



TEST REPORT

No. I17Z60314-EMC04

for

HMD Global Oy

Smart Phone

Model Name: TA-1033

FCC ID: 2AJOTTA-1033

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
I17Z60314-EMC04	Rev.0	1st edition	2017-04-15



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1. Test Laboratory

1.1. Testing Location

CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-04-11

Testing End Date: 2017-04-12

1.4. Signature



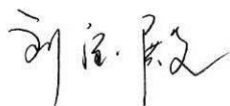
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2. Client Information

2.1. Applicant Information

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2.2. Manufacturer Information

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City: Espoo
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Smart Phone
Model Name	TA-1033
FCC ID	2AJOTTA-1033
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-1033 manufactured by HMD Global Oy. is a variant model based on TA-1021 for conformance test. According to the declaration of changes, results are inherited from the initial model. The report number of initial model is I17Z60076-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; 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; 1MHz—1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω



6. SUMMARY OF TEST RESULTS

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	ESC17	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 ($\mu\text{V}/\text{m}$)		
	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:

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

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 (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/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 (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/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

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

Charging Mode, Set.1

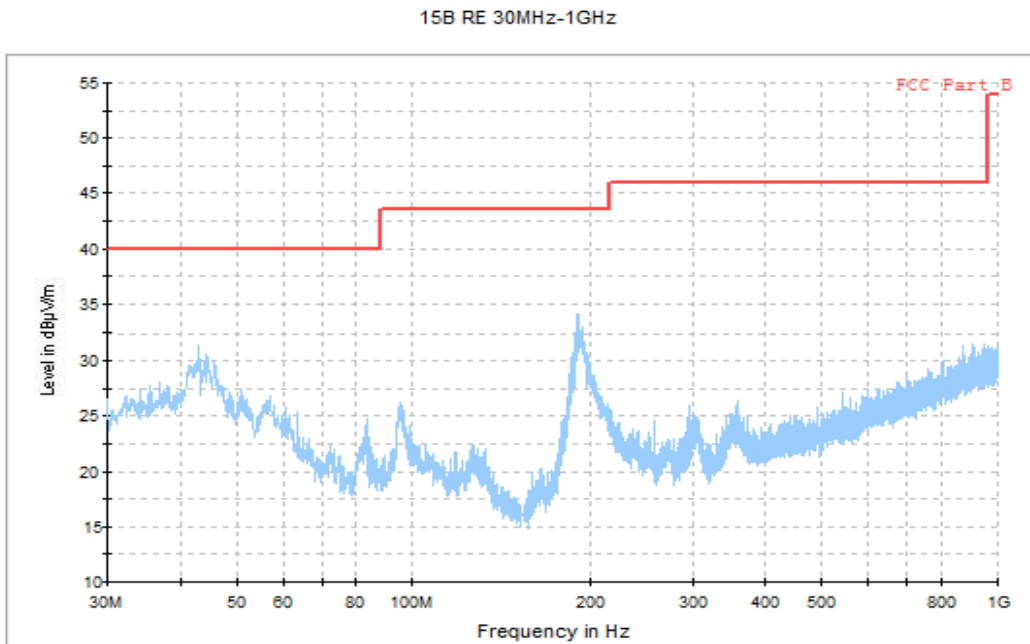


Fig.1 Radiated Emission from 30MHz to 1GHz

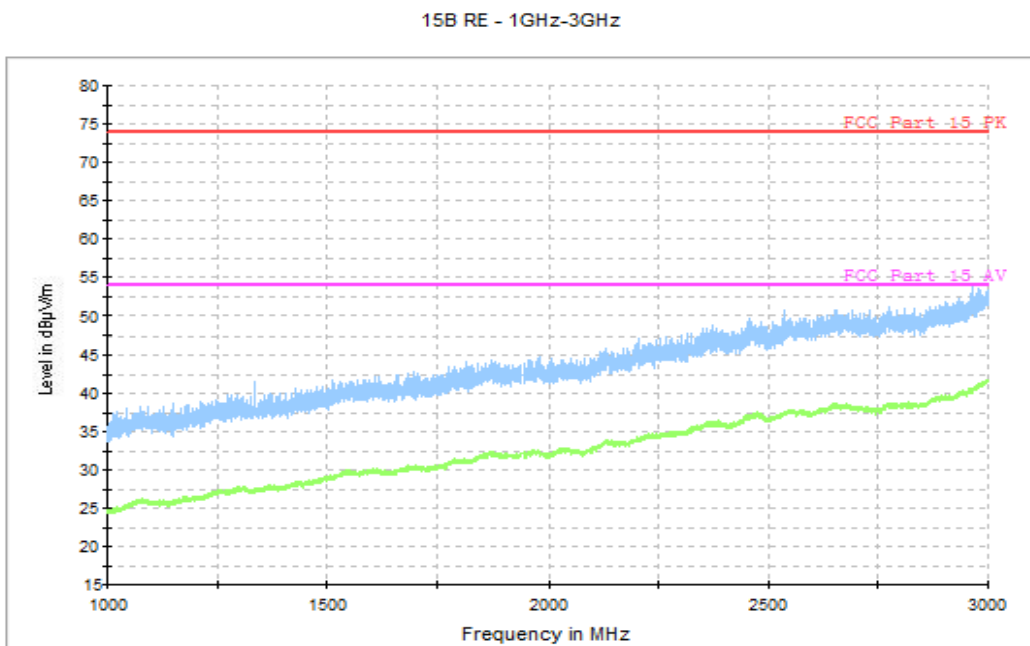


Fig.2 Radiated Emission from 1GHz to 3GHz

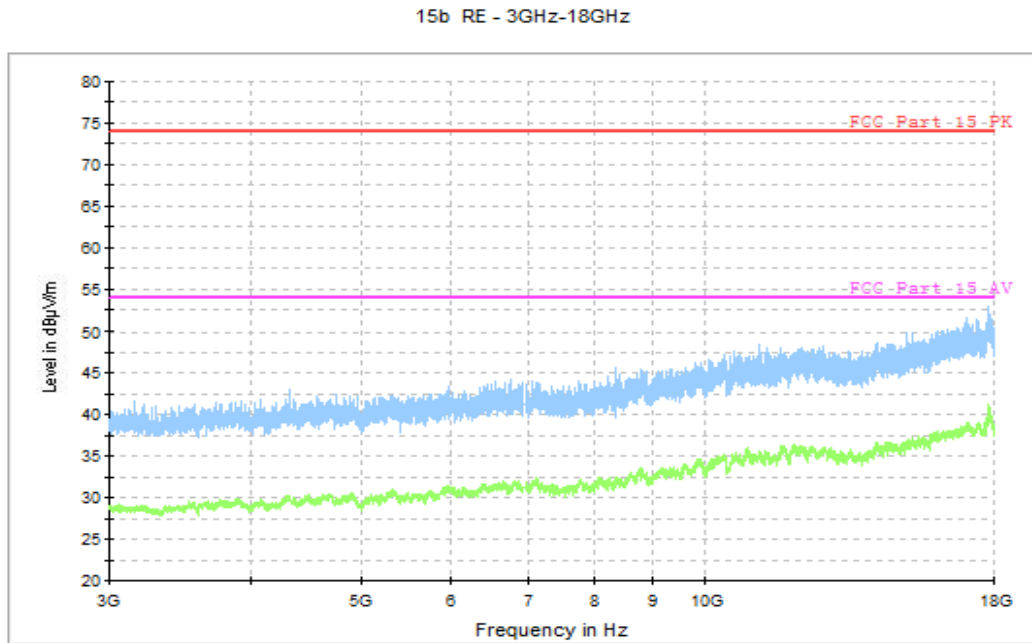


Fig.3 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.2

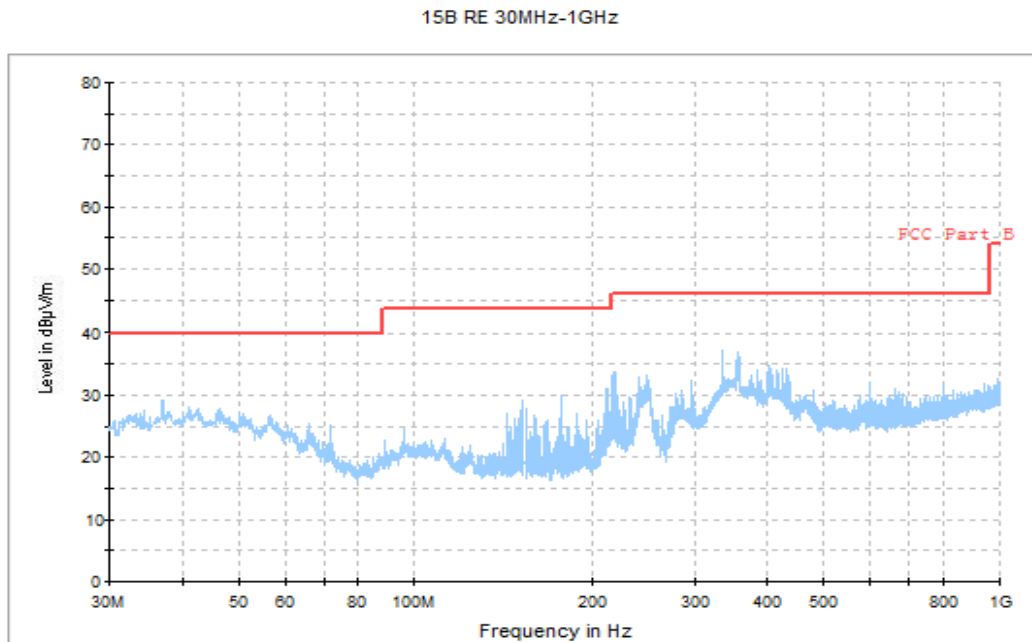


Fig.4 Radiated Emission from 30MHz to 1GHz

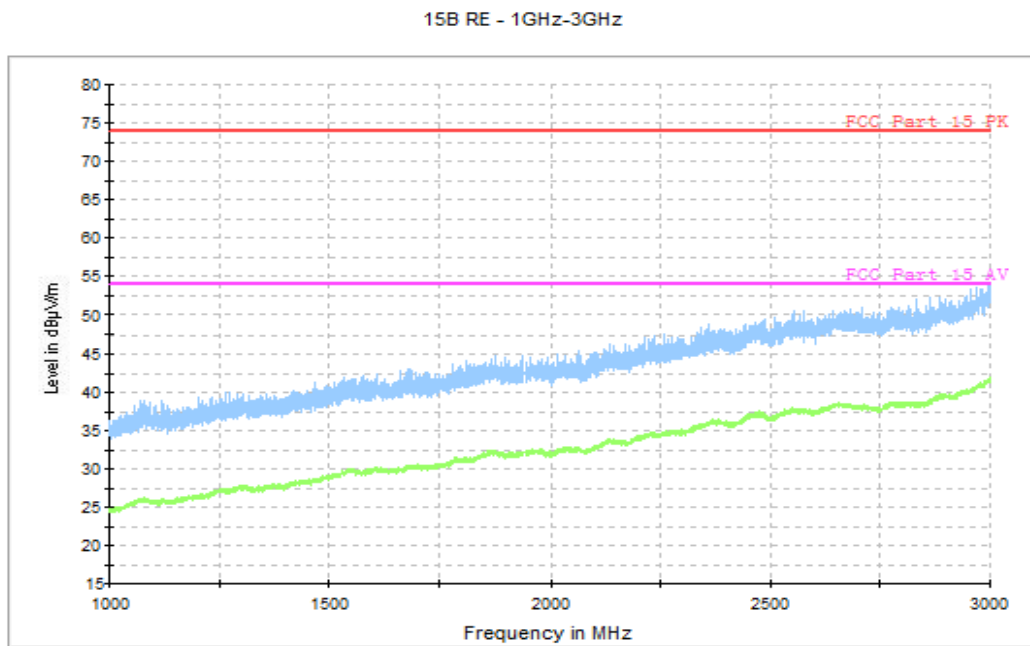


Fig.5 Radiated Emission from 1GHz to 3GHz

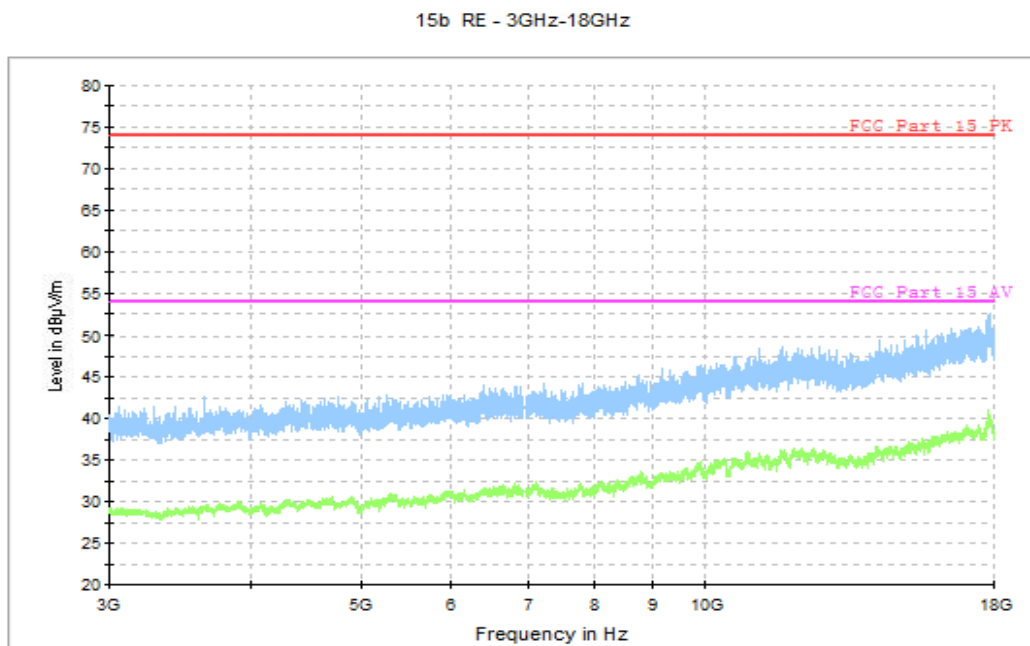


Fig.6 Radiated Emission from 3GHz to 18GHz

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 (dB μ V)	
	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

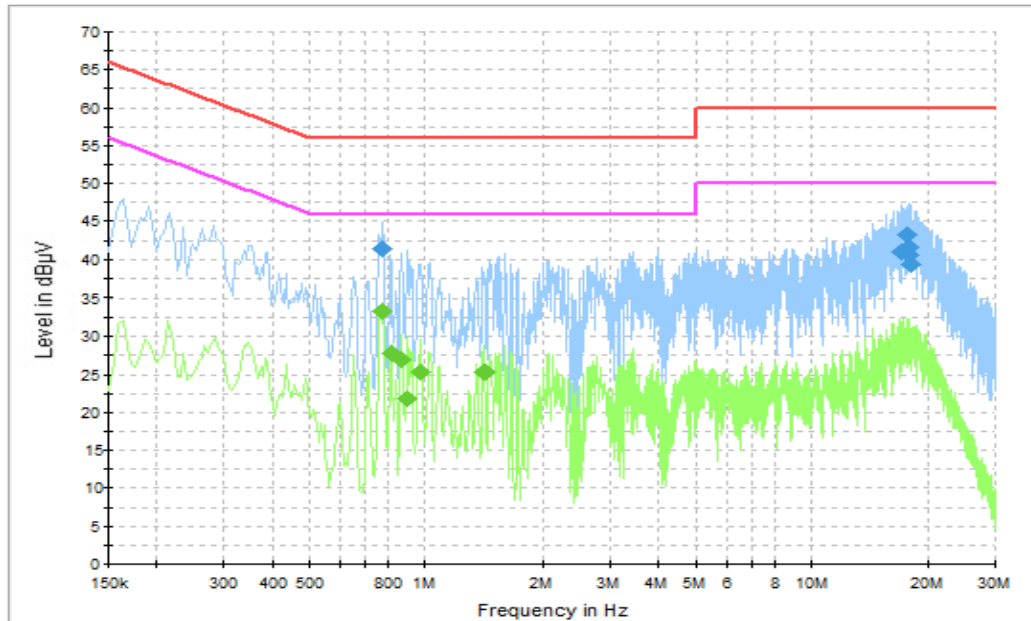


Fig.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (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 (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (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

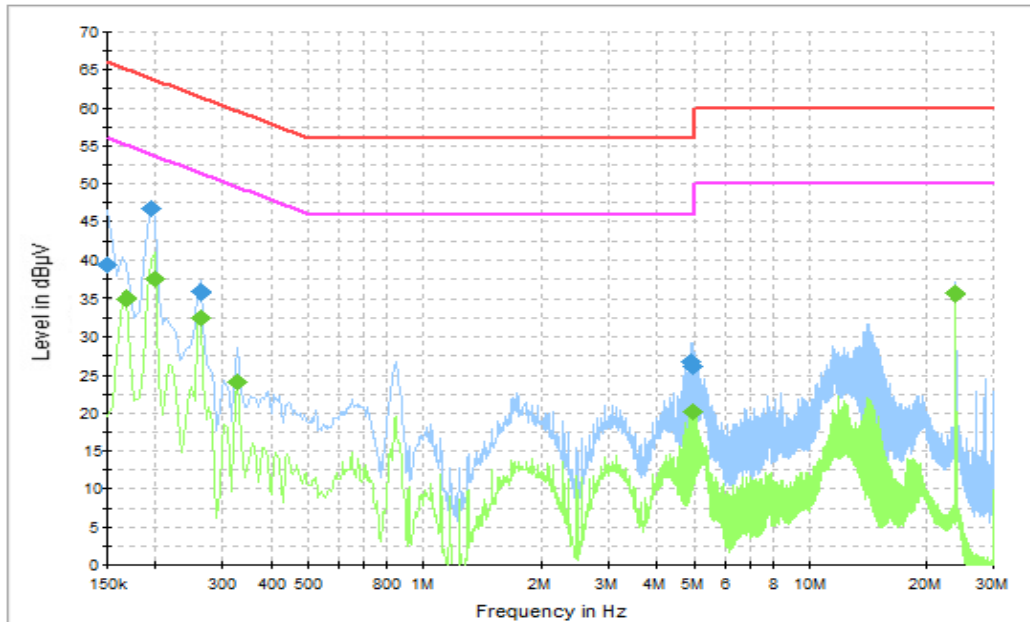


Fig.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (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 (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (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