



# TEST REPORT

No. I19Z70269-EMC01

for

**Samsung Electronics Co., Ltd.**

**Mobile phone**

**Model Name: SM-A015F/DS, SM-A015F**

**FCC ID: ZCasma015F**

with

**Hardware Version: REV1.0**

**Software Version: A015F.001(A015FXxE0AS11)**

**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

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

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: [cttl\\_terminals@caict.ac.cn](mailto:cttl_terminals@caict.ac.cn), website: [www.caict.ac.cn](http://www.caict.ac.cn)

## **REPORT HISTORY**

<b>Report Number</b>	<b>Revision</b>	<b>Description</b>	<b>Issue Date</b>
I19Z70269-EMC01	Rev.0	1 <sup>st</sup> edition	2019-10-29
I19Z70269-EMC01	Rev.1	2 <sup>nd</sup> edition	2019-11-08

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

## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>4</b>
<b>1.1. INTRODUCTION &amp; ACCREDITATION .....</b>	<b>4</b>
<b>2. TEST LABORATORY .....</b>	<b>4</b>
<b>2.1. TESTING LOCATION .....</b>	<b>4</b>
<b>2.2. TESTING ENVIRONMENT .....</b>	<b>4</b>
<b>2.3. PROJECT DATA .....</b>	<b>4</b>
<b>2.4. SIGNATURE .....</b>	<b>4</b>
<b>3. CLIENT INFORMATION .....</b>	<b>5</b>
<b>3.1. APPLICANT INFORMATION.....</b>	<b>5</b>
<b>3.2. MANUFACTURER INFORMATION.....</b>	<b>5</b>
<b>4. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>6</b>
<b>4.1. ABOUT EUT.....</b>	<b>6</b>
<b>4.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....</b>	<b>6</b>
<b>4.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....</b>	<b>6</b>
<b>4.4. EUT SET-UPS .....</b>	<b>7</b>
<b>5. REFERENCE DOCUMENTS.....</b>	<b>8</b>
<b>5.1. REFERENCE DOCUMENTS FOR TESTING.....</b>	<b>8</b>
<b>6. LABORATORY ENVIRONMENT.....</b>	<b>9</b>
<b>7. SUMMARY OF TEST RESULTS.....</b>	<b>10</b>
<b>8. TEST EQUIPMENTS UTILIZED.....</b>	<b>11</b>
<b>ANNEX A: MEASUREMENT RESULTS .....</b>	<b>12</b>
<b>ANNEX B: PERSONS INVOLVED IN THIS TESTING .....</b>	<b>22</b>

## **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℃

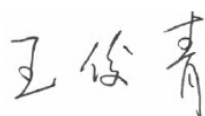
Relative Humidity: 20-75%

### **2.3. Project data**

Testing Start Date: 2019-09-26

Testing End Date: 2019-10-15

### **2.4. Signature**



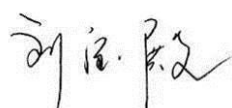
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**Wang Junqing**  
**(Prepared this test report)**



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**Zhang Ying**  
**(Reviewed this test report)**



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**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-A015F/DS, SM-A015F
FCC ID	ZCasma015F
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	359471100095843/ 359472100095841	REV1.0	A015F.001(A015FXXE0ASI1)
EUT2	/	REV1.0	A015F.001(A015FXXE0ASI1)

\*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**

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

Note: Mobile phone, SM-A015F/DS and SM-A015F 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.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
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)	B.1	P	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(huayuan North Road)

## 8. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100235	R&S	2020-03-01	1 Year
2	Test Receiver	ESCI3	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 ( $\mu\text{V/m}$ )		
	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

$G_{\text{PL}}$ : Path Loss

$P_{\text{Mea}}$ : 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 (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17959.200	46.4	-17.7	45.6	18.500	H
17955.800	46.1	-17.7	45.6	18.200	H
17952.400	46.0	-17.7	45.6	18.100	V
17820.933	46.0	-18.5	45.6	18.900	H
17948.433	45.9	-17.7	45.6	18.000	H
17956.933	45.9	-17.7	45.6	18.000	H

##### Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17951.267	57.9	-17.7	45.6	30.000	H
17945.033	57.9	-17.7	45.6	30.000	H
17942.200	57.3	-17.7	45.6	29.400	V
17737.633	57.1	-18.5	45.6	30.000	H
17838.500	57.1	-18.5	45.6	30.000	H
17844.167	57.1	-18.5	45.6	30.000	H

### Measurement results for Set.2:

#### USB Mode/Average detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17963.733	45.8	-17.7	45.6	17.900	H
17952.967	45.7	-17.7	45.6	17.800	H
17963.167	45.7	-17.7	45.6	17.800	V
17953.533	45.7	-17.7	45.6	17.800	H
17938.800	45.7	-17.7	45.6	17.800	H
17937.667	45.7	-17.7	45.6	17.800	H

#### USB Mode/ Peak detector

Frequency (MHz)	Measurement Result (dB $\mu$ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB $\mu$ V)	Antenna Pol. (H/V)
17973.367	57.8	-17.7	45.6	29.900	H
17398.200	57.2	-19.2	41.5	34.900	H
17960.900	57.1	-17.7	45.6	29.200	V
17906.500	57.0	-18.5	45.6	29.900	H
17956.367	56.9	-17.7	45.6	29.000	H
17819.800	56.9	-18.5	45.6	29.800	H

Note: The measurement results of Set.1, Set.2 showed here are worst cases of the combinations of different USB cables.

## Charging Mode, Set.1

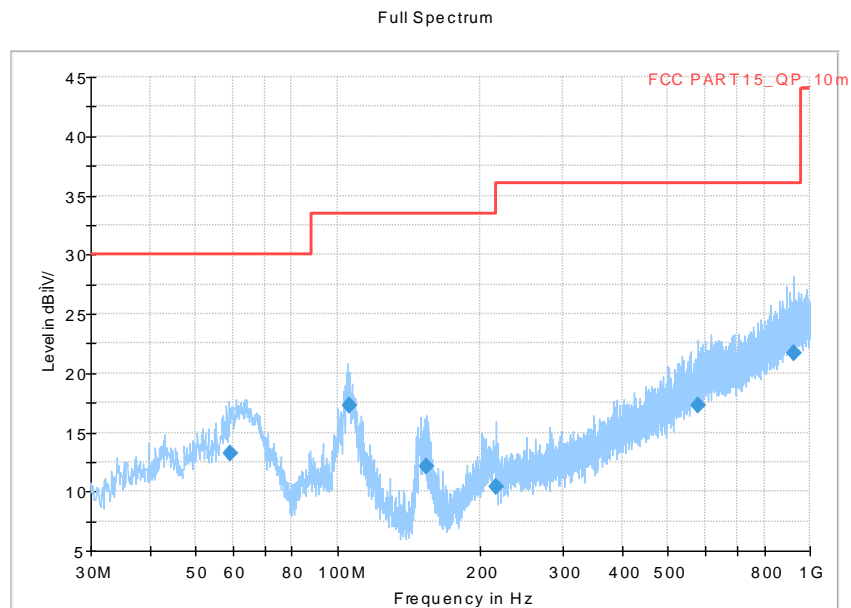
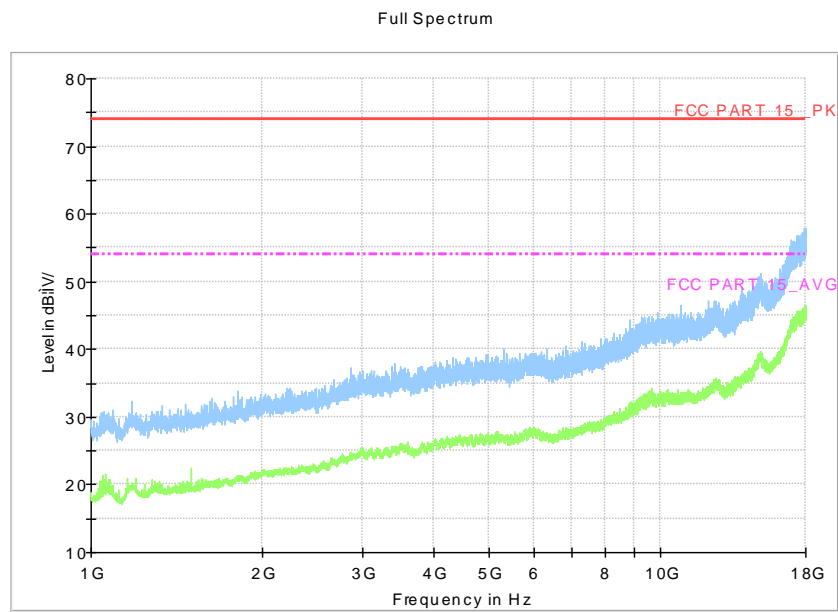


Fig A.1 Radiated Emission from 30MHz to 1GHz

## Final\_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
59.063000	13.16	30.00	16.84	1000.0	120.000	104.0	V	-22.0
105.655000	17.29	33.50	16.23	1000.0	120.000	104.0	V	265.0
153.657000	12.08	33.50	21.44	1000.0	120.000	124.0	V	81.0
216.466000	10.42	36.00	25.60	1000.0	120.000	124.0	V	294.0
578.295000	17.23	36.00	18.79	1000.0	120.000	392.0	V	78.0
924.797000	21.69	36.00	14.33	1000.0	120.000	314.0	V	30.0



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



## USB Mode, Set.2

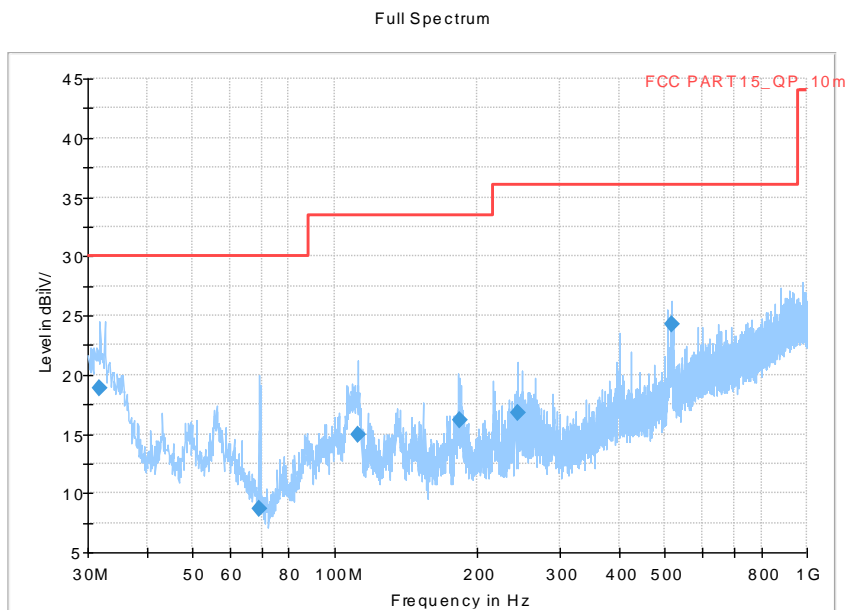
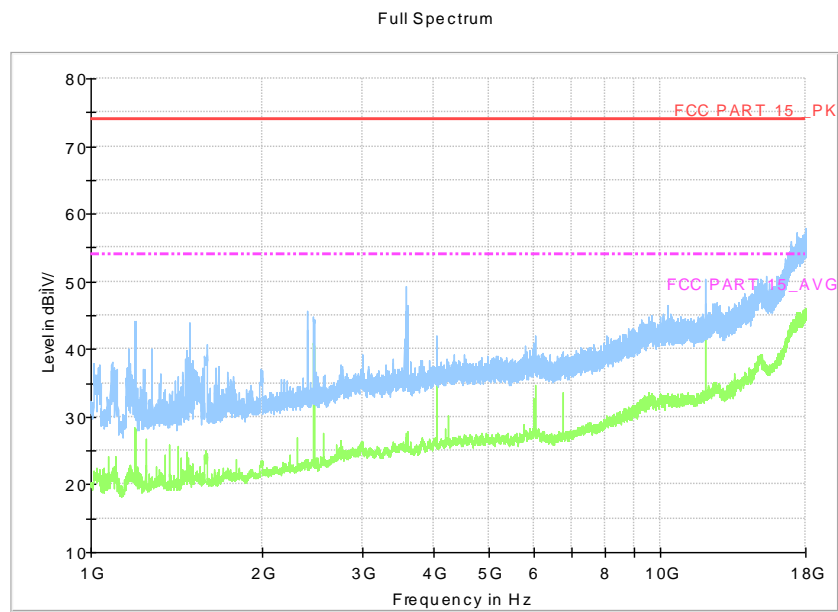


Fig A.3 Radiated Emission from 30MHz to 1GHz

## Final Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
31.783000	18.86	30.00	11.14	1000.0	120.000	102.0	V	116.0
69.405000	8.74	30.00	21.26	1000.0	120.000	175.0	V	30.0
112.062000	14.92	33.50	18.60	1000.0	120.000	180.0	V	97.0
183.463000	16.12	33.50	17.40	1000.0	120.000	101.0	V	245.0
243.479000	16.82	36.00	19.20	1000.0	120.000	107.0	V	152.0
518.044000	24.27	36.00	11.75	1000.0	120.000	301.0	V	164.0



**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 $\mu$ 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:  $U = 3.38 \text{ dB}$ ,  $k=2$ .

#### Charging Mode, Set.1

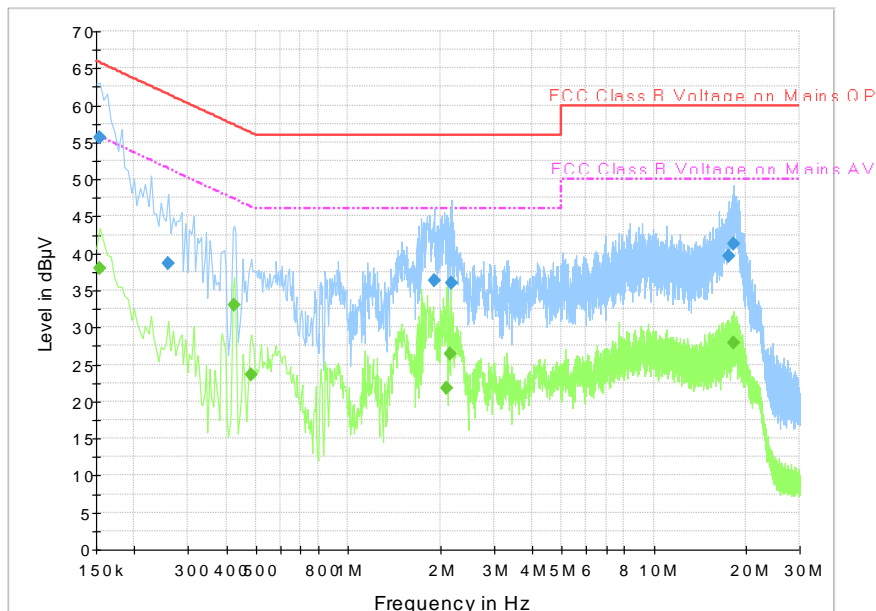


Fig A.5 Radiated Emission from 30MHz to 1GHz

#### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.154500	55.6	2000.0	9.000	On	L1	29.7	10.1	65.8	
0.258000	38.6	2000.0	9.000	On	L1	19.8	22.9	61.5	
1.909500	36.4	2000.0	9.000	On	L1	19.6	19.6	56.0	
2.179500	35.9	2000.0	9.000	On	L1	19.6	20.1	56.0	
17.533500	39.6	2000.0	9.000	On	L1	19.8	20.4	60.0	
18.262500	41.3	2000.0	9.000	On	L1	19.8	18.7	60.0	

#### Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.154500	38.0	2000.0	9.000	On	L1	29.7	17.7	55.8	
0.424500	33.0	2000.0	9.000	On	L1	19.8	14.4	47.4	
0.483000	23.6	2000.0	9.000	On	L1	19.8	22.7	46.3	
2.098500	21.9	2000.0	9.000	On	L1	19.6	24.1	46.0	
2.166000	26.4	2000.0	9.000	On	L1	19.6	19.6	46.0	
18.222000	27.8	2000.0	9.000	On	L1	19.8	22.2	50.0	

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

## USB Mode, Set.2

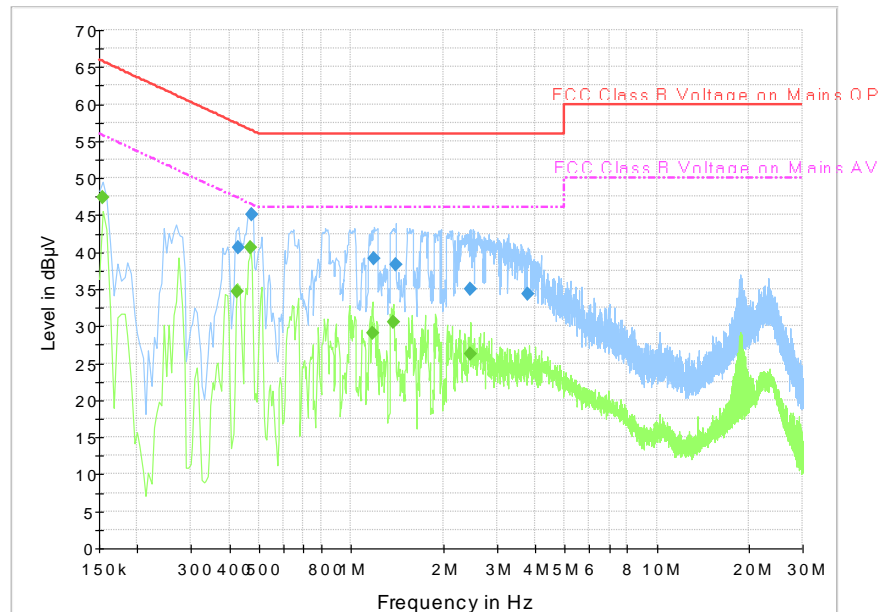


Fig A.6 Radiated Emission from 30MHz to 1GHz

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.429000	40.6	2000.0	9.000	On	L1	19.8	16.7	57.3	
0.474000	45.2	2000.0	9.000	On	L1	19.8	11.3	56.4	
1.189500	39.2	2000.0	9.000	On	N	19.7	16.8	56.0	
1.401000	38.2	2000.0	9.000	On	N	19.6	17.8	56.0	
2.458500	35.1	2000.0	9.000	On	N	19.6	20.9	56.0	
3.799500	34.3	2000.0	9.000	On	N	19.6	21.7	56.0	

### Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)	Comment
0.154500	47.4	2000.0	9.000	On	L1	29.7	8.4	55.8	
0.424500	34.7	2000.0	9.000	On	L1	19.8	12.6	47.4	
0.469500	40.7	2000.0	9.000	On	L1	19.8	5.9	46.5	
1.176000	29.1	2000.0	9.000	On	L1	19.7	16.9	46.0	
1.374000	30.5	2000.0	9.000	On	L1	19.6	15.5	46.0	
2.454000	26.3	2000.0	9.000	On	N	19.6	19.7	46.0	

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

## **ANNEX B: PERSONS INVOLVED IN THIS TESTING**

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

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