# TEST REPORT

# FCC Part 15C

| | |
|---|---|
| **Equipment under test** | Wireless Charger |
| **Model name** | KWS-211 |
| **FCC ID** | 2ACCCKWS-211 |
| **Applicant** | KOMATECH Co.,Ltd. |
| **Manufacturer** | KOMATECH Co.,Ltd. |
| **Date of test(s)** | 2015.05.28~2015.06.04 |
| **Date of issue** | 2015.06.11 |

**Issued to**

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| **Test and report completed by :** | **Report approval by :** |
|---|---|
| Kwang-Yeol Choo<br>Test engineer | Jeff Do<br>Technical manager |

# Revision history

| Revision | Date of issue | Test report No. | Description |
|---|---|---|---|
| - | 2015.06.11 | KES-RF-15T0047 | Initial |

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## 1. General information

| | |
|---|---|
| Applicant | KOMATECH Co.,Ltd. |
| Applicant address | 62-16 19th st. Gamjeong-ro, Gimpo-si, Gyeonggi-do, Korea |
| Test site | KES Co., Ltd. |
| Test site address | C-3701, Simin-daero 365-40, Dongan-gu, Anyang-si, Gyeonggi-do,431-716, Korea<br>473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea |
| Rule part(s) | Part 15C |
| Test device serial No. | ☒ Production ☐ Pre-production ☐ Engineering |

### 1.1. EUT description

| | |
|---|---|
| Equipment under test | Wireless Charger |
| Frequency range | 112 ㎑ ~205 ㎑ |
| Modulation type | ASK |
| Model: | KWS-211 |
| Antenna specification | Internal type(Coil antenna) |
| Power source | AC 120 V Adapter |

### 1.2. Test frequency

| | Frequency Range |
|---|---|
| **Frequency (㎑)** | 112 ㎑ ~205 ㎑ |

### 1.3. Information about derivative model

N/A

### 1.4. Device modifications

N/A

### 1.5 Device information

KWS-211 that wireless charger can be used only normal position.
Therefore the test was carried out only normal position.

## 2.1 Summary of tests

| FCC Part Sections | Parameter | Test results |
|---|---|---|
| 15.209 | Radiated spurious emission | Pass |
| 15.207 | AC conducted emissions | Pass |

**Statement**;

The measurement procedures described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 ㎑ to 40 ㎓ (ANSI C63.4-2003/ 2009) were used in the measurement of the DUT.

## 2. 2 Test mode

| Mode | Charging current | Description |
|---|---|---|
| Charging mode With load | 295 mA | Using Max load |
| | 584 mA | Using Mid load |
| | 1140 mA | Using Min load |
| Charging mode With Mobile Phone | - | < 1% of Battery status |
| | - | 50% of Battery status |

## 2. 3 Battery status during charging

< 1% of Battery, 50 % of Battery

## 2. 4 Fundamental emission comparison

The level of call connecting of WCDMA mode was more than airplane mode, charging with Mobile Phone in standby mode and charging with Mobile Phone turned off mode. So WCDMA mode was selected.

# 3. Test results

## 3.1. Radiated spurious emission

**Test location**

Testing was performed at a test distance of 3 meter Open Area Test Site

**Test procedures**

[9 ㎑ to 30 ㎒]

The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Quasi-peak function and specified bandwidth with maximum hold mode.

The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 ㎐ / 300 ㎐ for peak detection (PK) at frequency below 9 ㎑~ 150 ㎑.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 ㎑ / 10 ㎑ for peak detection (PK) at frequency below 150 ㎑~ 30 ㎒.
3. For the frequency bands 9~ 90 ㎑, 110~490 ㎑ the radiated emission limits are based on measurements employing an average detector.

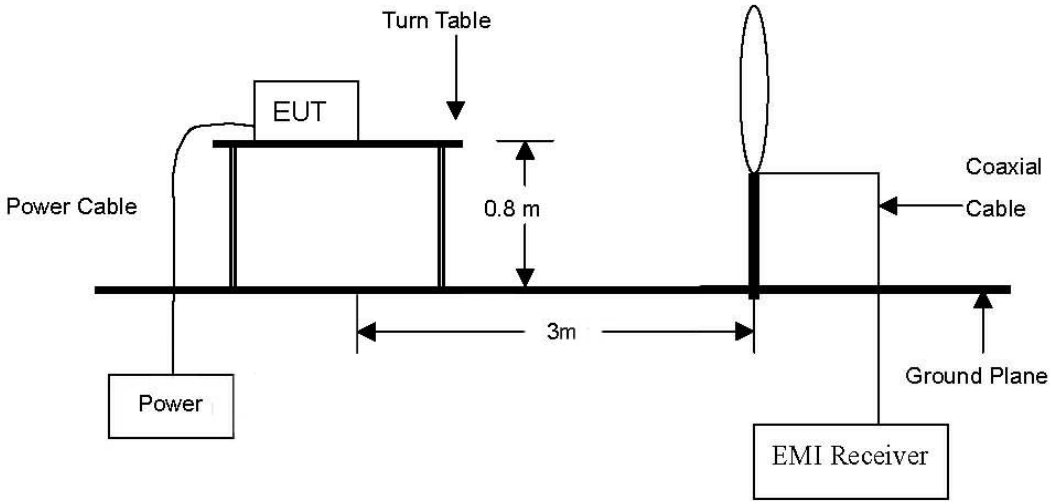
[30 ㎒ to 1 ㎓]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.
The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

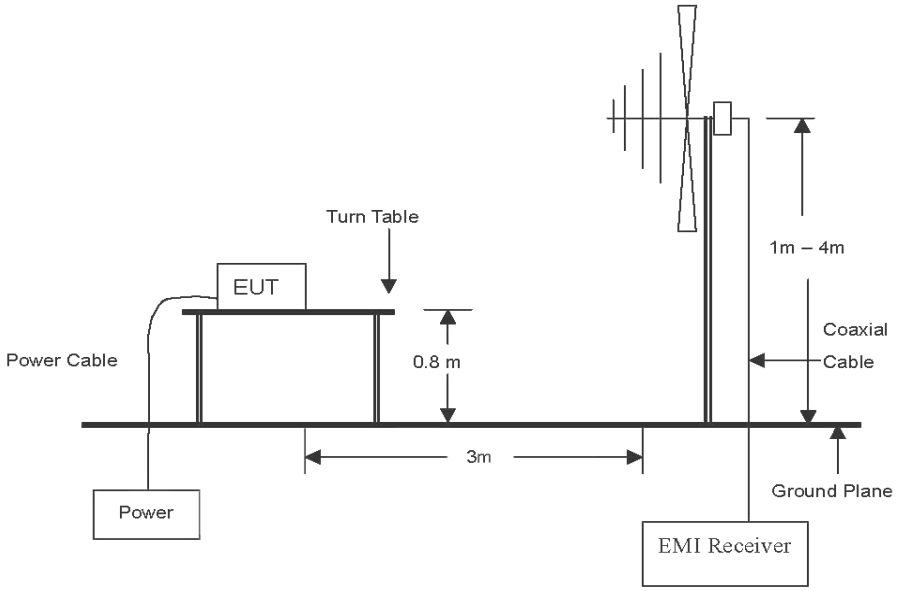
The spectrum analyzer is set to:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 ㎓.

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.




The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



**Limit**

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

| Frequency (㎒) | Distance (Meters) | Radiated (㎶/m) |
|---|---|---|
| 0.009 ~ 0.490 | 300 | 2400 / F(㎑) |
| 0.490 ~ 1.705 | 30 | 24000 / F(㎑) |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 3 | 100** |
| 88 ~ 216 | 3 | 150** |
| 216 ~ 960 | 3 | 200** |
| Above 960 | 3 | 500 |

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 ㎒, 76 ~ 88 ㎒, 174 ~ 216 ㎒ or 470 ~ 806 ㎒. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

**Test results (Below 30 ㎒)**

The frequency spectrum from 9 ㎑ to 30 ㎒ was investigated.

- Pad type / charging with load (Max)

| Radiated emissions | | | Correction factors | | | Total | Limit | |
|---|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Detect | Reading (dB㎶) | Ant. factor (dB/m) | Cable loss (dB) | $F_d$ (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| 0.109 9* | Peak | 21.37 | 19.50 | 0.02 | -80 | -39.11 | 26.78 | 65.89 |
| | - | - | | | | - | | - |
| 0.117 3** | Peak | 33.45 | 19.50 | 0.02 | -80 | -27.03 | 26.22 | 53.25 |
| | Avg | 33.39 | | | | -27.09 | | 53.31 |
| 0.351 9 | Peak | 27.24 | 19.47 | 0.05 | -80 | -33.24 | 16.68 | 49.92 |
| | Avg | 27.15 | | | | -33.33 | | 50.01 |
| 0.586 5 | Peak | 23.16 | 19.40 | 0.06 | -40 | 2.62 | 32.24 | 29.62 |
| | - | - | | | | - | | - |
| 0.821 1 | Peak | 21.69 | 19.40 | 0.08 | -40 | 1.17 | 29.32 | 28.15 |
| | - | - | | | | - | | - |

- Pad type / charging with load (Mid)

| Radiated emissions | | | Correction factors | | | Total | Limit | |
|---|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Detect | Reading (dB㎶) | Ant. factor (dB/m) | Cable loss (dB) | $F_d$ (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| 0.103 4* | Peak | 21.82 | 19.50 | 0.02 | -80 | -38.66 | 27.31 | 65.97 |
| | - | - | | | | - | | - |
| 0.121 2** | Peak | 33.76 | 19.50 | 0.02 | -80 | -26.72 | 25.93 | 52.65 |
| | Avg | 33.69 | | | | -26.79 | | 52.72 |
| 0.363 6 | Peak | 27.52 | 19.47 | 0.05 | -80 | -32.96 | 16.39 | 49.35 |
| | Avg | 27.47 | | | | -33.01 | | 49.40 |
| 0.606 0 | Peak | 24.75 | 19.40 | 0.06 | -40 | 4.21 | 31.95 | 27.74 |
| | - | - | | | | - | | - |
| 0.848 4 | Peak | 21.77 | 19.40 | 0.08 | -40 | 1.25 | 29.03 | 27.78 |
| | - | - | | | | - | | - |

- Pad type / charging with load (Min)

| Radiated emissions | | | Correction factors | | | Total | Limit | |
|---|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Detect | Reading (dB㎶) | Ant. factor (dB/m) | Cable loss (dB) | $F_d$ (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| 0.101 6* | Peak | 23.96 | 19.50 | 0.02 | -80 | -36.52 | 27.47 | 63.99 |
| | - | - | | | | - | | - |
| 0.112 0** | Peak | 34.18 | 19.50 | 0.02 | -80 | -26.30 | 26.62 | 52.92 |
| | Avg | 34.10 | | | | -26.38 | | 53.00 |
| 0.336 2 | Peak | 27.81 | 19.48 | 0.05 | -80 | -32.66 | 17.07 | 49.73 |
| | Avg | 27.75 | | | | -32.72 | | 49.79 |
| 0.510 9 | Peak | 25.06 | 19.40 | 0.05 | -40 | 4.51 | 33.44 | 28.93 |
| | - | - | | | | - | | - |
| 0.781 8 | Peak | 22.39 | 19.40 | 0.08 | -40 | 1.87 | 29.74 | 27.87 |
| | - | - | | | | - | | - |

- Pad type / charging with Mobile Phone (< 1% of Battery)

| Radiated emissions | | | Correction factors | | | Total | Limit | |
|---|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Detect | Reading (dB㎶) | Ant. factor (dB/m) | Cable loss (dB) | $F_d$ (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| 0.103 6* | Peak | 17.24 | 19.50 | 0.02 | -80 | -43.24 | 27.30 | 70.54 |
| | - | - | | | | - | | - |
| 0.143 7** | Peak | 31.26 | 19.50 | 0.02 | -80 | -29.22 | 24.46 | 53.68 |
| | Avg | 31.19 | | | | -29.29 | | 53.75 |
| 0.431 2 | Peak | 25.36 | 19.43 | 0.05 | -80 | -35.16 | 14.91 | 50.07 |
| | Avg | 25.30 | | | | -35.22 | | 50.13 |
| 0.718 8 | Peak | 21.04 | 19.40 | 0.08 | -40 | 0.52 | 30.47 | 29.95 |
| | - | - | | | | - | | - |
| 0.998 9 | Peak | 16.94 | 19.40 | 0.08 | -40 | -3.58 | 27.61 | 31.19 |
| | - | - | | | | - | | - |

- Pad type / charging with Mobile Phone ( 50% of Battery)

| Radiated emissions | | | Correction factors | | | Total | Limit | |
|---|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Detect | Reading (dB㎶) | Ant. factor (dB/m) | Cable loss (dB) | $F_d$ (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| 0.105 3* | Peak | 18.54 | 19.50 | 0.02 | -80 | -41.94 | 27.16 | 69.10 |
| | - | - | | | | - | | - |
| 0.133 6** | Peak | 31.36 | 19.50 | 0.02 | -80 | -29.12 | 25.09 | 54.21 |
| | Avg | 31.32 | | | | -29.16 | | 54.25 |
| 0.400 5 | Peak | 25.45 | 19.45 | 0.05 | -80 | -35.05 | 15.55 | 50.60 |
| | Avg | 25.34 | | | | -35.16 | | 50.71 |
| 0.671 3 | Peak | 21.15 | 19.40 | 0.07 | -40 | 0.62 | 31.07 | 30.45 |
| | - | - | | | | - | | - |

**※ Remark**

1. "*" means Restricted frequency.
2. "**" means Fundamental frequency.
3. Measurement distance : 3 m.
4. Actual = Reading + Ant. factor + Cable loss + $F_d$
5. $F_d = 40\log(D_m / D_s)$

Where:

$F_d$ = Distance factor in dB
$D_m$ = Measurement distance in meters
$D_s$ = Specification distance in meters

For 300m: 40log(300/3) = 80 dB for frequency band 0.009 ㎒ to 0.490 ㎒
For 30m: 40log(30/3) = 40 dB for frequency band 0.490 ㎒ to 30 ㎒

**Test results (Below 1 000 ㎒)**

The frequency spectrum from 30 ㎒ to 1 000 ㎒ was investigated.

- Pad type / charging with load (Max)

| Radiated emissions | | Ant. | Correction factors | | Total | Limit | |
|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Reading (dB㎶) | Pol. | Ant. factor (dB/m) | Cable loss (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| | | | | | | | |
| No emissions were detected at a level greater than 20 ㏈ below limit | | | | | | | |
| | | | | | | | |

- Pad type / charging with load (Mid)

| Radiated emissions | | Ant. | Correction factors | | Total | Limit | |
|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Reading (dB㎶) | Pol. | Ant. factor (dB/m) | Cable loss (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| | | | | | | | |
| No emissions were detected at a level greater than 20 ㏈ below limit | | | | | | | |
| | | | | | | | |

- Pad type / charging with load (Min)

| Radiated emissions | | Ant. | Correction factors | | Total | Limit | |
|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Reading (dB㎶) | Pol. | Ant. factor (dB/m) | Cable loss (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| | | | | | | | |
| No emissions were detected at a level greater than 20 ㏈ below limit | | | | | | | |
| | | | | | | | |

- Pad type / charging with Mobile Phone (< 1% of Battery)

| Radiated emissions | | Ant. | Correction factors | | Total | Limit | |
|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Reading (dB㎶) | Pol. | Ant. factor (dB/m) | Cable loss (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| | | | | | | | |
| No emissions were detected at a level greater than 20 dB below limit | | | | | | | |
| | | | | | | | |

- Pad type / charging with Mobile Phone (50% of Battery)

| Radiated emissions | | Ant. | Correction factors | | Total | Limit | |
|---|---|---|---|---|---|---|---|
| Frequency (㎒) | Reading (dB㎶) | Pol. | Ant. factor (dB/m) | Cable loss (dB) | Actual (dB㎶/m) | Limit (dB㎶/m) | Margin (dB) |
| | | | | | | | |
| No emissions were detected at a level greater than 20 dB below limit | | | | | | | |
| | | | | | | | |

**※ Remark**

1. Actual = Reading + Ant. factor + Cable loss

## 3.2. AC conducted emissions

### Frequency range of measurement
150 ㎑ to 30 ㎒

### Instrument settings
IF Band Width: 9 ㎑

### Test procedures
The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m. Amplitude measurements were performed with a quasi-peak detector and an average detector.

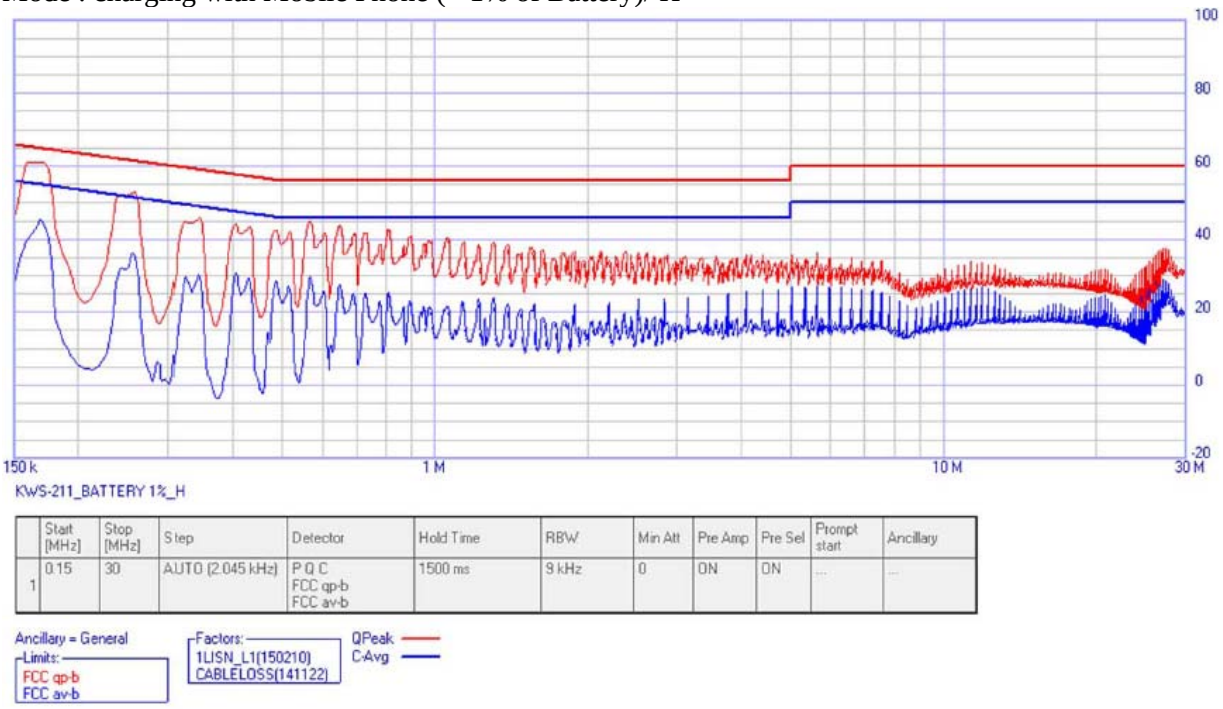
### Limit
According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

| Frequency of Emission (㎒) | Conducted limit (㏈㎶/m) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 – 0.50 | 66 - 56* | 56 - 46* |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

※ Remark
1. Decreases with the logarithm of the frequency.

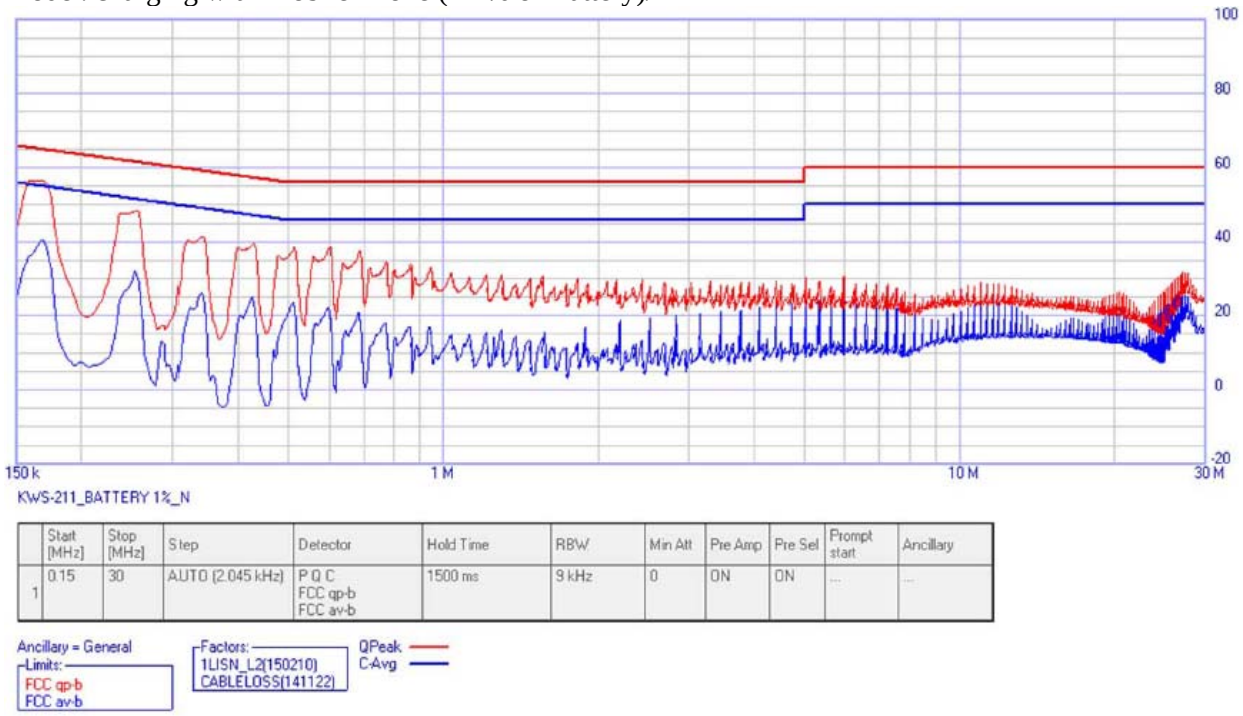
**Test results**

Mode : charging with Mobile Phone (< 1% of Battery)/ H




| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.152 | 50.620 | 65.890 | -15.270 | 33.040 | 55.890 | -22.850 | 9.650 | 0.020 |
| 0.160 | 61.230 | 65.450 | -4.220 | 40.290 | 55.450 | -15.160 | 9.650 | 0.030 |
| 0.258 | 52.830 | 61.480 | -8.650 | 35.400 | 51.480 | -16.080 | 9.650 | 0.030 |
| 0.344 | 45.750 | 59.100 | -13.350 | 29.600 | 49.100 | -19.500 | 9.650 | 0.030 |
| 0.518 | 41.940 | 56.000 | -14.060 | 26.200 | 46.000 | -19.800 | 9.650 | 0.030 |
| 0.567 | 44.860 | 56.000 | -11.140 | 29.640 | 46.000 | -16.360 | 9.650 | 0.030 |
| 0.649 | 43.600 | 56.000 | -12.400 | 27.560 | 46.000 | -18.440 | 9.650 | 0.030 |
| 0.651 | 43.600 | 56.000 | -12.400 | 27.560 | 46.000 | -18.440 | 9.650 | 0.040 |
| 0.811 | 42.710 | 56.000 | -13.290 | 25.430 | 46.000 | -20.570 | 9.650 | 0.050 |
| 0.813 | 42.710 | 56.000 | -13.290 | 25.430 | 46.000 | -20.570 | 9.650 | 0.050 |

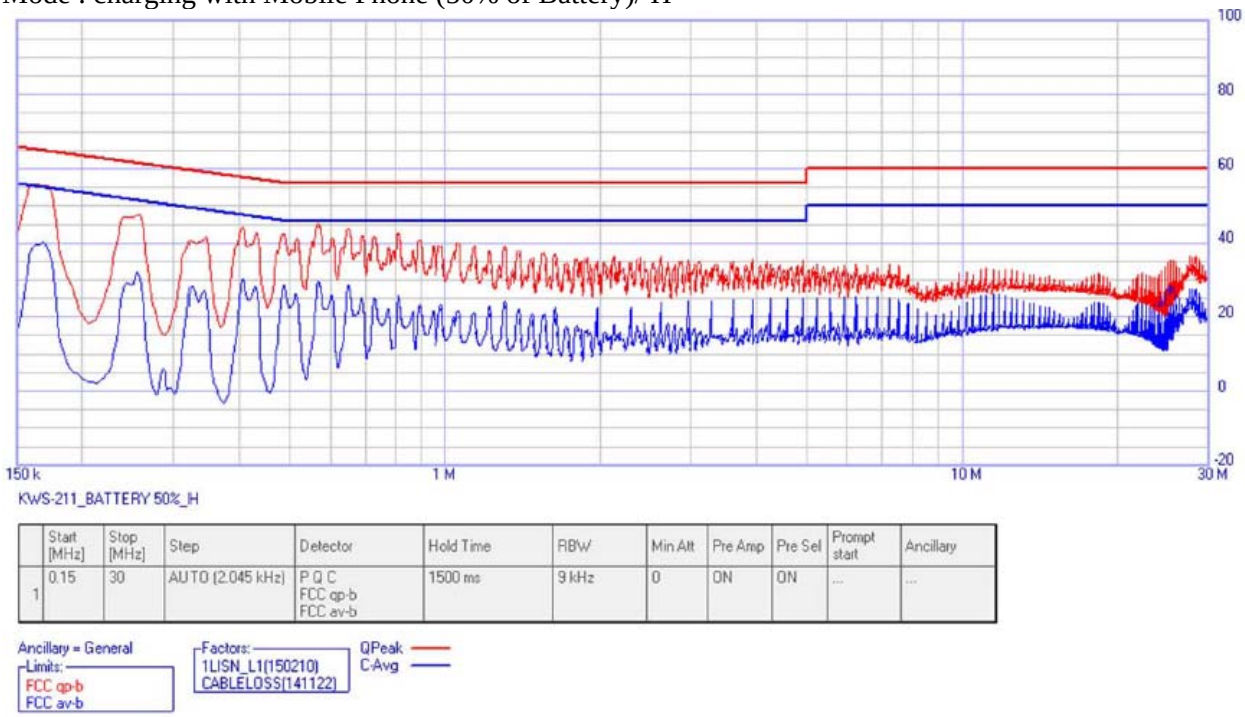
Mode : charging with Mobile Phone (< 1% of Battery)/ N




| | Start [MHz] | Stop [MHz] | Step | Detector | Hold Time | RBW | Min Att | Pre Amp | Pre Sel | Prompt start | Ancillary |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15 | 30 | AUTO (2.045 kHz) | P Q C<br>FCC qp-b<br>FCC av-b | 1500 ms | 9 kHz | 0 | ON | ON | ... | ... |

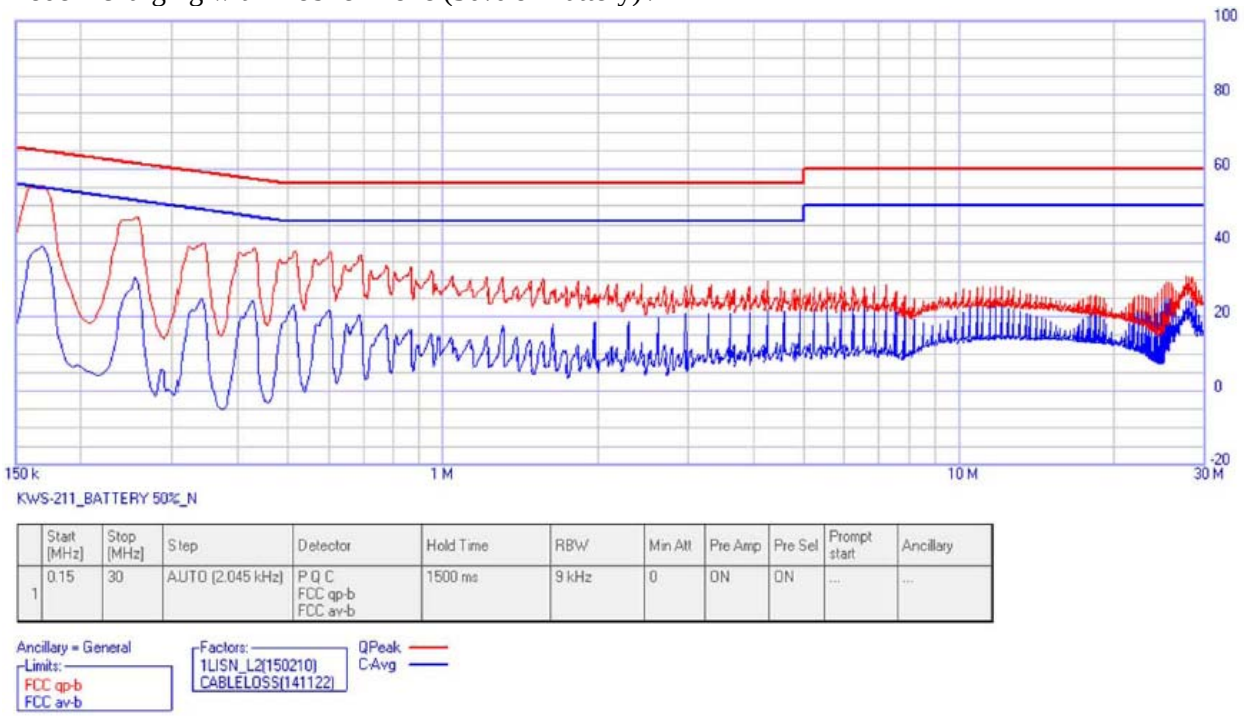
| Frequency [MHz] | Q-Peak [dBµV] | Limit [dBµV] | Margin [dB] | C-Avg [dBµV] | Limit [dBµV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.152 | 48.230 | 65.890 | -17.660 | 29.800 | 55.890 | -26.090 | 9.630 | 0.020 |
| 0.160 | 56.570 | 65.450 | -8.880 | 36.390 | 55.450 | -19.060 | 9.630 | 0.030 |
| 0.256 | 48.360 | 61.550 | -13.190 | 31.180 | 51.550 | -20.370 | 9.640 | 0.030 |
| 0.342 | 41.350 | 59.150 | -17.800 | 24.950 | 49.150 | -24.200 | 9.640 | 0.030 |
| 0.514 | 38.440 | 56.000 | -17.560 | 22.560 | 46.000 | -23.440 | 9.650 | 0.030 |
| 0.516 | 38.440 | 56.000 | -17.560 | 22.560 | 46.000 | -23.440 | 9.650 | 0.030 |
| 0.600 | 38.350 | 56.000 | -17.650 | 21.390 | 46.000 | -24.610 | 9.650 | 0.030 |
| 0.688 | 37.290 | 56.000 | -18.710 | 18.780 | 46.000 | -27.220 | 9.650 | 0.040 |
| 0.690 | 37.290 | 56.000 | -18.710 | 18.780 | 46.000 | -27.220 | 9.650 | 0.040 |
| 0.774 | 34.600 | 56.000 | -21.400 | 16.570 | 46.000 | -29.430 | 9.650 | 0.050 |

Mode : charging with Mobile Phone (50% of Battery)/ H



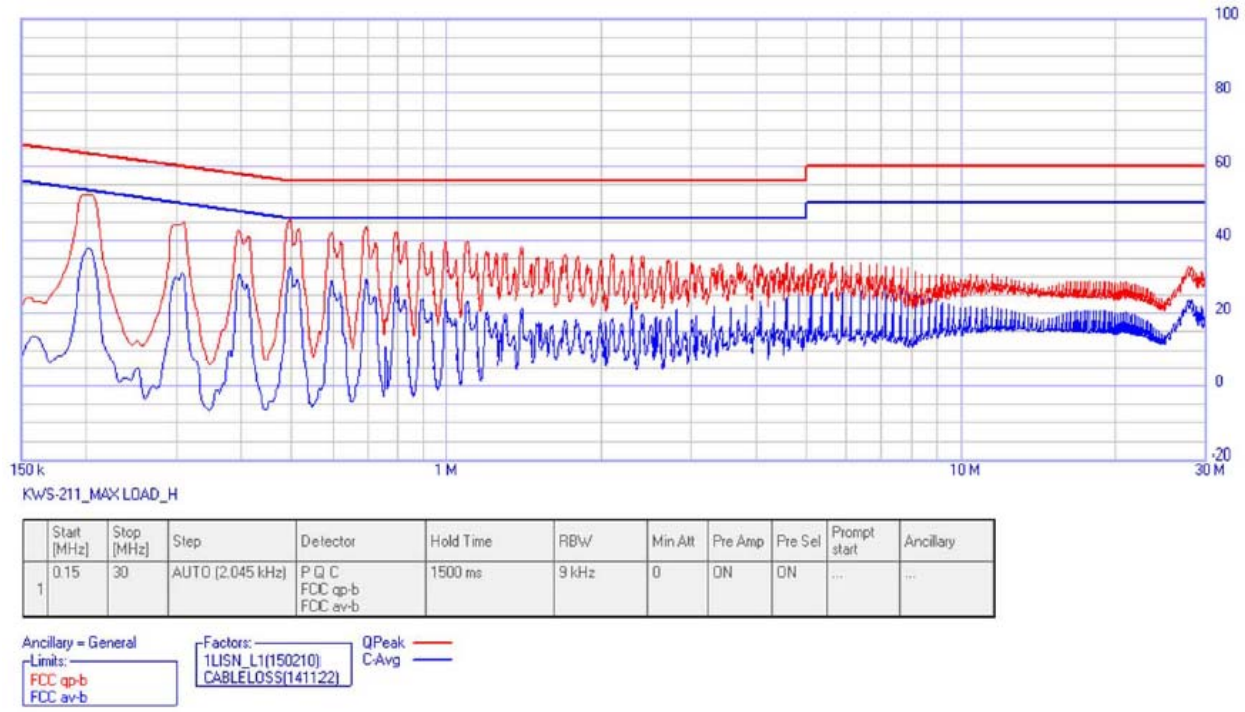

| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.152 | 46.910 | 65.890 | -18.980 | 20.900 | 55.890 | -34.990 | 9.650 | 0.020 |
| 0.160 | 55.830 | 65.450 | -9.620 | 38.480 | 55.450 | -16.970 | 9.650 | 0.030 |
| 0.258 | 47.630 | 61.480 | -13.850 | 30.700 | 51.480 | -20.780 | 9.650 | 0.030 |
| 0.404 | 44.150 | 57.780 | -13.630 | 29.910 | 47.780 | -17.870 | 9.650 | 0.030 |
| 0.567 | 45.020 | 56.000 | -10.980 | 29.690 | 46.000 | -16.310 | 9.650 | 0.030 |
| 0.649 | 43.790 | 56.000 | -12.210 | 28.430 | 46.000 | -17.570 | 9.650 | 0.030 |
| 0.651 | 43.790 | 56.000 | -12.210 | 28.430 | 46.000 | -17.570 | 9.650 | 0.040 |
| 0.690 | 41.970 | 56.000 | -14.030 | 25.000 | 46.000 | -21.000 | 9.650 | 0.040 |
| 0.811 | 42.580 | 56.000 | -13.420 | 25.720 | 46.000 | -20.280 | 9.650 | 0.050 |
| 0.813 | 42.580 | 56.000 | -13.420 | 25.720 | 46.000 | -20.280 | 9.650 | 0.050 |

Mode：charging with Mobile Phone (50% of Battery) / N




| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.152 | 46.420 | 65.890 | -19.470 | 21.590 | 55.890 | -34.300 | 9.630 | 0.020 |
| 0.160 | 55.080 | 65.450 | -10.370 | 36.570 | 55.450 | -18.880 | 9.630 | 0.030 |
| 0.256 | 46.950 | 61.550 | -14.600 | 30.430 | 51.550 | -21.120 | 9.640 | 0.030 |
| 0.344 | 40.000 | 59.100 | -19.100 | 23.400 | 49.100 | -25.700 | 9.640 | 0.030 |
| 0.516 | 37.780 | 56.000 | -18.220 | 22.350 | 46.000 | -23.650 | 9.650 | 0.030 |
| 0.604 | 37.850 | 56.000 | -18.150 | 19.940 | 46.000 | -26.060 | 9.650 | 0.030 |
| 0.690 | 36.810 | 56.000 | -19.190 | 19.470 | 46.000 | -26.530 | 9.650 | 0.040 |
| 0.778 | 34.010 | 56.000 | -21.990 | 16.040 | 46.000 | -29.960 | 9.650 | 0.050 |
| | | | | | | | | |
| | | | | | | | | |

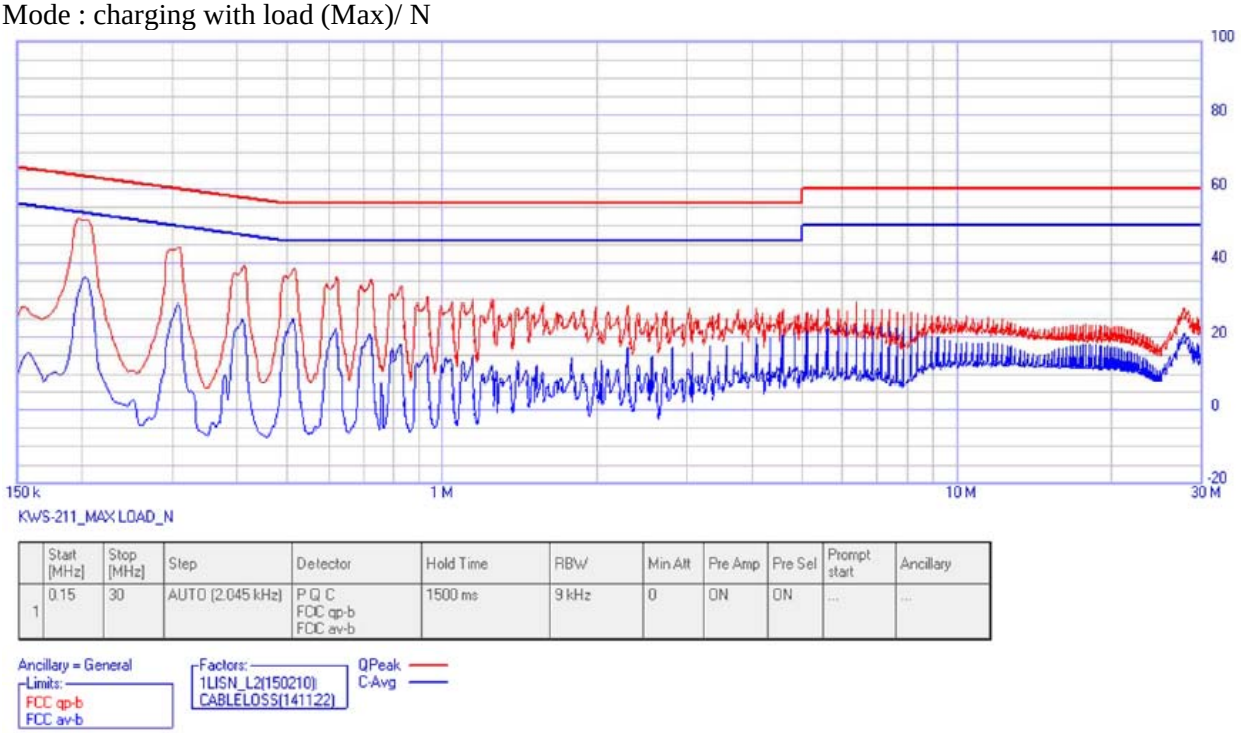
Mode : charging with load (Max)/ H




| | Start [MHz] | Stop [MHz] | Step | Detector | Hold Time | RBW | Min Att | Pre Amp | Pre Sel | Prompt start | Ancillary |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15 | 30 | AUTO (2.045 kHz) | P Q C<br>FCC qp-b<br>FCC av-b | 1500 ms | 9 kHz | 0 | ON | ON | ... | ... |

| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.197 | 52.380 | 63.730 | -11.350 | 34.800 | 53.730 | -18.930 | 9.650 | 0.030 |
| 0.310 | 44.790 | 59.980 | -15.190 | 29.940 | 49.980 | -20.040 | 9.650 | 0.030 |
| 0.395 | 42.530 | 57.950 | -15.420 | 30.090 | 47.950 | -17.860 | 9.650 | 0.030 |
| 0.496 | 45.550 | 56.070 | -10.520 | 32.350 | 46.070 | -13.720 | 9.650 | 0.030 |
| 0.518 | 43.130 | 56.000 | -12.870 | 27.770 | 46.000 | -18.230 | 9.650 | 0.030 |
| 0.596 | 42.010 | 56.000 | -13.990 | 28.960 | 46.000 | -17.040 | 9.650 | 0.030 |
| 0.598 | 42.010 | 56.000 | -13.990 | 28.960 | 46.000 | -17.040 | 9.650 | 0.030 |
| 0.694 | 43.560 | 56.000 | -12.440 | 29.280 | 46.000 | -16.720 | 9.650 | 0.040 |
| 0.696 | 43.560 | 56.000 | -12.440 | 29.280 | 46.000 | -16.720 | 9.650 | 0.040 |
| 0.794 | 42.150 | 56.000 | -13.850 | 27.430 | 46.000 | -18.570 | 9.650 | 0.050 |

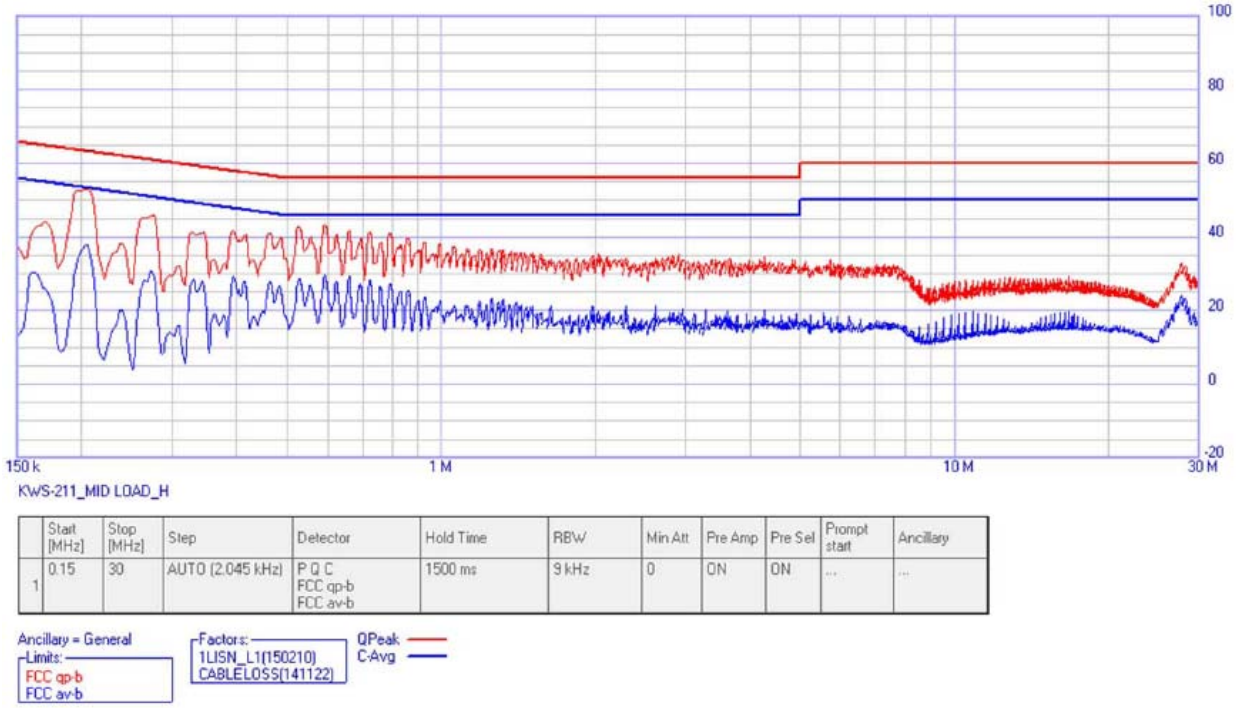
Mode : charging with load (Max)/ N




| | Start [MHz] | Stop [MHz] | Step | Detector | Hold Time | RBW | Min Att | Pre Amp | Pre Sel | Prompt start | Ancillary |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15 | 30 | AUTO (2.045 kHz) | P Q C<br>FCC qp-b<br>FCC av-b | 1500 ms | 9 kHz | 0 | ON | ON | ... | ... |

| Frequency [MHz] | Q-Peak [dBµV] | Limit [dBµV] | Margin [dB] | C-Avg [dBµV] | Limit [dBµV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.197 | 51.710 | 63.730 | -12.020 | 31.540 | 53.730 | -22.190 | 9.640 | 0.030 |
| 0.310 | 44.100 | 59.980 | -15.880 | 28.050 | 49.980 | -21.930 | 9.640 | 0.030 |
| 0.414 | 39.060 | 57.570 | -18.510 | 23.270 | 47.570 | -24.300 | 9.640 | 0.030 |
| 0.494 | 36.320 | 56.110 | -19.790 | 19.660 | 46.110 | -26.450 | 9.650 | 0.030 |
| 0.518 | 38.490 | 56.000 | -17.510 | 22.920 | 46.000 | -23.080 | 9.650 | 0.030 |
| 0.622 | 36.010 | 56.000 | -19.990 | 20.060 | 46.000 | -25.940 | 9.650 | 0.030 |
| 0.725 | 35.230 | 56.000 | -20.770 | 19.930 | 46.000 | -26.070 | 9.650 | 0.040 |
| 0.727 | 35.230 | 56.000 | -20.770 | 19.930 | 46.000 | -26.070 | 9.650 | 0.040 |
| **0.829** | **33.610** | **56.000** | **-22.390** | **17.300** | **46.000** | **-28.700** | **9.650** | **0.050** |
| | | | | | | | | |

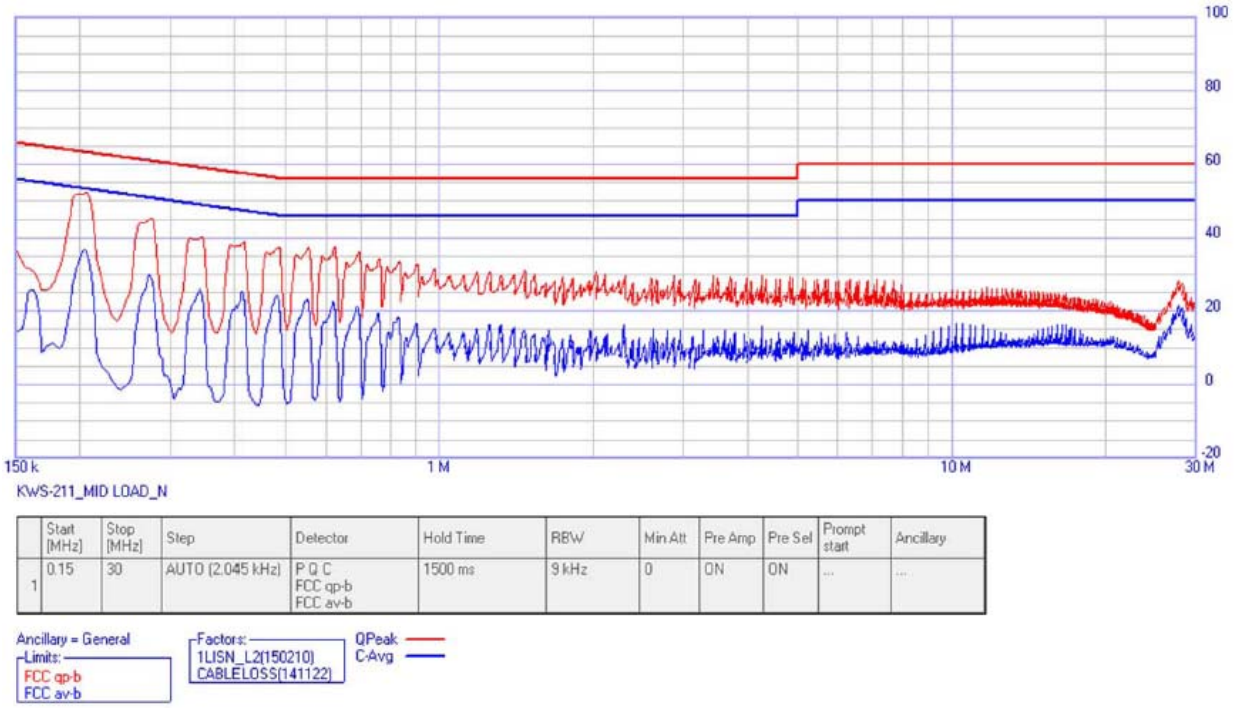
Mode : charging with load (Mid)/ H




| | Start [MHz] | Stop [MHz] | Step | Detector | Hold Time | RBW | Min Att | Pre Amp | Pre Sel | Prompt start | Ancillary |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15 | 30 | AUTO (2.045 kHz) | P Q C<br>FCC qp-b<br>FCC av-b | 1500 ms | 9 kHz | 0 | ON | ON | ... | ... |

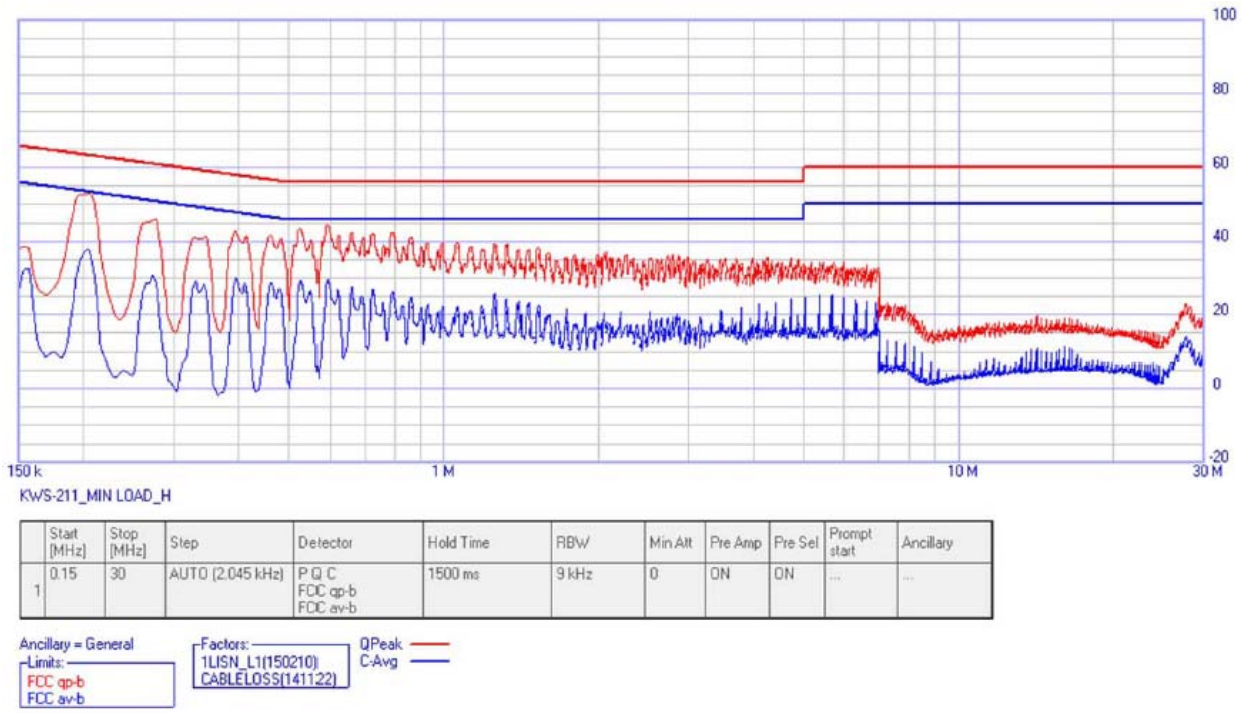
| Frequency [MHz] | Q-Peak [dBµV] | Limit [dBµV] | Margin [dB] | C-Avg [dBµV] | Limit [dBµV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.170 | 43.960 | 64.940 | -20.980 | 25.730 | 54.940 | -29.210 | 9.650 | 0.030 |
| 0.205 | 53.080 | 63.400 | -10.320 | 37.590 | 53.400 | -15.810 | 9.650 | 0.030 |
| 0.277 | 46.030 | 60.910 | -14.880 | 29.430 | 50.910 | -21.480 | 9.650 | 0.030 |
| 0.393 | 41.740 | 57.990 | -16.250 | 28.440 | 47.990 | -19.550 | 9.650 | 0.030 |
| 0.526 | 42.720 | 56.000 | -13.280 | 28.650 | 46.000 | -17.350 | 9.650 | 0.030 |
| 0.592 | 43.240 | 56.000 | -12.760 | 29.580 | 46.000 | -16.420 | 9.650 | 0.030 |
| 0.659 | 41.640 | 56.000 | -14.360 | 29.240 | 46.000 | -16.760 | 9.650 | 0.040 |
| 0.661 | 41.640 | 56.000 | -14.360 | 29.240 | 46.000 | -16.760 | 9.650 | 0.040 |
| 0.723 | 41.310 | 56.000 | -14.690 | 27.370 | 46.000 | -18.630 | 9.650 | 0.040 |
| | | | | | | | | |

Mode : charging with load (Mid)/ N



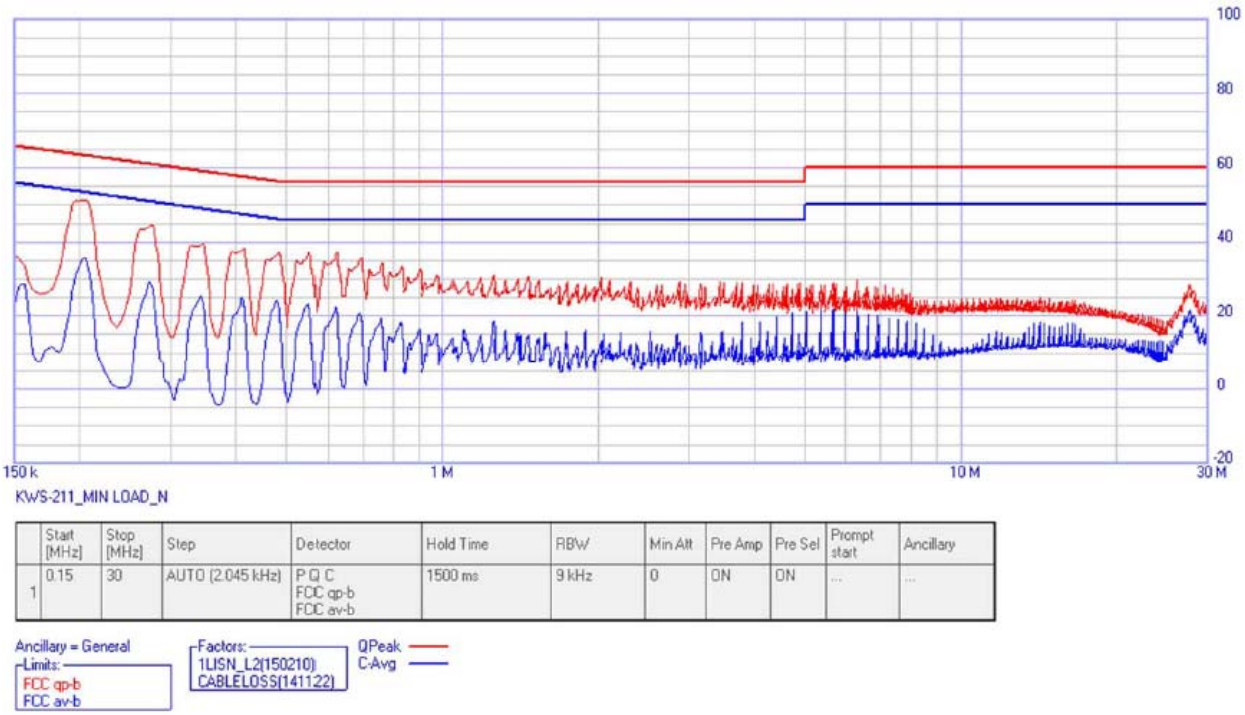

| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.205 | 52.140 | 63.400 | -11.260 | 36.360 | 53.400 | -17.040 | 9.640 | 0.030 |
| 0.275 | 45.170 | 60.970 | -15.800 | 29.620 | 50.970 | -21.350 | 9.640 | 0.030 |
| 0.344 | 40.120 | 59.100 | -18.980 | 25.560 | 49.100 | -23.540 | 9.640 | 0.030 |
| 0.416 | 38.680 | 57.530 | -18.850 | 23.050 | 47.530 | -24.480 | 9.640 | 0.030 |
| 0.555 | 37.310 | 56.000 | -18.690 | 20.740 | 46.000 | -25.260 | 9.650 | 0.030 |
| 0.624 | 37.330 | 56.000 | -18.670 | 20.450 | 46.000 | -25.550 | 9.650 | 0.030 |
| 0.694 | 36.000 | 56.000 | -20.000 | 19.050 | 46.000 | -26.950 | 9.650 | 0.040 |
| 0.764 | 34.310 | 56.000 | -21.690 | 17.330 | 46.000 | -28.670 | 9.650 | 0.050 |
| | | | | | | | | |
| | | | | | | | | |

Mode : charging with load (Min)/ H




| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.205 | 52.800 | 63.400 | -10.600 | 37.300 | 53.400 | -16.100 | 9.650 | 0.030 |
| 0.275 | 45.930 | 60.970 | -15.040 | 30.460 | 50.970 | -20.510 | 9.650 | 0.030 |
| 0.393 | 42.560 | 57.990 | -15.430 | 29.100 | 47.990 | -18.890 | 9.650 | 0.030 |
| 0.461 | 41.610 | 56.680 | -15.070 | 28.490 | 46.680 | -18.190 | 9.650 | 0.030 |
| 0.526 | 43.410 | 56.000 | -12.590 | 29.120 | 46.000 | -16.880 | 9.650 | 0.030 |
| 0.592 | 44.300 | 56.000 | -11.700 | 29.210 | 46.000 | -16.790 | 9.650 | 0.030 |
| 0.659 | 42.490 | 56.000 | -13.510 | 27.620 | 46.000 | -18.380 | 9.650 | 0.040 |
| 0.661 | 42.490 | 56.000 | -13.510 | 27.620 | 46.000 | -18.380 | 9.650 | 0.040 |
| 0.790 | 42.340 | 56.000 | -13.660 | 26.230 | 46.000 | -19.770 | 9.650 | 0.050 |
| | | | | | | | | |

Mode : charging with load (Min)/ N




| Frequency [MHz] | Q-Peak [dBμV] | Limit [dBμV] | Margin [dB] | C-Avg [dBμV] | Limit [dBμV] | Margin [dB] | Factor (LISN) [dB] | Factor (Cable Loss) [dB] |
|---|---|---|---|---|---|---|---|---|
| 0.205 | 51.310 | 63.400 | -12.090 | 35.570 | 53.400 | -17.830 | 9.640 | 0.030 |
| 0.275 | 44.420 | 60.970 | -16.550 | 28.790 | 50.970 | -22.180 | 9.640 | 0.030 |
| 0.344 | 39.450 | 59.100 | -19.650 | 24.830 | 49.100 | -24.270 | 9.640 | 0.030 |
| 0.414 | 38.180 | 57.570 | -19.390 | 24.260 | 47.570 | -23.310 | 9.640 | 0.030 |
| 0.553 | 36.990 | 56.000 | -19.010 | 22.290 | 46.000 | -23.710 | 9.650 | 0.030 |
| 0.624 | 37.110 | 56.000 | -18.890 | 20.720 | 46.000 | -25.280 | 9.650 | 0.030 |
| 0.694 | 35.770 | 56.000 | -20.230 | 18.530 | 46.000 | -27.470 | 9.650 | 0.040 |
| 0.766 | 34.090 | 56.000 | -21.910 | 16.890 | 46.000 | -29.110 | 9.650 | 0.050 |
| | | | | | | | | |
| | | | | | | | | |

## Appendix A. Measurement equipment

| Equipment | Manufacturer | Model | Serial number | Cal Interval | Calibration due. |
|---|---|---|---|---|---|
| Spectrum analyzer | R&S | FSV30 | 101389 | 1 year | 2016.01.22 |
| Vector signal generator | R&S | SMBV2100A | 1407.6004K02 | 1 year | 2015.07.24 |
| Radio Communication Tester | R&S | CMU200 | 107627 | 1 year | 2015.07.24 |
| Loop antenna | R&S | HFH2-Z2.335.4711.52 | 826532 | 2 years | 2017.03.03 |
| Trilog-broadband antenna | Schwarzbeck | VULB 9168 | 9168-461 | 2 years | 2017.04.03 |
| Preamplifier | HP | 8447F | 2805A02570 | 1 year | 2016.01.23 |
| AC power supply | HP | 6813A | 3729A00754 | 1 year | 2016.01.22 |
| EMI Test Receiver | LIG NEX1 | ISA-80 | L0912K014 | 1 year | 2015.11.14 |
| EMI Receiver/Signal Analyzer | Narda S.T.S./PMM | R&S | PMM 9010F | 1 year | 2016.04.01 |
| LISN | R&S | ENV216 | 101137 | 1 year | 2016.02.10 |

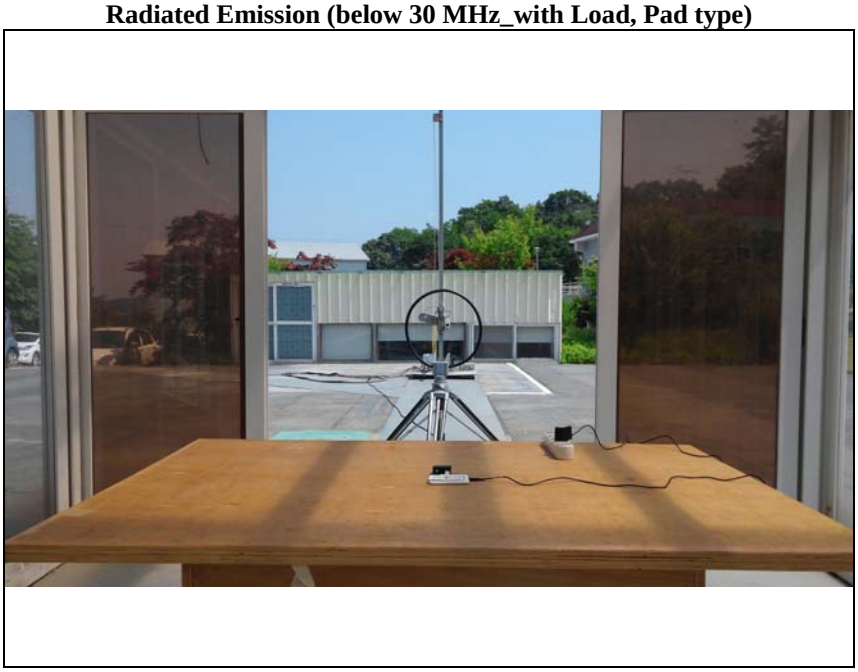
## Peripheral device

| Device | Manufacturer | Model No. | Note |
|---|---|---|---|
| Wireless Charging Cover(with load) | KOMATECH Co.,Ltd. | N/A | - |
| Mobile Phone | SAMSUNG ELECTRONICS CO., LTD. | SHV-E210S (FCC ID : A3LSHVE210S) | - |

-The above devices were supported by manufacturer.

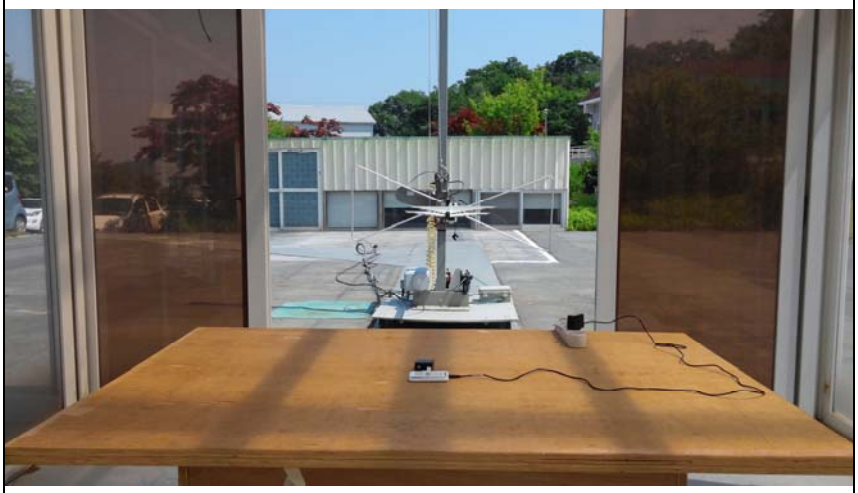
## Appendix B. Test setup photo

**Radiated Emission (below 30 MHz_with Load, Pad type)**

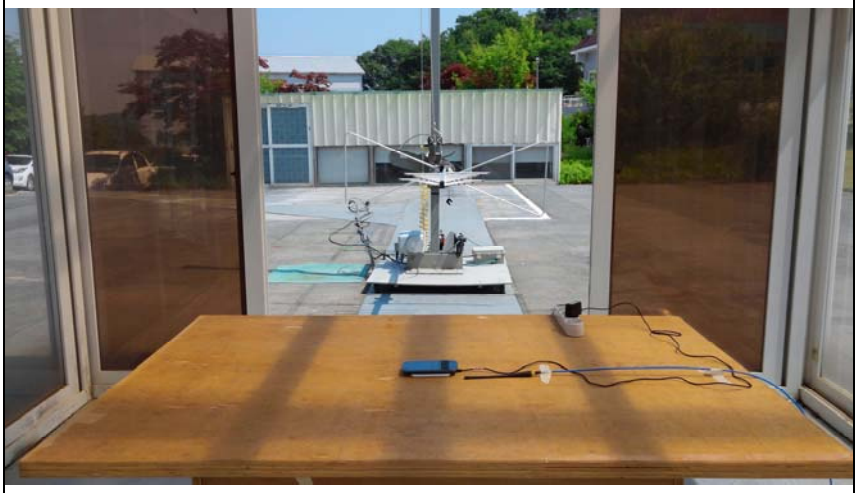


**Radiated Emission ((below 30 MHz_with Phone, Pad type)**

**Radiated Emission (below 1 GHz_with Load, Pad type)**



**Radiated Emission ((below 1 GHz_with Phone, Pad type)**



**AC conducted Emission (with Load)**

**AC conducted Emission (with Phone)**