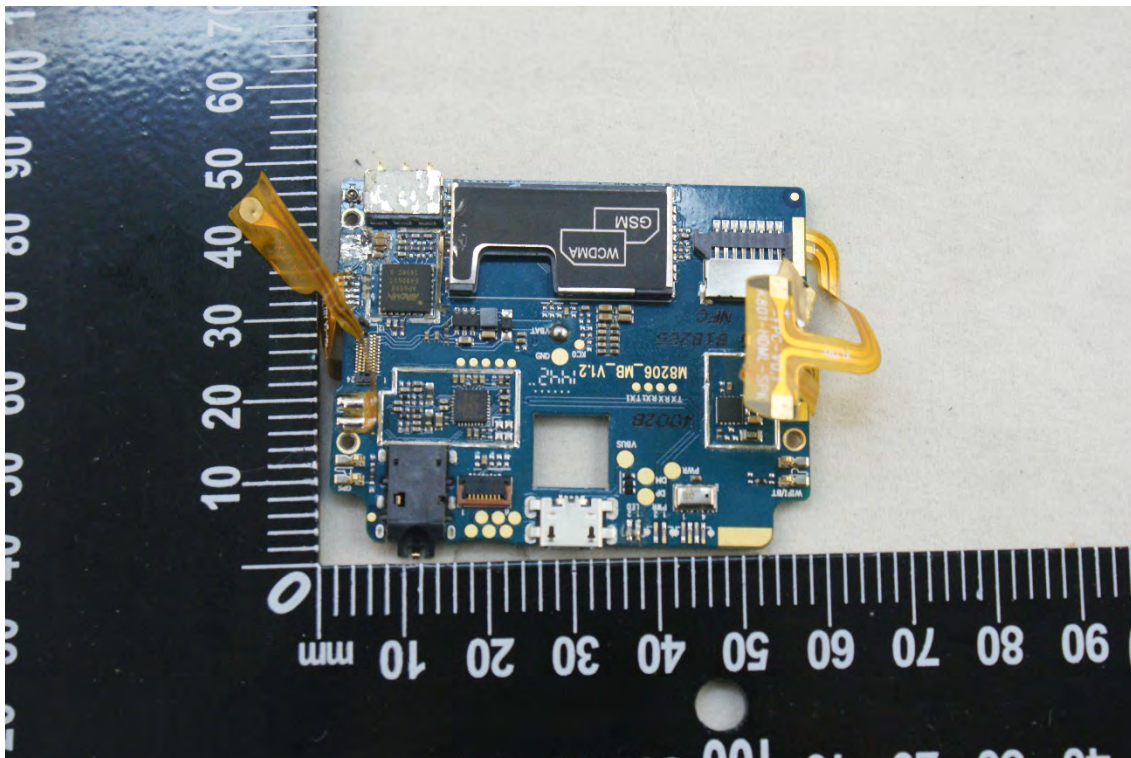
MAIN BOARD BACK VIEW 4



MAIN BOARD TOP VIEW 5



MAIN BOARD BACK VIEW 5



MAIN BOARD TOP VIEW 6

--END OF REPORT--