# FCC RF Test Report

| | | |
|---|---|---|
| **APPLICANT** | **:** | **Volansys Technologies Pvt Ltd.** |
| **EQUIPMENT** | **:** | **Modular IoT Gateway** |
| **BRAND NAME** | **:** | **Volansys** |
| **MODEL NAME** | **:** | **VT-GTWY-6UL01-M2-M4** |
| **MARKETING NAME** | **:** | **Modular IoT Gateway** |
| **FCC ID** | **:** | **2AKNO-GW6UL01M2M4** |
| **STANDARD** | **:** | **FCC Part 15 Subpart C §15.225** |
| **CLASSIFICATION** | **:** | **(DXX) Low Power Communication Device Transmitter** |

**The product was received on Jul. 12, 2017 and testing was completed on Aug. 22, 2017. We, Sporton International (Shenzhen) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.**

**The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Shenzhen) Inc., the test report shall not be reproduced except in full.**

Eric Shih

**Approved by: Eric Shih / Manager**

NVLAP®
TESTING
NVLAP LAB CODE 600156-0

***Sporton International (Shenzhen) Inc.***
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***Guangdong Province 518055 China***

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# REVISION HISTORY

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| FR771202D | Rev. 01 | Initial issue of report | Aug. 24, 2017 |
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# SUMMARY OF THE TEST RESULT

| Applied Standard: 47 CFR FCC Part 15 Subpart C / IC RSS-210 issue 9 | | | | | |
|---|---|---|---|---|---|
| **Part** | **FCC Rule** | **IC Rule** | **Description of Test** | **Result** | **Remark** |
| 3.1 | 15.207 | RSS-GEN 8.8 | AC Power Line Conducted Emissions | Complies | Under limit 3.83 dB at 13.560MHz |
| 3.2 | 15.225(a)(b)(c) | B.6 | Field Strength of Fundamental Emissions | Complies | Max level 58.59 dBμV/m at 13.560 MHz |
| 3.3 | 15.225(d) 15.209 | B.6 | Radiated Emissions | Complies | Under limit 16.51 dB at 40.670 MHz |
| 3.4 | 15.203 | - | Antenna Requirements | Complies | - |

| Test Items | Uncertainty | Remark |
|---|---|---|
| AC Power Line Conducted Emissions | ±2.5dB | Confidence levels of 95% |
| Radiated Emissions (30MHz~1000MHz) | ±5.1dB | Confidence levels of 95% |

# 1. GENERAL INFORMATION

## 1.1 Applicant

**Volansys Technologies Pvt Ltd.**

Block A-7th Floor, Safal Profitaire, Corporate Road, Prahaladnagar, Ahmedabad-380 015, Gujarat. India

## 1.2 Manufacturer

**Volansys Technologies Pvt Ltd.**

Block A-7th Floor, Safal Profitaire, Corporate Road, Prahaladnagar, Ahmedabad-380 015, Gujarat. India

## 1.3 Product Feature of Equipment Under Test

| Product Feature | |
|---|---|
| **Equipment** | Modular IoT Gateway |
| **Brand Name** | Volansys |
| **Model Name** | VT-GTWY-6UL01-M2-M4 |
| **Marketing Name** | Modular IoT Gateway |
| **FCC ID** | 2AKNO-GW6UL01M2M4 |
| **EUT supports Radios application** | NFC<br>WLAN 2.4G 802.11b/g/n HT20/<br>Bluetooth 4.1 LE / v4.2 LE<br>Zigbee/Thread: 250kpbs |
| **HW Version** | 1.0 |
| **SW Version** | test 1.2.0 |
| **EUT Stage** | Production Unit |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

| Standards-related Product Specification | |
|---|---|
| **Tx/Rx Frequency Range** | 13.553 ~ 13.567MHz |
| **Channel Number** | 1 |
| **Antenna Type** | PCB trace Antenna |
| **Type of Modulation** | ASK |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.5 Modification of EUT

No modifications are made to the EUT during all test items.

## 1.6 Re-use of Measured Data

### 1.6.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: VT-GTWY-6UL01-M2-M4, FCC ID: 2AKNO-GW6UL01M2M4) is electrically identical to the reference device (Model:VT-GTWY-6UL01-M4, FCC ID: 2AKNO-GW6UL01M4) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 178919 D01.

### 1.6.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Operational Description.

The re-used RF data includes the following bands provided in Appendix D (RF Report No. C170223Z01-RP1-4 for the reference device Model:VT-GTWY-6UL01-M4, FCC ID: 2AKNO-GW6UL01M4):

### 1.6.3 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for radiated spurious emission, the test result were consistent with FCC ID: 2AKNO-GW6UL01M4.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

### 1.6.4 Reference detail Section:

| Equipment Class | Reference FCC ID | Folder Test/RF Exposure | Report Title/Section |
|---|---|---|---|
| DTS (BLE) | 2AKNO-GW6UL01M4 | Part15C(C170223Z01-RP1-2) | All conducted sections applicable for Bluetooth 4.1 LE |
| DTS (WLAN) | 2AKNO-GW6UL01M4 | Part15C(C170223Z01-RP1-1) | All conducted sections applicable |
| DTS (Zigbee) | 2AKNO-GW6UL01M4 | Part15C(C170223Z01-RP1-3) | All conducted sections applicable |
| DXX (NFC) | 2AKNO-GW6UL01M4 | Part15C(C170223Z01-RP1-4) | All conducted sections applicable |

## 1.7 Testing Location

Sporton Lab is accredited to ISO 17025 by National Voluntary Laboratory Accreditation Program (NVLAP code: 600156-0) and the FCC designation No are CN5018 and CN5019.

| | | |
|---|---|---|
| **Test Site** | Sporton International (Shenzhen) Inc. | |
| **Test Site Location** | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen City Guangdong Province 518055 China<br>TEL: +86-755-8637-9589<br>FAX: +86-755-8637-9595 | |
| **Test Site No.** | **Sporton Site No.** | **FCC Test Firm Registration No.** |
| | CO01-SZ | 251365 |
| **Test Engineer** | Haohai Ye | |
| **Temperature** | 22~25℃ | |
| **Relative Humidity** | 50~55% | |

| | | |
|---|---|---|
| **Test Site** | SPORTON International (ShenZhen) INC. | |
| **Test Site Location** | No. 3 Bldg the third floor of south, Shahe River west, Fengzeyuan Warehouse, Nanshan District Shenzhen City Guangdong Province 518055 China<br>TEL: +86-755-3320-2398 | |
| **Test Site No.** | **Sporton Site No.** | **FCC Test Firm Registration No.** |
| | 03CH01-SZ | 577730 |
| **Test Engineer** | Lun Liu | |
| **Temperature** | 24~25℃ | |
| **Relative Humidity** | 48~49% | |

**Note:** The test site complies with ANSI C63.4 2014 requirement.

## 1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.225
- ANSI C63.10-2013
- IC RSS-210 Issue 9
- IC RSS-Gen Issue 4

# 2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST

## 2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations for searching the worst cases.

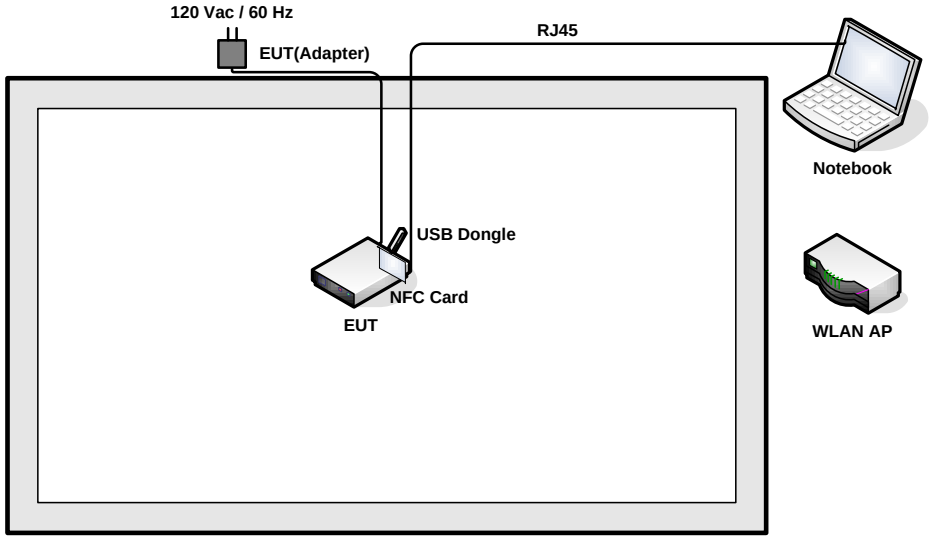
The following table is a list of the test modes shown in this test report.

| Test Items | |
|---|---|
| AC Power Line Conducted Emissions | Field Strength of Fundamental Emissions |
| Radiated Emissions 9kHz~30MHz | Radiated Emissions 30MHz~1GHz |

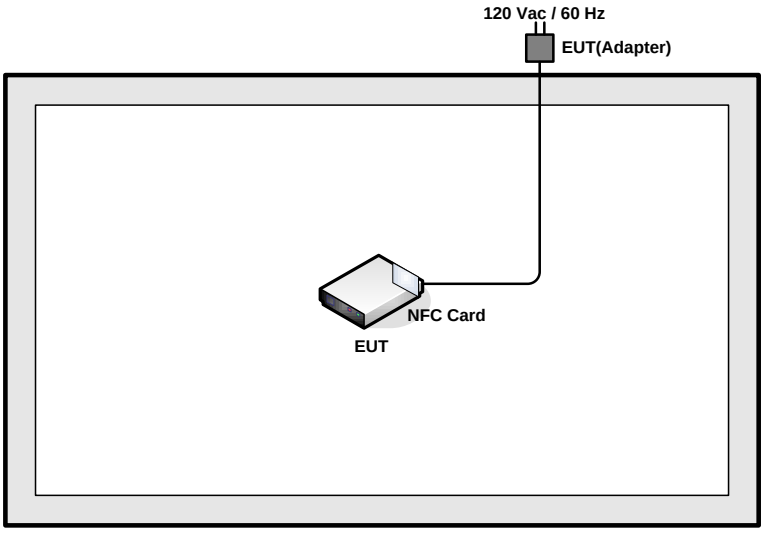
The EUT pre-scanned in four NFC type, A, B, F, V. The worst type (type A) was recorded in this report.

## 2.2 Connection Diagram of Test System

**<AC Conducted Emissions>**



**< For Fundamental Emissions and Mask and Radiated Emissions Measurement >**




## 2.3 Table for Supporting Units

| Support Unit | Manufacturer | Model | FCC ID |
|---|---|---|---|
| WLAN AP | D-Link | DIR-855 | KA2DIR855A2 |
| Notebook | Lenovo | E450 | FCC DoC |
| SD Card | Kingstone | 8G | N/A |
| USB Dongle | N/A | N/A | N/A |
| NFC Card | N/A | N/A | N/A |

## 2.4 EUT Operation Test Setup

The EUT was programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 3 cm gap to the EUT.

# 3. TEST RESULTS

## 3.1 AC Power Line Conducted Emissions Measurement

### 3.1.1 Limit of AC Conducted Emission

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 in the following table.

| 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.

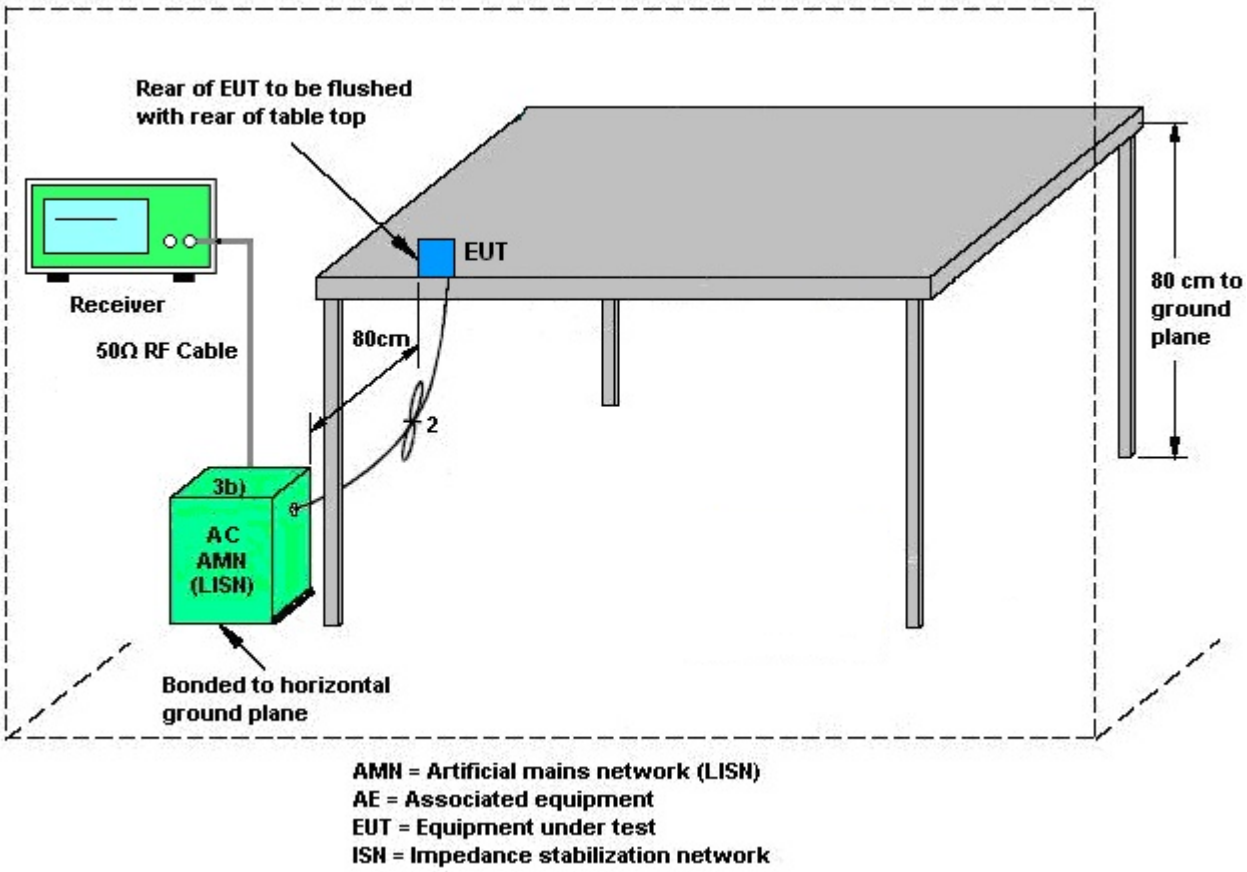
### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.1.4 Test setup




### 3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

## 3.2 Field Strength of Fundamental Emissions and Mask Measurement

### 3.2.1 Limit

| Rules and specifications | FCC CFR 47 Part 15 section 15.225<br>IC RSS-210 B.6 | | | |
|---|---|---|---|---|
| Description | Compliance with the spectrum mask is tested with RBW set to 9kHz. | | | |
| Freq. of Emission (MHz) | Field Strength (μV/m) at 30m | Field Strength (dBμV/m) at 30m | Field Strength (dBμV/m) at 10m | Field Strength (dBμV/m) at 3m |
| 1.705~13.110 | 30 | 29.5 | 48.58 | 69.5 |
| 13.110~13.410 | 106 | 40.5 | 59.58 | 80.5 |
| 13.410~13.553 | 334 | 50.5 | 69.58 | 90.5 |
| 13.553~13.567 | 15848 | 84.0 | 103.08 | 124.0 |
| 13.567~13.710 | 334 | 50.5 | 69.58 | 90.5 |
| 13.710~14.010 | 106 | 40.5 | 59.58 | 80.5 |
| 14.010~30.000 | 30 | 29.5 | 48.58 | 69.5 |

### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

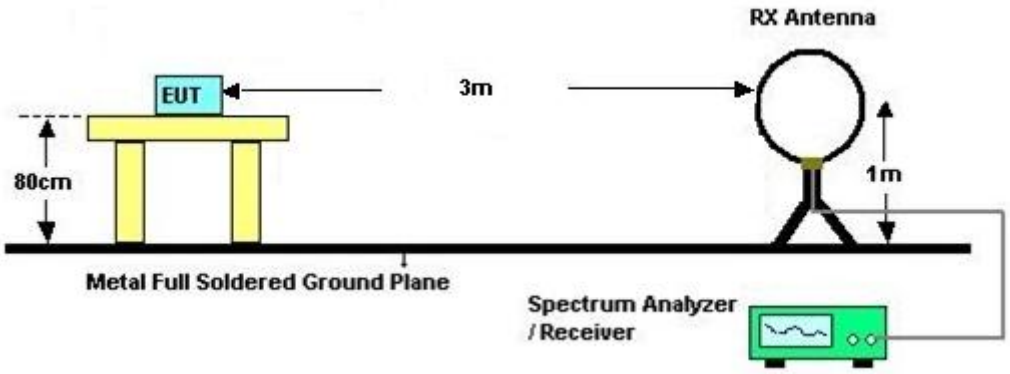
### 3.2.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.

5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested with RBW set to 9kHz.
   Note: Emission level (dBμV/m) = 20 log Emission level (μV/m).

### 3.2.4 Test Setup

For radiated emissions below 30MHz




### 3.2.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix B.

## 3.3 Radiated Emissions Measurement

### 3.3.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

| Frequencies (MHz) | Field Strength (μV/m) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(kHz) | 300 |
| 0.490~1.705 | 24000/F(kHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.3.3 Measuring Instrument Setting

The following table is the setting of receiver.

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Frequency Range: 9kHz~150kHz | RBW 200Hz for QP |
| Frequency Range: 150kHz~30MHz | RBW 9kHz for QP |
| Frequency Range: 30MHz~1000MHz | RBW 120kHz for Peak |

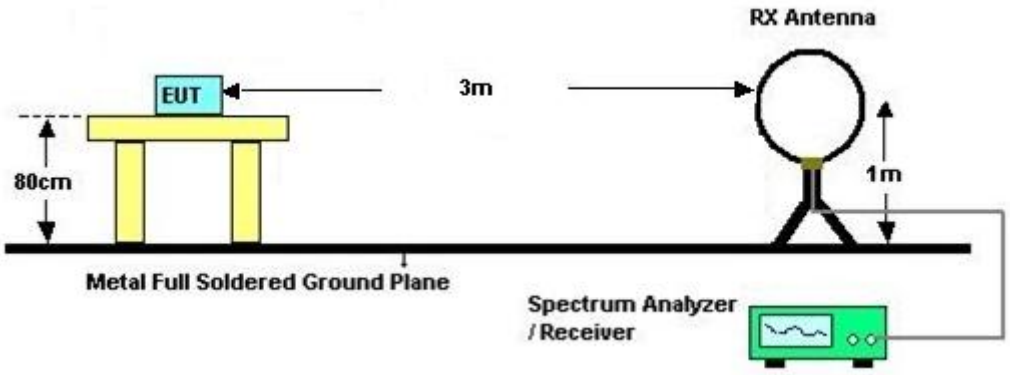
**Note:** The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

### 3.3.4 Test Procedures

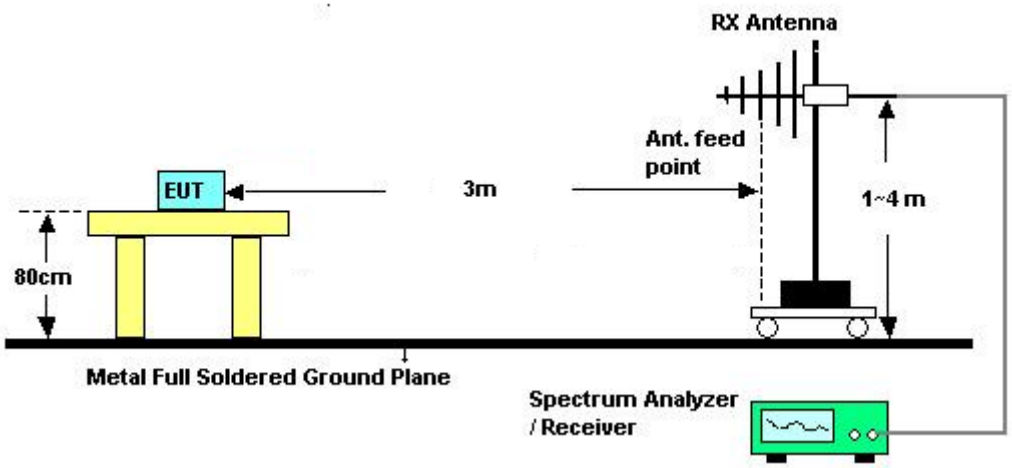
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. Antenna Requirements

### 3.3.5 Test Setup

For radiated emissions below 30MHz




For radiated emissions above 30MHz




### 3.3.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix B.

## 3.4 Antenna Requirements

### 3.4.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

### 3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

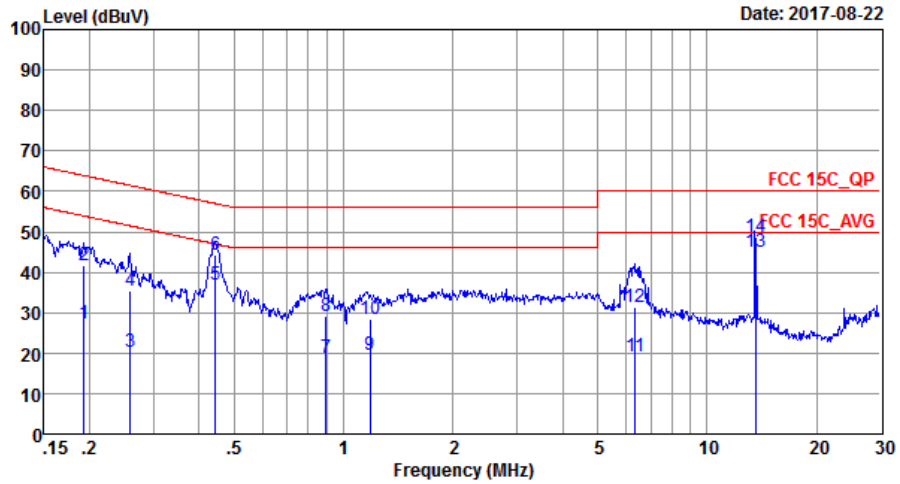
# 4. LIST OF MEASURING EQUIPMENT

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| EMI Test Receiver&SA | Agilent | N9038A | MY52260185 | 20Hz~26.5GHz | Apr. 20, 2017 | Aug. 07, 2017~ Aug. 22, 2017 | Apr. 19, 2018 | Radiation (03CH01-SZ) |
| Loop Antenna | R&S | HFH2-Z2 | 100354 | 9kHz~30MHz | May 14, 2017 | Aug. 07, 2017~ Aug. 22, 2017 | May 13, 2018 | Radiation (03CH01-KS) |
| Bilog Antenna | TeseQ | CBL6112D | 23188 | 30MHz-2GHz | Apr. 25, 2017 | Aug. 07, 2017~ Aug. 22, 2017 | Apr. 24, 2018 | Radiation (03CH01-SZ) |
| LF Amplifier | Burgeon | BPA-530 | 102209 | 0.01~3000Mhz | Apr. 20, 2017 | Aug. 07, 2017~ Aug. 22, 2017 | Apr. 19, 2018 | Radiation (03CH01-SZ) |
| AC Power Source | Chroma | 61601 | 616010001985 | N/A | NCR | Aug. 07, 2017~ Aug. 22, 2017 | NCR | Radiation (03CH01-SZ) |
| Turn Table | EM | EM1000 | N/A | 0~360 degree | NCR | Aug. 07, 2017~ Aug. 22, 2017 | NCR | Radiation (03CH01-SZ) |
| Antenna Mast | EM | EM1000 | N/A | 1 m~4 m | NCR | Aug. 07, 2017~ Aug. 22, 2017 | NCR | Radiation (03CH01-SZ) |
| EMI Receiver | R&S | ESR7 | 101630 | 9kHz~7GHz; | Jan. 06, 2017 | Aug. 22, 2017 | Jan. 05, 2018 | Conduction (CO01-SZ) |
| AC LISN | EMCO | 3816/2SH | 00103912 | 9kHz~30MHz | Jan. 05, 2017 | Aug. 22, 2017 | Jan. 04, 2018 | Conduction (CO01-SZ) |
| AC LISN (for auxiliary equipment) | MessTec | 3816/2SH | 00103892 | 9kHz~30MHz | Jan. 05, 2017 | Aug. 22, 2017 | Jan. 04, 2018 | Conduction (CO01-SZ) |
| AC Power Source | Chroma | 61602 | 616020000891 | 100Vac~250Vac | Jul. 19, 2017 | Aug. 22, 2017 | Jul. 18, 2018 | Conduction (CO01-SZ) |

NCR: No Calibration Required

# Appendix A. Test Results of Conducted Emission Test

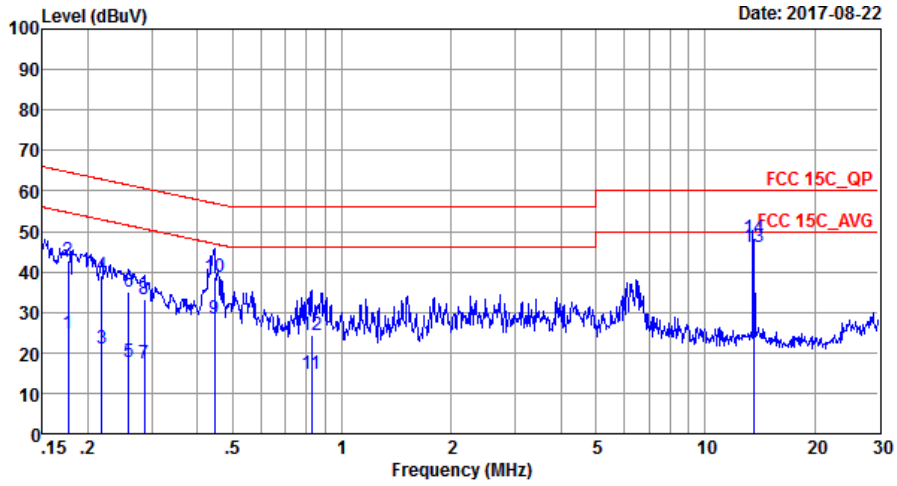
| Test Mode : | NFC Tx | Test Voltage : | 120Vac / 60Hz |
|---|---|---|---|
| Function Type : | NFC Link + Adapter | | |




Site : CO01-SZ
Condition: FCC 15C_QP LISN_20170301_L LINE

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.19 | 27.17 | -26.72 | 53.89 | 16.90 | 0.03 | 10.24 | Average |
| 2 | | 0.19 | 41.57 | -22.32 | 63.89 | 31.30 | 0.03 | 10.24 | QP |
| 3 | | 0.26 | 20.25 | -31.22 | 51.47 | 10.00 | 0.03 | 10.22 | Average |
| 4 | | 0.26 | 35.35 | -26.12 | 61.47 | 25.10 | 0.03 | 10.22 | QP |
| 5 | | 0.44 | 36.91 | -10.07 | 46.98 | 26.69 | 0.03 | 10.19 | Average |
| 6 | | 0.44 | 44.31 | -12.67 | 56.98 | 34.09 | 0.03 | 10.19 | QP |
| 7 | | 0.89 | 18.81 | -27.19 | 46.00 | 8.61 | 0.05 | 10.15 | Average |
| 8 | | 0.89 | 29.11 | -26.89 | 56.00 | 18.91 | 0.05 | 10.15 | QP |
| 9 | | 1.18 | 19.63 | -26.37 | 46.00 | 9.40 | 0.08 | 10.15 | Average |
| 10 | | 1.18 | 28.43 | -27.57 | 56.00 | 18.20 | 0.08 | 10.15 | QP |
| 11 | | 6.35 | 19.23 | -30.77 | 50.00 | 8.70 | 0.22 | 10.31 | Average |
| 12 | | 6.35 | 31.53 | -28.47 | 60.00 | 21.00 | 0.22 | 10.31 | QP |
| 13 | * | 13.56 | 45.20 | -4.80 | 50.00 | 34.40 | 0.47 | 10.33 | Average |
| 14 | | 13.56 | 48.63 | -11.37 | 60.00 | 37.83 | 0.47 | 10.33 | QP |

| Test Mode : | NFC Tx | Test Voltage : | 120Vac / 60Hz |
|---|---|---|---|
| Function Type : | NFC Link + Adapter | | |



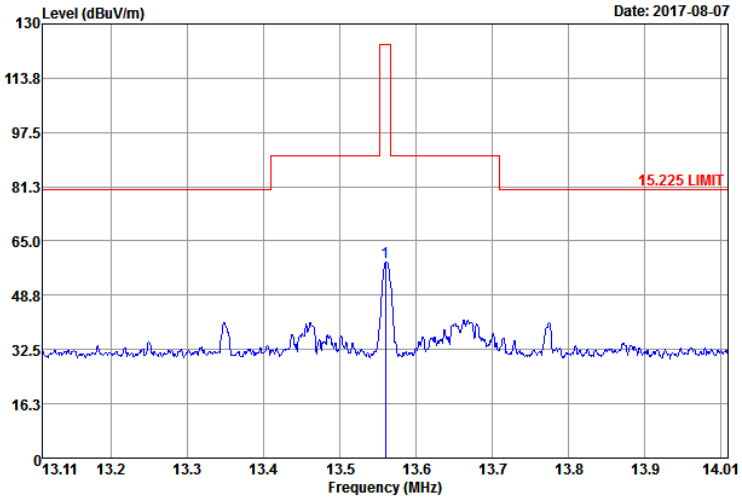

Site : CO01-SZ
Condition: FCC 15C_QP LISN_20170301_N NEUTRAL

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.18 | 24.73 | -29.91 | 54.64 | 14.40 | 0.03 | 10.30 | Average |
| 2 | | 0.18 | 42.63 | -22.01 | 64.64 | 32.30 | 0.03 | 10.30 | QP |
| 3 | | 0.22 | 21.05 | -31.83 | 52.88 | 10.80 | 0.03 | 10.22 | Average |
| 4 | | 0.22 | 39.25 | -23.63 | 62.88 | 29.00 | 0.03 | 10.22 | QP |
| 5 | | 0.26 | 17.65 | -33.82 | 51.47 | 7.40 | 0.03 | 10.22 | Average |
| 6 | | 0.26 | 35.15 | -26.32 | 61.47 | 24.90 | 0.03 | 10.22 | QP |
| 7 | | 0.29 | 17.35 | -33.28 | 50.63 | 7.10 | 0.03 | 10.22 | Average |
| 8 | | 0.29 | 33.25 | -27.38 | 60.63 | 23.00 | 0.03 | 10.22 | QP |
| 9 | | 0.45 | 28.51 | -18.42 | 46.93 | 18.30 | 0.02 | 10.19 | Average |
| 10 | | 0.45 | 38.61 | -18.32 | 56.93 | 28.40 | 0.02 | 10.19 | QP |
| 11 | | 0.83 | 14.79 | -31.21 | 46.00 | 4.60 | 0.03 | 10.16 | Average |
| 12 | | 0.83 | 24.49 | -31.51 | 56.00 | 14.30 | 0.03 | 10.16 | QP |
| 13 | * | 13.56 | 46.17 | -3.83 | 50.00 | 35.55 | 0.29 | 10.33 | Average |
| 14 | | 13.56 | 48.30 | -11.70 | 60.00 | 37.68 | 0.29 | 10.33 | QP |

# Appendix B. Test Results of Radiated Test Items

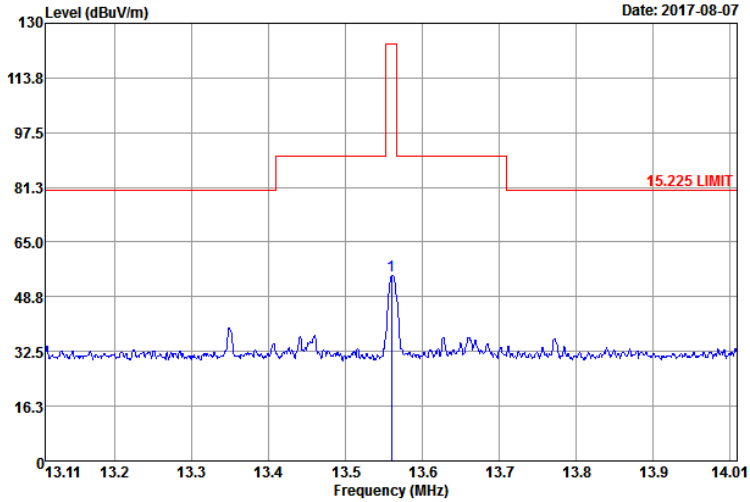
## B1. Test Result of Field Strength of Fundamental Emissions

| Test Mode : | NFC Tx | Test Frequency (MHz) | 13.56 |
|---|---|---|---|




Site : 03CH01-SZ
Condition : 15.225 LIMIT 3m LOOP ANT_1706 HORIZONTAL

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | cm | deg | |
| 1 | 13.56 | 58.59 | -65.41 | 124.00 | 38.67 | 19.47 | 0.45 | --- | --- | QP |




Site : 03CH01-SZ
Condition : 15.225 LIMIT 3m LOOP ANT_1706 VERTICAL

| | Freq | Level | Over Limit | Limit Line | Read Level | Antenna Factor | Cable Loss | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | cm | deg | |
| 1 | 13.56 | 55.07 | -68.93 | 124.00 | 35.15 | 19.47 | 0.45 | --- | --- | QP |

## B2. Results of Radiated Spurious Emissions (9 kHz~30MHz)

| Test Mode : | NFC Tx | Polarization : | Horizontal |
|---|---|---|---|

| Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 0.01 | 50.03 | -77.6 | 127.63 | 28.98 | 21 | 0.05 | - | - | Average |
| 0.06 | 45.49 | -66.31 | 111.8 | 24.93 | 20.5 | 0.06 | - | - | Average |
| 0.09 | 41.31 | -66.84 | 108.15 | 20.54 | 20.7 | 0.07 | - | - | QP |
| 0.13 | 37.84 | -67.4 | 105.24 | 17.16 | 20.6 | 0.08 | - | - | Average |
| 0.22 | 57.39 | -43.43 | 100.82 | 36.97 | 20.32 | 0.1 | - | - | Average |
| 2.01 | 40.12 | -29.88 | 70 | 19.39 | 20.55 | 0.18 | - | - | QP |
| 23.61 | 34.57 | -35.43 | 70 | 14.65 | 19.35 | 0.57 | | | QP |
| 26.12 | 34.23 | -35.77 | 70 | 14.03 | 19.59 | 0.61 | - | - | QP |

| Test Mode : | NFC Tx | Polarization : | Vertical |
|---|---|---|---|

| Frequency ( MHz ) | Level ( dBμV/m ) | Over Limit ( dB ) | Limit Line ( dBμV/m ) | Read Level (dBμV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 0.01 | 49.09 | -79.14 | 128.23 | 28.04 | 21 | 0.05 | - | - | Average |
| 0.06 | 38.72 | -73.06 | 111.78 | 18.16 | 20.5 | 0.06 | - | - | Average |
| 0.12 | 38.98 | -67.36 | 106.34 | 18.3 | 20.6 | 0.08 | - | - | Average |
| 0.12 | 34.45 | -71.27 | 105.72 | 13.77 | 20.6 | 0.08 | - | - | Average |
| 0.69 | 54.26 | -16.56 | 70.82 | 33.69 | 20.48 | 0.09 | - | - | QP |
| 2.01 | 36.22 | -33.78 | 70 | 15.49 | 20.55 | 0.18 | - | - | QP |
| 18.09 | 34.16 | -35.84 | 70 | 14.1 | 19.55 | 0.51 | | | QP |
| 29.70 | 36.34 | -33.66 | 70 | 16.09 | 19.58 | 0.67 | - | - | QP |

**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
3. Limit line = specific limits (dBμV) + distance extrapolation factor.

## B3. Results of Radiated Spurious Emissions (30MHz~1GHz)

| Test Mode : | NFC Tx | Polarization : | Horizontal |
|---|---|---|---|

| Frequency ( MHz ) | Level ( dBµV/m ) | Over Limit ( dB ) | Limit Line ( dBµV/m ) | Read Level (dBµV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 33.88 | 24.56 | -24.98 | 49.54 | 30.95 | 24.96 | 0.3 | 31.65 | - | - | Peak |
| 190.05 | 28.78 | -25.2 | 53.98 | 42.23 | 16.24 | 1.55 | 31.24 | - | - | Peak |
| 217.21 | 29.63 | -27.27 | 56.9 | 42.54 | 16.55 | 1.7 | 31.16 | - | - | Peak |
| 400.54 | 34.1 | -22.8 | 56.9 | 41.59 | 21.42 | 2.39 | 31.3 | - | - | Peak |
| 500.45 | 34.92 | -21.98 | 56.9 | 40.31 | 23.3 | 2.71 | 31.4 | - | - | Peak |
| 792.42 | 37.1 | -19.8 | 56.9 | 38.06 | 26.95 | 3.59 | 31.5 | 100 | 155 | Peak |

| Test Mode : | NFC Tx | Polarization : | Vertical |
|---|---|---|---|

| Frequency ( MHz ) | Level ( dBµV/m ) | Over Limit ( dB ) | Limit Line ( dBµV/m ) | Read Level (dBµV) | Antenna Factor ( dB ) | Cable Loss ( dB ) | Preamp Factor ( dB ) | Ant Pos ( cm ) | Table Pos ( deg ) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 40.67 | 33.03 | -16.51 | 49.54 | 42.31 | 21.78 | 0.39 | 31.45 | 155 | 203 | Peak |
| 190.05 | 23.71 | -30.27 | 53.98 | 37.16 | 16.24 | 1.55 | 31.24 | - | - | Peak |
| 217.21 | 25.45 | -31.45 | 56.9 | 38.36 | 16.55 | 1.7 | 31.16 | - | - | Peak |
| 299.66 | 28.34 | -28.56 | 56.9 | 39.4 | 18.2 | 2.04 | 31.3 | - | - | Peak |
| 400.54 | 33.55 | -23.35 | 56.9 | 41.04 | 21.42 | 2.39 | 31.3 | - | - | Peak |
| 500.45 | 37.05 | -19.85 | 56.9 | 42.44 | 23.3 | 2.71 | 31.4 | - | - | Peak |

**Note:**

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dBµV/m) = 20 log Emission level (µV/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.

# Appendix D. Reference Report

Please refer to report number C170223Z01-RP1-4 which is issued separately.