



# RADIO TEST REPORT

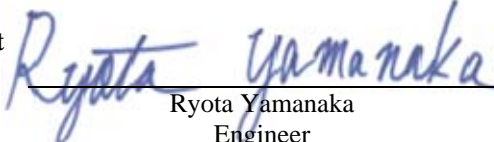
**Test Report No. : 12062715H-A**

**Applicant** : SINFONIA TECHNOLOGY CO.,LTD.  
**Type of Equipment** : Digital Photo Printer  
**Model No.** : CHC-S2245-6  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**FCC ID** : ZQU-D1150410A  
**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.
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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)

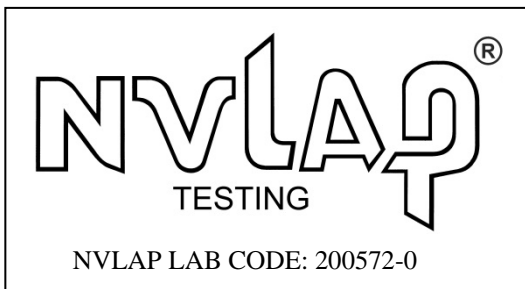
**Date of test:** December 4 to 11, 2017

**Representative test engineer:**

  
Ryota Yamanaka  
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/](http://japan.ul.com/resources/emc_accredited/)

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13-EM-F0429

# **REVISION HISTORY**

**Original Test Report No.: 12062715H-A**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12062715H-A	January 23, 2018	-	-

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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-S2245-6  
Serial No. : Refer to Section 4, Clause 4.2  
Receipt Date of Sample : December 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-S2245-6 (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: : External: 24 MHz, CPU: Internal 375 MHz,  
SDRM: 133 MHz, FPGA: 60 MHz, RF-ID: 13.56 MHz,  
USB: 480 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  
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 January 2, 2018 and effective February 1, 2018

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

\* The revision on January 2, 2018, does not affect the test specification applied to the EUT.

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

#### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.10:2013 6 Standard test methods ----- <IC>RSS-Gen 8.8	Section 15.207 ----- <IC>RSS-Gen 8.8	[QP] 14.2 dB 18.33114 MHz, N [AV] 9.3 dB 18.33114 MHz, N	Complied	Radiated
Electric Field Strength of Fundamental Emission	ANSI C63.10:2013 6 Standard test methods ----- <IC> RSS-Gen 6.4, 6.12	Section 15.225(a) ----- <IC>RSS-210 B.6	64.0 dB, 13.56000 MHz, QP, 0 deg.	Complied	Radiated
Spectrum Mask	ANSI C63.10:2013 6 Standard test methods ----- <IC>RSS-Gen 6.4, 6.13	Section 15.225(b)(c) ----- <IC> RSS-210 B.6	43.7 dB, 13.55300 MHz, QP, 0 deg.	Complied	Radiated
20dB Bandwidth	ANSI C63.10:2013 6 Standard test methods ----- <IC> -	Section15.215(c) ----- <IC> -	See data	Complied	Radiated
Electric Field Strength of Spurious Emission	ANSI C63.10:2013 6 Standard test methods ----- <IC>RSS-Gen 6.4, 6.13	Section 15.209, Section 15.225 (d) ----- <IC>RSS-210 B.6	15.3 dB 257.640 MHz, Horizontal, QP	Complied	Radiated
Frequency Tolerance	ANSI C63.10:2013 6 Standard test methods ----- <IC>RSS-Gen 6.11, 8.11	Section 15.225(e) ----- <IC> RSS-210 B.6	See data	Complied	Radiated

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 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.

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### 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.

### 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 to 0.15 MHz	3.8 dB
0.15 MHz to 30 MHz	3.4 dB

Test distance	Radiated emission (+/-)
	9 kHz to 30 MHz
3 m	3.8 dB
10 m	3.6 dB

\*Measurement distance

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*)(+/-)		(10 m*)(+/-)	
	30 MHz to 200 MHz	200 MHz to 1000 MHz	30 MHz to 200 MHz	200 MHz to 1000 MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	5.0 dB	6.3 dB	4.9 dB	5.0 dB

\* Measurement distance

Antenna terminal test	Uncertainty (+/-)
Frequency error	
13.56 MHz	0.01541 ppm

#### 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.

### 3.5 Test Location

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NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

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

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

### **4.1 Operating Modes**

The mode is used :

<b>Mode</b>	<b>Remarks</b>
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.	

<b>Test Item</b>	<b>Operating mode</b>
Conducted emission	Tx Mod on, with Tag Tx Mod on, without Tag Tx Terminated *2)
Electric Field Strength of Fundamental Emission	Tx Mod on, without Tag *1)
Spectrum Mask	Tx Mod on, without Tag *1)
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 (below 30 MHz) *1) Tx Mod on, with Tag (above 30 MHz) *1)
Frequency Tolerance	Tx Mod off, without Tag

\*1) After the comparison of the test data between with Tag and without Tag, the tests were performed with the worst case.

\*2) 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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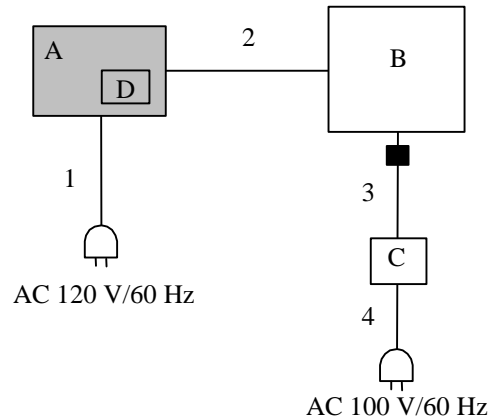
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## 4.2 Configuration and peripherals



■ : Standard Ferrite Core

\* Cabling and setup 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-S2245-6	P2-005	SINFONIA TECHNOLOGY CO.,LTD.	EUT
B	Laptop PC	CF-N8HWCDPS	9LKSA04645	Panasonic	-
C	AC Adapter	CF-AA6372B	6372BM610214975E	Panasonic	-
D	Ribbon Tag	3005925	001	SMARTRAC N.V.	EUT

### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.8	Unshielded	Unshielded	-
2	USB Cable	1.5	Shielded	Shielded	-
3	DC Cable	1.1	Unshielded	Unshielded	-
4	AC Cable	0.9	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

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

Test Procedure

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**

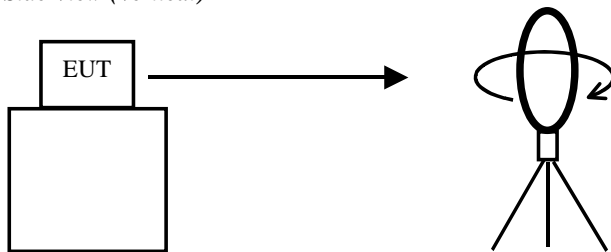
Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	Between 2.0 times and 5.0 times of the OBW	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Between 1.5 times and 5.0 times of the OBW	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum 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.

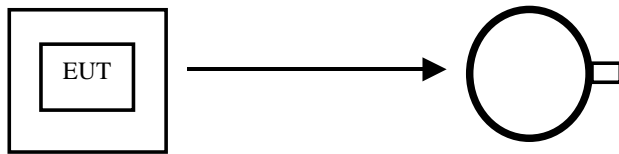
Test data : APPENDIX  
Test result : Pass

**Figure 1: Direction of the Loop Antenna**

*Side View (Vertical)*

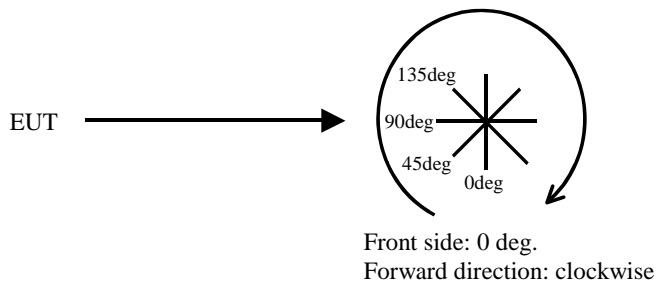


*Top View (Horizontal)*



Antenna was not rotated.

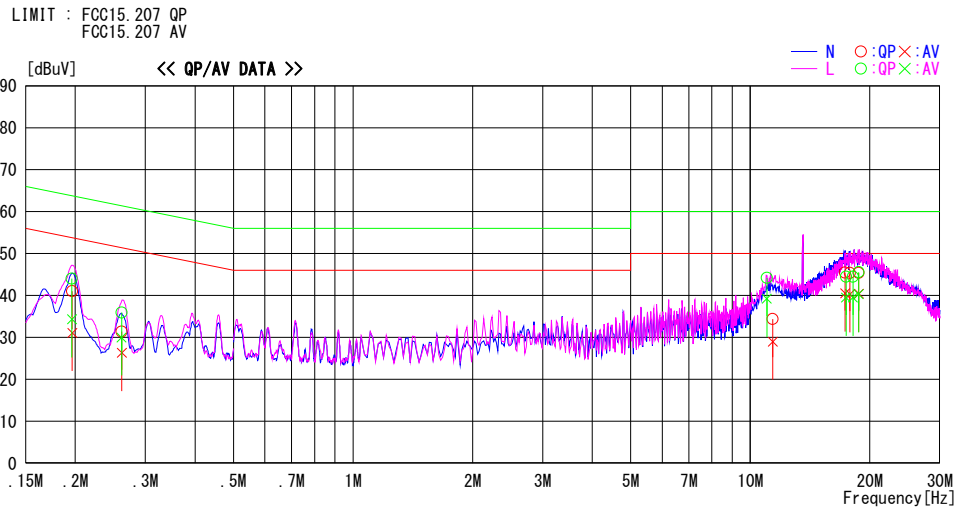
*Top View (Vertical)*



**APPENDIX 1: Test data**

**Conducted emission**

Report No. 12062715H  
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Date December 8, 2017  
Temperature / Humidity 20 deg. C / 40 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56MHz With Tag



Frequency [MHz]	Reading		Level [dBuV]	Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]			QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.19643	27.7	17.8	13.3	13.3	41.0	31.1	63.8	53.8	22.8	22.7	N	
0.26179	18.1	13.0	13.3	13.3	31.4	26.3	61.4	51.4	30.0	25.1	N	
11.38488	20.3	14.9	14.1	14.1	34.4	29.0	60.0	50.0	25.6	21.0	N	
17.31547	31.1	26.1	14.4	14.4	45.5	40.5	60.0	50.0	14.5	9.5	N	
17.81840	31.0	25.9	14.4	14.4	45.4	40.3	60.0	50.0	14.6	9.7	N	
18.74677	31.0	26.0	14.4	14.4	45.4	40.4	60.0	50.0	14.6	9.6	N	
0.19599	30.7	21.0	13.3	13.3	44.0	34.3	63.8	53.8	19.8	19.5	L	
0.26123	22.6	16.7	13.3	13.3	35.9	30.0	61.4	51.4	25.5	21.4	L	
11.00263	30.1	25.1	14.1	14.1	44.2	39.2	60.0	50.0	15.8	10.8	L	
17.40873	30.1	25.1	14.4	14.4	44.5	39.5	60.0	50.0	15.5	10.5	L	
18.12745	30.1	25.1	14.4	14.4	44.5	39.5	60.0	50.0	15.5	10.5	L	
18.74291	31.2	25.9	14.4	14.4	45.6	40.3	60.0	50.0	14.4	9.7	L	

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

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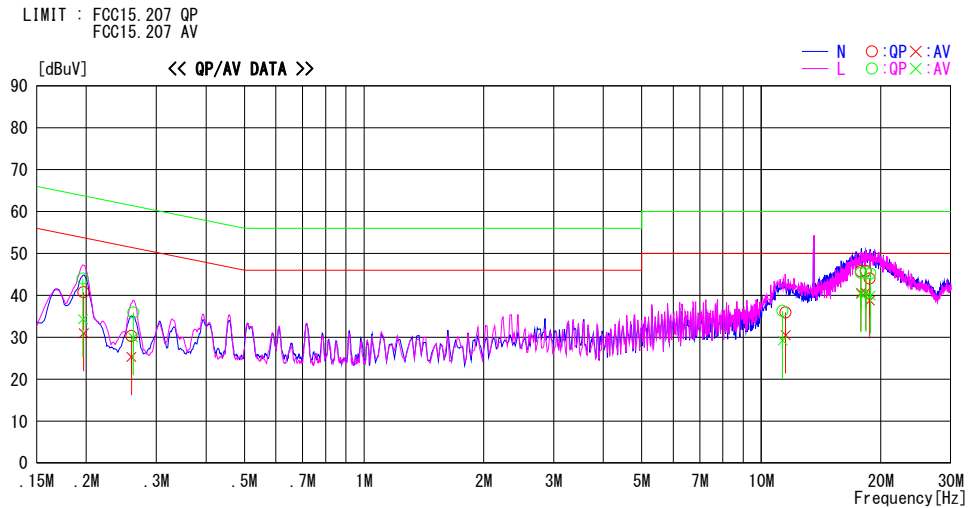
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## Conducted emission

Report No. 12062715H  
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Date December 8, 2017  
Temperature / Humidity 20 deg. C / 40 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56MHz Without Tag



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]		
0.19689	27.4	17.7	13.3	40.7	31.0	63.7	53.7	23.0	22.7	N	
0.25970	17.0	12.0	13.3	30.3	25.3	61.4	51.4	31.1	26.1	N	
11.51451	21.8	16.4	14.1	35.9	30.5	60.0	50.0	24.1	19.5	N	
17.82723	31.3	26.2	14.4	45.7	40.6	60.0	50.0	14.3	9.4	N	
18.33114	31.4	26.3	14.4	45.8	40.7	60.0	50.0	14.2	9.3	N	
18.75226	29.6	24.4	14.4	44.0	38.8	60.0	50.0	16.0	11.2	N	
0.19593	30.7	21.0	13.3	44.0	34.3	63.8	53.8	19.8	19.5	L	
0.26251	22.6	16.7	13.3	35.9	30.0	61.4	51.4	25.5	21.4	L	
11.31635	22.2	15.1	14.1	36.3	29.2	60.0	50.0	23.7	20.8	L	
17.82653	31.0	25.9	14.4	45.4	40.3	60.0	50.0	14.6	9.7	L	
18.33003	31.2	26.0	14.4	45.6	40.4	60.0	50.0	14.4	9.6	L	
18.83702	30.8	25.6	14.4	45.2	40.0	60.0	50.0	14.8	10.0	L	

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

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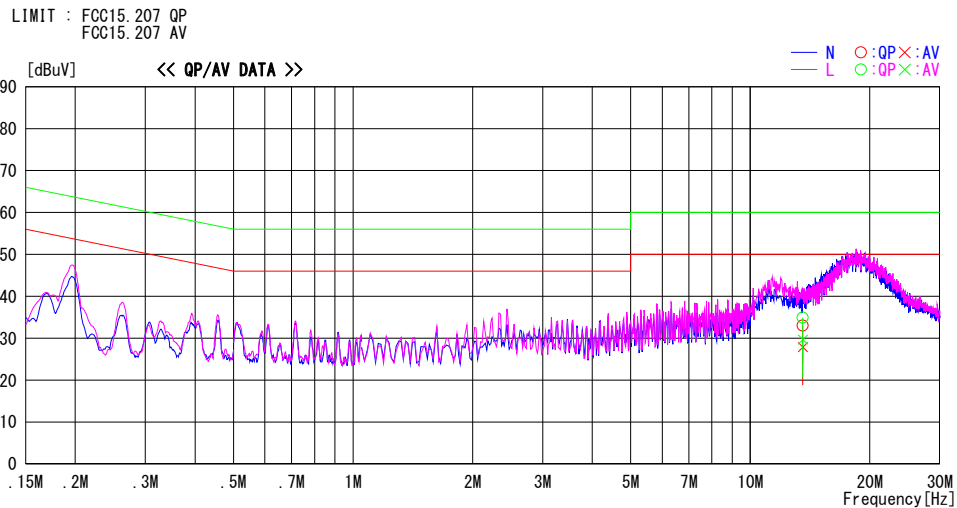
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### Conducted emission

Report No. 12062715H  
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Date December 8, 2017  
Temperature / Humidity 20 deg. C / 40 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56MHz Terminated



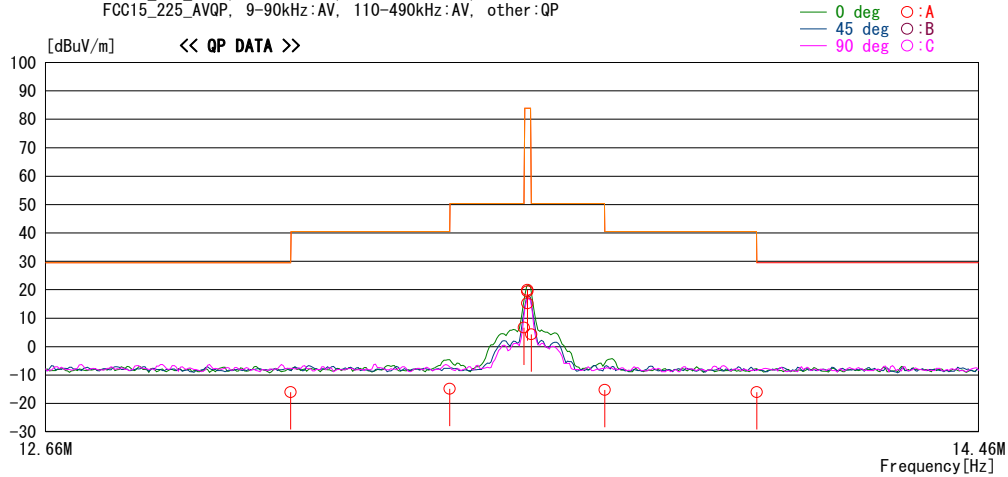
Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
13.56000	18.8	13.7	14.2	33.0	27.9	60.0	50.0	27.0	22.1	N	
13.56000	20.7	15.5	14.2	34.9	29.7	60.0	50.0	25.1	20.3	L	

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

## Fundamental emission and Spectrum Mask

Report No. 12062715H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date December 4, 2017  
Temperature / Humidity 22 deg. C / 35 % RH  
Engineer Ryota Yamanaka  
Mode 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]	
13.11000	29.6	QP	19.6	-33.2	32.1	-16.1	29.5	45.6	0	A	352
13.41000	30.8	QP	19.6	-33.2	32.1	-14.9	40.5	55.4	0	A	352
13.55300	52.4	QP	19.6	-33.2	32.1	6.7	50.4	43.7	0	A	352
13.56000	65.6	QP	19.6	-33.2	32.1	19.9	83.9	64.0	0	A	352 *
13.56000	65.1	QP	19.6	-33.2	32.1	19.4	83.9	64.5	0	A	352 With tag
13.56000	60.9	QP	19.6	-33.2	32.1	15.2	83.9	68.7	0	A	352 Hori
13.56700	50.0	QP	19.6	-33.2	32.1	4.3	50.4	46.1	0	A	352
13.71000	30.4	QP	19.6	-33.2	32.1	-15.3	40.5	55.8	0	A	352
14.01000	29.7	QP	19.5	-33.2	32.1	-16.1	29.5	45.6	0	A	352

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

### Result of the fundamental emission at 3 m without Distance factor

Ant Deg [deg]	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Duty Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
0	13.56000	QP	65.6	19.6	6.8	32.1	-	59.9	-	-	- Fundamental

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

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### Spurious emission

Report No. 12062715H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date December 4, 2017  
Temperature / Humidity 22 deg. C / 35 % RH  
Engineer Ryota Yamanaka  
Mode 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

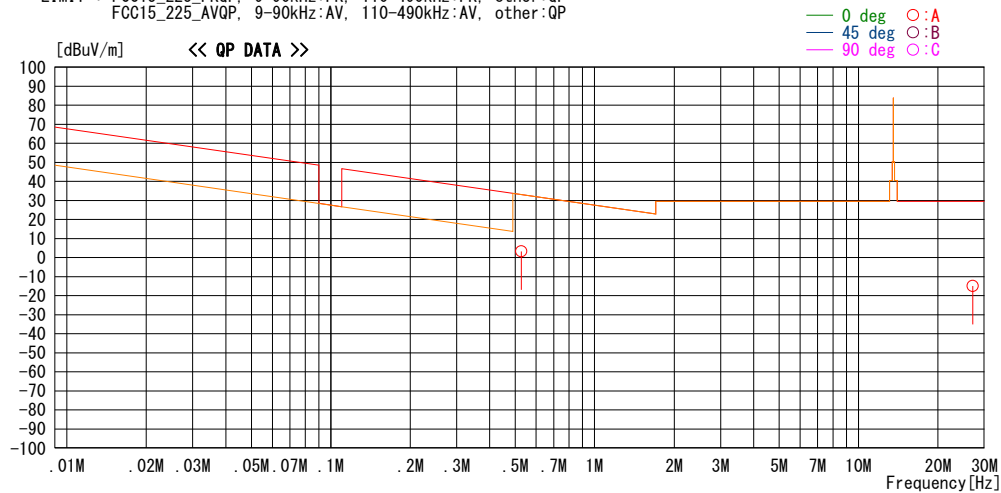
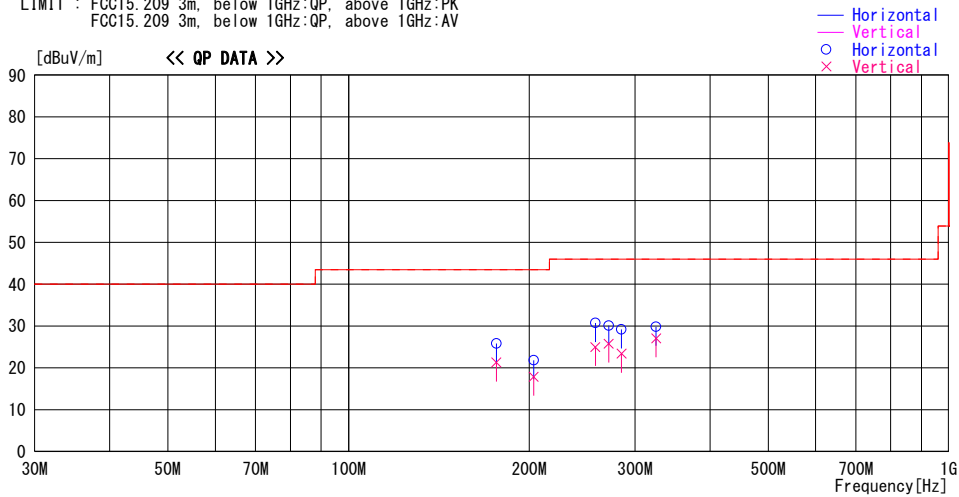


CHART: WITH FACTOR  
ANT TYPE: - 30 MHz: LOOP, 30 MHz - 200 MHz: BICONICAL, 200 MHz - 1000 MHz: LOGPERIODIC,  
1000 MHz -: HORN  
CALCULATION: RESULT = READING + ANT FACTOR + LOSS & GAIN (CABLE + ATT - GAIN(AMP))

### Spurious emission

Report No. 12062715H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date December 5, 2017  
Temperature / Humidity 22 deg. C / 35 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56MHz With Tag

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



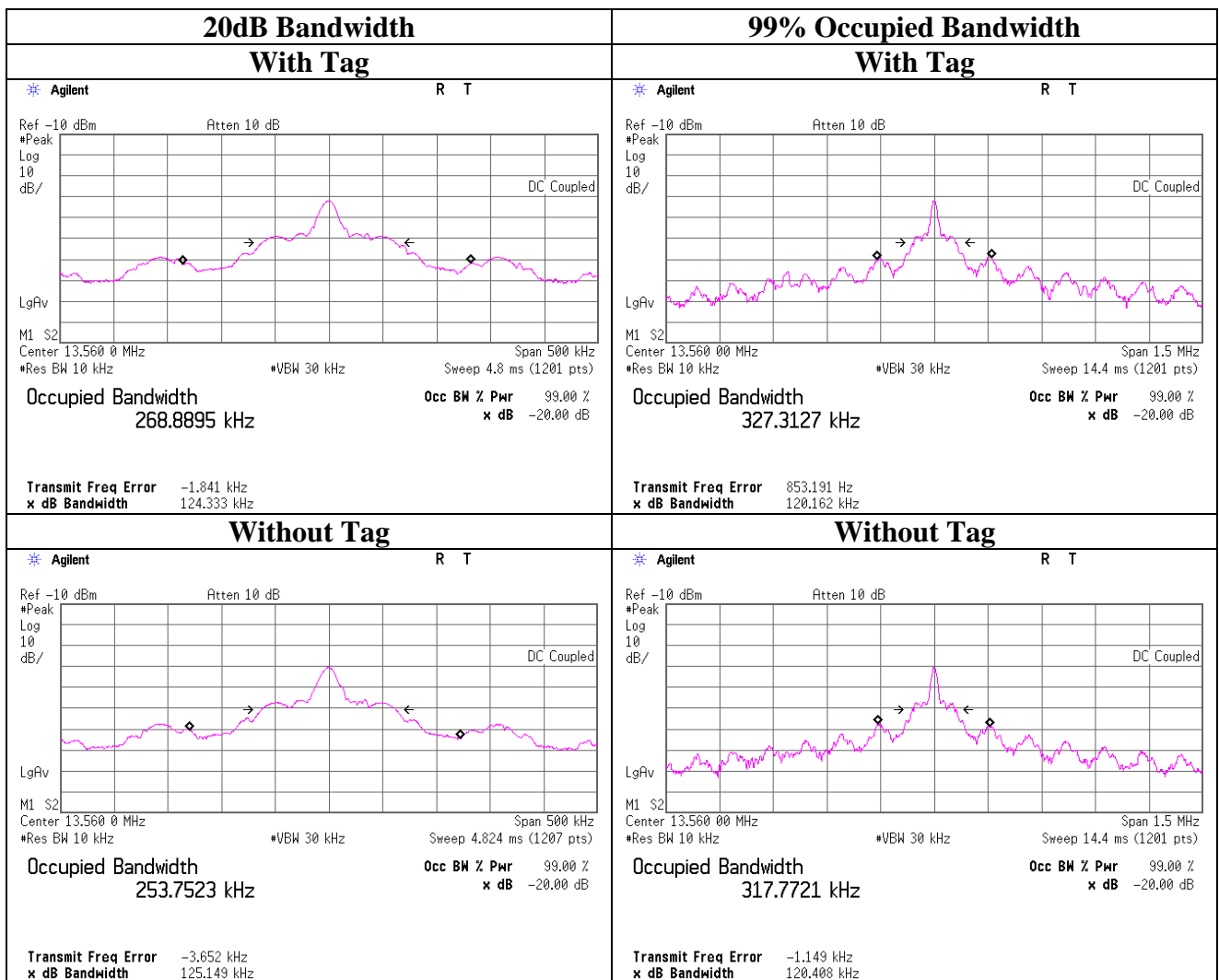
Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
176.280	32.7	QP	16.2	-23.1	25.8	224	183	Hori.	43.5	17.7	
176.280	28.2	QP	16.2	-23.1	21.3	146	216	Vert.	43.5	22.2	
203.400	33.1	QP	11.4	-22.7	21.8	49	169	Hori.	43.5	21.7	
203.400	29.2	QP	11.4	-22.7	17.9	350	100	Vert.	43.5	25.6	
257.640	41.0	QP	12.0	-22.3	30.7	100	104	Hori.	46.0	15.3	
257.640	35.3	QP	12.0	-22.3	25.0	269	190	Vert.	46.0	21.0	
271.200	39.8	QP	12.5	-22.2	30.1	78	108	Hori.	46.0	15.9	
271.200	35.5	QP	12.5	-22.2	25.8	158	100	Vert.	46.0	20.2	
284.760	38.3	QP	13.0	-22.1	29.2	131	111	Hori.	46.0	16.8	
284.760	32.5	QP	13.0	-22.1	23.4	74	100	Vert.	46.0	22.6	
325.440	37.5	QP	14.1	-21.8	29.8	111	100	Hori.	46.0	16.2	
325.440	34.8	QP	14.1	-21.8	27.1	133	129	Vert.	46.0	18.9	

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

## 20dB Bandwidth and 99% Occupied Bandwidth

Report No. 12062715H  
 Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
 Date December 8, 2017  
 Temperature / Humidity 20 deg. C / 40 % RH  
 Engineer Ryota Yamanaka  
 Mode Tx Mod on

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	125.149	317.7721
	With Tag	124.333	327.3127



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## Frequency Tolerance

Test place : Ise EMC Lab. No.11 Measurement Room  
Report No. : 12062715H  
Date : 12/11/2017  
Temperature/ Humidity : 25 deg. C / 37 % RH  
Engineer : Yuta Moriya  
Mode : Tx Mod off, without Tag

Test condition Temp. [deg. C]	Voltage [V]	Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
					[%]	[ppm]	
50	120	Power on	13.559637	-0.000363	-0.00268	-26.8	0.01
		+ 2 min.	13.559632	-0.000368	-0.00271	-27.1	0.01
		+ 5 min.	13.559631	-0.000369	-0.00272	-27.2	0.01
		+ 10 min.	13.559632	-0.000368	-0.00272	-27.2	0.01
40	120	Power on	13.559646	-0.000354	-0.00261	-26.1	0.01
		+ 2 min.	13.559640	-0.000360	-0.00266	-26.6	0.01
		+ 5 min.	13.559637	-0.000363	-0.00268	-26.8	0.01
		+ 10 min.	13.559636	-0.000364	-0.00269	-26.9	0.01
30	120	Power on	13.559670	-0.000330	-0.00243	-24.3	0.01
		+ 2 min.	13.559666	-0.000334	-0.00247	-24.7	0.01
		+ 5 min.	13.559661	-0.000339	-0.00250	-25.0	0.01
		+ 10 min.	13.559660	-0.000340	-0.00251	-25.1	0.01
20	120	Power on	13.559690	-0.000310	-0.00228	-22.8	0.01
		+ 2 min.	13.559681	-0.000319	-0.00235	-23.5	0.01
		+ 5 min.	13.559679	-0.000321	-0.00236	-23.6	0.01
		+ 10 min.	13.559678	-0.000322	-0.00238	-23.8	0.01
20	102 (120V -15%)	Power on	13.559683	-0.000317	-0.00234	-23.4	0.01
		+ 2 min.	13.559680	-0.000321	-0.00236	-23.6	0.01
		+ 5 min.	13.559679	-0.000321	-0.00237	-23.7	0.01
		+ 10 min.	13.559679	-0.000321	-0.00237	-23.7	0.01
20	138 (120V +15%)	Power on	13.559682	-0.000318	-0.00234	-23.4	0.01
		+ 2 min.	13.559680	-0.000320	-0.00236	-23.6	0.01
		+ 5 min.	13.559680	-0.000320	-0.00236	-23.6	0.01
		+ 10 min.	13.559680	-0.000320	-0.00236	-23.6	0.01
10	120	Power on	13.559713	-0.000287	-0.00211	-21.1	0.01
		+ 2 min.	13.559711	-0.000289	-0.00213	-21.3	0.01
		+ 5 min.	13.559709	-0.000291	-0.00215	-21.5	0.01
		+ 10 min.	13.559708	-0.000292	-0.00215	-21.5	0.01
0	120	Power on	13.559707	-0.000293	-0.00216	-21.6	0.01
		+ 2 min.	13.559718	-0.000282	-0.00208	-20.8	0.01
		+ 5 min.	13.559719	-0.000281	-0.00207	-20.7	0.01
		+ 10 min.	13.559720	-0.000280	-0.00207	-20.7	0.01
-10	120	Power on	13.559713	-0.000287	-0.00212	-21.2	0.01
		+ 2 min.	13.559711	-0.000289	-0.00213	-21.3	0.01
		+ 5 min.	13.559709	-0.000291	-0.00214	-21.4	0.01
		+ 10 min.	13.559707	-0.000293	-0.00216	-21.6	0.01
-20	120	Power on	13.559623	-0.000377	-0.00278	-27.8	0.01
		+ 2 min.	13.559639	-0.000361	-0.00266	-26.6	0.01
		+ 5 min.	13.559652	-0.000348	-0.00256	-25.6	0.01
		+ 10 min.	13.559674	-0.000326	-0.00240	-24.0	0.01
-30	120	Power on	13.559519	-0.000481	-0.00355	-35.5	0.01
		+ 2 min.	13.559574	-0.000426	-0.00314	-31.4	0.01
		+ 5 min.	13.559596	-0.000404	-0.00298	-29.8	0.01
		+ 10 min.	13.559604	-0.000396	-0.00292	-29.2	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-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2017/10/30 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2017/01/20 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2017/10/11 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ suciform141- PE(1m)/ RFM- E121(Switcher)	-/04178	RE/CE	2017/07/26 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2017/06/12 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2017/03/27 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE/CE	2017/01/19 * 12
MTR-10	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	RE/CE	2017/01/12 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2017/11/23 * 12
MLA-23	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	RE	2017/01/26 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2017/06/26 * 12
MAT-97	Attenuator	KEYSIGHT	8491A	MY52462282	RE	2017/10/12 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2017/07/24 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(AE)	2017/07/20 * 12
MTA-54	Terminator	TME	CT-01BP	-	CE	2017/12/11 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/12/24 * 12
MMM-17	DIGITAL HiTESTER	Hioki	3805	070900530	FT	2017/01/19 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	FT	2016/12/13 * 12
MCH-06	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	14007630	FT	2017/04/10 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	FT	2017/06/21 * 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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