



FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

RFID MODULE

MODEL NUMBER: RI16A

FCC ID: ACJ9TGRI16A

REPORT NUMBER: 11576086H-A-R2

ISSUE DATE: March 2, 2017

Prepared for

PANASONIC CORPORATION OF NORTH AMERICA
Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490

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*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

Revision History

| Rev. | Issue Date | Revisions | Revised By |
|------|------------|--|-------------|
| -- | 02/23/2017 | Initial Issue | T. Hatakeda |
| 1 | 02/27/2017 | Correction of clause 6.3.DESCRPTION OF AVAILABLE ANTENNAS | T. Hatakeda |
| 1 | 02/27/2017 | Correction of Section 13.MAXIMUM PERMISSIBLE EXPOSURE | T. Hatakeda |
| | | *This report is a revised version of 11576086H-A, which is replaced with this report. | |
| 2 | 03/02/2017 | Correction of "TEST PROCEDURE" in clause 8.1. LIMITS AND PROCEDURE 30 MHz - 1000 MHz →9 kHz to 1000 MHz | T. Hatakeda |
| 2 | 03/02/2017 | Deletion of Section 13.MAXIMUM PERMISSIBLE EXPOSURE in 1576086H-A-R1 | T. Hatakeda |
| | | *This report is a revised version of 11576086H-A-R1, which is replaced with this report. | |

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PANASONIC CORPORATION OF NORTH AMERICA
Two Riverfront Plaza, 9th Floor, Newark, NJ 07102-5490

EUT DESCRIPTION: RFID MODULE

MODEL: RI16A

SERIAL NUMBER: 6LTSA00093

DATE TESTED: February 11 to 16, 2017

| APPLICABLE STANDARDS | |
|-----------------------|--------------|
| STANDARD | TEST RESULTS |
| FCC PART 15 SUBPART C | Pass |

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

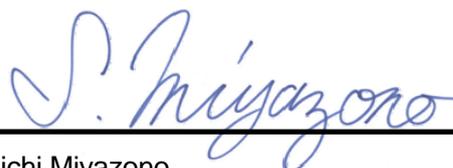
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL Japan, Inc. By:

Tested By:



Takahiro Hatakeda
Leader
Consumer Technology Division



Shinichi Miyazono
Engineer
Consumer Technology Division

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0
The full scope of accreditation can be viewed at
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor $k = 2$.

Ise EMC Lab.

| Antenna terminal test Uncertainty (+/-) | | | | | | | |
|---|-------------|--------------------------------------|--------------|---------------|--------------------|------------------|---------------|
| Power meter | | Conducted emission and Power density | | | Conducted emission | | Channel power |
| Below 1 GHz | Above 1 GHz | Below 1 GHz | 1 GHz -3 GHz | 3 GHz -18 GHz | 18 GHz -26.5 GHz | 26.5 GHz -40 GHz | |
| 0.9 dB | 1.0 dB | 1.4 dB | 1.5 dB | 2.8 dB | 2.8 dB | 2.9 dB | 2.6 dB |

| Frequency range | Conducted emission using AMN(LISN) (+/-) |
|-----------------|--|
| 0.009 – 0.15MHz | 3.5 dB |
| 0.15 – 30MHz | 3.0 dB |

| Test distance | Radiated emission (+/-) 9 kHz - 30 MHz |
|---------------|---|
| 3m | 3.8 dB |
| 10m | 3.7 dB |

| Polarity | Radiated emission (Below 1GHz) | | | |
|------------|--------------------------------|---------------|---------------|---------------|
| | (3 m*) (+/-) | | (10 m*) (+/-) | |
| | 30 – 200 MHz | 200 – 1000MHz | 30 – 200 MHz | 200 – 1000MHz |
| Horizontal | 5.0 dB | 5.3 dB | 5.0 dB | 5.0 dB |
| Vertical | 4.7 dB | 5.9 dB | 5.0 dB | 5.1 dB |

| Radiated emission (Above 1GHz) | | | | |
|--------------------------------|-----------|---------------|--------------|---------------|
| (3 m*) (+/-) | | (1 m*) (+/-) | | (10 m*) (+/-) |
| 1 – 6GHz | 6 – 18GHz | 10 – 26.5 GHz | 26.5 – 40GHz | 1 -18 GHz |
| 5.2 dB | 5.4 dB | 5.5 dB | 5.5 dB | 5.4 dB |

*Measurement distance

Conducted emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test (3 m)

The data listed in this test report has enough margin, more than the site margin.

5. TEST PROCEDURE AND RESULTS

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|--|--|---------------------------------------|---------------------------------------|----------|----------|
| Conducted emission | ANSI C63.10:2013 6 Standard test methods | Section 15.207 | [QP] 20.1 dB 0.15000 MHz, L1 | Complied | - |
| | <IC>RSS-Gen 8.8 | <IC>RSS-Gen 8.8 | [AV] 18.3 dB 0.18960 MHz, L1 | | |
| Electric Field Strength of Fundamental Emission | ANSI C63.10:2013 6 Standard test methods | Section 15.225(a) | 50.6dB, 13.56000MHz, QP, 0deg. | Complied | Radiated |
| | <IC> RSS-Gen 6.4, 6.12 | <IC>RSS-210 B.6 | | | |
| Spectrum Mask | ANSI C63.10:2013 6 Standard test methods | Section 15.225(b)(c) | 31.5dB, 13.56700MHz, QP, 90deg. | Complied | Radiated |
| | <IC>RSS-Gen 6.4, 6.13 | <IC> RSS-210 B.6 | | | |
| 20dB Bandwidth | ANSI C63.10:2013 6 Standard test methods | Section15.215(c) | See data | Complied | Radiated |
| | <IC> - | <IC> - | | | |
| Electric Field Strength of Spurious Emission | ANSI C63.10:2013 6 Standard test methods | Section 15.209, Section 15.225 (d) | 6.2dB 40.680MHz, Vertical, QP | Complied | Radiated |
| | <IC>RSS-Gen 6.4, 6.13 | <IC>RSS-210 B.6 | | | |
| Frequency Tolerance | ANSI C63.10:2013 6 Standard test methods | Section 15.225(e) | See data | Complied | Radiated |
| | <IC>RSS-Gen 6.11, 8.11 | <IC> RSS-210 B.6 | | | |
| Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422 | | | | | |

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is an RFID module that is embedded inside Panasonic PC model CF-33. The radio module is manufactured by NXP.

6.2. MAXIMUM TRANSMITTER FIELD STRENGTH

The field strength of the transmitter is as follows:

| Frequency Range (MHz) | Mode | Output Power (dBuV/m @ 30m) |
|-----------------------|--------------------|-----------------------------|
| 13.56 | Without Tag | 33.3 |
| 13.56 | Normal Mode Type A | 17.0 |
| 13.56 | Normal Mode Type B | 17.1 |

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Loop antenna.

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

6.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Regulation test EMVco_loopback.exe

6.5. WORST-CASE CONFIGURATION AND MODE

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of PC to see the position of maximum noise, and the test was made at the position that has the maximum noise.

6.6. MODIFICATIONS

No modifications were made during testing.

6.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

| PERIPHERAL SUPPORT EQUIPMENT LIST | | | | |
|-----------------------------------|--------------|---------------|------------------|--------|
| Description | Manufacturer | Model | Serial Number | FCC ID |
| Personal Computer | Panasonic | CF-33 | 6LTSA00550 | - |
| AC Adapter | Panasonic | CF-AA5713A M3 | 5713AM316904288C | - |
| Tag board | - | - | - | - |

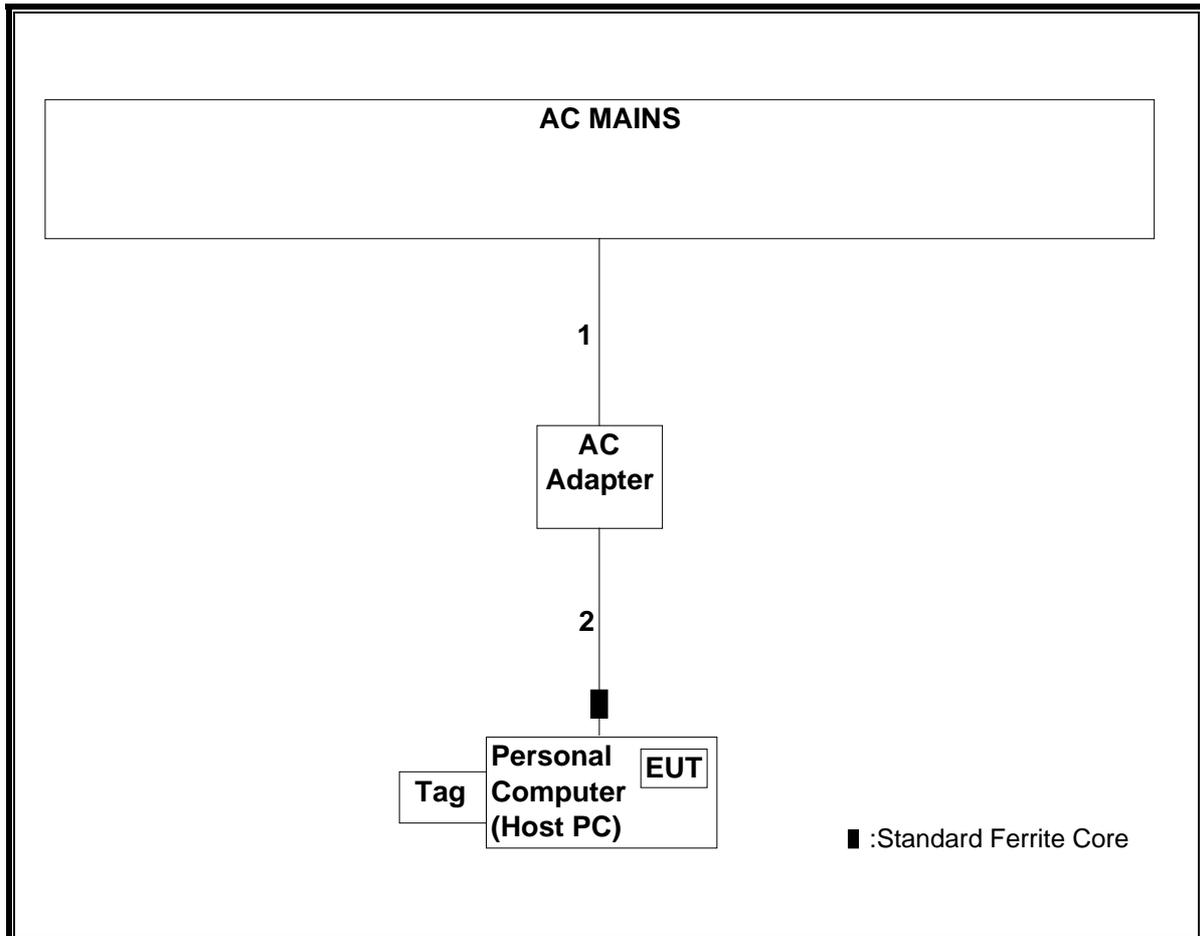
I/O CABLES

| I/O CABLE LIST | | | | | | |
|----------------|------|----------------------|----------------|-------------|--------------|---------|
| Cable No. | Port | # of Identical Ports | Connector Type | Cable Type | Cable Length | Remarks |
| 1 | DC | 1 | DC | Un-Shielded | 1.4 m | N/A |
| 2 | AC | 1 | AC | Un-Shielded | 1.8 m | N/A |

TEST SETUP

The EUT is installed in a host tablet computer during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|----------------------------------|----------------------|---|------------|-----------|------------------------------------|
| MAEC-03 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE/CE | 2016/10/20 * 12 |
| MOS-13 | Thermo-Hygrometer | Custom | CTH-180 | 1301 | RE/CE | 2017/01/20 * 12 |
| MJM-16 | Measure | KOMELON | KMC-36 | - | RE/CE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE/CE | - |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | RE/CE | 2016/08/17 * 12 |
| MTR-08 | Test Receiver | Rohde & Schwarz | ESCI | 100767 | RE/CE | 2016/09/15 * 12 |
| MLPA-01 | Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100017 | RE | 2016/10/14 * 12 |
| MCC-112 | Coaxial cable | Fujikura/Suhner/TSJ | 5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher) | -/00640 | RE/CE | 2016/07/26 * 12 |
| MCC-143 | Coaxial Cable | UL Japan | - | - | RE | 2016/06/20 * 12 |
| MPA-13 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260834 | RE | 2016/03/24 * 12 |
| MAT-98 | Attenuator | KEYSIGHT | 8491A | MY52462349 | RE | 2016/12/05 * 12 |
| MMM-08 | DIGITAL HiTESTER | Hioki | 3805 | 051201197 | RE/CE | 2017/01/19 * 12 |
| MBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | 1915 | RE | 2016/10/15 * 12 |
| MLA-22 | Logperiodic Antenna(200-1000MHz) | Schwarzbeck | VUSLP9111B | 911B-191 | RE | 2017/01/26 * 12 |
| MCC-51 | Coaxial cable | UL Japan | - | - | RE | 2016/07/26 * 12 |
| MLS-23 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127-729 | CE(EUT) | 2016/07/07 * 12 |
| MAT-66 | Attenuator(13dB) | JFW Industries, Inc. | 50FP-013H2 N | - | CE | 2016/12/24 * 12 |
| MFC-01 | Microwave Counter | Advantest | R5373 | 120100309 | FT | 2016/06/01 * 12 |
| MCH-04 | Temperature and Humidity Chamber | Tabai Espec | PL-2KP | 14015723 | FT | 2016/08/30 * 12 |
| MOS-14 | Thermo-Hygrometer | Custom | CTH-201 | 1401 | FT | 2017/01/20 * 12 |

The expiration date of the calibration is the end of the expired month.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item:

- CE: Conducted emission
- RE: Radiated emission
- FT: Frequency Tolerance

8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMIT

§15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Limits for radiated disturbance of an intentional radiator | | |
|--|-----------------|--------------------------|
| Frequency range (MHz) | Limits (µV/m) | Measurement Distance (m) |
| 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 |

** 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 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:

Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in § 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10-2013

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 9 kHz to 1000 MHz.

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

RESULTS

9. FUNDAMENTAL EMISSION and Spectrum Mask

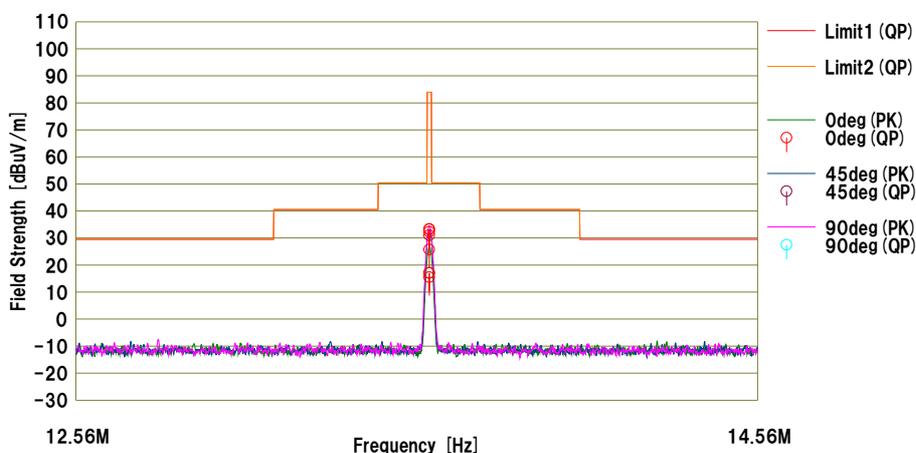
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/11

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 32% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz without Tag Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
 Limit2 : FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



| No. | Freq. [MHz] | Reading | Ant.Fac [dB/m] | Loss [dB] | Gain [dB] | Result | | Limit | | Margin | | Antenna [deg] | Table | Comment |
|-----|----------------|----------------|-------------------|--------------|--------------|------------------|------------------|------------------|--------------|--------------|------|------------------|-------------------------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dBuV/m] | <QP> [dBuV/m] | <QP> [dB] | <QP> [dB] | | | | |
| 1 | 13.56000 | 71.8 | 19.4 | -33.3 | 32.2 | 25.7 | 83.9 | 83.9 | 58.2 | 58.2 | Odeg | 33 | Odeg | |
| 2 | 13.56000 | 78.4 | 19.4 | -33.3 | 32.2 | 32.3 | 83.9 | 83.9 | 51.6 | 51.6 | Odeg | 247 | 45deg | |
| 3 | 13.56000 | 79.4 | 19.4 | -33.3 | 32.2 | 33.3 | 83.9 | 83.9 | 50.6 | 50.6 | Odeg | 205 | 90deg | |
| 4 | 13.56000 | 77.1 | 19.4 | -33.3 | 32.2 | 31.0 | 83.9 | 83.9 | 52.9 | 52.9 | Odeg | 60 | 135deg | |
| 5 | 13.56000 | 79.3 | 19.4 | -33.3 | 32.2 | 33.2 | 83.9 | 83.9 | 50.7 | 50.7 | Odeg | 218 | 270deg | |
| 6 | 13.56000 | 63.1 | 19.4 | -33.3 | 32.2 | 17.0 | 83.9 | 83.9 | 66.9 | 66.9 | Odeg | 205 | 90deg with Tag (Type A) | |
| 7 | 13.56000 | 63.2 | 19.4 | -33.3 | 32.2 | 17.1 | 83.9 | 83.9 | 66.8 | 66.8 | Odeg | 205 | 90deg with Tag (Type B) | |
| 8 | 13.56000 | 61.6 | 19.4 | -33.3 | 32.2 | 15.5 | 83.9 | 83.9 | 68.4 | 68.4 | Odeg | 44 | Hori | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz:-HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

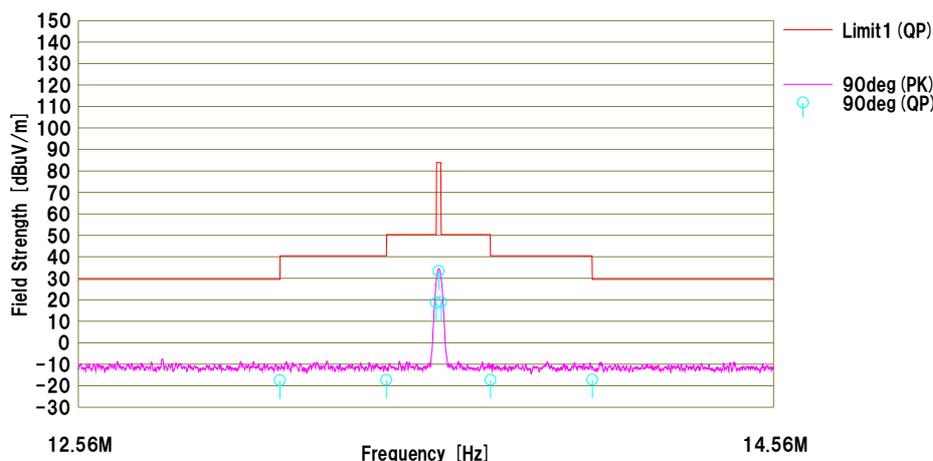
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 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz without Tag Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP



| No. | Freq. [MHz] | Reading | Ant.Fac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | Margin | Antenna | Table | Comment |
|-----|----------------|----------------|-------------------|--------------|--------------|------------------|--------------|--------|---------|-------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dB] | | | | |
| 1 | 13.11000 | 28.7 | 19.4 | -33.4 | 32.2 | -17.3 | 29.5 | 47.0 | 90deg | 205 | |
| 2 | 13.41000 | 28.8 | 19.4 | -33.3 | 32.2 | -17.3 | 40.5 | 57.8 | 90deg | 205 | |
| 3 | 13.55300 | 64.7 | 19.4 | -33.3 | 32.2 | 18.6 | 50.4 | 31.8 | 90deg | 205 | |
| 4 | 13.56000 | 79.4 | 19.4 | -33.3 | 32.2 | 33.3 | 83.9 | 50.6 | 90deg | 205 | |
| 5 | 13.56700 | 65.0 | 19.4 | -33.3 | 32.2 | 18.8 | 50.4 | 31.5 | 90deg | 205 | |
| 6 | 13.71000 | 28.8 | 19.4 | -33.3 | 32.2 | -17.3 | 40.5 | 57.8 | 90deg | 205 | |
| 7 | 14.01000 | 28.9 | 19.4 | -33.3 | 32.2 | -17.2 | 29.5 | 46.7 | 90deg | 205 | |

CHART:WITH FACTOR ANT TYPE:-30MHz-Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz--HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

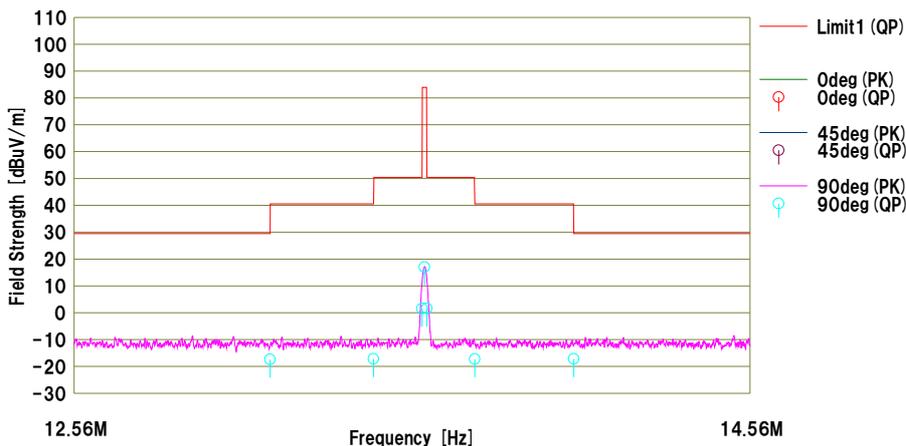
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Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP



| No. | Freq. [MHz] | Reading | Ant.Fac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | Margin | Antenna | Table | Comment |
|-----|----------------|----------------|-------------------|--------------|--------------|------------------|--------------|--------|---------|-------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dB] | | | | |
| 1 | 13.11000 | 28.8 | 19.4 | -33.4 | 32.2 | -17.4 | 29.5 | 46.9 | 90deg | 205 | |
| 2 | 13.41000 | 28.9 | 19.4 | -33.3 | 32.2 | -17.2 | 40.5 | 57.7 | 90deg | 205 | |
| 3 | 13.53000 | 47.6 | 19.4 | -33.3 | 32.2 | 1.5 | 50.4 | 48.9 | 90deg | 205 | |
| 4 | 13.58000 | 63.1 | 19.4 | -33.3 | 32.2 | 17.0 | 83.9 | 66.9 | 90deg | 205 | |
| 5 | 13.56700 | 47.7 | 19.4 | -33.3 | 32.2 | 1.6 | 50.4 | 48.8 | 90deg | 205 | |
| 6 | 13.71000 | 28.8 | 19.4 | -33.3 | 32.2 | -17.3 | 40.5 | 57.8 | 90deg | 205 | |
| 7 | 14.01000 | 28.9 | 19.4 | -33.3 | 32.2 | -17.2 | 29.5 | 46.7 | 90deg | 205 | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz--HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

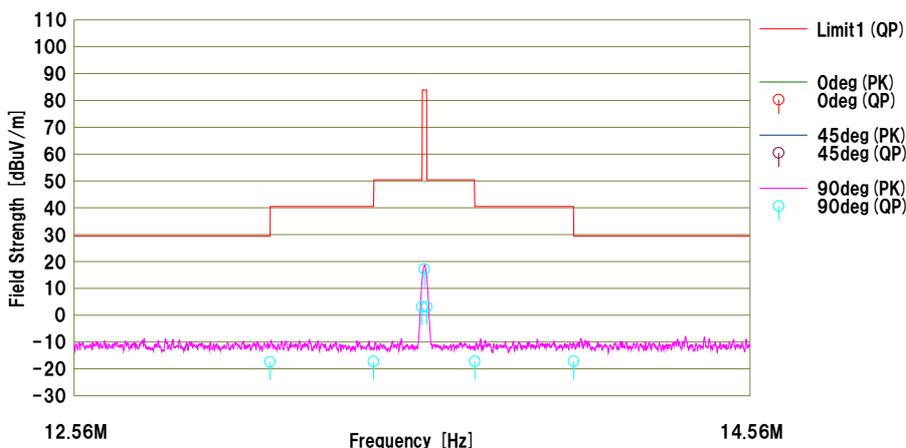
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/11

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 32% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz with Tag (Type B) Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz-PK, 110-490kHz-PK, other:QP



| No. | Freq. [MHz] | Reading | AntFac | Loss | Gain | Result | Limit | Margin | Antenna | Table | Comment |
|-----|----------------|----------------|--------|-------|------|--------|-------|--------|---------|-------|---------|
| | | <QP> [dBuV] | | | | [dB/m] | [dB] | [dB] | | | |
| 1 | 13.11000 | 28.8 | 19.4 | -33.4 | 32.2 | -17.4 | 29.5 | 46.9 | 90deg | 205 | |
| 2 | 13.41000 | 28.8 | 19.4 | -33.3 | 32.2 | -17.3 | 40.5 | 57.8 | 90deg | 205 | |
| 3 | 13.55300 | 49.2 | 19.4 | -33.3 | 32.2 | 3.1 | 50.4 | 47.3 | 90deg | 205 | |
| 4 | 13.56000 | 63.2 | 19.4 | -33.3 | 32.2 | 17.1 | 83.9 | 66.8 | 90deg | 205 | |
| 5 | 13.56700 | 49.2 | 19.4 | -33.3 | 32.2 | 3.1 | 50.4 | 47.3 | 90deg | 205 | |
| 6 | 13.71000 | 28.9 | 19.4 | -33.3 | 32.2 | -17.2 | 40.5 | 57.7 | 90deg | 205 | |
| 7 | 14.01000 | 28.9 | 19.4 | -33.3 | 32.2 | -17.2 | 29.5 | 46.7 | 90deg | 205 | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz:-HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

Result of the fundamental emission at 3m without Distance factor

QP

| Ant Deg [deg] | Frequency [MHz] | Detector | Reading [dBuV] | Ant Factor [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---------------|--------------------|----------|-------------------|-------------------------|--------------|--------------|------------------------|--------------------|-------------------|----------------|-----------------|
| 90 | 13.56000 | QP | 79.4 | 19.4 | 6.6 | 32.2 | - | 73.2 | - | - | without Tag |
| 90 | 13.56000 | QP | 63.1 | 19.4 | 6.6 | 32.2 | - | 56.9 | - | - | with Type A tag |
| 90 | 13.56000 | QP | 63.2 | 19.4 | 6.6 | 32.2 | - | 57.0 | - | - | with Type B tag |

Result = Reading + Ant Factor + Loss (Cable+Attenuator) - Gain(Amprifier)

9.1. SPURIOUS EMISSIONS (0.009 – 30 MHz)

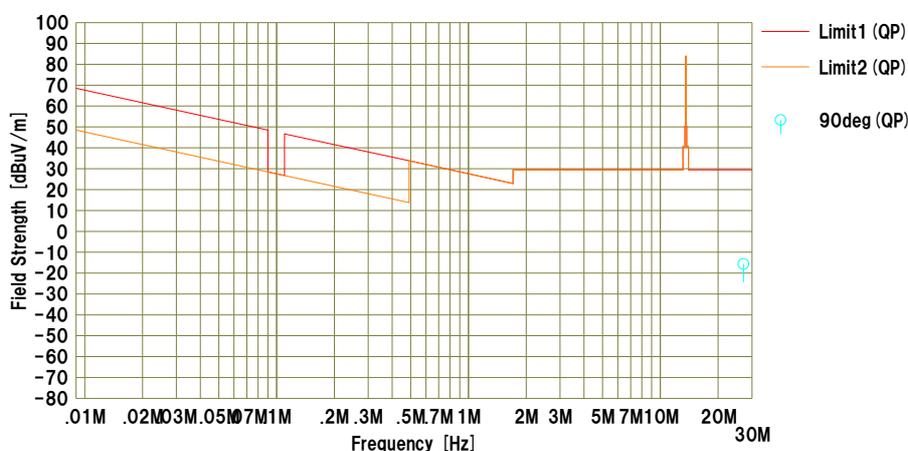
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/11

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 32% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz without Tag Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
 Limit2 : FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



| No. | Freq. [MHz] | Reading | AntFac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | | Margin | | Antenna [deg] | Table [deg] | Comment |
|-----|----------------|----------------|------------------|--------------|--------------|------------------|------------------|--------------|--------------|-----|------------------|----------------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dBuV/m] | <QP> [dB] | <QP> [dB] | | | | |
| 1 | 27.12000 | 29.2 | 20.3 | -33.0 | 32.2 | -15.7 | 29.5 | --- | 45.2 | --- | 90deg | 129 | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz--HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

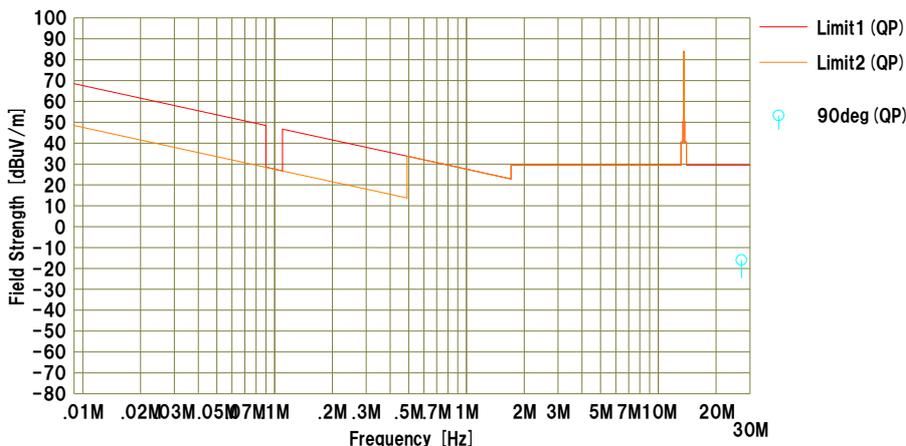
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/11

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 32% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz with Tag (Type A) Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
 Limit2 : FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



| No. | Freq. [MHz] | Reading | AntFac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | | Margin | | Antenna | Table [deg] | Comment |
|-----|----------------|----------------|------------------|--------------|--------------|------------------|------------------|--------------|--------------|-----|---------|----------------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dBuV/m] | <QP> [dB] | <QP> [dB] | | | | |
| 1 | 27.12000 | 28.9 | 20.3 | -33.0 | 32.2 | -16.0 | 29.5 | --- | 45.5 | --- | 90deg | 129 | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz:-HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

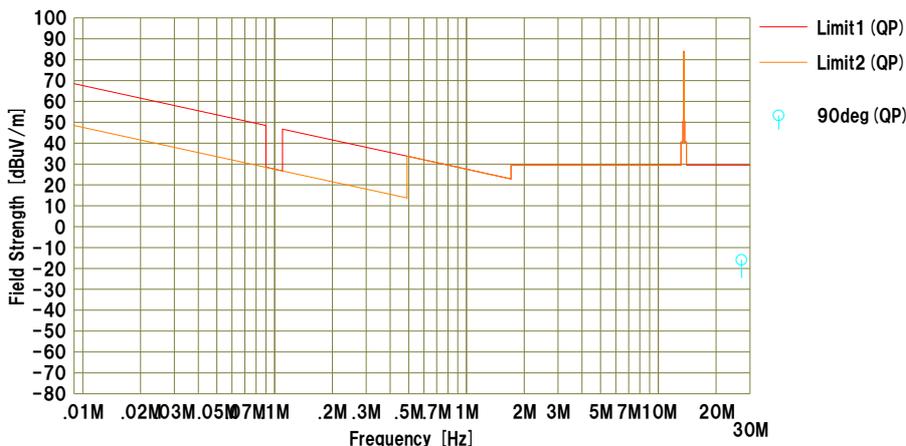
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/11

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 32% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz with Tag (Type B) Worst-Axis (Tablet style_X-Axis)

Limit1 : FCC15_225_PKQP, 9-90kHz:PK, 110-490kHz:PK, other:QP
 Limit2 : FCC15_225_AVQP, 9-90kHz:AV, 110-490kHz:AV, other:QP



| No. | Freq. [MHz] | Reading | AntFac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | | Margin | | Antenna | Table | Comment |
|-----|----------------|----------------|------------------|--------------|--------------|------------------|------------------|--------------|--------------|-----|---------|-------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dBuV/m] | <QP> [dB] | <QP> [dB] | | | | |
| 1 | 27.12000 | 29.0 | 20.3 | -33.0 | 32.2 | -15.9 | 29.5 | --- | 45.4 | --- | 90deg | 129 | |

CALCULATION : RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN + D.FACTOR) - GAIN(AMP)
 CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz--HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. + D-FACTOR - GAIN (AMP))

9.2. SPURIOUS EMISSION 30 TO 1000 MHz

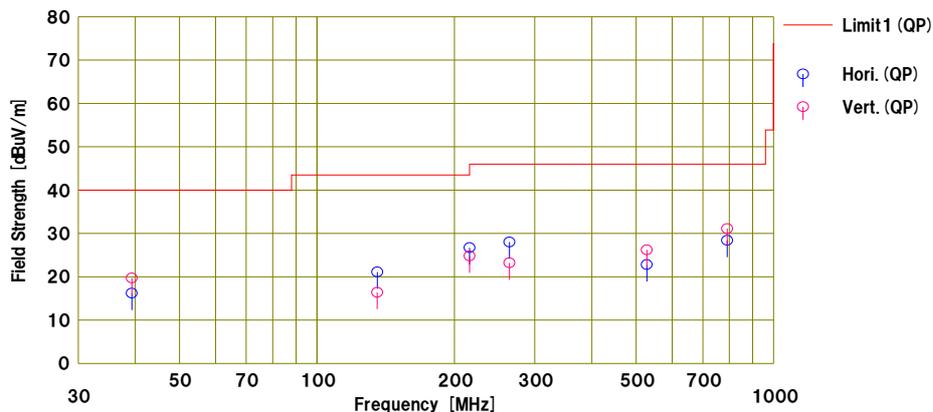
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz without Tag (TypeA) Worst Axis (PC style_X-Axis)

Limit1 : FCC15.209 3m. below 1GHz:QP, above 1GHz:PK



| No. | Freq [MHz] | Reading <QP> [dBuV] | AntFac [dB/m] | Loss [dB] | Gain [dB] | Result <QP> [dBuV/m] | Limit <QP> [dBuV/m] | Margin <QP> [dB] | Pola. [H/V] | Height [cm] | Angle [deg] | Ant. Type | Comment |
|-----|---------------|---------------------------|------------------|--------------|--------------|----------------------------|---------------------------|------------------------|----------------|----------------|----------------|--------------|---------|
| 1 | 39.324 | 26.5 | 14.6 | 7.3 | 32.2 | 16.2 | 40.0 | 23.8 | Hori. | 400 | 2 | BA | |
| 2 | 135.591 | 30.5 | 14.2 | 8.5 | 32.1 | 21.1 | 43.5 | 22.4 | Hori. | 100 | 0 | BA | |
| 3 | 216.000 | 37.6 | 11.8 | 9.3 | 32.0 | 26.7 | 43.5 | 16.8 | Hori. | 143 | 273 | LA22 | |
| 4 | 264.000 | 37.6 | 12.7 | 9.7 | 32.0 | 28.0 | 46.0 | 18.0 | Hori. | 115 | 265 | LA22 | |
| 5 | 528.000 | 25.3 | 18.0 | 11.5 | 32.0 | 22.8 | 46.0 | 23.2 | Hori. | 160 | 244 | LA22 | |
| 6 | 792.000 | 26.5 | 20.6 | 12.9 | 31.6 | 28.4 | 46.0 | 17.6 | Hori. | 100 | 288 | LA22 | |
| 7 | 39.324 | 30.0 | 14.6 | 7.3 | 32.2 | 19.7 | 40.0 | 20.3 | Vert. | 100 | 0 | BA | |
| 8 | 135.570 | 25.8 | 14.2 | 8.5 | 32.1 | 16.4 | 43.5 | 27.1 | Vert. | 100 | 0 | BA | |
| 9 | 216.000 | 35.7 | 11.8 | 9.3 | 32.0 | 24.8 | 43.5 | 18.7 | Vert. | 100 | 0 | LA22 | |
| 10 | 264.000 | 32.8 | 12.7 | 9.7 | 32.0 | 23.2 | 46.0 | 22.8 | Vert. | 100 | 288 | LA22 | |
| 11 | 528.000 | 28.7 | 18.0 | 11.5 | 32.0 | 26.2 | 46.0 | 19.8 | Vert. | 100 | 0 | LA22 | |
| 12 | 792.000 | 29.2 | 20.6 | 12.9 | 31.6 | 31.1 | 46.0 | 14.9 | Vert. | 120 | 0 | LA22 | |

CHART:WITH FACTOR ANT TYPE:-30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz:-HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - GAIN (AMP))

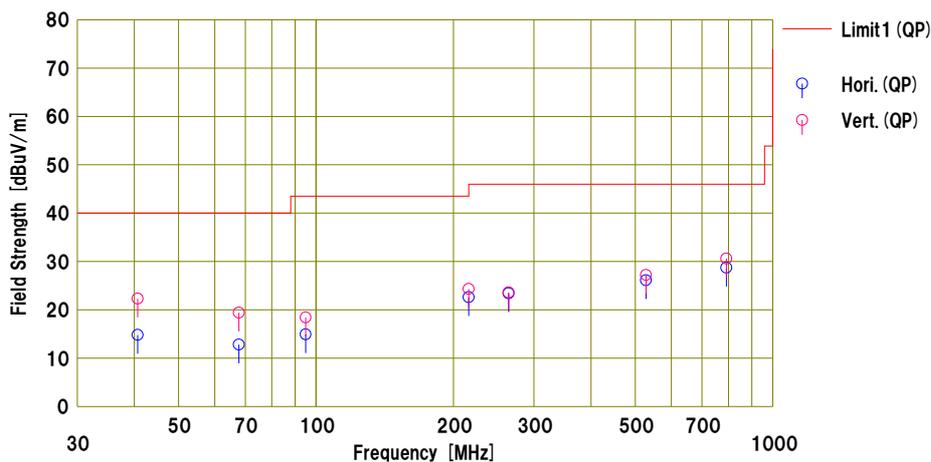
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz with Tag (TypeA) Worst Axis (PC style_X-Axis)

Limit1 : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK



| No. | Freq. [MHz] | Reading | Ant.Fac [dB/m] | Loss [dB] | Gain [dB] | Result | Limit | Margin | Pola. [H/V] | Height [cm] | Angle [deg] | Ant. Type | Comment |
|-----|----------------|----------------|-------------------|--------------|--------------|------------------|--------------|--------|----------------|----------------|----------------|--------------|---------|
| | | <QP> [dBuV] | | | | <QP> [dBuV/m] | <QP> [dB] | | | | | | |
| 1 | 40.680 | 25.6 | 14.1 | 7.3 | 32.2 | 14.8 | 40.0 | 25.2 | Hori. | 300 | 146 | BA | |
| 2 | 67.804 | 30.6 | 6.7 | 7.7 | 32.2 | 12.8 | 40.0 | 27.2 | Hori. | 100 | 0 | BA | |
| 3 | 94.923 | 30.0 | 9.0 | 8.1 | 32.2 | 14.9 | 43.5 | 28.6 | Hori. | 237 | 0 | BA | |
| 4 | 216.000 | 33.5 | 11.8 | 9.3 | 32.0 | 22.6 | 43.5 | 20.9 | Hori. | 100 | 308 | LA22 | |
| 5 | 264.000 | 33.0 | 12.7 | 9.7 | 32.0 | 23.4 | 46.0 | 22.6 | Hori. | 100 | 290 | LA22 | |
| 6 | 528.000 | 28.6 | 18.0 | 11.5 | 32.0 | 26.1 | 46.0 | 19.9 | Hori. | 159 | 214 | LA22 | |
| 7 | 792.000 | 26.8 | 20.6 | 12.9 | 31.6 | 28.7 | 46.0 | 17.3 | Hori. | 100 | 315 | LA22 | |
| 8 | 40.680 | 33.1 | 14.1 | 7.3 | 32.2 | 22.3 | 40.0 | 17.7 | Vert. | 100 | 256 | BA | |
| 9 | 67.804 | 37.2 | 6.7 | 7.7 | 32.2 | 19.4 | 40.0 | 20.6 | Vert. | 100 | 297 | BA | |
| 10 | 94.923 | 33.5 | 9.0 | 8.1 | 32.2 | 18.4 | 43.5 | 25.1 | Vert. | 100 | 0 | BA | |
| 11 | 216.000 | 35.2 | 11.8 | 9.3 | 32.0 | 24.3 | 43.5 | 19.2 | Vert. | 100 | 0 | LA22 | |
| 12 | 264.000 | 33.2 | 12.7 | 9.7 | 32.0 | 23.6 | 46.0 | 22.4 | Vert. | 100 | 304 | LA22 | |
| 13 | 528.000 | 29.7 | 18.0 | 11.5 | 32.0 | 27.2 | 46.0 | 18.8 | Vert. | 100 | 0 | LA22 | |
| 14 | 792.000 | 28.7 | 20.6 | 12.9 | 31.6 | 30.6 | 46.0 | 15.4 | Vert. | 118 | 0 | LA22 | |

CHART:WITH FACTOR ANT TYPE--30MHz:Loop, 30-200MHz:BICONICAL, 200-1000MHz:LOGPERIODIC, 1000MHz--HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - GAIN (AMP))

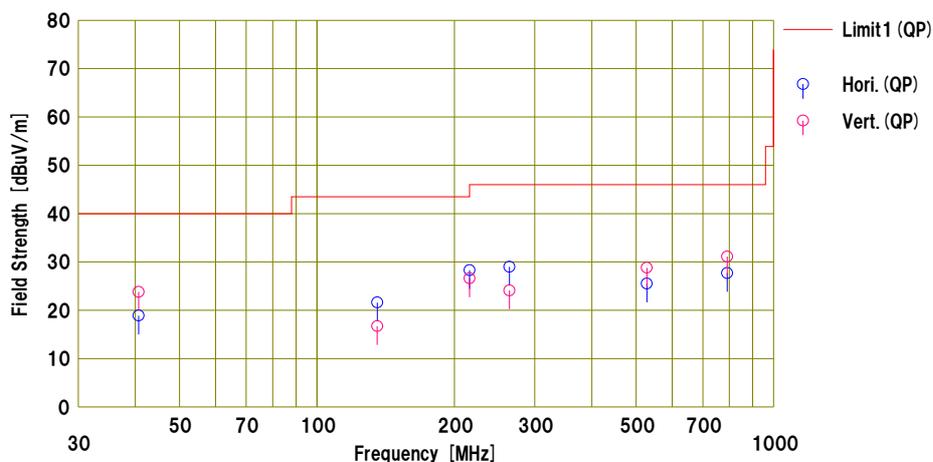
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz without Tag (TypeB) Worst Axis (PC style_X-Axis)

Limit1 : FCC15.209 3m. below 1GHz:QP, above 1GHz:PK



| No. | Freq. [MHz] | Reading | AntFac | Loss | Gain | Result | Limit | Margin | Pola. | Height [cm] | Angle [deg.] | Ant. Type | Comment |
|-----|----------------|---------|--------|------|------|----------|-------|--------|-------|----------------|-----------------|--------------|---------|
| | | [dBuV] | [dB/m] | [dB] | [dB] | [dBuV/m] | [dB] | [dB] | | | | | |
| 1 | 40.680 | 29.7 | 14.1 | 7.3 | 32.2 | 18.9 | 40.0 | 21.1 | Hori. | 100 | 0 | BA | |
| 2 | 135.591 | 31.0 | 14.2 | 8.5 | 32.1 | 21.6 | 43.5 | 21.9 | Hori. | 100 | 0 | BA | |
| 3 | 216.000 | 39.2 | 11.8 | 9.3 | 32.0 | 28.3 | 43.5 | 15.2 | Hori. | 100 | 282 | LA22 | |
| 4 | 264.000 | 38.6 | 12.7 | 9.7 | 32.0 | 29.0 | 46.0 | 17.0 | Hori. | 127 | 261 | LA22 | |
| 5 | 528.000 | 28.0 | 18.0 | 11.5 | 32.0 | 25.5 | 46.0 | 20.5 | Hori. | 158 | 271 | LA22 | |
| 6 | 792.000 | 25.8 | 20.6 | 12.9 | 31.6 | 27.7 | 46.0 | 18.3 | Hori. | 100 | 248 | LA22 | |
| 7 | 40.680 | 34.6 | 14.1 | 7.3 | 32.2 | 23.8 | 40.0 | 16.2 | Vert. | 100 | 0 | BA | |
| 8 | 135.570 | 26.1 | 14.2 | 8.5 | 32.1 | 16.7 | 43.5 | 26.8 | Vert. | 100 | 0 | BA | |
| 9 | 216.000 | 37.5 | 11.8 | 9.3 | 32.0 | 26.6 | 43.5 | 16.9 | Vert. | 100 | 0 | LA22 | |
| 10 | 264.000 | 33.7 | 12.7 | 9.7 | 32.0 | 24.1 | 46.0 | 21.9 | Vert. | 100 | 288 | LA22 | |
| 11 | 528.000 | 31.3 | 18.0 | 11.5 | 32.0 | 28.8 | 46.0 | 17.2 | Vert. | 100 | 0 | LA22 | |
| 12 | 792.000 | 29.2 | 20.6 | 12.9 | 31.6 | 31.1 | 46.0 | 14.9 | Vert. | 120 | 0 | LA22 | |

CHART:WITH FACTOR ANT TYPE:~30MHz:Loop, 30~200MHz:BICONICAL, 200~1000MHz:LOGPERIODIC, 1000MHz~HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - GAIN (AMP))

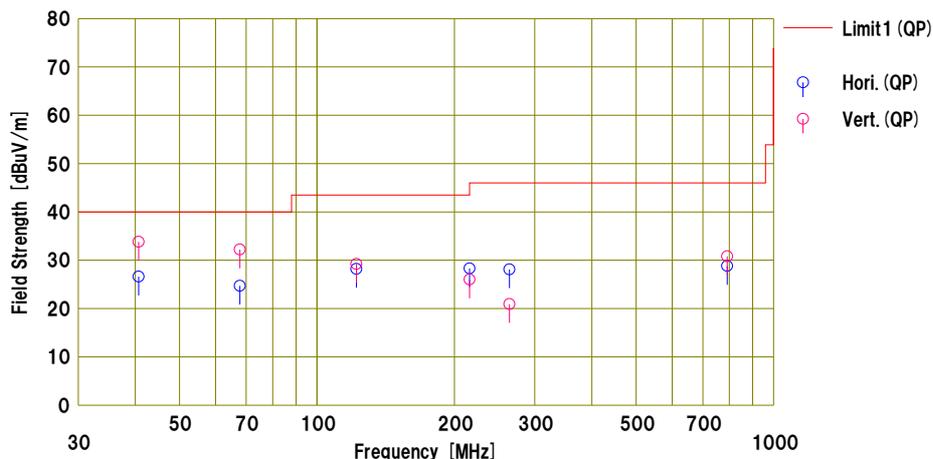
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz with Tag (TypeB) Worst Axis (PC style_X-Axis)

Limit1 : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK



| No. | Freq. | Reading | AntFac | Loss | Gain | Result | Limit | Margin | Pola. | Height | Angle | Ant. Type | Comment |
|-----|---------|---------|--------|------|------|----------|----------|--------|-------|--------|-------|-----------|---------|
| | [MHz] | [dBuV] | [dB/m] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dB] | | | | | |
| 1 | 40.680 | 37.4 | 14.1 | 7.3 | 32.2 | 28.8 | 40.0 | 13.4 | Hori. | 357 | 190 | BA | |
| 2 | 67.804 | 42.5 | 6.7 | 7.7 | 32.2 | 24.7 | 40.0 | 15.3 | Hori. | 298 | 189 | BA | |
| 3 | 122.040 | 38.8 | 13.2 | 8.4 | 32.2 | 28.2 | 43.5 | 15.3 | Hori. | 155 | 25 | BA | |
| 4 | 216.000 | 39.2 | 11.8 | 9.3 | 32.0 | 28.3 | 43.5 | 15.2 | Hori. | 143 | 272 | LA22 | |
| 5 | 264.000 | 37.7 | 12.7 | 9.7 | 32.0 | 28.1 | 46.0 | 17.9 | Hori. | 116 | 250 | LA22 | |
| 6 | 792.000 | 26.9 | 20.6 | 12.9 | 31.6 | 28.8 | 46.0 | 17.2 | Hori. | 100 | 131 | LA22 | |
| 7 | 40.680 | 44.6 | 14.1 | 7.3 | 32.2 | 33.8 | 40.0 | 6.2 | Vert. | 100 | 111 | BA | |
| 8 | 67.800 | 50.0 | 6.7 | 7.7 | 32.2 | 32.2 | 40.0 | 7.8 | Vert. | 100 | 257 | BA | |
| 9 | 122.040 | 39.8 | 13.2 | 8.4 | 32.2 | 29.2 | 43.5 | 14.3 | Vert. | 100 | 351 | BA | |
| 10 | 216.000 | 36.9 | 11.8 | 9.3 | 32.0 | 26.0 | 43.5 | 17.5 | Vert. | 100 | 0 | LA22 | |
| 11 | 264.000 | 30.5 | 12.7 | 9.7 | 32.0 | 20.9 | 46.0 | 25.1 | Vert. | 100 | 0 | LA22 | |
| 12 | 792.000 | 28.9 | 20.6 | 12.9 | 31.6 | 30.8 | 46.0 | 15.2 | Vert. | 114 | 0 | LA22 | |

CHART:WITH FACTOR ANT TYPE:-30MHz-Loop, 30-200MHz:BICONICAL, 200-1000MHz-LOGPERIODIC, 1000MHz-HORN
 CALCULATION:RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - GAIN (AMP))

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207

(a) Except as shown in paragraphs (b) and (c) of this section, 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 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

| Frequency range (MHz) | Limits (dB μ V) | |
|--------------------------|---------------------|----------|
| | Quasi-peak | Average |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 |
| 0.50 to 5 | 56 | 46 |
| 5 to 30 | 60 | 50 |

Notes:
1. The lower limit shall apply at the transition frequencies
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

TEST PROCEDURE

ANSI C63.10-2013

RESULTS

Modulation Type A without Card

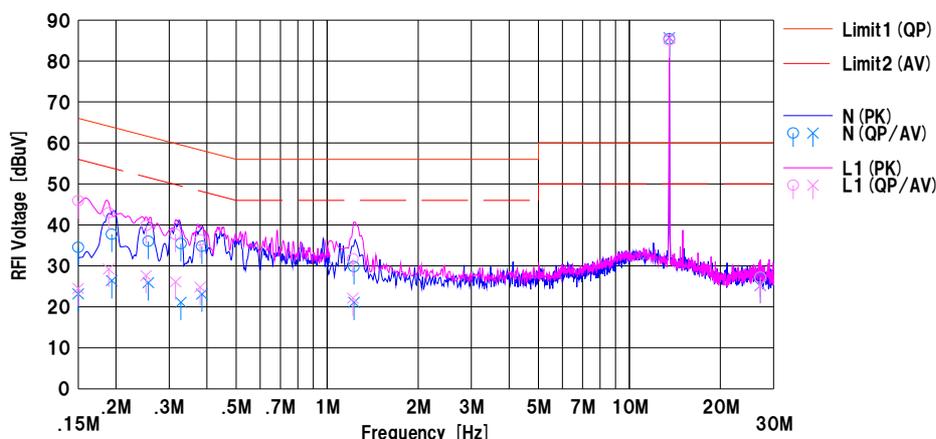
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz without Tag (Type A) PC style

Limit1 : FCC15.207 QP
 Limit2 : FCC15.207 AV



| No. | Freq. [MHz] | Reading | | C.Fac [dB] | Results | | Limit | | Margin | | Phase | Comment |
|-----|----------------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|--------------|--------------|-------|------------------|
| | | <QP> [dBuV] | <AV> [dBuV] | | <QP> [dBuV] | <AV> [dBuV] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dB] | <AV> [dB] | | |
| 1 | 0.15000 | 21.3 | 10.0 | 13.2 | 34.5 | 23.2 | 66.0 | 56.0 | 31.5 | 32.8 | N | |
| 2 | 0.19372 | 24.5 | 13.2 | 13.2 | 37.7 | 26.4 | 63.8 | 53.8 | 26.1 | 27.4 | N | |
| 3 | 0.25600 | 22.7 | 12.6 | 13.3 | 36.0 | 25.9 | 61.5 | 51.5 | 25.5 | 25.6 | N | |
| 4 | 0.32800 | 22.1 | 7.8 | 13.3 | 35.4 | 21.1 | 59.5 | 49.5 | 24.1 | 28.4 | N | |
| 5 | 0.38480 | 21.5 | 9.8 | 13.3 | 34.8 | 23.1 | 58.1 | 48.1 | 23.3 | 25.0 | N | |
| 6 | 1.22640 | 16.5 | 7.8 | 13.3 | 29.8 | 21.1 | 56.0 | 46.0 | 26.2 | 24.9 | N | |
| 7 | 13.56000 | 71.2 | 71.5 | 14.2 | 85.4 | 85.7 | 60.0 | 50.0 | - | - | N | Refer to Page 31 |
| 8 | 27.12000 | 12.0 | 10.4 | 14.8 | 26.8 | 25.2 | 60.0 | 50.0 | 33.2 | 24.8 | N | |
| 9 | 0.15000 | 32.7 | 11.3 | 13.2 | 45.9 | 24.5 | 66.0 | 56.0 | 20.1 | 31.5 | L1 | |
| 10 | 0.18932 | 29.7 | 16.0 | 13.2 | 42.9 | 29.2 | 64.0 | 54.0 | 21.1 | 24.8 | L1 | |
| 11 | 0.25170 | 26.5 | 14.3 | 13.3 | 39.8 | 27.6 | 61.7 | 51.7 | 21.9 | 24.1 | L1 | |
| 12 | 0.31470 | 24.4 | 12.8 | 13.3 | 37.7 | 26.1 | 59.8 | 49.8 | 22.1 | 23.7 | L1 | |
| 13 | 0.38001 | 23.0 | 11.5 | 13.3 | 36.3 | 24.8 | 58.2 | 48.2 | 21.9 | 23.4 | L1 | |
| 14 | 1.21640 | 18.4 | 8.8 | 13.3 | 31.7 | 22.1 | 56.0 | 46.0 | 24.3 | 23.9 | L1 | |
| 15 | 13.56000 | 70.9 | 71.3 | 14.2 | 85.1 | 85.5 | 60.0 | 50.0 | - | - | L1 | Refer to Page 31 |
| 16 | 27.12000 | 12.4 | 10.4 | 14.8 | 27.2 | 25.2 | 60.0 | 50.0 | 32.8 | 24.8 | L1 | |

CHART:WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)

Modulation Type A with Card

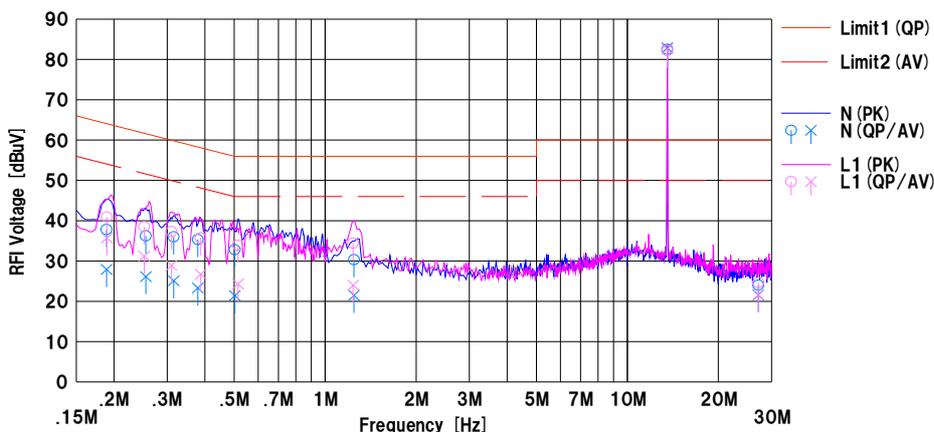
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz with Tag (Type A) PC style

Limit1 : FCC15.207 QP
 Limit2 : FCC15.207 AV



| No. | Freq. [MHz] | Reading | | C.Fac | Results | | Limit | | Margin | | Phase | Comment |
|-----|----------------|----------------|----------------|-------|----------------|----------------|----------------|----------------|--------------|--------------|-------|------------------|
| | | <QP> [dBuV] | <AV> [dBuV] | | <QP> [dBuV] | <AV> [dBuV] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dB] | <AV> [dB] | | |
| 1 | 0.18910 | 24.6 | 14.7 | 13.2 | 37.8 | 27.9 | 64.0 | 54.0 | 26.2 | 26.1 | N | |
| 2 | 0.25510 | 22.9 | 12.8 | 13.3 | 36.2 | 26.1 | 61.5 | 51.5 | 25.3 | 25.4 | N | |
| 3 | 0.31530 | 22.7 | 11.8 | 13.3 | 36.0 | 25.1 | 59.8 | 49.8 | 23.8 | 24.7 | N | |
| 4 | 0.37890 | 22.0 | 10.0 | 13.3 | 35.3 | 23.3 | 58.3 | 48.3 | 23.0 | 25.0 | N | |
| 5 | 0.50250 | 19.5 | 8.1 | 13.3 | 32.8 | 21.4 | 56.0 | 46.0 | 23.2 | 24.6 | N | |
| 6 | 1.24612 | 17.0 | 8.2 | 13.3 | 30.3 | 21.5 | 56.0 | 46.0 | 25.7 | 24.5 | N | |
| 7 | 13.56000 | 68.3 | 68.7 | 14.2 | 82.5 | 82.9 | 60.0 | 50.0 | - | - | N | Refer to Page 31 |
| 8 | 27.12000 | 9.2 | 6.8 | 14.8 | 24.0 | 21.6 | 60.0 | 50.0 | 36.0 | 28.4 | N | |
| 9 | 0.18960 | 27.7 | 22.5 | 13.2 | 40.9 | 35.7 | 64.0 | 54.0 | 23.1 | 18.3 | L1 | |
| 10 | 0.25180 | 25.2 | 17.9 | 13.3 | 38.5 | 31.2 | 61.6 | 51.6 | 23.1 | 20.4 | L1 | |
| 11 | 0.31010 | 24.0 | 15.6 | 13.3 | 37.3 | 28.9 | 59.9 | 49.9 | 22.6 | 21.0 | L1 | |
| 12 | 0.38730 | 22.4 | 13.4 | 13.3 | 35.7 | 26.7 | 58.1 | 48.1 | 22.4 | 21.4 | L1 | |
| 13 | 0.51480 | 20.6 | 11.0 | 13.3 | 33.9 | 24.3 | 56.0 | 46.0 | 22.1 | 21.7 | L1 | |
| 14 | 1.23812 | 21.1 | 10.7 | 13.3 | 34.4 | 24.0 | 56.0 | 46.0 | 21.6 | 22.0 | L1 | |
| 15 | 13.56000 | 68.0 | 68.4 | 14.2 | 82.2 | 82.6 | 60.0 | 50.0 | - | - | L1 | Refer to Page 31 |
| 16 | 27.12000 | 9.8 | 6.8 | 14.8 | 24.6 | 21.6 | 60.0 | 50.0 | 35.4 | 28.4 | L1 | |

CHART:WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)

Modulation Type B with Card

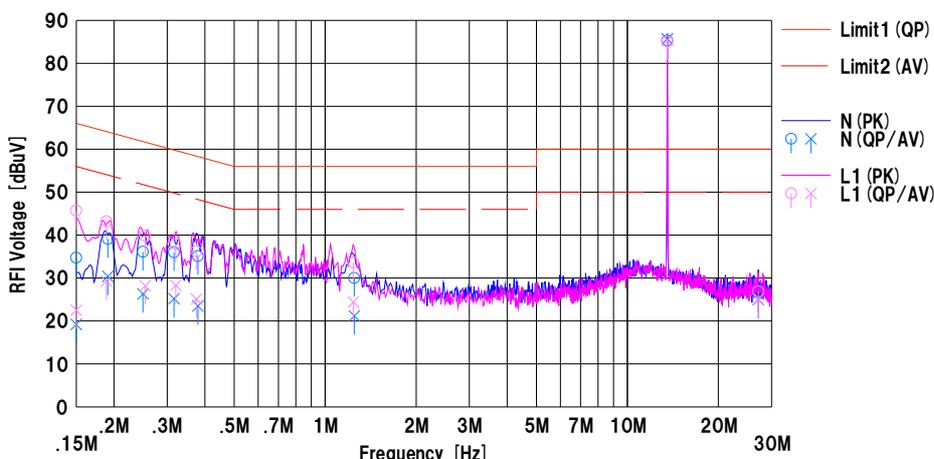
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz without Tag (Type B) PC style

Limit1 : FCC15.207 QP
 Limit2 : FCC15.207 AV



| No. | Freq. [MHz] | Reading | | C.Fac | Results | | Limit | | Margin | | Phase | Comment |
|-----|----------------|----------------|----------------|-------|---------|----------------|----------------|----------------|----------------|--------------|-------|------------------|
| | | <QP> [dBuV] | <AV> [dBuV] | | [dB] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dB] | | |
| 1 | 0.15000 | 21.5 | 6.0 | 13.2 | 34.7 | 19.2 | 66.0 | 56.0 | 31.3 | 36.8 | N | |
| 2 | 0.113.56000 | 25.9 | 17.2 | 13.2 | 39.1 | 30.4 | 63.9 | 53.9 | 24.8 | 23.5 | N | |
| 3 | 0.24950 | 22.9 | 13.1 | 13.2 | 36.1 | 26.3 | 61.7 | 51.7 | 25.6 | 25.4 | N | |
| 4 | 0.31606 | 22.7 | 11.9 | 13.3 | 36.0 | 25.2 | 59.8 | 49.8 | 23.8 | 24.6 | N | |
| 5 | 0.37910 | 21.8 | 10.2 | 13.3 | 35.1 | 23.5 | 58.2 | 48.2 | 23.1 | 24.7 | N | |
| 6 | 1.24880 | 16.7 | 7.9 | 13.3 | 30.0 | 21.2 | 56.0 | 46.0 | 26.0 | 24.8 | N | |
| 7 | 13.56000 | 71.1 | 71.5 | 14.2 | 85.3 | 85.7 | 60.0 | 50.0 | - | - | N | Refer to Page 31 |
| 8 | 27.12000 | 11.8 | 10.2 | 14.8 | 26.6 | 25.0 | 60.0 | 50.0 | 33.4 | 25.0 | N | |
| 9 | 0.15000 | 32.5 | 9.3 | 13.2 | 45.7 | 22.5 | 66.0 | 56.0 | 20.3 | 33.5 | L1 | |
| 10 | 0.18880 | 30.0 | 16.1 | 13.2 | 43.2 | 29.3 | 64.0 | 54.0 | 20.8 | 24.7 | L1 | |
| 11 | 0.25371 | 26.5 | 14.9 | 13.3 | 39.8 | 28.2 | 61.6 | 51.6 | 21.8 | 23.4 | L1 | |
| 12 | 0.32030 | 24.6 | 15.0 | 13.3 | 37.9 | 28.3 | 59.6 | 49.6 | 21.7 | 21.3 | L1 | |
| 13 | 0.37470 | 22.9 | 11.8 | 13.3 | 36.2 | 25.1 | 58.3 | 48.3 | 22.1 | 23.2 | L1 | |
| 14 | 1.23960 | 20.3 | 11.1 | 13.3 | 33.6 | 24.4 | 56.0 | 46.0 | 22.4 | 21.6 | L1 | |
| 15 | 13.56000 | 70.9 | 71.2 | 14.2 | 85.1 | 85.4 | 60.0 | 50.0 | - | - | L1 | Refer to Page 31 |
| 16 | 27.12000 | 12.1 | 10.3 | 14.8 | 26.9 | 25.1 | 60.0 | 50.0 | 33.1 | 24.9 | L1 | |

CHART:WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)

Modulation Type B without Card

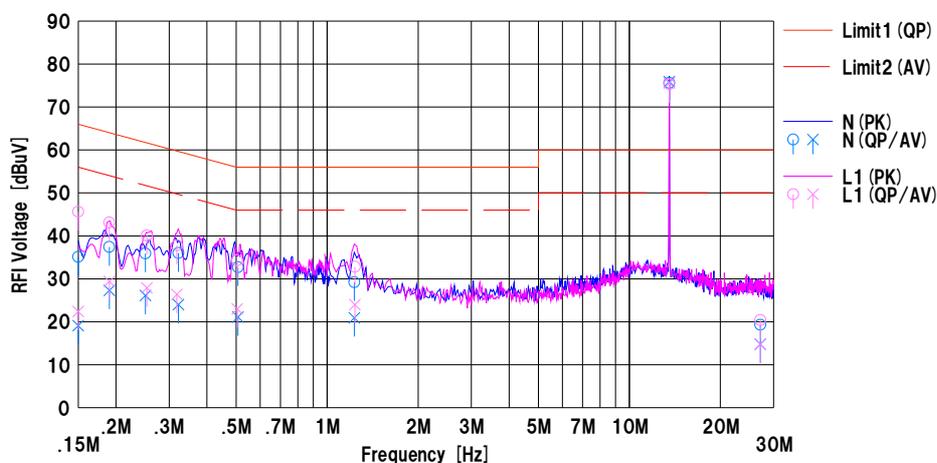
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/12

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 20deg. C / 30% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz with Tag (Type B) PC style

Limit1 : FCC15.207 QP
 Limit2 : FCC15.207 AV



| No. | Freq. [MHz] | Reading | | C.Fac | Results | | Limit | | Margin | | Phase | Comment |
|-----|----------------|----------------|----------------|-------|---------|----------------|----------------|----------------|----------------|--------------|-------|------------------|
| | | <QP> [dBuV] | <AV> [dBuV] | | [dB] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dB] | | |
| 1 | 0.15000 | 21.9 | 5.9 | 13.2 | 35.1 | 19.1 | 66.0 | 56.0 | 30.9 | 36.9 | N | |
| 2 | 0.19010 | 24.2 | 14.1 | 13.2 | 37.4 | 27.3 | 64.0 | 54.0 | 26.6 | 26.7 | N | |
| 3 | 0.25038 | 22.6 | 12.8 | 13.3 | 35.9 | 26.1 | 61.7 | 51.7 | 25.8 | 25.6 | N | |
| 4 | 0.32198 | 22.7 | 10.7 | 13.3 | 36.0 | 24.0 | 59.6 | 49.6 | 23.6 | 25.6 | N | |
| 5 | 0.50692 | 19.4 | 7.8 | 13.3 | 32.7 | 21.1 | 56.0 | 46.0 | 23.3 | 24.9 | N | |
| 6 | 1.22944 | 15.9 | 7.6 | 13.3 | 29.2 | 20.9 | 56.0 | 46.0 | 26.8 | 25.1 | N | |
| 7 | 13.56000 | 61.4 | 61.7 | 14.2 | 75.6 | 75.9 | 60.0 | 50.0 | - | - | N | Refer to Page 31 |
| 8 | 27.12000 | 4.5 | 0.0 | 14.8 | 19.3 | 14.8 | 60.0 | 50.0 | 40.7 | 35.2 | N | |
| 9 | 0.15000 | 32.4 | 9.2 | 13.2 | 45.6 | 22.4 | 66.0 | 56.0 | 20.4 | 33.6 | L1 | |
| 10 | 0.19016 | 29.9 | 16.2 | 13.2 | 43.1 | 29.4 | 64.0 | 54.0 | 20.9 | 24.6 | L1 | |
| 11 | 0.25304 | 26.8 | 14.6 | 13.3 | 40.1 | 27.9 | 61.6 | 51.6 | 21.5 | 23.7 | L1 | |
| 12 | 0.31820 | 24.5 | 13.1 | 13.3 | 37.8 | 26.4 | 59.7 | 49.7 | 21.9 | 23.3 | L1 | |
| 13 | 0.50389 | 21.0 | 9.7 | 13.3 | 34.3 | 23.0 | 56.0 | 46.0 | 21.7 | 23.0 | L1 | |
| 14 | 1.23500 | 19.5 | 10.7 | 13.3 | 32.8 | 24.0 | 56.0 | 46.0 | 23.2 | 22.0 | L1 | |
| 15 | 13.56000 | 61.1 | 61.4 | 14.2 | 75.3 | 75.6 | 60.0 | 50.0 | - | - | L1 | Refer to Page 31 |
| 16 | 27.12000 | 5.6 | 0.0 | 14.8 | 20.4 | 14.8 | 60.0 | 50.0 | 39.6 | 35.2 | L1 | |

CHART:WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)

RFID ANT Termination

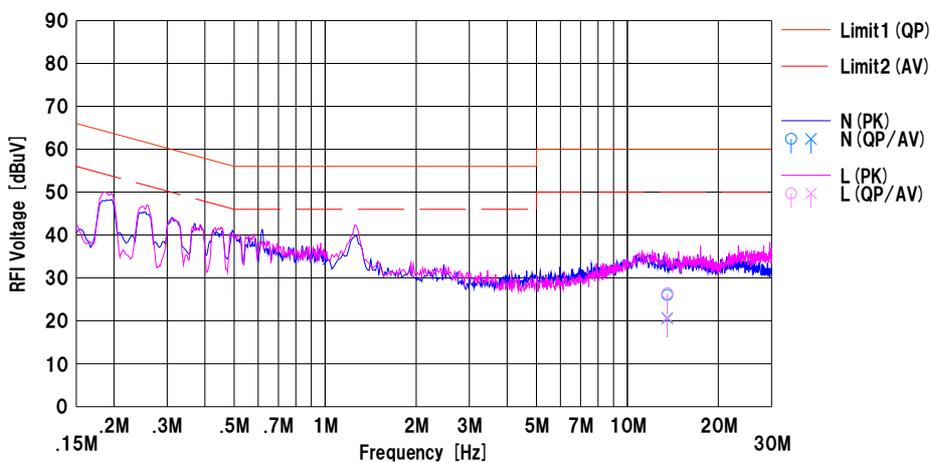
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2017/02/16

Report No. : 11576086H
 Power : AC120V / 60Hz
 Temp./Humi. : 24deg. C / 34% RH
 Engineer : Ryota Yamanaka

Mode / Remarks : Tx 13.56MHz RFID ANT Termination

Limit1 : FCC15.207 QP
 Limit2 : FCC15.207 AV



| No. | Freq. [MHz] | Reading | | C.Fac | Results | | Limit | | Margin | | Phase | Comment |
|-----|----------------|----------------|----------------|-------|---------|----------------|----------------|----------------|----------------|--------------|-------|---------|
| | | <QP> [dBuV] | <AV> [dBuV] | | [dB] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dBuV] | <AV> [dBuV] | <QP> [dB] | | |
| 1 | 13.56000 | 11.8 | 6.4 | 14.2 | 26.0 | 20.6 | 60.0 | 50.0 | 34.0 | 29.4 | N | |
| 2 | 13.56000 | 12.2 | 6.6 | 14.2 | 26.4 | 20.8 | 60.0 | 50.0 | 33.6 | 29.2 | L | |

CHART:WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)

11. FREQUENCY STABILITY

LIMIT

§15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST PROCEDURE

ANSI C63.10-2013

RESULTS

| Test Condition deg.C | Volts | Test Timing | Measured freq [MHz] | Freq error [MHz] | Result [ppm] | Limit (+/- 0.01%) [+/- ppm] | Margin [ppm] |
|-------------------------|-----------|-------------|------------------------|---------------------|-----------------|-----------------------------------|-----------------|
| 20deg.C | 138V | Power on | 13.560084 | 0.000084 | 6.19 | 100.00 | 93.81 |
| | | on 2min. | 13.560080 | 0.000080 | 5.90 | 100.00 | 94.10 |
| | | on 5min. | 13.560079 | 0.000079 | 5.83 | 100.00 | 94.17 |
| | | on 10min. | 13.560079 | 0.000079 | 5.83 | 100.00 | 94.17 |
| | 120V | Power on | 13.560098 | 0.000098 | 7.23 | 100.00 | 92.77 |
| | | on 2min. | 13.560089 | 0.000089 | 6.56 | 100.00 | 93.44 |
| | | on 5min. | 13.560086 | 0.000086 | 6.34 | 100.00 | 93.66 |
| | | on 10min. | 13.560081 | 0.000081 | 5.97 | 100.00 | 94.03 |
| | 102V | Power on | 13.560080 | 0.000080 | 5.90 | 100.00 | 94.10 |
| | | on 2min. | 13.560078 | 0.000078 | 5.75 | 100.00 | 94.25 |
| | | on 5min. | 13.560078 | 0.000078 | 5.75 | 100.00 | 94.25 |
| | | on 10min. | 13.560077 | 0.000077 | 5.68 | 100.00 | 94.32 |
| 50deg.C. | 120V | Power on | 13.560009 | 0.000009 | 0.66 | 100.00 | 99.34 |
| | | on 2min. | 13.560008 | 0.000008 | 0.59 | 100.00 | 99.41 |
| | | on 5min. | 13.560009 | 0.000009 | 0.66 | 100.00 | 99.34 |
| | | on 10min. | 13.560008 | 0.000008 | 0.59 | 100.00 | 99.41 |
| 40deg.C. | | Power on | 13.560028 | 0.000028 | 2.06 | 100.00 | 97.94 |
| | | on 2min. | 13.560024 | 0.000024 | 1.77 | 100.00 | 98.23 |
| | | on 5min. | 13.560024 | 0.000024 | 1.77 | 100.00 | 98.23 |
| | | on 10min. | 13.560024 | 0.000024 | 1.77 | 100.00 | 98.23 |
| 30deg.C. | | Power on | 13.560060 | 0.000060 | 4.42 | 100.00 | 95.58 |
| | | on 2min. | 13.560055 | 0.000055 | 4.06 | 100.00 | 95.94 |
| | | on 5min. | 13.560055 | 0.000055 | 4.06 | 100.00 | 95.94 |
| | | on 10min. | 13.560054 | 0.000054 | 3.98 | 100.00 | 96.02 |
| 20deg.C. | Power on | 13.560098 | 0.000098 | 7.23 | 100.00 | 92.77 | |
| | on 2min. | 13.560089 | 0.000089 | 6.56 | 100.00 | 93.44 | |
| | on 5min. | 13.560086 | 0.000086 | 6.34 | 100.00 | 93.66 | |
| | on 10min. | 13.560081 | 0.000081 | 5.97 | 100.00 | 94.03 | |
| 10deg.C. | Power on | 13.560137 | 0.000137 | 10.10 | 100.00 | 89.90 | |
| | on 2min. | 13.560130 | 0.000130 | 9.59 | 100.00 | 90.41 | |
| | on 5min. | 13.560129 | 0.000129 | 9.51 | 100.00 | 90.49 | |
| | on 10min. | 13.560129 | 0.000129 | 9.51 | 100.00 | 90.49 | |
| 0deg.C. | Power on | 13.560162 | 0.000162 | 11.95 | 100.00 | 88.05 | |
| | on 2min. | 13.560157 | 0.000157 | 11.58 | 100.00 | 88.42 | |
| | on 5min. | 13.560157 | 0.000157 | 11.58 | 100.00 | 88.42 | |
| | on 10min. | 13.560157 | 0.000157 | 11.58 | 100.00 | 88.42 | |
| -10deg.C. | Power on | 13.560172 | 0.000172 | 12.68 | 100.00 | 87.32 | |
| | on 2min. | 13.560171 | 0.000171 | 12.61 | 100.00 | 87.39 | |
| | on 5min. | 13.560171 | 0.000171 | 12.61 | 100.00 | 87.39 | |
| | on 10min. | 13.560171 | 0.000171 | 12.61 | 100.00 | 87.39 | |
| -20deg.C | Power on | 13.560159 | 0.000159 | 11.73 | 100.00 | 88.27 | |
| | on 2min. | 13.560165 | 0.000165 | 12.17 | 100.00 | 87.83 | |
| | on 5min. | 13.560165 | 0.000165 | 12.17 | 100.00 | 87.83 | |
| | on 10min. | 13.560165 | 0.000165 | 12.17 | 100.00 | 87.83 | |

Limit : 13.56 13.56 MHz +/-0.01 % (+/- 100ppm) = +/- 0.001356 MHz

*The test was begun from 50 deg.C and the temperature was lowered each 10 deg.C.

12. 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

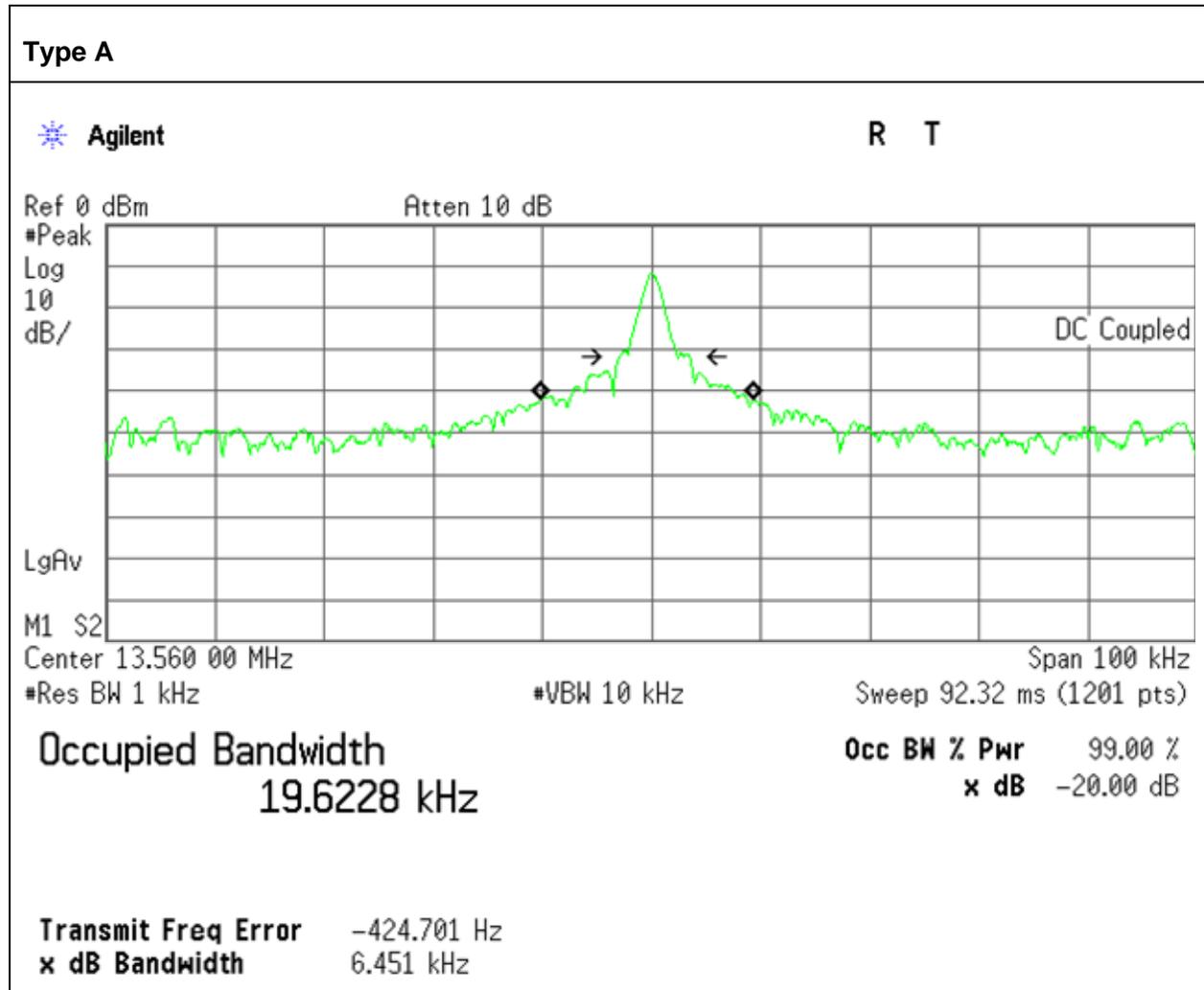
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 20dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 20dB bandwidth function is utilized.

RESULTS

| Frequency (MHz) | 20dB Bandwidth (KHz) |
|--------------------|-------------------------|
| 13.56, Type A | 6.45 |
| 13.56, Type B | 4.05 |

20dB BANDWIDTH

| FREQ [MHz] | 20dB Bandwidth [kHz] | 99% Occupied Bandwidth [kHz] |
|---------------|-------------------------|---------------------------------|
| 13.56 | 6.45 | 19.62 |



20dB BANDWIDTH

| FREQ [MHz] | 20dB Bandwidth [kHz] | 99% Occupied Bandwidth [kHz] |
|------------|----------------------|------------------------------|
| 13.56 | 4.05 | 24.03 |

