



# TEST REPORT

No. I19Z70303-EMC01

for

**Samsung Electronics. Co., Ltd.**

**Mobile phone**

**Model Name: SM-A015V**

**FCC ID: ZCASMA015V**

with

**Hardware Version: REV3.0**

**Software Version: A015V.001(A015VVRE0ASJ3)**

**Issued Date: 2019-12-30**

**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 |
|-----------------|----------|-------------------------|------------|
| I19Z70303-EMC01 | Rev.0    | 1 <sup>st</sup> edition | 2019-12-30 |
|                 |          |                         |            |

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

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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

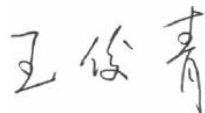
### **2.2. Testing Environment**

Normal Temperature: 15-35° C  
Relative Humidity: 20-75%

### **2.3. Project data**

Testing Start Date: 2019-11-11  
Testing End Date: 2019-12-16

### **2.4. Signature**



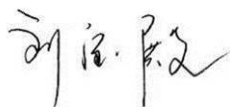
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**Wang Junqing**  
**(Prepared this test report)**



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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: R5, A Tower 22 Floor A-1,(Maetan dong)  
129,Samsung-ro,Yeongtong-gu, Suwon-Si, Gyeonggi-do 16677, Korea  
Contact Person JP KIM  
Contact Email jp426.kim@samsung.com  
Telephone: +82-10-4376-0326  
Fax: /

#### **3.2. Manufacturer Information**

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

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

##### 4.1. About EUT

|                     |                                     |
|---------------------|-------------------------------------|
| Description         | Mobile phone                        |
| Model Name          | SM-A015V                            |
| FCC ID              | ZCASMA015V                          |
| 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    | 351765110000166 | REV3.0     | A015V.001(A015VVRE0ASJ3) |
| EUT3    | 351765110000117 | REV3.0     | A015V.001(A015VVRE0ASJ3) |

\*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     | /  | 315     |
| AE4    | Charger     | /  | 929     |
| AE5    | Charger     | /  | 941     |
| AE6    | USB Cable   | /  | /       |
| AE7    | Headset     | /  | /       |
| AE10   | OTG Cable   | /  | /       |

###### AE1

|                 |                                   |
|-----------------|-----------------------------------|
| Model           | QL1695                            |
| Manufacturer    | Ningde Amperex Technology Limited |
| Capacitance     | /                                 |
| Nominal voltage | 3.85 V                            |

###### AE2

|                 |                                    |
|-----------------|------------------------------------|
| Model           | QL1695                             |
| Manufacturer    | SCUD(Fujian) Electronics Co., Ltd. |
| Capacitance     | /                                  |
| Nominal voltage | 3.85 V                             |

###### AE3

|                 |                   |
|-----------------|-------------------|
| Model           | EP-TA50JWE        |
| Manufacturer    | DongYang E&P Inc. |
| Length of cable | /                 |

###### AE4

|                 |              |
|-----------------|--------------|
| Model           | EP-TA50JWE   |
| Manufacturer    | HAEM Co.,Ltd |
| Length of cable | /            |



AE5

|                 |            |
|-----------------|------------|
| Model           | EP-TA50JWE |
| Manufacturer    | RF Tech    |
| Length of cable | /          |

AE6

|                 |                                |
|-----------------|--------------------------------|
| Model           | EP-DR140AWE                    |
| Manufacturer    | LUXSHARE-ICT (VIETNAM) LIMITED |
| Length of cable | /                              |

AE7

|                 |                                      |
|-----------------|--------------------------------------|
| Model           | EHS61ASFWE                           |
| Manufacturer    | DONGGUAN YOUNGBO ELECTRONICS CO.,LTD |
| Length of cable | /                                    |

AE10

|                 |   |
|-----------------|---|
| Model           | / |
| 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.7          | EUT1+ AE1/AE2+ AE3+ AE6+ AE7 | Charger + FM      |
| Set.8          | EUT1+ AE1/AE2+ AE4+ AE6      | Charger           |
| Set.9          | EUT1+ AE1/AE2+ AE5+ AE6      | Charger           |
| Set.10         | EUT1+ AE1/AE2+ AE6           | USB               |
| Set.11         | EUT1+ AE1+AE6+AE10+ EUT3     | OTG Charging mode |



## **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<br>Methods of Measurement of Radio-<br>Noise Emissions from Low-Voltage<br>Electrical and Electronic Equipment<br>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;<br>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         |

**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                                           |

## 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<br>NUMBER | MANUFACTURE  | CAL DUE<br>DATE | CALIBRATI<br>ON<br>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<br>Communication<br>Tester | CMW500    | 150344           | R&S          | 2019-12-27      | 1 year                      |
| 4   | Universal Radio<br>Communication<br>Tester | CMW500    | 116588           | R&S          | 2019-12-26      | 1 year                      |
| 5   | LISN                                       | ENV216    | 101200           | R&S          | 2020-03-14      | 1 year                      |
| 6   | EMI Antenna                                | VULB 9163 | 9163-1222        | Schwarzbeck  | 2020-03-14      | 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                         |
| 10  | Signal<br>Generator                        | SMBV100A  | 260613           | R&S          | 2019-12-27      | 1 year                      |

## **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, charging mode of MS and OTG 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, charging mode and OTG 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 and is connected to a device in the case of OTG 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<br>(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.7:

##### Charging 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) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|--------------------|
| 17826.033       | 46.8                              | -18.5           | 45.6                  | 19.7                          | H                  |
| 17963.733       | 46.8                              | -17.7           | 45.6                  | 18.9                          | H                  |
| 17952.967       | 46.7                              | -17.7           | 45.6                  | 18.8                          | V                  |
| 17935.967       | 46.6                              | -17.7           | 45.6                  | 18.7                          | H                  |
| 17955.233       | 46.6                              | -17.7           | 45.6                  | 18.7                          | H                  |
| 17947.867       | 46.5                              | -17.7           | 45.6                  | 18.6                          | H                  |

##### Charging 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) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|--------------------|
| 17958.633       | 58.2                              | -17.7           | 45.6                  | 30.3                          | H                  |
| 17917.833       | 58.0                              | -17.7           | 45.6                  | 30.1                          | H                  |
| 17824.333       | 58.0                              | -18.5           | 45.6                  | 30.9                          | V                  |
| 17816.400       | 57.9                              | -18.5           | 45.6                  | 30.8                          | H                  |
| 17950.700       | 57.9                              | -17.7           | 45.6                  | 30.0                          | H                  |
| 17505.867       | 57.9                              | -19.2           | 45.6                  | 31.5                          | H                  |

**Measurement results for Set.8:**
**Charging Mode/Average detector**

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|--------------------|
| 17956.933       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17960.333       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17821.500       | 46.8                        | -18.5           | 45.6                  | 19.7                    | V                  |
| 17954.100       | 46.7                        | -17.7           | 45.6                  | 18.8                    | H                  |
| 17949.000       | 46.7                        | -17.7           | 45.6                  | 18.8                    | H                  |
| 17947.867       | 46.6                        | -17.7           | 45.6                  | 18.7                    | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|--------------------|
| 17826.033       | 58.8                        | -18.5           | 45.6                  | 31.7                    | H                  |
| 17941.067       | 58.6                        | -17.7           | 45.6                  | 30.7                    | H                  |
| 17956.933       | 58.4                        | -17.7           | 45.6                  | 30.5                    | V                  |
| 17942.767       | 58.2                        | -17.7           | 45.6                  | 30.3                    | H                  |
| 17849.267       | 58.1                        | -18.5           | 45.6                  | 31.0                    | H                  |
| 17718.367       | 57.9                        | -18.9           | 45.6                  | 31.2                    | H                  |

**Measurement results for Set.9:**
**Charging Mode/Average detector**

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|--------------------|
| 17956.933       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17960.333       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17821.500       | 46.8                        | -18.5           | 45.6                  | 19.7                    | V                  |
| 17954.100       | 46.7                        | -17.7           | 45.6                  | 18.8                    | H                  |
| 17949.000       | 46.7                        | -17.7           | 45.6                  | 18.8                    | H                  |
| 17947.867       | 46.6                        | -17.7           | 45.6                  | 18.7                    | 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) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|--------------------|
| 17843.600       | 58.1                        | -18.5           | 45.6                  | 31.0                    | H                  |
| 17990.367       | 57.9                        | -17.7           | 45.6                  | 30.0                    | H                  |
| 17975.633       | 57.9                        | -17.7           | 45.6                  | 30.0                    | V                  |
| 17402.167       | 57.8                        | -19.2           | 41.5                  | 35.5                    | H                  |
| 17802.233       | 57.6                        | -18.5           | 45.6                  | 30.5                    | H                  |
| 17917.267       | 57.6                        | -17.7           | 45.6                  | 29.7                    | H                  |



**Measurement results for Set.10:****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) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|--------------------|
| 17960.333       | 46.8                              | -17.7           | 45.6                  | 18.9                          | H                  |
| 17822.633       | 46.5                              | -18.5           | 45.6                  | 19.4                          | H                  |
| 17959.767       | 46.4                              | -17.7           | 45.6                  | 18.5                          | V                  |
| 17942.767       | 46.4                              | -17.7           | 45.6                  | 18.5                          | H                  |
| 17954.667       | 46.3                              | -17.7           | 45.6                  | 18.4                          | H                  |
| 17956.367       | 46.2                              | -17.7           | 45.6                  | 18.3                          | 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) |
|-----------------|-----------------------------------|-----------------|-----------------------|-------------------------------|--------------------|
| 17962.033       | 57.7                              | -17.7           | 45.6                  | 29.8                          | H                  |
| 17969.967       | 57.6                              | -17.7           | 45.6                  | 29.7                          | H                  |
| 17514.933       | 57.5                              | -19.2           | 45.6                  | 31.1                          | V                  |
| 17980.733       | 57.5                              | -17.7           | 45.6                  | 29.6                          | H                  |
| 17698.533       | 57.5                              | -18.9           | 45.6                  | 30.8                          | H                  |
| 17611.833       | 57.5                              | -18.9           | 45.6                  | 30.8                          | H                  |

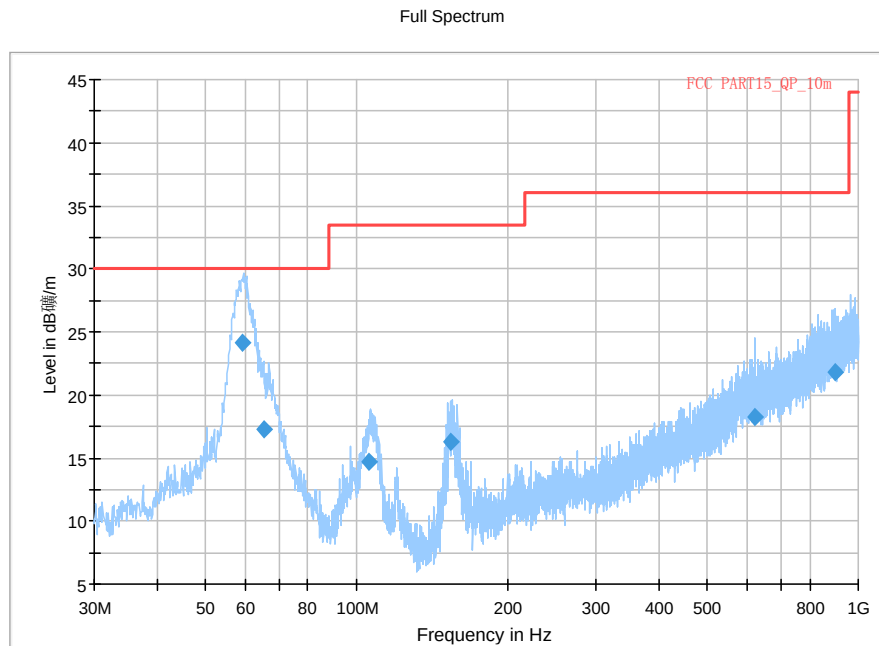
**Measurement results for Set.11:**
**OTG Charging Mode/Average detector**

| Frequency (MHz) | Measurement Result (dBμV/m) | Cable loss (dB) | Antenna Factor (dB/m) | Receiver Reading (dBμV) | Antenna Pol. (H/V) |
|-----------------|-----------------------------|-----------------|-----------------------|-------------------------|--------------------|
| 17822.067       | 46.9                        | -18.5           | 45.6                  | 19.8                    | H                  |
| 17942.200       | 46.9                        | -17.7           | 45.6                  | 19.0                    | H                  |
| 17961.467       | 46.8                        | -17.7           | 45.6                  | 18.9                    | V                  |
| 17950.133       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17960.900       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |
| 17927.467       | 46.8                        | -17.7           | 45.6                  | 18.9                    | H                  |

**OTG 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       | 59.4                        | -17.7           | 45.6                  | 31.5                    | H                  |
| 17959.200       | 58.5                        | -17.7           | 45.6                  | 30.6                    | H                  |
| 17622.033       | 58.4                        | -18.9           | 45.6                  | 31.7                    | V                  |
| 17945.033       | 58.3                        | -17.7           | 45.6                  | 30.4                    | H                  |
| 17962.600       | 58.2                        | -17.7           | 45.6                  | 30.3                    | H                  |
| 17963.733       | 58.2                        | -17.7           | 45.6                  | 30.3                    | H                  |

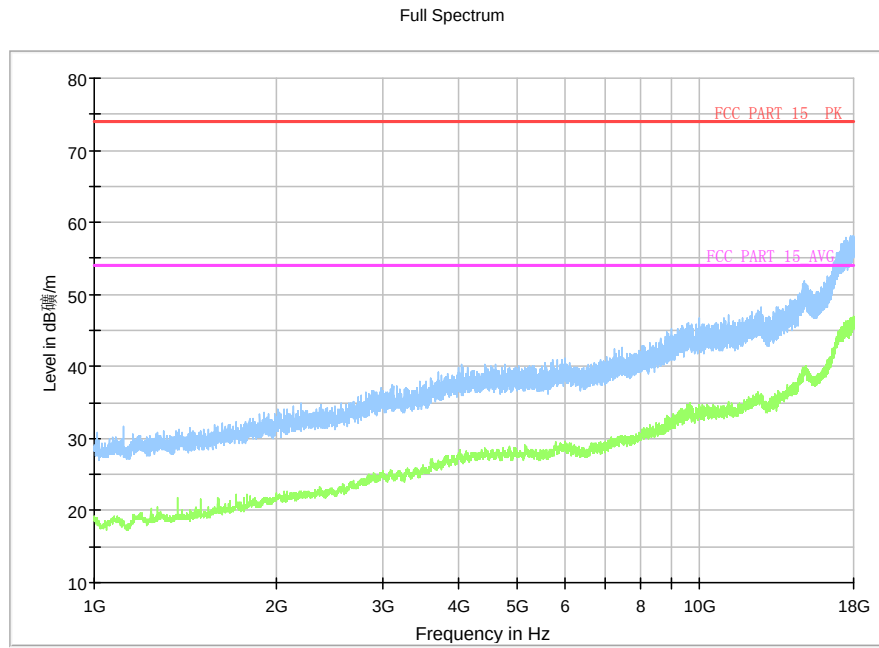
## Charging Mode, Set.7



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

## Final Result

| Frequency<br>(MHz) | QuasiPeak<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Height<br>(cm) | Pol | Azimuth<br>(deg) |
|--------------------|-----------------------------|-------------------------|----------------|-----------------------|--------------------|----------------|-----|------------------|
| 59.128000          | 24.11                       | 30.00                   | 5.89           | 1000.0                | 120.000            | 225.0          | V   | 11.0             |
| 65.451000          | 17.33                       | 30.00                   | 12.67          | 1000.0                | 120.000            | 179.0          | V   | 300.0            |
| 106.210000         | 14.71                       | 33.50                   | 18.81          | 1000.0                | 120.000            | 190.0          | V   | 240.0            |
| 154.451000         | 16.34                       | 33.50                   | 17.18          | 1000.0                | 120.000            | 106.0          | V   | 62.0             |
| 621.973000         | 18.26                       | 36.00                   | 17.76          | 1000.0                | 120.000            | 298.0          | V   | -2.0             |
| 897.942000         | 21.87                       | 36.00                   | 14.15          | 1000.0                | 120.000            | 325.0          | V   | 24.0             |



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

## Charging Mode, Set.8

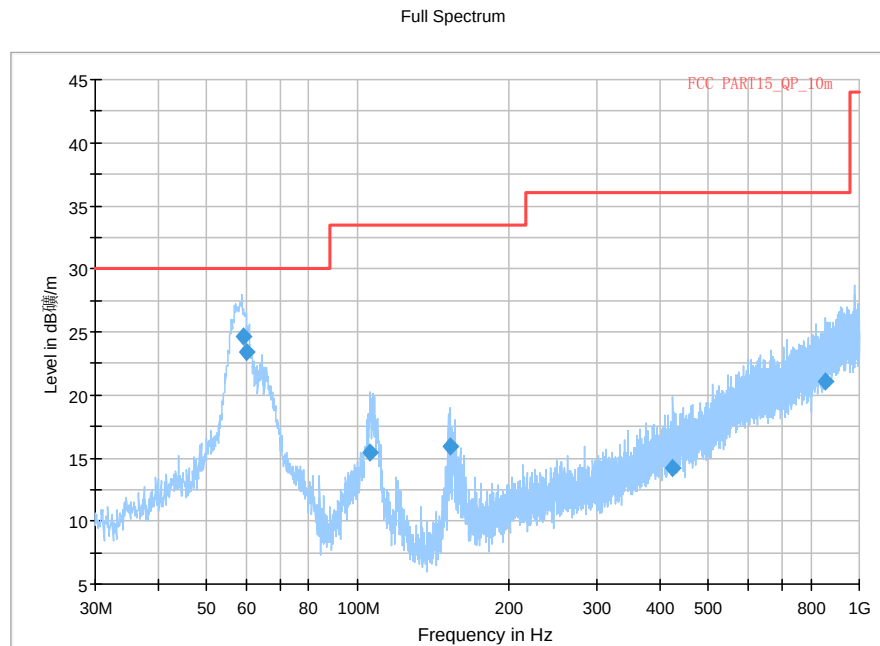
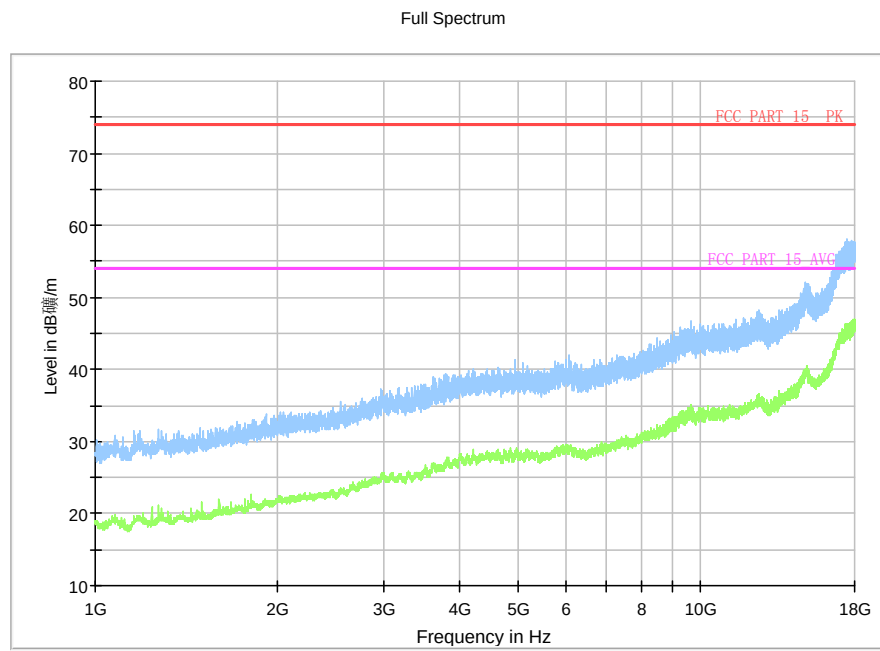


Fig A.3 Radiated Emission from 30MHz to 1GHz

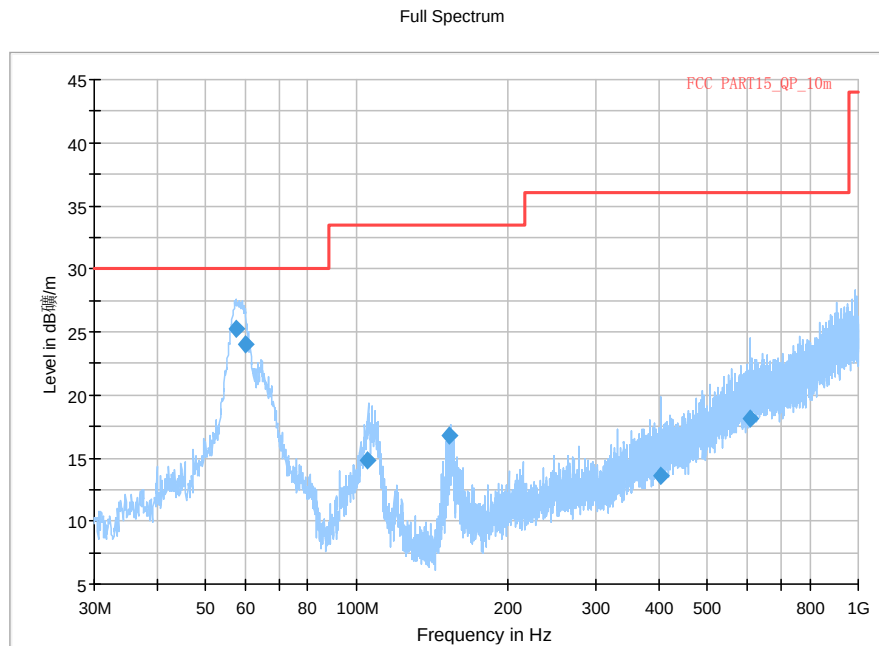
## Final Result

| Frequency (MHz) | QuasiPeak (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|
| 59.012000       | 24.58              | 30.00          | 5.42        | 1000.0          | 120.000         | 105.0       | V   | -17.0         |
| 60.149000       | 23.39              | 30.00          | 6.61        | 1000.0          | 120.000         | 102.0       | V   | -4.0          |
| 105.748000      | 15.46              | 33.50          | 18.06       | 1000.0          | 120.000         | 124.0       | V   | 285.0         |
| 152.608000      | 15.87              | 33.50          | 17.65       | 1000.0          | 120.000         | 124.0       | V   | 60.0          |
| 425.857000      | 14.19              | 36.00          | 21.83       | 1000.0          | 120.000         | 104.0       | V   | 120.0         |
| 853.715000      | 21.02              | 36.00          | 15.00       | 1000.0          | 120.000         | 197.0       | V   | 95.0          |



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

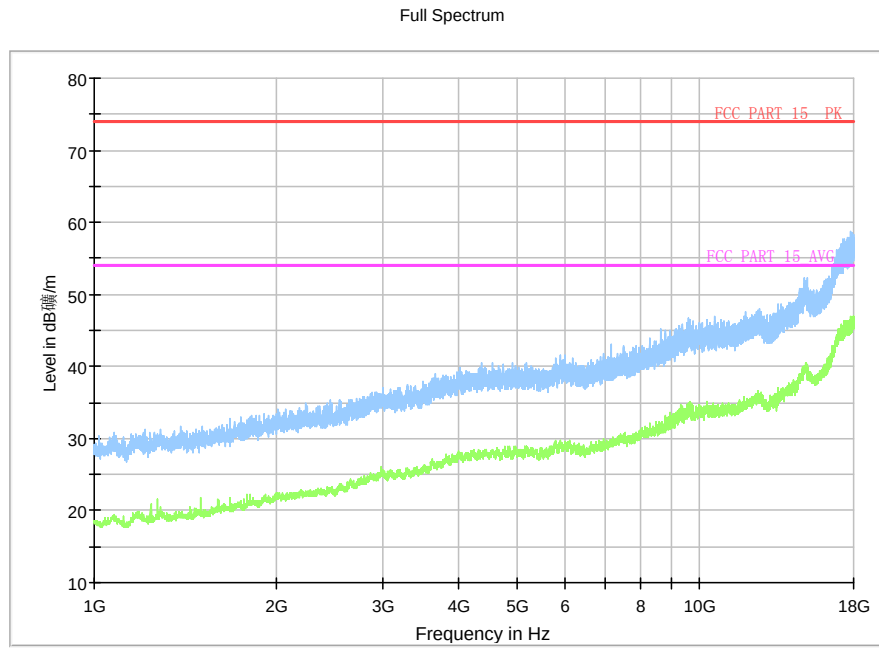
## Charging Mode, Set.9



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

## Final Result

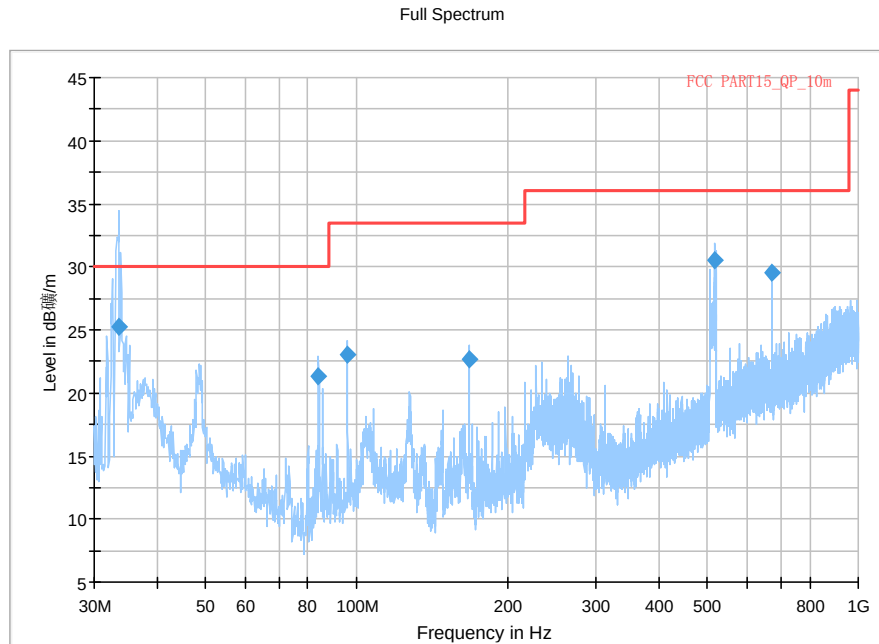
| Frequency<br>(MHz) | QuasiPeak<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Height<br>(cm) | Pol | Azimuth<br>(deg) |
|--------------------|-----------------------|-------------------|----------------|-----------------------|--------------------|----------------|-----|------------------|
| 57.705000          | 25.29                 | 30.00             | 4.71           | 1000.0                | 120.000            | 277.0          | V   | 14.0             |
| 59.955000          | 23.96                 | 30.00             | 6.04           | 1000.0                | 120.000            | 102.0          | V   | -26.0            |
| 105.443000         | 14.84                 | 33.50             | 18.68          | 1000.0                | 120.000            | 119.0          | V   | -16.0            |
| 153.269000         | 16.76                 | 33.50             | 16.76          | 1000.0                | 120.000            | 100.0          | V   | 75.0             |
| 403.062000         | 13.60                 | 36.00             | 22.42          | 1000.0                | 120.000            | 325.0          | V   | 202.0            |
| 607.801000         | 18.08                 | 36.00             | 17.94          | 1000.0                | 120.000            | 123.0          | V   | 242.0            |



**Fig A.6 Radiated Emission from 1GHz to 18GHz**



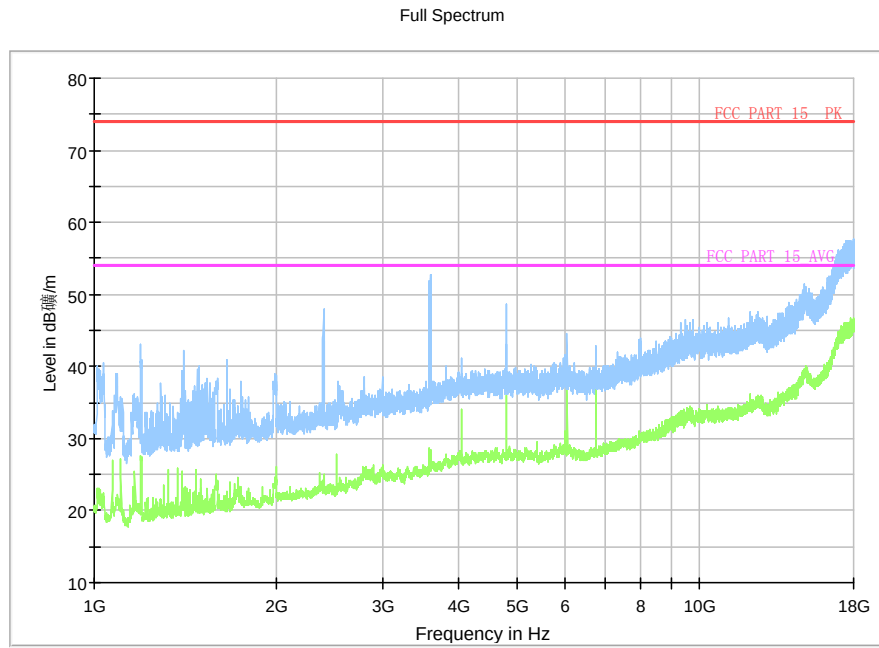
## USB Mode, Set.10



**Fig A.7 Radiated Emission from 30MHz to 1GHz**

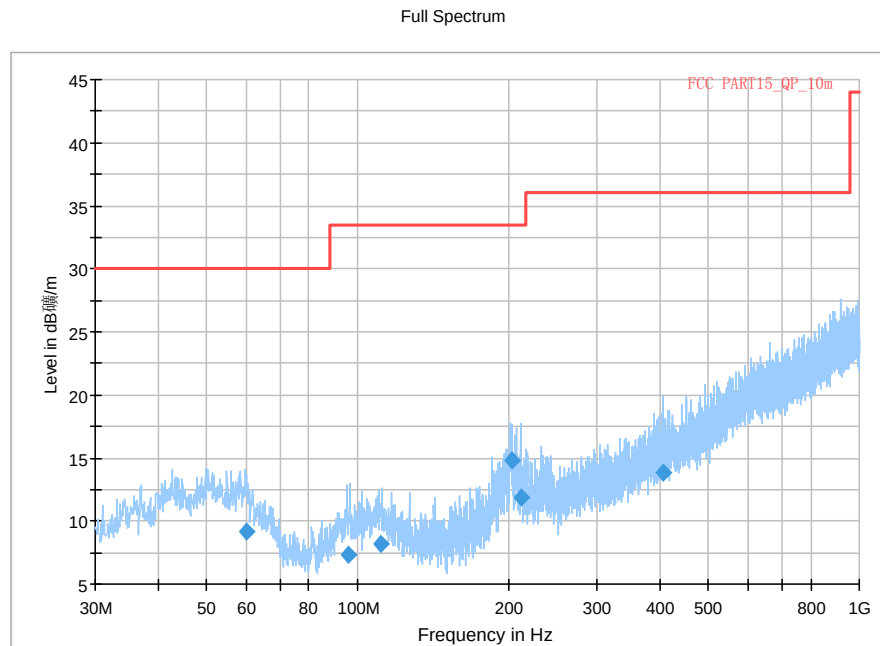
## Final\_Result

| Frequency<br>(MHz) | QuasiPeak<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Margin<br>(dB) | Meas.<br>Time<br>(ms) | Bandwidth<br>(kHz) | Height<br>(cm) | Pol | Azimuth<br>(deg) |
|--------------------|-----------------------------|-------------------------|----------------|-----------------------|--------------------|----------------|-----|------------------|
| 33.709000          | 25.23                       | 30.00                   | 4.77           | 1000.0                | 120.000            | 225.0          | V   | 210.0            |
| 84.089000          | 21.31                       | 30.00                   | 8.69           | 1000.0                | 120.000            | 291.0          | V   | 65.0             |
| 96.080000          | 23.00                       | 33.50                   | 10.52          | 1000.0                | 120.000            | 102.0          | V   | 63.0             |
| 168.151000         | 22.68                       | 33.50                   | 10.84          | 1000.0                | 120.000            | 106.0          | V   | 178.0            |
| 519.268000         | 30.55                       | 36.00                   | 5.47           | 1000.0                | 120.000            | 225.0          | V   | -21.0            |
| 671.983000         | 29.54                       | 36.00                   | 6.48           | 1000.0                | 120.000            | 225.0          | V   | 171.0            |



**Fig A.8 Radiated Emission from 1GHz to 18GHz**

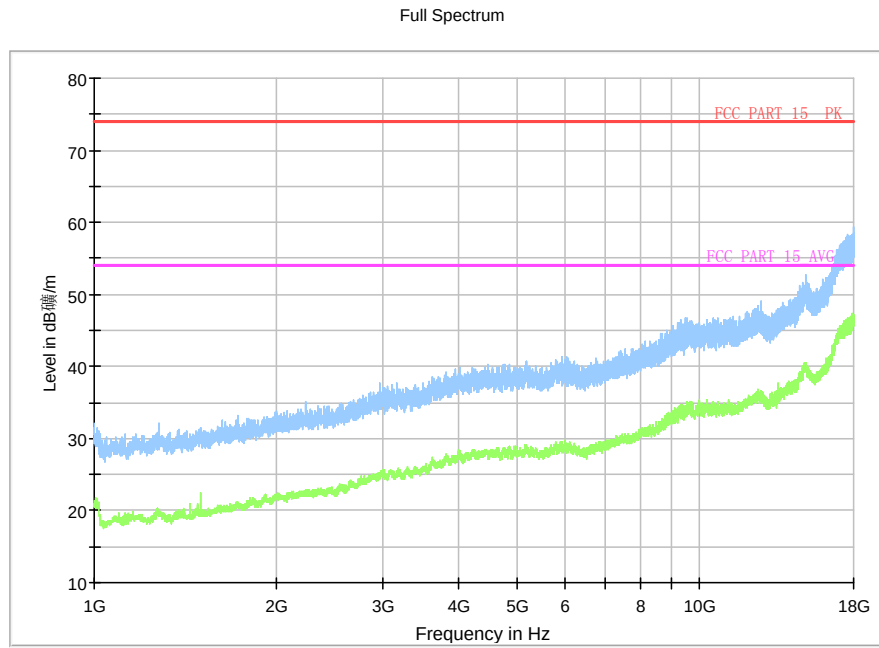
## OTG Charging Mode, Set.11



**Fig A.9 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) |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|
| 60.199000       | 9.21               | 30.00          | 20.79       | 1000.0          | 120.000         | 278.0       | V   | 77.0          |
| 95.928000       | 7.27               | 33.50          | 26.25       | 1000.0          | 120.000         | 279.0       | V   | 284.0         |
| 111.485000      | 8.16               | 33.50          | 25.36       | 1000.0          | 120.000         | 104.0       | V   | 277.0         |
| 202.872000      | 14.84              | 33.50          | 18.68       | 1000.0          | 120.000         | 125.0       | V   | 63.0          |
| 211.653000      | 11.92              | 33.50          | 21.60       | 1000.0          | 120.000         | 125.0       | V   | 30.0          |
| 406.452000      | 13.88              | 36.00          | 22.14       | 1000.0          | 120.000         | 103.0       | V   | 69.0          |



**Fig A.10 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, 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 (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:  $U = 3.38 \text{ dB}$ ,  $k=2$ .

#### Charging Mode, Set.7

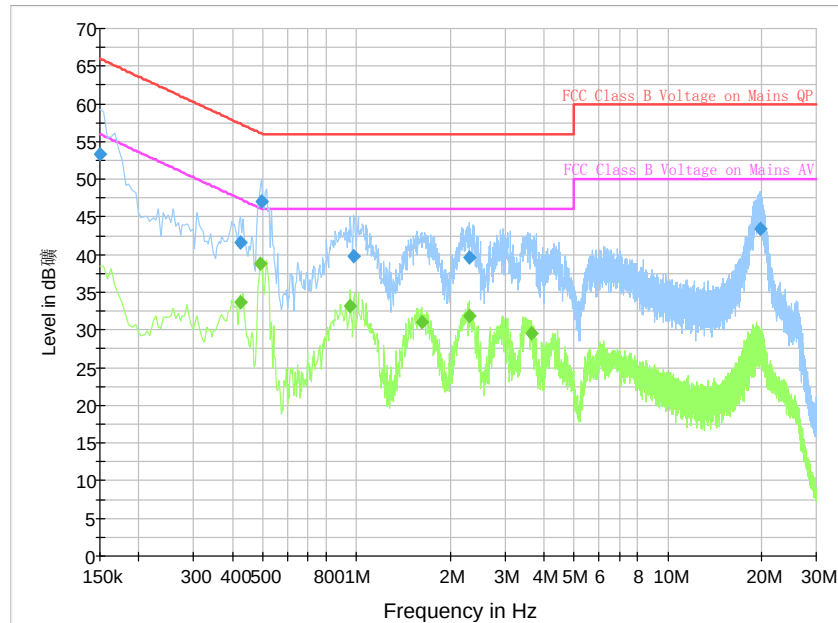


Fig A.11 Conducted Emission from 30MHz to 1GHz

#### Final Result 1

| Frequency (MHz) | QuasiPeak (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.150000        | 53.3             | 2000.0          | 9.000           | On     | L1   | 30.7       | 12.7        | 66.0         |         |
| 0.424500        | 41.6             | 2000.0          | 9.000           | On     | L1   | 19.8       | 15.8        | 57.4         |         |
| 0.496500        | 47.0             | 2000.0          | 9.000           | On     | L1   | 19.8       | 9.1         | 56.1         |         |
| 0.978000        | 39.8             | 2000.0          | 9.000           | On     | L1   | 19.7       | 16.2        | 56.0         |         |
| 2.301000        | 39.6             | 2000.0          | 9.000           | On     | L1   | 19.6       | 16.4        | 56.0         |         |
| 19.747500       | 43.4             | 2000.0          | 9.000           | On     | N    | 19.9       | 16.6        | 60.0         |         |

#### Final Result 2

| Frequency (MHz) | Average (dBμV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBμV) | Comment |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.424500        | 33.6           | 2000.0          | 9.000           | On     | L1   | 19.8       | 13.7        | 47.4         |         |
| 0.492000        | 38.7           | 2000.0          | 9.000           | On     | L1   | 19.8       | 7.4         | 46.1         |         |
| 0.955500        | 33.2           | 2000.0          | 9.000           | On     | L1   | 19.7       | 12.8        | 46.0         |         |
| 1.621500        | 31.1           | 2000.0          | 9.000           | On     | L1   | 19.6       | 14.9        | 46.0         |         |
| 2.301000        | 31.9           | 2000.0          | 9.000           | On     | L1   | 19.6       | 14.2        | 46.0         |         |
| 3.651000        | 29.6           | 2000.0          | 9.000           | On     | L1   | 19.6       | 16.4        | 46.0         |         |

## Charging Mode, Set.8

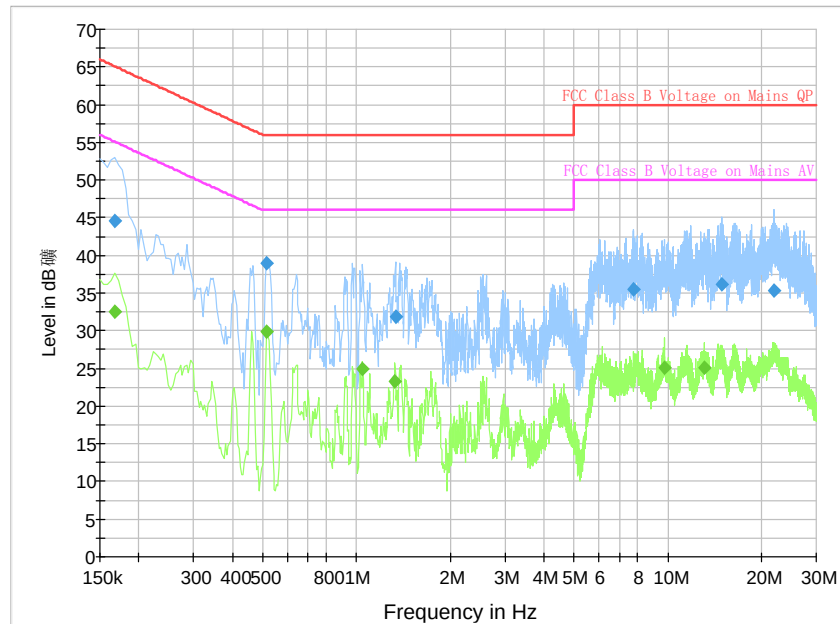


Fig A.12 Conducted Emission from 30MHz to 1GHz

### Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.168000        | 44.5             | 2000.0          | 9.000           | On     | L1   | 26.8       | 20.6        | 65.1         |         |
| 0.514500        | 39.0             | 2000.0          | 9.000           | On     | L1   | 19.8       | 17.0        | 56.0         |         |
| 1.333500        | 31.9             | 2000.0          | 9.000           | On     | L1   | 19.6       | 24.1        | 56.0         |         |
| 7.768500        | 35.5             | 2000.0          | 9.000           | On     | L1   | 19.7       | 24.5        | 60.0         |         |
| 14.923500       | 36.1             | 2000.0          | 9.000           | On     | L1   | 19.8       | 23.9        | 60.0         |         |
| 22.024500       | 35.3             | 2000.0          | 9.000           | On     | L1   | 19.9       | 24.7        | 60.0         |         |

### Final Result 2

| Frequency (MHz) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.168000        | 32.5           | 2000.0          | 9.000           | On     | L1   | 26.8       | 22.6        | 55.1         |         |
| 0.514500        | 29.8           | 2000.0          | 9.000           | On     | L1   | 19.8       | 16.2        | 46.0         |         |
| 1.045500        | 24.9           | 2000.0          | 9.000           | On     | L1   | 19.7       | 21.1        | 46.0         |         |
| 1.329000        | 23.2           | 2000.0          | 9.000           | On     | L1   | 19.6       | 22.8        | 46.0         |         |
| 9.744000        | 25.1           | 2000.0          | 9.000           | On     | L1   | 19.7       | 24.9        | 50.0         |         |
| 13.159500       | 25.2           | 2000.0          | 9.000           | On     | L1   | 19.8       | 24.8        | 50.0         |         |

## Charging Mode, Set.9

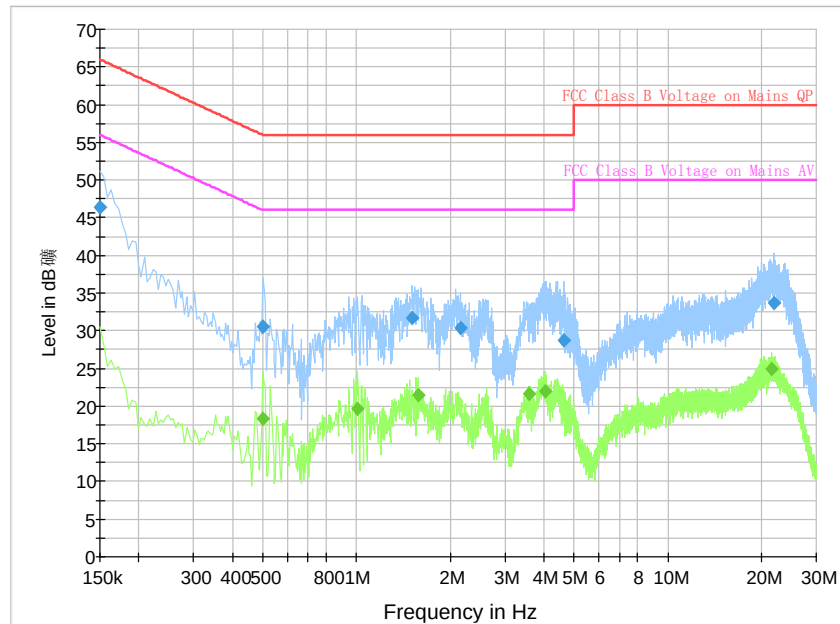


Fig A.13 Conducted Emission from 30MHz to 1GHz

### Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.150000        | 46.5             | 2000.0          | 9.000           | On     | L1   | 30.7       | 19.5        | 66.0         |         |
| 0.501000        | 30.6             | 2000.0          | 9.000           | On     | L1   | 19.8       | 25.4        | 56.0         |         |
| 1.513500        | 31.7             | 2000.0          | 9.000           | On     | L1   | 19.6       | 24.3        | 56.0         |         |
| 2.152500        | 30.3             | 2000.0          | 9.000           | On     | L1   | 19.6       | 25.7        | 56.0         |         |
| 4.627500        | 28.6             | 2000.0          | 9.000           | On     | L1   | 19.6       | 27.4        | 56.0         |         |
| 22.015500       | 33.6             | 2000.0          | 9.000           | On     | L1   | 19.9       | 26.4        | 60.0         |         |

### Final Result 2

| Frequency (MHz) | Average (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|----------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.501000        | 18.3           | 2000.0          | 9.000           | On     | L1   | 19.8       | 27.7        | 46.0         |         |
| 1.009500        | 19.6           | 2000.0          | 9.000           | On     | L1   | 19.7       | 26.4        | 46.0         |         |
| 1.576500        | 21.4           | 2000.0          | 9.000           | On     | L1   | 19.6       | 24.6        | 46.0         |         |
| 3.574500        | 21.6           | 2000.0          | 9.000           | On     | L1   | 19.6       | 24.4        | 46.0         |         |
| 4.047000        | 21.9           | 2000.0          | 9.000           | On     | L1   | 19.6       | 24.1        | 46.0         |         |
| 21.525000       | 24.9           | 2000.0          | 9.000           | On     | L1   | 19.9       | 25.1        | 50.0         |         |



## USB Mode, Set.10

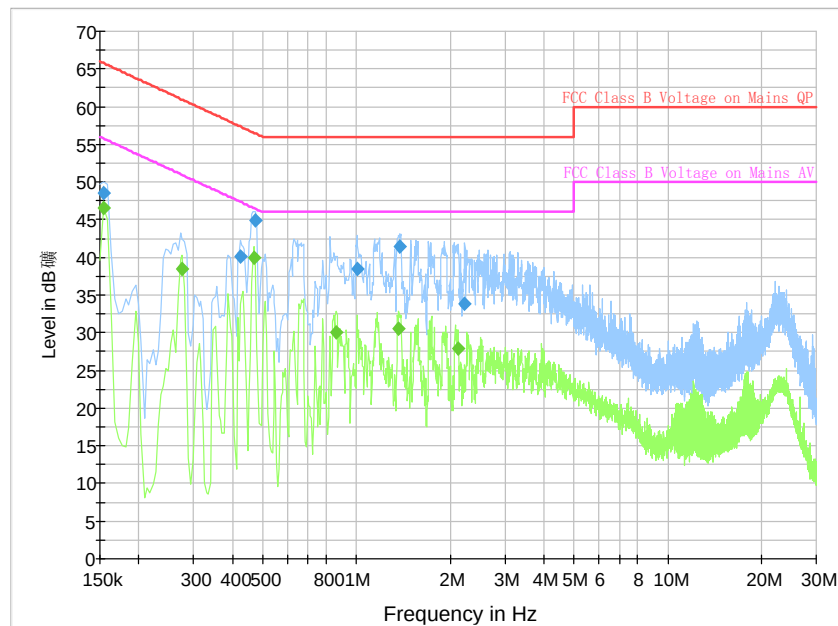


Fig A.14 Conducted Emission from 30MHz to 1GHz

### Final Result 1

| Frequency (MHz) | QuasiPeak (dBuV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBuV) | Comment |
|-----------------|------------------|-----------------|-----------------|--------|------|------------|-------------|--------------|---------|
| 0.154500        | 48.6             | 2000.0          | 9.000           | On     | L1   | 29.7       | 17.1        | 65.8         |         |
| 0.424500        | 40.2             | 2000.0          | 9.000           | On     | L1   | 19.8       | 17.2        | 57.4         |         |
| 0.474000        | 44.9             | 2000.0          | 9.000           | On     | L1   | 19.8       | 11.5        | 56.4         |         |
| 1.005000        | 38.4             | 2000.0          | 9.000           | On     | N    | 19.7       | 17.6        | 56.0         |         |
| 1.378500        | 41.4             | 2000.0          | 9.000           | On     | L1   | 19.6       | 14.6        | 56.0         |         |
| 2.229000        | 33.8             | 2000.0          | 9.000           | On     | N    | 19.6       | 22.2        | 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        | 46.5           | 2000.0          | 9.000           | On     | L1   | 29.7       | 9.2         | 55.8         |         |
| 0.276000        | 38.5           | 2000.0          | 9.000           | On     | L1   | 19.8       | 12.5        | 50.9         |         |
| 0.469500        | 40.0           | 2000.0          | 9.000           | On     | L1   | 19.8       | 6.6         | 46.5         |         |
| 0.861000        | 30.0           | 2000.0          | 9.000           | On     | L1   | 19.7       | 16.0        | 46.0         |         |
| 1.369500        | 30.6           | 2000.0          | 9.000           | On     | N    | 19.6       | 15.4        | 46.0         |         |
| 2.130000        | 28.0           | 2000.0          | 9.000           | On     | N    | 19.6       | 18.0        | 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             | Yan Hanchen<br>Wang Huan<br>Li Pengfei |

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