RADIO TEST REPORT

Test Report No. : 10754085H-A-R2

Applicant	:	**BROTHER INDUSTRIES, LTD.**
Type of Equipment	:	**NFC Module**
Model No.	:	**BRNF13M002**
Test regulation	:	**FCC Part 15 Subpart C: 2015**
FCC ID	:	**B3QBRNF13M002**
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)
7. This report is a revised version of 10754085H-A-R1. 10754085H-A-R1 is replaced with this report.

Date of test: May 25 to July 7, 2015

Representative test engineer:
T. Noguchi
Takafumi Noguchi
Engineer
Consumer Technology Division

Approved by:
Takayuki Shimada
Engineer
Consumer Technology Division

NVLAP LAB CODE: 200572-0

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://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

REVISION HISTORY

Original Test Report No.: 10754085H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10754085H-A	June 25, 2015	-	-
1	10754085H-A-R1	July 6, 2015	P.9	Addition of following sentence; * These cores did not affect emission tests.
2	10754085H-A-R2	July 7, 2015	P.5	Correction of Worst margin for Conducted emission test
2	10754085H-A-R2	July 7, 2015	P.8	Correction of Type of tag for Conducted emission test
2	10754085H-A-R2	July 7, 2015	P.9	Addition of following sentence; * Also, Conducted emission test was performed without cores.
2	10754085H-A-R2	July 7, 2015	P.14 to 28	Correction of Conducted emission data.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	BROTHER INDUSTRIES, LTD.
Trade Name	:	brother
Address	:	15-1, Naeshiro-cho Mizuho-ku Nagoya 467-8561, Japan
Telephone Number	:	+81-52-824-2345
Facsimile Number	:	+81-52-824-2734
Contact Person	:	Yasuhiro Asai

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

2.1 Identification of E.U.T.

Type of Equipment	:	NFC Module
Model No.	:	BRNF13M002
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample	:	April 18, 2015
Country of Mass-production	:	China and Vietnam
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

General Specification

Clock frequency(ies) in the system	:	CPU: 325.44 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	13.56MHz
Modulation	:	ASK
Power Supply (radio part input)	:	DC 3.1 V / 1.88 V
Antenna type	:	Printed Loop Coil Pattern Antenna
Operating Temperature	:	0 deg. C to +40 deg. C

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on January 21, 2015
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

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted emission	ANSI C63.4:2009 7. AC powerline conducted emission measurements	Section 15.207	[QP] 20.2 dB, 27.12000 MHz, N [AV] 10.0 dB, 27.12000 MHz, N	Complied	-
	<IC>RSS-Gen 8.8	<IC>RSS-Gen 8.8			
Electric Field Strength of Fundamental Emission	ANSI C63.4:2009 13. Measurement of intentional radiators	Section 15.225(a)	59.2 dB, 13.56000 MHz, QP, 0 deg.	Complied	Radiated
	<IC> RSS-Gen 6.4, 6.12	<IC>RSS-210 A2.6			
Spectrum Mask	ANSI C63.4:2009 13. Measurement of intentional radiators	Section 15.225(b)(c)	29.0 dB, 12.92504 MHz, QP, 0 deg.	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC> RSS-210 A2.6			
20dB Bandwidth	ANSI C63.4:2009 13. Measurement of intentional radiators	Section15.215(c)	See data	Complied	Radiated
	<IC> -	<IC> -			
Electric Field Strength of Spurious Emission	ANSI C63.4:2009 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	4.6 dB 40.667 MHz, Vertical, QP	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC>RSS-210 A2.6			
Frequency Tolerance	ANSI C63.4:2009 13. Measurement of intentional radiators	Section15.225(e)	See data	Complied	Radiated
	<IC>RSS-Gen 6.11, 8.11	<IC> RSS-210 A2.6			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422					

FCC 15.31 (e)
This EUT provides stable voltage (DC 3.1 V / 1.88 V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement
It is impossible for end users to replace the antenna, because it is printed on the circuit board. Therefore the equipment complies with the requirement of 15.203/212.

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.

Test room (semi-anechoic chamber)	Conducted emission (±dB)
	150 kHz - 30 MHz
No.1	3.5 dB
No.2	3.5 dB
No.3	3.4 dB
No.4	3.5 dB

Test room (semi-anechoic chamber)	Radiated emission						
	(3 m*)(±dB)				(1 m*)(±dB)		(0.5 m*)(±dB)
	9 kHz - 30 MHz	30 MHz - 300 MHz	300 MHz - 1 GHz	1 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz
No.1	4.3 dB	5.5 dB	6.3 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No.2	4.2 dB	5.4 dB	6.3 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No.3	4.4 dB	5.4 dB	6.4 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No.4	4.7 dB	5.6 dB	6.4 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

*3m/1m/0.5m = Measurement distance

Frequency counter (±)	
Normal condition	Extreme condition
7×10^{-6}	9×10^{-6}

Conducted emission test

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

Radiated emission test (3m)

[Electric Field Strength of Fundamental Emission and Spectrum Mask]

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

[Electric Field Strength of Spurious Emission]

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

	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 7.7	7.0 x 6.0	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room
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
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	-	8.0 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 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 13.56 MHz) - TypeA - TypeB - FeliCa(212 kbps) - FeliCa(424 kbps) - ISO15693	With Tag Without Tag Antenna terminated
The EUT was operated in a manner similar to typical use during the tests.	

Test Item	Operating mode *1)	Type of tag
Conducted emission	Tx with Tag	All type
	Tx without Tag	All type
	Tx Antenna terminated	All type
Electric Field Strength of Fundamental Emission	Tx with Tag	FeliCa(212 kbps)
	Tx without Tag	TypeA, TypeB, FeliCa(424 kbps), ISO15693
Spectrum Mask	Tx with Tag	FeliCa(212 kbps)
	Tx without Tag	TypeA, TypeB, FeliCa(424 kbps), ISO15693
20dB Bandwidth 99% Occupied Bandwidth	Tx with Tag	All type
	Tx without Tag	
Electric Field Strength of Spurious Emission	Tx with Tag	All type
Frequency Tolerance	Tx without Tag	All type

*1) This EUT has two modes which Tag is attached to the EUT or not. The worst case was confirmed with and without Tag. The test was performed with worst case each type of Tag.

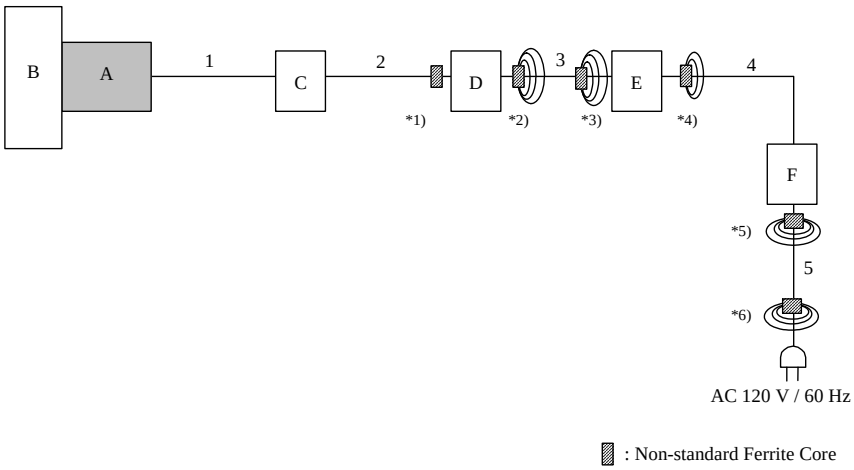
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

Frequency Tolerance:

Temperature : -20deg.C to +50deg.C Step 10deg.C
Voltage : Normal Voltage : DC 3.300 V
Maximum Voltage : DC 3.795 V
Minimum Voltage : DC 2.805 V
(DC 3.3 V ±15 %)

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

4.2 Configuration and peripherals



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

<Notes for Ferrite cores>

No.	Model No.	Manufacturer	Turn	Remark
*1)	K3 FF 20.00x12.00x6.50x1.30	FERRICO CORPORATION	1turn	5 mm from Item D
*2)	K3 FF 20.00x12.00x6.50x1.30	FERRICO CORPORATION	4 turns	10 mm from Item D
*3)	ESD-R-38	TOKIN	4 turns	10 mm from Item E
*4)	TFT274015S	TKK	3 turns	15 mm from Item E
*5)	TFT274015S	TKK	4 turns	10 mm from Item F
*6)	TFT274015S	TKK	4 turns	10 mm from AC plug
* These cores did not affect Radiated emission and Frequency tolerance tests. Also, Conducted emission test was performed without cores.				

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	NFC Module	BRNF13M002	5D17 02E	BROTHER INDUSTRIES, LTD.	EUT
B	Tag	TypeA	04303331711b80	NXP Semiconductors	-
		TypeB	-	Electronic Drivers License	-
		FeliCa 212kbps	01010801510c7800	SONY	-
		FeliCa 424kbps	010108012f12a916	SONY	-
		ISO15693	e004010011f69ff6	NXP Semiconductors	-
C	Jig	-	5A2300 *1) 5D17 00D *2)	BROTHER INDUSTRIES, LTD.	-
D	Jig	-	B01	BROTHER INDUSTRIES, LTD.	-
E	Jig	-	75	BROTHER INDUSTRIES, LTD.	-
F	AC Adapter	DS-C	GOHD35200628S2	BROTHER INDUSTRIES, LTD.	-

*1) Used for other tests except for Frequency Tolerance test.
*2) Used for Frequency Tolerance test only.

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Flexible Cable	0.1	Unshielded	Unshielded	-
2	Flexible Cable	0.1	Unshielded	Unshielded	-
3	DC Cable	0.3	Unshielded	Unshielded	-
4	DC Cable	1.5	Unshielded	Unshielded	-
5	AC Cable	1.8	Unshielded	Unshielded	-

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 40cm 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 80cm from any other grounded conducting surface. EUT was located 80cm 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 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm 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 - 30 MHz**
Test data	**: APPENDIX**
Test result	**: Pass**

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 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: 0deg., 45deg., 90deg., 135 deg., and 180 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 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

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	Above 1 GHz	
Instrument used	Test Receiver					Spectrum Analyzer	
Detector	PK/AV	QP	PK/AV	QP	QP	PK	AV
IF Bandwidth	200 Hz	200 Hz	9 kHz	9 kHz	120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz
Test Distance	3 m *1)	3 m *1)	3 m *1)	3 m *2)	3 m	3 m	3 m

*1) Distance Factor: 40 x log (3 m/300 m) = -80 dB
*2) Distance Factor: 40 x log (3 m/30 m) = -40 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 937606.

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

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

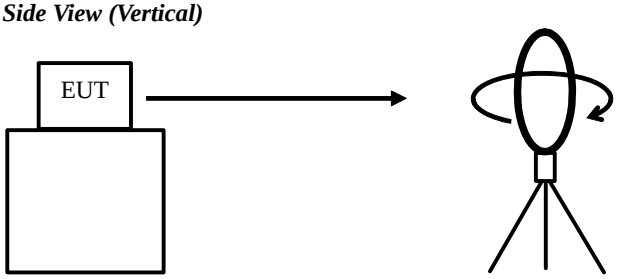
SECTION 7: Other test

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20dB Bandwidth 99% Occupied Bandwidth	50 kHz	1 kHz	3 kHz	Auto (Simple)	Sample	Clear Write	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter

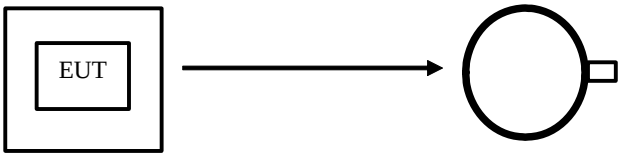
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

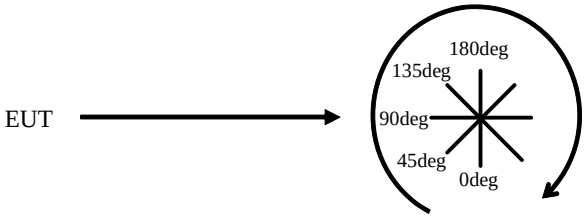


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

APPENDIX 1: Test data

Conducted emission
TypeA

DATA OF CONDUCTED EMISSION TEST

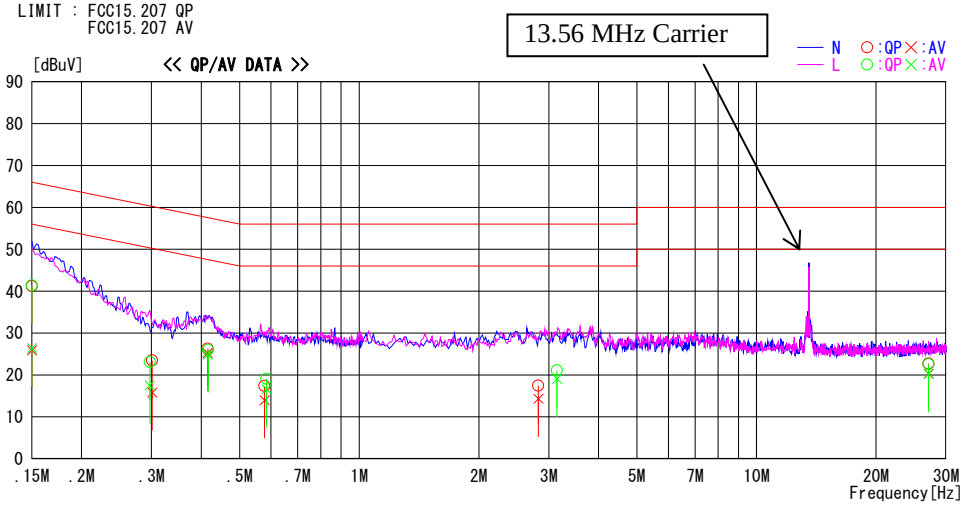
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation Type A without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.0	12.7	13.2	41.2	25.9	66.0	56.0	24.8	30.1	N	
0.30120	10.3	2.6	13.2	23.5	15.8	60.2	50.2	36.7	34.4	N	
0.41530	13.1	12.0	13.2	26.3	25.2	57.5	47.5	31.2	22.3	N	
0.57800	4.1	0.7	13.3	17.4	14.0	56.0	46.0	38.6	32.0	N	
2.82400	4.0	0.8	13.5	17.5	14.3	56.0	46.0	38.5	31.7	N	
27.12000	7.5	5.1	15.2	22.7	20.3	60.0	50.0	37.3	29.7	N	
0.15000	28.2	13.2	13.2	41.4	26.4	66.0	56.0	24.6	29.6	L	
0.29700	9.9	4.3	13.2	23.1	17.5	60.3	50.3	37.2	32.8	L	
0.41630	12.8	11.7	13.2	26.0	24.9	57.5	47.5	31.5	22.6	L	
0.58440	5.8	3.3	13.3	19.1	16.6	56.0	46.0	36.9	29.4	L	
3.14500	7.5	5.5	13.6	21.1	19.1	56.0	46.0	34.9	26.9	L	
27.12000	7.4	5.0	15.2	22.6	20.2	60.0	50.0	37.4	29.8	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
TypeA

DATA OF CONDUCTED EMISSION TEST

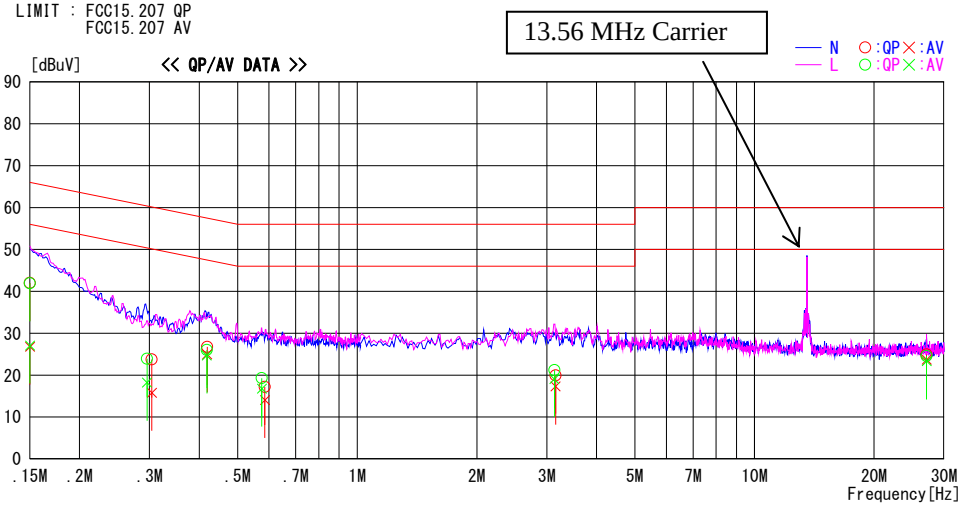
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation Type A with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.8	13.6	13.2	42.0	26.8	66.0	56.0	24.0	29.2	N	
0.30400	10.5	2.6	13.2	23.7	15.8	60.1	50.1	36.4	34.3	N	
0.41890	13.5	11.8	13.2	26.7	25.0	57.5	47.5	30.8	22.5	N	
0.58520	3.9	0.8	13.3	17.2	14.1	56.0	46.0	38.8	31.9	N	
3.15600	6.3	3.7	13.6	19.9	17.3	56.0	46.0	36.1	28.7	N	
27.12000	9.7	8.5	15.2	24.9	23.7	60.0	50.0	35.1	26.3	N	
0.15000	28.7	13.9	13.2	41.9	27.1	66.0	56.0	24.1	28.9	L	
0.29560	10.7	5.0	13.2	23.9	18.2	60.4	50.4	36.5	32.2	L	
0.41820	12.8	11.5	13.2	26.0	24.7	57.5	47.5	31.5	22.8	L	
0.57540	6.0	3.5	13.3	19.3	16.8	56.0	46.0	36.7	29.2	L	
3.13600	7.6	5.5	13.6	21.2	19.1	56.0	46.0	34.8	26.9	L	
27.12000	9.4	8.1	15.2	24.6	23.3	60.0	50.0	35.4	26.7	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
TypeA

DATA OF CONDUCTED EMISSION TEST

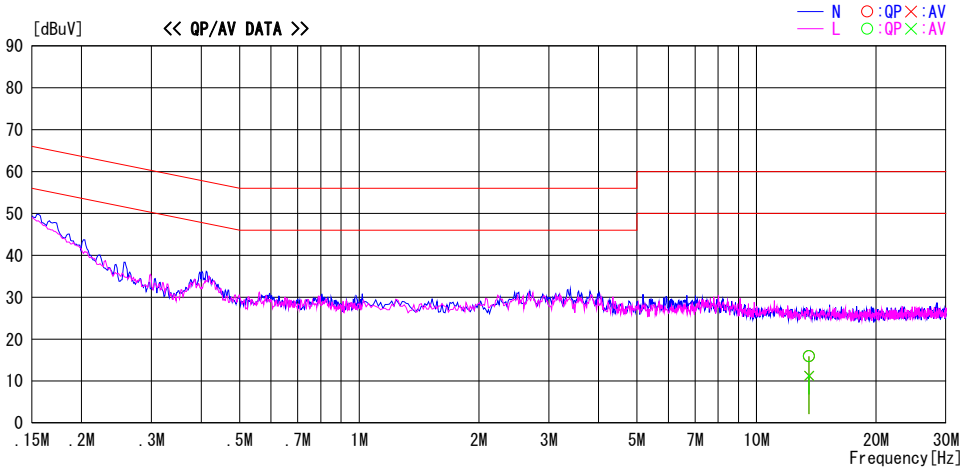
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Mod ON Type A, Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	1.4	-3.3	14.5	15.9	11.2	60.0	50.0	44.1	38.8	N	
13.56000	1.4	-3.3	14.5	15.9	11.2	60.0	50.0	44.1	38.8	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
TypeB

DATA OF CONDUCTED EMISSION TEST

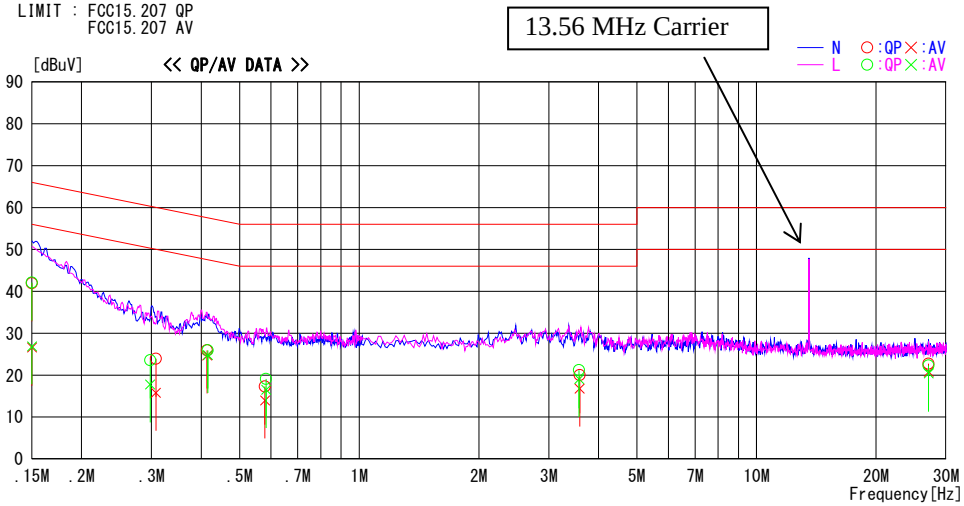
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation Type B without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.7	13.4	13.2	41.9	26.6	66.0	56.0	24.1	29.4	N	
0.30780	10.7	2.6	13.2	23.9	15.8	60.0	50.0	36.1	34.2	N	
0.41420	12.7	11.5	13.2	25.9	24.7	57.6	47.6	31.7	22.9	N	
0.57923	4.0	0.7	13.3	17.3	14.0	56.0	46.0	38.7	32.0	N	
3.58960	6.4	3.2	13.6	20.0	16.8	56.0	46.0	36.0	29.2	N	
27.12000	7.5	5.6	15.2	22.7	20.8	60.0	50.0	37.3	29.2	N	
0.15000	28.9	13.7	13.2	42.1	26.9	66.0	56.0	23.9	29.1	L	
0.29770	10.4	4.6	13.2	23.6	17.8	60.3	50.3	36.7	32.5	L	
0.41590	12.7	11.6	13.2	25.9	24.8	57.5	47.5	31.6	22.7	L	
0.58280	5.8	3.2	13.3	19.1	16.5	56.0	46.0	36.9	29.5	L	
3.57760	7.6	5.5	13.6	21.2	19.1	56.0	46.0	34.8	26.9	L	
27.12000	7.1	5.2	15.2	22.3	20.4	60.0	50.0	37.7	29.6	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
TypeB

DATA OF CONDUCTED EMISSION TEST

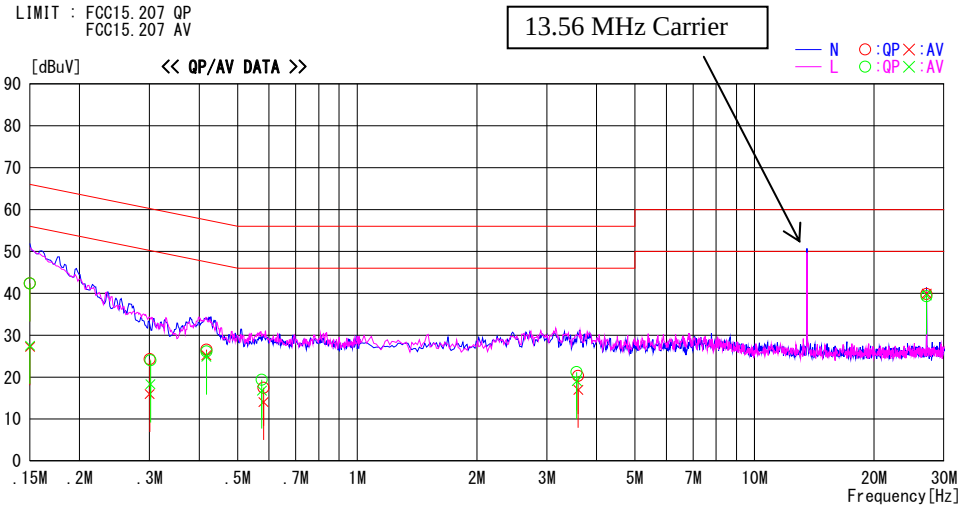
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation Type B with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	29.2	14.0	13.2	42.4	27.2	66.0	56.0	23.6	28.8	N	
0.30030	11.1	2.8	13.2	24.3	16.0	60.2	50.2	35.9	34.2	N	
0.41720	13.4	12.0	13.2	26.6	25.2	57.5	47.5	30.9	22.3	N	
0.58113	4.2	0.8	13.3	17.5	14.1	56.0	46.0	38.5	31.9	N	
3.59960	6.6	3.3	13.7	20.3	17.0	56.0	46.0	35.7	29.0	N	
27.12000	24.6	24.8	15.2	39.8	40.0	60.0	50.0	20.2	10.0	N	
0.15000	29.2	14.3	13.2	42.4	27.5	66.0	56.0	23.6	28.5	L	
0.30160	10.8	5.1	13.2	24.0	18.3	60.2	50.2	36.2	31.9	L	
0.41720	12.9	11.7	13.2	26.1	24.9	57.5	47.5	31.4	22.6	L	
0.57516	6.1	3.5	13.3	19.4	16.8	56.0	46.0	36.6	29.2	L	
3.56960	7.6	5.5	13.6	21.2	19.1	56.0	46.0	34.8	26.9	L	
27.12000	24.1	24.3	15.2	39.3	39.5	60.0	50.0	20.7	10.5	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
TypeB

DATA OF CONDUCTED EMISSION TEST

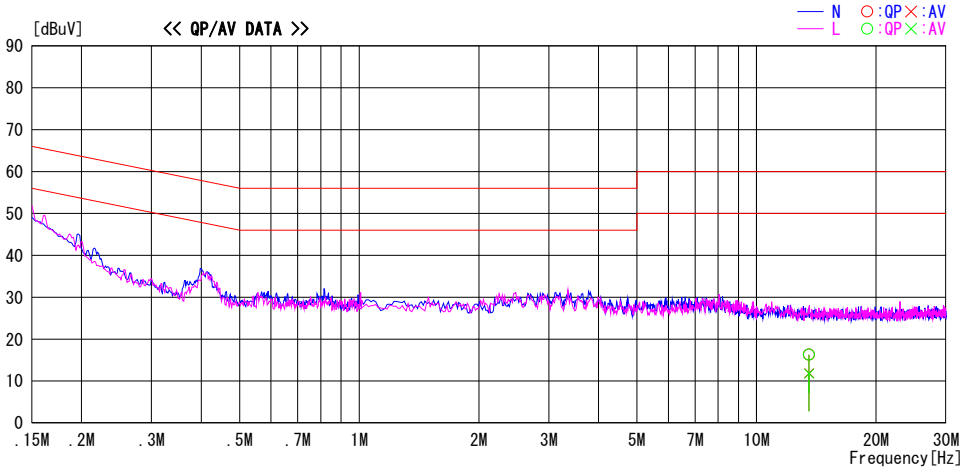
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Mod ON Type B, Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	1.8	-2.6	14.5	16.3	11.9	60.0	50.0	43.7	38.1	N	
13.56000	1.8	-2.7	14.5	16.3	11.8	60.0	50.0	43.7	38.2	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
FeliCa(212 kbps)

DATA OF CONDUCTED EMISSION TEST

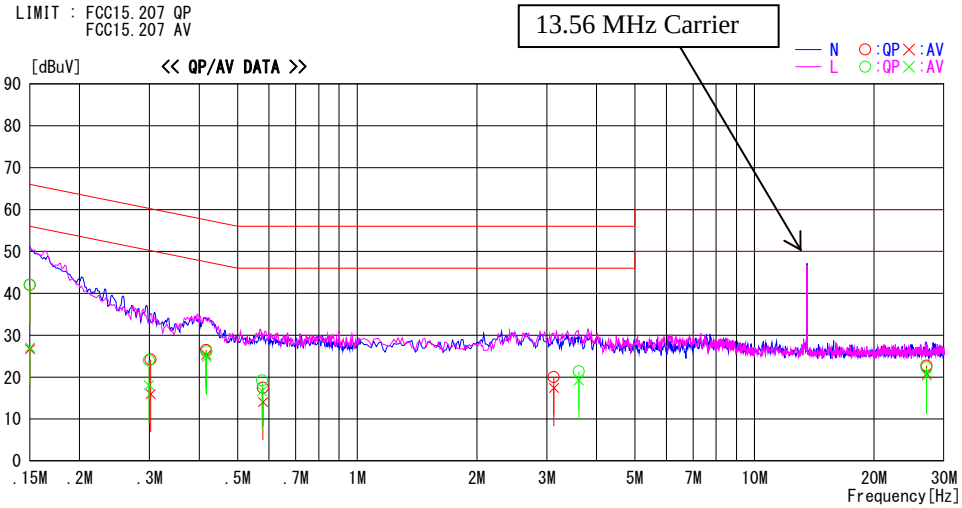
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(212 kbps) without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.8	13.5	13.2	42.0	26.7	66.0	56.0	24.0	29.3	N	
0.30190	11.0	2.8	13.2	24.2	16.0	60.2	50.2	36.0	34.2	N	
0.41670	13.3	12.1	13.2	26.5	25.3	57.5	47.5	31.0	22.2	N	
0.57910	4.2	0.8	13.3	17.5	14.1	56.0	46.0	38.5	31.9	N	
3.12400	6.4	3.8	13.6	20.0	17.4	56.0	46.0	36.0	28.6	N	
27.12000	7.5	5.6	15.2	22.7	20.8	60.0	50.0	37.3	29.2	N	
0.15000	28.8	13.9	13.2	42.0	27.1	66.0	56.0	24.0	28.9	L	
0.29910	10.8	4.9	13.2	24.0	18.1	60.3	50.3	36.3	32.2	L	
0.41780	12.9	11.6	13.2	26.1	24.8	57.5	47.5	31.4	22.7	L	
0.57618	5.9	3.4	13.3	19.2	16.7	56.0	46.0	36.8	29.3	L	
3.61100	7.7	5.5	13.7	21.4	19.2	56.0	46.0	34.6	26.8	L	
27.12000	7.1	5.1	15.2	22.3	20.3	60.0	50.0	37.7	29.7	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Conducted emission
FeliCa(212 kbps)

DATA OF CONDUCTED EMISSION TEST

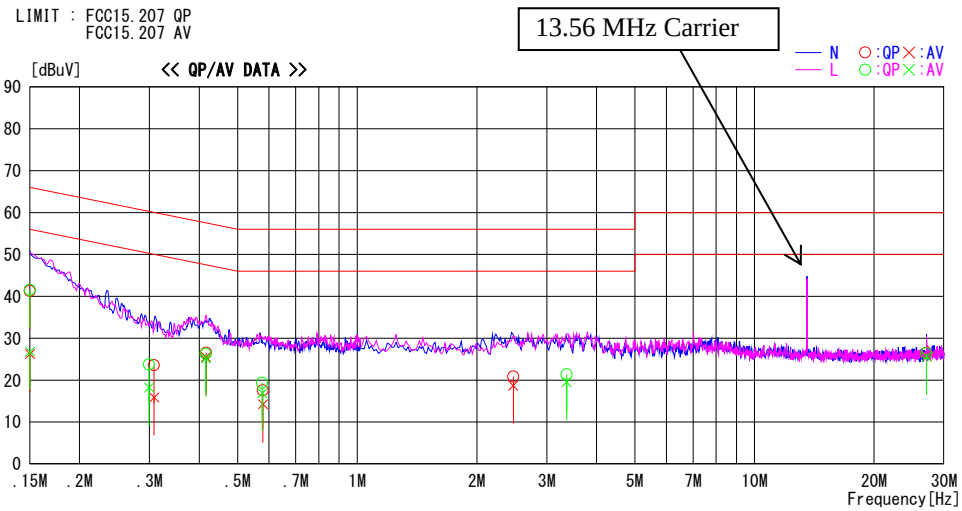
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(212 kbps) with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.1	13.0	13.2	41.3	26.2	66.0	56.0	24.7	29.8	N	
0.30810	10.4	2.7	13.2	23.6	15.9	60.0	50.0	36.4	34.1	N	
0.41630	13.4	12.3	13.2	26.6	25.5	57.5	47.5	30.9	22.0	N	
0.57910	4.3	0.9	13.3	17.6	14.2	56.0	46.0	38.4	31.8	N	
2.47200	7.3	5.2	13.5	20.8	18.7	56.0	46.0	35.2	27.3	N	
27.12000	11.3	10.5	15.2	26.5	25.7	60.0	50.0	33.5	24.3	N	
0.15000	28.4	13.6	13.2	41.6	26.8	66.0	56.0	24.4	29.2	L	
0.29930	10.5	5.0	13.2	23.7	18.2	60.3	50.3	36.6	32.1	L	
0.41580	13.1	12.0	13.2	26.3	25.2	57.5	47.5	31.2	22.3	L	
0.57630	6.1	3.6	13.3	19.4	16.9	56.0	46.0	36.6	29.1	L	
3.36600	7.8	5.9	13.6	21.4	19.5	56.0	46.0	34.6	26.5	L	
27.12000	11.2	10.4	15.2	26.4	25.6	60.0	50.0	33.6	24.4	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
FeliCa(212 kbps)

DATA OF CONDUCTED EMISSION TEST

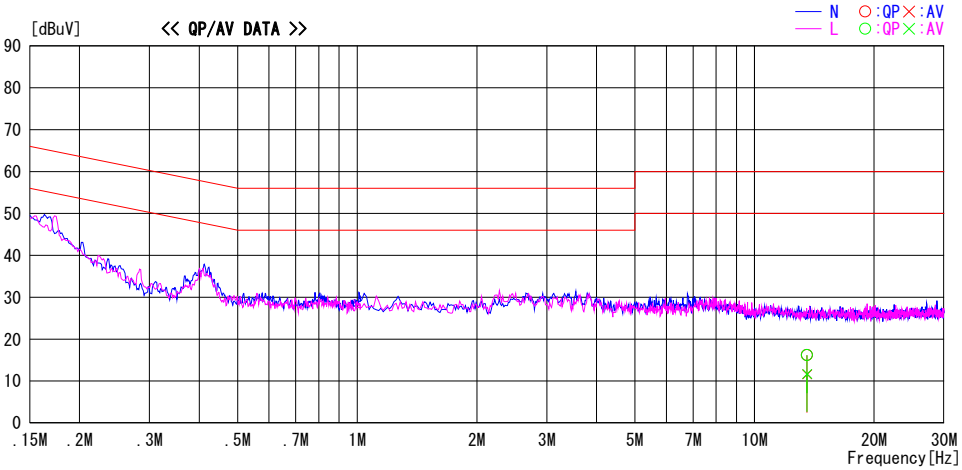
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Mod ON FeliCa (212kbps), Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	1.7	-2.9	14.5	16.2	11.6	60.0	50.0	43.8	38.4	N	
13.56000	1.7	-2.8	14.5	16.2	11.7	60.0	50.0	43.8	38.3	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
FeliCa(424 kbps)

DATA OF CONDUCTED EMISSION TEST

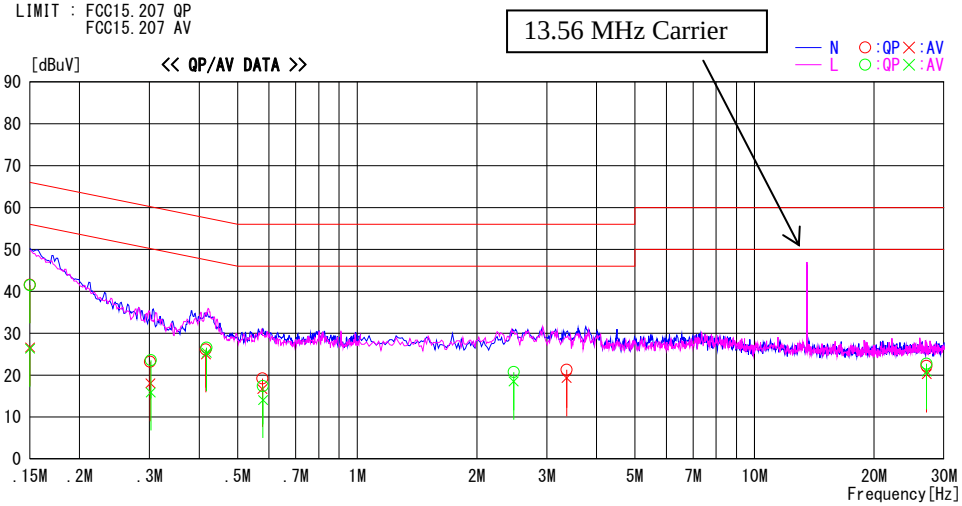
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(424 kbps) without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	28.4	13.4	13.2	41.6	26.6	66.0	56.0	24.4	29.4	N	
0.30150	10.0	4.9	13.2	23.2	18.1	60.2	50.2	37.0	32.1	N	
0.41580	12.9	11.8	13.2	26.1	25.0	57.5	47.5	31.4	22.5	N	
0.57740	5.9	3.4	13.3	19.2	16.7	56.0	46.0	36.8	29.3	N	
3.36500	7.7	5.7	13.6	21.3	19.3	56.0	46.0	34.7	26.7	N	
27.12000	7.0	5.0	15.2	22.2	20.2	60.0	50.0	37.8	29.8	N	
0.15000	28.3	13.1	13.2	41.5	26.3	66.0	56.0	24.5	29.7	L	
0.30230	10.4	2.7	13.2	23.6	15.9	60.2	50.2	36.6	34.3	L	
0.41780	13.4	12.1	13.2	26.6	25.3	57.5	47.5	30.9	22.2	L	
0.57910	4.1	0.8	13.3	17.4	14.1	56.0	46.0	38.6	31.9	L	
2.47600	7.2	5.0	13.5	20.7	18.5	56.0	46.0	35.3	27.5	L	
27.12000	7.5	5.7	15.2	22.7	20.9	60.0	50.0	37.3	29.1	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
FeliCa(424 kbps)

DATA OF CONDUCTED EMISSION TEST

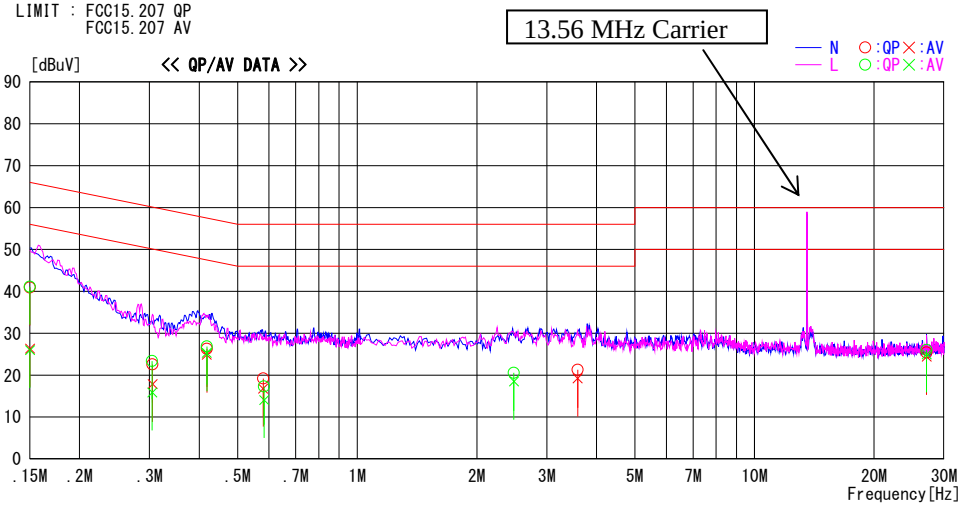
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(424 kbps) with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	27.7	13.1	13.2	40.9	26.3	66.0	56.0	25.1	29.7	N	
0.30540	9.4	4.7	13.2	22.6	17.9	60.1	50.1	37.5	32.2	N	
0.41810	13.1	11.7	13.2	26.3	24.9	57.5	47.5	31.2	22.6	N	
0.58001	5.9	3.5	13.3	19.2	16.8	56.0	46.0	36.8	29.2	N	
3.58600	7.7	5.6	13.6	21.3	19.2	56.0	46.0	34.7	26.8	N	
27.12000	10.2	9.2	15.2	25.4	24.4	60.0	50.0	34.6	25.6	N	
0.15000	27.9	12.8	13.2	41.1	26.0	66.0	56.0	24.9	30.0	L	
0.30470	10.2	2.7	13.2	23.4	15.9	60.1	50.1	36.7	34.2	L	
0.41840	13.6	12.1	13.2	26.8	25.3	57.5	47.5	30.7	22.2	L	
0.58320	4.0	0.8	13.3	17.3	14.1	56.0	46.0	38.7	31.9	L	
2.47800	7.1	5.0	13.5	20.6	18.5	56.0	46.0	35.4	27.5	L	
27.12000	10.8	9.8	15.2	26.0	25.0	60.0	50.0	34.0	25.0	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
FeliCa(424 kbps)

DATA OF CONDUCTED EMISSION TEST

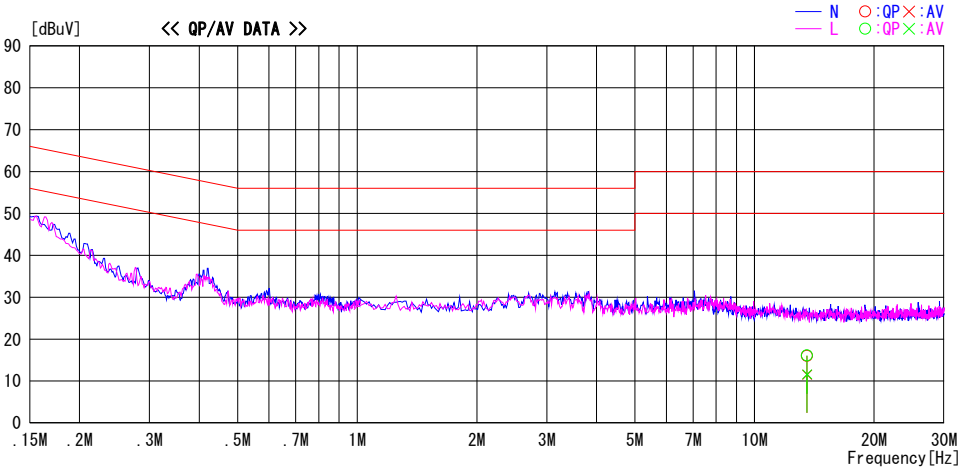
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Mod ON FeliCa (424kbps), Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	1.5	-3.0	14.5	16.0	11.5	60.0	50.0	44.0	38.5	N	
13.56000	1.6	-2.9	14.5	16.1	11.6	60.0	50.0	43.9	38.4	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Conducted emission
ISO15693

DATA OF CONDUCTED EMISSION TEST

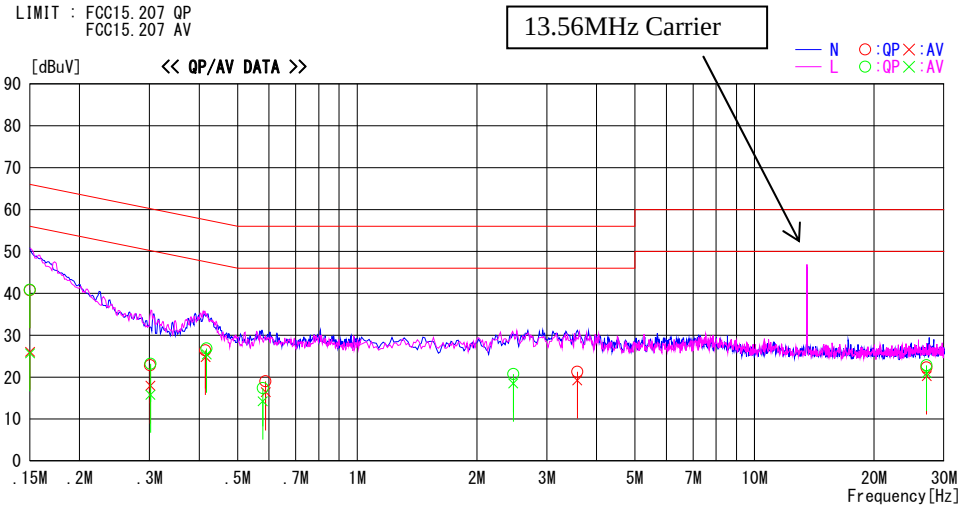
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation ISO15693 without Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	27.5	12.9	13.2	40.7	26.1	66.0	56.0	25.3	29.9	N	
0.30120	9.6	4.8	13.2	22.8	18.0	60.2	50.2	37.4	32.2	N	
0.41490	13.2	11.6	13.2	26.4	24.8	57.5	47.5	31.1	22.7	N	
0.58820	5.7	3.1	13.3	19.0	16.4	56.0	46.0	37.0	29.6	N	
3.57900	7.7	5.6	13.6	21.3	19.2	56.0	46.0	34.7	26.8	N	
27.12000	7.1	5.0	15.2	22.3	20.2	60.0	50.0	37.7	29.8	N	
0.15000	27.6	12.5	13.2	40.8	25.7	66.0	56.0	25.2	30.3	L	
0.30180	10.0	2.6	13.2	23.2	15.8	60.2	50.2	37.0	34.4	L	
0.41780	13.6	12.2	13.2	26.8	25.4	57.5	47.5	30.7	22.1	L	
0.57820	4.1	0.9	13.3	17.4	14.2	56.0	46.0	38.6	31.8	L	
2.47100	7.2	5.0	13.5	20.7	18.5	56.0	46.0	35.3	27.5	L	
27.12000	7.6	5.8	15.2	22.8	21.0	60.0	50.0	37.2	29.0	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Conducted emission
ISO15693

DATA OF CONDUCTED EMISSION TEST

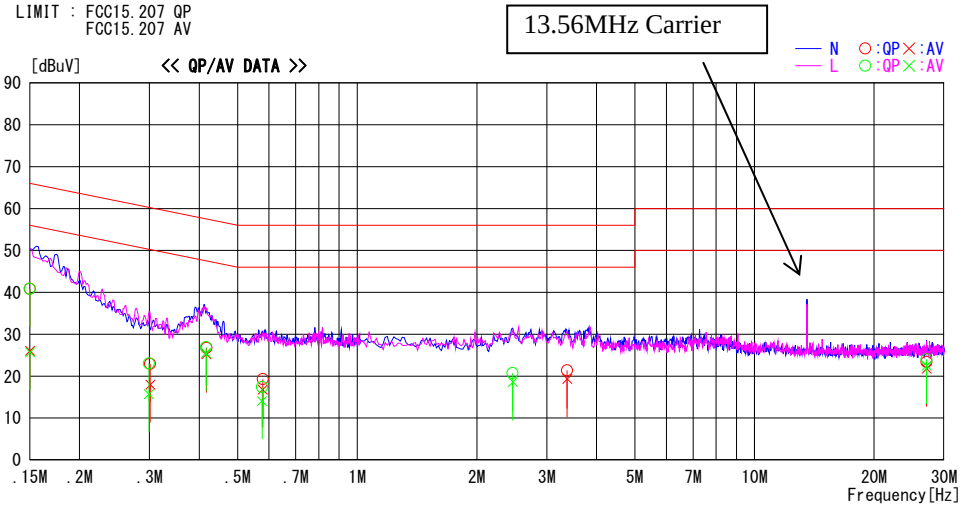
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation ISO15693 with Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	27.6	12.9	13.2	40.8	26.1	66.0	56.0	25.2	29.9	N	
0.30150	9.7	4.8	13.2	22.9	18.0	60.2	50.2	37.3	32.2	N	
0.41740	13.5	12.0	13.2	26.7	25.2	57.5	47.5	30.8	22.3	N	
0.57860	6.0	3.5	13.3	19.3	16.8	56.0	46.0	36.7	29.2	N	
3.37800	7.8	5.7	13.6	21.4	19.3	56.0	46.0	34.6	26.7	N	
27.12000	8.2	6.6	15.2	23.4	21.8	60.0	50.0	36.6	28.2	N	
0.15000	27.6	12.5	13.2	40.8	25.7	66.0	56.0	25.2	30.3	L	
0.29910	9.8	2.5	13.2	23.0	15.7	60.3	50.3	37.3	34.6	L	
0.41650	13.7	12.3	13.2	26.9	25.5	57.5	47.5	30.6	22.0	L	
0.57610	4.1	0.8	13.3	17.4	14.1	56.0	46.0	38.6	31.9	L	
2.46360	7.2	5.1	13.5	20.7	18.6	56.0	46.0	35.3	27.4	L	
27.12000	8.8	7.3	15.2	24.0	22.5	60.0	50.0	36.0	27.5	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Conducted emission
ISO15693

DATA OF CONDUCTED EMISSION TEST

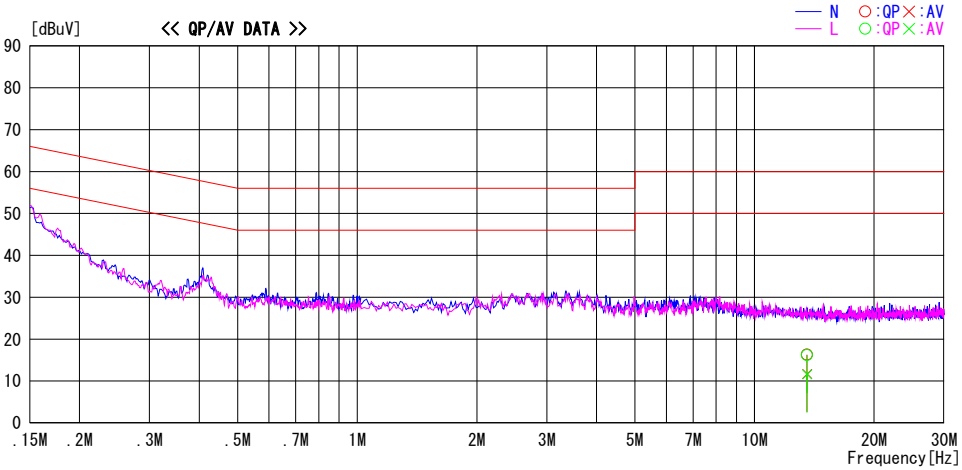
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2015/07/07

Report No. : 10754085H

Temp./Humi. : 23deg. C / 54% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Mod ON ISO15693, Antenna terminated

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
13.56000	1.8	-2.8	14.5	16.3	11.7	60.0	50.0	43.7	38.3	N	
13.56000	1.7	-2.9	14.5	16.2	11.6	60.0	50.0	43.8	38.4	L	

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

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Fundamental emission and Spectrum Mask
TypeA

DATA OF RADIATED EMISSION TEST

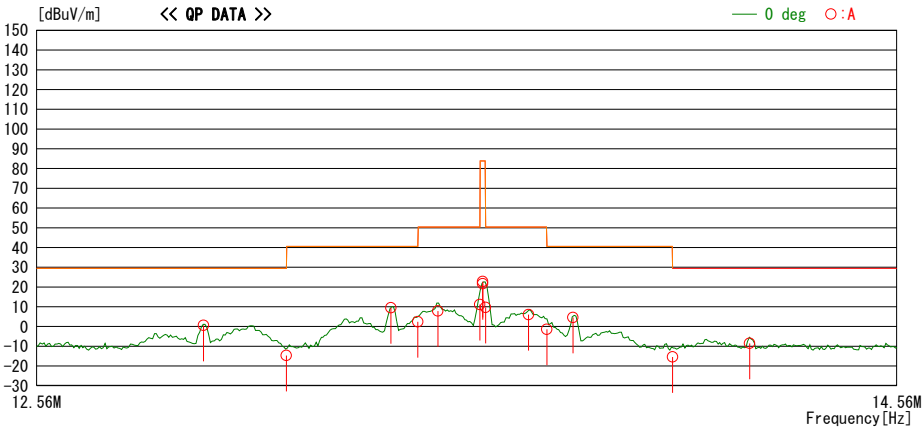
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./ Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation Type A without Tag Worst Axis Z

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
12.92504	46.3	QP	19.5	-33.2	32.1	0.5	29.5	29.0	0	A	180	
13.11000	31.1	QP	19.5	-33.2	32.1	-14.7	29.5	44.2	0	A	180	
13.34803	55.3	QP	19.4	-33.2	32.1	9.4	40.5	31.1	0	A	180	
13.41000	48.2	QP	19.4	-33.2	32.1	2.3	40.5	38.2	0	A	180	
13.45604	53.8	QP	19.4	-33.2	32.1	7.9	50.4	42.5	0	A	180	
13.55300	57.1	QP	19.4	-33.2	32.1	11.2	50.4	39.2	0	A	180	
13.56000	68.7	QP	19.4	-33.2	32.1	22.8	83.9	61.1	0	A	180	
13.56000	67.6	QP	19.4	-33.2	32.1	21.7	83.9	62.2	0	A	180	With Tag A
13.56700	55.6	QP	19.4	-33.2	32.1	9.7	50.4	40.7	0	A	180	
13.66729	52.0	QP	19.4	-33.2	32.1	6.1	50.4	44.3	0	A	180	
13.71000	44.5	QP	19.4	-33.2	32.1	-1.4	40.5	41.9	0	A	180	
13.77240	50.4	QP	19.4	-33.2	32.1	4.5	40.5	36.0	0	A	180	
14.01000	30.6	QP	19.3	-33.2	32.1	-15.4	29.5	44.9	0	A	180	
14.19637	37.5	QP	19.3	-33.2	32.1	-8.5	29.5	38.0	0	A	180	

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) - GAIN(AMP)

Result of the fundamental emission at 3m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	68.7	19.4	6.8	32.1	-	62.8	-	-	Fundamental

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

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Fundamental emission and Spectrum Mask
TypeB

DATA OF RADIATED EMISSION TEST

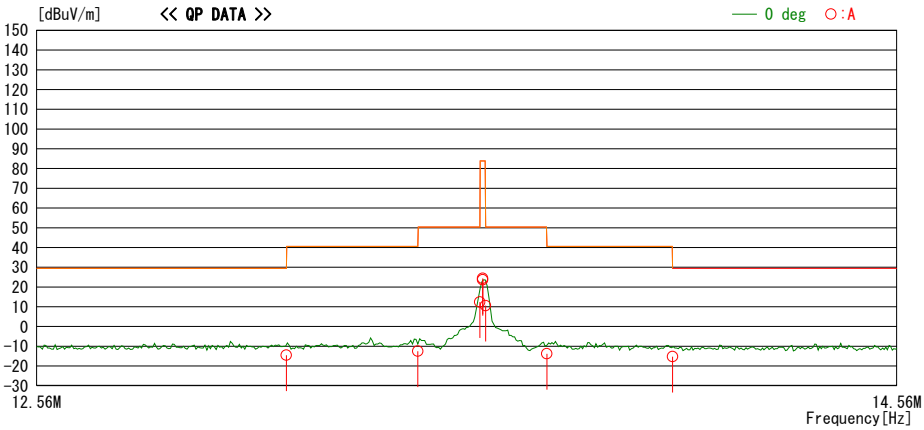
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./ Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation Type B without Tag Worst Axis Z

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	31.2	QP	19.5	-33.2	32.1	-14.6	29.5	44.1	0	A	359	
13.41000	33.4	QP	19.4	-33.2	32.1	-12.5	40.5	53.0	0	A	359	
13.55300	58.2	QP	19.4	-33.2	32.1	12.3	50.4	38.1	0	A	359	
13.56000	70.2	QP	19.4	-33.2	32.1	24.3	83.9	59.6	0	A	359	
13.56000	69.5	QP	19.4	-33.2	32.1	23.6	83.9	60.3	0	A	359	With Type B
13.56700	56.5	QP	19.4	-33.2	32.1	10.6	50.4	39.8	0	A	359	
13.71000	32.1	QP	19.4	-33.2	32.1	-13.8	40.5	54.3	0	A	359	
14.01000	30.8	QP	19.3	-33.2	32.1	-15.2	29.5	44.7	0	A	359	

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) - GAIN(AMP)

Result of the fundamental emission at 3m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	70.2	19.4	6.8	32.1	-	64.3	-	-	Fundamental

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

Fundamental emission and Spectrum Mask
FeliCa(212 kbps)

DATA OF RADIATED EMISSION TEST

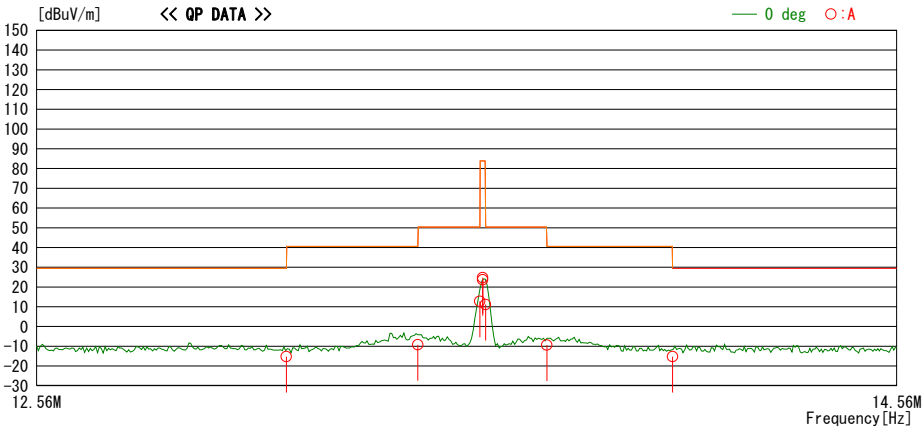
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./ Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(212 kbps) with Tag Worst Axis Z

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	30.6	QP	19.5	-33.2	32.1	-15.2	29.5	44.7	0	A	172	
13.41000	36.7	QP	19.4	-33.2	32.1	-9.2	40.5	49.7	0	A	172	
13.55300	58.7	QP	19.4	-33.2	32.1	12.8	50.4	37.6	0	A	172	
13.56000	69.5	QP	19.4	-33.2	32.1	23.6	83.9	60.3	0	A	359	Without Felica
13.56000	70.6	QP	19.4	-33.2	32.1	24.7	83.9	59.2	0	A	172	
13.56700	57.0	QP	19.4	-33.2	32.1	11.1	50.4	39.3	0	A	172	
13.71000	36.5	QP	19.4	-33.2	32.1	-9.4	40.5	49.9	0	A	172	
14.01000	30.8	QP	19.3	-33.2	32.1	-15.2	29.5	44.7	0	A	172	

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) - GAIN(AMP)

Result of the fundamental emission at 3m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	70.6	19.4	6.8	32.1	-	64.7	-	-	Fundamental

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

Fundamental emission and Spectrum Mask
FeliCa(424 kbps)

DATA OF RADIATED EMISSION TEST

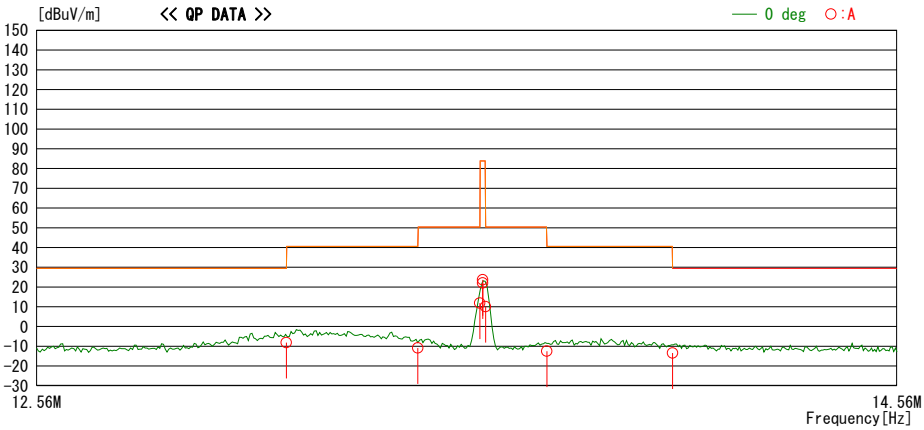
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./ Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(424 kbps) without Tag Worst Axis Z

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	37.7	QP	19.5	-33.2	32.1	-8.1	29.5	37.6	0	A	359	
13.41000	35.0	QP	19.4	-33.2	32.1	-10.9	40.5	51.4	0	A	359	
13.55300	57.7	QP	19.4	-33.2	32.1	11.8	50.4	38.6	0	A	359	
13.56000	69.5	QP	19.4	-33.2	32.1	23.6	83.9	60.3	0	A	359	
13.56000	68.0	QP	19.4	-33.2	32.1	22.1	83.9	61.8	0	A	174	With Felica
13.56700	55.9	QP	19.4	-33.2	32.1	10.0	50.4	40.4	0	A	359	
13.71000	33.4	QP	19.4	-33.2	32.1	-12.5	40.5	53.0	0	A	359	
14.01000	32.6	QP	19.3	-33.2	32.1	-13.4	29.5	42.9	0	A	359	

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) - GAIN(AMP)

Result of the fundamental emission at 3m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	69.5	19.4	6.8	32.1	-	63.6	-	-	Fundamental

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

Fundamental emission and Spectrum Mask
ISO15693

DATA OF RADIATED EMISSION TEST

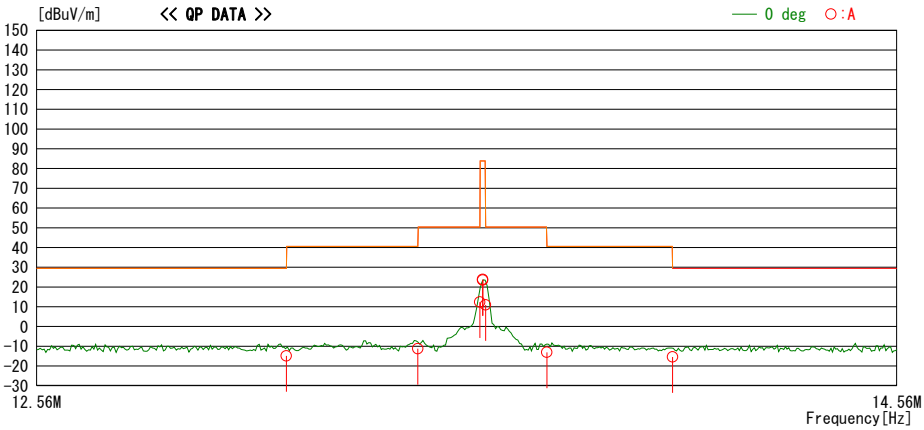
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./ Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation ISO15693 without Tag Worst Axis Z

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	30.9	QP	19.5	-33.2	32.1	-14.9	29.5	44.4	0	A	355	
13.41000	34.6	QP	19.4	-33.2	32.1	-11.3	40.5	51.8	0	A	355	
13.55300	58.2	QP	19.4	-33.2	32.1	12.3	50.4	38.1	0	A	355	
13.56000	69.8	QP	19.4	-33.2	32.1	23.9	83.9	60.0	0	A	355	
13.56000	69.3	QP	19.4	-33.2	32.1	23.4	83.9	60.5	0	A	359	With ISO tag
13.56700	56.8	QP	19.4	-33.2	32.1	10.9	50.4	39.5	0	A	355	
13.71000	32.8	QP	19.4	-33.2	32.1	-13.1	40.5	53.6	0	A	355	
14.01000	30.6	QP	19.3	-33.2	32.1	-15.4	29.5	44.9	0	A	355	

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) - GAIN(AMP)

Result of the fundamental emission at 3m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	69.8	19.4	6.8	32.1	-	63.9	-	-	Fundamental

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

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Spurious emission
(Below 30 MHz)
TypeA

DATA OF RADIATED EMISSION TEST

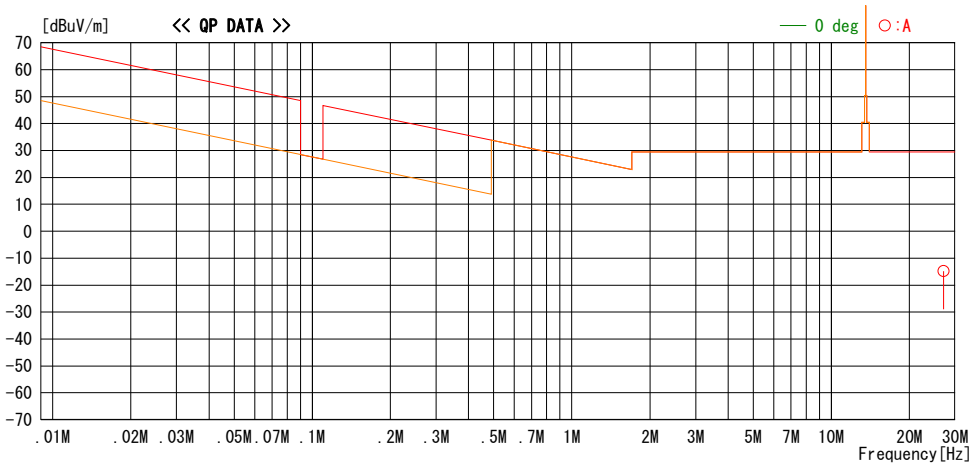
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp. / Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation Type A without Tag Worst Axis Z

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
27.12000	30.5	QP	19.7	-32.9	32.1	-14.8	29.5	44.3	0	A	359	

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) - GAIN(AMP)

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Spurious emission
(Below 30 MHz)
TypeB

DATA OF RADIATED EMISSION TEST

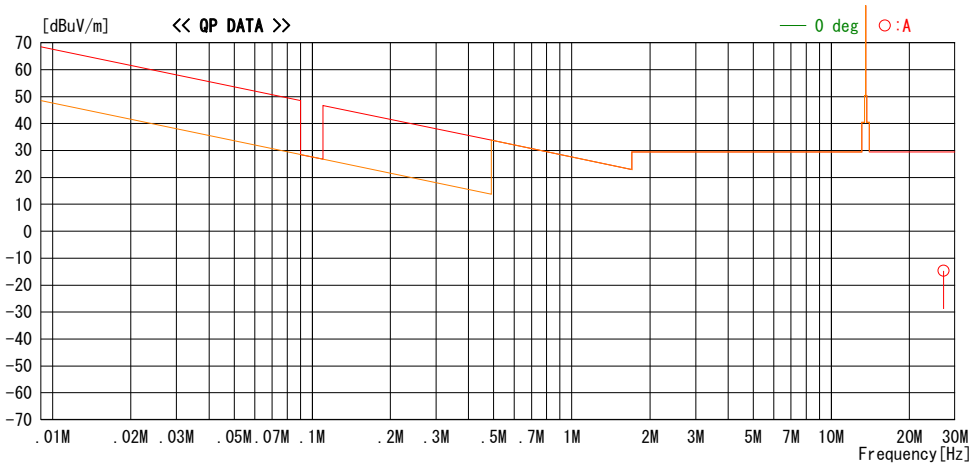
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp. / Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation Type B without Tag Worst Axis Z

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
27.12000	30.6	QP	19.7	-32.9	32.1	-14.7	29.5	44.2	0	A	359	

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) - GAIN(AMP)

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Spurious emission
(Below 30 MHz)
FeliCa(212 kbps)

DATA OF RADIATED EMISSION TEST

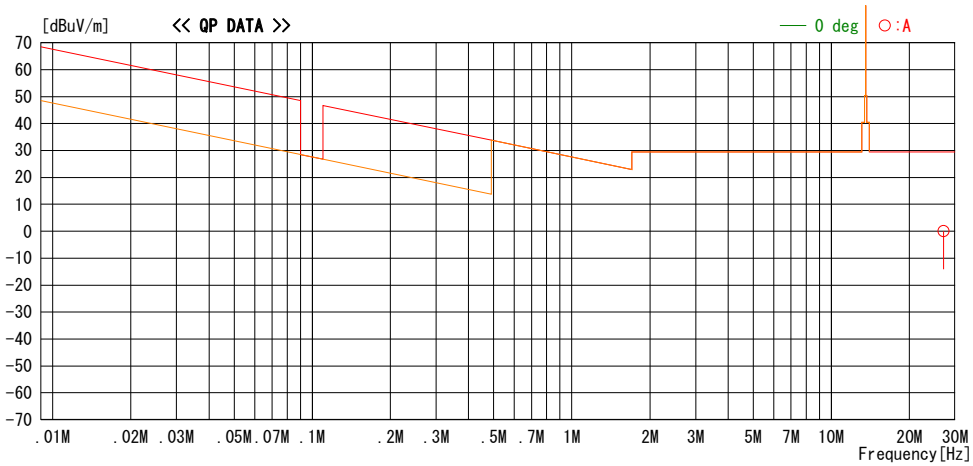
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp. / Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(212 kbps) with Tag Worst Axis Z

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
27.12000	45.3	QP	19.7	-32.9	32.1	0.0	29.5	29.5	0	A	359	

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) - GAIN(AMP)

Spurious emission
(Below 30 MHz)
FeliCa(424 kbps)

DATA OF RADIATED EMISSION TEST

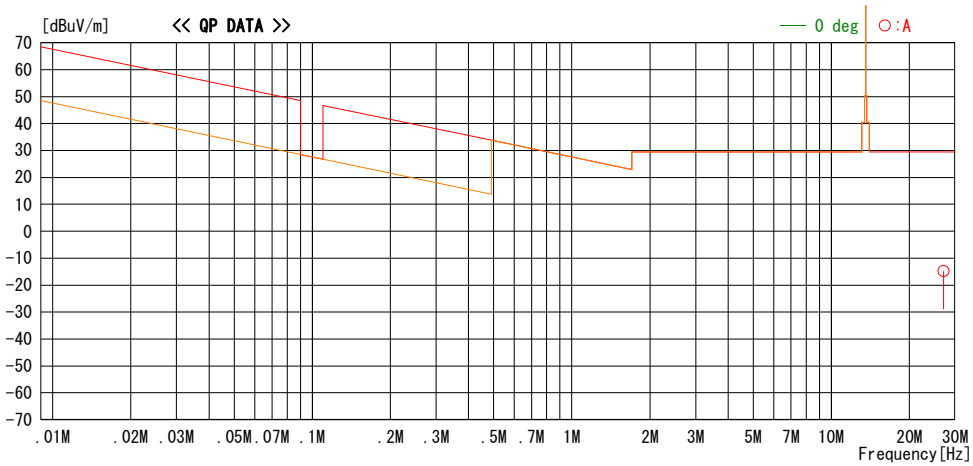
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/26

Report No. : 10754085H

Temp. / Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(424 kbps) without Tag Worst Axis Z

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
27.12000	30.5	QP	19.7	-32.9	32.1	-14.8	29.5	44.3	0	A	359	

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) - GAIN(AMP)

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Spurious emission
(Below 30 MHz)
ISO15693

DATA OF RADIATED EMISSION TEST

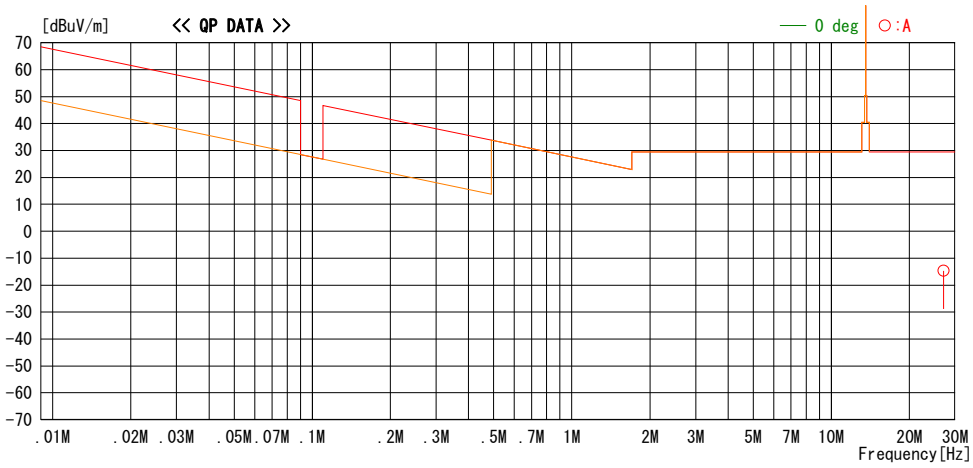
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/26

Report No. : 10754085H

Temp. / Humi. : 24deg. C / 60% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx 13.56MHz Modulation ISO15693 without Tag Worst Axis Z

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
27.12000	30.6	QP	19.7	-32.9	32.1	-14.7	29.5	44.2	0	A	359	

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) - GAIN(AMP)

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Spurious emission
(Above 30 MHz)
TypeA

DATA OF RADIATED EMISSION TEST

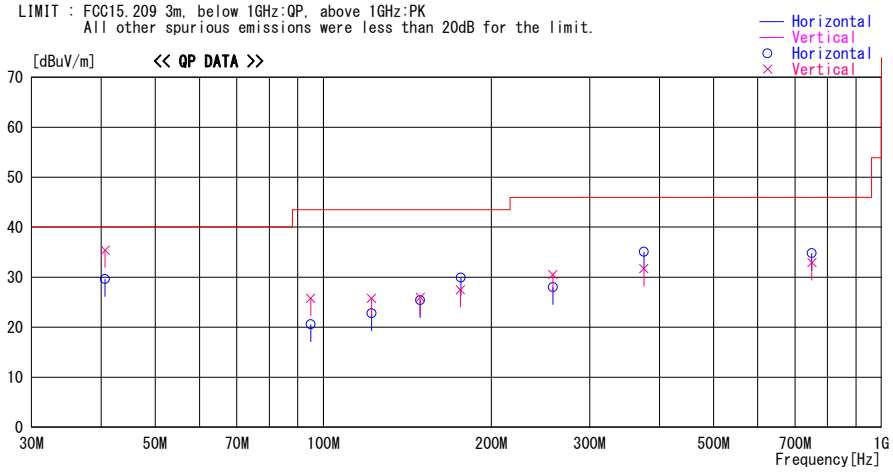
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation Type A with Tag Worst Axis (Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.660	40.4	QP	14.0	-24.8	29.6	167	383	Hori.	40.0	10.4	
40.667	46.2	QP	14.0	-24.8	35.4	92	100	Vert.	40.0	4.6	
94.918	40.7	QP	9.1	-24.0	25.8	90	100	Vert.	43.5	17.7	
94.919	35.5	QP	9.1	-24.0	20.6	178	196	Hori.	43.5	22.9	
122.035	36.3	QP	13.1	-23.6	25.8	91	100	Vert.	43.5	17.7	
122.037	33.3	QP	13.1	-23.6	22.8	176	128	Hori.	43.5	20.7	
149.157	33.7	QP	14.9	-23.2	25.4	162	122	Hori.	43.5	18.1	
149.161	34.3	QP	14.9	-23.2	26.0	83	100	Vert.	43.5	17.5	
176.092	34.5	QP	16.0	-23.0	27.5	117	100	Vert.	43.5	16.0	
176.277	36.9	QP	16.0	-23.0	29.9	139	195	Hori.	43.5	13.6	
257.637	32.6	QP	17.6	-22.2	28.0	269	132	Hori.	46.0	18.0	
257.642	35.1	QP	17.6	-22.2	30.5	177	100	Vert.	46.0	15.5	
374.998	38.6	QP	18.0	-21.5	35.1	146	100	Hori.	46.0	10.9	
375.002	35.2	QP	18.0	-21.5	31.7	233	152	Vert.	46.0	14.3	
750.000	31.3	QP	22.8	-19.3	34.8	178	134	Hori.	46.0	11.2	
750.000	29.4	QP	22.8	-19.3	32.9	112	100	Vert.	46.0	13.1	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. - GAIN(AMP))

Spurious emission
(Above 30 MHz)
TypeB

DATA OF RADIATED EMISSION TEST

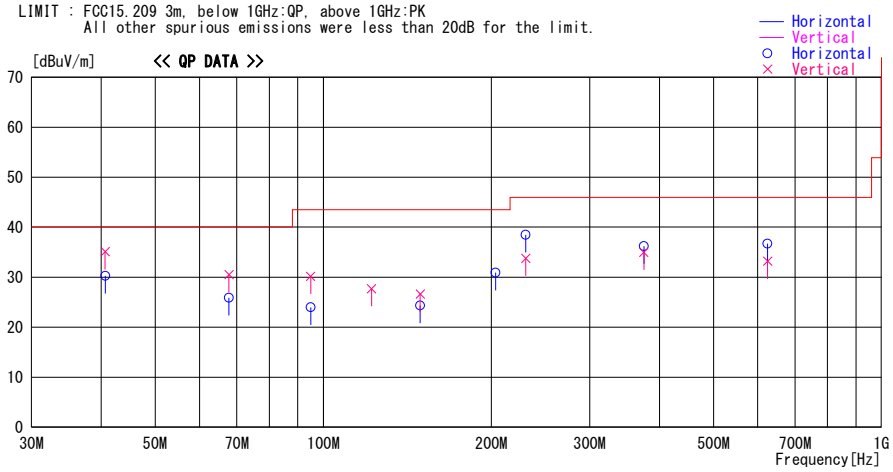
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation TypeB with Tag Worst Axis (Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin	Comment
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.667	45.9	QP	14.0	-24.8	35.1	90	100	Vert.	40.0	4.9	
40.674	41.1	QP	14.0	-24.8	30.3	178	368	Hori.	40.0	9.7	
67.794	48.2	QP	6.6	-24.3	30.5	89	100	Vert.	40.0	9.5	
67.798	43.6	QP	6.6	-24.3	25.9	0	251	Hori.	40.0	14.1	
94.915	45.1	QP	9.1	-24.0	30.2	91	100	Vert.	43.5	13.3	
94.914	38.9	QP	9.1	-24.0	24.0	199	176	Hori.	43.5	19.5	
122.041	38.2	QP	13.1	-23.6	27.7	95	100	Vert.	43.5	15.8	
149.153	32.6	QP	14.9	-23.2	24.3	221	113	Hori.	43.5	19.2	
149.159	34.9	QP	14.9	-23.2	26.6	97	100	Vert.	43.5	16.9	
203.392	36.9	QP	16.7	-22.7	30.9	256	166	Hori.	43.5	12.6	
230.516	39.2	QP	17.0	-22.4	33.8	196	100	Vert.	46.0	12.2	
230.516	43.9	QP	17.0	-22.4	38.5	266	140	Hori.	46.0	7.5	
374.998	39.7	QP	18.0	-21.5	36.2	150	100	Hori.	46.0	9.8	
374.998	38.5	QP	18.0	-21.5	35.0	233	152	Vert.	46.0	11.0	
625.005	36.2	QP	20.7	-20.2	36.7	174	161	Hori.	46.0	9.3	
625.007	32.7	QP	20.7	-20.2	33.2	290	100	Vert.	46.0	12.8	

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. - GAIN(AMP))

Spurious emission
(Above 30 MHz)
FeliCa(212 kbps)

DATA OF RADIATED EMISSION TEST

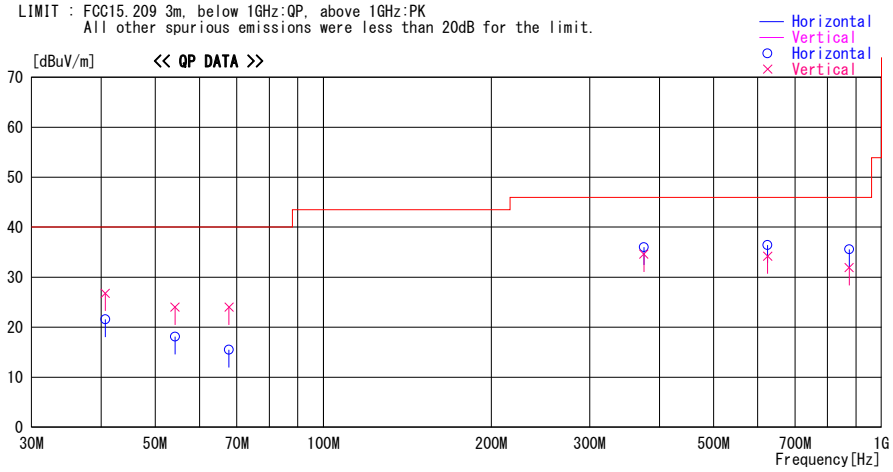
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(212 kbps) with Tag Worst Axis (Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
40.674	32.4	QP	14.0	-24.8	21.6	187	361	Hori.	40.0	18.4
40.680	37.6	QP	14.0	-24.8	26.8	96	100	Vert.	40.0	13.2
54.234	33.2	QP	9.4	-24.5	18.1	0	383	Hori.	40.0	21.9
54.238	39.1	QP	9.4	-24.5	24.0	88	100	Vert.	40.0	16.0
67.793	33.2	QP	6.6	-24.3	15.5	0	251	Hori.	40.0	24.5
67.794	41.7	QP	6.6	-24.3	24.0	76	100	Vert.	40.0	16.0
374.995	39.5	QP	18.0	-21.5	36.0	150	100	Hori.	46.0	10.0
374.998	38.1	QP	18.0	-21.5	34.6	230	158	Vert.	46.0	11.4
625.001	35.9	QP	20.7	-20.2	36.4	170	176	Hori.	46.0	9.6
874.997	29.5	QP	24.2	-18.1	35.6	187	100	Hori.	46.0	10.4
624.994	33.7	QP	20.7	-20.2	34.2	289	100	Vert.	46.0	11.8
875.002	25.8	QP	24.2	-18.1	31.9	0	161	Vert.	46.0	14.1

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. - GAIN(AMP))

Spurious emission
(Above 30 MHz)
FeliCa(424 kbps)

DATA OF RADIATED EMISSION TEST

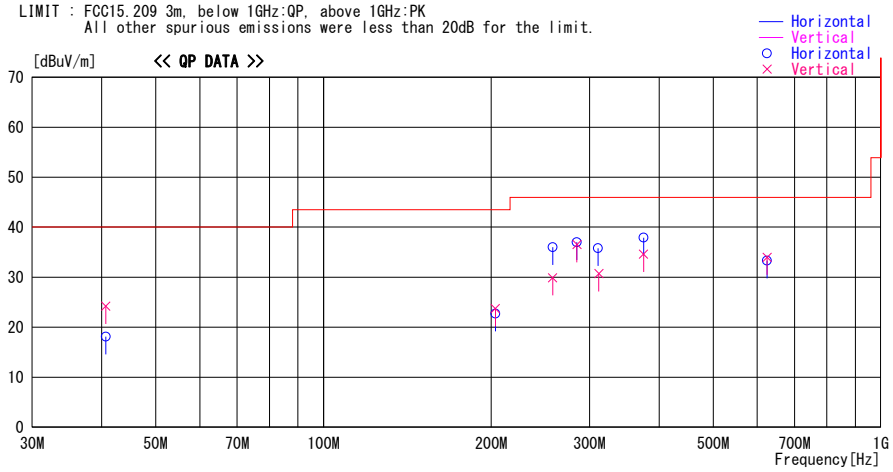
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation FeliCa(424 kbps) with Tag Worst Axis (Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
40.678	28.9	QP	14.0	-24.8	18.1	174	359	Hori.	40.0	21.9
40.678	35.0	QP	14.0	-24.8	24.2	100	100	Vert.	40.0	15.8
203.399	28.7	QP	16.7	-22.7	22.7	246	162	Hori.	43.5	20.8
203.401	29.7	QP	16.7	-22.7	23.7	298	100	Vert.	43.5	19.8
257.639	40.6	QP	17.6	-22.2	36.0	276	122	Hori.	46.0	10.0
257.646	34.5	QP	17.6	-22.2	29.9	177	100	Vert.	46.0	16.1
284.759	40.0	QP	19.0	-22.0	37.0	273	122	Hori.	46.0	9.0
284.762	39.5	QP	19.0	-22.0	36.5	161	209	Vert.	46.0	9.5
311.037	40.3	QP	17.3	-21.8	35.8	269	100	Hori.	46.0	10.2
311.882	35.2	QP	17.3	-21.8	30.7	313	190	Vert.	46.0	15.3
374.995	41.4	QP	18.0	-21.5	37.9	149	100	Hori.	46.0	8.1
375.005	38.1	QP	18.0	-21.5	34.6	183	151	Vert.	46.0	11.4
625.003	33.5	QP	20.7	-20.2	34.0	280	100	Vert.	46.0	12.0
625.021	32.8	QP	20.7	-20.2	33.3	141	168	Hori.	46.0	12.7

CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. - GAIN(AMP))

Spurious emission
(Above 30 MHz)
ISO15693

DATA OF RADIATED EMISSION TEST

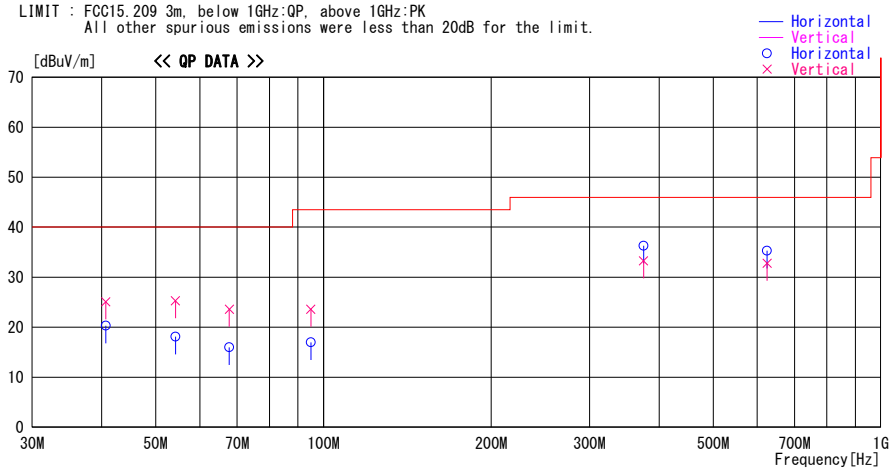
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/05/25

Report No. : 10754085H

Temp./Humi. : 22deg. C / 53% RH
Engineer : Shinichi Miyazono

Mode / Remarks : Tx 13.56MHz Modulation ISO15693 with Tag Worst Axis (Hori: Z, Vert: Z)

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



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
40.682	31.1	QP	14.0	-24.8	20.3	174	330	Hori.	40.0	19.7
40.683	35.9	QP	14.0	-24.8	25.1	91	100	Vert.	40.0	14.9
54.241	40.4	QP	9.4	-24.5	25.3	210	100	Vert.	40.0	14.7
54.243	33.2	QP	9.4	-24.5	18.1	105	395	Hori.	40.0	21.9
67.797	41.3	QP	6.6	-24.3	23.6	254	100	Vert.	40.0	16.4
67.801	33.7	QP	6.6	-24.3	16.0	0	272	Hori.	40.0	24.0
94.919	31.9	QP	9.1	-24.0	17.0	193	173	Hori.	43.5	26.5
94.921	38.5	QP	9.1	-24.0	23.6	84	100	Vert.	43.5	19.9
375.005	39.8	QP	18.0	-21.5	36.3	149	100	Hori.	46.0	9.7
375.002	36.8	QP	18.0	-21.5	33.3	203	151	Vert.	46.0	12.7
625.000	32.3	QP	20.7	-20.2	32.8	280	100	Vert.	46.0	13.2
624.999	34.8	QP	20.7	-20.2	35.3	172	173	Hori.	46.0	10.7

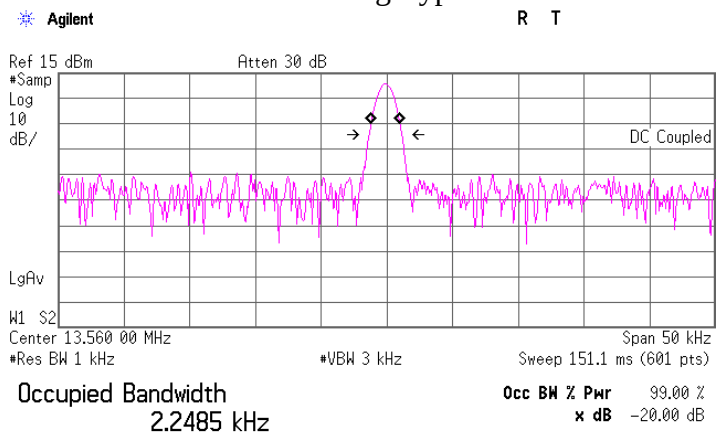
CHART:WITH FACTOR ANT TYPE: -30MHz:LOOP, 30-300MHz:BICONICAL, 300MHz-1000MHz:LOGPERIODIC, 1000MHz-:HORN
CALCULATION:RESULT = READING + ANT FACTOR + LOSS(CABLE + ATTEN. - GAIN(AMP))

20dB Bandwidth and 99% Occupied Bandwidth
TypeA

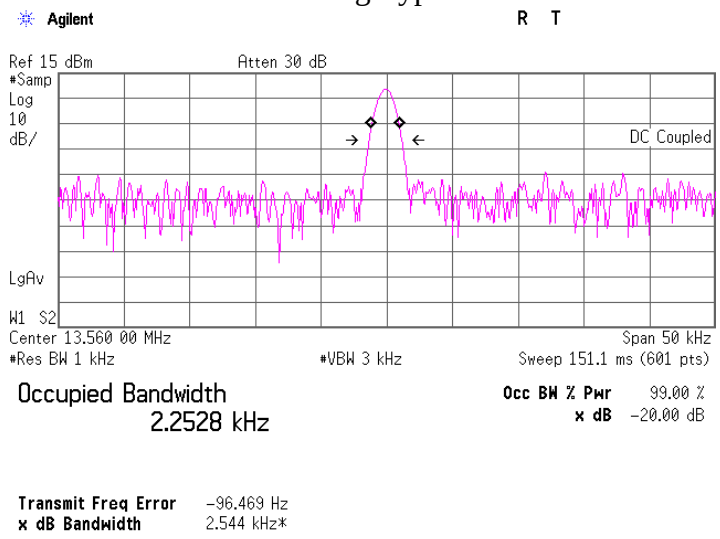
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10754085H
Date	05/25/2015
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takafumi Noguchi
Mode	Tx Mod on (Type A)

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	2.57	2.25
	With Tag	2.54	2.25

Without Tag Type A



With Tag Type A

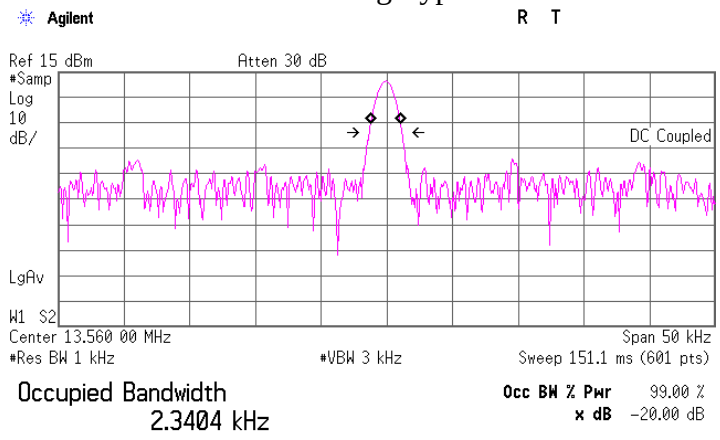


20dB Bandwidth and 99% Occupied Bandwidth
TypeB

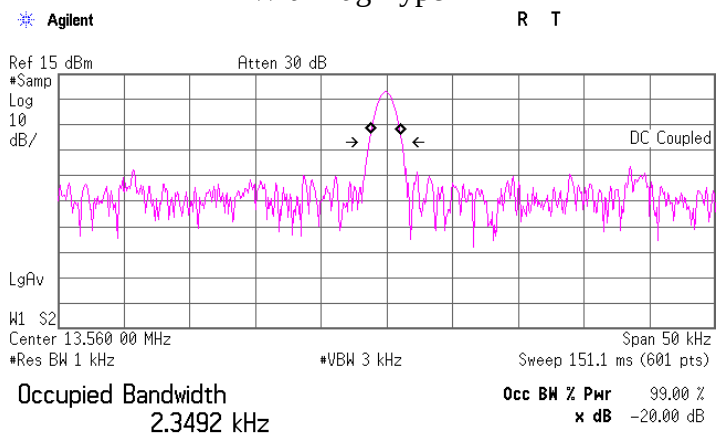
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10754085H
Date	05/25/2015
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takafumi Noguchi
Mode	Tx Mod on (Type B)

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	2.56	2.34
	With Tag	2.58	2.35

Without Tag Type B



With Tag Type B

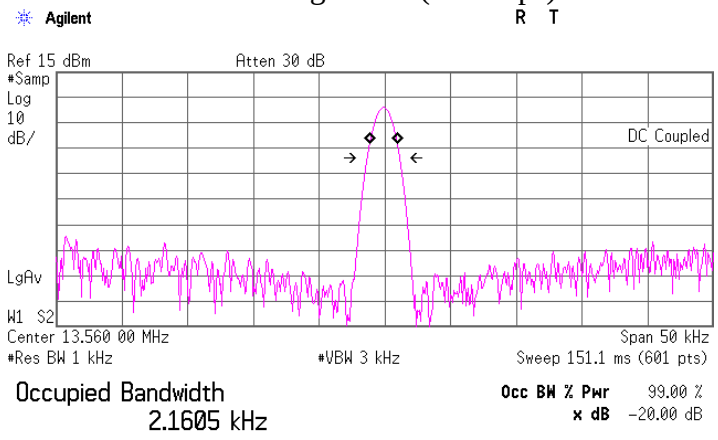


20dB Bandwidth and 99% Occupied Bandwidth
FeliCa(212 kbps)

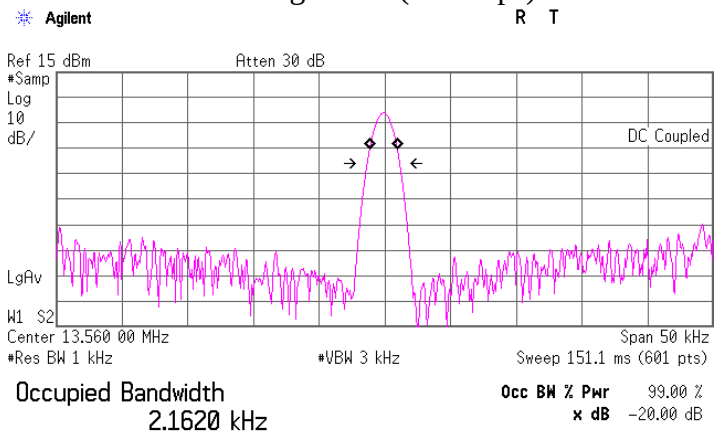
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10754085H
Date	05/25/2015
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takafumi Noguchi
Mode	Tx Mod on (FeliCa(212 kbps))

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	2.55	2.16
	With Tag	2.55	2.16

Without Tag FeliCa(212 kbps)



With Tag FeliCa(212 kbps)

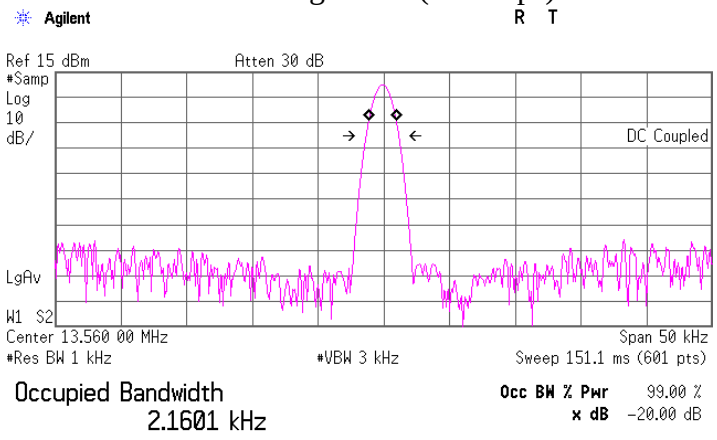


20dB Bandwidth and 99% Occupied Bandwidth
FeliCa(424 kbps)

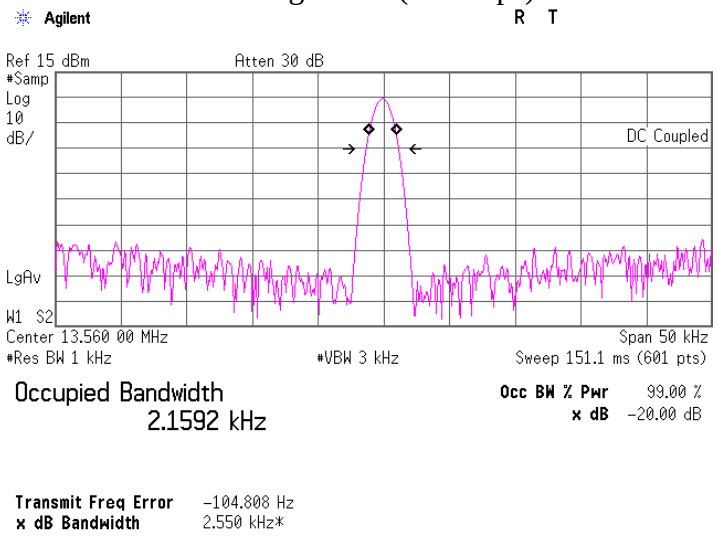
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10754085H
Date	05/25/2015
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takafumi Noguchi
Mode	Tx Mod on (FeliCa(424 kbps))

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	2.55	2.16
	With Tag	2.55	2.16

Without Tag FeliCa(424 kbps)



With Tag FeliCa(424 kbps)

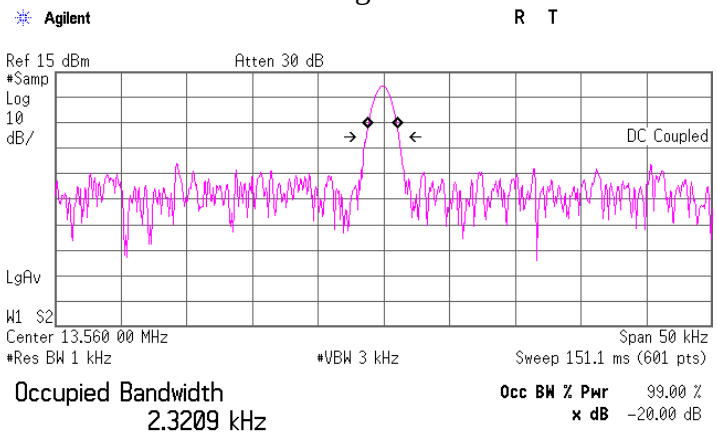


20dB Bandwidth and 99% Occupied Bandwidth
ISO15693

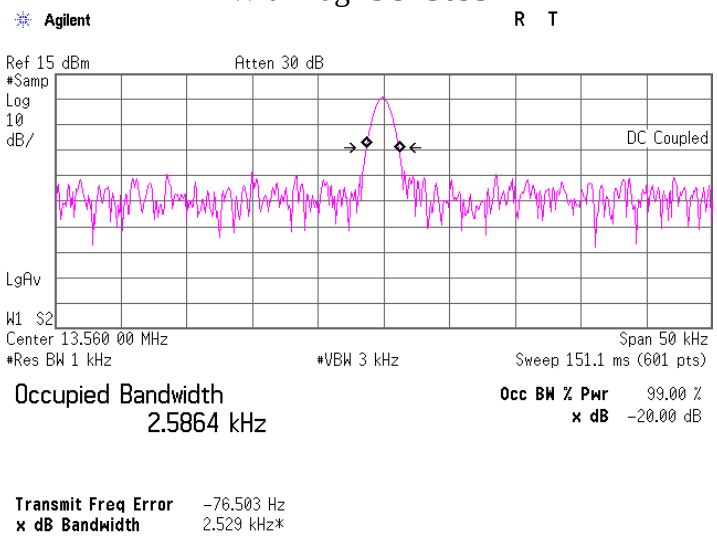
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10754085H
Date	05/25/2015
Temperature/ Humidity	24 deg. C / 60% RH
Engineer	Takafumi Noguchi
Mode	Tx Mod on (ISO15693)

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	2.55	2.32
	With Tag	2.53	2.59

Without Tag ISO15693



With Tag ISO15693



Frequency Tolerance

Test place	Ise EMC Lab. No.11 measurement room	
Report No.	10754085H	
Date	05/28/2014	06/01/2015
Temperature/ Humidity	25 deg. C / 33% RH	26 deg. C / 32% RH
Engineer	Shinichi Miyazono	Takumi Shimada
	Temperature variation	Voltage variation
Mode	Tx 13.56MHz CW Without Tag	

Test Condition deg.C	Volts	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
20deg.C	2.805V	Power on	13.5599732	-0.0000268	-1.98	100.00	98.02
		on 2min.	13.5599444	-0.0000556	-4.10	100.00	95.90
		on 5min.	13.5599390	-0.0000610	-4.50	100.00	95.50
		on 10min.	13.5599380	-0.0000620	-4.57	100.00	95.43
	3.3V	Power on	13.5599672	-0.0000328	-2.42	100.00	97.58
		on 2min.	13.5599442	-0.0000558	-4.12	100.00	95.88
		on 5min.	13.5599370	-0.0000630	-4.65	100.00	95.35
		on 10min.	13.5599347	-0.0000653	-4.82	100.00	95.18
	3.795V	Power on	13.5599642	-0.0000358	-2.64	100.00	97.36
		on 2min.	13.5599350	-0.0000650	-4.79	100.00	95.21
		on 5min.	13.5599281	-0.0000719	-5.30	100.00	94.70
		on 10min.	13.5599274	-0.0000726	-5.35	100.00	94.65
50deg.C	3.3V	Power on	13.5598967	-0.0001033	-7.62	100.00	92.38
		on 2min.	13.5599039	-0.0000961	-7.09	100.00	92.91
		on 5min.	13.5599065	-0.0000935	-6.90	100.00	93.10
		on 10min.	13.5599069	-0.0000931	-6.87	100.00	93.13
40deg.C		Power on	13.5599084	-0.0000916	-6.76	100.00	93.24
		on 2min.	13.5598975	-0.0001025	-7.56	100.00	92.44
		on 5min.	13.5598970	-0.0001030	-7.60	100.00	92.40
		on 10min.	13.5598970	-0.0001030	-7.60	100.00	92.40
30deg.C		Power on	13.5599280	-0.0000720	-5.31	100.00	94.69
		on 2min.	13.5599083	-0.0000917	-6.76	100.00	93.24
		on 5min.	13.5599067	-0.0000933	-6.88	100.00	93.12
		on 10min.	13.5599065	-0.0000935	-6.90	100.00	93.10
20deg.C		Power on	13.5599561	-0.0000439	-3.24	100.00	96.76
		on 2min.	13.5599324	-0.0000676	-4.99	100.00	95.01
		on 5min.	13.5599293	-0.0000707	-5.21	100.00	94.79
		on 10min.	13.5599285	-0.0000715	-5.27	100.00	94.73
10deg.C		Power on	13.5599760	-0.0000240	-1.77	100.00	98.23
		on 2min.	13.5599609	-0.0000391	-2.88	100.00	97.12
		on 5min.	13.5599576	-0.0000424	-3.13	100.00	96.87
		on 10min.	13.5599573	-0.0000427	-3.15	100.00	96.85
0deg.C		Power on	13.5599870	-0.0000130	-0.96	100.00	99.04
		on 2min.	13.5599825	-0.0000175	-1.29	100.00	98.71
		on 5min.	13.5599809	-0.0000191	-1.41	100.00	98.59
		on 10min.	13.5599808	-0.0000192	-1.42	100.00	98.58
-10deg.C		Power on	13.5599816	-0.0000184	-1.36	100.00	98.64
		on 2min.	13.5599897	-0.0000103	-0.76	100.00	99.24
		on 5min.	13.5599897	-0.0000103	-0.76	100.00	99.24
		on 10min.	13.5599897	-0.0000103	-0.76	100.00	99.24
-20deg.C		Power on	13.5599233	-0.0000767	-5.66	100.00	94.34
		on 2min.	13.5599710	-0.0000290	-2.14	100.00	97.86
		on 5min.	13.5599722	-0.0000278	-2.05	100.00	97.95
		on 10min.	13.5599722	-0.0000278	-2.05	100.00	97.95

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

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

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	2015/02/26 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE/CE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2014/06/02 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2014/10/04 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(5m)/ 421-010(1m)/ sucoform141-PE(1m)/ RFM-E121(Switcher)	-/04178	RE	2014/07/15 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2014/07/28 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MLS-26	LISN(AMN)	Schwarzbeck	NSLK8127	8127-732	CE	2014/07/09 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2015/01/19 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2014/07/15 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2015/02/19 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	CE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	CE	-
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	CE	2014/10/17 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE	2014/08/19 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2014/07/10 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/ SFM141(3m) /sucoform141-PE(1m)/ 421-010(1.5m)/ RFM-E321(Switcher)	-/00640	CE	2014/07/14 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MCH-05	Temperature and Humidity Chamber	Tabai Espec	PL-1KP	14019569	FT	2015/04/29 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	FT	2014/08/11 * 12
MAT-21	Attenuator(20dB)(above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	FT	2015/01/07 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	FT	2014/12/22 * 12
MLPA-07	Loop Antenna	UL Japan	-	-	FT	Pre Check

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