

# FCC TEST REPORT

**Reference No. : GPWL2009001750EG**

**Applicant : Franklin Technology Inc.**

**Equipment Under Test (EUT) :**

Product Name : Mobile Hotspot

Model Name : RT410

**FCC Authorization Type : Certificate of Conformity**

**Applied Standards : FCC Part 15 Subpart B,  
ANSI C 63.4:2014**


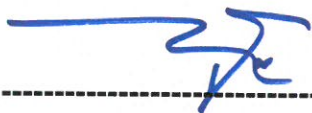
**FCC ID : XHG-RT410**

**Date of Receipt : September 11, 2020**

**Date of Test : October 27, 2020**

**Date of Issue : November 3, 2020**

**Test Results : Complied**

|                      |   |
|----------------------|---|
| <b>Tested by</b> :   | <br>-----<br><b>Kevin Jo</b>  |
| <b>Reviewed by</b> : | <br>-----<br><b>Paul Kang</b> |

**This test report does not assure KOLAS accreditation.**

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

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The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full

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## Revision History

| Revision | Report Number        | Description |
|----------|----------------------|-------------|
| 0        | F690501-RF-EMG000359 | Initial     |
| 1        |                      |             |
| 2        |                      |             |

# 1. General Information

## 1.1 Client Information

Applicant : Franklin Technology Inc.  
 - Address of Applicant : 906(Gasan-Dong, JEI Platz), 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.(08502)

Manufacturer : Franklin Technology Inc.  
 - Address of Manufacturer : 906(Gasan-Dong, JEI Platz), 186, Gasan digital 1-ro, Geumcheon-gu, Seoul, Republic of Korea.(08502)

## 1.2 Test Laboratory

Name and Address : SGS Korea Co., Ltd.  
 - Giheung 1 Laboratory : 35, Giheungdanji-ro 121beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea  
 - Giheung 2 Laboratory : 23, Giheungdanji-ro 24beon-gil, Giheung-gu, Yongin-si, Gyeonggi-do, Republic of Korea  
 - Gunpo Laboratory : 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, 15807, Republic of Korea.

FCC Registration No. : KR0150  
 IC Registration No. : 7837B

Phone : + 82 31 428 5700  
 Fax : + 82 31 427 2370  
 e-mail : [paul.kang@sgs.com](mailto:paul.kang@sgs.com)

## 1.3 General Information of E.U.T.

| Classification             | Description  |
|----------------------------|--|
| Product Name               | Mobile Hotspot   |
| Model Name                 | RT410  |
| Serial No.                 | None   |
| EMI Classification         | Class B  |
| Test Voltage               | 120 V~, 60 Hz  |
| Rated Voltage              | 3.8 Vd.c.(Min : 3.40 Vd.c., Max : 4.35 Vd.c.), Max. DC Current : 2.450 A |
| Highest Internal Frequency | 5 825 Mhz  |
| H/W Version                | P1   |
| S/W Version                | RT410F21.FR.1609   |
| Operating temperature      | (-)10 °C ~ 55 °C   |

### 1.4 Operating Modes and Conditions

| Operating Mode              | Operating Condition                                   |
|-----------------------------|---|
| 1) Charging+LTE BAND 2 Idle | Charging status and connect to LTE BAND 2 Idle status |

### 1.5 Auxiliary Equipments

| Description                         | Model   | Serial No. | Manufacturer | FCC ID |
|-------------------------------------|---------|------------|--------------|--------|
| Wideband Radio Communication Tester | CMW 500 | -          | -            | -      |

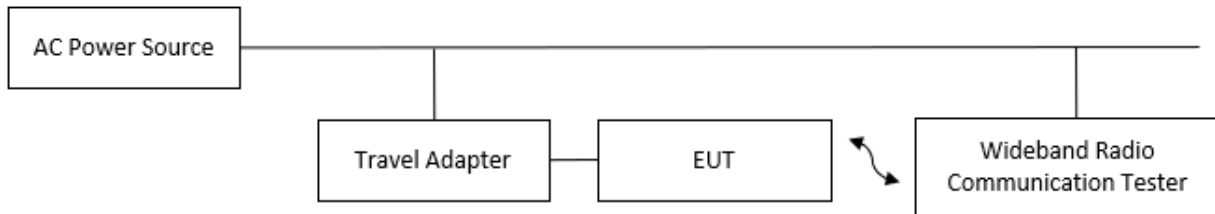
### 1.6 Cable List

| Start           |          | END                                 |          | Cable Spec. |          | Used core |
|-----------------|----------|-------------------------------------|----------|-------------|----------|-----------|
| Name            | I/O Port | Name                                | I/O Port | Length      | Shield   |           |
| AC Power Source | AC OUT   | Travel Adapter                      | AC IN    | -           | -        | -         |
|                 |          | Wideband Radio Communication Tester |          | -           | -        | -         |
| Travel Adapter  | DC OUT   | EUT                                 | DC IN    | 1.0         | Unshield | No.       |
| EUT             | -        | Wideband Radio Communication Tester | -        | -           | -        | -         |

### 1.7 System Configurations

| Description    | Model                | Serial No. | Manufacturer |
|----------------|----------------------|------------|--------------|
| Main Board     | RT410 P1 2020.08.11. | -          | -            |
| Battery        | -                    | -          | -            |
| Travel Adapter | -                    | -          | -            |

### 1.8 Test System Layout



### 1.9 Modifications

There was no modified item during the test.

### 1.10 Applicable Standards for Testing

| Standards             | Status     | Deviation    |
|-----------------------|------------|--------------|
| FCC Part 15 Subpart B | Applicable | No Deviation |

### 1.11 Summary of Test Results

| Test Item          | Standards  | Results  |
|--------------------|--|----------|
| Conducted Emission | FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014 | Complied |
| Radiated Emission  | FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014 | Complied |

Note : Test methods of all test items are performed according to the basic standards in this table.

# EMISSION

## 2.1 Test Results

| Test Items         | Basic Standards  | Test Results    |
|--------------------|--|-----------------|
| Conducted Emission | FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014 | <b>Complied</b> |
| Radiated Emission  | FCC Part 15 Subpart B Section 15.109, ANSI C 63.4:2014 | <b>Complied</b> |

## 2.2 Test Method and Limits

### 2.2.1 Test Method

| Test Items         | Measuring Frequency Range | RBW     | Measuring Distance |
|--------------------|---------------------------|---------|--------------------|
| Conducted Emission | 0.15 MHz ~ 30 MHz         | 9 kHz   | -                  |
| Radiated Emission  | 30 MHz ~ 1 GHz            | 120 kHz | 10 m & 3 m         |
|                    | Above 1 GHz               | 1 MHz   | 3 m                |

Note : 10 m method of radiated emission measurement is only applied to Class A equipment over the frequency range of 30 MHz ~ 1 GHz. Except this, 3 m method is applied to Class B equipment over the frequency range of 30 MHz ~ 1 GHz and Class A and Class B equipment above 1 GHz.

### 2.2.2 Test Limits

#### -Conducted Emission Limits at Mains Port

| Frequency Range    | Limits( dB( $\mu$ V) ) |          | Class          |
|--------------------|------------------------|----------|----------------|
|                    | Quasi-peak             | Average  |                |
| 0.15 MHz ~ 0.5 MHz | 79                     | 66       | <b>Class A</b> |
| 0.5 MHz ~ 30 MHz   | 73                     | 60       |                |
| 0.15 MHz ~ 0.5 MHz | 66 to 56               | 56 to 46 | <b>Class B</b> |
| 0.5 MHz ~ 5 MHz    | 56                     | 46       |                |
| 5 MHz ~ 30 MHz     | 60                     | 50       |                |

Note : The lower limit shall apply at the transition frequencies. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

#### -Radiated Emission Limits below 1 GHz

| Frequency Range   | Limits( dB( $\mu$ V/m) ) | Class                           |
|-------------------|--------------------------|---------------------------------|
|                   | Quasi-peak               |                                 |
| 30 MHz ~ 88 MHz   | 39.1                     | <b>Class A<br/>(10m method)</b> |
| 88 MHz ~ 216 MHz  | 43.5                     |                                 |
| 216 MHz ~ 960 MHz | 46.4                     |                                 |
| 960 MHz ~ 1 GHz   | 49.5                     |                                 |
| 30 MHz ~ 88 MHz   | 40.0                     | <b>Class B<br/>(3m method)</b>  |
| 88 MHz ~ 216 MHz  | 43.5                     |                                 |
| 216 MHz ~ 960 MHz | 46.0                     |                                 |
| 960 MHz ~ 1 GHz   | 54.0                     |                                 |

#### -Radiated Emission Limits above 1 GHz (3m method)

| Frequency Range | Limits( dB( $\mu$ V/m) ) |      | Class          |
|-----------------|--------------------------|------|----------------|
|                 | Average                  | Peak |                |
| Above 1 GHz     | 59.5                     | 79.5 | <b>Class A</b> |
| Above 1 GHz     | 54.0                     | 74.0 | <b>Class B</b> |

Note : The limits of class A equipment is extrapolated using an extrapolation factor of 20 dB/decade because it was measured at 3 m distance not 10 m distance.

### 2.3 Conducted Emission

The initial preliminary exploratory scans were performed over the measuring frequency range(0.15 MHz to 30 MHz) using a max hold mode incorporating a Peak detector and C-Average detector and using the software of EMC32(Version V8.52.0 from R&S). The final test data was measured using a Quasi-Peak detector and C-Average detector.

#### 2.3.1 Test Equipments

| Description                         | Model No. | Manufacturer   | S/N    | Cal Due. Date |
|-------------------------------------|-----------|----------------|--------|---------------|
| Two-Line V-Network                  | ENV216    | R & S          | 100190 | 2021.05.08    |
| Test Receiver                       | ESCI 7    | R & S          | 100911 | 2021.02.19    |
| Wideband Radio Communication Tester | CMW500    | R & S          | 144032 | 2021.05.06    |
| Shield Room                         | -         | SY CORPORATION | -      | -             |

Note : The calibration period of every equipment is 1 year.

#### 2.3.2 Test Site

Shield Room in Gunpo Laboratory

#### 2.3.3 Environment Conditions and data

##### - Conducted Emission at AC Mains Port

Temperature (Minimum 21.2, Maximum 21.8) °C,  
 Humidity (Minimum 32.0, Maximum 35.0) % R.H.,  
 Atmospheric Pressure (Minimum 100.1, Maximum 100.1) kPa

Test Date : October 27, 2020

| Freq.<br>( MHz ) | LISN<br>( dB ) | CL<br>( dB ) | Line<br>(P/N) | Q/P                     |                         |                          |                  | C-A/V                   |                         |                          |                  |
|------------------|----------------|--------------|---------------|-------------------------|-------------------------|--------------------------|------------------|-------------------------|-------------------------|--------------------------|------------------|
|                  |                |              |               | Limit<br>( dB $\mu$ V ) | Level<br>( dB $\mu$ V ) | Result<br>( dB $\mu$ V ) | Margin<br>( dB ) | Limit<br>( dB $\mu$ V ) | Level<br>( dB $\mu$ V ) | Result<br>( dB $\mu$ V ) | Margin<br>( dB ) |
| 0.16             | 9.80           | 0.05         | N             | 65.36                   | 32.55                   | 42.40                    | 22.96            | 55.36                   | 15.85                   | 25.70                    | 29.66            |
| 0.16             | 9.70           | 0.05         | H             | 65.36                   | 34.25                   | 44.00                    | 21.36            | 55.36                   | 21.15                   | 30.90                    | 24.46            |
| 0.19             | 9.80           | 0.06         | N             | 63.86                   | 30.94                   | 40.80                    | 23.06            | 53.86                   | 13.74                   | 23.60                    | 30.26            |
| 0.19             | 9.78           | 0.06         | H             | 63.86                   | 31.76                   | 41.60                    | 22.26            | 53.86                   | 19.96                   | 29.80                    | 24.06            |
| 0.23             | 9.80           | 0.06         | N             | 62.60                   | 29.64                   | 39.50                    | 23.10            | 52.60                   | 13.94                   | 23.80                    | 28.80            |
| 0.23             | 9.74           | 0.06         | H             | 62.45                   | 29.20                   | 39.00                    | 23.45            | 52.45                   | 20.80                   | 30.60                    | 21.85            |
| 0.26             | 9.70           | 0.07         | H             | 61.37                   | 27.83                   | 37.60                    | 23.77            | 51.37                   | 20.83                   | 30.60                    | 20.77            |
| 0.42             | 9.80           | 0.13         | N             | 57.41                   | 29.27                   | 39.20                    | 18.21            | 47.41                   | 18.57                   | 28.50                    | 18.91            |
| 0.46             | 9.80           | 0.14         | N             | 56.66                   | 31.06                   | 41.00                    | 15.66            | 46.66                   | 13.96                   | 23.90                    | 22.76            |
| 0.46             | 9.70           | 0.14         | H             | 56.66                   | 39.56                   | 49.40                    | 7.26             | 46.66                   | 29.36                   | 39.20                    | 7.46             |
| 0.49             | 9.70           | 0.15         | H             | 56.24                   | 40.65                   | 50.50                    | 5.74             | 46.24                   | 31.65                   | 41.50                    | 4.74             |
| 0.49             | 9.80           | 0.16         | N             | 56.10                   | 31.04                   | 41.00                    | 15.10            | 46.10                   | 14.54                   | 24.50                    | 21.60            |

Measurement Uncertainty : 3.38 dB (The confidential level is about 95%, k=2)

Note : • Line ( H ) : Hot  
 • CL: Cable Loss  
 • Result = Level + CL + LISN  
 • Line ( N ) : Neutral  
 • LISN : LISN Factor  
 • Margin = Limit – Result

#### See Appendix A (Conducted Emission at AC Mains Port)

## 2.4 Radiated Emission

The initial preliminary exploratory scans were performed at 3 m distance over the measuring frequency range(30 MHz to 18 GHz) using a max hold mode incorporating a Peak detector and using the software of EP5RE(Version Ver5.3.70 from TOYO). The final test data was measured using a Quasi-Peak detector below 1 GHz at 3 m distance and a Peak and Average detector above 1 GHz at 3 m distance. Measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency.

### 2.4.1 Test Equipments

| Description                         | Model No. | Manufacturer   | S/N        | Cal Due. Date |
|-------------------------------------|-----------|----------------|------------|---------------|
| Horn Antenna                        | HF906     | R & S          | 100326     | 2021.02.14    |
| Signal Conditioning Unit            | SCU 18    | R & S          | 10117      | 2021.06.10    |
| Test Receiver                       | ESU26     | R & S          | 100109     | 2021.02.18    |
| Bilog Antenna                       | VULB9163  | SCHWARZBECK    | 396        | 2021.03.21    |
| Amplifier                           | 8447F     | HP             | 2944A03909 | 2021.08.06    |
| Wideband Radio Communication Tester | CMW500    | R & S          | 144032     | 2021.05.06    |
| 3m SEMI-ANECHOIC CHAMBER            | -         | SY CORPORATION | -          | -             |

Note : The Bilog Antenna calibration period is 2 years, but the other equipment calibration period are 1 year.

### 2.4.2 Test Site

3m SEMI-ANECHOIC CHAMBER Gunpo Laboratory (Below 1 GHz, Above 1 GHz)

### 2.4.3 Environment Conditions and data

#### Radiated Emission Test

##### - Below 1 GHz

Temperature (Minimum 21.3, Maximum 21.9) °C,  
 Humidity (Minimum 33.0, Maximum 36.0) % R.H.,  
 Atmospheric Pressure (Minimum 100.2, Maximum 100.2) kPa

**Test Date** : October 27, 2020

##### - Above 1 GHz

Temperature (Minimum 21.3, Maximum 21.9) °C,  
 Humidity (Minimum 33.0, Maximum 36.0) % R.H.,  
 Atmospheric Pressure (Minimum 100.2, Maximum 100.2) kPa

**Test Date** : October 27, 2020



### Radiated Emission Test Data

#### - Below 1 GHz (3 m method)

| Freq. ( MHz ) | Reading ( dB $\mu$ V ) | Pol. ( H/V ) | A ( ° ) | H ( cm ) | AF ( dB/m ) | CL ( dB ) | Amp. ( dB ) | F/S ( dB $\mu$ V/m ) | Limit ( dB $\mu$ V/m ) | Margin ( dB ) |
|---------------|------------------------|--------------|---------|----------|-------------|-----------|-------------|----------------------|------------------------|---------------|
| 92.53         | 40.20                  | V            | 8       | 100      | 16.57       | 1.78      | 28.01       | 30.54                | 43.50                  | 12.96         |
| 94.99         | 39.70                  | V            | 203     | 100      | 17.02       | 1.80      | 28.01       | 30.51                | 43.50                  | 12.99         |
| 108.89        | 30.50                  | V            | 118     | 300      | 16.74       | 1.92      | 27.96       | 21.20                | 43.50                  | 22.30         |
| 171.66        | 37.60                  | V            | 332     | 100      | 14.87       | 2.43      | 27.67       | 27.23                | 43.50                  | 16.27         |
| 178.41        | 37.20                  | V            | 332     | 100      | 15.25       | 2.48      | 27.63       | 27.30                | 43.50                  | 16.20         |
| 542.24        | 31.10                  | H            | 279     | 100      | 24.03       | 4.42      | 28.93       | 30.62                | 46.00                  | 15.38         |

Measurement Uncertainty (Horizontal) : 5.01 dB (The confidential level is about 95%, k=2)

Measurement Uncertainty (Vertical) : 5.38 dB (The confidential level is about 95%, k=2)

Note: • AF = Antenna Factor  
 • Pol.(H) = Horizontal  
 • Margin = Limit – F/S  
 • A : Angle  
 • CL = Cable Loss  
 • Pol.(V) = Vertical  
 • F/S = Level + AF + CL – Amp.  
 • H : Height  
 • F/S = Field Strength  
 • Amp. = Amplifier Gain

#### - Above 1 GHz (3 m method)

| Freq. ( MHz ) | Level ( dB $\mu$ V ) |       | Pol. ( H/V ) | A ( ° ) | H ( cm ) | AF ( dB ) | CL ( dB ) | Amp. ( dB ) | CF ( dB ) | F/S ( dB $\mu$ V/m ) | Limit ( dB $\mu$ V/m ) | Margin ( dB ) |
|---------------|----------------------|-------|--------------|---------|----------|-----------|-----------|-------------|-----------|----------------------|------------------------|---------------|
|               | Peak                 | C-AV  |              |         |          |           |           |             |           |                      |                        |               |
| 1211.08       | 45.00                | -     | H            | 4       | 200      | 25.07     | 7.23      | 45.49       | 0.00      | 31.81                | 74.00                  | 42.19         |
| 1211.08       | -                    | 31.80 | H            | 4       | 200      | 25.07     | 7.23      | 45.49       | 0.00      | 18.61                | 54.00                  | 35.39         |
| 1447.67       | 45.90                | -     | V            | 151     | 100      | 25.19     | 7.98      | 45.38       | 0.00      | 33.69                | 74.00                  | 40.31         |
| 1447.67       | -                    | 31.60 | V            | 151     | 100      | 25.19     | 7.98      | 45.38       | 0.00      | 19.39                | 54.00                  | 34.61         |
| 1461.13       | 45.30                | -     | H            | 172     | 100      | 25.22     | 7.99      | 45.37       | 0.00      | 33.14                | 74.00                  | 40.86         |
| 1461.13       | -                    | 32.00 | H            | 172     | 100      | 25.22     | 7.99      | 45.37       | 0.00      | 19.84                | 54.00                  | 34.16         |
| 2375.58       | 42.90                | -     | V            | 158     | 200      | 28.06     | 10.22     | 45.31       | 0.00      | 35.87                | 74.00                  | 38.13         |
| 2375.58       | -                    | 29.20 | V            | 158     | 200      | 28.06     | 10.22     | 45.31       | 0.00      | 22.17                | 54.00                  | 31.83         |
| 2686.54       | 42.80                | -     | H            | 13      | 200      | 28.85     | 11.16     | 45.11       | 0.00      | 37.70                | 74.00                  | 36.30         |
| 2686.54       | -                    | 39.90 | H            | 13      | 200      | 28.85     | 11.16     | 45.11       | 0.00      | 34.80                | 54.00                  | 19.20         |
| 16518.87      | 41.60                | -     | V            | 274     | 100      | 41.44     | 28.91     | 45.21       | 0.00      | 66.74                | 74.00                  | 7.26          |
| 16518.87      | -                    | 25.80 | V            | 274     | 100      | 41.44     | 28.91     | 45.21       | 0.00      | 50.94                | 54.00                  | 3.06          |
| 17267.58      | 41.10                | -     | V            | 284     | 100      | 42.37     | 29.18     | 45.51       | 0.00      | 67.14                | 74.00                  | 6.86          |
| 17267.58      | -                    | 24.90 | V            | 284     | 100      | 42.37     | 29.18     | 45.51       | 0.00      | 50.94                | 54.00                  | 3.06          |
| 17697.54      | 40.30                | -     | V            | 2       | 100      | 43.70     | 29.63     | 45.68       | 0.00      | 67.95                | 74.00                  | 6.05          |
| 17697.54      | -                    | 23.30 | V            | 2       | 100      | 43.70     | 29.63     | 45.68       | 0.00      | 50.95                | 54.00                  | 3.05          |

Measurement Uncertainty (Horizontal) : 5.33 dB (The confidential level is about 95%, k=2)

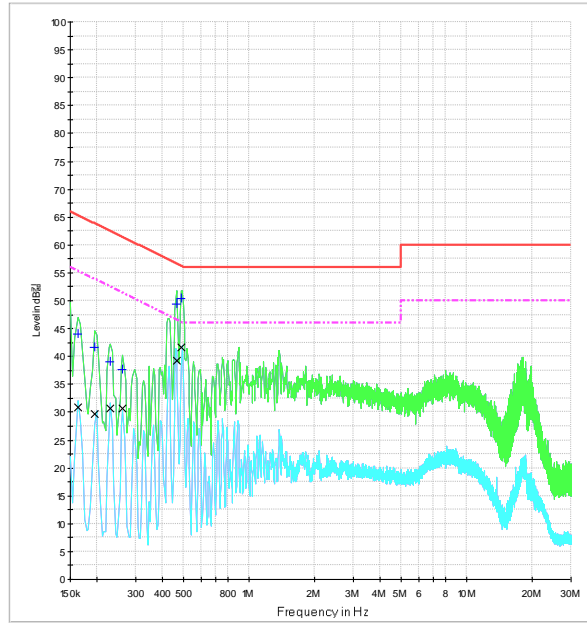
Measurement Uncertainty (Vertical) : 5.35 dB (The confidential level is about 95%, k=2)

Note: • AF = Antenna Factor  
 • Pol.(H) = Horizontal  
 • Margin = Limit – F/S  
 • A : Angle  
 • CL = Cable Loss  
 • Pol.(V) = Vertical  
 • F/S = Level + AF + CL – Amp.  
 • H : Height  
 • F/S = Field Strength  
 • Amp. = Amplifier Gain

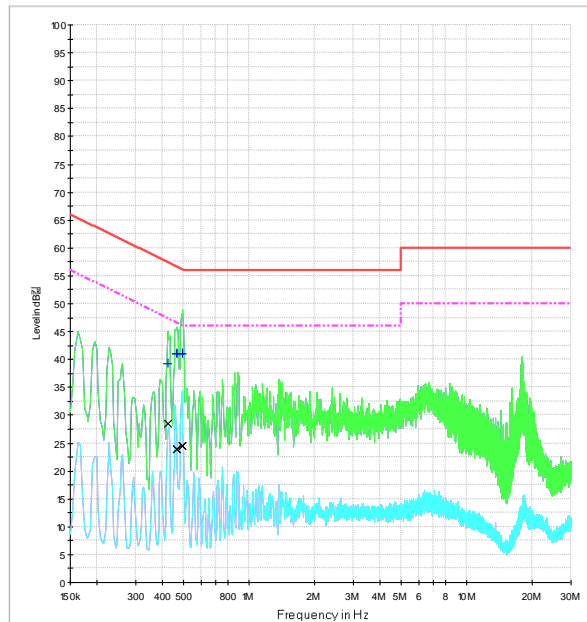
### See Appendix B (Radiated Emission)

**Appendix A : Conducted Emission at AC Mains Port**

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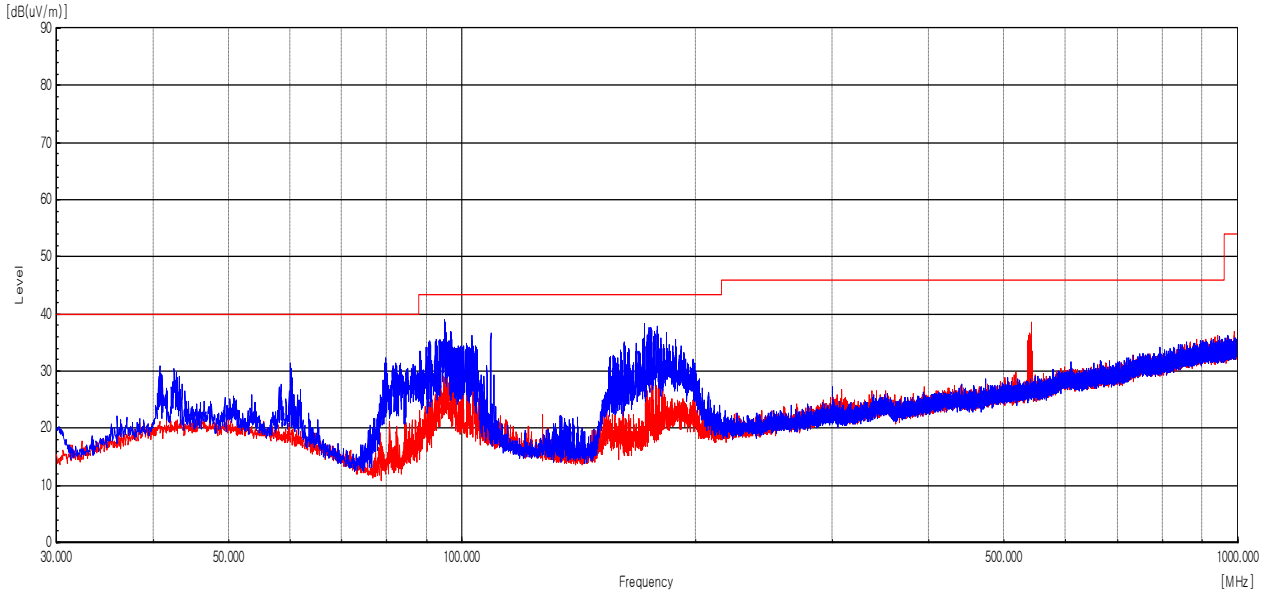


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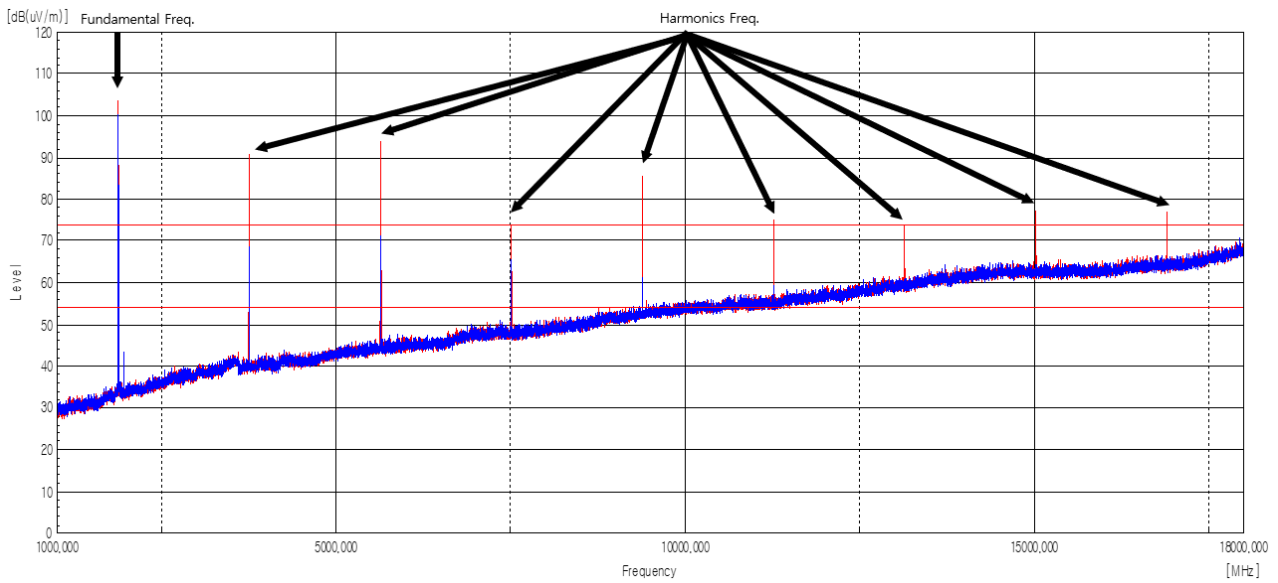


## Appendix B : Radiated Emission

### Below 1 GHz



### Above 1 GHz



- End of the Report -