


# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

**Test Report No.** : OT-196-RWD-015  
**AGR No.** : A192A-017  
**Applicant** : BIOLOG DEVICE  
**Address** : 3F, 64-10, Dongtangiheung-ro, Dongtan-myeon, Hwaseong-si, Gyeonggi-do, Korea  
**Manufacturer** : BIOLOG DEVICE  
**Address** : 3F, 64-10, Dongtangiheung-ro, Dongtan-myeon, Hwaseong-si, Gyeonggi-do, Korea  
**Type of Equipment** : Face Recognition Terminal  
**FCC ID** : 2ATMI-FL1000-A  
**Model Name** : FL1000-A  
**Multiple Model Name** : FL1000-B, FL1000-C, FL1000-D, FL1000-E, FL1000-F, FL1000-G, FL1000-H, FL1000-I, FL1000-J, FL1000-K, FL1000-L, FL1000-M, FL1000-N, FL1000-O, FL1000-P, FL1000-Q, FL1000-R, FL1000-S, FL1000-T, FL1000-U, FL1000-V  
**Serial number** : N/A  
**Total page of Report** : 23 pages (including this page)  
**Date of Incoming** : April 15, 2019  
**Date of Issuing** : June 07, 2019

## SUMMARY

The equipment complies with the requirements of **FCC CFR 47 PART 15 SUBPART C Section 15.225**  
 This test report contains only the result of a single test of the sample supplied for the examination.  
 It is not a general valid assessment of the features of the respective products of the mass-production.

Reviewed by:   
 \_\_\_\_\_  
 Ha-Ram Lee / Assistant Manager  
 ONETECH Corp.

Approved by:   
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 Jae-Ho Lee / Chief Engineer  
 ONETECH Corp.

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### REVISION HISTORY

| Issued Report No. | Issued Date   | Revisions     | Effect Section |
|-------------------|---------------|---------------|----------------|
| OT-196-RWD-015    | June 07, 2019 | Initial Issue | All            |
|                   |               |               |                |
|                   |               |               |                |

### DOCUMENT HISTORY

| Revision No. | Issued Date   | Revisions                             | Effect Section                |
|--------------|---------------|---------------------------------------|-------------------------------|
| Original     | June 07, 2019 | Initial Issue                         | -                             |
| Rev. 01      | June 12, 2019 | Added data of Conducted emission test | 7. CONDUCTED EMISSION<br>TEST |
|              |               |                                       |                               |

## 1. VERIFICATION OF COMPLIANCE

Applicant : BIOLOG DEVICE  
 Address : 3F, 64-10, Dongtangiheung-ro, Dongtan-myeon, Hwaseong-si, Gyeonggi-do, Korea  
 Contact Person : PARK YUN HO / Deputy department head  
 Telephone No. : +82-70-5015-4176  
 FCC ID : 2ATMI-FL1000-A  
 Model Name : FL1000-A  
 Brand Name : -  
 Serial Number : N/A  
 Date : June 07, 2019

|  |  |
|--|--|
| DEVICE TYPE  | DXX – Low Power Communication Device Transmitter |
| E.U.T. DESCRIPTION                                   | Face Recognition Terminal                        |
| THIS REPORT CONCERNS                                 | Original Grant                                   |
| MEASUREMENT PROCEDURES                               | ANSI C63.10: 2013                                |
| TYPE OF EQUIPMENT TESTED                             | Pre-Production                                   |
| KIND OF EQUIPMENT AUTHORIZATION REQUESTED            | Certification                                    |
| EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)   | FCC CFR47 Part 15 Subpart C Section 15.225       |
| MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE | None   |
| FINAL TEST WAS CONDUCTED ON                          | 3 m Semi Anechoic Chamber                        |

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

## 2. GENERAL INFORMATION

### 2.1 Product Description

The BIOLOG DEVICE, Model FL1000-A (referred to as the EUT in this report) is a Face Recognition Terminal, Product specification information described herein was obtained from product data sheet or user’s manual.

|  |                           |  |          |
|--|---------------------------|--|----------|
| Device Type  | Face Recognition Terminal |  |          |
| Operating Frequency                                    | Bluetooth                 | 2 402 MHz ~ 2 480 MHz  |          |
|  | WLAN<br>2.4 GHz Hand      | 2 412 MHz ~ 2 462 MHz  |          |
|  | NFC                       | 13.56 MHz  |          |
| RF Output Power  | Bluetooth                 | 1 Mbps   | 6.33 dBm |
|  |                           | 2 Mbps   | 5.33 dBm |
|  |                           | 3 Mbps   | 5.51 dBm |
|  | WLAN<br>2.4 GHz Hand      | Wi-Fi 802.11b (8.99 dBm)<br>Wi-Fi 802.11g (8.37 dBm)<br>Wi-Fi 802.11n(HT20) (8.23 dBm) |          |
| Number of Channel                                      | Bluetooth                 | 79 Channels  |          |
|  | WLAN<br>2.4 GHz Hand      | 11 Channels  |          |
|  | NFC                       | 1 Channel  |          |
| Modulation Type  | Bluetooth                 | GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps                          |          |
|  | WLAN<br>2.4 GHz Hand      | DSSS Modulation(DBPSK/DQPSK/CCK)<br>OFDM Modulation(BPSK/QPSK/16QAM/64QAM)             |          |
|  | NFC                       | ASK  |          |
| Antenna Type   | Bluetooth                 | FPCB Antenna   |          |
|  | WLAN<br>2.4 GHz Hand      |  |          |
|  | NFC                       | PCB Antenna  |          |
| Antenna Gain   | Bluetooth                 | 2.0 dBi  |          |
|  | WLAN<br>2.4 GHz Hand      |  |          |
| List of each Osc. or crystal Freq.(Freq. $\geq$ 1 MHz) | 12 MHz, 25 MHz, 26 MHz    |  |          |
| Rated Supply Voltage                                   | DC 12.0 V                 |  |          |

**2.2 Alternative type(s)/model(s); also covered by this test report.**

-. The following lists consist of the added model and their differences.

| Model Name | Differences   | Tested                              |
|------------|---|-------------------------------------|
| FL1000-A   | Basic Model   | <input checked="" type="checkbox"/> |
| FL1000-B   | This model is identical to the basic model except for model name. Multiple Model name is added for the marketing purpose. | <input type="checkbox"/>            |
| FL1000-C   |   | <input type="checkbox"/>            |
| FL1000-D   |   | <input type="checkbox"/>            |
| FL1000-E   |   | <input type="checkbox"/>            |
| FL1000-F   |   | <input type="checkbox"/>            |
| FL1000-G   |   | <input type="checkbox"/>            |
| FL1000-H   |   | <input type="checkbox"/>            |
| FL1000-I   |   | <input type="checkbox"/>            |
| FL1000-J   |   | <input type="checkbox"/>            |
| FL1000-K   |   | <input type="checkbox"/>            |
| FL1000-L   |   | <input type="checkbox"/>            |
| FL1000-M   |   | <input type="checkbox"/>            |
| FL1000-N   |   | <input type="checkbox"/>            |
| FL1000-O   |   | <input type="checkbox"/>            |
| FL1000-P   |   | <input type="checkbox"/>            |
| FL1000-Q   |   | <input type="checkbox"/>            |
| FL1000-R   |   | <input type="checkbox"/>            |
| FL1000-S   |   | <input type="checkbox"/>            |
| FL1000-T   |   | <input type="checkbox"/>            |
| FL1000-U   |   | <input type="checkbox"/>            |
| FL1000-V   | <input type="checkbox"/>  |                                     |

Note: 1. Applicant consigns only basic model to test. Therefore, this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

### 2.3 Related Submittal(s) / Grant(s)

Original submittal only

### 2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.225.

### 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

### 2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666 / T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013



### 3. SYSTEM TEST CONFIGURATION

#### 3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

| DEVICE TYPE      | MANUFACTURER | MODEL/PART NUMBER | FCC ID |
|------------------|--------------|-------------------|--------|
| Main Board       | N/A          | N/A               | -      |
| LED Board        | N/A          | N/A               | -      |
| NFC Module Board | N/A          | N/A               | -      |
| Camera Board     | N/A          | N/A               | -      |

#### 5.2 Peripheral equipment

-None

#### 3.3 Mode of operation during X` the test

-. The EUT has NFC, program was used for making continuous transmission mode during the test.

To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis, but the worst data was recorded in this test report.

#### 3.4 Equipment Modifications

-. None

### 3.5 Configuration of Test System

**Radiated Emission Test :** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.

For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field. The measuring antenna is an electrically screened loop antenna.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

### 3.6 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

**Antenna Construction:**

The transmitter antenna of the EUT is a PCB antenna so there is no consideration of replacement by the user.

## 4. PRELIMINARY TEST

### 4.1 AC Power line Conducted Emissions Tests

As this product is only using DC power, AC conducted emission test has not been performed.

### 4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

| Operation Mode    | The Worse operating condition (Please check one only) |
|-------------------|---|
| Transmitting Mode | X   |

## 5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

### 5.1 RADIATED EMISSION TEST

#### 5.1.1 Operation frequency band: 13.553 ~ 13.567 MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 45 % R.H. Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter Operation within the band 1.705-30.0 MHz.  
 Result : PASSED

EUT : Face Recognition Terminal Date: May 07, 2019  
 Operating Condition : Transmitting Mode  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)  
 Distance : 3 m

| Radiated Emission |                  | Ant  | Correction Factors |            | Total              | FCC            |             |
|-------------------|------------------|------|--------------------|------------|--------------------|----------------|-------------|
| Freq. (MHz)       | Amplitude (dBµV) | Pol. | Antenna (dB/m)     | Cable (dB) | Amplitude (dBµV/m) | Limit (dBµV/m) | Margin (dB) |
| 13.56             | 32.16            | H    | 19.98              | 1.09       | 53.23              | 124            | 70.77       |
| 13.56             | 27.85            | V    | 19.98              | 1.09       | 48.92              | 124            | 75.08       |

Remark. The EUT was tested at 3 m, so conversation factor was included at above limit.



Tested by: Yu-Seog Sim / Assistant Manager

**5.1.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz**

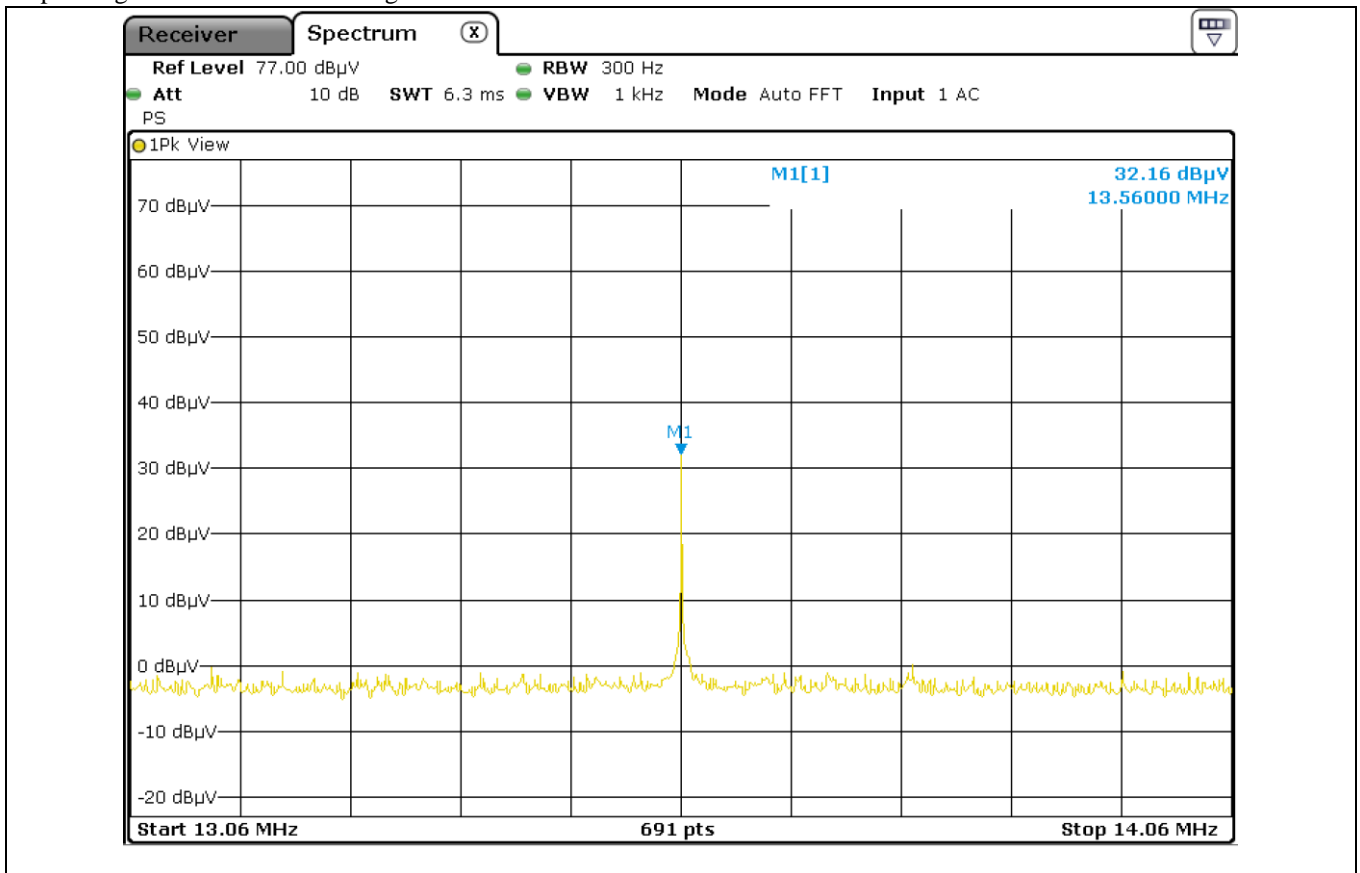
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 45 % R.H. Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter Operation within the band 1.705-30.0 MHz.  
 Result : PASSED

EUT : Face Recognition Terminal

Date: May 07, 2019

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.56 MHz is 32.16 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

**Tested by: Yu-Seog Sim / Assistant Manager**

## 5.2 SPURIOUS EMISSION TEST

### 5.2.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 45 % R.H. Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter Operation within the band 1.705-30.0 MHz.  
 Frequency Range : 9 kHz ~ 30 MHz  
 Result : PASSED

EUT : Face Recognition Terminal Date: May 07, 2019

Operating Condition : Transmitting Mode

Distance : 3 m

| Frequency (MHz)                               | Reading (dBμV) | Ant. Pol. (H/V) | Ant. Height (m) | Angle (°) | Ant. Factor (dB/m) | Cable Loss | Emission Level(dBμV/m) | Limits (dBμV/m) | Margin (dB) |
|---|----------------|-----------------|-----------------|-----------|--------------------|------------|------------------------|-----------------|-------------|
| Any emissions were not observed from the EUT. |                |                 |                 |           |                    |            |                        |                 |             |



**Tested by: Yu-Seog Sim / Assistant Manager**

**5.2.2 Spurious Radiated Emission below 1 GHz**

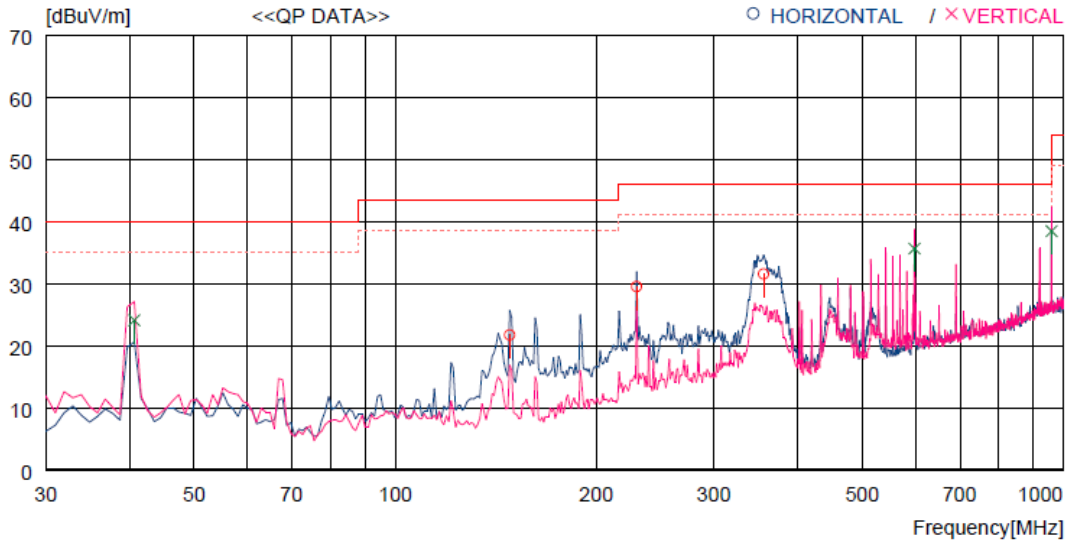
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 45 % R.H. Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209  
 Type of Test : Low Power Transmitter Operation within the band 1.705-30.0 MHz.  
 Frequency range : 30 MHz ~ 1 000 MHz  
 Result : PASSED

EUT : Face Recognition Terminal Date: May 07, 2019

Operating Condition : Transmitting Mode

Distance : 3 m



| No.                    | FREQ<br>[MHz] | READING<br>QP<br>[dBuV] | ANT<br>FACTOR<br>[dB] | LOSS<br>[dB] | GAIN<br>[dB] | RESULT<br>[dBuV/m] | LIMIT<br>[dBuV/m] | MARGIN<br>[dB] | ANTENNA<br>[cm] | TABLE<br>[DEG] |
|------------------------|---------------|-------------------------|-----------------------|--------------|--------------|--------------------|-------------------|----------------|-----------------|----------------|
| ----- Horizontal ----- |               |                         |                       |              |              |                    |                   |                |                 |                |
| 1                      | 148.340       | 42.9                    | 8.5                   | 3.2          | 32.9         | 21.7               | 43.5              | 21.8           | 200             | 89             |
| 2                      | 229.820       | 46.8                    | 11.9                  | 3.9          | 33.1         | 29.5               | 46.0              | 16.5           | 100             | 0              |
| 3                      | 355.920       | 44.8                    | 14.9                  | 4.9          | 33.1         | 31.5               | 46.0              | 14.5           | 100             | 120            |
| ----- Vertical -----   |               |                         |                       |              |              |                    |                   |                |                 |                |
| 4                      | 40.670        | 41.3                    | 14.2                  | 1.7          | 33.1         | 24.1               | 40.0              | 15.9           | 100             | 73             |
| 5                      | 598.418       | 43.1                    | 19.4                  | 6.4          | 33.3         | 35.6               | 46.0              | 10.4           | 100             | 359            |
| 6                      | 960.217       | 38.9                    | 23.3                  | 8.2          | 32.0         | 38.4               | 54.0              | 15.6           | 100             | 343            |

**Tested by: Yu-Seog Sim / Assistant Manager**

### 5.3 20 dB BANDWIDTH

#### 5.3.1 Operating environment

Temperature : 24 °C  
Relative humidity : 45 % R.H.

#### 5.3.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.

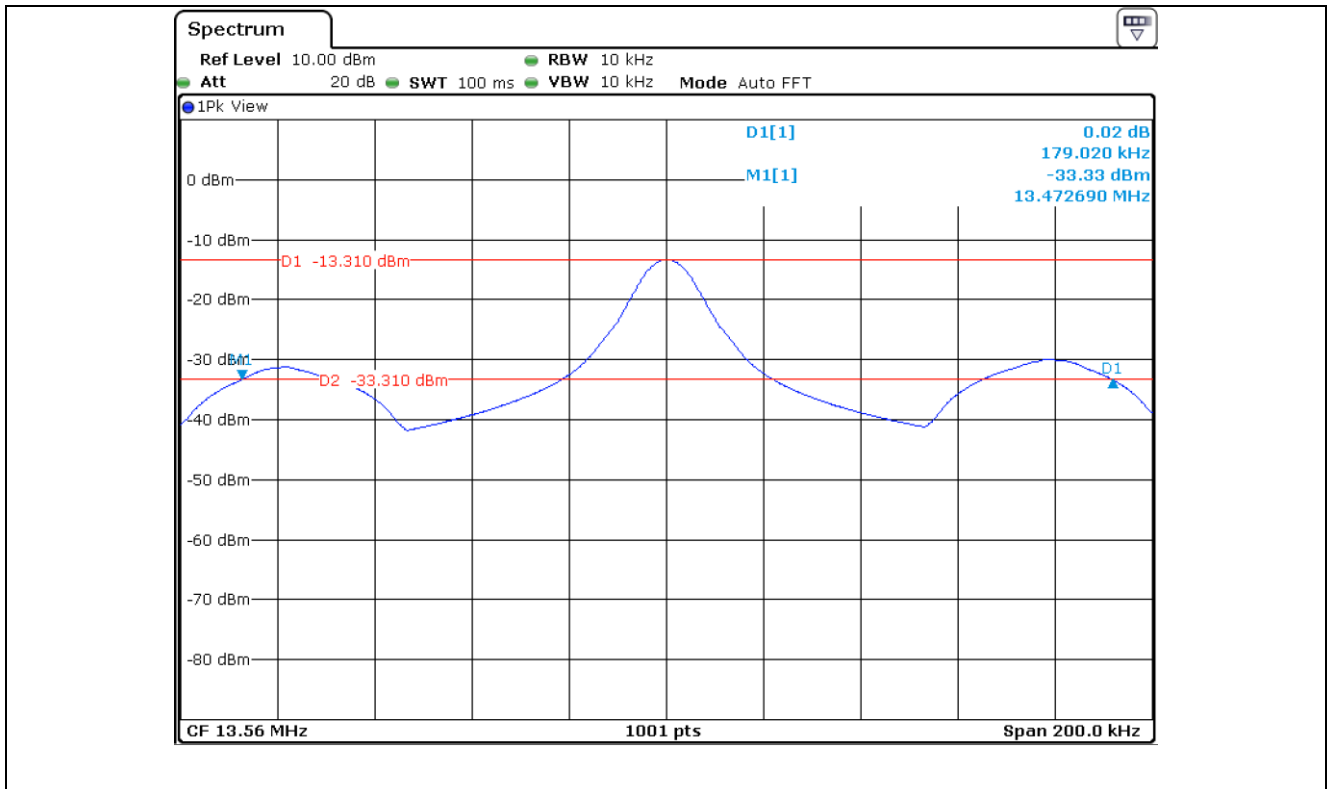


**5.3.3 Test data**

-. Test Date : May 07, 2019

-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

| Operating Freq.<br>(MHz) | Measured Value (kHz) | Assigned Operating<br>Frequency Band (kHz) | Result      |
|--------------------------|----------------------|--|-------------|
| 13.56                    | 179.02               | 900  | <b>PASS</b> |



*Handwritten signature*

Tested by: Yu-Seog Sim / Assistant Manager



## 5.4 FREQUENCY STABILITY WITH TEMPERATURE VARIATION

### 5.4.1 Operating environment

Temperature : 24 °C  
 Relative humidity : 45 % R.H.

### 5.4.2 Test set-up

Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +50°C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

### 5.4.3 Test data

-. Test Date : May 07, 2019  
 -. Result : PASSED

| Temperature (°C) | Carrier Freq. (Hz) | Measured Freq. (Hz) | Margin (Hz) | Limit (Hz) |
|------------------|--------------------|---------------------|-------------|------------|
| -20              | 13 560 000         | 13 560 132          | 132         | ± 1 356.00 |
| -10              |                    | 13 560 118          | 118         |            |
| 0                |                    | 13 560 125          | 125         |            |
| 10               |                    | 13 560 112          | 112         |            |
| 20               |                    | 13 560 117          | 117         |            |
| 30               |                    | 13 560 084          | 84          |            |
| 40               |                    | 13 560 091          | 91          |            |
| 50               |                    | 13 560 105          | 105         |            |



**Tested by: Yu-Seog Sim / Assistant Manager**

## 5.5 FREQUENCY STABILITY WITH VOLTAGE VARIATION

### 5.5.1 Operating environment

Temperature : 24 °C  
 Relative humidity : 45 % R.H.

### 5.5.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.

### 5.5.3 Test data

-. Test Date : May 07, 2019  
 -. Result : PASSED

| Voltage (Vdc) | Carrier Freq. (Hz) | Measured Freq. (Hz) | Margin (Hz) | Limit (Hz) |
|---------------|--------------------|---------------------|-------------|------------|
| 264.5(115 %)  | 13 560 000         | 13 560 087          | 87          | ± 1 356.00 |
| 230(100 %)    |                    | 13 560 084          | 84          |            |
| 195.5(85 %)   |                    | 13 560 098          | 98          |            |



Tested by: Yu-Seog Sim / Assistant Manager

## 6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses.

|                    |                |
|--------------------|----------------|
| + Meter reading    | (dB $\mu$ V)   |
| - Amplifier Gain   | (dB)           |
| + Cable Loss       | (dB)           |
| - Antenna Factor   | (dB/m)         |
| <hr/>              |                |
| = Corrected Result | (dB $\mu$ V/m) |

Margin (dB)

|                       |             |
|-----------------------|-------------|
| Specification Limit   | (dBuV/m)    |
| - Corrected Result    | (dBuV/m)    |
| <hr/>                 |             |
| = dB Relative to Spec | ( $\pm$ dB) |

## 7. CONDUCTED EMISSION TEST

### 7.1 Operating environment

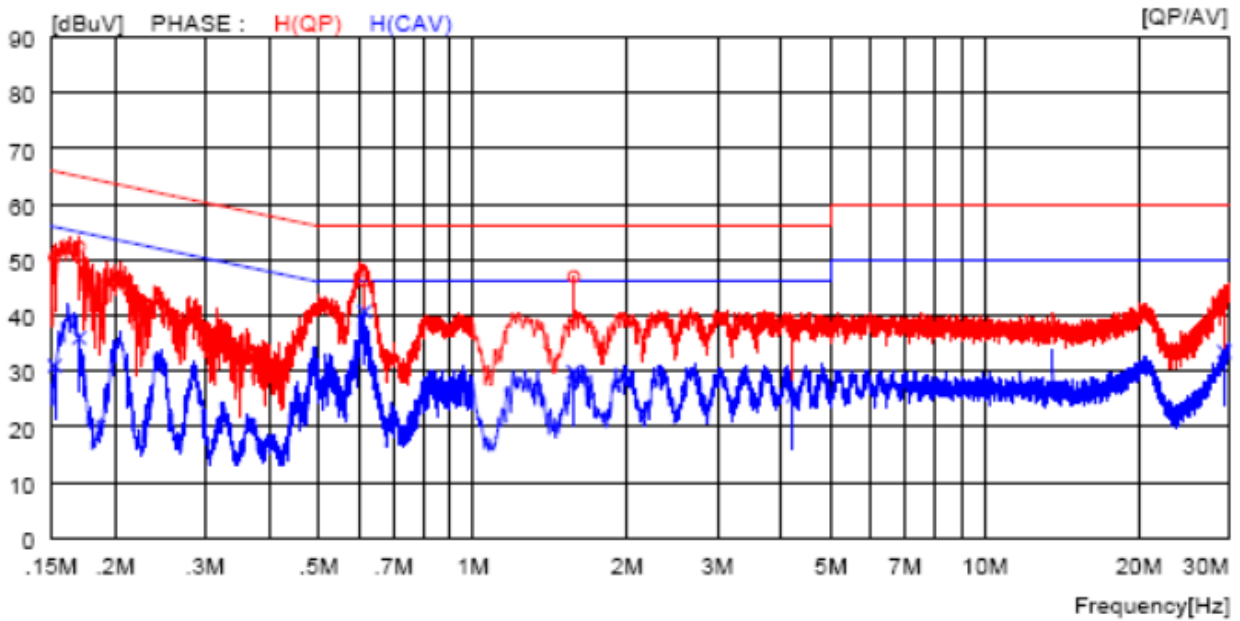
Temperature : 24 °C  
Relative humidity : 45 % R.H

### 7.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50  $\Omega$  / 50  $\mu$ H + 5  $\Omega$  Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

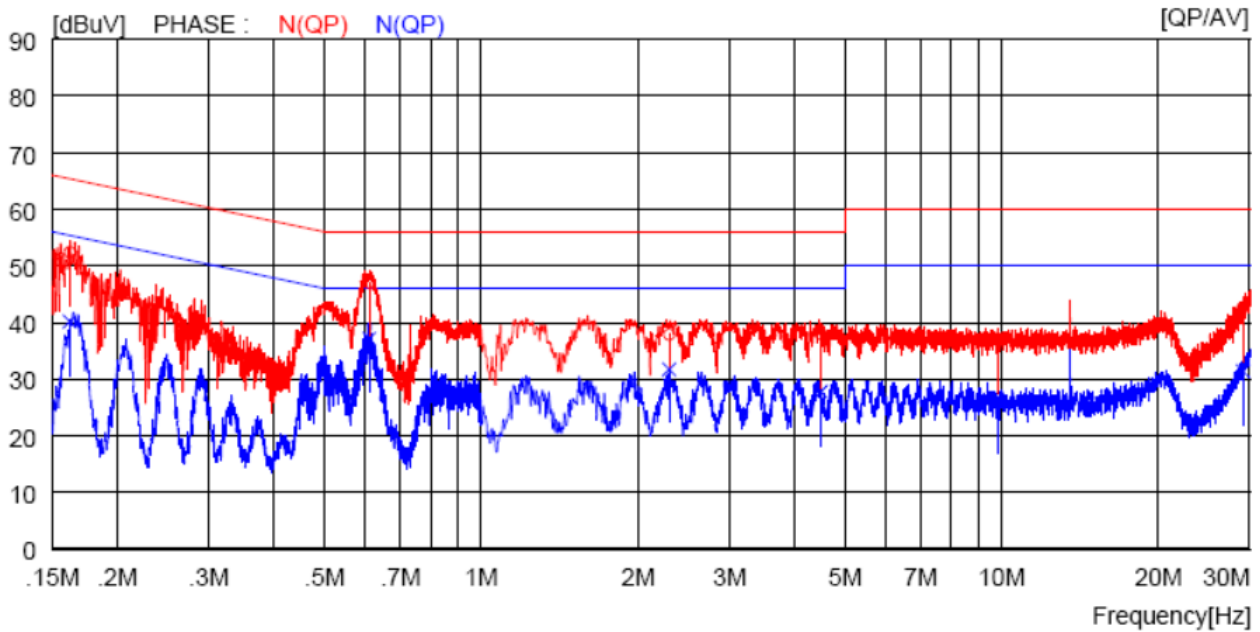
**7.3 Test data**

- Test Date : May 21, 2019
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



| NO | FREQ<br>[MHz] | READING      |              | C. FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE  |
|----|---------------|--------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                   | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |        |
| 1  | 0.15200       | 40.3         | ----         | 10.1              | 50.4         | ----         | 65.9         | ----         | 15.5         | ----         | H(QP)  |
| 2  | 0.17000       | 42.2         | ----         | 10.1              | 52.3         | ----         | 65.0         | ----         | 12.7         | ----         | H(QP)  |
| 3  | 0.61200       | 36.1         | ----         | 10.1              | 46.2         | ----         | 56.0         | ----         | 9.8          | ----         | H(QP)  |
| 4  | 1.57200       | 36.8         | ----         | 10.1              | 46.9         | ----         | 56.0         | ----         | 9.1          | ----         | H(QP)  |
| 5  | 4.22000       | 28.0         | ----         | 10.1              | 38.1         | ----         | 56.0         | ----         | 17.9         | ----         | H(QP)  |
| 6  | 29.34000      | 33.0         | ----         | 10.6              | 43.6         | ----         | 60.0         | ----         | 16.4         | ----         | H(QP)  |
| 7  | 0.15200       | ----         | 20.9         | 10.1              | ----         | 31.0         | ----         | 55.9         | ----         | 24.9         | H(CAV) |
| 8  | 0.17000       | ----         | 25.9         | 10.1              | ----         | 36.0         | ----         | 55.0         | ----         | 19.0         | H(CAV) |
| 9  | 0.61200       | ----         | 30.6         | 10.1              | ----         | 40.7         | ----         | 46.0         | ----         | 5.3          | H(CAV) |
| 10 | 1.57200       | ----         | 19.7         | 10.1              | ----         | 29.8         | ----         | 46.0         | ----         | 16.2         | H(CAV) |
| 11 | 4.22000       | ----         | 15.5         | 10.1              | ----         | 25.6         | ----         | 46.0         | ----         | 20.4         | H(CAV) |
| 12 | 29.34000      | ----         | 22.9         | 10.6              | ----         | 33.5         | ----         | 50.0         | ----         | 16.5         | H(CAV) |

-. Tested Line : NEUTRAL LINE



| NO | FREQ<br>[MHz] | READING      |              | C. FACTOR<br>[dB] | RESULT       |              | LIMIT        |              | MARGIN       |              | PHASE  |
|----|---------------|--------------|--------------|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------|
|    |               | QP<br>[dBuV] | AV<br>[dBuV] |                   | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] |        |
| 1  | 0.16200       | 42.3         | ----         | 10.1              | 52.4         | ----         | 65.4         | ----         | 13.0         | ----         | N(QP)  |
| 2  | 0.61000       | 37.0         | ----         | 10.1              | 47.1         | ----         | 56.0         | ----         | 8.9          | ----         | N(QP)  |
| 3  | 2.30000       | 27.7         | ----         | 10.1              | 37.8         | ----         | 56.0         | ----         | 18.2         | ----         | N(QP)  |
| 4  | 4.50000       | 27.9         | ----         | 10.1              | 38.0         | ----         | 56.0         | ----         | 18.0         | ----         | N(QP)  |
| 5  | 9.81000       | 26.7         | ----         | 10.3              | 37.0         | ----         | 60.0         | ----         | 23.0         | ----         | N(QP)  |
| 6  | 29.13000      | 32.0         | ----         | 10.6              | 42.6         | ----         | 60.0         | ----         | 17.4         | ----         | N(QP)  |
| 7  | 0.16200       | ----         | 30.1         | 10.1              | ----         | 40.2         | ----         | 55.4         | ----         | 15.2         | N(CAV) |
| 8  | 0.61000       | ----         | 27.0         | 10.1              | ----         | 37.1         | ----         | 46.0         | ----         | 8.9          | N(CAV) |
| 9  | 2.30000       | ----         | 21.7         | 10.1              | ----         | 31.8         | ----         | 46.0         | ----         | 14.2         | N(CAV) |
| 10 | 4.50000       | ----         | 17.7         | 10.1              | ----         | 27.8         | ----         | 46.0         | ----         | 18.2         | N(CAV) |
| 11 | 9.81000       | ----         | 16.1         | 10.3              | ----         | 26.4         | ----         | 50.0         | ----         | 23.6         | N(CAV) |
| 12 | 29.13000      | ----         | 20.8         | 10.6              | ----         | 31.4         | ----         | 50.0         | ----         | 18.6         | N(CAV) |

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

**Tested by: Yu-Seog Sim / Assistant Manager**

### 8. LIST OF TEST EQUIPMENT

| No. | EQUIPMENTS               | MFR.              | MODEL                  | SER. NO.                  | LAST CAL      | DUE CAL  | USE                                 |
|-----|--------------------------|-------------------|------------------------|---------------------------|---------------|----------|-------------------------------------|
| 1.  | Test receiver            | R/S               | ESCI                   | 101012                    | Oct. 22, 2018 | One Year | <input type="checkbox"/>            |
| 2.  |                          | R/S               | ESR                    | 101470                    | Oct. 22, 2018 | One Year | <input checked="" type="checkbox"/> |
| 3.  | Spectrum analyzer        | R/S               | FSV30                  | 101200                    | Aug. 23, 2018 | One Year | <input checked="" type="checkbox"/> |
| 4.  | Amplifier                | Sonoma Instrument | 310N                   | 312544                    | Mar. 18, 2019 | One Year | <input checked="" type="checkbox"/> |
| 5.  | Amplifier                | Sonoma Instrument | 310N                   | 312545                    | Mar. 18, 2019 | One Year | <input type="checkbox"/>            |
| 6.  | BBV 9718 B               | Schwarzbeck       | Broadband Preamplifier | 009                       | Mar. 18, 2019 | One Year | <input checked="" type="checkbox"/> |
| 7.  | TRILOG Broadband Antenna | Schwarzbeck       | VULB9163               | 9163-255                  | Jun. 05, 2018 | Two Year | <input checked="" type="checkbox"/> |
| 8.  | TRILOG Broadband Antenna | Schwarzbeck       | VULB9163               | 9163-419                  | Aug. 09, 2018 | Two Year | <input type="checkbox"/>            |
| 9.  | Controller               | Innco System      | CO3000                 | CO3000/904/<br>37211215/L | N/A           | N/A      | <input checked="" type="checkbox"/> |
| 10. | LISN                     | EMCO              | 3825/2                 | 9109-1869                 | Mar 19, 2019  | One Year | <input type="checkbox"/>            |
|     |                          | Schwarzbeck       | NSLK8126               | 8126-480                  | Oct. 22, 2018 | One Year | <input type="checkbox"/>            |
|     |                          | Schwarzbeck       | NSLK8126               | 8128-479                  | Oct. 22, 2018 | One Year | <input type="checkbox"/>            |
| 11. | Turn Table               | Innco System      | DT3000-3t              | N/A                       | N/A           | N/A      | <input checked="" type="checkbox"/> |
| 12. | Antenna Master           | Innco System      | MA-4000XPET            | MA4000/509/<br>37211215/L | N/A           | N/A      | <input checked="" type="checkbox"/> |
| 13. | Antenna Master           | Innco System      | MA4000-EP              | MA4000/332/<br>27030611/L | N/A           | N/A      | <input type="checkbox"/>            |
| 14. | Loop Antenna             | Schwarzbeck       | FMZB 1513              | 1513-235                  | May. 13, 2018 | Two Year | <input checked="" type="checkbox"/> |
| 15. | Frequency Counter        | HP                | 53152A                 | US39270295                | Aug. 23, 2018 | One Year | <input checked="" type="checkbox"/> |
| 16. | Chamber                  | ESPEC             | PSL-2KP                | 14009407                  | Feb. 22, 2019 | One Year | <input checked="" type="checkbox"/> |
| 17. | DC Power Supply          | Protek            | PWS-3003D              | 4020409                   | Aug. 24, 2018 | One Year | <input type="checkbox"/>            |
| 18. | Test Receiver            | R/S               | ESCI                   | 101420                    | Mar. 28, 2019 | One Year | <input checked="" type="checkbox"/> |
| 19. | AMN                      | EMCO              | 3825/2                 | 9109-1867                 | Mar. 27, 2019 | One Year | <input checked="" type="checkbox"/> |
| 20. | LISN                     | Schwarzbeck       | NSLK8126               | 8126-480                  | Oct. 22, 2018 | One Year | <input checked="" type="checkbox"/> |
| 21. | Transient Limiter        | Hewlett Packard   | 11947A                 | 3107A02762                | Mar. 28, 2019 | One Year | <input checked="" type="checkbox"/> |