



TEST REPORT

No. I19Z70275-EMC01

for

Samsung Electronics Co., Ltd.

Mobile phone

Model Name: SM-A015M/DS, SM-A015M

FCC ID: ZCasma015M

with

Hardware Version: REV1.0

Software Version: A015M.001(A015MUBE0ASJ4)

Issued Date: 2019-11-08

Note:

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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
I19Z70275-EMC01	Rev.0	1 st edition	2019-11-08

Note: the latest revision of the test report supersedes all previous versions.

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

2. Test Laboratory

2.1. Testing Location

CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China100191

2.2. Testing Environment

Normal Temperature: 15-35℃
Relative Humidity: 20-75%

2.3. Project data

Testing Start Date: 2019-09-26
Testing End Date: 2019-11-15

2.4. Signature



Wang Junqing
(Prepared this test report)



Zhang Ying
(Reviewed this test report)



Liu Baodian
Deputy Director of the laboratory
(Approved this test report)

3. Client Information

3.1. Applicant Information

Company Name: Samsung Electronics. Co., Ltd.
Address /Post: R5, A Tower 22 Floor A-1 ,(Maetan dong) 129, Samsung-ro,
Yeongtong-gu, Suwon-Si, Gyeonggi-do 16677, Korea
City: /
Postal Code: 16677
Country: Korea
Contact Person JP KIM
Contact Email jp426.kim@samsung.com
Telephone: +82-10-4376-0326
Fax: /

3.2. Manufacturer Information

Company Name: HUAQIN TELECOM HONG KONG LIMITED
Address /Post: FLAT/RM 510 5/F LINCOLN CENTER,20 YIP FUNG STREET
FANLING NT,HONG KONG
City: Hong Kong
Postal Code: /
Contact Person Dongling Li
Contact Email lidongling@huaqin.com
Country: P.R. China
Telephone: +86 13632958367

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

4.1. About EUT

Description	Mobile phone
Model Name	SM-A015M/DS, SM-A015M
FCC ID	ZCASMA015M
Extreme vol. Limits	3.6VDC to 4.2VDC (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.

4.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	359771100012056/	REV1.0	A015M.001(A015MUBE0ASJ4)
	359772100012054		

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

4.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Battery	/	/
AE2	Battery	/	/
AE3	Charger	/	/
AE4	Charger	/	/
AE5	USB Cable	/	/
AE6	Headset	/	/

AE1

Model	QL1695
Manufacturer	Ningde Amperex Technology Limited
Capacitance	2920mAh/3000mAh
Nominal voltage	3.85 V

AE2

Model	QL1695
Manufacturer	SCUD(Fujian) Electronics Co., Ltd.
Capacitance	2920mAh/3000mAh
Nominal voltage	3.85 V

AE3

Model	ETA0U83EWE
Manufacturer	Samsung Electronics Co., Ltd
Length of cable	/

AE4

Model	ETA0U83JWS
Manufacturer	Samsung Electronics Co., Ltd
Length of cable	/



AE5

Model	ECB-DU68WE
Manufacturer	SHENGHUA
Length of cable	95cm

AE6

Model	EHS61ASFWE
Manufacturer	/
Length of cable	/

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

Note: The USB cables are shielded.

4.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1/AE2+ AE4+ AE5+ AE6	Charger +FM
Set.2	EUT1+ AE1/AE2+ AE5	USB mode

Note: Mobile phone, SM-A015M/DS and SM-A015M are manufactured by Samsung Electronics Co., Ltd. And according to the declaration of changes, only one model needs to be tested.

5. Reference Documents

5.1. 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.

6. 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

7. 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(huayuan North Road)
2	Conducted Emission	15.107(a)	A.2	P	CTTL(huayuan North Road)

8. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2020-03-01	1 Year
2	Test Receiver	ESC13	100344	R&S	2020-02-14	1 Year
3	Universal Radio Communication Tester	CMW500	150344	R&S	2019-12-27	1 year
4	Universal Radio Communication Tester	CMW500	116588	R&S	2019-12-26	1 year
5	LISN	ENV216	101200	R&S	2020-03-14	1 year
6	Signal Power	SMBV100A	260613	R&S	2019-12-27	1 year
7	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2020-08-20	1 year
7	EMI Antenna	3115	6914	ETS-Lindgren	2020-01-03	1 year
8	PC	M4000E-17	M706GWXD	LENOVO	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A

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 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 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 M4000E-17, and the serial number of the PC is M706GWXD. 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 ($\mu\text{V}/\text{m}$)		
	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): $U = 5.44 \text{ dB}$, $k=2$.

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)	Antenna Pol. (H/V)
17943.333	46.3	-5.4	33.8	17.916	H
17938.800	46.3	-5.4	33.8	17.916	H
17942.200	46.2	-5.4	33.8	17.816	V
17953.533	45.9	-5.4	33.8	17.516	H
17955.233	45.8	-5.4	33.8	17.416	H
17954.100	45.8	-5.4	33.8	17.416	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)	Antenna Pol. (H/V)
17960.900	57.6	-5.4	33.8	29.216	H
17804.500	57.6	-5.7	33.8	29.538	H
17514.933	57.3	-5.9	33.8	29.425	V
17822.633	57.3	-5.7	33.8	29.238	H
17901.967	57.3	-5.7	33.8	29.238	H
17840.767	57.1	-5.7	33.8	29.038	H

Measurement results for Set.2:
USB Mode/Average detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
17957.500	46.2	-5.4	33.8	17.816	H
17949.000	46.0	-5.4	33.8	17.616	H
17834.533	45.9	-5.7	33.8	17.838	V
17824.333	45.9	-5.7	33.8	17.838	H
17945.033	45.8	-5.4	33.8	17.416	H
17928.033	45.7	-5.4	33.8	17.316	H

USB Mode/ Peak detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Antenna Pol. (H/V)
17870.233	57.3	-5.7	33.8	29.238	H
17950.133	57.2	-5.4	33.8	28.816	H
17949.567	57.2	-5.4	33.8	28.816	V
17718.933	57.0	-6.9	33.8	30.102	H
17686.633	56.8	-6.9	33.8	29.902	H
17947.300	56.8	-5.4	33.8	28.416	H

Charging Mode, Set.1

Full Spectrum

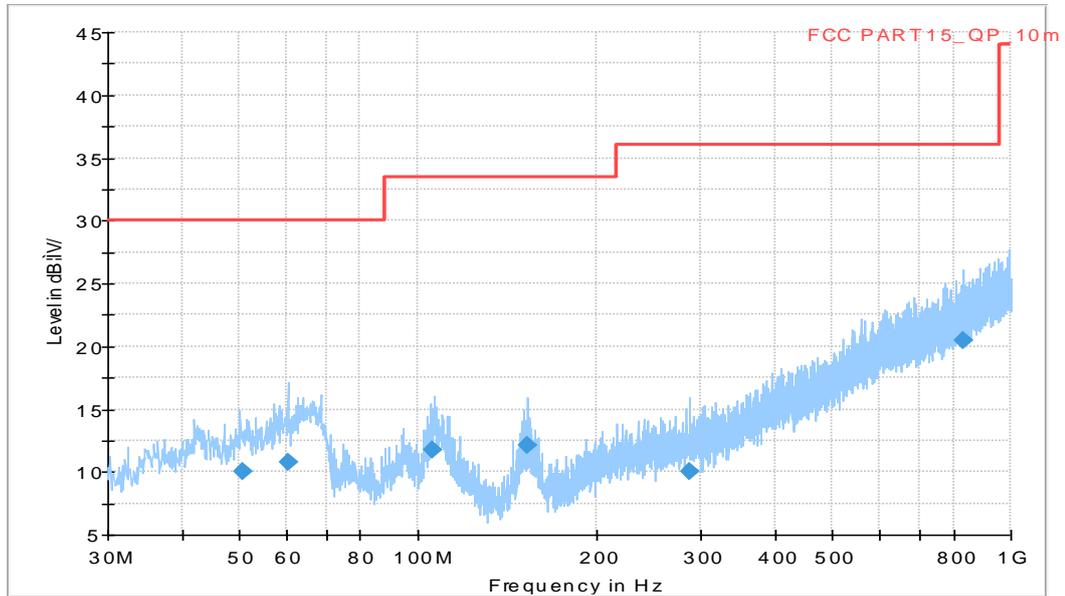


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
50.619000	10.03	30.00	19.97	1000.	120.000	199.0	V	271.0
60.481000	10.82	30.00	19.18	1000.	120.000	125.0	V	-24.0
106.173000	11.74	33.50	21.78	1000.	120.000	175.0	V	300.0
152.996000	12.13	33.50	21.39	1000.	120.000	120.0	V	120.0
286.898000	10.09	36.00	25.93	1000.	120.000	125.0	V	7.0
830.984000	20.47	36.00	15.55	1000.	120.000	125.0	V	187.0

Full Spectrum

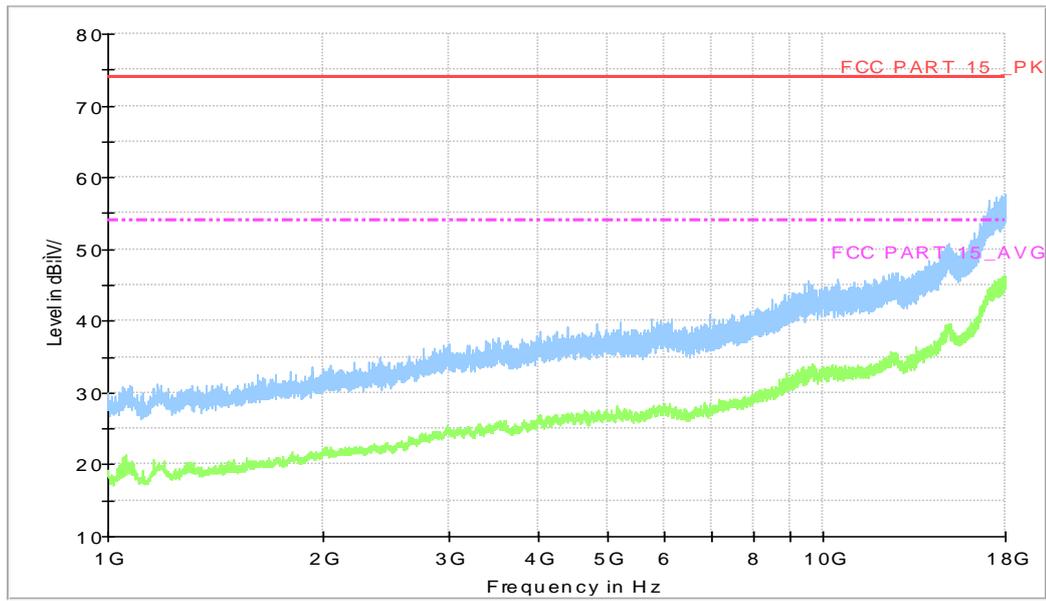


Fig A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

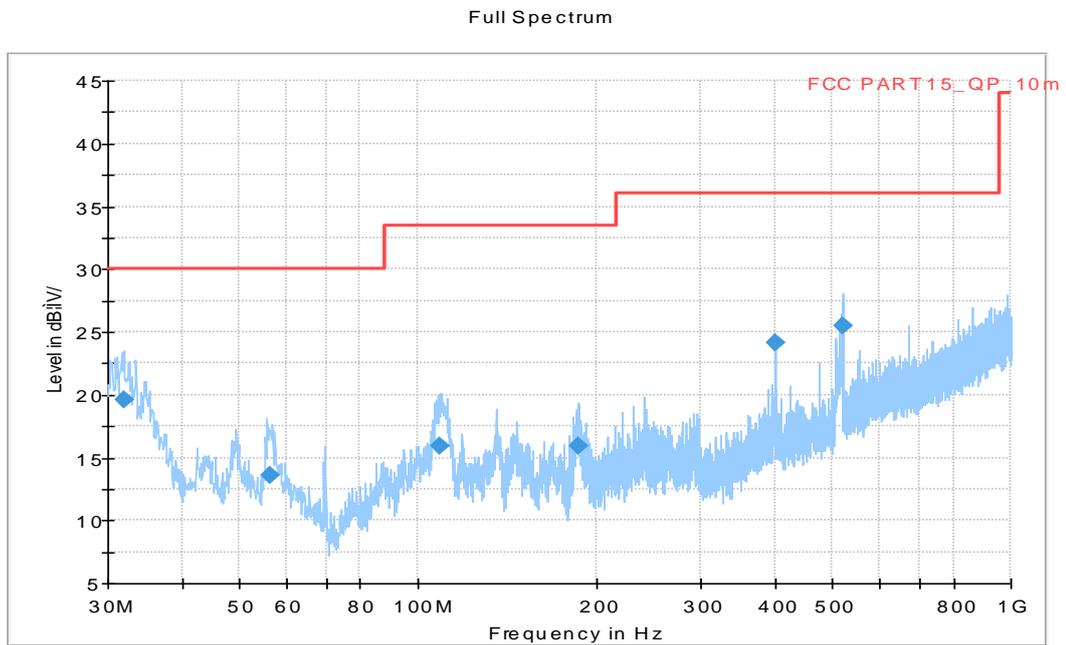


Fig A.3 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
31.982000	19.65	30.00	10.35	1000.	120.000	119.0	V	193.0
56.232000	13.59	30.00	16.41	1000.	120.000	277.0	V	293.0
108.981000	15.86	33.50	17.66	1000.	120.000	212.0	V	93.0
186.443000	15.94	33.50	17.58	1000.	120.000	108.0	V	281.0
399.995000	24.15	36.00	11.87	1000.	120.000	400.0	V	284.0
519.850000	25.44	36.00	10.58	1000.	120.000	317.0	V	160.0

Full Spectrum

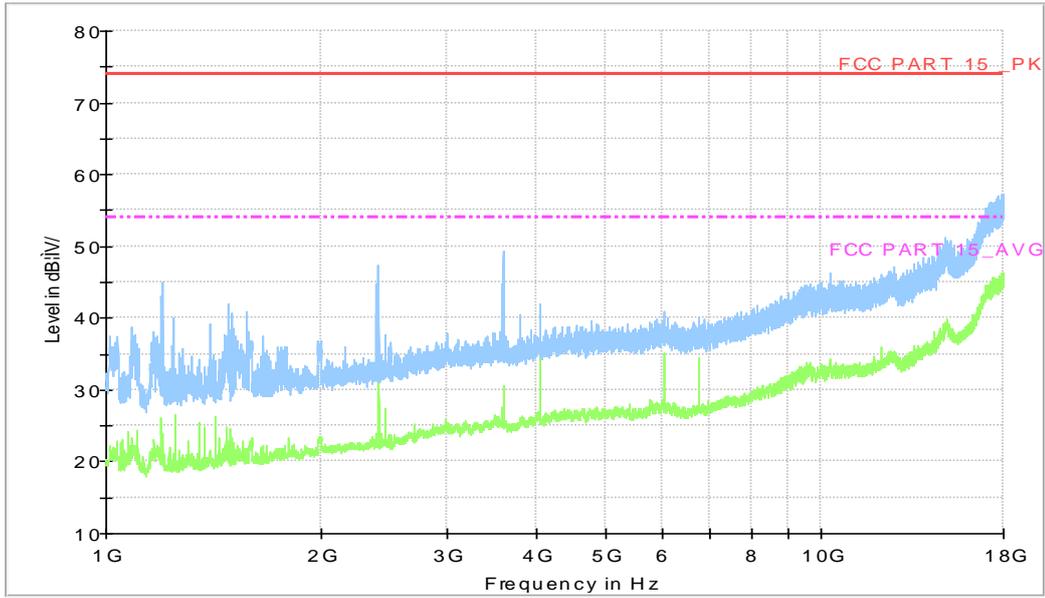


Fig A.4 Radiated Emission from 1GHz to 18GHz

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 M4000E-17, and the serial number of the PC is M706GWXD. 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 (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

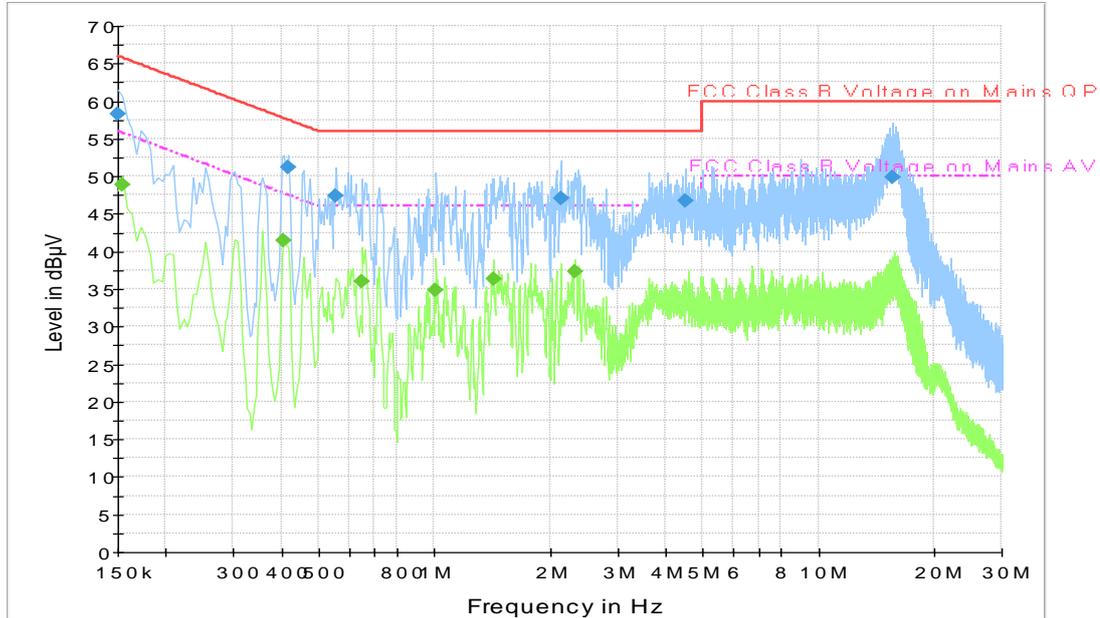


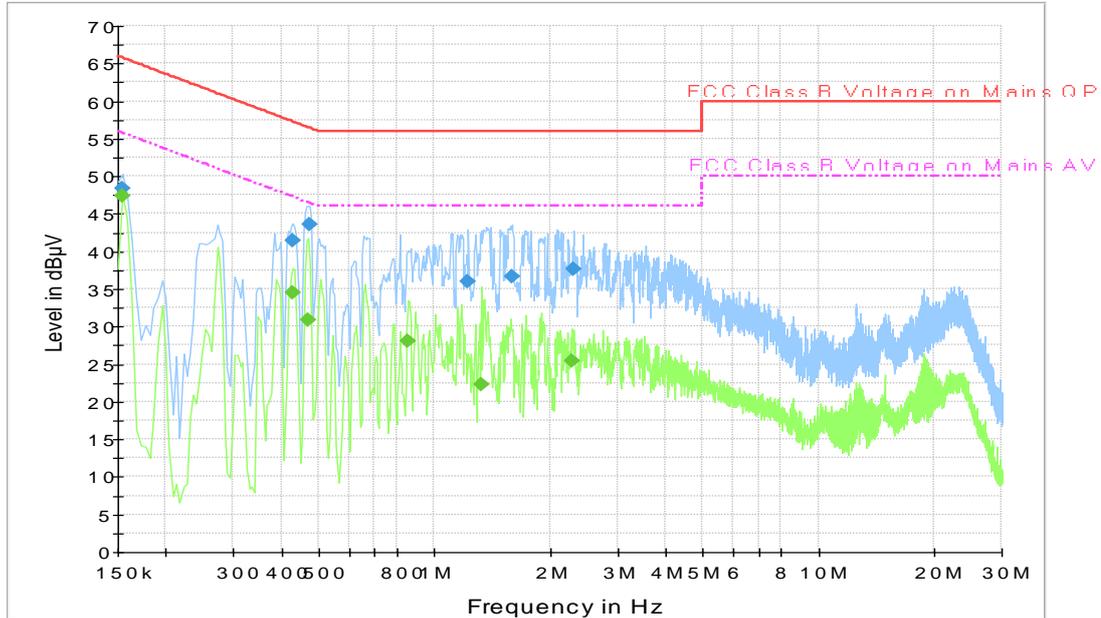
Fig A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	58.3	2000.	9.000	On	L1	30.7	7.7	66.0
0.415500	51.1	2000.	9.000	On	L1	19.8	6.4	57.5
0.555000	47.3	2000.	9.000	On	L1	19.8	8.7	56.0
2.134500	47.0	2000.	9.000	On	L1	19.6	9.0	56.0
4.506000	46.7	2000.	9.000	On	L1	19.6	9.3	56.0
15.571500	49.8	2000.	9.000	On	L1	19.8	10.2	60.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	48.8	2000.	9.000	On	L1	29.7	6.9	55.8
0.406500	41.5	2000.	9.000	On	L1	19.8	6.2	47.7
0.649500	36.1	2000.	9.000	On	L1	19.8	9.9	46.0
1.009500	34.8	2000.	9.000	On	L1	19.7	11.2	46.0
1.423500	36.3	2000.	9.000	On	L1	19.6	9.7	46.0
2.319000	37.3	2000.	9.000	On	L1	19.6	8.7	46.0

USB Mode, Set.2

Fig A.6 Radiated Emission from 30MHz to 1GHz
Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	48.4	2000.	9.000	On	L1	29.7	17.4	65.8
0.429000	41.4	2000.	9.000	On	L1	19.8	15.9	57.3
0.474000	43.6	2000.	9.000	On	N	19.8	12.9	56.4
1.225500	36.0	2000.	9.000	On	N	19.6	20.0	56.0
1.590000	36.6	2000.	9.000	On	N	19.6	19.4	56.0
2.301000	37.7	2000.	9.000	On	N	19.6	18.3	56.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	47.3	2000.	9.000	On	L1	29.7	8.4	55.8
0.429000	34.4	2000.	9.000	On	L1	19.8	12.8	47.3
0.469500	30.8	2000.	9.000	On	N	19.8	15.7	46.5
0.856500	28.1	2000.	9.000	On	N	19.7	17.9	46.0
1.324500	22.3	2000.	9.000	On	N	19.6	23.7	46.0
2.278500	25.5	2000.	9.000	On	L1	19.6	20.6	46.0



ANNEX B: PERSONS INVOLVED IN THIS TESTING

Test Item	Test Software and Version	Software Vendor	Test operator
Conducted Emission	EMC32 V8.5.2	R&S	Shi Suolan
Radiated Emission	EMC32 V9.01.00	R&S	Li Pengfei

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