



RADIO TEST REPORT

Test Report No. : 11017362H-A-R1

Applicant : CASIO COMPUTER CO., LTD.
Type of Equipment : Handheld Printer Terminal
Model No. : IT-9000-MC25E-C
Test regulation : FCC Part 15 Subpart C: 2015
FCC ID : BBQIT9000C
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 11017362H-A. 11017362H-A is replaced with this report.

Date of test: November 20 to December 13, 2015

Representative test engineer:

Tsubasa Takayama
Engineer

Consumer Technology Division

Approved by:

Takahiro Hatakeda
Leader

Consumer Technology Division



NVLAP LAB CODE: 200572-0

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13-EM-F0429

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SECTION 1: Customer information

Company Name : CASIO COMPUTER CO., LTD.
Address : 2951-5, Ishikawa-Machi, Hachioji-shi Tokyo 192-8556, Japan
Telephone Number : +81-42-639-5188
Facsimile Number : +81-42-639-5046
Contact Person : KATSUMASA MOTOKI

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

2.1 Identification of E.U.T.

Type of Equipment : Handheld Printer Terminal
Model No. : IT-9000-MC25E-C
Serial No. : Refer to Section 4, Clause 4.2
Rating : Li-ion battery DC7.4V 2000mAh/15Wh, M/N:HA-G20BAT
Receipt Date of Sample : October 17, 2015
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: IT-9000-MC25E-C (referred to as the EUT in this report) is Handheld Printer Terminal.

Model No.: IT-9000-MC25E-C has a variant model: IT-9000-C25E-C.
The difference of them is that only IT-9000-MC25E-C has a magnetic card reader.
Except for it they are completely identical in electronic characteristics.
Therefore the test was performed with IT-9000-MC25E-C as a representative.

Radio Specification

WLAN (IEEE802.11b/g/n-20)

Equipment Type	Transceiver
Frequency of Operation	2412-2462MHz
Type of Modulation	DSSS, OFDM
Antenna Gain	2.34dBi

BT

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Antenna Gain	2.34dBi

RFID

Equipment Type	Transceiver
Frequency of Operation	13.56MHz
Type of Modulation	ASK

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
*Some parts are effective on and after December 17, 2015 or December 23, 2015.
The revision does not affect the test specification applied to the EUT.

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 C63.10-2013 6. Standard test methods	Section 15.207	[QP] 19.4 dB, 0.23466 MHz,L	Complied	-
	<IC>RSS-Gen 8.8	<IC>RSS-Gen 8.8	0.23477 MHz, N [AV] 19.0 dB, 0.23466 MHz,L		
Electric Field Strength of Fundamental Emission	ANSI C63.10-2013 6. Standard test methods	Section 15.225(a)	56.3 dB, 13.56000 MHz,	Complied	Radiated
	<IC> RSS-Gen 6.4, 6.12	<IC>RSS-210 A2.6	QP, 0 deg.		
Spectrum Mask	ANSI C63.10-2013 6. Standard test methods	Section 15.225(b)(c)	36.8 dB, 13.56700 MHz,	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC> RSS-210 A2.6	QP, 0 deg.		
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)	5.7 dB 40.680 MHz,	Complied	Radiated
	<IC>RSS-Gen 6.4, 6.13	<IC>RSS-210 A2.6	Vertical, QP		
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 A2.6			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V / 1.8 V) constantly to RF Part regardless of input voltage. Therefore, this EUT complies with the requirement.

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) (+dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

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

*Measurement distance

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(+dB)		(10 m*)(+dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(+dB)	(1 m*)(+dB)	(0.5 m*)(+dB)	(10 m*)(+dB)	
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

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 (3 m)

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

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3.5 Test Location

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

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

3.6 Test set up, Test data, and Test instruments

Refer to APPENDIX.

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

4.1 Operating Modes

The mode is used :

Mode	Remarks
Transmitting (Tx) -TypeA -TypeB -FeliCa (212kbps) -ISO15693	Modulated on (Mod on)
*Power of the EUT was set by the software as follows; Software: NFCTest052 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product	

Test Item	Operating mode*
Conducted emission	Tx Mod on,with Tag
Electric Field Strength of Fundamental Emission	Tx Mod on,without cradle, without Tag
Spectrum Mask	Tx Mod on,without cradle, without Tag
20 dB Bandwidth 99 % Occupied Bandwidth	Tx Mod on,with Tag / without Tag
Spurious Emission (below 30MHz)	Tx Mod on, without cradle, without Tag
Spurious Emission (above 30MHz)	Tx Mod on, without cradle, with Tag
Frequency Tolerance	Tx Mod off, without Tag

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

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

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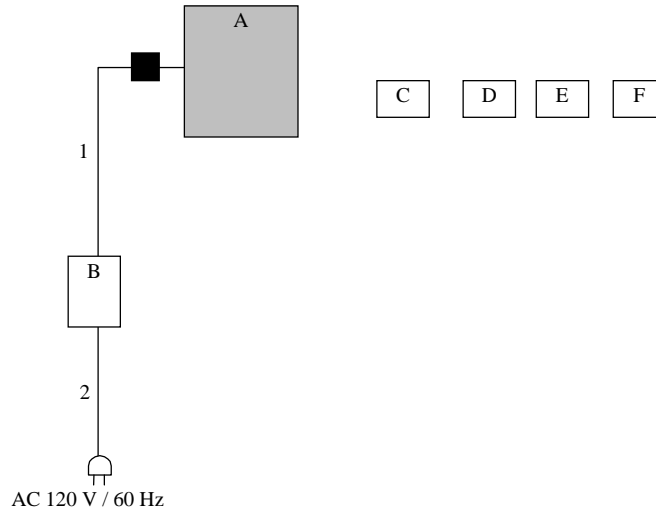
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4.2 Configuration and peripherals



■: Standard Ferrite Core

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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Handheld Printer Terminal	IT-9000-MC25E-C	11CGM L75B00007IAAA1 *1) 11CGM L75B00016IAA1 *2)	CASIO COMPUTER CO., LTD.	EUT
B	AC Adapter	AD-S42120C	0915C	CASIO COMPUTER CO., LTD.	-
C	TypeA Card	SLE 66R32P	No.1	infineon	-
D	TypeB Card	-	No.1	-	-
E	Type FeliCa	RC-S886	000L00023477	Sony	-
F	ISO15693	-	No.1	-	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	AC Cable	2.0	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

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

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

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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

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

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 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 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: $40 \times \log(3 \text{ m} / 300 \text{ m}) = -80 \text{ dB}$

*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 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 and EUT with Cradle 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

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SECTION 7: Other test

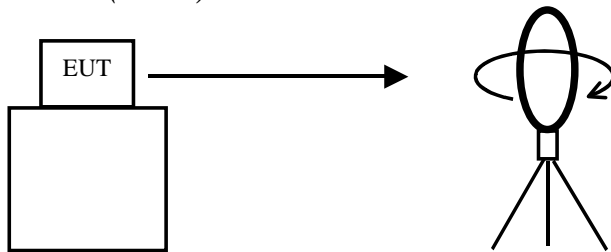
Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
20 dB Bandwidth	50 kHz	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak *1)	Max Hold *2)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency counter

*1) The measurement was performed with Peak detector, Max Hold since the duty cycle was not 100 %.
*2) The measurement was performed with Max Hold since the duty cycle was not 100 %.

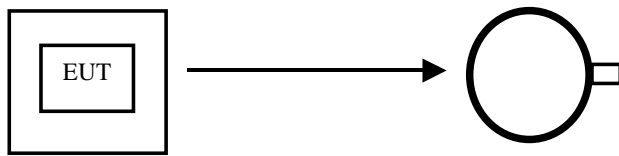
Test data : APPENDIX
Test result : Pass

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

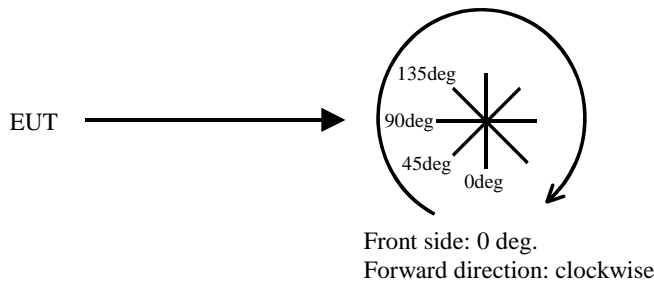


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



APPENDIX 1: Test data

**Conducted emission
Type A**

DATA OF CONDUCTED EMISSION TEST

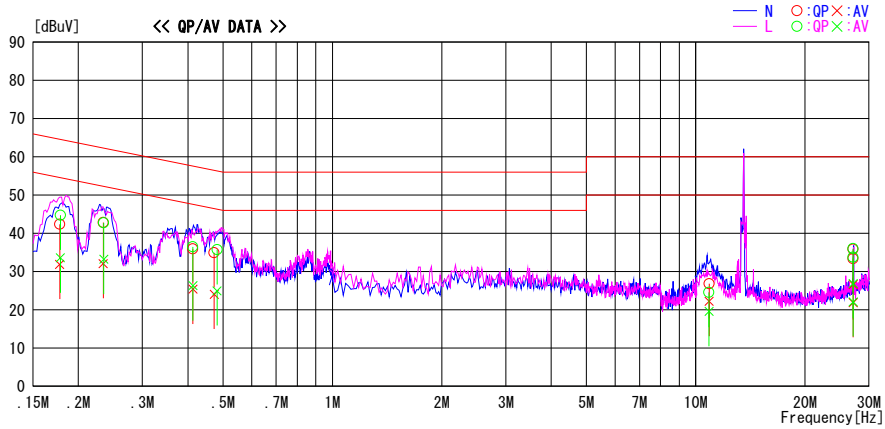
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
 Date : 2015/12/08

Report No. : 11017362H

Temp./Humi. : 20deg. C / 31% RH
 Engineer : Takafumi Noguchi

Mode / Remarks : Tx RFID with Type A 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]		
0.17767	29.2	18.7	13.2	42.4	31.9	64.6	54.6	22.2	22.7	N	
0.17837	31.5	20.4	13.2	44.7	33.6	64.6	54.6	19.9	21.0	L	
0.23416	29.5	18.8	13.3	42.8	32.1	62.3	52.3	19.5	20.2	N	
0.23474	29.4	19.9	13.3	42.7	33.2	62.3	52.3	19.6	19.1	L	
0.41293	22.6	12.1	13.3	35.9	25.4	57.6	47.6	21.7	22.2	N	
0.41322	23.2	13.0	13.3	36.5	26.3	57.6	47.6	21.1	21.3	L	
0.47281	21.6	10.8	13.3	34.9	24.1	56.5	46.5	21.6	22.4	N	
0.48171	22.4	11.7	13.3	35.7	25.0	56.3	46.3	20.6	21.3	L	
10.86942	10.1	5.1	14.5	24.6	19.6	60.0	50.0	35.4	30.4	L	
10.86660	12.3	7.7	14.5	26.8	22.2	60.0	50.0	33.2	27.8	N	
27.12000	20.3	11.1	15.5	35.8	26.6	60.0	50.0	24.2	23.4	N	
27.12000	20.5	11.4	15.5	36.0	26.9	60.0	50.0	24.0	23.1	L	
27.12000	17.9	6.4	15.5	33.4	21.9	60.0	50.0	26.6	28.1	N	without tag
27.12000	18.2	6.6	15.5	33.7	22.1	60.0	50.0	26.3	27.9	L	without tag

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

Conducted emission TypeB

DATA OF CONDUCTED EMISSION TEST

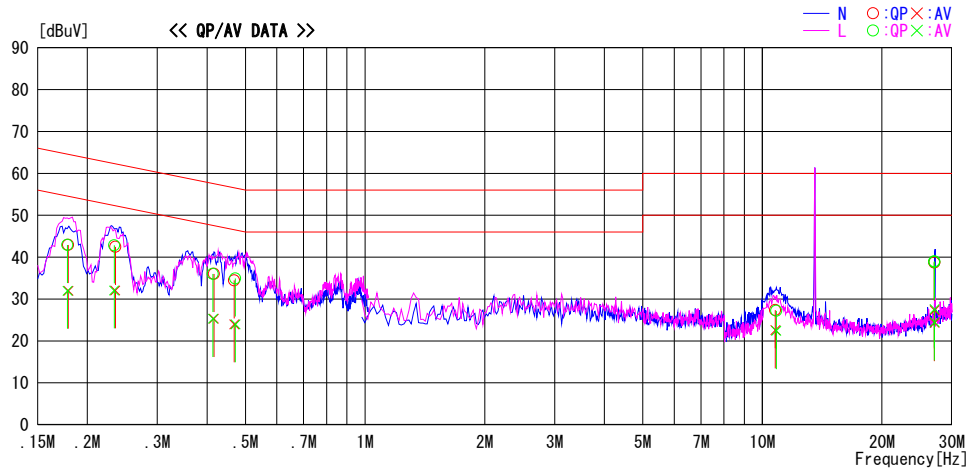
UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
 Date : 2015/12/08

Report No. : 11017362H

Temp./Humi. : 20deg. C / 31% RH
 Engineer : Takafumi Noguchi

Mode / Remarks : Tx RFID with Type B 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]		
0.17826	29.7	18.8	13.2	42.9	32.0	64.6	54.6	21.7	22.6	L	
0.17896	29.7	18.8	13.2	42.9	32.0	64.5	54.5	21.6	22.5	N	
0.23366	29.5	18.8	13.3	42.8	32.1	62.3	52.3	19.5	20.2	L	
0.23522	29.2	18.8	13.3	42.5	32.1	62.3	52.3	19.8	20.2	N	
0.41411	22.7	12.0	13.3	36.0	25.3	57.6	47.6	21.6	22.3	L	
0.41635	22.7	12.0	13.3	36.0	25.3	57.5	47.5	21.5	22.2	N	
0.46871	21.2	10.7	13.3	34.5	24.0	56.5	46.5	22.0	22.5	N	
0.47172	21.6	10.7	13.3	34.9	24.0	56.5	46.5	21.6	22.5	L	
10.77498	12.9	8.1	14.5	27.4	22.6	60.0	50.0	32.6	27.4	N	
10.83400	12.7	7.9	14.5	27.2	22.4	60.0	50.0	32.8	27.6	L	
27.12000	23.2	11.8	15.5	38.7	27.3	60.0	50.0	21.3	22.7	N	
27.12000	23.5	12.1	15.5	39.0	27.6	60.0	50.0	21.0	22.4	L	
27.12000	23.2	8.8	15.5	38.7	24.3	60.0	50.0	21.3	25.7	N	without tag
27.12000	23.3	9.0	15.5	38.8	24.5	60.0	50.0	21.2	25.5	L	without tag

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.

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Conducted emission FeliCa (212kbps)

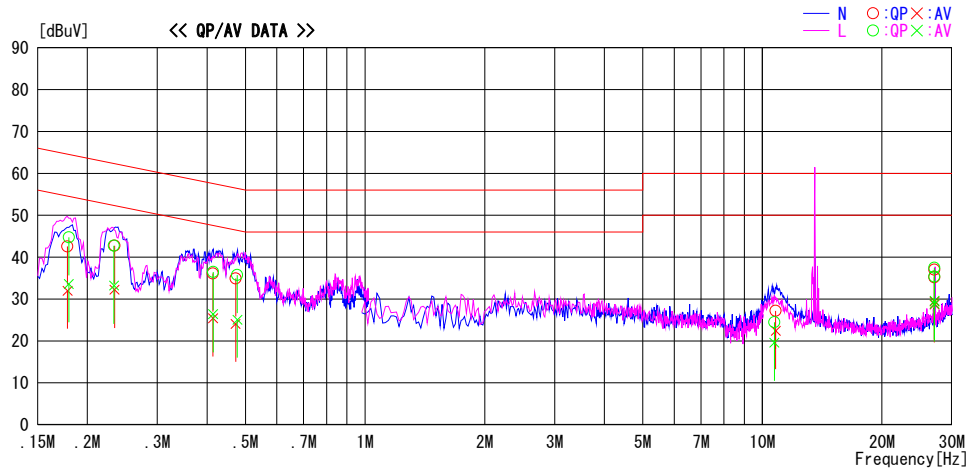
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
Date : 2015/12/08

Report No. : 11017362H
Temp./Humi. : 20deg. C / 31% RH
Engineer : Takafumi Noguchi

Mode / Remarks : Tx RFID with Type FeliCa Tag

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency [MHz]	Reading		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.17813	29.4	18.8	13.2	42.6	32.0	64.6	54.6	22.0	22.6	N	
0.17966	31.5	20.4	13.2	44.7	33.6	64.5	54.5	19.8	20.9	L	
0.23322	29.4	19.9	13.3	42.7	33.2	62.3	52.3	19.6	19.1	L	
0.23407	29.4	18.9	13.3	42.7	32.2	62.3	52.3	19.6	20.1	N	
0.41386	22.8	12.1	13.3	36.1	25.4	57.6	47.6	21.5	22.2	N	
0.41444	23.2	13.1	13.3	36.5	26.4	57.6	47.6	21.1	21.2	L	
0.47235	21.6	10.8	13.3	34.9	24.1	56.5	46.5	21.6	22.4	N	
0.47684	22.4	11.8	13.3	35.7	25.1	56.4	46.4	20.7	21.3	L	
10.71520	10.0	5.1	14.5	24.5	19.6	60.0	50.0	35.5	30.4	L	
10.79937	12.7	7.9	14.5	27.2	22.4	60.0	50.0	32.8	27.6	N	
27.12000	21.5	13.9	15.5	37.0	29.4	60.0	50.0	23.0	20.6	N	
27.12000	22.0	14.1	15.5	37.5	29.6	60.0	50.0	22.5	20.4	L	
27.12000	19.7	13.2	15.5	35.2	28.7	60.0	50.0	24.8	21.3	N	without tag
27.12000	19.9	13.4	15.5	35.4	28.9	60.0	50.0	24.6	21.1	L	without tag

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

Conducted emission
ISO15693

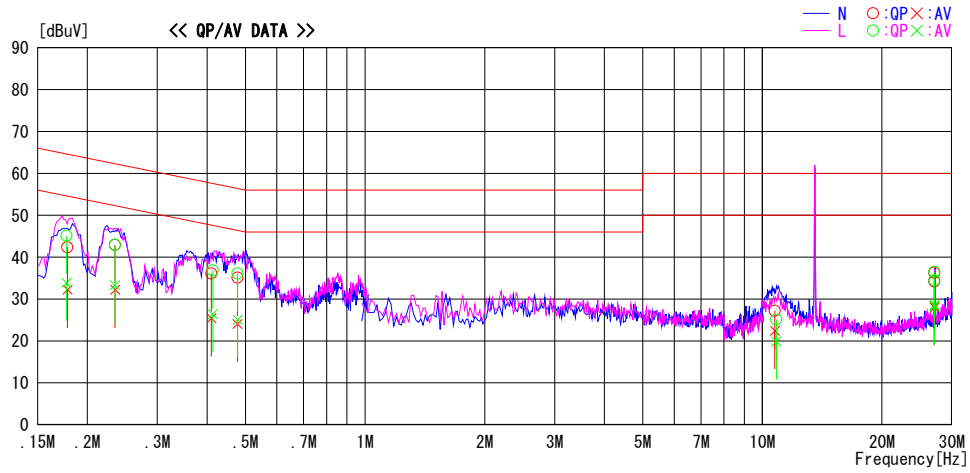
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.1 Semi Anechoic Chamber
 Date : 2015/12/08

Report No. : 11017362H
 Temp./Humi. : 20deg. C / 31% RH
 Engineer : Takafumi Noguchi

Mode / Remarks : Tx RFID with Type ISO 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]		
0.17728	31.9	20.7	13.2	45.1	33.9	64.6	54.6	19.5	20.7	L	
0.17813	29.2	19.0	13.2	42.4	32.2	64.6	54.6	22.2	22.4	N	
0.23466	29.6	20.0	13.3	42.9	33.3	62.3	52.3	19.4	19.0	L	
0.23477	29.6	18.9	13.3	42.9	32.2	62.3	52.3	19.4	20.1	N	
0.41035	22.8	12.1	13.3	36.1	25.4	57.6	47.6	21.5	22.2	N	
0.41344	23.5	13.1	13.3	36.8	26.4	57.6	47.6	20.8	21.2	L	
0.47747	21.8	10.8	13.3	35.1	24.1	56.4	46.4	21.3	22.3	N	
0.47767	22.8	11.8	13.3	36.1	25.1	56.4	46.4	20.3	21.3	L	
10.75869	12.7	7.9	14.5	27.2	22.4	60.0	50.0	32.8	27.6	N	
10.84250	10.6	5.4	14.5	25.1	19.9	60.0	50.0	34.9	30.1	L	
27.12000	20.8	12.8	15.5	36.3	28.3	60.0	50.0	23.7	21.7	N	
27.12000	21.0	13.1	15.5	36.5	28.6	60.0	50.0	23.5	21.4	L	
27.12000	18.7	12.5	15.5	34.2	28.0	60.0	50.0	25.8	22.0	N	without tag
27.12000	19.0	12.7	15.5	34.5	28.2	60.0	50.0	25.5	21.8	L	without tag

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

Conducted emission
 (Antenna terminal)

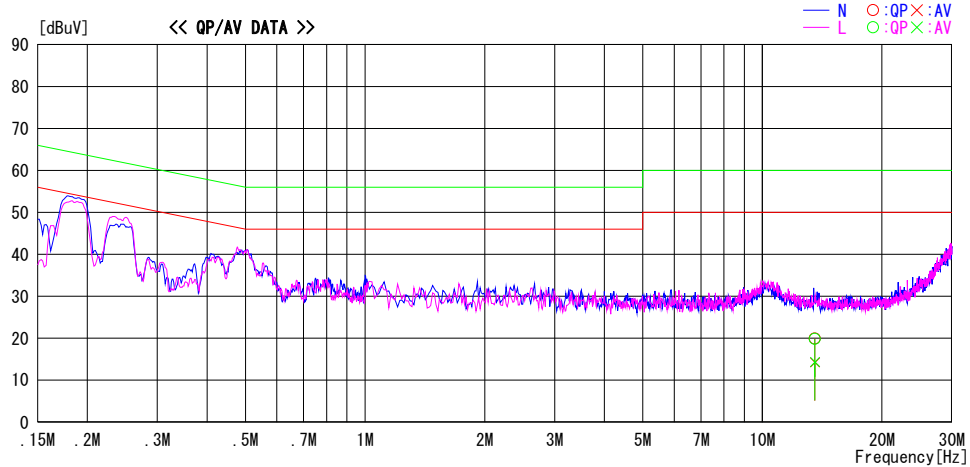
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2015/12/13

Report No. : 11017362H
 Temp./Humi. : 23deg. C / 40% RH
 Engineer : Shinichi Miyazono

Mode / Remarks : 13.56 RFID / Antenna terminated

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	5.4	-0.3	14.5	19.9	14.2	60.0	50.0	40.1	35.8	N	
13.56000	5.3	-0.2	14.5	19.8	14.3	60.0	50.0	40.2	35.7	L	

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

Fundamental emission and Spectrum Mask TypeA

DATA OF RADIATED EMISSION TEST

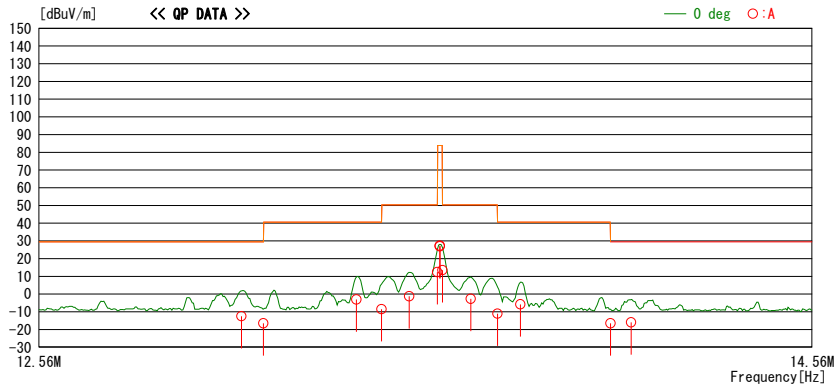
UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2015/11/20

Report No. : 11017362H

Temp./ Humi. : 24deg. C / 49% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation Type A Worst axis:X(without cradle, 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]	
13.05600	33.5	QP	19.2	-33.2	32.1	-12.6	29.5	42.1	0	A	1
13.11000	29.6	QP	19.2	-33.2	32.1	-16.5	29.5	46.0	0	A	1
13.34600	43.1	QP	19.2	-33.2	32.1	-3.0	40.5	43.5	0	A	1
13.41000	37.5	QP	19.2	-33.2	32.1	-8.6	40.5	49.1	0	A	1
13.48120	44.9	QP	19.2	-33.2	32.1	-1.2	50.4	51.6	0	A	1
13.58300	58.4	QP	19.2	-33.2	32.1	12.3	50.4	38.1	0	A	1
13.58000	73.4	QP	19.2	-33.2	32.1	27.3	83.9	56.6	0	A	1
13.58000	73.0	QP	19.2	-33.2	32.1	26.9	83.9	57.0	0	A	1 With Tag
13.56700	59.6	QP	19.2	-33.2	32.1	13.5	50.4	36.9	0	A	1
13.64040	43.4	QP	19.2	-33.2	32.1	-2.7	50.4	53.1	0	A	1
13.71000	35.1	QP	19.2	-33.2	32.1	-11.0	40.5	51.5	0	A	1
13.77060	40.3	QP	19.2	-33.2	32.1	-5.8	40.5	46.3	0	A	1
14.01000	29.6	QP	19.2	-33.2	32.1	-16.5	29.5	46.0	0	A	1
14.06500	30.1	QP	19.2	-33.2	32.1	-16.0	29.5	45.5	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.) - GAIN(AMP.) - distance fac.

Result of the fundamental emission at 3 m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	73.4	19.2	6.8	32.1	-	67.3	-	-	Fundamental

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

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Fundamental emission and Spectrum Mask TypeB

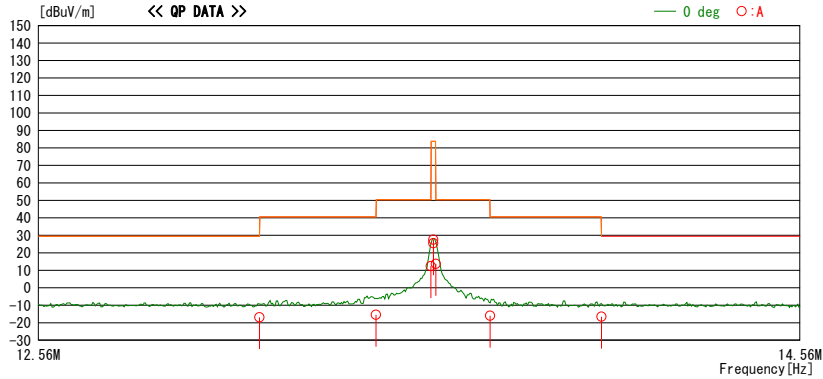
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/11/21

Report No. : 11017362H
Temp. / Humi. : 24deg. C / 49% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation Type B Worst axis:X(without cradle,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	29.3	QP	19.2	-33.2	32.1	-16.8	29.5	46.3	0	A	2
13.41000	30.7	QP	19.2	-33.2	32.1	-15.4	40.5	55.9	0	A	2
13.55300	58.5	QP	19.2	-33.2	32.1	12.4	50.4	38.0	0	A	2
13.56000	73.6	QP	19.2	-33.2	32.1	27.5	83.9	56.4	0	A	2
13.56000	71.5	QP	19.2	-33.2	32.1	25.4	83.9	58.5	0	A	2
13.56700	59.7	QP	19.2	-33.2	32.1	13.6	50.4	36.8	0	A	2
13.71000	30.1	QP	19.2	-33.2	32.1	-16.0	40.5	56.5	0	A	2
14.01000	29.6	QP	19.2	-33.2	32.1	-16.5	29.5	46.0	0	A	2

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.) - distance fac.

Result of the fundamental emission at 3 m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	73.6	19.2	6.8	32.1	-	67.5	-	-	- Fundamental

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

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Fundamental emission and Spectrum Mask FeliCa (212kbps)

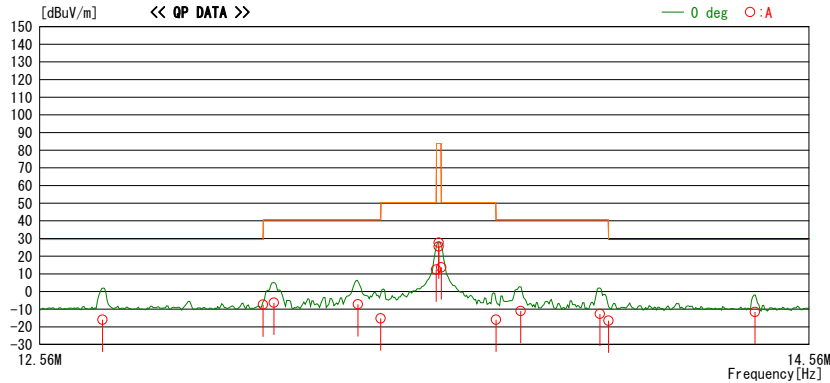
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2015/11/21

Report No. : 11017362H
Temp./ Humi. : 24deg. C / 49% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation FeliCa Worst axis:X(without cradle,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]	
12.71200	30.0	QP	19.3	-33.2	32.1	-16.0	29.5	45.5	0	A	1
13.11000	38.7	QP	19.2	-33.2	32.1	-7.4	29.5	36.9	0	A	1
13.13800	39.7	QP	19.2	-33.2	32.1	-6.4	40.5	46.9	0	A	1
13.35100	38.8	QP	19.2	-33.2	32.1	-7.3	40.5	47.8	0	A	1
13.41000	30.8	QP	19.2	-33.2	32.1	-15.3	40.5	55.8	0	A	1
13.55300	58.5	QP	19.2	-33.2	32.1	12.4	50.4	38.0	0	A	1
13.56000	73.7	QP	19.2	-33.2	32.1	27.6	83.9	56.3	0	A	1
13.56000	71.5	QP	19.2	-33.2	32.1	25.4	83.9	58.5	0	A	1 With Tag
13.56700	59.7	QP	19.2	-33.2	32.1	13.6	50.4	36.8	0	A	1
13.71000	30.1	QP	19.2	-33.2	32.1	-16.0	40.5	56.5	0	A	1
13.77500	35.1	QP	19.2	-33.2	32.1	-11.0	40.5	51.5	0	A	1
13.98600	33.4	QP	19.2	-33.2	32.1	-12.7	40.5	53.2	0	A	1
14.01000	29.5	QP	19.2	-33.2	32.1	-16.6	29.5	46.1	0	A	1
14.40900	34.5	QP	19.1	-33.2	32.1	-11.7	29.5	41.2	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.) - GAIN(AMP.) - distance fac.

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	73.7	19.2	6.8	32.1	-	67.6	-	-	Fundamental

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

Fundamental emission and Spectrum Mask ISO15693

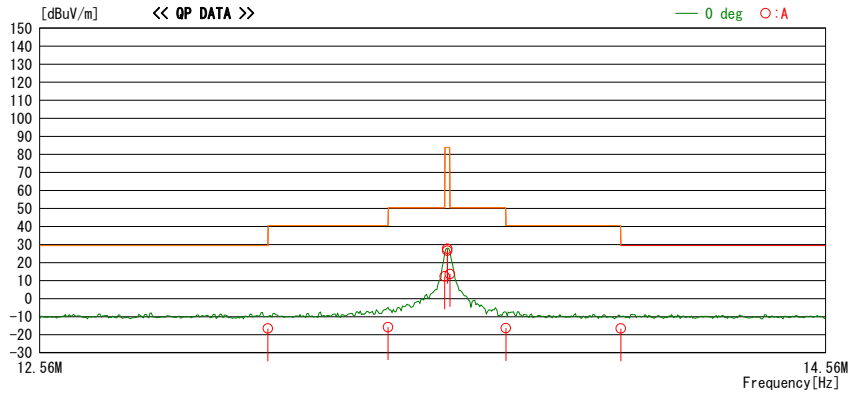
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2015/11/21

Report No. : 11017362H
Temp. / Humi. : 24deg. C / 49% RH
Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation ISO Worst axis:X(without cradle,without Tag)

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



Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
			[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
13.11000	29.5	QP	19.2	-33.2	32.1	-16.6	29.5	46.1	0	A	3
13.41000	30.3	QP	19.2	-33.2	32.1	-15.8	40.5	56.3	0	A	3
13.55300	58.5	QP	19.2	-33.2	32.1	12.4	50.4	38.0	0	A	3
13.56000	73.7	QP	19.2	-33.2	32.1	27.6	83.9	56.3	0	A	3
13.56000	72.7	QP	19.2	-33.2	32.1	26.6	83.9	57.3	0	A	3
13.56700	59.7	QP	19.2	-33.2	32.1	13.6	50.4	36.8	0	A	3
13.71000	29.8	QP	19.2	-33.2	32.1	-16.3	40.5	56.8	0	A	3
14.01000	29.6	QP	19.2	-33.2	32.1	-16.5	29.5	46.0	0	A	3

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.) - distance fac.

Result of the fundamental emission at 3 m without Distance factor

QP

Ant Deg [deg]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	13.56000	QP	73.7	19.2	6.8	32.1	-	67.6	-	-	Fundamental

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

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Spurious emission
(Below 30MHz)
TypeA

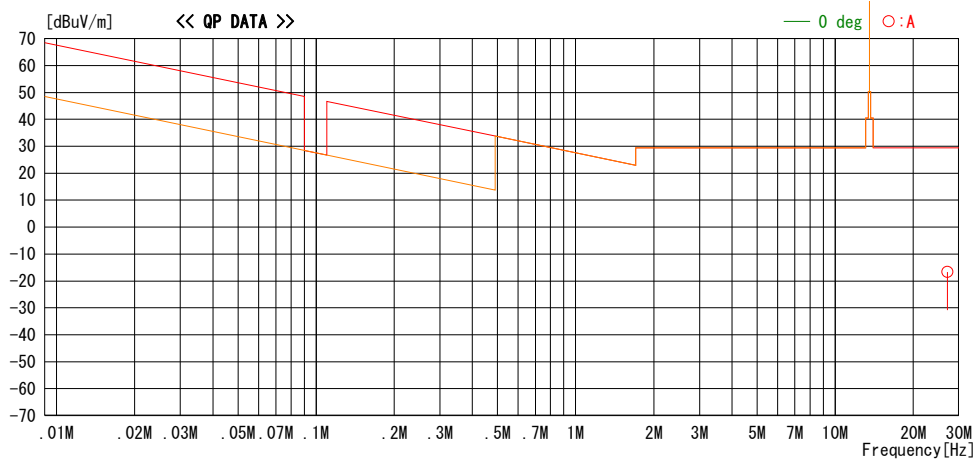
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
 Date : 2015/11/20

Report No. : 11017362H
 Temp./ Humi. : 24deg. C / 49% RH
 Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation Type A Worst axis:X(without cradle,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]	
27.12000	29.1	QP	19.2	-32.9	32.1	-16.7	29.5	46.2	0	A	354

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.) - distance fac.

Spurious emission
(Below 30MHz)
TypeB

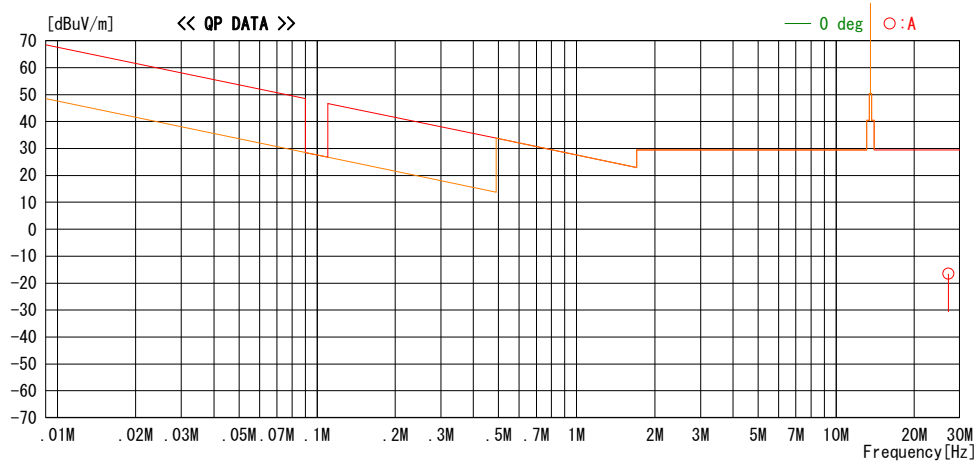
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
 Date : 2015/11/21

Report No. : 11017362H
 Temp./ Humi. : 24deg. C / 49% RH
 Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation Type B Worst axis:X(without cradle,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]	
27.12000	29.3	QP	19.2	-32.9	32.1	-16.5	29.5	46.0	0	A	227

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.) - distance fac.

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

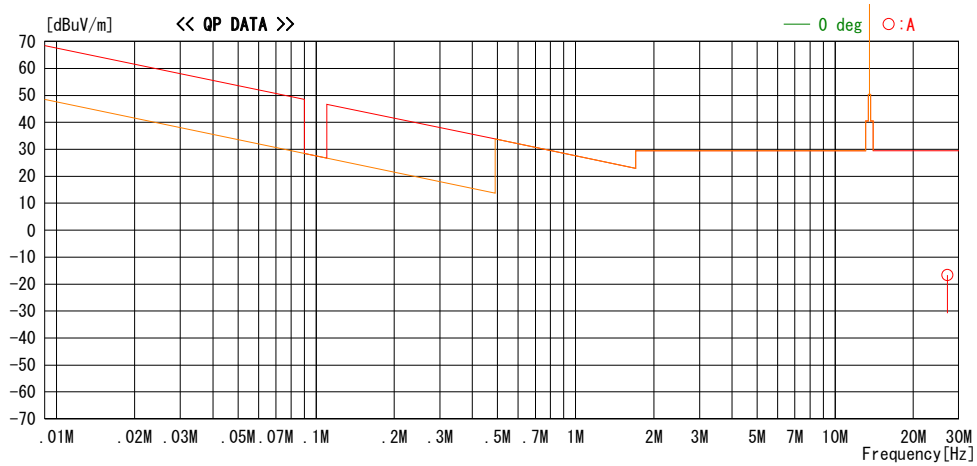
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
 Date : 2015/11/21

Report No. : 11017362H
 Temp./ Humi. : 24deg. C / 49% RH
 Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation FeliCa, Worst axis:X(without cradle,without Tag)

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



Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment	
			[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]		
27.12000	29.2	QP	19.2	-32.9	32.1	-16.6	29.5	46.1	0	A	100	

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.) - distance fac.

Spurious emission
(Below 30MHz)
ISO15693

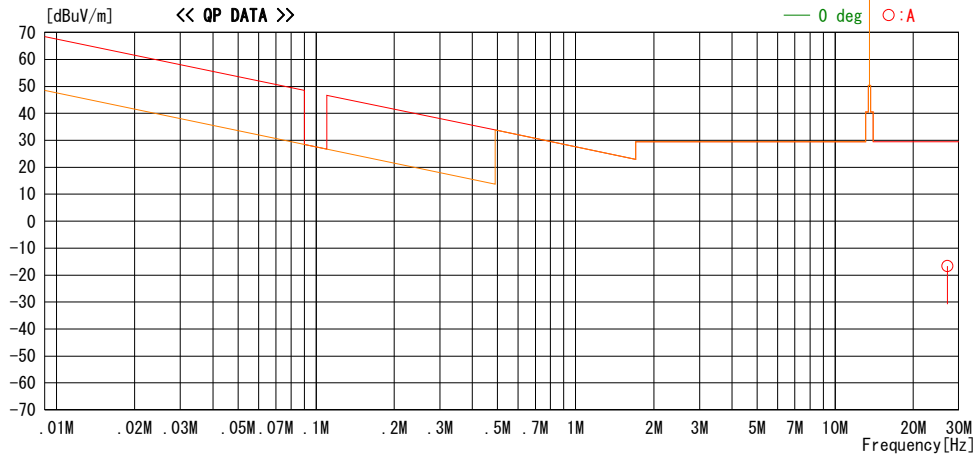
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No. 4 Semi Anechoic Chamber
 Date : 2015/11/21

Report No. : 11017362H
 Temp. / Humi. : 24deg. C / 49% RH
 Engineer : Hiroyuki Furutaka

Mode / Remarks : Tx 13.56MHz, Modulation ISO Worst axis:X(without cradle, without Tag)

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



Freq. [MHz]	Reading [dBuV]	DET	Ant. Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table	Comment
			[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]	
27.12000	29.2	QP	19.2	-32.9	32.1	-16.6	29.5	46.1	0	A	150

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.) - distance fac.

**Spurious emission
(Above 30MHz)**

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2015/12/02

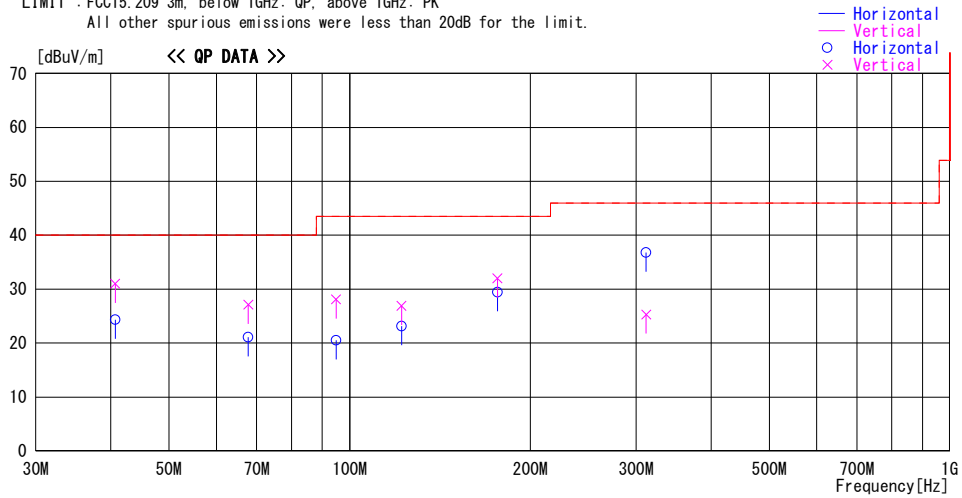
Report No. : 11017362H

Temp./Humi. : 22deg.C / 34% RH
Engineer : Tsubasa Takayama

Mode / Remarks : Tx Type A (Hor:X, Ver:Z) without cradle with 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 [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
40.680	35.6	QP	13.7	-25.0	24.3	359	332	Hori.	40.0	15.7	
40.680	42.3	QP	13.7	-25.0	31.0	195	100	Vert.	40.0	9.0	
67.800	39.6	QP	6.0	-24.5	21.1	21	280	Hori.	40.0	18.9	
67.800	45.6	QP	6.0	-24.5	27.1	196	100	Vert.	40.0	12.9	
94.920	35.8	QP	8.9	-24.2	20.5	31	182	Hori.	43.5	23.0	
94.920	43.4	QP	8.9	-24.2	28.1	188	100	Vert.	43.5	15.4	
122.040	34.4	QP	12.6	-23.9	23.1	21	172	Hori.	43.5	20.4	
122.040	38.2	QP	12.6	-23.9	26.9	182	100	Vert.	43.5	16.6	
176.280	36.8	QP	16.0	-23.4	29.4	359	100	Hori.	43.5	14.1	
176.280	39.4	QP	16.0	-23.4	32.0	179	100	Vert.	43.5	11.5	
311.880	43.9	QP	14.9	-22.0	36.8	103	100	Hori.	46.0	9.2	
311.880	32.4	QP	14.9	-22.0	25.3	189	100	Vert.	46.0	20.7	

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

**UL Japan, Inc.
Ise EMC Lab.**

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

Spurious emission
(Above 30MHz)

DATA OF RADIATED EMISSION TEST

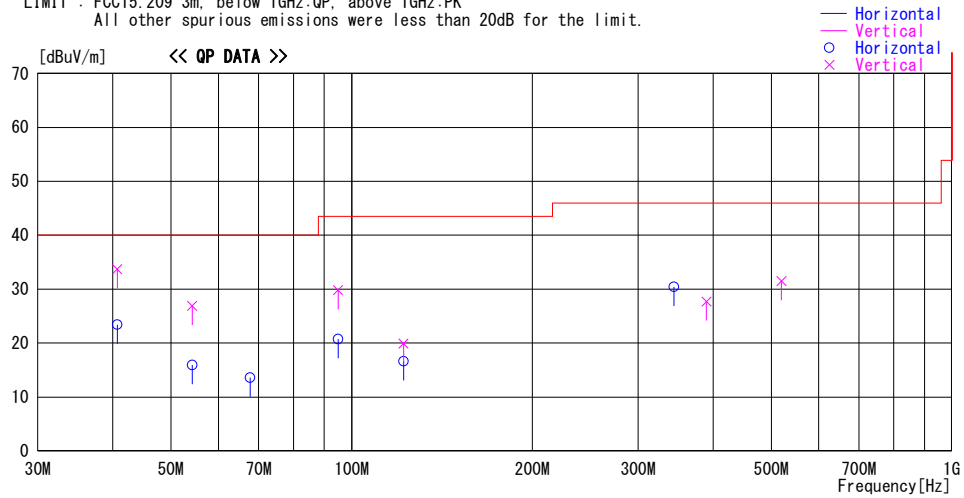
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2015/11/23

Report No. : 11017362H

Temp./Humi. : 23deg.C / 48% RH
 Engineer : Tsubasa Takayama

Mode / Remarks : Tx 13.56MHz, Modulation, Type B, Axis(Hor:X, Ver:Z), without cradle with 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 [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
40.680	34.7	QP	13.7	-25.0	23.4	346	332	Hori.	40.0	16.6	
40.680	45.0	QP	13.7	-25.0	33.7	189	100	Vert.	40.0	6.3	
54.240	31.8	QP	8.8	-24.7	15.9	124	289	Hori.	40.0	24.1	
54.240	42.8	QP	8.8	-24.7	26.9	305	100	Vert.	40.0	13.1	
67.800	32.1	QP	6.0	-24.5	13.6	359	198	Hori.	40.0	26.4	
94.920	36.0	QP	8.9	-24.2	20.7	359	188	Hori.	43.5	22.8	
94.920	45.1	QP	8.9	-24.2	29.8	0	100	Vert.	43.5	13.7	
122.040	27.9	QP	12.6	-23.9	16.6	268	128	Hori.	43.5	26.9	
122.040	31.2	QP	12.6	-23.9	19.9	91	100	Vert.	43.5	23.6	
344.333	36.2	QP	15.9	-21.7	30.4	269	100	Hori.	46.0	15.6	
389.833	32.0	QP	17.1	-21.4	27.7	354	100	Vert.	46.0	18.3	
520.000	34.0	QP	18.3	-20.8	31.5	354	100	Vert.	46.0	14.5	

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)

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**Spurious emission
(Above 30MHz)**

DATA OF RADIATED EMISSION TEST

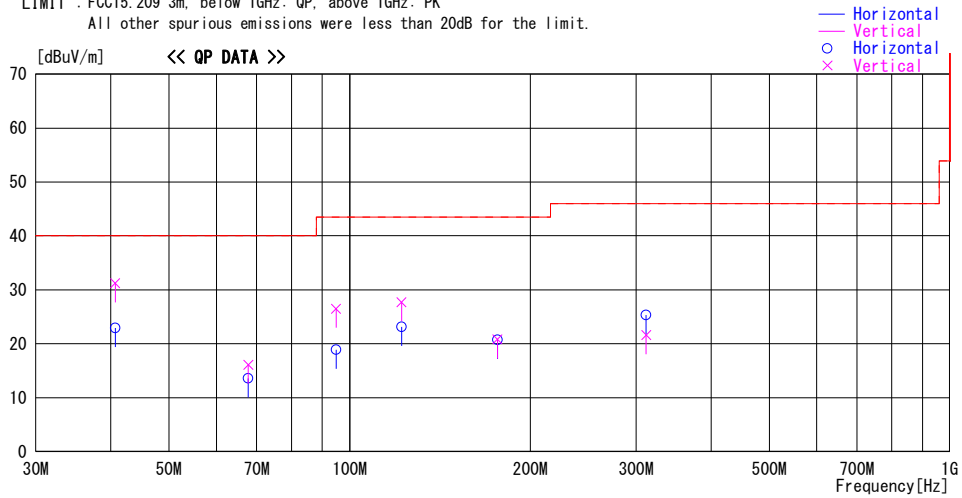
UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
Date : 2015/12/02

Report No. : 11017362H
 Temp./Humi. : 22deg. C. / 34% RH
 Engineer : Tsubasa Takayama

Mode / Remarks : Tx FeliCa (Hor:X, Ver:Z) without cradle with 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	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.680	34.2	QP	13.7	-25.0	22.9	3	321	Hori.	40.0	17.1	
40.680	42.5	QP	13.7	-25.0	31.2	195	100	Vert.	40.0	8.8	
67.800	32.1	QP	6.0	-24.5	13.6	34	287	Hori.	40.0	26.4	
67.800	34.6	QP	6.0	-24.5	16.1	192	100	Vert.	40.0	23.9	
94.920	34.2	QP	8.9	-24.2	18.9	27	182	Hori.	43.5	24.6	
94.920	41.8	QP	8.9	-24.2	26.5	184	100	Vert.	43.5	17.0	
122.040	34.4	QP	12.6	-23.9	23.1	29	175	Hori.	43.5	20.4	
122.040	39.0	QP	12.6	-23.9	27.7	173	100	Vert.	43.5	15.8	
176.280	28.1	QP	16.0	-23.4	20.7	359	100	Hori.	43.5	22.8	
176.280	28.2	QP	16.0	-23.4	20.8	142	100	Vert.	43.5	22.7	
311.880	32.4	QP	14.9	-22.0	25.3	109	100	Hori.	46.0	20.7	
311.880	28.7	QP	14.9	-22.0	21.6	126	100	Vert.	46.0	24.4	

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

Spurious emission
(Above 30MHz)

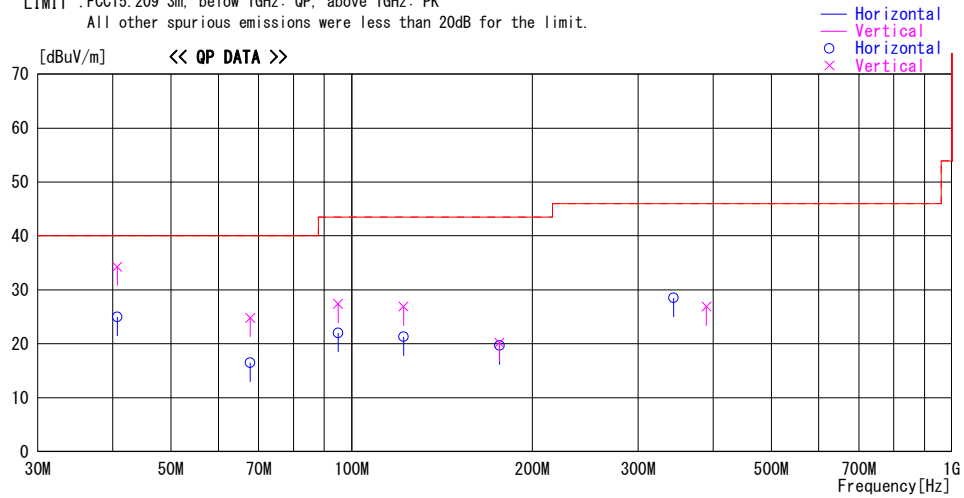
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Ise EMC Lab. No.3 Semi Anechoic Chamber
 Date : 2015/12/02

Report No. : 11017362H
 Temp./Humi. : 22deg. C. / 34% RH
 Engineer : Tsubasa Takayama

Mode / Remarks : Tx ISO (Hor:X, Ver:Z) without cradle with 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	Angle	Height	Polar.	Limit	Margin	Comment
			Factor	Gain							
			[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]	
40.680	36.3	QP	13.7	-25.0	25.0	41	321	Hori.	40.0	15.0	
40.680	45.6	QP	13.7	-25.0	34.3	192	100	Vert.	40.0	5.7	
67.800	35.0	QP	6.0	-24.5	16.5	39	287	Hori.	40.0	23.5	
67.800	43.3	QP	6.0	-24.5	24.8	175	100	Vert.	40.0	15.2	
94.920	37.3	QP	8.9	-24.2	22.0	2	182	Hori.	43.5	21.5	
94.920	42.7	QP	8.9	-24.2	27.4	167	100	Vert.	43.5	16.1	
122.040	32.6	QP	12.6	-23.9	21.3	14	175	Hori.	43.5	22.2	
122.040	38.2	QP	12.6	-23.9	26.9	159	100	Vert.	43.5	16.6	
176.280	27.1	QP	16.0	-23.4	19.7	29	100	Hori.	43.5	23.8	
176.280	27.6	QP	16.0	-23.4	20.2	151	100	Vert.	43.5	23.3	
344.020	34.3	QP	15.9	-21.7	28.5	112	100	Hori.	46.0	17.5	
390.042	31.2	QP	17.1	-21.4	26.9	112	100	Vert.	46.0	19.1	

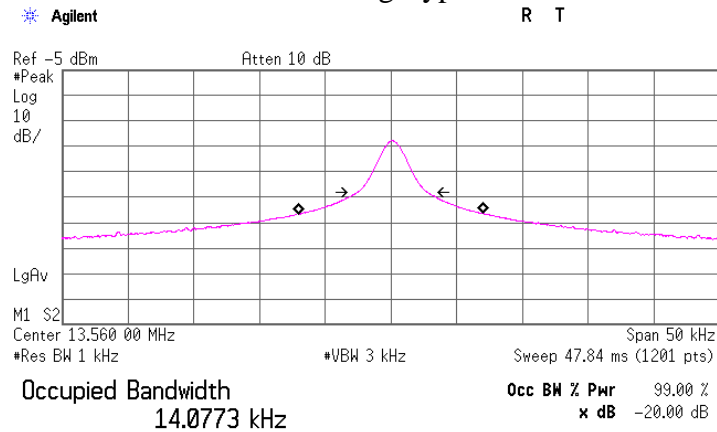
CHART: WITH FACTOR ANT TYPE: -30MHz: LOOP, 30-300MHz: BICONICAL, 300MHz-1000MHz: LOGPERIODIC, 1000MHz-: HORN
 CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE + FILTER - GAIN (AMP))

20dB Bandwidth and 99% Occupied Bandwidth Type A

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11017362H
Date	11/20/2015
Temperature/ Humidity	24 deg. C / 45 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx Mod on (Type A)

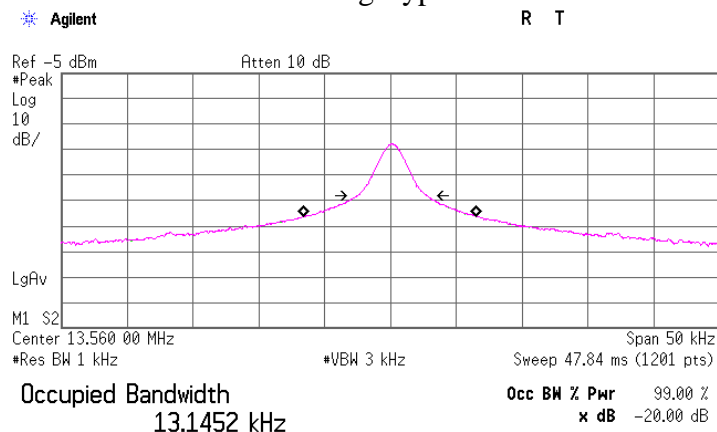
FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	5.25	14.08
	With Tag	5.23	13.15

Without Tag Type A



Transmit Freq Error -10.773 Hz
 x dB Bandwidth 5.246 kHz

With Tag Type A



Transmit Freq Error -15.141 Hz
 x dB Bandwidth 5.234 kHz

UL Japan, Inc.

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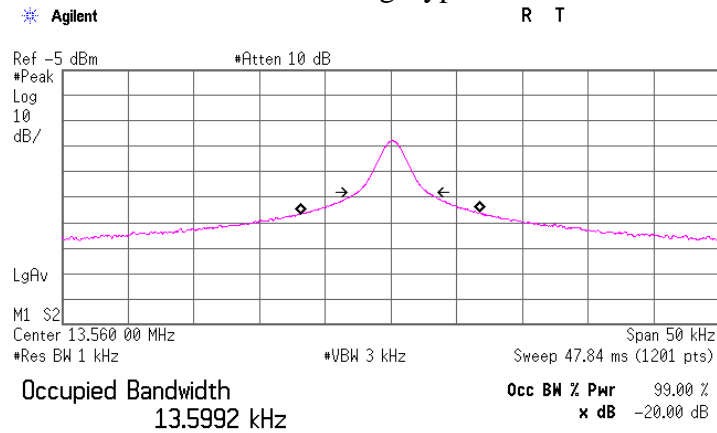
Facsimile : +81 596 24 8124

20dB Bandwidth and 99% Occupied Bandwidth TypeB

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11017362H
Date	11/20/2015
Temperature/ Humidity	24 deg. C / 45 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx Mod on (Type B)

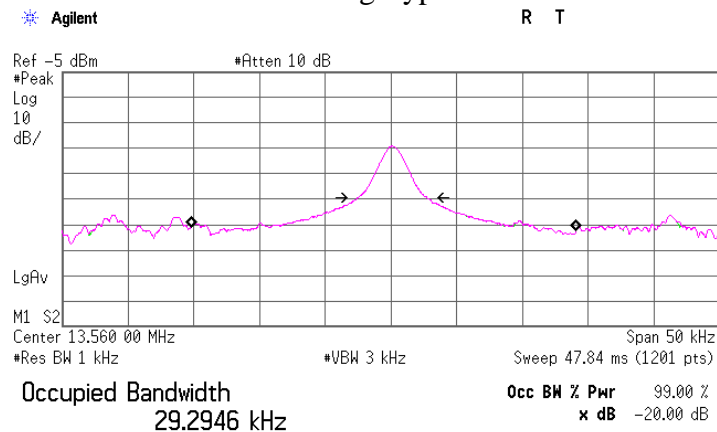
FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	5.23	13.60
	With Tag	5.19	29.29

Without Tag Type B



Transmit Freq Error -35.193 Hz
x dB Bandwidth 5.231 kHz

With Tag Type B



Transmit Freq Error -569.472 Hz
x dB Bandwidth 5.191 kHz

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Telephone : +81 596 24 8999

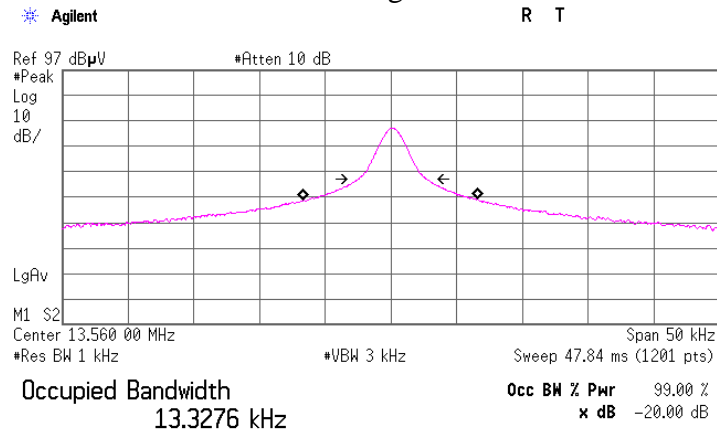
Facsimile : +81 596 24 8124

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

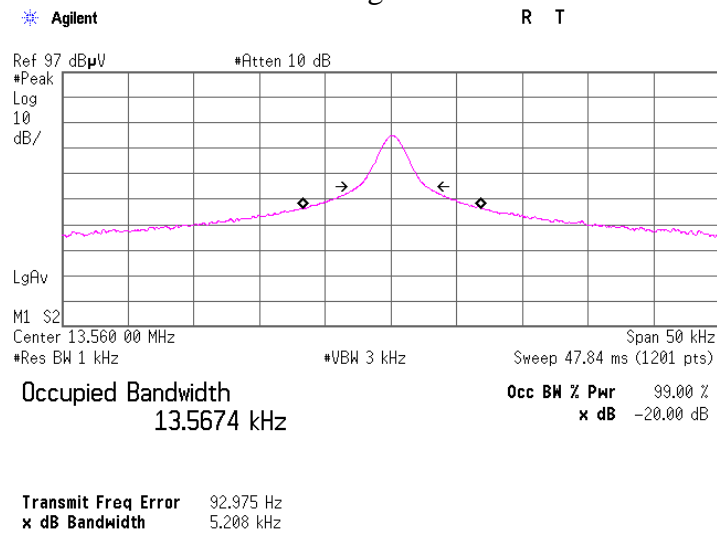
Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11017362H
Date	11/20/2015
Temperature/ Humidity	24 deg. C / 45 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx Mod on (FeliCa)

FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	5.24	13.33
	With Tag	5.21	13.57

Without Tag Felica



With Tag Felica

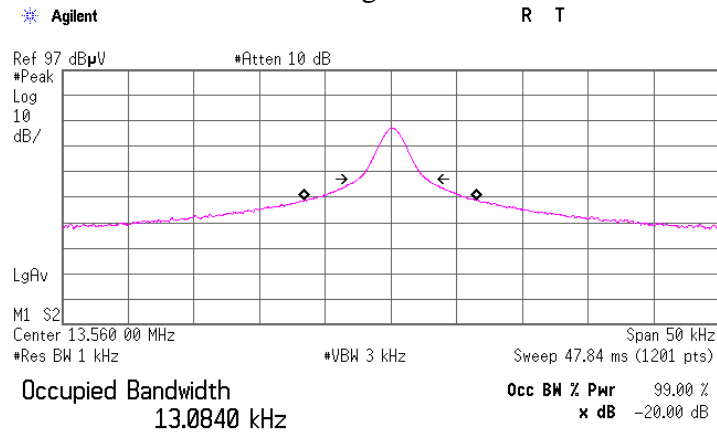


20dB Bandwidth and 99% Occupied Bandwidth ISO15693

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11017362H
Date	11/20/2015
Temperature/ Humidity	24 deg. C / 45 % RH
Engineer	Hiroyuki Furutaka
Mode	Tx Mod on (ISO15693)

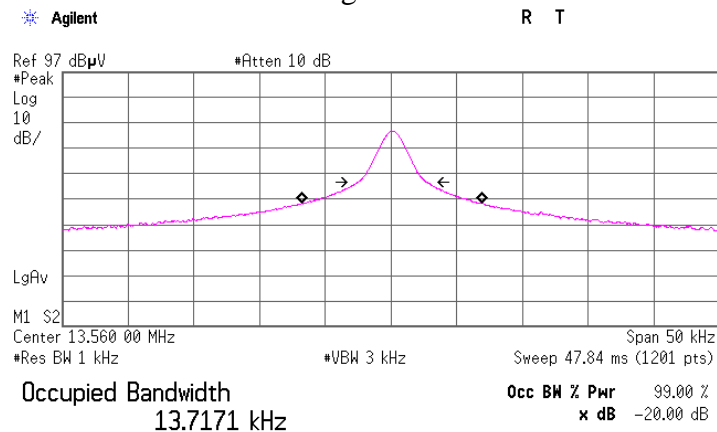
FREQ [MHz]	Mode	20dB Bandwidth [kHz]	99% Occupied Bandwidth [kHz]
13.56	Without Tag	5.19	13.08
	With Tag	5.19	13.72

Without Tag ISO15693



Transmit Freq Error -37.911 Hz
x dB Bandwidth 5.191 kHz

With Tag ISO15693



Transmit Freq Error 62.428 Hz
x dB Bandwidth 5.185 kHz

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Frequency Tolerance

Test place : Ise EMC Lab. No.6 measurement room
Report No. : 11017362H
Date : 11/26/2015
Temperature/ Humidity : 25deg. C / 34 % RH
Engineer : Hironobu Ohnishi
Mode : Tx Mod off

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
50	12	Power on	13.560067	0.000067	0.00049	4.9	0.01
		+ 2 min.	13.560061	0.000061	0.00045	4.5	0.01
		+ 5 min.	13.560059	0.000059	0.00044	4.4	0.01
		+ 10 min.	13.560058	0.000058	0.00043	4.3	0.01
40	12	Power on	13.560093	0.000093	0.00069	6.9	0.01
		+ 2 min.	13.560083	0.000083	0.00061	6.1	0.01
		+ 5 min.	13.560080	0.000080	0.00059	5.9	0.01
		+ 10 min.	13.560078	0.000078	0.00058	5.8	0.01
30	12	Power on	13.560132	0.000132	0.00097	9.7	0.01
		+ 2 min.	13.560118	0.000118	0.00087	8.7	0.01
		+ 5 min.	13.560113	0.000113	0.00083	8.3	0.01
		+ 10 min.	13.560111	0.000111	0.00082	8.2	0.01
20	12	Power on	13.560166	0.000166	0.00122	12.2	0.01
		+ 2 min.	13.560155	0.000155	0.00114	11.4	0.01
		+ 5 min.	13.560151	0.000151	0.00111	11.1	0.01
		+ 10 min.	13.560147	0.000147	0.00108	10.8	0.01
20	10.2 (12 V -15 %)	Power on	13.560164	0.000164	0.00121	12.1	0.01
		+ 2 min.	13.560151	0.000151	0.00111	11.1	0.01
		+ 5 min.	13.560150	0.000150	0.00111	11.1	0.01
		+ 10 min.	13.560147	0.000147	0.00108	10.8	0.01
20	13.8 (12 V +15 %)	Power on	13.560163	0.000163	0.00120	12.0	0.01
		+ 2 min.	13.560150	0.000150	0.00111	11.1	0.01
		+ 5 min.	13.560149	0.000149	0.00110	11.0	0.01
		+ 10 min.	13.560148	0.000148	0.00109	10.9	0.01
10	12	Power on	13.560197	0.000197	0.00145	14.5	0.01
		+ 2 min.	13.560188	0.000188	0.00139	13.9	0.01
		+ 5 min.	13.560184	0.000184	0.00136	13.6	0.01
		+ 10 min.	13.560183	0.000183	0.00135	13.5	0.01
0	12	Power on	13.560213	0.000213	0.00157	15.7	0.01
		+ 2 min.	13.560210	0.000210	0.00155	15.5	0.01
		+ 5 min.	13.560207	0.000207	0.00153	15.3	0.01
		+ 10 min.	13.560206	0.000206	0.00152	15.2	0.01
-10	12	Power on	13.560206	0.000206	0.00152	15.2	0.01
		+ 2 min.	13.560212	0.000212	0.00156	15.6	0.01
		+ 5 min.	13.560214	0.000214	0.00158	15.8	0.01
		+ 10 min.	13.560213	0.000213	0.00157	15.7	0.01
-20	12	Power on	13.560175	0.000175	0.00129	12.9	0.01
		+ 2 min.	13.560191	0.000191	0.00141	14.1	0.01
		+ 5 min.	13.560196	0.000196	0.00145	14.5	0.01
		+ 10 min.	13.560197	0.000197	0.00145	14.5	0.01
-30	12	Power on	13.560106	0.000106	0.00078	7.8	0.01
		+ 2 min.	13.560138	0.000138	0.00102	10.2	0.01
		+ 5 min.	13.560148	0.000148	0.00109	10.9	0.01
		+ 10 min.	13.560150	0.000150	0.00111	11.1	0.01

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

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

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	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2015/01/13 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2015/04/03 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2015/10/24 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	RE	2015/07/02 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2015/06/24 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2015/01/16 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2015/02/26 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2015/09/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2015/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2015/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2015/04/08 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2015/03/10 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2015/01/16 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	FT	2015/02/05 * 12
MCH-04	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	14015723	FT	2015/08/02 * 12
MFC-01	Microwave Counter	Advantest	R5373	120100309	FT	2015/08/14 * 12
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	CE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	CE	2015/01/13 * 12
MJM-25	Measure	KOMELON	KMC-36	-	CE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	CE	2015/06/08 * 12
MLS-26	LISN(AMN)	Schwarzbeck	NSLK8127	8127-732	CE	2015/07/17 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	CE	2015/09/29 * 12
MAT-64	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	CE	2015/08/19 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	CE	2015/07/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	CE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	CE	2015/11/06 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2015/07/10 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2015/02/06 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2015/01/29 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	CE	2015/08/19 * 12

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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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