



RADIO TEST REPORT

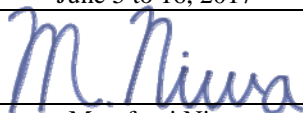
Test Report No. : 11796546H-D

Applicant : SINFONIA TECHNOLOGY CO.,LTD.
Type of Equipment : Digital Photo Printer
Model No. : CHC-S2245-5
Test regulation : FCC Part 15 Subpart C: 2017
FCC ID : ZQU-D1150410
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)

Date of test: June 5 to 16, 2017

Representative test engineer:


Masafumi Niwa

Engineer

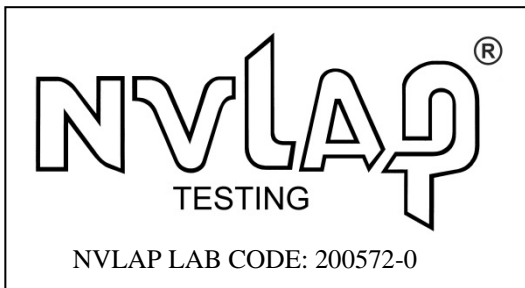
Consumer Technology Division

Approved by:


Satofumi Matsuyama

Engineer

Consumer Technology Division



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

*As for the range of Accreditation in NVLAP, you may refer to the WEB address,

http://japan.ul.com/resources/emc_accredited/

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13-EM-F0429

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SECTION 1: Customer information

Company Name : SINFONIA TECHNOLOGY CO., LTD.
Address : 100-Takegahana-cho Ise-shi Mie-ken 516-8550 JAPAN
Telephone Number : +81-596-36-1286
Facsimile Number : +81-596-36-3884
Contact Person : Tsutomu Inagaki

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Digital Photo Printer
Model No. : CHC-S2245-5
Serial No. : Refer to Section 4, Clause 4.2
Rating : AC 100 V to 240 V, 50/60 Hz
Receipt Date of Sample : June 1, 2017
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: CHC-S2245-5 (referred to as the EUT in this report) is a Digital Photo Printer.
The EUT receive image data from a PC and print images.

General Information

The clock frequencies used in the EUT: : 24 MHz, CPU: Internal 375 MHz,
SDRM: 133 MHz, FPGA: 60 MHz/50 MHz, RFID: 13.56 MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 13.56 MHz
Modulation : ASK
Power Supply (inner) : DC 3.3 V
Antenna type : Pattern antenna
Clock frequency (Maximum) : 13.56 MHz
Operating Temperature : +10 deg. C to +35 deg. C

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.225 : Operation within the band 13.110-14.010MHz

* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

* Also the EUT complies with FCC Part 15 Subpart B.

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3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---------------------------------------|---|----------|----------|
| Conducted emission | ANSI C63.10:2013 6 Standard test methods | Section 15.207 | [QP] 15.7 dB 0.16852 MHz, N | Complied | Radiated |
| | <IC>RSS-Gen 8.8 | <IC>RSS-Gen 8.8 | [AV] 8.4 dB 0.16852 MHz, N | | |
| Electric Field Strength of Fundamental Emission | ANSI C63.10:2013 6 Standard test methods | Section 15.225(a) | 77.6 dB, 13.56000 MHz, QP, 0 deg. | 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) | 46.1 dB, 13.11000 MHz, QP, 0 deg. | Complied | Radiated |
| | <IC>RSS-Gen 6.4, 6.13 | <IC> RSS-210 B.6 | | | |
| 20dB Bandwidth | ANSI C63.10:2013 6 Standard test methods | Section 15.215(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) | 16.3 dB 135.600 MHz, 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

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V) constantly to RF Module through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

However, the supply voltage was varied and tested at 85 % and 115 % of the nominal rated supply voltage during frequency tolerance test according to Section 15.225(e).

FCC Part 15.203 Antenna requirement

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.

3.3 Addition to standard

| No. | Item | Test Procedure | Specification | Remarks | Deviation | Worst margin | Results |
|-----|--------------------------|----------------|---------------|----------|-----------|--------------|---------|
| 1 | 99 % Occupied Band Width | RSS-Gen 6.6 | - | Radiated | N/A | N/A | N/A |

Other than above, no addition, exclusion nor deviation has been made from the standard.

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3.4 Uncertainty

EMI

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

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

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

*Measurement distance

| Polarity | Radiated emission (Below 1 GHz) | | | |
|------------|---------------------------------|--------------------|------------------|-------------------|
| | (3 m*)(+/-) | | (10 m*)(+/-) | |
| | 30 MHz - 200 MHz | 200 MHz - 1000 MHz | 30 MHz - 200 MHz | 200 MHz - 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 |

* Measurement distance

| Frequency Tolerance | Uncertainty (+/-) |
|----------------------|-------------------|
| Frequency error | |
| Below 150 kHz | 3.5 Hz |
| 150 kHz - 13.56 MHz | 3.5 Hz |
| 13.56 MHz - 2500 MHz | 111.9 Hz |
| 2500 MHz - 6000 MHz | 328.1 Hz |

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.

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3.5 Test Location

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| | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms |
|----------------------------|------------------------|----------------------------|--|------------------------|
| No.1 semi-anechoic chamber | 2973C-1 | 19.2 x 11.2 x 7.7m | 7.0 x 6.0m | No.1 Power source room |
| No.2 semi-anechoic chamber | 2973C-2 | 7.5 x 5.8 x 5.2m | 4.0 x 4.0m | - |
| No.3 semi-anechoic chamber | 2973C-3 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.3 Preparation room |
| No.3 shielded room | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.4 semi-anechoic chamber | 2973C-4 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.4 Preparation room |
| No.4 shielded room | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.5 semi-anechoic chamber | - | 6.0 x 6.0 x 3.9m | 6.0 x 6.0m | - |
| No.6 shielded room | - | 4.0 x 4.5 x 2.7m | 4.0 x 4.5m | - |
| No.6 measurement room | - | 4.75 x 5.4 x 3.0m | 4.75 x 4.15m | - |
| No.7 shielded room | - | 4.7 x 7.5 x 2.7m | 4.7 x 7.5m | - |
| No.8 measurement room | - | 3.1 x 5.0 x 2.7m | N/A | - |
| No.9 measurement room | - | 8.0 x 4.6 x 2.8m | 2.4 x 2.4m | - |
| No.11 measurement room | - | 6.2 x 4.7 x 3.0m | 4.8 x 4.6m | - |

* Size of vertical conducting plane (for Conducted Emission test): 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Test data, and Test instruments

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The mode is used :

| Mode | Remarks* |
|---|---|
| Transmitting mode (Tx) | The EUT Transmits and Receives at the same time and there is no receiving mode. |
| The EUT was operated in a manner similar to typical use during the tests. | |

| Test Item | Operating mode* |
|---|---|
| Conducted emission | Tx Mod on, without Tag Tx Mod on, Terminated *1) |
| Electric Field Strength of Fundamental Emission | Tx Mod on, without Tag |
| Spectrum Mask | Tx Mod on, without Tag |
| 20 dB Bandwidth | Tx Mod on, with Tag |
| 99 % Occupied Bandwidth | Tx Mod on, without Tag |
| Electric Field Strength of Spurious Emission | Tx Mod on, without Tag |
| Frequency Tolerance | Tx Mod off |

* After the comparison of the test data between with Tag and without Tag, the tests were performed with the worst case.

*1) 50 ohm termination was installed instead of the antenna.

Justification: The system was configured in typical fashion (as a user would normally use it) for testing.

Frequency Tolerance:

Temperature : -30 deg. C to +50 deg. C; Step 10 deg. C (-30deg.C: Reference)

Voltage : Normal Voltage AC 120 V

Maximum Voltage AC 138 V, Minimum Voltage AC 102 V (AC 120 V ±15 %)

*This EUT provides stable voltage (DC 3.3 V) constantly to RF Part regardless of input voltage

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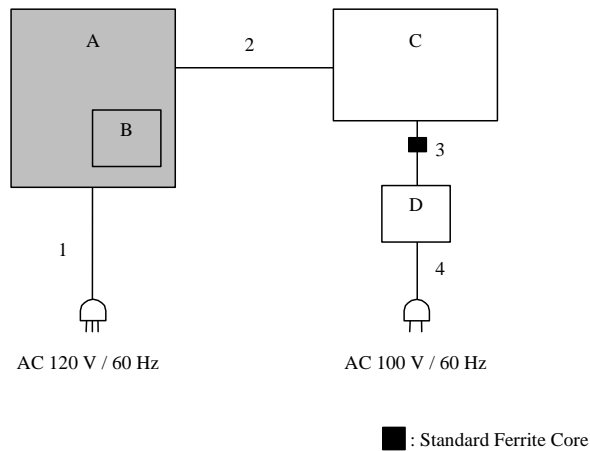
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4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|-----------------------|--------------|----------------------------|------------------------------|---------|
| A | Digital Photo Printer | CHC-S2245-5 | PP2-014 | SINFONIA TECHNOLOGY CO.,LTD. | EUT |
| B | Ribbon Tag | AZ-H32+SLIX2 | 001 | NXP Semiconductors N.V. | EUT |
| C | Laptop PC | T410 | R8-D74Hd | Lenovo | - |
| D | AC adapter | 92P1160 | 11S92P1160Z1ZBGH8 6PEAN | Lenovo | - |

List of cables used

| No. | Name | Length (m) | Shield | | Remarks |
|-----|-----------|------------|------------|------------|---------|
| | | | Cable | Connector | |
| 1 | AC Cable | 1.4 | Unshielded | Unshielded | - |
| 2 | USB Cable | 1.6 | Shielded | Shielded | - |
| 3 | DC Cable | 1.8 | Unshielded | Unshielded | - |
| 4 | AC Cable | 0.8 | Unshielded | Unshielded | - |

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SECTION 5: Conducted emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

| | |
|--------------------------|----------------------------|
| Detector | : QP and CISPR AV |
| Measurement range | : 0.15 MHz - 30 MHz |
| Test data | : APPENDIX |
| Test result | : Pass |

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SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency: From 9 kHz to 30 MHz

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency: From 30 MHz to 1 GHz

The measuring antenna height varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

| | | | |
|--------------|--------------|-------------------|------------------|
| Frequency | Below 30 MHz | 30 MHz to 200 MHz | 200 MHz to 1 GHz |
| Antenna Type | Loop | Biconical | Logperiodic |

| | | | | | |
|-----------------|--|------------------------|-------------------------|------------------------|----------------------|
| Frequency | From 9 kHz to 90 kHz and From 110 kHz to 150 kHz | From 90 kHz to 110 kHz | From 150 kHz to 490 kHz | From 490 kHz to 30 MHz | From 30 MHz to 1 GHz |
| Instrument used | Test Receiver | | | | |
| Detector | PK / AV | QP | PK / AV | QP | QP |
| IF Bandwidth | 200 Hz | 200 Hz | 9 kHz | 9 kHz | 120 kHz |
| Test Distance | 3 m *1) | 3 m *1) | 3 m *1) | 3 m *2) | 3 m |

*1) Distance Factor: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

*2) Distance Factor: $40 \times \log(3 \text{ m} / 30 \text{ m}) = -40 \text{ dB}$

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 414788.

These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane.

However test results were confirmed to pass against standard limit.

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 9 kHz - 1 GHz
Test data : APPENDIX 1
Test result : Pass

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SECTION 7: Other test

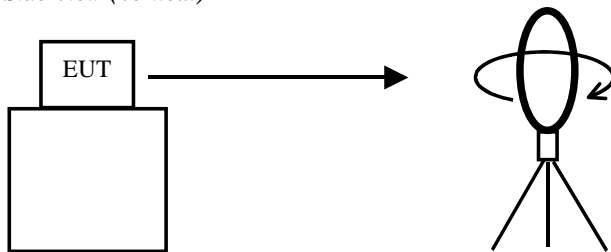
| Test | Span | RBW | VBW | Sweep | Detector | Trace | Instrument used |
|-------------------------|---|-----------------|--------------------|-------|----------|--------------|-------------------|
| 20 dB Bandwidth | 200 kHz | 3.6 kHz | 11 kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99 % Occupied Bandwidth | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto | Peak *1) | Max Hold *1) | Spectrum Analyzer |
| Frequency Tolerance | - | - | - | - | - | - | Frequency Counter |

*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %.
Peak hold was applied as Worst-case measurement.

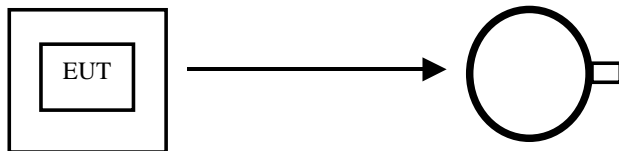
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

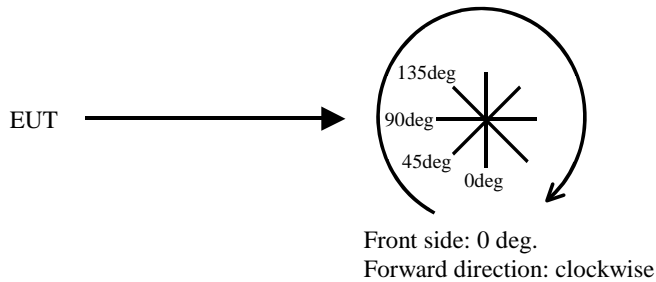


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Test data

Conducted emission

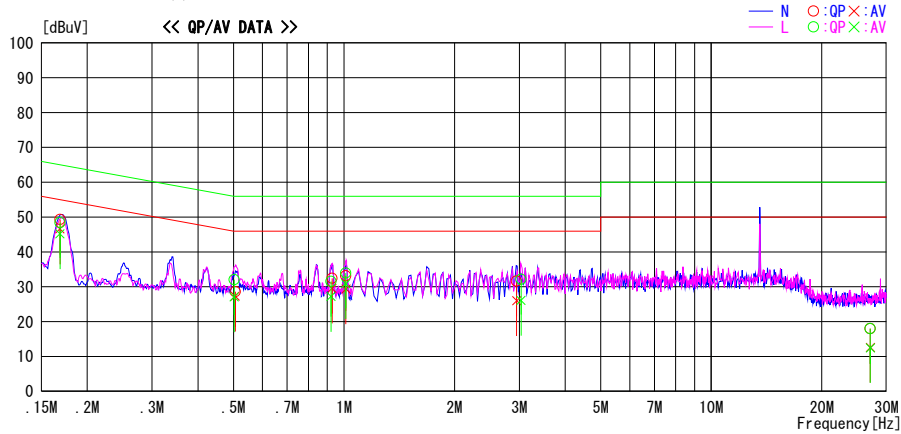
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2017/06/05

Report No. : 11796546H
Temp./Humi. : 22deg. C / 40% RH
Engineer : Shuichi Ohyama

Mode / Remarks : Tx 13.56 MHz without Tag

LIMIT : FCC15.107(a) QP ClassB
FCC15.107(a) AV ClassB



| Frequency [MHz] | Reading Level | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|---------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 0.16852 | 36.1 | 33.4 | 13.2 | 49.3 | 46.6 | 65.0 | 55.0 | 15.7 | 8.4 | N | |
| 0.50582 | 15.3 | 14.0 | 13.3 | 28.6 | 27.3 | 56.0 | 46.0 | 27.4 | 18.7 | N | |
| 0.92737 | 19.1 | 16.3 | 13.3 | 32.4 | 29.6 | 56.0 | 46.0 | 23.6 | 16.4 | N | |
| 1.01192 | 19.8 | 16.1 | 13.3 | 33.1 | 29.4 | 56.0 | 46.0 | 22.9 | 16.6 | N | |
| 2.95115 | 18.0 | 12.4 | 13.6 | 31.6 | 26.0 | 56.0 | 46.0 | 24.4 | 20.0 | N | |
| 27.12000 | 2.7 | -2.7 | 15.3 | 18.0 | 12.6 | 60.0 | 50.0 | 42.0 | 37.4 | N | |
| 0.16854 | 35.2 | 32.0 | 13.2 | 48.4 | 45.2 | 65.0 | 55.0 | 16.6 | 9.8 | L | |
| 0.50229 | 18.7 | 13.8 | 13.3 | 32.0 | 27.1 | 56.0 | 46.0 | 24.0 | 18.9 | L | |
| 0.92173 | 18.2 | 13.9 | 13.3 | 31.5 | 27.2 | 56.0 | 46.0 | 24.5 | 18.8 | L | |
| 1.01144 | 20.7 | 17.6 | 13.3 | 34.0 | 30.9 | 56.0 | 46.0 | 22.0 | 15.1 | L | |
| 3.03364 | 18.5 | 12.5 | 13.6 | 32.1 | 26.1 | 56.0 | 46.0 | 23.9 | 19.9 | L | |
| 27.12000 | 2.7 | -2.8 | 15.3 | 18.0 | 12.5 | 60.0 | 50.0 | 42.0 | 37.5 | L | |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT = READING + C.F(LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

Conducted emission

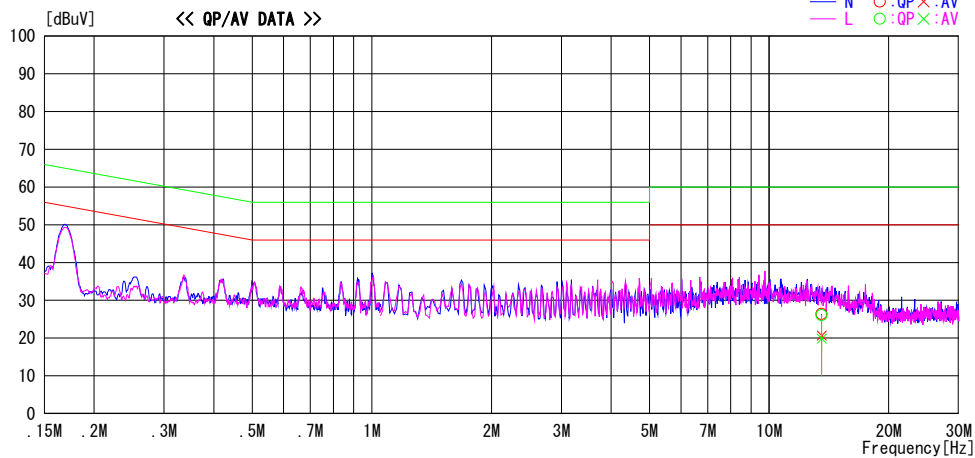
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2017/06/16

Report No. : 11796546H
Temp./Humi. : 24deg. C / 32% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56 MHz Terminated

LIMIT : FCC15.107(a) QP ClassB
FCC15.107(a) AV ClassB



| Frequency [MHz] | Reading Level | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|---------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 13.56000 | 12.2 | 6.5 | 14.2 | 26.4 | 20.7 | 60.0 | 50.0 | 33.6 | 29.3 | N | |
| 13.56000 | 11.9 | 5.7 | 14.2 | 26.1 | 19.9 | 60.0 | 50.0 | 33.9 | 30.1 | L | |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT = READING + C.F(LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

Fundamental emission and Spectrum Mask

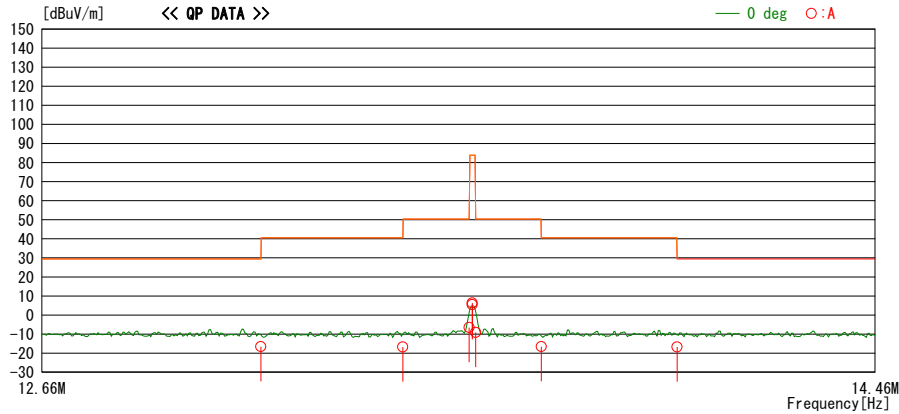
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 semi-anechoic chamber
Date : 2017/06/06

Report No. : 11796546H
Temp./ Humi. : 24deg. C / 43% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz without tag

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



| Freq. [MHz] | Reading [dBuV] | DET | Ant. Fac [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Antenna [deg] | Table [deg] | Comment |
|----------------|-------------------|-----|--------------------|--------------|--------------|--------------------|-------------------|----------------|------------------|----------------|----------|
| | | | | | | | | | | | |
| 13.11000 | 29.2 | QP | 19.4 | -32.9 | 32.3 | -16.6 | 29.5 | 46.1 | 0 | A | 0 |
| 13.41000 | 29.1 | QP | 19.4 | -32.9 | 32.3 | -16.7 | 40.5 | 57.2 | 0 | A | 0 |
| 13.55300 | 39.3 | QP | 19.4 | -32.9 | 32.3 | -6.5 | 50.4 | 56.9 | 0 | A | 0 |
| 13.56000 | 52.1 | QP | 19.4 | -32.9 | 32.3 | 6.3 | 83.9 | 77.6 | 0 | A | 0 |
| 13.56000 | 51.2 | QP | 19.4 | -32.9 | 32.3 | 5.4 | 83.9 | 78.5 | 0 | A | with tag |
| 13.56700 | 36.7 | QP | 19.4 | -32.9 | 32.3 | -9.1 | 50.4 | 59.5 | 0 | A | 0 |
| 13.71000 | 29.2 | QP | 19.4 | -32.9 | 32.3 | -16.6 | 40.5 | 57.1 | 0 | A | 0 |
| 14.01000 | 29.1 | QP | 19.4 | -32.9 | 32.3 | -16.7 | 29.5 | 46.2 | 0 | A | 0 |

CHART: WITH FACTOR ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - D. Factor) - GAIN (AMP)

Result of the fundamental emission at 3 m 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 |
|---------------|--------------------|----------|-------------------|-------------------------|--------------|--------------|------------------------|--------------------|-------------------|----------------|-------------|
| 0 | 13.56000 | QP | 52.1 | 19.4 | 7.1 | 32.3 | - | 46.3 | - | - | Fundamental |

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

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Spurious emission

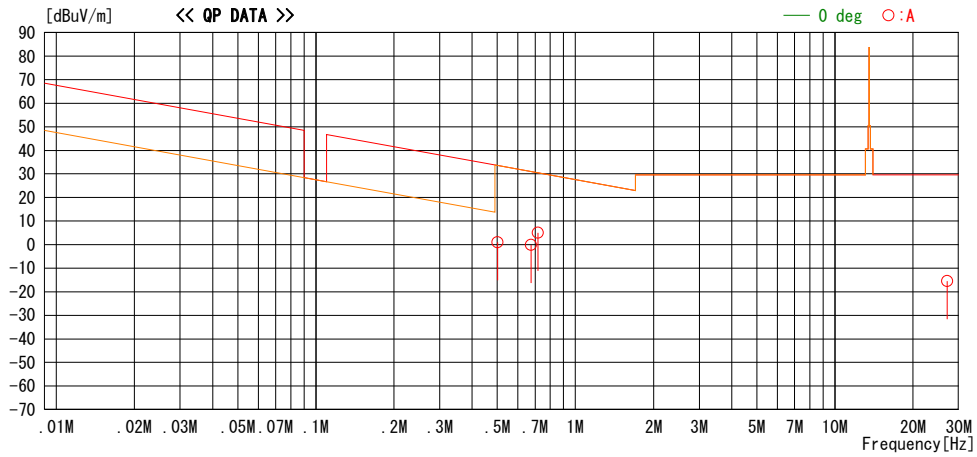
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 semi-anechoic chamber
Date : 2017/06/06

Report No. : 11796546H
Temp. / Humi. : 24deg. C / 43% RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz without tag

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



| Freq. | Reading | DET | Ant. Fac | Loss | Gain | Result | Limit | Margin | Antenna | Table | Comment |
|----------|---------|-----|----------|-------|------|----------|----------|--------|---------|-------|---------|
| [MHz] | [dBuV] | | [dB/m] | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dB] | [deg] | [deg] | |
| 0.50100 | 47.6 | QP | 19.5 | -33.8 | 32.3 | 1.0 | 33.6 | 32.6 | 0 | A | 11 |
| 0.67414 | 46.3 | QP | 19.5 | -33.8 | 32.2 | -0.2 | 31.0 | 31.2 | 0 | A | 26 |
| 0.71836 | 51.5 | QP | 19.5 | -33.8 | 32.2 | 5.0 | 30.5 | 25.5 | 0 | A | 72 |
| 27.12000 | 28.8 | QP | 20.3 | -32.4 | 32.2 | -15.5 | 29.5 | 45.0 | 0 | A | 0 |

CHART: WITH FACTOR . ANT TYPE: LOOP Except for the data below : adequate margin data below the limits.
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + ATTEN. - D. Factor) - GAIN (AMP)

Spurious emission

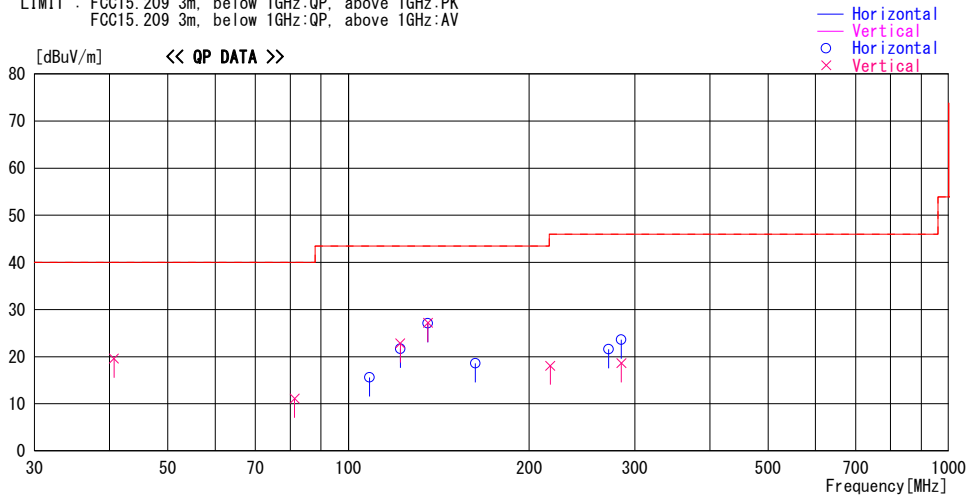
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber

Report No. : 11796546H
Temp./Humi. : 24 deg. C / 32 % RH
Engineer : Masafumi Niwa

Mode / Remarks : Tx 13.56MHz without tag

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



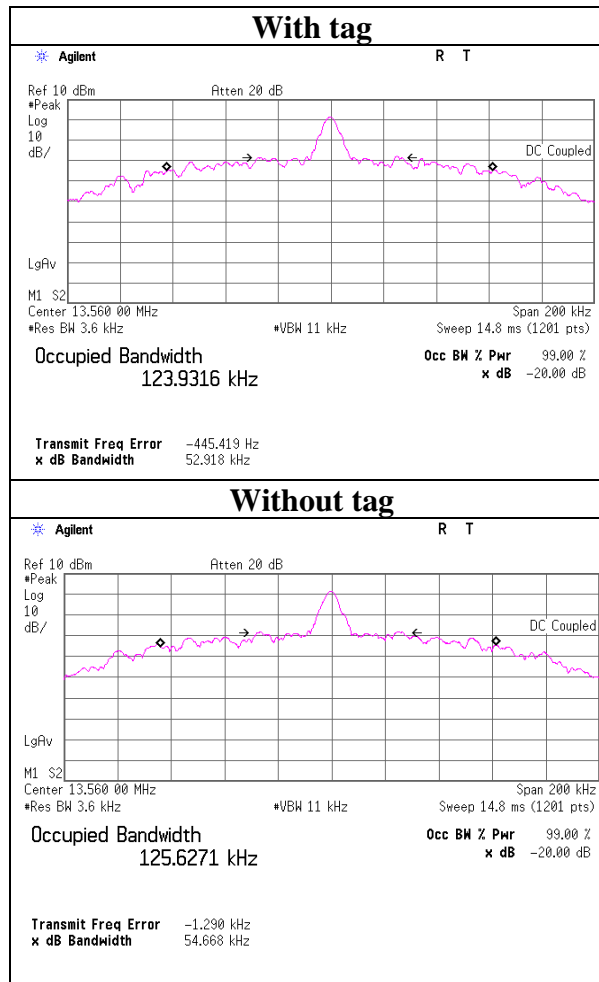
| Frequency [MHz] | Reading [dBuV] | DET | Antenna | Loss& | Level [dBuV/m] | Angle [Deg] | Height [cm] | Polar. | Limit [dBuV/m] | Margin [dB] | Comment |
|--------------------|-------------------|-----|------------------|--------------|-------------------|----------------|----------------|--------|-------------------|----------------|---------|
| | | | Factor [dB/m] | Gain [dB] | | | | | | | |
| 40.680 | 30.4 | QP | 14.1 | -24.9 | 19.6 | 247 | 100 | Vert. | 40.0 | 20.4 | |
| 81.360 | 28.8 | QP | 6.6 | -24.3 | 11.1 | 96 | 135 | Vert. | 40.0 | 28.9 | |
| 108.480 | 28.2 | QP | 11.3 | -23.9 | 15.6 | 202 | 291 | Hori. | 43.5 | 27.9 | |
| 122.040 | 33.4 | QP | 13.2 | -23.8 | 22.8 | 356 | 103 | Vert. | 43.5 | 20.7 | |
| 122.040 | 32.3 | QP | 13.2 | -23.8 | 21.7 | 202 | 145 | Hori. | 43.5 | 21.8 | |
| 135.600 | 36.5 | QP | 14.2 | -23.5 | 27.2 | 172 | 100 | Vert. | 43.5 | 16.3 | |
| 135.600 | 36.4 | QP | 14.2 | -23.5 | 27.1 | 194 | 209 | Hori. | 43.5 | 16.4 | |
| 162.720 | 26.3 | QP | 15.6 | -23.3 | 18.6 | 23 | 178 | Hori. | 43.5 | 24.9 | |
| 216.960 | 29.3 | QP | 11.6 | -22.8 | 18.1 | 271 | 100 | Vert. | 46.0 | 27.9 | |
| 271.200 | 31.3 | QP | 12.5 | -22.2 | 21.6 | 94 | 104 | Hori. | 46.0 | 24.4 | |
| 284.760 | 27.8 | QP | 12.9 | -22.1 | 18.6 | 324 | 249 | Vert. | 46.0 | 27.4 | |
| 284.760 | 32.8 | QP | 12.9 | -22.1 | 23.6 | 110 | 101 | Hori. | 46.0 | 22.4 | |

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

20dB Bandwidth and 99% Occupied Bandwidth

| | |
|-----------------------|-------------------------------------|
| Test place | Ise EMC Lab. No.11 measurement room |
| Report No. | 11796546H |
| Date | 06/08/2017 |
| Temperature/ Humidity | 25 deg. C / 56 % RH |
| Engineer | Masafumi Niwa |
| Mode | Tx Mod on |

| FREQ [MHz] | Mode | 20dB Bandwidth [kHz] | 99% Occupied Bandwidth [kHz] |
|---------------|-------------|-------------------------|---------------------------------|
| 13.56 | With Tag | 52.92 | 123.93 |
| | Without Tag | 54.67 | 125.63 |



Frequency Tolerance

Test place : Ise EMC Lab. No.11 measurement room
Report No. : 11796546H
Date : 06/08/2017
Temperature/ Humidity : 25 deg. C / 56 % RH
Engineer : Masafumi Niwa
Mode : Tx Mod off

| Test condition | | Tested timing | Measured frequency [MHz] | Frequency error [MHz] | Result | | Limit [+/- %] |
|----------------|--------------------|---------------|--------------------------|-----------------------|----------|-------|---------------|
| Temp. [deg. C] | Voltage [V] | | | | [%] | [ppm] | |
| 50 | 120 | Power on | 13.559528 | -0.000472 | -0.00348 | -34.8 | 0.01 |
| | | + 2 min. | 13.559523 | -0.000477 | -0.00352 | -35.2 | 0.01 |
| | | + 5 min. | 13.559521 | -0.000479 | -0.00353 | -35.3 | 0.01 |
| | | + 10 min. | 13.559519 | -0.000481 | -0.00354 | -35.4 | 0.01 |
| 40 | 120 | Power on | 13.559561 | -0.000439 | -0.00324 | -32.4 | 0.01 |
| | | + 2 min. | 13.559547 | -0.000453 | -0.00334 | -33.4 | 0.01 |
| | | + 5 min. | 13.559542 | -0.000458 | -0.00338 | -33.8 | 0.01 |
| | | + 10 min. | 13.559540 | -0.000460 | -0.00339 | -33.9 | 0.01 |
| 30 | 120 | Power on | 13.559587 | -0.000413 | -0.00304 | -30.4 | 0.01 |
| | | + 2 min. | 13.559585 | -0.000415 | -0.00306 | -30.6 | 0.01 |
| | | + 5 min. | 13.559578 | -0.000422 | -0.00311 | -31.1 | 0.01 |
| | | + 10 min. | 13.559575 | -0.000425 | -0.00314 | -31.4 | 0.01 |
| 20 | 120 | Power on | 13.559634 | -0.000366 | -0.00270 | -27.0 | 0.01 |
| | | + 2 min. | 13.559627 | -0.000373 | -0.00275 | -27.5 | 0.01 |
| | | + 5 min. | 13.559625 | -0.000376 | -0.00277 | -27.7 | 0.01 |
| | | + 10 min. | 13.559623 | -0.000377 | -0.00278 | -27.8 | 0.01 |
| 20 | 102 (120V -15%) | Power on | 13.559637 | -0.000363 | -0.00268 | -26.8 | 0.01 |
| | | + 2 min. | 13.559625 | -0.000375 | -0.00277 | -27.7 | 0.01 |
| | | + 5 min. | 13.559623 | -0.000377 | -0.00278 | -27.8 | 0.01 |
| | | + 10 min. | 13.559620 | -0.000380 | -0.00280 | -28.0 | 0.01 |
| 20 | 138 (120V +15%) | Power on | 13.559630 | -0.000370 | -0.00273 | -27.3 | 0.01 |
| | | + 2 min. | 13.559623 | -0.000377 | -0.00278 | -27.8 | 0.01 |
| | | + 5 min. | 13.559620 | -0.000380 | -0.00280 | -28.0 | 0.01 |
| | | + 10 min. | 13.559619 | -0.000381 | -0.00281 | -28.1 | 0.01 |
| 10 | 120 | Power on | 13.559672 | -0.000328 | -0.00242 | -24.2 | 0.01 |
| | | + 2 min. | 13.559663 | -0.000337 | -0.00249 | -24.9 | 0.01 |
| | | + 5 min. | 13.559657 | -0.000343 | -0.00253 | -25.3 | 0.01 |
| | | + 10 min. | 13.559655 | -0.000345 | -0.00254 | -25.4 | 0.01 |
| 0 | 120 | Power on | 13.559683 | -0.000317 | -0.00234 | -23.4 | 0.01 |
| | | + 2 min. | 13.559683 | -0.000317 | -0.00234 | -23.4 | 0.01 |
| | | + 5 min. | 13.559680 | -0.000320 | -0.00236 | -23.6 | 0.01 |
| | | + 10 min. | 13.559679 | -0.000321 | -0.00237 | -23.7 | 0.01 |
| -10 | 120 | Power on | 13.559674 | -0.000326 | -0.00240 | -24.0 | 0.01 |
| | | + 2 min. | 13.559654 | -0.000346 | -0.00255 | -25.5 | 0.01 |
| | | + 5 min. | 13.559689 | -0.000311 | -0.00229 | -22.9 | 0.01 |
| | | + 10 min. | 13.559689 | -0.000311 | -0.00229 | -22.9 | 0.01 |
| -20 | 120 | Power on | 13.559633 | -0.000367 | -0.00271 | -27.1 | 0.01 |
| | | + 2 min. | 13.559665 | -0.000336 | -0.00247 | -24.7 | 0.01 |
| | | + 5 min. | 13.559673 | -0.000327 | -0.00241 | -24.1 | 0.01 |
| | | + 10 min. | 13.559675 | -0.000325 | -0.00240 | -24.0 | 0.01 |
| -30 | 120 | Power on | 13.559579 | -0.000421 | -0.00310 | -31.0 | 0.01 |
| | | + 2 min. | 13.559619 | -0.000381 | -0.00281 | -28.1 | 0.01 |
| | | + 5 min. | 13.559635 | -0.000365 | -0.00269 | -26.9 | 0.01 |
| | | + 10 min. | 13.559637 | -0.000363 | -0.00267 | -26.7 | 0.01 |

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Tested frequency: 13.56 MHz
Limit (+/-): 0.01 % (+/- 100ppm)

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

*As for the range of specification operating temperature, the test was performed with required temperature range on Frequency Tolerance.

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APPENDIX 2: Test instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|----------------------------------|----------------------|--|------------|-----------|---------------------------------------|
| MAEC-02 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-06902 | CE,RE | 2016/08/02 * 12 |
| MOS-22 | Thermo-Hygrometer | Custom | CTH-201 | 0003 | CE,RE | 2016/12/13 * 12 |
| MJM-14 | Measure | KOMELON | KMC-36 | - | CE,RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | CE,RE | - |
| MTR-03 | Test Receiver | Rohde & Schwarz | ESCI | 100300 | CE | 2016/10/21 * 12 |
| MLS-23 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127-729 | CE(EUT) | 2016/07/07 * 12 |
| MLS-24 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127-730 | CE(AE) | 2016/07/11 * 12 |
| MTA-51 | Terminator | TME | CT-01BP | - | CE | 2016/12/01 * 12 |
| MCC-13 | Coaxial Cable | Fujikura | 3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m) | - | CE | 2017/02/24 * 12 |
| MAT-65 | Attenuator(13dB) | JFW Industries, Inc. | 50FP-013H2 N | - | CE | 2016/12/21 * 12 |
| MMM-01 | Digital Tester | Fluke | FLUKE 26-3 | 78030611 | CE,RE | 2016/08/23 * 12 |
| MLPA-01 | Loop Antenna | Rohde & Schwarz | HFH2-Z2 | 100017 | RE | 2016/10/14 * 12 |
| MCC-143 | Coaxial Cable | UL Japan | - | - | RE | 2017/06/12 * 12 |
| MPA-13 | Pre Amplifier | SONOMA INSTRUMENT | 310 | 260834 | RE,CE | 2017/03/27 * 12 |
| MAT-07 | Attenuator(6dB) | Weinschel Corp | 2 | BK7970 | RE | 2016/11/28 * 12 |
| 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 | - |
| MSA-04 | Spectrum Analyzer | Agilent | E4448A | US44300523 | RE,CE | 2016/11/10 * 12 |
| MTR-08 | Test Receiver | Rohde & Schwarz | ESCI | 100767 | RE,CE | 2016/09/15 * 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 |
| MAT-98 | Attenuator | KEYSIGHT | 8491A | MY52462349 | RE | 2016/12/05 * 12 |
| MMM-08 | DIGITAL HiTESTER | Hioki | 3805 | 051201197 | RE | 2017/01/19 * 12 |
| MCC-112 | Coaxial cable | Fujikura/Suhner/TSJ | 5D-2W(10m)/ SFM141(3m)/ suoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher) | -/00640 | CE | 2016/07/26 * 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 |
| MLPA-07 | Loop Antenna | UL Japan | - | - | FT | Pre Check |
| MCH-04 | Temperature and Humidity Chamber | Tabai Espec | PL-2KP | 14015723 | FT | 2016/08/30 * 12 |
| MMM-12 | DIGITAL HiTESTER | Hioki | 3805 | 060500120 | FT | 2017/02/15 * 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.

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

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

Test Item:

CE: Conducted Emission,
RE: Radiated Emission,
FT: Frequency Tolerance

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