



# RADIO TEST REPORT

**Test Report No. : 12276215H-D-R1**

**Applicant** : SINFONIA TECHNOLOGY CO.,LTD.  
**Type of Equipment** : Card Printer  
**Model No.** : CHC-C320-5  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**FCC ID** : ZQU-D1150260  
**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 the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. 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.
8. This report is a revised version of 12276215H-D. 12276215H-D is replaced with this report.

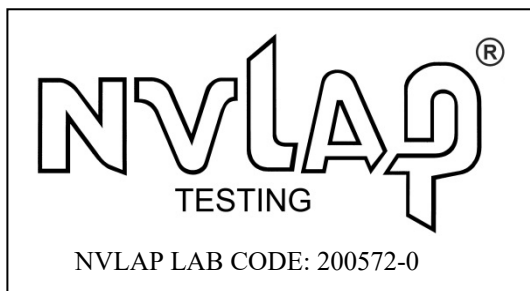
**Date of test:** May 7 to 28, 2018

**Representative test engineer:**

*Ryota Yamanaka*  
Ryota Yamanaka  
Engineer  
Consumer Technology Division

**Approved by:**

*S. Matsuyama*  
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,  
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- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.  
☒ There is no testing item of "Non-accreditation".

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 12276215H-D**

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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 : Shigeyuki Kawamura

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Card Printer  
Model No. : CHC-C320-5  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : AC 100 V to 240 V, 50/60 Hz  
Receipt Date of Sample : April 27, 2018  
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-C320-5 (referred to as the EUT in this report) is a Card Printer.  
The EUT receive image data from a PC, and print images.

### **General Specification**

Clock frequency(ies) in the system : RF-ID: 13.56 MHz

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 13.56 MHz  
Modulation : ASK  
Antenna type : Pattern antenna  
Operating Temperature : +5 deg. C - +35 deg. C

### **SECTION 3: Test specification, procedures & results**

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on March 12, 2018 and effective April 11, 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.

\* 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	Section 15.207	[QP] 8.7 dB 13.56000 MHz, L	Complied	Radiated
	<IC>RSS-Gen 8.8	<IC>RSS-Gen 8.8	[AV] 5.5 dB 13.56000 MHz, L		
Electric Field Strength of Fundamental Emission	ANSI C63.10:2013 6 Standard test methods	Section 15.225(a)	72.7 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)	45.8 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	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)	3.7 dB 134.960 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 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.

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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 of this test item meets the limits unless the measurement uncertainty is taken into consideration.

### 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 :

Mode	Remarks*
Transmitting mode (Tx)	The EUT Transmits and Receives at the same time and there is no receiving mode.
Standby mode	The EUT does not Transmit and Receive.
The EUT was operated in a manner similar to typical use during the tests.	

Test Item	Operating mode*
Conducted emission	Tx Mod on, with Tag Tx Mod on, without Tag Standby
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.

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)

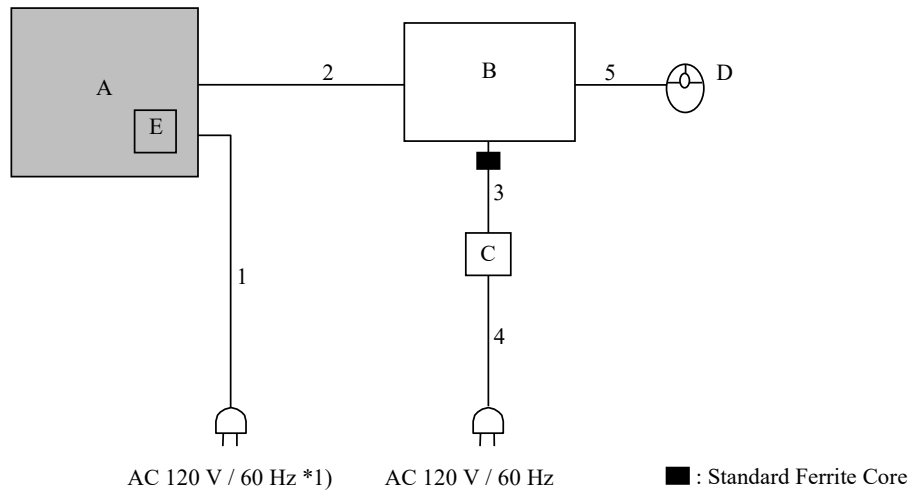
Voltage : Normal Voltage AC 120 V

Maximum Voltage AC 138 V, Minimum Voltage AC 102 V (AC 120 V  $\pm$ 15 %)

\*This EUT provides stable voltage constantly to RF Part regardless of input voltage



## 4.2 Configuration and peripherals



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

\*1) Conducted emission test was performed with this port.

### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Card Printer	CHC-C320-5	P4-031	SINFONIA TECHNOLOGY CO.,LTD.	EUT
B	Laptop PC	CF-N8HWCDPS	0CKSA09265	Panasonic	-
C	AC adapter	CF-AA6372B	6372BM610X10953E	Panasonic	-
D	USB Mouse	X05-89304	1794482-0	Microsoft	-
E	Ribbon Tag	RI-I17-112A-03	009	Texas Instruments Incorporated	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	-
5	USB Cable	1.5	Shielded	Shielded	-

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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.

<b>Detector</b>	<b>: QP and CISPR AV</b>
<b>Measurement range</b>	<b>: 0.15 MHz - 30 MHz</b>
<b>Test data</b>	<b>: APPENDIX</b>
<b>Test result</b>	<b>: Pass</b>

## **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

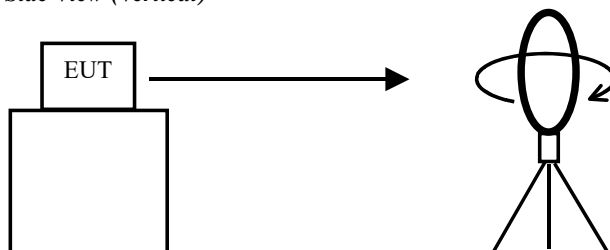
Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	Between 2.0 times and 5.0 times of the OBW	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Between 1.5 times and 5.0 times of the OBW	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum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

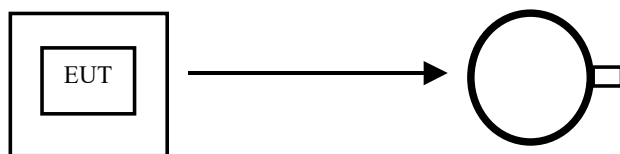
Test data : APPENDIX  
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

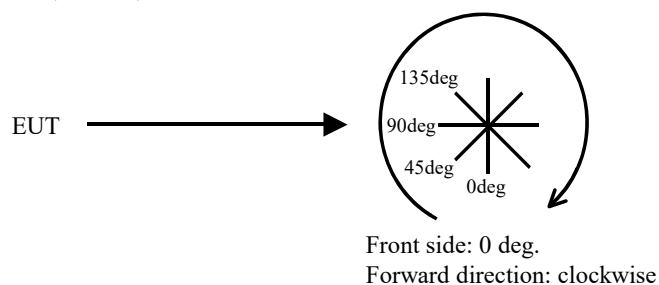


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)

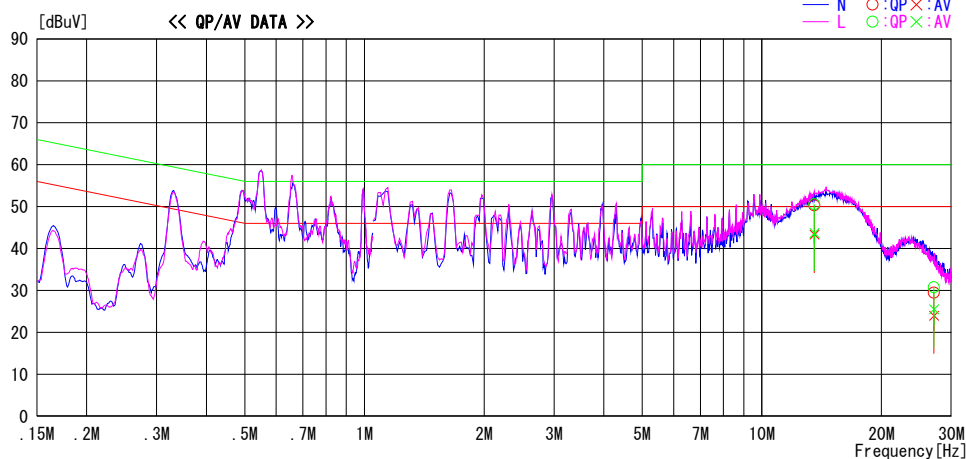


## APPENDIX 1: Test data

### Conducted emission

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 8, 2018  
Temperature / Humidity 21 deg. C / 62 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56 MHz Mod on, with Tag

LIMIT : FCC15.207 QP  
FCC15.207 AV



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	36.1	29.1	14.2	50.3	43.3	60.0	50.0	9.7	6.7	N	
13.56000	36.4	29.5	14.2	50.6	43.7	60.0	50.0	9.4	6.3	L	
27.12000	14.8	9.3	14.7	29.5	24.0	60.0	50.0	30.5	26.0	N	
27.12000	16.0	10.8	14.7	30.7	25.5	60.0	50.0	29.3	24.5	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.

\*For a limit of Conducted emission, the Section 15.107(b) Class A for the EMC noise and the Section 15.207 for 13.56 MHz were applied since this product was corresponded to Class A device based on the FCC15 subpart B. In addition, there are no differences in spurious emission of radio operation and EMC operation.

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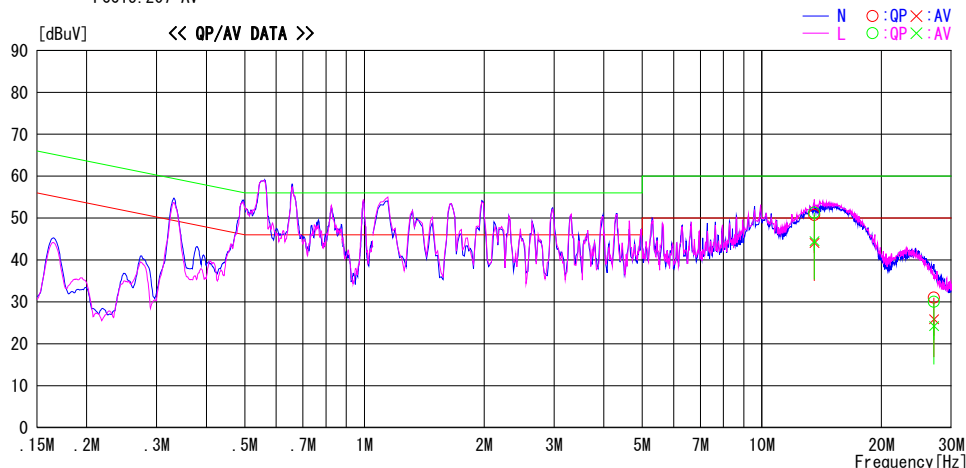
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## Conducted emission

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 8, 2018  
Temperature / Humidity 21 deg. C / 62 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56 MHz Mod on, without Tag

LIMIT : FCC15.207 QP  
FCC15.207 AV



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
13.56000	36.5	29.9	14.2	50.7	44.1	60.0	50.0	9.3	5.9	N	
13.56000	37.1	30.3	14.2	51.3	44.5	60.0	50.0	8.7	5.5	L	
27.12000	16.3	11.2	14.7	31.0	25.9	60.0	50.0	29.0	24.1	N	
27.12000	15.3	9.5	14.7	30.0	24.2	60.0	50.0	30.0	25.8	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.

\*For a limit of Conducted emission, the Section 15.107(b) Class A for the EMC noise and the Section 15.207 for 13.56 MHz were applied since this product was corresponded to Class A device based on the FCC15 subpart B. In addition, there are no differences in spurious emission of radio operation and EMC operation.

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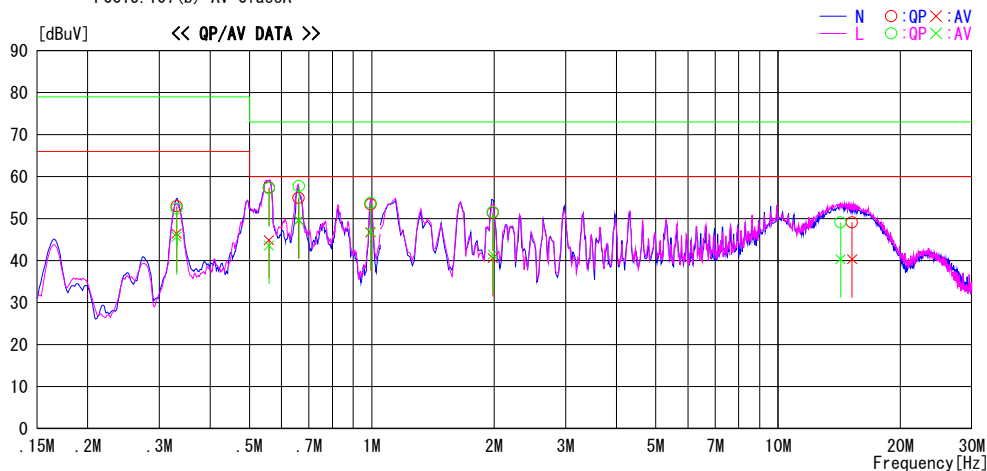
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## Conducted emission

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 8, 2018  
Temperature / Humidity 21 deg. C / 62 % RH  
Engineer Ryota Yamanaka  
Mode Standby

LIMIT : FCC15.107(b) QP ClassA  
FCC15.107(b) AV ClassA



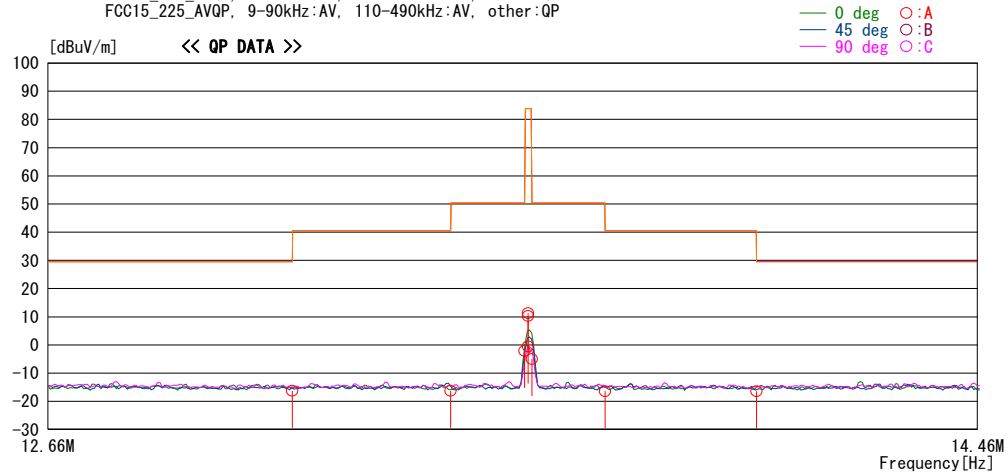
Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.33090	39.6	33.1	13.3	52.9	46.4	79.0	66.0	26.1	19.6	N	
0.55810	44.0	31.5	13.4	57.4	44.9	73.0	60.0	15.6	15.1	N	
0.66138	41.5	36.2	13.4	54.9	49.6	73.0	60.0	18.1	10.4	N	
0.99271	40.0	33.3	13.4	53.4	46.7	73.0	60.0	19.6	13.3	N	
1.98543	37.9	27.1	13.5	51.4	40.6	73.0	60.0	21.6	19.4	N	
15.20800	34.9	26.1	14.2	49.1	40.3	73.0	60.0	23.9	19.7	N	
0.33090	39.1	32.4	13.3	52.4	45.7	79.0	66.0	26.6	20.3	L	
0.55810	43.8	30.2	13.4	57.2	43.6	73.0	60.0	15.8	16.4	L	
0.66208	44.3	36.2	13.4	57.7	49.6	73.0	60.0	15.3	10.4	L	
0.99271	40.3	33.5	13.4	53.7	46.9	73.0	60.0	19.3	13.1	L	
1.98543	38.1	27.9	13.5	51.6	41.4	73.0	60.0	21.4	18.6	L	
14.25000	34.9	26.1	14.2	49.1	40.3	73.0	60.0	23.9	19.7	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

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 7, 2018  
Temperature / Humidity 22 deg. C / 37 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56 MHz Mod on, 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	29.4	QP	19.6	-33.2	32.1	-16.3	29.5	45.8	0	A	1
13.41000	29.4	QP	19.6	-33.2	32.1	-16.3	40.5	56.8	0	A	1
13.55300	43.6	QP	19.6	-33.2	32.1	-2.1	50.4	52.5	0	A	1
13.56000	56.9	QP	19.6	-33.2	32.1	11.2	83.9	72.7	0	A	1 *
13.56000	55.9	QP	19.6	-33.2	32.1	10.2	83.9	73.7	0	A	1 With Tag
13.56000	45.1	QP	19.6	-33.2	32.1	-0.6	83.9	84.5	0	A	1 Hori
13.56700	40.7	QP	19.6	-33.2	32.1	-5.0	50.4	55.4	0	A	1
13.71000	29.3	QP	19.6	-33.2	32.1	-16.4	40.5	56.9	0	A	1
14.01000	29.3	QP	19.5	-33.2	32.1	-16.5	29.5	46.0	0	A	1

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

QP

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	56.9	19.6	6.8	32.1	-	51.2	-	-	Fundamental

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

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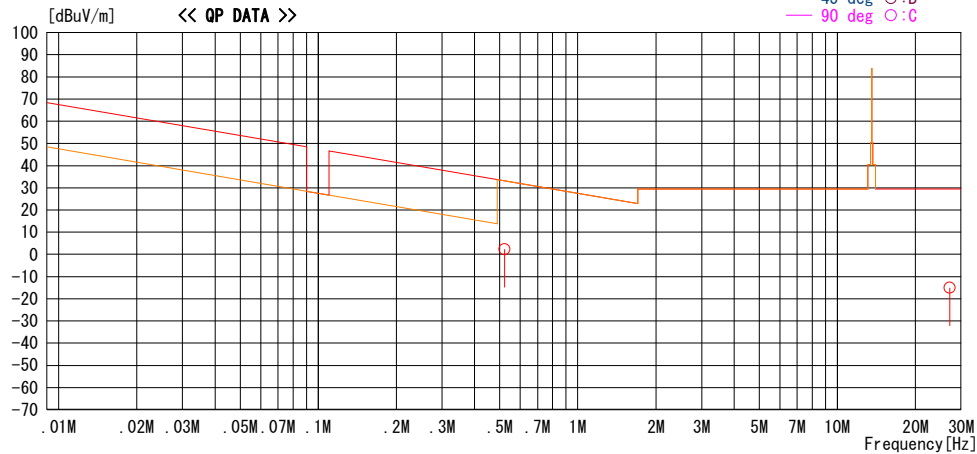
Facsimile : +81 596 24 8124



## Spurious emission (Below 30 MHz)

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 7, 2018  
Temperature / Humidity 22 deg. C / 37 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56 MHz Mod on, 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]	
0.52116	48.6	QP	19.7	-33.8	32.1	2.4	33.3	30.9	0	A	1
27.12000	29.6	QP	20.4	-32.9	32.1	-15.0	29.5	44.5	0	A	1

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)

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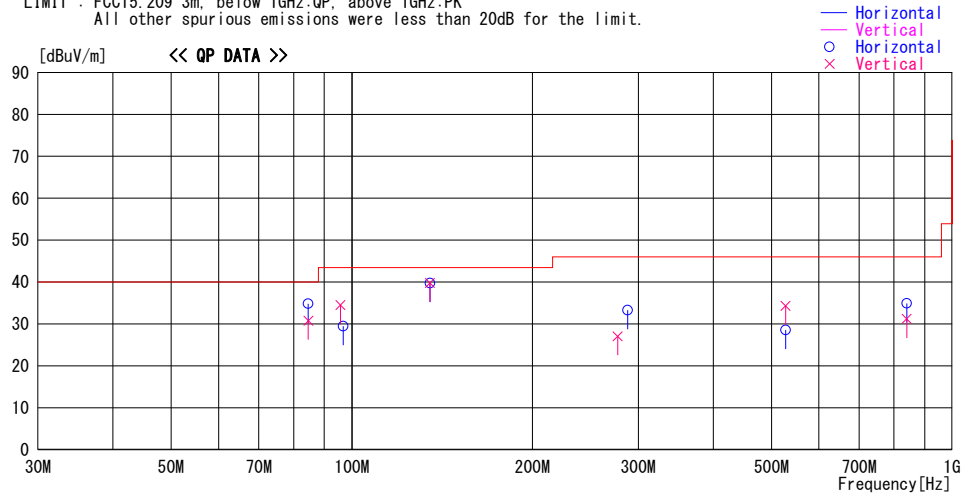
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## Spurious emission (Above 30 MHz)

Report No. 12276215H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date May 7, 2018  
Temperature / Humidity 22 deg. C / 37 % RH  
Engineer Ryota Yamanaka  
Mode Tx 13.56 MHz Mod on, without Tag

LIMIT : FCC15.209 3m, below 1GHz:QP, above 1GHz:PK  
All other spurious emissions were less than 20dB for the limit.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit	Margin	Comment
			Factor [dB/m]	Gain [dB]					[dBuV/m]	[dB]	
84.619	51.7	QP	7.2	-24.1	34.8	97	234	Hori.	40.0	5.2	
84.619	47.7	QP	7.2	-24.1	30.8	80	127	Vert.	40.0	9.2	
95.719	49.2	QP	9.3	-24.0	34.5	5	100	Vert.	43.5	9.0	
96.699	44.0	QP	9.5	-24.0	29.5	96	200	Hori.	43.5	14.0	
134.960	49.2	QP	14.2	-23.6	39.8	39	100	Vert.	43.5	3.7	
135.082	49.1	QP	14.2	-23.6	39.7	59	218	Hori.	43.5	3.8	
288.000	42.3	QP	13.1	-22.1	33.3	100	100	Hori.	46.0	12.7	
277.237	36.5	QP	12.8	-22.2	27.1	71	100	Vert.	46.0	18.9	
528.000	31.1	QP	18.2	-20.7	28.6	199	100	Hori.	46.0	17.4	
528.000	36.8	QP	18.2	-20.7	34.3	208	100	Vert.	46.0	11.7	
839.982	32.0	QP	21.5	-18.6	34.9	212	100	Hori.	46.0	11.1	
839.982	28.3	QP	21.5	-18.6	31.2	275	100	Vert.	46.0	14.8	

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 (CABLE + ATTEN) - GAIN (AMP)

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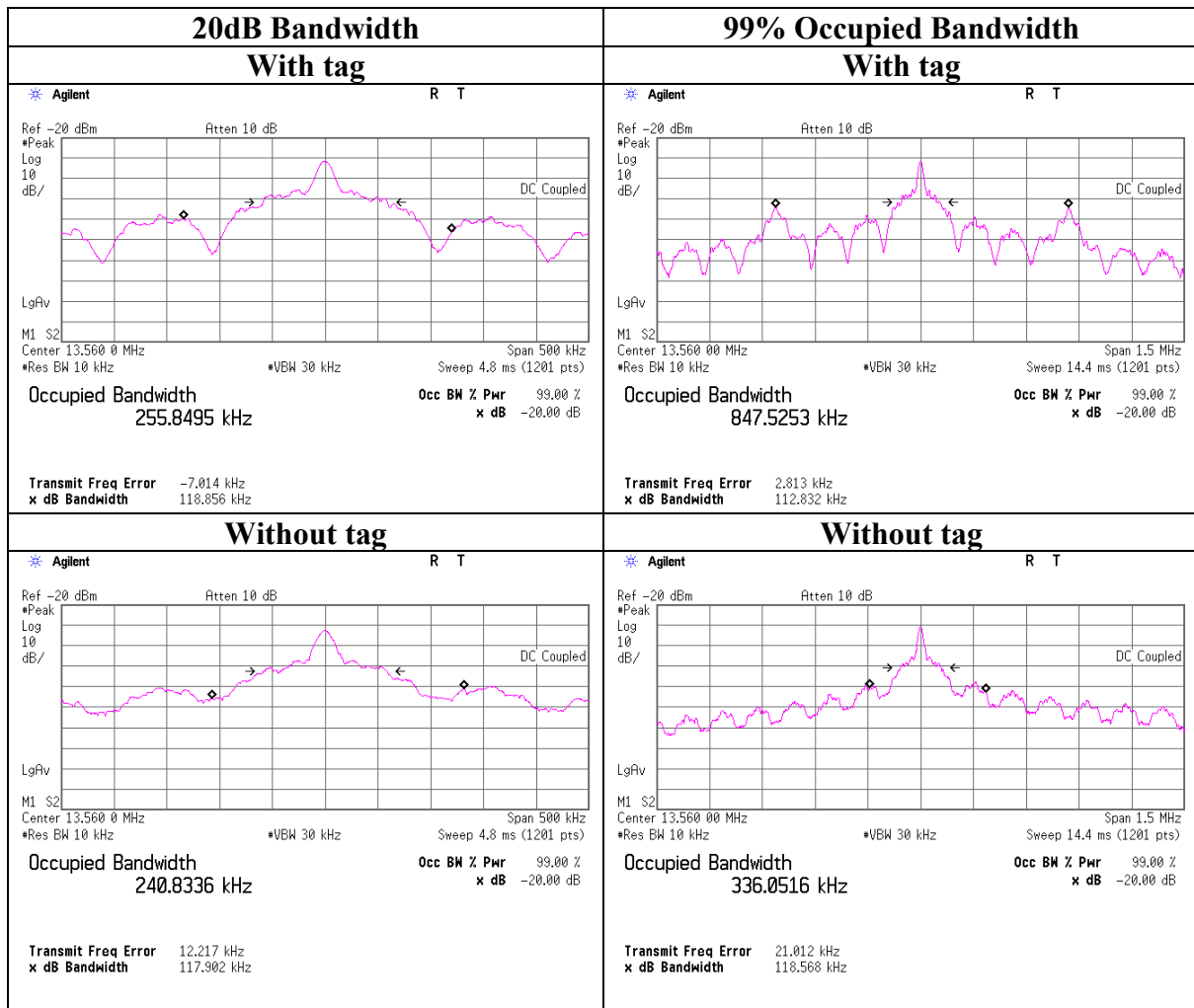
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## 20dB Bandwidth and 99% Occupied Bandwidth

Report No.	12276215H
Test place	Ise EMC Lab. No.11 measurement room
Date	May 28, 2018
Temperature/ Humidity	24 deg. C / 58 % RH
Engineer	Takumi Shimada
Mode	Tx Mod on

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	With Tag	118.856	847.5253
	Without Tag	117.902	336.0516



## Frequency Tolerance

Report No. 12276215H  
Test place Ise EMC Lab. No.11 measurement room  
Date May 28, 2018  
Temperature/ Humidity 24 deg. C / 58 % RH  
Engineer Takumi Shimada  
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	13.559581	-0.000419	-0.00309	-30.9	0.01
		+ 2 min.	13.559579	-0.000421	-0.00310	-31.0	0.01
		+ 5 min.	13.559379	-0.000621	-0.00458	-45.8	0.01
		+ 10 min.	13.559580	-0.000420	-0.00310	-31.0	0.01
40	120	Power on	13.559578	-0.000422	-0.00311	-31.1	0.01
		+ 2 min.	13.559577	-0.000423	-0.00312	-31.2	0.01
		+ 5 min.	13.559577	-0.000423	-0.00312	-31.2	0.01
		+ 10 min.	13.559577	-0.000423	-0.00312	-31.2	0.01
30	120	Power on	13.559597	-0.000403	-0.00297	-29.7	0.01
		+ 2 min.	13.559592	-0.000408	-0.00301	-30.1	0.01
		+ 5 min.	13.559589	-0.000411	-0.00303	-30.3	0.01
		+ 10 min.	13.559587	-0.000413	-0.00304	-30.4	0.01
20	120	Power on	13.559600	-0.000400	-0.00295	-29.5	0.01
		+ 2 min.	13.559599	-0.000401	-0.00295	-29.5	0.01
		+ 5 min.	13.559599	-0.000401	-0.00296	-29.6	0.01
		+ 10 min.	13.559598	-0.000402	-0.00296	-29.6	0.01
20	102 (120V -15%)	Power on	13.559603	-0.000397	-0.00292	-29.2	0.01
		+ 2 min.	13.559601	-0.000399	-0.00294	-29.4	0.01
		+ 5 min.	13.559599	-0.000401	-0.00296	-29.6	0.01
		+ 10 min.	13.559598	-0.000402	-0.00297	-29.7	0.01
20	138 (120V +15%)	Power on	13.559600	-0.000400	-0.00295	-29.5	0.01
		+ 2 min.	13.559599	-0.000401	-0.00296	-29.6	0.01
		+ 5 min.	13.559598	-0.000402	-0.00297	-29.7	0.01
		+ 10 min.	13.559597	-0.000403	-0.00297	-29.7	0.01
10	120	Power on	13.559629	-0.000371	-0.00273	-27.3	0.01
		+ 2 min.	13.559629	-0.000371	-0.00273	-27.3	0.01
		+ 5 min.	13.559627	-0.000373	-0.00275	-27.5	0.01
		+ 10 min.	13.559626	-0.000374	-0.00276	-27.6	0.01
0	120	Power on	13.559620	-0.000380	-0.00280	-28.0	0.01
		+ 2 min.	13.559634	-0.000366	-0.00270	-27.0	0.01
		+ 5 min.	13.559638	-0.000362	-0.00267	-26.7	0.01
		+ 10 min.	13.559638	-0.000362	-0.00267	-26.7	0.01
-10	120	Power on	13.559584	-0.000416	-0.00307	-30.7	0.01
		+ 2 min.	13.559611	-0.000389	-0.00287	-28.7	0.01
		+ 5 min.	13.559623	-0.000377	-0.00278	-27.8	0.01
		+ 10 min.	13.559628	-0.000372	-0.00274	-27.4	0.01
-20	120	Power on	13.559521	-0.000479	-0.00353	-35.3	0.01
		+ 2 min.	13.559565	-0.000435	-0.00321	-32.1	0.01
		+ 5 min.	13.559587	-0.000413	-0.00305	-30.5	0.01
		+ 10 min.	13.559596	-0.000404	-0.00298	-29.8	0.01
-30	120	Power on	13.559417	-0.000583	-0.00430	-43.0	0.01
		+ 2 min.	13.559484	-0.000516	-0.00381	-38.1	0.01
		+ 5 min.	13.559519	-0.000481	-0.00355	-35.5	0.01
		+ 10 min.	13.559534	-0.000466	-0.00344	-34.4	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

### Test equipment

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	7/24/2017	7/31/2018	12
CE	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/19/2017	12/31/2018	12
CE	141934	Terminator	TME	CT-01BP	-	12/11/2017	12/31/2018	12
CE	141358	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	7/20/2017	7/31/2018	12
RE	141413	Coaxial Cable	UL Japan	-	-	6/12/2017	6/30/2018	12
RE	148898	Attenuator	KEYSIGHT	8491A	MY52462282	10/12/2017	10/31/2018	12
RE	141254	Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	100017	10/11/2017	10/31/2018	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	11/5/1900	260833	2/27/2018	2/28/2019	12
RE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	10/30/2017	10/31/2018	12
RE	141425	Biconical Antenna	Schwarzbeck	BBA9106	1302	11/23/2017	11/30/2018	12
RE	141397	Coaxial Cable	UL Japan	-	-	6/22/2017	6/30/2018	12
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	12/10/2017	12/31/2018	12
RE/FT	141429	Temperature and Humidity Chamber	TABAI ESPEC	PL-2KP	14015723	8/7/2017	8/31/2018	12
RE/FT	141561	Thermo-Hygrometer	CUSTOM	CTH-201	1401	1/24/2018	1/31/2019	12
RE	141855	Spectrum Analyzer	AGILENT	E4440A	MY46187750	11/17/2017	11/30/2018	12
RE/CE	141217	Coaxial cable	Fujikura/Suhner /TSJ	5D-2W/SFM141/ 421-010/ sucoform141-P	-/04178	7/26/2017	7/31/2018	12
RE/CE	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	1/30/2018	1/31/2019	12
RE/CE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE/CE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE/CE	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	1/24/2018	1/31/2019	12
RE/CE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	1/9/2018	1/31/2019	12

\*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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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