



TEST REPORT

No. I18Z60820-EMC04

for

Wingtech Group (Hong Kong) Limited

Muti-band GSM/WCDMA/LTE phone with Bluetooth.WLAN

Model Name: VFD 525

FCC ID: 2APXWVFD525

with

Hardware Version: 88909_1_12

Software Version: VFD-525-ZA-B23

Issued Date: 2018-06-13



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.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60820-EMC04	Rev.0	1 st edition	2018-06-13

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1. Test Laboratory

1.1. Testing Location

Location1: CTTL(huayuan North Road)

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

Location2: CTTL (BDA)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development
Area, Beijing, P. R. China 100176

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2018-05-28

Testing End Date: 2018-06-10

1.4. Signature



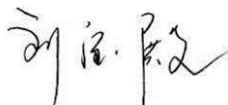
Li Yan

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: Wingtech Group (Hong Kong) Limited
Address /Post: Flat/RM 1903, 19/F, Podium Plaza 5 Hanoi Road, Tsim Sha Tsui
Kowloon, Hong Kong
City: Hong Kong
Postal Code: /
Country: /
Telephone: /
Fax: /

2.2. Manufacturer Information

Company Name: Wingtech Group (Hong Kong) Limited
Address /Post: Flat/RM 1903, 19/F, Podium Plaza 5 Hanoi Road, Tsim Sha Tsui
Kowloon, Hong Kong
City: Hong Kong
Postal Code: /
Country: /
Telephone: /
Fax: /

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

3.1. About EUT

Description	Muti-band GSM/WCDMA/LTE phone with Bluetooth.WLAN
Model Name	VFD 525
FCC ID	2APXWVFD525
Extreme vol. Limits	3.6VDC to 4.4VDC (nominal: 3.85VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, CAICT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	356984090009056	88909_1_12	VFD-525-ZA-B23

*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	/	/
AE2	USB Cable	/	/
AE3	Charger	/	/

AE1

Model	88909
Manufacturer	Jiade Energy Technology (Zhuhai) Co., Ltd.
Capacitance	2800 mAh
Nominal voltage	3.85V

AE2

Model	SWT-A086A
Manufacturer	Saibao(Jiangxi) Communication Industrial Co.,Ltd
Length	/

AE3

Model	A103A-050100U-US1
Manufacturer	DongGuan AoHai Power Technology Co., Ltd
Length	/

*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.1	EUT3+AE1+AE2+AE3	Charger
Set.2	EUT3+AE1+AE2	USB mode

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	2016
ANSI C63.4	American National Standard for 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 have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) 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, 10 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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) 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, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
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

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	A.1	P	CTTL(BDA)
2	Conducted Emission	15.107(a)	A.2	P	CTTL(BDA)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100376	R&S	2018-12-17	1 year
2	Test Receiver	ESCI 3	100766	Rohde & Schwarz	2019-04-16	1 year
3	Universal Radio Communication Tester	CMW500	159408	R&S	2019-04-12	1 year
4	LISN	ESH3-Z5	825562/028	Rohde & Schwarz	2019-01-31	1 year
5	EMI Antenna	VULB9163	9163-514	Schwarzbeck	2020-02-03	3 years
6	EMI Antenna	3117	00139065	ETS-Lindgren	2020-11-15	3 years
7	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
10	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

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

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (USB mode of MS and charging mode of MS) at distances of 3 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 the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit ($\mu\text{V/m}$)		
	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: 5.4dB, 1GHz-18GHz: 4.32dB, $k=2$.

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)
16804.500	38.3	-26.1	41.5	23.01	54.0	15.7	H
16809.000	38.3	-26.1	41.5	22.97	54.0	15.7	H
17993.250	38.2	-25.1	40.8	22.49	54.0	15.8	V
16808.250	38.2	-26.1	41.5	22.82	54.0	15.8	V
16790.250	38.2	-26.2	41.5	22.86	54.0	15.8	V
16809.750	38.1	-26.1	41.5	22.79	54.0	15.9	V

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)
16409.250	50.7	-25.9	40.9	35.61	74.0	23.3	H
17424.000	50.1	-25.3	41.2	34.28	74.0	23.9	V
16856.250	50.1	-26.0	41.5	34.61	74.0	23.9	H
17649.750	50.1	-25.6	41.1	34.60	74.0	23.9	V
17960.250	50.0	-25.0	40.8	34.17	74.0	24.0	V
16971.000	50.0	-25.6	41.4	34.20	74.0	24.0	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)
5874.750	38.7	-32.2	35.1	35.80	54.0	15.3	V
5875.500	38.6	-32.2	35.1	35.66	54.0	15.4	V
16809.750	38.2	-26.1	41.5	22.84	54.0	15.8	H
16794.750	38.1	-26.2	41.5	22.84	54.0	15.9	V
17971.500	38.1	-25.2	40.8	22.47	54.0	15.9	V
17968.500	38.1	-25.1	40.8	22.40	54.0	15.9	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)
16161.750	50.6	-25.7	40.6	35.70	74.0	23.4	H
17640.750	50.6	-25.8	41.1	35.25	74.0	23.4	H
17735.250	50.5	-24.2	41.0	33.66	74.0	23.5	H
16639.500	50.5	-26.0	41.3	35.09	74.0	23.5	V
17763.000	50.3	-23.8	41.0	33.11	74.0	23.7	H
17836.500	50.1	-23.4	40.9	32.53	74.0	23.9	V

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.1

15B RE 30MHz-1GHz

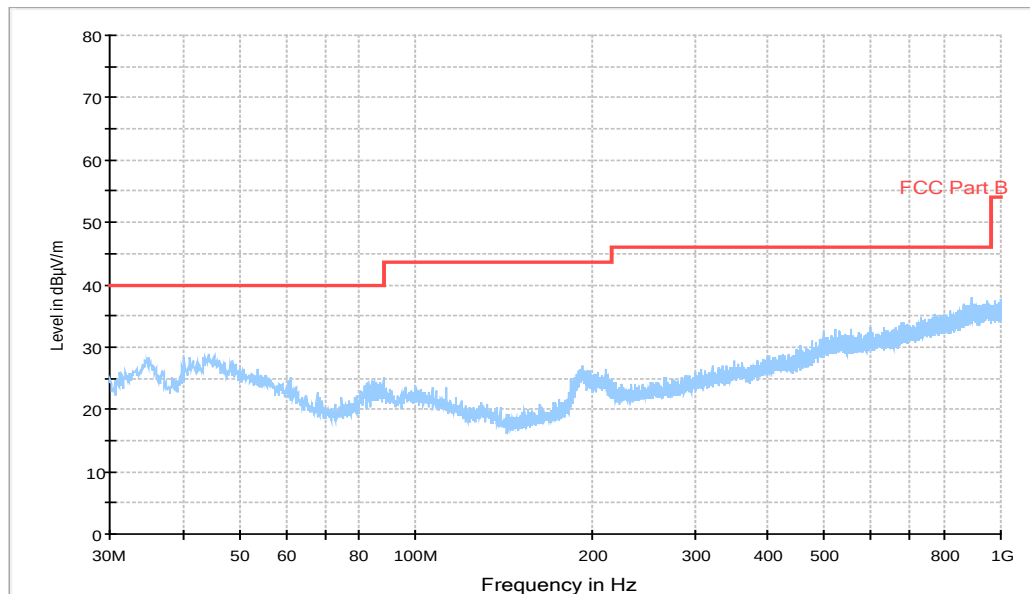


Figure A.1 Radiated Emission from 30MHz to 1GHz

15B RE - 1GHz-3GHz

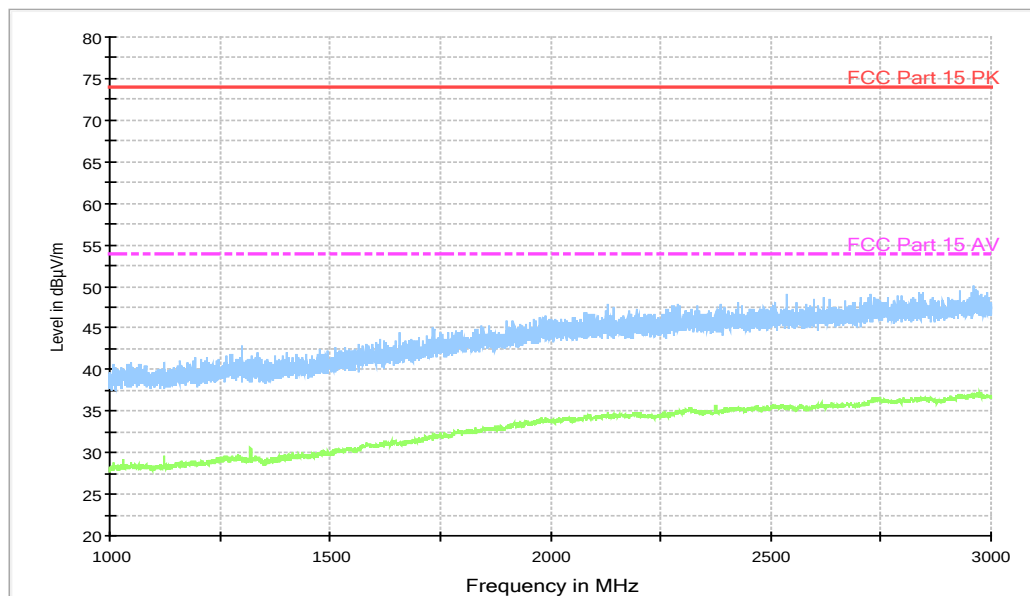


Figure A.2 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

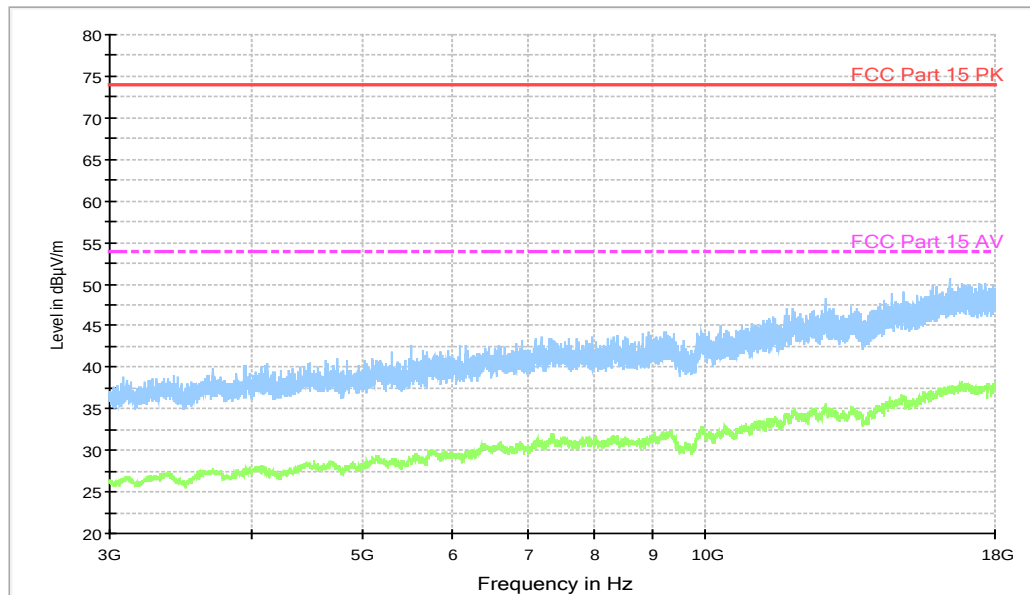


Figure A.3 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.2

15B RE 30MHz-1GHz

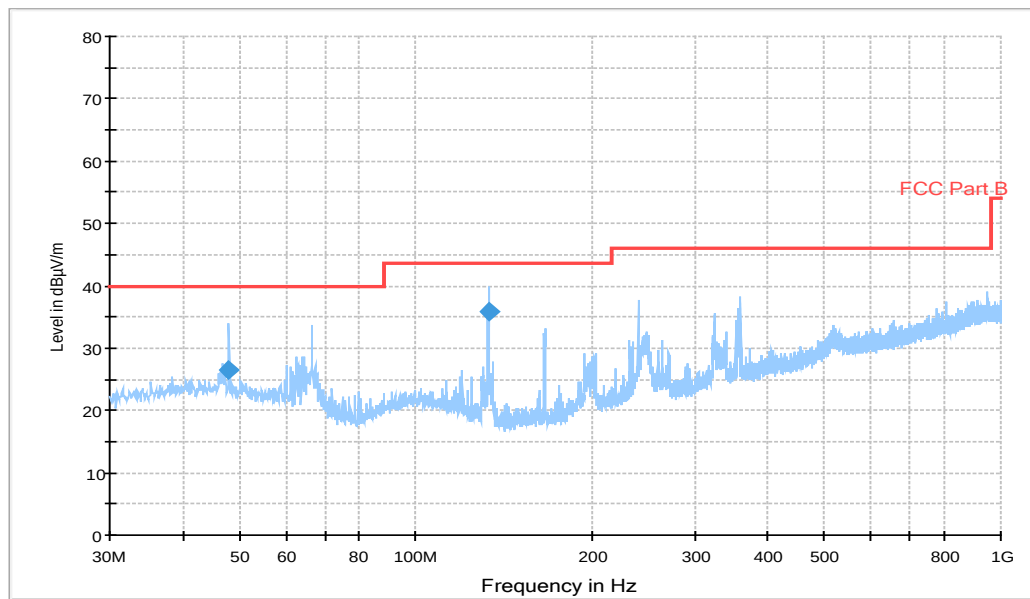


Figure A.4 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
47.945000	26.5	125.0	V	305.0	-0.5	13.5	40.0
133.20800	35.8	125.0	H	270.0	-4.2	7.7	43.5

15B RE - 1GHz-3GHz

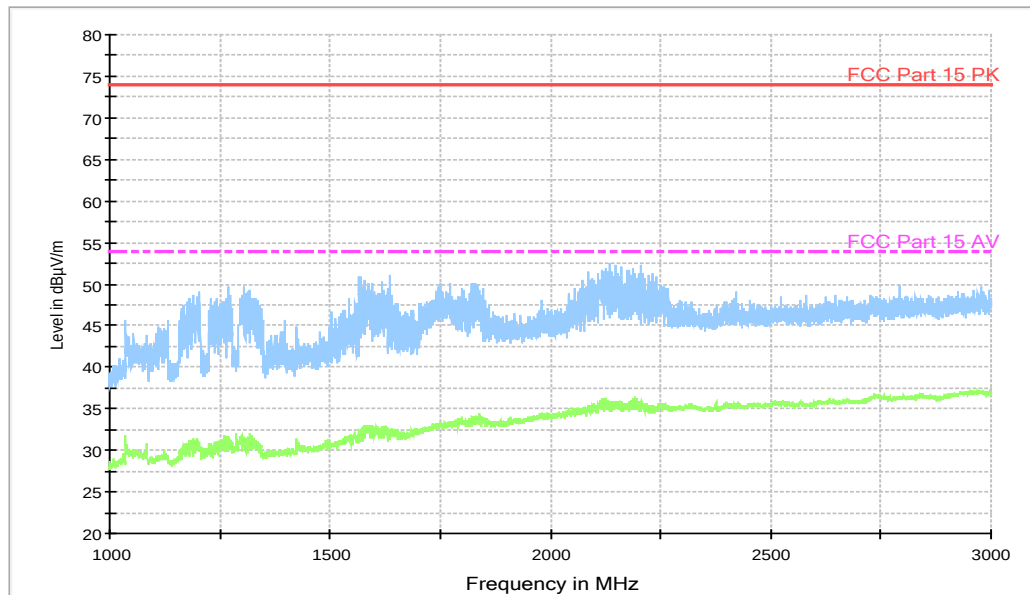


Figure A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

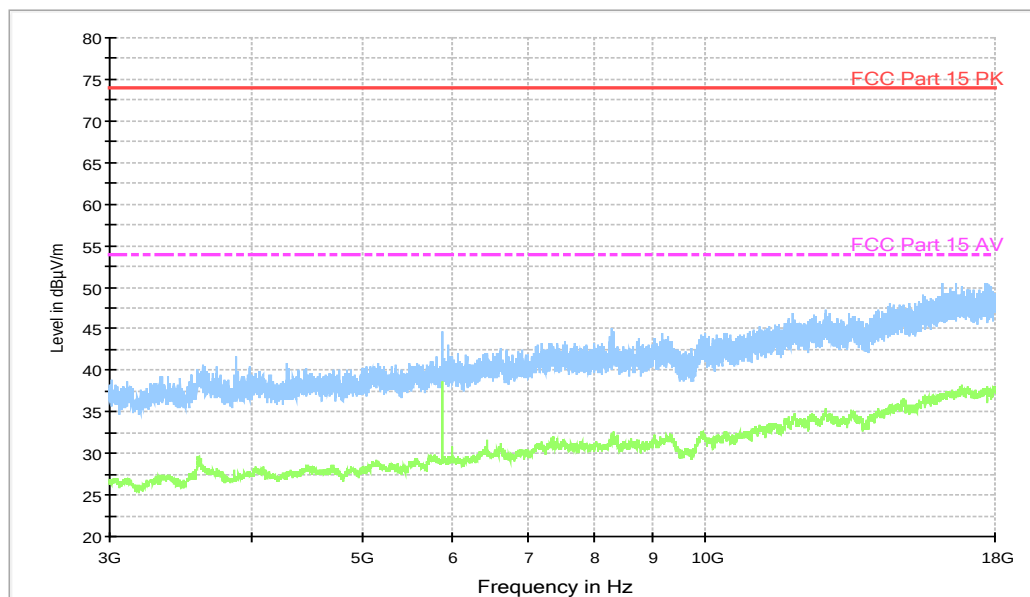


Figure A.6 Radiated Emission from 3GHz to 18GHz

A.2 Conducted Emission

Reference

FCC: CFR Part 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 7.3.

A.2.2 EUT Operating Mode

The MS is operating in the USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note: I/O information: Printer – USB, Mouse – PS/2, Keyboard – USB.

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: $U = 3.1 \text{ dB}$, $k=2$.

Charging Mode, Set.1

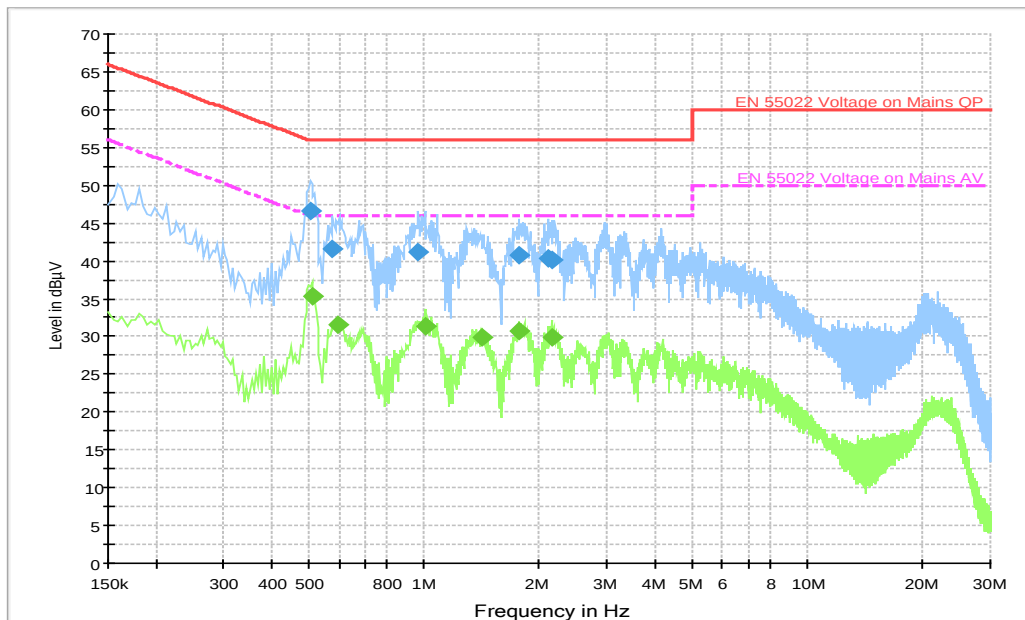


Figure A.5 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.505500	46.5	2000.0	9.000	L1	10.7	9.5	56.0
0.577500	41.5	2000.0	9.000	N	10.7	14.5	56.0
0.964500	41.2	2000.0	9.000	L1	10.8	14.8	56.0
1.770000	40.8	2000.0	9.000	N	10.9	15.2	56.0
2.116500	40.3	2000.0	9.000	N	10.8	15.7	56.0
2.166000	40.1	2000.0	9.000	N	10.7	15.9	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.510000	35.4	2000.0	9.000	L1	10.6	10.6	46.0
0.595500	31.5	2000.0	9.000	N	10.7	14.5	46.0
1.005000	31.2	2000.0	9.000	L1	10.9	14.8	46.0
1.410000	29.8	2000.0	9.000	N	10.7	16.2	46.0
1.770000	30.7	2000.0	9.000	N	10.9	15.3	46.0
2.148000	30.0	2000.0	9.000	N	10.8	16.0	46.0

USB Mode, Set.2

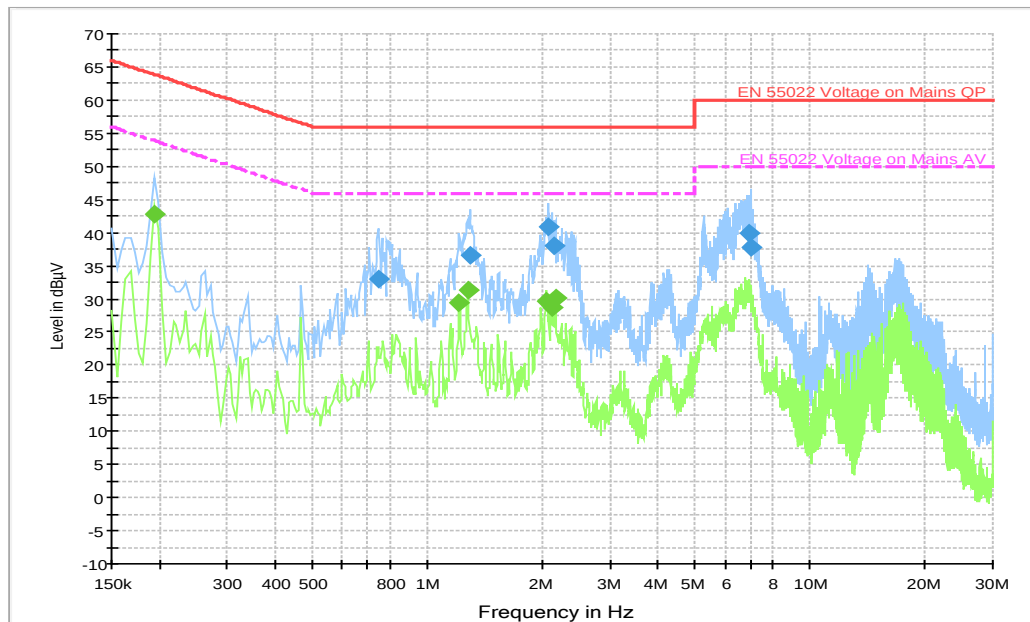


Figure A.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.744000	32.9	2000.0	9.000	L1	10.7	23.1	56.0
1.297500	36.6	2000.0	9.000	N	10.7	19.4	56.0
2.076000	40.8	2000.0	9.000	N	10.9	15.2	56.0
2.143500	38.0	2000.0	9.000	N	10.8	18.0	56.0
6.900000	40.0	2000.0	9.000	L1	10.9	20.0	60.0
7.048500	37.8	2000.0	9.000	N	10.6	22.2	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.195000	42.7	2000.0	9.000	L1	10.8	11.1	53.8
1.212000	29.3	2000.0	9.000	N	10.7	16.7	46.0
1.279500	31.4	2000.0	9.000	L1	10.7	14.6	46.0
2.049000	29.6	2000.0	9.000	L1	10.5	16.4	46.0
2.112000	28.7	2000.0	9.000	L1	10.4	17.3	46.0
2.170500	30.0	2000.0	9.000	N	10.7	16.0	46.0

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