# TEST REPORT
## No. I17Z60076-EMC04

**for**

**HMD Global Oy**

**Smart Phone**

**Model Name: TA-1021**

**FCC ID: 2AJOTTA-1021**

**with**

**Hardware Version: 3**

**Software Version: 000C_3_050**

**Issued Date: 2017-04-15**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

**Test Laboratory:**

*FCC 2.948 Listed: No. 525429*

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## REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| I17Z60076-EMC04 | Rev.0 | 1st edition | 2017-04-15 |

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# 1. Test Laboratory

## 1.1. Testing Location
**CTTL(BDA)**

Address:　　　No. 18 Jia Kangding Street, BDA District ,Beijing, P. R. China

## 1.2. Testing Environment
Normal Temperature:　　15-35℃
Relative Humidity:　　20-75%

## 1.3. Project data
Testing Start Date:　　2017-04-11
Testing End Date:　　2017-04-12

## 1.4. Signature

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**Zhang Hui**
**(Prepared this test report)**

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**Qu Pengfei**
**(Reviewed this test report)**
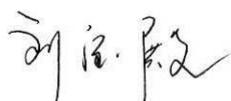
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**Liu Baodian**
**Deputy Director of the laboratory**
**(Approved this test report)**

## 2. Client Information

### 2.1. Applicant Information

| | |
|---|---|
| Company Name: | HMD Global Oy |
| Address /Post: | Karaportti 2, 02610 Espoo, Finland |
| City: | Espoo |
| Postal Code: | 201203 |
| Country: | Finland |
| Contact Person: | Mikko Kahlos |
| Contact Email | mikko.kahlos@hmdglobal.com |
| Telephone: | +358-408036126 |
| Fax: | / |

### 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | HMD Global Oy |
| Address /Post: | Karaportti 2, 02610 Espoo, Finland |
| City: | Espoo |
| Postal Code: | 201203 |
| Country: | Finland |
| Contact Person: | Mikko Kahlos |
| Contact Email | mikko.kahlos@hmdglobal.com |
| Telephone: | +358-408036126 |
| Fax: | / |

## 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

### 3.1. About EUT

| | |
|---|---|
| Description | Smart Phone |
| Model Name | TA-1021 |
| FCC ID | 2AJOTTA-1021 |
| Extreme vol. Limits | 3.6VDC to 4.2VDC (nominal: 3.8VDC) |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT of People's Republic of China.

### 3.2. Internal Identification of EUT used during the test

| EUT ID* | SN or IMEI | HW Version | SW Version |
|---|---|---|---|
| EUT1 | 356020080007998/35602008008004 | 3 | 000C_3_050 |

*EUT ID: is used to identify the test sample in the lab internally.

### 3.3. Internal Identification of AE used during the test

| AE ID* | Description | SN | Remarks |
|---|---|---|---|
| AE1 | Battery | / | INBUILT |
| AE2 | Battery | / | INBUILT |
| AE3 | Travel charger | / | / |
| AE4 | Travel charger | / | / |
| AE5 | USB cable | / | / |
| AE6 | Headset | / | / |

AE1

| | |
|---|---|
| Model | HE316 |
| Manufacturer | SCUD(FUJIAN) ELECTRONICS CO LTD |
| Capacitance | 3000mAh |
| Nominal voltage | 3.82V |

AE2

| | |
|---|---|
| Model | HE317 |
| Manufacturer | SCUD(FUJIAN) ELECTRONICS CO LTD |
| Capacitance | 3000mAh |
| Nominal voltage | 3.84V |

AE3/AE4

| | |
|---|---|
| Model | FC0102 |
| Manufacturer | Salcomp |
| Length of cable | / |

AE5

| Model | CUBB01M-FA010-DH |
|---|---|
| Manufacturer | FOXCONN |
| Length of cable | 99cm |

AE6

| Model | 5CAB5422B-N01-DG |
|---|---|
| Manufacturer | FOXCONN |
| Length of cable | / |

*AE ID: is used to identify the test sample in the lab internally.

Note: The USB cables are shielded.

## 3.4. EUT set-ups

| EUT set-up No. | Combination of EUT and AE | Remarks |
|---|---|---|
| Set.2 | EUT1+ AE1+ AE3+AE5 | Charging mode |
| Set.3 | EUT1+ AE1+ AE5 | USB mode |

Note:

The Smart Phone TA-1021 manufactured by HMD Global Oy. is a variant model based on TA-1025 for conformance test. According to the declaration of changes, results are inherited from the initial model. The report number of initial model is I17Z60075-EMC04.

# 4. Reference Documents

## 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|---|---|---|
| FCC Part 15, Subpart B | Radio frequency devices - Unintentional Radiators | 2015 |
| ANSI C63.4 | Methods of Measurement of Radio-Noise Emissions from Low - Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2014 |

Note: The test methods used have no deviation with standards above.

# 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber SAC-2** (10.0m x 6.7m x 6.15m) did not exceed following limits along the EMC testing:

| Temperature | Min. = 15 °C, Max. = 35 °C |
|---|---|
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |
| Normalised site attenuation (NSA) | < ±4 dB, 3 m distance |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1GHz to 6GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 3000 MHz |

**Shielded room** did not exceed following limits along the EMC testing:

| Temperature | Min. = 15 °C, Max. = 35 °C |
|---|---|
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz, >60dB;<br>1MHz－1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |

## 6. <u>SUMMARY OF TEST RESULTS</u>

| Abbreviations used in this clause: | | |
|---|---|---|
| Verdict Column | P | Pass |
| | NA | Not applicable |
| | F | Fail |
| Location Column | 1 | The test is performed in test location 1 which are described in section 1.1 of this report |

| Clause | List | Clause in FCC rules | Verdict | Location |
|---|---|---|---|---|
| 1 | Radiated Emission | 15.109(a) | P | 1 |
| 2 | Conducted Emission | 15.107(a) | P | 1 |

## 7. Test Equipments Utilized

| NO. | Description | TYPE | SERIES NUMBER | MANUFACTURE | CAL DUE DATE | CALIBRATION INTERVAL |
|-----|-------------|------|---------------|-------------|--------------|----------------------|
| 1 | Test Receiver | ESCI7 | 100948 | R&S | 2017-07-05 | 1 year |
| 2 | Test Receiver | ESU26 | 100376 | R&S | 2017-10-30 | 1 year |
| 3 | Universal Radio Communication Tester | CMW500 | 127406 | R&S | 2018-01-19 | 1 year |
| 4 | AMN | ESH3-Z5 | 825562/028 | R&S | 2017-07-06 | 1 year |
| 5 | EMI Antenna | VULB 9163 | 9163-514 | Schwarzbeck | 2017-11-24 | 3 years |
| 6 | EMI Antenna | 3117 | 00139065 | ETS | 2017-09-21 | 3 years |

### Test Software Utilized

| Test Item | Test Software and Version | Software Vendor |
|-----------|---------------------------|-----------------|
| Radiated Continuous Emission | EMC32 V9.01 | R&S |
| Conducted Emission | EMC32 V8.52.0 | R&S |

# ANNEX A: MEASUREMENT RESULTS

### A.1 Radiated Emission (§15.109(a))

### A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (charging mode of MS) at distances of 10 meters(for 30MHz-1GHz) and 3 meters (for above 1GHz) is tested. Tested in accordance with the procedures of ANSI C63.4 - 2014, section 8.3.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3/10 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

### A.1.2 EUT Operating Mode:

The MS is operating in charging mode. During the test MS is connected to a charger in the case of charging mode.

### A.1.3 Measurement Limit

| Frequency range (MHz) | Field strength limit (µV/m) | | |
|---|---|---|---|
| | Quasi-peak | Average | Peak |
| 30-88 | 100 | | |
| 88-216 | 150 | | |
| 216-960 | 200 | | |
| 960-1000 | 500 | | |
| >1000 | | 500 | 5000 |

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

### A.1.4 Test Condition

| Frequency range (MHz) | RBW/VBW | Sweep Time (s) | Detector |
|---|---|---|---|
| 30-1000 | 120kHz (IF Bandwidth) | 5 | Peak/Quasi-peak |
| Above 1000 | 1MHz/1MHz | 15 | Peak, Average |

**A.1.5 Measurement Results**

A "reference path loss" is established and the $A_{Rpl}$ is the attenuation of "reference path loss". It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result = $P_{Mea}$ + $A_{Rpl}$ = $P_{Mea}$ + $G_A$ + $G_{PL}$

Where

   $G_A$: Antenna factor of receive antenna

   $G_{PL}$: Path Loss

   $P_{Mea}$: Measurement result on receiver.

Measurement uncertainty (worst case):

30MHz-1GHz：$U$ = 4.86 dB, $k$=2,

1GHz-18GHz：$U$ = 5.26 dB, $k$=2

.

**Measurement results for Set.1**:

**Charging Mode/Average detector**

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) |
|---|---|---|---|---|---|---|---|
| 17804.250 | 41.3 | -23.1 | 41.0 | 23.445 | 54.0 | 12.7 | V |
| 17806.500 | 41.2 | -23.0 | 41.0 | 23.290 | 54.0 | 12.8 | H |
| 17811.000 | 41.0 | -23.0 | 41.0 | 23.040 | 54.0 | 13.0 | V |
| 17805.000 | 40.9 | -23.1 | 41.0 | 23.048 | 54.0 | 13.1 | H |
| 17803.500 | 40.9 | -23.1 | 41.0 | 23.053 | 54.0 | 13.1 | V |
| 17823.750 | 40.9 | -23.2 | 40.9 | 23.145 | 54.0 | 13.1 | H |

**Charging Mode/Peak detector**

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Limit (dBμV/m) | Margin (dB) | Antenna Pol. (H/V) |
|---|---|---|---|---|---|---|---|
| 17797.500 | 53.0 | -23.2 | 41.0 | 35.218 | 74.0 | 21.0 | V |
| 17805.750 | 52.9 | -23.1 | 41.0 | 34.950 | 74.0 | 21.1 | H |
| 17812.500 | 52.6 | -23.0 | 40.9 | 34.673 | 74.0 | 21.4 | V |
| 17806.500 | 52.0 | -23.0 | 41.0 | 34.101 | 74.0 | 22.0 | V |
| 17793.000 | 51.9 | -23.3 | 41.0 | 34.239 | 74.0 | 22.1 | H |
| 17847.000 | 51.9 | -23.5 | 40.9 | 34.461 | 74.0 | 22.1 | H |

**Measurement results for Set.2**:

**USB Mode/Average detector**

| Frequency (MHz) | Measurement Result (dBµV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBµV) | Limit (dBµV/m) | Margin (dB) | Antenna Pol. (H/V) |
|---|---|---|---|---|---|---|---|
| 17808.750 | 41.5 | -23.0 | 41.0 | 23.553 | 54.0 | 12.5 | H |
| 17802.000 | 41.3 | -23.1 | 41.0 | 23.432 | 54.0 | 12.7 | V |
| 17798.250 | 41.2 | -23.2 | 41.0 | 23.421 | 54.0 | 12.8 | V |
| 17793.750 | 41.2 | -23.2 | 41.0 | 23.483 | 54.0 | 12.8 | H |
| 17801.250 | 41.2 | -23.1 | 41.0 | 23.360 | 54.0 | 12.8 | H |
| 17797.500 | 41.2 | -23.2 | 41.0 | 23.410 | 54.0 | 12.8 | V |

**USB Mode/Peak detector**

| Frequency (MHz) | Measurement Result (dBµV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBµV) | Limit (dBµV/m) | Margin (dB) | Antenna Pol. (H/V) |
|---|---|---|---|---|---|---|---|
| 17816.250 | 54.0 | -23.1 | 40.9 | 36.147 | 74.0 | 20.0 | H |
| 17794.500 | 53.1 | -23.2 | 41.0 | 35.389 | 74.0 | 20.9 | H |
| 17801.250 | 52.7 | -23.1 | 41.0 | 34.900 | 74.0 | 21.3 | V |
| 17790.750 | 52.5 | -23.3 | 41.0 | 34.874 | 74.0 | 21.5 | H |
| 17814.750 | 52.4 | -23.1 | 40.9 | 34.557 | 74.0 | 21.6 | H |
| 17810.250 | 52.4 | -23.0 | 41.0 | 34.485 | 74.0 | 21.6 | V |

**Sample calculation: Average detector , 17816.250MHz**

**Result = $P_{Mea} + A_{Rpl} = P_{Mea}$(36.147 dBuV) + $G_A$ (40.9dB/m)+ $G_{PL}$ (-23.1dB) = 54.0dBuV/m**

**Charging Mode, Set.1**
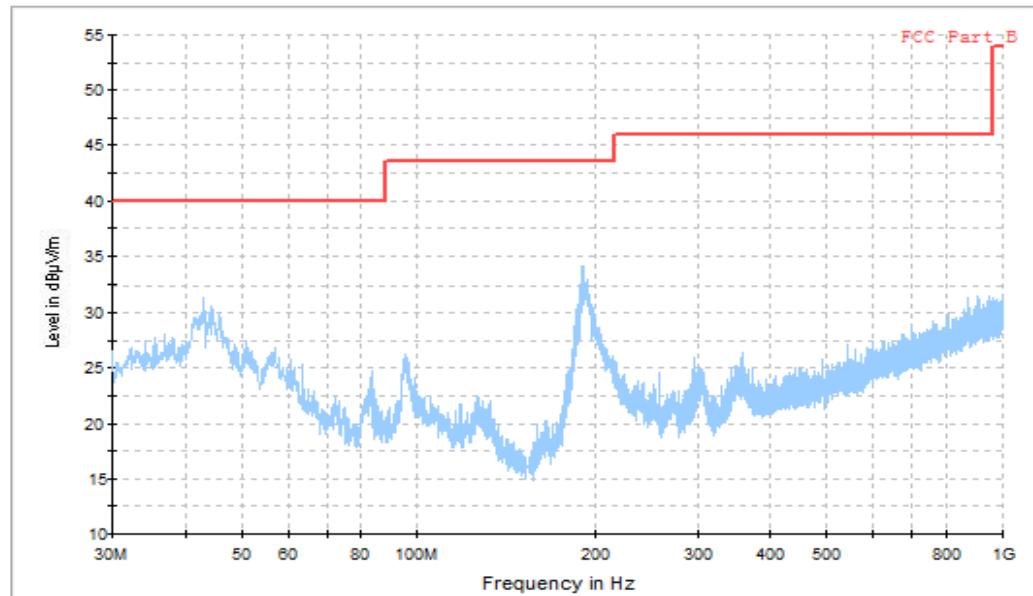


**Fig.1   Radiated Emission from 30MHz to 1GHz**



**Fig.2   Radiated Emission from 1GHz to 3GHz**

15b RE - 3GHz-18GHz
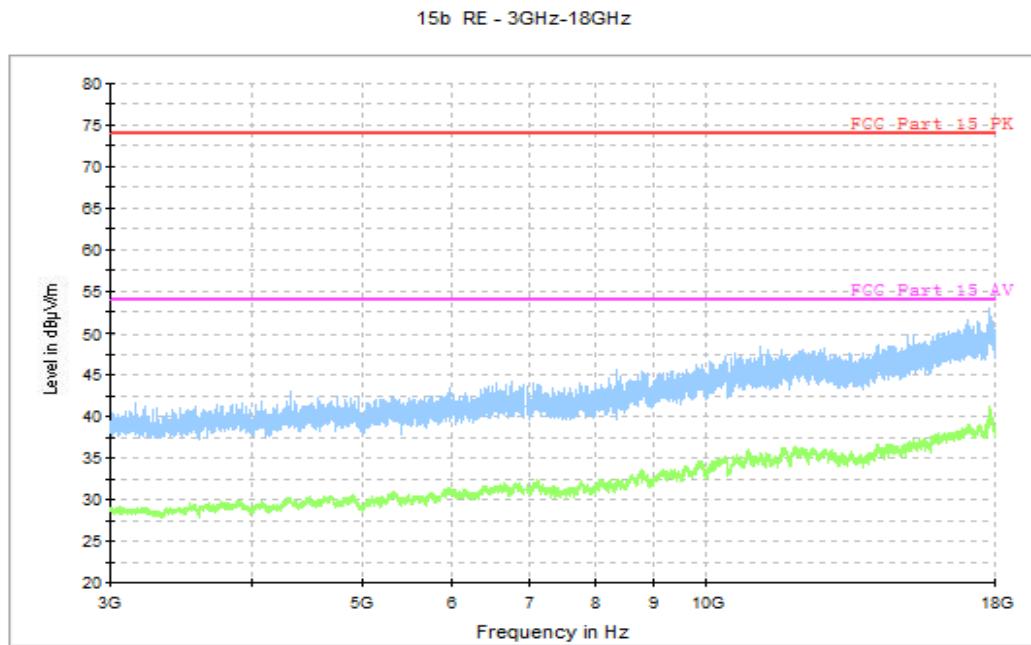


**Fig.3   Radiated Emission from 3GHz to 18GHz**

**USB Mode, Set.2**

15B RE 30MHz-1GHz
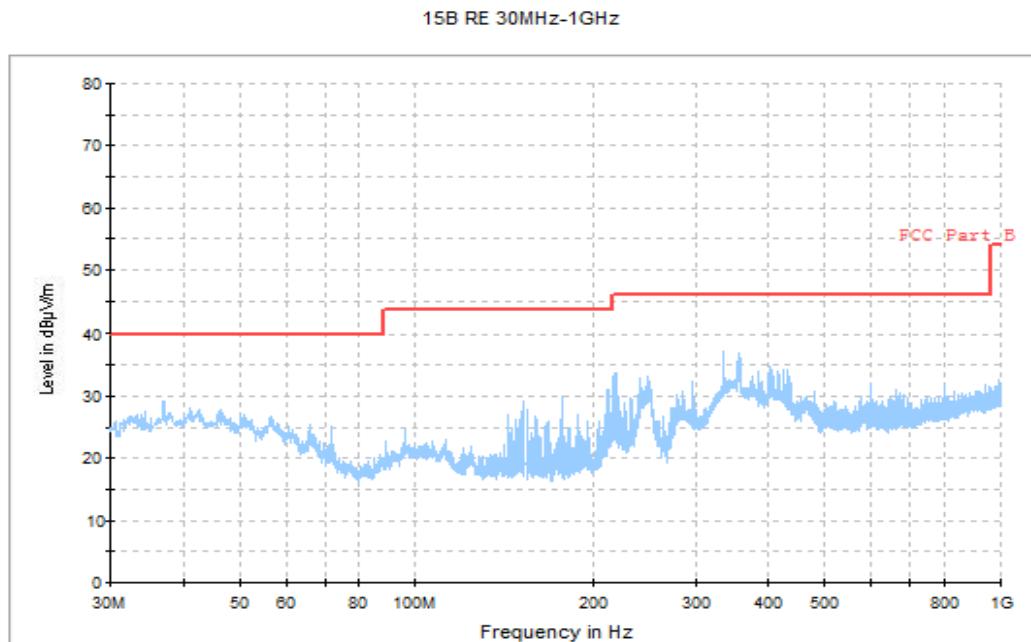


**Fig.4   Radiated Emission from 30MHz to 1GHz**

15B RE - 1GHz-3GHz
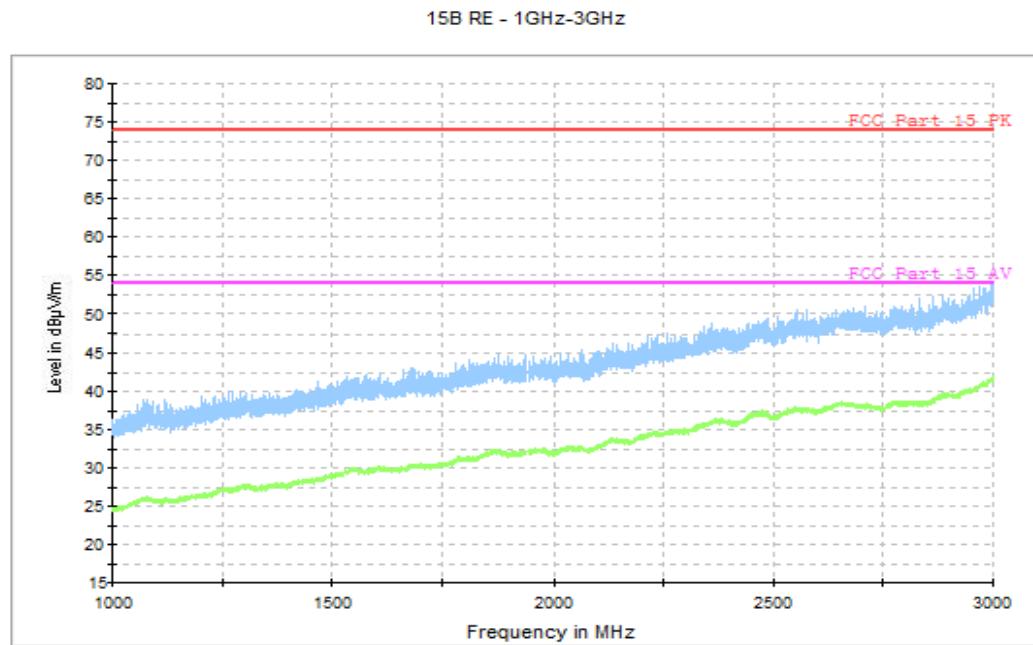


**Fig.5   Radiated Emission from 1GHz to 3GHz**

15b  RE - 3GHz-18GHz
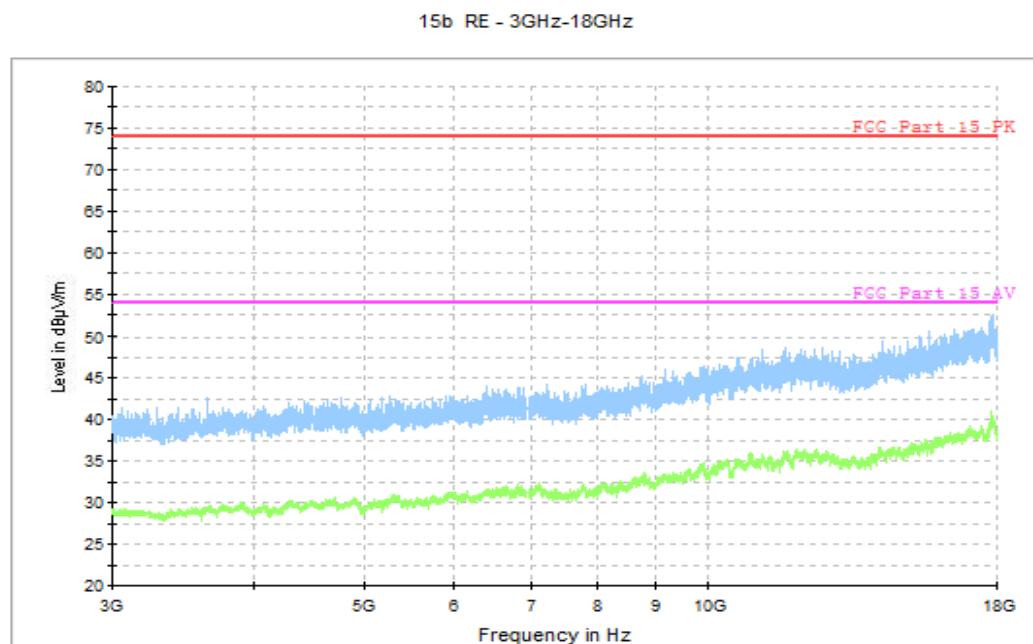


**Fig.6   Radiated Emission from 3GHz to 18GHz**

**A.2 Conducted Emission (§15.107(a))**

**A.2.1 Method of measurement**

For equipment 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 or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 - 2014, section 7.2.

**A.2.2 EUT Operating Mode**

The MS is operating in charging mode. During the test MS is connected to a charger in the case of charging mode.

**A.2.3 Measurement Limit**

| Frequency of emission (MHz) | Conducted limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56* | 56 to 46* |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |
| *Decreases with the logarithm of the frequency | | |

**A.2.4 Test Condition in charging mode**

| Voltage（V） | Frequency（Hz） |
|---|---|
| 120 | 60 |

| RBW/IF bandwidth | Sweep Time(s) |
|---|---|
| 9kHz | 1 |

### A.2.5 Measurement Results

Measurement uncertainty: $U$= 3.38 dB, $k$=2.

**Charging Mode, Set.1**
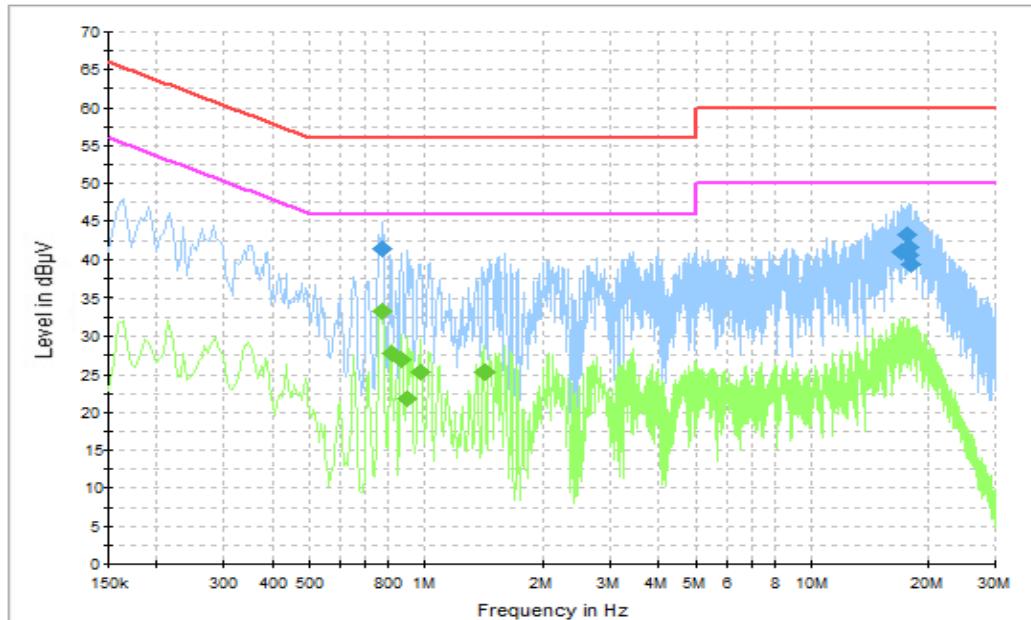


**Fig.7   Conducted Emission**

## Final Result 1

| Frequency | QuasiPeak | PE | Line | Corr. | Margin | Limit |
|---|---|---|---|---|---|---|
| (MHz) | (dBµV) | | | (dB) | (dB) | (dBµV) |
| 0.775500 | 41.4 | GND | L1 | 10.7 | 14.6 | 56.0 |
| 17.101500 | 41.0 | GND | L1 | 11.2 | 19.0 | 60.0 |
| 17.772000 | 43.2 | GND | L1 | 11.2 | 16.8 | 60.0 |
| 17.826000 | 41.7 | GND | L1 | 11.2 | 18.3 | 60.0 |
| 17.997000 | 40.6 | GND | L1 | 11.2 | 19.4 | 60.0 |
| 18.051000 | 39.4 | GND | L1 | 11.2 | 20.6 | 60.0 |

## Final Result 2

| Frequency | Average | PE | Line | Corr. | Margin | Limit |
|---|---|---|---|---|---|---|
| (MHz) | (dBµV) | | | (dB) | (dB) | (dBµV) |
| 0.775500 | 33.3 | GND | L1 | 10.7 | 12.7 | 46.0 |
| 0.816000 | 27.9 | GND | L1 | 10.7 | 18.1 | 46.0 |
| 0.870000 | 27.0 | GND | L1 | 10.7 | 19.0 | 46.0 |
| 0.901500 | 21.9 | GND | L1 | 10.7 | 24.1 | 46.0 |
| 0.973500 | 25.2 | GND | L1 | 10.7 | 20.8 | 46.0 |
| 1.414500 | 25.3 | GND | L1 | 10.7 | 20.7 | 46.0 |

**USB Mode, Set.2**
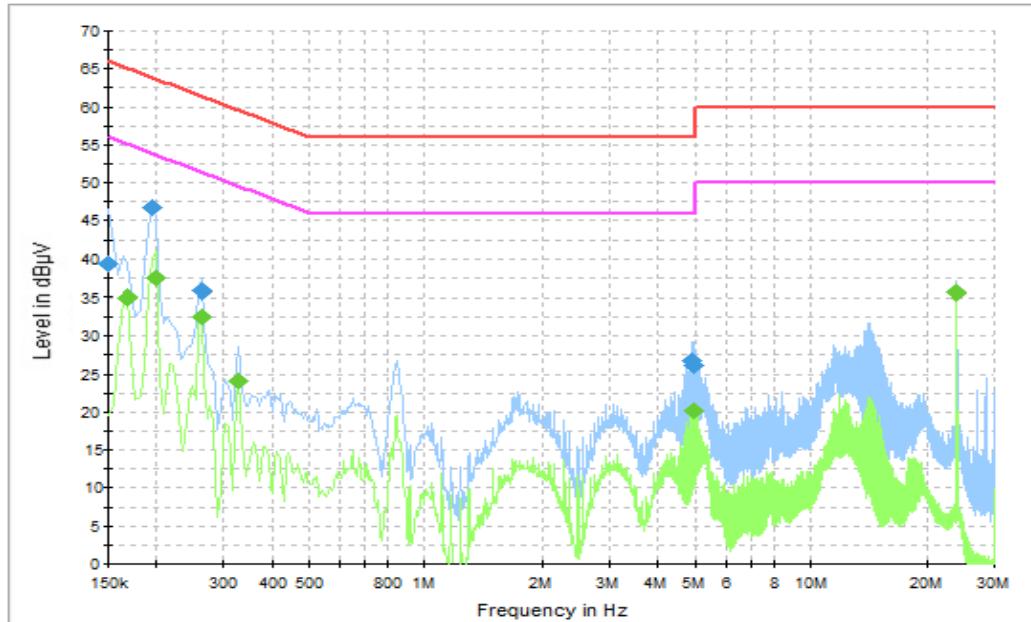


**Fig.8   Conducted Emission**

## Final Result 1

| Frequency | QuasiPeak | PE | Line | Corr. | Margin | Limit |
|-----------|-----------|-----|------|-------|--------|-------|
| (MHz) | (dBμV) | | | (dB) | (dB) | (dBμV) |
| 0.150000 | 39.3 | GND | N | 10.6 | 26.7 | 66.0 |
| 0.195000 | 46.8 | GND | L1 | 10.7 | 17.0 | 63.8 |
| 0.262500 | 35.9 | GND | L1 | 10.7 | 25.4 | 61.4 |
| 4.888500 | 26.7 | GND | L1 | 10.8 | 29.3 | 56.0 |
| 4.956000 | 26.1 | GND | L1 | 10.8 | 29.9 | 56.0 |
| 23.968500 | 35.6 | GND | L1 | 11.2 | 24.4 | 60.0 |

## Final Result 2

| Frequency | Average | PE | Line | Corr. | Margin | Limit |
|-----------|---------|-----|------|-------|--------|-------|
| (MHz) | (dBμV) | | | (dB) | (dB) | (dBμV) |
| 0.168000 | 34.9 | GND | L1 | 10.6 | 20.1 | 55.1 |
| 0.199500 | 37.5 | GND | L1 | 10.7 | 16.2 | 53.6 |
| 0.262500 | 32.6 | GND | L1 | 10.7 | 18.8 | 51.4 |
| 0.325500 | 24.1 | GND | L1 | 10.7 | 25.4 | 49.6 |
| 4.956000 | 20.1 | GND | L1 | 10.8 | 25.9 | 46.0 |
| 23.968500 | 35.7 | GND | L1 | 11.2 | 14.3 | 50.0 |

**\*\*\*END OF REPORT\*\*\***